



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.

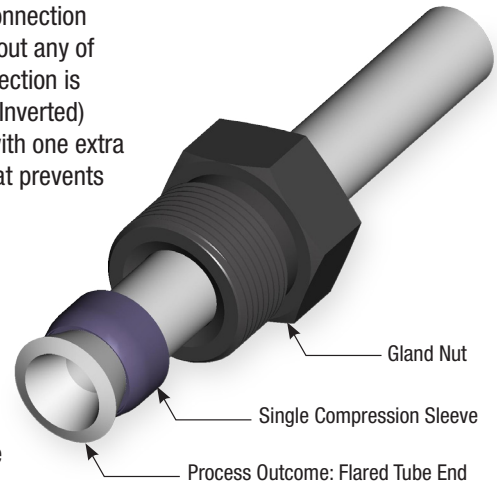
FCC: Flared Coned Connection

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 ² (mm ²)	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)

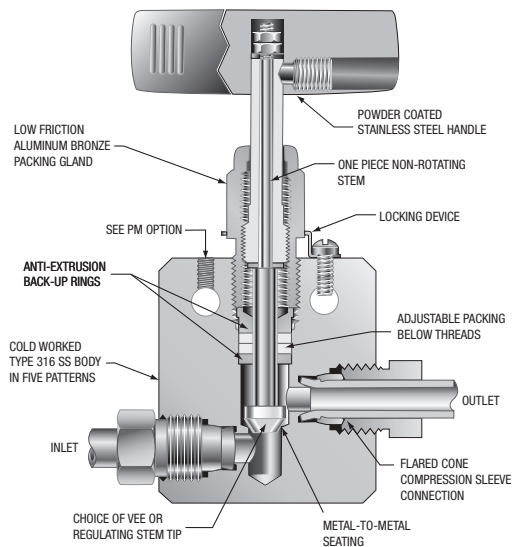
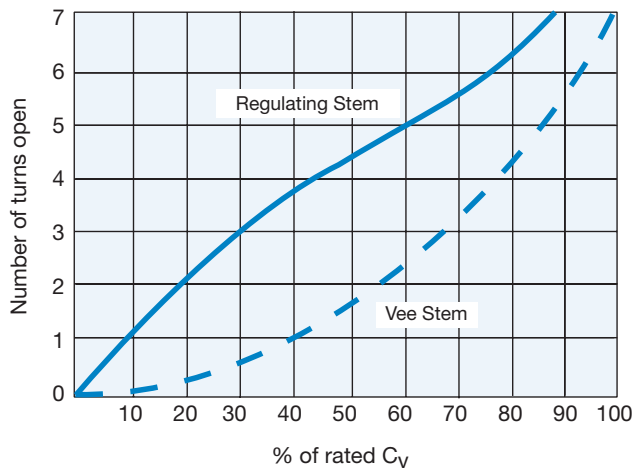
Notes:

* 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 replaceable 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 to download Operation Manuals.

Catalog Number	Stem Type	Outside Dia. Tube	Orifice Dia.	Dimensions - inches (mm)												Block Thickness
				A	B	C	D	D ₁	E	F	G	G ₁	H*	M	N	
2-Way Straight (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)
2-Way Angle (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 ₁	E	F	G	G ₁	H*	M		N
3-Way 2 on Pressure (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)
3-Way 1 on Pressure (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 drill size

Panel mounting drill size: 0.22" all valves

G₁ - 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

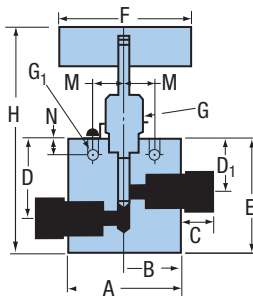


Figure 2: 2-Way Angle

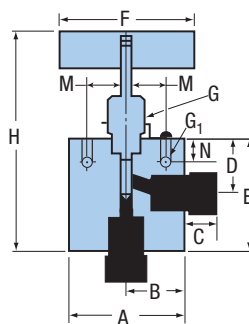


Figure 3: 3-Way 2 On Pressure

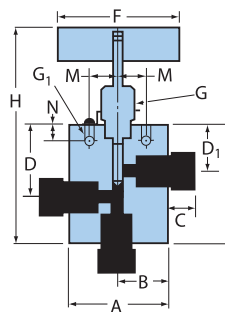
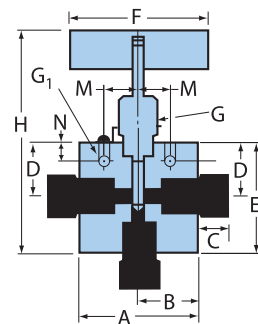


Figure 4: 3-Way 1 on Pressure



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 ₁	E	F	G	G ₁	H*	M	N	
2-Way Angle / Replaceable Seat (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)
3-Way / 2-Stem Manifold (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

G₁ - 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

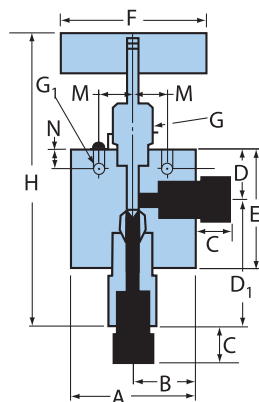


Figure 6: 3-Way / 2-Stem Manifold

