Metal Gasket Face Seal Fittings

FR Series

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FG08040813

FITOK
Valves and Fittings

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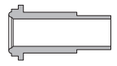
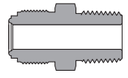
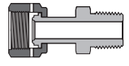
Glands - G  03

Bodies - CM, CMB, CF, U, UB, BU, BW, RU, RA, RB, LM, LU, TTT, C  06

Welded Glands - WG  10

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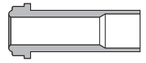
High-Flow Connections - G, CW, BW, LU, TTT, N, MN  14

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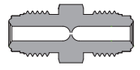
Flow Restrictors  17

Features

- 316, 316L, and 316L VAR (Vacuum Arc Remelt) stainless steel materials are available.
- Metal-to-metal seal provides perfect leak-tight service from critical vacuum to high pressure.
- FR female threads are silver plated.
- Every gland and body is stamped with size, material and heat code.
- All seal faces and male threads are protected with plastic caps.
- Test port at nut for easy leak testing.
- Precision manufactured gasket for maximum performance.

Technical Data

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

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

- Working Pressure:
  Catalog working pressure is calculated in accordance with ANSI/ASME B31.3. To determine working pressure in accordance with ANSI/ASME B31.1, multiply by 0.94.
- Working Temperature:

Component	Material	Working Temperature
Fittings	316 stainless steel	1000°F (538°C)
	316L stainless steel	
	316L VAR stainless steel	
Gaskets	316L stainless steel	
	Copper	400°F (204°C)
	Nickel	600°F (316°C)

Standard Materials of Construction

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

Materials traceable, certification available upon request

Testing

FR fitting is tested with helium at a maximum leak rate of 4×10^{-9} std cm^3/s.

Ordering Information

◎ Dimensions are for reference only and are subject to change.

◎ Each component should be ordered separately.

◎ Add the material designator as a prefix, Wetted Surface Finish code or Cleaning and Packaging code as a suffix to the basic ordering number to get the complete ordering number.

◎ Wetted Surface Finish

Standard surface finish is a roughness average of 15 µin. (0.4 µm) Ra. To order fittings to a roughness average of 10 µin. (0.2 µm) Ra, add -E3 as a suffix to the ordering number. Put Wetted Surface Finish before code Cleaning and Packaging code. Example: **6L-G-FR4-TB4-E3**.

◎ Standard Process Specification

FC-01 standard cleaning and packaging, Is applied to all the fittings for general industrial procedure. No suffix is required. Example: **6L-G-FR2-TB2**.

◎ High-Purity Process Specification

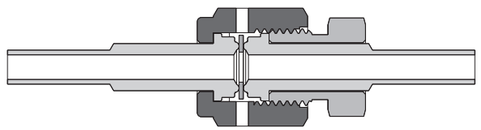
FC-02 special cleaning and packaging, following ASTM G93 level C, add - E2F2 as a suffix to the basic ordering number. Example: **6L-G-FR4-TB4-E2F2**.

◎ Ultrahigh-purity Process Specification

FC-03 ultrahigh-purity cleaning and packaging, add - E3F3 as a suffix to the basic ordering number.
Example: **6LV-G-FR8-TB8-6-E3F3**

Installation Instructions

1. Assemble the gland, nut, gasket and male nut as below, finger tighten the nut.



2. For 316L stainless steel and nickel gasket material, tighten the nut 1/8 turn with a wrench while holding the male nut or body of the fitting steady. Tighten the nut 1/4 turn for copper gasket.

Cautions:

◎ Over-tightening will damage the sealing beads and possibly cause system leakage.

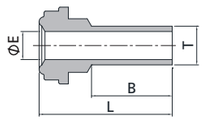
◎ The old gasket must be replaced by the new gasket for each assembly.

◎ Tungsten Inert Gas Welding (TIG) is recommended.

◎ Always use proper thread sealants on tapered pipe threads.

◎ Do not loosen or tighten fittings when system is pressurized.

Glands

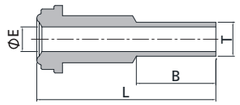


FR Gland to Short Fractional Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
				L	B	E	6L	CU	NI
1/8	1/8	0.028	-G-FR2-TB2-12S	27.4	19.1	1.5	8500 (586)	6800 (468)	8500 (586)
1/4	1/8	0.028	-G-FR4-TB2-12S	27.9	19.1	1.5	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-4S	15.2	6.4	4.6	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-6S	18.3	9.7	4.6	5100 (351)	5100 (351)	5100 (351)
1/4	1/4	0.035	-G-FR4-TB4-12S	27.9	19.1	4.6	5100 (351)	5100 (351)	5100 (351)
1/2	1/4	0.035	-G-FR8-TB4-12S	28.4	19.1	4.6	4300 (296)	2800 (192)	3500 (241)
1/2	3/8	0.035	-G-FR8-TB6-4S	15.7	6.4	7.9	3300 (227)	2600 (179)	3300 (227)
1/2	3/8	0.035	-G-FR8-TB6-12S	28.4	19.1	7.9	3300 (227)	2600 (179)	3300 (227)
1/2	1/2	0.049	-G-FR8-TB8-4S	15.7	6.4	10.2	3500 (241)	2800 (192)	3500 (241)
1/2	1/2	0.049	-G-FR8-TB8-6S	18.8	9.7	10.2	3500 (241)	2800 (192)	3500 (241)
1/2	1/2	0.049	-G-FR8-TB8-12S	28.4	19.1	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	Dimension, mm			Working Pressure, psig (bar)		
				L	B	E	6L	CU	NI
1/4	6	1.0	-G-FR4-MTB6-12S	29.5	19.1	4.0	6800(468)	5400(372)	6800(468)
1/4	8	1.0	-G-FR4-MTB8-12S	29.5	19.1	6.0	4900(337)	4900(337)	4900(337)
1/2	10	1.0	-G-FR8-MTB10-12S	29.5	19.1	8.0	3500(241)	2800(192)	3500(241)
1/2	12	1.0	-G-FR8-MTB12-12S	29.5	19.1	10.0	3100(213)	2400(165)	3100(213)
3/4	18	1.5	-G-FR12-MTB18-12S	31.0	19.1	15.0	3000(206)	2400(165)	3000(206)



FR Gland to Long Fractional Tube Butt Weld

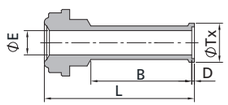
FR Size (in.)	T-Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
				L	B	E	6L	CU	NI
1/8	1/8	0.028	-G-FR2-TB2-12	36.1	19.1	1.5	8500(586)	6800(468)	8500(586)
1/4	1/4	0.035	-G-FR4-TB4-4	30.5	6.4	4.6	5100(351)	5100(351)	5100(351)
1/4	1/4	0.035	-G-FR4-TB4-6	33.5	9.7	4.6	5100(351)	5100(351)	5100(351)
1/4	1/4	0.035	-G-FR4-TB4-12	43.2	19.1	4.6	5100(351)	5100(351)	5100(351)
1/2	1/4	0.035	-G-FR8-TB4-12	45.7	19.1	4.6	4300(296)	2800(192)	3500(241)
1/2	3/8	0.035	-G-FR8-TB6-4	32.8	6.4	7.9	3300(227)	2600(179)	3300(227)
1/2	3/8	0.035	-G-FR8-TB6-12	45.5	19.1	7.9	3300(227)	2600(179)	3300(227)
1/2	1/2	0.049	-G-FR8-TB8-4	32.8	6.4	10.2	3500(241)	2800(192)	3500(241)
1/2	1/2	0.049	-G-FR8-TB8-6	35.8	9.7	10.2	3500(241)	2800(192)	3500(241)
1/2	1/2	0.049	-G-FR8-TB8-12	45.5	19.1	10.2	3500(241)	1900(130)	3500(241)
3/4	3/4	0.049	-G-FR12-TB12-12	51.6	19.1	16.5	2400(165)	1900(130)	2400(165)
1	1	0.065	-G-FR16-TB16-12	58.9	19.1	22.1	2400(165)	2400(165)	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	Dimension, mm			Working Pressure, psig (bar)		
				L	B	E	6L	CU	NI
1/4	6	1.0	-G-FR4-MTB6-12	43.2	19.1	4.0	6800(468)	5400(372)	6800(468)
1/4	8	1.0	-G-FR4-MTB8-12	43.2	19.1	6.0	4900(337)	4900(337)	4900(337)
1/2	10	1.0	-G-FR8-MTB10-12	45.5	19.1	8.0	3500(241)	2800(192)	3500(241)
1/2	12	1.0	-G-FR8-MTB12-12	45.5	19.1	10.0	3100(213)	2400(165)	3100(213)
3/4	18	1.5	-G-FR12-MTB18-12	51.6	19.1	15.0	3000(207)	2400(165)	3000(207)

The suffix -4, -6, -12 indicate the length of Dim. B, eg. SS-G-FR8-TB6-4, -4 means Dim B=4/16"∗25.4=6.4 mm.

Glands

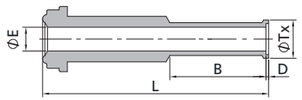


Short Fractional Automatic Tube Butt Weld

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

Short Metric Automatic Tube Butt Weld

FR Size (in.)	T-Tube O.D. (mm)	Nominal Wall Thickness (mm)	Basic Ordering Number	Dimension, mm					Working Pressure, psig (bar)		
				L	B	D	E	Tx	6L	CU	NI
1/4	6	1.0	-AG-FR4-MTB6-12S	30.0	19.1	0.5	4.0	6.8	6800(468)	5400(372)	6800(468)
1/4	8	1.0	-AG-FR4-MTB8-12S	30.2	19.1	0.8	6.0	8.9	4900(337)	4900(337)	4900(337)
1/2	10	1.0	-AG-FR8-MTB10-12S	31.0	19.1	0.8	8.0	10.9	3500(241)	2800(192)	3500(241)
1/2	12	1.0	-AG-FR8-MTB12-12S	30.5	19.1	1.0	10.0	13.2	3100(213)	2400(165)	3100(213)



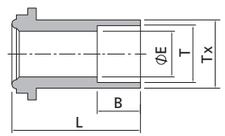
Long Fractional Automatic Tube Butt Weld

FR Size (in.)	T-Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimension, mm					Working Pressure, psig (bar)		
				L	B	D	E	Tx	6L	CU	NI
1/4	1/4	0.035	-AG-FR4-TB4-12	43.7	19.1	0.5	4.6	7.4	5100(351)	5100(351)	5100(351)
1/2	1/4	0.035	-AG-FR8-TB4-12	46.2	19.1	0.5	4.6	7.4	3500(241)	2800(192)	3500(241)
1/2	3/8	0.035	-AG-FR8-TB6-12	46.2	19.1	0.8	7.9	10.4	3300(227)	2600(179)	3300(227)
1/2	1/2	0.049	-AG-FR8-TB8-12	46.5	19.1	1.0	10.2	14.0	3500(241)	2800(192)	3500(241)
3/4	3/4	0.049	-AG-FR12-TB12-12	52.6	19.1	1.0	16.5	20.3	2400(165)	2400(165)	2400(165)
1	1	0.065	-AG-FR16-TB16-16	65.3	24.4	1.0	22.1	26.9	2400(165)	1900(130)	2400(165)

Long Metric Automatic Tube Butt Weld

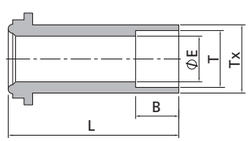
FR Size (in.)	T-Tube O.D. (mm)	Nominal Wall Thickness (mm)	Basic Ordering Number	Dimension, mm					Working Pressure, psig (bar)		
				L	B	D	E	Tx	6L	CU	NI
1/4	6	1.0	-AG-FR4-MTB6-12	43.7	19.1	0.5	4.0	6.8	6800(468)	5400(372)	6800(468)
1/2	12	1.0	-AG-FR8-MTB12-12	46.5	19.1	1.0	10.0	13.2	3100(213)	2400(165)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

Glands



FR Gland to Short Tube Socket Weld

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



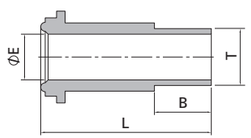
FR Gland to Tube Socket Weld

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimension, mm				Working Pressure, psig (bar)		
			L	B	E	Tx	6L	CU	NI
1/8	1/16	-G-FR2-TS1	17.8	2.5	1.3	3.3	9000 (620)	7200 (496)	9000 (620)
1/8	1/8	-G-FR2-TS2	17.8	2.5	2.3	5.1	7100 (489)	7100 (489)	7100 (489)
1/4	1/8	-G-FR4-TS2	33.3	2.5	2.3	8.9	8000 (551)	8000 (551)	8000 (551)
1/4	1/4	-G-FR4-TS4	33.3	7.1	4.6	8.9	5500 (378)	5500 (378)	5500 (378)
1/2	1/4	-G-FR8-TS4	38.1	7.1	4.6	15.2	4300 (296)	3500 (241)	3500 (241)
1/2	3/8	-G-FR8-TS6	38.1	7.9	7.1	15.2	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-G-FR8-TS8	38.1	9.7	10.2	15.2	3000 (206)	2400 (165)	3000 (206)
5/8	5/8	-G-FR10-TS10	39.6	10.4	12.7	18.3	2800 (192)	2200 (151)	2800 (192)
3/4	3/4	-G-FR12-TS12	50.8	11.2	15.7	22.4	2800 (192)	2200 (151)	2800 (192)
1	1	-G-FR16-TS16	56.4	15.7	22.1	30.2	3000 (206)	1900 (130)	2400 (165)

Reducing Socket Weld

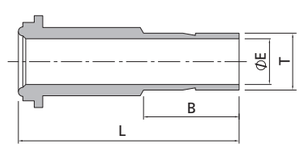
Reducing Socket Weld

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



FR Gland to Male Weld

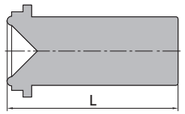
FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
			L	B	E	6L	CU	NI
1/8	1/8	-G-FR2-TB2	17.8	7.1	1.5	11200 (772)	7200 (496)	9000 (620)
1/4	1/8	-G-FR4-TB2	33.3	7.1	1.5	10000 (689)	6400 (440)	8000 (551)
1/4	1/4	-G-FR4-TB4	33.3	10.4	3.0	10000 (689)	6400 (440)	8000 (551)
1/2	1/4	-G-FR8-TB4	38.1	10.4	3.0	4300 (296)	2800 (192)	3500 (241)
1/2	3/8	-G-FR8-TB6	38.1	10.4	7.1	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-G-FR8-TB8	38.1	12.7	10.2	3500 (241)	3500 (241)	3500 (241)
3/4	3/4	-G-FR12-TB12	50.8	15.7	13.5	3700 (254)	2400 (165)	3000 (206)
1	1	-G-FR16-TB16	56.4	20.6	19.1	3000 (206)	1900 (130)	2400 (165)



FR Gland to Tube Port

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
			L	B	E	6L	CU	NI
1/4	1/4	-G-FR4-FT4	41.1	16.3	4.3	10000 (689)	6400 (440)	8000 (551)
1/2	3/8	-G-FR8-FT6	46.0	17.8	6.9	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-G-FR8-FT8	49.3	24.4	9.4	4300 (296)	2800 (192)	3500 (241)

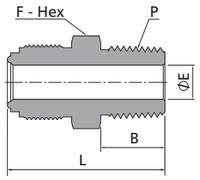
Glands



Blind Gland

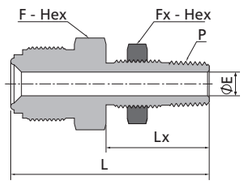
FR Size (in.)	Basic Ordering Number	Dimension, mm
		L
1/8	-G-FR2-B	17.8
1/4	-G-FR4-B	33.3
1/2	-G-FR8-B	38.1
3/4	-G-FR12-B	50.8
1	-G-FR16-B	56.4

Bodies



FR Body to Male NPT

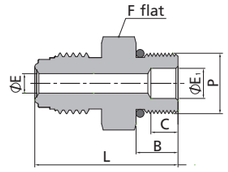
FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimension, mm				Working Pressure, psig (bar)		
			L	B	E	F	6L	CU	NI
1/8	1/16	-CM-FR2-NS1	27.2	9.7	2.3	9.5	9000 (620)	7200 (496)	9000 (620)
1/8	1/8	-CM-FR2-NS2	27.2	9.7	2.3	11.1	9000 (620)	7200 (496)	9000 (620)
1/4	1/8	-CM-FR4-NS2	33.3	9.7	4.6	15.9	10000 (689)	6400 (440)	8000 (551)
1/4	1/4	-CM-FR4-NS4	37.9	14.2	4.6	15.9	10000 (689)	6400 (440)	8000 (551)
1/2	1/4	-CM-FR8-NS4	41.9	14.2	7.1	23.8	4300 (296)	2800 (192)	3500 (241)
1/2	3/8	-CM-FR8-NS6	41.9	19.1	9.7	23.8	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-CM-FR8-NS8	46.7	19.1	10.2	23.8	4300 (296)	2800 (192)	3500 (241)
3/4	3/4	-CM-FR12-NS12	55.6	19.1	15.8	33.3	3700 (254)	2400 (165)	3000 (206)
1	1	-CM-FR16-NS16	62.7	23.9	22.1	41.3	3000 (206)	1900 (130)	2400 (165)



FR Body to Bulkhead Male Connector

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

FR Body to SAE/MS Thread

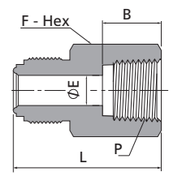


FR Body to SAE/MS Thread

FR Size (in.)	P-SAE/MS Thread Size	Uniform O-Ring① Size	Basic Ordering Number	Dimension, mm						Working Pressure, psig (bar)		
				L	B	C	E	E_1	F	6L	CU	NI
1/4	9/16-18	906	-CM-FR4-ST9	33.8	9.9	6.4	4.6	7.1	19.1	4500(310)	4500(310)	4500(310)
1/2	9/16-18	906	-CM-FR8-ST9	37.6	9.9	–	7.1	7.1	23.8	3500(240)	2800(192)	3500(240)
1/2	7/8-14	910	-CM-FR8-ST12	42.2	12.7	10.2	7.1	15.0	25.4	3500(240)	2800(192)	3500(240)

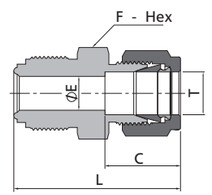
① Fluorocarbon FKM is standard, other materials are available.

Bodies



FR Body to Female NPT

FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimension, mm				Working Pressure, psig (bar)		
			L	B	E	F	6L	CU	NI
1/8	1/16	-CF-FR2-NS1	27.9	9.9	2.3	11.1	6700 (461)	6700 (461)	6700 (461)
1/8	1/8	-CF-FR2-NS2	30.2	10.4	2.3	14.3	6500 (447)	6500 (447)	6500 (447)
1/4	1/8	-CF-FR4-NS2	35.8	10.4	4.6	15.9	8000 (551)	6400 (440)	8000 (551)
1/4	1/4	-CF-FR4-NS4	39.1	15.0	4.6	19.1	6600 (454)	5200 (358)	6600 (454)
1/2	3/8	-CF-FR8-NS6	44.7	15.0	10.2	23.8	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-CF-FR8-NS8	50.5	19.8	10.2	27.0	4300 (296)	2800 (192)	3500 (241)
3/4	3/4	-CF-FR12-NS12	59.9	20.6	15.7	33.3	3700 (254)	2400 (165)	3000 (207)
1	1	-CF-FR16-NS16	63.8	25.4	22.1	41.3	3000 (207)	1900 (130)	2400 (165)

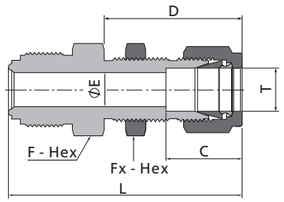


FR Body to Tube Fitting

FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimension, mm				Working Pressure, psig (bar)		
			L①	C	E	F	6L	CU	NI
1/4	1/8	-U-FR4-FL2	38.9	12.7	2.3	15.9	10000 (689)	6400 (440)	8000 (551)
1/4	1/4	-U-FR4-FL4	41.1	15.2	4.6	15.9	10000 (689)	6400 (440)	8000 (551)
1/2	3/8	-U-FR8-FL6	46.7	16.8	7.1	23.8	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-U-FR8-FL8	49.5	22.9	10.2	23.8	4300 (296)	2800 (192)	3500 (241)

① Dimension L is typical finger-tight.

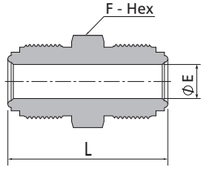
Bodies



FR Body to Bulkhead Tube Fitting Union

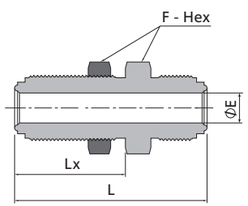
FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimension, mm						Panel Hole Size(mm)	Max. Panel Thickness (mm)	Working Pressure, psig (bar)		
			L①	C	D	E	F	Fx			6L	CU	NI
1/4	1/4	-UB-FR4-FL4	57.2	15.2	33.5	4.6	15.9	15.9	11.9	10.2	10000 (689)	6400 (440)	8000 (551)
1/4	1/4	-UB-FR4-FL4-1.88	47.8	15.2	26.7	4.6	15.9	15.9	11.9	3.3	10000 (689)	6400 (440)	8000 (551)
1/2	3/8	-UB-FR8-FL6	64.5	16.8	36.8	7.1	23.8	19.1	15.1	11.2	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-UB-FR8-FL8	69.6	22.9	41.9	10.2	23.8	23.8	19.8	12.7	4300 (296)	2800 (192)	3500 (241)

① Dimension L is typical finger-tight.



Union Body

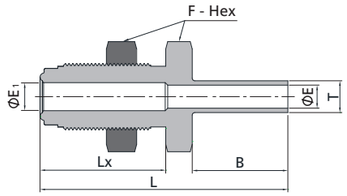
FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/8	1/8	-U-FR2	28.7	2.3	9.5	11200 (772)	7200 (496)	9000 (620)
1/4	1/8	-U-FR4-FR2	34.8	2.3	15.9	10000 (689)	6400 (440)	8000 (551)
1/4	1/4	-U-FR4	39.4	4.6	15.9	10000 (689)	6400 (440)	8000 (551)
1/2	1/4	-U-FR8-FR4	43.4	4.6	23.8	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-U-FR8	46.7	10.2	23.8	4300 (296)	2800 (192)	3500 (241)
3/4	3/4	-U-FR12	62.0	15.7	33.3	3700 (254)	2400 (165)	3000 (207)
1	1	-U-FR16	65.8	22.1	41.3	3000 (207)	1900 (130)	2400 (165)



Bulkhead Union Body

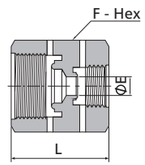
FR Size (in.)	Basic Ordering Number	Dimension, mm				Panel Hole Drill Size(mm)	Max. Panel Thickness (mm)	Working Pressure, psig (bar)		
		L	Lx	E	F			6L	CU	NI
1/4	-BU-FR4-1.82	46.2	25.1	4.6	19.1	15.0	3.3	10000 (689)	6400 (440)	8000 (551)
1/4	-BU-FR4	56.6	33.0	4.6	19.1	15.0	11.2	10000 (689)	6400 (440)	8000 (551)
1/2	-BU-FR8-2.14	54.4	28.2	10.2	27.0	23.0	3.3	4300 (296)	2800 (192)	3500 (241)
1/2	-BU-FR8	65.3	37.6	10.2	27.0	23.0	12.7	4300 (296)	2800 (192)	3500 (241)

Bodies



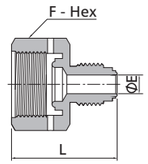
FR Bulkhead Body to Tube Butt Weld

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



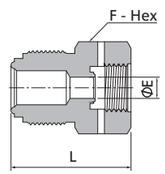
Female Reducing Union

FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/4	1/8	-RU-FR4-FR2	29.5	3.3	19.1	10000 (689)	6400 (440)	8000 (551)
1/2	1/4	-RU-FR8-FR4	35.8	6.4	27.0	4300 (296)	2800 (192)	3500 (241)



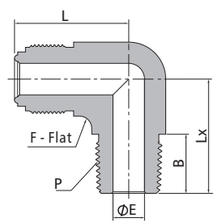
Reducing Adapter

FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/4	1/8	-RA-FR4-FR2	30.2	2.3	19.1	10000 (689)	6400 (440)	8000 (551)
1/2	1/4	-RA-FR8-FR4	35.8	4.6	27.0	4300 (296)	2800 (192)	3500 (241)



Reducing Bushing

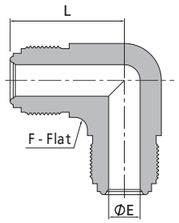
FR Size (in.)	FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
			L	E	F	6L	CU	NI
1/4	1/8	-RB-FR4-FR2	26.9	3.3	15.9	10000 (689)	6400 (440)	8000 (551)
1/2	1/4	-RB-FR8-FR4	35.8	6.4	23.8	4300 (296)	2800 (192)	3500 (241)



FR Body to Male NPT Elbow

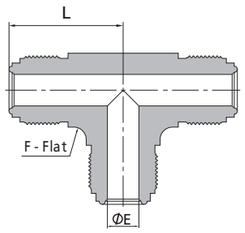
FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimension, mm					Working Pressure, psig (bar)		
			L	Lx	B	E	F	6L	CU	NI
1/4	1/8	-LM-FR4-NS2	27.2	22.1	9.6	4.6	12.7	10000 (689)	6400 (440)	8000 (551)
1/4	1/4	-LM-FR4-NS4	27.2	26.7	14.2	4.6	12.7	8000 (551)	8000 (551)	8000 (551)
1/2	3/8	-LM-FR8-NS6	36.8	32.0	14.2	10.2	20.6	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-LM-FR8-NS8	36.8	36.8	19.1	10.2	20.6	4300 (296)	2800 (192)	3500 (241)

Bodies



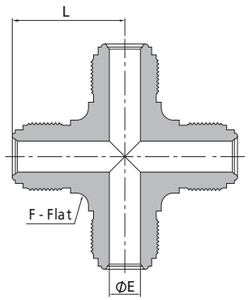
FR Body Union Elbow

FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/8	-LU-FR2	22.6	2.3	11.1	11200 (772)	7200 (496)	9000 (620)
1/4	-LU-FR4	27.2	4.6	12.7	10000 (689)	6400 (440)	8000 (551)
1/2	-LU-FR8	36.8	10.2	20.6	4300 (296)	2800 (192)	3500 (241)
3/4	-LU-FR12	48.8	15.7	31.8	3700 (254)	2400 (165)	3000 (207)
1	-LU-FR16	50.8	22.1	42.9	3000 (207)	1900 (130)	2400 (165)



FR Body Union Tee

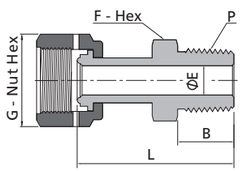
FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/8	-TTT-FR2	22.6	2.3	11.1	11200 (772)	7200 (496)	9000 (620)
1/4	-TTT-FR4	27.2	4.6	12.7	10000 (689)	6400 (440)	8000 (551)
1/2	-TTT-FR8	36.8	10.2	20.6	4300 (296)	2800 (192)	3500 (241)
3/4	-TTT-FR12	48.8	15.7	31.8	3700 (254)	2400 (165)	3000 (207)
1	-TTT-FR16	50.8	22.1	42.9	3000 (207)	1900 (130)	2400 (165)



FR Body Union Cross

FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/8	-C-FR2	22.6	2.3	11.1	11200 (772)	7200 (496)	9000 (620)
1/4	-C-FR4	27.2	4.6	12.7	10000 (689)	6400 (440)	8000 (551)
1/2	-C-FR8	36.8	10.2	20.6	4300 (296)	2800 (192)	3500 (241)
3/4	-C-FR12	48.8	15.7	31.8	3700 (254)	2400 (165)	3000 (206)
1	-C-FR16	50.8	22.1	42.9	3000 (206)	1900 (130)	2400 (165)

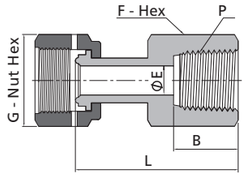
Welded Glands



FR Welded Gland to Male NPT

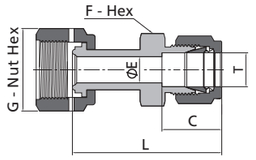
FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimension, mm					Working Pressure, psig (bar)		
			L	B	E	G	F	6L	CU	NI
1/4	1/8	-WG-FR4-NS2	40.1	9.7	4.6	19.05	11.1	8000 (551)	6400 (446)	8000 (551)
1/4	1/4	-WG-FR4-NS4	45.5	14.2	4.6	19.05	14.3	8000 (551)	6400 (446)	8000 (551)
1/2	3/8	-WG-FR8-NS6	48.0	14.2	10.2	26.99	17.5	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-WG-FR8-NS8	53.1	19.1	10.2	26.99	22.2	4300 (296)	2800 (192)	3500 (241)

Welded Glands



FR Welded Gland to Female NPT

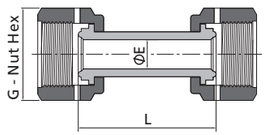
FR Size (in.)	P-NPT Size	Basic Ordering Number	Dimension, mm					Working Pressure, psig (bar)		
			L	B	E	G	F	6L	CU	NI
1/4	1/4	-WG-FR4-FNS4	45.0	15.0	4.6	19.1	19.1	6600 (454)	5200 (458)	6600 (454)
1/2	3/8	-WG-FR8-FNS6	49.5	15.0	10.2	27.0	22.2	4300 (296)	2800 (192)	3500 (241)
1/2	1/2	-WG-FR8-FNS8	55.4	19.8	10.2	27.0	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	Dimension, mm					Working Pressure, psig (bar)		
			L①	C	E	G	F	6L	CU	NI
1/4	1/4	-WG-FR4-FL4	49.3	15.2	4.6	19.1	12.7	10000 (689)	6400 (440)	8000 (551)
1/4	3/8	-WG-FR4-FL6	50.0	16.8	4.6	19.1	15.9	6500 (447)	5200 (358)	6500 (447)
1/2	1/2	-WG-FR8-FL8	56.6	22.9	10.2	27.0	20.6	4300 (296)	2800 (192)	3500 (241)

① Dimension L is typical finger-tight.

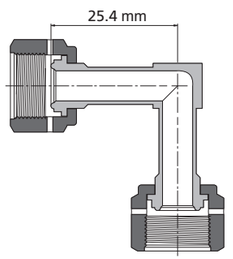


FR Welded Gland Union

FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
		L	E	G	6L	CU	NI
1/4	-WG-FR4	43.4	4.6	19.1	10000 (689)	6400 (440)	8000 (551)
1/2	-WG-FR8	46.7	10.2	27.0	4300 (296)	2800 (192)	3500 (241)

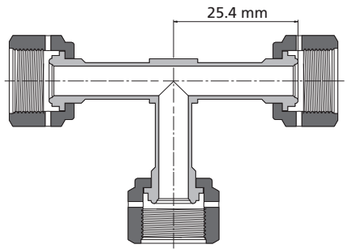
Female Elbow

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

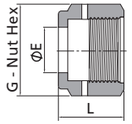


Female Tee

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

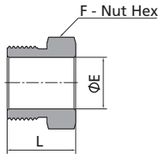


Nuts



Female Nut

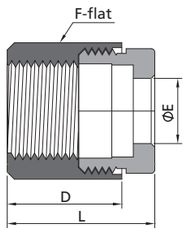
FR Size (in.)	Basic Ordering Number	Dimension, mm		
		L	E	G
1/8	-N-FR2	13.5	5.3	11.1
1/4	-N-FR4	20.6	9.1	19.1
1/2	-N-FR8	22.4	15.5	27.0
5/8	-N-FR10	22.4	18.8	30.2
3/4	-N-FR12	28.4	22.6	38.1
1	-N-FR16	34.0	30.5	44.5

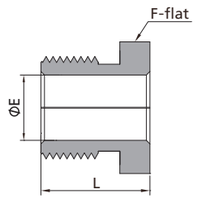


Male Nut

FR Size (in.)	Basic Ordering Number	Dimension, mm		
		L	E	F
1/8	-MN-FR2	12.7	5.3	9.5
1/4	-MN-FR4	18.0	9.1	15.9
1/2	-MN-FR8	20.6	15.5	23.8
5/8	-MN-FR10	20.6	18.8	27.0
3/4	-MN-FR12	25.4	22.6	33.3
1	-MN-FR16	30.2	30.5	41.3

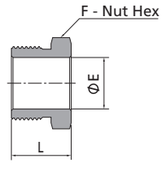
Split-Nut Assemblies





Split-Nut Assemblies

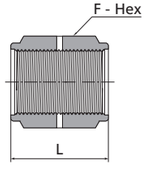
FR Size (in.)	Split Nut Type	Basic Ordering Number	Dimension, mm (in.)			
			L	E	F	D
1/4	Female	-N-FR4-SN	20.6(0.81)	9.1(0.36)	19.1(3/4)	16(0.63)
1/4	Male	-MN-FR4-SN	15.2(0.60)	9.1(0.36)	15.9(5/8)	–



Short Male Nut

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

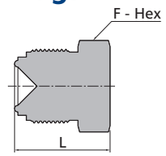
For use with short gland



Coupling

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		L	F
1/8	-BC-FR2	16.8	11.1
1/4	-BC-FR4	30.2	19.1
1/2	-BC-FR8	33.3	27.0
3/4	-BC-FR12	42.7	38.1
1	-BC-FR16	51.8	44.5

Plugs



Plug

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		L	F
1/8	-PG-FR2	17.3	9.5
1/4	-PG-FR4	23.4	15.9
1/2	-PG-FR8	27.4	23.8
3/4	-PG-FR12	36.3	33.3
1	-PG-FR16	38.6	41.3

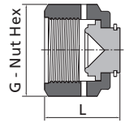
Plug with Lanyard

Lanyard material is 304 satinless steel.
Lanyard length is 15.2 cm.

Plug with Lanyard

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		L	F
1/4	-PG-FR4-BP	23.4	15.9
1/2	-PG-FR8-BP	27.4	23.8

Caps



Cap

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		L	G
1/8	-CP-FR2	16.0	11.1
1/4	-CP-FR4	23.9	19.1
1/2	-CP-FR8	25.6	27.0
3/4	-CP-FR12	32.8	38.1
1	-CP-FR16	39.1	44.5

Cap with Lanyard

Lanyard material is 304 satinless steel.
Lanyard length is 15.2 cm.

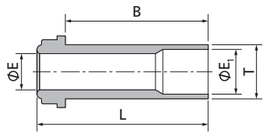
Cap with Lanyard

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		L	G
1/4	-CP-FR4-BP	23.9(0.92)	19.1
1/2	-CP-FR8-BP	25.6(1.08)	27

High-Flow Connections—"H" Type FR

◎ For uniform flow, use 1/4" side-load retainer style gasket.

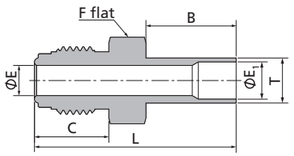
Glands



Tube Butt Weld

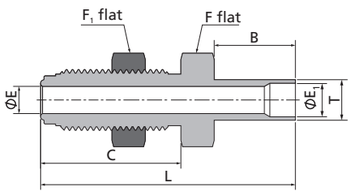
FR Size (in.)	T-Tube O.D. (in.)	Nominal Wall Thickness (in.)	Basic Ordering Number	Dimension, mm				Working Pressure, psig (bar)		
				L	B	E	E1	6L	CU	NI
1/4	3/8	0.035	-G-HFR4-TB6-15.2	15.2	10.4	6.4	7.9	3300 (227)	3300 (227)	3300 (227)
1/4	3/8	0.035	-G-HFR4-TB6-30.2	30.2	25.4	6.4	7.9	3300 (227)	3300 (227)	3300 (227)
1/4	3/8	0.035	-G-HFR4-TB6-33.3	33.3	28.4	6.4	7.9	3300 (227)	3300 (227)	3300 (227)

Bodies



Tube Butt Weld

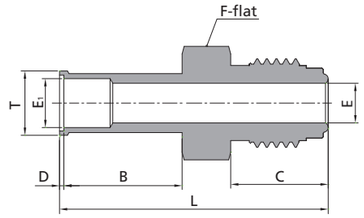
FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimension, mm						Working Pressure, psig (bar)		
			L	B	C	E	E1	F	6L	CU	NI
1/4	3/8	-CW-HFR4-TB6	42.7	19.1	15.7	6.4	7.9	15.9	3300 (227)	3300 (227)	3300 (227)



Bulkhead connector

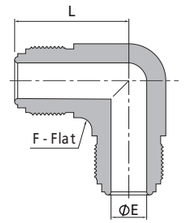
FR Size (in.)	T-Tube O.D. (in.)	Basic Ordering Number	Dimension, mm							Panel Hole Dia	Max Panel Thickness Hole Dia	Working Pressure, psig (bar)		
			L	B	C	E	E1	F	F1			6L	CU	NI
1/4	3/8	-BW-HFR4-TB6	59.9	19.1	33.0	7.9	6.4	19.1	19.1	15.0	11.2	3300 (227)	3300 (227)	3300 (227)

Automatic Tube Weld



Automatic Tube Weld

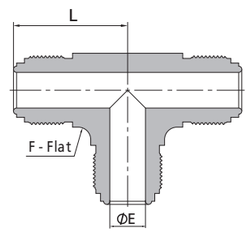
FR Size (in.)	Tube Size (in.)	Basic Ordering Number	Dimension, mm								Working Pressure, psig (bar)		
			L	B	C	D	E	E1	F	T	6L	CU	NI
1/4	3/8	-AW-HFR4-TB6	43.4	19.1	15.7	0.8	6.4	7.9	15.875	10.4	4500(310)	4500(310)	4500(310)



Union Elbow

FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/4	-LU-HFR4	27.2	6.4	12.7	10 000 (689)	6400 (440)	8000 (551)

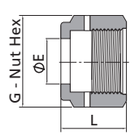
Bodies



Union Tee

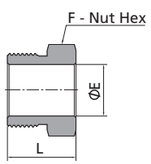
FR Size (in.)	Basic Ordering Number	Dimension, mm			Working Pressure, psig (bar)		
		L	E	F	6L	CU	NI
1/4	-TTT-HFR4	27.2	6.4	12.7	10 000 (689)	6400 (440)	8000 (551)

Nuts



Female

FR Size (in.)	Basic Ordering Number	Dimension, mm		
		L	E	G
1/4	-N-HFR4	20.6	9.9	19.1



Male

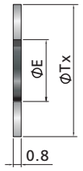
FR Size (in.)	Basic Ordering Number	Dimension, mm		
		L	E	F
1/4	-MN-HFR4	18.0	9.9	15.9

Gaskets

- Nickel and Copper gasket retainer assemblies use a 316L stainless steel retainer.
- Copper gaskets are unplated.
- Side-load retainer style gaskets are not available in copper.
- Blind (undrilled) gaskets are available in nonretained and retainer assembly styles, add-B as a suffix to the ordering number. Example: **-GT-FR4-UP-B.**

Silver Plated

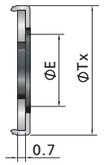
Cannot be used in a gasket retainer assembly.



Nonretained

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		Tx	E
1/8	-GT-FR2	6.6	2.3
1/4	-GT-FR4	11.9	5.6
1/2	-GT-FR8	19.8	11.2
5/8	-GT-FR10	23.1	14.7
3/4	-GT-FR12	29.0	16.8
1	-GT-FR16	35.6	22.6

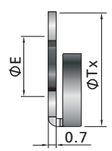
Retainer and gasket must be used as an assembly.



Gasket Retainer Assembly

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		Tx	E
1/4	-GT-FR4-A	12.7	6.1
1/2	-GT-FR8-A	20.1	11.2
3/4	-GT-FR12-A	29.0	16.8
1	-GT-FR16-A	35.6	22.6

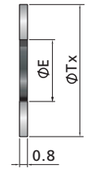
Unplated (UP)



Side-load retainer

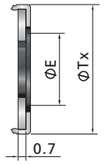
FR Size (in.)	Basic Ordering Number	Dimension, mm	
		Tx	E
1/4	-GT-FR4-AS-UP	11.4	5.8
1/2	-GT-FR8-AS-UP	19.1	11.0

Unplated (UP)



Nonretained

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		Tx	E
1/8	-GT-FR2-UP	6.6	2.3
1/4	-GT-FR4-UP	11.9	5.6
1/2	-GT-FR8-UP	19.8	11.2
5/8	-GT-FR10-UP	23.1	14.7
3/4	-GT-FR12-UP	29.0	16.8
1	-GT-FR16-UP	35.6	22.6

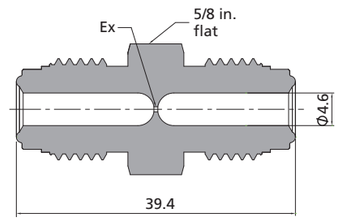


Gaskets Retainer Assembly

FR Size (in.)	Basic Ordering Number	Dimension, mm	
		Tx	E
1/4	-GT-FR4-A-UP	12.7	6.1
1/2	-GT-FR8-A-UP	20.1	11.2
3/4	-GT-FR12-A-UP	29.0	16.8
1	-GT-FR16-A-UP	35.6	22.6

Flow Restrictors

Working pressure 10000psig (689bar)



FR Body to Male NPT

Ex, in.(mm)	Ordering Number
0.010(0.254)	6LV-R-FR4-010
0.012(0.305)	6LV-R-FR4-012
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