



# Ball and Plug Valves

Catalog 4121-BV

July 2014

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

## 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" (9.6mm) 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

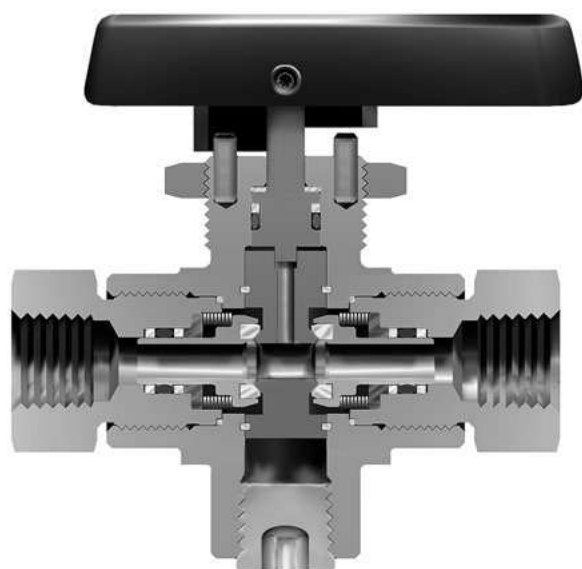
## Specifications

<b>Pressure Rating</b>	10,000 psig (689 bar) CWP with PEEK (PKR) Seats 6,000 psig (414 bar) CWP with PCTFE (K) Seats
<b>Temp. Rating</b>	-65°F to 400°F (-54°C to 204°C)
<b>Body Materials</b>	Stainless steel
<b>Body Config.</b>	Two-way and three-way
<b>Port Connections</b>	Tube compression (CPI™/A-LOK®) Short and long female NPT
<b>Port Size</b>	1/8" – 1/2" (6 mm to 12 mm)

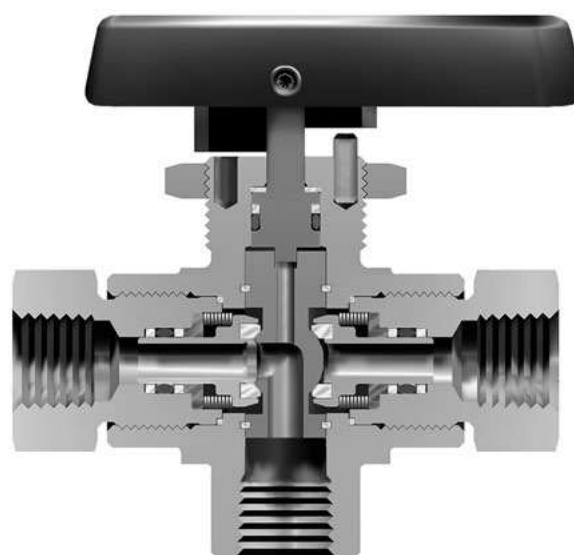
## Flow Data

	Two-Way HB4L	Three-Way HB4X
<b>C<sub>v</sub></b>	1.02	0.62
<b>X<sub>T</sub></b>	0.42	0.71
<b>Orifice</b>	0.188" (4.8mm)	0.188" (4.8mm)

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

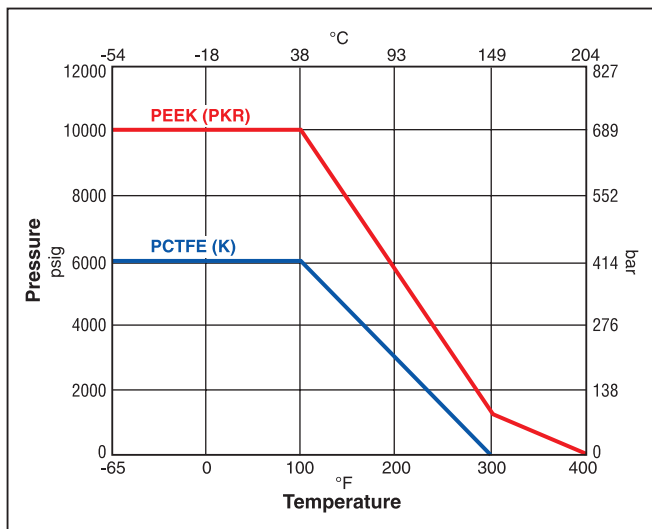


Two-Way HB4L Design



Three-Way HB4X Design

## 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:

Nitrile (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)

HB

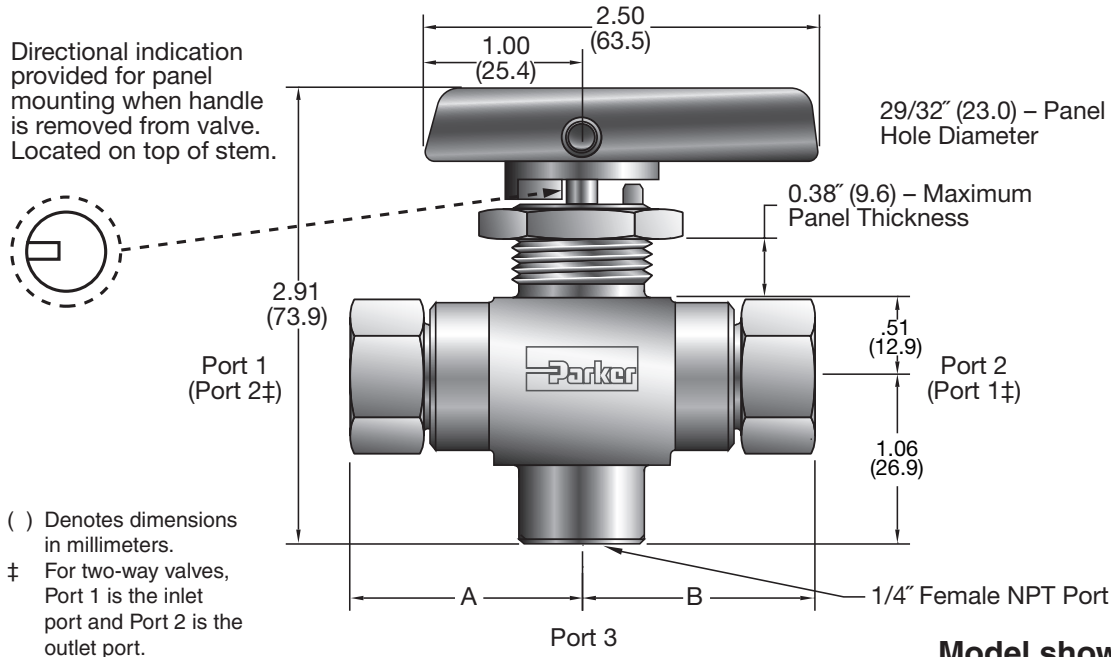
## Flow Calculations, Two-Way HB4L

Inlet Pressure		Pressure Drop ΔP		Water @ 60°F (16°C)		Air @ 60°F (16°C)	
psig	bar	psig	bar	gpm	m3/hr	scfm	m3/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 ΔP		Water @ 60°F (16°C)		Air @ 60°F (16°C)	
psig	bar	psig	bar	gpm	m3/hr	scfm	m3/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

## Dimensions, Pressure Data



**Model shown:  
4F-HB4XPKR-SSP**

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

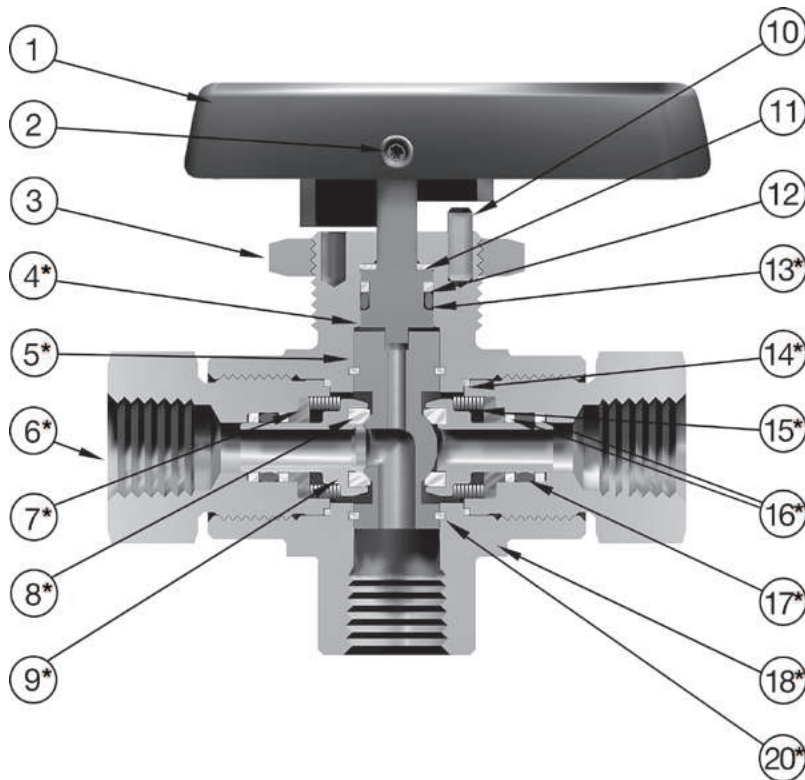
\*\* Designed with shorter end-to-end dimensions than the 4FL model to save space.

† 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.

Dimensions in inches/millimeters are for reference only, subject to change.

## Materials of Construction



HB

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

## How to Order

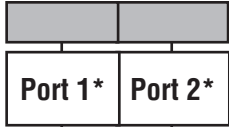
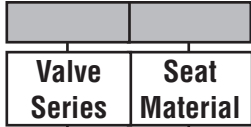

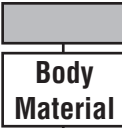
The correct part number is easily derived from the following example and ordering chart. The five product characteristics required are coded as shown in the chart.

**Note:** If ports 1 and 2 are the same, eliminate the port 2 designator.

**Example 1** below 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.

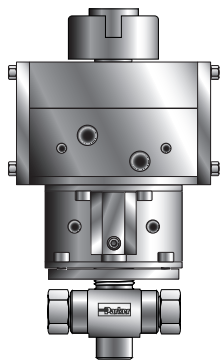
**Example 2** below describes a HB4L, two-way ball valve with a 1/4" female NPT port 1 and a 1/4" A-LOK® compression port 2, PCTFE seats and ethylene propylene rubber seals, stainless steel body construction, and a panel mounting nut. **Note:** Port 3 will always have a 1/4" Male NPT plug when ordering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

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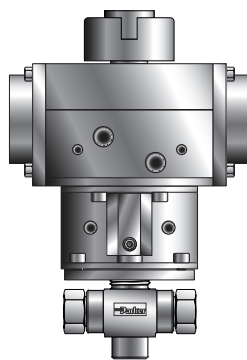
<b>Example 1:</b>	<b>4Z</b>	-	<b>HB4XPKR</b>	-	-	<b>SSP</b>					
<b>Example 2:</b>	<b>4F4A</b>	-	<b>HB4LK</b>	-	<b>EPR</b>	<b>SSP</b>					
		-		-							
	<b>Port 1*</b>	<b>Port 2*</b>	<b>Valve Series</b>	<b>Seat Material</b>	<b>Seal Material</b>	<b>Body Material</b>					
<b>2F</b>	1/8" Female NPT	<b>2F</b>	1/8" Female NPT	<b>HB4L</b>	2-way	<b>PKR</b>	PEEK – Polyetheretherketone	<b>Blank</b>	Fluorocarbon Rubber	<b>SSP</b>	Stainless Steel with Panel Nut
<b>4F</b>	1/4" Female NPT	<b>4F</b>	1/4" Female NPT	<b>HB4X</b>	3-way	<b>K</b>	PCTFE – Polychlorotrifluoroethylene	<b>BN</b>	Nitrile Rubber		
<b>4FL</b>	1/4" Female NPT (Long)	<b>4FL</b>	1/4" Female NPT (Long)					<b>EPR</b>	Ethylene Propylene Rubber		
<b>4A</b>	1/4" A-LOK® Compression	<b>4A</b>	1/4" A-LOK® Compression								
<b>4Z</b>	1/4" CPI™ Compression	<b>4Z</b>	1/4" CPI™ Compression								
<b>4MP7</b>	1/4" MPI™ Compression	<b>4MP7</b>	1/4" MPI™ Compression								
<b>6A</b>	3/8" A-LOK® Compression	<b>6A</b>	3/8" A-LOK® Compression								
<b>6Z</b>	3/8" CPI™ Compression	<b>6Z</b>	3/8" CPI™ Compression								
<b>6MP7</b>	3/8" MPI™ Compression	<b>6MP7</b>	3/8" MPI™ Compression								
<b>8A</b>	1/2" A-LOK® Compression	<b>8A</b>	1/2" A-LOK® Compression								
<b>8Z</b>	1/2" CPI™ Compression	<b>8Z</b>	1/2" CPI™ Compression								
<b>M6A</b>	6 mm A-LOK® Compression	<b>M6A</b>	6 mm A-LOK® Compression								
<b>M6Z</b>	6 mm CPI™ Compression	<b>M6Z</b>	6 mm CPI™ Compression								
<b>M8A</b>	8 mm A-LOK® Compression	<b>M8A</b>	8 mm A-LOK® Compression								
<b>M8Z</b>	8 mm CPI™ Compression	<b>M8Z</b>	8 mm CPI™ Compression								
<b>M10A</b>	10 mm A-LOK® Compression	<b>M10A</b>	10 mm A-LOK® Compression								
<b>M10Z</b>	10 mm CPI™ Compression	<b>M10Z</b>	10 mm CPI™ Compression								
<b>M12A</b>	12 mm A-LOK® Compression	<b>M12A</b>	12 mm A-LOK® Compression								
<b>M12Z</b>	12 mm CPI™ Compression	<b>M12Z</b>	12 mm CPI™ Compression								

\* If ports 1 and 2 are the same, eliminate the port 2 designator.

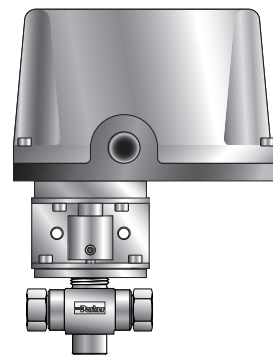
## Actuator Options



**Double Acting (61AD)  
Pneumatic Actuator**



**Spring Return  
(61AC & AO)  
Pneumatic Actuator**



**70, 80 & 90 Series  
Electric Actuator**

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## 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 the [Pneumatic Actuators section](#) of this catalog. 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 the [Electric Actuators section](#) of this catalog. 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-SS or KIT-HB4LK-SS – 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-SS or KIT-HB4XK-SS – 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.