

TKD Series 3-Way Ball Valves

Product Data Sheet



introduction

< STANDARDS >



ASTM D1784
ASTM D2466
ASTM D2467
ASTM D2464
ASTM F1498



ANSI B1.20.1

IPEX TKD Series 3-Way Ball Valves can be used for flow diverting, mixing, or on/off isolation. They will replace a Tee + 2 valve linkage assembly at reduced cost and space, along with shorter installation and maintenance time. The patented seat stop carrier allows for in-line microadjustment of the ball seating, and features o-ring cushioning to minimize wear and prevent seizing. The TKD also includes our patented DUAL BLOCK® locking union nut system, which ensures the nuts are held in position even under severe service conditions such as high vibration or thermal expansion. Integral mounting flange and bracketing allows for direct actuation and simple support, while a locking handle can prevent improper positioning. TKD Series 3-Way Ball Valves are part of our complete Xirtec®140 systems of pipe, valves and fittings, engineered and manufactured to our strict quality, performance, and dimensional standards.

Valve Availability

Body Material:	PVC
Size Range:	1/2" through 2"
Pressure:	232psi
Seats:	Teflon® (PTFE)
Seals:	EPDM or Viton® (FKM)
End Connections:	Socket (IPS), Threaded (FNPT)

TKD Series 3-Way Ball Valves

Sample Specification



1.0 Ball Valves - TKD

1.1 Material

- The valve body, stem, ball, end connectors, and unions shall be made of PVC compound which shall meet or exceed the requirements of cell classification 12454 according to ASTM D1784.

1.2 Seats

- The ball seats shall be made of Teflon® (PTFE).

1.3 Seals

- The o-ring seals shall be made of EPDM.
- or The o-ring seals shall be made of Viton® (FKM).

- 1.4 All other wetted and non-wetted parts of the valves shall comply with standards that are equivalent to NSF Standard 61 for potable water.

2.0 Connections

2.1 Socket style

- The IPS socket PVC end connectors shall conform to the dimensional standards ASTM D2466 and ASTM D2467.

2.2 Threaded style

- The female NPT threaded PVC end connectors shall conform to the dimensional standards ASTM D2464, ASTM F1498 and ANSI B1.20.1.

3.0 Design Features

- All valves shall be true union at all three ports.
- All sizes shall be full port.
- Valve design shall permit positive shutoff of any of the three ports.
- Balls shall be of T-port or L-port design (specifier must select one).
- The valve shall have blocking seat supports at all three ports.
- The threaded carrier (ball seat support) shall be adjustable with the valve installed.
- The valve body, union nuts, and carrier shall have deep square style threads for increased strength.
- The ball shall be machined smooth to minimize wear on valve seats.
- All valve seats shall have o-ring backing cushions to compensate for wear and prevent seizure of the ball.

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Sample Specification (cont'd)



- The thickness of the valve body shall be the same at all three ports.
- The stem design shall feature a shear point above the o-ring to maintain system integrity in the unlikely event of a stem breakage.
- The valve shall include the DUAL BLOCK® union nut locking mechanism.
- The handle shall incorporate an optional feature to allow the valve position to be secured with a padlock.
- The handle shall incorporate a removable tool for adjustment of the threaded carrier.
- The top of the stem shall incorporate molded features to indicate port location and ball position.
- All valves shall have integrally molded mounting flanges for support and actuation.

3.1 Pressure Rating

- All valves shall be rated at 232psi at 73°F (23°C).

3.2 Markings

- All valves shall be marked to indicate size, material designation, and manufacturer's name or trade mark.

3.3 Color Coding

- All PVC valves shall be color-coded dark grey.

4.0 All valves shall be Xirtec®140 by IPEX or approved equal.

TKD Series 3-Way Ball Valves

Valve Selection

Size (inches)	Body Material	Port Style	O-ring Material	IPEX Part Number		Pressure Rating @ 73°F
				IPS Socket	FNPT Threaded	
1/2	PVC	T	EPDM	253850		232 psi
			Viton®	253862		
		L	EPDM	253844		
			Viton®	253856		
3/4	PVC	T	EPDM	253851		
			Viton®	253863		
		L	EPDM	253845		
			Viton®	253857		
1	PVC	T	EPDM	253852		
			Viton®	253864		
		L	EPDM	253846		
			Viton®	253858		
1-1/4	PVC	T	EPDM	253853		
			Viton®	253865		
		L	EPDM	253847		
			Viton®	253859		
1-1/2	PVC	T	EPDM	253854		
			Viton®	253866		
		L	EPDM	253848		
			Viton®	253860		
2	PVC	T	EPDM	253855		
			Viton®	253867		
		L	EPDM	253849		
			Viton®	253861		

Note: Flanged valves available upon request.

Port:

T L

Size (inches):

1/2 1-1/4
 3/4 1-1/2
 1 2

Seals:

EPDM
 Viton® (FPM)

End Connections:

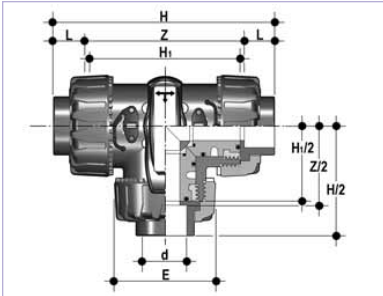
Socket (IPS)
 Threaded (FNPT)

IPEX Part Number:

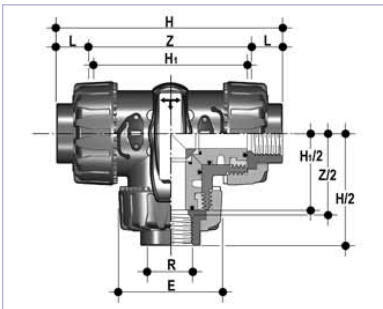
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Technical Data

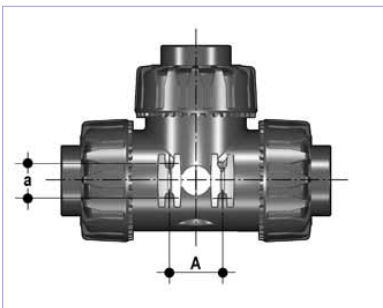
dimensions



IPS Socket Connections - Dimension (inches)							
Size (d)	DN	PN	E	H	H ₁	L	Z
1/2	0.59	0.63	2.13	5.20	3.15	0.91	3.43
3/4	0.79	0.63	2.56	6.27	3.94	1.00	4.26
1	0.98	0.63	2.87	6.85	4.33	1.13	4.59
1-1/4	1.26	0.63	3.39	8.07	5.16	1.26	5.55
1-1/2	1.57	0.63	3.86	8.96	5.83	1.38	6.20
2	1.97	0.63	4.80	10.51	7.05	1.50	7.50



Female NPT Socket Connections - Dimension (inches)							
Size (R)	DN	PN	E	H	H ₁	L	Z
1/2	0.59	0.63	2.13	4.96	3.15	0.71	3.56
3/4	0.79	0.63	2.56	5.76	3.94	0.71	4.35
1	0.98	0.63	2.87	6.56	4.33	0.89	4.78
1-1/4	1.26	0.63	3.39	7.71	5.16	0.99	5.73
1-1/2	1.57	0.63	3.86	8.32	5.83	0.97	6.38
2	1.97	0.63	4.80	9.99	7.05	1.17	7.66



Mounting Flanges - Dimension (inches)			
Size	DN	a	A
1/2	0.59	0.79	1.22
3/4	0.79	0.79	1.22
1	0.98	0.79	1.22
1-1/4	1.26	1.18	1.97
1-1/2	1.57	1.18	1.97
2	1.97	1.18	1.97

TKD Series 3-Way Ball Valves

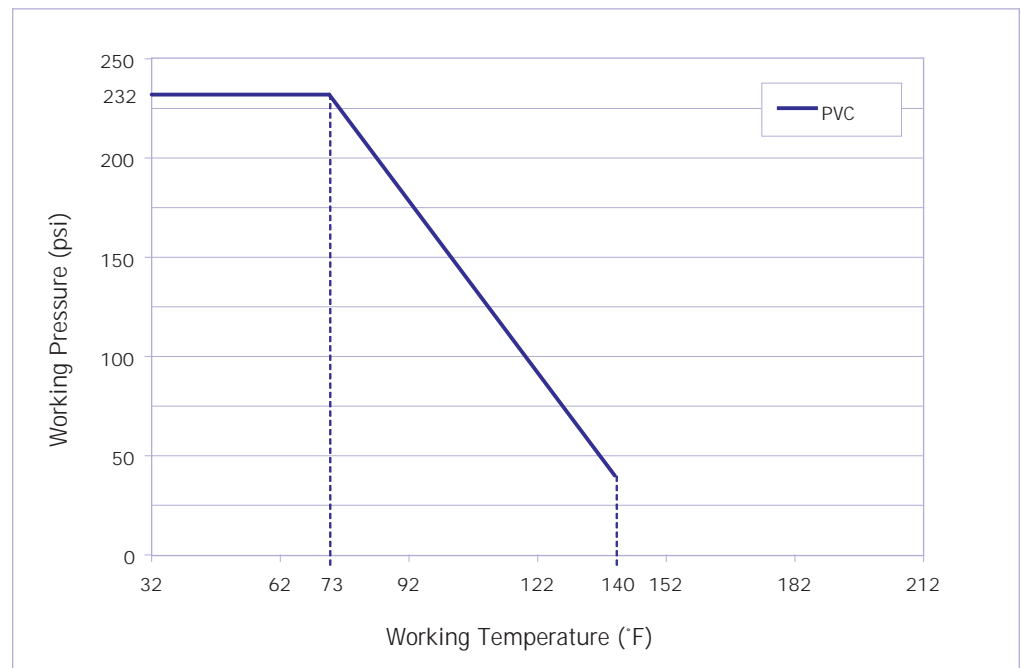
Technical Data (cont'd)

weights



Size (inches)	Approximate Weight (lbs)	
	IPS Socket	FNPT Threaded
1/2	0.68	0.68
3/4	1.21	1.21
1	1.74	1.74
1-1/4	2.81	2.81
1-1/2	3.66	3.66
2	6.17	6.17

pressure – temperature ratings



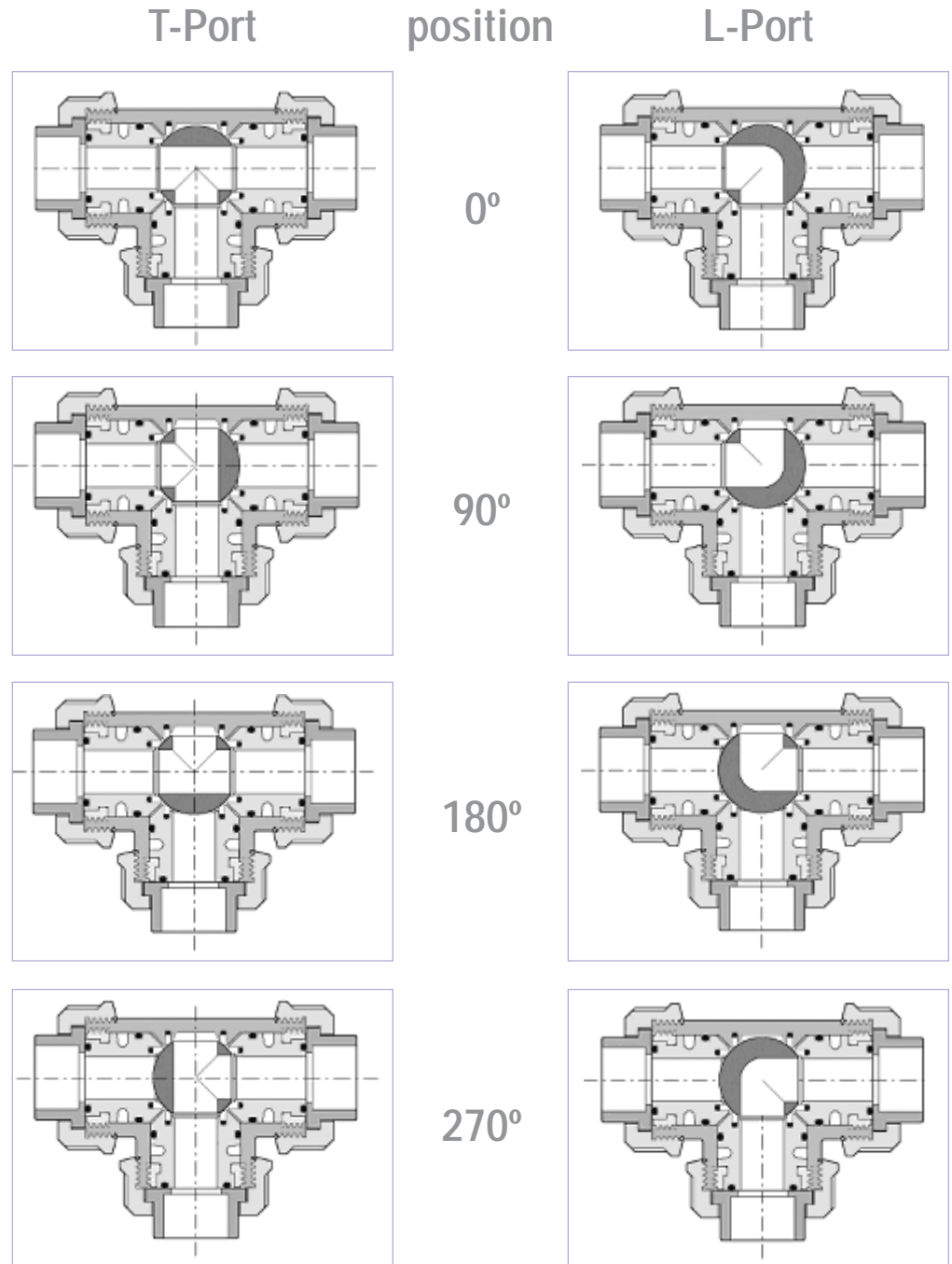
TKD Series 3-Way Ball Valves

Technical Data (cont'd)

operating positions



Position	T-Port	L-Port
0°	mixing	diverting
90°	diverting	closed
180°	straight flow	closed
270°	diverting	diverting



TKD Series 3-Way Ball Valves

Technical Data (cont'd)

flow coefficients



The flow coefficient (CV) represents the flow rate in gallons per minute (GPM) at 68°F for which there is a 1 psi pressure drop across the valve in the fully open position. These values are determined from an industry standard testing procedure which uses water as the flowing media (specific gravity of 1.0). To determine specific flow rate and pressure loss scenarios, one can use the following formula:

$$f = sg \times \left(\frac{Q}{C_v} \right)^2$$

Where,

f is the pressure drop (friction loss) in psi,

sg is the specific gravity of the fluid,

Q is the flow rate in GPM,

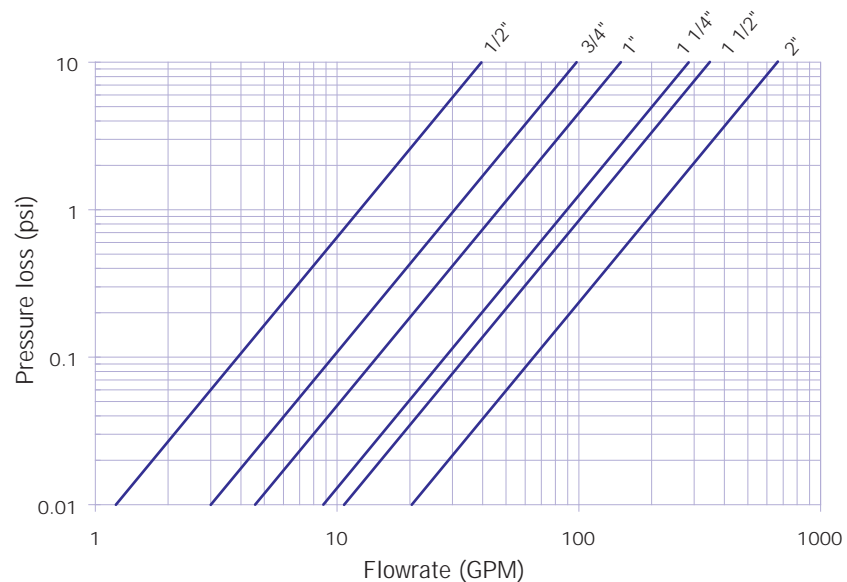
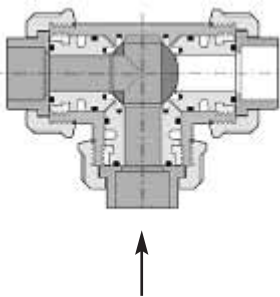
C_v is the flow coefficient.

Size	C _v Value				
	Position				
	A	B	C	D	E
1/2	3.85	2.45	4.55	13.7	5.11
3/4	9.50	6.65	10.2	26.6	10.5
1	14.4	9.80	17.2	53.2	18.6
1-1/4	27.3	18.9	32.2	73.5	33.3
1-1/2	33.3	23.1	42.0	119	43.4
2	63.0	43.4	84.0	224	85.4

pressure loss chart

Position A:

- T-Port
- Center Inlet
- Diverting Flow



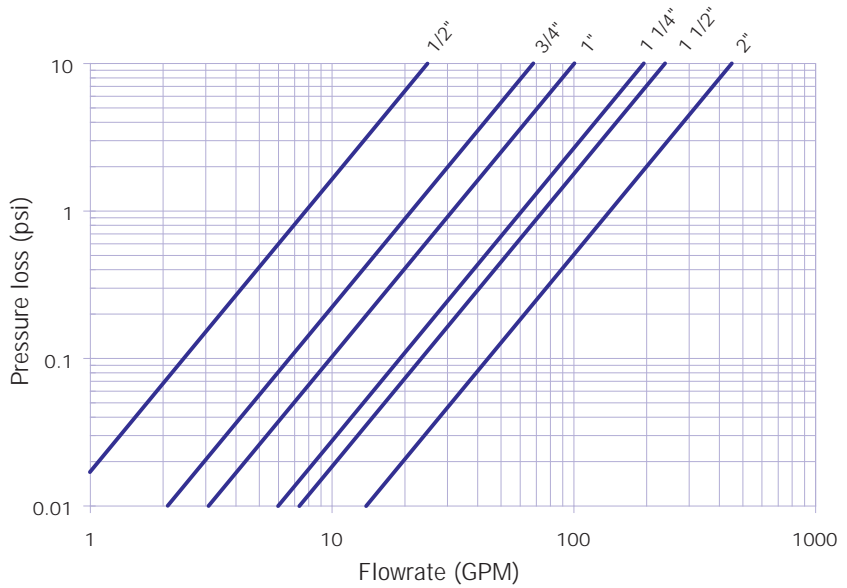
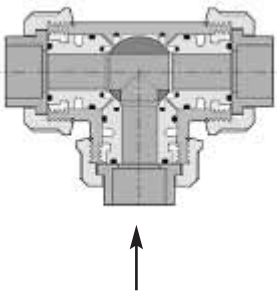
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Technical Data (cont'd)

pressure loss charts (cont'd)

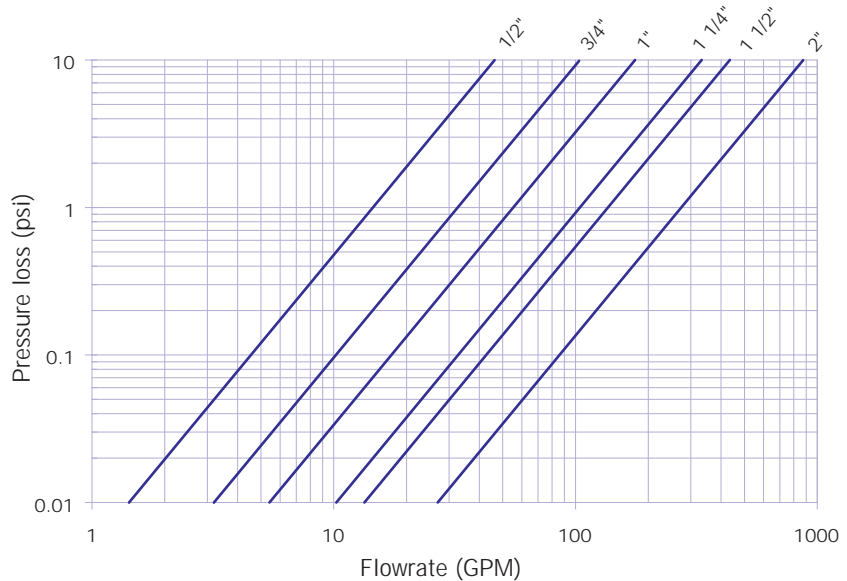
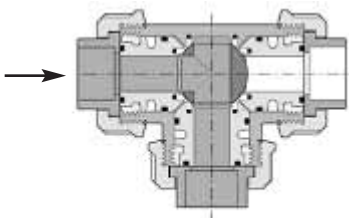
Position B:

- T-Port
- Center Inlet
- Separating Flow



Position C:

- T-Port
- Side Inlet
- Diverting Flow



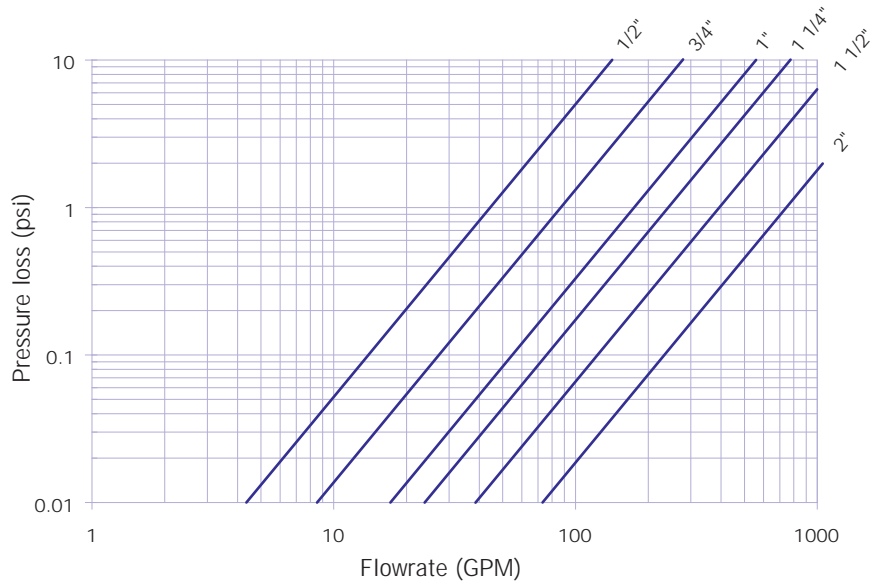
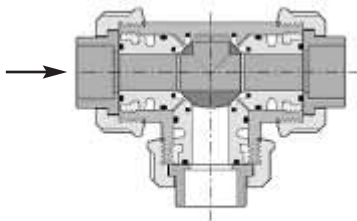
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Technical Data (cont'd)

pressure loss charts (cont'd)

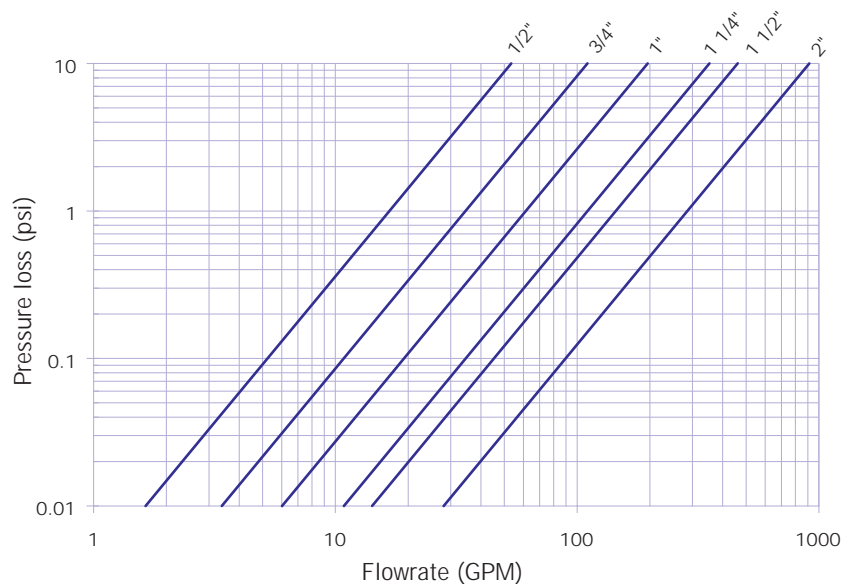
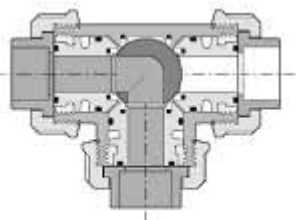
Position D:

- T-Port
- Side Inlet
- Straight Flow



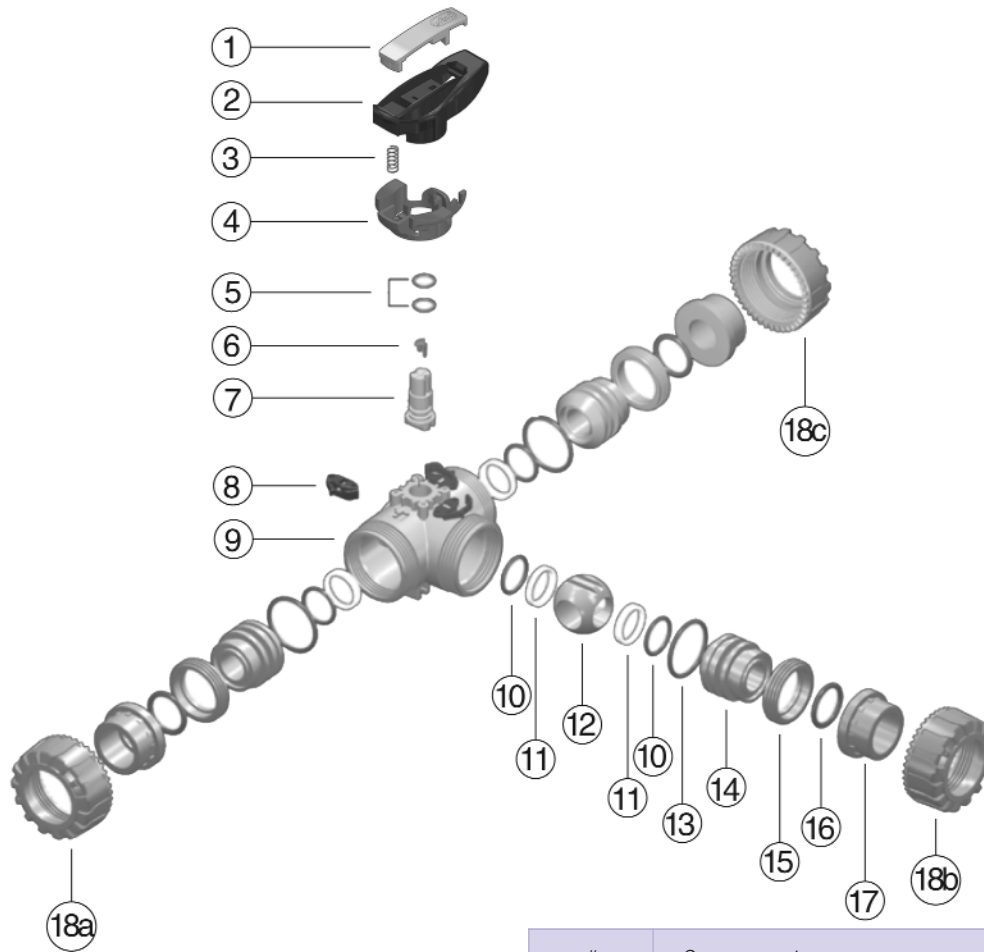
Position E:

- L-Port
- Any Inlet
- Diverting Flow



TKD Series 3-Way Ball Valves

Components



#	Component	Material	Qty
1	insert	U-PVC	1
2	handle	U-PVC	1
3	spring (SHKD)	Stainless Steel	1
4**	safety handle block (SHKD)	PP-GR	1
5*	stem o-rings	EPDM-FKM	2
6	position indicator	POM	1
7	stem	U-PVC	1
8	Dual Block®	POM	3
9	body	U-PVC	1
10*	support o-ring for ball seat	EPDM-FKM	4
11*	ball seat	PTFE	4
12	ball	U-PVC	1
13	radial seal o-ring	EPDM-FKM	3
14	support for ball seat	U-PVC	3
15	stop ring	U-PVC	3
16*	socket seal o-ring	EPDM-FKM	3
17*	end connector	U-PVC	3
18abc	union nuts	U-PVC	3

* Spare parts available.

** Optional feature



IPEX

TKD Series 3-Way Ball Valves

Installation Procedures



1. For socket and threaded style connections, remove the union nuts (part #18 on previous page) and slide them onto the pipe. For flanged connections, remove the union nut / flange assemblies from the valve.
2. Please refer to the appropriate connection style sub-section:
 - a. For socket style, solvent cement the end connectors (17) onto the pipe ends. For correct joining procedure, please refer to the section entitled, *“Joining Methods – Solvent Cementing”* in the IPEX Industrial Technical Manual Series, *“Volume I: Vinyl Process Piping Systems”*. **Be sure to allow sufficient cure time before continuing with the valve installation.**
 - b. For threaded style, thread the end connectors (17) onto the pipe ends. For correct joining procedure, please refer to the section entitled, *“Joining Methods – Threading”* in the IPEX Industrial Technical Manual Series, *“Volume I: Vinyl Process Piping Systems”*.
 - c. For flanged style, join the union nut / flange assemblies to the pipe flanges. For correct joining procedure, please refer to the section entitled, *“Joining Methods – Flanging”* in the IPEX Industrial Technical Manual Series, *“Volume I: Vinyl Process Piping Systems”*.
3. Open and close the valve to ensure that the seat supports (14) are at the desired adjustment. If adjustment is required, remove the insert tool (1) from the handle (2). Line up the moldings on the tool with the slots in the seat supports. Tighten or loosen to the desired position then replace the tool on the handle. **For correct alignment of the ball and seat support system, adjustment should begin with the center port.**
4. Ensure that the socket o-rings (16) are properly fitted in their grooves then carefully place the valve in the system between the end connections. If anchoring is required, fix the valve to the supporting structure via the integral mounting flange on the bottom of the valve body (9).
5. Tighten the three union nuts. Hand tightening is typically sufficient to maintain a seal for the maximum working pressure. **Over-tightening may damage the threads on the valve body and/or the union nut, and may even cause the union nut to crack.**
6. Check the installation of the dedicated lock nut device DUAL BLOCK® (8) on the valve body.
7. Open and close the valve to ensure that the cycling performance is adequate. If adjustment is required, loosen the union nuts, remove the valve from the system, and then continue from Step 3.



TKD Series 3-Way Ball Valves

Valve Maintenance

disassembly

1. If removing the valve from an operating system, isolate the valve from the rest of the system. **Be sure to depressurize and drain the isolated branch and valve before continuing.**
2. Unlock the Dual Block® system by compressing the lever (8). Loosen the three union nuts (18) and drop the valve out of the line. If retaining the socket o-rings (16), take care that they are not lost when removing the valve from the line.
3. To disassemble, rotate the handle (2) to the following position:
 - a. For T-Port valves, the three arrows must line up with the three valve ports (The valve must be open at all three ports).
 - b. For L-Port valves, the two arrows must line up with ports "a" and "b" (see component diagram).
4. Remove the insert tool (1) from the handle then line up the moldings on the tool with the slots in the seat supports (14). Loosen and remove all three seat supports from the valve body (9).
5. Remove the ball (12) from the valve body while taking care not to score or damage the outer surface.
6. Remove the handle from the stem (7) by pulling upwards. To remove the stem, push it into the valve body from above.
7. Remove the seats (11), backing o-rings (10), and body o-rings (13) from the seat supports.
8. Remove the seat and backing o-ring from the inside of the valve body.
9. Remove the stem o-rings (5).
10. The valve components can now be checked for problems and/or replaced.

assembly



Note: Before assembling the valve components, it is advisable to lubricate the o-rings with a water soluble lubricant. **Be sure to consult the "IPEX Chemical Resistance Guide" and/or other trusted resources to determine specific lubricant-rubber compatibilities.**

1. Properly fit the stem o-rings (5) in the grooves on the stem (7), then insert the stem from the inside of the valve body (9).
2. Line up the markings on the stem with the ports in the valve body.
3. Replace the backing o-ring (10) and seat (11) at the back of the valve body.
4. Insert the ball (12) into the valve body while ensuring that the ports line up with the markings on the stem.
5. Ensure that all body o-rings (13), backing o-rings, and seats are properly fitted on the three seat supports (14). **Starting with the center port**, tighten each support into the valve body using the insert tool (1).
6. Replace the handle (2) on the stem while ensuring that the position markings on the handle line up with those on the stem. Replace the insert tool on the handle.
7. Properly fit the socket o-rings (16) in their respective grooves.
8. Place the end connectors (17) into the union nuts (18), then thread onto the valve body taking care that the socket o-rings remain properly fitted in their grooves.



TKD Series 3-Way Ball Valves

Testing and Operating



The purpose of system testing is to assess the quality of all joints and fittings to ensure that they will withstand the design working pressure, plus a safety margin, without loss of pressure or fluid. Typically, the system will be tested and assessed in sub-sections as this allows for improved isolation and remediation of potential problems. With this in mind, the testing of a specific installed valve is achieved while carrying out a test of the overall system.

An onsite pressure test procedure is outlined in the IPEX Industrial Technical Manual Series, *"Volume I: Vinyl Process Piping Systems"* under the section entitled, *"Testing"*. The use of this procedure should be sufficient to assess the quality of a valve installation. **In any test or operating condition, it is important to never exceed the pressure rating of the lowest rated appurtenance in the system.**

Important points:

- Never test thermoplastic piping systems with compressed air or other gases including air-over-water boosters.
- When testing, do not exceed the rated maximum operating pressure of the valve.
- Avoid the rapid closure of valves to eliminate the possibility of water hammer which may cause damage to the pipeline or the valve.

The TKD offers an optional locking mechanism that prevents unintentional rotation. A padlock can be installed through the handle as an additional safety precaution.

Please contact IPEX customer service and technical support with regard to any concern not addressed in this data sheet or the technical manual.

TKD Series 3-Way Ball Valves

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