



## FCC: Flare Coned Connection Product Catalog

Valves, Fittings, Adapters and Tubing Specifically for use with FCC Connection

- 316/316L Stainless Steel to 20,000 psi (1380 bar) Operation
- 2507 Super Duplex to 22,500 psi (1550 bar) Operation

aerospace  
climate control  
electromechanical  
filtration  
fluid & gas handling  
hydraulics  
pneumatics  
process control  
sealing & shielding



ENGINEERING YOUR SUCCESS.

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## Flared Cone Connection – The Latest High Pressure Instrument Tube Connection Designed Specifically for Needs of the Oil & Gas Industry.

The engineers of Parker Autoclave Engineers using “Voice of the Customer” feedback have developed the easiest and safest medium pressure instrument tube connection ever produced! Built on the experience with the MPI and QSS Ferrule style connections, we’ve taken this new design to a new level of capability, producing a connection as safe as a Cone & Thread but reducing assembly time to less than 5 minutes using hydraulic preset tools.

Customer wish list:

### Higher Working Pressure:

*“The connection needs to be able to utilize the features of “Medium Pressure,” cold worked; high strength instrument tubing utilized by the offshore Oil and Gas Industry. Wells are being drilled to unheard of depths and we need a connection that is capable of at least 20,000 psi working pressure and temperatures close to 400°F but easier to create and assemble than present day Cone & Thread connections...”*

**Answer:** The patent pending FC Connection has an MAWP rating of 22,500 psi (1550 bar) using 2507 Super Duplex or 20,000 psi (1340 bar) using 316/316L Stainless Steel in ALL connection sizes (1/4” to 1” OD Tubing) and has an operating temperature range of -100° (-73°C) to 600°F (316°C).

### Ease of Installation:

*“We see that the Cone & Thread connection, when properly made and installed by trained individuals, is the safest and most capable connection for High Pressure available but it is so hard to get and keep instrument technicians that have this specific knowledge. We need something easier to make up and install. We are familiar with and like the double ferrule design from Parker (MPI) and single sleeve design from Autoclave (QSS) but they are both limited to 15,000 psi and we’re always concerned about tube ejection...”*

**Answer:** The patent pending FC Connection is made using a hydraulic set-tool (as does both MPI and QSS) but includes a second step that accurately flares the Medium Pressure tubing that prevents tube ejection but also creates the primary sealing surface that allows Parker Autoclave to offer “Redundant Sealing” capability. When properly torqued, both the flare and the single sleeve ferrule are independent sealing surfaces each capable of full working pressure. This two-step process takes approximately 4 minutes per tube end to complete as compared to the 15 to 20 minutes an end for Cone & Thread connections.

### Must be Safe and Durable:

*“We need a connection that has the tube extraction safety afforded us by the Cone & Thread connection but that also includes an “anti-vibration” feature that prevents early tube failure or leaks due to vibration.”*

**Answer:** The patent pending FC Connection as indicated above is designed to include a tube flare that not only provides a sealing surface but completely prevents any kind of tube extraction. Another inherent design feature of the flare is that when torqued and in compression it fully supports the entire length of the connection and vibration is completely controlled without the need for any extra parts that could be forgotten at the time of order entry.

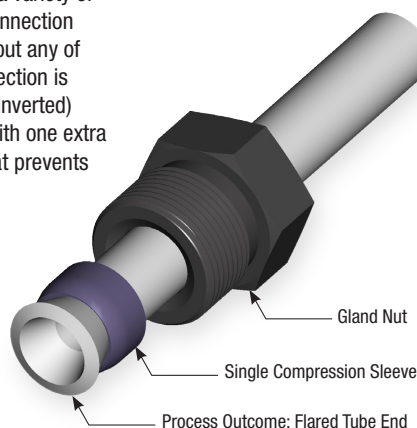
# FCC: Flared Coned Connection

## The Most Revolutionary Instrument Tube Connection Ever Developed!

NO ANTIVIBRATION GLAND NEEDED! Parker Autoclave Engineers has taken a variety of in-house technologies and has created a patent pending simple to make connection using easy-to-use tools that is as safe as a Cone & Thread connection without any of the vibration sensitivity. Using just a hydraulic press and two dies, the connection is made using a similar pre-set process as the Parker MPI (Medium Pressure Inverted) and Autoclave Engineers QSS (Quick Set Series) ferrule style connections with one extra step that flares the tube. This extra step gives the tubing the flare shape that prevents tube extraction and creates the first of two redundant sealing surfaces.

The process is simple:

- 1) Cut the tubing square and deburr
- 2) Slide on Gland Nut
- 3) Slide on Compression Sleeve
- 4) Set Compression Sleeve using Die Set "A" to charted hydraulic pressure
- 5) Form Flare using Die Set "B" to charted hydraulic pressure



Instructions are simple, intuitive, and easy to accomplish. One end can be formed and ready to install in a few minutes as compared to 15-20 with Cone and Thread type connections. Once formed, only a torque wrench is needed to properly complete the connection in the fitting or valve.

Features:

- 22,500 psi (2507 SD) or 20,000 psi (316 SS) working pressures
- Flared Tubing Prevents Tube Extraction
- Redundant Metal to Metal Sealing Surfaces
  - First Seal is on ID of Tube Flare
  - Second Seal is Between Compression Sleeve and Fitting or Valve body
- Wide Temperature Range from -100°F (-73°C) to 600°F (316°C), and -50°F (-45°C) for 2507 SD
- Single Inconel 718 Compression Sleeve Reduces Assembly Errors
- No Anti-vibration gland fitting needed - vibration is controlled in the standard design



System Components Flow/Pressure			2507 SD Working Pressure psi/bar**	316SS Working Pressure psi/bar**
Connection	Orifice Diameter in (mm)	Flow Area* in <sup>2</sup> (mm <sup>2</sup> )	Temperature -50° to 600°F (-45° to 316°C)	Temperature -100° to 600°F (-73° to 316°C)
1/4"	0.109 (2.77)	0.009 (5.81)	22,500 (1550)	20,000 (1340)
3/8"	0.203 (5.16)	0.032 (20.65)	22,500 (1550)	20,000 (1340)
9/16"	0.312 (7.92)	0.076 (49.03)	22,500 (1550)	20,000 (1340)
3/4"	0.438 (11.13)	0.151 (97.42)	22,500 (1550)	20,000 (1340)
1"	0.562 (14.27)	0.248 (160.00)	22,500 (1550)	20,000 (1340)

\* Flow area shown is minimum "system" flow area including tubing.

\*\* Maximum Working pressure is based on lowest rating of any system component.

# Needle Valves

## FCNV Series Pressures to 22,500 psi (1550 bar)

Since 1945 Parker Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Parker Autoclave Engineers a reputation for reliable efficient product performance. Parker Autoclave Engineers has long been established as the world leader in high pressure fluid handling components for the chemical/petrochemical, and oil and gas industries.

### Medium Pressure Valve Features:

- Designed to interface with Flared Cone Connection to 22,500 psi (1550 bar).
- Tubing connection sizes available from 1/4" to 1".
- Cold worked 316 Stainless Steel as standard (20,000 psi) - 2507 Super Duplex option (22,500 psi).
- Rising stem/barstock body design.
- Non-rotating stem prevents stem/seat galling.
- Anti-galling molybdenum disulfide coated gland nuts.
- Connection weep holes for safety and leak detection.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE encapsulated packing provides dependable stem and body sealing.
- Stem sleeve and packing gland materials have been selected to achieve extended thread cycle life and reduced handle torque.
- Choice of Vee or Regulating stem tip.
- Available in five body patterns.
- 1" valve bodies are 2507® Super Duplex as standard.

Parker Autoclave Engineers valves are complemented by a complete line of fittings, tubing, check valves and line filters. The FC Series uses Parker Autoclave Engineers' Flared Cone compression sleeve design, providing fast easy make-up and reliable bubble-tight performance in liquid or gas service.



# Needle Valves

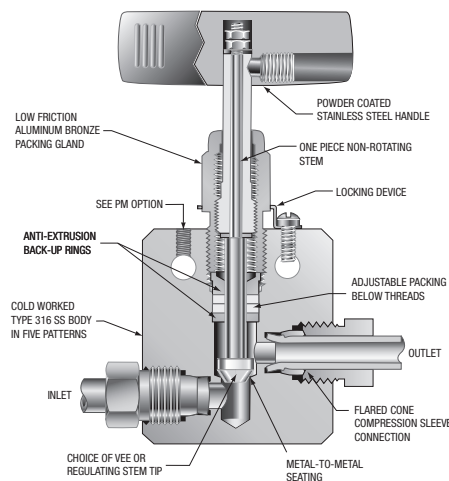
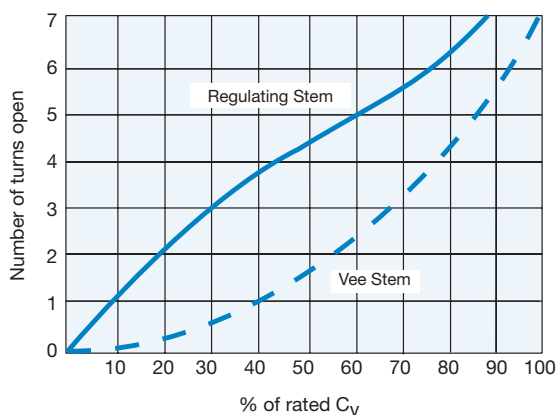
## FCNV Series Pressures to 22,500 psi (1550 bar)



Tube Outside Diameter Size inches	Connection Type	Orifice Size Inches (mm)	Rated Cv*	Pressure/Temperature Rating psi (bar) @ Room Temperature**	
				2507 SD	316 SS
1/4	FLC250	0.109 (2.76)	0.31	22,500 (1550)	20,000 (1379)
3/8	FLC375	0.203 (5.15)	0.75	22,500 (1550)	20,000 (1379)
9/16	FLC562	0.312 (7.92)	1.30	22,500 (1550)	20,000 (1379)
3/4	FLC750	0.438 (11.12)	2.50	22,500 (1550)	20,000 (1379)
1	FLC1000	0.562 (14.27)	4.40	22,500 (1550)	20,000 (1379)

Notes:  
 \* Cv values shown are for 2-way straight valve pattern.  
 For 2-way angle patterns, increase Cv value 50% (Based on water)  
 \*\* For complete temperature ratings see pressure/temperature rating guide in Technical Information section in main catalog.

### Generalized Flow Coefficient Curves (Cv)



To ensure proper fit Parker Autoclave Engineers tubing must be used

### Ordering Procedure Example

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. FC Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number example: **FCNV9084** (catalog number is created based on customer selection of product parameters, see below for example)

FCNV	9	08	4	-	Options
Valve Series	Outside Diameter Tube size	Stem/Seat Type	Body Pattern		Options
FCNV	4 = 1/4"	07 = Non-Rotating Vee Stem (on/off service)	1 = 2 way straight		For extreme temperature and other options, see Valve Options on next page.  PM = panel mount, additional 10-24 screw supplied.
	6 = 3/8"	08 = Non-Rotating regulating stem (tapered tip for regulating and shutoff)	2 = 2 way angle		
	9 = 9/16"	87 = Vee Stem with replaceable seat	3 = 3 way, 2 on pressure		
	12 = 3/4"	88 = Regulating Stem with replacable seat	4 = 3 way, 1 on pressure		
	16 = 1"		5 = 3 way, 2 stem manifold valve		

All dimensions for reference only and subject to change. For prompt service, Parker Autoclave Engineers stocks select products. Consult your local representative.

# Needle Valves

## FCNV Series Pressures to 22,500 psi (1550 bar)

### Valve Options

#### Extreme Temperatures

Standard Parker Autoclave Engineers valves with PTFE packing may be operated from 0°F (-18°C) to 450°F (232°C). High temperature packing are available for service from -100°F (-73°C) to 600°F (316°C) by adding the following suffixes to catalog order number.†

**TG** standard valve with PTFE glass packing to 600°F (316°C).

**B** Standard valve with cryogenic trim material and PTFE packing to -100°F (-73°C)

†Parker Autoclave Engineers does not recommend FCC compression sleeve connections below -100°F (-73°C) or above 600°F (316°C). For additional valve options, contact your Sales Representative.

### Valve Maintenance

Repair Kits: See Page 39 for complete details.

Consult your Parker Autoclave Engineers Representative for other kit numbers, body part numbers and pricing.

Visit [www.autoclave.com](http://www.autoclave.com) to download Operation Manuals.

Catalog Number	Stem Type	Outside Dia. Tube	Orifice Dia.	Dimensions - inches (mm)												Block Thickness
				A	B	C	D	D <sub>1</sub>	E	F	G	G <sub>1</sub>	H*	M	N	
<b>2-Way Straight</b> (See Figure 1)																
FCNV4071 FCNV4081	VEE REG	1/4" (6.35)	0.11 (2.79)	2.00 (50.80)	1.00 (25.40)	0.36 (9.02)	1.63 (41.28)	1.19 (30.18)	2.00 (50.80)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	4.69 (119.13)	0.62 (15.75)	0.38 (9.65)	0.81 (20.57)
FCNV6071 FCNV6081	VEE REG	3/8" (9.53)	0.20 (5.08)	2.50 (63.50)	1.25 (31.75)	0.44 (11.23)	1.63 (41.28)	1.19 (30.18)	2.13 (53.98)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	4.75 (120.65)	0.62 (15.75)	0.38 (9.65)	1.00 (25.40)
FCNV9071 FCNV9081	VEE REG	9/16" (14.29)	0.31 (7.87)	3.50 (88.90)	1.75 (44.45)	0.66 (16.84)	2.38 (60.33)	1.75 (44.45)	3.13 (79.38)	4.00 (101.60)	1.00 (25.40)	0.34 (8.64)	6.18 (156.97)	0.69 (17.53)	0.50 (12.70)	1.38 (35.05)
FCNV12071 FCNV12081	VEE REG	3/4" (19.05)	0.44 (11.18)	4.38 (111.13)	2.19 (55.56)	0.88 (22.43)	3.13 (79.38)	2.25 (57.15)	4.00 (101.60)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	7.25 (184.15)	0.88 (22.35)	0.63 (16.00)	1.75 (44.45)
FCNV16071 FCNV16081	VEE REG	1" (25.4)	0.56 (14.22)	6.25 (158.75)	3.13 (79.38)	0.95 (24.13)	3.88 (98.43)	2.81 (71.45)	5.00 (127.00)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	8.25 (209.55)	0.88 (22.35)	0.63 (16.00)	2.25 (57.15)
<b>2-Way Angle</b> (See Figure 2)																
FCNV4072 FCNV4082	VEE REG	1/4" (6.35)	0.11 (2.79)	2.00 (50.80)	1.00 (25.40)	0.36 (9.02)	1.19 (30.18)		2.38 (60.33)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	5.06 (128.52)	0.62 (15.75)	0.38 (9.65)	0.81 (20.57)
FCNV6072 FCNV6082	VEE REG	3/8" (9.53)	0.20 (5.08)	2.50 (63.50)	1.25 (31.75)	0.44 (11.23)	1.19 (30.18)		2.50 (63.50)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	5.13 (130.30)	0.62 (15.75)	0.38 (9.65)	1.00 (25.40)
FCNV9072 FCNV9082	VEE REG	9/16" (14.29)	0.31 (7.87)	3.50 (88.90)	1.75 (44.45)	0.66 (16.84)	1.75 (44.45)		3.50 (88.90)	4.00 (101.60)	1.00 (25.40)	0.34 (8.64)	6.56 (166.62)	0.69 (17.53)	0.50 (12.70)	1.38 (35.05)
FCNV12072 FCNV12082	VEE REG	3/4" (19.05)	0.44 (11.18)	4.38 (111.13)	2.19 (55.56)	0.88 (22.43)	2.25 (57.15)		4.50 (114.30)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	7.75 (196.85)	0.88 (22.35)	0.63 (16.00)	1.75 (44.45)
FCNV16072 FCNV16082	VEE REG	1" (25.4)	0.56 (14.22)	6.25 (158.75)	3.13 (79.38)	0.95 (24.13)	2.81 (71.45)		6.00 (152.40)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	9.25 (234.95)	0.88 (22.35)	0.63 (16.00)	2.25 (57.15)

# Needle Valves

## FCNV Series Pressures to 22,500 psi (1550 bar)

Catalog Number	Stem Type	Outside Dia. Tube	Orifice Dia.	Dimensions - inches (mm)												Block Thickness
				A	B	C	D	D <sub>1</sub>	E	F	G	G <sub>1</sub>	H*	M	N	
<b>3-Way 2 on Pressure</b> (See Figure 3)																
FCNV4073 FCNV4083	VEE REG	1/4" (6.35)	0.11 (2.79)	2.00 (50.80)	1.00 (25.40)	0.36 (9.02)	1.63 (41.23)	1.19 (30.18)	2.57 (65.15)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	5.57 (141.48)	0.62 (15.75)	0.38 (9.65)	0.81 (20.57)
FCNV6073 FCNV6083	VEE REG	3/8" (9.53)	0.20 (5.08)	2.50 (63.50)	1.25 (31.75)	0.44 (11.23)	1.63 (41.23)	1.19 (30.18)	2.63 (66.80)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	5.52 (140.21)	0.62 (15.75)	0.38 (9.65)	1.00 (25.40)
FCNV9073 FCNV9083	VEE REG	9/16" (14.29)	0.31 (7.87)	3.50 (88.90)	1.75 (44.45)	0.66 (16.84)	2.38 (60.33)	1.75 (44.45)	3.94 (100.08)	4.00 (101.60)	1.00 (25.40)	0.34 (8.64)	7.00 (177.80)	0.69 (17.53)	0.50 (12.70)	1.38 (35.05)
FCNV12073 FCNV12083	VEE REG	3/4" (19.05)	0.44 (11.18)	4.38 (111.13)	2.19 (55.56)	0.88 (22.43)	3.13 (79.38)	2.25 (57.15)	5.00 (127.00)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	8.24 (209.30)	0.88 (22.35)	0.63 (16.00)	1.75 (44.45)
FCNV16073 FCNV16083	VEE REG	1" (25.40)	0.56 (14.22)	6.25 (158.75)	3.13 (79.38)	0.95 (24.13)	3.88 (98.43)	2.81 (71.45)	6.63 (168.40)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	9.87 (250.70)	0.88 (22.35)	0.63 (16.00)	2.25 (57.15)
<b>3-Way 1 on Pressure</b> (See Figure 4)																
FCNV4074 FCNV4084	VEE REG	1/4" (6.35)	0.11 (2.79)	2.00 (50.80)	1.00 (25.40)	0.36 (9.02)	1.19 (30.18)		2.38 (60.33)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	5.06 (128.52)	0.62 (15.75)	0.38 (9.65)	0.81 (20.57)
FCNV6074 FCNV6084	VEE REG	3/8" (9.53)	0.20 (5.08)	2.50 (63.50)	1.25 (31.75)	0.44 (11.23)	1.19 (30.18)		2.50 (63.50)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	5.13 (130.30)	0.62 (15.75)	0.38 (9.65)	1.00 (25.40)
FCNV9074 FCNV9084	VEE REG	9/16" (14.29)	0.31 (7.87)	3.50 (88.90)	1.75 (44.45)	0.66 (16.84)	1.75 (44.45)		3.50 (88.90)	4.00 (101.60)	1.00 (25.40)	0.34 (8.64)	6.56 (166.62)	0.69 (17.53)	0.50 (12.70)	1.38 (35.05)
FCNV12074 FCNV12084	VEE REG	3/4" (19.05)	0.44 (11.18)	4.38 (111.13)	2.19 (55.56)	0.88 (22.43)	2.25 (57.15)		4.50 (114.30)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	7.75 (196.85)	0.88 (22.35)	0.63 (16.00)	1.75 (44.45)
FCNV16074 FCNV16084	VEE REG	1" (25.40)	0.56 (14.22)	6.25 (158.75)	3.13 (79.38)	0.95 (24.13)	2.81 (71.45)		6.00 (152.40)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	9.25 (234.95)	0.88 (22.35)	0.63 (16.00)	2.25 (57.15)

G - Packing gland mounting hole 5/16 size

Panel mounting drill size: 0.22" all valves

G<sub>1</sub> - Bracket mounting hole size

For prompt service Parker Autoclave Engineers stock select products. Consult factory. All Dimensions for reference only and are subject to change

\*H Dimension is with stem in closed position.

Figure 1: 2-Way Straight

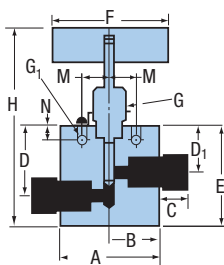


Figure 2: 2-Way Angle

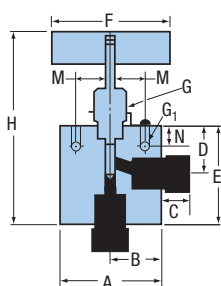


Figure 3: 3-Way 2 On Pressure

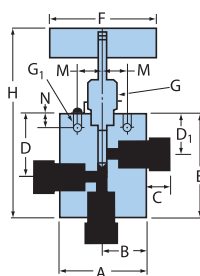
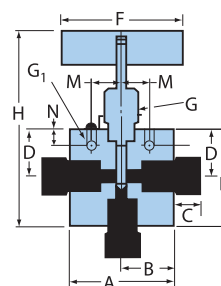


Figure 4: 3-Way 1 on Pressure



All dimensions for reference only and subject to change. For prompt service, Parker Autoclave Engineers stocks select products. Consult your local representative.

# Needle Valves

## FCNV Series Pressures to 22,500 psi (1550 bar)

Catalog Number	Stem Type	Outside Dia. Tube	Orifice Dia.	Dimensions - inches (mm)											Block Thickness	
				A	B	C	D	D <sub>1</sub>	E	F	G	G <sub>1</sub>	H*	M		N
<b>2-Way Angle / Replaceable Seat</b> (See Figure 5)																
FCNV4872 FCNV4882	VEE REG	1/4" (6.35)	0.11 (2.79)	2.00 (50.80)	1.00 (25.40)	0.36 (9.02)	1.19 (30.23)	2.07 (52.58)	2.25 (57.15)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	5.94 (150.95)	0.62 (15.75)	0.38 (9.65)	0.81 (20.57)
FCNV6873 FCNV6882	VEE REG	3/8" (9.53)	0.20 (5.08)	2.50 (63.50)	1.25 (31.75)	0.44 (11.23)	1.19 (30.23)	2.27 (57.66)	2.25 (57.15)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	6.09 (154.64)	0.62 (15.75)	0.38 (9.65)	1.00 (25.40)
FCNV9872 FCNV9882	VEE REG	9/16" (14.29)	0.31 (7.87)	3.50 (88.90)	1.75 (44.45)	0.66 (16.84)	1.69 (42.93)	3.00 (76.20)	3.13 (79.50)	4.00 (101.60)	1.00 (25.40)	0.34 (8.64)	7.75 (196.85)	0.69 (17.53)	0.50 (12.70)	1.38 (35.05)
FCNV12872 FCNV12882	VEE REG	3/4" (19.05)	0.44 (11.18)	4.38 (111.13)	2.19 (55.56)	0.88 (22.43)	2.13 (54.10)	4.22 (107.19)	4.25 (107.95)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	9.60 (243.84)	0.88 (22.35)	0.63 (16.00)	1.75 (44.45)
FCNV16872 FCNV16882	VEE REG	1" (25.4)	0.56 (14.22)	6.25 (158.75)	3.13 (79.38)	0.95 (24.13)	3.75 (95.25)	5.66 (143.76)	5.25 (133.35)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	12.66 (321.56)	0.88 (22.35)	0.63 (16.00)	2.25 (57.15)
<b>3-Way / 2-Stem Manifold</b> (See Figure 6)																
FCNV4075 FCNV4085	VEE REG	1/4" (6.35)	0.11 (2.79)	2.00 (50.80)	1.00 (25.40)	0.36 (9.02)	1.63 (41.28)	1.19 (30.18)	3.25 (82.55)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	8.62 (218.95)	0.62 (15.75)	0.38 (9.65)	0.81 (20.57)
FCNV6075 FCNV6085	VEE REG	3/8" (9.53)	0.20 (5.08)	2.50 (63.50)	1.25 (31.75)	0.44 (11.23)	1.63 (41.28)	1.19 (30.18)	3.25 (82.55)	3.00 (76.20)	0.75 (19.05)	0.22 (5.59)	8.51 (216.15)	0.62 (15.75)	0.38 (9.65)	1.00 (25.40)
FCNV9075 FCNV9085	VEE REG	9/16" (14.29)	0.31 (7.87)	3.50 (88.90)	1.75 (44.45)	0.66 (16.84)	2.38 (60.33)	1.75 (44.45)	4.75 (120.65)	4.00 (101.60)	1.00 (25.40)	0.34 (8.64)	10.87 (276.10)	0.69 (17.53)	0.50 (12.70)	1.38 (35.05)
FCNV12075 FCNV12085	VEE REG	3/4" (19.05)	0.44 (11.18)	4.38 (111.13)	2.19 (55.56)	0.88 (22.43)	3.13 (79.38)	2.25 (57.15)	6.25 (158.75)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	12.75 (323.85)	0.88 (22.35)	0.63 (16.00)	1.75 (44.45)
FCNV16075 FCNV16085	VEE REG	1" (25.4)	0.56 (14.22)	6.25 (158.75)	3.13 (79.38)	0.95 (24.13)	3.88 (98.43)	2.81 (71.45)	7.75 (196.85)	10.25 (260.35)	1.13 (28.58)	0.44 (11.18)	14.25 (361.95)	0.88 (22.35)	0.63 (16.00)	2.25 (57.15)

G - Packing gland mounting hole drill size

G<sub>1</sub> - Bracket mounting hole size

\* H Dimension is with stem in closed position.

Panel mounting drill size: 0.22" all valves

For prompt service Parker Autoclave Engineers stock select products. Consult factory.

All Dimensions for reference only and are subject to change

Figure 5: 2-Way Angle / Replaceable Seat

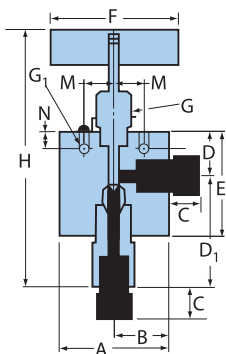
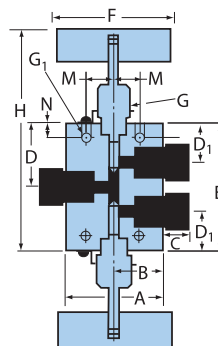


Figure 6: 3-Way / 2-Stem Manifold



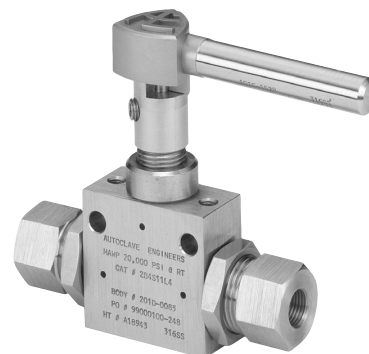
# Ball Valves

## 2-Way Pressures to 20,000 psi (1379 bar)

Parker Autoclave Engineers high-pressure ball valves have been designed to provide superior quality for maximum performance within a variety of valve styles, sizes, and process connections. Some of the more unique design innovations include an integral one-piece trunnion mounted style ball and stem that eliminates the shear failure common in two piece designs, re-torqueable seat glands that result in longer seat life, and a low friction stem seal that reduces actuation torque and enhances cycle life.

These ball valves can also be modified to incorporate the use of special materials, seals for high temperature applications, subsea models, and valve actuators.

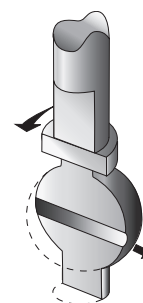
When it comes to high-pressure applications, these ball valves with the associated high-pressure components, provide the critical performance demanded by the high pressure market.



### PAE 2-Way Ball Valve Features:

- One-piece, trunnion mounted style, stem design eliminates shear failure and reduces the effects of side loading found in two piece designs.
- Re-torqueable seat glands for longer seat life.
- PEEK seats offer excellent resistance to chemicals, heat, and wear/abrasion.
- Full-port flow path minimizes pressure drop.
- 316 cold worked stainless steel valve construction as standard. Optional materials available..
- Low friction pressure assisted graphite filled PTFE stem seal increases cycle life and reduces operating torque.
- Quarter turn from open to close with positive stop.
- Viton o-rings are standard for operation from 0°F (-17.8°C) to 400°F (204°C)
- Optional o-rings available.
- Electric and pneumatic actuator options.

### Flow Configuration



Two-Way  
Shut-Off

### Applications:

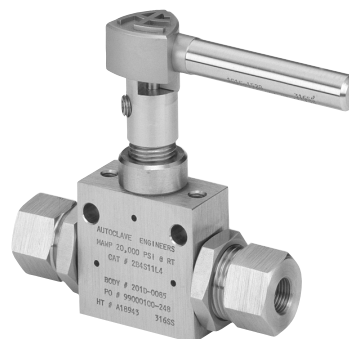
- Laboratories
- Test Stands
- Control Panels
- Chemical Research
- Pilot Plants
- Water Blasting Pumping Units
- High Volume Chemical Injection Skids

# Ball Valves

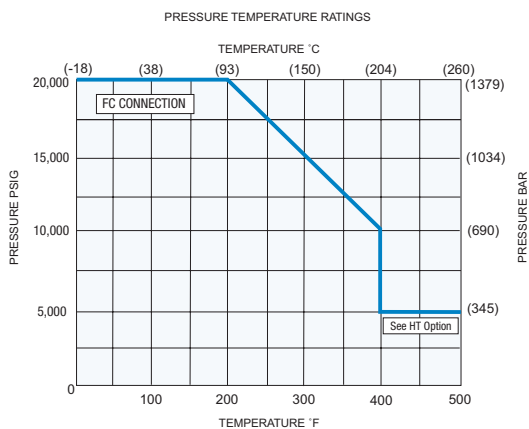
**1/4" 2-Way .250" (6.35mm) Ball Orifice • Pressures to 20,000 psi (1379 bar)**

Connection	MAWP@ Room Temperature	Minimum Orifice inches (mm)	Valve C <sub>v</sub>
FLC250	20,000 (1379)	.109 (2.77)	.3
FLC375	20,000 (1379)	.203 (5.16)	1.5

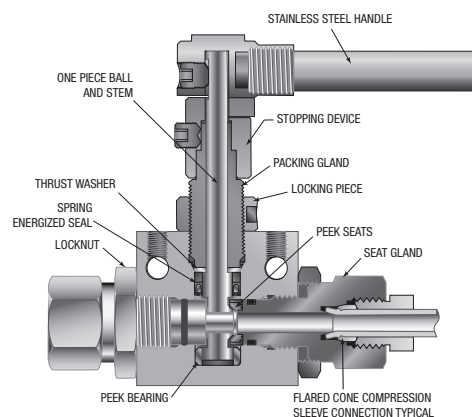
MAWP: Maximum Allowable Working Pressure



## Pressure/Temperature Chart



## Product Cutaway



Note: Critical gas applications such as Hydrogen or Helium should be evaluated on a case by case basis. Consult factory.

## Ordering Procedure Example

Typical catalog number example: **2B4S20FC4** (catalog number is created based on customer selection of product parameters, see below for example)

2B	4	S	20	FC4	-	XXX
Valve Series	Ball Orifice Diameter	Material	Pressure (X 1000 psi)	End Connection		Options
2B = 2 way	4 = 1/4" (6.35 mm)	S = 316SS		FC4 = FLC250 (See chart on next page)		HT = Perfluoroelastomer 500°F (260°C) max. EPR = Ethylene Propylene 250°F (121°C) max. BO = Buna-N 250°F (121°C) max. (Ball Valve Actuators, see next page)

# Ball Valves

**1/4" 2-Way .250" (6.35mm) Ball Orifice • Pressures to 20,000 psi (1379 bar)**

## End Connections Options

Catalog Number	End Connection Number	Connection	MAWP@ Room Temperature	Seat Gland Hex inches (mm)
2B4S20FC4	FC4	FLC250	20,000 psi (1379 bar)	1.0 (25.40)
2B4S20FC6	FC6	FLC375	20,000 psi (1379 bar)	1.0 (25.40)

## Ball Valve Options

### Pneumatic Actuator

- AO - Air-to-open/spring to close
- AC - Air-to-close/spring to open
- AOC - Air-to-open-and-close (double action)

### Electric Actuator

- E01 - 120 volt AC 50/60 Hz
- E02 - 220 volt AC 50/60 Hz
- E03 - 24 VDC

### Sealing Options:

- HT = Perfluoroelastomer 500°F (260°C) max.
- EPR = Ethylene Propylene 250°F (121°C) max.
- BO = Buna-N 250°F (121°C) max.

See ball valve actuator section starting on page 27 for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "R" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R2B4S**)

Consult your Parker Autoclave Engineers representative for pricing on repair kits.

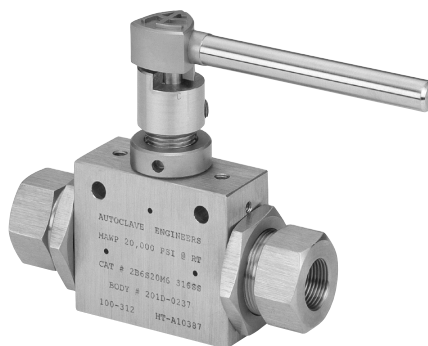
Refer to the Operation and Maintenance manual for proper maintenance procedures. Visit [www.autoclave.com](http://www.autoclave.com).

See page 18 for 2-Way Ball Valve dimensions.

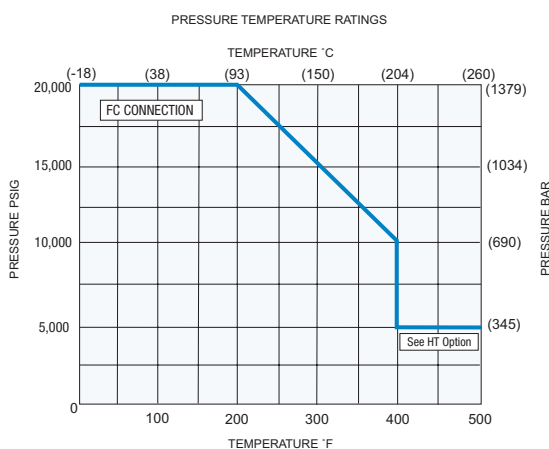
# Ball Valves

**3/8" 2-Way .375" (9.52 mm) Ball Orifice • Pressures to 20,000 psi (1379 bar)**

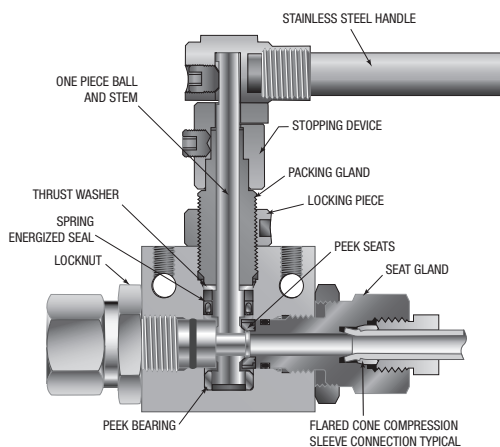
Connection	MAWP@ Room Temperature	Minimum Orifice inches (mm)
FLC375	20,000 (1379)	.203 (6.16)
FLC562	20,000 (1379)	.312 (7.92)
FLC750	20,000 (1379)	.312 (7.92)
Valve C <sub>v</sub> = 3.9		
MAWP: Maximum Allowable Working Pressure		



## Pressure/Temperature Chart



## Product Cutaway



Note: Critical gas applications such as Hydrogen or Helium should be evaluated on a case by case basis. Consult factory.

## Ordering Procedure Example

Typical catalog number example: **2B6S20FC9** (catalog number is created based on customer selection of product parameters, see below for example)

2B	6	S	20	FC9	-	XXX
Valve Series	Ball Orifice Diameter	Material	Pressure (X 1000 psi)	End Connection		Options
2B = 2 way	6 = 3/8" (9.52 mm)	S = 316SS		FC9 = FLC562 (See chart on next page)		HT = Perfluoroelastomer 500°F (260°C) max. EPR = Ethylene Propylene 250°F (121°C) max. BO = Buna-N 250°F (121°C) max. (Ball Valve Actuators, see next page)

# Ball Valves

**3/8" 2-Way .375" (9.52 mm) Ball Orifice Orifice • Pressures to 20,000 psi (1379 bar)**

## End Connections Options

Catalog Number	End Connection Number	Connection	MAWP@ Room Temperature	Seat Gland Hex inches (mm)
2B6S20FC6	FC6	FLC375	20,000 psi (1379 bar)	1.38 (35.05)
2B6S20FC9	FC9	FLC562	20,000 psi (1379 bar)	1.38 (35.05)
2B6S20FC12	FC12	FLC750	20,000 psi (1379 bar)	1.38 (35.05)

## Ball Valve Options

### Pneumatic Actuator

- AO - Air-to-open/spring to close
- AC - Air-to-close/spring to open
- AOC - Air-to-open-and-close (double action)

### Electric Actuator

- E01 - 120 volt AC 50/60 Hz
- E02 - 220 volt AC 50/60 Hz
- E03 - 24 VDC

### Sealing Options:

- HT = Perfluoroelastomer 500°F (260°C) max.
- EPR = Ethylene Propylene 250°F (121°C) max.
- BO = Buna-N 250°F (121°C) max.

See ball valve actuator section starting on page 27 for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "R" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R2B6S**)

Consult your Parker Autoclave Engineers representative for pricing on repair kits.

Refer to the Operation and Maintenance manual for proper maintenance procedures. Visit [www.autoclave.com](http://www.autoclave.com).

See page 18 for 2-Way Ball Valve dimensions.

# Ball Valves

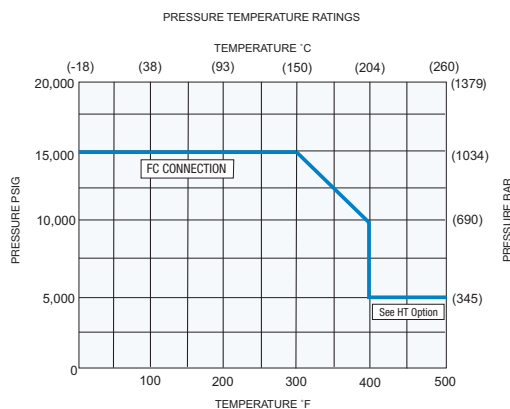
**1/2" 2-Way .500" (12.7 mm) Ball Orifice • Pressures to 15,000 psi (1034 bar)**

Connection	MAWP@ Room Temperature	Minimum Orifice inches (mm)	Valve C <sub>v</sub>
FLC750	15,000 (1034)	.438 (11.13)	8.1
FLC1000	15,000 (1034)	.500 (12.70)	10.2

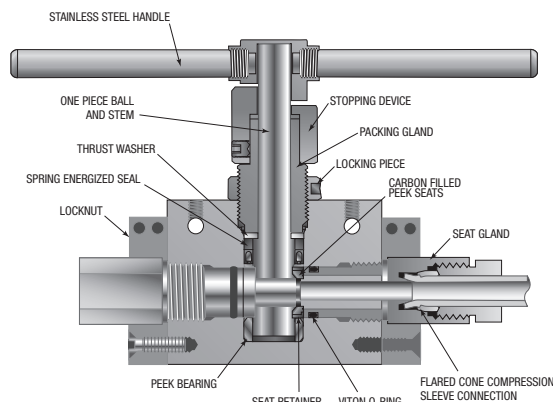
MAWP: Maximum Allowable Working Pressure



## Pressure/Temperature Chart



## Product Cutaway



Note: Critical gas applications such as Hydrogen or Helium should be evaluated on a case by case basis. Consult factory.

## Ordering Procedure Example

Typical catalog number example: **2B8S15FC12** (catalog number is created based on customer selection of product parameters, see below for example)

2B	8	S	15	FC12	-	XXX
Valve Series	Ball Orifice Diameter	Material	Pressure (X 1000 psi)	End Connection		Options
2B = 2 way	8 = 1/2" (12.7 mm)	S = 316SS		FC12 = FLC750 (See chart on next page)		HT = Perfluoroelastomer 500°F (260°C) max. EPR = Ethylene Propylene 250°F (121°C) max. BO = Buna-N 250°F (121°C) max. (Ball Valve Actuators, see next page)

# Ball Valves

**1/2" 2-Way .500" (12.7 mm) Ball Orifice • Pressures to 15,000 psi (1034 bar)**

## End Connections Options

Catalog Number	End Connection Number	Connection	MAWP@ Room Temperature	Seat Gland Hex/Square inches (mm)
2B8S15FC12	FC12	FLC750	15,000 psi (1034 bar)	Hex: 1.75 (44.5)
2B8S15FC16	FC16	FLC1000	15,000 psi (1034 bar)	Square: 2.25 (57.2)

## Ball Valve Options

### Pneumatic Actuator

- AO - Air-to-open/spring to close
- AC - Air-to-close/spring to open
- AOC - Air-to-open-and-close (double action)

### Electric Actuator

- E01 - 120 volt AC 50/60 Hz
- E02 - 220 volt AC 50/60 Hz
- E03 - 24 VDC

### Sealing Options:

- HT = Perfluoroelastomer 500°F (260°C) max.
- EPR = Ethylene Propylene 250°F (121°C) max.
- BO = Buna-N 250°F (121°C) max.

See ball valve actuator section starting on page 27 for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "R" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R2B8S**)

Consult your Parker Autoclave Engineers representative for pricing on repair kits.

Refer to the Operation and Maintenance manual for proper maintenance procedures. Visit [www.autoclave.com](http://www.autoclave.com).

See page 18 for 2-Way Ball Valve dimensions.

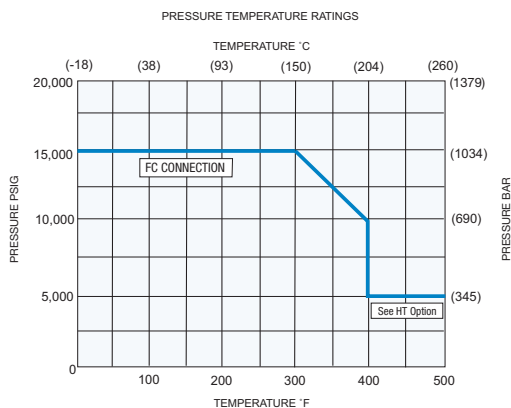
# Ball Valves

**3/4" 2-Way .750" (19.05 mm) Ball Orifice • Pressures to 15,000 psi (1034 bar)**

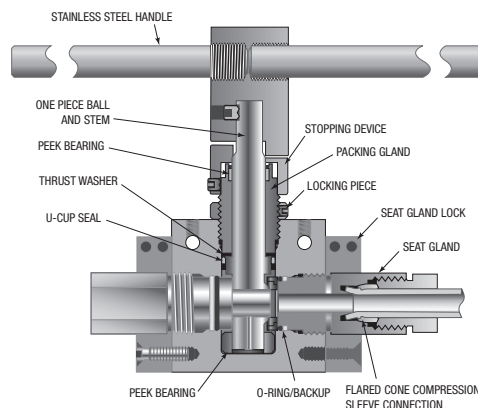
Connection	MAWP@ Room Temperature	Minimum Orifice inches (mm)
FC750	15,000 (1034)	.438 (11.13)
FC1000	15,000 (1034)	.562 (14.27)
Valve C <sub>v</sub> = 14.9		
MAWP: Maximum Allowable Working Pressure		



## Pressure/Temperature Chart



## Product Cutaway



Note: Critical gas applications such as Hydrogen or Helium should be evaluated on a case by case basis. Consult factory.

## Ordering Procedure Example

Typical catalog number example: **2B12S15FC16** (catalog number is created based on customer selection of product parameters, see below for example)

2B	12	S	15	FC16	-	XXX
Valve Series	Ball Orifice Diameter	Material	Pressure (X 1000 psi)	End Connection		Options
2B = 2 way	12 = 3/4" (19.05 mm)	S = 316SS		FC16 = FLC1000 (See chart on next page)		C = PTFE U-Cup 500°F (260°C) max. EPR = Ethylene Propylene 250°F (121°C) max. BO = Buna-N 250°F (121°C) max. (Ball Valve Actuators, see next page)

# Ball Valves

**3/4" 2-Way .750" (19.05 mm) Ball Orifice • Pressures to 15,000 psi (1034 bar)**

## End Connections Options

Catalog Number	End Connection Number	Connection	MAWP@ Room Temperature	Seat Gland Hex/Square inches (mm)
2B12S15FC12	FC12	FLC750	15,000 psi (1034 bar)	Square: 2.25 (57.2)
2B12S15FC16	FC16	FLC1000	15,000 psi (1034 bar)	Square: 2.25 (57.2)

## Ball Valve Options

### Pneumatic Actuator

- AO - Air-to-open/spring to close
- AC - Air-to-close/spring to open
- AOC - Air-to-open-and-close (double action)

### Electric Actuator

- E01 - 120 volt AC 50/60 Hz
- E02 - 220 volt AC 50/60 Hz
- E03 - 24 VDC

### Sealing Options:

- C = PTFE U-Cup 500°F (260°C) max.
- EPR = Ethylene Propylene 250°F (121°C) max.
- BO = Buna-N 250°F (121°C) max.

See ball valve actuator section starting on page 27 for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "R" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R2B12S**)

Consult your Parker Autoclave Engineers representative for pricing on repair kits.

Refer to the Operation and Maintenance manual for proper maintenance procedures. Visit [www.autoclave.com](http://www.autoclave.com).

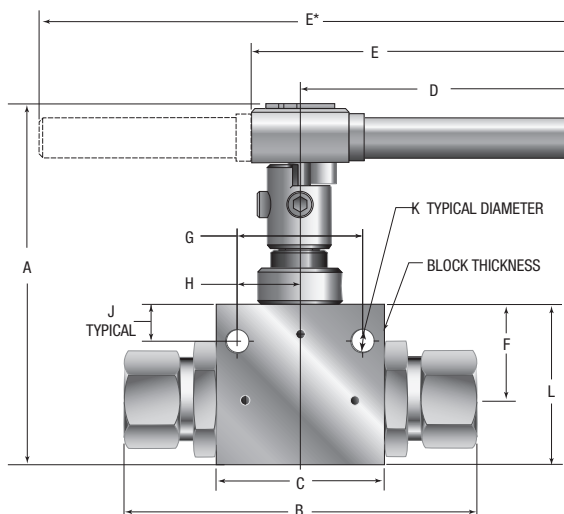
See page 18 for 2-Way Ball Valve dimensions.

# Ball Valves

**2-Way** Pressures to 20,000 psi (1379 bar)

## Ball Valve Dimensions - inches (mm)

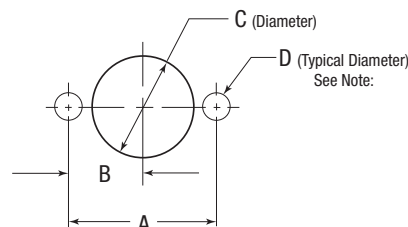
	VALVE MODELS			
	2B4S	2B6S	2B8S	2B12S
	1/4"	3/8"	1/2"	3/4"
<b>A</b>	4.33 (109.99)	4.97 (126.30)	6.43 (see note 1)	10.13 (261.62)
<b>B</b>	4.19 (106.49)	6.27 (159.26)	(see note 1)	(see note 1)
<b>C</b>	2.00 (50.80)	3.00 (76.20)	4.13 (104.78)	4.50 (114.30)
<b>D</b>	3.37 (85.55)	4.99 (126.82)	5.12 (130.04)	11.00 (279.40)
<b>E</b>	3.90 (99.02)	5.52 (140.32)	10.25* (260.35)	22.00* (558.80)
<b>F</b>	1.13 (28.58)	1.38 (34.92)	1.75 (44.51)	2.47 (62.70)
<b>G</b>	1.50 (38.10)	2.00 (50.80)	3.00 (76.20)	3.25 (82.60)
<b>H</b>	0.75 (19.05)	1.00 (25.40)	1.50 (38.10)	1.63 (41.40)
<b>J</b>	0.43 (10.92)	0.41 (10.31)	0.50 (12.70)	0.69 (17.50)
<b>K</b>	0.28 (7.11)	0.28 (7.11)	0.28 (7.11)	0.41 (10.40)
<b>L</b>	1.91 (48.41)	2.50 (63.50)	3.55 (90.10)	4.50 (114.30)
Block Thickness	1.00 (25.40)	1.38 (34.92)	1.75 (44.45)	3.00 (76.20)



\* Double handle overall length. Note 1: FC12: 11.16, FC16: 12.72

## Ball Valve Panel Mounting Dimensions - inches (mm)

	VALVE MODELS			
	2B4S	2B6S	2B8S	2B12S
	1/4"	3/8"	1/2"	3/4"
<b>A</b>	1.50 (38.10)	2.00 (50.80)	3.00 (76.20)	3.25 (82.60)
<b>B</b>	0.750 (19.05)	1.00 (25.40)	1.50 (38.10)	1.63 (41.40)
<b>C</b>	1.06 (26.92)	1.50 (38.10)	1.88 (47.63)	2.38 (60.30)
<b>D</b>	.28 (7.11)	.28 (7.11)	.28 (7.11)	.44 (11.20)
Body Mounting Thread	1/4" -20	1/4" -20	1/4" -20	3/8" -16



All dimensions are for reference only and are subject to change without notice.

# Ball Valves

## 3-Way Pressures to 20,000 psi (1379 bar)

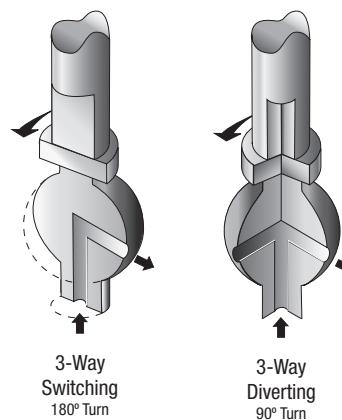
Parker Autoclave Engineers high-pressure 3-way ball valves have been designed to provide superior quality for maximum performance within a variety of valve styles, sizes, and process connections. Some of the more unique design innovations include an integral one-piece trunnion mounted style ball and stem that eliminates the shear failure common in two piece designs, re-torqueable seat glands that result in longer seat life, and a low friction stem seal that reduces actuation torque and enhances cycle life.

These 3-way ball valves can also be modified to incorporate the use of special materials, seals for high temperature applications, subsea models, and valve actuators.

When it comes to high-pressure applications, these ball valves with the associated high-pressure components, provide the critical performance demanded by the high pressure market.



### Flow Configuration



### PAE 3-Way Ball Valve Features:

- One-piece, trunnion mounted style, stem design eliminates shear failure found in two piece designs and reduces effects of side loading.
- Re-torqueable seat glands for longer seat life.
- Carbon filled PEEK seats offer excellent resistance to chemicals, heat, and wear/abrasion.
- Full-port flow path minimizes pressure drop.
- 316 cold worked stainless steel valve construction.
- Low friction pressure assisted graphite filled PTFE stem seal increases cycle life and reduces operating torque.
- Available in 90° turn diverter and 180° turn switching models.
- Viton o-rings for operation from 0°F (-17.8°C) to 400°F (204°C).
- Optional o-rings available for high-temperature applications.
- Electric and pneumatic actuator options.

### Applications:

- Laboratories
- Test Stands
- Control Panels
- Chemical Research
- Pilot Plants
- Water Blasting Pumping Units
- High Volume Chemical Injection Skids

# Ball Valves

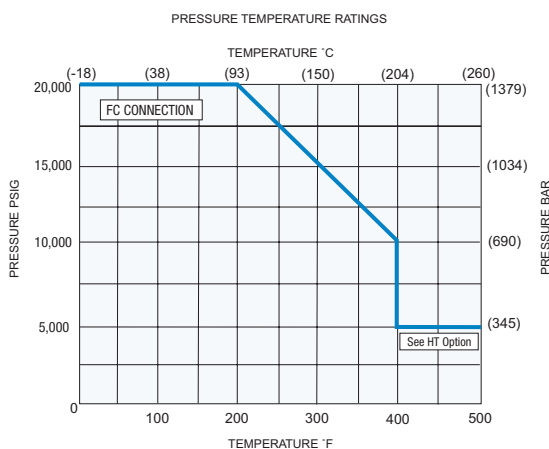
3/16" 3-Way .187" (4.77 mm) Ball Orifice • Pressures to 20,000 psi (1379 bar)

Connection	MAWP@ Room Temperature	Minimum Orifice inches (mm)	Valve Cv
FC250	20,000 (1379)	.109 (2.77)	.26
FC375	20,000 (1379)	.188 (4.77)	.5
MAWP: Maximum Allowable Working Pressure			

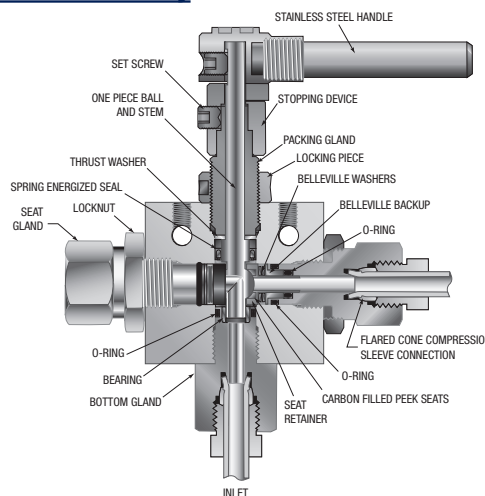
Note: Maximum side connection inlet pressure 15,000 psi (1034 bar)



## Pressure/Temperature Chart



## Product Cutaway



Note: Critical gas applications such as Hydrogen or Helium should be evaluated on a case by case basis. Consult factory.

## Ordering Procedure Example

Typical catalog number example: **3B3S20FC4** (catalog number is created based on customer selection of product parameters, see below for example)

3B	3	S	20	FC4	-	XXX
Valve Series	Ball Orifice Diameter	Material	Pressure (X 1000 psi)	End Connection		Options
3B = 3 way Switching 3BD* = 3 way Diverter	3 = 3/16" (4.77 mm)	S = 316SS		FC4 = FLC250 (See chart on next page)		C = PTFE U-Cup 500°F (260°C) max. EPR = Ethylene Propylene 250°F (121°C) max. BO = Buna-N 250°F (121°C) max. (Ball Valve Actuators, see next page)

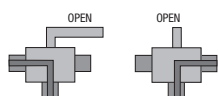
\*The Diverter Valve design permits inlet flow through the bottom port. Outlet flow may be diverted to either valve side port.

# Ball Valves

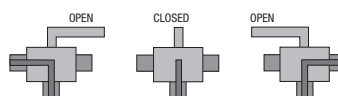
3/16" 3-Way .187" (4.77 mm) Ball Orifice • Pressures to 20,000 psi (1379 bar)

## End Connection Options

Catalog Number	End Connection Number	Connection	MAWP@ Room Temperature	Seat Gland Hex inches (mm)
3B3S20FC4	FC4	FLC250	20,000 psi (1379 bar)	1 (25.40)
3BD3S20FC4				
3B3S20FC6	FC6	FLC375	20,000 psi (1379 bar)	1 (25.40)
3BD3S20FC6				



\*3-Way Diverter Valve  
90° Turn



3-Way Switching Valve  
180° Turn

## Ball Valve Options

### Pneumatic Actuator

- AO - Air-to-open/spring to close
- AC - Air-to-close/spring to open
- AOC - Air-to-open-and-close (double action)

### Electric Actuator

- E01 - 120 volt AC 50/60 Hz
- E02 - 220 volt AC 50/60 Hz
- E03 - 24 VDC

### Actuator Operating Temperature:

- Pneumatic: -10°F to 175°F (-23°C to 79°C)
- Electric: 0°F to 160°F (-17.8°C to 71°C)

### Sealing Options:

- C = PTFE U-Cup 500°F (260°C) max.
- EPR = Ethylene Propylene 250°F (121°C) max.
- BO = Buna-N 250°F (121°C) max.

See ball valve actuator section starting on page 27 for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "R" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R3B3S**)

Consult your Parker Autoclave Engineers representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures. Visit [www.autoclave.com](http://www.autoclave.com).

See page 26 for 3-Way Ball Valve dimensions.

# Ball Valves

**3/8" 3-Way .328" (8.33 mm) Ball Orifice • Pressures to 15,000 psi (1034 bar)**

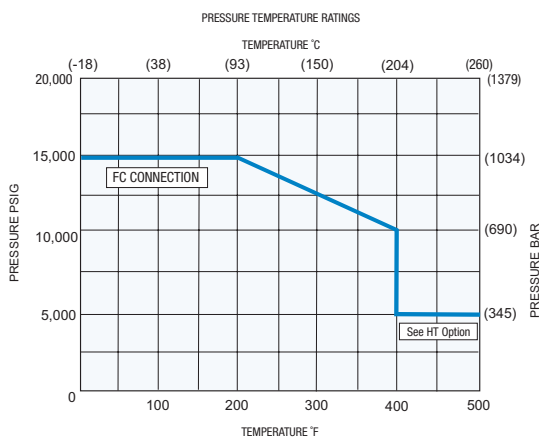
Connection	MAWP@ Room Temperature	Minimum Orifice inches (mm)	Value Cv
FLC375	15,000 (1034)	.203 (5.16)	1.1
FLC562	15,000 (1034)	.312 (7.92)	2.0

MAWP: Maximum Allowable Working Pressure

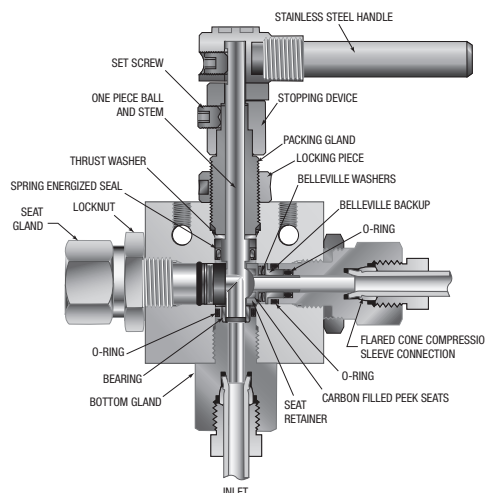
Note: Side connection pressure not recommended (see 3/16" and 1/2" Ball Valves for side inlet options)



## Pressure/Temperature Chart



## Product Cutaway



Note: Critical gas applications such as Hydrogen or Helium should be evaluated on a case by case basis. Consult factory.

## Ordering Procedure Example

Typical catalog number example: **3B6S15FC9** (catalog number is created based on customer selection of product parameters, see below for example)

3B	6	S	15	FC9	-	XXX
Valve Series	Ball Orifice Diameter	Material	Pressure (X 1000 psi)	End Connection		Options
3B = 3 way Switching 3BD* = 3 way Diverter	6 = 3/8" (9.52 mm)	S = 316SS		FC9 = FLC562 (See chart on next page)		C = PTFE U-Cup 500°F (260°C) max. EPR = Ethylene Propylene 250°F (121°C) max. BO = Buna-N 250°F (121°C) max. (Ball Valve Actuators, see next page)

\*The Diverter Valve design permits inlet flow through the bottom port. Outlet flow may be diverted to either valve side port.

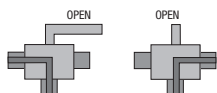
# Ball Valves

**3/8" 3-Way .328" (8.33 mm) Ball Orifice • Pressures to 15,000 psi (1034 bar)**

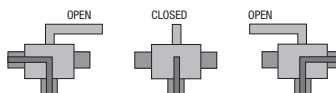
## End Connection Options

Catalog Number	End Connection Number	Connection	MAWP@ Room Temperature	Seat Gland Hex inches (mm)
3B6S15FC6	FC6	FLC375	15,000 psi (1034 bar)	1.38 (35.05)
3BD6S15FC6				
3B6S15FC9	FC9	FLC562	15,000 psi (1034 bar)	1.38 (35.05)
3BD6S15FC9				

MAWP: Maximum Allowable Working Pressure



\*3-Way Diverter Valve  
90° Turn



3-Way Switching Valve  
180° Turn

## Ball Valve Options

### Pneumatic Actuator

- AO - Air-to-open/spring to close
- AC - Air-to-close/spring to open
- AOC - Air-to-open-and-close (double action)

### Electric Actuator

- E01 - 120 volt AC 50/60 Hz
- E02 - 220 volt AC 50/60 Hz
- E03 - 24 VDC

### Sealing Options:

- C = PTFE U-Cup 500°F (260°C) max.
- EPR = Ethylene Propylene 250°F (121°C) max.
- BO = Buna-N 250°F (121°C) max.

See ball valve actuator section starting on page 27 for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "R" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R3B6S**)

Consult your Parker Autoclave Engineers representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures. Visit [www.autoclave.com](http://www.autoclave.com).

See page 26 for 3-Way Ball Valve dimensions.

# Ball Valves

1/2" 3-Way .500" (12.7 mm) Ball Orifice • Pressures to 10,000 psi (690 bar)

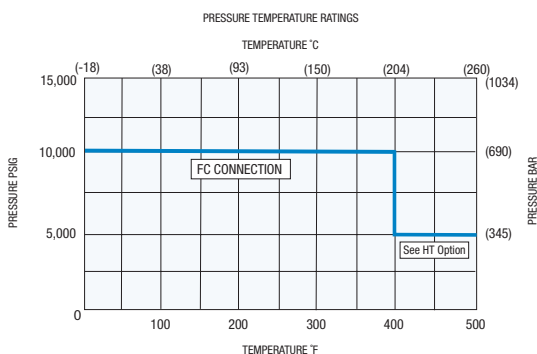
Connection	MAWP@ Room Temperature	Minimum Orifice inches (mm)	Valve C <sub>v</sub>
FLC750	10,000 (690)	.438 (11.13)	4.1
FLC1000	10,000 (690)	.500 (12.70)	4.4
MAWP: Maximum Allowable Working Pressure			



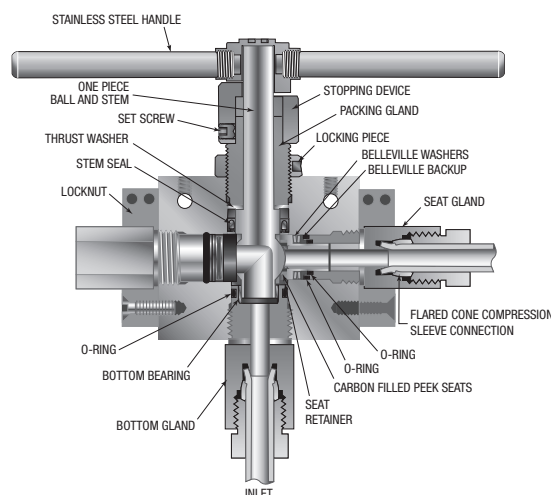
Note: Maximum side connection inlet pressure 10,000 psi (690 bar)

This 1/2" 3-way Ball Valve is limited to 400° maximum - No High Temp option is available at this time.

## Pressure/Temperature Chart



## Product Cutaway



Note: Critical gas applications such as Hydrogen or Helium should be evaluated on a case by case basis. Consult factory.

## Ordering Procedure Example

Typical catalog number example: **3B8S10FC12** (catalog number is created based on customer selection of product parameters, see below for example)

3B	8	S	10	FC12	-	XXX
Valve Series	Ball Orifice Diameter	Material	Pressure (X 1000 psi)	End Connection		Options
3B = 3 way Switching 3BD* = 3 way Diverter	8 = 1/2" (12.7 mm)	S = 316SS		FC12 = FLC750 (See chart on next page)		C = PTFE U-Cup 500°F (260°C) max. EPR = Ethylene Propylene 250°F (121°C) max. BO = Buna-N 250°F (121°C) max. (Ball Valve Actuators, see next page)

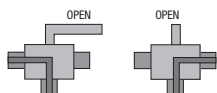
\*The Diverter Valve design permits inlet flow through the bottom port. Outlet flow may be diverted to either valve side port.

# Ball Valves

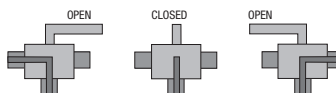
1/2" 3-Way .500" (12.7 mm) Ball Orifice • Pressures to 10,000 psi (690 bar)

## End Connection Options

Catalog Number	End Connection Number	Connection	MAWP@ Room Temperature	Seat Gland Hex inches (mm)
3B8S10FC12	FC12	FLC750	10,000 psi (690 bar)	1.75 (44.5)
3BD8S10FC12				
3B8S10FC16	FC16	FLC1000	10,000 psi (690 bar)	Square 2.25 (57.2)
3BD8S10FC16				



\*3-Way Diverter Valve  
90° Turn



3-Way Switching Valve  
180° Turn

## Ball Valve Options

### Pneumatic Actuator

- AO - Air-to-open/spring to close
- AC - Air-to-close/spring to open
- AOC - Air-to-open-and-close (double action)

### Electric Actuator

- E01 - 120 volt AC 50/60 Hz
- E02 - 220 volt AC 50/60 Hz
- E03 - 24 VDC

### Sealing Options:

- C = PTFE U-Cup 500°F (260°C) max.
- EPR = Ethylene Propylene 250°F (121°C) max.
- BO = Buna-N 250°F (121°C) max.

See ball valve actuator section starting on page 27 for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "R" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R3B8S**)

Consult your Parker Autoclave Engineers representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures. Visit [www.autoclave.com](http://www.autoclave.com).

See page 26 for 3-Way Ball Valve dimensions.

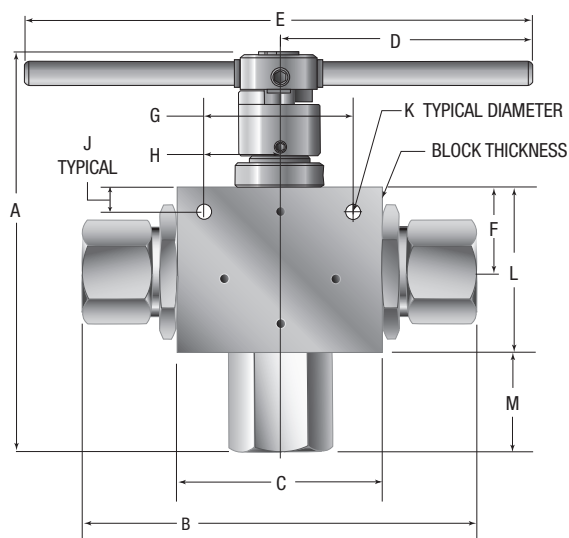
# Ball Valves

**3-Way** Pressures to 20,000 psi (1379 bar)

## Ball Valve Dimensions - inches (mm)

	VALVE MODELS		
	3B3S/3BD3S	3B6S/3BD6S	3B8S/3BD8S
	3/16"	3/8"	1/2"
<b>A</b>	5.64 (143.35)	6.90 (175.26)	8.91 (226.31)
<b>B</b>	4.72 (119.94)	6.28 (159.51)	11.97 (304.04)
<b>C</b>	2.50 (63.50)	3.00 (76.20)	4.13 (104.78)
<b>D</b>	3.37 (85.55)	4.99 (126.82)	5.12 (130.04)
<b>E</b>	3.90 (99.02)	5.52 (140.32)	10.25* (260.35)
<b>F</b>	1.13 (28.58)	1.38 (34.92)	1.66 (42.16)
<b>G</b>	1.50 (38.10)	2.00 (50.80)	3.00 (76.20)
<b>H</b>	0.75 (19.05)	1.00 (25.40)	1.50 (38.10)
<b>J</b>	0.43 (10.92)	0.41 (10.31)	0.50 (12.70)
<b>K</b>	0.28 (7.11)	0.28 (7.11)	0.28 (7.11)
<b>L</b>	2.25 (57.15)	2.88 (73.03)	3.34 (84.94)
<b>M</b>	0.97 (24.64)	1.54 (39.11)	2.78 (70.61)
Block Thickness	1.00 (25.40)	1.38 (34.92)	1.75 (44.45)

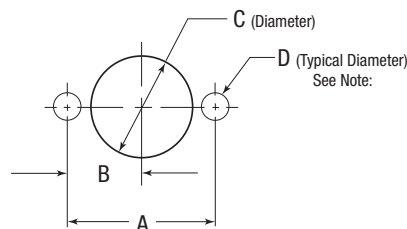
\* 3B8S10Q12 and 3BD8SQ12 Valves Only



## Ball Valve Panel Mounting Dimensions - inches (mm)

	VALVE MODELS		
	3B3S/3BD3S	3B6S/3BD6S	3B8S/3BD8S
	3/16"	3/8"	1/2"
<b>A</b>	1.50 (38.10)	2.00 (50.80)	3.00 (76.20)
<b>B</b>	0.750 (19.05)	1.00 (25.40)	1.50 (38.10)
<b>C</b>	1.06 (26.92)	1.50 (38.10)	1.88 (47.63)
<b>D</b>	.28 (7.11)	.28 (7.11)	.28 (7.11)

Note: Body Mounting 1/4" - 20 thread.



All dimensions are for reference only and are subject to change without notice.

# Ball Valves

## Actuators Pneumatic and Electric

Parker Autoclave Engineers ball valves can be supplied with either pneumatic or electric operators for automated or remote operation.

Pneumatic and electric operators can be supplied with a variety of features and options. Operators are sized for each valve series to provide reliable and trouble free operation. Listed below are the operator features and available options.

### AE Ball Valve Actuator Features:

#### **Pneumatic Operators**

- Used for remote and automatic operation
- Air-to-open/spring-to-close (AO)
- Air-to-close/spring-to-open (AC)
- Air-to-open and close (double acting) (AOC)
- Limit switches or limit switches with visual indicators available
- High temperature option available.
- Stainless steel housing for corrosive applications available.
- Optional solenoid valve available
- Standard anodized aluminum housing
- Optional epoxy coated housing available

#### **Electric Operators**

- Interface with control systems for automated operation and monitoring
- 120 & 220 VAC, 50/60 Hz standard
- 24VDC
- Explosion proof available
- CE Mark and ATEX approvals available for most options

### Applications:

- |                     |  |
|---------------------|--|
| • Laboratories      | • Pilot Plants                         |
| • Test Stands       | • Water Blasting Pumping Units         |
| • Control Panels    | • High Volume Chemical Injection Skids |
| • Chemical Research |  |



# Ball Valves

## Actuators Pneumatic and Electric

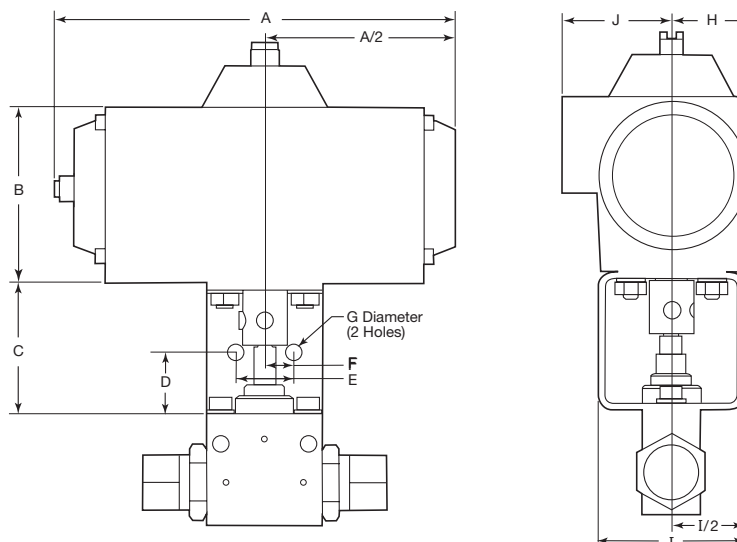
### Pneumatic Operated Ball Valves

Add the suffix **-AO**, **-AC** or **-AOC<sup>†</sup>** to the appropriate valve catalog number for a complete valve assembly.

VALVE SERIES	Dimensions Data - inches (mm)										Minimum Required Air Pressure
	A	B	C	D	E	F	G	H	I	J	
2B4-AO/AC	6.85 (173.99)	3.20 (81.28)	2.50 (63.50)	1.25 (31.75)	1.00 (25.40)	0.50 (12.70)	0.28 (7.11)	1.30 (33.02)	2.50 (63.50)	1.88 (47.45)	80 psi (5.51 bar)
2B6-AO/AC	7.28 (184.91)	3.86 (98.04)	3.00 (76.20)	1.50 (38.10)	1.50 (38.10)	0.75 (19.05)	0.34 (8.64)	1.59 (40.39)	3.00 (76.20)	2.10 (53.34)	80 psi (5.51 bar)
2B8-AO/AC	9.38 (238.25)	4.62 (117.35)	3.00 (76.20)	1.50 (38.10)	2.00 (50.80)	1.00 (25.40)	0.53 (13.46)	2.00 (50.80)	3.00 (76.20)	2.48 (62.99)	80 psi (5.51 bar)
2B12-AO/AC	17.30 (439.42)	8.00 (203.20)	5.00 (127.00)	2.50 (63.50)	3.25 (82.55)	1.63 (41.40)	0.53 (13.46)	3.54 (89.92)	5.00 (127.00)	3.57 (90.68)	80 psi (5.51 bar)
3BD3-AO/AC <sup>††</sup>	6.85 (173.99)	3.20 (81.28)	2.50 (63.50)	1.25 (31.75)	1.00 (25.40)	0.50 (12.70)	0.28 (7.11)	1.30 (33.02)	2.50 (63.50)	1.88 (47.75)	80 psi (5.51 bar)
3BD6-AO/AC <sup>††</sup>	7.28 (184.91)	3.86 (98.04)	3.00 (76.20)	1.50 (38.10)	1.50 (38.10)	0.75 (19.05)	0.34 (8.64)	1.59 (40.39)	3.00 (76.20)	2.10 (53.34)	80 psi (5.51 bar)
3BD8-AO/AC <sup>††</sup>	9.38 (238.25)	4.62 (117.35)	3.00 (76.20)	1.50 (38.10)	2.00 (50.80)	1.00 (25.40)	0.53 (13.46)	2.00 (50.80)	3.00 (76.20)	2.48 (62.99)	80 psi (5.51 bar)

**NOTE:**

- Maximum allowable air pressure is 150 psi (10.34)
- 1/4" NPT female air connection
- AO: Air to open/spring to close
- AC: Air to close/spring to open
- AOC<sup>†</sup>: Air to open/air to close (double acting)
- Actuators operating temperature: -10°F to 175°F (-23°C to 79°C)
- High temperature actuator option available, consult factory
- Stainless steel housing actuator models available, consult factory
- Actuators available with limit switches and visual indicators.
- Corrosion resistant anodized aluminum housing.
- Epoxy coated housing available.
- Solenoids available, direct or nipple mount.
- † AOC Actuator not shown consult factory
- †† 3B3, 3B6, & 3B8 Series not shown consult factory



# Ball Valves

## Actuators Pneumatic and Electric

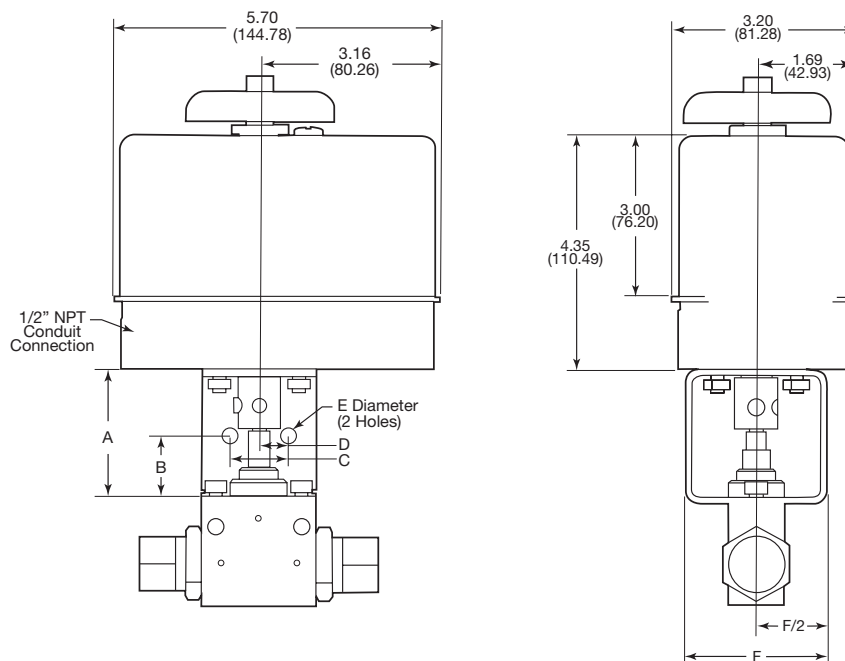
### Electric Operated Ball Valves

Add the suffix **-E01**, **-E02** or **-E03** to the appropriate valve catalog number for a complete valve assembly.

VALVE SERIES	Dimensions Data - inches (mm)						VOLTAGE
	A	B	C	D	E	F	
2B4-E01	2.50 (63.50)	1.25 (31.75)	1.00 (25.4)	0.50 (12.70)	0.28 (7.11)	2.50 (63.50)	120 VAC
240 VAC							
24 VDC							
2B6-E01	3.00 (76.2)	1.50 (38.1)	1.50 (38.1)	0.75 (19.05)	0.34 (8.64)	3.00 (76.2)	120 VAC
240 VAC							
24 VDC							
3BD3-E01 <sup>†</sup>	2.50 (63.50)	1.25 (31.75)	1.00 (25.4)	0.50 (12.70)	0.28 (7.11)	2.50 (63.50)	120 VAC
3BD3-E02 <sup>†</sup>							240 VAC
3BD3-E03 <sup>†</sup>							24 VDC
3BD6-E01 <sup>†</sup>	3.00 (76.2)	1.50 (38.1)	1.50 (38.1)	0.75 (19.05)	0.34 (8.64)	3.00 (76.2)	120 VAC
3BD6-E02 <sup>†</sup>							240 VAC
3BD6-E03 <sup>†</sup>							24 VDC

NOTE:

- Manual override
- Powder coated aluminum housing
- CE & CSA approved. ATEX certification for most options available
- Actuators operating temperature: 0°F to 160°F (-17.8°C to 71°C)
- 120 and 240 Volt are 50/60 Hz, For other voltages consult factory
- <sup>†</sup>3B3 and 3B6 are same dimensions as the 3BD3 and 3BD6
- For other options consult factory



All dimensions for reference only and subject to change. For prompt service, Parker Autoclave Engineers stocks select products. Consult your local representative.

# Ball Valves

## Actuators Pneumatic and Electric

### Electric Operated Ball Valves

Add the suffix **-E01**, **-E02** or **-E03** to the appropriate valve catalog number for a complete valve assembly.

VALVE SERIES	Dimensions Data - inches (mm)						VOLTAGE	
	A	B	C	D	E	F		
<b>2B8-E01</b>	3.00	1.50	2.00	1.00	0.53	3.00	120 VAC	See Figure 1
<b>2B8-E02</b>	(76.2)	(38.1)	(50.8)	(25.40)	(13.46)	(76.2)	240 VAC	
<b>2B8-E03</b>							24 VDC	
<b>3BD8-E01<sup>†</sup></b>	3.00	1.50	2.00	1.00	0.53	3.00	120 VAC	See Figure 1
<b>3BD8-E02<sup>†</sup></b>	(76.2)	(38.1)	(50.80)	(25.40)	(13.46)	(76.2)	240 VAC	
<b>3BD8-E03<sup>†</sup></b>							24 VDC	
<b>2B12-E01</b>	5.00	2.50	3.25	1.63	0.53	5.00	120 VAC	See Figure 2
<b>2B12-E02</b>	(127.00)	(63.50)	(82.55)	(41.40)	(13.46)	(127.00)	240 VAC	

- NOTE:
- E01: Electric 120 VAC
  - E02: Electric 220 VAC
  - E03: Electric 24 VDC
  - For other voltages consult factory
  - Actuator operating temperature: 0°F to 160°F (-17.8°C to 71°C)
  - Powder coated aluminum housing
  - CE & CSA approved for NEMA 4 and 4x
  - ATEX certification available for most options
  - For other options contact factory
  - Manual override
  - 1/2" NPT female air connector
  - <sup>†</sup>3B8 series are the same dimensions as the 3BD8

Figure 1

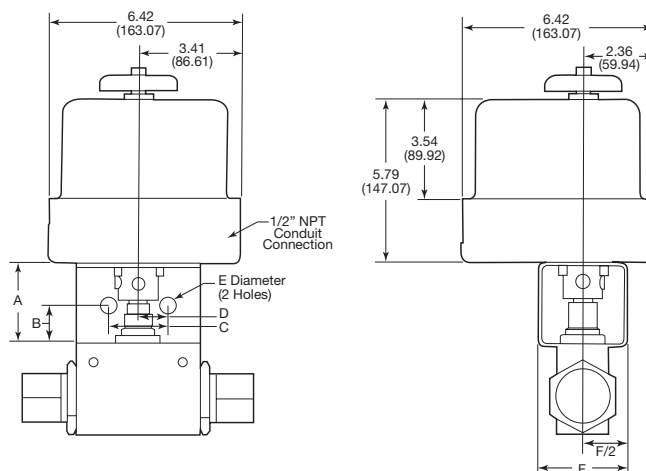
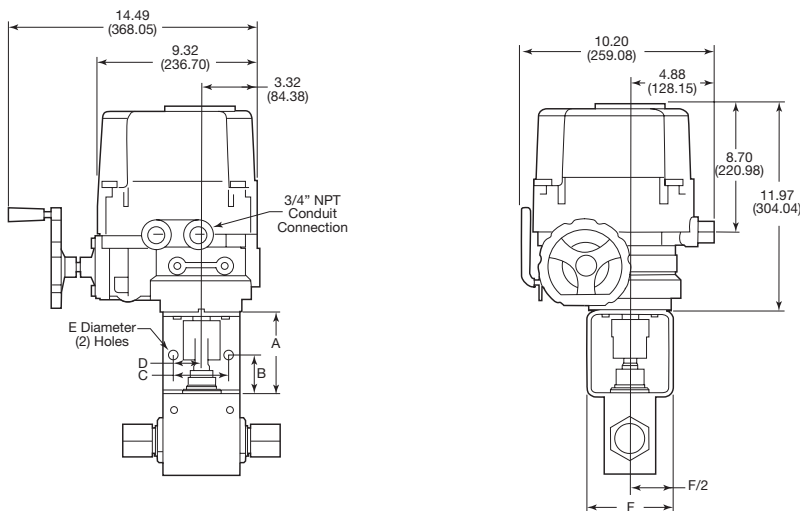


Figure 2



# Fittings and Tubing

## Flared Cone Connection Pressures to 22,500 psi (1550 bar)

Since 1945 Parker Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Parker Autoclave Engineers a reputation for reliable, efficient product performance.

Parker Autoclave Engineers has developed this revolutionary new connection that is as safe as our Cone and Thread Medium Pressure Connection with the advantage of simple and quick make up. The Flared Cone prevents tube extraction while also providing one of two sealing surfaces. Redundant Sealing with Anti-Blow out Technology!



### FC Compression Sleeve Fitting and Tubing Features:

- FC single bite-type compression sleeve connection up to 22,500 psi (1550 bar)
- Available sizes are 1/4, 3/8, 9/16, 3/4 and 1”.
- Fittings and tubing manufactured from high strength cold worked 316 Stainless Steel to 20,000 psi (1380 bar) as Standard. Optional 2507 Super Duplex to 22,500 psi (1550 bar)
- Molybdenum disulfide-coated gland nuts to prevent galling.
- Connection weep holes for safety and leak detection.
- Fast easy make-up of connection.
- Operating Temperatures from -100°F (-73°C) to 600°F (316°C), and -50°F (-45°C) for 2507 SD
- 1” FC fitting bodies are 2507® Super Duplex standard.



The Medium Pressure FC Series uses Parker Autoclave Engineers’ Flared bite-type compression sleeve design. This single compression sleeve connection delivers fast, easy make-up and reliable bubble-tight performance in liquid or gas service.

# Fittings and Tubing

## Flared Cone Connection Pressures to 22,500 psi (1550 bar)

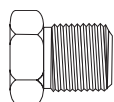
Parker Autoclave Engineers Medium Pressure FC Fittings are designed for use with FC Series valves and medium pressure tubing. These fittings feature improved bite-type compression connections with larger orifices for excellent flow capabilities.

Parker Autoclave Engineers fittings and components are manufactured of high strength stainless steel.



### Connection Components

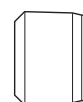
All Parker Autoclave Engineers valves and fittings are supplied complete with appropriate glands and sleeves. To order these components separately, use order numbers listed. When using plug, sleeve is not required.



**Gland**  
FCG ( )



**Plug**  
FCP ( )



**Sleeve**  
FCS ( )

Add tube size ( )

1/4" - 40  
3/8" - 60  
9/16" - 90

3/4" - 120  
1" - 160

**Example: 1/4 Gland - FCG 40**

To ensure proper fit use Parker Autoclave Engineers tubing. Consult factory for mounting hole dimensions.

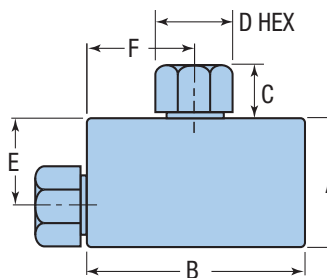
### Elbow (see Figure 1)

Catalog Number	Connection Type	Outside Diameter Tube	Pressure Rating psi (bar)*	Minimum Opening	Dimensions - inches (mm)							Block Thickness
					A	B	C	D Typical	E	F	G	
FCL4400	FLC250	1/4 (6.35)	20,000 (1379)	0.11 (2.79)	1.38 (35.05)	2.00 (50.80)	0.36 (9.02)	0.63 (16.00)	1.00 (25.40)	1.00 (25.40)		0.81 (20.57)
FCL6600	FLC375	3/8 (9.53)	20,000 (1379)	0.20 (5.08)	1.75 (44.45)	2.50 (63.50)	0.44 (11.23)	0.81 (20.57)	1.25 (31.75)	1.25 (31.75)		1.00 (25.40)
FCL9900	FLC562	9/16 (14.29)	20,000 (1379)	0.31 (7.87)	2.80 (71.12)	3.00 (76.20)	0.66 (16.84)	1.19 (30.23)	1.75 (44.45)	1.50 (38.10)		1.38 (35.05)
FCL12	FLC750	3/4 (19.05)	20,000 (1379)	0.44 (11.18)	3.00 (76.20)	4.13 (104.90)	0.88 (22.43)	1.50 (38.10)	2.38 (60.45)	2.06 (52.32)		1.75 (44.45)
FCL16	FLC1000	1 (25.4)	20,000 (1379)	0.56 (14.22)	4.50 (114.30)	6.00 (152.40)	0.95 (24.13)	1.75 (44.45)	3.25 (82.55)	3.00 (76.203)		2.25 (57.15)

\* = 22,500 psi when using 2507 Super Duplex material

1. Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.
2. 1" FC fitting bodies are 2507 Super Duplex as standard
3. Compression Sleeve material is IN718
4. For mounting hole option add suffix PM to catalog number. Consult factory for mounting hole dimensions.

All dimensions for reference only and subject to change.  
For prompt service, Parker Autoclave Engineers stocks select products.  
Consult your local representative.



ELBOW - Figure 1

# Fittings and Tubing

## Flared Cone Connection Pressures to 22,500 psi (1550 bar)

**Tee** (see Figure 2)

Catalog Number	Connection Type	Outside Diameter Tube	Pressure Rating psi (bar)*	Minimum Opening	Dimensions - inches (mm)							Block Thickness
					A	B	C	D Typical	E	F	G	
FCT4400	FLC250	1/4 (6.35)	20,000 (1379)	0.11 (2.79)	1.38 (35.05)	2.00 (50.80)	0.36 (9.02)	0.63 (16.00)	1.00 (25.40)	1.00 (25.40)		0.81 (20.57)
FCT6600	FLC375	3/8 (9.53)	20,000 (1379)	0.20 (5.08)	1.75 (44.45)	2.50 (63.50)	0.44 (11.23)	0.81 (20.57)	1.25 (31.75)	1.25 (31.75)		1.00 (25.40)
FCT9900	FLC562	9/16 (14.29)	20,000 (1379)	0.31 (7.87)	2.80 (71.12)	3.00 (76.20)	0.66 (16.84)	1.19 (30.23)	1.75 (44.45)	1.50 (38.10)		1.38 (35.05)
FCT12	FLC750	3/4 (19.05)	20,000 (1379)	0.44 (11.18)	3.00 (76.20)	4.13 (104.90)	0.88 (22.43)	1.50 (38.10)	2.38 (60.45)	2.06 (52.32)		1.75 (44.45)
FCT16	FLC1000	1 (25.4)	20,000 (1379)	0.56 (14.22)	4.50 (114.30)	6.00 (152.40)	0.95 (24.13)	1.75 (44.45)	3.25 (82.55)	3.00 (76.203)		2.25 (57.15)

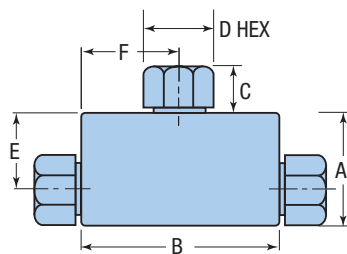
\* = 22,500 psi when using 2507 Super Duplex material

**Cross** (see Figure 3)

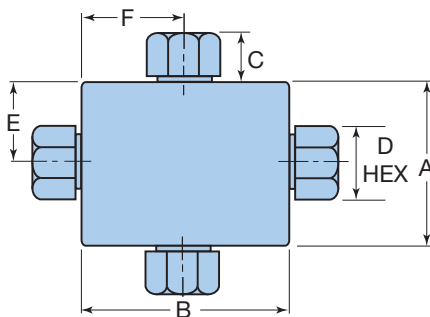
Catalog Number	Connection Type	Outside Diameter Tube	Pressure Rating psi (bar)*	Minimum Opening	Dimensions - inches (mm)							Block Thickness
					A	B	C	D Typical	E	F	G	
FCX4400	FLC250	1/4 (6.35)	20,000 (1379)	0.11 (2.79)	2.00 (50.80)	2.00 (50.80)	0.36 (9.02)	0.63 (16.00)	1.00 (25.40)	1.00 (25.40)		0.81 (20.57)
FCX6600	FLC375	3/8 (9.53)	20,000 (1379)	0.20 (5.08)	2.50 (63.50)	2.50 (63.50)	0.44 (11.23)	0.81 (20.57)	1.25 (31.75)	1.25 (31.75)		1.00 (25.40)
FCX9900	FLC562	9/16 (14.29)	20,000 (1379)	0.31 (7.87)	3.50 (88.90)	3.00 (76.20)	0.66 (16.84)	1.19 (30.23)	1.75 (44.45)	1.50 (38.10)		1.38 (35.05)
FCX12	FLC750	3/4 (19.05)	20,000 (1379)	0.44 (11.18)	4.75 (120.65)	4.13 (104.90)	0.88 (22.43)	1.50 (38.10)	2.38 (60.45)	2.06 (52.32)		1.75 (44.45)
FCX16	FLC1000	1 (25.4)	20,000 (1379)	0.56 (14.22)	6.50 (165.10)	6.00 (152.40)	0.95 (24.13)	1.75 (44.45)	3.25 (82.55)	3.00 (76.203)		2.25 (57.15)

\* = 22,500 psi when using 2507 Super Duplex material

1. Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.
2. 1" FC fitting bodies are 2507 Super Duplex as standard
3. Compression Sleeve material is IN718
4. For mounting hole option add suffix PM to catalog number. Consult factory for mounting hole dimensions.



TEE - Figure 2



CROSS - Figure 3

All dimensions for reference only and subject to change. For prompt service, Parker Autoclave Engineers stocks select products. Consult your local representative.

# Fittings and Tubing

## Flared Cone Connection Pressures to 22,500 psi (1550 bar)

### Straight Coupling (see Figure 4)

Catalog Number	Connection Type	Outside Diameter Tube	Pressure Rating psi (bar)*	Minimum Opening	Dimensions - inches (mm)			
					A	B	C	D Typical
20F44FF	FLC250	1/4 (6.35)	20,000 (1379)	0.11 (2.79)	0.81 (20.57)	2.00 (50.80)	0.36 (9.02)	0.63 (16.00)
20F66FF	FLC375	3/8 (9.53)	20,000 (1379)	0.20 (5.08)	1.00 (25.40)	2.38 (60.45)	0.44 (11.23)	0.81 (20.57)
20F99FF	FLC562	9/16 (14.29)	20,000 (1379)	0.31 (7.87)	1.38 (35.05)	3.00 (76.20)	0.66 (16.84)	1.19 (30.23)
20F12F	FLC750	3/4 (19.05)	20,000 (1379)	0.44 (11.18)	1.75 (44.45)	3.75 (95.25)	0.88 (22.43)	1.50 (38.10)
20F16F	FLC1000	1 (25.4)	20,000 (1379)	0.56 (14.22)	2.25 <sup>†</sup> (57.15)	5.50 (139.70)	0.95 (24.13)	1.75 (44.45)

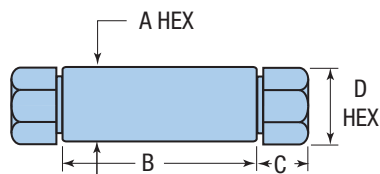
\* = 22,500 psi when using 2507 Super Duplex material

### Bulkhead Coupling (see Figure 5)

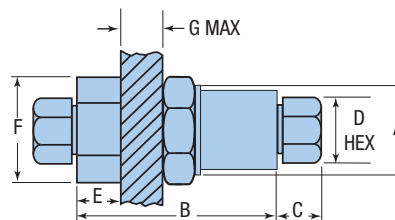
Catalog Number	Connection Type	Outside Diameter Tube	Pressure Rating psi (bar)*	Minimum Opening	Dimensions - inches (mm)						
					A	B	C	D Typical	E	F	G
20BF44FF	FLC250	1/4 (6.35)	20,000 (1379)	0.11 (2.79)	0.81 (20.57)	2.00 (50.80)	0.36 (9.02)	0.63 (16.00)	0.63 (16.00)	1.00 (25.40)	0.38 (9.65)
20BF66FF	FLC375	3/8 (9.53)	20,000 (1379)	0.20 (5.08)	1.00 (25.40)	2.38 (60.45)	0.44 (11.23)	0.81 (20.57)	0.79 (20.07)	1.38 (35.05)	0.38 (9.65)
20BF99FF	FLC562	9/16 (14.29)	20,000 (1379)	0.31 (7.87)	1.38 (35.05)	3.00 (76.20)	0.66 (16.84)	1.19 (30.23)	0.91 (23.11)	1.75 (44.45)	0.38 (9.65)
20BF12F	FLC750	3/4 (19.05)	20,000 (1379)	0.44 (11.18)	1.75 (44.45)	3.75 (95.25)	0.88 (22.43)	1.50 (38.10)	1.50 (38.10)	2.13 (54.10)	0.38 (9.65)
20BF16F	FLC1000	1 (25.4)	20,000 (1379)	0.56 (14.22)	2.25 <sup>†</sup> (57.15)	5.50 (139.70)	0.95 (24.13)	1.75 (44.45)	2.00 (50.80)	2.50 <sup>†</sup> (63.50)	0.38 (9.65)

\* = 22,500 psi when using 2507 Super Duplex material

1. Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.
2. 1" FC fitting bodies are 2507 Super Duplex as standard
3. Compression Sleeve material is IN718
4. For mounting hole option add suffix PM to catalog number. Consult factory for mounting hole dimensions.
5. <sup>†</sup> Distance across flats
6. Union Couplings are designed with a removable seat insert allowing disassembly and tubing removal without the necessity of loosening other items in a line. Contact factory for availability.



STRAIGHT COUPLING- Figure 4



BULKHEAD COUPLING- Figure 5

# Tubing

## Medium Pressure Pressures to 22,500 psi (1550 bar)

Parker Autoclave Engineers offers a complete selection of austenetic, cold drawn stainless steel tubing designed to match the performance standards of Parker Autoclave Engineers valves and fittings.

Parker Autoclave Engineers medium pressure tubing is manufactured specifically for high pressure applications requiring both strength and corrosion resistance. The tubing is furnished in random lengths between 20 feet (6 meters) and 26.5 feet (8.0 meters). The average is 24 feet (7.3 meters). Medium Pressure Tubing is available in five sizes and a variety of materials.

### Inspection and Testing

Parker Autoclave Engineer's medium pressure tubing is inspected to assure freedom from seams, laps, fissures or other flaws, as well as carburization or intergranular carbide precipitation. The outside and inside diameters of the tubing are subject to special inspection and are controlled within close tolerances to assure proper fit. Sample pieces of tube for each lot are tested to confirm mechanical properties. Hydrostatic testing is also performed on a statistical basis and is conducted at the working pressure of the tube. Parker Autoclave Engineers will perform 100% hydrostatic testing at additional cost if desired.



### Special Materials

In addition to our standard material of 316/316L Stainless Steel, rated to 20,000 psi (1380 bar) we also offer SAF 2507 Super Duplex Tubing rated to 22,500 psi (1550 bar)

### Tubing Sizes

Nominal Tubing Size - inches (mm)

- 1/4 (6.35)
- 3/8 (9.53)
- 9/16 (14.27)
- 3/4 (19.05)
- 1 (25.4)

**Note:**

Tubing outside diameter dimensions are not standard commercial sizes.  
Tubing outside sizes are specific to Parker Autoclave Engineers design requirements.  
Parker Autoclave Engineers components will not be compatible with other manufactured tubing.

# Tubing

## Medium Pressure Pressures to 22,500 psi (1550 bar)

### 316 Stainless Steel

Catalog Number	Tube Material	Fits Connection Type	Tube Size Inches (mm)			Flow Area in. <sup>2</sup> (mm <sup>2</sup> )	Working Pressure psi (bar)*			
			Outside Diameter	Inside Diameter	Wall Thickness		-425 to 100°F -252 to 37.8°C	200°F 93°C	400°F 204°C	600°F 316°C
MS15-092	316SS	FC250	1/4 (6.35)	0.109 (2.77)	0.070 (1.78)	0.009 (6.81)	20,000 (1378.93)	20,000 (1378.93)	19,250 (1327.22)	18,050 (1244.48)
MS15-093	316SS	FC375	3/8 (9.53)	0.203 (6.16)	0.086 (2.18)	0.032 (20.66)	20,000 (1378.93)	20,000 (1378.93)	19,250 (1327.22)	18,050 (1244.48)
MS15-085	316SS	FC562	9/16 (14.29)	0.312 (7.92)	0.125 (3.18)	0.076 (49.03)	20,000 (1378.93)	20,000 (1378.93)	19,250 (1327.22)	18,050 (1244.48)
MS15-095	316SS	FC750	3/4 (19.05)	0.438 (11.13)	0.156 (3.96)	0.151 (94.42)	20,000 (1378.93)	20,000 (1378.93)	19,250 (1327.22)	18,050 (1244.48)
MS15-096	316SS	FC1000	1 (25.4)	0.562 (14.27)	0.219 (5.56)	0.248 (160.0)	20,000 (1378.93)	20,000 (1378.93)	19,250 (1327.22)	18,050 (1244.48)

### 2507 Super Duplex

Catalog Number	Tube Material	Fits Connection Type	Tube Size Inches (mm)			Flow Area in. <sup>2</sup> (mm <sup>2</sup> )	Working Pressure psi (bar)*			
			Outside Diameter	Inside Diameter	Wall Thickness		-425 to 100°F -252 to 37.8°C	200°F 93°C	400°F 204°C	600°F 316°C
MS15-503	2507 SD	FLC250	1/4 (6.35)	0.109 (2.77)	0.070 (1.78)	0.009 (6.81)	22,500 (1550)	19,800 (1365)	17,100 (1179)	16,200 (1116)
MS15-504	2507 SD	FLC375	3/8 (9.53)	0.203 (6.16)	0.086 (2.18)	0.032 (20.66)	22,500 (1550)	19,800 (1365)	17,100 (1179)	16,200 (1116)
MS15-505	2507 SD	FLC562	9/16 (14.29)	0.312 (7.92)	0.125 (3.18)	0.076 (49.03)	22,500 (1550)	19,800 (1365)	17,100 (1179)	16,200 (1116)
MS15-506	2507 SD	FLC750	3/4 (19.05)	0.438 (11.13)	0.156 (3.96)	0.151 (94.42)	22,500 (1550)	19,800 (1365)	17,100 (1179)	16,200 (1116)
MS15-507	2507 SD	FLC1000	1 (25.4)	0.562 (14.27)	0.219 (5.56)	0.248 (160.0)	22,500 (1550)	19,800 (1365)	17,100 (1179)	16,200 (1116)

Maximum pressure rating is based on the lowest rating of any component.

Actual working pressure may be determined by tubing pressure rating, if lower. For prompt service, Parker Autoclave Engineers stocks select products. Consult your local representative. All dimensions for reference only and subject to change.

# Check Valves

## Flared Cone Connection Pressures to 22,500 psi (1550 bar)

Provide unidirectional flow and tight shut-off for liquids and gases with high reliability. When differential drops below cracking pressure\*, valve shuts off. **(Not for use as relief valve.)**

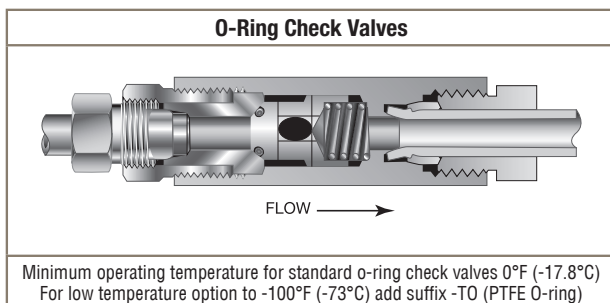
**Materials:** 316 Stainless Steel: Body, cover, poppet, cover gland. 300 Stainless Steel: Spring. Except 1" (see note). Standard O-ring: Viton, for operation to 400° F (204°C). Buna-N or PTFE available for 250°F (121°C) or 400°F (204°C) respectively; specify when ordering.

**\*Cracking Pressure:** 20 psi (1.38 bar) ±30%. Springs for higher cracking pressures (up to 100 psi (6.89bar)) available on special order for O-ring style check valves only.

Prevent reverse flow where leak-tight shut-off is not mandatory. When differential drops below cracking pressure, valve closes. With all-metal components, valve can be used up to 600°F (316°C). See Technical Information section for connection temperature limitations. **(Not for use as a relief valve.)**

**Ball and poppet are an integral design** to assure positive, in-line seating without "chatter". Poppet is designed essentially for axial flow with minimum pressure drop.

**Materials:** 316 Stainless Steel: Body, cover, cover gland, ball poppet. 300 Series Stainless Steel: Spring. Except 1" (see note).

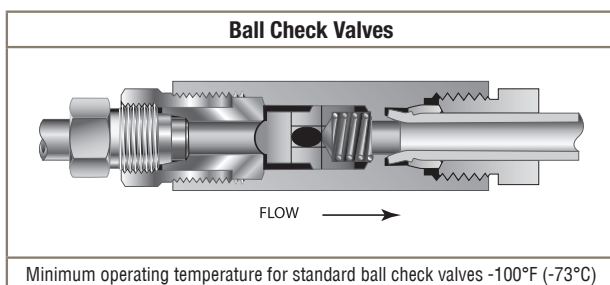


**CAUTION:**  
While testing has shown O-Rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. **PERIODIC INSPECTIONS SHOULD BE MADE** to detect any deterioration, and O-rings replaced as required.

**Note:**  
All check valves are furnished complete with connection components unless otherwise specified.

1" check valve bodies, cover and cover gland are 2507 Super Duplex standard.

\*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.



# Check Valves

## Flared Cone Connection Pressures to 22,500 psi (1550 bar)

### O-Ring Check Valves (see Figure1)

Catalog Number	Fits Connection Type	Pressure Rating psi (bar)*	Orifice inches (mm)	Rated C <sub>v</sub>	Dimensions - inches (mm)				
					A	B	C	D Typical	Hex
FCO4400	FLC250	20,000 (1379)	0.109 (2.77)	0.15 (3.81)	3.18 (80.77)	2.56 (65.07)	0.36 (9.02)	0.63 (16.00)	0.81 (20.57)
FCO6600	FLC375	20,000 (1379)	0.203 (5.16)	0.63 (16.00)	3.94 (100.08)	3.38 (85.73)	0.44 (11.23)	0.81 (20.57)	1.00 (25.40)
FCO9900	FLC562	20,000 (1379)	0.312 (7.92)	2.30 (58.42)	5.21 (132.33)	4.50 (114.30)	0.66 (16.84)	1.19 (30.23)	1.75 (44.45)
FCO12	FLC750	20,000 (1379)	0.438 (11.13)	4.70 (119.38)	6.40 (162.56)	5.50 (139.70)	0.88 (22.43)	1.50 (38.10)	1.88 <sup>†</sup> (47.75)
FCO16	FLC1000	20,000 (1379)	0.562 (14.27)	14.00 (355.60)	8.92 (226.57)	7.52 (191.01)	0.95 (24.13)	1.75 (44.45)	3.00 <sup>†</sup> (76.20)

\* = 22,500 psi when using 2507 Super Duplex material

### Ball Check Valves (see Figure 1)

Catalog Number	Fits Connection Type	Pressure Rating psi (bar)*	Orifice inches (mm)	Rated C <sub>v</sub>	Dimensions - inches (mm)				
					A	B	C	D Typical	Hex
FCB4400	FLC250	20,000 (1379)	0.109 (2.77)	0.15 (3.81)	3.18 (80.77)	2.56 (65.07)	0.36 (9.02)	0.63 (16.00)	0.81 (20.57)
FCB6600	FLC375	20,000 (1379)	0.203 (5.16)	0.63 (16.00)	3.94 (100.08)	3.38 (85.73)	0.44 (11.23)	0.81 (20.57)	1.00 (25.40)
FCB9900	FLC562	20,000 (1379)	0.312 (7.92)	2.30 (58.42)	5.21 (132.33)	4.50 (114.30)	0.66 (16.84)	1.19 (30.23)	1.75 (44.45)
FCB12	FLC750	20,000 (1379)	0.438 (11.13)	4.70 (119.38)	6.40 (162.56)	5.50 (139.70)	0.88 (22.43)	1.50 (38.10)	1.88 <sup>†</sup> (47.75)
FCB16	FLC1000	20,000 (1379)	0.562 (14.27)	14.00 (355.60)	8.92 (226.57)	7.52 (191.01)	0.95 (24.13)	1.75 (44.45)	3.00 <sup>†</sup> (76.20)

\* = 22,500 psi when using 2507 Super Duplex material

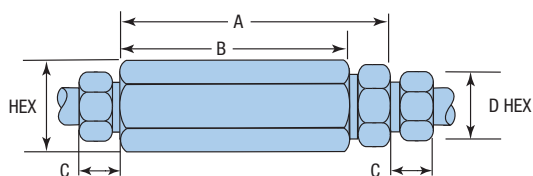
<sup>†</sup>Distance across flats

**Note:**

All check valves are furnished complete with connection components unless otherwise specified.

1" check valve bodies, cover, cover gland and poppet is 2507 Super Duplex standard.

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.



CHECK VALVES - Figure 1

# Needle Valve Repair Kits

**Valve Maintenance** Pressures to 22,500 psi (1550 bar)

Basic Repair Kits for 316 SS material	
VEE STEM	REG STEM
RFC407	RFC408
RFC607	RFC608
RFC907	RFC908
RFC1207	RFC1208
RFC1607	RFC1608
Two Way Replaceable Seat and Stem	
VEE STEM	REG STEM
RFC4872	RFC4882
RFC6872	RFC6882
RFC9872	RFC9882
RFC12872	RFC12882
RFC16872	RFC16882
Two Stem, Two Way Manifold	
VEE STEM	REG STEM
RFC4075	RFC4085
RFC6075	RFC6085
RFC9075	RFC9085
RFC12075	RFC12085
RFC16075	RFC16085
Consult your Parker Autoclave Engineers Representative for other kit numbers, body part numbers and pricing.	
Visit <a href="http://www.autoclave.com">www.autoclave.com</a> for operation manuals.	

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