FITOK

Full Technical Catalog for Ultra High Purity Products

FITOK Full Technical Catalog

For Ultra High Purity Products

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Weld Fittings

Face Seal Fittings

Diaphragm Valves

Bellows-sealed Valves

Check Valves

Regulators

FITOK

Fittings

Valves & Regulators

Weld Fittings

M Series

L Series

A Series

T Series

Weld Fittings

Features

◎ Radius junction design with elbows to provide smooth flow path
◎ Precision machined diameter to match tube diameter
◎ Square, burr-free tube weld ends to enhance alignment
◎ Manual or automatic welding equipment both applicable
◎ Tube wall uniformity to promote weld repeatability
◎ Standard surface roughness finished to an average of Ra 10 μin. (0.25 μm) or electropolished to Ra 5 μin. (0.13 μm) optional
◎ Each fitting marked with size, material and heat number

Technical Data

◎ Materials:

Material	Bar Stock ①	Forging ②	Designator
316 SS	ASTM A479/A276	ASTM A182/A314	SS
316L SS			6L
316L VAR SS	ASTM A479/A276 SEMI F20	——	6LV
316L VIM-VAR SS			6LW

① *Only for straight configurations and all M Series weld fittings.*
② *Includes all elbows, crosses and tees, excluding M Series weld fittings.*

◎ Working Pressure:
a. Working pressures shown in the Catalog are calculated according to ASME B31.3 and B31.1 at ambient temperature.
b. To get the allowable working pressure at elevated temperature, use the allowable working pressure at ambient temperature to multiply the elevated temperature factors. Please refer to Table 22 - Elevated Temperature Factors in the FITOK Catalog ***Tubing*** for the elevated temperature factors.

◎ Working Temperature:

Material	Minimum Temperature	Maximum Temperature
316 SS	-325°F (-198°C)	1000°F (538°C)
316L SS	-325°F (-198°C)	850°F (454°C)
316L VAR SS		
316L VIM-VAR SS		

Ordering Information

◎ Add the material designator as a prefix, cleaning and packaging code as a suffix to the basic ordering number to get the complete ordering number.
◎ Cleaning and Packaging
a. FC-01 Standard Cleaning and Packaging is applied for general industrial procedures. No suffix is needed.
b. FC-02 Special Cleaning and Packaging, to ensure compliance with product cleanliness requirement as stated in ASTM G93 Level C. Add "-F2" as a suffix when needed.
c. FC-03 Ultra-High Purity Process Specification is applied to products with wetted surface roughness finished to an average of Ra 5 μin. (0.13 μm). Add "-F3" as suffix when needed.
Example: For 1/2" 316L VAR SS Union Tee with FC-03 Ultra-High Purity Process Specification, the ordering number is 6LV-WT1-TB8-F3.

Cautions

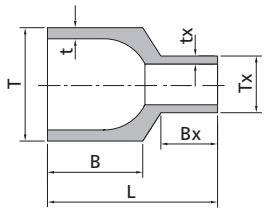
◎ Dimensions are for reference only and are subject to change.
◎ Welding of the same material is more advisable considering the same coefficient of expansion, lower possibility of poor weld, out-of-roundness or dimensional changes.
◎ Tungsten Inert Gas Welding (TIG) is recommended.

M Series Micro Weld Fittings

Features

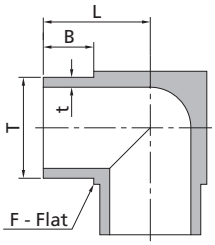
◎ Compact design
◎ Sizes range from 1/8" to 1/2 "and 6 mm to 12 mm
◎ Applicable to miniaturized tubing system

Reducing Unions



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Tx-Tube O.D. (in.)	tx-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
					L	B	Bx	
1/4	0.035	1/8	0.028	-WU1-TB4-TB2	0.75 (19.1)	0.42 (10.7)	0.25 (6.4)	5100 (351)
3/8	0.035	1/4	0.035	-WU1-TB6-TB4	0.75 (19.1)	0.42 (10.7)	0.25 (6.4)	3300 (227)
1/2	0.049	1/4	0.035	-WU1-TB8-TB4	0.75 (19.1)	0.42 (10.7)	0.25 (6.4)	3700 (254)
1/2	0.049	3/8	0.035	-WU1-TB8-TB6	0.75 (19.1)	0.42 (10.7)	0.25 (6.4)	3300 (227)

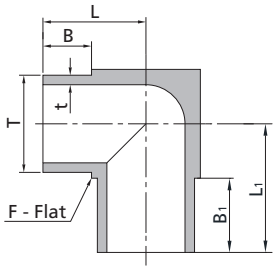
90° Union Elbows



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	F	
1/8	0.028	-WL1-TB2	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	8500 (585)
1/4	0.035	-WL1-TB4	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	5100 (351)
3/8	0.035	-WL1-TB6	0.47 (11.9)	0.25 (6.4)	7/16 (11.1)	3300 (227)
1/2	0.049	-WL1-TB8	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3700 (254)

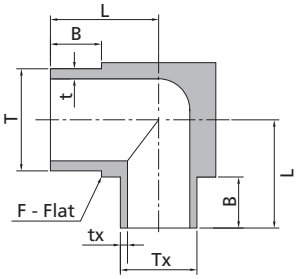
T-Tube O.D. (mm)	t-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
			L	B	F	
6	1.0	-WL1-MTB6	10.4 (0.41)	6.4 (0.25)	7.9 (5/16)	420 (6095)
8	1.0	-WL1-MTB8	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	310 (4499)
10	1.0	-WL1-MTB10	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	240 (3483)
12	1.0	-WL1-MTB12	13.5 (0.53)	6.4 (0.25)	14.3 (9/16)	200 (2902)

Extended Leg 90° Union Elbows



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			B	B1	F	L	L1	
1/4	0.035	-WL1-TB4-1	0.25 (6.4)	0.45 (11.4)	5/16 (7.9)	0.41 (10.4)	0.61 (15.5)	5100 (351)
1/4	0.035	-WL1-TB4-2	0.25 (6.4)	0.50 (12.7)	5/16 (7.9)	0.41 (10.4)	0.66 (16.8)	5100 (351)
1/4	0.035	-WL1-TB4-3	0.45 (11.4)	0.45 (11.4)	5/16 (7.9)	0.61 (15.5)	0.61 (15.5)	5100 (351)
1/4	0.035	-WL1-TB4-4	0.50 (12.7)	0.50 (12.7)	5/16 (7.9)	0.66 (16.8)	0.66 (16.8)	5100 (351)

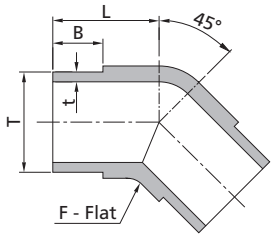
Reducing 90° Union Elbows



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Tx-Tube O.D. (in.)	tx-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
					L	B	F	
3/8	0.035	1/4	0.035	-WL1-TB6-TB4	0.47 (11.9)	0.25 (6.4)	7/16 (11.1)	3300 (227)
1/2	0.049	1/4	0.035	-WL1-TB8-TB4	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3700 (254)
1/2	0.049	3/8	0.035	-WL1-TB8-TB6	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3300 (227)

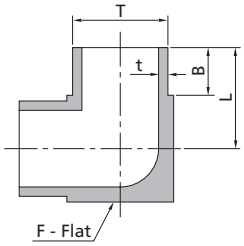
T-Tube O.D. (mm)	t-Wall Thickness (mm)	Tx-Tube O.D. (mm)	tx-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
					L	B	F	
8	1.0	6	1.0	-WL1-MTB8-MTB6	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	310 (4499)
10	1.0	6	1.0	-WL1-MTB10-MTB6	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	240 (3483)
12	1.0	6	1.0	-WL1-MTB12-MTB6	13.5 (0.53)	6.4 (0.25)	14.3 (9/16)	200 (2902)
12	1.0	8	1.0	-WL1-MTB12-MTB8	13.5 (0.53)	6.4 (0.25)	14.3 (9/16)	200 (2902)

45° Union Elbows

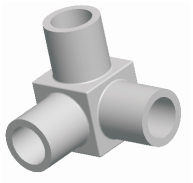


T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	F	
1/4	0.035	-WV1-TB4	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	5100 (351)
3/8	0.035	-WV1-TB6	0.47 (11.9)	0.25 (6.4)	7/16 (11.1)	3300 (227)
1/2	0.049	-WV1-TB8	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3700 (254)

Tribows

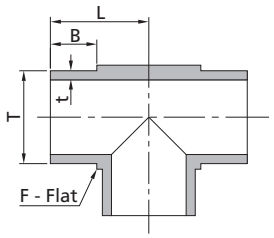


T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	F	
1/4	0.035	-WB1-TB4	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	5100 (351)
3/8	0.035	-WB1-TB6	0.47 (11.9)	0.25 (6.4)	7/16 (11.1)	3300 (227)
1/2	0.049	-WB1-TB8	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3700 (254)



T-Tube O.D. (mm)	t-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
			L	B	F	
6	1.0	-WB1-MTB6	10.4 (0.41)	6.4 (0.25)	7.9 (5/16)	420 (6095)

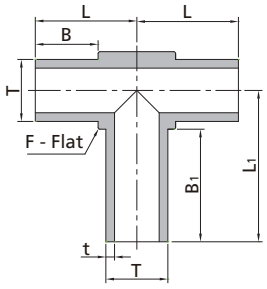
Union Tees



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working pressure psig (bar)
			L	B	F	
1/8	0.028	-WT1-TB2	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	8500 (585)
1/4	0.035	-WT1-TB4	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	5100 (351)
3/8	0.035	-WT1-TB6	0.47 (11.9)	0.25 (6.4)	7/16 (11.1)	3300 (227)
1/2	0.049	-WT1-TB8	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3700 (254)

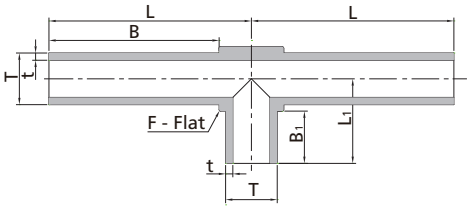
T-Tube O.D. (mm)	t-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working pressure bar (psig)
			L	B	F	
6	1.0	-WT1-MTB6	10.4 (0.41)	6.4 (0.25)	7.9 (5/16)	420 (6095)
8	1.0	-WT1-MTB8	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	310 (4499)
10	1.0	-WT1-MTB10	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	240 (3483)
12	1.0	-WT1-MTB12	13.5 (0.53)	6.4 (0.25)	14.3 (9/16)	200 (2902)

Extended Branch Leg Union Tees



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	L_1	B	B_1	F	
1/4	0.035	-WT1-TB4-45	0.41 (10.4)	0.61 (15.5)	0.25 (6.4)	0.45 (11.4)	5/16 (7.9)	5100 (351)

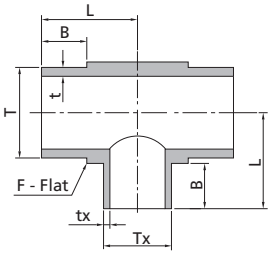
Extended Run Leg Union Tees



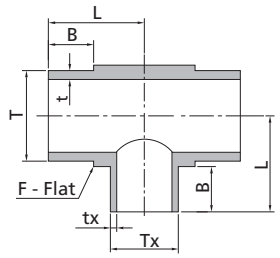
There may be a minor step between run ends at drill intersection.

T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	L_1	B	B_1	F	
1/4	0.035	-WT1-TB4-98	0.98 (24.9)	0.41 (10.4)	0.83 (21.1)	0.25 (6.4)	5/16 (7.9)	5100 (351)

Reducing Tees

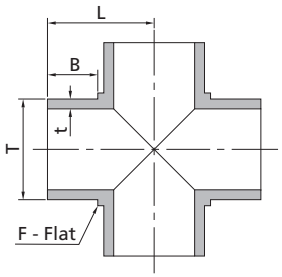


T-Tube O.D. (in.)	t-Wall Thickness (in.)	Tx-Tube O.D. (in.)	tx-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
					L	B	F	
3/8	0.035	1/4	0.035	-WT1-TB6-TB6-TB4	0.47 (11.9)	0.25 (6.4)	7/16 (11.1)	3300 (227)
1/2	0.049	1/4	0.035	-WT1-TB8-TB8-TB4	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3700 (254)
1/2	0.049	3/8	0.035	-WT1-TB8-TB8-TB6	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3300 (227)



T-Tube O.D. (mm)	t-Wall Thickness (mm)	Tx-Tube O.D. (mm)	tx-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
					L	B	F	
10	1.0	6	1.0	-WT1-MTB10-MTB10-MTB6	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	240 (3483)
12	1.0	6	1.0	-WT1-MTB12-MTB12-MTB6	0.53 (13.5)	6.4 (0.25)	14.3 (9/16)	200 (2902)
12	1.0	8	1.0	-WT1-MTB12-MTB12-MTB8	0.53 (13.5)	6.4 (0.25)	14.3 (9/16)	200 (2902)

Union Crosses



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	F	
1/8	0.028	-WC1-TB2	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	8500 (585)
1/4	0.035	-WC1-TB4	0.41 (10.4)	0.25 (6.4)	5/16 (7.9)	5100 (351)
3/8	0.035	-WC1-TB6	0.47 (11.9)	0.25 (6.4)	7/16 (11.1)	3300 (227)
1/2	0.049	-WC1-TB8	0.53 (13.5)	0.25 (6.4)	9/16 (14.3)	3700 (254)

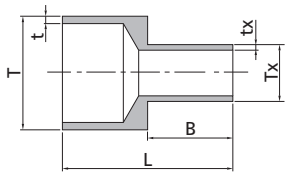
T-Tube O.D. (mm)	t-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
			L	B	F	
6	1.0	-WC1-MTB6	10.4 (0.41)	6.4 (0.25)	7.9 (5/16)	420 (6095)
8	1.0	-WC1-MTB8	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	310 (4499)
10	1.0	-WC1-MTB10	11.9 (0.47)	6.4 (0.25)	11.1 (7/16)	240 (3483)
12	1.0	-WC1-MTB12	13.5 (0.53)	6.4 (0.25)	14.3 (9/16)	200 (2902)

L Series Tube Butt Weld Fittings

Features

- ◎ Extended tube design
- ◎ Machined from forging blanks except for straight configurations
- ◎ Sizes range from 1/4" to 1" and 6 mm to 18 mm

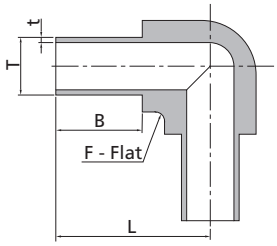
Reducing Unions



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Tx-Tube O.D. (in.)	tx-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)		Working Pressure psig (bar)
					L	B	
3/8	0.035	1/4	0.035	-WU2-TB6-TB4	1.50 (38.1)	0.75 (19.1)	3300 (227)
1/2	0.049	1/4	0.035	-WU2-TB8-TB4	1.50 (38.1)	0.75 (19.1)	3700 (254)
1/2	0.049	3/8	0.035	-WU2-TB8-TB6	1.50 (38.1)	0.75 (19.1)	3300 (227)
3/4	0.049	1/2	0.049	-WU2-TB12-TB8	1.50 (38.1)	0.75 (19.1)	2400 (165)
1	0.065	1/2	0.049	-WU2-TB16-TB8	1.50 (38.1)	0.75 (19.1)	2400 (165)
1	0.065	3/4	0.049	-WU2-TB16-TB12	1.50 (38.1)	0.75 (19.1)	2400 (165)

T-Tube O.D. (mm)	t-Wall Thickness (mm)	Tx-Tube O.D. (mm)	tx-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)		Working Pressure bar (psig)
					L	B	
10	1.0	6	1.0	-WU2-MTB10-MTB6	38.1 (1.50)	19.1 (0.75)	240 (3483)
10	1.0	8	1.0	-WU2-MTB10-MTB8	38.1 (1.50)	19.1 (0.75)	240 (3483)
12	1.0	6	1.0	-WU2-MTB12-MTB6	38.1 (1.50)	19.1 (0.75)	200 (2902)
12	1.0	8	1.0	-WU2-MTB12-MTB8	38.1 (1.50)	19.1 (0.75)	200 (2902)
12	1.0	10	1.0	-WU2-MTB12-MTB10	38.1 (1.50)	19.1 (0.75)	200 (2902)
18	1.5	6	1.5	-WU2-MTB18-MTB6	38.1 (1.50)	19.1 (0.75)	200 (2902)
18	1.5	12	1.5	-WU2-MTB18-MTB12	38.1 (1.50)	19.1 (0.75)	200 (2902)

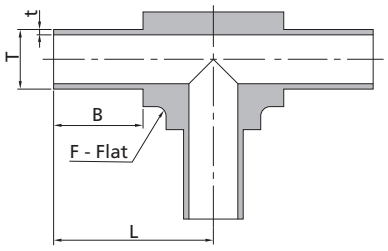
Union Elbows



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	F	
1/4	0.035	-WL2-TB4	1.23 (31.2)	0.75 (19.1)	7/16 (11.1)	5100 (351)
3/8	0.035	-WL2-TB6	1.20 (30.5)	0.75 (19.1)	7/16 (11.1)	3300 (227)
1/2	0.049	-WL2-TB8	1.34 (34.0)	0.75 (19.1)	11/16 (17.5)	3700 (254)
3/4	0.049	-WL2-TB12	1.46 (37.1)	0.75 (19.1)	15/16 (23.8)	2400 (165)

T-Tube O.D. (mm)	t-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
			L	B	F	
6	1.0	-WL2-MTB6	31.2 (1.23)	19.1 (0.75)	11.1 (7/16)	420 (6095)
8	1.0	-WL2-MTB8	31.2 (1.23)	19.1 (0.75)	11.1 (7/16)	310 (4499)
10	1.0	-WL2-MTB10	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	240 (3483)
12	1.0	-WL2-MTB12	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	200 (2902)
18	1.5	-WL2-MTB18	37.6 (1.48)	19.1 (0.75)	23.8 (15/16)	200 (2902)

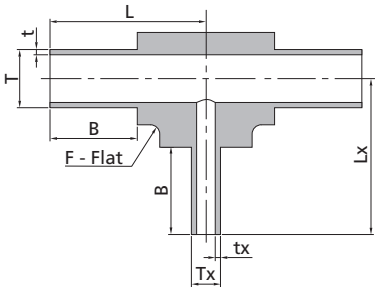
Union Tees



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	F	
1/4	0.035	-WT2-TB4	1.23 (31.2)	0.75 (19.1)	7/16 (11.1)	5100 (351)
3/8	0.035	-WT2-TB6	1.20 (30.5)	0.75 (19.1)	7/16 (11.1)	3300 (227)
1/2	0.049	-WT2-TB8	1.34 (34.0)	0.75 (19.1)	11/16 (17.5)	3700 (254)
3/4	0.049	-WT2-TB12	1.46 (37.1)	0.75 (19.1)	15/16 (23.8)	2400 (165)

T-Tube O.D. (mm)	t-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
			L	B	F	
6	1.0	-WT2-MTB6	31.2 (1.23)	19.1 (0.75)	11.1 (7/16)	420 (6095)
8	1.0	-WT2-MTB8	31.2 (1.23)	19.1 (0.75)	11.1 (7/16)	310 (4499)
10	1.0	-WT2-MTB10	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	240 (3483)
12	1.0	-WT2-MTB12	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	200 (2902)
18	1.5	-WT2-MTB18	37.6 (1.48)	19.1 (0.75)	23.8 (15/16)	200 (2902)

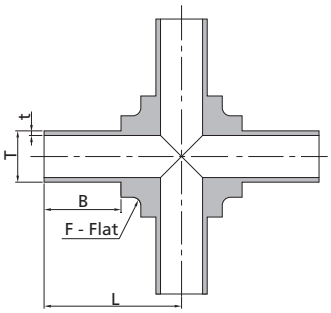
Reducing Tees



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Tx-Tube O.D. (in.)	tx-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure psig (bar)
					L	Lx	B	F	
3/8	0.035	1/4	0.035	-WT2-TB6-TB6-TB4	1.20 (30.5)	1.23 (31.2)	0.75 (19.1)	7/16 (11.1)	3300 (227)
1/2	0.049	1/4	0.035	-WT2-TB8-TB8-TB4	1.34 (34.0)	1.34 (34.0)	0.75 (19.1)	11/16 (17.5)	3700 (254)
1/2	0.049	3/8	0.035	-WT2-TB8-TB8-TB6	1.34 (34.0)	1.35 (34.3)	0.75 (19.1)	11/16 (17.5)	3700 (254)
3/4	0.049	1/4	0.035	-WT2-TB12-TB12-TB4	1.46 (37.1)	1.48 (37.6)	0.75 (19.1)	15/16 (23.8)	2400 (165)
3/4	0.049	3/8	0.035	-WT2-TB12-TB12-TB6	1.46 (37.1)	1.35 (34.3)	0.75 (19.1)	15/16 (23.8)	2400 (165)

T-Tube O.D. (mm)	t-Wall Thickness (mm)	Tx-Tube O.D. (mm)	tx-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)				Working Pressure bar (psig)
					L	Lx	B	F	
8	1.0	6	1.0	-WT2-MTB8-MTB8-MTB6	31.3 (1.23)	31.3 (1.23)	19.1 (0.75)	11.1 (7/16)	310 (4499)
10	1.0	6	1.0	-WT2-MTB10-MTB10-MTB6	34.0 (1.34)	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	240 (3483)
10	1.0	8	1.0	-WT2-MTB10-MTB10-MTB8	34.0 (1.34)	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	240 (3483)
12	1.0	6	1.0	-WT2-MTB12-MTB12-MTB6	34.0 (1.34)	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	200 (2902)
12	1.0	8	1.0	-WT2-MTB12-MTB12-MTB8	34.0 (1.34)	34.0 (1.34)	19.1 (0.75)	17.5 (11/16)	200 (2902)

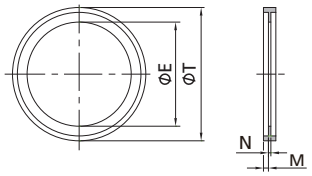
Union Crosses



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	F	
1/4	0.035	-WC2-TB4	1.23 (31.2)	0.75 (19.1)	7/16 (11.1)	5100 (351)
3/8	0.035	-WC2-TB6	1.20 (30.5)	0.75 (19.1)	7/16 (11.1)	3300 (227)
1/2	0.049	-WC2-TB8	1.34 (34.0)	0.75 (19.1)	11/16 (17.5)	3700 (254)

T-Tube O.D. (mm)	t-Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
			L	B	F	
6	1.0	-WC2-MTB6	31.2 (1.23)	19.1 (0.75)	11.1 (7/16)	420 (6095)
8	1.0	-WC2-MTB8	31.2 (1.23)	19.1 (0.75)	11.1 (7/16)	310 (4499)
10	1.0	-WC2-MTB10	34.0 (1.34)	19.1 (0.75)	15.9 (5/8)	240 (3483)
12	1.0	-WC2-MTB12	34.0 (1.34)	19.1 (0.75)	15.9 (5/8)	200 (2902)

Weld Rings



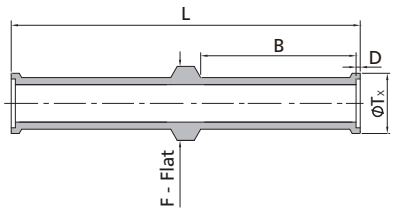
T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)			
		E	M	N	T
1/4	-WR-4	0.20 (5.1)	0.02 (0.51)	0.01 (0.25)	0.28 (7.1)
3/8	-WR-6	0.32 (8.1)	0.02 (0.51)	0.01 (0.25)	0.41 (10.4)
1/2	-WR-8	0.42 (10.7)	0.02 (0.51)	0.01 (0.25)	0.54 (13.7)

A Series Automatic Tube Butt Weld Fittings

Features

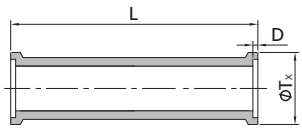
◎ Extended tube design with locating ring
◎ Machined from forging blanks except for straight configurations
◎ Sizes range from 1/4" to 1" and 6 mm to 18 mm

Locator Unions



Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	B	D	F	Tx	
1/4	0.035	-WU2-L-TB4A	1.69 (42.9)	0.75 (19.1)	0.02 (0.5)	0.36 (9.1)	0.29 (7.4)	5100 (351)
3/8	0.035	-WU2-L-TB6A	1.71 (43.4)	0.75 (19.1)	0.03 (0.8)	0.42 (10.7)	0.41 (10.4)	3300 (227)
1/2	0.049	-WU2-L-TB8A	1.73 (43.9)	0.75 (19.1)	0.04 (1.0)	0.60 (15.2)	0.55 (14.0)	3700 (254)

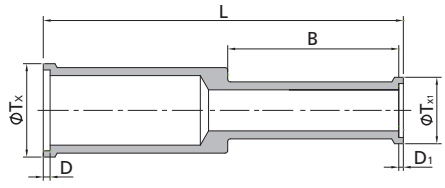
Unions



Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	D	Tx	
1/4	0.035	-WU2-TB4A	1.00 (25.4)	0.02 (0.5)	0.29 (7.4)	5100 (351)
3/8	0.035	-WU2-TB6A	1.00 (25.4)	0.03 (0.8)	0.41 (10.4)	3300 (227)
1/2	0.049	-WU2-TB8A	1.00 (25.4)	0.04 (1.0)	0.55 (14.0)	3700 (254)
3/4	0.049	-WU2-TB12A	1.00 (25.4)	0.04 (1.0)	0.80 (20.3)	2400 (165)
1	0.065	-WU2-TB16A	1.25 (31.8)	0.04 (1.0)	1.06 (26.9)	2400 (165)

Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure bar (psig)
			L	D	Tx	
6	1	-WU2-MTB6A	31.8 (1.25)	0.5 (0.02)	6.9 (0.27)	420 (6095)
8	1	-WU2-MTB8A	31.8 (1.25)	0.8 (0.03)	8.9 (0.35)	310 (4499)
10	1	-WU2-MTB10A	31.8 (1.25)	0.8 (0.03)	10.9 (0.43)	240 (3483)
12	1	-WU2-MTB12A	31.8 (1.25)	1.0 (0.04)	13.2 (0.52)	200 (2902)
18	1.5	-WU2-MTB18A	31.8 (1.25)	1.0 (0.04)	19.3 (0.76)	200 (2902)

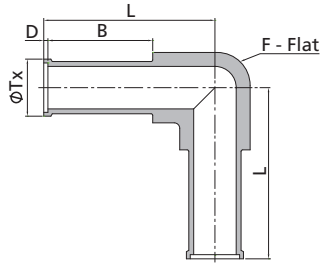
Reducing Unions



Tube O.D. (in.)	Wall Thickness (in.)	Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)						Working Pressure psig (bar)
					L	B	D	D_1	T_x	T_{x1}	
3/8	0.035	1/4	0.035	-WU2-TB6A-TB4A	1.58 (40.1)	0.75 (19.1)	0.03 (0.8)	0.02 (0.5)	0.41 (10.4)	0.29 (7.4)	3300 (227)
1/2	0.049	1/4	0.035	-WU2-TB8A-TB4A	1.58 (40.1)	0.75 (19.1)	0.04 (1.0)	0.02 (0.5)	0.55 (14.0)	0.29 (7.4)	3700 (254)
1/2	0.049	3/8	0.035	-WU2-TB8A-TB6A	1.58 (40.1)	0.75 (19.1)	0.04 (1.0)	0.03 (0.8)	0.55 (14.0)	0.41 (10.4)	3300 (227)
3/4	0.049	1/2	0.049	-WU2-TB12A-TB8A	1.62 (41.1)	0.75 (19.1)	0.04 (1.0)	0.04 (1.0)	0.80 (20.3)	0.55 (14.0)	2400 (165)

Tube O.D. (mm)	Wall Thickness (mm)	Tube O.D. (mm)	Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)						Working Pressure bar (psig)
					L	B	D	D_1	T_x	T_{x1}	
8	1	6	1	-WU2-MTB8A-MTB6A	39.9 (1.57)	19.1 (0.75)	0.8 (0.03)	0.5 (0.02)	8.90 (0.35)	6.8 (0.27)	310 (4499)
12	1	6	1	-WU2-MTB12A-MTB6A	40.1 (1.58)	19.1 (0.75)	1.0 (0.04)	0.5 (0.02)	13.2 (0.52)	6.8 (0.27)	200 (2902)
12	1	8	1	-WU2-MTB12A-MTB8A	40.4 (1.59)	19.1 (0.75)	1.0 (0.04)	0.8 (0.03)	13.2 (0.52)	8.9 (0.35)	200 (2902)

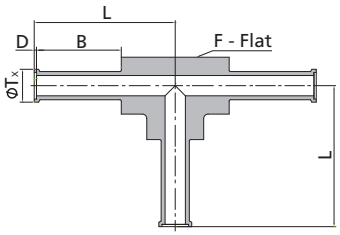
90° Union Elbows



Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	B	D	F	T_x	
1/4	0.035	-WL2-TB4A	1.25 (31.8)	0.75 (19.1)	0.02 (0.5)	7/16 (11.1)	0.29 (7.4)	5100 (351)
3/8	0.035	-WL2-TB6A	1.23 (31.2)	0.75 (19.1)	0.03 (0.8)	7/16 (11.1)	0.41 (10.4)	3300 (227)
1/2	0.049	-WL2-TB8A	1.38 (35.1)	0.75 (19.1)	0.04 (1.0)	11/16 (17.5)	0.55 (14.0)	3700 (254)
3/4	0.049	-WL2-TB12A	1.50 (38.1)	0.75 (19.1)	0.04 (1.0)	15/16 (23.8)	0.80 (20.3)	2400 (165)

Tube O.D. (mm)	Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)					Working Pressure bar (psig)
			L	B	D	F	T_x	
6	1	-WL2-MTB6A	31.8 (1.25)	19.1 (0.75)	0.5 (0.02)	11.1 (7/16)	6.90 (0.27)	351 (5100)
8	1	-WL2-MTB8A	32.0 (1.26)	19.1 (0.75)	0.8 (0.03)	11.1 (7/16)	8.90 (0.35)	227 (3300)
10	1	-WL2-MTB10A	34.8 (1.37)	19.1 (0.75)	0.8 (0.03)	17.5 (11/16)	10.9 (0.43)	254 (3700)
12	1	-WL2-MTB12A	35.1 (1.38)	19.1 (0.75)	1.0 (0.04)	17.5 (11/16)	13.2 (0.52)	199 (2888)
18	1.5	-WL2-MTB18A	38.6 (1.52)	19.1 (0.75)	1.0 (0.04)	23.8 (15/16)	19.3 (0.76)	206 (2989)

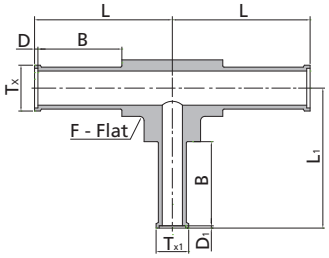
Union Tees



Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	B	D	F	T_x	
1/4	0.035	-WT2-TB4A	1.25 (31.8)	0.75 (19.1)	0.02 (0.5)	7/16 (11.1)	0.29 (7.4)	5100 (351)
3/8	0.035	-WT2-TB6A	1.23 (31.2)	0.75 (19.1)	0.03 (0.8)	7/16 (11.1)	0.41 (10.4)	3300 (227)
1/2	0.049	-WT2-TB8A	1.38 (35.1)	0.75 (19.1)	0.04 (1.0)	11/16 (17.5)	0.55 (14.0)	3500 (241)
3/4	0.049	-WT2-TB12A	1.50 (38.1)	0.75 (19.1)	0.04 (1.0)	15/16 (23.8)	0.80 (20.3)	2400 (165)

Tube O.D. (mm)	Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)					Working Pressure bar (psig)
			L	B	D	F	T_x	
6	1	-WT2-MTB6A	31.8 (1.25)	19.1 (0.75)	0.5 (0.02)	11.1 (7/16)	6.90 (0.27)	454 (6589)
8	1	-WT2-MTB8A	32.0 (1.26)	19.1 (0.75)	0.8 (0.03)	11.1 (7/16)	8.90 (0.35)	323 (4687)
10	1	-WT2-MTB10A	34.8 (1.37)	19.1 (0.75)	0.8 (0.03)	17.5 (11/16)	10.9 (0.43)	254 (3686)
12	1	-WT2-MTB12A	35.1 (1.38)	19.1 (0.75)	1.0 (0.04)	17.5 (11/16)	13.2 (0.52)	206 (2989)
18	1.5	-WT2-MTB18A	38.6 (1.52)	19.1 (0.75)	1.0 (0.04)	23.8 (15/16)	19.3 (0.76)	206 (2989)

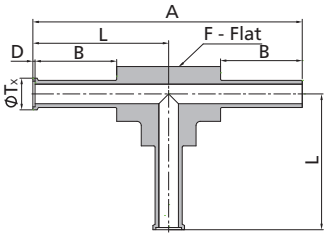
Reducing Tees



Tube O.D. (in.)	Wall Thickness (in.)	Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)								Working Pressure psig (bar)
					L	L1	B	D	D1	T_x	T_{x1}	F	
3/8	0.035	1/4	0.035	-WT2-TB6A-TB6A-TB4A	1.23 (31.2)	1.25 (31.8)	0.75 (19.1)	0.03 (0.8)	0.02 (0.5)	0.41 (10.4)	0.29 (7.4)	7/16 (11.1)	3300 (227)
1/2	0.049	1/4	0.035	-WT2-TB8A-TB8A-TB4A	1.38 (35.1)	1.38 (35.1)	0.75 (19.1)	0.04 (1.0)	0.02 (0.5)	0.55 (14.0)	0.29 (7.4)	11/16 (17.5)	3700 (254)
1/2	0.049	3/8	0.035	-WT2-TB8A-TB8A-TB6A	1.38 (35.1)	1.37 (34.8)	0.75 (19.1)	0.04 (1.0)	0.03 (0.8)	0.55 (14.0)	0.41 (10.4)	11/16 (17.5)	3300 (227)
3/4	0.049	3/8	0.035	-WT2-TB12A-TB12A-TB6A	1.50 (38.1)	1.50 (38.1)	0.75 (19.1)	0.04 (1.0)	0.03 (0.8)	0.80 (20.3)	0.41 (10.4)	15/16 (23.8)	2400 (165)
3/4	0.049	1/2	0.049	-WT2-TB12A-TB12A-TB8A	1.50 (38.1)	1.50 (38.1)	0.75 (19.1)	0.04 (1.0)	0.04 (1.0)	0.80 (20.3)	0.55 (14.0)	15/16 (23.8)	2400 (165)

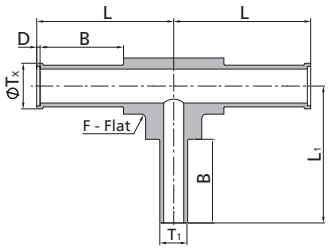
Tube O.D. (mm)	Wall Thickness (mm)	Tube O.D. (mm)	Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)								Working Pressure bar (psig)
					L	L1	B	D	D1	T_x	T_{x1}	F	
12	1	6	1	-WT2-MTB12A-MTB12A-MTB6A	35.1 (1.38)	34.5 (1.36)	19.1 (0.75)	0.5 (0.02)	0.5 (0.02)	13.2 (0.52)	6.9 (0.27)	17.5 (11/16)	200 (2902)

Manifold Tees



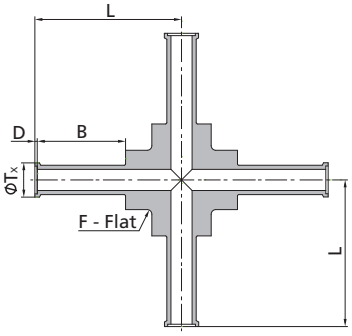
Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)						Working Pressure psig (bar)
			A	L	B	D	F	Tx	
1/4	0.035	-WT2-TB4A-TB4-TB4A	2.48 (63.0)	1.25 (31.8)	0.75 (19.1)	0.02 (0.5)	7/16 (11.1)	0.29 (7.4)	5100 (351)
3/8	0.035	-WT2-TB6A-TB6-TB6A	2.43 (61.7)	1.23 (31.2)	0.75 (19.1)	0.03 (0.8)	11/16 (17.5)	0.41 (10.4)	3300 (227)
1/2	0.049	-WT2-TB8A-TB8-TB8A	2.72 (69.1)	1.38 (35.1)	0.75 (19.1)	0.04 (1.0)	11/16 (17.5)	0.55 (14.0)	3700 (254)

Reducing Tees



Tube O.D. (in.)	Wall Thickness (in.)	Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)						Working Pressure psig (bar)
					L	L1	B	D	Tx	F	
3/8	0.035	1/4	0.035	-WT2-TB6A-TB6A-TB4	1.23 (31.2)	1.23 (31.2)	0.75 (19.1)	0.03 (0.8)	0.41 (10.4)	7/16 (11.1)	3300 (227)
1/2	0.049	1/4	0.035	-WT2-TB8A-TB8A-TB4	1.38 (35.1)	1.36 (34.5)	0.75 (19.1)	0.04 (1.0)	0.55 (14.0)	11/16 (17.5)	3700 (254)
1/2	0.049	3/8	0.035	-WT2-TB8A-TB8A-TB6	1.38 (35.1)	1.35 (34.3)	0.75 (19.1)	0.04 (1.0)	0.55 (14.0)	11/16 (17.5)	3300 (227)

Union Crosses



Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	B	D	F	Tx	
1/4	0.035	-WC2-TB4A	1.25 (31.8)	0.75 (19.1)	0.02 (0.5)	7/16 (11.1)	0.29 (7.4)	5100 (351)
3/8	0.035	-WC2-TB6A	1.23 (31.2)	0.75 (19.1)	0.03 (0.8)	7/16 (11.1)	0.41 (10.4)	3300 (227)
1/2	0.049	-WC2-TB8A	1.35 (34.3)	0.75 (19.1)	0.04 (1.0)	5/8 (17.5)	0.55 (14.0)	3700 (254)

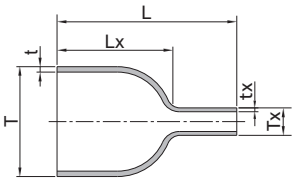
Tube O.D. (mm)	Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)					Working Pressure bar (psig)
			L	B	D	F	Tx	
6	1	-WC2-MTB6A	31.8 (1.25)	19.1 (0.75)	0.5 (0.02)	11.1 (7/16)	6.9 (0.27)	420 (6095)
8	1	-WC2-MTB8A	31.8 (1.25)	19.1 (0.75)	0.8 (0.03)	11.1 (7/16)	8.9 (0.35)	310 (4499)

T Series Tubular Fittings

Features

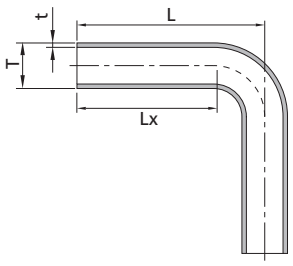
◎ 316L Stainless Steel
◎ Sizes range from 1/4" to 2"
◎ Available in a variety of configurations

Concentric Reducings



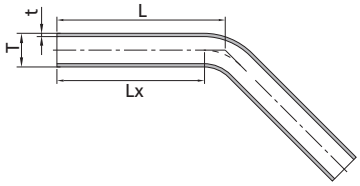
T-Tube O.D. (in.)	t-Wall Thickness (in.)	Tx-Tube O.D. (in.)	tx-Wall Thickness (in.)	Ordering Number	Dimensions, in. (mm)		Working Pressure psig (bar)
					L	Lx	
3/4	0.065	1/4	0.035	6L-WU3-TB12-TB4	2.13 (54.0)	0.75 (19.1)	3330 (230)
3/4	0.065	3/8	0.035	6L-WU3-TB12-TB6	2.13 (54.0)	0.75 (19.1)	3330 (230)
3/4	0.065	1/2	0.049	6L-WU3-TB12-TB8	2.13 (54.0)	0.75 (19.1)	3330 (230)
1	0.065	1/4	0.035	6L-WU3-TB16-TB4	2.36 (60.0)	1.00 (25.4)	2420 (167)
1	0.065	3/8	0.035	6L-WU3-TB16-TB6	2.36 (60.0)	1.00 (25.4)	2420 (167)
1	0.065	1/2	0.049	6L-WU3-TB16-TB8	2.36 (60.0)	1.00 (25.4)	2420 (167)
1	0.065	3/4	0.065	6L-WU3-TB16-TB12	2.64 (67.0)	1.00 (25.4)	2420 (167)
1 1/2	0.065	1/4	0.035	6L-WU3-TB24-TB4	2.87 (73.0)	1.50 (38.1)	1550 (107)
1 1/2	0.065	3/8	0.035	6L-WU3-TB24-TB6	2.87 (73.0)	1.50 (38.1)	1550 (107)
1 1/2	0.065	1/2	0.049	6L-WU3-TB24-TB8	2.87 (73.0)	1.50 (38.1)	1550 (107)
1 1/2	0.065	3/4	0.065	6L-WU3-TB24-TB12	3.15 (80.0)	1.50 (38.1)	1550 (107)
1 1/2	0.065	1	0.065	6L-WU3-TB24-TB16	3.15 (80.0)	1.50 (38.1)	1160 (80)
2	0.065	1/4	0.035	6L-WU3-TB32-TB4	2.87 (73.0)	1.50 (38.1)	1160 (80)
2	0.065	3/8	0.035	6L-WU3-TB32-TB6	2.87 (73.0)	1.50 (38.1)	1160 (80)
2	0.065	1/2	0.049	6L-WU3-TB32-TB8	2.87 (73.0)	1.50 (38.1)	1160 (80)
2	0.065	3/4	0.065	6L-WU3-TB32-TB12	3.15 (80.0)	1.50 (38.1)	1160 (80)
2	0.065	1	0.065	6L-WU3-TB32-TB16	3.15 (80.0)	1.50 (38.1)	1160 (80)
2	0.065	1 1/2	0.065	6L-WU3-TB32-TB24	3.54 (90.0)	1.50 (38.1)	1160 (80)

90° Elbows



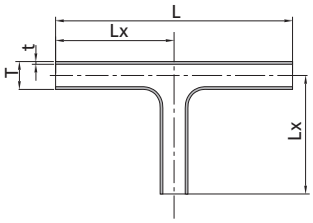
T-Tube O.D. (in.)	t-Wall Thickness (in.)	Ordering Number	Dimensions, in. (mm)		Working Pressure psig (bar)
			L	Lx	
1/4	0.035	6L-WL3-TB4	1.93 (49.0)	1.14 (29.0)	5150 (355)
3/8	0.035	6L-WL3-TB6	2.05 (52.0)	1.14 (29.0)	3330 (230)
1/2	0.049	6L-WL3-TB8	2.13 (54.0)	1.14 (29.0)	3530 (243)
3/4	0.065	6L-WL3-TB12	2.60 (66.0)	1.42 (36.0)	3330 (230)
1	0.065	6L-WL3-TB16	2.72 (69.0)	1.42 (36.0)	2420 (167)
1 1/2	0.065	6L-WL3-TB24	4.09 (104.0)	1.81 (46.0)	1550 (167)
2	0.065	6L-WL3-TB32	4.84 (123.0)	1.81 (46.0)	1160 (80)

45° Elbows



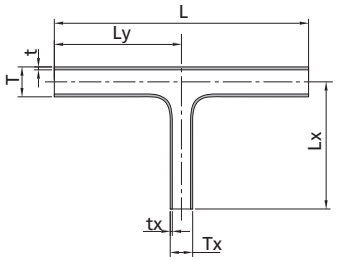
T-Tube O.D. (in.)	t-Wall Thickness (in.)	Ordering Number	Dimensions, in. (mm)		Working Pressure psig (bar)
			L	Lx	
1/4	0.035	6L-WV3-TB4	1.50 (38.0)	1.14 (29.0)	5150 (355)
3/8	0.035	6L-WV3-TB6	1.54 (39.0)	1.14 (29.0)	3330 (230)
1/2	0.049	6L-WV3-TB8	1.57 (40.0)	1.14 (29.0)	3530 (243)
3/4	0.065	6L-WV3-TB12	1.93 (49.0)	1.42 (36.0)	3330 (230)
1	0.065	6L-WV3-TB16	1.97 (50.0)	1.42 (36.0)	2420 (167)
1 1/2	0.065	6L-WV3-TB24	2.76 (70.0)	1.81 (46.0)	1550 (107)
2	0.065	6L-WV3-TB32	3.07 (78.0)	1.81 (46.0)	1160 (80)

Tees



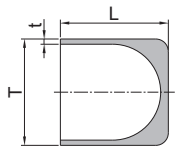
T-Tube O.D. (in.)	t-Wall Thickness (in.)	Ordering Number	Dimensions, in. (mm)		Working Pressure psig (bar)
			L	Lx	
1/4	0.035	6L-WT3-TB4	2.76 (70.0)	1.38 (35.0)	5150 (355)
3/8	0.035	6L-WT3-TB6	2.91 (74.0)	1.46 (37.0)	3330 (230)
1/2	0.049	6L-WT3-TB8	3.07 (78.0)	1.54 (39.0)	3530 (243)
3/4	0.065	6L-WT3-TB12	4.09 (104.0)	2.05 (52.0)	3330 (230)
1	0.065	6L-WT3-TB16	4.33 (110.0)	2.17 (55.0)	2420 (167)
1 1/2	0.065	6L-WT3-TB24	5.83 (148.0)	2.91 (74.0)	1550 (107)
2	0.065	6L-WT3-TB32	6.06 (154.0)	3.03 (77.0)	1160 (80)

Reducing Tees



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Tx-Tube O.D. (in.)	tx-Wall Thickness (in.)	Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
					L	Lx	Ly	
3/8	0.035	1/4	0.035	6L-WT3-TB6-TB6-TB4	2.91 (74.0)	1.46 (37.0)	1.46 (37.0)	3330 (230)
1/2	0.049	1/4	0.035	6L-WT3-TB8-TB8-TB4	3.07 (78.0)	1.54 (39.0)	1.54 (39.0)	3530 (243)
1/2	0.049	3/8	0.035	6L-WT3-TB8-TB8-TB6	3.07 (78.0)	1.54 (39.0)	1.54 (39.0)	3330 (230)
3/4	0.065	1/4	0.035	6L-WT3-TB12-TB12-TB4	3.70 (94.0)	1.73 (44.0)	1.85 (47.0)	3330 (230)
3/4	0.065	3/8	0.035	6L-WT3-TB12-TB12-TB6	3.70 (94.0)	1.73 (44.0)	1.85 (47.0)	3330 (230)
3/4	0.065	1/2	0.049	6L-WT3-TB12-TB12-TB8	3.70 (94.0)	1.73 (44.0)	1.85 (47.0)	3330 (230)
1	0.065	1/4	0.035	6L-WT3-TB16-TB16-TB4	3.70 (94.0)	1.85 (47.0)	1.85 (47.0)	2420 (167)
1	0.065	3/8	0.035	6L-WT3-TB16-TB16-TB6	3.70 (94.0)	1.85 (47.0)	1.85 (47.0)	2420 (167)
1	0.065	1/2	0.049	6L-WT3-TB16-TB16-TB8	3.70 (94.0)	1.85 (47.0)	1.85 (47.0)	2420 (167)
1	0.065	3/4	0.065	6L-WT3-TB16-TB16-TB12	4.33 (110.0)	2.17 (55.0)	2.17 (55.0)	2420 (167)
1 1/2	0.065	1/4	0.035	6L-WT3-TB24-TB24-TB4	4.49 (114.0)	2.13 (54.0)	2.24 (57.0)	1550 (107)
1 1/2	0.065	3/8	0.035	6L-WT3-TB24-TB24-TB6	4.49 (114.0)	2.13 (54.0)	2.24 (57.0)	1550 (107)
1 1/2	0.065	1/2	0.049	6L-WT3-TB24-TB24-TB8	4.49 (114.0)	2.13 (54.0)	2.24 (57.0)	1550 (107)
1 1/2	0.065	3/4	0.065	6L-WT3-TB24-TB24-TB12	5.35 (136.0)	2.44 (62.0)	2.68 (68.0)	1550 (107)
1 1/2	0.065	1	0.065	6L-WT3-TB24-TB24-TB16	5.35 (136.0)	2.44 (62.0)	2.68 (68.0)	1550 (107)
2	0.065	1/4	0.035	6L-WT3-TB32-TB32-TB4	4.49 (114.0)	2.24 (57.0)	2.24 (57.0)	1160 (80)
2	0.065	3/8	0.035	6L-WT3-TB32-TB32-TB6	4.49 (114.0)	2.24 (57.0)	2.24 (57.0)	1160 (80)
2	0.065	1/2	0.049	6L-WT3-TB32-TB32-TB8	4.49 (114.0)	2.24 (57.0)	2.24 (57.0)	1160 (80)
2	0.065	3/4	0.065	6L-WT3-TB32-TB32-TB12	5.35 (136.0)	2.56 (65.0)	2.68 (68.0)	1160 (80)
2	0.065	1	0.065	6L-WT3-TB32-TB32-TB16	5.35 (136.0)	2.56 (65.0)	2.68 (68.0)	1160 (80)
2	0.065	1 1/2	0.065	6L-WT3-TB32-TB32-TB24	6.06 (154.0)	3.03 (77.0)	3.03 (77.0)	1160 (80)

End Caps



T-Tube O.D. (in.)	t-Wall Thickness (in.)	Ordering Number	Dimensions, in. (mm)	Working Pressure psig (bar)
			L	
1/4	0.035	6L-CW3-TB4	0.50 (12.7)	5150 (355)
3/8	0.035	6L-CW3-TB6	0.50 (12.7)	3330 (230)
1/2	0.049	6L-CW3-TB8	0.50 (12.7)	3530 (243)
3/4	0.065	6L-CW3-TB12	0.75 (19.1)	3330 (230)
1	0.065	6L-CW3-TB16	1.00 (25.4)	2420 (167)
1 1/2	0.065	6L-CW3-TB24	1.50 (38.1)	1550 (167)
2	0.065	6L-CW3-TB32	1.50 (38.1)	1160 (80)

Face Seal Fittings

FR Series

TFO Series

FO Series

Contents

FR Series Metal Gasket Face Seal Fittings

TFO Series L-ring Face Seal Fittings

FO Series O-ring Face Seal Fittings

Face Seal Fittings

FR Series Face Seal Fittings

Features

- Metal-to-metal seal to provide perfect leak-tight service for working conditions from critical vacuum to high pressure
- Precision manufactured gasket to ensure best performance
- Test port at nut for easy leak testing
- Silver-plated female threads
- Standard surface roughness finished to an average of Ra 10 μin. (0.25 μm) or electropolished to Ra 5 μin. (0.13 μm) optional
- All seal faces and male threads protected with plastic caps
- Every gland and body marked with size, material and heat code

Technical Data

- Sizes range from 1/16" to 1" and 6 mm to 18 mm
- Thread Specifications:

Thread Type	Specification
NPT	ASME B1.20.1, SAE AS71051
Unified (SAE)	ASME B1.1, SAE J475

- Materials:

Material	Bar Stock	Forging	Designator
Fitting Material			
316 SS	ASTM A276 ASME SA479	ASME SA182 ASTM A314	SS
316L SS			6L
316L VAR SS	SEMI F20		6LV
Gasket Material			
316L SS	ASTM A240		6L
Copper	ASTM B152		CU
Nickel	ASTM B162		NI

- Working Pressure:
  Working pressures shown in the Catalog are calculated according to ASME B31.3 and B31.1 at ambient temperature.

- Working Temperature:

Component	Material	Max. Temperature
Fittings	316 SS	1000°F (538°C)
	316L SS	
	316L VAR SS	
Gaskets	316L SS	
	Copper	400°F (204°C)
	Nickel	600°F (316°C)

Testing

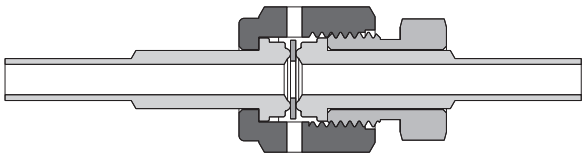
Every FR fitting is Helium leak tested to a maximum allowable leak rate of 4×10^{-9} std cm^3/s.

Ordering Information

◎ Each component can be ordered separately.
◎ Add the material designator as a prefix, cleaning and packaging code as a suffix to the basic ordering number to get the complete ordering number.
◎ Cleaning and Packaging
a. FC-01 Standard Cleaning and Packaging for general industrial procedures. No suffix is needed.
b. FC-02 Special Cleaning and Packaging, to ensure compliance with product cleanliness requirement as stated in ASTM G93 Level C. Add "-F2" as a suffix when needed.
c. FC-03 Ultra-High Purity Process Specification is applied to products with wetted surface roughness finished to an average of Ra 5 μin. (0.13 μm). Add "-F3" as suffix when needed. It is only available for 316L and 316L VAR SS fittings.
Example: For 1/2" 316L VAR SS gland with FC-03 Ultra-High Purity Process Specification, the complete ordering number is 6LV-G-FR8-TB8-6-F3.

Installation Instructions

1. Assemble the gland, nut, gasket and male nut as below. Finger tight the nut.

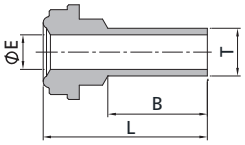


2. For fittings with 316L SS and Nickel gaskets, tighten the nut 1/8 turn with a wrench while holding the male nut or the fitting body steady. Tighten the nut 1/4 turn for those with Copper gaskets.

Cautions

◎ Dimensions are for reference only and are subject to change.
◎ Over-tightening will damage the sealing beads and lead to possible leak.
◎ Utilize a new gasket for each assembly.
◎ Tungsten Inert Gas Welding (TIG) is recommended.
◎ Always apply proper thread sealants on tapered pipe threads.
◎ Do not loosen or tighten fittings when system is pressurized.

Glands

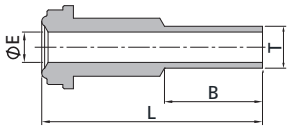


FR Gland to Short Fractional Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
				L	B	E	6L	CU	NI
1/8	1/8	0.028	-G-FR2-TB2-12S	1.08 (27.4)	0.75 (19.1)	0.06 (1.5)	8500 (586)	6800 (468)	8500 (586)
1/4	1/8	0.028	-G-FR4-TB2-12S	1.10 (27.9)	0.75 (19.1)	0.06 (1.5)	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-4S	0.60 (15.2)	0.25 (6.4)	0.18 (4.6)	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-6S	0.72 (18.3)	0.38 (9.6)	0.18 (4.6)	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-12S	1.10 (27.9)	0.75 (19.1)	0.18 (4.6)	5100 (351)	5100 (351)	5100 (351)
1/2	1/4	0.035	-G-FR8-TB4-12S	1.12 (28.4)	0.75 (19.1)	0.18 (4.6)	4300 (296)	2800 (192)	3500 (241)
1/2	3/8	0.035	-G-FR8-TB6-4S	0.62 (15.7)	0.25 (6.4)	0.31 (7.9)	3300 (227)	2600 (179)	3300 (227)
1/2	3/8	0.035	-G-FR8-TB6-12S	1.12 (28.4)	0.75 (19.1)	0.31 (7.9)	3300 (227)	2600 (179)	3300 (227)
1/2	1/2	0.049	-G-FR8-TB8-4S	0.62 (15.7)	0.25 (6.4)	0.40 (10.2)	3500 (241)	2800 (192)	3500 (241)
1/2	1/2	0.049	-G-FR8-TB8-6S	0.74 (18.8)	0.38 (9.6)	0.40 (10.2)	3500 (241)	2800 (192)	3500 (241)
1/2	1/2	0.049	-G-FR8-TB8-12S	1.12 (28.4)	0.75 (19.1)	0.40 (10.2)	3500 (241)	2800 (192)	3500 (241)

FR Gland to Short Metric Tube Butt Weld

FR Size (in.)	T-Tube O.D. (mm)	Nominal Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure, bar (psig)		
				L	B	E	6L	CU	NI
1/4	6	1.0	-G-FR4-MTB6-12S	29.5 (1.16)	19.1 (0.75)	4.0 (0.16)	468 (6800)	372 (5400)	468 (6800)
1/4	8	1.0	-G-FR4-MTB8-12S	29.5 (1.16)	19.1 (0.75)	6.0 (0.24)	337 (4900)	337 (4900)	337 (4900)
1/2	10	1.0	-G-FR8-MTB10-12S	29.5 (1.16)	19.1 (0.75)	8.0 (0.31)	241 (3500)	192 (2800)	241 (3500)
1/2	12	1.0	-G-FR8-MTB12-12S	29.5 (1.16)	19.1 (0.75)	10.0 (0.39)	213 (3100)	165 (2400)	213 (3100)
3/4	18	1.5	-G-FR12-MTB18-12S	31.0 (1.22)	19.1 (0.75)	15.0 (0.59)	206 (3000)	165 (2400)	206 (3000)



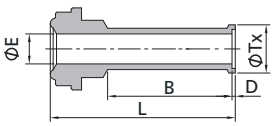
FR Gland to Long Fractional Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
				L	B	E	6L	CU	NI
1/8	1/8	0.028	-G-FR2-TB2-12	1.42 (36.1)	0.75 (19.1)	0.06 (1.5)	8500 (586)	6800 (468)	8500 (586)
1/4	1/4	0.035	-G-FR4-TB4-4	1.20 (30.5)	0.25 (6.4)	0.18 (4.6)	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-1.31①	1.31 (33.3)	0.36 (9.1)	0.18 (4.6)	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-6	1.32 (33.5)	0.38 (9.6)	0.18 (4.6)	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-12	1.70 (43.2)	0.75 (19.1)	0.18 (4.6)	5100 (351)	5100 (351)	5100 (351)
1/2	1/4	0.035	-G-FR8-TB4-12	1.80 (45.7)	0.75 (19.1)	0.18 (4.6)	4300 (296)	2800 (192)	3500 (241)
1/2	3/8	0.035	-G-FR8-TB6-4	1.29 (32.8)	0.25 (6.4)	0.31 (7.9)	3300 (227)	2600 (179)	3300 (227)
1/2	3/8	0.035	-G-FR8-TB6-12	1.79 (45.5)	0.75 (19.1)	0.31 (7.9)	3300 (227)	2600 (179)	3300 (227)
1/2	1/2	0.049	-G-FR8-TB8-4	1.29 (32.8)	0.25 (6.4)	0.40 (10.2)	3500 (241)	2800 (192)	3500 (241)
1/2	1/2	0.049	-G-FR8-TB8-6	1.41 (35.8)	0.38 (9.6)	0.40 (10.2)	3500 (241)	2800 (192)	3500 (241)
1/2	1/2	0.049	-G-FR8-TB8-12	1.79 (45.5)	0.75 (19.1)	0.40 (10.2)	3500 (241)	2800 (192)	3500 (241)
3/4	3/4	0.049	-G-FR12-TB12-12	2.03 (51.6)	0.75 (19.1)	0.65 (16.5)	2400 (165)	1900 (130)	2400 (165)
1	1	0.065	-G-FR16-TB16-12	2.32 (58.9)	0.75 (19.1)	0.87 (22.1)	2400 (165)	1900 (130)	2400 (165)

FR Gland to Long Metric Tube Butt Weld

FR Size (in.)	T-Tube O.D. (mm)	Nominal Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)			Working Pressure, bar (psig)		
				L	B	E	6L	CU	NI
1/4	6	1.0	-G-FR4-MTB6-12	43.2 (1.7)	19.1 (0.75)	4.0 (0.16)	468 (6800)	372 (5400)	468 (6800)
1/4	8	1.0	-G-FR4-MTB8-12	43.2 (1.7)	19.1 (0.75)	6.0 (0.24)	337 (4900)	337 (4900)	337 (4900)
1/2	10	1.0	-G-FR8-MTB10-12	45.5 (1.79)	19.1 (0.75)	8.0 (0.31)	241 (3500)	192 (2800)	241 (3500)
1/2	12	1.0	-G-FR8-MTB12-12	45.5 (1.79)	19.1 (0.75)	10.0 (0.39)	213 (3100)	165 (2400)	213 (3100)
3/4	18	1.5	-G-FR12-MTB18-12	51.6 (2.03)	19.1 (0.75)	15.0 (0.59)	206 (3000)	165 (2400)	206 (3000)

Suffix -4, -6, -12 indicates that Dimension B equals to the specific suffix value times 1/16. Example: With suffix "12", Dimension B= 12/16 = 3/4" or 19.1 mm.
① -1.31 means the length of Dim L.

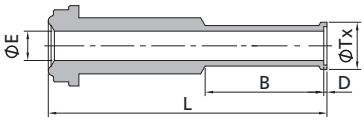


FR Gland to Short Fractional Automatic Tube Butt Weld

FR Size (in.)	Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure, psig (bar)		
				L	B	D	E	Tx	6L	CU	NI
1/4	1/4	0.035	-AG-FR4-TB4-12S	1.12 (28.4)	0.75 (19.1)	0.02 (0.5)	0.18 (4.6)	0.29 (7.4)	5100 (351)	5100 (351)	5100 (351)
1/2	3/8	0.035	-AG-FR8-TB6-12S	1.15 (29.2)	0.75 (19.1)	0.03 (0.8)	0.31 (7.9)	0.41 (10.4)	3300 (227)	2600 (179)	3300 (227)
1/2	1/2	0.049	-AG-FR8-TB8-12S	1.16 (29.5)	0.75 (19.1)	0.04 (1.0)	0.40 (10.2)	0.55 (14.0)	3500 (241)	2800 (192)	3500 (241)

FR Gland to Short Metric Automatic Tube Butt Weld

FR Size (in.)	Tube O.D. (mm)	Nominal Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)					Working Pressure, bar (psig)		
				L	B	D	E	Tx	6L	CU	NI
1/4	6	1.0	-AG-FR4-MTB6-12S	30.0 (1.18)	19.1 (0.75)	0.5 (0.02)	4.0 (0.16)	6.8 (0.27)	468 (6800)	372 (5400)	468 (6800)
1/4	8	1.0	-AG-FR4-MTB8-12S	30.2 (1.19)	19.1 (0.75)	0.8 (0.03)	6.0 (0.24)	8.9 (0.35)	337 (4900)	337 (4900)	337 (4900)
1/2	10	1.0	-AG-FR8-MTB10-12S	31.0 (1.22)	19.1 (0.75)	0.8 (0.03)	8.0 (0.31)	10.9 (0.43)	241 (3500)	192 (2800)	241 (3500)
1/2	12	1.0	-AG-FR8-MTB12-12S	30.5 (1.20)	19.1 (0.75)	1.0 (0.04)	10.0 (0.39)	13.2 (0.52)	213 (3100)	165 (2400)	213 (3100)

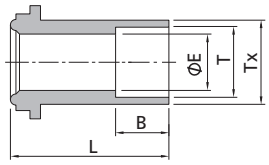


FR Gland to Long Fractional Automatic Tube Butt Weld

FR Size (in.)	Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure, psig (bar)		
				L	B	D	E	Tx	6L	CU	NI
1/4	1/4	0.035	-AG-FR4-TB4-12	1.72 (43.7)	0.75 (19.1)	0.02 (0.5)	0.18 (4.6)	0.29 (7.4)	5100 (351)	5100 (351)	5100 (351)
1/2	1/4	0.035	-AG-FR8-TB4-12	1.82 (46.2)	0.75 (19.1)	0.02 (0.5)	0.18 (4.6)	0.29 (7.4)	3500 (241)	2800 (192)	3500 (241)
1/2	3/8	0.035	-AG-FR8-TB6-12	1.82 (46.2)	0.75 (19.1)	0.03 (0.8)	0.31 (7.9)	0.41 (10.4)	3300 (227)	2600 (179)	3300 (227)
1/2	1/2	0.049	-AG-FR8-TB8-12	1.83 (46.5)	0.75 (19.1)	0.04 (1.0)	0.40 (10.2)	0.55 (14.0)	3500 (241)	2800 (192)	3500 (241)
3/4	3/4	0.049	-AG-FR12-TB12-12	2.07 (52.6)	0.75 (19.1)	0.04 (1.0)	0.65 (16.5)	0.80 (20.3)	2400 (165)	2400 (165)	2400 (165)
1	1	0.065	-AG-FR16-TB16-16	2.57 (65.3)	0.96 (24.4)	0.04 (1.0)	0.87 (22.1)	1.06 (26.9)	2400 (165)	1900 (130)	2400 (165)

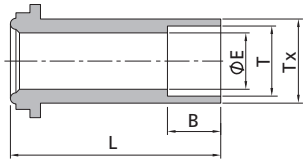
FR Gland to Long Metric Automatic Tube Butt Weld

FR Size (in.)	Tube O.D. (mm)	Nominal Wall Thickness (mm)	Basic Ordering Number	Dimensions, mm (in.)					Working Pressure, bar (psig)		
				L	B	D	E	Tx	6L	CU	NI
1/4	6	1.0	-AG-FR4-MTB6-12	43.7 (1.72)	19.1 (0.75)	0.5 (0.02)	4.0 (0.16)	6.8 (0.27)	468 (6800)	372 (5400)	468 (6800)
1/2	12	1.0	-AG-FR8-MTB12-12	46.5 (1.83)	19.1 (0.75)	1.0 (0.04)	10.0 (0.39)	13.2 (0.52)	213 (3100)	165 (2400)	213 (3100)
3/4	18	1.5	-AG-FR12-MTB18-12	52.6 (2.07)	19.1 (0.75)	1.0 (0.04)	15.0 (0.59)	19.3 (0.76)	206 (3000)	165 (2400)	206 (3000)



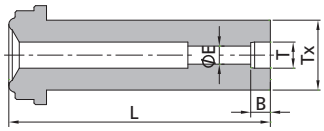
FR Gland to Short Tube Socket Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
			L	B	E	Tx	6L	CU	NI
1/4	1/4	-G-FR4-TS4-0.50	0.50 (12.7)	0.28 (7.1)	0.18 (4.6)	0.35 (8.9)	5500 (378)	5500 (378)	5500 (378)
1/4	1/4	-G-FR4-TS4-0.75	0.75 (19.1)	0.28 (7.1)	0.18 (4.6)	0.35 (8.9)	5500 (378)	5500 (378)	5500 (378)



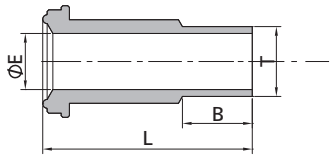
FR Gland to Tube Socket Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
			L	B	E	Tx	6L	CU	NI
1/8	1/16	-G-FR2-TS1	0.70 (17.8)	0.10 (2.5)	0.05 (1.3)	0.13 (3.3)	9000 (620)	7200 (496)	9000 (620)
1/8	1/8	-G-FR2-TS2	0.70 (17.8)	0.10 (2.5)	0.09 (2.3)	0.20 (5.1)	7100 (489)	7100 (489)	7100 (489)
1/4	1/4	-G-FR4-TS4	1.31 (33.3)	0.28 (7.1)	0.18 (4.6)	0.35 (8.9)	5500 (378)	5500 (378)	5500 (378)
1/2	3/8	-G-FR8-TS6	1.50 (38.1)	0.31 (7.9)	0.28 (7.1)	0.60 (15.2)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-G-FR8-TS8	1.50 (38.1)	0.38 (9.7)	0.40 (10.2)	0.60 (15.2)	3000 (206)	2400 (165)	3000 (206)
5/8	5/8	-G-FR10-TS10	1.56 (39.6)	0.41 (10.4)	0.50 (12.7)	0.72 (18.3)	2800 (192)	2200 (151)	2800 (192)
3/4	3/4	-G-FR12-TS12	2.00 (50.8)	0.44 (11.2)	0.62 (15.7)	0.88 (22.4)	2800 (192)	2200 (151)	2800 (192)
1	1	-G-FR16-TS16	2.22 (56.4)	0.62 (15.7)	0.87 (22.1)	1.19 (30.2)	3000 (206)	1900 (130)	2400 (165)



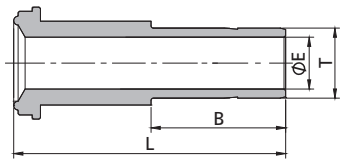
Reducing Socket Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
			L	B	E	Tx	6L	CU	NI
1/4	1/8	-G-FR4-RTS2	1.31 (33.3)	0.10 (2.5)	0.09 (2.3)	0.35 (8.9)	8000 (551)	8000 (551)	8000 (551)
1/2	1/4	-G-FR8-RTS4	1.50 (38.1)	0.28 (7.1)	0.18 (4.6)	0.60 (15.2)	3500 (241)	3500 (241)	3500 (241)



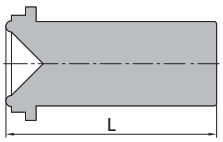
FR Gland to Male Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
			L	B	E	6L	CU	NI
1/8	1/8	-G-FR2-TB2	0.70 (17.8)	0.28 (7.1)	0.06 (1.5)	11200 (772)	7200 (496)	9000 (620)
1/4	1/8	-G-FR4-TB2	1.31 (33.3)	0.28 (7.1)	0.06 (1.5)	10000 (690)	6400 (440)	8000 (551)
1/4	1/4	-G-FR4-TB4	1.31 (33.3)	0.41 (10.4)	0.12 (3.0)	10000 (690)	6400 (440)	8000 (551)
1/2	1/4	-G-FR8-TB4	1.50 (38.1)	0.41 (10.4)	0.12 (3.0)	4300 (296)	2800 (192)	3500 (241)
1/2	3/8	-G-FR8-TB6	1.50 (38.1)	0.41 (10.4)	0.28 (7.1)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-G-FR8-TB8	1.50 (38.1)	0.50 (12.7)	0.40 (10.2)	3500 (241)	3500 (241)	3500 (241)
3/4	3/4	-G-FR12-TB12	2.00 (50.8)	0.62 (15.7)	0.53 (13.5)	3700 (254)	2400 (165)	3000 (206)
1	1	-G-FR16-TB16	2.22 (56.4)	0.81 (20.6)	0.75 (19.1)	3000 (206)	1900 (130)	2400 (165)



FR Gland to Tube Port

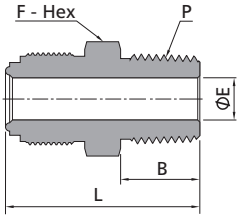
FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
			L	B	E	6L	CU	NI
1/4	1/4	-G-FR4-FT4	1.62 (41.0)	0.64 (16.2)	0.17 (4.3)	10000 (690)	6400 (440)	8000 (551)
1/2	3/8	-G-FR8-FT6	1.81 (46.0)	0.70 (17.8)	0.27 (6.9)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-G-FR8-FT8	1.94 (49.3)	0.96 (24.4)	0.37 (9.4)	4300 (296)	2800 (192)	3500 (241)



Blind Gland

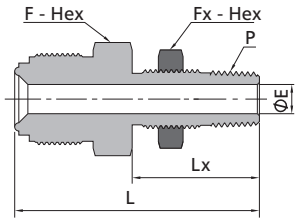
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)
		L
1/8	-G-FR2-B	0.70 (17.8)
1/4	-G-FR4-B	1.31 (33.3)
1/2	-G-FR8-B	1.50 (38.1)
3/4	-G-FR12-B	2.00 (50.8)
1	-G-FR16-B	2.22 (56.4)

Bodies



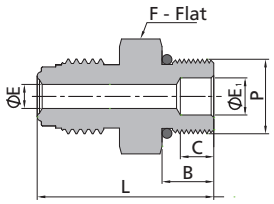
FR Body to Male NPT

FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
			L	B	E	F	6L	CU	NI
1/8	1/16	-CM-FR2-NS1	1.07 (27.2)	0.38 (9.7)	0.09 (2.3)	3/8 (9.5)	9000 (620)	7200 (496)	9000 (620)
1/8	1/8	-CM-FR2-NS2	1.07 (27.2)	0.38 (9.7)	0.09 (2.3)	7/16 (11.1)	9000 (620)	7200 (496)	9000 (620)
1/4	1/8	-CM-FR4-NS2	1.31 (33.3)	0.38 (9.7)	0.18 (4.6)	5/8 (15.9)	10000 (690)	6400 (440)	8000 (551)
1/4	1/4	-CM-FR4-NS4	1.49 (37.8)	0.56 (14.2)	0.18 (4.6)	5/8 (15.9)	10000 (690)	6400 (440)	8000 (551)
1/2	1/4	-CM-FR8-NS4	1.65 (41.9)	0.56 (14.2)	0.28 (7.1)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)
1/2	3/8	-CM-FR8-NS6	1.65 (41.9)	0.56 (14.2)	0.38 (9.7)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-CM-FR8-NS8	1.84 (46.7)	0.75 (19.1)	0.40 (10.2)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)
3/4	3/4	-CM-FR12-NS12	2.19 (55.6)	0.75 (19.1)	0.62 (15.7)	1 15/16 (33.3)	3700 (254)	2400 (165)	3000 (206)
1	1	-CM-FR16-NS16	2.47 (62.7)	0.94 (23.9)	0.87 (22.1)	1 5/8 (41.3)	3000 (206)	1900 (130)	3000 (206)



FR Body to Bulkhead Male Connector

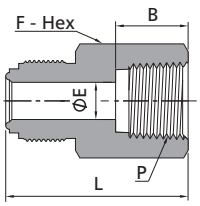
FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)					Panel Hole Size in. (mm)	Max. Panel Thickness in. (mm)	Working Pressure, psig (bar)		
			L	Lx	E	F	Fx			6L	CU	NI
1/4	1/4	-CMB-FR4-NS4	2.21 (56.1)	1.24 (31.5)	0.28 (7.1)	13/16 (20.6)	13/16 (20.6)	21/32 (16.7)	0.38 (9.7)	8000 (551)	6400 (440)	8000 (551)
1/2	1/4	-CMB-FR8-NS4	2.34 (59.4)	1.24 (31.5)	0.28 (7.1)	15/16 (23.8)	13/16 (20.6)	21/32 (16.7)	0.38 (9.7)	4370 (301)	2800 (192)	3500 (241)



FR Body to SAE/MS Thread

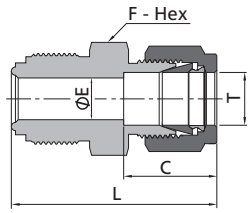
FR Size (in.)	P-SAE/MS Thread Size	Uniform O-ring① Size	Basic Ordering Number	Dimensions, in. (mm)						Working Pressure, psig (bar)		
				L	B	C	E	E_1	F	6L	CU	NI
1/4	9/16-18	906	-CM-FR4-ST9	1.33 (33.8)	0.39 (9.9)	0.25 (6.4)	0.18 (4.6)	0.28 (7.1)	3/4 (19.1)	4500 (310)	4500 (310)	4500 (310)
1/2	9/16-18	906	-CM-FR8-ST9	1.48 (37.6)	0.39 (9.9)	–	0.28 (7.1)	0.28 (7.1)	15/16 (23.8)	3500 (241)	2800 (192)	3500 (241)
1/2	7/8-14	910	-CM-FR8-ST14	1.66 (42.2)	0.50 (12.7)	0.40 (10.2)	0.28 (7.1)	0.59 (15.0)	1 (25.4)	3500 (241)	2800 (192)	3500 (241)

① *Fluorocarbon FKM is standard O-ring material, contact FITOK Group for other materials.*



FR Body to Female NPT

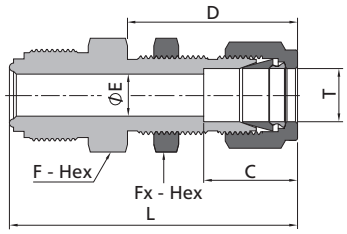
FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
			L	B	E	F	6L	CU	NI
1/8	1/16	-CF-FR2-NS1	1.10 (27.9)	0.39 (9.9)	0.09 (2.3)	7/16 (11.1)	6700 (461)	6700 (461)	6700 (461)
1/8	1/8	-CF-FR2-NS2	1.19 (30.2)	0.41 (10.4)	0.09 (2.3)	9/16 (14.3)	6500 (447)	6500 (447)	6500 (447)
1/4	1/8	-CF-FR4-NS2	1.41 (35.8)	0.41 (10.4)	0.18 (4.6)	5/8 (15.9)	8000 (551)	6400 (440)	8000 (551)
1/4	1/4	-CF-FR4-NS4	1.54 (39.1)	0.59 (15.0)	0.18 (4.6)	3/4 (19.1)	6600 (454)	5200 (358)	6600 (454)
1/2	3/8	-CF-FR8-NS6	1.76 (44.7)	0.59 (15.0)	0.40 (10.2)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-CF-FR8-NS8	1.99 (50.5)	0.78 (19.8)	0.40 (10.2)	1 1/16 (27.0)	4300 (296)	2800 (192)	3500 (241)
3/4	3/4	-CF-FR12-NS12	2.36 (59.9)	0.81 (20.6)	0.62 (15.7)	1 5/16 (33.3)	3700 (254)	2400 (165)	3000 (206)
1	1	-CF-FR16-NS16	2.51 (63.8)	1.00 (25.4)	0.87 (22.1)	1 5/8 (41.3)	3000 (206)	1900 (130)	2400 (165)



FR Body to Tube Fitting

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
			L①	C	E	F	6L	CU	NI
1/4	1/8	-U-FR4-FL2	1.53 (38.9)	0.50 (12.7)	0.09 (2.3)	5/8 (15.9)	10000 (690)	6400 (440)	8000 (551)
1/4	1/4	-U-FR4-FL4	1.62 (41.1)	0.60 (15.2)	0.18 (4.6)	5/8 (15.9)	10000 (690)	6400 (440)	8000 (551)
1/2	3/8	-U-FR8-FL6	1.84 (46.7)	0.66 (16.8)	0.28 (7.1)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-U-FR8-FL8	1.95 (49.5)	0.90 (22.9)	0.40 (10.2)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)

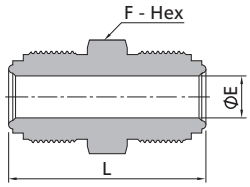
① *Dimension L is with FITOK nuts finger-tight.*



FR Body to Bulkhead Tube Fitting Union

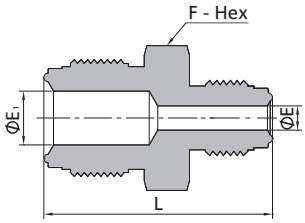
FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)						Panel Hole Size in. (mm)	Max. Panel Thickness in. (mm)	Working Pressure, psig (bar)		
			L①	C	D	E	F	Fx			6L	CU	NI
1/4	1/4	-UB-FR4-FL4	2.25 (57.2)	0.60 (15.2)	1.32 (33.5)	0.18 (4.6)	5/8 (15.9)	5/8 (15.9)	15/32 (11.9)	0.40 (10.2)	10000 (690)	6400 (440)	8000 (551)
1/4	1/4	-UB-FR4-FL4-1.88	1.88 (47.8)	0.60 (15.2)	1.05 (26.7)	0.18 (4.6)	5/8 (15.9)	5/8 (15.9)	15/32 (11.9)	0.13 (3.3)	10000 (690)	6400 (440)	8000 (551)
1/2	3/8	-UB-FR8-FL6	2.54 (64.5)	0.66 (16.8)	1.45 (36.8)	0.28 (7.1)	15/16 (23.8)	3/4 (19.1)	19/32 (15.0)	0.44 (11.2)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-UB-FR8-FL8	2.74 (69.6)	0.90 (22.9)	1.65 (41.9)	0.40 (10.2)	15/16 (23.8)	15/16 (23.8)	25/32 (19.8)	0.50 (12.7)	4300 (296)	2800 (192)	3500 (241)

① *Dimension L is with FITOK nuts finger-tight.*



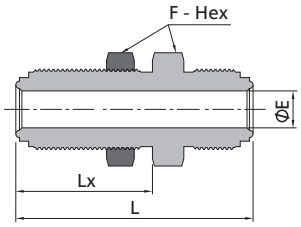
Union Body

FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/8	1/8	-U-FR2	1.13 (28.7)	0.09 (2.3)	3/8 (9.5)	11200 (772)	7200 (496)	9000 (620)
1/4	1/4	-U-FR4	1.55 (39.4)	0.18 (4.6)	5/8 (15.9)	10000 (690)	6400 (440)	8000 (551)
1/2	1/2	-U-FR8	1.84 (46.7)	0.40 (10.2)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)
3/4	3/4	-U-FR12	2.44 (62.0)	0.62 (15.7)	1 5/16 (33.3)	3700 (254)	2400 (165)	3000 (206)
1	1	-U-FR16	2.59 (65.8)	0.87 (22.1)	1 5/8 (41.3)	3000 (206)	1900 (130)	2400 (165)



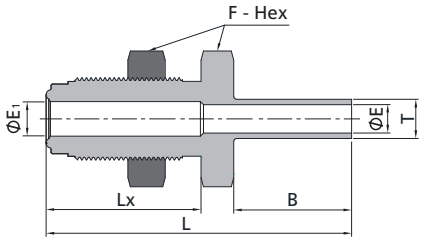
Reducing Union

FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
			L	E	E_1	F	6L	CU	NI
1/4	1/8	-U-FR4-FR2	1.37 (34.8)	0.09 (2.3)	0.18 (4.6)	5/8 (15.9)	10000 (690)	6400 (440)	8000 (551)
1/2	1/4	-U-FR8-FR4	1.71 (43.4)	0.18 (4.6)	0.40 (10.2)	5/16 (23.8)	4300 (296)	2800 (192)	3500 (241)



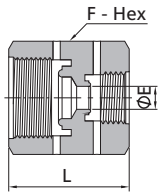
Bulkhead Union Body

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)				Panel Hole Drill Size in. (mm)	Max. Panel Thickness in. (mm)	Working Pressure, psig (bar)		
		L	Lx	E	F			6L	CU	NI
1/4	-BU-FR4-1.82	1.82 (46.2)	0.99 (25.1)	0.18 (4.6)	3/4 (19.1)	19/32 (15.0)	0.13 (3.3)	10000 (690)	6400 (440)	8000 (551)
1/4	-BU-FR4	2.23 (56.6)	1.30 (33.3)	0.18 (4.6)	3/4 (19.1)	19/32 (15.0)	0.44 (11.2)	10000 (690)	6400 (440)	8000 (551)
1/2	-BU-FR8-2.14	2.14 (54.4)	1.11 (28.2)	0.40 (10.2)	1 1/16 (27.0)	29/32 (23.1)	0.13 (3.3)	4300 (296)	2800 (192)	3500 (241)
1/2	-BU-FR8	2.57 (65.3)	1.48 (37.6)	0.40 (10.2)	1 1/16 (27.0)	29/32 (23.1)	0.50 (12.7)	4300 (296)	2800 (192)	3500 (241)



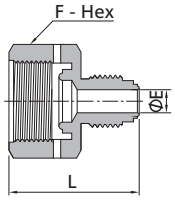
FR Bulkhead Body to Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)						Panel Hole Drill Size in. (mm)	Max. Panel Thickness in. (mm)	Working Pressure, psig (bar)		
			L	Lx	B	E	E_1	F			6L	CU	NI
1/4	1/4	-BW-FR4-TB4-1.95	1.95 (49.5)	0.99 (25.1)	0.75 (19.1)	0.18 (4.6)	0.22 (5.6)	0.75 (19.1)	19/32 (15.1)	0.13 (3.3)	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	-BW-FR4-TB4	2.36 (59.9)	1.30 (33.0)	0.75 (19.1)	0.18 (4.6)	0.22 (5.6)	0.75 (19.1)	19/32 (15.1)	0.44 (11.2)	5100 (351)	5100 (351)	5100 (351)



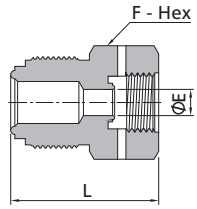
Female Reducing Union

FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/4	1/8	-RU-FR4-FR2	1.16 (29.5)	0.13 (3.3)	3/4 (19.1)	10000 (690)	6400 (440)	8000 (551)
1/2	1/4	-RU-FR8-FR4	1.41 (35.8)	0.25 (6.4)	1 1/16 (27.0)	4300 (296)	2800 (192)	3500 (241)



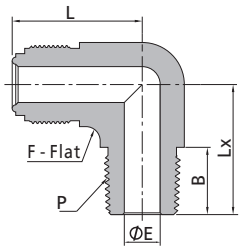
Reducing Adapter

FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/4	1/8	-RA-FR4-FR2	1.19 (30.2)	0.09 (2.3)	3/4 (19.1)	10000 (690)	6400 (440)	8000 (551)
1/2	1/4	-RA-FR8-FR4	1.41 (35.8)	0.18 (4.6)	1 1/16 (27.0)	4300 (296)	2800 (192)	3500 (241)



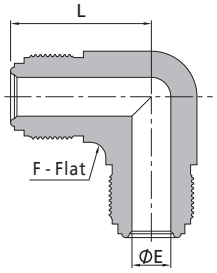
Reducing Bushing

FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/4	1/8	-RB-FR4-FR2	1.06 (26.9)	0.13 (3.3)	5/8 (15.9)	10000 (690)	6400 (440)	8000 (551)
1/2	1/4	-RB-FR8-FR4	1.41 (35.8)	0.25 (6.4)	15/16 (23.8)	4300 (296)	2800 (192)	3500 (241)



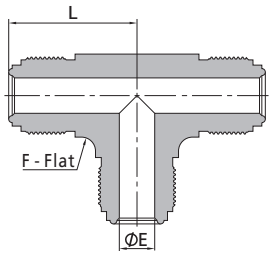
FR Body to Male NPT Elbow

FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure, psig (bar)		
			L	Lx	B	E	F	6L	CU	NI
1/4	1/8	-LM-FR4-NS2	1.07 (27.2)	0.87 (22.1)	0.38 (9.6)	0.18 (4.6)	1/2 (12.7)	10000 (690)	6400 (440)	8000 (551)
1/4	1/4	-LM-FR4-NS4	1.07 (27.2)	1.05 (26.7)	0.56 (14.2)	0.18 (4.6)	1/2 (12.7)	8000 (551)	8000 (551)	8000 (551)
1/2	3/8	-LM-FR8-NS6	1.45 (36.8)	1.26 (32.0)	0.56 (14.2)	0.40 (10.2)	13/16 (20.6)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-LM-FR8-NS8	1.45 (36.8)	1.45 (36.8)	0.75 (19.1)	0.40 (10.2)	13/16 (20.6)	4300 (296)	2800 (192)	3500 (241)



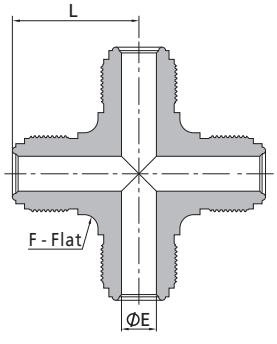
FR Body Union Elbow

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/8	-LU-FR2	0.89 (22.6)	0.09 (2.3)	7/16 (11.1)	11200 (772)	7200 (496)	9000 (620)
1/4	-LU-FR4	1.07 (27.2)	0.18 (4.6)	1/2 (12.7)	10000 (690)	6400 (440)	8000 (551)
1/2	-LU-FR8	1.45 (36.8)	0.40 (10.2)	13/16 (20.6)	4300 (296)	2800 (192)	3500 (241)
3/4	-LU-FR12	1.92 (48.8)	0.62 (15.7)	1 1/4 (31.8)	3700 (254)	2400 (165)	3000 (206)
1	-LU-FR16	2.00 (50.8)	0.87 (22.1)	1 11/16 (42.9)	3000 (206)	1900 (130)	2400 (165)



FR Body Union Tee

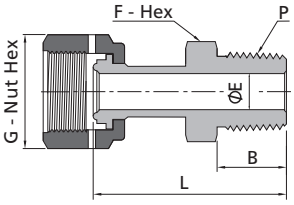
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/8	-TTT-FR2	0.89 (22.6)	0.09 (2.3)	7/16 (11.1)	11200 (772)	7200 (496)	9000 (620)
1/4	-TTT-FR4	1.07 (27.2)	0.18 (4.6)	1/2 (12.7)	10000 (690)	6400 (440)	8000 (551)
1/2	-TTT-FR8	1.45 (36.8)	0.40 (10.2)	13/16 (20.6)	4300 (296)	2800 (192)	3500 (241)
3/4	-TTT-FR12	1.92 (48.8)	0.62 (15.7)	1 1/4 (31.8)	3700 (254)	2400 (165)	3000 (206)
1	-TTT-FR16	2.00 (50.8)	0.87 (22.1)	1 11/16 (42.9)	3000 (206)	1900 (130)	2400 (165)



FR Body Union Cross

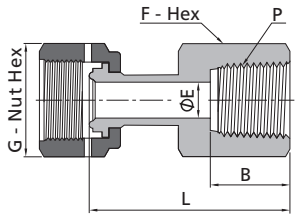
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/8	-C-FR2	0.89 (22.6)	0.09 (2.3)	7/16 (11.1)	11200 (772)	7200 (496)	9000 (620)
1/4	-C-FR4	1.07 (27.2)	0.18 (4.6)	1/2 (12.7)	10000 (690)	6400 (440)	8000 (551)
1/2	-C-FR8	1.45 (36.8)	0.40 (10.2)	13/16 (20.6)	4300 (296)	2800 (192)	3500 (241)
3/4	-C-FR12	1.92 (48.8)	0.62 (15.7)	1 1/4 (31.8)	3700 (254)	2400 (165)	3000 (206)
1	-C-FR16	2.00 (50.8)	0.87 (22.1)	1 11/16 (42.9)	3000 (206)	1900 (130)	2400 (165)

Welded Glands



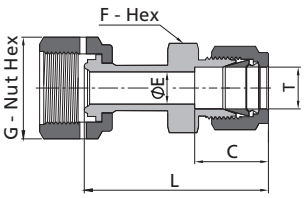
FR Welded Gland to Male NPT

FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure, psig (bar)		
			L	B	E	G	F	6L	CU	NI
1/4	1/8	-WG-FR4-NS2	1.58 (40.1)	0.38 (9.7)	0.18 (4.6)	3/4 (19.1)	7/16 (11.1)	8000 (551)	6400 (446)	8000 (551)
1/4	1/4	-WG-FR4-NS4	1.79 (45.5)	0.56 (14.2)	0.18 (4.6)	3/4 (19.1)	9/16 (14.3)	8000 (551)	6400 (446)	8000 (551)
1/2	3/8	-WG-FR8-NS6	1.89 (48.0)	0.56 (14.2)	0.40 (10.2)	1 1/16 (27.0)	11/16 (17.5)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-WG-FR8-NS8	2.09 (53.1)	0.75 (19.1)	0.40 (10.2)	1 1/16 (27.0)	7/8 (22.2)	4300 (296)	2800 (192)	3500 (241)



FR Welded Gland to Female NPT

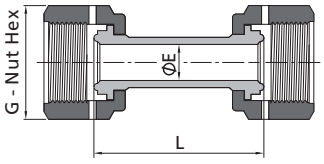
FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure, psig (bar)		
			L	B	E	G	F	6L	CU	NI
1/4	1/4	-WG-FR4-FNS4	1.77 (45.0)	0.59 (15.0)	0.18 (4.6)	3/4 (19.1)	3/4 (19.1)	6600 (454)	5200 (458)	6600 (454)
1/2	3/8	-WG-FR8-FNS6	1.95 (49.5)	0.59 (15.0)	0.40 (10.2)	1 1/16 (27.0)	7/8 (22.2)	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-WG-FR8-FNS8	2.18 (55.4)	0.78 (19.8)	0.40 (10.2)	1 1/16 (27.0)	1 1/16 (27.0)	4300 (296)	2800 (192)	3500 (241)



FR Welded Gland to Tube Fitting

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure, psig (bar)		
			L①	C	E	G	F	6L	CU	NI
1/4	1/4	-WG-FR4-FL4	1.94 (49.3)	0.60 (15.2)	0.18 (4.6)	3/4 (19.1)	1/2 (12.7)	8000 (551)	6400 (440)	8000 (551)
1/4	3/8	-WG-FR4-FL6	1.97 (50.0)	0.66 (16.8)	0.18 (4.6)	3/4 (19.1)	5/8 (15.9)	6500 (447)	5200 (358)	6500 (447)
1/2	1/2	-WG-FR8-FL8	2.23 (56.6)	0.90 (22.9)	0.40 (10.2)	1 1/16 (27.0)	13/16 (20.6)	4300 (296)	2800 (192)	3500 (241)

① *Dimension L is with FITOK nuts finger-tight.*

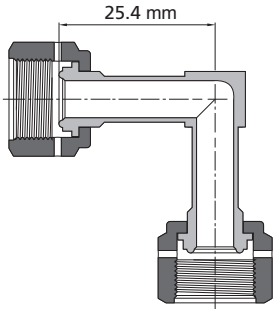


FR Welded Gland Union

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
		L	E	G	6L	CU	NI
1/4	-WG-FR4	1.71 (43.4)	0.18 (4.6)	3/4 (19.1)	8000 (551)	6400 (440)	8000 (551)
1/2	-WG-FR8	1.84 (46.7)	0.40 (10.2)	1 1/16 (27.0)	4300 (296)	2800 (192)	3500 (241)

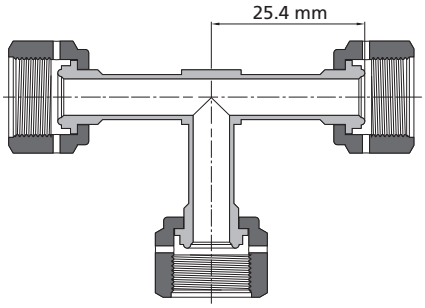
Female Elbows

Basic ordering number: **-LWG-FR4**

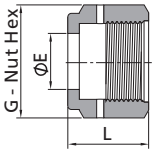


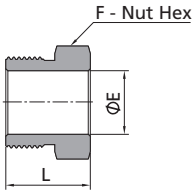
Female Tees

Basic ordering number: **-TWG-FR4**



Nuts



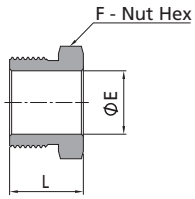


Female Nut

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)		
		L	E	G
1/8	-N-FR2	0.53 (13.5)	0.21 (5.3)	7/16 (11.1)
1/4	-N-FR4	0.81 (20.6)	0.36 (9.1)	3/4 (19.1)
1/2	-N-FR8	0.88 (22.4)	0.61 (15.5)	1 1/16 (27.0)
5/8	-N-FR10	0.88 (22.4)	0.74 (18.8)	1 3/16 (30.2)
3/4	-N-FR12	1.12 (28.4)	0.89 (22.6)	1 1/2 (38.1)
1	-N-FR16	1.34 (34.0)	1.20 (30.5)	1 3/4 (44.5)

Male Nut

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)		
		L	E	F
1/8	-MN-FR2	0.50 (12.7)	0.21 (5.3)	3/8 (9.5)
1/4	-MN-FR4	0.71 (18.0)	0.36 (9.1)	5/8 (15.9)
1/2	-MN-FR8	0.81 (20.6)	0.61 (15.5)	15/16 (23.8)
5/8	-MN-FR10	0.81 (20.6)	0.74 (18.8)	1 1/16 (27.0)
3/4	-MN-FR12	1.00 (25.4)	0.89 (22.6)	1 5/16 (33.3)
1	-MN-FR16	1.19 (30.2)	1.20 (30.5)	1 5/8 (41.3)

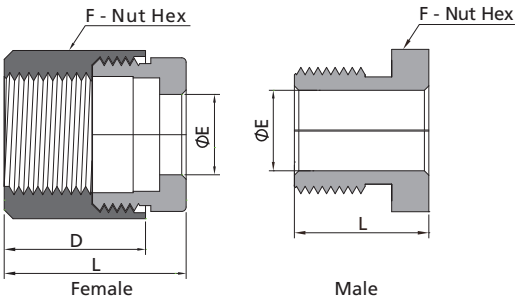


Short Male Nut

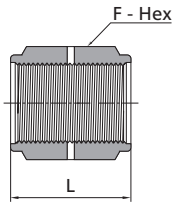
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)		
		L	E	F
1/4	-MN-FR4-0.54	0.54 (13.7)	0.36 (9.1)	5/8 (15.9)
1/4	-MN-FR4-0.65	0.65 (16.5)	0.36 (9.1)	5/8 (15.9)

For use with Gland to Short Tube Butt Weld

Split-Nut Assemblies

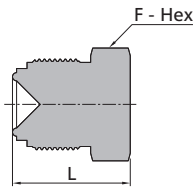


Split-Nut Assemblies						
FR Size (in.)	Split Nut Type	Basic Ordering Number	Dimensions, in. (mm)			
			L	E	F	D
1/4	Female	-N-FR4-SN	0.81 (20.6)	0.36 (9.1)	3/4 (19.1)	0.63 (16.0)
1/4	Male	-MN-FR4-SN	0.60 (15.2)	0.36 (9.1)	5/8 (15.9)	–



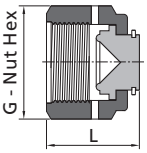
Coupling			
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	F
1/8	-BC-FR2	0.66 (16.8)	7/16 (11.1)
1/4	-BC-FR4	1.19 (30.2)	3/4 (19.1)
1/2	-BC-FR8	1.31 (33.3)	1 1/16 (27.0)
3/4	-BC-FR12	1.68 (42.7)	1 1/2 (38.1)
1	-BC-FR16	2.04 (51.8)	1 3/4 (44.5)

Plugs



Plug			
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	F
1/8	-PG-FR2	0.68 (17.3)	3/8 (9.5)
1/4	-PG-FR4	0.92 (23.4)	5/8 (15.9)
1/2	-PG-FR8	1.08 (27.4)	15/16 (23.8)
3/4	-PG-FR12	1.43 (36.3)	1 5/16 (33.3)
1	-PG-FR16	1.52 (38.6)	1 5/8 (41.3)

Caps



Cap			
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	G
1/8	-CP-FR2	0.63 (16.0)	7/16 (11.1)
1/4	-CP-FR4	0.94 (23.9)	3/4 (19.1)
1/2	-CP-FR8	1.01 (25.6)	1 1/16 (27.0)
3/4	-CP-FR12	1.29 (32.8)	1 1/2 (38.1)
1	-CP-FR16	1.54 (39.1)	1 3/4 (44.5)

Plugs with Lanyard

- Lanyard material: 304 SS.
- Lanyard length: 15.2 cm.

Plug with Lanyard			
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	F
1/4	-PG-FR4-BP	0.92 (23.4)	5/8 (15.9)
1/2	-PG-FR8-BP	1.08 (27.4)	15/16 (23.8)

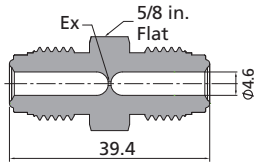
Caps with Lanyard

- Lanyard material: 304 SS.
- Lanyard length: 15.2 cm.

Cap with Lanyard			
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	G
1/4	-CP-FR4-BP	0.94 (23.9)	3/4 (19.1)
1/2	-CP-FR8-BP	1.01 (25.6)	1 1/16 (27.0)

Flow Restrictors

◎ Working pressure up to: 10,000 psig (690 bar)



FR Body to Male FR	
Ex, in. (mm)	Ordering Number
0.015 (0.381)	6LV-R-FR4-015
0.017 (0.432)	6LV-R-FR4-017
0.020 (0.508)	6LV-R-FR4-020
0.023 (0.584)	6LV-R-FR4-023
0.025 (0.635)	6LV-R-FR4-025
0.026 (0.660)	6LV-R-FR4-026
0.027 (0.686)	6LV-R-FR4-027
0.030 (0.762)	6LV-R-FR4-030
0.035 (0.889)	6LV-R-FR4-035
0.040 (1.016)	6LV-R-FR4-040
0.045 (1.143)	6LV-R-FR4-045
0.050 (1.270)	6LV-R-FR4-050
0.055 (1.397)	6LV-R-FR4-055
0.060 (1.529)	6LV-R-FR4-060
0.065 (1.651)	6LV-R-FR4-065
0.070 (1.778)	6LV-R-FR4-070
0.075 (1.905)	6LV-R-FR4-075
0.080 (2.032)	6LV-R-FR4-080
0.085 (2.159)	6LV-R-FR4-085
0.090 (2.286)	6LV-R-FR4-090
0.093 (2.362)	6LV-R-FR4-093
0.095 (2.413)	6LV-R-FR4-095
0.100 (2.540)	6LV-R-FR4-100

Locking Device

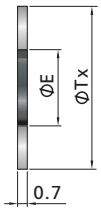
◎ To help prevent unintentional disassembly of FR connections.
◎ Used for FITOK FR metal gasket face seal assemblies with standard male and female nuts.

Locking Device	
FR Size (in.)	Ordering Number
1/4	S4-FR4-LD
1/2	S4-FR8-LD

Gaskets

◎ Copper gaskets are unplated.
◎ Unplated SS gaskets and Nickel gaskets are electropolished.
◎ If Silver-plated SS or Nickel gaskets are required, please delete the suffix of "-UP" from the ordering number.

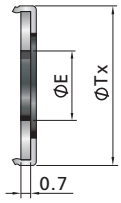
Nonretained



Unplated (UP)			
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		Tx	E
1/8	-GT-FR2-UP	0.26 (6.6)	0.09 (2.3)
1/4	-GT-FR4-UP	0.47 (11.9)	0.22 (5.6)
1/2	-GT-FR8-UP	0.78 (19.8)	0.44 (11.2)
5/8	-GT-FR10-UP	0.91 (23.1)	0.58 (14.7)
3/4	-GT-FR12-UP	1.14 (29.0)	0.66 (16.8)
1	-GT-FR16-UP	1.40 (35.6)	0.89 (22.6)

Gaskets are used without retainers.

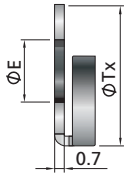
Gasket Retainer Assemblies



Unplated (UP)			
FR Size (in.)	Basic Ordering Number	Dimensions, mm	
		Tx	E
1/4	-GT-FR4-A-UP	0.50 (12.7)	0.24 (6.1)
1/2	-GT-FR8-A-UP	0.79 (20.1)	0.44 (11.2)
3/4	-GT-FR12-A-UP	1.14 (29.0)	0.66 (16.8)
1	-GT-FR16-A-UP	1.40 (35.6)	0.89 (22.6)

1. Gaskets are used with retainers.
2. Retainer material is 316L SS.
3. Retainers are available in different colors, please contact FITOK Group for more details.

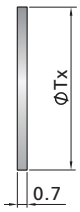
Side-load Retainer



Unplated (UP)			
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		Tx	E
1/4	-GT-FR4-AS-UP	0.45 (11.4)	0.24 (6.1)
1/2	-GT-FR8-AS-UP	0.75 (19.1)	0.43 (11.0)

1. Gaskets are only available in 316L SS and Nickel.
2. Silver-plated gaskets are not available.

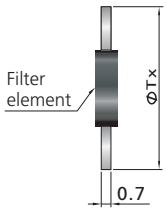
Blind



Unplated (UP)		
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)
		Tx
1/8	-GT-FR2-B-UP	0.26 (6.6)
1/4	-GT-FR4-B-UP	0.47 (11.9)
1/2	-GT-FR8-B-UP	0.78 (19.8)
5/8	-GT-FR10-B-UP	0.91 (23.1)
3/4	-GT-FR12-B-UP	1.14 (29.0)
1	-GT-FR16-B-UP	1.40 (35.6)

Blind gasket retainer assemblies are available, please contact FITOK Group for more details.

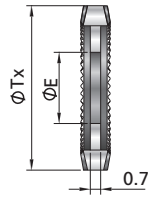
Snubber



Unplated (UP)		
FR Size (in.)	Basic Ordering Number	Dimensions, mm
		Tx
1/4	-GT-FR4-UP-**M	0.47 (11.9)
1/2	-GT-FR8-UP-**M	0.78 (19.8)
3/4	-GT-FR12-UP-**M	1.14 (29.0)
1	-GT-FR16-UP-**M	1.40 (35.6)

1. Add the designator of filter element precision accuracy as a suffix to the basic ordering number to get the complete ordering number.
Example: For 1/4" 316L SS snubber with filter element precision accuracy of 5 µm, the ordering number is 6L-GT-FR4-UP-5M.

Knurled Gasket

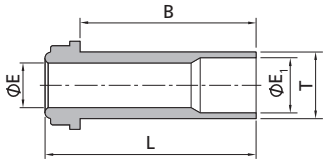


Unplated (UP)			
FR Size (in.)	Basic Ordering Number	Dimensions, in.(mm)	
		Tx	E
1/4	-GT-FR4-KN-A-UP	0.5(12.7)	0.22(5.5)

1. Used to prevent nuts from loosening from vibration.
2. General 316L SS or Nickle gasket is assembled by 1/8 turn, but its installation method is 3/8 turn.

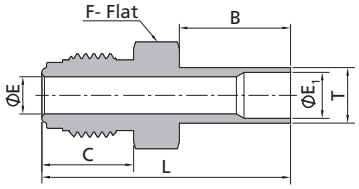
High-Flow Connections - "H" Type FR

"H" type FR connections with high flow capacity are compatible with regular FR connections.
Gasket retainer assemblies are recommended to minimize flow resistance.



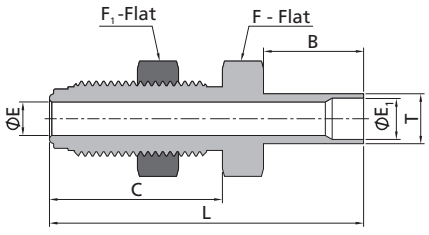
HFR Gland to Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure, psig (bar)		
				L	B	E	E_1	6L	CU	NI
1/4	3/8	0.035	-G-HFR4-TB6-0.60	0.60 (15.2)	0.41 (10.4)	0.25 (6.4)	0.31 (7.9)	3300 (227)	3300 (227)	3300 (227)
1/4	3/8	0.035	-G-HFR4-TB6-1.19	1.19 (30.2)	1.00 (25.4)	0.25 (6.4)	0.31 (7.9)	3300 (227)	3300 (227)	3300 (227)
1/4	3/8	0.035	-G-HFR4-TB6-1.31	1.31 (33.3)	1.12 (28.4)	0.25 (6.4)	0.31 (7.9)	3300 (227)	3300 (227)	3300 (227)



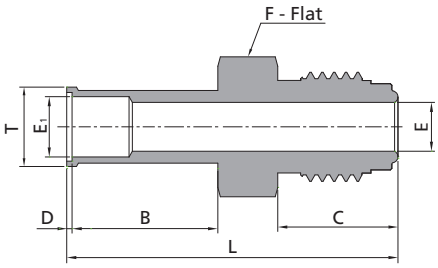
HFR Body to Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)						Working Pressure, psig (bar)		
			L	B	C	E	E_1	F	6L	CU	NI
1/4	3/8	-CW-HFR4-TB6	1.68 (42.7)	0.75 (19.1)	0.62 (15.7)	0.25 (6.4)	0.31 (7.9)	5/8 (15.9)	3300 (227)	3300 (227)	3300 (227)



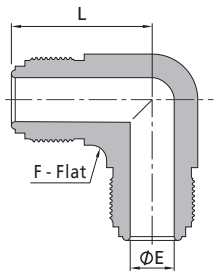
HFR Bulkhead Body to Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)							Panel Hole Dia	Max. Panel Thickness Hole Dia	Working Pressure, psig (bar)		
			L	B	C	E	E1	F	F1			6L	CU	NI
1/4	3/8	-BW-HFR4-TB6	2.36 (59.9)	0.75 (19.1)	1.30 (33.0)	0.31 (7.9)	0.25 (6.4)	3/4 (19.1)	3/4 (19.1)	19/32 (15.0)	0.44 (11.2)	3300 (227)	3300 (227)	3300 (227)



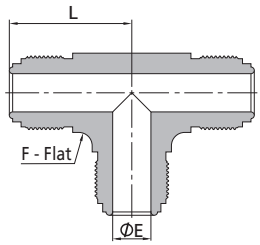
HFR Body to Automatic Tube Weld

FR Size (in.)	Tube Size (in.)	Basic Ordering Number	Dimensions, in. (mm)								Working Pressure, psig (bar)		
			L	B	C	D	E	E_1	F	T	6L	CU	NI
1/4	3/8	-AW-HFR4-TB6	1.71 (43.4)	0.75 (19.1)	0.62 (15.7)	0.03 (0.8)	0.25 (6.4)	0.31 (7.9)	5/8 (15.9)	0.41 (10.4)	3300 (227)	3300 (227)	3300 (227)



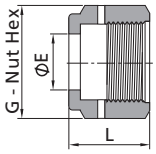
HFR Body Union Elbow

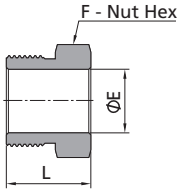
FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/4	-LU-HFR4	1.07 (27.2)	0.25 (6.4)	1/2 (12.7)	10000 (690)	6400 (440)	8000 (551)



HFR Body Union Tee

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/4	-TTT-HFR4	1.07 (27.2)	0.25 (6.4)	1/2 (12.7)	10000 (690)	6400 (440)	8000 (551)





HFR Female Nut

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)		
		L	E	G
1/4	-N-HFR4-9.9	0.81 (20.6)	0.39 (9.9)	3/4 (19.1)
1/4	-N-HFR4-11.7	0.81 (20.6)	0.46 (11.7)	3/4 (19.1)

HFR Male Nut

FR Size (in.)	Basic Ordering Number	Dimensions, in. (mm)		
		L	E	F
1/4	-MN-HFR4	0.71 (18.0)	0.39 (9.9)	5/8 (15.9)

Face Seal Fittings

TFO Series L-ring Face Seal Fittings

Features

- Reduced internal entrapment
- Lubricant-free L-ring seal
- Controlled L-ring extrusion to prevent over-tightening
- Butt weld connection to ensure the system unhindered
- Standard surface roughness finished to an average of Ra 20 µin. (0.51 µm)
- Each fitting marked with size, material and heat number

Technical Data

- Sizes range from 1/4" to 1"
- Materials:

Material	Bar Stock	Designator
316 SS	ASTM A276, ASME SA479	SS
316L SS		6L

- Working Pressure @ 100°F (37°C):

Tube OD.	Working Pressure psig (bar)
1/4 in.	2500 (172)
1/2 in.	2000 (137)
3/4 in.	1500 (103)
1 in.	
12 mm	2000 (137)

- Working Temperature:
  Temperature ranges for TFO fittings are restricted by the L-ring materials.

Material	Designator	Working Temperature
PTFE	T	- 50°F to 450°F (- 45°C to 232°C)

Testing

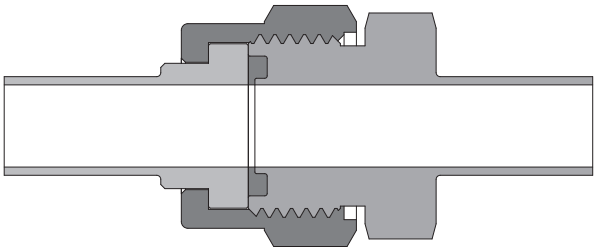
Every TFO fitting is Helium leak tested to a maximum allowable leak rate of 4×10^{-9} std cm^3/s.

Ordering Information

◎ Each component can be ordered separately.
◎ Add the material designator as a prefix, cleaning and packaging code as a suffix to the basic ordering number to get the complete ordering number.
◎ Cleaning and Packaging
a. FC-01 Standard Cleaning and Packaging for general industrial procedures. No suffix is needed.
b. FC-02 Special Cleaning and Packaging, to ensure compliance with product cleanliness requirement as stated in ASTM G93 Level C. Add "-F2" as a suffix when needed.
Example: For 316L SS standard 1/4" gland with FC-02 Special Cleaning and Packaging, the ordering number is 6L-G-TFO4-TB4-F2.

Installation Instructions

1. Assemble the gland, nut and gasket as below. Finger tight the nut.

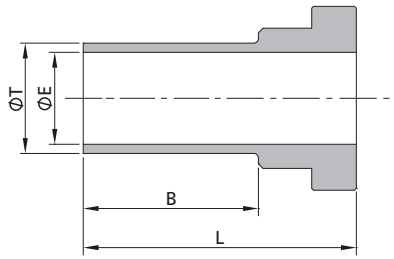


2. Tighten the nut 1/8 turn with a wrench while holding the fitting body steady.

Cautions

◎ Dimensions are for reference only and are subject to change.
◎ Inspect the O-ring each time the groove housing is dismantled.
◎ Before welding the body, the L-ring should be removed to prevent possible damages.
◎ Tungsten Inert Gas Welding (TIG) is recommended.
◎ Do not loosen or tighten fittings when system is pressurized.

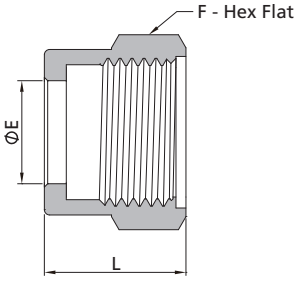
Glands



T-Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)		
			L	B	E
1/4	0.035	-G-TFO4-TB4	0.67 (17.0)	0.25 (6.4)	0.18 (4.6)
1/4	0.035	-G-TFO4-TB4-12	1.17 (29.7)	0.75 (19.1)	0.18 (4.6)
1/2	0.049	-G-TFO8-TB8	1.17 (29.7)	0.75 (19.1)	0.40 (10.2)
1/2	0.065	-G-TFO8-TB8×0.065	1.17 (29.7)	0.75 (19.1)	0.37 (9.4)
3/4	0.065	-G-TFO12-TB12	1.24 (31.5)	0.75 (19.1)	0.62 (15.7)
1	0.065	-G-TFO16-TB16	1.45 (36.8)	0.96 (24.4)	0.87(22.1)

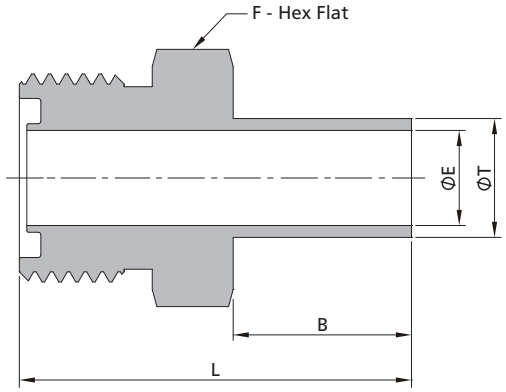
T-Tube O.D. (mm)	Wall Thickness (mm)	Basic Ordering Number	Dimensions, in. (mm)		
			L	B	E
12	1	-G-TFO8-MTB12	1.17 (29.7)	0.75 (19.1)	0.39 (10.0)

Nuts



Basic Ordering Number	Dimensions, in. (mm)		
	L	E	F
-N-TFO4	0.75 (19.1)	0.39 (9.9)	11/16 (17.5)
-N-TFO8	0.84 (21.3)	0.61 (15.5)	1 (25.4)
-N-TFO12	0.90 (22.9)	0.94 (23.9)	1 1/2 (38.1)
-N-TFO16	0.90 (22.9)	1.25 (31.8)	1 3/4 (44.5)

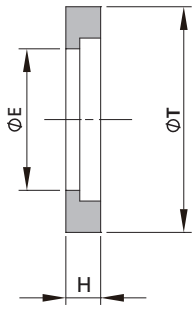
Tube Butt Weld Bodies



T-Tube OD. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)			
			L	B	E	F
1/4	0.035	-CW-TFO4-TB4	1.03 (26.2)	0.25 (6.4)	0.18 (4.6)	5/8 (15.9)
1/4	0.035	-CW-TFO4-TB4-12	1.53 (38.9)	0.75 (19.1)	0.18 (4.6)	5/8 (15.9)
1/2	0.049	-CW-TFO8-TB8	1.65 (41.9)	0.75 (19.1)	0.40 (10.2)	15/16 (23.8)
1/2	0.065	-CW-TFO8-TB8×0.065	1.65 (41.9)	0.75 (19.1)	0.37 (9.4)	15/16 (23.8)
3/4	0.065	-CW-TFO12-TB12	1.75 (44.4)	0.75 (19.1)	0.62 (15.7)	1 5/16 (33.3)
1	0.065	-CW-TFO16-TB16	1.99 (50.5)	0.96 (24.4)	0.87 (22.1)	15/8 (47.6)

T-Tube OD. (mm)	Wall Thickness (mm)	Basic Ordering Number	Dimensions, in. (mm)			
			L	B	E	F
12	1	-CW-TFO8-MTB12	1.65 (41.9)	0.75 (19.1)	0.39 (10.0)	15/16 (23.8)

L-ring Seal



Basic Ordering Number	Dimensions, in. (mm)		
	T	E	H
-GT-TFO4	0.38 (9.6)	0.18 (4.6)	0.07 (1.8)
-GT-TFO8	0.64 (16.2)	0.40 (10.2)	0.10 (2.5)
-GT-TFO12	0.92 (23.4)	0.62 (15.7)	0.10 (2.5)
-GT-TFO16	1.30 (33.0)	0.87 (22.1)	0.14 (3.6)

Add the L-ing material designator in page F-38 as a prefix to the basic ordering number to get the complete ordering number.
Example: T-GT-TFO4

Face Seal Fittings

FO Series O-ring Face Seal Fittings

Features

- O-ring seal to provide perfect leak-tight service for working conditions from critical vacuum to high pressure
- O-ring contained completely for maximum efficiency
- Smooth finish on gland face to ensure positive seal
- Test ports at nut for easy leak testing
- Easy installation and maintenance
- Silver-plated female threads
- Standard surface roughness finished to an average of Ra 10 μin. (0.25 μm)
- Every gland and body marked with size, material and heat number

Technical Data

- Sizes range from 1/8" to 1"
- Thread Specifications:

Thread Type	Specification
NPT	ASME B1.20.1, SAE AS71051
Unified (SAE)	ASME B1.1, SAE J475

- Materials:

Material	Bar Stock	Forging	Designator
316 SS	ASTM A276, ASME SA479	ASTM A182, ASME SA182	SS
316L SS			6L

- Working Pressure:
  Working pressures shown in the Catalog are calculated according to ASME B31.3 and B31.1 at ambient temperature.

- Working Temperature:
  Temperature ranges for FO fittings are restricted by the O-ring materials.

Material	Designator	Working Temperature
Fluorocarbon FKM (70 durometer)	VI7	-10°F to 400°F (-23°C to 204°C)
Fluorocarbon FKM (90 durometer)	VI9	-10°F to 400°F (-23°C to 204°C)
PTFE	T	-50°F to 450°F (-45°C to 232°C)
Buna N (70 durometer)	BN7	-10°F to 250°F (-23°C to 121°C)
Perfluoroelastomer	Z	-10°F to 550°F (-23°C to 287°C)
Ethylene Propylene	E	-50°F to 300°F (-45°C to 148°C)

Fluorocarbon FKM of 90 durometer is used for SAEIMS threads end.

Testing

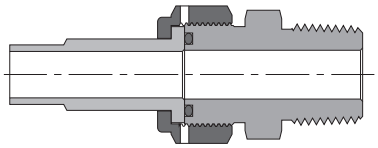
Every FO fitting is Helium leak tested to a maximum allowable leak rate of 4×10^{-9} std cm^3/s.

Ordering Information

◎ Each component can be ordered separately.
◎ The FO body is supplied with O-rings of fluorocarbon FKM (70 durometer).
◎ Add the material designator as a prefix, cleaning and packaging code as a suffix to the basic ordering number to get the complete ordering number.
◎ Cleaning and Packaging
a. FC-01 Standard Cleaning and Packaging for general industrial procedures. No suffix is needed.
b. FC-02 Special Cleaning and Packaging, to ensure compliance with product cleanliness requirement as stated in ASTM G93 Level C. Add "-F2" as a suffix when needed.
Example: For 316L SS standard 1/4'' gland with FC-02 Special Cleaning and Packaging, the ordering number is 6L-G-FO4-TB4-F2.

Installation Instructions

1. Assemble the gland, nut, O-ring and body as below. Finger tight the nut.

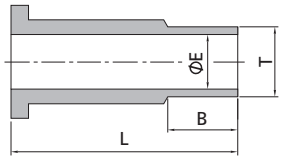


2. Tighten the nut 1/8 - 1/4 turn with a wrench while holding the fitting body steady, until there is a sharp rise in torque.

Cautions

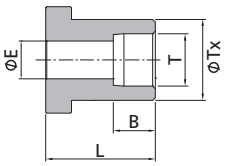
◎ Dimensions are for reference only and are subject to change.
◎ Inspect the O-ring each time the groove housing is dismantled.
◎ Before welding the body, the O-ring should be removed to prevent possible damages.
◎ Tungsten Inert Gas Welding (TIG) is recommended.
◎ Do not loosen or tighten fittings when system is pressurized.

Glands



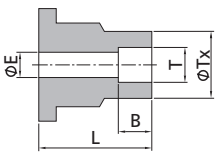
FO Gland to Tube Butt Weld

FO Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	E	
1/4	1/8	-G-FO4-TB2	0.77 (19.6)	0.28 (7.1)	0.06 (1.5)	11200 (771)
1/4	1/4	-G-FO4-TB4	1.12 (28.4)	0.41 (10.4)	0.12 (3.0)	11200 (771)
1/2	1/4	-G-FO8-TB4	0.91 (23.1)	0.41 (10.4)	0.12 (3.0)	11200 (771)
1/2	3/8	-G-FO8-TB6	0.84 (21.3)	0.41 (10.4)	0.23 (5.8)	8200 (564)
1/2	1/2	-G-FO8-TB8	1.06 (26.9)	0.50 (12.7)	0.33 (8.4)	7500 (516)



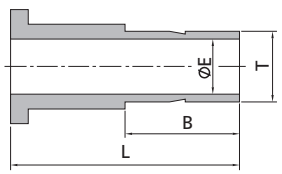
FO Gland to Tube Socket Weld

FO Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working pressure psig (bar)
			L	B	E	Tx	
1/8	1/8	-G-FO2-TS2	0.77 (19.6)	0.10 (2.5)	0.09 (2.3)	0.38 (9.7)	15400 (1061)
1/4	1/4	-G-FO4-TS4	0.77 (19.6)	0.28 (7.1)	0.18 (4.6)	0.38 (9.7)	6800 (468)
3/8	3/8	-G-FO6-TS6	0.81 (20.6)	0.31 (7.9)	0.28 (7.1)	0.60 (15.2)	8100 (558)
1/2	1/2	-G-FO8-TS8	0.81 (20.6)	0.38 (9.7)	0.40 (10.2)	0.60 (15.2)	3000 (206)
3/4	3/4	-G-FO12-TS12	0.94 (23.9)	0.44 (11.2)	0.62 (15.7)	0.92 (23.4)	3700 (255)
1	1	-G-FO16-TS16	0.98 (24.9)	0.62 (15.7)	0.87 (22.1)	1.19 (30.2)	3000 (206)



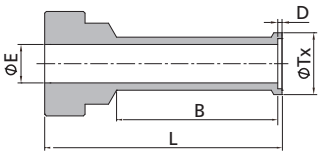
FO Gland to Tube Socket Weld Reducing

FO Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working pressure psig (bar)
			L	B	E	Tx	
1/4	1/8	-G-FO4-TS2	0.77 (19.6)	0.10 (2.5)	0.09 (2.3)	0.29 (7.4)	12600 (868)
1/2	1/4	-G-FO8-TS4	0.81 (20.6)	0.28 (7.1)	0.18 (4.6)	0.48 (12.2)	10700 (737)



FO Gland to Tube Port

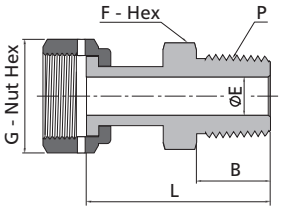
FO Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	B	E	
1/4	1/4	-G-FO4-FT4	1.31 (33.3)	0.64 (16.3)	0.18 (4.6)	10200 (702)
1/2	3/8	-G-FO8-FT6	1.38 (35.1)	0.70 (17.8)	0.27 (6.8)	6500 (447)
1/2	1/2	-G-FO8-FT8	1.62 (41.1)	0.96 (24.4)	0.37 (9.3)	6700 (461)
3/4	3/4	-G-FO12-FT12	1.80 (45.7)	1.02 (25.9)	0.58 (14.7)	5800 (399)
1	1	-G-FO16-FT16	2.05 (52.1)	1.30 (33.0)	0.80 (20.3)	4700 (323)



FO Gland to Automatic Tube Weld

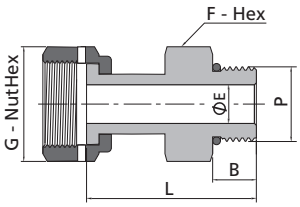
FO Size (in.)	Tube O.D. (in.)	Wall Thickness (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working pressure psig (bar)
				L	B	D	E	Tx	
1/4	1/4	0.035	-G-FO4-TB4A	1.12 (28.4)	0.78 (19.8)	0.02 (0.5)	0.18 (4.6)	0.29 (7.4)	5100 (351)
1/2	3/8	0.035	-G-FO8-TB6A	1.13 (28.7)	0.79 (20.0)	0.03 (0.8)	0.31 (7.9)	0.41 (10.4)	3300 (227)
1/2	1/2	0.049	-G-FO8-TB8A	1.14 (29.0)	0.80 (20.3)	0.04 (1.0)	0.40 (10.2)	0.55 (14.0)	3500 (241)
3/4	3/4	0.049	-G-FO12-TB12A	1.20 (30.5)	0.80 (20.3)	0.04 (1.0)	0.65 (16.5)	0.80 (20.3)	2200 (151)
1	1	0.065	-G-FO16-TB16A	1.41 (35.8)	1.00 (25.4)	0.04 (1.0)	0.87 (22.1)	1.06 (26.9)	2200 (151)

Welded Glands



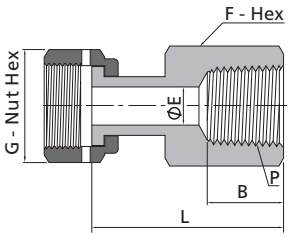
FO Welded Gland to Male NPT

FO Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	B	E	G	F	
1/4	1/4	-WG-FO4-NS4	1.59 (40.4)	0.56 (14.2)	0.18 (4.6)	11/16 (17.5)	5/8 (15.9)	9800 (675)
1/2	3/8	-WG-FO8-NS6	1.67 (42.4)	0.56 (14.2)	0.40 (10.2)	1 (25.4)	15/16 (23.8)	5600 (385)
1/2	1/2	-WG-FO8-NS8	1.87 (47.5)	0.75 (19.1)	0.40 (10.2)	1 (25.4)	15/16 (23.8)	5600 (385)
3/4	3/4	-WG-FO12-NS12	2.03 (51.6)	0.75 (19.1)	0.62 (15.7)	1 1/2 (38.1)	1 1/16 (27.0)	3900 (268)
1	1	-WG-FO16-NS16	2.36 (59.9)	0.94 (23.9)	0.87 (22.1)	1 3/4 (44.5)	1 5/8 (41.3)	2900 (199)



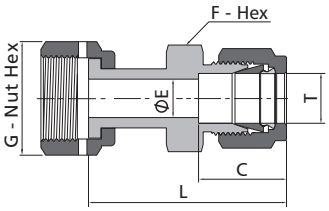
FO Welded Gland to SAE/MS Thread

FO Size (in.)	P-SAE/MS Thread Size	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	B	E	G	F	
1/4	7/16-20	-WG-FO4-ST7	1.54 (39.1)	0.36 (9.1)	0.18 (4.6)	11/16 (17.5)	9/16 (14.3)	4500 (310)
1/2	9/16-18	-WG-FO8-ST9	1.64 (41.7)	0.39 (9.9)	0.40 (10.2)	1 (25.4)	11/16 (17.5)	4500 (310)
1/2	3/4-16	-WG-FO8-ST12	1.71 (43.4)	0.45 (11.2)	0.40 (10.2)	1 (25.4)	7/8 (22.2)	4500 (310)
3/4	1 1/16-12	-WG-FO12-ST17	2.07 (52.6)	0.59 (15.0)	0.62 (15.7)	1 1/2 (38.1)	1 1/4 (31.8)	3600 (248)
1	1 5/16-12	-WG-FO16-ST21	2.17 (55.1)	0.59 (15.0)	0.87 (22.1)	1 3/4 (44.5)	1 1/2 (38.1)	2900 (199)



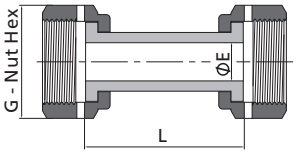
FO Welded Gland to Female NPT

FO Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	B	E	G	F	
1/4	1/4	-WG-FO4-FNS4	1.57 (39.9)	0.59 (15.0)	0.18 (4.6)	11/16 (17.5)	3/4 (19.1)	6600 (454)
1/2	3/8	-WG-FO8-FNS6	1.73 (43.9)	0.59 (15.0)	0.40 (10.2)	1 (25.4)	7/8 (22.2)	5300 (365)
1/2	1/2	-WG-FO8-FNS8	1.96 (49.8)	0.78 (19.8)	0.40 (10.2)	1 (25.4)	1 1/16 (27.0)	4900 (337)
3/4	3/4	-WG-FO12-FNS12	2.12 (53.8)	0.81 (20.6)	0.62 (15.7)	1 1/2 (38.1)	1 5/16 (33.3)	4000 (275)
1	1	-WG-FO16-FNS16	2.29 (58.2)	1.00 (25.4)	0.87 (22.1)	1 3/4 (44.5)	1 5/8 (41.3)	3000 (206)



FO Welded Gland to Tube Fitting

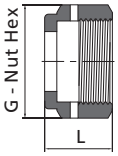
FO Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	C	E	G	F	
1/4	1/4	-WG-FO4-FL4	1.74 (44.2)	0.60 (15.2)	0.18 (4.6)	11/16 (17.5)	1/2 (12.7)	10200 (702)
1/2	3/8	-WG-FO8-FL6	1.87 (47.5)	0.66 (16.8)	0.28 (7.1)	1 (25.4)	5/8 (15.9)	5800 (399)
1/2	1/2	-WG-FO8-FL8	2.01 (51.1)	0.90 (22.9)	0.40 (10.2)	1 (25.4)	13/16 (20.6)	5800 (399)
3/4	3/4	-WG-FO12-FL12	2.14 (54.4)	0.96 (24.4)	0.62 (15.7)	1 1/2 (38.1)	1 1/16 (27.0)	4000 (275)
1	1	-WG-FO16-FL16	2.45 (62.2)	1.23 (31.2)	0.87 (22.1)	1 3/4 (44.5)	1 3/8 (34.9)	3000 (206)



FO Welded Gland Union

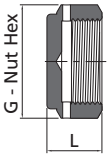
FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
		L	E	G	
1/4	-WG-FO4	1.42 (36.1)	0.18 (4.6)	11/16 (17.5)	10200 (702)
1/2	-WG-FO8	1.61 (40.9)	0.40 (10.2)	1 (25.4)	5800 (399)

Nuts



Female

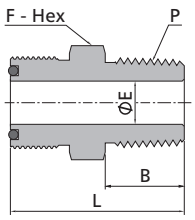
FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	G
1/8-1/4	-N-FO4	0.66 (16.8)	11/16 (17.5)
3/8-1/2	-N-FO8	0.69 (17.5)	1 (25.4)
3/4	-N-FO12	0.81 (20.6)	1 1/2 (38.1)
1	-N-FO16	0.81 (20.6)	1 3/4 (44.5)



Blind

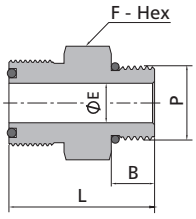
FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	G
1/8-1/4	-N-FO4-B	0.44 (11.2)	11/16 (17.5)
3/8-1/2	-N-FO8-B	0.56 (14.2)	1 (25.4)
3/4	-N-FO12-B	0.75 (19.1)	1 1/2 (38.1)
1	-N-FO16-B	0.81 (20.6)	1 3/4 (44.5)

Bodies



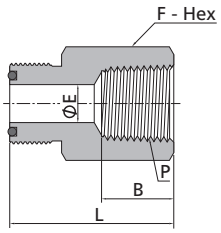
FO Body to Male NPT

FO Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)				Working pressure psig (bar)
			L	F	B	E	
1/4	1/8	-CM-FO4-NS2	1.16 (29.5)	5/8 (15.9)	0.38 (9.7)	0.18 (4.6)	10000 (689)
1/4	1/4	-CM-FO4-NS4	1.34 (34.0)	5/8 (15.9)	0.56 (14.2)	0.18 (4.6)	13400 (923)
1/2	3/8	-CM-FO8-NS6	1.46 (37.1)	15/16 (23.8)	0.56 (14.2)	0.38 (9.7)	7800 (537)
1/2	1/2	-CM-FO8-NS8	1.65 (41.9)	15/16 (23.8)	0.75 (19.1)	0.40 (10.2)	10000 (689)
3/4	3/4	-CM-FO12-NS12	1.75 (44.5)	1 5/16 (33.3)	0.75 (19.1)	0.62 (15.7)	7300 (502)
1	1	-CM-FO16-NS16	1.97 (50.0)	1 5/8 (41.3)	0.94 (23.9)	0.87 (22.1)	5300 (365)



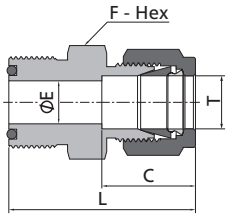
FO Body to SAE/MS Thread

FO Size (in.)	P-SAE/MS Thread Size	Basic Ordering Number	Dimensions, in. (mm)				Working pressure psig (bar)
			L	F	B	E	
1/4	7/16-20	-CM-FO4-ST7	1.24 (31.5)	11/16 (17.5)	0.36 (9.1)	0.18 (4.6)	4500 (310)
1/4	9/16-18	-CM-FO4-ST9	1.17 (29.7)	11/16 (17.5)	0.39 (9.9)	0.18 (4.6)	4500 (310)
1/2	7/16-20	-CM-FO8-ST7	1.36 (34.5)	15/16 (23.8)	0.36 (9.1)	0.18 (4.6)	4500 (310)
1/2	9/16-18	-CM-FO8-ST9	1.39 (35.3)	15/16 (23.8)	0.39 (9.9)	0.30 (7.6)	4500 (310)
1/2	3/4-16	-CM-FO8-ST12	1.47 (37.3)	1 (25.4)	0.44 (11.2)	0.40 (10.2)	4500 (310)
3/4	1 1/16-12	-CM-FO12-ST17	1.73 (43.9)	1 3/8 (34.9)	0.59 (15.0)	0.62 (15.7)	3600 (248)
1	1 5/16-12	-CM-FO16-ST21	1.79 (45.5)	1 5/8 (41.3)	0.59 (15.0)	0.85 (21.6)	2900 (199)



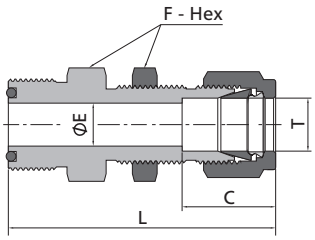
FO Body to Female NPT

FO Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure psig (bar)
			L	F	B	E	
1/4	1/8	-CF-FO4-NS2	1.25 (31.8)	5/8 (15.9)	0.41 (10.4)	0.18 (4.6)	8400 (578)
1/4	1/4	-CF-FO4-NS4	1.39 (35.3)	3/4 (19.1)	0.59 (15.0)	0.18 (4.6)	6600 (454)
1/2	3/8	-CF-FO8-NS6	1.57 (39.9)	15/16 (23.8)	0.59 (15.0)	0.40 (10.2)	6600 (454)
1/2	1/2	-CF-FO8-NS8	1.77 (45.0)	1 1/16 (27.0)	0.78 (19.8)	0.40 (10.2)	4900 (337)
3/4	3/4	-CF-FO12-NS12	1.93 (49.0)	1 5/16 (33.3)	0.81 (20.6)	0.62 (15.7)	4600 (316)
1	1	-CF-FO16-NS16	2.02 (51.3)	1 5/8 (41.3)	1.00 (25.4)	0.87 (22.1)	4400 (303)



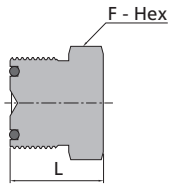
FO Body to Tube Fitting

FO Size (in.)	T-tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Working Pressure psig (bar)
			L	F	C	E	
1/4	1/8	-U-FO4-FL2	1.38 (35.1)	5/8 (15.9)	0.51 (13.0)	0.09 (2.3)	10900 (751)
1/4	1/4	-U-FO4-FL4	1.47 (37.3)	5/8 (15.9)	0.60 (15.2)	0.18 (4.6)	10200 (702)
1/2	3/8	-U-FO8-FL6	1.65 (41.9)	15/16 (23.8)	0.66 (16.8)	0.28 (7.1)	6500 (447)
1/2	1/2	-U-FO8-FL8	1.78 (45.2)	15/16 (23.8)	0.90 (22.9)	0.40 (10.2)	6700 (461)
3/4	3/4	-U-FO12-FL12	1.86 (47.2)	1 5/16 (33.3)	0.96 (24.4)	0.62 (15.7)	5800 (399)
1	1	-U-FO16-FL16	2.06 (52.3)	1 5/8 (41.3)	1.23 (31.2)	0.87 (22.1)	4700 (323)



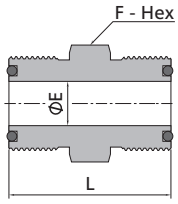
FO Body to Bulkhead Tube Fitting

FO Size (in.)	T-tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)				Panel Hole Drill Size in. (mm)	Max. Panel Thickness in. (mm)	Working Pressure psig (bar)
			L	F	C	E			
1/4	1/4	-UB-FO4-FL4	2.10 (53.4)	5/8 (15.9)	0.60 (15.2)	0.18 (4.6)	0.45 (11.5)	0.40 (10.2)	10200 (702)
1/2	3/8	-UB-FO8-FL6	2.34 (59.4)	15/16 (23.8)	0.66 (16.8)	0.28 (7.1)	0.58 (14.7)	0.44 (11.2)	6500 (447)
1/2	1/2	-UB-FO8-FL8	2.55 (64.8)	15/16 (23.8)	0.90 (22.9)	0.40 (10.2)	0.76 (19.4)	0.50 (12.7)	6700 (461)
3/4	3/4	-UB-FO12-FL12	2.86 (72.6)	1 5/16 (33.3)	0.96 (24.4)	0.62 (15.7)	1.02 (25.8)	0.66 (16.8)	5800 (399)
1	1	-UB-FO16-FL16	3.29 (83.6)	1 5/8 (41.3)	1.23 (31.2)	0.87 (22.1)	1.33 (33.7)	0.75 (19.1)	4700 (323)



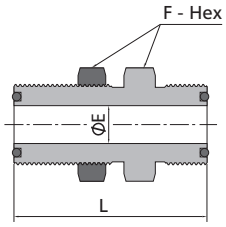
Blind Body

FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)	
		L	F
1/4	-BY-FO4	0.77 (19.6)	5/8 (15.9)
1/2	-BY-FO8	0.89 (22.6)	15/16 (23.8)
3/4	-BY-FO12	0.99 (25.1)	1 5/16 (33.3)
1	-BY-FO16	1.02 (25.9)	1 5/8 (41.3)



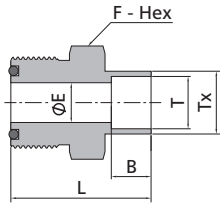
Union Body

FO Size (in.)	FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
			L	F	E	
1/4	1/4	-U-FO4	1.25 (31.8)	5/8 (15.9)	0.18 (4.6)	14300 (985)
1/2	1/4	-U-FO8-FO4	1.43 (36.3)	15/16 (23.8)	0.18 (4.6)	11100 (764)
1/2	1/2	-U-FO8	1.50 (38.1)	15/16 (23.8)	0.40 (10.2)	11100 (764)



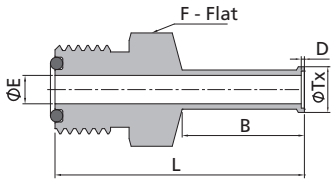
Bulkhead Union Body

FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Panel Hole Drill Size in. (mm)	Max. Panel Thickness in. (mm)	Working Pressure psig (bar)
		L	F	E			
1/4	-BU-FO4	1.88 (47.8)	3/4 (19.1)	0.18 (4.60)	0.58 (14.7)	0.36 (9.10)	14300 (985)
1/2	-BU-FO8	2.09 (53.1)	1 1/16 (27.0)	0.40 (10.2)	0.89 (22.6)	0.40 (10.2)	11100 (764)



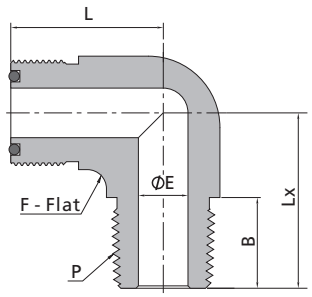
FO Body to Tube Socket Weld

FO Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	F	E	B	Tx	
1/8	1/8	-CW-FO4-TS2	0.88 (22.4)	5/8 (15.9)	0.09 (2.3)	0.10 (2.5)	0.29 (7.4)	12600 (868)
1/4	1/4	-CW-FO4-TS4	1.09 (27.7)	5/8 (15.9)	0.18 (4.6)	0.28 (7.1)	0.38 (9.7)	6800 (468)
3/8	3/8	-CW-FO8-TS6	1.28 (32.5)	15/16 (23.8)	0.28 (7.1)	0.31 (7.9)	0.60 (15.2)	8100 (558)
1/2	1/2	-CW-FO8-TS8	1.34 (34.0)	15/16 (23.8)	0.40 (10.2)	0.38 (9.7)	0.60 (15.2)	3000 (206)
3/4	3/4	-CW-FO12-TS12	1.50 (38.1)	1 5/16 (33.3)	0.62 (15.7)	0.44 (11.2)	0.92 (23.4)	3700 (254)
1	1	-CW-FO16-TS16	1.72 (43.7)	1 5/8 (41.3)	0.87 (22.1)	0.62 (15.7)	1.19 (30.2)	3000 (206)



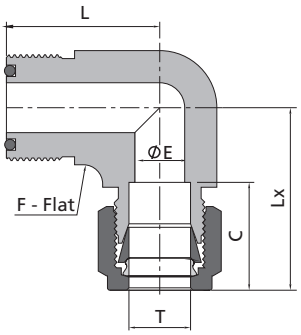
FO Body to Automatic Tube Weld

FO Size (in.)	T-tube O.D. (in.)	Wall (in.)	Basic Ordering Number	Dimensions, in. (mm)						Working Pressure psig (bar)
				L	B	D	E	Tx	F	
1/4	1/4	0.035	-CW-FO4-TB4A	1.59 (40.4)	0.78 (19.8)	0.02 (0.5)	0.18 (4.6)	0.29 (7.4)	5/8 (15.9)	5100 (351)
1/2	3/8	0.035	-CW-FO8-TB6A	1.74 (44.2)	0.79 (20.0)	0.03 (0.8)	0.31 (7.9)	0.41 (10.4)	15/16 (23.8)	3300 (227)
1/2	1/2	0.049	-CW-FO8-TB8A	1.75 (44.4)	0.80 (20.3)	0.04 (1.0)	0.40 (10.2)	0.55 (14.0)	15/16 (23.8)	3500 (241)
3/4	3/4	0.049	-CW-FO12-TB12A	1.78 (45.2)	0.80 (20.3)	0.04 (1.0)	0.65 (16.5)	0.80 (20.3)	1 5/16 (23.8)	2200 (151)
1	1	0.065	-CW-FO16-TB16A	2.03 (51.6)	1.00 (25.4)	0.04 (1.0)	0.87 (22.1)	1.06 (26.9)	1 5/8 (47.6)	2200 (151)



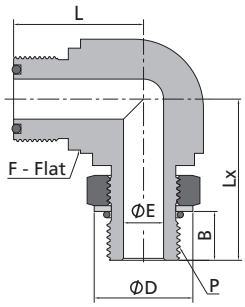
FO Body to Male NPT Elbow

FO Size (in.)	P-NPT Size	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	F	B	E	Lx	
1/4	1/8	-LM-FO4-NS2	0.96 (24.4)	9/16 (14.3)	0.38 (9.7)	0.18 (4.6)	0.87 (22.1)	10000 (689)
1/4	1/4	-LM-FO4-NS4	0.96 (24.4)	9/16 (14.3)	0.56 (14.2)	0.18 (4.6)	1.05 (26.7)	8000 (551)
1/2	3/8	-LM-FO8-NS6	1.26 (32.0)	13/16 (20.6)	0.56 (14.2)	0.38 (9.7)	1.26 (32.0)	7800 (537)
1/2	1/2	-LM-FO8-NS8	1.26 (32.0)	13/16 (20.6)	0.75 (19.1)	0.40 (10.2)	1.45 (36.8)	7700 (530)
3/4	3/4	-LM-FO12-NS12	1.48 (37.6)	1 1/4 (31.8)	0.75 (19.1)	0.62 (15.7)	1.67 (42.4)	7300 (502)
1	1	-LM-FO16-NS16	1.56 (39.6)	1 11/16 (42.9)	0.94 (23.9)	0.87 (22.0)	1.94 (49.3)	5300 (365)



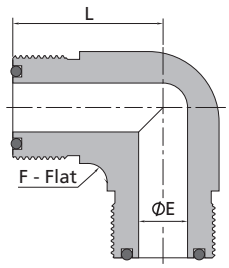
FO Body to Tube Fitting Elbow

FO Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimensions, in. (mm)					Working Pressure psig (bar)
			L	F	C	E	Lx	
1/4	1/4	-LU-FO4-FL4	0.96 (24.4)	9/16 (14.3)	0.60 (15.2)	0.18 (4.6)	1.19 (30.2)	10200 (702)
1/2	3/8	-LU-FO8-FL6	1.26 (32.0)	13/16 (20.6)	0.66 (16.8)	0.28 (7.1)	1.39 (35.3)	6500 (447)
1/2	1/2	-LU-FO8-FL8	1.26 (32.0)	13/16 (20.6)	0.90 (22.9)	0.40 (10.2)	1.50 (38.1)	6700 (461)
3/4	3/4	-LU-FO12-FL12	1.48 (37.6)	1 1/4 (31.8)	0.96 (24.4)	0.62 (15.7)	1.80 (45.7)	5800 (399)
1	1	-LU-FO16-FL16	1.56 (39.6)	1 11/16 (42.9)	1.23 (31.2)	0.87 (22.1)	2.04 (51.8)	4700 (323)



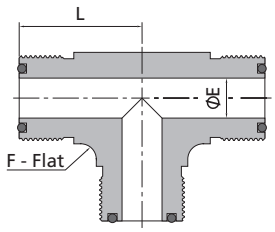
FO Body to Male SAE/MS Thread Adjustable Elbow

FO Size (in.)	P-SAE/MS Thread Size	Basic Ordering Number	Dimensions, in. (mm)						Working Pressure psig (bar)
			L	F	B	E	D	Lx	
1/4	7/16-20	-LP-FO4-ST7	0.96 (24.4)	1/2 (12.7)	0.39 (9.9)	0.18 (4.6)	0.65 (16.5)	1.19 (30.2)	4500 (310)
1/2	9/16-18	-LP-FO8-ST9	1.33 (33.8)	13/16 (20.6)	0.44 (11.2)	0.30 (7.6)	0.79 (20.1)	1.54 (39.1)	3600 (248)
1/2	3/4-16	-LP-FO8-ST12	1.33 (33.8)	13/16 (20.6)	0.50 (12.7)	0.40 (10.2)	1.01 (25.7)	1.65 (41.9)	3600 (248)
3/4	1 1/16-12	-LP-FO12-ST17	1.53 (38.9)	1 1/4 (31.8)	0.66 (16.8)	0.62 (15.7)	1.44 (36.6)	2.13 (54.1)	2900 (199)
1	1 5/16-12	-LP-FO16-ST21	1.72 (43.7)	1 11/16 (42.9)	0.66 (16.8)	0.87 (22.1)	1.73 (43.9)	2.31 (58.7)	2300 (158)



FO Body Union Elbow

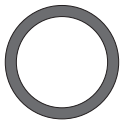
FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
		L	F	E	
1/4	-LU-FO4	0.96 (24.4)	9/16 (14.3)	0.18 (4.6)	14300 (985)
1/2	-LU-FO8	1.26 (32.0)	13/16 (20.6)	0.40 (10.2)	11100 (764)
3/4	-LU-FO12	1.48 (37.6)	1 1/4 (31.8)	0.62 (15.7)	10900 (751)
1	-LU-FO16	1.56 (39.6)	1 11/16 (42.9)	0.87 (22.1)	8800 (606)



FO Body Union Tee

FO Size (in.)	Basic Ordering Number	Dimensions, in. (mm)			Working Pressure psig (bar)
		L	F	E	
1/4	-TTT-FO4	0.96 (24.4)	9/16 (14.3)	0.18 (4.6)	14300 (985)
1/2	-TTT-FO8	1.26 (32.0)	13/16 (20.6)	0.40 (10.2)	11100 (764)
3/4	-TTT-FO12	1.48 (37.6)	1 1/4 (31.8)	0.62 (15.7)	10900 (751)
1	-TTT-FO16	1.56 (39.6)	1 11/16 (42.9)	0.87 (22.1)	8800 (606)

O-rings



FO Size (in.)	Basic Ordering Number
1/8-1/4	-010
3/8-1/2	-111
3/4	-116
1	-215

Add the O-ring material designator in page F-42 as a prefix to the basic ordering number to get the complete ordering number.
Example: VI7-010

Diaphragm Valves

DQ, DP, DH, DM, DS, DR, DV, DL and DF Series

Diaphragm Valves

DQ Series Low Pressure Manual Diaphragm Valves

Features

◎ Low internal volume, fully swept flow path
◎ Contained seat to provide excellent resistance to swelling and contamination
◎ Elgiloy diaphragm to provide high strength and corrosion resistance to ensure long cycle life
◎ Different handle types available
◎ Suitable for ultra high purity applications

Technical Data

Port Size		1/4" to 3/8" or 6 mm to 8 mm
Flow Coefficient (Cv)		0.27
Orifice Size		0.16 in. (4.1 mm)
Max. Working Pressure		250 psig (17.2 bar)
Temperature		PCTFE: -10~150°F (-23~65°C) PFA: -10~302°F (-23~150°C)
Leak Rate (Helium)	**Internal**	$\leqslant 1x10^{-9}$ mbar l/s
	External	$\leqslant 1x10^{-9}$ mbar l/s

Flow Data

Air @ 70°F (21°C)
Water @ 60°F (16°C)

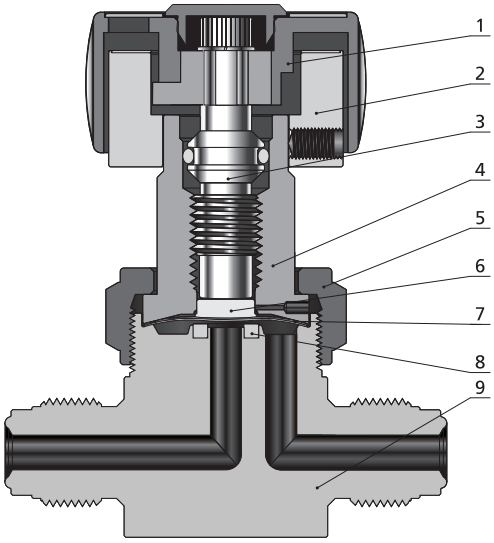
Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10 (0.68)	86	3.2
50 (3.4)	230	7.2
100 (6.8)	410	10.2

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316L SS/ASTM A479		316L VAR/SEMI F20 316L VIM-VAR /SEMI F20
Wetted Surface Roughness	Ra 10 µin. (0.25 µm)①		Ra 5 µin. (0.13 µm)
Polishing Process	Machine finished①		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

① For FR connections and tube butt connections, the standard polishing process is electropolishing and the internal surface roughness is finished to an average of Ra 5 µin. (0.13 µm).

Major Materials of Construction



Round Handle Model

Item	Component		Material/Specification
1	Handle	Round	ABS
		Integral Lockout	Aluminum
2	Actuator		Aluminum
3	Stem		316 SS/ASTM A479
4	Bonnet		S17400/ASTM A564
5	Bonnet Nut		316 SS/ASTM A479
6	Button		316 SS/ASTM A479
7	Diaphragm (2)		Elgiloy/AMS 5876
8	Seat		PCTFE/ASTM D1430 or PFA/ASTM D3307
9	Body		316L SS/ASTM A479 or 316L VAR/SEMI F20 or 316L VIM-VAR/SEMI F20

Manual Actuators

Round Handle

- Quick, quarter-turn actuation
- Handle with window to visually indicate open and closed states

OPEN

CLOSED

Integral Lockout Handle

- Quick, quarter-turn actuation
- Lockable in the closed position for safety

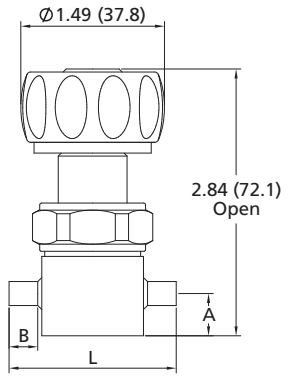
Dimensions and Ordering Information

Straight Type

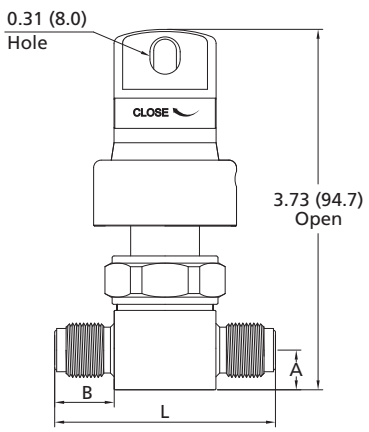
Dimensions

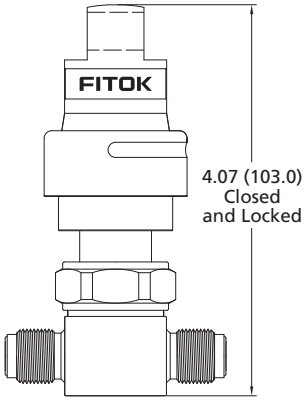
Dimensions, in inches (millimeters), are for reference only.

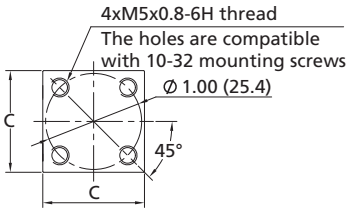
Round Handle

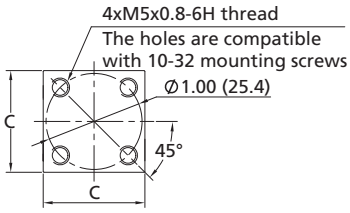


Integral Lockout Handle









Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
DQ□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.06 (26.9)	1.74 (44.2)
DQ□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.26 (6.6)	1.06 (26.9)	1.74 (44.2)
DQ□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	2.78 (70.6)
DQ□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	2.78 (70.6)
DQ□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	1.06 (26.9)	2.30 (58.4)

Ordering Number Description

DQ6L – TB4 – FR4 – RAF2

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Inlet Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Handle Type	
R	Round
U	Integral Lockout

Seat	
	PCTFE
A	PFA

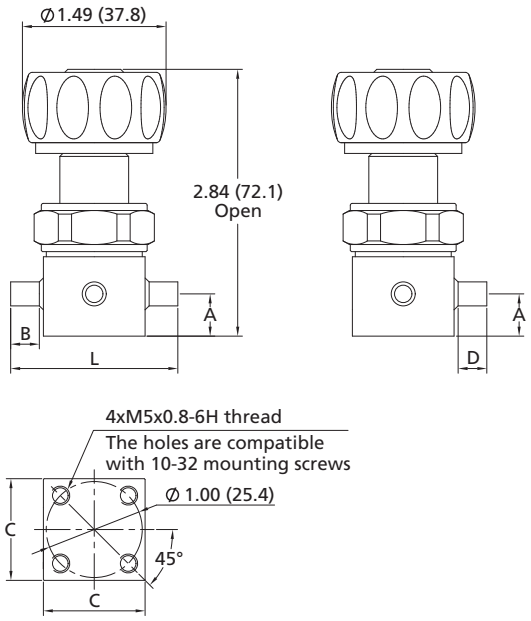
Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Branch Type

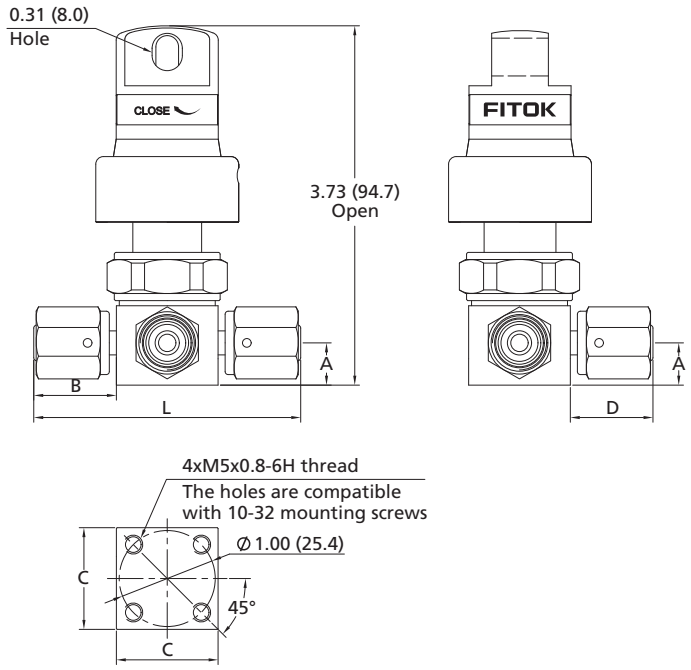
Dimensions

Dimensions, in inches (millimeters), are for reference only.

Round Handle



Integral Lockout Handle

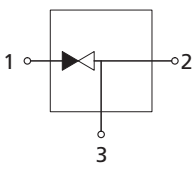


Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DQ□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.06 (26.9)	0.30 (7.6)	1.74 (44.2)
DQ□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.26 (6.6)	1.06 (26.9)	0.26 (6.6)	1.74 (44.2)
DQ□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	0.86 (21.8)	2.78 (70.6)
DQ□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	0.86 (21.8)	2.78 (70.6)
DQ□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	1.06 (26.9)	0.62 (15.7)	2.30 (58.4)

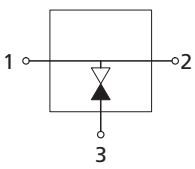
Flow Paths

◎ Flow paths as viewed from the top

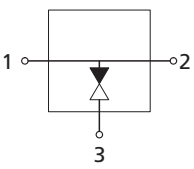
3D Flow



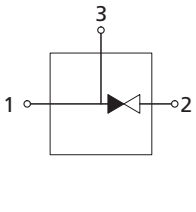
3E Flow



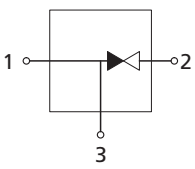
3F Flow



3G Flow



3K Flow



Ordering Number Description

DQ6L – TB4 – FR4 – FFR4 – 3G – RAF2

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Port 1 Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Port 1 Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Port 2/3 Type / Port 2/3 Size	
	Same as Port 1
Specified in the same way as Port 1 type and size	

Flow Path
3D
3E
3F
3G
3K

Handle Type	
R	Round
U	Integral Lockout

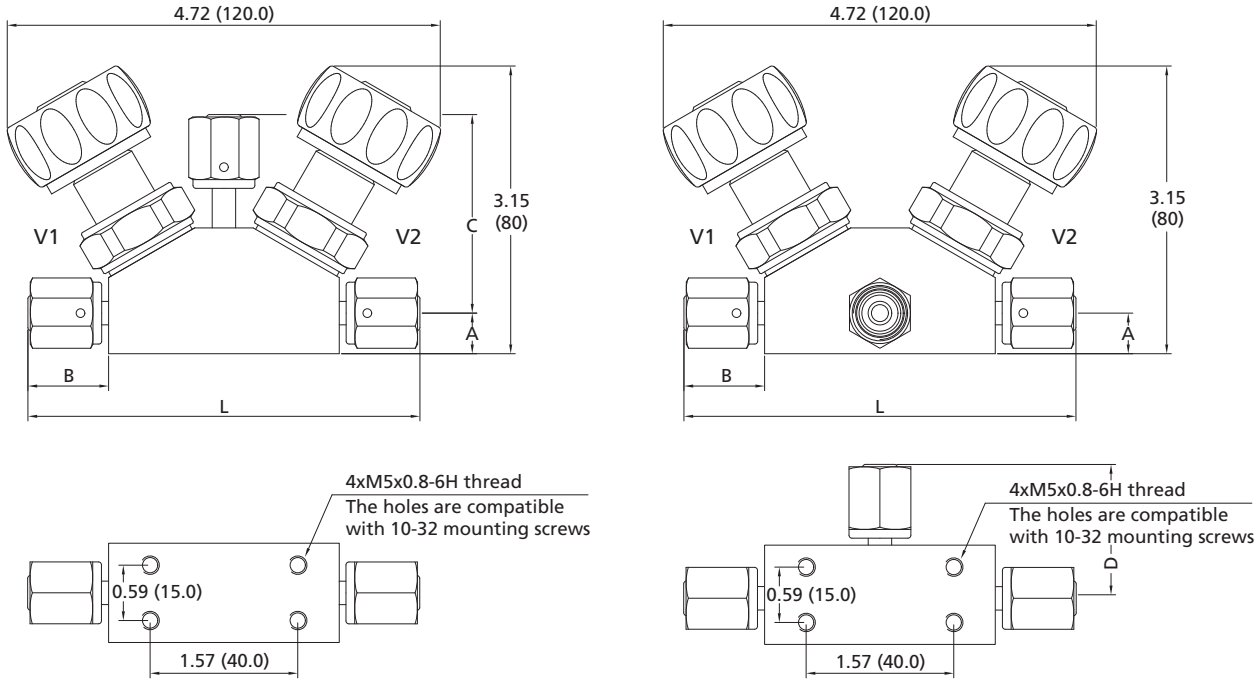
Seat	
	PCTFE
A	PFA

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

2-Valve 3-Way Block Type

Dimensions

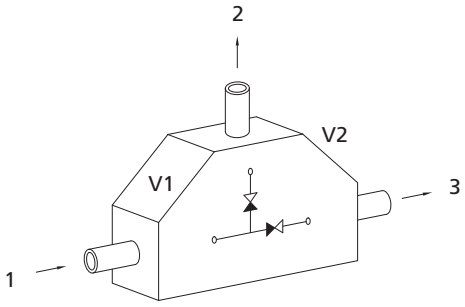
Dimensions, in inches (millimeters), are for reference only.



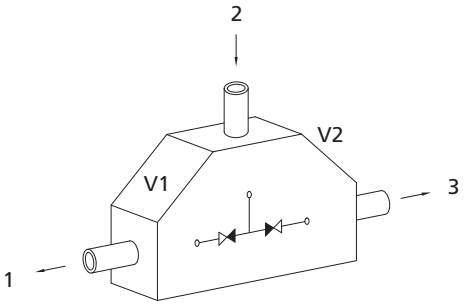
Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DQ23□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	2.12 (53.8)	—	4.24 (107.6)
DQ23□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	—	1.37 (34.8)	4.24 (107.6)
DQ23□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	2.12 (53.8)	—	4.24 (107.6)
DQ23□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	—	1.37 (34.8)	4.24 (107.6)

Flow Paths

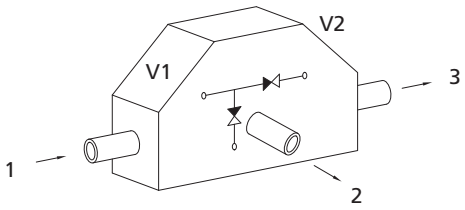
VT Flow



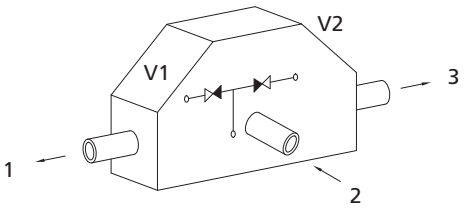
WT Flow



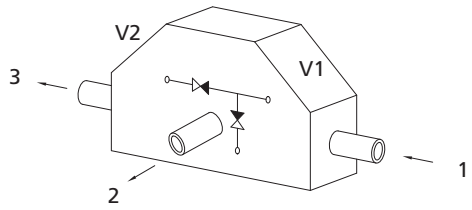
VF Flow



WF Flow



VB Flow



Ordering Number Description

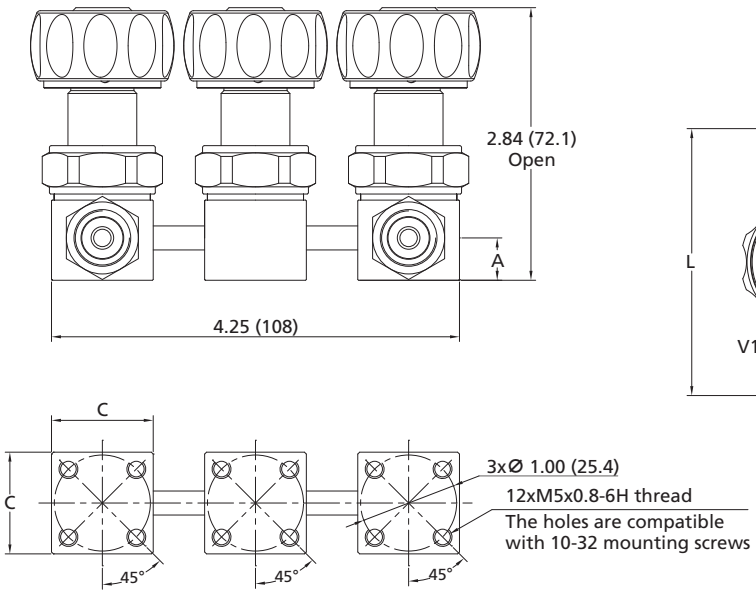
DQ236L – FFR4 – RFR4 – FFR4 – VF – RAF2

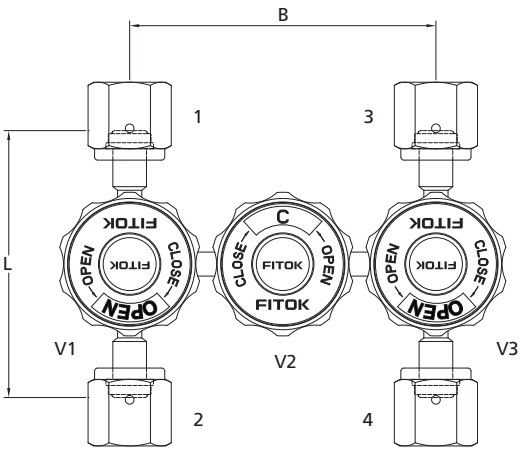
Type		Body Material		Port 1 Type		Port 1 Size		Port 2/3 Type	Port 2/3 Size	Flow Path	Seat		Product Grade	
23	2 Valves and 3 Ports	6L	316L SS	FFR	Female FR Fitting	4	1/4"	Same as Port 1	Same as Port 1	VT		PCTFE		Standard Cleaning and Packaging
		6LV	316L VAR	RFR	Rotatable Male FR Fitting			Specified in the same way as Port 1 type and size		VF	A	PFA	F2	Special Cleaning and Packaging
		6LW	316L VIM-VAR							VB	Handle Type		F3	Ultra High Purity
										WT	R	Round		
										WF	U	Integral Lcokout		

3-Valve 4-Way Block Type

Dimensions

Dimensions, in inches (millimeters), are for reference only.

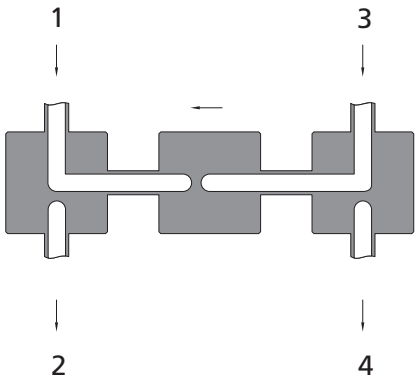




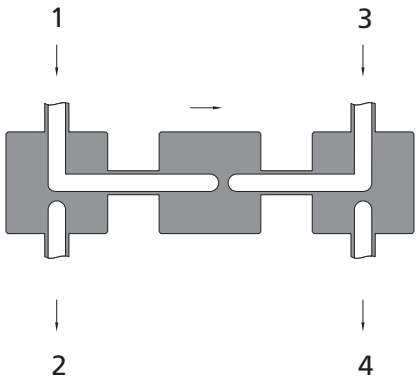
Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
DQ34□□-FFR4-	1/4" Female FR	0.44 (11.2)	3.19 (81.0)	1.06 (26.9)	2.78 (70.6)
DQ34□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	3.19 (81.0)	1.06 (26.9)	2.78 (70.6)

Flow Paths

◎ Flow paths as viewed from the top



GK Flow



KG Flow

Ordering Number Description

DQ346L – FFR4 – RFR4 – FFR4 – FFR4 – GK – RAF3

Type	
34	3 Valves and 4 Ports

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Port 1 Type	
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting

Port 1 Size	
4	1/4 "

Port 2/3/4 Type	
	Same as Port 1
	Specified in the same way as Port 1 type and size

Port 2/3/4 Size	
	Same as Port 1
	Specified in the same way as Port 1 type and size

Flow Path	
GK	
KG	

Handle Type	
R	Round
U	Integral Lockout

Seat	
	PCTFE
A	PFA

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Diaphragm Valves

DP Series Low Pressure Pneumatic Diaphragm Valves

Features

◎ Minimum particle generation and dead space
◎ Fully contained seat to provide excellent resistance to swelling and contamination
◎ Elgiloy diaphragm to provide high strength and corrosion resistance
◎ Long cycle life with high speed actuation
◎ Internally threadless and springless
◎ Fully functional under vacuum conditions
◎ Indicator switch available assembled on normally closed pneumatically actuated valves

Technical Data

Port Size		1/4" to 3/8" or 6 mm to 8 mm
Flow Coefficient (Cv)		0.27
Orifice Size		0.16 in. (4.1 mm)
Max. Working Pressure		250 psig (17.2 bar)
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)
		70 psig (4.8 bar) for actuator with indicator switch
Temperature		PCTFE: -10~150°F (-23~65°C) PFA: -10~302°F (-23~150°C)
Leak Rate (Helium)	**Internal**	≤1x10^{-9} mbar l/s
	External	≤1x10^{-9} mbar l/s

Flow Data

Air @ 70°F (21°C)
Water @ 60°F (16°C)

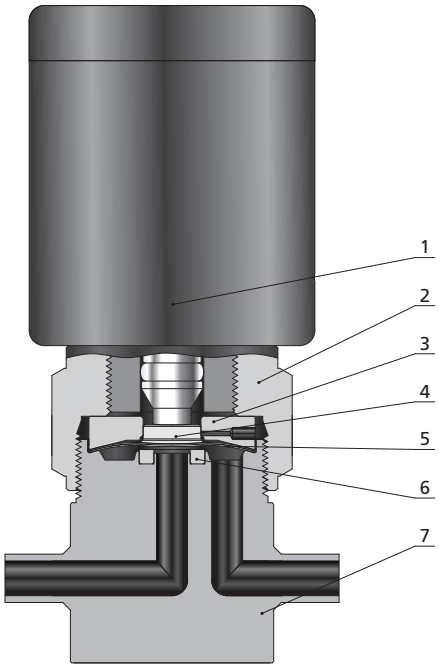
Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10 (0.68)	86	3.2
50 (3.4)	230	7.2
100 (6.8)	410	10.2

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316L SS/ASTM A479		316L VAR/SEMI F20 316L VIM-VAR /SEMI F20
Wetted Surface Roughness	Ra 10 µin. (0.25 µm)①		Ra 5 µin. (0.13 µm)
Polishing Process	Machine finished①		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

① For FR connections and tube butt connections, the standard polishing process is electropolishing and the internal surface roughness is finished to an average of Ra 5 µin. (0.13 µm).

Major Materials of Construction



Normally Closed Model

Item	Component	Material/Specification
1	Actuator	Aluminum
2	Bonnet Nut	316 SS/ASTM A479
3	Bonnet	S17400/ASTM A564
4	Button	316 SS/ASTM A479
5	Diaphragm (2)	Elgiloy/AMS 5876
6	Seat	PCTFE/ASTM D1430 or PFA/ASTM D3307
7	Body	316L SS/ASTM A479 or 316L VAR/SEMI F20 or 316L VIM-VAR/SEMI F20

Pneumatic Actuators

◎ Normally open, "N.O." marked on the top of the cylinder
◎ Normally closed, "N.C." marked on the top of the cylinder

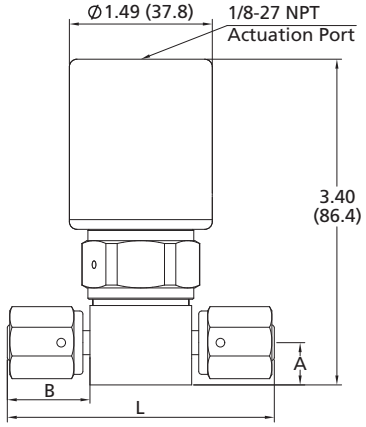
Normally Open/Closed
Indicator Switch
Rated voltage: 220 V (ac)
Rated current: 1/2 A

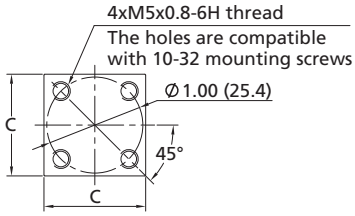
Dimensions and Ordering Information

Straight Type

Dimensions

Dimensions, in inches (millimeters), are for reference only.





Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
DP□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.06 (26.9)	1.74 (44.2)
DP□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.26 (6.6)	1.06 (26.9)	1.74 (44.2)
DP□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	2.78 (70.6)
DP□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	2.78 (70.6)
DP□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	1.06 (26.9)	2.30 (58.4)

Ordering Number Description

DP6L – TB4 – FR4 – CAF2M

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Inlet Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Actuator Type	
C	Normally Closed
O	Normally Open

Seat	
	PCTFE
A	PFA

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

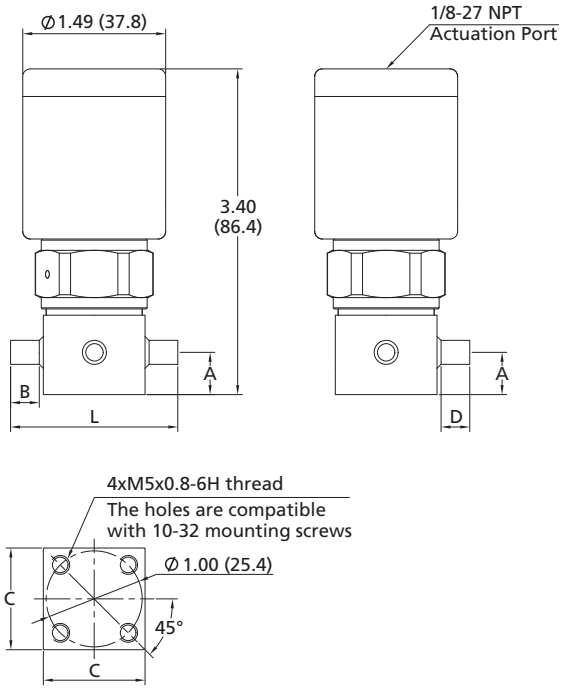
Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for normally closed pneumatically actuated valves

Branch Type

Dimensions

Dimensions, in inches (millimeters), are for reference only.

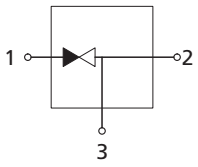


Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DP□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.06 (26.9)	0.30 (7.6)	1.74 (44.2)
DP□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.26 (6.6)	1.06 (26.9)	0.26 (6.6)	1.74 (44.2)
DP□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	0.86 (21.8)	2.78 (70.6)
DP□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	0.86 (21.8)	2.78 (70.6)
DP□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	1.06 (26.9)	0.62 (15.7)	2.30 (58.4)

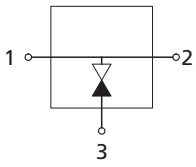
Flow Paths

◎ Flow paths as viewed from the top

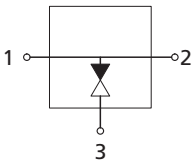
3D Flow



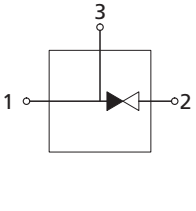
3E Flow



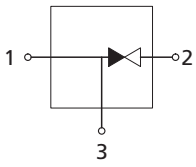
3F Flow



3G Flow



3K Flow



Ordering Number Description

DP6L – TB4 – FR4 – FFR4 – 3G – CAF2M

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Port 1 Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Port 1 Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Port 2/3 Type / Port 2/3 Size	
	Same as Port 1

Specified in the same way as Port 1 type and size

Flow Path
3D
3E
3F
3G
3K

Actuator Type	
C	Normally Closed
O	Normally Open

Seat	
	PCTFE
A	PFA

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

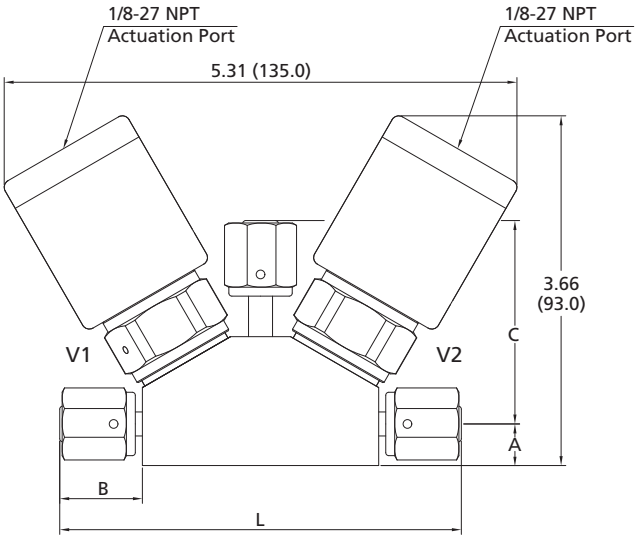
Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

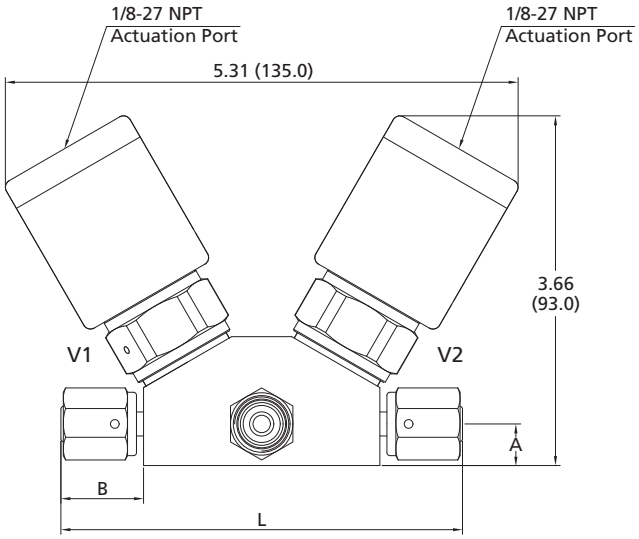
Note: Only for normally closed pneumatically actuated valves

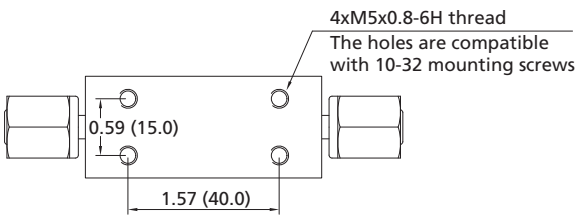
2-Valve 3-Way Block Type

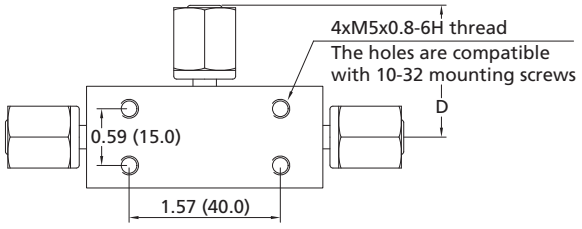
Dimensions

Dimensions, in inches (millimeters), are for reference only.





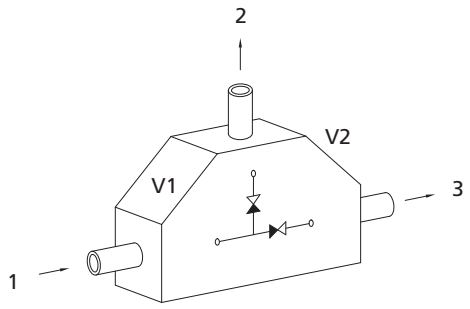




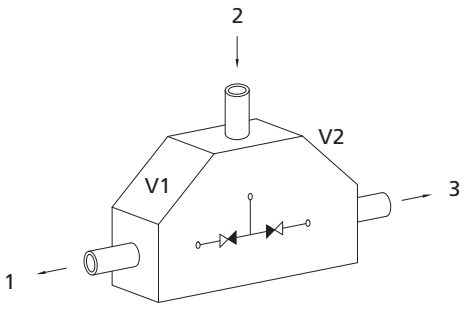
Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DP23□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	2.12 (53.8)	—	4.24 (107.6)
DP23□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	—	1.37 (34.8)	4.24 (107.6)
DP23□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	2.12 (53.8)	—	4.24 (107.6)
DP23□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	—	1.37 (34.8)	4.24 (107.6)

Flow Paths

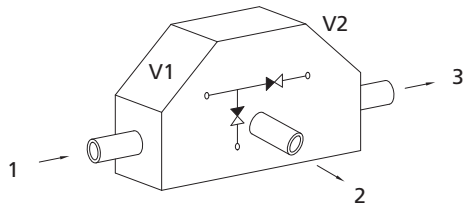
VT Flow



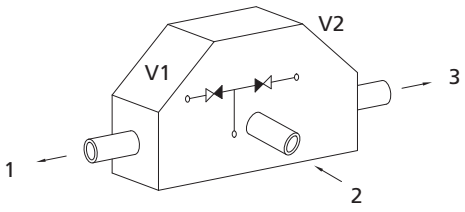
WT Flow



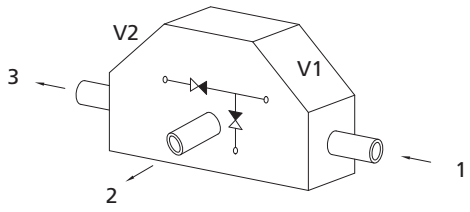
VF Flow



WF Flow



VB Flow



Ordering Number Description

DP236L – FFR4 – RFR4 – FFR4 – VF – COAF2M

Type	
23	2 Valves and 3 Ports

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Port 1 Type	
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting

Port 1 Size	
4	1/4"

Port 2/3 Type	Port 2/3 Size
	Same as Port 1
Specified in the same way as Port 1 type and size	

Flow Path
VT
VF
VB
WT
WF

Actuator Type (V1 and V2)	
C	V1 Pneumatic (Normally Closed) V2 Pneumatic (Normally Closed)
O	V1 Pneumatic (Normally Open) V2 Pneumatic (Normally Open)
CO	V1 Pneumatic (Normally Closed) V2 Pneumatic (Normally Open)
OC	V1 Pneumatic (Normally Open) V2 Pneumatic (Normally Closed)

Seat	
	PCTFE
A	PFA

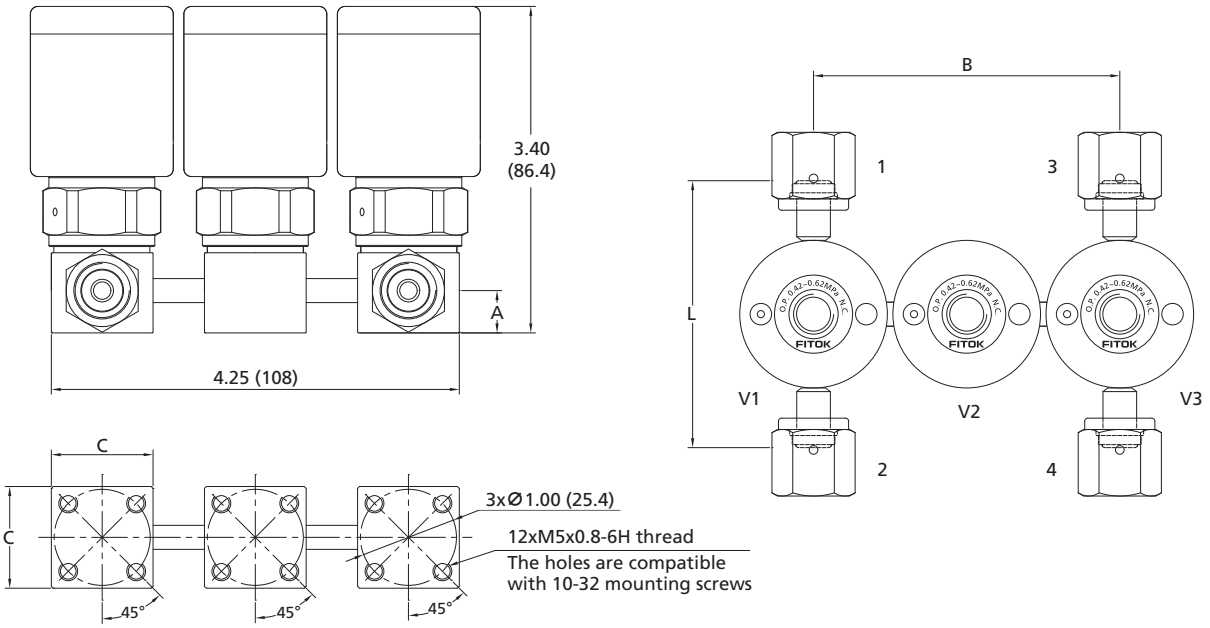
Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed
Note: Only for normally closed pneumatically actuated valves	

3-Valve 4-Way Block Type

Dimensions

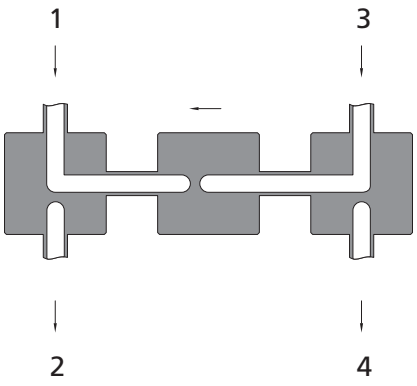
Dimensions, in inches (millimeters), are for reference only.



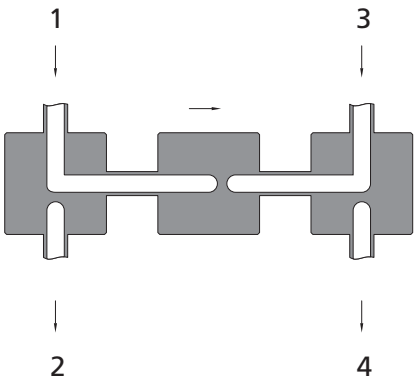
Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
DP34□□-FFR4-	1/4" Female FR	0.44 (11.2)	3.19 (81.0)	1.06 (26.9)	2.78 (70.6)
DP34□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	3.19 (81.0)	1.06 (26.9)	2.78 (70.6)

Flow Paths

◎ Flow paths as viewed from the top



GK Flow



KG Flow

Ordering Number Description

DP346L - FFR4 - RFR4 - FFR4 - FFR4 - GK - CAF3M

Type	
34	3 Valves and 4 Ports

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Port 1 Type	
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting

Port 1 Size	
4	1/4 "

Port 2/3/4 Type	Port 2/3/4 Size
Same as Port 1	
Specified in the same way as Port 1 type and size	

Flow Path
GK
KG

Seat	
	PCTFE
A	PFA

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Actuator Type	
C	Normally Closed
O	Normally Open

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for normally closed pneumatically actuated valves

Diaphragm Valves

DH Series High Pressure Springless Diaphragm Valves

Features

◎ Metal-to-metal diaphragm seal
◎ Elgiloy diaphragm to provide high strength and corrosion resistance
◎ Long cycle life in high pressure application
◎ Manual and pneumatic actuators available
◎ Indicator switch available assembled on pneumatically actuated valves
◎ Normally open and normally closed indicator switches optional

Technical Data

Port Size		1/4" to 3/8" or 6 mm to 8 mm
Flow Coefficient (Cv)		0.20
Orifice Size		0.16 in. (4.1 mm)
Max. Working Pressure		3000 psig (206 bar)
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)
Temperature		PCTFE: -10~150°F (-23~65°C)
Leak rate (Helium)	**Internal**	$\leqslant 1x10^{-9}$ mbar l/s
	External	$\leqslant 1x10^{-9}$ mbar l/s

Flow Data

Air @ 70°F (21°C)
Water @ 60°F (16°C)

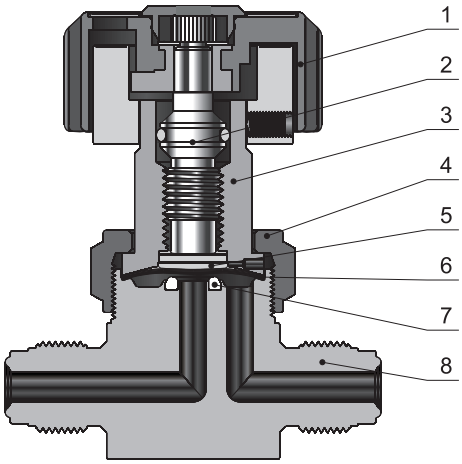
Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10 (0.68)	64	2.4
50 (3.4)	170	5.4
100 (6.8)	300	7.6

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316L SS/ASTM A479		316L VAR/SEMI F20 316L VIM-VAR /SEMI F20
Wetted Surface Roughness	Ra 10 µin. (0.25 µm)①		Ra 5 µin. (0.13 µm)
Polishing Process	Machine finished①		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

① For FR connections and tube butt connections, the standard polishing process is electropolishing and the internal surface roughness is finished to an average of Ra 5 µin. (0.13 µm).

Major Materials of Construction



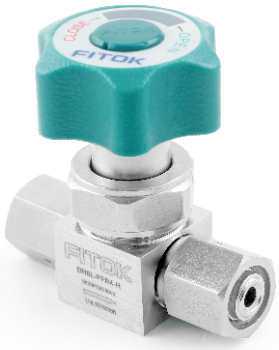
Round Handle Model

Item	Component	Material/Specification
1	Handle	ABS
2	Stem	316 SS/ASTM A479
3	Bonnet	S17400/ASTM A564
4	Bonnet Nut	316 SS/ASTM A479
5	Button	316 SS/ASTM A479
6	Diaphragm (5)	Elgiloy(3)/AMS 5876 + C17200(2)/ASTM B194
7	Seat	PCTFE/ASTM D1430
8	Body	316L SS/ASTM A479 or 316L VAR/SEMI F20 or 316L VIM-VAR/SEMI F20

Actuators

Manual - Round Handle

- Quick, quarter-turn actuation
- Handle with window to visually indicate open and closed states



Pneumatic

- Normally open, "N.O." marked on the top of the cylinder
- Normally closed, "N.C." marked on the top of the cylinder

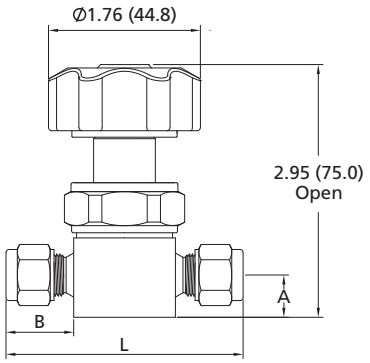
Dimensions and Ordering Information

Straight Type

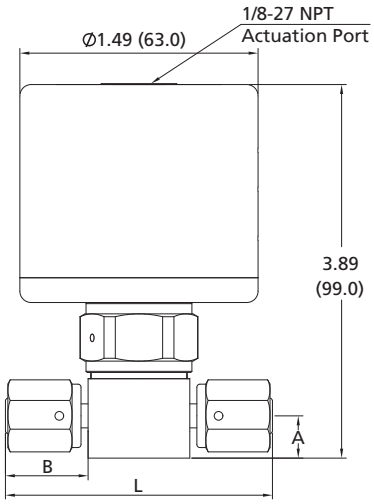
Dimensions

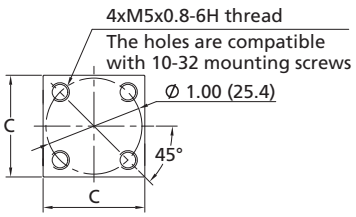
Dimensions, in inches (millimeters), are for reference only.

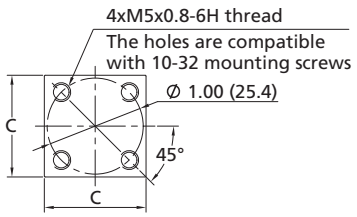
Manual - Round Handle



Pneumatic







Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
DH□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.06 (26.9)	1.74 (44.2)
DH□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.26 (6.6)	1.06 (26.9)	1.74 (44.2)
DH□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	2.78 (70.6)
DH□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	2.78 (70.6)
DH□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	1.06 (26.9)	2.30 (58.4)
DH□□-ML6-	6 mm FITOK Tube Fitting	0.44 (11.2)	0.70 (17.9)	1.06 (26.9)	2.47 (62.7)

Ordering Number Description

DH6L – FL4 – ML6 – CF2M

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Inlet Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Outlet Type	Outlet Size
Same as Inlet	

Specified in the same way as Inlet type and size

Actuator Type	
R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Note: For butt weld connection, pneumatic actuator is not recommended unless it causes no interference to welding.

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

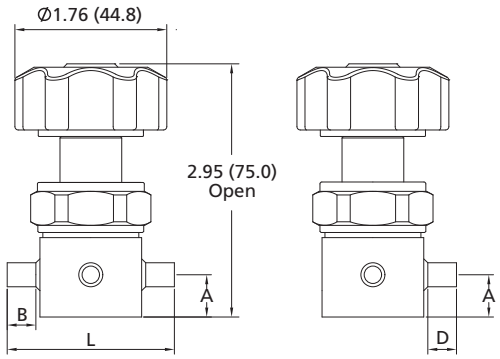
Note: Only for pneumatically actuated valves

Branch Type

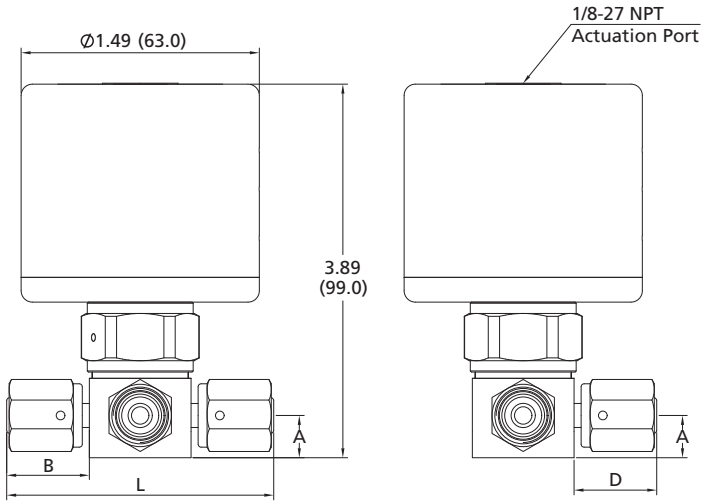
Dimensions

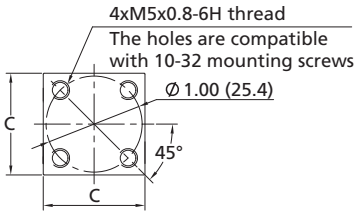
Dimensions, in inches (millimeters), are for reference only.

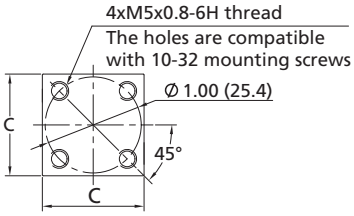
Manual - Round Handle



Pneumatic





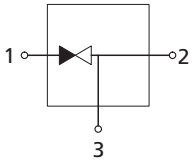


Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DH□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.06 (26.9)	0.30 (7.6)	1.74 (44.2)
DH□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.26 (6.6)	1.06 (26.9)	0.26 (6.6)	1.74 (44.2)
DH□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	0.86 (21.8)	2.78 (70.6)
DH□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	0.86 (21.8)	1.06 (26.9)	0.86 (21.8)	2.78 (70.6)
DH□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	1.06 (26.9)	0.62 (15.7)	2.30 (58.4)
DH□□-FL4-	1/4" FITOK Tube Fitting	0.44 (11.2)	0.70 (17.9)	1.06 (26.9)	0.70 (17.9)	2.47 (62.7)

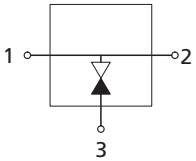
Flow Paths

◎ Flow paths as viewed from the top

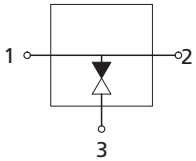
3D Flow



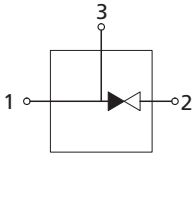
3E Flow



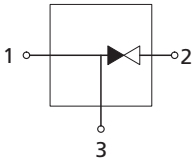
3F Flow



3G Flow



3K Flow



Ordering Number Description

DH6L – TB4 – TB4 – FR4 – 3F – CF2M

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Port 1 Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Port 1 Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Port 2/3 Type / Port 2/3 Size	
	Same as Port 1

Specified in the same way as Port 1 type and size

Flow Path
3D
3E
3F
3G
3K

Actuator Type	
R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Note: For butt weld connection, pneumatic actuator is not recommended unless it causes no interference to welding.

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for pneumatically actuated valves

Diaphragm Valves

DM Series High Pressure Spring Diaphragm Valves

Features

- ◎ All-metal containment, packless
- ◎ Repetitive shutoff with fully contained soft-seat stem tip
- ◎ Position indicator ring for lever handle
- ◎ Reduced seat volume
- ◎ Fully functional under vacuum conditions
- ◎ Different handle types and pneumatic actuators available
- ◎ Indicator switch available assembled on pneumatically actuated valves
- ◎ Normally open and normally closed indicator switches optional

Technical Data

Port Size		1/4" to 3/8" or 6 mm to 8 mm
Flow Coefficient (Cv)	**Lever Handle**	0.14
	Round Handle	0.30
	Pneumatic Actuator	0.20
Orifice Size		0.16 in. (4.1 mm)
Max. Working Pressure		3500 psig (241 bar)
Max. Differential Back Pressure ①		1500 psig (103 bar)
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)
Temperature		PCTFE: -100~250°F (-73~121°C) Vespel: -100~320°F (-73~160°C)
Leak Rate (Helium)	**Internal**	≤4x10^{-9} mbar l/s
	External	≤4x10^{-9} mbar l/s

① *A 17-7 stainless steel spring is available to increase the rating to 2500 psig (172 bar). To order, please contact FITOK group or our authorized distributors.*

Flow Data

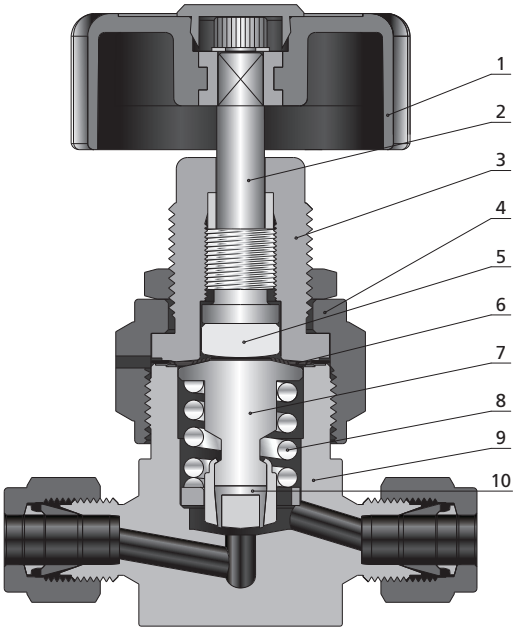
Air @ 70°F (21°C)
Water @ 60°F (16°C)

Pressure Drop to Atmosphere psi (bar)	Lever Handle		Round Handle		Pneumatic Actuator	
	Air (l/min)	Water (l/min)	Air (l/min)	Water (l/min)	Air (l/min)	Water (l/min)
10 (0.68)	49	1.6	100	3.5	64	2.4
50 (3.4)	130	3.9	270	8.0	170	5.4
100 (6.8)	240	5.4	490	11.4	300	7.6

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316 SS/ASTM A479 or 316L SS/ASTM A479		316L SS/ASTM A479
Wetted Surface Roughness	Ra 20 μin. (0.51 μm)		Ra 10 μin. (0.25 μm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

Major Materials of Construction



Round Handle Model

Item	Component	Material/Specification
1	Handle	Aluminum
2	Actuator	316 SS/ASTM A479
3	Bonnet	316 SS/ASTM A479
4	Bonnet Nut	316 SS/ASTM A479
5	Button	C36000/ASTM B16
6	Diaphragm (3)	Elgiloy/AMS 5876
7	Stem	316L SS/ASTM A479
8	Spring	316 SS/ASTM A313
9	Body	316 SS/ASTM A479 or 316L SS/ASTM A479
10	Seat	PCTFE/ASTM D1430 or Vespel

Actuators

Manual - Lever Handle

◎ Quick, quarter-turn actuation
◎ Position indicator ring to visually indicate open and closed states

Manual - Round Handle

◎ One and a half turns to operate from fully open to closed

Pneumatic

◎ Normally open, "N.O." marked on the top of the cylinder
◎ Normally closed, "N.C." marked on the top of the cylinder

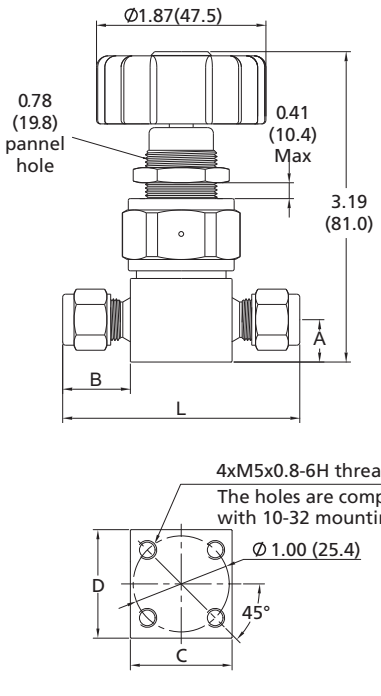
Dimensions and Ordering Information

Straight Type

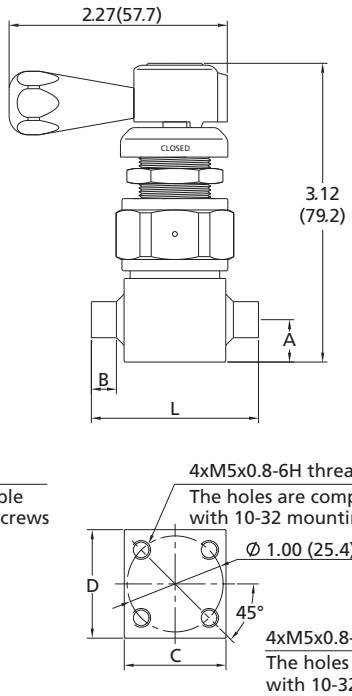
Dimensions

Dimensions, in inches (millimeters), are for reference only.

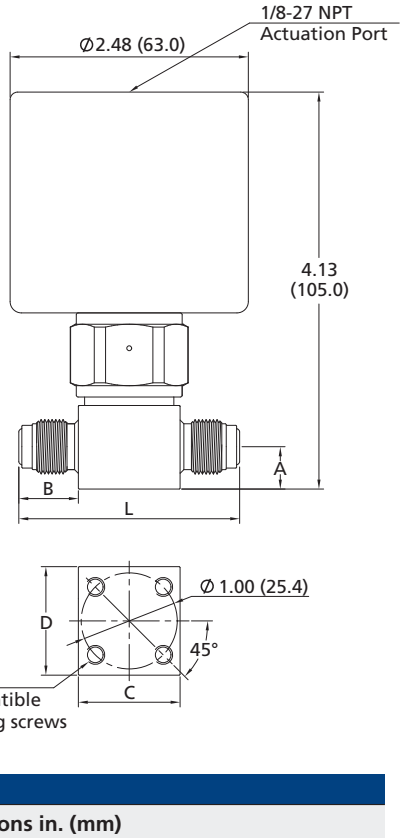
Manual - Round Handle



Manual - Lever Handle



Pneumatic



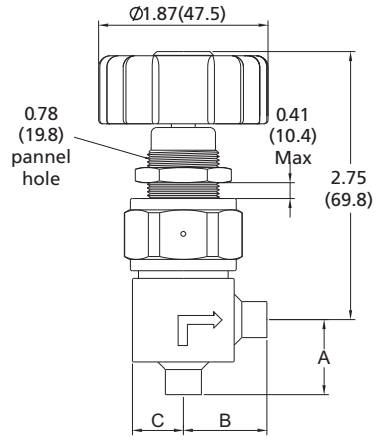
Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DM□□-FL4-	1/4" FITOK Tube Fitting	0.44 (11.2)	0.70 (17.9)	1.06 (26.9)	1.13 (28.7)	2.46 (62.5)
DM□□-FL6-	3/8" FITOK Tube Fitting	0.44 (11.2)	0.76 (19.3)	1.06 (26.9)	1.13 (28.7)	2.58 (65.5)
DM□□-ML6-	6 mm FITOK Tube Fitting	0.44 (11.2)	0.70 (17.9)	1.06 (26.9)	1.13 (28.7)	2.46 (62.5)
DM□□-ML8-	8 mm FITOK Tube Fitting	0.44 (11.2)	0.74 (18.7)	1.06 (26.9)	1.13 (28.7)	2.53 (64.3)
DM□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.06 (26.9)	1.13 (28.7)	1.74 (44.2)
DM□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.26 (6.6)	1.06 (26.9)	1.13 (28.7)	1.74 (44.2)
DM□□-NS4-	1/4" Integral Male FR	0.44 (11.2)	—	1.06 (26.9)	1.13 (28.7)	2.46 (62.5)
DM□□-FNS4-	1/4" Female NPT	0.44 (11.2)	—	1.06 (26.9)	1.13 (28.7)	2.46 (62.5)
DM□□-FR4-	1/4" Male FR	0.44 (11.2)	0.62 (15.7)	1.06 (26.9)	1.13 (28.7)	2.30 (58.4)
DM□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.85 (21.6)	1.06 (26.9)	1.13 (28.7)	2.76 (70.1)
DM□□-FO4-	1/4" Male FO	0.44 (11.2)	0.47 (11.9)	1.06 (26.9)	1.13 (28.7)	2.00 (50.8)

Angle Type

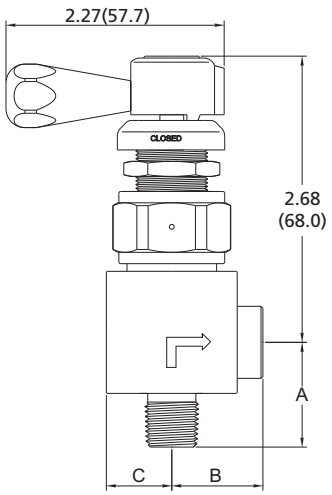
Dimensions

Dimensions, in inches (millimeters), are for reference only.

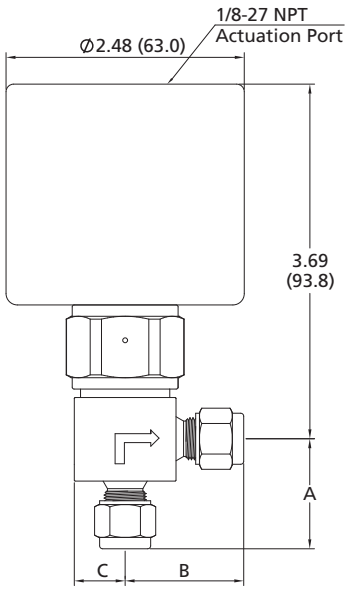
Manual - Round Handlee



Manual - Lever Handle



Pneumatic



Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)		
		A	B	C
DM□□-FL4-	1/4" FITOK Tube Fitting	1.14 (29.1)	1.23 (31.3)	0.53 (13.4)
DM□□-ML6-	6 mm FITOK Tube Fitting	1.14 (29.1)	1.23 (31.3)	0.53 (13.4)
DM□□-TB6-	3/8" Tube Butt Weld	0.78 (19.8)	0.87 (22.0)	0.53 (13.4)
DM□□-NS4-FNS4	Inlet 1/4" Male NPT	1.09 (27.7)	0.95 (24.1)	0.68 (17.3)
	Outlet 1/4" Female NPT			

Ordering Number Description

DMSS − FL4 − ML6 − A − CVF2M

Body Material	
6L	316L SS
SS	316 SS

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting
NS	Male NPT
FNS	Female NPT

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Inlet Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm or 1/2"

Flow Path	
	Straight
A	Angle

Actuator Type	
R	Round Handle
L	Lever Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Note: For butt weld connection, pneumatic actuator is not recommended unless it causes no interference to welding.

Stem Tip Material	
	PCTFE
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

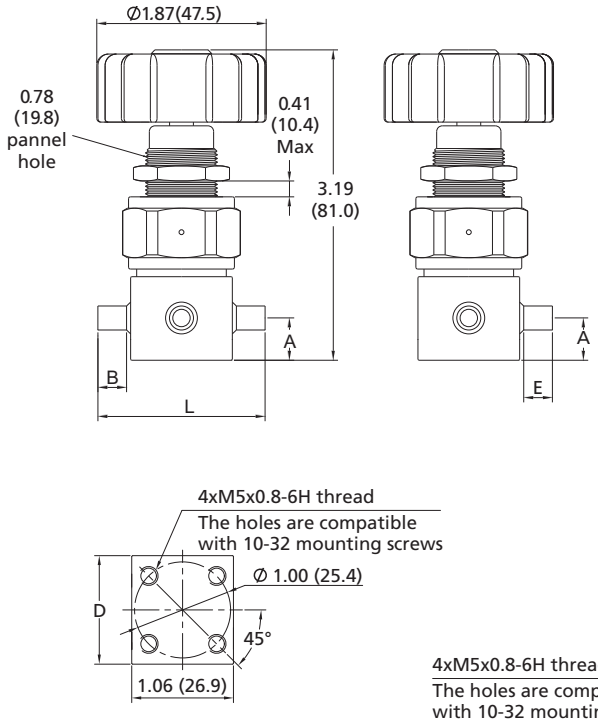
Note: Only for pneumatically actuated valves

Branch Type

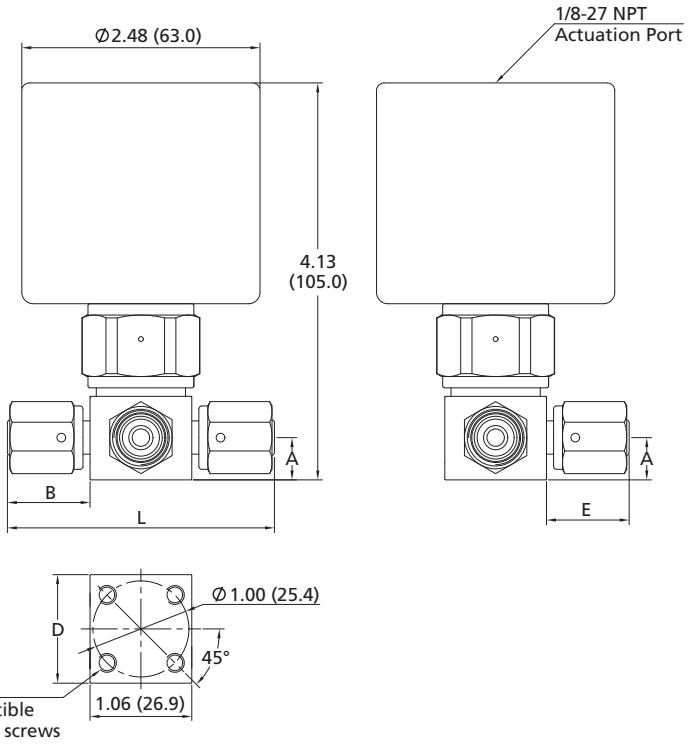
Dimensions

Dimensions, in inches (millimeters), are for reference only.

Manual - Round Handle



Pneumatic

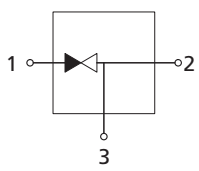


Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	D	E	L
DM□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.13 (28.7)	0.30 (7.6)	1.74 (44.2)
DM□□-MTB6-	6 mm Tube Butt Weld	0.44 (11.2)	0.30 (7.6)	1.13 (28.7)	0.30 (7.6)	1.74 (44.2)
DM□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.85 (21.6)	1.13 (28.7)	0.85 (21.6)	2.76 (70.1)
DM□□-RFR4-	1/4" Rotatable Male FR	0.44 (11.2)	1.21 (30.7)	1.13 (28.7)	1.21 (30.7)	3.48 (88.4)

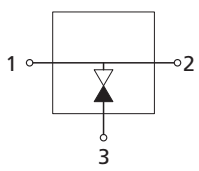
Flow Paths

◎ Flow paths as viewed from the top

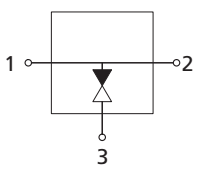
3D Flow



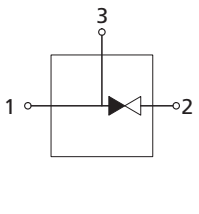
3E Flow



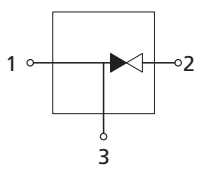
3F Flow



3G Flow



3K Flow



Ordering Number Description

DMSS – TB4 – TB4 – FFR4 – 3F – LVF2M

Body Material	
6L	316L SS
SS	316 SS

Port 1 Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting

Port 1 Size	
4	1/4"
6	6 mm

Port 2/3 Type / Port 2/3 Size	
	Same as Port 1

Specified in the same way as Port 1 type and size

Flow Path
3D
3E
3F
3G
3K

Actuator Type	
R	Round Handle
L	Lever Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Note: For butt weld connection, pneumatic actuator is not recommended unless it causes no interference to welding.

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Stem Tip Material	
	PCTFE
V	Vespel

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for pneumatically actuated valves

Diaphragm Valves

DS Series High Pressure Compact Diaphragm Valves

Features

◎ Reduced inner volume
◎ Packless diaphragm seal to ensure high purity
◎ Minimized number of components
◎ Manual and pneumatic actuators available
◎ Aluminum piston to increase operation speed

Technical Data

Port Size		1/4" to 3/8" or 6 mm to 8 mm
Flow Coefficient (Cv)		0.17
Orifice Size		0.12 in. (3.0 mm)
Max. Working Pressure	**Manual**	4500 psig (310 bar)
	Pneumatic	3000 psig (206 bar)
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)
Temperature		PCTFE: -10~150°F (-23~65°C) Vespel: -10~250°F (-23~121°C)
Leak Rate (Helium)	**Internal**	$\leqslant 1x10^{-9}$ mbar l/s
	External	$\leqslant 1x10^{-9}$ mbar l/s

Flow Data

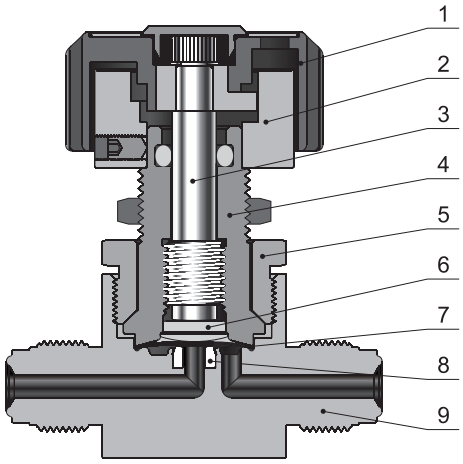
Air @ 70°F (21°C)
Water @ 60°F (16°C)

Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10 (0.68)	55	1.9
50 (3.4)	150	4.5
100 (6.8)	260	6.4

Product Technology Grade

Product Grade / Technology	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316 SS/ASTM A479 316L SS/ASTM A479		316L VAR/SEMI F20 316L VIM-VAR /SEMI F20
Wetted Surface Roughness	Ra 20 µin. (0.51 µm)		Ra 10 µin. (0.25 µm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

Major Materials of Construction



Round Handle Model

Item	Component	Material/Specification
1	Handle	ABS
2	Actuator	Aluminum
3	Stem	316 SS/ASTM A479
4	Bonnet	S17400/ASTM A564
5	Bonnet Nut	316 SS/ASTM A479
6	Button	C36000/B16
7	Diaphragm (5)	Elgiloy (3) /AMS 5876 + C17200 (2) /ASTM B194
8	Seat	PCTFE/ASTM D1430 or Vespel
9	Body	316 SS/ASTM A479 or 316L SS/ASTM A479 or 316L VIM-VAR/SEMI F20

Actuators

Manual - Round Handle

- Quick, quarter-turn actuation
- Handle with window to visually indicate open and closed states

Pneumatic

- Normally open, "N.O." marked on the top of the cylinder
- Normally closed, "N.C." marked on the top of the cylinder

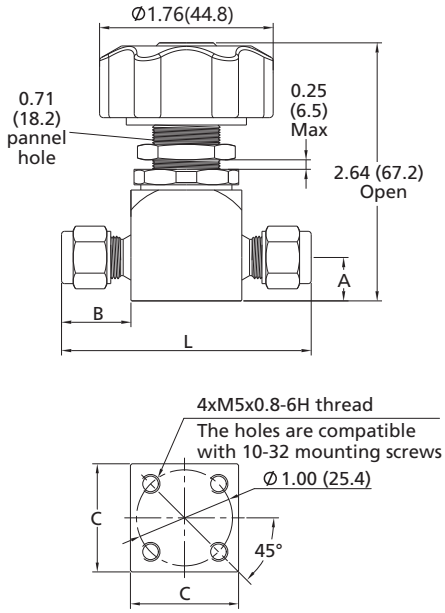
Dimensions and Ordering Information

Straight Type

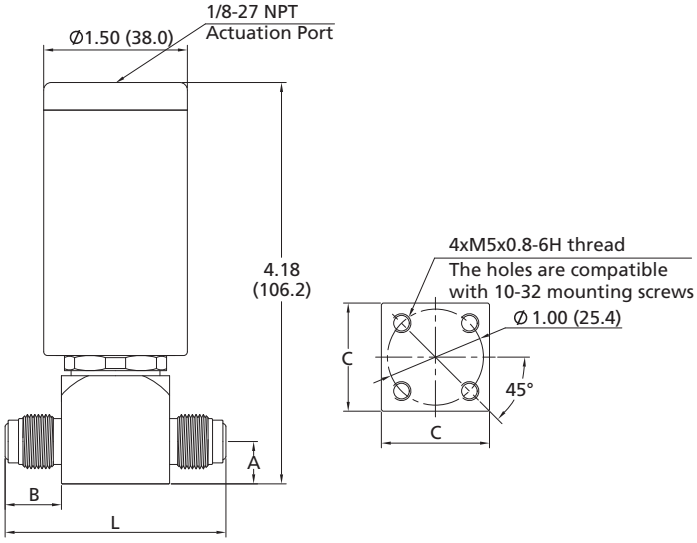
Dimensions

Dimensions, in inches (millimeters), are for reference only.

Manual - Round Handle



Pneumatic



Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
DS□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.34 (8.6)	1.12 (28.6)	1.81 (45.9)
DS□□-TB6-	3/8" Tube Butt Weld	0.44 (11.2)	0.34 (8.6)	1.12 (28.6)	1.81 (45.9)
DS□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	1.12 (28.6)	2.85 (72.3)
DS□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.58 (14.9)	1.12 (28.6)	2.30 (58.4)
DS□□-FL4-	1/4" FITOK Tube Fitting	0.44 (11.2)	0.70 (17.9)	1.12 (28.6)	2.54 (64.4)
DS□□-NS4-	1/4" Male NPT	0.44 (11.2)	0.56 (14.2)	1.12 (28.6)	2.24 (57.0)
DS□□-FNS4-	1/4" Female NPT	0.44 (11.2)	—	1.12 (28.6)	2.36 (60.0)

Ordering Number Description

DS6L – NS4 – FNS4 – RVF2

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR
SS	316 SS

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting
NS	Male NPT
FNS	Female NPT

Inlet Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Actuator Type	
R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

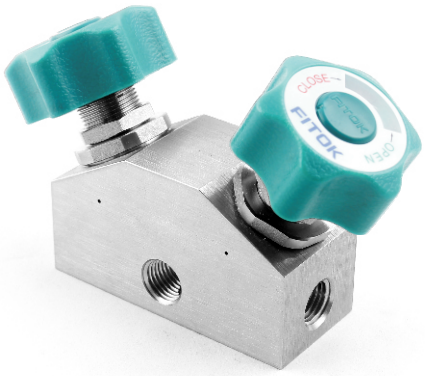
Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Seat	
	PCTFE
V	Vespel

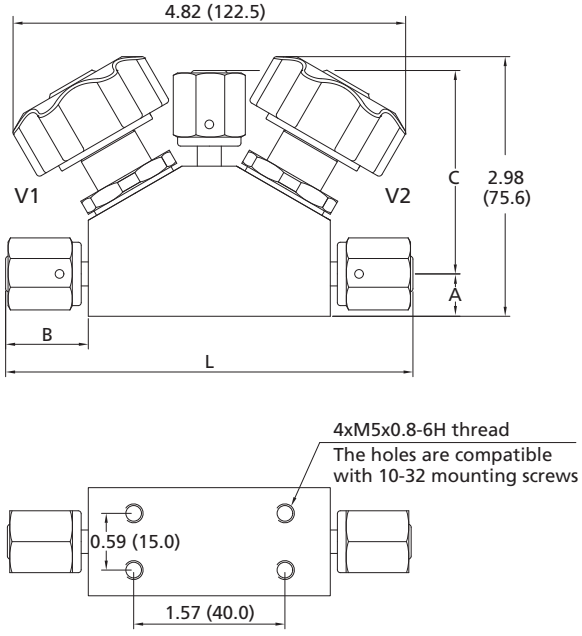
2-Valve 3-Way Block Type

Dimensions

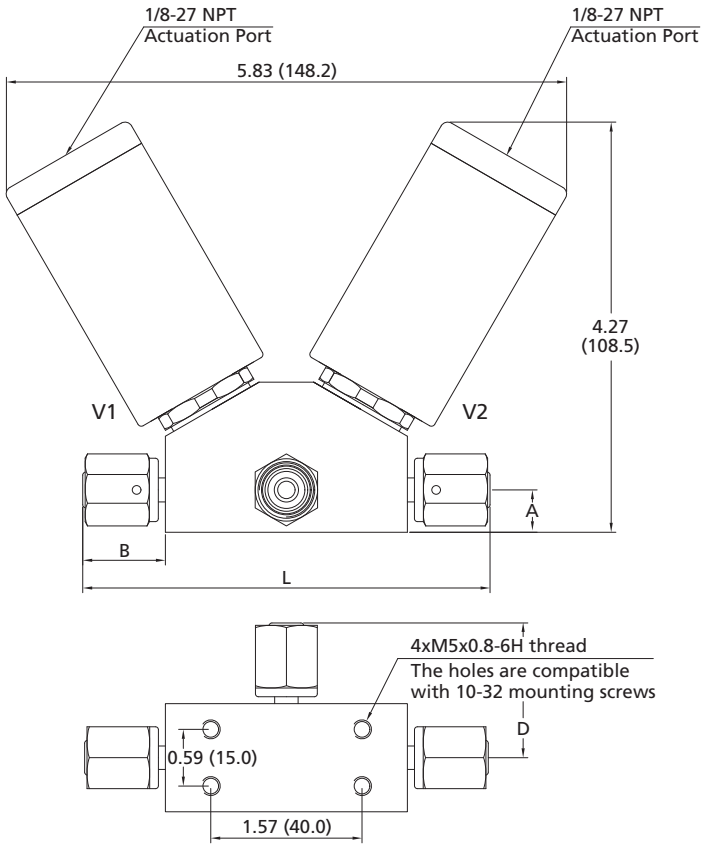
Dimensions, in inches (millimeters), are for reference only.



Manual - Round Handle



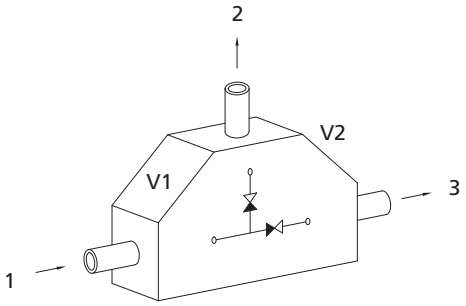
Pneumatic



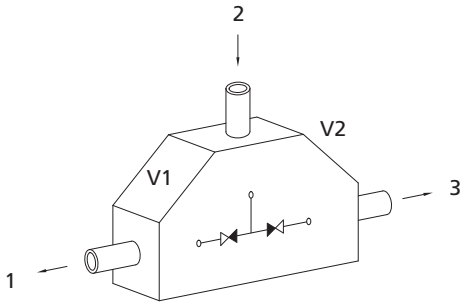
Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DS23□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	2.59 (65.7)	—	4.24 (107.6)
DS23□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.86 (21.8)	—	1.54 (39.1)	4.24 (107.6)
DS23□□-FNS4-	1/4" Female NPT	0.44 (11.2)	—	—	0.68 (17.3)	3.07 (78.0)

Flow Paths

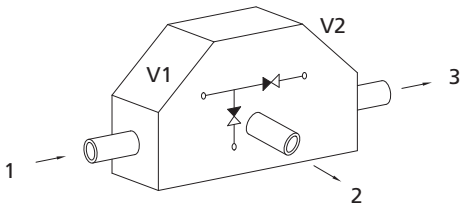
VT Flow



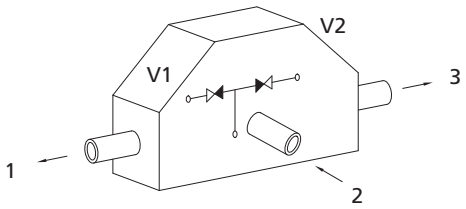
WT Flow



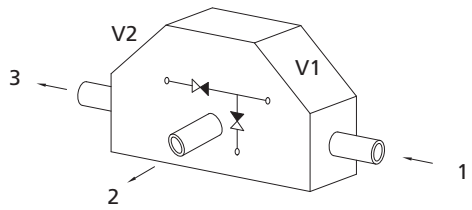
VF Flow



WF Flow



VB Flow



Ordering Number Description

DS236L - FFR4 - RFR4 - FFR4 - VF - COVF2

Type	
23	2 Valves and 3 Ports

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR
SS	316 SS

Port 1 Type	
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting
FNS	Female NPT

Port 1 Size	
4	1/4"

Port 2/3 Type	Port 2/3 Size
Same as Port 1	
Specified in the same way as Port 1 type and size	

Flow Path
VT
VF
VB
WT
WF

Actuator Type (V1 and V2)	
R	V1 Handle V2 Handle
C	V1 Pneumatic (Normally Closed) V2 Pneumatic (Normally Closed)
O	V1 Pneumatic (Normally Open) V2 Pneumatic (Normally Open)
RC	V1 Handle V2 Pneumatic (Normally Closed)
RO	V1 Handle V2 Pneumatic (Normally Open)
CR	V1 Pneumatic (Normally Closed) V2 Handle
OR	V1 Pneumatic (Normally Open) V2 Handle
CO	V1 Pneumatic (Normally Closed) V2 Pneumatic (Normally Open)
OC	V1 Pneumatic (Normally Open) V2 Pneumatic (Normally Closed)

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Seat	
	PCTFE
V	Vespel

Diaphragm Valves

DR Series Low Pressure/Medium Flow Diaphragm Valves

Features

◎ For medium flow applications
◎ Minimum particle generation and dead space
◎ Fully contained seat to provide excellent resistance to swelling and contamination
◎ Elgiloy diaphragm to provide high strength and corrosion resistance to ensure long cycle life
◎ Manual and pneumatic actuators available
◎ Indicator switch available assembled on normally closed pneumatically actuated valves

Technical Data

Port Size		3/8" to 1/2" or 10 mm to 12 mm
Flow Coefficient (Cv)		0.70
Orifice Size		0.31 in. (7.9 mm)
Max. Working Pressure		145 psig (10 bar)
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)
Temperature		PCTFE: -10~150°F (-23~65°C) PFA: -10~302°F (-23~150°C)
Leak Rate (Helium)	**Internal**	≤1x10^{-9} mbar l/s
	External	≤1x10^{-9} mbar l/s

Flow Data

Air @ 70°F (21°C)
Water @ 60°F (16°C)

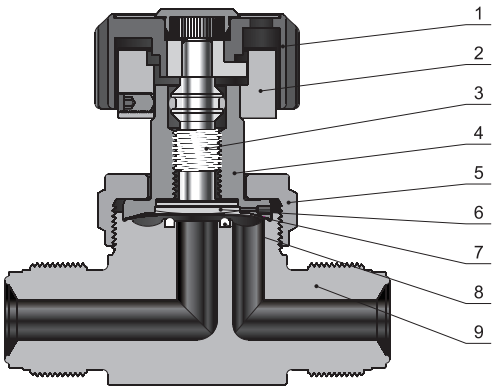
Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10 (0.68)	240	8.4
50 (3.4)	630	18.6
100 (6.8)	1120	26.6

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316L SS/ASTM A479		316L VAR/SEMI F20 316L VIM-VAR /SEMI F20
Wetted Surface Roughness	Ra 10 µin. (0.25 µm)①		Ra 5 µin. (0.13 µm)
Polishing Process	Machine finished①		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

① For FR connections and tube butt connections, the standard polishing process is electropolishing and the internal surface roughness is finished to an average of Ra 5 µin. (0.13 µm).

Major Materials of Construction



Round Handle Model

Item	Component	Material/Specification
1	Handle	ABS
2	Actuator	Aluminum
3	Stem	316 SS/ASTM A479
4	Bonnet	S17400/ASTM A564
5	Bonnet Nut	316 SS/ASTM A479
6	Button	316 SS/ASTM A479
7	Diaphragm (2)	Elgiloy/AMS 5876
8	Seat	PCTFE/ASTM D1430 or PFA/ASTM D3307
9	Body	316L SS/ASTM A479 or 316L VAR/SEMI F20 or 316L VIM-VAR/SEMI F20

Actuators

Manual - Round Handle

- Quick, quarter-turn actuation
- Handle with windows to visually indicate open and closed states

Pneumatic

- Normally open, "N.O." marked on the top of the cylinder
- Normally closed, "N.C." marked on the top of the cylinder

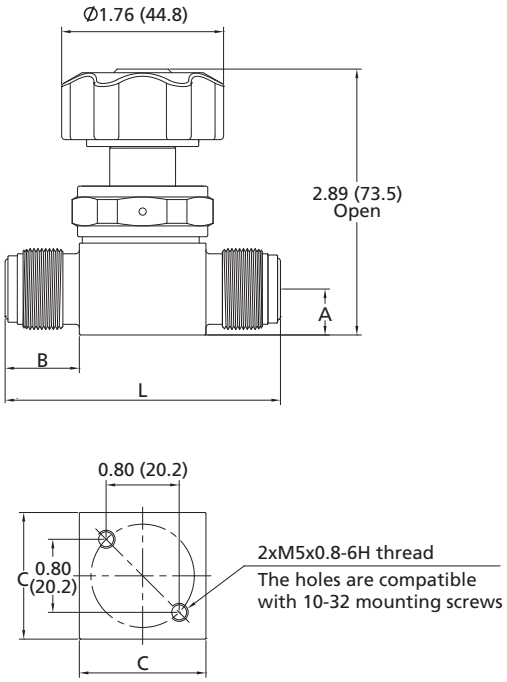
Dimensions and Ordering Information

Straight Type

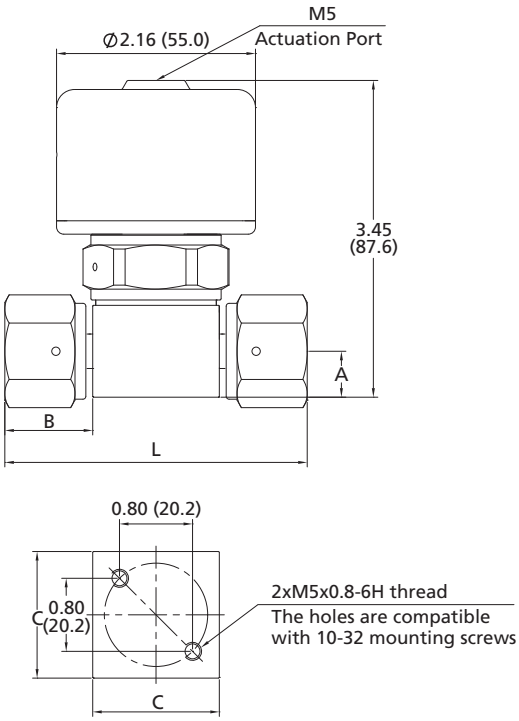
Dimensions

Dimensions, in inches (millimeters), are for reference only.

Manual - Round Handle



Pneumatic



Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
DR□□-TB6-	3/8" Tube Butt Weld	0.50 (12.7)	0.67 (17.0)	1.38 (35.0)	2.72 (69.0)
DR□□-TB8-	1/2" Tube Butt Weld	0.50 (12.7)	0.67 (17.0)	1.38 (35.0)	2.72 (69.0)
DR□□-FFR8-	1/2" Female FR	0.50 (12.7)	0.94 (24.0)	1.38 (35.0)	3.27 (83.0)
DR□□-FR8-	1/2" Integral Male FR	0.50 (12.7)	0.81 (20.6)	1.38 (35.0)	3.00 (76.2)

Ordering Number Description

DR6L – FFR8 – RFR8 – RAF3M

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Inlet Size	
6	3/8"
8	1/2"
10	10 mm
12	12 mm

Actuator Type	
R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat	
	PCTFE
A	PFA

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for normally closed pneumatically actuated valves

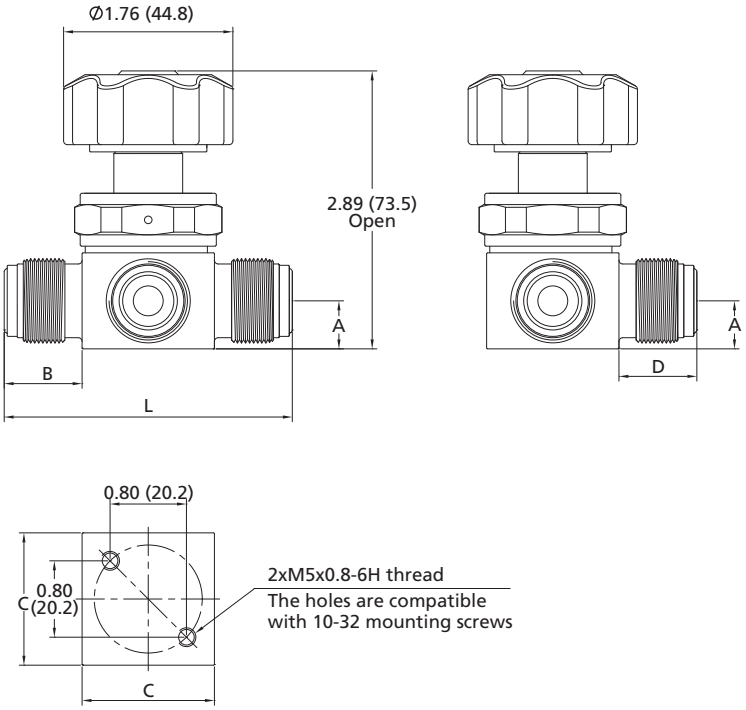
Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Branch Type

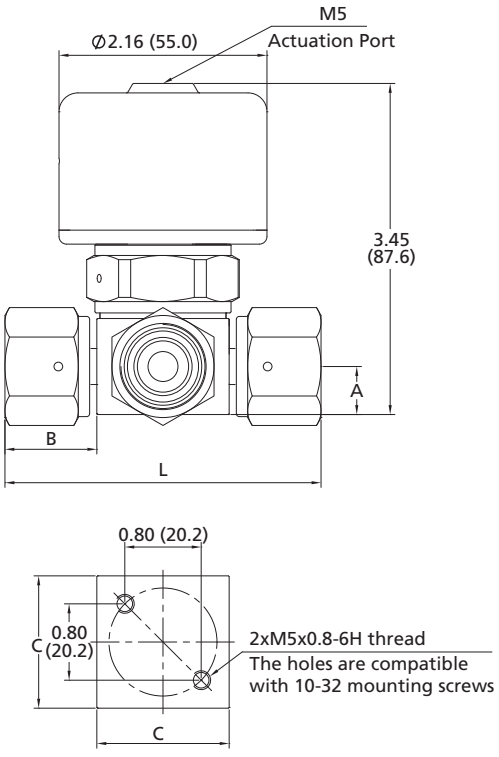
Dimensions

Dimensions, in inches (millimeters), are for reference only.

Manual - Round Handle



Pneumatic

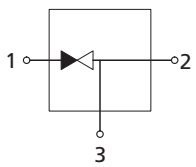


Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)				
		A	B	C	D	L
DR□□-TB6-	3/8" Tube Butt Weld	0.50 (12.7)	0.67 (17.0)	1.38 (35.0)	0.67 (17.0)	2.72 (69.0)
DR□□-TB8-	1/2" Tube Butt Weld	0.50 (12.7)	0.67 (17.0)	1.38 (35.0)	0.67 (17.0)	2.72 (69.0)
DR□□-FFR8-	1/2" Female FR	0.50 (12.7)	0.94 (24.0)	1.38 (35.0)	0.94 (24.0)	3.27 (83.0)
DR□□-RFR8-	1/2" Rotatable Male FR	0.50 (12.7)	1.34 (34.0)	1.38 (35.0)	1.34 (34.0)	4.05 (103.0)
DR□□-FR8-	1/2" Integral Male FR	0.50 (12.7)	0.81 (20.6)	1.38 (35.0)	0.81 (20.6)	3.00 (76.2)

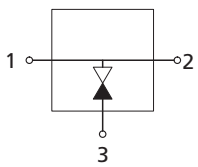
Flow Paths

◎ Flow paths as viewed from the top

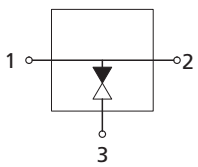
3D Flow



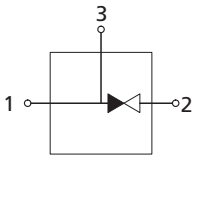
3E Flow



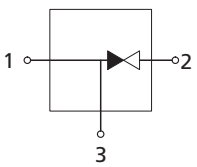
3F Flow



3G Flow



3K Flow



Ordering Number Description

DR6L – FFR8 – RFR8 – FR8 – 3D – RAF3M

Body Material	
6L	316L SS
6LV	316L VAR
6LW	316L VIM-VAR

Port 1 Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
RFR	Rotatable Male FR Fitting

Port 1 Size	
6	3/8"
8	1/2"
10	10 mm
12	12 mm

Port 2/3 Type / Port 2/3 Size	
	Same as Port 1

Specified in the same way as Port 1 type and size

Flow Path
3D
3E
3F
3G
3K

Actuator Type	
R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat	
	PCTFE
A	PFA

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for normally closed pneumatically actuated valves

Diaphragm Valves

DV Series Low Pressure/High Flow Diaphragm Valves

Features

◎ Ideal for high flow applications
◎ Metal-to-metal seal
◎ Tide-diaphragm design to provide positive stem retraction
◎ No springs or threads in wetted areas to ensure clean operation
◎ Manual and pneumatic actuators available
◎ Indicator switch available assembled on normally closed valves

Technical Data

Port Size		1/2" to 1" or 12 mm to 18 mm
Flow Coefficient (Cv)	**Manual**	2.8
	Pneumatic	2.4
Orifice Size		0.5 in. (12.7 mm)
Max. Working Pressure	**Manual**	300 psig (20.6 bar)
	Pneumatic	145 psig (10 bar)
Pneumatic actuator operating pressure		60 to 90 psig (4.2 to 6.2 bar)
Temperature		PCTFE：-10~150°F (-23~65°C) Vespel：-10~250°F (-23~121°C)
Leak Rate (Helium)	**Internal**	≤1x10^{-9} mbar l/s
	External	≤1x10^{-9} mbar l/s

Flow Data

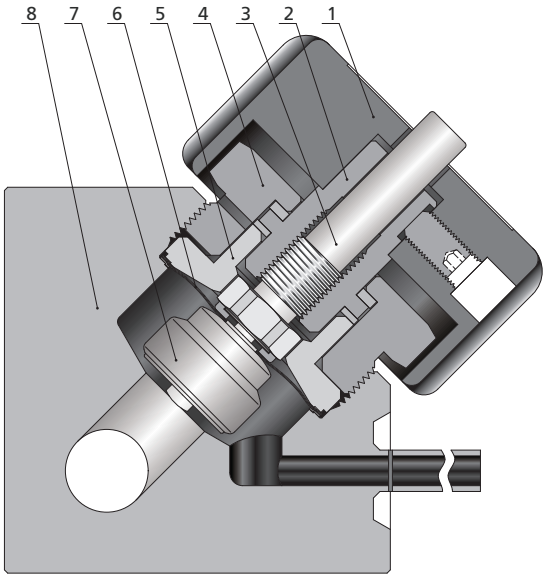
Air @ 70°F (21°C)
Water @ 60°F (16°C)

Pressure Drop to Atmosphere psig (bar)	**Manual**		**Pneumatic**	
	Air (l/min)	**Water (l/min)**	**Air (l/min)**	**Water (l/min)**
10 (0.68)	870	34	780	29
50 (3.4)	2300	75	2050	64
100 (6.8)	4100	100	3650	91

Product Technology Grade

Technology \ **Product Grade**	**Standard Cleaning and Packaging**	**Special Cleaning and Packaging (F2)**	**Ultra High Purity (F3)**
Material/Specification	316 SS/ASTM A479 or 316L SS/ASTM A479		316L SS/ASTM A479
Wetted Surface Roughness	Ra 10 µin. (0.25 µm)		Ra 5 µin. (0.13 µm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

Major Materials of Construction



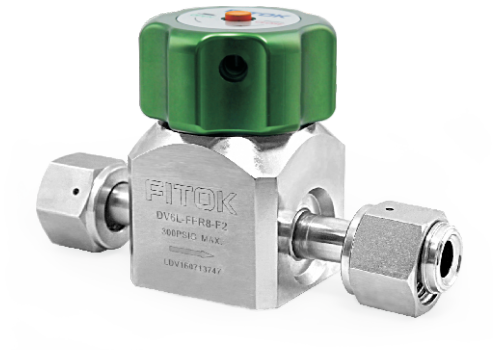
Item	Component	Material/Specification
1	Handle	Aluminum
2	Actuator	316 SS/ASTM A479
3	Upper Stem	316 SS/ASTM A479
4	Bonnet Nut	316 SS/ASTM A479
5	Bonnet	S17400/ASTM A564
6	Diaphragm (3)	Elgiloy/AMS 5876
7	Stem Subassembly	316L SS/ASTM A479 and PCTFE/ASTM D1430 or 316L SS/ASTM A479 and Vespel
8	Body	316 SS/ASTM A479 or 316L SS/ASTM A479

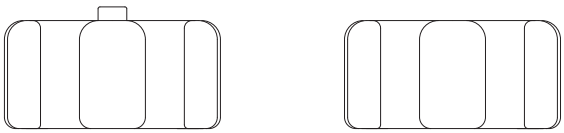
Manual Actuation - Branch Type

Actuators

Manual - Round Handle

◎ Upper stem position to indicate open and closed states





OPEN CLOSED

Pneumatic

◎ Normally open, "N.O." marked on the top of the cylinder
◎ Normally closed, "N.C." marked on the top of the cylinder

Notes: The upper stem protruding from the handle indicates open state.
The upper stem paralleling to or sinking into the handle indicates closed state.

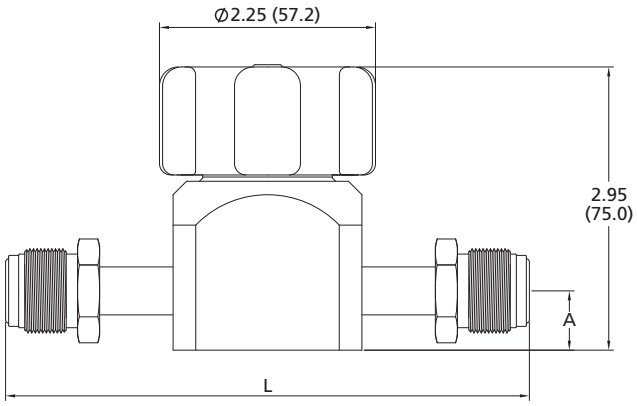
Dimensions and Ordering Information

Straight Type

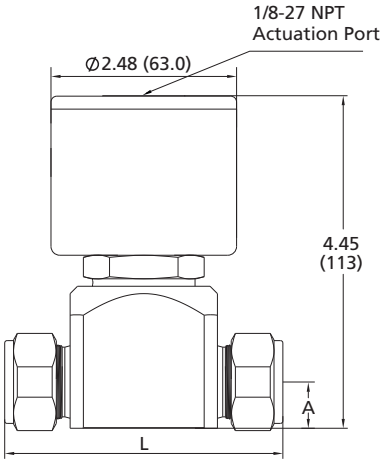
Dimensions

Dimensions, in inches (millimeters), are for reference only.

Manual - Round Handle



Pneumatic



Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)	
		A	L
DV□□-TB8-	1/2" Tube Butt Weld	0.62 (15.7)	5.91 (150.0)
DV□□-TB12-	3/4" Tube Butt Weld	0.62 (15.7)	5.91 (150.0)
DV□□-FR8-	1/2" Integral Male FR	0.62 (15.7)	5.46 (138.7)
DV□□-FFR8-	1/2" Female FR	0.62 (15.7)	5.46 (138.7)
DV□□-FL8-	1/2" FITOK Tube Fitting	0.62 (15.7)	3.71 (94.2)
DV□□-FL12-	3/4" FITOK Tube Fitting	0.62 (15.7)	3.72 (94.4)

Ordering Number Description

DV6L - FR8 - FL8 - CVF2M

Body Material	
6L	316L SS
SS	316 SS

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Inlet Size	
8	1/2"
12	12 mm or 3/4"
18	18 mm

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Actuator Type	
R	Manual
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat	
	PCTFE
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

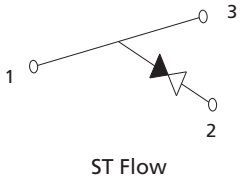
Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

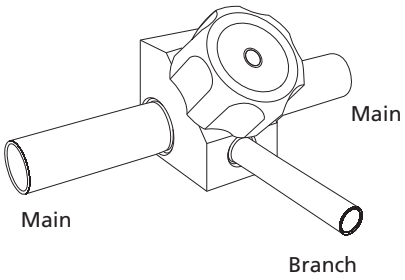
Note: Only for normally closed pneumatically actuated valves

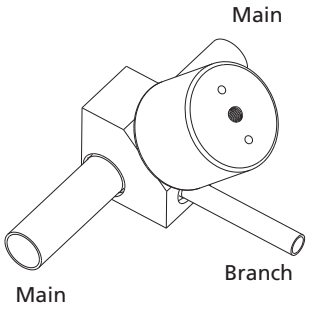
Branch Type

Dimensions

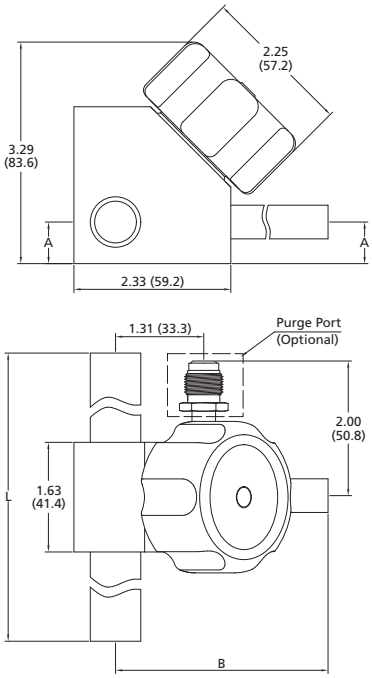
Dimensions, in inches (millimeters), are for reference only.



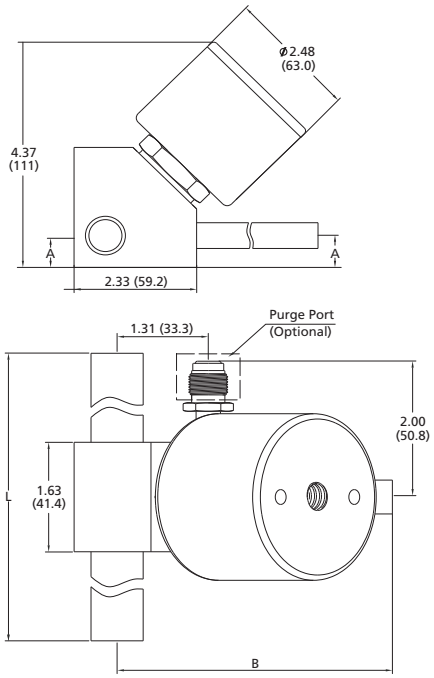




Manual-Round Handle



Pneumatic

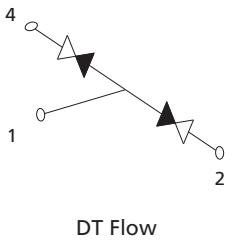


Basic Ordering Number	Connection Type and Size		Dimensions in. (mm)		
	Main	Branch	A	B	L
DV□□-TB8-TB4-	1/2" × 0.049"	1/4" × 0.035"	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)
DV□□-TB8-TB8-	1/2" × 0.049"	1/2" × 0.049"	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)
DV□□-TB8-RFR4-	1/2" × 0.049"	1/4" Rotatable Male FR	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)
DV□□-TB8-RFR8-	1/2" × 0.049"	1/2" Rotatable Male FR	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)
DV□□-TB12-TB8-	3/4" × 0.065"	1/2" × 0.049"	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)
DV□□-TB12-RFR8-	3/4" × 0.065"	1/2" Rotatable Male FR	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)
DV□□-TB16-TB8-	1" × 0.065"	1/2" × 0.049"	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)
DV□□-TB16-RFR8-	1" × 0.065"	1/2" Rotatable Male FR	0.62 (15.7)	4.69 (119.0)	7.58 (193.0)

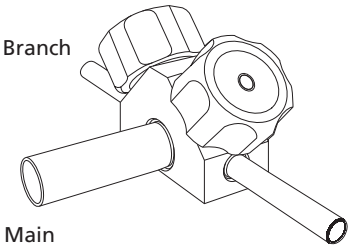
Block Type

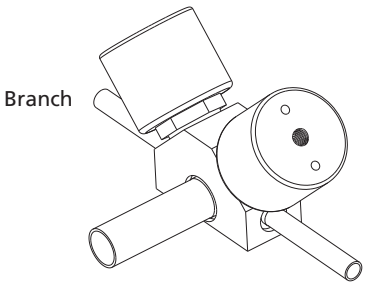
Dimensions

Dimensions, in inches (millimeters), are for reference only.

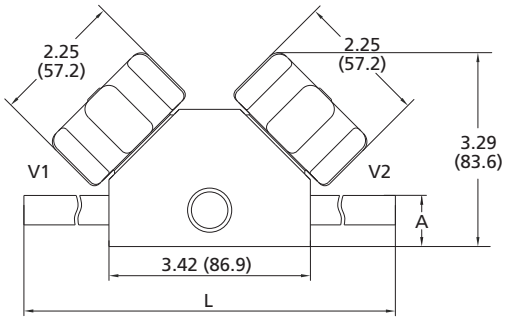


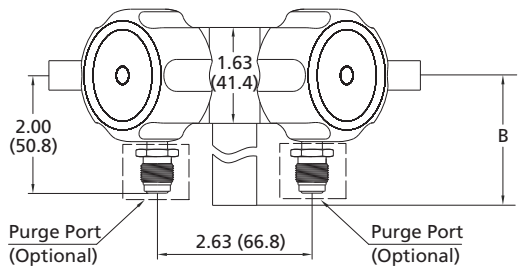
DT Flow



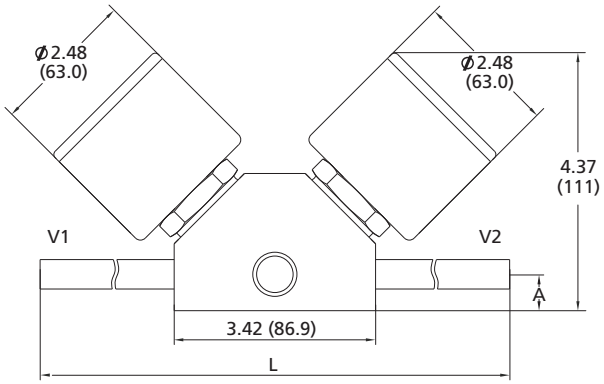


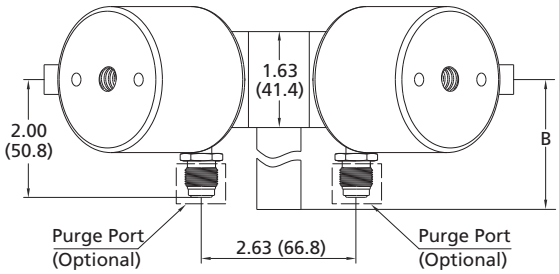
Manual-Round Handle





Pneumatic



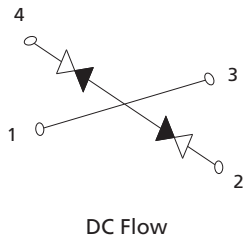


Basic Ordering Number	Connection Type and Size		Dimensions in. (mm)		
	Main	Branch	A	B	L
DV□□-TB12-TB8-	3/4" × 0.065"	1/2" × 0.049"	0.62 (15.7)	3.79 (96.3)	9.38 (238.0)
DV□□-TB12-RFR8-	3/4" × 0.065"	1/2" Rotatable Male FR	0.62 (15.7)	3.79 (96.3)	9.38 (238.0)
DV□□-TB16-TB8-	1" × 0.065"	1/2" × 0.049"	0.62 (15.7)	3.79 (96.3)	9.38 (238.0)
DV□□-TB16-RFR8-	1" × 0.065"	1/2" Rotatable Male FR	0.62 (15.7)	3.79 (96.3)	9.38 (238.0)

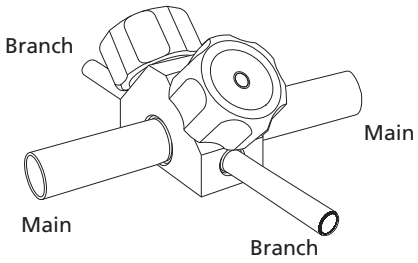
Block Type

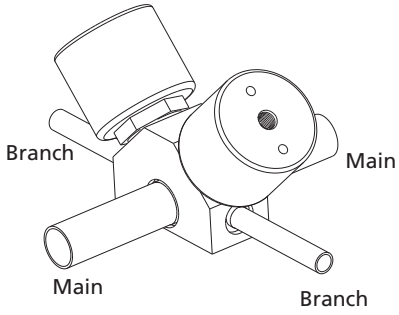
Dimensions

Dimensions, in inches (millimeters), are for reference only.

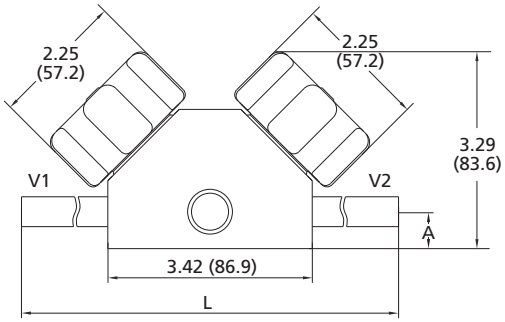


DC Flow

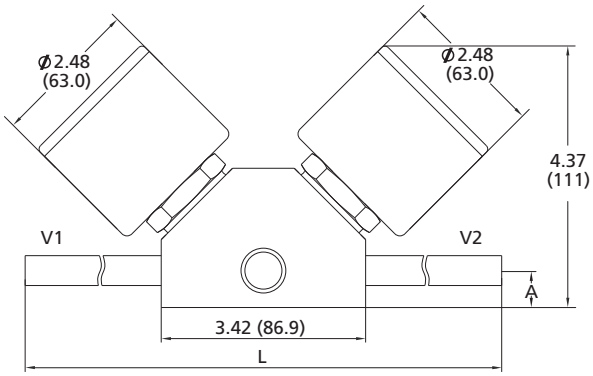


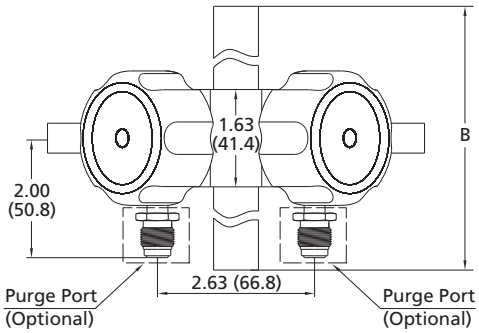


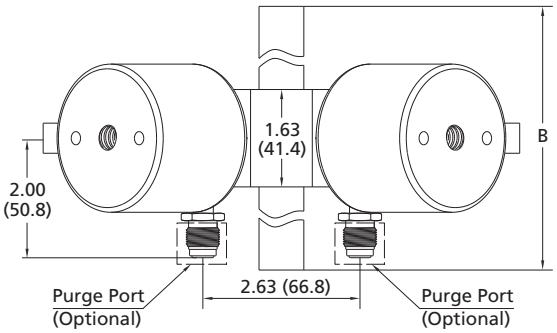
Manual-Round Handle



Pneumatic







Basic Ordering Number	Connection Type and Size		Dimensions in. (mm)		
	Main	Branch	A	B	L
DV□□-TB8-TB8-	1/2" × 0.049"	1/2" × 0.049"	0.62 (15.7)	7.58 (193.0)	9.38 (238.0)
DV□□-TB8-RFR8-	1/2" × 0.049"	1/2" Rotatable Male FR	0.62 (15.7)	7.58 (193.0)	9.38 (238.0)
DV□□-TB12-TB8-	3/4" × 0.065"	1/2"×0.049"	0.62 (15.7)	7.58 (193.0)	9.38 (238.0)
DV□□-TB12-RFR8-	3/4" × 0.065"	1/2" Rotatable Male FR	0.62 (15.7)	7.58 (193.0)	9.38 (238.0)
DV□□-TB16-TB8-	1" × 0.065"	1/2"×0.049"	0.62 (15.7)	7.58 (193.0)	9.38 (238.0)
DV□□-TB16-RFR8-	1" × 0.065"	1/2" Rotatable Male FR	0.62 (15.7)	7.58 (193.0)	9.38 (238.0)

Ordering Number Description

DV6L - TB12 - TB8 - DC - P2 - COVF2M

Body Material	
6L	316L SS
SS	316 SS

Main Connection Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld

Main Connection Size	
8	1/2"
12	3/4"
16	1"

Branch Connection Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
RFR	Rotatable Male FR Fitting

Branch Connection Size	
4	1/4"
8	8 mm or 1/2"
12	12 mm

Flow Path	
ST	
DT	
DC	

Purge Port Location	
	None
P0	Inlet Side
P1	Outlet Side
P2	Inlet and Outlet

Actuator Type (V1 and V2)	
R	V1 Handle V2 Handle
C	V1 Pneumatic (Normally Closed) V2 Pneumatic (Normally Closed)
O	V1 Pneumatic (Normally Open) V2 Pneumatic (Normally Open)
RC	V1 Handle V2 Pneumatic (Normally Closed)
RO	V1 Handle V2 Pneumatic (Normally Open)
CR	V1 Pneumatic (Normally Closed) V2 Handle
OR	V1 Pneumatic (Normally Open) V2 Handle
CO	V1 Pneumatic (Normally Closed) V2 Pneumatic (Normally Open)
OC	V1 Pneumatic (Normally Open) V2 Pneumatic (Normally Closed)

Seat	
	PCTFE
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for normally closed pneumatically actuated valves

Diaphragm Valves

DL Series Low Pressure/Ultra High Flow Diaphragm Valves

Features

- ◎ Ideal for ultra high flow applications
- ◎ Metal to metal sealed diaphragm to ensure excellent leak intergrity
- ◎ Internally threadless and springless
- ◎ PCTFE stem tip insert for leak-tight shutoff
- ◎ Upper stem position to indicate open and closed states

Technical Data

Port Size		3/4" to 1" or 23 mm to 25 mm
Flow Coefficient (Cv)		13
Orifice Size		1.125 in. (28.6 mm)
Max. Working Pressure		300 psig (20.6 bar)
Temperature		PCTFE: -10~150°F (-23~65°C) Vespel: -10~250°F (-23~121°C)
Leak Rate (Helium)	**Internal**	≤1x10^{-9} mbar l/s
	External	≤1x10^{-9} mbar l/s

Flow Data

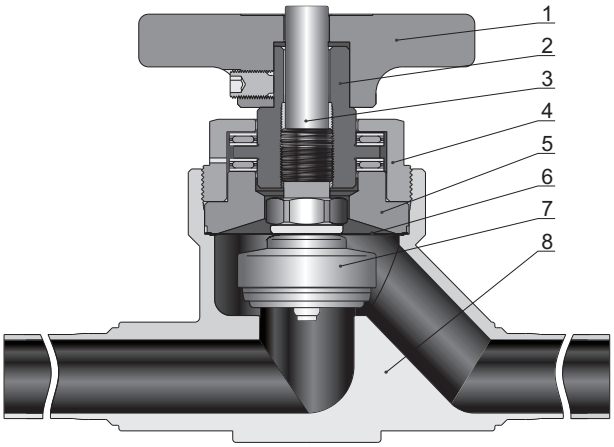
Air @ 70°F (21°C)
Water @ 60°F (16°C)

Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10(0.68)	3900	150
50(3.4)	11000	340
100(6.8)	19500	490

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	CF8M/ASTM A351, CF3M/ASTM A351, 316 SS/ASTM A479		316L SS/ASTM A479
Wetted Surface Roughness	Ra 20 µin. (0. 51 µm)		Ra 5 µin. (0.13 µm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

Major Materials of Construction

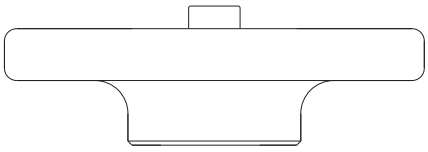


Item	Component	Material/Specification
1	Handle	Aluminum
2	Actuator	316 SS/ASTM A479
3	Upper stem	316 SS/ASTM A479
4	Bonnet nut	316 SS/ASTM A479
5	Bonnet	316 SS/ASTM A479
6	Diaphragm (3)	Elgiloy/AMS 5876
7	Stem subassembly	316L SS/ASTM A479 and PCTFE/ASTM D1430 or 316L SS/ASTM A479 and Vespel
8	Body	CF8M/ASTM A351, CF3M/ASTM A351 316 SS/ASTM A479 316L SS/ASTM A479

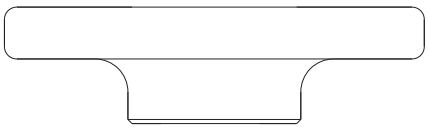
Actuators

Handle

- Five turns and a half to operate from fully open to closed
- Upper stem position to indicate open and closed states



OPEN



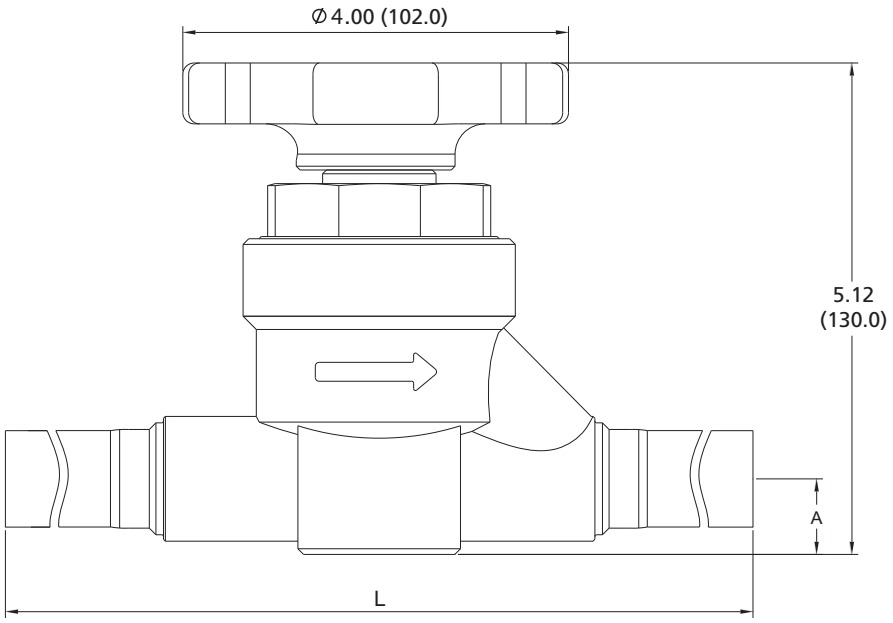
CLOSED

Notes: The upper stem protruding from the handle indicates open state.
The upper stem paralleling to or sinking into the handle indicates closed state.

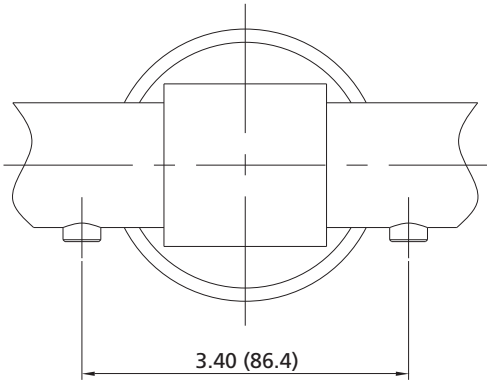
Dimensions

Dimensions, in inches (millimeters), are for reference only.

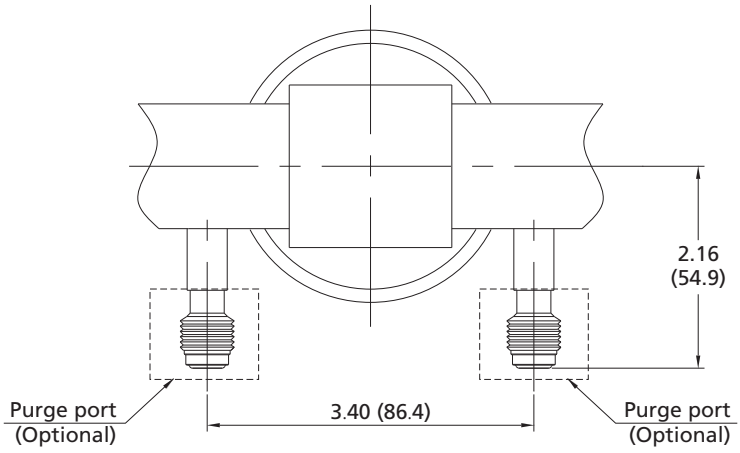
Cast Body Valves



No purge ports

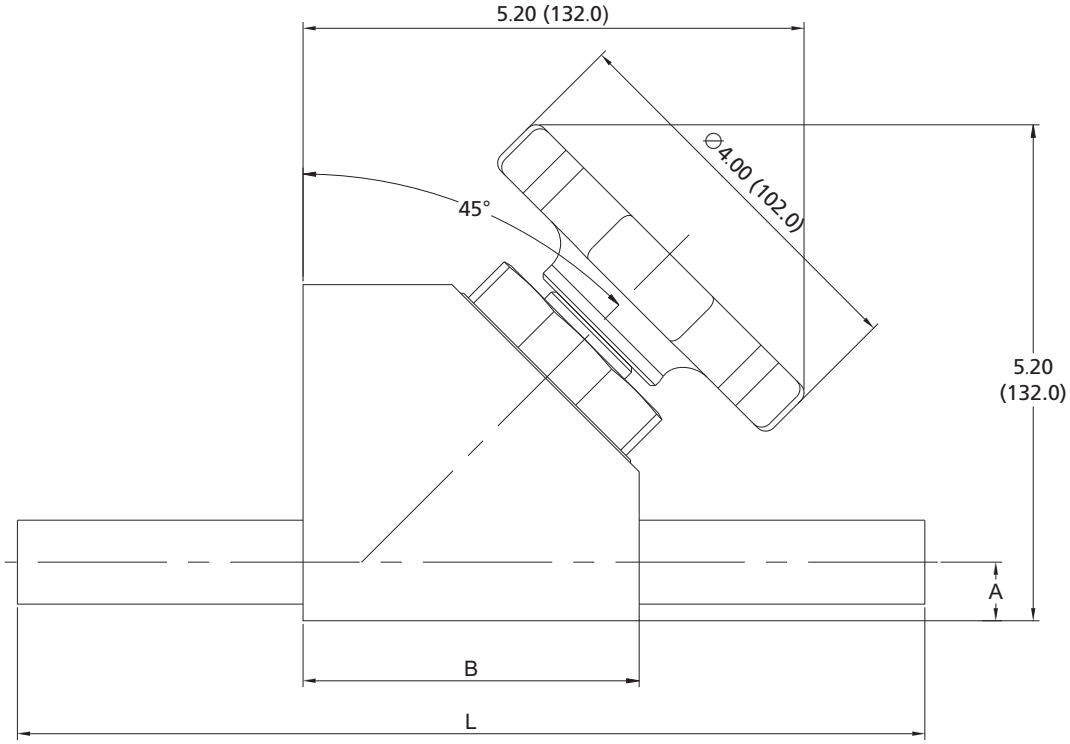


Integral 1/4" Male FR Fittings

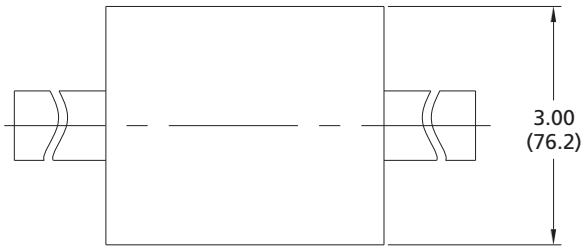


Basic Ordering Number	End Connections		Dimensions, in. (mm)	
	Type	Size	A	L
DL□□-FL12-	FITOK Tube Fitting	3/4"	0.79 (20.0)	8.27 (210.0)
DL□□-FL16-		1"		8.46 (215.0)
DL□□-ML25-		25 mm		8.63 (219.0)
DL□□-TB16-	Tube extension, 2.75 in. (69.8 mm) long	1" x 0.065"		10.90 (277.0)
DL□□-MTB23-		23 x 1.5 mm		
DL□□-MTB25-		25 x 1.5 mm		

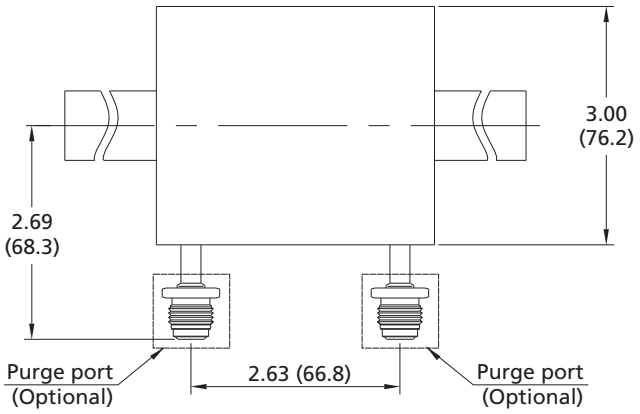
Bar Stock Valves



No purge ports



1/4" Rotatable Male FR Fittings



Basic Ordering Number	End Connections		Dimensions, in. (mm)		
	Type	Size	A	B	L
DL□□-TB12-B-	Tube Butt Weld	3/4" x 0.065"	0.61 (15.5)	3.50 (88.9)	9.46 (240.0)
DL□□-TB16-B-		1" x 0.065"			

Ordering Number Description

DL6L – TB16 – FL16 – BP2 – VF2

Body Material	
6L	CF3M
	316L SS
SS	CF8M
	316 SS

Inlet Type	
FL	Fractional Tube Fitting
ML	Metric Tube Fitting
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld

Inlet Size	
12	3/4"
16	1"
23	23 mm
25	25 mm

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Purge Port Location	
	None
P0	Inlet Side
P1	Outlet Side
P2	Inlet and Outlet

Valve Type	
	Cast Body
B	Bar Stock

Seat	
	PCTFE
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Diaphragm Valves

DF Series High Pressure/High Flow Diaphragm Valves

Features

◎ Ideal for high flow applications
◎ Metal-to-metal seal
◎ Spring type design
◎ Elgiloy diaphragm to provide high strength and corrosion resistance to ensure long cycle life
◎ Indicator switch available assembled on pneumatically actuated valves
◎ Normally closed and normally open indicator switches optional

Technical Data

Port Size		3/8" to 1/2" or 8 mm to 12 mm
Flow Coefficient (Cv)		0.80
Orifice Size		0.31 in. (8.0 mm)
Max. Working Pressure	**Handle**	3500 psig (241 bar)
	Pneumatic	3000 psig (206 bar)
Max.Differential Back Pressure		150 psig (10.3 bar)
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)
Temperature		PCTFE: -10~150°F (-23~65°C) Vespel: -10~250°F (-23~121°C)
Leak Rate (Helium)	**Internal**	≤$4x10^{-9}$ mbar l/s
	External	≤$4x10^{-9}$ mbar l/s

Flow Data

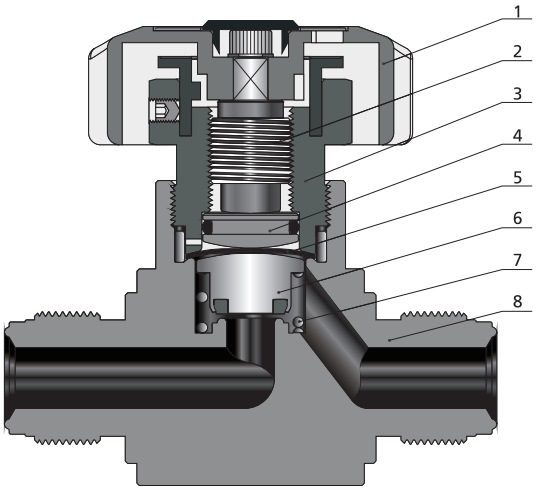
Air @ 70°F (21°C)
Water @ 60°F (16°C)

Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10 (0.68)	274	9.5
50 (3.4)	733	21.5
100 (6.8)	1300	30.3

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316 SS/ASTM A479 or 316L SS/ASTM A479		316L SS/ASTM A479
Wetted Surface Roughness	Ra 20 μin. (0.51 μm)		Ra 10 μin. (0.25 μm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

Major Materials of Construction



Round Handle Model

Item	Component	Material/Specification
1	Handle	Aluminum
2	Actuator	316 SS/ASTM A479
3	Bonnet Nut	S17400/ASTM A564
4	Button	C36000/ASTM B16
5	Diaphragm (5)	Elgiloy (3) /AMS 5876 + C17200 (2) /ASTM B194
6	Stem Subassembly	316L SS/ASTM A479 and PCTFE/ASTM D1430 or 316L SS/ASTM A479 and Vespel
7	Spring	316 SS/ASTM A313
8	Body	316 SS/ASTM A479 or 316L SS/ASTM A479

Actuators

Manual - Round Handle

- One-half turn to operate from fully open to closed
- Handle with window to visually indicate open and closed states

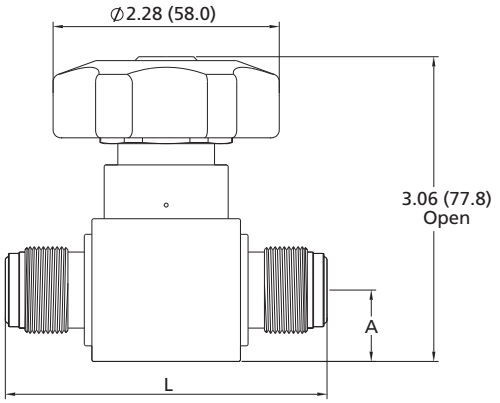
Pneumatic

- Normally open, "N.O." marked on the top of the cylinder
- Normally closed, "N.C." marked on the top of the cylinder

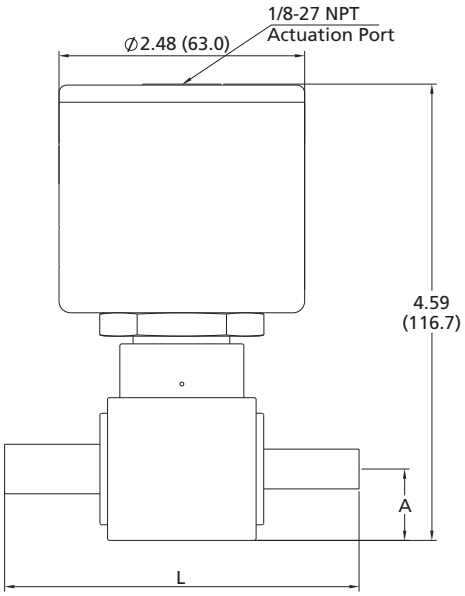
Dimensions

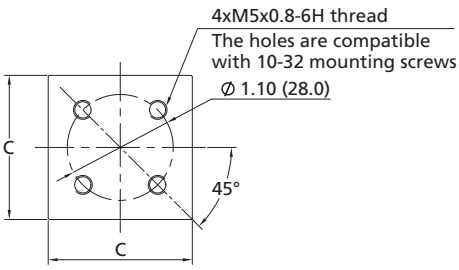
Dimensions, in inches (millimeters), are for reference only.

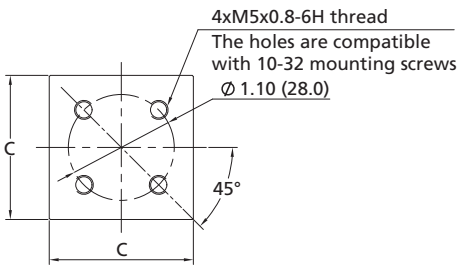
Manual - Round Handle



Pneumatic







Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)		
		A	C	L
DF□□-TB6-	3/8" Tube Butt Weld	0.71 (18.0)	1.50 (38.1)	3.58 (90.9)
DF□□-TB8-	1/2" Tube Butt Weld	0.71 (18.0)	1.50 (38.1)	3.58 (90.9)
DF□□-FR8-	1/2" Integral Male FR	0.71 (18.0)	1.50 (38.1)	3.25 (82.5)
DF□□-FFR8-	1/2" Female FR	0.71 (18.0)	1.50 (38.1)	3.89 (98.8)
DF□□-FL6-	3/8" FITOK Tube Fitting	0.71 (18.0)	1.50 (38.1)	3.27 (83.0)
DF□□-FL8-	1/2" FITOK Tube Fitting	0.71 (18.0)	1.50 (38.1)	3.47 (88.2)
DF□□-FNS8-	1/2" Female NPT	0.71 (18.0)	1.50 (38.1)	3.30 (84.0)

Ordering Number Description

DFSS – FR8 – FL8 – CVF2M

Body Material	
6L	316L SS
SS	316 SS

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting
NS	Male NPT
FNS	Female NPT

Inlet Size	
6	3/8"
8	8 mm or 1/2"
10	10 mm
12	12 mm

Outlet Type / Outlet Size	
	Same as Inlet

Specified in the same way as Inlet type and size

Actuator Type	
R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat	
	PCTFE
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Note: Only for pneumatically actuated valves

Bellows-sealed Valves

SM, SVH Series

Bellows-sealed Valves

SM Series Low Pressure Bellows-sealed Valves

Features

- ◎ Metal-to-metal gasket seal without external leakage
- ◎ Precision-formed metal bellows to ensure reliability
- ◎ Non-rotating stem tip to increase shutoff cycle life
- ◎ Handle and pneumatic actuator available
- ◎ Pneumatic actuator to rotate 360° for ease of installation
- ◎ Panel mounting and bottom mounting available
- ◎ Indicator switch available assembled on normally closed pneumatically actuated valves

Technical Data

Type		SM4	SM8
Ports Size		1/4" to 3/8" or 6 mm to 8 mm	3/8" to 1/2" or 10 mm to 12 mm
Flow Coefficient (Cv)		0.30	0.80
Orifice Size		0.16 in. (4.1mm)	0.31 in. (8.0 mm)
Max Working Pressure	Handle	500 psig (34.4 bar)	
	Pneumatic	145 psig (10 bar)	
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)	
Temperature		PCTFE: -10 ~ 200°F (-23 ~ 93℃) PFA: -10 ~ 302°F (-23 ~ 150℃) Vespel: -10 ~ 400°F (-23 ~ 204℃)	
Leak rate (Helium)	Internal	≤ $4x10^{-9}$ mbar l/s	
	External	≤ $4x10^{-9}$ mbar l/s	

Flow Data

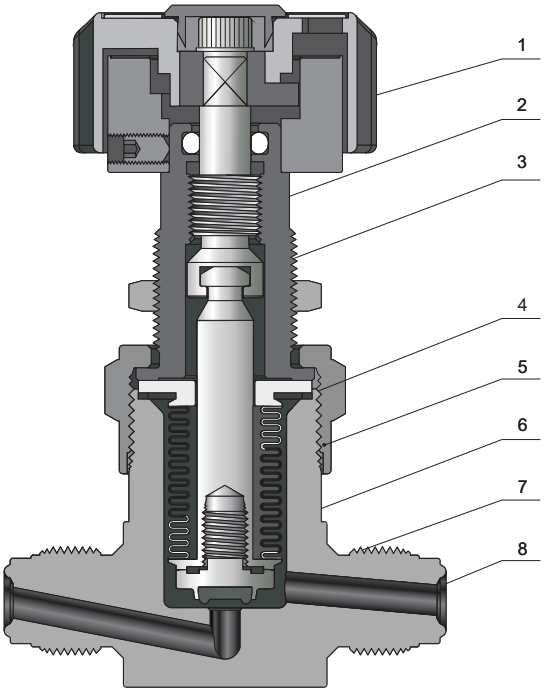
Air @ 70°F (21℃)
Water @ 60°F (16℃)

Pressure Drop to Atmosphere psi (bar)	Sm4: Cv 0.30		Sm8: Cv 0.80	
	Air (l/min)	Water (l/min)	Air (l/min)	Water (l/min)
10 (0.68)	96	3.6	270	9.6
50 (3.4)	250	7.9	730	21.6
100 (6.8)	450	11.0	1280	30.0

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316 SS/ASTM A479 316L SS/ASTM A479		316L VAR/SEMI F20
Wetted Surface Roughness	Ra 20 μin. (0.51 μm)		Ra 8 μin. (0.20 μm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

Major Materials of Construction



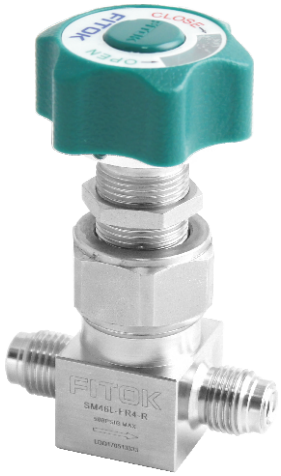
Round Handle Model

Item	Component	Material/Specification
1	Handle	ABS
2	Actuator	416 SS/ASTM A582
3	Bonnet	316 SS/ASTM A479
4	Bonnet Gasket	316L SS/ASTM A269
5	Bonnet nut	316 SS/ASTM A479
6	Bellows	316L SS/ASTM A269
7	Seat	PCTFE/ASTM D1430 or PFA/ASTM D3307 or Vespel
8	Body	316 SS/ASTM A479 or 316L SS/ASTM A479 or 316L VAR/SEMI F20

Actuators

Manual - Round Handle

- ◎ Half turn to operate from fully open to closed
- ◎ Handle with window to visually indicate open and closed states



Pneumatic

- ◎ Normally open, "N.O." marked on the top of the cylinder
- ◎ Normally closed, "N.C." marked on the top of the cylinder

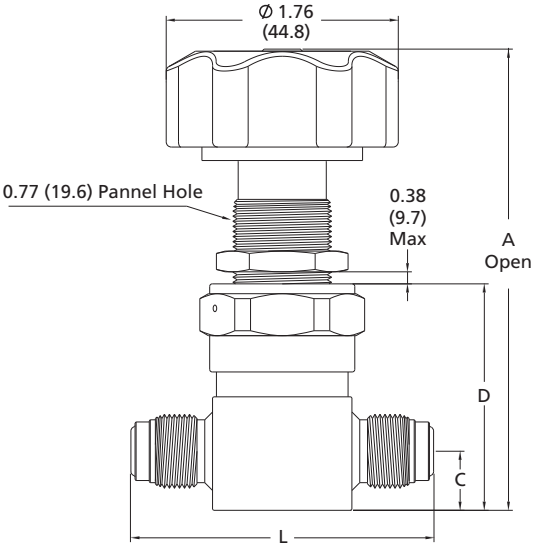
Dimensions and Ordering Information

Straight Type

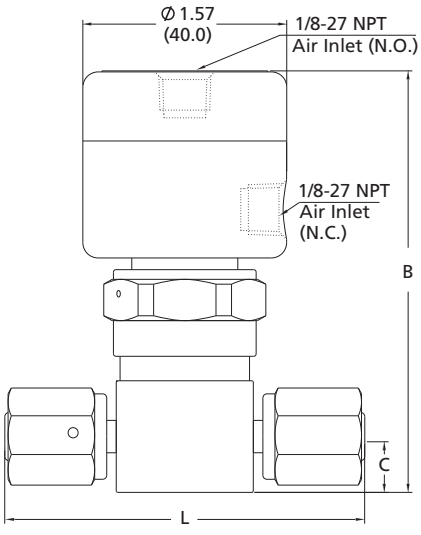
Dimensions

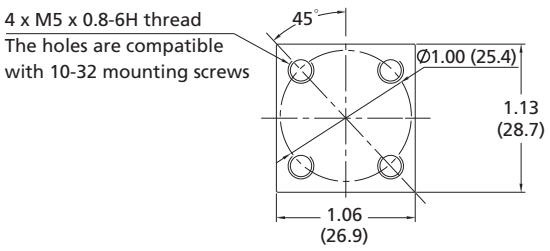
Dimensions, in inches (millimeters), are for reference only.

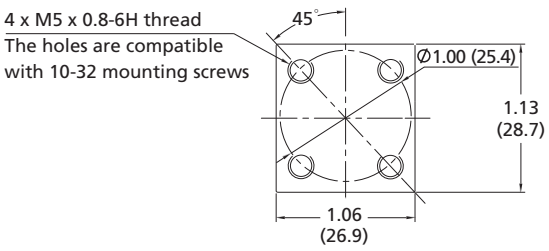
Manual - Handle



Pneumatic







Basic Ordering Number	Connection Type and Size	Dimensions, in. (mm)				
		A	B	C	D	L
	SM4 Series					
SM4□□-FL4-	1/4" FITOK Tube Fitting	3.51 (89.4)	3.31 (84.0)	0.45 (11.4)	1.78 (45.2)	2.46(62.5)
SM4□□-FL6-	3/8" FITOK Tube Fitting					2.58(65.5)
SM4□□-ML6-	6 mm FITOK Tube Fitting					2.46(62.5)
SM4□□-ML8-	8 mm FITOK Tube Fitting					2.53(64.3)
SM4□□-TB4-	1/4" Tube Butt Weld					1.74(44.2)
SM4□□-TB6-	3/8" Tube Butt Weld					
SM4□□-MTB6-	6 mm Tube Butt Weld					
SM4□□-TS4-	1/4" Tube Socket Weld					1.75(44.4)
SM4□□-FR4-	1/4" Integral Male FR					2.30(58.4)
SM4□□-FFR4-	1/4" Female FR					2.76(70.1)
SM4□□-FO4-	1/4" Male FO					2.00(50.8)
	SM8 Series					
SM8□□-FL6-	3/8"FITOK Tube Fitting	3.77 (95.7)	3.76 (95.5)	0.53 (13.5)	2.02 (51.3)	2.58(65.5)
SM8□□-FL8-	1/2" FITOK Tube Fitting					2.80(71.1)
SM8□□-ML10-	10 mm FITOK Tube Fitting					2.60(66.0)
SM8□□-ML12-	12 mm FITOK Tube Fitting					2.80(71.1)
SM8□□-TB6-	3/8" Tube Butt Weld					1.74(44.2)
SM8□□-TB8-	1/2" Tube Butt Weld					
SM8□□-FR8-	1/2" Integral Male FR	3.87 (98.2)	3.86 (98.0)	0.63 (16.0)	2.12 (53.8)	2.58(65.5)
SM8□□-FFR8-	1/2" Female FR					3.15(80.0)

Ordering Number Description

SM4SS – FL4 – ML6 – RAF2M

Body Material	
6L	316L SS
6LV	316L VAR
SS	316 SS

Type
4
8

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
TS	Fractional Tube Socket Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting
FO	Male FO Fitting

Inlet Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm or 1/2"
10	10 mm
12	12 mm

Outlet Type / Outlet Size	
	Same as Inlet
	Specified in the same way as Inlet type and size

Actuator Type	
R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat	
	PCTFE
A	PFA
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

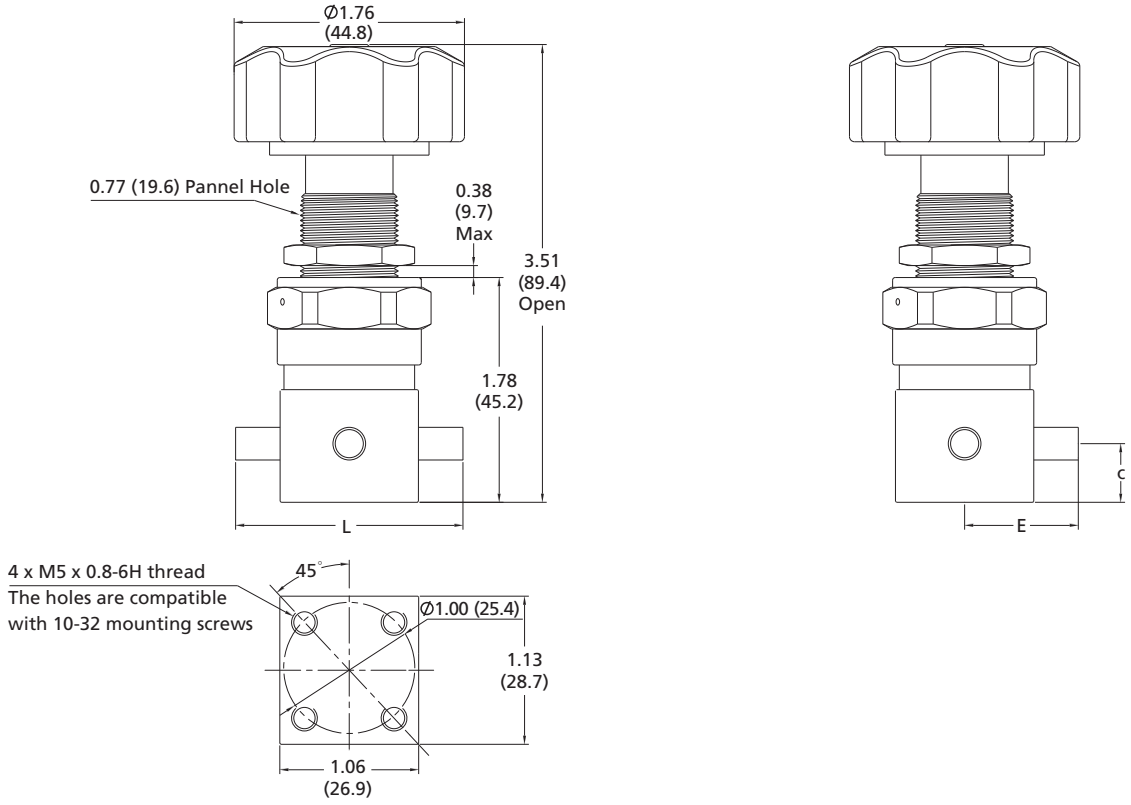
Indicator Switch	
	None
M	Normally Open
M2	Normally Closed
	Note: Only for normally closed pneumatically actuated valves

Branch Type

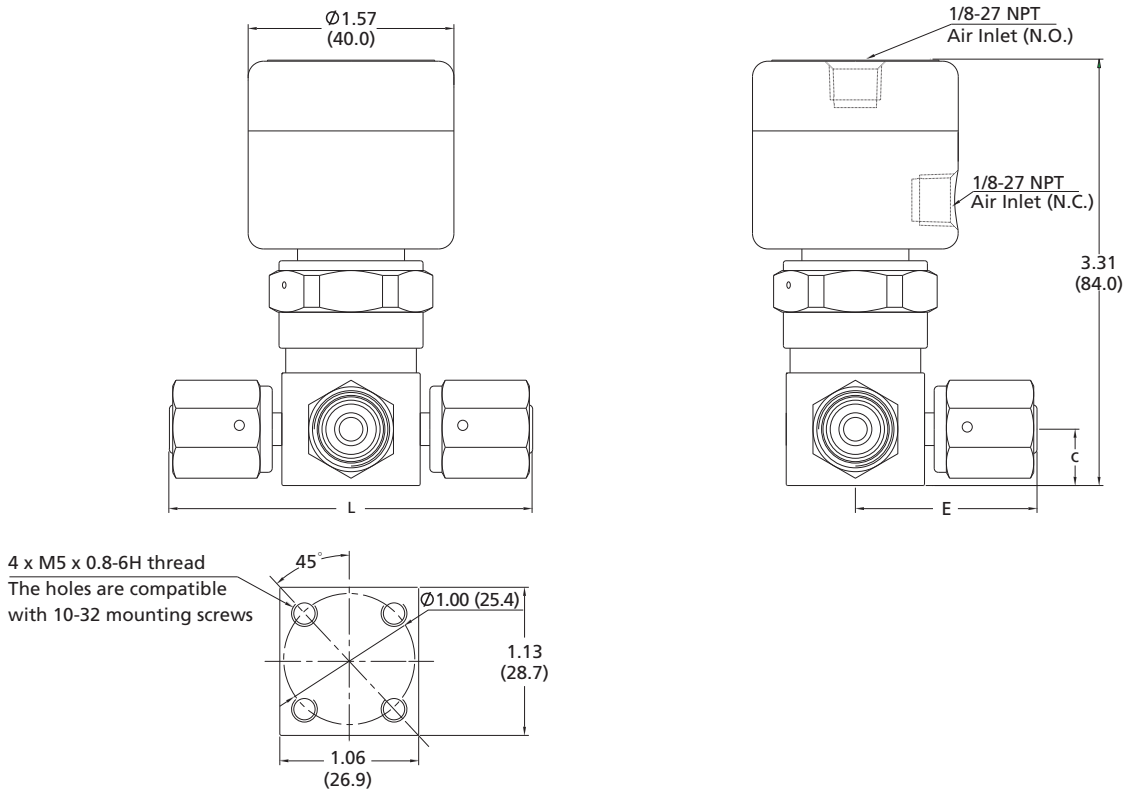
Dimensions

Dimensions, in inches (millimeters), are for reference only.

Manual - Handle



Pneumatic

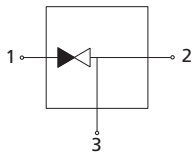


Basic Ordering Number	Connection Type and Size	Dimensions, in. (mm)		
		C	E	L
SM4□□-TB4-	1/4" Tube Butt Weld	0.45 (11.4)	0.87 (22.1)	1.74 (44.2)
SM4□□-MTB6-	6 mm Tube Butt Weld			
SM4□□-FFR4-	1/4" Female FR		1.38 (35.1)	2.76 (70.1)
SM4□□-RFR4-	1/4" Rotatable Male FR		1.74 (44.2)	3.48 (88.4)

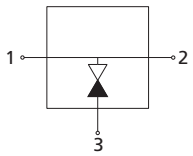
Flow Paths

◎ Flow paths as viewed from the top

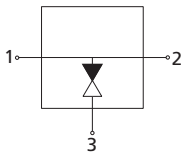
3D Flow



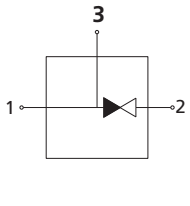
3E Flow



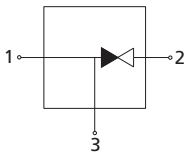
3F Flow



3G Flow



3K Flow



Ordering Number Description

SM4SS – TB4 – FR4 – FFR4 – 3G – RAF2M

Type

4	

Body Material

6L	316L SS
6LV	316L VAR
SS	316 SS

Port 1 Type

TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
TS	Fractional Tube Socket Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting
FO	Male FO Fitting

Port 1 Size

4	1/4"
6	6 mm or 3/8"
8	8 mm

Port 2/3 Type

Same as Port 1
Specified in the same way as Port 1 type and size

Port 2/3 Size

Same as Port 1
Specified in the same way as Port 1 type and size

Actuator Type

R	Handle
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat

	PCTFE
A	PFA
V	Vespel

Indicator Switch

	None
M	Normally Open
M2	Normally Closed

Note: Only for normally closed pneumatically actuated valves

Flow Path

3D
3E
3F
3G
3K

Product Grade

	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Bellows-sealed Valves

SVH Series High Pressure Bellows-sealed Valves

Features

◎ Packless valves with all-metal seal to atmosphere
◎ Compact designed body with minimal dead space
◎ 316L SS precision-formed bellows for long cycle life
◎ PCTFE stem tip material with remarkable chemical and thermal resistance
◎ Normally closed and normally open pneumatic actuator optional
◎ Bottom mounting
◎ Indicator switch available assembled on pneumatically actuated valves
◎ Normally open and normally closed indicator switches optional

Technical Data

Ports Size		1/4" to 3/8" or 6 mm to 8 mm
Flow Coefficient (Cv)		0.30
Orifice Size		0.15 in. (3.8 mm)
Max. Working Pressure		3500 psig (241 bar)
Pneumatic Actuator Operating Pressure		60 to 90 psig (4.2 to 6.2 bar)
Temperature		PCTFE: -40~150°F (-40~65°C) Vespel: -40~400°F (-40~204°C)
Leak Rate (Helium)	**Internal**	$\leqslant 4x10^{-9}$ mbar l/s
	External	$\leqslant 4x10^{-9}$ mbar l/s

Flow Data

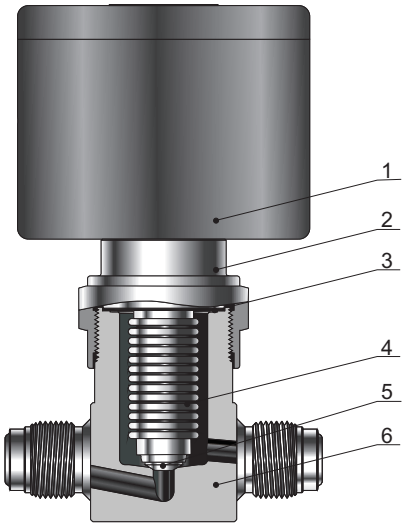
Air @ 70°F (21°C)
Water @ 60°F (16°C)

Pressure Drop to Atmosphere psi (bar)	Air (l/min)	Water (l/min)
10 (0.68)	96	3.6
50 (3.4)	250	7.9
100 (6.8)	450	11.0

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316 SS/ASTM A479 316L SS/ASTM A479		316L SS/ASTM A479
Wetted Surface Roughness	Ra 20 µin. (0.51 µm)		Ra 10 µin. (0.25 µm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

Major Materials of Construction



Normally Closed Model

Item	Component	Material/Specification
1	Pneumatic Actuator	Aluminum
2	Bonnet Nut	304 SS/ASTM A479
3	Gasket	PTFE-coated 316L SS/A240
4	Bellows	316L SS/ASTM A269
5	Seat	PCTFE/ASTM D1430 or Vsepel
6	Body	316 SS/ASTM A479 or 316L SS/ASTM A479

Pneumatic Actuators

◎ Normally open, "N.O." marked on the top of the cylinder
◎ Normally closed, "N.C." marked on the top of the cylinder

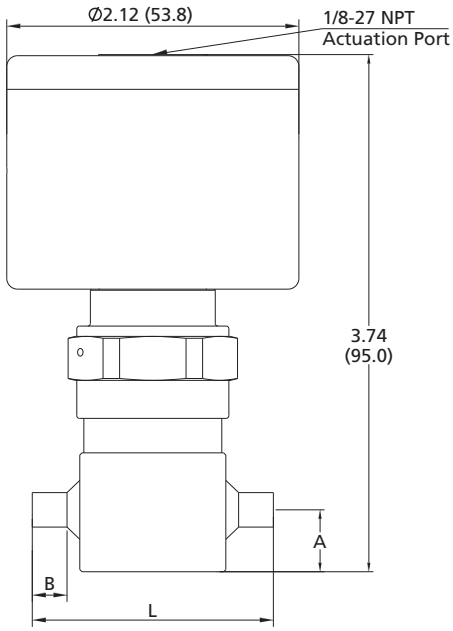
Dimensions and Ordering Information

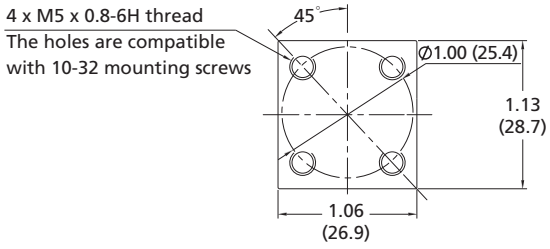
Straight Type

Dimensions

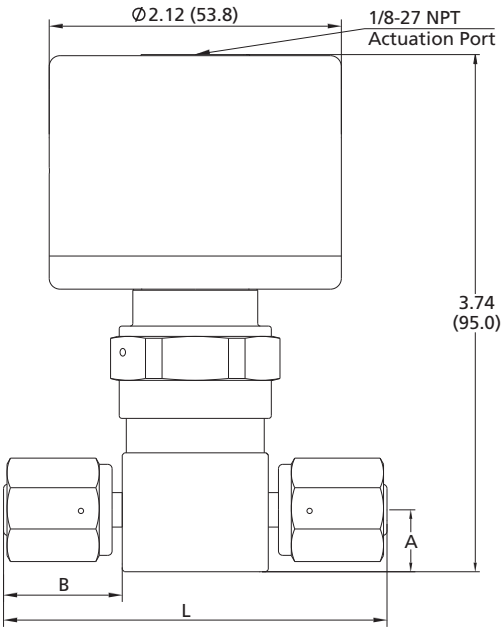
Dimensions, in inches (millimeters), are for reference only.

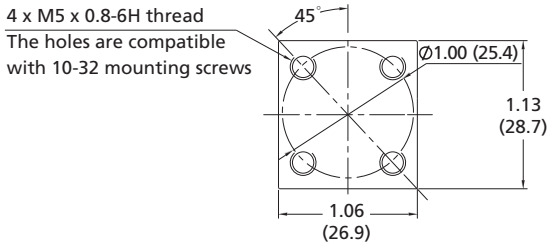
Normally Closed





Normally Open





Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)		
		A	B	L
SVH□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.25 (6.4)	1.75 (44.4)
SVH□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.85 (21.6)	2.76 (70.1)
SVH□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	2.30 (58.4)
SVH□□-FL4-	1/4" FITOK Tube Fitting	0.44 (11.2)	0.70 (17.8)	2.46 (62.5)
SVH□□-FL6-	3/8" FITOK Tube Fitting	0.44 (11.2)	0.76 (19.3)	2.58 (65.5)
SVH□□-ML6-	6 mm FITOK Tube Fitting	0.44 (11.2)	0.70 (17.8)	2.46 (62.5)

Ordering Number Description

SVHSS – FL4 – ML6 – CVF2M

Body Material	
6L	316L SS
SS	316 SS

Inlet Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Inlet Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Outlet Type
Same as Inlet
Specified in the sameway as Inlet type and size

Outlet Size

Actuator Type	
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat	
	PCTFE
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

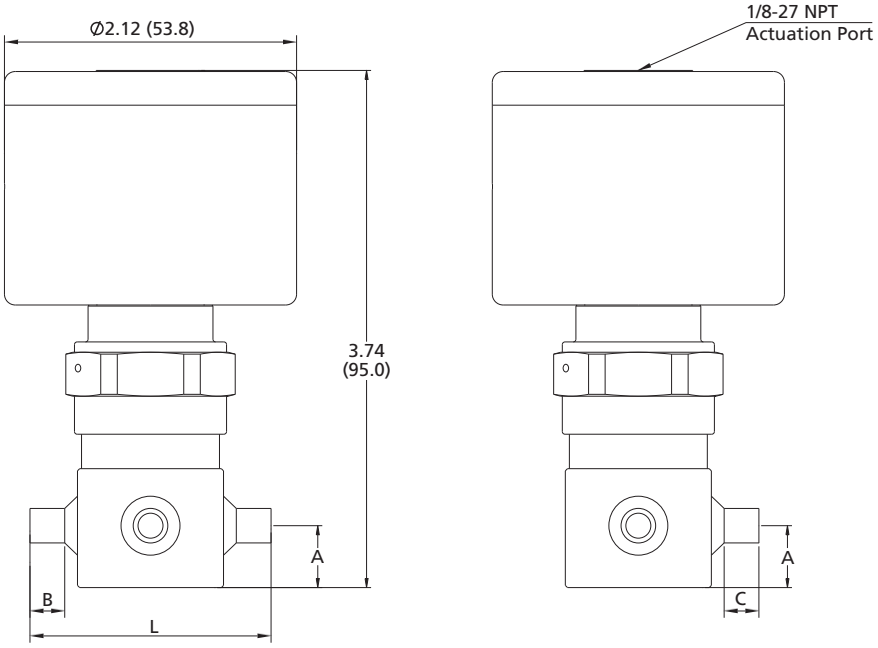
Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

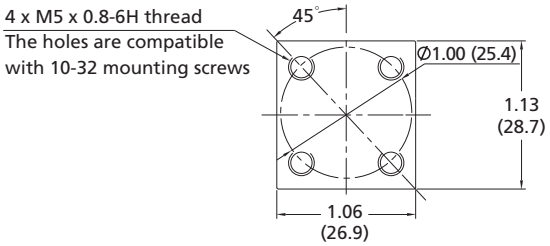
Branch Type

Dimensions

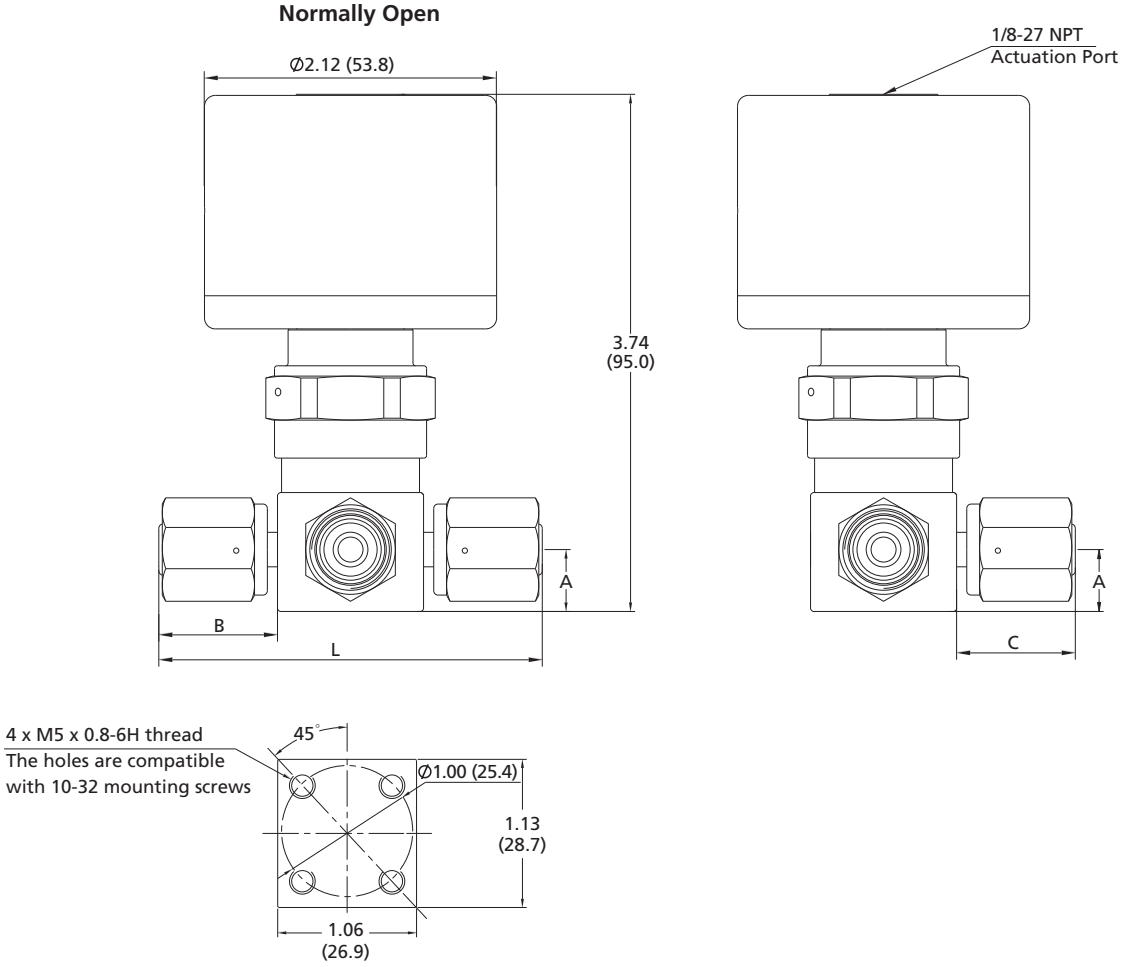
Dimensions, in inches (millimeters), are for reference only.

Normally Closed





Normally Open

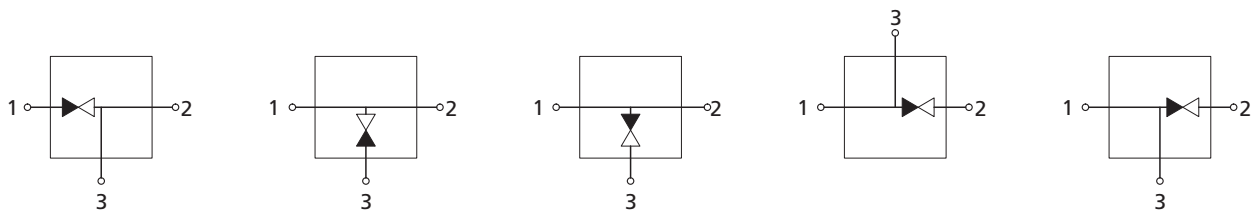


Basic Ordering Number	Connection Type and Size	Dimensions in. (mm)			
		A	B	C	L
SVH□□-TB4-	1/4" Tube Butt Weld	0.44 (11.2)	0.25 (6.4)	0.25 (6.4)	1.75 (44.4)
SVH□□-FFR4-	1/4" Female FR	0.44 (11.2)	0.85 (21.6)	0.85 (21.6)	2.76 (70.1)
SVH□□-FR4-	1/4" Integral Male FR	0.44 (11.2)	0.62 (15.7)	0.62 (15.7)	2.30 (58.4)
SVH□□-FL4-	1/4" FITOK Tube Fitting	0.44 (11.2)	0.70 (17.8)	0.70 (17.8)	2.46 (62.5)
SVH□□-FL6-	3/8" FITOK Tube Fitting	0.44 (11.2)	0.76 (19.3)	0.76 (19.3)	2.58 (65.5)
SVH□□-ML6-	6 mm FITOK Tube Fitting	0.44 (11.2)	0.70 (17.8)	0.70 (17.8)	2.46 (62.5)

Flow Paths

◎ Flow paths as viewed from the top

3D Flow **3E Flow** **3F Flow** **3G Flow** **3K Flow**



Ordering Number Description

SVHSS – TB4 – FR4 – FFR4 – 3G – CVF2M

Body Material	
6L	316L SS
SS	316 SS

Port 1 Type	
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
FR	Integral Male FR Fitting
FFR	Female FR Fitting
FL	Fractional Tube Fitting
ML	Metric Tube Fitting

Port 1 Size	
4	1/4"
6	6 mm or 3/8"
8	8 mm

Port 2/3 Type	
	Same as Port 1
Specified in the same way as port 2/3 type and size	

Port 2/3 Size

Flow Path
3D
3E
3F
3G
3K

Actuator Type	
C	Pneumatic (Normally Closed)
O	Pneumatic (Normally Open)

Seat	
	PCTFE
V	Vespel

Product Grade	
	Standard Cleaning and Packaging
F2	Special Cleaning and Packaging
F3	Ultra High Purity

Indicator Switch	
	None
M	Normally Open
M2	Normally Closed

Bellows-sealed Metering Valves

MU Series

Features

- Reset spring design with no backlash for precise, repeatable flow settings
- Micrometer handle measures stem position in 0.0008 in. (0.02 mm) increments
- Valves open to maximum flow in six turns
- Metering and regulating stem tips available
- Modular design to reduce maintenance cost
- Slotted handle tops enable adjustment with a screwdriver
- Lock screw secures flow settings

Technical Data

Stem Type		Metering	Regulating
Flow coefficient (Cv)		0.019	0.30
Max. working pressure		700 psig (48.2 bar)	
Max. working temperature		900°F (482°C)	
Leak rate (Helium)	Internal	-	$\leqslant 7.0 \times 10^{-7}$ mbarl/s
	External	$\leqslant 4.0 \times 10^{-9}$ mbarl/s	$\leqslant 4.0 \times 10^{-9}$ mbarl/s

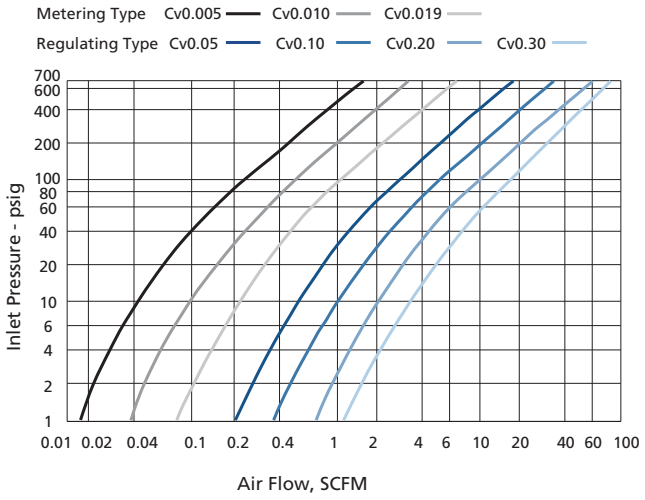
Pressure-Temperature Ratings

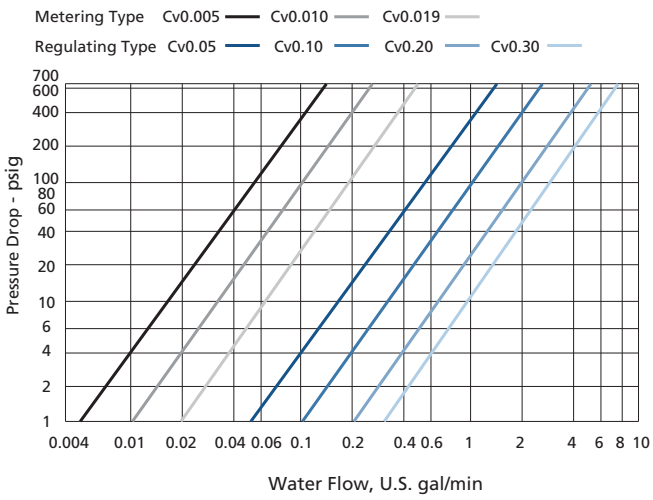
Material	316 SS	
Body-to-Bellows Seal	Gasket	Welded
Temperature °F (°C)	Working Pressure, psig (bar)	
-20 (-28) to 100 (38)	700 (48.2)	700 (48.2)
200 (93)	610 (42.0)	610 (42.0)
300 (148)	530 (36.5)	530 (36.5)
400 (204)	450 (31.0)	450 (31.0)
500 (260)	375 (25.8)	375 (25.8)
600 (315)	300 (20.6)	300 (20.6)
650 (343)	-	260 (17.9)
700 (371)	-	230 (15.8)
750 (398)	-	200 (13.7)
800 (426)	-	160 (11.0)
850 (354)	-	130 (8.9)
900 (482)	-	100 (6.8)

Handle Temperature Gradient

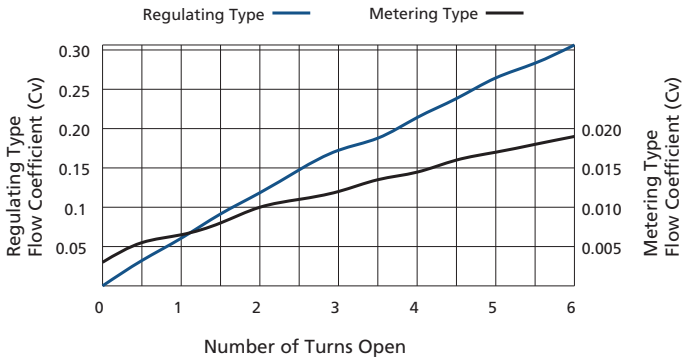
Stem Tip Temperature °F (°C)	Handle Temperature °F (°C)
600 (315)	217 (103)
900 (482)	316 (158)

Flow Data





Flow Coefficient at Turns Open



Factory Flow Settings

For valves with metering stem tips, with 10 psig (0.68 bar) inlet pressure and the flow rate from 10 to 15 ml/min, the handle is set at 0. Not intended for shut-off service.

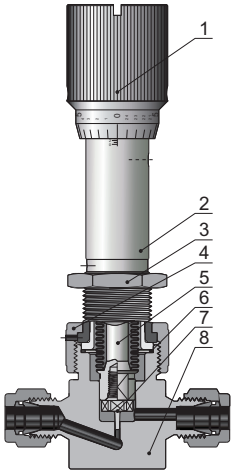
For valves with regulating stem tips, when valves are closed, after helium leak tested to a maximum allowable leak rate of $7x10^{-7}$ mbar·l/s, the handle is set at 0.

Note: Valves with regulating stem tips and welded seal are not recommended for shut-off service above 600°F (315°C).

Product Technology Grade

Product Grade / Technology	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)
Material/Specification	316 SS/ASTM A479	
Wetted Surface Roughness	Ra 15 µin. (0.38 µm)	
Polishing	Mechanical Polishing	
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non - ozone-depleting chemicals
Assembly Environment	At atmosphere	In specially cleaned areas
Packaging	Individually bagged	Double bagged

Major Materials of Construction

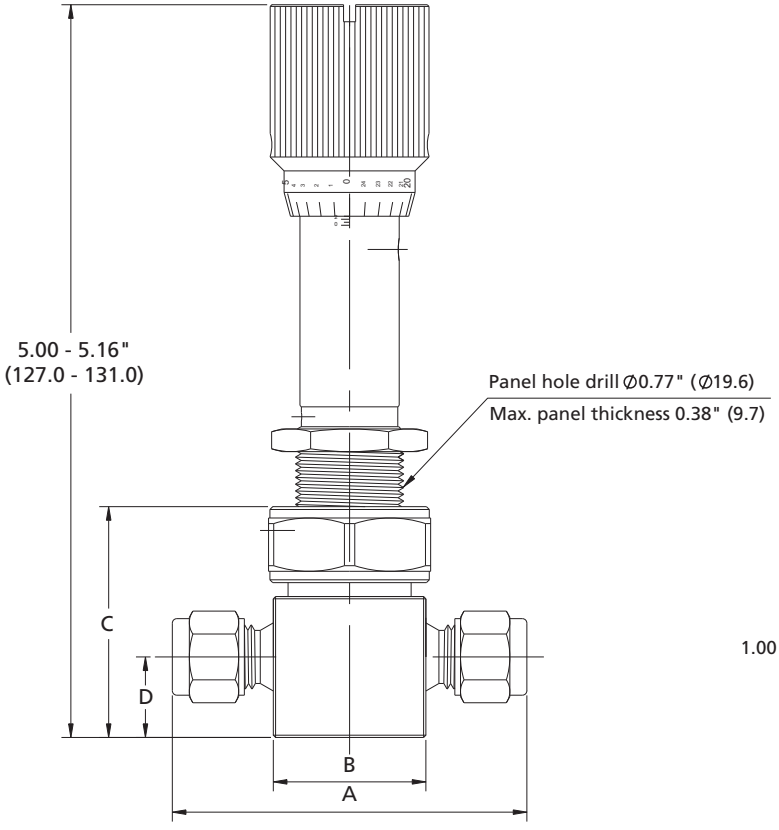


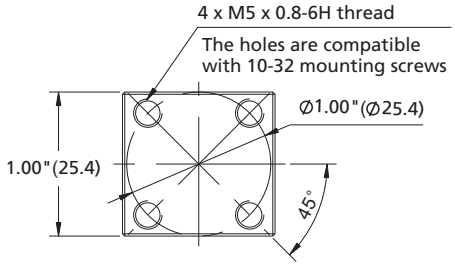
Item	Component	Material/Specification
1	Handle	6061/ASTM B211
2	Bonnet	304 SS/ASTM A479
3	Panel nut	304 SS/ASTM A479
4	Nut	304 SS/ASTM A479
5	Bellows assembly	316 SS/ASTM A240/ASTM A479
6	Gasket	Silver-plated 316L SS/ASTM A269
7	Stem tip	316 SS/ASTM A479
8	Body	316 SS/ASTM A479

Ordering Information and Dimensions

Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.





Ordering Information	End Connection Type and Size	Cv	Dimensions, in. (mm)			
			A	B	C	D
MUSS-FFR4-G-F2	1/4" Female FR Fitting	0.019	2.76 (70.1)	1.00 (25.4)	1.60 (40.7)	0.56 (14.2)
MUSS-FFR8-G-F2	1/2" Female FR Fitting		4.61 (117.0)	1.00 (25.4)		
MUSS-FFR4-RG-F2	1/4" Female FR Fitting	0.3	2.76 (70.1)	1.00 (25.4)		
MUSS-FFR8-RG-F2	1/2" Female FR Fitting		4.61 (117.0)	1.00 (25.4)		
MUSS-FL4-G	1/4" Tube Fitting	0.019	2.46 (62.5)	1.06 (26.9)		0.56 (14.2)
MUSS-FL6-G	6 mm Tube Fitting					
MUSS-FL4-RG	1/4" Tube Fitting	0.3	2.46 (62.5)	1.06 (26.9)		
MUSS-FL6-RG	6 mm Tube Fitting					
MUSS-FR4-G-F2	1/4" Male FR Fitting	0.019	2.24 (56.9)	1.00 (25.4)		0.44 (11.2)
MUSS-FR4-RG-F2	1/4" Male FR Fitting	0.3				
MUSS-TS4B6-G	1/4" Tube Socket Weld and 3/8" Tube Butt Weld	0.019	1.68 (42.7)	1.00 (25.4)		0.56 (14.2)
MUSS-TS4B6-RG		0.3				

Note: For valves with welded body-to-bellows seal (add -W as suffix), the dimension C will be changed to 1.57 (40.0).

Ordering Number Description

MUSS - FFR4 - G - WF2

Series	Body Material	End Connection Type and Size	Stem Tip Type	Body-to-Bellows Seal	Cleaning and Packaging Process
MU	SS 316 SS	FFR4 1/4" Male FR Fitting	G Metering Stem Tip	Gasket	Standard Cleaning and Packaging
		FFR8 1/4" Female FR Fitting	RG Regulating Stem Tip	W Welded	F2 Special Cleaning and Packaging
		TS4B6 1/4" Fractional Tube Socket Weld and 3/8" Fractional Tube Butt Weld			
		ML6 6 mm Metric Tube Fitting			
		FL4 1/4" Fractional Tube Fitting			

Note: MU series valves with FR end connections are standard with *F2 Special Cleaning and Packaging* process specification.

All-Welded Check Valves

CW Series

Features

- ◎ Internally threadless and all-welded design
- ◎ Forward flow starts at less than 2 psig (0.14 bar) pressure differential
- ◎ Valve closes with less than 2 psig (0.14 bar) back pressure
- ◎ Standard surface roughness finished to an average of Ra 20 µin. (0.51 µm) or electropolished to Ra 10 µin. (0.25 µm) optional
- ◎ Variety of end connections available

Technical Data

Ports Size	1/4" to 1/2" or 6 mm to 12 mm
Flow Coefficient (Cv)	0.55 or 0.70
Cracking Pressure①	Less than 2 psig (0.14 bar)
Max. Working Pressure	3000 psig (206 bar)
Max. Pressure Drop	145 psig (10 bar)
Working Temperature	-10~400°F (-23~204°C)

① For valves not actuated for a period of time, initial cracking pressure may be higher than the set cracking pressure.

Flow Data

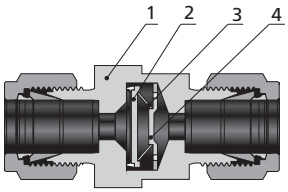
Air @ 70°F (21°C)

Pressure Drop to Atmosphere psi (bar)	Cv 0.55 (l/min)	Cv 0.70 (l/min)
10 (0.68)	170	220
50 (3.4)	450	590
100 (6.8)	820	1040

Product Technology Grade

Technology \ Product Grade	Standard Cleaning and Packaging	Special Cleaning and Packaging (F2)	Ultra High Purity (F3)
Material/Specification	316L SS/ASTM A479		316L SS/ASTM A479 316L VAR/SEMI F20
Wetted Surface Roughness	Ra 20 µin. (0.51 µm)		Ra 10 µin. (0.25 µm)
Polishing Process	Machine finished		Electropolished
Process Specification	FC-01 Standard Cleaning and Packaging	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Thrice degreasing ultrasonic cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	At atmosphere	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Individually bagged	Double bagged	Double bagged and vacuum sealed in cleanroom

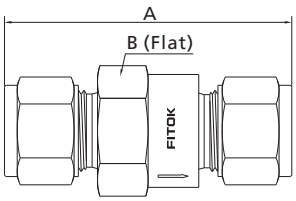
Major Materials of Construction



	Component	Material Grade/ASTM Specification
1	Body	316L SS/A479
2	Poppet	Fluorocarbon FKM-bonded 316 SS/A479
3	Belleville Spring	Hastelloy
4	Poppet Stop	316L SS/A240

Note: Check valves are designed for directional flow control only and should never be used as code safety relief devices.

Dimensions



Basic Ordering Number	Connection Type and Size		Cv	Dimensions, in. (mm)	
	Inlet	Outlet		A	B
CW□□-TB4	1/4" TB	1/4" TB	0.55	1.24 (31.5)	7/8 (22.22)
CW□□-TB6	3/8" TB	3/8" TB	0.70		
CW□□-TB8	1/2" TB	1/2" TB			
CW□□-MTB6	6 mm MTB	6 mm MTB	0.55		
CW□□-FR4	1/4" Male FR	1/4" Male FR	0.70	1.80 (45.7)	
CW□□-FR8	1/2" Male FR	1/2" Male FR		2.06 (52.3)	1 (25.4)
CW□□-FL4	1/4" FITOK	1/4" FITOK	0.55	1.96 (49.8)	7/8 (22.22)
CW□□-ML6	6 mm FITOK	6 mm FITOK			

Ordering Number Description

CW6L – FL8 – ML10 – B – F2

Series	Body Material	Inlet Type	Inlet Size	Outlet Type	Outlet Size	Seal Material	Product Grade
CW	6L 316L SS 6LV 316L VAR SS	FL Fractional Tube Fitting ML Metric Tube Fitting FFR Female FR Fitting FR Male FR Fitting RFR Rotatable Male FR Fitting TB Fractional Tube Butt Weld MTB Metric Tube Butt Weld	4 1/4" 6 3/8" or 6 mm 8 1/2" or 8 mm 10 10 mm 12 12 mm	Same as Inlet Specified in the same way as the inlet type and size		Fluorocarbon FKM B Buna N E EPDM	Standard Cleaning and Packaging F2 Special Cleaning and Packaging F3 Ultra High Purity

Regulators

FHR-1 Series High Performance High Purity Regulators

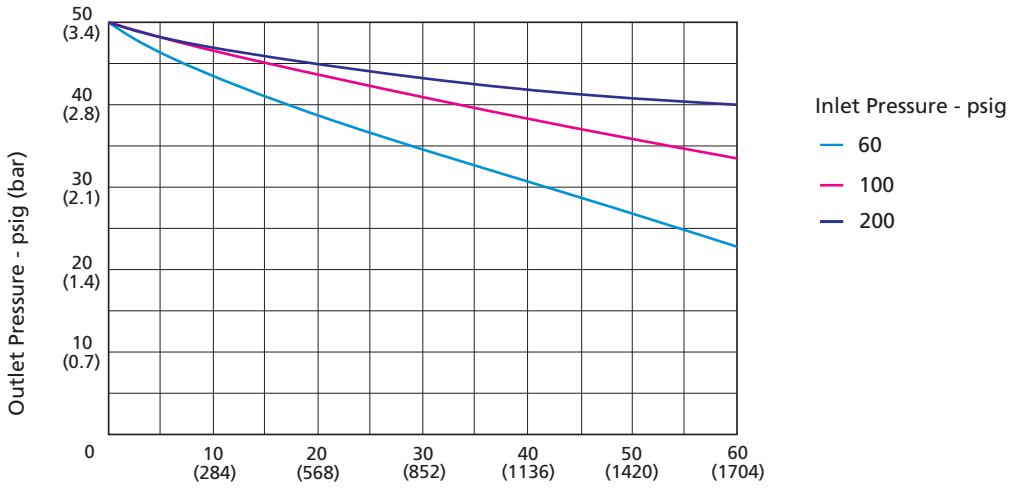
Features

- ◎ 316L stainless steel body for corrosive gases and toxic gases
- ◎ Standard Hastelloy poppet and diaphragm
- ◎ Tied diaphragm for added safety
- ◎ Metal to metal diaphragm to body seal
- ◎ No springs or threads are exposed to the wetted area
- ◎ Internal surfaces are finished with Ra 10 µin. (0.25 µm) or Ra 5 µin. (0.13 µm) to ensure minimal particle generation
- ◎ With special cleaning and packaging, applicable to oxygen-enriched environments
- ◎ Ultra High Purity Service available

Technical Data

Port Size		1/4" , 3/8" or 1/2"
Max. Working Pressure		3500 psig
Outlet Pressure Range		0~30, 0~60, 0~100, 0 ~150 psig
Flow Coefficient (Cv)		3500 psig Inltet: 0.06 600,1000 psig Inlet: 0.15
Temperature		PCTFE: -40~149°F (-40~65°C) Vespel: -15~302°F (-26~150°C)
Leak Rate (Helium)	**Internal**	$\leqslant 5\times10^{-8}$ mbar l/s
	External	$\leqslant 1\times10^{-9}$ mbar l/s
Weight (regulator only)		≈1.5 lbs (0.7 kg)

Flow Data



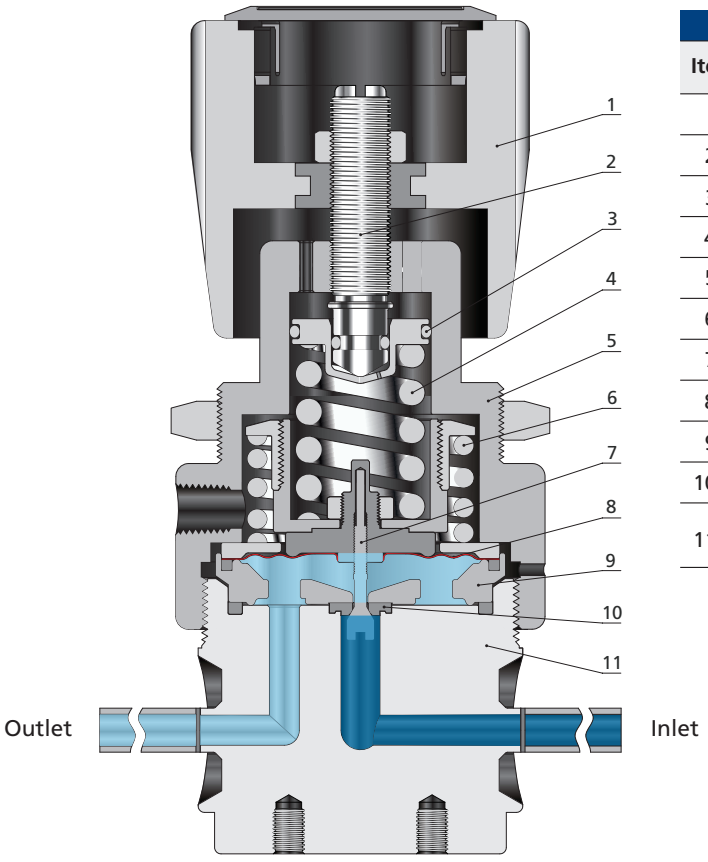
Flow Rate - SCFM (SLPM) Nitrogen

Product Technology Grade

Technology \ Product Grade	Special Cleaning and Packaging	Ultra High Purity (F3)
Material/Specification	316L SS/ASTM A479	316L VAR /SEMI F20
Wetted Surface Roughness	Ra 10 μin. (0.25 μm)①	Ra 5 μin. (0.13 μm)
Polishing Process	Machine finished①	Electropolished
Process Specification	FC-02 Special Cleaning and Packaging	FC-03 Ultra High Purity Process Specification
Cleaning	Special cleaning with non-ozone-depleting chemicals	Ultra high purity cleaning in continuously monitored ultrasonic cleaning system with deionized water
Assembly Environment	In specially cleaned areas	In ISO Class 5/Federal Class 100 cleanroom
Packaging	Double bagged	Double bagged and vacuum sealed in cleanroom

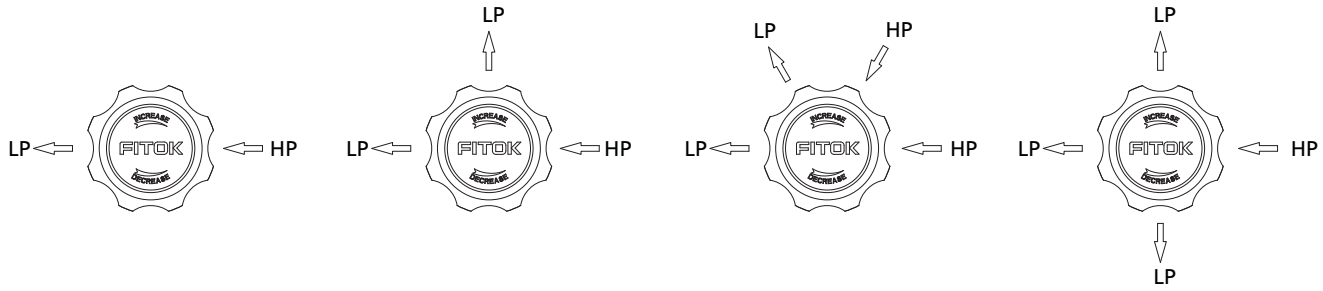
① For FR connections and tube butt connections, the standard polishing process is electropolishing and the internal surface roughness is finished to an average of Ra 5 μin. (0.13 μm).

Major Materials of Construction



Item	Component	Material/Specification
1	Handle	Aluminum
2	Stem	C36000/ASTM B16
3	O-ring	Viton
4	Range Spring	S17700/ASTM A313
5	Bonnet	304 SS/ASTM A479
6	Back Move Spring	302 SS/ASTM A313
7	Lift Poppet	N06022/ASTM B574
8	Diaphragm	Hastelloy
9	Support	316L SS/ASTM A479
10	Seat	PCTFE/ASTM D1430 or Vespel
11	Body	316L SS/ASTM A479 or 316L VAR /SEMI F20 or 316L VIM-VAR /SEMI F20

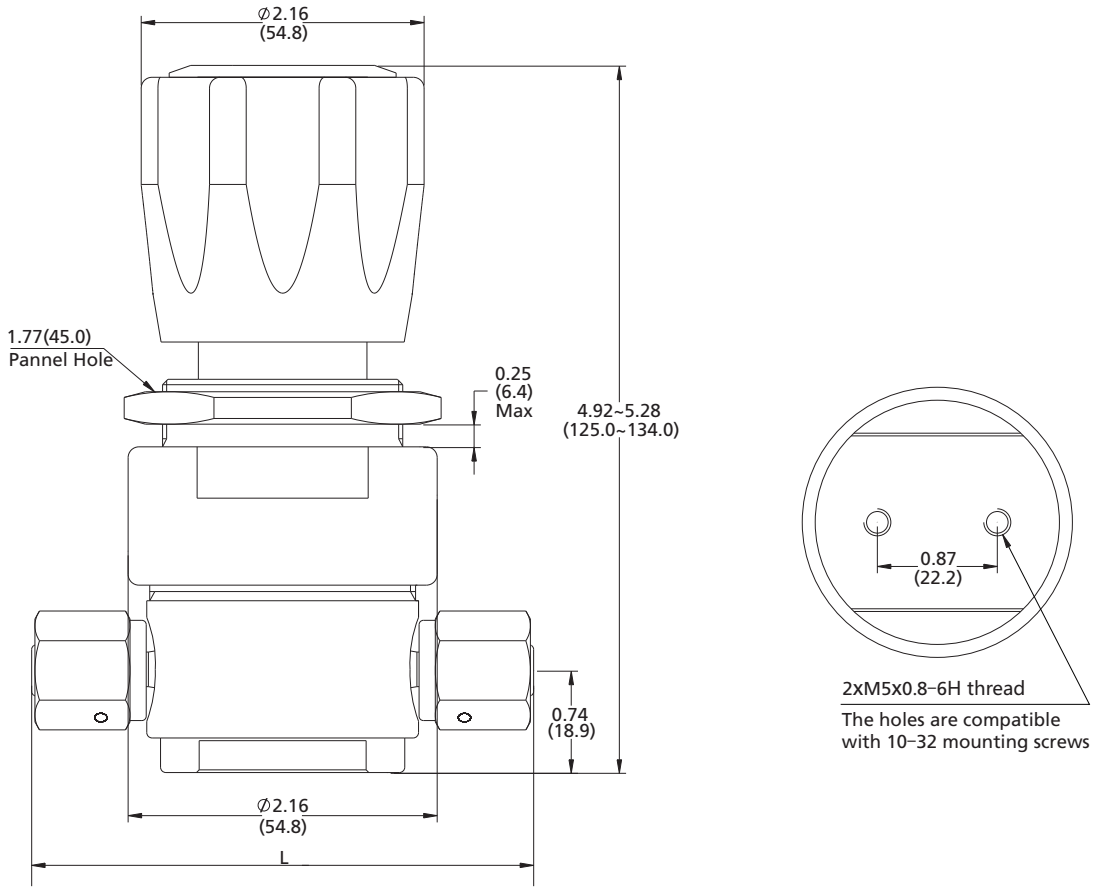
Porting Configurations



2 Ports (2P) | **3 Ports (3P)** | **4 Ports (4P)** | **4 Ports (4C)**

Dimensions

Dimensions, in inches (millimeters), are for reference only.



Connection Code	Connection Type and Size	L
C4	1/4" Fractional Tube Fitting	4.97"(126.2)
C6	3/8" Fractional Tube Fitting	5.99"(152.1)
T4	1/4" Fractional Tube Butt Weld	3.70 (94.0)
T6	3/8" Fractional Tube Butt Weld	
F4	1/4" Female Face Seal	
F8	1/2" Female Face Seal	4.75"(120.6)
M4	1/4" Rotatable Male Face Seal	3.70 (94.0)
M8	1/2" Rotatable Male Face Seal	4.75"(120.6)
IF4	1/4" Internal Female Face Seal	1.09"(27.7)

Ordering Number Description

FHR – 16L – 35 – 100 – 4P – B – M4M4M4M4 – ZV – F3

Body Material	
6L	316L SS
6LV	316L VAR

Inlet Pressure P1	
06	600 psig
10	1000 psig
35	3500 psig

Outlet Pressure Range P2	
30	0~30 psig
60	0~60 psig
100	0~100 psig
150	0~150 psig

Porting	
2P	2 ports (no gauge port)
3P	3 ports (gauge port at outlet)
4P	4 ports (gauge ports at inlet and outlet)
4C	4 ports (gauge port at outlet)

Gauge	
	Without gauge
B	With gauge (psi/bar)
M	With gauge (psi/MPa)

Connection Type and Size	
C4	1/4" Fractional Tube Fitting
C6	3/8" Fractional Tube Fitting
T4	1/4" Fractional Tube Butt Weld
T6	3/8" Fractional Tube Butt Weld
F4	1/4" Female Face Seal
F8	1/2" Female Face Seal
M4	1/4" Rotatable Male Face Seal
M8	1/2" Rotatable Male Face Seal
IF4	1/4" Internal Female Face Seal
Other connections are available upon request	

Optional Feature	
	None
Z	Panel nut
N	Bolts for assembly
V	Vespel seat

Product Grade	
	Special Cleaning and Packaging
F3	Ultra High Purity

Note: "Ordering Number Description" is a reference to understand the combination rules of FITOK product part number. Not all combinations are available.

Warranty Information

FITOK products are backed by the FITOK Limited Lifetime Warranty. For a copy, contact FITOK Group or our authorized distributors.

info@fitokgroup.com
www.fitokgroup.com

FK-FC-S-02-EN-191018