TKD Series 3-Way Automated Ball Valves

Product Data Sheet

IPEX TKD Series 3-Way Automated Ball Valves can be used for flow diverting, mixing, or on/off isolation. They offer a variety of advanced features such as the patented seat stop carrier, a high quality stem and ball support system, and the new DUAL BLOCK® system which locks the union nuts preventing back-off due to vibration or thermal cycling. Deep grooves, thick o-rings, and cushioned Teflon® seats contribute to strong seals at pressures up to 232psi while an integral mounting flange and support bracketing combine for simple adaptation for actuation and anchoring. Actuators can be configured for 90° or 180° operation. TKD Series 3-Way Automated Ball Valves are part of our complete systems of pipe, valves, and fittings, engineered and manufactured to our strict quality, performance, and dimensional standards.

< STANDARDS >

ASTM D1784
ASTM D2464
ASTM D2466
ASTM D2467
ASTM F1498
ASTM F437
ASTM F439

ANSI B1.20.1

VALVE AVAILABILITY

Body Material:	PVC, CPVC
Size Range:	1/2" through 2"
Pressure:	232psi
Seats:	Teflon® (PTFE)
Seals:	EPDM or FPM
End Connections:	Socket (IPS), Threaded (FNPT)
Actuator Control:	Double Acting Pneumatic, Spring Return Pneumatic, Electric

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IPEX by aliaxis

TKD Series 3-Way Automated Ball Valves

Sample Specification

Samples Specifications

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.
- The valve body, stem, ball and unions shall be made of Corzan® CPVC compound which shall meet or exceed the requirements of 23447 according to ASTM D1784.
- These compounds shall be listed with NSF to Standard 61 for potable water.

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 FPM.

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 valves 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.
- The thickness of the valve body shall be the same at all three ports.
- The valve shall include the Dual Block® union nut locking mechanism.
- The stem design shall feature a shear point above the o-ring to maintain system integrity in the unlikely event of a stem breakage.
- 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 manufacturers name or trade mark.

TKD Series 3-Way Automated Ball Valves

Sample Specification

3.3 Color Coding

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

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

5.0 Actuators

- All Actuators shall be factory installed by IPEX

Pneumatic Actuator:

- Shall be sized for 80 psi control air pressure
- Shall be dual piston rack and pinion design with linear torque output.
- Body shall be Technopolymer UT series or Anodized Aluminum MT series with standard position indicator and NAMUR VDI/VDE 3845 and ISO 5211 mounting dimensions.
- All models shall be operable using air, water, nitrogen or compatible hydraulic fluids from 40 – 120psi.
- Aluminum body models shall feature dual travel stops that provide +/- 10° stroke rotation on both the opening and closing phases.
- All external fasteners shall be stainless steel.

Electric Actuator:

- Shall have 100VAC – 240VAC reversing motors with torque limiters, thermal protection, auxiliary limit switches, NEMA 4X enclosure*, manual override, and position indicator as standard.

or Shall have 24VDC reversing motors with torque limiters, thermal protection, auxiliary limit switches, NEMA 4X enclosure*, manual override, and position indicator as standard.

- 4-20mA positioner, battery backup, and 180° rotation models shall be available in 100 – 240VAC and 24VDC
- All models shall have ISO 5211 mounting dimensions

* Type 4X Indoor Use Only Enclosure

TKD Series 3-Way Automated Ball Valves

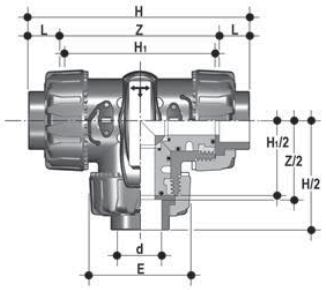
Product Data Sheet

Size (inches)	Body Material	Seal Material	IPEX Part Number							
			Pneumatic Double Acting		Pneumatic Spring Return, Normally Closed		Pneumatic Spring Return, Normally Open		Electric Double Acting, 100-240 VAC	
			IPS Socket	FNPT Threaded	IPS Socket	FNPT Threaded	IPS Socket	FNPT Threaded	IPS Socket	FNPT Threaded
1/2	PVC L-Port	EPDM	253791		253767		253744		253720	
		FPM	253797		253773		253750		253726	
	PVC T-Port	EPDM	253803		253779		253756		253732	
		FPM	253809		253785		253762		253738	
	CPVC L-Port	EPDM	254071		254061		253828		253840	
		FPM	254001		254013		254025		254037	
	CPVC T-Port	EPDM	254055		254067		253834		253995	
		FPM	254007		254019		254031		254044	
3/4	PVC L-Port	EPDM	253792		253768		253745		253721	
		FPM	253798		253774		253751		253727	
	PVC T-Port	EPDM	253804		253780		253757		253733	
		FPM	253810		253786		253763		253739	
	CPVC L-Port	EPDM	254049		254062		253829		253841	
		FPM	254002		254014		254026		254038	
	CPVC T-Port	EPDM	254056		254068		253835		253996	
		FPM	254008		254020		254032		254045	
1	PVC L-Port	EPDM	253793		253769		253746		253722	
		FPM	253799		253775		253752		253728	
	PVC T-Port	EPDM	253805		253781		253758		253734	
		FPM	253811		253787		253764		253740	
	CPVC L-Port	EPDM	254051		254063		253830		253991	
		FPM	254003		254015		254027		254039	
	CPVC T-Port	EPDM	254057		254069		253836		253997	
		FPM	254009		254021		254033		254046	
1-1/4	PVC L-Port	EPDM	253794		253770		253747		253723	
		FPM	253800		253776		253753		253729	
	PVC T-Port	EPDM	253806		253782		253759		253735	
		FPM	253812		253788		253765		253741	
	CPVC L-Port	EPDM	254052		254064		253831		253992	
		FPM	254004		254016		254028		254040	
	CPVC T-Port	EPDM	254058		254070		253837		253998	
		FPM	254010		254022		254034		254047	
1-1/2	PVC L-Port	EPDM	253795		253771		253748		253724	
		FPM	253801		253777		253754		253730	
	PVC T-Port	EPDM	253807		253783		253760		253736	
		FPM	253813		253789		253766		253742	
	CPVC L-Port	EPDM	254053		254065		253832		253993	
		FPM	254005		254017		254029		254041	
	CPVC T-Port	EPDM	254059		254050		253838		253999	
		FPM	254011		254023		254035		254048	
2	PVC L-Port	EPDM	253796		253772		253749		253725	
		FPM	253802		253778		253755		253431	
	PVC T-Port	EPDM	253808		253784		253761		253737	
		FPM	253814		253790		253815		253743	
	CPVC L-Port	EPDM	254060		254066		253833		253994	
		FPM	254006		254018		254030		254043	
	CPVC T-Port	EPDM	254054		254072		253839		254000	
		FPM	254012		254024		254036		254042	

TKD Series 3-Way Automated Ball Valves

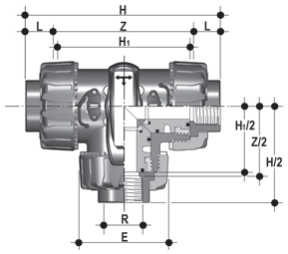
Technical Data

Dimensions



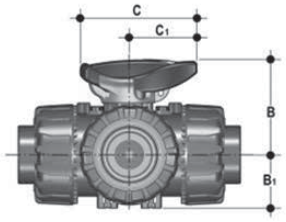
IPS Socket Connections – Dimension (inches)

Size (d)	E	H	H_1	L	Z
1/2	2.13	5.20	3.15	0.91	3.43
3/4	2.56	6.27	3.94	1.00	4.26
1	2.87	6.85	4.33	1.13	4.59
1-1/4	3.39	8.07	5.16	1.26	5.55
1-1/2	3.86	8.96	5.83	1.38	6.20
2	4.80	10.51	7.05	1.50	7.50



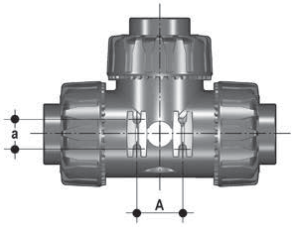
Female NPT Threaded Connections – Dimension (inches)

Size (R)	E	H	H_1	L	Z
1/2	2.13	4.96	3.15	0.71	3.56
3/4	2.56	5.76	3.94	0.71	4.35
1	2.87	6.56	4.33	0.89	4.78
1-1/4	3.39	7.71	5.16	0.99	5.73
1-1/2	3.86	8.32	5.83	0.97	6.38
2	4.80	9.99	7.05	1.17	7.66



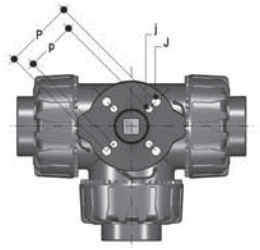
IPS Socket & Female NPT Threaded – Dimension (inches)

Size (R)	B	B_1	C	C_1
1/2	2.13	1.14	2.64	1.58
3/4	2.56	1.36	3.35	1.93
1	2.74	1.54	3.35	1.93
1-1/4	3.25	1.81	4.25	2.52
1-1/2	3.50	2.05	4.25	2.52
2	4.25	2.44	5.28	2.99



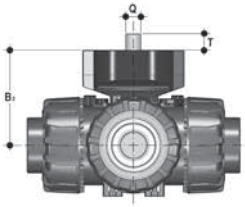
Mounting Flanges – Dimension (inches)

Size	A
1/2	1.22
3/4	1.22
1	1.22
1-1/4	1.97
1-1/2	1.97
2	1.97



Mounting Kit – Dimensions (inches)

Size	B_2	T	Q	p / P	j / J
1/2	2.28	0.47	0.43	F03 / F04	0.22
3/4	2.89	0.47	0.43	F03 / F05 or F04	0.22 / 0.26 or 0.22
1	2.91	0.47	0.43	F03 / F05 or F04	0.22 / 0.26 or 0.22
1-1/4	3.82	0.63	0.43 or 0.55	F05	0.26
1-1/2	4.09	0.63	0.43 or 0.55	F05	0.26
2	4.49	0.63	0.43 or 0.55	F05 / F07	0.26 / 0.33

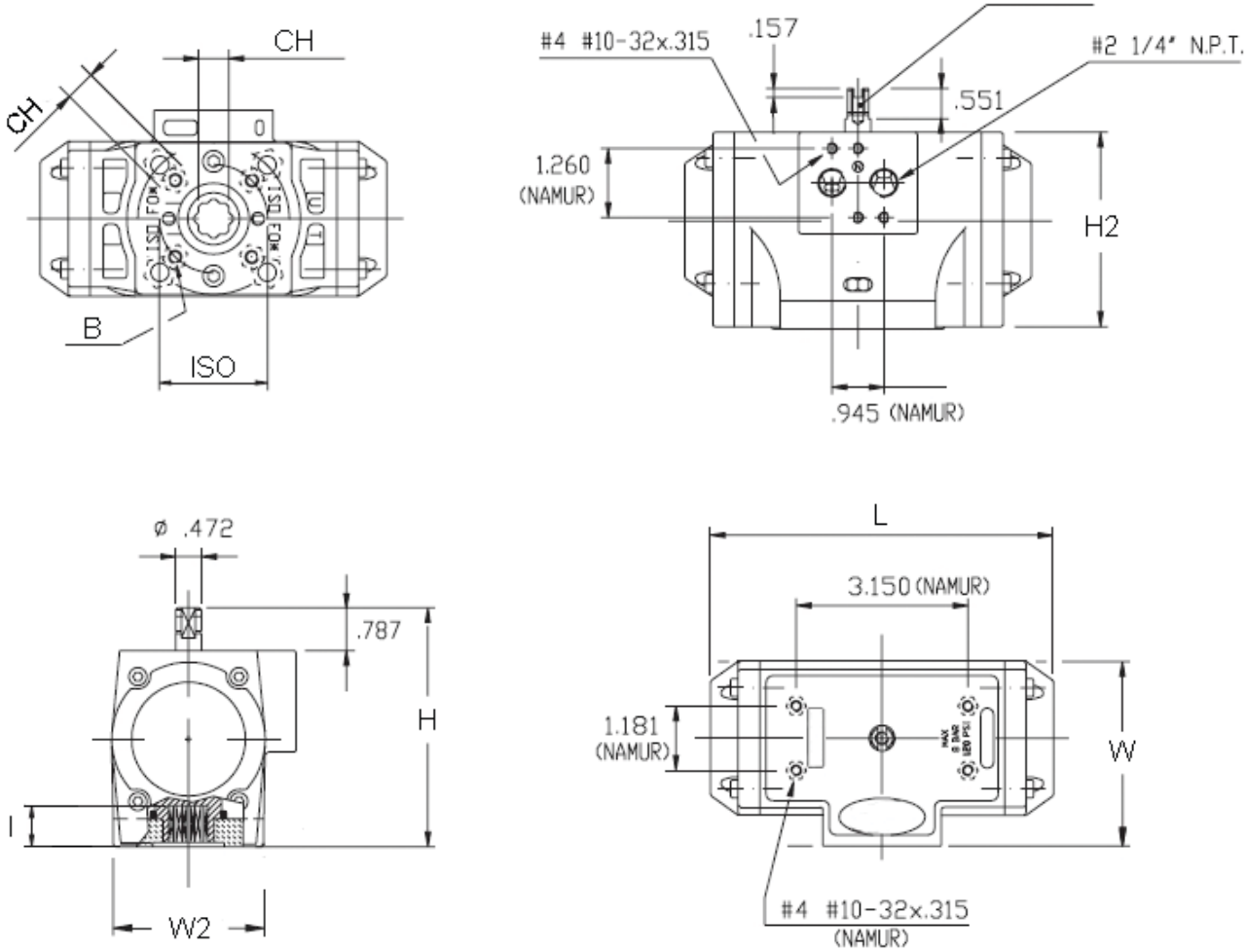


TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Pneumatic Actuator Dimensions

Models UT11, UT14, UT19



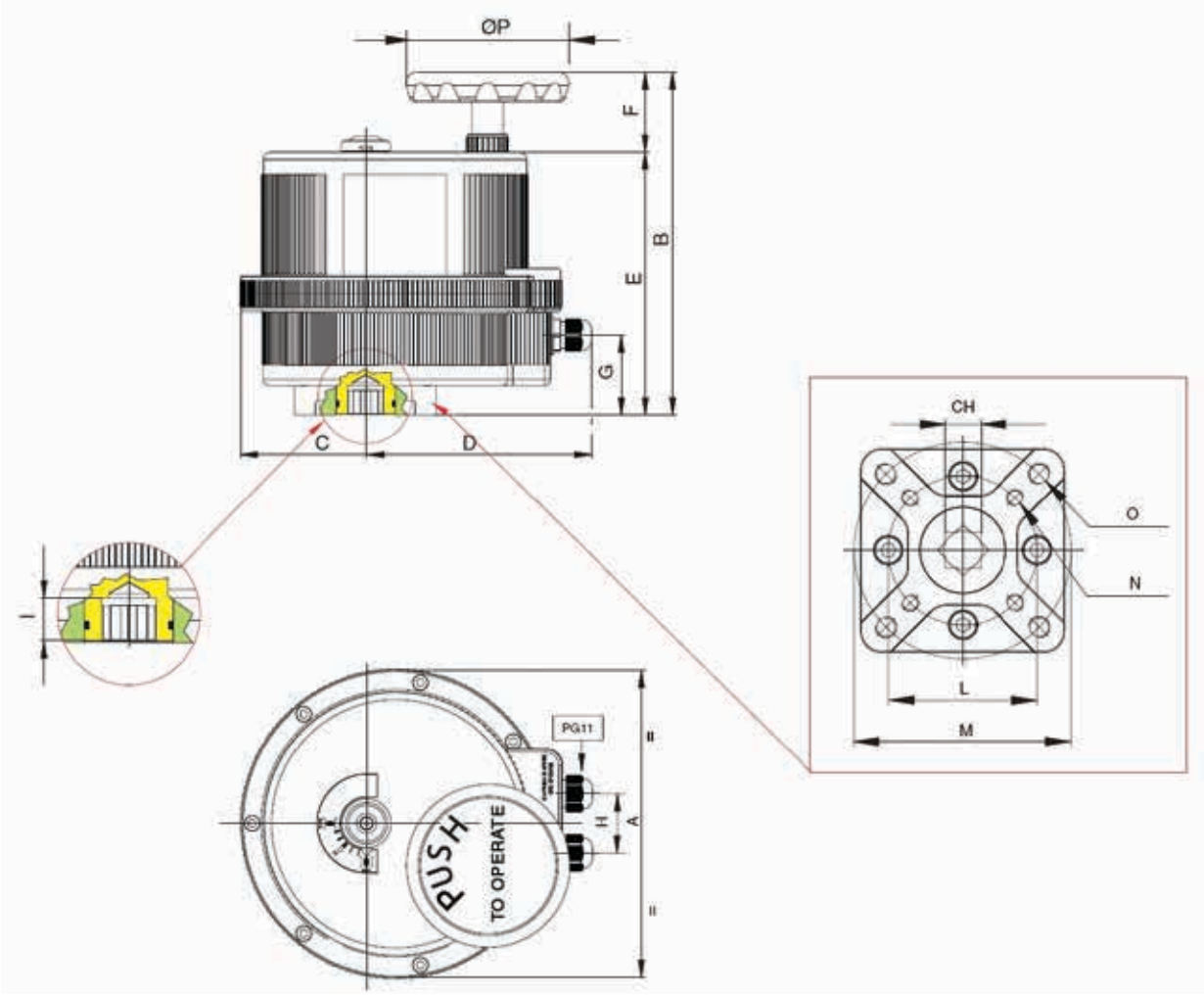
Dimensions (inches)

Valve Size	Double Acting Model	ISO	CH	L	W	W2	H	H2	I	B
1/2	UT11DA	F04	0.43	4.69	2.64	2.09	3.58	2.76	0.49	10-32 UNF x 0.40
3/4	UT14DA	F05 / F07	0.55	6.30	3.39	2.76	4.37	3.54	0.75	1/4-20 UNC x 0.51
1	UT14DA	F05 / F07	0.55	6.30	3.39	2.76	4.37	3.54	0.75	1/4-20 UNC x 0.51
1-1/4	UT14DA	F05 / F07	0.55	6.30	3.39	2.76	4.37	3.54	0.75	1/4-20 UNC x 0.51
1-1/2	UT14DA	F05 / F07	0.55	6.30	3.39	2.76	4.37	3.54	0.75	1/4-20 UNC x 0.51
2	UT14DA	F05 / F07	0.55	6.30	3.39	2.76	4.37	3.54	0.75	1/4-20 UNC x 0.51

TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Electric Actuator Dimensions



Dimensions (inches)

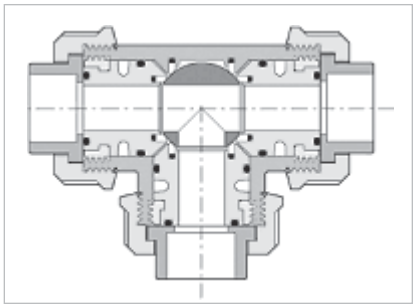
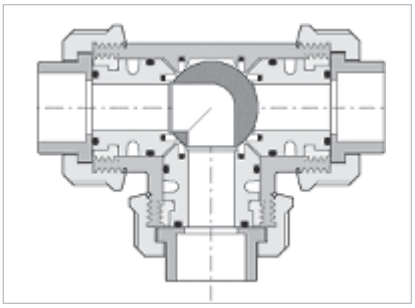
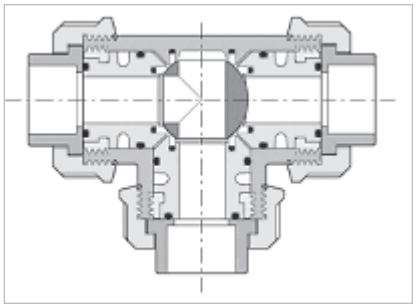
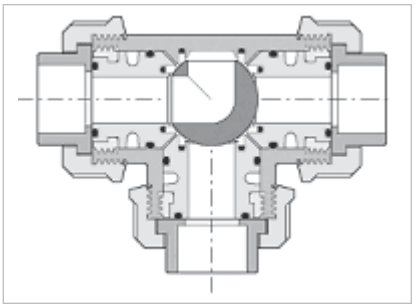
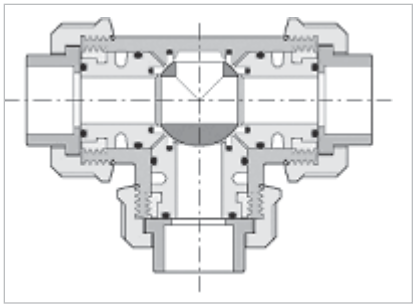
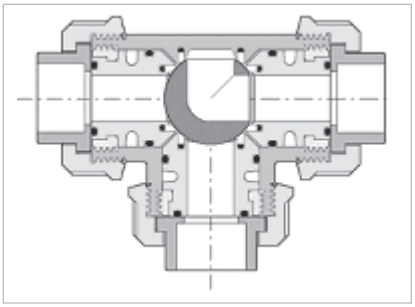
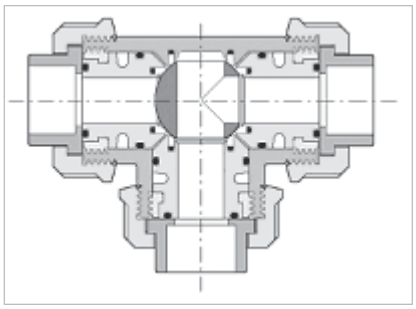
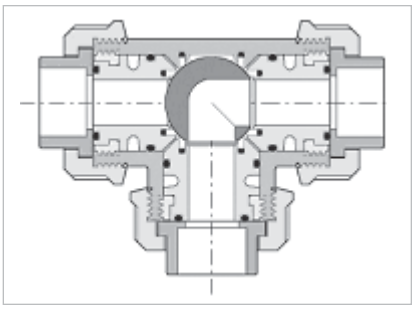
Valve Size	Actuator Model	ISO	CH	A	B	C	D	E	F	G	H	I	L	M	N	O
1/2	VB015	F03 / F05	0.43	4.84	6.28	1.67	4.78	5.67	0.61	4.35	1.26	0.47	1.42	1.97	10-24 UNC x 0.55	1/4-20 UNC x 0.55
3/4	VB015	F03 / F05	0.43	4.84	6.28	1.67	4.78	5.67	0.61	4.35	1.26	0.47	1.42	1.97	10-24 UNC x 0.55	1/4-20 UNC x 0.55
1	VB015	F03 / F05	0.43	4.84	6.28	1.67	4.78	5.67	0.61	4.35	1.26	0.47	1.42	1.97	10-24 UNC x 0.55	1/4-20 UNC x 0.55
1-1/4	VB015	F03 / F05	0.43	4.84	6.28	1.67	4.78	5.67	0.61	4.35	1.26	0.47	1.42	1.97	10-24 UNC x 0.55	1/4-20 UNC x 0.55
1-1/2	VB030	F03 / F05	0.43	6.18	7.39	2.38	5.01	5.75	1.64	1.30	1.42	0.47	1.42	1.97	10-24 UNC x 0.55	1/4-20 UNC x 0.55
2	VB030	F03 / F05	0.43	6.18	7.39	2.38	5.01	5.75	1.64	1.30	1.42	0.47	1.42	1.97	10-24 UNC x 0.55	1/4-20 UNC x 0.55

TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

operating positions

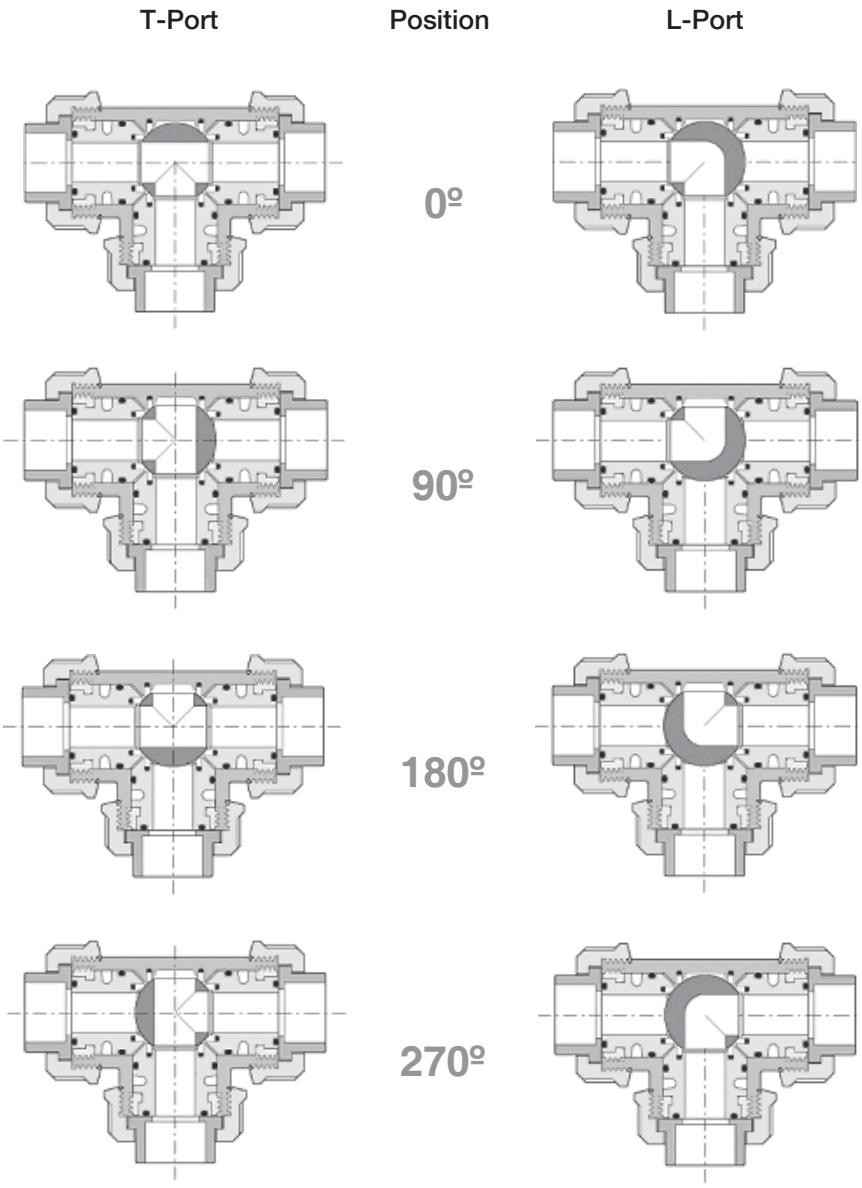
Position	T-Port	L-Port
0°	mixing	diverting
90°	diverting	closed
180°	straight flow	closed
270°	diverting	diverting

T-Port	position	L-Port
	0º	
	90º	
	180º	
	270º	

TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Operating Positions – Please specify 'open' and 'closed' positions



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

Note: Electric actuators can be configured for either 90° or 180° operation.

TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Note: Pneumatic actuator performance is based on 80psi available control air pressure.

Actuator Technical Data

Valve Size (inches)	Double Acting Pneumatic	Actuator Model Spring Return Pneumatic	Electric
1/2	UT11DA	UT11S2	VB015
3/4	UT14DA	UT14S4	VB015
1	UT14DA	UT14S4	VB015
1-1/4	UT14DA	UT19S5	VB015
1-1/2	UT14DA	UT19S5	VB030
2	UT14DA	UT26S4	VB030

Pneumatic Actuator Torque Data

Valve Size (inches)	DOUBLE ACTING		SPING RETURN					
					Spring Torque (in-lbs)		Air Torque (in-lbs)	
	Model	Torque (in-lbs)	Model	Spring Set (standard)	Start	End	Start	End
1/2	UT11DA	125	UT11S2	S2	66	44	81	59
3/4	UT14DA	275	UT14S4	S4	150	107	168	125
1	UT14DA	275	UT14S4	S4	150	107	168	125
1-1/4	UT14DA	275	UT19S5	S5	307	230	270	193
1-1/2	UT14DA	275	UT19S5	S5	307	230	270	193
2	UT14DA	275	UT26S4	S4	392	247	503	358

Pneumatic Actuator Weights and Air Consumption

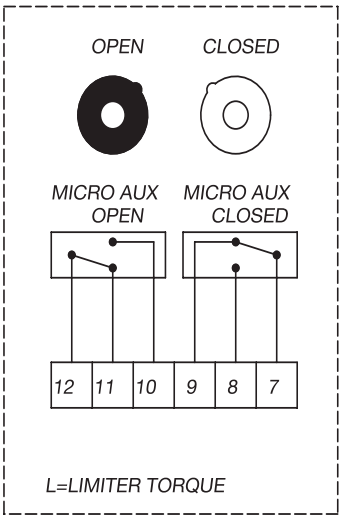
Valve Size (inches)	DOUBLE ACTING			SPRING RETURN		
	Model	Weight (lbs)	Air Cons. (in^3)	Model	Weight (lbs)	Air Cons. (in^3)
1/2	UT11DA	1.26	13.5	UT11S2	1.44	8.0
3/4	UT14DA	2.62	22.0	UT14S4	3.06	10.8
1	UT14DA	2.62	22.0	UT14S4	3.06	10.8
1-1/4	UT14DA	2.62	22.0	UT19S5	5.16	17.5
1-1/2	UT14DA	2.62	22.0	UT19S5	5.16	17.5
2	UT14DA	2.62	22.0	UT26S4	9.88	30.0

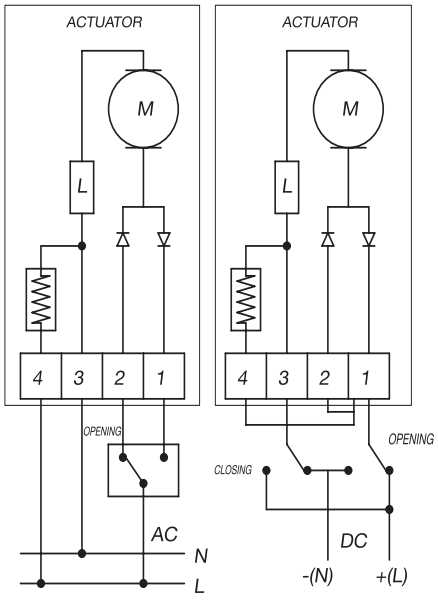
TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Electrical Actuator

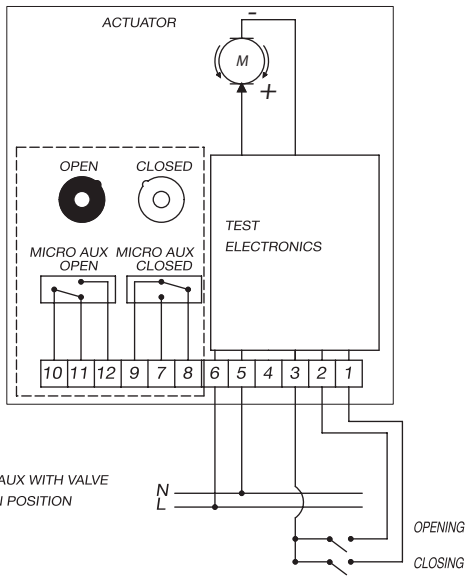
Model VB015 24V AC/DC



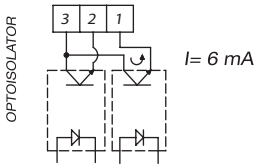


MICRO AUX WITH VALVE IN OPEN POSITION

Model VB015 100V – 240V AC



STATIC IMPULSE DRIVE OPTOISOLATED BY PLC

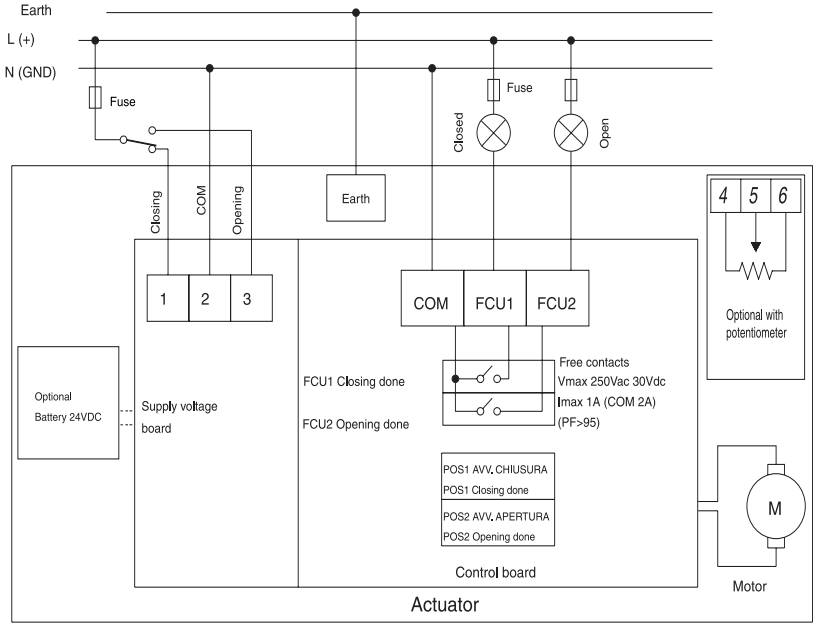


TKD Series 3-Way Automated Ball Valves

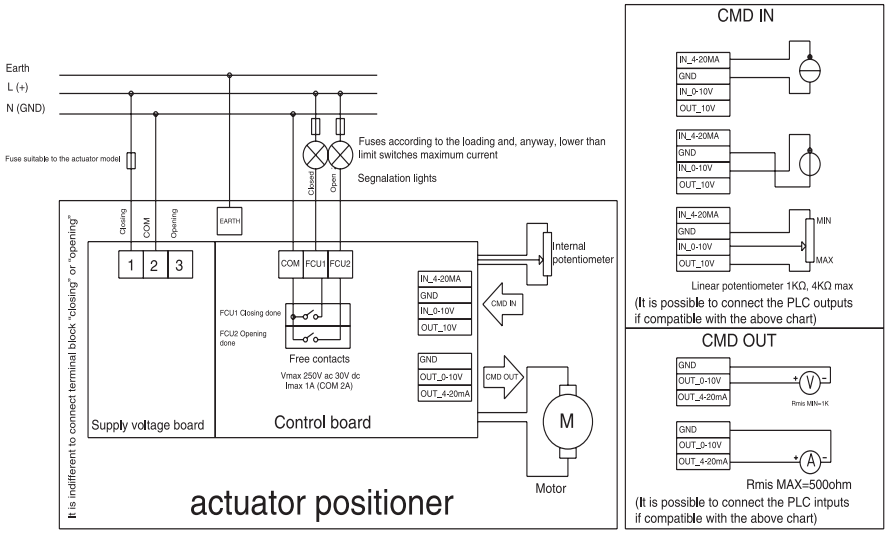
Technical Data (cont'd)

Electrical Actuator

Model VB30 to VB350, 24V AC/DC, 110 – 240V AC



VB30 to VB350 24V AC/DC, 110 – 240V AC with Positioner



TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Model		VB015	VB030
Max Working Torque (in-Lbs)		133	266
Voltage (V)	Low Voltage	12V AC/DC	12V DC
		24V AC/DC	24V AC/DC
	High Voltage Multitension	100-240V AC	100-240V AC
Working Time (sec)		10	8
Torque Limiter		STD	STD
Duty Rating		50%	75%
Protection		IP65 ** NEMA 4X*	IP65-67 NEMA 4X*
Rotation		90°	90°
Upon Request		180°	180° or 70°
Manual Intervention		STD	STD
Position Indicator		STD	STD
Working Temperature		-4F +131F	-4F +131F
Heater		STD	STD
Additional Free Limit Switches		2 STD	2 STD
Drilling ISO 5211 PAD		F03 – F05	F03 – F05
Square Drive		0.43	0.43
Square Upon Request		0.35	0.35 – 0.55
Positioner (4~20mA or 0~10 VDC)		Not Available	Upon Request
Electrical Connections		PG11	PG11
Weight (LBS)		3.09	5.07

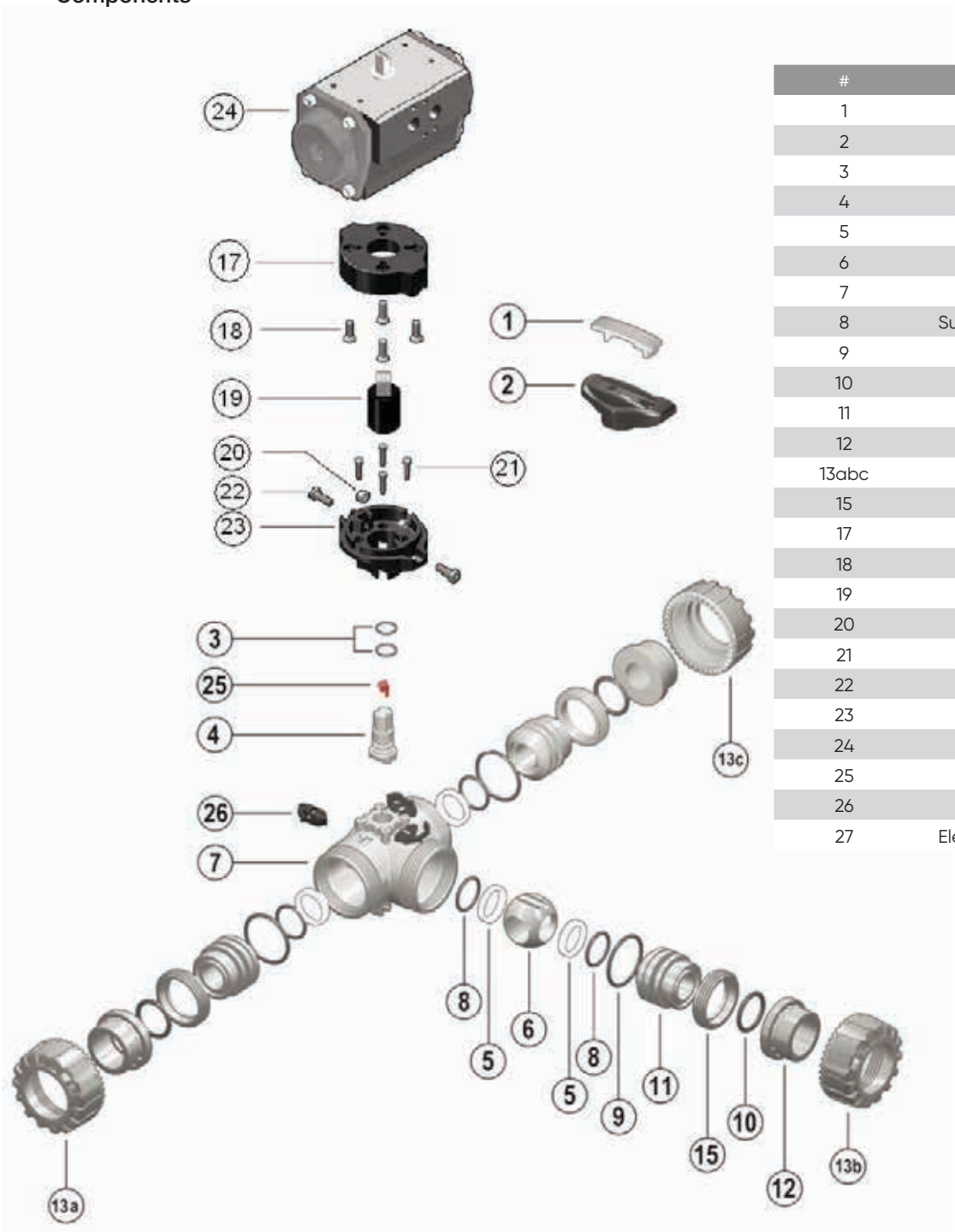
Electric Actuator Power Consumption

MODEL		VB015		VB030	
VERSION H	Nominal Voltage	100V AC	240V AC	100 – 240V AC	
	Absorbed Current	75mA	25mA	0.3 – 0.2A	
	Absorbed Power	6.6 VA	6 VA	30 – 48VA	
VERSION L	Nominal Voltage	24V AC/DC		24V AC/DC	
	Absorbed Current	1.2A	0.6A	2.0A	1.0A
	Absorbed Power	15 VA		24 VA	
Frequency		50/60 HZ			

TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Components



#	Components
1	Insert
2	Handle
3	Stem O-Rings
4	Stem
5	Ball Seat
6	Ball
7	Body
8	Support O-Ring for Ball Seat
9	Radial Seal O-Ring
10	Socket Seal O-Ring
11	Support for Ball Seat
12	End Connector
13abc	Union Nuts
15	Stop Ring
17	Upper Plate
18	Screw
19	Coupling Spindle
20	Nut
21	Screw
22	Screw
23	Lower Plate
24	Pneumatic Actuator
25	Position Indicator
26	
27	Electric Actuator (not shown)

TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

Installation Procedures

1. For socket and threaded style connections, remove the union nuts (part #13 on previous page) and slide them onto the pipe. For flanged connections, remove the union nut / flange assemblies from the valve (Figure 1).
2. Please refer to the appropriate connection style subsection:
   a. For socket style, solvent cement the end connectors (12) 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 (12) 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" (Figure 2).
3. All quarter turn automated valves are tested for proper operation before leaving the factory. Adjustment of the seat stop carrier should not be necessary. However, If adjustment is required, remove the insert tool (1) from the handle (2) provided. 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 (10) 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 (7).
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 (Figure 2).
6. Check the installation of the dedicated lock nut device DUAL BLOCK® (26) on the valve body (Figure 3).
7. Connect pneumatic or electric connections according to provided diagrams.
8. Cycle the valve open and close 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.

Figure 1

Figure 2

Figure 3

TKD Series 3-Way Automated Ball Valves

Technical Data (cont'd)

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. If necessary, remove actuator connections and detach the valve from the support structure
3. Unlock the Dual Block® system (Figure 3) by compressing the lever (26). Loosen the three union nuts (13) and drop the valve out of the line. If retaining the socket o-rings (10), take care that they are not lost when removing the valve from the line.
4. Remove the actuator, if necessary, from the valve by removing the screws (22) located horizontally across from each other fastening the upper and lower portions of the actuation pad.
5. To disassemble, rotate the ball to the appropriate position using the provided handle (2).
4. Remove the insert tool (1) from the handle provided, then line up the moldings on the tool with the slots in the seat supports (11). Loosen and remove all three seat supports from the valve body (7).
5. Remove the ball (6) from the valve body while taking care not to score or damage the outer surface.
6. To remove the stem, push it into the valve body from above.
7. Remove the seats (5), backing o-rings (8), and body o-rings (9) 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 (3).
10. The valve components can now be checked for problems and/or replaced.

Note: It is not necessary to remove the actuator from the valve unless the stem requires servicing or replacement. If possible, leave actuator attached to valve during servicing.

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 (3) in the grooves on the stem (4), then insert the stem from the inside of the valve body (7).
2. Line up the markings on the stem with the ports in the valve body.
3. Replace the backing o-ring (8) and seat (5) at the back of the valve body.
4. Insert the ball (6) into the valve body while ensuring that the ports line up with the markings on the stem. Ensure that the actuator and ball position correspond to the same operating position
5. Ensure that all body o-rings (9), backing o-rings, and seats are properly fitted on the three seat supports (11). Starting with the center port, tighten each support into the valve body using the insert tool (1).
6. Replace the actuator, if removed, and affix in position using screws (22) located horizontally across from each other.
7. Properly fit the socket o-rings (10) in their respective grooves.
8. Place the end connectors (12) into the union nuts (13), then thread onto the valve body taking care that the socket o-rings remain properly fitted in their grooves.

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