TECNI-AR
Seu caminho
Para automação

Needle Valves (NP6 Series)

Catalog 4110-NP
Revised, April 2004

NP6 Series Needle Valves

Introduction

Parker NP6 Needle Valves are designed with packing below the stem threads and a two-piece stem. The packing below the threads protects the flow stream from thread lubricant contamination or washout and also protects the stem threads from potential damaging effects of the media. The two-piece stem produces a non-rotating lower stem for superior, repeatable sealing and reduced packing wear.

Features

- Packing below power threads protects thread lubricants from media and isolates the media from the lubricant for severe service applications
- O-ring dust seal in bonnet protects stem threads from external contamination
- Choice of two non-rotating stem types:
  R-Stem – All metal, blunt stem tip
  K-Stem – PCTFE stem tip
- Non rotating lower stem extends packing and valve life
- 316 stainless steel construction
- Inline and angle patterns
- Wide variety of US Customary and SI ports
- Panel mountable
- 100% factory tested
- Optional color coded handles

Specifications

- **Pressure Rating:**
  6000 psig (414 bar) CWP
- **Temperature Rating:**

PTFE Packing:
-65 °F to 450 °F (-54 °C to 232 °C)

PCTFE:
-65 °F to 350 °F (-54 °C to 177 °C)

Buna-N Rubber:
-30 °F to 250 °F (-34 °C to 121 °C)

Ethylene Propylene Rubber:
-70 °F to 275 °F (-57 °C to 135 °C)

Fluorocarbon Rubber:
-15 °F to 400 °F (-26 °C to 204 °C)

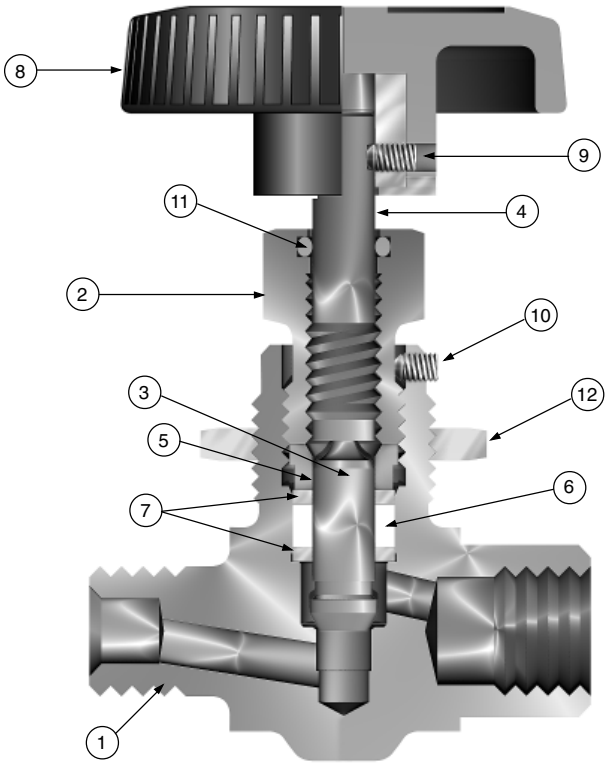
Grafoil®:
-70 °F to 700 °F (-57 °C to 371 °C)

Materials of Construction

Item #	Description	Material
1	Body	ASTM A 182 Type F316
2	Packing Nut	ASTM A 479 Type 316
3	Lower Stem (R-Stem)	ASTM A 276 Type 316
3	Lower Stem (K-Stem)	ASTM A 276 Type 316, with PCTFE
4	Upper Stem	ASTM A 276 Type 316
5	Packing Gland	ASTM A 479 Type 316
6	Packing*	PTFE
7	Packing Washer	Stainless Steel
8	Handle**	Nylon 6/6 with SS insert
9	Handle Screw	Stainless Steel
10	Packing Nut Screw	Stainless Steel
11	Dust Seal	Fluorocarbon Rubber
12	Panel Nut	316 Stainless Steel

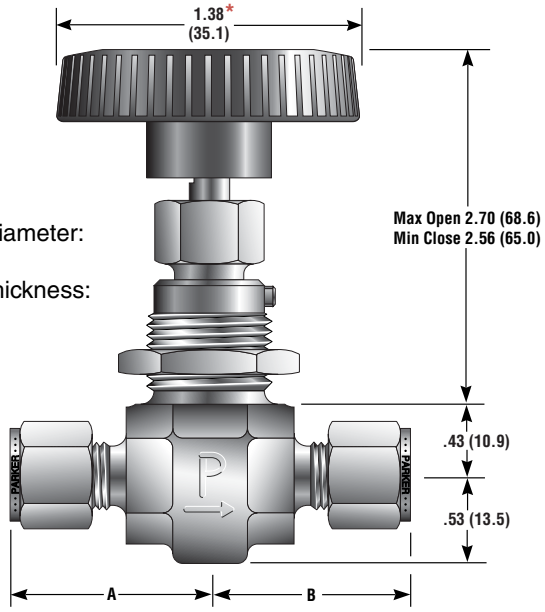
* Optional elastomeric stem seals and Grafoil®packing are available - See How to Order

** Handles for Grafoil®packed valves are aluminum T-bars. Lubrication: Perfluorinated polyether

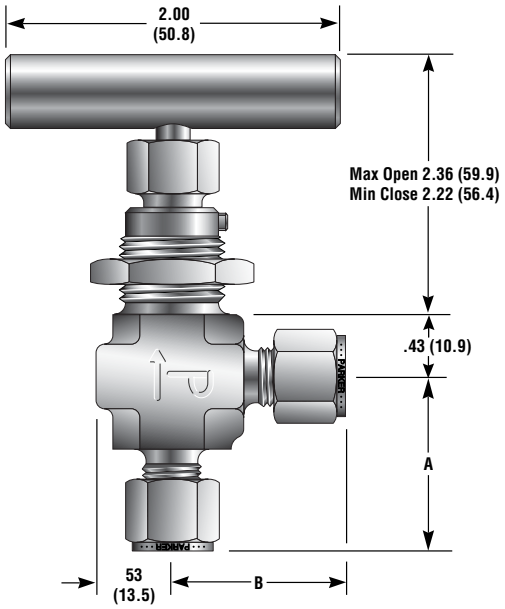


Model Shown: 4M4F-NP6LR-SSP

Panel Hole Diameter:
0.77 (19.6)
Max Panel Thickness:
0.25 (6.4)



Model Shown: 4Z-NP6LK-SSP



Model Shown: 4Z-NP6AR-G-SSP

*** Note:** Handle diameter for R Stem NP6 Series Valves is 1.81 (46.0)

Dimensions / Flow Data

( ) Denotes dimensions in millimeters

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	X_T*	C_v	X_T*	Inch	mm	Inch	mm
4A-NP6LR 4A-NP6LK	4A-NP6AR 4A-NP6AK	1/4" Compression A-LOK®		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.20	30.5	1.20	30.5
4F-NP6LR 4F-NP6LK	4F-NP6AR 4F-NP6AK	1/4" Female NPT		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.00	25.4	1.00	25.4
4M-NP6LR 4M-NP6LK	4M-NP6AR 4M-NP6AK	1/4" Male NPT		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.03	26.2	1.03	26.2
4Z-NP6LR 4Z-NP6LK	4Z-NP6AR 4Z-NP6AK	1/4" Compression CPI™		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.20	30.5	1.20	30.5
6A-NP6LR 6A-NP6LK	6A-NP6AR 6A-NP6AK	3/8" Compression A-LOK®		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.23	31.2	1.23	31.2
6Z-NP6LR 6Z-NP6LK	6Z-NP6AR 6Z-NP6AK	3/8" Compression CPI™		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.23	31.2	1.23	31.2
M6A-NP6LR M6A-NP6LK	M6A-NP6AR M6A-NP6AK	6mm Compression A-LOK®		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.16	29.5	1.16	29.5
M6Z-NP6LR M6Z-NP6LK	M6Z-NP6AR M6Z-NP6AK	6mm Compression CPI™		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.16	29.5	1.16	29.5
M8A-NP6LR M8A-NP6LK	M8A-NP6AR M8A-NP6AK	8mm Compression A-LOK®		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.24	31.5	1.24	31.5
M8Z-NP6LR M8Z-NP6LK	M8Z-NP6AR M8Z-NP6AK	8mm Compression CPI™		Blunt PCTFE	0.177	4.5	0.60 0.51	0.50 0.55	0.67 0.65	0.39 0.52	1.24	31.5	1.24	31.5

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = X_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

How to Order

The correct part number is easily derived from the following number sequence. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example:	4Z	*	-	NP6A	K	-	BN	-	SSP
	①	②		③	④		⑤		⑥
	Inlet Port	Outlet Port		Valve Series	Stem Type		Stem Seal		Body Material

Describes a angle pattern NP6 Series needle valve equipped with 1/4" CPI™ compression inlet and outlet ports, a PCTFE tipped stem, Buna-N seals, and stainless steel construction with panel mounting nut.

Example:	4M	4F	-	NP6L	R	-	SSP
	①	②		③	④	⑤	⑥
	Inlet Port	Outlet Port		Valve Series	Stem Type	Stem Seal	Body Material

Describes a inline pattern NP6 Series needle valve equipped with 1/4" male NPT inlet port, 1/4" female NPT outlet port, a blunt stem type, PTFE stem seal, stainless steel construction with panel mounting nut.

① Inlet Port / ② Outlet Port	③ Valve Series	④ Stem Type	⑤ Stem Seal	⑥ Body Material
4A, 4F, 4M, 4Z, 6A, 6Z, M6A, M6Z, M8A, M8Z	**NP6L** **NP6A**	**R** - Blunt **K** - PCTFE	**Blank -** PTFE **BN-** Buna-N Rubber **EPR-** Ethylene Propylene Rubber **V-** Fluorocarbon Rubber **G** - Grafoil®	**SSP-** Stainless Steel with Panel Nut

How to Order Options

Colored Round Handles – Add the designator corresponding to the correct handle color as a suffix to the part number. Black is standard, **W** - white, **B** - blue, **G** - green, **R** - red, **Y** - yellow. Example: 4A-NP6LK-SS-**G**

Oxygen Cleaning – Add the suffix **-C3** to the end of the part number to receive valves cleaned and assembled for oxygen service in accordance with Parker Specification ES8003. Example: M6A-NP6AK-EPR-SS-**C3**

Sour Gas –To obtain valves suitable for sour gas service in accordance with NACE Standard MR0175, add the suffix **NACE** to the end of the part number. Example: 4M4F-NP6LN-SS-**NACE**

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⚠ WARNING

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The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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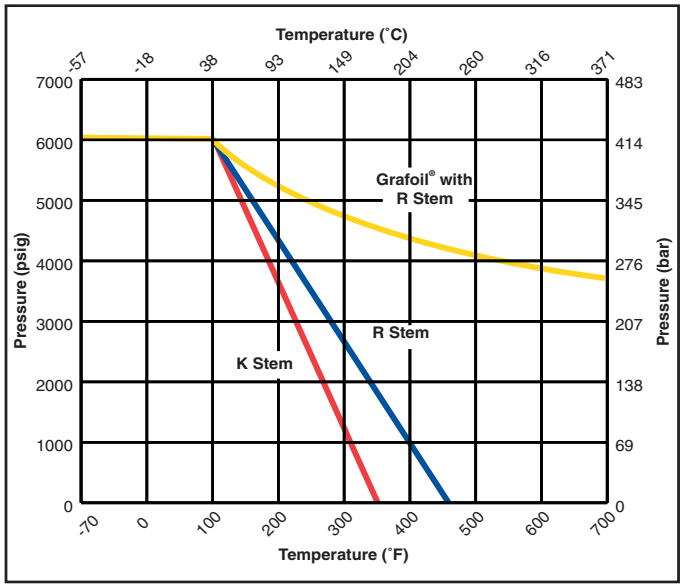
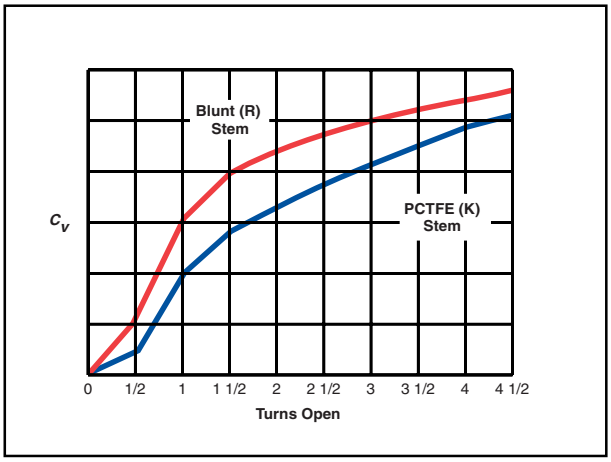
Pressure vs. Temperature



Note: To determine MPa, multiply bar by 0.1

Flow Characteristics



Note: When combining seat and seal materials, the most restrictive temperature rating becomes the limiting factor on temperature range.

Inline Pattern Flow Calculations

C_v = .60 / X_T = .50

Inlet Pressure		Pressure Drop Δp		Water @ 60 ½F (16 ½C)		Air @ 60 ½F (16 ½C)	
psig	bar	psig	bar	gpm	m³/hr	scfm	m³/hr
100	7	1	0.1	0.6	0.1	6.4	10.2
		10	0.7	1.9	0.4	19.0	30.0
		25	1.7	3.0	0.7	27.3	42.1
1000	69	10	0.7	1.9	0.4	59.7	100.9
		100	6.9	6.0	1.4	177.5	299.7
		250	17.2	9.5	2.2	251.1	422.8
3000	207	100	6.9	6.0	1.4	320.2	543.7
		500	34.5	13.4	3.0	651.3	1105.2
		1000	69.0	19.0	4.3	806.5	1367.5
6000	413	500	34.5	13.4	3.0	977.0	1660.8
		1000	69.0	19.0	4.3	1300.6	2210.4
		2000	137.9	26.8	6.1	1610.0	2734.6

C_v = .51 / X_T = .55

Inlet Pressure		Pressure Drop Δp		Water @ 60 ½F (16 ½C)		Air @ 60 ½F (16 ½C)	
psig	bar	psig	bar	gpm	m³/hr	scfm	m³/hr
100	7	1	0.1	0.5	0.1	5.4	8.6
		10	0.7	1.6	0.4	16.3	25.6
		25	1.7	2.6	0.6	23.6	36.4
1000	69	10	0.7	1.6	0.4	50.8	85.8
		100	6.9	5.1	1.2	151.8	256.4
		250	17.2	8.1	1.8	217.2	365.9
3000	207	100	6.9	5.1	1.2	272.8	463.1
		500	34.5	11.4	2.6	559.8	950.1
		1000	69.0	16.1	3.7	703.3	1192.6
6000	413	500	34.5	11.4	2.6	834.8	1419.2
		1000	69.0	16.1	3.7	1118.0	1900.2
		2000	137.9	22.8	5.2	1403.9	2384.8

Angle Pattern Flow Calculations

C_v = .67 / X_T = .39

Inlet Pressure		Pressure Drop Δp		Water @ 60 ½F (16 ½C)		Air @ 60 ½F (16 ½C)	
psig	bar	psig	bar	gpm	m³/hr	scfm	m³/hr
100	7	1	0.1	0.7	0.2	7.1	11.3
		10	0.7	2.1	0.5	20.9	32.8
		25	1.7	3.3	0.8	29.0	44.4
1000	69	10	0.7	2.1	0.5	66.5	112.4
		100	6.9	6.7	1.5	194.3	328.0
		250	17.2	10.6	2.4	264.8	445.5
3000	207	100	6.9	6.7	1.5	355.3	603.3
		500	34.5	15.0	3.4	701.8	1190.6
		1000	69.0	21.2	4.8	828.5	1403.9
6000	413	500	34.5	15.0	3.4	1072.9	1823.7
		1000	69.0	21.2	4.8	1401.2	2381.3
		2000	137.9	30.0	6.8	1653.4	2807.7

C_v = .65 / X_T = .52

Inlet Pressure		Pressure Drop Δp		Water @ 60 ½F (16 ½C)		Air @ 60 ½F (16 ½C)	
psig	bar	psig	bar	gpm	m³/hr	scfm	m³/hr
100	7	1	0.1	0.7	0.1	6.9	11.0
		10	0.7	2.1	0.5	20.7	32.6
		25	1.7	3.3	0.7	29.8	46.0
1000	69	10	0.7	2.1	0.5	64.7	109.3
		100	6.9	6.5	1.5	192.8	325.6
		250	17.2	10.3	2.3	274.0	461.5
3000	207	100	6.9	6.5	1.5	347.2	589.5
		500	34.5	14.5	3.3	708.9	1203.1
		1000	69.0	20.6	4.7	883.3	1497.8
6000	413	500	34.5	14.5	3.3	1060.8	1803.2
		1000	69.0	20.6	4.7	1415.7	2406.2
		2000	137.9	29.1	6.6	1763.3	2995.1

TECNI-AR
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Needle Valves (U Series)

Catalog 4110-U
Revised, August 2004

Introduction

Parker U Series Union Bonnet Valves have been engineered for use at pressures up to 6,000 (414 bar) and temperatures as high as 1,200 °F (649 °C). A non-rotating lower stem helps to extend packing life by removing rotation from the packing area. Stem packing below the threads isolates the thread lubricant from the flow, ensuring adequate lubrication regardless of the media.

Features

- Union bonnet design ensures high integrity seal under severe service applications
- Packing below the power threads protects thread lubricants from media and isolates the lubricants from the media
- Dust seal in the packing nut protects stem threads from external contamination
- Stem swivel above the packing eliminates entrapment area and increases packing life
- Choice of Grafoil® or PTFE packing
- Choice of Regulating or Blunt stem types. Blunt stem type helps combat wire draw which may occur when two phase flow is present (i.e. steam service)
- 316 stainless steel construction
- Wide variety of US Customary and SI ports
- Panel mountable
- 100% factory tested

Specifications

Pressure Rating:
6000 psig (414 bar) CWP

Temperature Rating:
PTFE packing:
-65 °F to 450 °F (-54 °C to 232 °C)
Grafoil® packing:
-65 °F to 700 °F (-54 °C to 371 °C)
Grafoil® packing with HT option:
-65 °F to 1200 °F (-54 °C to 649 °C)

Orifice: .177" to .437" (4.5mm to 11.1mm)

C_v: .53 to 3.55

Pressure Rating and Tubing Selection:

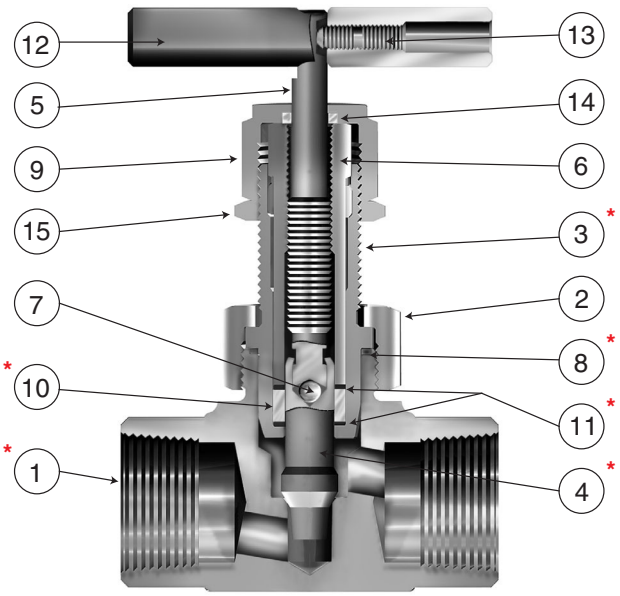
For working pressures of A-LOK® and CPI™ tube connections, please see the Instrument Tubing Selection Guide (Bulletin 4200-TS), found in the Technical Section of the Parker Instrumentation Products Master Binder, or the Parker Instrument Tube Fitting Installation Manual (Bulletin 4200-B4).

For working pressures of valves with external or internal pipe threads, please see Catalog 4260, Instrumentation Pipe Fittings.

Materials of Construction

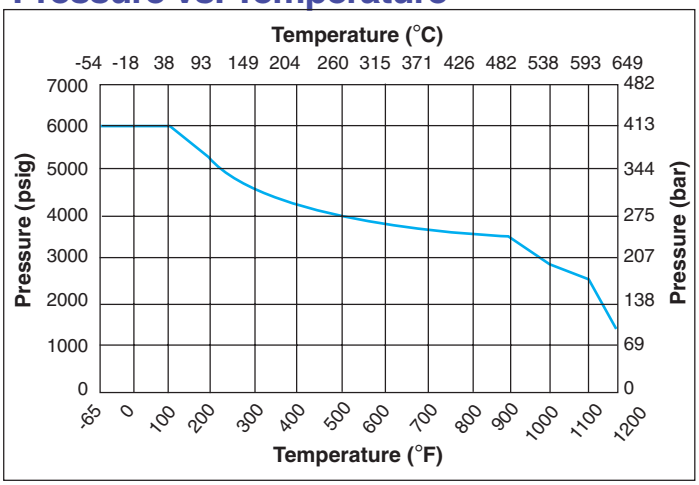
Item #	Description	Material
*1	Body	ASTM A 182, Type F316
2	Bonnet Nut	ASTM A 479, Type 316
*3	Bonnet	ASTM A 479, Type 316
*4	Lower Stem*	ASTM A 564, Type 630
5	Upper Stem	ASTM A 564, Type 630
6	Stem Guide	ASTM A 581, Type 416
7	Ball	440-C Stainless Steel
*8	Bonnet Seal**	Nickel-Chromium-Iron Alloy
9	Packing Nut	ASTM A 479, Type 316
*10	Packing***	Grafoil®
*11	Packing Washer	316 Stainless Steel
12	Handle****	Aluminum
13	Handle Screw	316 Stainless Steel
14	Dust Seal*****	Nylon 6/6
15	Locking Nut	Stainless Steel

* Wetted parts
* Lower Stem material is ASTM A 276 Type 316 with HT option
** Not required on U6 and U12 Series which have metal-to-metal seals
*** Optional PTFE Packing is available
**** Handle material is stainless steel with HT option
***** Dust Seal not available with HT option
Lubrication: Molybdenum disulfide with soft metallic fillers

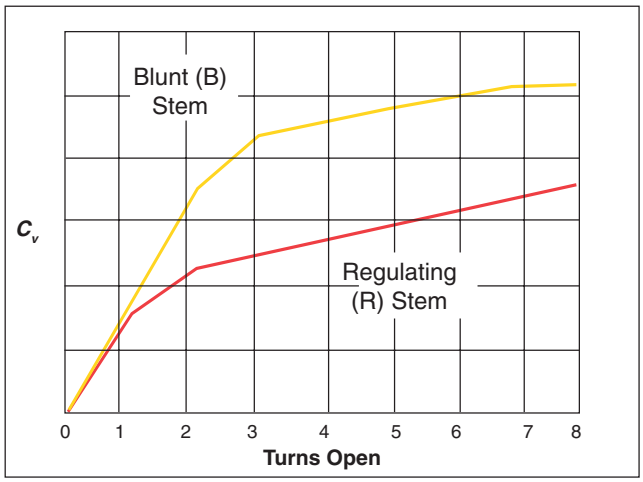


Model Shown: 16F-U16LR-G-SS

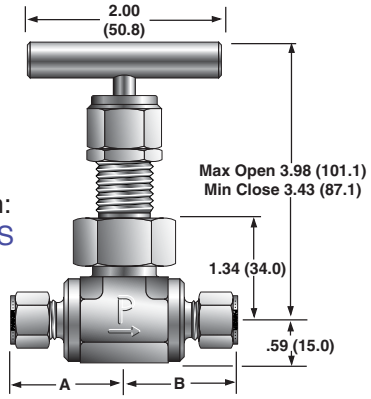
Pressure vs. Temperature



Flow Characteristics

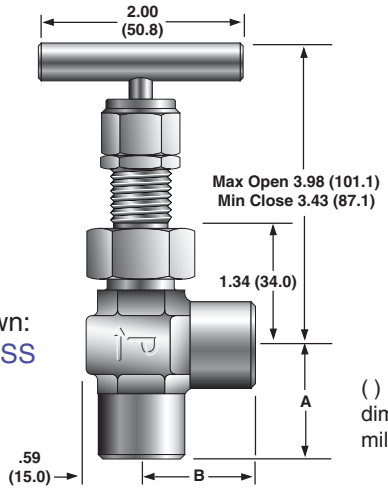


Model Shown:
4Z-U6LB-T-SS



Panel Hole Diameter:
0.65 (16.5)
Max Panel Thickness:
0.42 (10.7)

Model Shown:
4F-U6AR-T-SS



( ) Denotes dimensions in millimeters

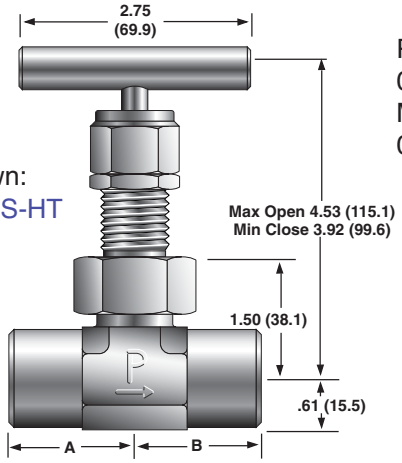
U6 Series Dimensions / Flow Data

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	x_T*	C_v	x_T*	Inch	mm	Inch	mm
2F-U6LR 2F-U6LB	2F-U6AR 2F-U6AB	1/8" Female NPT		Regulating Blunt	0.188	4.8	0.58 0.69	0.83 0.50	0.77 0.91	0.70 0.42	1.00	25.4	1.00	25.4
4A-U6LR 4A-U6LB	4A-U6AR 4A-U6AB	1/4" Compression A-LOK®		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	1.38	35.1	1.38	35.1
4F-U6LR 4F-U6LB	4F-U6AR 4F-U6AB	1/4" Female NPT		Regulating Blunt	0.228	5.8	0.78 0.82	0.95 0.59	1.04 1.09	0.80 0.50	1.03	26.2	1.03	26.2
4M-U6LR 4M-U6LB	4M-U6AR 4M-U6AB	1/4" Male NPT		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	1.09	27.7	1.09	27.7
4W-U6LR 4W-U6LB	4W-U6AR 4W-U6AB	1/4" Socket Weld		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	.91	23.1	.91	23.1
4Z-U6LR 4Z-U6LB	4Z-U6AR 4Z-U6AB	1/4" Compression CPI™		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	1.38	35.1	1.38	35.1
M6A-U6LR M6A-U6LB	M6A-U6AR M6A-U6AB	6mm Compression A-LOK®		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	1.38	35.1	1.38	35.1
M6Z-U6LR M6Z-U6LB	M6Z-U6AR M6Z-U6AB	6mm Compression CPI™		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	1.38	35.1	1.38	35.1
M8A-U6LR M8A-U6LB	M8A-U6AR M8A-U6AB	8mm Compression A-LOK®		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	1.38	35.1	1.38	35.1
M8Z-U6LR M8Z-U6LB	M8Z-U6AR M8Z-U6AB	8mm Compression CPI™		Regulating Blunt	0.177	4.5	0.53 0.65	0.80 0.48	0.70 0.86	0.67 0.40	1.38	35.1	1.38	35.1

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = X_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position

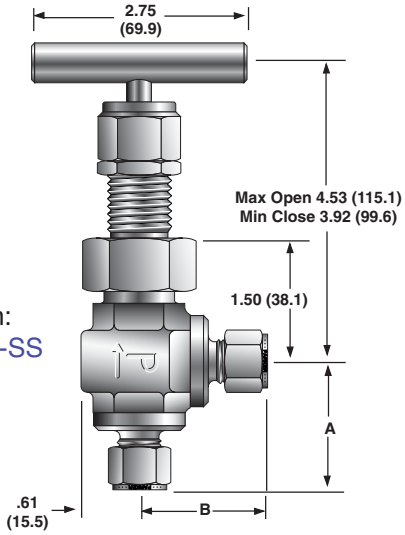
U Series Needle Valves

Model Shown:
6F-U12LB-G-SS-HT



Panel Hole Diameter:
0.83 (21.1)
Max Panel Thickness:
0.61 (15.5)

Model Shown:
M12A-U12AB-T-SS

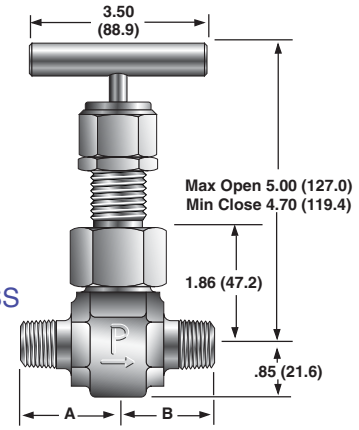


U12 Series Dimensions / Flow Data

( ) Denotes dimensions in millimeters

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	x_T*	C_v	x_T*	Inch	mm	Inch	mm
4A-U12LR 4A-U12LB	4A-U12AR 4A-U12AB	1/4" Compression A-LOK®		Regulating Blunt	0.125	3.2	0.44 0.51	0.57 0.40	0.60 0.68	0.49 0.33	1.39	35.3	1.39	35.3
4F-U12LR 4F-U12LB	4F-U12AR 4F-U12AB	1/4" Female NPT		Regulating Blunt	0.250	6.4	0.94 1.03	0.65 0.60	1.25 1.37	0.55 0.51	1.13	28.7	1.13	28.7
4Z-U12LR 4Z-U12LB	4Z-U12AR 4Z-U12AB	1/4" Compression CPI™		Regulating Blunt	0.125	3.2	0.44 0.51	0.57 0.40	0.60 0.68	0.49 0.33	1.39	35.3	1.39	35.3
6A-U12LR 6A-U12LB	6A-U12AR 6A-U12AB	3/8" Compression A-LOK®		Regulating Blunt	0.187	4.7	0.69 0.77	0.61 0.50	0.92 1.02	0.52 0.42	1.60	40.6	1.60	40.6
6F-U12LR 6F-U12LB	6F-U12AR 6F-U12AB	3/8" Female NPT		Regulating Blunt	0.312	7.9	1.19 1.31	0.78 0.80	1.58 1.74	0.66 0.68	1.30	33.0	1.30	33.0
6W-U12LR 6W-U12LB	6W-U12AR 6W-U12AB	3/8" Tube Socket Weld		Regulating Blunt	0.228	5.8	0.85 0.94	0.64 0.57	1.13 1.25	0.54 0.48	1.13	28.7	1.13	28.7
6Z-U12LR 6Z-U12LB	6Z-U12AR 6Z-U12AB	3/8" Compression CPI™		Regulating Blunt	0.187	4.7	0.69 0.77	0.61 0.50	0.92 1.02	0.52 0.42	1.60	40.6	1.60	40.6
8A-U12LR 8A-U12LB	8A-U12AR 8A-U12AB	1/2" Compression A-LOK®		Regulating Blunt	0.250	6.4	0.94 1.03	0.65 0.60	1.25 1.37	0.55 0.51	1.49	37.8	1.49	37.8
8F-U12LR 8F-U12LB	8F-U12AR 8F-U12AB	1/2" Female NPT		Regulating Blunt	0.312	7.9	1.19 1.31	0.78 0.80	1.58 1.74	0.66 0.68	1.50	38.1	1.50	38.1
8W-U12LR 8W-U12LB	8W-U12AR 8W-U12AB	1/2" Tube Socket Weld		Regulating Blunt	0.312	7.9	1.19 1.31	0.78 0.80	1.58 1.74	0.66 0.68	1.25	31.8	1.25	31.8
8Z-U12LR 8Z-U12LB	8Z-U12AR 8Z-U12AB	1/2" Compression CPI™		Regulating Blunt	0.250	6.4	0.94 1.03	0.65 0.60	1.25 1.37	0.55 0.51	1.49	37.8	1.49	37.8
M10A-U12LR M10A-U12LB	M10A-U12AR M10A-U12AB	10mm Compression A-LOK®		Regulating Blunt	0.250	6.4	0.94 1.03	0.65 0.60	1.25 1.37	0.55 0.51	1.53	38.9	1.53	38.9
M10Z-U12LR M10Z-U12LB	M10Z-U12AR M10Z-U12AB	10mm Compression CPI™		Regulating Blunt	0.250	6.4	0.94 1.03	0.65 0.60	1.25 1.37	0.55 0.51	1.53	38.9	1.53	38.9
M12A-U12LR M12A-U12LB	M12A-U12AR M12A-U12AB	12mm Compression A-LOK®		Regulating Blunt	0.312	7.9	1.19 1.31	0.78 0.80	1.58 1.74	0.66 0.68	1.70	43.2	1.70	43.2
M12Z-U12LR M12Z-U12LB	M12Z-U12AR M12Z-U12AB	12mm Compression CPI™		Regulating Blunt	0.312	7.9	1.19 1.31	0.78 0.80	1.58 1.74	0.66 0.68	1.70	43.2	1.70	43.2
M14A-U12LR M14A-U12LB	M14A-U12AR M14A-U12AB	14mm Compression A-LOK®		Regulating Blunt	0.312	7.9	1.19 1.31	0.78 0.80	1.58 1.74	0.66 0.68	1.70	43.2	1.70	43.2
M14Z-U12LR M14Z-U12LB	M14Z-U12AR M14Z-U12AB	14mm Compression CPI™		Regulating Blunt	0.312	7.9	1.19 1.31	0.78 0.80	1.58 1.74	0.66 0.68	1.70	43.2	1.70	43.2

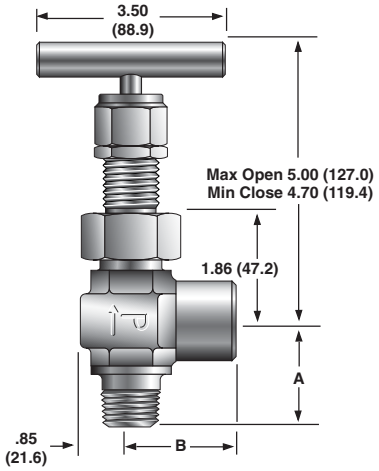
* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position



Model Shown:
16M-U16LR-G-SS

Panel Hole Diameter:
1.02 (25.9)
Max Panel Thickness:
0.62 (15.7)

( ) Denotes dimensions in millimeters



Model Shown:
16M16F-U16AB-T-SS

U16 Series Dimensions / Flow Data

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
					Orifice		Inline		Angle		A†		B†	
Inline	Angle	Inlet (Port 1)	Outlet (Port 2)	Type	Inch	mm	C_v	x_T*	C_v	x_T*	Inch	mm	Inch	mm
8A-U16LR 8A-U16LB	8A-U16AR 8A-U16AB	1/2" Compression A-LOK®		Regulating Blunt	0.394	10.0	1.59 1.90	0.73 0.95	2.11 2.53	0.62 0.81	1.97	50.0	1.97	50.0
8F-U16LR 8F-U16LB	8F-U16AR 8F-U16AB	1/2" Female NPT		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.56	39.6	1.56	39.6
8M-U16LR 8M-U16LB	8M-U16AR 8M-U16AB	1/2" Male NPT		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.92	48.8	1.92	48.8
8PSW-U16LR 8PSW-U16LB	8PSW-U16AR 8PSW-U16AB	1/2" Pipe Socket Weld		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.56	39.6	1.56	39.6
8W-U16LR 8W-U16LB	8W-U16AR 8W-U16AB	1/2" Tube Socket Weld		Regulating Blunt	0.394	10.0	1.59 1.90	0.73 0.95	2.11 2.53	0.62 0.81	1.69	42.9	1.69	42.9
8Z-U16LR 8Z-U16LB	8Z-U16AR 8Z-U16AB	1/2" Compression CPI™		Regulating Blunt	0.394	10.0	1.59 1.90	0.73 0.95	2.11 2.53	0.62 0.81	1.97	50.0	1.97	50.0
12A-U16LR 12A-U16LB	12A-U16AR 12A-U16AB	3/4" Compression A-LOK®		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0
12F-U16LR 12F-U16LB	12F-U16AR 12F-U16AB	3/4" Female NPT		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.63	41.4	1.63	41.4
12M-U16LR 12M-U16LB	12M-U16AR 12M-U16AB	3/4" Male NPT		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.63	41.4	1.63	41.4
12PSW-U16LR 12PSW-U16LB	12PSW-U16AR 12PSW-U16AB	3/4" Pipe Socket Weld		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.56	39.6	1.56	39.6
12W-U16LR 12W-U16LB	12W-U16AR 12W-U16AB	3/4" Tube Socket Weld		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.56	39.6	1.56	39.6
12Z-U16LR 12Z-U16LB	12Z-U16AR 12Z-U16AB	3/4" Compression CPI™		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0
16A-U16LR 16A-U16LB	16A-U16AR 16A-U16AB	1" Compression A-LOK®		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0
16F-U16LR 16F-U16LB	16F-U16AR 16F-U16AB	1" Female NPT		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.81	46.0	1.81	46.0
16M-U16LR 16M-U16LB	16M-U16AR 16M-U16AB	1" Male NPT		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.81	46.0	1.81	46.0
16Z-U16LR 16Z-U16LB	16Z-U16AR 16Z-U16AB	1" Compression CPI™		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0
M12A-U16LR M12A-U16LB	M12A-U16AR M12A-U16AB	12mm Compression A-LOK®		Regulating Blunt	0.394	10.0	1.59 1.90	0.73 0.95	2.11 2.53	0.62 0.81	1.97	50.0	1.97	50.0
M12Z-U16LR M12Z-U16LB	M12Z-U16AR M12Z-U16AB	12mm Compression CPI™		Regulating Blunt	0.394	10.0	1.59 1.90	0.73 0.95	2.11 2.53	0.62 0.81	1.97	50.0	1.97	50.0
M20A-U16LR M20A-U16LB	M20A-U16AR M20A-U16AB	20mm Compression A-LOK®		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0
M20Z-U16LR M20Z-U16LB	M20Z-U16AR M20Z-U16AB	20mm Compression CPI™		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0
M25A-U16LR M25A-U16LB	M25A-U16AR M25A-U16AB	25mm Compression A-LOK®		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0
M25Z-U16LR M25Z-U16LB	M25Z-U16AR M25Z-U16AB	25mm Compression CPI™		Regulating Blunt	0.437	11.1	1.82 2.67	0.72 0.80	2.42 3.55	0.61 0.68	1.97	50.0	1.97	50.0

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position

How to Order

The correct part number is easily derived from the following number sequence. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example: 4Z (1) Inlet Port * (2) Outlet Port - U6A (3) Valve Series R (4) Stem Type - G (5) Packing - SS (6) Body Material

Describes an angle pattern U6 Series needle valve equipped with 1/4" CPI™ compression inlet and outlet ports, a regulating stem type, Grafoil® packing, stainless steel construction.

(1) Inlet Port	(2) Outlet Port	(3) Valve Series	(4) Stem Type	(5) Packing	(6) Body Material
2F, 4A, 4F, 4M, 4W, 4Z, M6A, M6Z, M8A, M8Z		U6A U6L	B - Blunt R - Regulating	T - PTFE G - Grafoil®	SS- Stainless Steel
4A, 4F, 4Z, 6A, 6F, 6W, 6Z, 8A, 8F, 8W, 8Z, 10A, 10Z, 12A, 12Z, M10A, M10Z, M12A, M12Z, M14A, M14Z		U12A U12L			
8A, 8F, 8M, 8PSW, 8W, 8Z, 12A, 12F, 12M, 12PSW, 12W, 12Z, 16A, 16F, 16M, 16Z, M12A, M12Z, M20A, M20Z, M25A, M25Z		U16A U16L			

How to Order Options

High Temperature - Add the suffix **-HT** to the end of the part number to receive valves with a 316 stainless steel lower stem and stainless steel handle. Example: 4M-U6LB-G-SS**-HT**

Oxygen Cleaning - Add the suffix **-C3** to the end of the part number to receive valves cleaned and assembled for oxygen service in accordance with Parker Specification ES8003. Example: 8A-U12LR-T-SS**-C3**

Stainless Steel Bar Handle - To obtain valves with stainless steel bar handle, add the suffix **-ST** to the end of the part number. Example: 12Z-U16AB-T-SS-**ST**

How to Order Maintenance Kits

Stainless Steel T-Bar Handles with Handle Screw - U6: V4-BAR-HANDLE-SS; U12:U12-BAR-HANDLE-SS; U16: U16-BAR-HANDLE-SS

Aluminum T-Bar Handles with Handle Screw - U6: V4-BAR-HANDLE-AL; U12:U12-BAR-HANDLE-AL; U16: U16-BAR-HANDLE-AL

Panel Mounting Nuts - U6: U6-LOCKNUT; U12: U12-LOCKNUT; U16: U16-LOCKNUT

PTFE Packing Kits - Consists of One PTFE Packing; One Dust Seal; Maintenance Instructions. Kit-Valve Series-T. Example: **KIT-U12-T**

Grafoil® Packing Kits - Consists of One Grafoil® Packing; One Dust Seal; Maintenance Instructions. Kit-Valve Series-G. Example: **KIT-U16-G**

Grafoil® is a registered trademark of UCAR Carbon Technology Corporation

⚠ WARNING

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3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that items sold hereunder shall be free from defects in material or workmanship. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and not withstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

11/98-P

Parker Instrumentation

TECNI-AR
Seu caminho
Para automação

Metering Valves (N Series)

Catalog 4170-N
Revised, July 2002

NS Series Metering Valves

Introduction

The Parker NS Series of metering valves are designed to provide accurate and stable control of flow rates in analytical, instrumentation, and research applications. A variety of connection sizes, body patterns and materials of construction provide considerable application versatility. For higher flow rates, refer to the NM and NL Series of metering valves.

Features

- Precisely tapered valve stem accurately controls flow
- Brass or 316 SS forged body construction
- Panel or in-line mounting
- Positive handle stop prevents overtightening
- Angle or in-line patterns
- Valve stem threads not in contact with process fluid
- 100% function tested
- Optional stem seals and handles

Specifications

- Pressure Rating at all temperatures:
  2000 psig (138 bar) CWP
- Flow Data:
  Orifice: 0.03" (0.76mm)
  In-line pattern: $C_v = 0.039$; $X_T = 0.64$
  Angle pattern: $C_v = 0.042$; $X_T = 0.53$
- Stem Taper: 1°
- Turns to open: 13 +/- 1

NS Materials of Construction

Item #	Description	Stainless Steel	Brass
1	Body	ASTM A 182 Type F316	ASTM B 283 Alloy C37700 (Nickel Plated)
2	Bonnet	ASTM A 479 Type 316	ASTM B 16 Alloy C36000 (Nickel Plated)
3	Stem	ASTM A 276 Type 316	ASTM A 276 Type 316
4	Handle*	ASTM A 582 Type 303	ASTM A 582 Type 303
5	Panel Nut	ASTM B 16 (Nickel Plated)	ASTM B 16 (Nickel Plated)
6	Sealing Ring*	Fluorocarbon Rubber	Fluorocarbon Rubber
7	Stem Seals*	Fluorocarbon Rubber	Fluorocarbon Rubber
8	Handle Set Screw**	Stainless Steel	Stainless Steel
9	Handle Lock Screw**	Stainless Steel	Stainless Steel

* Optional Handles, Sealing Ring and Stem Seal materials are available - See How to Order

** K, KS, and F Handles use 18-8 stainless steel screws; V Handles use alloy steel screws; Lock Screws are not used on F and V Handles
Lubrication: Perfluorinated polyether

Valve / Seal Temperature Ratings

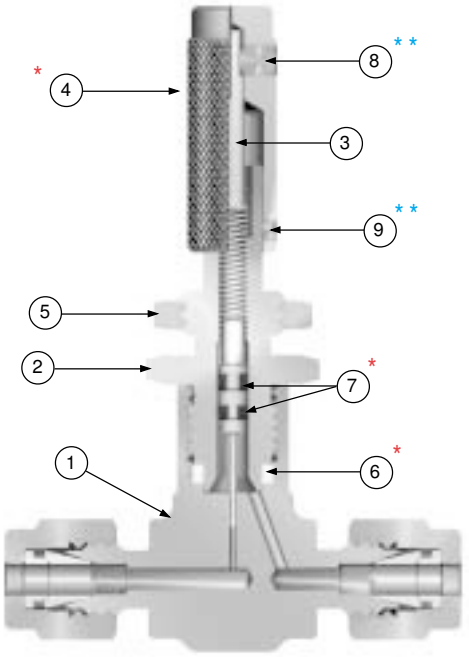
Buna-N Rubber:
-50 °F to 300 °F (-46 °C to 149 °C)

Ethylene Propylene Rubber:
-50 °F to 300 °F (-46 °C to 149 °C)

Neoprene Rubber:
-50 °F to 300 °F (-46 °C to 149 °C)

Fluorocarbon Rubber:
-25 °F to 400 °F (-32 °C to 204 °C)

Highly Fluorinated Fluorocarbon Rubber:
-25 °F to 200 °F (-32 °C to 93 °C)



Model Shown: 2A-NSL-NE-SS-K

Note: These products are not intended for use as shut-off valves. For metering valves with shut-off capabilities, please refer to Catalog 4170-HR.

Flow tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.

NS Dimensions

Basic Part Number	End Connections (Inlet) Port 1	End Connections (Outlet) Port 2	Dimensions A† Inch	A† mm	B† Inch	B† mm	C Inch	C mm	D Inch	D mm
1A-NSL	1/16" Compression A-LOK®		0.78	19.8	0.78	19.8	0.31	7.9	0.94	23.9
1A-NSA			0.82	20.8	0.82	20.8	0.31	7.9	0.94	23.9
1Z-NSL	1/16" Compression CPI™		0.78	19.8	0.78	19.8	0.31	7.9	0.94	23.9
1Z-NSA			0.82	20.8	0.82	20.8	0.31	7.9	0.94	23.9
2A-NSL	1/8" Compression A-LOK®		0.95	24.1	0.95	24.1	0.31	7.9	0.94	23.9
2A-NSA			1.01	25.7	1.01	25.7	0.31	7.9	0.94	23.9
2M-NSL	1/8" Male NPT		0.88	22.4	0.88	22.4	0.31	7.9	0.94	23.9
2M-NSA			0.88	22.4	0.88	22.4	0.31	7.9	0.94	23.9
2Z-NSL	1/8" Compression CPI™		0.95	24.1	0.95	24.1	0.31	7.9	0.94	23.9
2Z-NSA			1.01	25.7	1.01	25.7	0.31	7.9	0.94	23.9
4A-NSL	1/4" Compression A-LOK®		1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9
4A-NSA			1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9
4V-NSL	1/4" VacuSeal		1.03	26.2	1.03	26.2	0.53	13.5	0.94	23.9
4Z-NSL	1/4" Compression CPI™		1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9
4Z-NSA			1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9
M3A-NSL	3mm Compression A-LOK®		0.94	23.9	0.94	23.9	0.31	7.9	0.94	23.9
M3A-NSA			1.00	25.4	1.00	25.4	0.31	7.9	0.94	23.9
M3Z-NSL	3mm Compression CPI™		0.94	23.9	0.94	23.9	0.31	7.9	0.94	23.9
M3Z-NSA			1.00	25.4	1.00	25.4	0.31	7.9	0.94	23.9
M6A-NSL	6mm Compression A-LOK®		1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9
M6A-NSA			1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9
M6Z-NSL	6mm Compression CPI™		1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9
M6Z-NSA			1.02	25.9	1.02	25.9	0.31	7.9	0.94	23.9

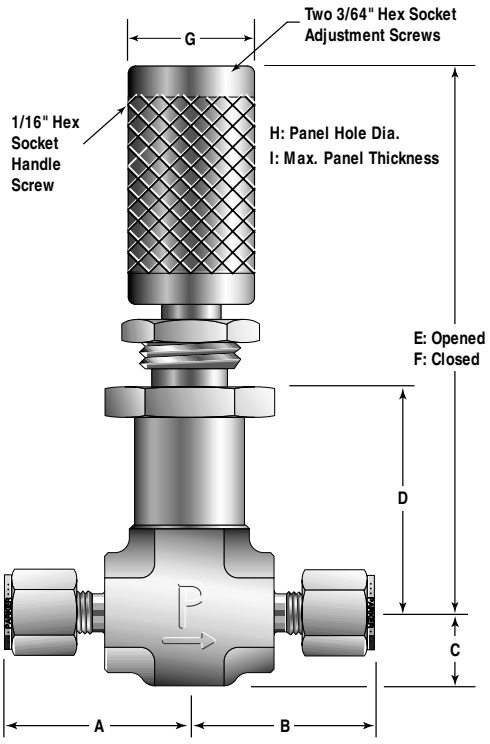
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

Note:

For K & KS Handles:
E = 2.50 (63.5mm), F = 2.27 (57.7mm), G = 0.37 (9.4mm), H = 0.46 (11.7mm), I = 0.16 (4.1mm)

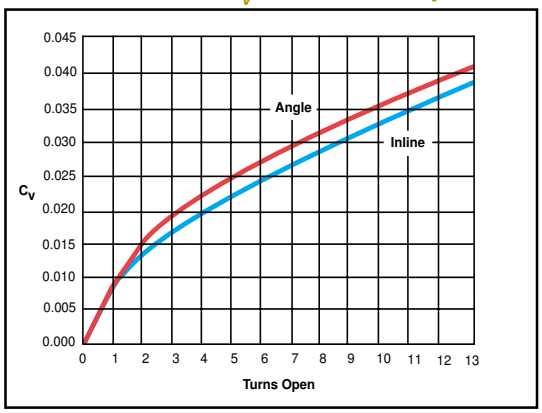
For V Handles:
E = 2.97 (75.4mm), F = 2.74 (69.6mm), G = 0.84 (21.3mm), H = 0.46 (11.7mm), I = 0.16 (4.1mm)

For F Handles:
E = 2.97 (75.4mm), F = 2.74 (69.6mm), G = 0.84 (21.3mm), H = 0.46 (11.7mm), I = 0.16 (4.1mm)

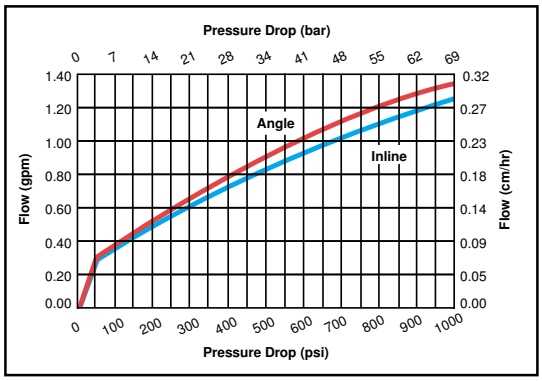


Model Shown: 2A-NSL-BN-SS-F

NS Series - C_v vs. Turns Open



NS Series - Water Flow Data



NM & NL Series Metering Valves

Introduction

The Parker NM and NL Series of metering valves provide higher flow rates than the NS Series of metering valves and retain most of the features found in the NS Series.

Features

- Precisely tapered valve stem accurately controls flow
- Brass or 316 SS forged body construction
- Panel or in-line mounting
- Angle or in-line patterns
- Valve stem threads not in contact with process fluid
- 100% function tested
- Optional stem seals and handles

Specifications

- Pressure Rating at all temperatures:
  1000 psig (69 bar) CWP

NM Specifications

- Flow Data:
  Orifice: 0.06" (1.5mm)
  In-line pattern: $C_v = 0.055$; $X_T = 0.41$
  Angle pattern: $C_v = 0.057$; $X_T = 0.38$
- Stem Taper: 3°
- Turns to open: 9 +/- 1

NL Specifications

- Flow Data:
  Orifice: 0.13" (3.3mm)
  In-line pattern: $C_v = 0.207$; $X_T = 0.71$
  Angle pattern: $C_v = 0.299$; $X_T = 0.60$
- Stem Taper: 5°
- Turns to open: 10 +/- 1

NM & NL Materials of Construction

Item #	Description	Stainless Steel	Brass
1	Body	ASTM A 182 Type F316	ASTM B 283 Alloy C37700 (Nickel Plated)
2	Bonnet	ASTM A 479 Type 316	ASTM B 16 Alloy C36000 (Nickel Plated)
3	Stem	ASTM A 276 Type 316	ASTM A 276 Type 316
4	Handle*	Stainless Steel	Stainless Steel
5	Panel Nut	ASTM B 16 (Nickel Plated)	ASTM B 16 (Nickel Plated)
6	Sealing Ring	PTFE	PTFE
7	Stem Seal*	Fluorocarbon Rubber	Fluorocarbon Rubber
8	Handle Set Screw**	Stainless Steel	Stainless Steel
9	Handle Lock Screw**	Stainless Steel	Stainless Steel

* Optional Handles and Stem Seal materials are available - See How to Order

** K, and KS Handles use 18-8 stainless steel screws;
V Handles use alloy steel screws; Lock Screws are not used on V Handles
Lubrication: Perfluorinated polyether

Valve / Seal Temperature Ratings

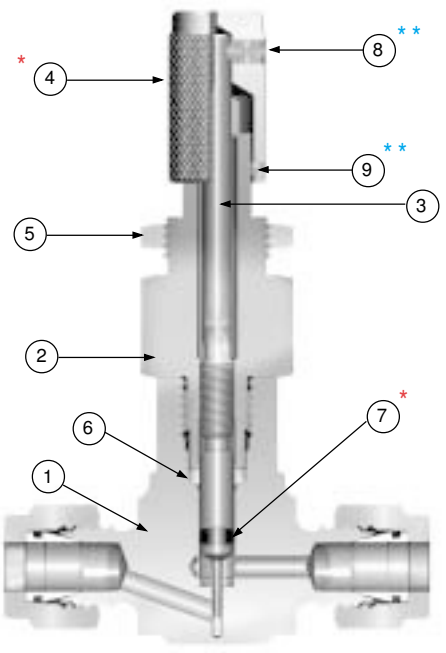
Buna-N Rubber:
-50 °F to 300 °F (-46 °C to 149 °C)

Ethylene Propylene Rubber:
-50 °F to 300 °F (-46 °C to 149 °C)

Neoprene Rubber:
-50 °F to 300 °F (-46 °C to 149 °C)

Fluorocarbon Rubber:
-25 °F to 400 °F (-32 °C to 204 °C)

Highly Fluorinated Fluorocarbon Rubber:
-25 °F to 200 °F (-32 °C to 93 °C)



Model Shown: 4A-NML-KZ-SS-K

Note: These products are not intended for use as shut-off valves. For metering valves with shut-off capabilities, please refer to Catalog 4170-HR.

Flow tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.

NM Dimensions

Basic Part Number	End Connections (Inlet) Port 1	End Connections (Outlet) Port 2	Dimensions A† Inch	A† mm	B† Inch	B† mm	C Inch	C mm	D Inch	D mm
2A-NML	1/8" Compression A-LOK®		1.03	26.2	1.03	26.2	0.41	10.4	1.56	39.6
2A-NMA			1.03	26.2	1.03	26.2	0.41	10.4	1.07	27.2
2F-NML	1/8" Female NPT		0.93	23.6	0.93	23.6	0.41	10.4	1.56	39.6
2F-NMA			0.93	23.6	0.93	23.6	0.41	10.4	1.07	27.2
2Z-NML	1/8" Compression CPI™		1.03	26.2	1.03	26.2	0.41	10.4	1.56	39.6
2Z-NMA			1.03	26.2	1.03	26.2	0.41	10.4	1.07	27.2
4A-NML	1/4" Compression A-LOK®		1.11	28.2	1.11	28.2	0.41	10.4	1.56	39.6
4A-NMA			1.11	28.2	1.11	28.2	0.41	10.4	1.07	27.2
4M-NML	1/4" Male NPT		0.93	23.6	0.93	23.6	0.41	10.4	1.56	39.6
4M-NMA			0.93	23.6	0.93	23.6	0.41	10.4	1.07	27.2
4V-NML	1/4" VacuSeal		1.03	26.2	1.03	26.2	0.53	13.5	1.56	39.6
4Z-NML	1/4" Compression CPI™		1.11	28.2	1.11	28.2	0.41	10.4	1.56	39.6
4Z-NMA			1.11	28.2	1.11	28.2	0.41	10.4	1.07	27.2
M3A-NML	3mm Compression A-LOK®		1.00	25.4	1.00	25.4	0.41	10.4	1.56	39.6
M3A-NMA			1.00	25.4	1.00	25.4	0.41	10.4	1.07	27.2
M3Z-NML	3mm Compression CPI™		1.00	25.4	1.00	25.4	0.41	10.4	1.56	39.6
M3Z-NMA			1.00	25.4	1.00	25.4	0.41	10.4	1.07	27.2
M6A-NML	6mm Compression A-LOK®		1.09	27.7	1.09	27.7	0.41	10.4	1.56	39.6
M6A-NMA			1.09	27.7	1.09	27.7	0.41	10.4	1.07	27.2
M6Z-NML	6mm Compression CPI™		1.09	27.7	1.09	27.7	0.41	10.4	1.56	39.6
M6Z-NMA			1.09	27.7	1.09	27.7	0.41	10.4	1.07	27.2

† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

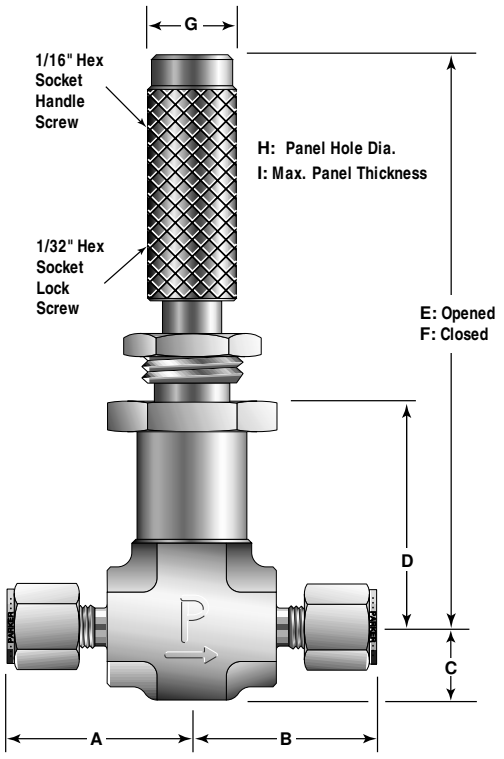
Note:

For K & KS Handles on in-line pattern valves:
E = 3.22 (81.8mm), F = 2.99 (75.9mm), G = 0.50 (12.7mm), H = 0.58 (14.7mm), I = 0.19 (4.8mm)

For K & KS Handles on angle pattern valves:
E = 2.82 (71.6mm), F = 2.59 (65.8mm), G = 0.50 (12.7mm), H = 0.58 (14.7mm), I = 0.27 (6.9mm)

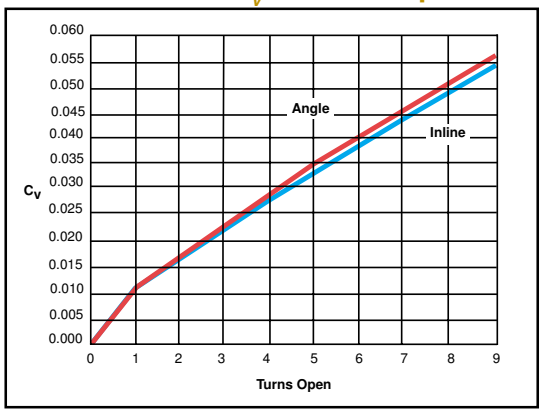
For V Handles on in-line pattern valves:
E = 3.63 (92.2mm), F = 3.40 (86.4mm), G = 0.84 (21.3mm), H = 0.58 (14.7mm), I = 0.19 (4.8mm)

For V Handles on angle pattern valves:
E = 3.23 (82.0mm), F = 3.00 (76.2mm), G = 0.84 (21.3mm), H = 0.58 (14.7mm), I = 0.27 (6.9mm)

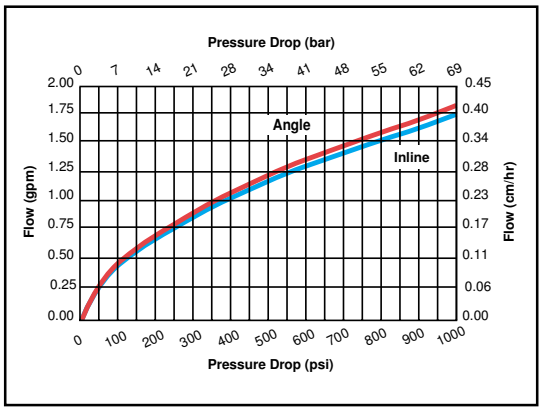


Model Shown: M3A-NML-V-SS-K

NM Series - C_v vs. Turns Open



NM Series - Water Flow Data



NL Dimensions

Basic Part Number	End Connections (Inlet) Port 1	End Connections (Outlet) Port 2	Dimensions A† Inch	A† mm	B† Inch	B† mm	C Inch	C mm	D Inch	D mm
2F-NLL	1/8" Female NPT		0.93	23.6	0.93	23.6	0.41	10.4	1.56	39.6
2F-NLA			0.93	23.6	0.93	23.6	0.41	10.4	1.07	27.2
4A-NLL	1/4" Compression A-LOK®		1.16	29.5	1.16	29.5	0.41	10.4	1.56	39.6
4A-NLA			1.16	29.5	1.16	29.5	0.41	10.4	1.07	27.2
4M-NLL	1/4" Male NPT		0.93	23.6	0.93	23.6	0.41	10.4	1.56	39.6
4M-NLA			0.93	23.6	0.93	23.6	0.41	10.4	1.07	27.2
4V-NLL	1/4" VacuSeal		1.03	26.2	1.03	26.2	0.53	13.5	1.56	39.6
4Z-NLL	1/4" Compression CPI™		1.16	29.5	1.16	29.5	0.41	10.4	1.56	39.6
4Z-NLA			1.16	29.5	1.16	29.5	0.41	10.4	1.07	27.2
6A-NLL	3/8" Compression A-LOK®		1.24	31.5	1.24	31.5	0.41	10.4	1.56	39.6
6Z-NLL	3/8" Compression CPI™		1.24	31.5	1.24	31.5	0.41	10.4	1.56	39.6
M6A-NLL	6mm Compression A-LOK®		1.12	28.4	1.12	28.4	0.41	10.4	1.56	39.6
M6A-NLA			1.15	29.2	1.15	29.2	0.41	10.4	1.07	27.2
M6Z-NLL	6mm Compression CPI™		1.12	28.4	1.12	28.4	0.41	10.4	1.56	39.6
M6Z-NLA			1.15	29.2	1.15	29.2	0.41	10.4	1.07	27.2

† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

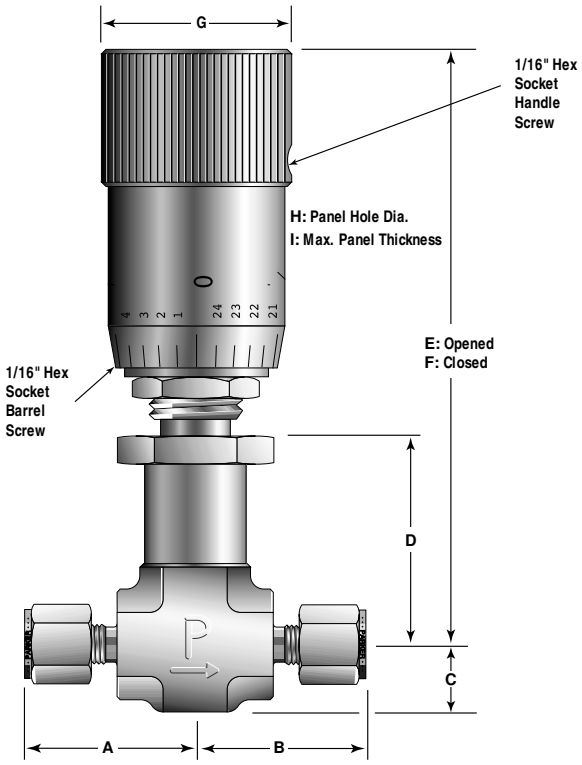
Note:

For K & KS Handles on in-line pattern valves:
E = 2.92 (74.2mm), F = 2.67 (67.8mm), G = 0.50 (12.7mm), H = 0.58 (14.7mm), I = 0.19 (4.8mm)

For K & KS Handles on angle pattern valves:
E = 2.83 (71.9mm), F = 2.58 (65.8mm), G = 0.50 (12.7mm), H = 0.58 (14.7mm), I = 0.27 (6.9mm)

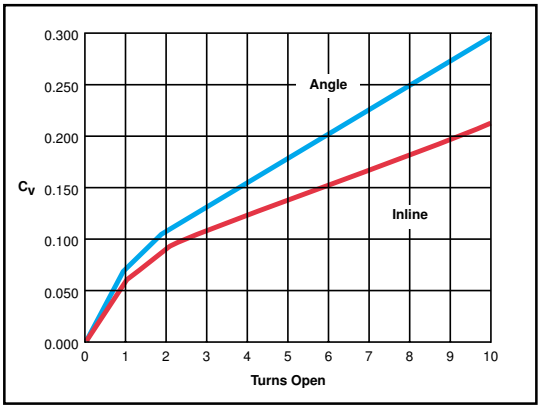
For V Handles on in-line pattern valves:
E = 3.33 (84.6mm), F = 3.08 (78.2mm), G = 0.84 (21.3mm), H = 0.58 (14.7mm), I = 0.19 (4.8mm)

For V Handles on angle pattern valves:
E = 3.24 (82.3mm), F = 2.99 (75.9mm), G = 0.84 (21.3mm), H = 0.58 (14.7mm), I = 0.27 (6.9mm)

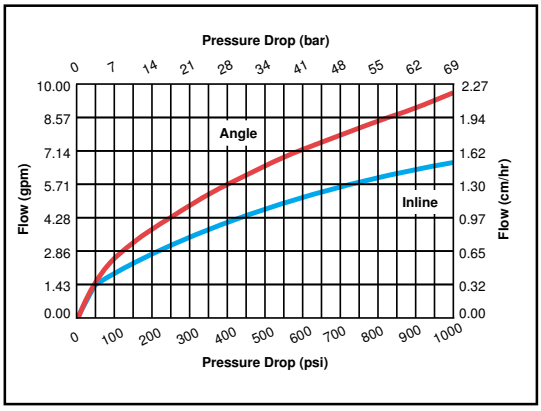


Model Shown: 6A-NLL-EPR-B-V

NL Series - C_v vs. Turns Open



NL Series - Water Flow Data



How to Order

The correct part number is easily derived from the following number sequence. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

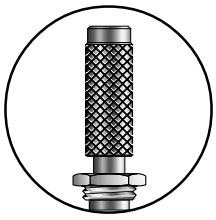
Example: 4Z (1) Inlet Port * (2) Outlet Port - NLL (3) Valve Series - V (4) Seal Material - SS (5) Body Material - V (6) Handle Type

(1) Inlet Port	(2) Outlet Port	(3) Valve Series	(4) Seal Material	(5) Body Material	(6) Handle Type
1A, 1Z, 2A, 2M, 2Z, 4A, 4V, 4Z, M3A, M3Z, M6A, M6Z		NSA NSL	**BN** - Buna-N Rubber **EPR** - Ethylene Propylene Rubber **NE** - Neoprene Rubber **V** - Fluorocarbon Rubber **KZ** - Highly Fluorinated Fluorocarbon Rubber	**SS**- Stainless Steel **B** - Brass	**K** - Knurled **KS** - Knurled with Slot **V** - Vernier **F** - Precision Adjustment*
2A, 2F, 2Z, 4A, 4M, 4V, 4Z, M3A, M3Z, M6A, M6Z		NMA NML			
2F, 4A, 4M, 4V, 4Z, 6A, 6Z, M6A, M6Z		NLA NLL			

* F Handle available only on NS Series.

Optional Handles

Knurled (K) and Knurled with Slot (KS)

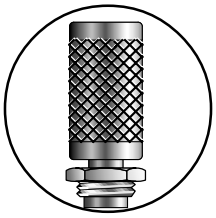


- Knurled K Handle for ease of actuation
- Knurled with Slot (KS) adds a screw-driver slot across the top for locations where handle access is difficult

Vernier (V)

- Precision graduated aluminum alloy permits repeatable flow settings
- Resolution to 1/25th turn

Precision Adjustment (F)



- Adjustable torque handle for precise positioning
- Knurled metal with two top mounted adjustment screws
- NS Series only

How to Order Options

Oxygen Cleaning – Add the suffix **-C3** to the end of the part number to receive valves cleaned and assembled for oxygen service in accordance with Parker Specification ES8003. **Example:** 4A-NMA-EPR-SS-V-**C3**

Parker Instrumentation

TECNI-AR
Seu caminho
Para automação

Metering Valves (HR Series)

Catalog 4170-HR
Revised, August 2002

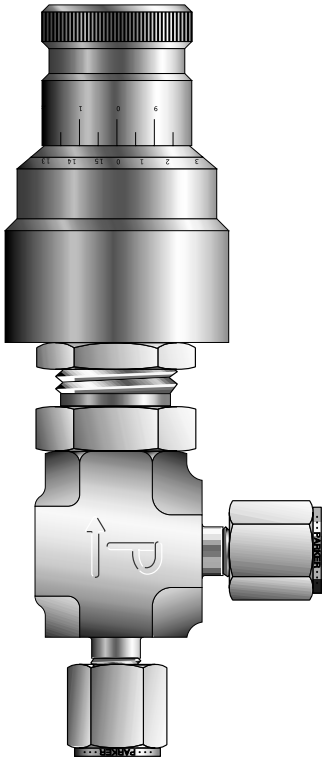
HR Series Metering Valves

Introduction

Parker HR Series Metering Valves provide the highest degree of precision metering for moderate pressure applications. A choice of seven precision ground, tapered flat, non-rotating and non-rising valve stems enable repeatable metering at flow capacities as low as 0.0004 C_v. With 15 stem turns, this valve offers the ultimate in precision flow control. This series also features shut-off capability not found in most metering valves.

Features

- Bubble tight shut-off
- Special fine pitch thread with 15 turn resolution is isolated from contact with process fluids
- Non-rotating/non-rising valve stem design provides smooth, non-reversing flow characteristics
- Seven optional valve stem tapers
- Special orifice liner assures long life
- Panel or in-line mounting
- Angle or in-line patterns
- Brass or 316 SS forged body construction
- 100% function tested for actuation and shut-off



Model Shown: 2A-H0A-NE-SS-TC

Specifications

Pressure Rating at all temperatures:

250 psig (17 bar) CWP

Flow Data:

H0
Orifice: 0.000002 in²
In-line pattern: C_v = 0.0004; X_T = 0.85
Angle pattern: C_v = 0.0004; X_T = 0.66

H1
Orifice: 0.000083 in²
In-line pattern: C_v = 0.0070; X_T = 0.85
Angle pattern: C_v = 0.0070; X_T = 0.66

H2
Orifice: 0.000168 in²
In-line pattern: C_v = 0.0140; X_T = 0.85
Angle pattern: C_v = 0.0140; X_T = 0.66

H3
Orifice: 0.000241 in²
In-line pattern: C_v = 0.0200; X_T = 0.85
Angle pattern: C_v = 0.0210; X_T = 0.66

H4
Orifice: 0.000674 in²
In-line pattern: C_v = 0.0300; X_T = 0.85
Angle pattern: C_v = 0.0320; X_T = 0.66

H5
Orifice: 0.002325 in²
In-line pattern: C_v = 0.0470; X_T = 0.85
Angle pattern: C_v = 0.0490; X_T = 0.66

H6
Orifice: 0.006227 in²
In-line pattern: C_v = 0.1180; X_T = 0.85
Angle pattern: C_v = 0.1550; X_T = 0.66

Turns to open: 15 +/- 1

Valve / Seal Temperature Ratings

Buna-N Rubber:
-50 °F to 300 °F (-47 °C to 149 °C)
Ethylene Propylene Rubber:
-50 °F to 300 °F (-47 °C to 149 °C)
Neoprene Rubber:
-50 °F to 300 °F (-47 °C to 149 °C)
Fluorocarbon Rubber*:
-25 °F to 400 °F (-32 °C to 204 °C)
Highly Fluorinated Fluorocarbon Rubber:
-25 °F to 200 °F (-32 °C to 93 °C)

***Note**: The Turns Counter Handle (TC) requires the HT option for use at temperatures above 300 °F (149 °C).

Flow tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.

Dimensions

Basic Part Number	End Connections (Inlet) Port 1	End Connections (Outlet) Port 2	Dimensions A† Inch	A† mm	B† Inch	B† mm	C Inch	C mm	D Inch	D mm
1A-H#A	1/16" Compression A-LOK®		0.92	23.4	0.92	23.4	0.41	10.4	0.73	18.5
1Z-H#A	1/16" Compression CPI™		0.92	23.4	0.92	23.4	0.41	10.4	0.73	18.5
2A-H#L	1/8" Compression A-LOK®		1.03	26.2	1.03	26.2	0.41	10.4	0.85	21.6
2A-H#A			1.03	26.2	1.03	26.2	0.41	10.4	0.73	18.5
2F-H#L	1/8" Female NPT		0.93	23.6	0.93	23.6	0.41	10.4	0.85	21.6
2F-H#A			0.93	23.6	0.93	23.6	0.41	10.4	0.73	18.5
2Z-H#L	1/8" Compression CPI™		1.03	26.2	1.03	26.2	0.41	10.4	0.85	21.6
2Z-H#A			1.03	26.2	1.03	26.2	0.41	10.4	0.73	18.5
4A-H#L	1/4" Compression A-LOK®		1.11	28.2	1.11	28.2	0.41	10.4	0.85	21.6
4A-H#A			1.11	28.2	1.11	28.2	0.41	10.4	0.73	18.5
4F-H#L	1/4" Female NPT		0.97	24.6	0.97	24.6	0.41	10.4	0.85	21.6
4F-H#A			0.97	24.6	0.97	24.6	0.41	10.4	0.73	18.5
4M-H#L	1/4" Male NPT		0.93	23.6	0.93	23.6	0.41	10.4	0.85	21.6
4M-H#A			0.93	23.6	0.93	23.6	0.41	10.4	0.73	18.5
4Z-H#L	1/4" Compression CPI™		1.11	28.2	1.11	28.2	0.41	10.4	0.85	21.6
4Z-H#A			1.11	28.2	1.11	28.2	0.41	10.4	0.73	18.5
M3A-H#L	3mm Compression A-LOK®		1.00	25.4	1.00	25.4	0.41	10.4	0.85	21.6
M3A-H#A			1.00	25.4	1.00	25.4	0.41	10.4	0.73	18.5
M3Z-H#L	3mm Compression CPI™		1.00	25.4	1.00	25.4	0.41	10.4	0.85	21.6
M3Z-H#A			1.00	25.4	1.00	25.4	0.41	10.4	0.73	18.5
M6A-H#L	6mm Compression A-LOK®		1.15	29.2	1.15	29.2	0.41	10.4	0.85	21.6
M6A-H#A			1.15	29.2	1.15	29.2	0.41	10.4	0.73	18.5
M6Z-H#L	6mm Compression CPI™		1.15	29.2	1.15	29.2	0.41	10.4	0.85	21.6
M6Z-H#A			1.15	29.2	1.15	29.2	0.41	10.4	0.73	18.5

† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

K Handle Dimensions

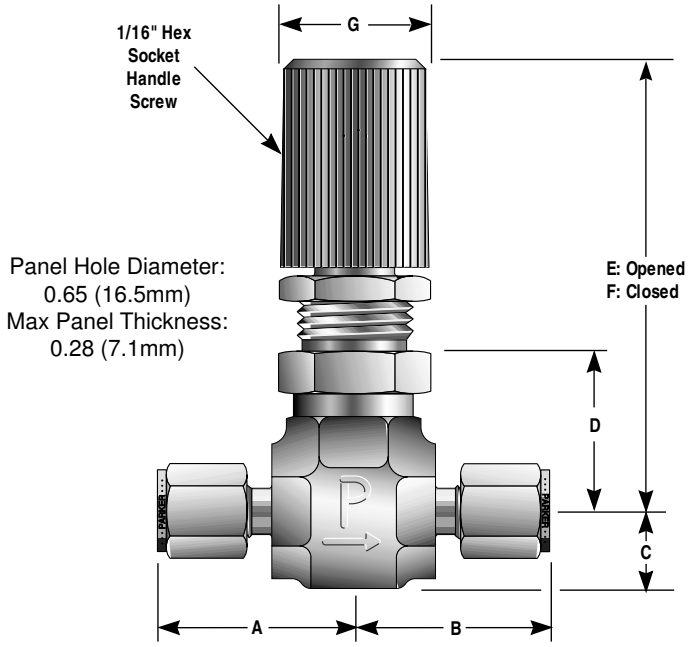
Pattern	Dimensions E Inch	E mm	F Inch	F mm	G Inch	G mm
In-line	2.35	59.7	2.35	59.7	0.78	19.8
Angle	2.23	56.6	2.23	56.6	0.78	19.8

TC Handle Dimensions

Pattern	Dimensions E Inch	E mm	F Inch	F mm	G Inch	G mm
In-line	2.88	73.2	2.88	73.2	1.12	28.4
Angle	2.76	70.1	2.76	70.1	1.12	28.4

NS Handle Dimensions

Pattern	Dimensions E Inch	E mm	F Inch	F mm	G Inch	G mm
In-line	2.33	59.2	2.33	59.2	0.25	6.4
Angle	2.21	56.1	2.21	56.1	0.25	6.4



Model Shown: M6A-H6L-KZ-SS-K

How to Order

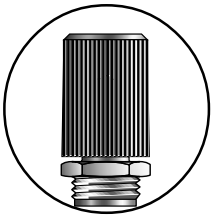
The correct part number is easily derived from the following number sequence. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example: 4Z - * - H3L - V - SS - TC

① Inlet Port	② Outlet Port	③ Valve/Stem Series	④ Seal Material	⑤ Body Material	⑥ Handle Type
1A, 1Z		H#A	**BN** - Buna-N Rubber **EPR -** Ethylene Propylene Rubber **NE -** Neoprene Rubber **V -** Fluorocarbon Rubber **KZ -** Highly Fluorinated Fluorocarbon Rubber	**SS-** Stainless Steel **B -** Brass	**K** - Knurled **TC -** Turns Counter **NS** - No Handle (Slotted Stem)
2A, 2F, 2Z, 4A, 4F, 4M, 4Z, M3A, M3Z, M6A, M6Z		H#A H#L			

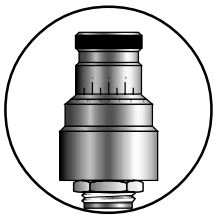
Handle Options

Knurled (K)



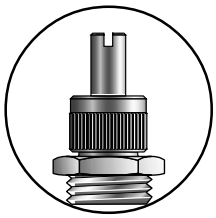
Knurled ABS molded handle provides ease of actuation

Turns Counter (TC)



Graduated black-anodized aluminum alloy handle provides a readable count of turns open

Slotted Stem (NS)



Screwdriver slot on top of stem may be used for inaccessible locations or tamper resistance

How to Order Options

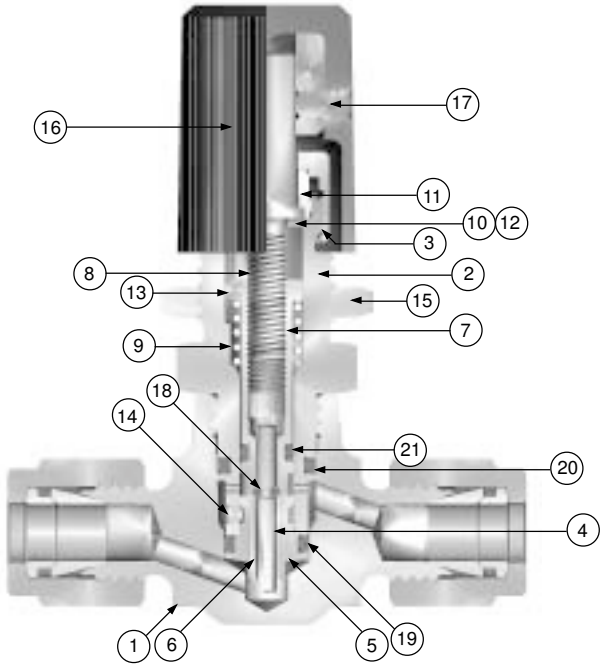
Oxygen Cleaning – Add the suffix **-C3** to the end of the part number to receive valves cleaned and assembled for oxygen service in accordance with Parker Specification ES8003. Example: 4A-H1A-EPR-SS-K**-C3**

High Temperature – Add the suffix **-HT** to the end of the part number to receive valves with Turns Counter (TC) handles suitable for service above 300 °F (149 °C). Example: M3A-H4L-KZ-SS-TC**-HT**

Materials of Construction

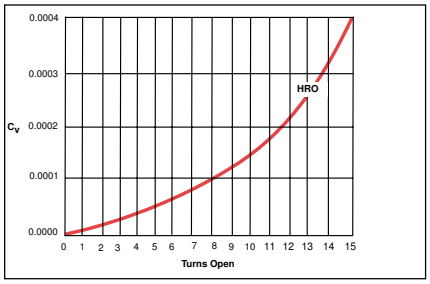
Item #	Description	Stainless Steel	Brass
1	Body	ASTM A 182 Type F316	ASTM B 283 Alloy C37700 (Nickel Plated)
2	Bonnet	ASTM A 479 Type 316	ASTM B 16 Alloy C36000 (Nickel Plated)
3	Bonnet Nut	ASTM B 16 Alloy C36000	ASTM B 16 Alloy C36000
4	Lower Stem	316 Stainless Steel	316 Stainless Steel
5	Orifice	ASTM A 479 Type 316	ASTM B 453 Alloy C34000
6	Orifice Liner	Mica Filled PTFE	Mica Filled PTFE
7	Stem Guide	ASTM A 182 Type F316	ASTM B 16 Alloy C36000
8	Upper Stem	ASTM B 150 Alloy C64200	ASTM B 150 Alloy C64200
9	Spring	302 Stainless Steel	302 Stainless Steel
10	Wave Washer	Steel	Steel
11	Friction Collar*	Acetal	Acetal
12	Stem Washer	Nylon	Nylon
13	Stem Guide Pin	Alloy Steel	Alloy Steel
14	Orifice Screw	Stainless Steel	Stainless Steel
15	Panel Nut	ASTM B 16 (Nickel Plated)	ASTM B 16 (Nickel Plated)
16	Handle**	ABS Plastic	ABS Plastic
17	Handle Set Screw	Alloy Steel	Alloy Steel
18	Lower Stem O-Ring***	Fluorocarbon Rubber	Fluorocarbon Rubber
19	Orifice O-Ring***	Fluorocarbon Rubber	Fluorocarbon Rubber
20	Bonnet O-Ring***	Fluorocarbon Rubber	Fluorocarbon Rubber
21	Stem Guide O-Ring***	Fluorocarbon Rubber	Fluorocarbon Rubber

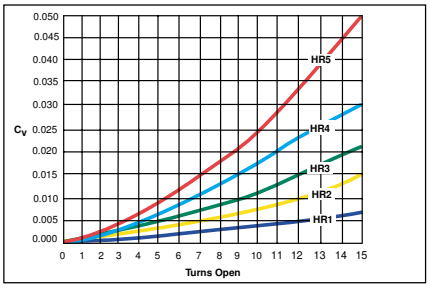
* Friction Collar is Polymide with HT option
** Acrylonitrile-Butadiene-Styrene. Optional handles are available
*** Optional materials are available - See How to Order
Lubrication: Perfluorinated polyether

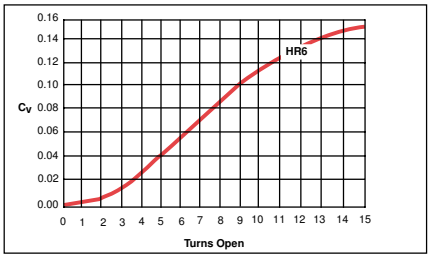


Model Shown: 4A-H4L-NE-SS-K

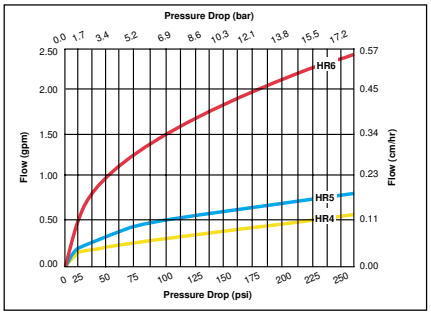
C_v vs. Turns Open

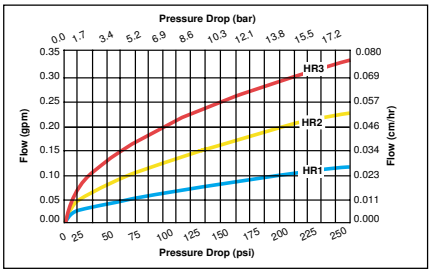


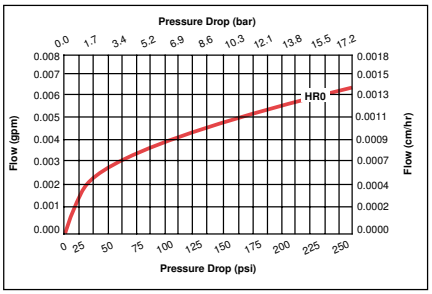




Water Flow Data







Parker Hannifin Corporation
Instrumentation Valve Division
Jacksonville, Alabama

TECNI-AR
Seu caminho
Para automação

Needle Valves (VQ Series)

Catalog 4110-VQ
Revised, April 2004

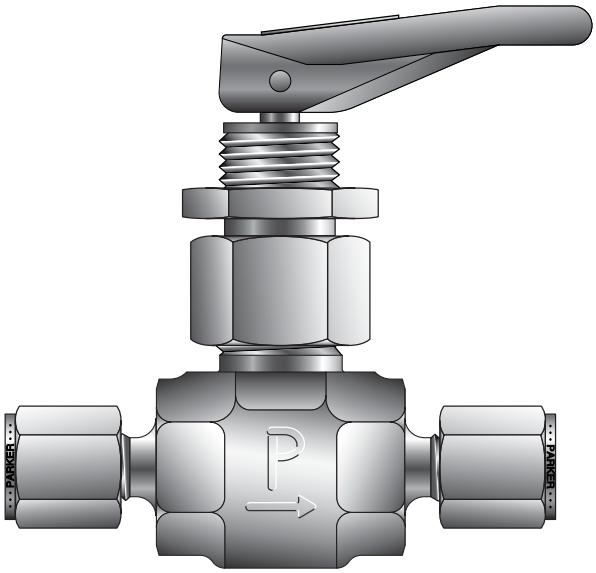
VQ Series Needle Valves

Introduction

Parker VQ Series Needle Valves are the right combination of performance and value for manual or pneumatic on-off control in moderate pressure and temperature applications. The manual version employs a toggle handle for quick action at pressures up to 300 psig (21 bar). Compact double acting, normally closed, and normally open pneumatically actuated versions of this valve are ideal for automatic control at pressures up to 600 psig (41 bar).

Manual Toggle Valve Features

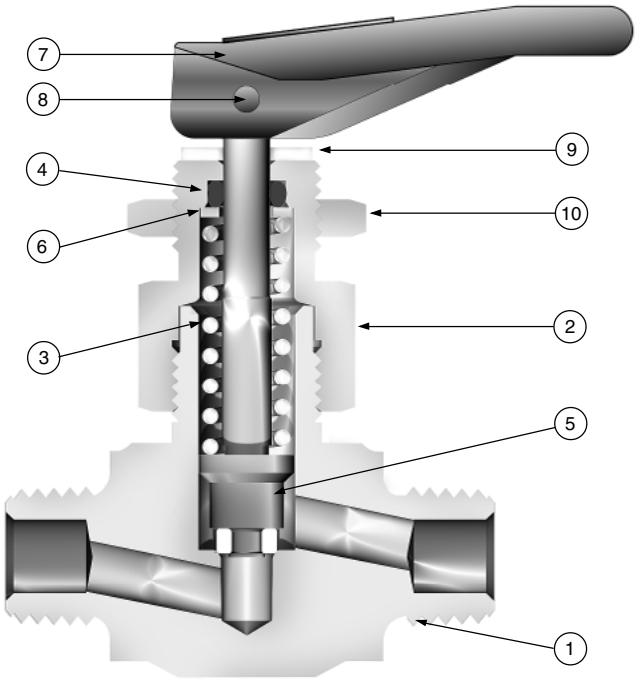
- Quick acting
- Inline and angle patterns
- Available with CPI™, A-LOK®, male and female NPT end connections
- Panel mountable
- Color-coded handles
- 316 stainless steel and brass body construction
- Stem seal materials -
  - Fluorocarbon Rubber
  - Buna-N Rubber
  - Ethylene Propylene Rubber
  - Highly Fluorinated Fluorocarbon Rubber
- Optional handle positioners and anti-lock handles
- 100% factory tested



Model Shown: 4A-V4LQ-BP

Manual Toggle Valve Specifications

- Pressure Rating at all temperatures:
  - 300 psig (21 bar) CWP
- Temperature Ratings -
  - PTFE Stem Tip: -20 °F to 200 °F (-29 °C to 93 °C)
  - PCTFE Stem Tip: -65 °F to 200 °F (-54 °C to 93 °C)



Model Shown: 4M-V4LQ-SSP

Materials of Construction Manual Toggle Valve

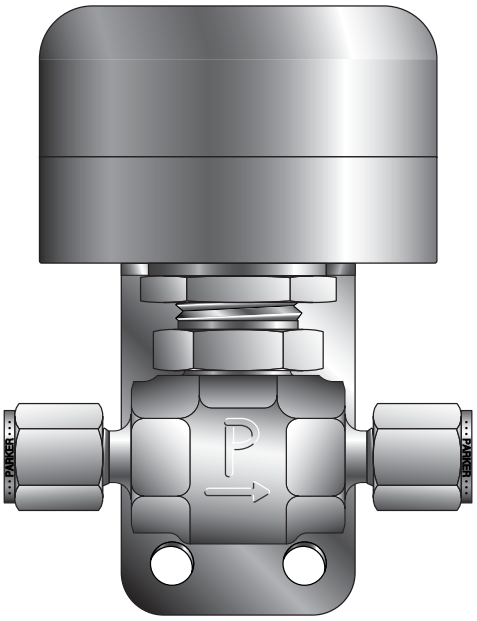
Item #	Description	Stainless Steel	Brass
1	Body	ASTM A 182 Type F316	ASTM B 283 Alloy C37700
2	Cap	ASTM A 479 Type 316	ASTM B 453 Alloy C34000
3	Spring	Stainless Steel	Stainless Steel
4	Stem Seal*	Fluorocarbon Rubber	Fluorocarbon Rubber
5	Stem	ASTM A 276 Type 316	ASTM A 276 Type 316
6	Stem Washer	Stainless Steel	Stainless Steel
7	Handle	Nylon 6/6	Nylon 6/6
8	Handle Pin	Stainless Steel	Stainless Steel
9	Handle Washer	Acetal	Acetal
10	Panel Nut	316 Stainless Steel	316 Stainless Steel

* Optional stem seal materials available - See How to Order
Lubrication: Silicone paste

Parker Hannifin Corporation
Instrumentation Products Division
Jacksonville, Alabama

Actuated Valve Features

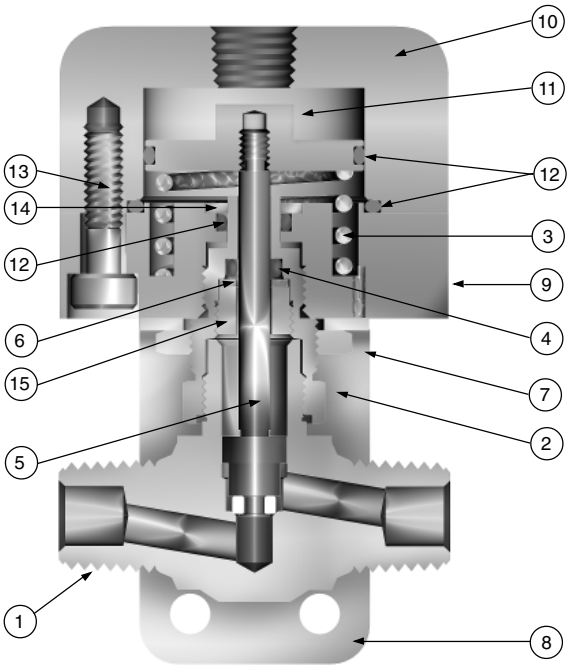
- Available in normally open, normally closed, and double acting models
- Inline and angle patterns
- Available with CPI™, A-LOK®, male and female NPT end connections
- Mounting bracket standard
- 316 stainless steel and brass body construction
- Stem seal materials -
  - Fluorocarbon Rubber
  - Buna-N Rubber
  - Ethylene Propylene Rubber
  - Highly Fluorinated Fluorocarbon Rubber
- 100% factory tested



Model Shown: M6A-V4LQ-BN-11AC-SS

Actuated Valve Specifications

- Pressure Rating at all temperatures:
  - Size V4 Normally Closed:
    - 600 psig (41 bar) CWP
  - Size V6 Normally Closed:
    - 500 psig (35 bar) CWP
  - Normally Open:
    - 450 psig (31 bar) CWP
  - Double Acting:
    - 450 psig (31 bar) CWP
- Temperature Ratings -
  - PTFE Stem Tip: -20 °F to 200 °F (-29 °C to 93 °C)
  - PCTFE Stem Tip: -65 °F to 200 °F (-54 °C to 93 °C)



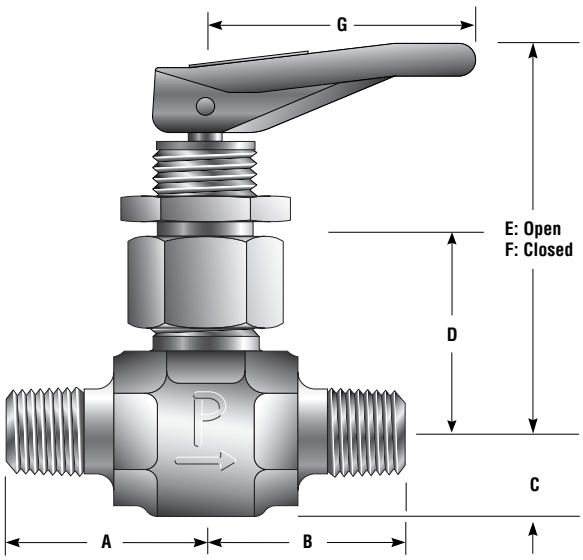
Model Shown: 4M-V4LQ-11AO-SS

Materials of Construction Actuated Valve

Item #	Description	Stainless Steel	Brass
1	Body	ASTM A 182 Type F316	ASTM B 283 Alloy C37700
2	Cap	ASTM A 479 Type 316	ASTM B 453 Alloy C34000
3	Spring*	Stainless Steel	Stainless Steel
4	Stem Seal**	Fluorocarbon Rubber	Fluorocarbon Rubber
5	Stem	ASTM A 276 Type 316	ASTM A 276 Type 316
6	Stem Washer	Stainless Steel	Stainless Steel
7	Lock Nut	316 Stainless Steel	316 Stainless Steel
8	Mounting Bracket	Aluminum	Aluminum
9	Actuator Base	Aluminum	Aluminum
10	Actuator Cap	Aluminum	Aluminum
11	Piston	Aluminum	Aluminum
12	Actuator Seals	Fluorocarbon Rubber	Fluorocarbon Rubber
13	Screws	Stainless Steel	Stainless Steel
14	Actuator Bushing	Aluminum	Aluminum
15	Stem Bushing***	ASTM A 479 Type 316	ASTM A 479 Type 316

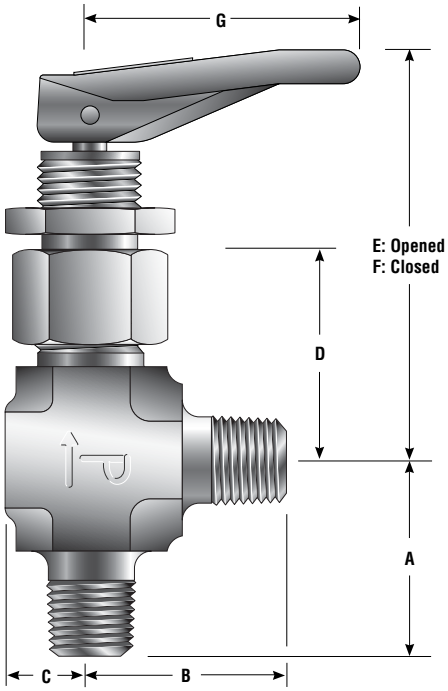
* Spring not used on Double Acting (11AD) models
** Optional stem seal materials available - See How to Order
*** Stem Bushing not used on Normally Closed (11AC) models
Lubrication: Silicone paste

VQ Series Needle Valves



Model Shown: 4M-V4LQ-SSP

Panel Hole Diameter:
V4: 0.52 (13.2)
V6: 0.65 (16.5)
Max. Panel Thickness:
V4: 0.25 (6.4)
V6: 0.35 (8.9)



Model Shown: 4M-V4AQ-EPR-SSP

( ) Denotes dimensions in millimeters

V4 Dimensions / Flow Data

Basic Part Number	End Connections		Flow Data				Dimensions													
	Inlet (Port 1)	Outlet (Port 2)	Orifice				A†		B†		C		D		E		F		G	
			Inch	mm	C_v	X_T*	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
2A-V4LQ 2A-V4AQ	1/8" Compression A-LOK®		0.078	2.0	0.14 0.15	0.52 0.50	1.10	27.9	1.10	27.9	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
2F-V4LQ 2F-V4AQ	1/8" Female NPT		0.176	4.5	0.36 0.49	0.71 0.64	0.81	20.6	0.81	20.6	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
2M-V4LQ 2M-V4AQ	1/8" Male NPT		0.125	3.2	0.30 0.35	0.50 0.55	0.81	20.6	0.81	20.6	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
2Z-V4LQ 2Z-V4AQ	1/8" Compression CPI™		0.078	2.0	0.14 0.15	0.52 0.50	1.10	27.9	1.10	27.9	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
4A-V4LQ 4A-V4AQ	1/4" Compression A-LOK®		0.176	4.5	0.36 0.49	0.71 0.64	1.15	29.2	1.15	29.2	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
4M-V4LQ 4M-V4AQ	1/4" Male NPT		0.176	4.5	0.36 0.49	0.71 0.64	0.94	23.9	0.94	23.9	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
4Z-V4LQ 4Z-V4AQ	1/4" Compression CPI™		0.176	4.5	0.36 0.49	0.71 0.64	1.15	29.2	1.15	29.2	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
6A-V4LQ 6A-V4AQ	3/8" Compression A-LOK®		0.176	4.5	0.36 0.49	0.71 0.64	1.17	29.7	1.17	29.7	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
6Z-V4LQ 6Z-V4AQ	3/8" Compression CPI™		0.176	4.5	0.36 0.49	0.71 0.64	1.17	29.7	1.17	29.7	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
M6A-V4LQ M6A-V4AQ	6mm Compression A-LOK®		0.176	4.5	0.36 0.49	0.71 0.64	1.13	28.7	1.13	28.7	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
M6Z-V4LQ M6Z-V4AQ	6mm Compression CPI™		0.176	4.5	0.36 0.49	0.71 0.64	1.13	28.7	1.13	28.7	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
M8A-V4LQ M8A-V4AQ	8mm Compression A-LOK®		0.176	4.5	0.36 0.49	0.71 0.64	1.13	28.7	1.13	28.7	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8
M8Z-V4LQ M8Z-V4AQ	8mm Compression CPI™		0.176	4.5	0.36 0.49	0.71 0.64	1.13	28.7	1.13	28.7	0.41	10.4	0.93	23.6	2.88	73.2	1.84	46.7	1.25	31.8

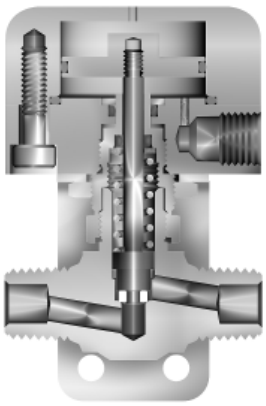
* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™and A-LOK®, dimensions are measured with nuts in the finger tight position

V6 Dimensions / Flow Data

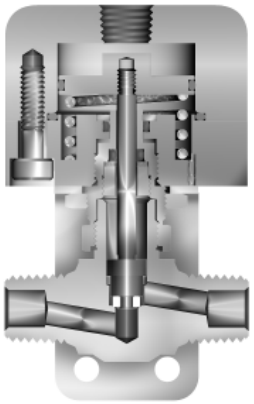
Basic Part Number	End Connections Inlet (Port 1)	End Connections Outlet (Port 2)	Flow Data Orifice Inch	Flow Data Orifice mm	C_v	X_T*	Dimensions A† Inch	A† mm	B† Inch	B† mm	C Inch	C mm	D Inch	D mm	E Inch	E mm	F Inch	F mm	G Inch	G mm
4F-V6LQ 4F-V6AQ	1/4" Female NPT		0.250	6.4	0.83 0.92	0.70 0.68	1.00	25.4	1.00	25.4	0.53	13.5	1.07	27.2	3.45	87.6	2.13	54.1	1.60	40.6
6A-V6LQ 6A-V6AQ	3/8" Compression A-LOK®		0.250	6.4	0.83 0.92	0.70 0.68	1.29	32.8	1.29	32.8	0.53	13.5	1.07	27.2	3.45	87.6	2.13	54.1	1.60	40.6
6Z-V6LQ 6Z-V6AQ	3/8" Compression CPI™		0.250	6.4	0.83 0.92	0.70 0.68	1.29	32.8	1.29	32.8	0.53	13.5	1.07	27.2	3.45	87.6	2.13	54.1	1.60	40.6
8A-V6LQ 8A-V6AQ	1/2" Compression A-LOK®		0.250	6.4	0.83 0.92	0.70 0.68	1.37	34.8	1.37	34.8	0.53	13.5	1.07	27.2	3.45	87.6	2.13	54.1	1.60	40.6
8Z-V6LQ 8Z-V6AQ	1/2" Compression CPI™		0.250	6.4	0.83 0.92	0.70 0.68	1.37	34.8	1.37	34.8	0.53	13.5	1.07	27.2	3.45	87.6	2.13	54.1	1.60	40.6
M10A-V6LQ M10A-V6AQ	10mm Compression A-LOK®		0.250	6.4	0.83 0.92	0.70 0.68	1.30	33.0	1.30	33.0	0.53	13.5	1.07	27.2	3.45	87.6	2.13	54.1	1.60	40.6
M10Z-V6LQ M10Z-V6AQ	10mm Compression CPI™		0.250	6.4	0.83 0.92	0.70 0.68	1.30	33.0	1.30	33.0	0.53	13.5	1.07	27.2	3.45	87.6	2.13	54.1	1.60	40.6

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™and A-LOK®, dimensions are measured with nuts in the finger tight position

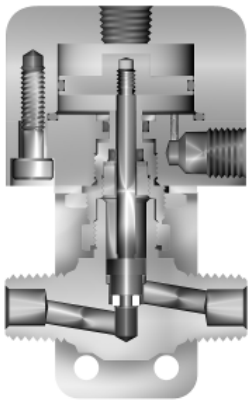
Pneumatically Actuated Valves



Normally Closed (11AC)

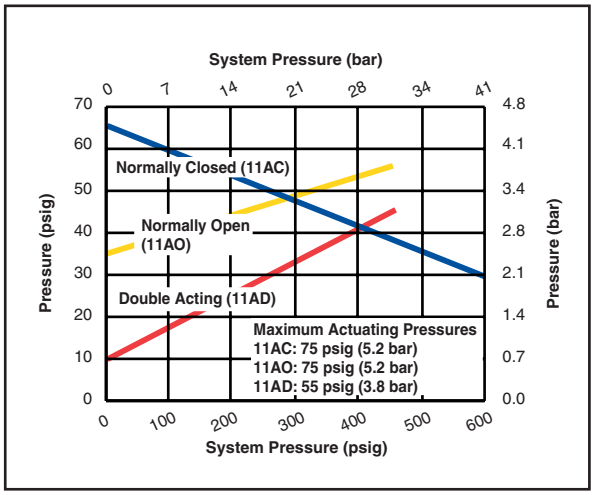


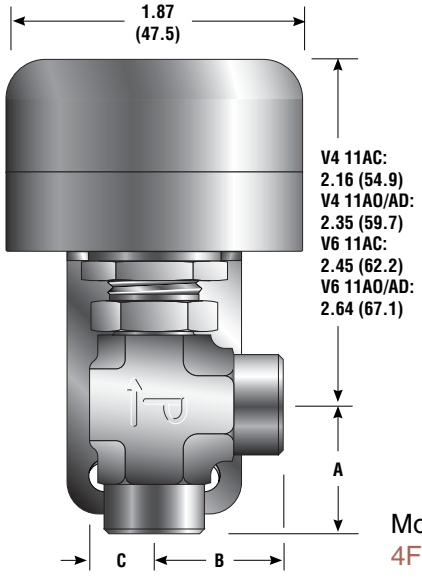
Normally Open (11AO)



Double Acting (11AD)

Minimum Actuating Pressures

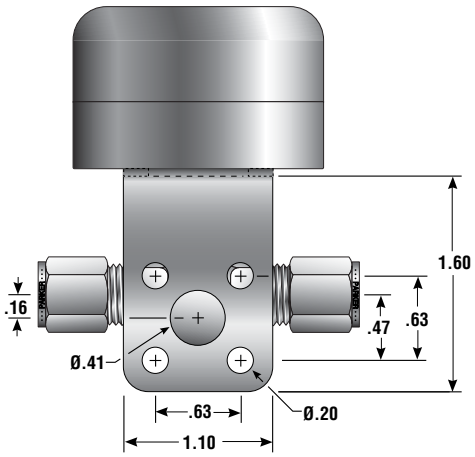




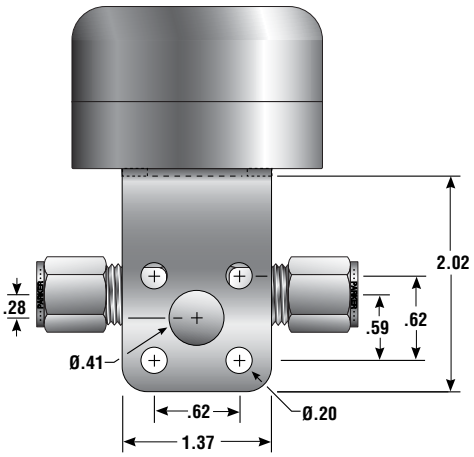
Model Shown:
4F-V6AQ-11AO-B

VQ Series Needle Valves

V4 Valve Mounting Bracket



V6 Valve Mounting Bracket



How to Order Manual Toggle Valves

The correct part number is easily derived from the following number sequence. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example:	4Z	*	-	V4LQ	K	-	BN	-	SSP
	① Inlet Port	② Outlet Port		③ Valve Series	④ Stem Tip		⑤ Stem Seal		⑥ Body Material

Describes a V4 Series inline pattern toggle valve equipped with 1/4" CPI™ compression inlet and outlet ports, PCTFE stem tip, Buna-N rubber stem seal, and stainless steel construction with panel mounting nut.

① Inlet Port	② Outlet Port	③ Valve Series	④ Stem Tip	⑤ Stem Seal	⑥ Body Material
2A, 2F, 2M, 2Z, 4A, 4M, 4Z, 6A, 6Z, M6A, M6Z, M8A, M8Z		V4LQ V4AQ	**Blank -** PTFE	**Blank -** Fluorocarbon Rubber **BN-** Buna-N Rubber **EPR-** Ethylene Propylene Rubber **KZ-** Highly Fluorinated Fluorocarbon Rubber	**SSP -** Stainless Steel with Panel Nut **BP -** Brass with Panel Nut
4F, 6A, 6Z, 8A, 8Z, M10A, M10Z		V6LQ V6AQ	**K -** PCTFE		

How to Order Actuated Valves

The correct part number is easily derived from the following number sequence. The seven product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example:	4M	4A	-	V4AQ	___	-	___	11AC	-	B
	① Inlet Port	② Outlet Port		③ Valve Series	④ Stem Tip		⑤ Stem Seal	⑥ Actuator Type		⑦ Body Material

Describes a V4 Series pneumatically actuated (normally closed) angle pattern valve equipped with a 1/4" MNPT inlet port, a 1/4" A-LOK® compression outlet port, PTFE stem tip, Fluorocarbon rubber stem seal, brass construction with mounting bracket.

How to Order Actuated Valves - Continued

① Inlet Port	② Outlet Port	③ Valve Series	④ Stem Tip	⑤ Stem Seal	⑥ Actuator Type	⑦ Body Material
2A, 2F, 2M, 2Z, 4A, 4M, 4Z, 6A, 6Z, M6A, M6Z, M8A, M8Z		**V4LQ** **V4AQ**	**Blank -** PTFE	**Blank -** Fluorocarbon Rubber **BN-** Buna-N Rubber **EPR-** Ethylene Propylene Rubber **KZ-** Highly Fluorinated Fluorocarbon Rubber	**11AC** - Normally Closed **11AO** - Normally Open **11AD** - Double Acting	**SS -** Stainless Steel **B -** Brass
4F, 6A, 6Z, 8A, 8Z, M10A, M10Z		**V6LQ** **V6AQ**	**K -** PCTFE			

How to Order Options

Colored Nylon Handles – Add the designator corresponding to the correct handle color as a suffix to the part number. Black is standard, **W** - white, **B** - blue, **G** - green, **R** - red, **Y** - yellow. Example: M10A-V6LQ-SSP**-G**

Anti-locking Handles - Prevents the handle from locking in the open position. Add **-ALH** as a suffix to the part number. Example: 4M4F-V4LQ-BN-SSP**-ALH**

Handle Positioner - Aids in keeping the handle from rotating away from a desired position. To order, add the suffix **-Q4** or **Q6** to the end of the part number. Example: 4M4F-V6LQ-EPR-SSP**-Q6**

Position Indicator Switch - Electric indicator activates when an 11AC valve is in the open position. To order, add the letter **S** to the actuator. Example: 4Z-V4AQ-11AC**S**-SS

Position Indicator - Mechanical indicator rises when an 11AC valve moves to the open position. To order, add the letter **I** to the actuator. Example: 8A-V6LQ-KZ-11AC**I**-B

Oxygen Cleaning – Add the suffix **-C3** to the end of the part number to receive valves cleaned and assembled for oxygen service in accordance with Parker Specification ES8003. Example: 4A-V4AQ-EPR-SSP**-C3**

How to Order Maintenance Kits

Colored Nylon Handles with Handle Pin - Valve Series-Handle-Color. Example: **V4Q-HANDLE-BLUE**

Handle Positioners - Enables the user to position the handle in a desired location and prevents it from rotating. V4: **V4Q-HANDLE-POSITIONER**; V6:**V6Q-HANDLE-POSITIONER**

Rubber Seal and Stem Kits - Consists of One Stem; One Rubber O-ring Stem Seal; One Packing Washer; One Handle Pin; Maintenance Instructions. Kit-Valve Series and Stem Tip-Seal Material. Examples: **KIT-V4Q-BN; KIT-V6QK-V**

Parker Instrumentation

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Needle Valves (SN6 Series)

Catalog 4110-SN
Revised, May 2003

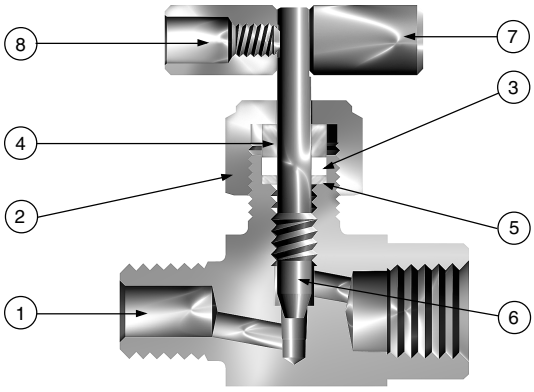
SN6 Series Needle Valves

Introduction

Parker compact SN6 Needle Valves provide shut-off and coarse regulation of liquids and gases utilized in process and instrumentation applications. These rugged valves are manufactured from stainless steel barstock and are integral bonnet designs with packing above the stem threads.

Features

- Integral bonnet design
- 316 stainless steel construction
- Choice of two stem types:
  R-Stem – All metal, blunt stem tip
  K-Stem – PCTFE stem tip
- Choice of PTFE or Grafoil® packing
- Inline and angle patterns
- 100% factory tested



Model Shown: 4F4M-SN6LR-SS

Materials of Construction

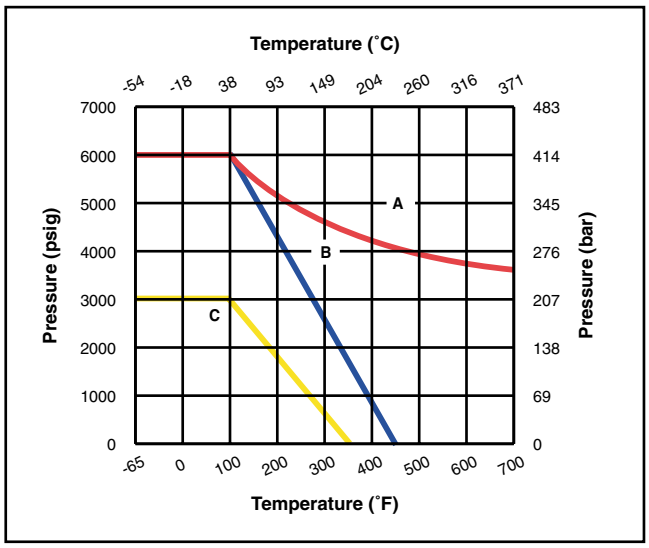
Item #	Description	Material
1	Body	ASTM A 276 Type 316
2	Packing Nut	ASTM A 479 Type 316
3	Packing*	PTFE
4	Packing Gland	ASTM A 479 Type 316
5	Packing Washer	Stainless Steel
6	Stem (R-Stem)	ASTM A 276 Type 316
6	Stem (K-Stem)	ASTM A 276 Type 316, with PCTFE
7	Handle**	Aluminum
8	Handle Screw	Stainless Steel

* Optional Grafoil® packing available - See How to Order
** Handles for Grafoil® packed valves and valves with R stem types are stainless steel T-bars
Lubrication: Graphite filled hydrocarbon

Specifications

- **Pressure Rating:**
  R Stem: 6000 psig (414 bar) CWP
  K Stem: 3000 psig (207 bar) CWP
- **Temperature Rating:**
  PTFE Packing:
  -65 °F to 450 °F (-54 °C to 232 °C)
  PCTFE Stem Tip:
  -65 °F to 350 °F (-54 °C to 177 °C)
  Grafoil® (**G**) Packing:
  -65 °F to 700 °F (-54 °C to 371 °C)

Pressure vs. Temperature



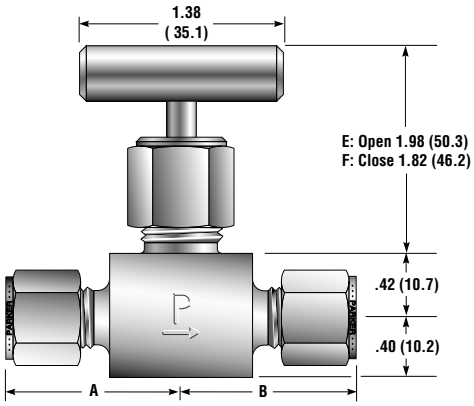
Legend: A - Grafoil® packing with R stem; B - PTFE packing with R stem; C - PTFE packing with K stem.

Note: To determine MPa, multiply bar by 0.1

Note: When combining seat and seal materials, the most restrictive temperature rating becomes the limiting factor on temperature range.

Pressure Rating and Tubing Selection:
For working pressures of A-LOK® and CPI™ tube connections, please see the Instrument Tubing Selection Guide (Bulletin 4200-TS), found in the Technical Section of the Parker Instrumentation Process Control Binder, or the Parker Instrument Tube Fitting Installation Manual (Bulletin 4200-B4).

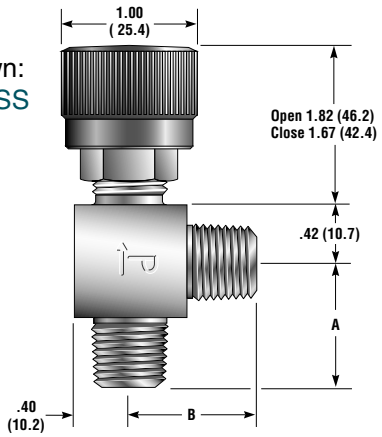
For working pressures of valves with external or internal pipe threads, please see Catalog 4260, Instrumentation Pipe Fittings.



Model Shown:
4Z-SN6LR-G-SS

( ) Denotes dimensions in millimeters

Model Shown:
4M-SN6AK-SS



Dimensions / Flow Data

Basic Part Number		End Connections		Stem Type	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)		Inch	mm	C_v	X_T*	C_v	X_T*	Inch	mm	Inch	mm
4A-SN6LR 4A-SN6LK	4A-SN6AR 4A-SN6AK	1/4" Compression A-LOK®		Blunt PCTFE	0.125	3.2	0.29 0.23	0.56 0.63	0.34 0.27	0.55 0.58	1.17	29.7	1.17	29.7
4F-SN6LR 4F-SN6LK	4F-SN6AR 4F-SN6AK	1/4" Female NPT		Blunt PCTFE	0.125	3.2	0.29 0.23	0.56 0.63	0.34 0.27	0.55 0.58	0.94	23.9	0.94	23.9
4M-SN6LR 4M-SN6LK	4M-SN6AR 4M-SN6AK	1/4" Male NPT		Blunt PCTFE	0.125	3.2	0.29 0.23	0.56 0.63	0.34 0.27	0.55 0.58	0.99	25.1	0.99	25.1
4Z-SN6LR 4Z-SN6LK	4Z-SN6AR 4Z-SN6AK	1/4" Compression CPI™		Blunt PCTFE	0.125	3.2	0.29 0.23	0.56 0.63	0.34 0.27	0.55 0.58	1.17	29.7	1.17	29.7
4M4A-SN6LR 4M4A-SN6LK	4M4A-SN6AR 4M4A-SN6AK	1/4" Male NPT	1/4" A-LOK®	Blunt PCTFE	0.125	3.2	0.29 0.23	0.56 0.63	0.34 0.27	0.55 0.58	0.99	25.1	1.17	29.7
4M4F-SN6LR 4M4F-SN6LK	4M4F-SN6AR 4M4F-SN6AK	1/4" Male NPT	1/4" Female NPT	Blunt PCTFE	0.125	3.2	0.29 0.23	0.56 0.63	0.34 0.27	0.55 0.58	0.99	25.1	0.94	23.9
4M4Z-SN6LR 4M4Z-SN6LK	4M4Z-SN6AR 4M4Z-SN6AK	1/4" Male NPT	1/4" CPI™	Blunt PCTFE	0.125	3.2	0.29 0.23	0.56 0.63	0.34 0.27	0.55 0.58	0.99	25.1	1.17	29.7

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position

How to Order

The correct part number is easily derived from the following number sequence. Eliminate the Stem Packing product characteristic if PTFE Packing is ordered. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example: **4Z** (1) Inlet Port - ***** (2) Outlet Port - **SN6L** (3) Valve Series - **K** (4) Stem Type - **G** (5) Stem Packing - **SS** (6) Body Material

Describes a in-line pattern SN6 Series needle valve equipped with 1/4" CPI™ compression inlet and outlet ports, a PCTFE tipped stem, Grafoil packing, and stainless steel construction.

Note: This valve is not panel mountable.

Grafoil® is a registered trademark of Union Carbide

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Rising Stem Plug Valves (PV Series)

Catalog 4110-PV
Revised, May 2004

PV Series Rising Stem Plug Valves

Introduction

Parker Rising Plug and Gauge/Root Valves are available with a variety of seat and seal materials. They are screwed bonnet designs featuring bonnet lock plates. The PV and PVG Series of valves provide a straight-through flow path in two orifice sizes. The valves utilize a non-wetted upper stem and a non-rotating lower stem in conjunction with a tapered seat for positive shut-off and long seat life, even in particulated media.

Features

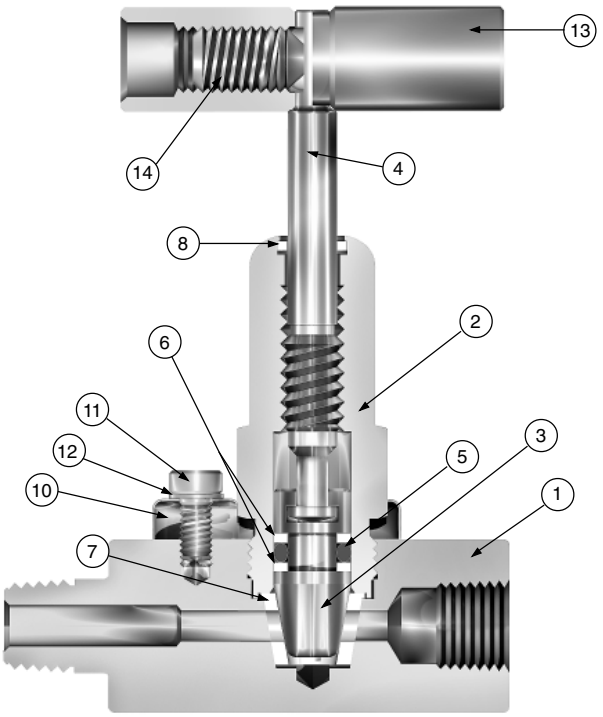
- Roddable, straight through flow path
- Bonnet lock plate resists accidental bonnet disengagement
- Stem dust seal helps protect stem from external contamination
- Rugged 316 stainless steel barstock construction
- Panel mounting option
- Gauge port option
- 100% factory tested

Specifications

- **Pressure Rating:**
  Acetal Seat (DE): 6000 psig (414 bar) CWP
  PEEK Seat (PK): 6000 psig (414 bar) CWP
  PCTFE Seat (K): 2200 psig (152 bar) CWP
  PFA Seat (PFA): 750 psig (52 bar) CWP
- **Temperature Rating:**
  Seats -
  Acetal:
  -20 °F to 250 °F (-29 °C to 121 °C)
  PEEK and PFA:
  -20 °F to 400 °F (-29 °C to 204 °C)
  PCTFE:
  -20 °F to 200 °F (-29 °C to 93 °C)
  Stem Seals -
  Buna-N Rubber (BN), Silicone Rubber (SI), and Ethylene Propylene Rubber (EPR):
  -20 °F to 250 °F (-29 °C to 121 °C)
  Fluorocarbon Rubber (V):
  -20 °F to 400 °F (-29 °C to 204 °C)
  Highly Fluorinated Fluorocarbon Rubber (KZ):
  -20 °F to 200 °F (-29 °C to 93 °C)

Flow Data

PV4: $C_v = 0.95$; $x_T = 0.43$; Orifice = 0.188" (4.8 mm)
PV8: $C_v = 2.01$; $x_T = 0.33$; Orifice = 0.250" (6.4 mm)
Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.



Model Shown: 4M4F-PV4DE-BN-SS

Materials of Construction

Item #	Description	Material
1	Body	ASTM A 479 Type 316
2	Bonnet	ASTM A 479 Type 316
3	Lower Stem	ASTM A 276 Type 316
4	Upper Stem	ASTM A 564 Type 316
5	Stem Seal*	Fluorocarbon Rubber
6	Back-up Rings	PTFE
7	Seat*	Acetal
8	Dust Seal	PTFE
9	Seat Pin (not shown)	Stainless Steel
10	Lock Plate	Stainless Steel
11	Lock Plate Screw	Stainless Steel
12	Lock Washer	Stainless Steel
13	Handle	Stainless Steel
14	Handle Screw	Stainless Steel

* Optional elastomeric O-ring stem seals and polymer seat materials are available - See How to Order
Lubrication: Graphite filled hydrocarbon

How to Order

The correct part number is easily derived from the following number sequence. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example:	4Z	*	-	PV4	K	-	BN	-	SS
	①	②		③	④		⑤		⑥
	Inlet Port	Outlet Port		Valve Series	Seat Type		Stem Seal		Body Material

Describes a PV4 Series rising stem plug valve equipped with 1/4" CPI™ compression inlet and outlet ports, a PCTFE seat, Buna-N stem seals, and stainless steel construction.

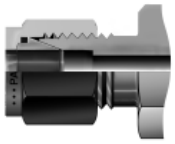
Example:	4M	4F	-	PVG4	DE	-	V	-	SSP
	①	②		③	④		⑤		⑥
	Inlet Port	Outlet Port		Valve Series	Seat Type		Stem Seal		Body Material

Describes a PVG4 Series rising stem plug valve with 1/4” gauge ports equipped with a 1/4" MNPT inlet port and 1/4” FNPT outlet port, an acetal seat, fluorocarbon stem seals, and stainless steel construction with panel mounting option.

① Inlet Port	② Outlet Port	③ Valve Series	④ Seat Material	⑤ Stem Seal Material	⑥ Body Material
4A, 4F, 4M, 4Z, 6A, 6Z, 8M		PV4 PVG4	**DE -** Acetal **K -** PCTFE **PK -** PEEK **PFA -** PFA	**V -** Fluorocarbon Rubber **BN -** Buna-N Rubber **SI -** Silicone Rubber **EPR -** Ethylene Propylene Rubber **KZ -** Highly Fluorinated Fluorocarbon Rubber	**SS -** Stainless Steel **SSP -** Stainless Steel with Panel Mounting Option
6M, 6F, 8A 8F, 8Z, 12M		PV8 PVG8			

Available End Connections

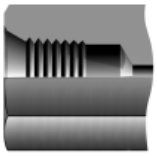
Z - One ferrule CPI™ compression port



A - Two ferrule A-LOK® compression port

M - ANSI/ASME B1.20.1 External pipe threads

F - ANSI/ASME B1.20.1 Internal pipe threads



Offer of Sale

The items described in this document and other documents or descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such items, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer, Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that items sold hereunder shall be free from defects in material or workmanship. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. Limitation Of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and not withstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

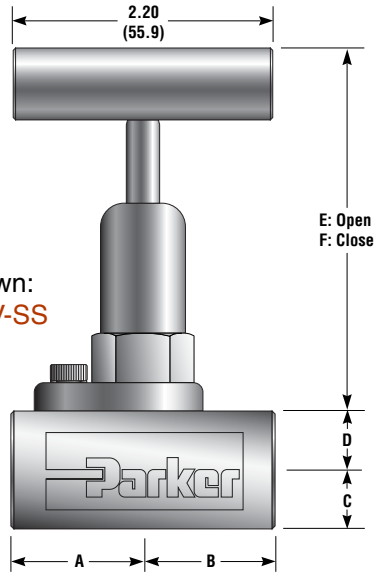
If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

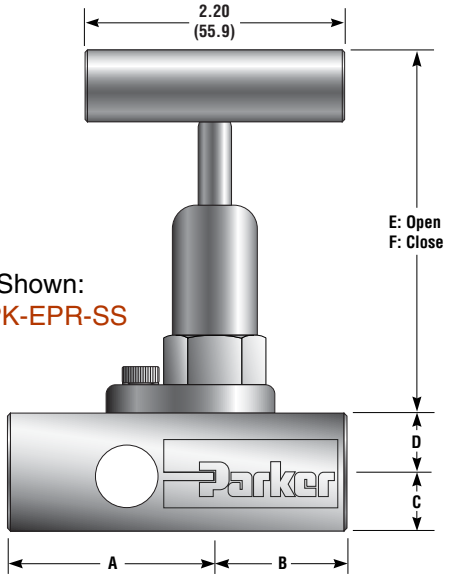
12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

11/98-P

PV Series Rising Stem Plug Valves



Model Shown:
4F-PV4DE-V-SS



Model Shown:
4F-PVG4PK-EPR-SS

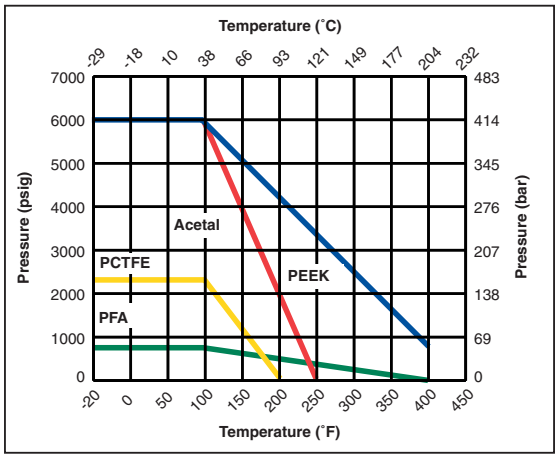
Dimensions

( ) Denotes dimensions in millimeters

Basic Part Number	End Connections		Dimensions											
	Inlet (Port 1)	Outlet (Port 2)	A†		B†		C		D		E		F	
			Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
4A-PV4	1/4" Compression A-LOK®	1/4" Compression A-LOK®	1.73	43.9	1.73	43.9	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
4F-PV4	1/4" Female NPT	1/4" Female NPT	1.13	28.7	1.13	28.7	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
4F-PVG4	1/4" Female NPT	1/4" Female NPT	1.75	44.5	1.13	28.7	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
4M4F-PV4	1/4" Male NPT	1/4" Female NPT	1.78	45.2	1.13	28.7	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
4Z-PV4	1/4" Compression CPI™	1/4" Compression CPI™	1.73	43.9	1.73	43.9	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
6A-PV4	3/8" Compression A-LOK®	3/8" Compression A-LOK®	1.79	45.5	1.79	45.5	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
6Z-PV4	3/8" Compression CPI™	3/8" Compression CPI™	1.79	45.5	1.79	45.5	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
8M4F-PV4	1/2" Male NPT	1/4" Female NPT	1.90	48.3	1.13	28.7	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
8M4F-PVG4	1/2" Male NPT	1/4" Female NPT	3.13	79.5	1.75	44.5	0.50	12.7	0.50	12.7	3.04	77.2	2.93	74.4
6M6F-PVG8	3/8" Male NPT	3/8" Female NPT	3.33	84.6	2.25	57.2	0.56	14.2	0.56	14.2	3.04	77.2	2.93	74.4
8A-PV8	1/2" Compression A-LOK®	1/2" Compression A-LOK®	1.91	48.5	1.91	48.5	0.56	14.2	0.56	14.2	3.04	77.2	2.93	74.4
8F-PV8	1/2" Female NPT	1/2" Female NPT	1.33	33.8	1.33	33.8	0.56	14.2	0.56	14.2	3.04	77.2	2.93	74.4
8M8F-PV8	1/2" Male NPT	1/2" Female NPT	2.17	55.1	1.33	33.8	0.56	14.2	0.56	14.2	3.04	77.2	2.93	74.4
8M8F-PVG8	1/2" Male NPT	1/2" Female NPT	3.33	84.6	2.25	57.2	0.56	14.2	0.56	14.2	3.04	77.2	2.93	74.4
8Z-PV8	1/2" Compression CPI™	1/2" Compression CPI™	1.91	48.5	1.91	48.5	0.56	14.2	0.56	14.2	3.04	77.2	2.93	74.4
12M8F-PV8	3/4" Male NPT	1/2" Female NPT	2.17	55.1	1.33	25.4	0.56	14.2	0.56	14.2	3.04	77.2	2.93	74.4

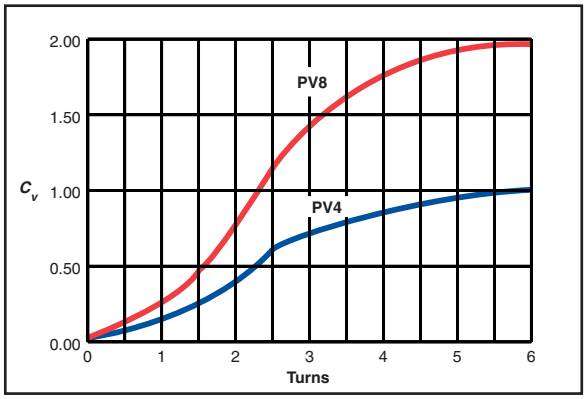
† For CPI™and A-LOK®, dimensions are measured with nuts in the finger tight position.

Pressure vs. Temperature



Note: To determine MPa, multiply bar by 0.1

Flow Characteristics



Note: When combining seat and seal materials, the most restrictive temperature rating becomes the limiting factor on temperature range.

Parker Hannifin Corporation
Instrumentation Products Division
Jacksonville, Alabama

Parker Instrumentation

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Needle Valves (V Series)

Catalog 4110-V
Revised, July 2001

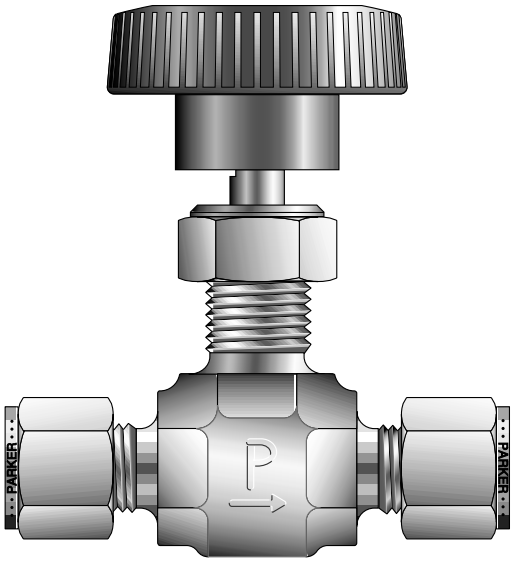
V Series Needle Valves

Introduction

Parker V Series Needle Valves are designed for positive leak tight shut-off and regulation of fluids in process, power, and instrumentation applications. With a wide variety of port sizes and styles, temperature capabilities ranging from -65 °F to 450 °F (-54 °C to 232 °C) and pressures to 5000 psig (345 bar), V Series Needle Valves provide the user with the utmost in flexibility when designing miniaturized tubing or piping systems.

Features

- Choice of three stem types:
  - R-Stem – All metal, blunt stem tip
  - N-Stem – All metal, tapered needle stem tip
  - K-Stem – PCTFE stem tip
- Differential hardness between the strain hardened stem and cold formed body threads provides improved cycle life
- Choice of PTFE packing or elastomeric O-ring stem seals
- 316 Stainless Steel, Steel, Brass and Alloy 400 construction
- Inline and angle patterns
- Wide variety of US Customary and SI ports
- Panel mountable
- 100% factory tested
- Optional color coded handles



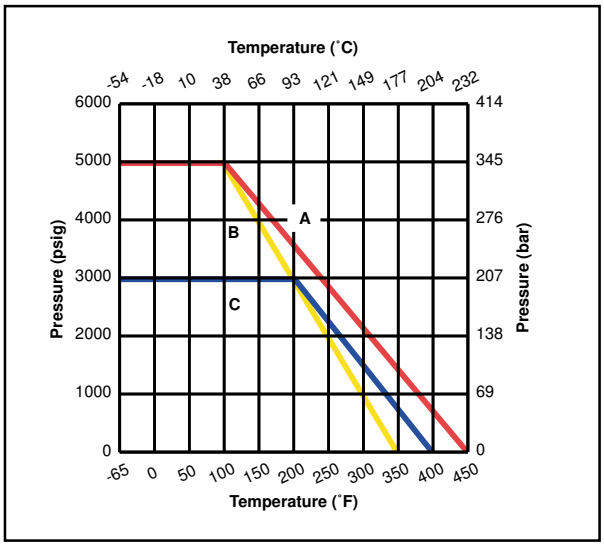
Model Shown: 4Z-V4LK-SS

Specifications

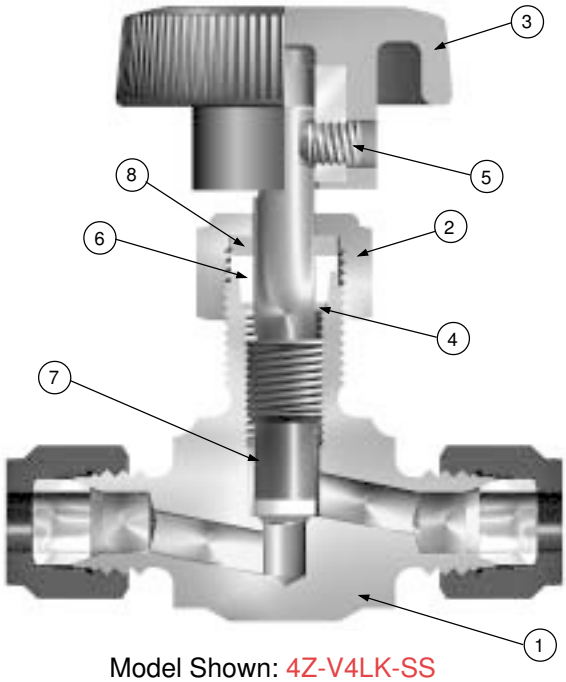
- Pressure Ratings:
  - 316 Stainless Steel:
    - 5000 psig (345 bar) CWP
  - Brass, Steel and Alloy 400:
    - 3000 psig (207 bar) CWP
- Orifice: 0.078” to 0.312” (2.0mm to 7.9mm)
- C_v: 0.12 to 1.90
- Port size: 1/8” to 3/4” (3mm to 12mm)
- Temperature Ratings:
  - Stainless Steel and Alloy 400:
    - -65 °F to 450 °F (-54 °C to 232 °C)
  - Brass:
    - -65 °F to 400 °F (-54 °C to 204 °C)
  - Steel:
    - -20 °F to 350 °F (-29 °C to 177 °C)
  - PTFE Packing:
    - -65 °F to 450 °F (-54 °C to 232 °C)
  - PCTFE Stem Tip:
    - -65 °F to 350 °F (-54 °C to 177 °C)
  - Buna-N Rubber Stem Seal:
    - -30 °F to 250 °F (-34 °C to 121 °C)
  - Fluorocarbon Rubber Stem Seal:
    - -15 °F to 400 °F (-26 °C to 204 °C)
  - Ethylene Propylene Rubber Stem Seal:
    - -70 °F to 275 °F (-57 °C to 135 °C)

Note: When combining body, seat and seal materials, the most restrictive temperature rating becomes the limiting factor on temperature range.

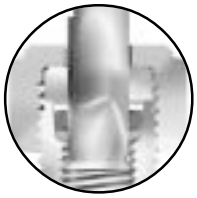
Pressure vs. Temperature



Legend: **A** - Stainless Steel with N or R stems; **B** - Stainless Steel with K stem; **C** - Brass, Steel, and Alloy 400 with N or R stems. Maximum temperature for Steel is 350 °F (177 °C)
Note: To determine MPa, multiply bar by 0.1



Model Shown: 4Z-V4LK-SS



O-Ring Stem Seal

Materials of Construction (with PTFE Packing)

Item #	Part Description	Stainless Steel	Brass	Steel	Alloy 400
1	Body	ASTM A 182 Type F316	ASTM B 283 Alloy C37700	ASTM A 576 Grade 1214	ASTM B 564 Alloy N04400
2	Packing Nut	ASTM A 479 Type 316	ASTM A 479 Type 316	ASTM A 479 Type 316	ASTM A 479 Type 316
3	Handle*	Nylon 6/6 with SS insert	Nylon 6/6 with SS insert	Nylon 6/6 with SS insert	Nylon 6/6 with SS insert
4	Lower Packing Washer	ASTM A 479 Type 316	ASTM A 479 Type 316	ASTM A 479 Type 316	ASTM B 164 Alloy N04400
5	Handle Screw	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
6	Packing**	PTFE	PTFE	PTFE	PTFE
7	Stem (R and N Stem)	ASTM A 276 Type 316	ASTM A 276 Type 316	ASTM A 276 Type 316	ASTM B 164 Alloy N04400
7A	Stem (K Stem)	ASTM A 276 Type 316, with PCTFE	ASTM A 276 Type 316, with PCTFE	ASTM A 276 Type 316, with PCTFE	ASTM B 164 with PCTFE
8	Upper Packing Washer	Brass	Brass	Brass	Brass
9	Panel Nut***	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel

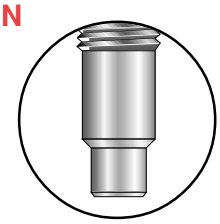
* Handles for V8 and V12 Series Valves with R and N Stems are aluminum T-bars.
** Optional O-ring elastomeric stem seals are available - See How to Order
*** Panel Nut is nickel plated brass on V2 Series Valves. Panel Nuts must be ordered separately - see page 10.
Lubrication: Graphite filled hydrocarbon

Stem Types

K

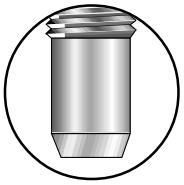
PCTFE tipped

N



Needle (2 1/2°)

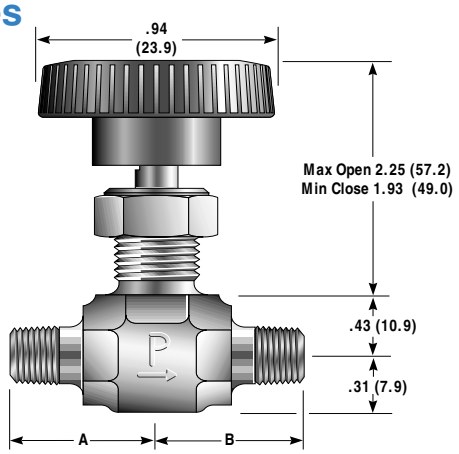
R



Blunt (30°)

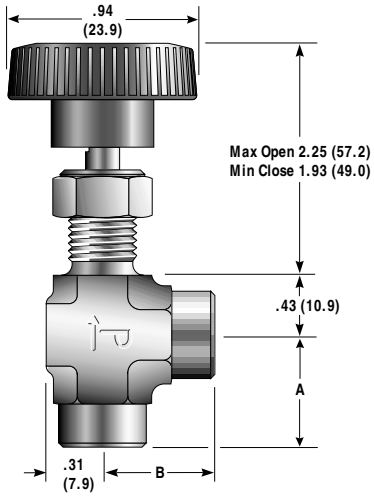
V Series Needle Valves

V2 Series



Model Shown: 2M-V2LN-B

Panel Hole Diameter:
0.45 (11.4)
Max Panel Thickness:
0.25 (6.4)



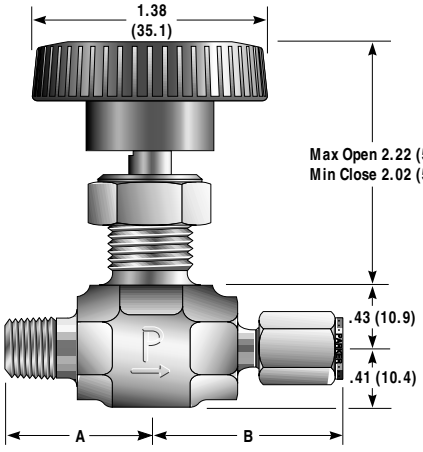
Model Shown: 2F-V2AR-V-SS

V2 Series Dimensions / Flow Data

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	X_T*	C_v	X_T*	Inch	mm	Inch	mm
2A-V2LR 2A-V2LN 2A-V2LK	2A-V2AR 2A-V2AN 2A-V2AK	1/8" Compression A-LOK®		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.13	0.78 0.80 0.83	0.14 0.14 0.14	0.67 0.63 0.63	1.01	25.7	1.01	25.7
2F-V2LR 2F-V2LN 2F-V2LK	2F-V2AR 2F-V2AN 2F-V2AK	1/8" Female NPT		Blunt Needle PCTFE	0.093	2.4	0.13 0.12 0.12	0.61 0.66 0.73	0.16 0.18 0.17	0.49 0.39 0.54	0.94	23.9	0.94	23.9
2M-V2LR 2M-V2LN 2M-V2LK	2M-V2AR 2M-V2AN 2M-V2AK	1/8" Male NPT		Blunt Needle PCTFE	0.093	2.4	0.13 0.12 0.12	0.61 0.66 0.73	0.16 0.18 0.17	0.49 0.39 0.54	0.75	19.1	0.75	19.1
2Z-V2LR 2Z-V2LN 2Z-V2LK	2Z-V2AR 2Z-V2AN 2Z-V2AK	1/8" Compression CPI™		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.13	0.78 0.80 0.83	0.14 0.14 0.14	0.67 0.63 0.63	1.01	25.7	1.01	25.7
4A-V2LR 4A-V2LN 4A-V2LK	4A-V2AR 4A-V2AN 4A-V2AK	1/4" Compression A-LOK®		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.13	0.78 0.80 0.83	0.14 0.14 0.14	0.67 0.63 0.63	1.09	27.7	1.09	27.7
4Z-V2LR 4Z-V2LN 4Z-V2LK	4Z-V2AR 4Z-V2AN 4Z-V2AK	1/4" Compression CPI™		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.13	0.78 0.80 0.83	0.14 0.14 0.14	0.67 0.63 0.63	1.09	27.7	1.09	27.7

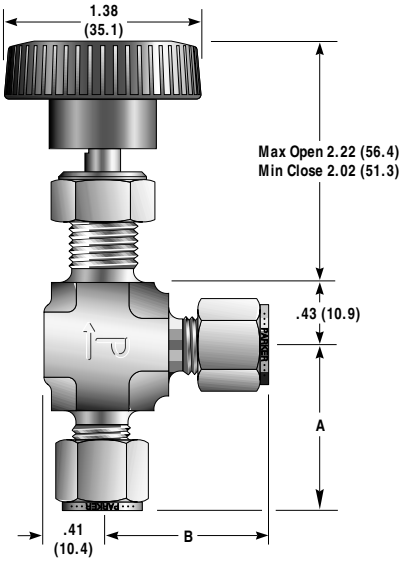
* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

V4 Series



Model Shown: 4M4Z-V4LK-SS

Panel Hole Diameter:
0.52 (13.2)
Max Panel Thickness:
0.25 (6.4)



Model Shown: M6A-V4AN-BN-B

( ) Denotes dimensions in millimeters

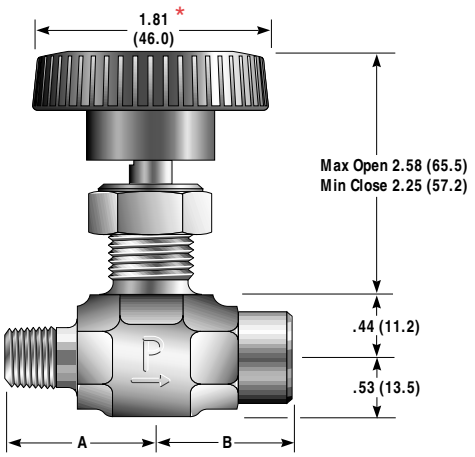
V4 Series Dimensions / Flow Data

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	X_T*	C_v	X_T*	Inch	mm	Inch	mm
2A-V4LR 2A-V4LN 2A-V4LK	2A-V4AR 2A-V4AN 2A-V4AK	1/8" Compression A-LOK®		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.14	0.52 0.68 0.66	0.15 0.15 0.17	0.64 0.59 0.49	1.10	27.9	1.10	27.9
2F-V4LR 2F-V4LN 2F-V4LK	2F-V4AR 2F-V4AN 2F-V4AK	1/8" Female NPT		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.77 0.69 0.55	0.55 0.55 0.58	0.63 0.63 0.68	0.81	20.6	0.81	20.6
2M-V4LR 2M-V4LN 2M-V4LK	2M-V4AR 2M-V4AN 2M-V4AK	1/8" Male NPT		Blunt Needle PCTFE	0.125	3.2	0.28 0.28 0.29	0.67 0.63 0.51	0.36 0.36 0.37	0.55 0.51 0.59	0.81	20.6	0.81	20.6
2Z-V4LR 2Z-V4LN 2Z-V4LK	2Z-V4AR 2Z-V4AN 2Z-V4AK	1/8" Compression CPI™		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.14	0.52 0.68 0.66	0.15 0.15 0.17	0.64 0.59 0.49	1.10	27.9	1.10	27.9
4A-V4LR 4A-V4LN 4A-V4LK	4A-V4AR 4A-V4AN 4A-V4AK	1/4" Compression A-LOK®		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	1.15	29.2	1.15	29.2
4M-V4LR 4M-V4LN 4M-V4LK	4M-V4AR 4M-V4AN 4M-V4AK	1/4" Male NPT		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	0.94	23.9	0.94	23.9
4W-V4LR 4W-V4LN 4W-V4LK	4W-V4AR 4W-V4AN 4W-V4AK	1/4" Tube Socket Weld		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	0.80	20.3	0.80	20.3
4Z-V4LR 4Z-V4LN 4Z-V4LK	4Z-V4AR 4Z-V4AN 4Z-V4AK	1/4" Compression CPI™		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	1.15	29.2	1.15	29.2
6A-V4LR 6A-V4LN 6A-V4LK	6A-V4AR 6A-V4AN 6A-V4AK	3/8" Compression A-LOK®		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	1.17	29.7	1.17	29.7
6Z-V4LR 6Z-V4LN 6Z-V4LK	6Z-V4AR 6Z-V4AN 6Z-V4AK	3/8" Compression CPI™		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	1.17	29.7	1.17	29.7
M3A-V4LR M3A-V4LN M3A-V4LK	M3A-V4AR M3A-V4AN M3A-V4AK	3mm Compression A-LOK®		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.14	0.52 0.68 0.66	0.15 0.15 0.17	0.64 0.59 0.49	1.10	27.9	1.10	27.9
M3Z-V4LR M3Z-V4LN M3Z-V4LK	M3Z-V4AR M3Z-V4AN M3Z-V4AK	3mm Compression CPI™		Blunt Needle PCTFE	0.078	2.0	0.12 0.12 0.14	0.52 0.68 0.66	0.15 0.15 0.17	0.64 0.59 0.49	1.10	27.9	1.10	27.9
M6A-V4LR M6A-V4LN M6A-V4LK	M6A-V4AR M6A-V4AN M6A-V4AK	6mm Compression A-LOK®		Blunt Needle PCTFE	0.156	4.0	0.37 0.37 0.39	0.78 0.72 0.62	0.48 0.48 0.51	0.60 0.58 0.64	1.15	29.2	1.15	29.2
M6Z-V4LR M6Z-V4LN M6Z-V4LK	M6Z-V4AR M6Z-V4AN M6Z-V4AK	6mm Compression CPI™		Blunt Needle PCTFE	0.156	4.0	0.37 0.37 0.39	0.78 0.72 0.62	0.48 0.48 0.51	0.60 0.58 0.64	1.15	29.2	1.15	29.2
M8A-V4LR M8A-V4LN M8A-V4LK	M8A-V4AR M8A-V4AN M8A-V4AK	8mm Compression A-LOK®		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	1.18	30.0	1.18	30.0
M8Z-V4LR M8Z-V4LN M8Z-V4LK	M8Z-V4AR M8Z-V4AN M8Z-V4AK	8mm Compression CPI™		Blunt Needle PCTFE	0.176	4.5	0.43 0.43 0.45	0.85 0.77 0.69	0.55 0.55 0.58	0.63 0.63 0.68	1.18	30.0	1.18	30.0

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

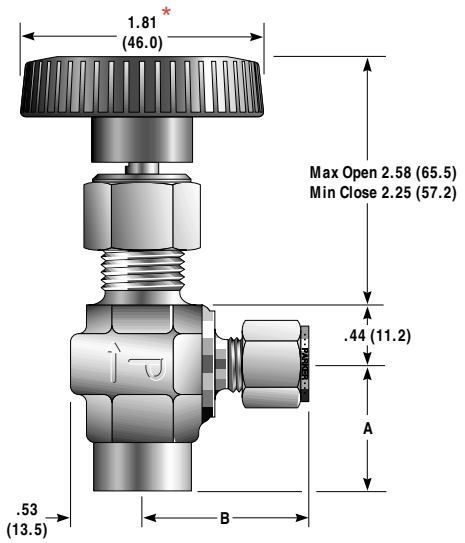
V Series Needle Valves

V6 Series



Model Shown: 6M4F-V6LR-V-SS

Panel Hole Diameter:
0.45 (11.4)
Max Panel Thickness:
0.25 (6.4)



Model Shown: 4F6Z-V6AK-SS

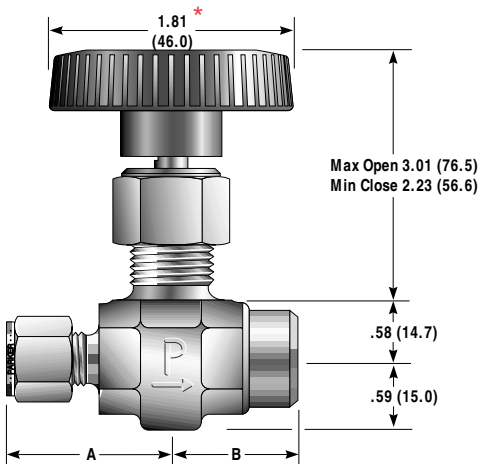
* Note: Handle diameter for K Stem V6 Series Valves is 1.38 (35.4)
( ) Denotes dimensions in millimeters

V6 Series Dimensions / Flow Data

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	X_T*	C_v	X_T*	Inch	mm	Inch	mm
4F-V6LR 4F-V6LN 4F-V6LK	4F-V6AR 4F-V6AN 4F-V6AK	1/4" Female NPT		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	0.94	23.9	0.94	23.9
6A-V6LR 6A-V6LN 6A-V6LK	6A-V6AR 6A-V6AN 6A-V6AK	3/8" Compression A-LOK®		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	1.29	32.8	1.29	32.8
6M-V6LR 6M-V6LN 6M-V6LK	6M-V6AR 6M-V6AN 6M-V6AK	3/8" Male NPT		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	1.03	26.2	1.03	26.2
6Z-V6LR 6Z-V6LN 6Z-V6LK	6Z-V6AR 6Z-V6AN 6Z-V6AK	3/8" Compression CPI™		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	1.29	32.8	1.29	32.8
8A-V6LR 8A-V6LN 8A-V6LK	8A-V6AR 8A-V6AN 8A-V6AK	1/2" Compression A-LOK®		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	1.40	35.6	1.40	35.6
8Z-V6LR 8Z-V6LN 8Z-V6LK	8Z-V6AR 8Z-V6AN 8Z-V6AK	1/2" Compression CPI™		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	1.40	35.6	1.40	35.6
M10A-V6LR M10A-V6LN M10A-V6LK	M10A-V6AR M10A-V6AN M10A-V6AK	10mm Compression A-LOK®		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	1.30	33.0	1.30	33.0
M10Z-V6LR M10Z-V6LN M10Z-V6LK	M10Z-V6AR M10Z-V6AN M10Z-V6AK	10mm Compression CPI™		Blunt Needle PCTFE	0.228	5.8	0.73 0.55 0.80	0.90 0.61 0.87	1.23 0.92 1.23	0.50 0.62 0.56	1.30	33.0	1.30	33.0

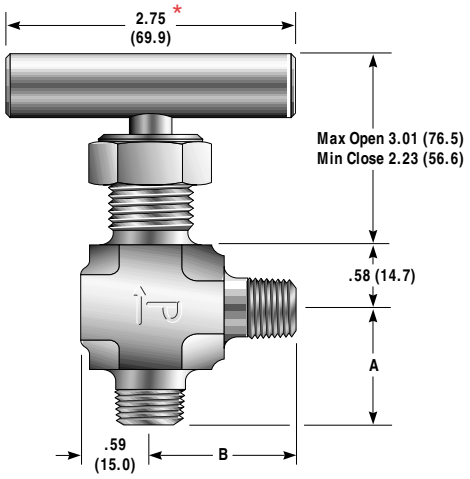
* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

V8 Series



Model Shown: 8Z6F-V8LK-SS

Panel Hole Diameter:
0.77 (19.6)
Max Panel Thickness:
0.40 (10.2)



Model Shown: 8M-V8AN-EPR-SS

* Note: Handles for N or R Stem V8 Series Valves are a T-bar
( ) Denotes dimensions in millimeters

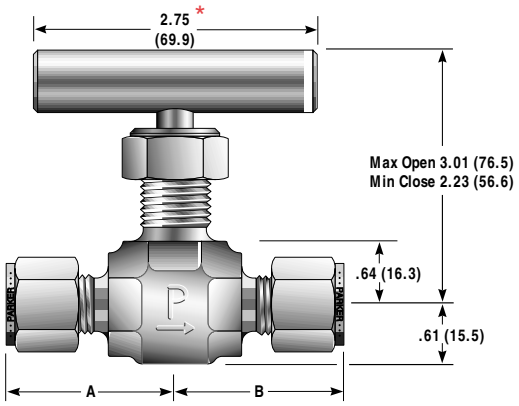
V8 Series Dimensions / Flow Data

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	X_T*	C_v	X_T*	Inch	mm	Inch	mm
6F-V8LR 6F-V8LN 6F-V8LK	6F-V8AR 6F-V8AN 6F-V8AK	3/8" Female NPT		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.34	34.0	1.34	34.0
8A-V8LR 8A-V8LN 8A-V8LK	8A-V8AR 8A-V8AN 8A-V8AK	1/2" Compression A-LOK®		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.53	38.9	1.53	38.9
8M-V8LR 8M-V8LN 8M-V8LK	8M-V8AR 8M-V8AN 8M-V8AK	1/2" Male NPT		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.34	34.0	1.34	34.0
8Z-V8LR 8Z-V8LN 8Z-V8LK	8Z-V8AR 8Z-V8AN 8Z-V8AK	1/2" Compression CPI™		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.53	38.9	1.53	38.9
M10A-V8LR M10A-V8LN M10A-V8LK	M10A-V8AR M10A-V8AN M10A-V8AK	10mm Compression A-LOK®		Blunt Needle PCTFE	0.281	7.1	1.13 0.97 1.18	0.79 0.78 0.80	1.52 1.18 1.69	0.66 0.75 0.66	1.42	36.1	1.42	36.1
M10Z-V8LR M10Z-V8LN M10Z-V8LK	M10Z-V8AR M10Z-V8AN M10Z-V8AK	10mm Compression CPI™		Blunt Needle PCTFE	0.281	7.1	1.13 0.97 1.18	0.79 0.78 0.80	1.52 1.18 1.69	0.66 0.75 0.66	1.42	36.1	1.42	36.1
M12A-V8LR M12A-V8LN M12A-V8LK	M12A-V8AR M12A-V8AN M12A-V8AK	12mm Compression A-LOK®		Blunt Needle PCTFE	0.281	7.1	1.13 0.97 1.18	0.79 0.78 0.80	1.52 1.18 1.69	0.66 0.75 0.66	1.51	38.4	1.51	38.4
M12Z-V8LR M12Z-V8LN M12Z-V8LK	M12Z-V8AR M12Z-V8AN M12Z-V8AK	12mm Compression CPI™		Blunt Needle PCTFE	0.281	7.1	1.13 0.97 1.18	0.79 0.78 0.80	1.52 1.18 1.69	0.66 0.75 0.66	1.51	38.4	1.51	38.4

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

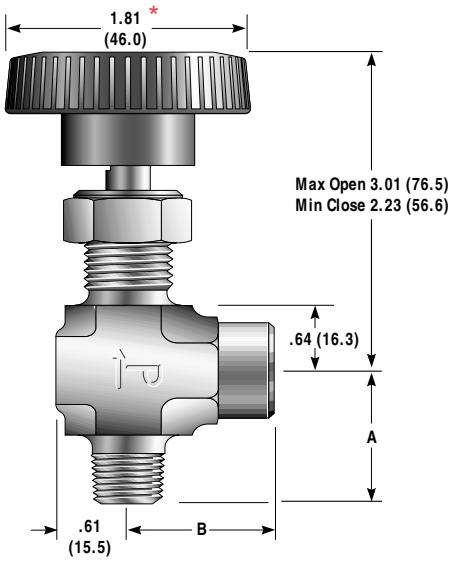
V Series Needle Valves

V12 Series



Model Shown: 10Z-V12LN-B

Panel Hole Diameter:
0.77 (19.6)
Max Panel Thickness:
0.40 (10.2)



Model Shown: 8M8F-V12AK-BN-SS

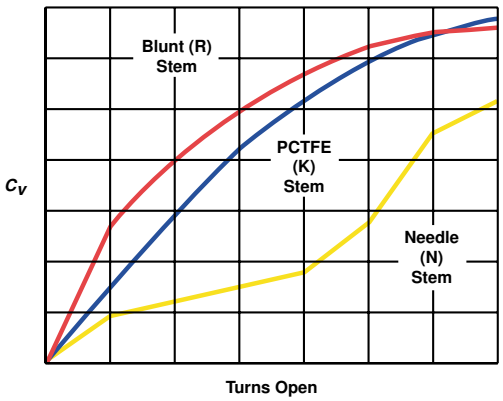
* Note: Handles for N or R Stem V12 Series Valves are a T-bar
( ) Denotes dimensions in millimeters

V12 Series Dimensions / Flow Data

Basic Part Number		End Connections		Stem	Flow Data						Dimensions			
		Inlet	Outlet		Orifice		Inline		Angle		A†		B†	
Inline	Angle	(Port 1)	(Port 2)	Type	Inch	mm	C_v	X_T*	C_v	X_T*	Inch	mm	Inch	mm
8F-V12LR 8F-V12LN 8F-V12LK	8F-V12AR 8F-V12AN 8F-V12AK	1/2" Female NPT		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.38	35.1	1.38	35.1
8W-V12LR 8W-V12LN 8W-V12LK	8W-V12AR 8W-V12AN 8W-V12AK	1/2" Tube Socket Weld		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.12	28.4	1.12	28.4
10A-V12LR 10A-V12LN 10A-V12LK	10A-V12AR 10A-V12AN 10A-V12AK	5/8" Compression A-LOK®		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.52	38.6	1.52	38.6
10Z-V12LR 10Z-V12LN 10Z-V12LK	10Z-V12AR 10Z-V12AN 10Z-V12AK	5/8" Compression CPI™		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.52	38.6	1.52	38.6
12A-V12LR 12A-V12LN 12A-V12LK	12A-V12AR 12A-V12AN 12A-V12AK	3/4" Compression A-LOK®		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.52	38.6	1.52	38.6
12Z-V12LR 12Z-V12LN 12Z-V12LK	12Z-V12AR 12Z-V12AN 12Z-V12AK	3/4" Compression CPI™		Blunt Needle PCTFE	0.312	7.9	1.23 1.05 1.29	0.87 0.83 0.91	1.66 1.28 1.90	0.72 0.80 0.76	1.52	38.6	1.52	38.6

* Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$.
† For CPI™ and A-LOK®, dimensions are measured with nuts in the finger tight position.

V Series Flow Characteristics



How to Order

The correct part number is easily derived from the following number sequence. The six product characteristics required are coded as shown below. *Note: If the inlet and outlet ports are the same, eliminate the outlet port designator.

Example:	4Z	*	-	V4A	K	-	BN	-	SS
	①	②		③	④		⑤		⑥
	Inlet Port	Outlet Port		Valve Series	Stem Type		Stem Seal		Body Material

Describes a angle pattern V4 Series needle valve equipped with 1/4" CPI™ compression inlet and outlet ports, a PCTFE tipped stem, Buna-N seals, and stainless steel construction.

Example:	4M	4F	-	V6L	N	-	B
	①	②		③	④	⑤	⑥
	Inlet Port	Outlet Port		Valve Series	Stem Type	Stem Seal	Body Material

Describes a inline pattern V6 Series needle valve equipped with 1/4" male NPT inlet port, 1/4" female NPT outlet port, a needle stem type, PTFE stem seal, brass construction.

① Inlet Port	② Outlet Port	③ Valve Series	④ Stem Type	⑤ Stem Seal	⑥ Body Material
2A, 2F, 2M, 2Z, 4A, 4Z		V2	**R** - Blunt (30°) **N** - Needle (2 1/2°) **K** - PCTFE	**Blank -** PTFE **BN-** Buna-N Rubber **EPR-** Ethylene Propylene Rubber **V-** Fluorocarbon Rubber	**SS-** Stainless Steel **S -** Steel **M -** Alloy 400 **B -** Brass
2A, 2F, 2M, 2Z, 4A, 4M, 4W, 4Z, 6A, 6Z, M3A, M3Z, M6A, M6Z, M8A, M8Z		V4			
4A, 4F, 4M, 4Z, 6A, 6M, 6W, 6Z, 8A, 8Z, M8A, M8Z, M10A, M10Z, M12A, M12Z		V6			
4F, 6A, 6F, 6Z, 8A, 8M, 8Z, M10A, M10Z, M12A, M12Z		V8			
8F, 8W, 10A, 10Z, 12A, 12Z		V12			

Available End Connections

Z - One ferrule CPI™ compression port

A - Two ferrule A-LOK® compression port

M - ANSI/ASME B1.20.1 External pipe threads

F - ANSI/ASME B1.20.1 Internal pipe threads

How to Order Options

Colored Round Handles – Add the designator corresponding to the correct handle color as a suffix to the part number. Black is standard, **W** - white, **B** - blue, **G** - green, **R** - red, **Y** - yellow. Example: M10A-V6LK-SS-**G**

Oxygen Cleaning – Add the suffix **-C3** to the end of the part number to receive valves cleaned and assembled for oxygen service in accordance with Parker Specification ES8003. Example: 4A-V4AN-EPR-SS-**C3**

Sour Gas – To obtain valves suitable for sour gas service in accordance with NACE Standard MR0175, add the suffix **NACE** to the end of the part number. Example: 8F-V12LR-SS-**NACE**

How to Order Components

Colored Round Nylon Handles with Handle Screw - Valve Series-Handle-Color. Example: **V4-HANDLE-BLUE**
Stainless Steel T-Bar Handles with Handle Screw - V2: V2-BAR-HANDLE-SS; V4:V4-BAR-HANDLE-SS; V6: V6-BAR-HANDLE-SS; V8: U12-BAR-HANDLE-SS; V12: U12-BAR-HANDLE-SS
Aluminum T-Bar Handles with Handle Screw - V2: Not available; V4: V4-BAR-HANDLE-AL; V6:V4-BAR-HANDLE-AL; V8: U12-BAR-HANDLE-AL; V12: U12-BAR-HANDLE-AL
Panel Mounting Nuts - V2: 2 Panel Nut; V4: 4 Panel Nut-SS; V6: 6 Panel Nut-SS; V8: 8 Panel Nut-SS

How to Order Maintenance Kits

PTFE Packing Stem Kits - Consists of One Stem; One PTFE Packing: One Upper Packing Washer; One Lower Packing Washer; One Packing Nut; Maintenance Instructions.
Kit-Valve Series and StemType-Body Material. Examples: **KIT-V4K-SS; KIT-V6N-B**
Fluorocarbon Rubber Packing Stem Kits - Consists of One Stem; One Fluorocarbon Rubber O-ring Seal; One O-ring Back-up Gland; One O-ring Gland; One Lower Packing Washer; One Packing Nut; Maintenance Instructions.
Kit-Valve Series and Stem Type-V-Body Material. Examples: **KIT-V2R-V-B; KIT-V4K-V-SS**
Buna-N Rubber Packing Stem Kits - Consists of One Stem; One Buna-N Rubber O-ring Seal; One O-ring Back-up Gland; One O-ring Gland; One Lower Packing Washer; One Packing Nut; Maintenance Instructions.
Kit-Valve Series and Stem Type-BN-Body Material. Examples: **KIT-V2R-BN-B; KIT-V4K-BN-SS**
Ethylene Propylene Rubber Packing Stem Kits - Consists of One Stem; One Ethylene Propylene Rubber O-ring Seal; One O-ring Back-up Gland; One O-ring Gland; One Lower Packing Washer; One Packing Nut; Maintenance Instructions.
Kit-Valve Series and Stem Type-EPR-Body Material. Examples: **KIT-V2R-EPR-B; KIT-V4K-EPR-SS**

Offer of Sale

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2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that items sold hereunder shall be free from defects in material or workmanship. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. Limitation Of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and not withstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

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