Ball Valves (HB Series)

Catalog 4121-HB
Revised, April 2005

Introduction

Parker High Pressure HB4 Series Ball Valves provide reliable shut-off or switching functions. The upper and lower trunnion bearings enhance the resistance of the trunnions against seizure, and increase the valve life in extreme applications. The compact and rugged design employs spring-loaded seats for high cycle life and low operating torques at pressures up to 10,000 psig (689 bar).

Features

- PEEK trunnion bearings for longer cycle life
- Two-way and three-way designs
- Compact FNPT version for tight work areas
- Blow-out resistant two-piece ball/stem
- Full operating pressure at any port
- Low operating torque
- Manual, electric or pneumatic actuation
- Panel mountable to 3/8″ (9.6 mm) thickness
- No packing to adjust
- Color coded fracture resistant handles
- Handle indicates direction of flow
- Positive handle stops
- Wide variety of US customary and SI ports
- Top of stem marked to indicate flow direction
- 100% factory tested
- Compact package
- Heat code traceability

Specifications

- **Pressure rating:** 10,000 psig (689 bar) CWP with PEEK (PKR) Seats; 6,000 psig (414 bar) CWP with PCTFE (K) Seats
- **Temperature rating:** -65˚F to 400˚F (-54˚C to 204˚C)
- **Body material:** Stainless steel
- **Body configurations:** Two-way and three-way
- **Port connections:** Tube compression (CPI™ / A-LOK®); short and long female NPT
- **Port size:** 1/8″ – 1/2″ (6 mm to 12 mm)

Flow Data

- Two-way HB4L: C_v = 1.02; x_T = 0.42; orifice = 0.188″ (4.8 mm)
- Three-way HB4X: C_v = 0.62; x_T = 0.71; orifice = 0.188″ (4.8 mm)

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

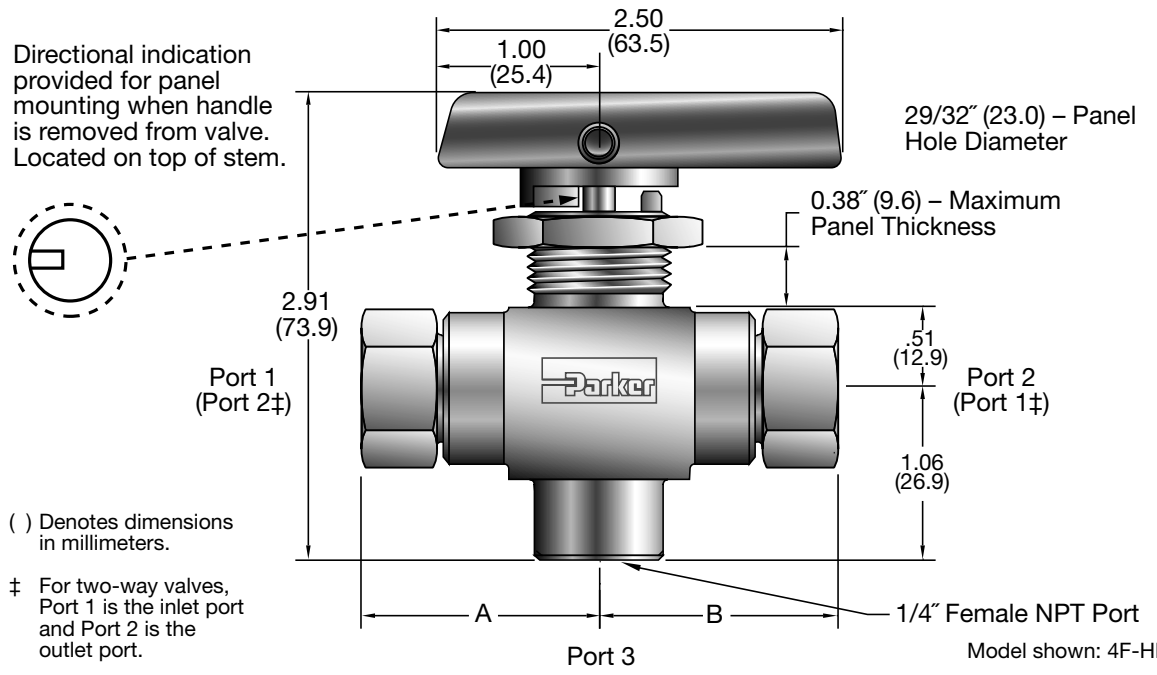
Testing

Standard production testing – valves are 100% factory tested with nitrogen at 1,000 psig (69 bar) for leakage at the seats and body seals. Both areas are required to have less than 0.1 SCCM leakage. Optional testing is available upon request. Consult your authorized Parker Instrumentation Distributor or the factory for further information.

Two-way HB4L design

Three-way HB4X design

Parker Hannifin Corporation
Instrumentation Products Division
Jacksonville, Alabama



Model shown: 4F-HB4XPKR-SSP

Dimensions / Pressure Data

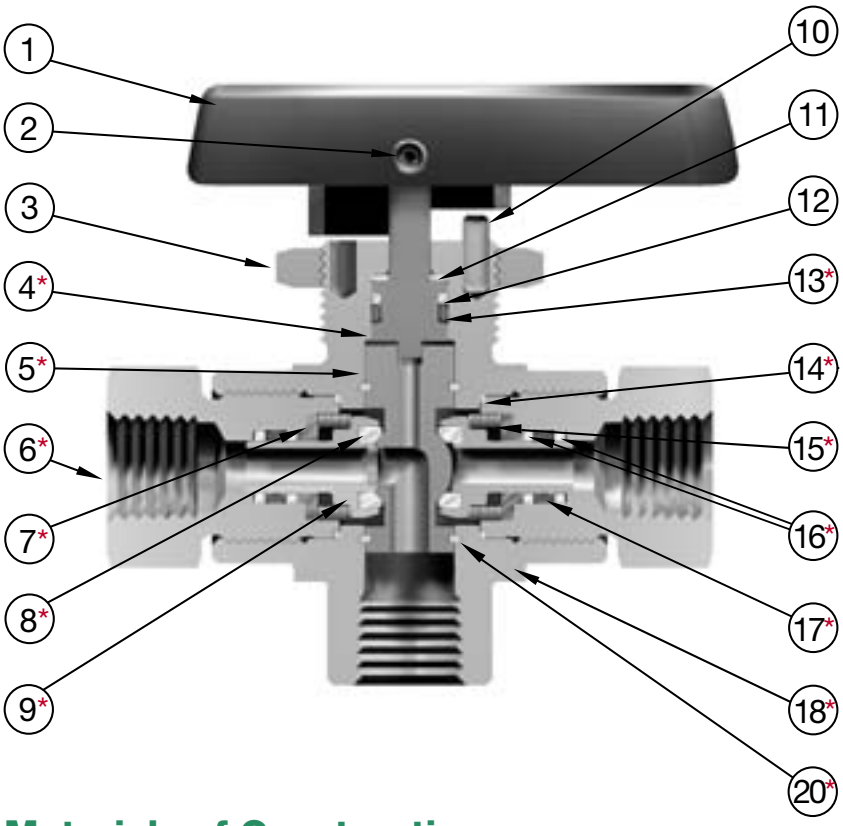
Basic Part Number*	Pressure Rating @100°F (38°C) psig	bar	End Connection Port 1 / Port 2	Dimensions A†† inch	mm	B†† inch	mm
2F-HB4	10,000	689	1/8″ Female NPT	1.47	37.3	1.47	37.3
4F-HB4**	10,000	689	1/4″ Female NPT	1.47	37.3	1.47	37.3
4FL-HB4	10,000	689	1/4″ Female NPT	1.97	50.0	1.97	50.0
4A-HB4	10,000	689	1/4″ A-LOK® Compression	2.07	52.6	2.07	52.6
4Z-HB4	10,000	689	1/4″ CPI™ Compression	2.07	52.6	2.07	52.6
M6A-HB4	10,000	689	6 mm A-LOK® Compression	2.07	52.6	2.07	52.6
M6Z-HB4	10,000	689	6 mm CPI™ Compression	2.07	52.6	2.07	52.6
6A-HB4	6,600†	455	3/8″ A-LOK® Compression	2.19	55.6	2.19	55.6
6Z-HB4	6,600†	455	3/8″ CPI™ Compression	2.19	55.6	2.19	55.6
8A-HB4	6,300†	434	1/2″ A-LOK® Compression	2.30	58.4	2.30	58.4
8Z-HB4	6,300†	434	1/2″ CPI™ Compression	2.30	58.4	2.30	58.4
M8A-HB4	7,975†	550	8 mm A-LOK® Compression	2.07	52.6	2.07	52.6
M8Z-HB4	7,975†	550	8 mm CPI™ Compression	2.07	52.6	2.07	52.6
M10A-HB4	6,525†	450	10 mm A-LOK® Compression	2.19	55.6	2.19	55.6
M10Z-HB4	6,525†	450	10 mm CPI™ Compression	2.19	55.6	2.19	55.6
M12A-HB4	6,162†	425	12 mm A-LOK® Compression	2.30	58.4	2.30	58.4
M12Z-HB4	6,162†	425	12 mm CPI™ Compression	2.30	58.4	2.30	58.4

* Flow configurations are two-way (HB4L) and three-way (HB4X); Seat materials are PEEK (Polyetheretherketone) and PCTFE (Polychlorotrifluoroethylene).

** Designed with shorter end-to-end dimensions than the 4FL model to save space.

† Reduced pressure rating is determined by the maximum rated pressure of the tubing as stated in the Parker Instrument Tubing Selection Guide Bulletin 4200-TS. The working pressure ratings are limited by the seat material (PCTFE – 6,000 psig (414 bar) maximum and PEEK – 10,000 psig (689 bar) maximum) and the temperature of the application.

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



Materials of Construction

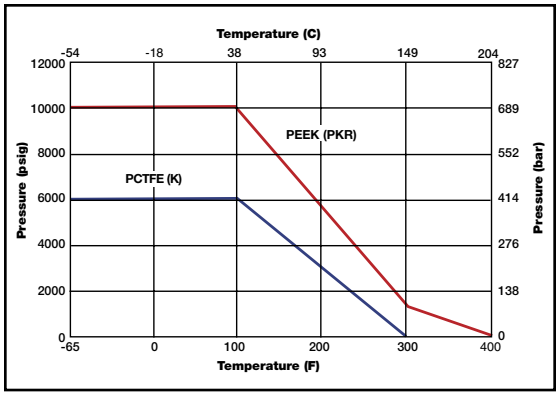
No.	Part Description	6,000 psi (414 bar)	10,000 psi (689 bar)
1	Handle/insert	Nylon 6/6/316 SS	Nylon 6/6/316 SS
2	Handle screw	Stainless steel	Stainless steel
3	Panel nut	316 Stainless steel	316 Stainless steel
4*	Stem	ASTM A 479 Type 316	ASTM A 479 Type 316
5*	Ball trunnion	ASTM A 479 Type 316	ASTM A 479 Type 316
6*	Port end connector	ASTM A 479 Type 316	ASTM A 479 Type 316
7*	Spring washer	ASTM A 479 Type 316	ASTM A 479 Type 316
8*	Seat	PCTFE	PEEK
9*	Seat retainer	ASTM A 276 Type 316	ASTM A 276 Type 316
10	Handle stop pins	302 Stainless steel	302 Stainless steel
11	Stem washer	PEEK	PEEK
12	Stem o-ring back-up	PTFE	PTFE
13*	Stem o-ring	Fluorocarbon rubber**	Fluorocarbon rubber**
14*	Connector end seal	PEEK	PEEK
15*	Spring	ASTM A 313 Type 631	ASTM A 313 Type 631
16*	Seat retainer o-ring back-up	PTFE	PTFE
17*	Seat retainer o-ring	Fluorocarbon rubber**	Fluorocarbon rubber**
18*	Valve body	ASTM A 276 Type 316	ASTM A 276 Type 316
19*	Pipe plug **(Not shown/HB4L only)**	316 Stainless steel	316 Stainless steel
20*	Trunnion bearing	PEEK	PEEK

* Wetted parts
** Optional elastomer seals available

Lubrication: Perfluorinated polyether

Parker Hannifin Corporation
Instrumentation Products Division
Jacksonville, Alabama

Pressure vs. Temperature



Note: To determine MPa, multiply bar by 0.1

This pressure versus temperature chart reflects the maximum temperature range of indicated materials.

When combining seat and seal materials, the most restrictive temperature rating of the seats or seals becomes the limiting factor on valve temperature range.

Temperature Ratings:

Buna-N (Nitrile) Rubber: -40˚F to 250˚F (-40˚C to 121˚C)
Ethylene Propylene Rubber: -65˚F to 300˚F (-54˚C to 149˚C)
Fluorocarbon Rubber: -15˚F to 400˚F (-26˚C to 204˚C)

Flow Calculations (Two-way HB4L)

Inlet Pressure		Pressure Drop P		Water @ 60°F (16°C)		Air @ 60°F (16°C)	
psig	bar	psig	bar	gpm	m^3/hr	scfm	m^3/hr
100	7	1	0.1	1.0	0.2	10.8	17.4
		10	0.7	3.2	0.7	32.0	50.7
		50	3.5	7.2	1.6	50.5	76.0
1000	69	10	0.7	3.2	0.7	101.3	171.3
		100	6.9	10.2	2.3	297.7	502.3
		500	34.5	22.8	5.2	446.7	749.6
3000	207	100	6.9	10.2	2.3	542.0	919.9
		1000	69.0	32.3	7.3	1297.0	2198.9
		1500	103.4	39.5	9.0	1327.2	2248.8
6000	414	1000	69.0	32.3	7.3	2158.5	3662.7
		2000	137.9	45.6	10.4	2188.5	4388.6
		3000	206.8	55.9	12.7	2647.9	4486.8
10000	689	1000	69.0	32.3	7.3	2954.3	5020.2
		2000	137.9	45.6	10.4	3818.4	6487.0
		3000	206.8	55.9	12.7	4236.2	7194.9

Flow Calculations (Three-way HB4X)

Inlet Pressure		Pressure Drop P		Water @ 60°F (16°C)		Air @ 60°F (16°C)	
psig	bar	psig	bar	gpm	m^3/hr	scfm	m^3/hr
100	7	1	0.1	0.6	0.1	6.6	10.6
		10	0.7	2.0	0.4	20.0	31.9
		50	3.5	4.4	1.0	37.1	57.4
1000	69	10	0.7	2.0	0.4	61.8	104.4
		100	6.9	6.2	1.4	187.2	316.1
		500	34.5	13.9	3.1	337.4	567.7
3000	207	100	6.9	6.2	1.4	333.1	565.4
		1000	69.0	19.6	4.5	903.4	1532.8
		1500	103.4	24.0	5.5	1004.4	1703.2
6000	414	1000	69.0	19.6	4.5	1393.5	2365.2
		2000	137.9	27.7	6.3	1803.8	3060.4
		3000	206.8	34.0	7.7	2004.9	3399.8
10000	689	1000	69.0	19.6	4.5	1858.9	3159.0
		2000	137.9	27.7	6.3	2499.6	4247.2
		3000	206.8	34.0	7.7	2903.0	4932.1

How to Order

The correct part number is easily derived by following the circled number sequence. The six product characteristics required are coded as shown. *Note: If ports 1 and 2 are the same, eliminate the port 2 designator.

4Z – * – HB4XPKR – – SSP

① Port 1 ② Port 2 ③ Valve Series ④ Seat Material ⑤ Seal Material ⑥ Body Material

Describes a HB4X, three-way ball valve with 1/4″ CPI™ compression end connections for ports 1 and 2, PEEK seats and fluorocarbon rubber seals, stainless steel body construction, and a panel mounting nut. Port 3 is always a 1/4″ FNPT port.

4F – 4A – HB4LK – EPR – SSP

① Port 1 ② Port 2 ③ Valve Series ④ Seat Material ⑤ Seal Material ⑥ Body Material

Describes a HB4L, two-way ball valve with a 1/4″ female NPT port 1 and a 1/4″ A-LOK® compression port 2, PCTFE seats and ethylene propylene rubber seals, stainless steel body construction, and a panel mounting nut.
Note: Port 3 will always have a 1/4″ MNPT plug when ordering a HB4L Series two-way ball valve.

① Port 1	② Port 2	③ Valve Series	④ Seat Material	⑤ Seal Material	⑥ Body Material
2F 1/8″ Female NPT	**2F** 1/8″ Female NPT				
4F 1/4″ Female NPT	**4F** 1/4″ Female NPT				
4FL 1/4″ Female NPT (Long)	**4FL** 1/4″ Female NPT (Long)			**Blank-** (Fluorocarbon Rubber)	
4A 1/4″ A-LOK® Compression	**4A** 1/4″ A-LOK® Compression				
4Z 1/4″ CPI™ Compression	**4Z** 1/4″ CPI™ Compression		**PKR** (PEEK–Polyetherether-ketone)		
6A 3/8″ A-LOK® Compression	**6A** 3/8″ A-LOK® Compression				
6Z 3/8″ CPI™ Compression	**6Z** 3/8″ CPI™ Compression	**HB4L** (2-way)			
8A 1/2″ A-LOK® Compression	**8A** 1/2″ A-LOK® Compression			**BN** (Buna-N Rubber)	**SSP** (Stainless Steel with Panel Nut)
8Z 1/2″ CPI™ Compression	**8Z** 1/2″ CPI™ Compression				
M6A 6 mm A-LOK® Compression	**M6A** 6 mm A-LOK® Compression				
M6Z 6 mm CPI™ Compression	**M6Z** 6 mm CPI™ Compression				
M8A 8 mm A-LOK® Compression	**M8A** 8 mm A-LOK® Compression		**K-** (PCTFE, Poly-chlorotrifluoro-ethylene)		
M8Z 8 mm CPI™ Compression	**M8Z** 8 mm CPI™ Compression	**HB4X** (3-way)			
M10A 10 mm A-LOK® Compression	**M10A** 10 mm A-LOK® Compression			**EPR** (Ethylene Propylene Rubber)	
M10Z 10 mm CPI™ Compression	**M10Z** 10 mm CPI™ Compression				
M12A 12 mm A-LOK® Compression	**M12A** 12 mm A-LOK® Compression				
M12Z 12 mm CPI™ Compression	**M12Z** 12 mm CPI™ Compression				

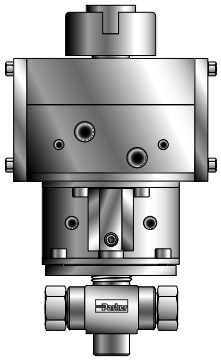
Available End Connections

Z – One ferrule CPI™ compression port

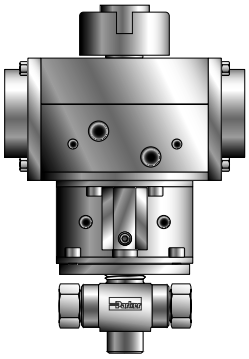
A – Two ferrule A-LOK® compression port

F – ANSI/ASME B1.20.1 internal pipe threads

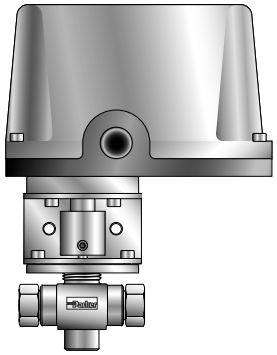
Actuator Options



Double Acting (61AD) Pneumatic Actuator



Spring Return (61AC & AO) Pneumatic Actuator



70 and 80 Series Electric Actuator

How to Order Options

Lock-Out Devices – Add the suffix **-LD** to the end of the part number to order directly on the valve.
(Example: 2F-HB4LPKR-BN-SSP-**LD**).
For field installation, simply substitute the correct valve series number after LD. (Example: **LD**-HB4L).

Colored Handles – Add the designator corresponding to the correct handle as a suffix to the part number:

W - white
B - blue
G - green
R - red
Y - yellow

(Example: M6A-HB4XPKR-SSP-**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-HB4LPKR-EPR-SSP-**C3**).

Pneumatic Actuators – For detailed actuator information, refer to Catalog 4123-PA. For factory assembly, add the actuator part number as the suffix to the valve part number. (Example: 4FL-HB4XK-SSP-**61ACX-2**).
For field installation, specify the actuator desired (Example: 61ACX-2). The appropriate mounting hardware may be obtained by adding the valve series and actuator size to the prefix **MK-.**
(Example: **MK-**HB4X-61).

Electric Actuators – For detailed actuator information, refer to Catalog 4123-EA. For factory assembly, add the actuator part number as the suffix to the valve part number (Example: 6A-HB4XPKR-SSP-**71XA**).
For field installation, specify the actuator desired (Example: 71XA). The appropriate mounting hardware may be obtained by adding the valve series and actuator series to the prefix **MK-** (Example: **MK-**HB4X-70).

How to Order Maintenance Kits

Handle Kits: HB4-Handle-Color (Example: HB4-HANDLE-RED). Consists of a red handle and handle screw.

Two-way Seal Kits: KIT-HB4LPKR or KIT-HB4LK – Consists of a two-way trunnion, springs, stem washers, stem seal, back-up ring, end connector seals, seat springs, seat retainer seals, seat retainer back-up rings, and seat assemblies.

Three-way Seal Kits: KIT-HB4XPKR or KIT-HB4XK – Consists of a three-way trunnion, springs, stem washers and stem seal, back-up ring, end connector seals, seat springs, seat retainer seals, seat retainer back-up rings, and seat assemblies.

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