Process to Instrument Valves

Pro-Bloc® EP Series

Parker

ENGINEERING YOUR SUCCESS.

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PROCESS INSTRUMENTATION VALVE SOLUTIONS

Introduction

Parker EP series Process to Instrument valves locate directly onto the process pipeline (front cover) and facilitate a double block and bleed function for the safe removal of pressure measuring instruments (transmitter or gauge).

This is done by isolating the primary block valve, opening the vent to remove the pressure within the instrument , then closing the vent and isolate the secondary block valve. The transmitter (or gauge) can now be safely removed for replacement or calibration in a workshop. The calibrated or replacement transmitter is then re installed and the block valves returned to the open position to resume the instrument function of pressure measurement.

The Parker EP series combines two block and one bleed valve into a single body. This reduces space, weight, potential leak points and additional costs all associated with the traditional method of combining single flanged block valves to create the double block and bleed function.

The EP series is designed to the EEMUA 182 design code giving the operator and owner assurance of a valve designed to sound engineering practices. The key advantages of EEMUA 182 are shown on the Features, Benefits and Values table.

Parker offer these valves in many configurations in a wide variety of materials commonly used in industries today. They are manufactured in our UK ISO9001, ISO14001 and ISO45001 compliant facility.

The valves are offered with both screwed ends such as NPT Female for direct mount of the instrument or when remote mount is required we offer integral compression fitting ends to facilitate the tubing.

The integral compression ends (two ferrule A-LOK® or single ferrule CPI™) removes the need for NPT, thus removing potential galling, thread tape or sealant, additional leak paths and at the same time reduces the costs associated with buying and installing a separate fitting.

Upstream Oil & Gas

Downstream Oil & Gas

Industrial Gas

Parker EHS Vision Statement:

Parker recognizes, and believes, in the importance of safeguarding natural resources and the global environment. We are committed to our employees, our communities, and our customers: their health, safety and understanding of the need for environmental stewardship.

We are committed to the concept of continuous improvement in environmental performance. Accordingly, we are committed to the following principles:

- We will seek to comply with environmental, health, and safety laws worldwide.
- We strive to minimize or eliminate the generation of waste.
- We will monitor compliance with environmental, health and safety regulations.

General Technical Information

Design

EEMUA 182 specification for integral block and bleed valve manifolds for direct connection to pipework. This specification covers manifolds, comprising two or more isolating valves and a vent valve, in an integral body, intended for the following applications:

- Having an inlet directly connected to the process pipework and an outlet connection not larger than DN 50 (NPS 2), whose principal use is as a replacement for individual block and bleed valves at tapping points in piping systems.
- Arrangements having an inlet and outlet directly connected to the process pipework, whose principal use is for equipment or process isolation.

Relevant codes, standards and specifications

Code/Specification	Description
EEMUA 182	Specification for Integral Block and Bleed and Bleed Valve Manifolds for Direct Connection to Pipework
ASME B16.34/ ASME VIII Div. I	Valves - Flanged, Threaded and Welding End
ASME B16.5	Pipe Flanges and Flanged Fittings
NACE MR0175 / ISO 15156	Petroleum and Natural Gas Industries - Materials for use in H2S - Containing Environments in Oil and Gas Production
API 598	Valves Inspection and Testing
API 607 / ISO 10497	Fire Test of Soft-Seated Quarter Turn Valves Fire Type-Testing Requirements
MSS SP-25	Standard Marking Systems for Valves, Fittings, Flange and Unions
MSS SP-61	Pressure Testing of Valves

Materials of construction

All materials are purchased from long standing reputable sources, conforming not only to recognised national/ international standards, but also to additional requirements imposed by Parker to assure suitability/usability across the widest spectrum of user applications.

A range of techniques and processes including PMI (Positive Material Identification) are used to validate all incoming material supplies, segregation, storage and maintenance of product quality.

Body material options

Material Group	Material Designator	UNS No.	ASTM Material Grade
Carbon Steel	A105 / A350-LF2	UNS 1.0482	A105
Austenitic Stainless Steel	316/316L Dual Certified	UNS S31600	A479 Gr 316
		UNS S31603	A479 Gr 316L
Austenitic-Ferritic Steel (Duplexes)	Duplex 22Cr	UNS S31803	A479/A276
	Duplex 25Cr	UNS S32750	A479/A276
		UNS S32760	A479/A276
Nickel Alloy	Alloy 825	UNS N08825	ASTM B425
Nickel Alloy	Alloy 625	UNS N06625	ASTM B446

All materials will meet (as applicable) the requirements of NACE MR0103/MR0175 and ISO 15156. They are further supplied as per NORSOK M650/M630 as required.

Pro-Bloc® Bore Size/Class Combinations

The shaded areas shown on the chart below indicate the available flange class/size per bore size. If not shaded the combinations cannot be manufactured on end entry type valves.

		Raised Face				Ring Type Joint			
Flange		Bore				Bore			
Class	Size	10mm	15mm	20mm	25mm	10mm	15mm	20mm	25mm
150 LB	1/2”	■							
	3/4”	■							
	1”	■	■	■		■	■	■	
	1 1/2”	■	■	■	■	■	■	■	■
	2”	■	■	■	■	■	■	■	■
	2 1/2”				■				■
	3”				■				■
300 LB	1/2”	■				■			
	3/4”	■	■			■	■		
	1”	■	■	■		■	■	■	
	1 1/2”	■	■	■	■	■	■	■	■
	2”	■	■	■	■	■	■	■	■
	2 1/2”				■				■
	3”				■				■
600 LB	1/2”	■				■			
	3/4”	■	■			■	■		
	1”	■	■	■		■	■	■	
	1 1/2”	■	■	■	■	■	■	■	■
	2”	■	■	■	■	■	■	■	■
	2 1/2”				■				■
	3”				■				■
900/1500 LB	1/2”	■				■			
	3/4”	■	■			■	■		
	1”	■	■	■		■	■	■	
	1 1/2”	■	■	■	■	■	■	■	■
	2”	■	■	■	■	■	■	■	■
	2 1/2”				■				■
	3”				■				■
2500 LB	1/2”	■				■			
	3/4”	■	■			■	■		
	1”	■	■	■		■	■	■	
	1 1/2”	■	■	■	■	■	■	■	■
	2”	■	■	■	■	■	■	■	■
	2 1/2”				■				■
	3”				■				■

Pro-Bloc® EP Series

With EEMUA 182 Design Conformance

Parker's Pro-Bloc® EP series valve, conforming to the EEMUA 182 standard is a process to instrument valve which has a double block and bleed function and consists of two separate isolating balls and one vent in a single unit. The valve is also available in a block and bleed arrangement.

The single piece construction offers space and weight saving benefits over the traditional method of using three separate valves fabricated to create double block and bleed.

Parker are able to supply all valves with integral ended compression fittings for remote applications where the measuring instrument is not directly connected to the valve, removing the need for NPT threads and associated sealant or tape.

Markets / Applications:

- Oil & Gas Upstream
- Oil & Gas Downstream
- Petrochemical
- Chemical
- Industrial Gas

Design Standards:

- EEMUA 182
- Body wall thickness: ASME B16.34/ASME VIII Div. I EEMUA 182
- Fire safe: API 6FA and API 607
- NACE

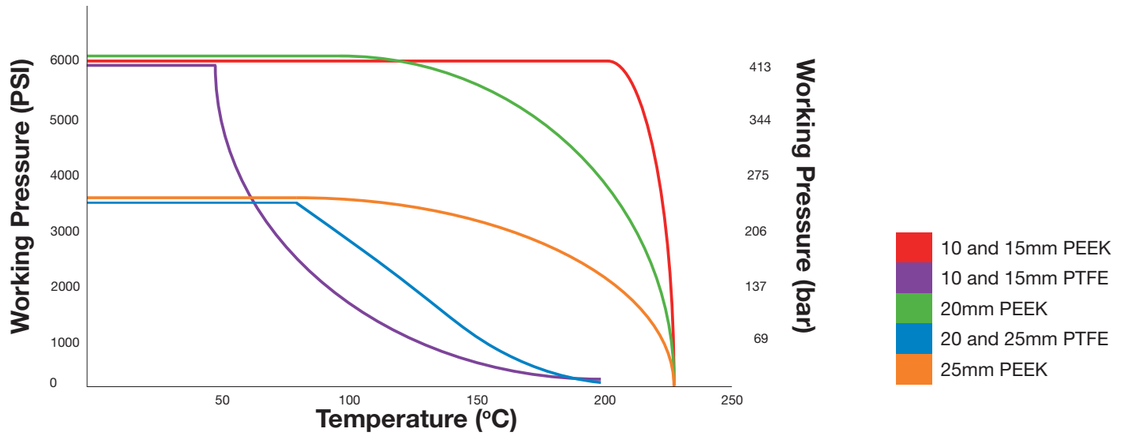
Technical Specifications:

Bore sizes	10 mm, 15 mm, 20 mm, 25 mm
Seat materials	PTFE, PEEK
Body materials	Stainless Steel ASTM A182-F316/F316L Duplex A182-F51 Super Duplex ASTM A182-F53/F55 Low Temp Carbon Steel ASTM A350 LF2/ ASTM A105 6Mo Alloy 625 Alloy 825
Max. Working Temperature	232° C
Min. Working Temperature	-54° C
Max. Working Pressure	6,249 PSI (431 bar)

Pressure-Temperature Ratings for Flanges ASME/ANSI B16.5

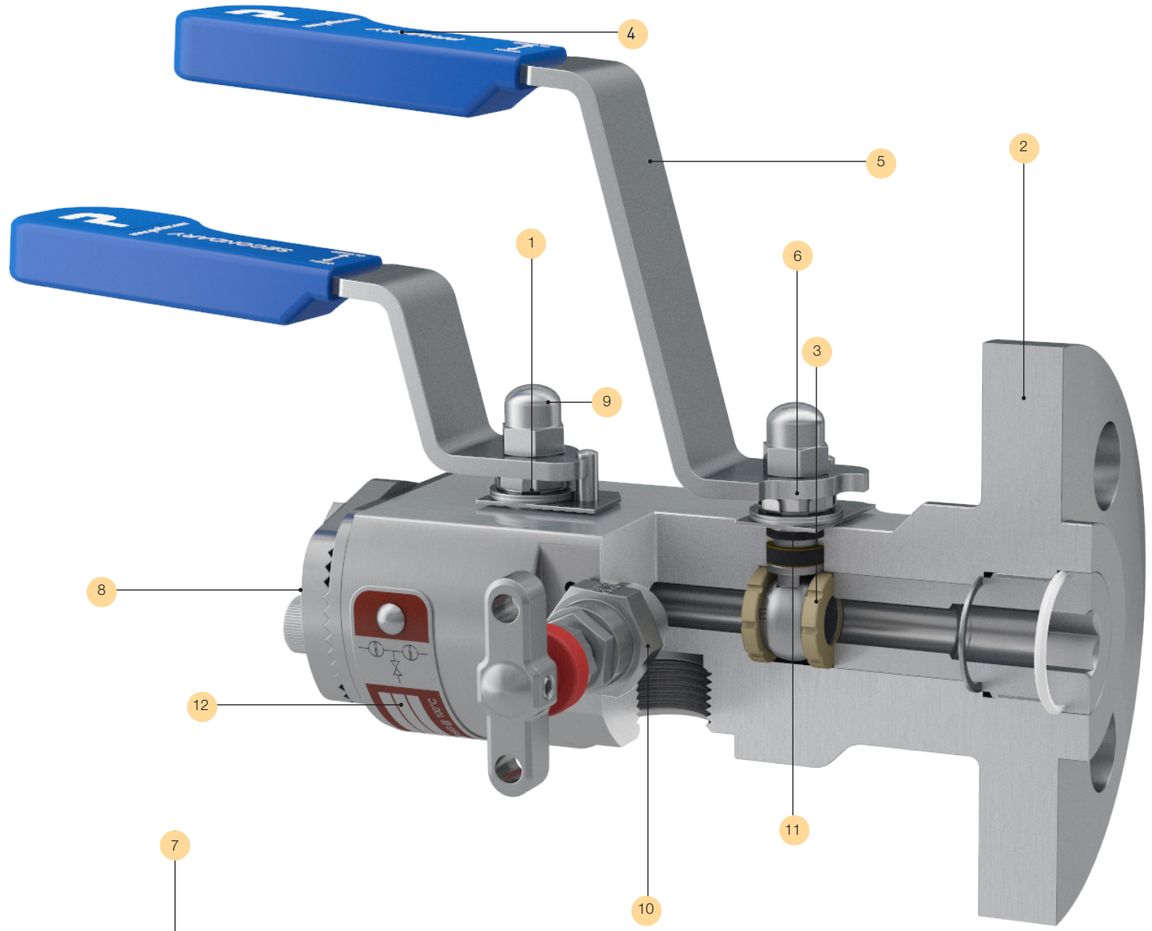
Flange Material	°C	-29	38	50	100	150	200	250
	°F	-20	100	122	212	302	392	482
		Working Pressure - PSI (bar)						
		Class 150						
Carbon Steel		284 (19.6)	284 (19.6)	278 (19.2)	257 (17.7)	229 (15.8)	200 (13.8)	175 (12.1)
316/316L St.Steel		276 (19.0)	276 (19.0)	267 (18.4)	235 (16.2)	215 (14.8)	199 (13.7)	175 (12.1)
Duplex		290 (20.0)	290 (20.0)	283 (19.5)	257 (17.7)	229 (15.8)	200 (13.8)	175 (12.1)
		Class 300						
Carbon Steel		741 (51.1)	741 (51.1)	727 (50.1)	676 (46.6)	654 (45.1)	635 (43.8)	608 (41.9)
316/316L St.Steel		719 (49.6)	719 (49.6)	698 (48.1)	612 (42.2)	558 (38.5)	518 (35.7)	484 (33.4)
Duplex		750 (51.7)	750 (51.7)	750 (51.7)	735 (50.7)	666 (45.9)	619 (42.7)	587 (40.5)
		Class 600						
Carbon Steel		1481 (102.1)	1481 (102.1)	1453 (100.2)	1352 (93.2)	1308 (90.2)	1270 (87.6)	1271 (83.9)
316/316L St.Steel		1440 (99.3)	1440 (99.3)	1395 (96.2)	1224 (84.4)	1117 (77.0)	1034 (71.3)	969 (66.8)
Duplex		1500 (103.4)	1500 (103.4)	1500 (103.4)	1469 (101.3)	1333 (91.9)	1237 (85.3)	1173 (80.9)
		Class 900						
Carbon Steel		2222 (153.2)	2222 (153.2)	2181 (150.4)	2028 (139.8)	1961 (135.2)	1906 (131.4)	1824 (125.8)
316/316L St.Steel		2159 (148.9)	2159 (148.9)	2093 (144.3)	1836 (126.6)	1675 (115.5)	1552 (107.0)	1452 (100.1)
Duplex		2249 (155.1)	2249 (155.1)	2249 (155.1)	2204 (152.0)	1999 (137.8)	1856 (128.0)	1761 (121.4)
		Class 1500						
Carbon Steel		3703 (255.3)	3703 (255.3)	3634 (250.6)	3379 (233.0)	3269 (225.4)	3176 (219.0)	3041 (209.7)
316/316L St.Steel		3600 (248.2)	3600 (248.2)	3489 (240.6)	3060 (211.0)	2792 (192.5)	2586 (178.3)	2421 (166.9)
Duplex		3750 (258.6)	3750 (258.6)	3750 (258.6)	3674 (253.3)	3330 (229.6)	3093 (213.3)	2934 (202.3)
		Class 2500						
Carbon Steel		6171 (425.5)	6171 (425.5)	6058 (417.7)	5632 (388.3)	5447 (375.6)	5294 (365.0)	5069 (349.5)
316/316L St.Steel		6000 (413.7)	6000 (413.7)	5814 (400.9)	5099 (351.6)	4653 (320.8)	4310 (297.2)	4033 (278.1)
Duplex		6249 (430.9)	6249 (430.9)	6249 (430.9)	6123 (422.2)	5550 (382.7)	5154 (355.4)	4890 (337.2)

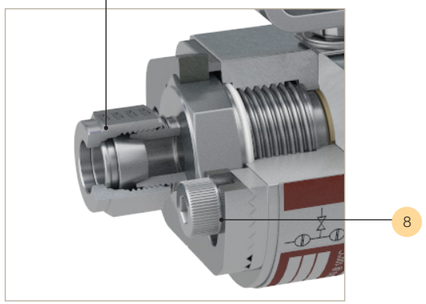
Pressure-Temperature Ratings for Seats



Pro-Bloc® EP Series

Features Benefits and Values





Tru-Loc® Mechanical End Connection

Designed specifically for Pro-Bloc® end connection security. Extensive tests have proved that end connections locked with the Tru-Loc™ end connector locking mechanism give 100% security and prevent end connector movement when disconnecting instruments or connectors. This ensures that the ball seat is securely positioned at all times.

Integral tubing connections

For the ultimate in safety, reliability, speed and ease of installation all valves can be specified with integral tube connections. Parker A-LOK® (Two Ferrule) or CPI™ (Single Ferrule) compression fitting technology.

Reference	Feature	Benefit	Value
1	Packing adjustment nut under lever	Allows removal of handle without compromising packing integrity Conforms to EEMUA 182	**Safety** **Performance & Reliability**
2	Close to shape forgings	Strength Reduction in potenital leak paths	**Safety** **Durability**
3	Slotted seats	Cavity relief on seats prevents over pressurisation of ball cavity	**Safety**
4	Ergonomic vinyl sleeves	Easy to grip and comfortable	**Ease of Operation**
5	Longer and thicker gauge levers	Gives more hand clearance More rugged and positive feel	**Ease of Operation** **Durability**
6	Double D stem drive for 10mm bore size, rectangular drive on stems for bore sizes over 10mm	Ensures handle orientation is correct Conforms to EEMUA 182	**Performance & Reliability** **Ease of Operartion**
7	Integral compression ends available (A-LOK®, CPI™)	Reduces leak paths Removes the need for PTFE tape and sealant Reduces component costs	**Performance & Reliability** **Lower overall cost**
8	Tru-Loc®	Prevents accidental disassembly of end loaded valves	**Safety**
9	Domed nut	Prevents dirt or corrosion compromising the thread integrity	**Safety** **Performance & Reliability**
10	5mm Bleed Hole	Prevents plugging and conforms to EEMUA 182	**Performance & Reliability**
11	Blowout proof stem	Prevents catastrophic failure and conforms to EEMUA 182	**Safety**
12	Metal identification label	Identify product part number, flow paths, material and temperature	**Safety**

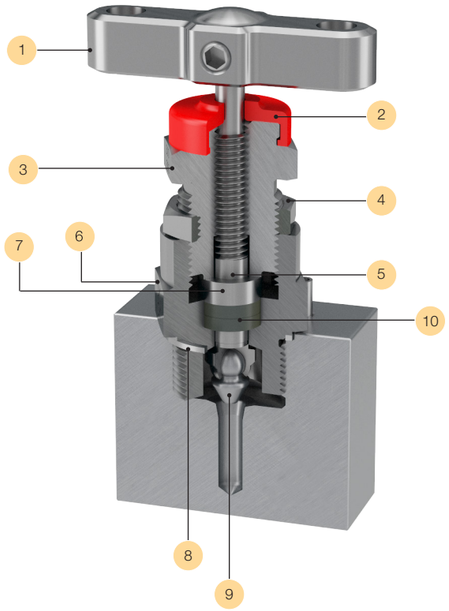
Bill of Materials

Description	Stainless Steel	Carbon Steel	Duplex
Body	316/316L St.Stl ASTM A182-F316/F316L	ASTM A105 /A350-LF2	Duplex St.Stl ASTM A182-F51
End Connections and Flange Inserts	316/316L St.Stl ASTM A479 UNS S31600/S31603	ASTM A105 /A350-LF2	Duplex St.Stl ASTM A479 UNS S31803
Ball Valve Ball	316/316L St.Stl ASTM A479 UNS S31600/S31603		Duplex St.Stl ASTM A479 UNS S31803
Ball Valve Stems	316/316L St.Stl ASTM A479 UNS S31600/S31603		Duplex St.Stl ASTM A479 UNS S31803
Ball Valve Seats	PTFE / PEEK		
Ball Valve Packing	Graphite		
Body Seals	316/316L St.Stl ASTM A479 UNS S31600/S31603 Graphite		6MO ASTM A479 UNS S31254
Needle Valve Stem	316/316L St.Stl ASTM A479 UNS S31600/S31603		Duplex St.Stl ASTM A479 UNS S31803
Needle Valve Tip	17/4 PH St.Stl ASTM A564/A564M UNS S17400		Super Duplex St.Stl ASTM A479 UNS S32750/S32760
Needle Valve Screwed Bonnet and Gland Adjuster	316/316L St.Stl ASTM A479 UNS S31600/S31603		Duplex St.Stl ASTM A479 UNS S31803
All other components	316 St.Stl		

Vent Valve Options

H-Series Needle Valve - Class 2500 (6,000 PSI)

For safe, reliable and repeatable performance



Reference	Description
1	Ergonomic ‘T’ bar style handle with positive retention
2	Dual purpose dust cap provides functional identification
3	Compensatory adjustable gland
4	Secure anti-vibration gland lock nut
5	Anti-blowout low torque back seating stem
6	All metal body bonnet seal
7	Gland thrust bush ensures uniform packing compression and tight sealing
8	Annealed sealing washer guarantees 100% sealing assurance
9	Self-centering, non-rotating stem tip guarantees bubble tight shut off
10	Gland packing below stem threads preventing thread lubricant wash-out

Notes:
- For products specified in optional materials, non-wetted parts will be 316 Stainless Steel as standard.
- The temperature range of the EP-Series valve is dictated by the ball valve seat material.

H-Series Anti-Tamper Valve

All EP-Series valves with anti-tamper on the vent are supplied with a key. Please note, image of the key below is not to scale compared with the anti-tamper spindle.

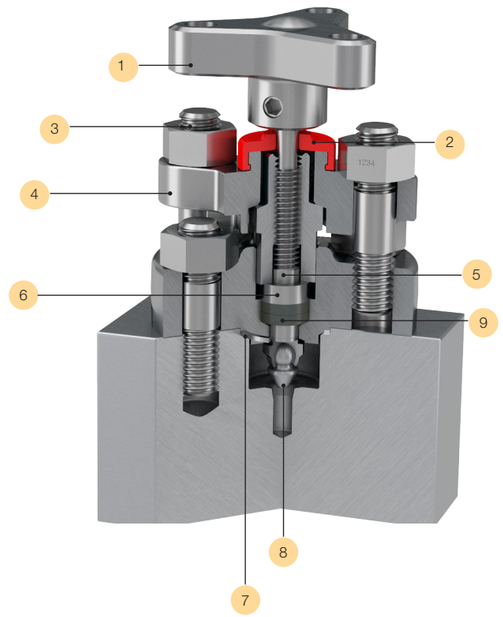
Anti-tamper spindle

This design valve head is to prevent accidental opening of the vent.

Key

The Key is necessary to open or close the anti-tamper spindle (vent valve). The valves are supplied with a Key and are also available as a separate item.

Outside Screw and Yoke - Class 2500 (6,000 PSI)



Reference	Description
1	Trilobe handle prevents excessive torque
2	Dual purpose dust cap provides functional identification
3	Packing adjustment nuts
4	Bridge (Yoke) provides downforce for packing
5	Anti-blowout low torque back seating stem
6	Gland thrust bush ensures uniform packing compression and tight sealing
7	Annealed sealing washer guarantees 100% sealing assurance
8	Self centering, non-rotating stem tip guarantees bubble tight shut off
9	Gland packing below stem threads preventing thread lubricant wash-out

Notes:
- For products specified in optional materials, non-wetted parts will be 316 Stainless Steel as standard.
- The temperature range of the EP-Series valve is dicated by the ball valve seat material.

Pro-Bloc® - EP Series

Ordering Information

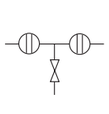
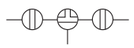
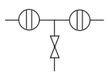
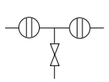
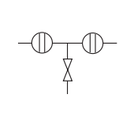
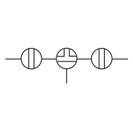
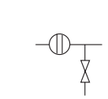
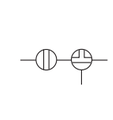
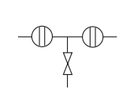
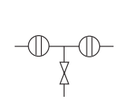
EPB **Y** **100** **E** **8F150** **A1** **F**

Series	
EP Pro-Bloc®	EPB

Ball Valve Bore Size	
10 mm	Y
15 mm	X
20 mm	W
25 mm	V

Material	
316 Stainless Steel/ 316L ASTM A182-F316/ F316L	B
Duplex A182-F51	E
Low Temp Carbon Steel ASTM A350 LF2/ ASTM A105	H
Super Duplex ASTM A182-F53/F55	F
Alloy 825	L
Alloy 625	M

Available for models 300, 400, 500, 600

Arrangement		
	Block-Bleed-Block 1st Isolate: Ball 2nd Isolate: Ball Vent: Needle	100
	Block-Bleed-Block 1st Isolate: Ball 2nd Isolate: Ball Vent: Ball	120
	Block-Bleed 1st Isolate: Ball Vent: Needle	130
	Block-Bleed 1st Isolate: Ball Vent: Ball	140
	Block-Bleed-Block (Modular Construction) 1st Isolate: Ball 2nd Isolate: Ball Vent: Needle	300
	Block-Bleed-Block (Modular Construction) 1st Isolate: Ball 2nd Isolate: Ball Vent: Needle	500
	Block-Bleed-Block 1st Isolate: Ball 2nd Isolate: Ball Vent: Needle	200
	Block-Bleed-Block 1st Isolate: Ball 2nd Isolate: Ball Vent: Ball	220
	Block-Bleed 1st Isolate: Ball Vent: Needle	230
	Block-Bleed 1st Isolate: Ball Vent: Ball	240
	Block-Bleed-Block (Modular Construction) 1st Isolate: Ball 2nd Isolate: Ball Vent: Needle	400
	Block-Bleed-Block (Modular Construction) 1st Isolate: Ball 2nd Isolate: Ball Vent: Needle	600

Flange Details					
Flange Size		Flange Style		Flange Class	
1/2”	8	Raised Face Spiral	F	150	150
3/4”	12	Ring Type Joint	T	300	300
1”	16			600	600
1 1/2”	24			900	900
2”	32			1500	1500
				2500	2500

See page 5 for bore size/class combinations.

Seat and Construction Options	
PTFE Ball Seats	*
PEEK Ball Seats	PB
Needle Tip 17-4PH St. St	*

* Fitted as standard - No part number designator required

Compliance	
Fire Safe (Graphite packing)	F
NACE	N
Fire Safe & NACE	FN

Where fire safe is not required, the default stem packing will be PTFE.

Certification requirements and customer specifications MUST be provided at enquiry and order stage.

Optional Outlet Connection			
3/8”	6	Female NPT	F
1/2”	8	A-LOK®	A
3/4”	12	CPI™	Z
1”	16		
10 mm	M10		
12 mm	M12		

The following standard outlet connections do not require a part number designator:

10 mm bore = 1/2” NPT (F)
15 mm bore = 1/2” NPT (F)
20 mm bore = 3/4” NPT (F)

Valve Handle Options	
Anti-tamper (vent) (Needle valve only)	A*
Padlock handle locking	L*
O.S.& Y. Needle Valve (vent)	Y

* Insert valve number:
1 - Primary
2 - Secondary
12 - Primary/Secondary
4 - All

Padlocks not supplied.

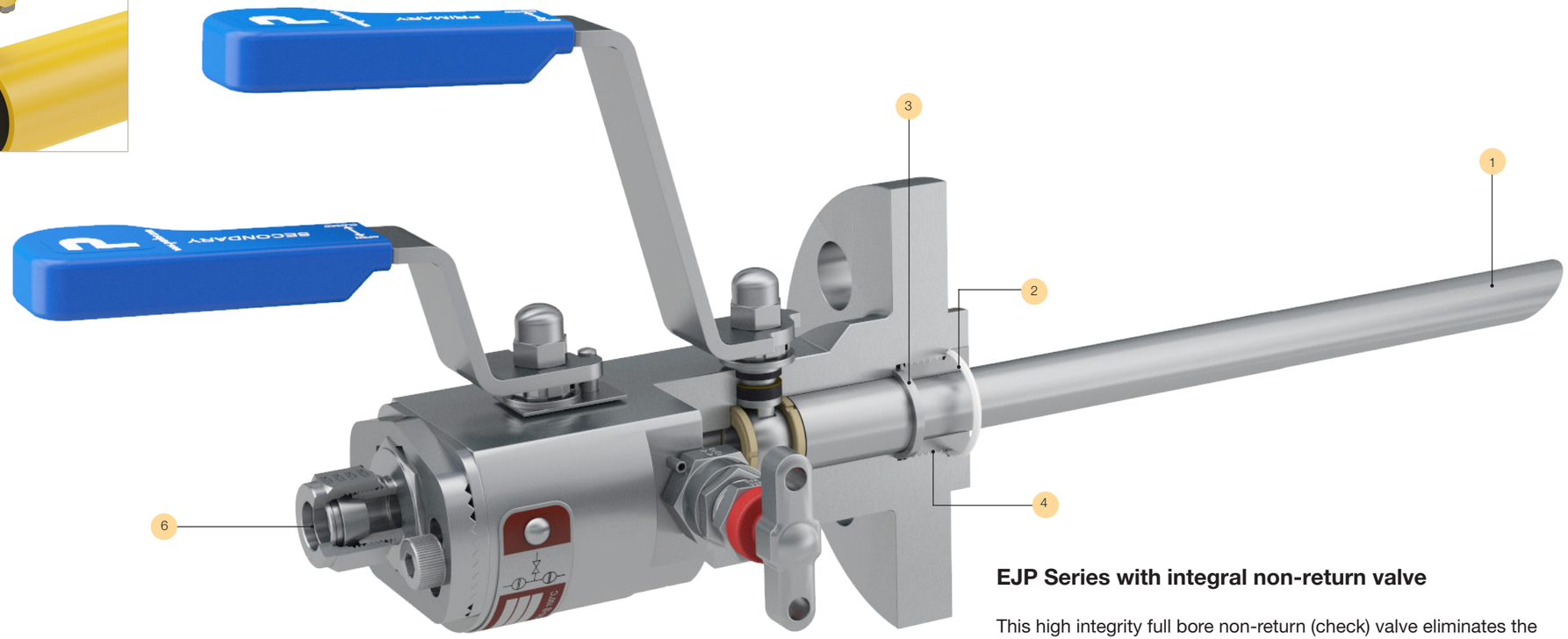
Notes:

- Plugged vent 1/2” NPTF as standard. 1/2” NPT plug supplied loose.
- All non wetted parts will be supplied in standard stainless steel for corrosion resistant alloys. For carbon steel construction trim materials will be supplied in stainless steel
- For flange to flange construction when the required flanges are different sizes then specify both sizes example: 1st flange 1” pipe (16), raised face (F), class 900 (900), 2nd flange 1/2” (8), raised face (F), class 900 (900) insert: 16F9008F900. Consult factory for available combinations
- For customer specific options not covered here, engineering will allocate a part number at quotation stage
- All modular three piece valves are available in 10mm, 15mm, 20mm bore

Pro-Bloc® ESP and EJP Series

For Sampling and Injection Applications

Pro-Bloc ESP and EJP Series range is designed to replace conventional multiple-valve installations where sampling of the process stream or injection into the process stream at full system pressure is required. Both valve series include a probe/quill. The EJP Series features a high integrity full bore non-return valve to eliminate the risk of back flow out of the process stream.



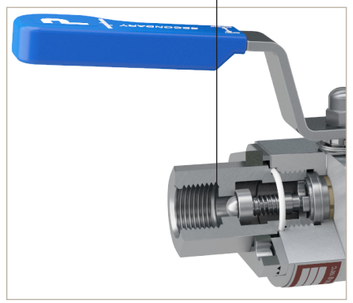
Features Benefits and Values

Reference	Feature	Benefit	Value
1	Gun-drilled sample/injection quill	Machined from solid bar, giving strength to resist vibration	**Durability** **Safety**
2	Environmental seal	Prevents inboard and outboard leakage	**Performance & Reliability**
3	Integral locking collar	Provides accurate location of quill giving optimum pressure on seat ensuring seat tightness and allowing low torque actuation of the valve	**Performance & Reliability** **Safety**
4	Mechanical locking mechanism	Solid mechanical fixing, no welding involved	**Performance & Reliability** **Safety**
5	Self centering poppet seal (EJP Series)	Ensures full sealing capability, preventing excessive wear of poppet o-ring	**Performance & Reliability**
6	Integral compression ends available (A-LOK®, CPI™)	Reduces leak paths Removes the need for PTFE tape and sealant Reduces component costs	**Performance & Reliability** **Lower overall cost**

EJP Series with integral non-return valve

This high integrity full bore non-return (check) valve eliminates the risk of back flow out of the process stream. The design utilises a spring loaded poppet to ensure leak proof performance. The non return valve is designed for higher flow and low pressure drop across the valve - having a larger through bore than most other manufacturers equivalent product.

As standard a viton seal will be supplied with a ‘cracking’ pressure of 10 PSI. A wide variety of seat materials and cracking pressures are available on request.



Pro-Bloc® - Sampling and Injection

Ordering Information

ESPB **Y** **100** **E**

Series	
Sampling Pro-Bloc®	ESPB
Injection Pro-Bloc®	EJPB

Ball Valve Bore Size	
10 mm	Y
15 mm	X

Material	
316 Stainless Steel/ 316L ASTM A182-F316/ F316L	B
Duplex A182-F51	E
Low Temp Carbon Steel ASTM A350 LF2/ ASTM A105	H

Arrangement		
	Block-Bleed-Block 1st Isolate: Ball 2nd Isolate: Ball Vent: Needle	100
	Block-Bleed 1st Isolate: Ball Vent: Needle	130

8F150 **8A** **A1** **F** - **100**

Flange Details					
Flange Size		Flange Style		Flange Class	
1”	16	Raised Face Spiral	F	150	150
1 1/2”	24	Ring Type Joint	T	300	300
2”	32			600	600
				900	900
				1500	1500
				2500	2500

10mm bore size 1” and above ASME flanges upto class 2500
15mm bore size 1 1/2” and above ASME flanges upto class 2500

Seat and Construction Options	
PTFE Ball Seats	*
PEEK Ball Seats	PB
Needle Tip 17-4PH St. St	*

* Fitted as standard - No part number designator required

Compliance	
Fire Safe (Graphite packing)	F
NACE	N
Fire Safe & NACE	FN

Where fire safe is not required, the default stem packing will be PTFE.

Certification requirements and customer specifications MUST be provided at enquiry and order stage.

Probe Length (mm)
Maximum probe length 750 mm

Optional Outlet Connection			
3/8”	6	Female NPT	F
1/2”	8	A-LOK®	A
10 mm	M10	CPI™	Z
12 mm	M12		

The following standard outlet connections do not require a part number designator:

10 mm bore = 1/2” NPT (F)
15 mm bore = 1/2” NPT (F)

Valve Handle Options	
Anti-tamper (vent) (Needle valve only)	A*
Padlock handle locking	L*
O.S.& Y. Needle Valve (vent)	Y*

* Insert valve number:

1 - Primary
2 - Secondary
3 - Vent
4 - All

Padlocks not supplied.

Notes:

- Probe length must be specified from the raised face to the end of the probe in mm, to the nearest mm
- Probes are supplied to suit the insertion length dictated by the pipeline diameter and thus must be specified by the customer
- A variety of end preparations and support collars are available
- Wake frequency calculations can be carried out against pipeline flow rates on request

Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. 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 item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods or work described will be referred to as "Products".

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4. Warranty. Seller warrants that the Products sold here-under shall be free from defects in material or workmanship for a period of twelve months from the date of delivery to Buyer or 2,000 hours of normal use, whichever occurs first. This warranty is made only to Buyer and does not extend to anyone to whom Products are sold after purchased from Seller. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery.

No other claims against Seller will be allowed unless asserted in writing within 60 days after delivery or, in the case of an alleged breach of warranty, within 30 days after the date within the warranty period on which the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for any amount due to Seller from Buyer) must be commenced within thirteen months from the date of tender of delivery by Seller or, for a cause of action based upon an alleged breach of warranty, within thirteen months from the date within the warranty period on which the defect is or should have been discovered by Buyer.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. Contingencies. Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. Loss to 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 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.

10. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products.

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 Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding 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.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Improper use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. 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 Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("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 a Product sold pursuant to this Agreement 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 a Product 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 the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product 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 Products 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 Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, 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 Products.

21. Equal Opportunity Clause. For the performance of government contracts and where dollar value of the Products exceed $10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.

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