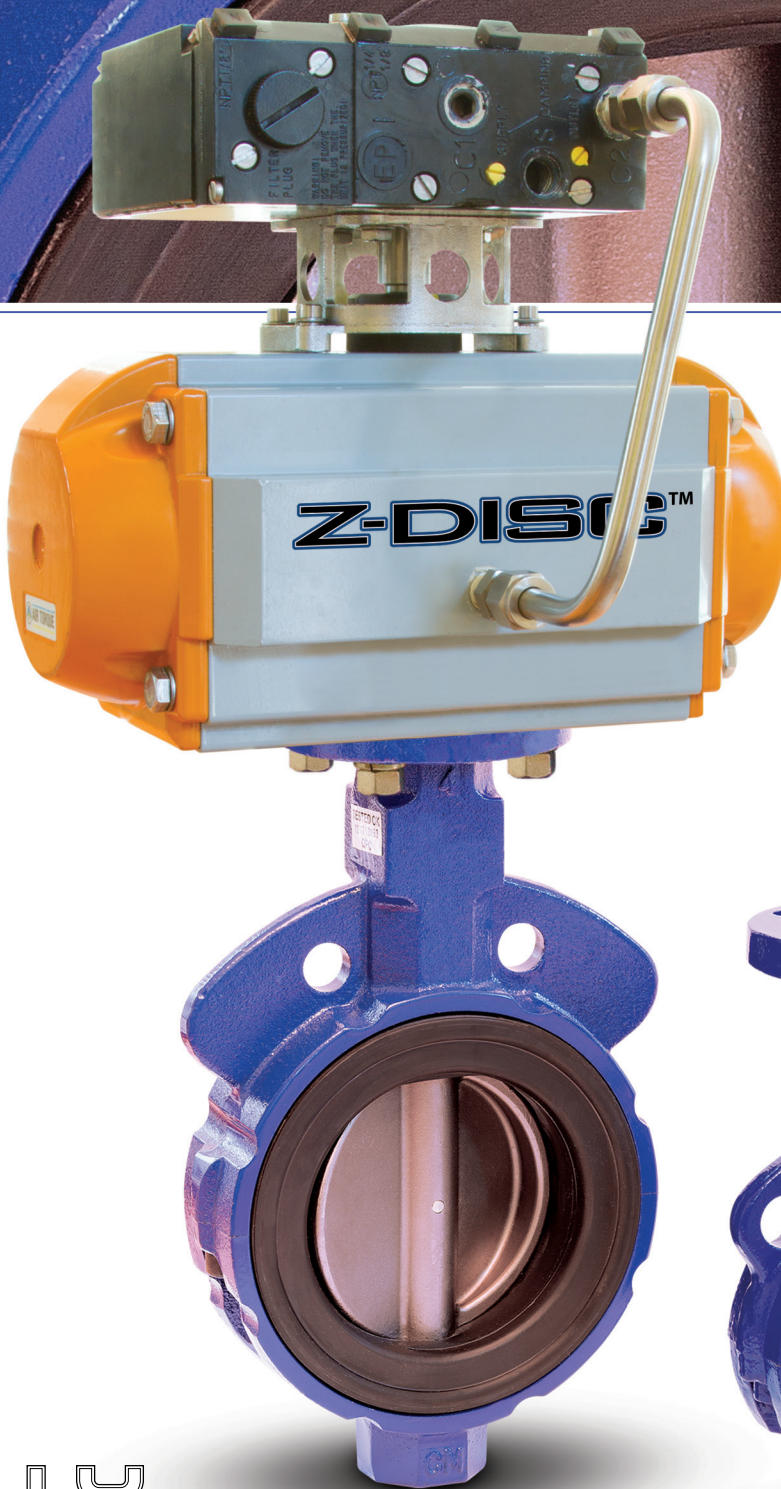


Installation & Operations Manual



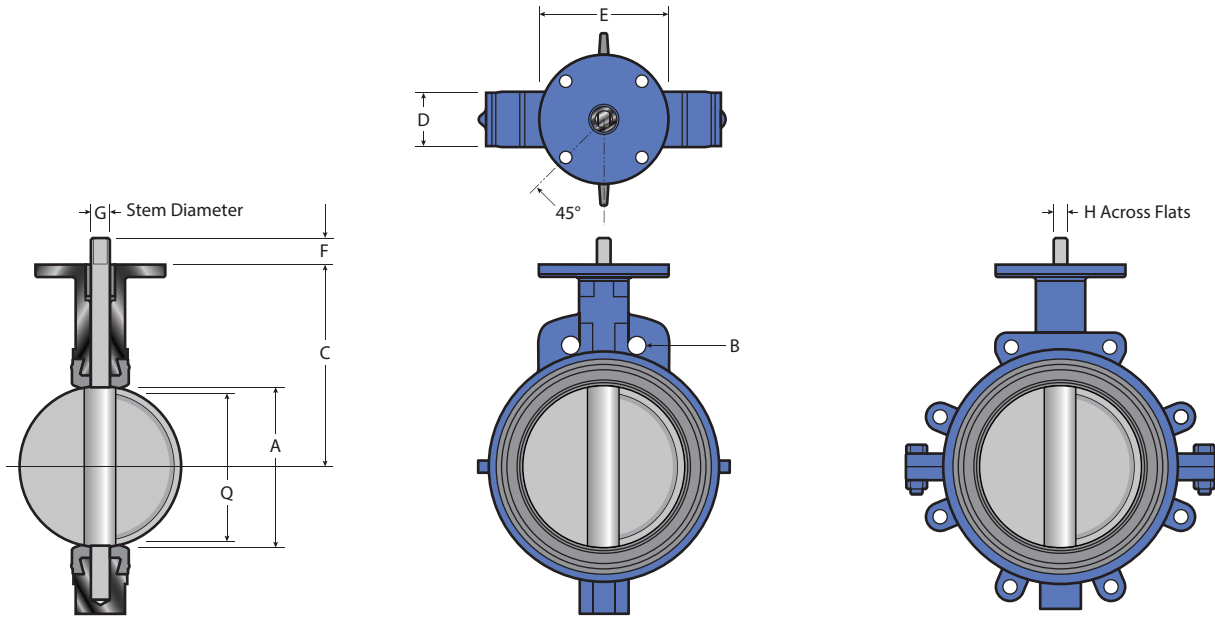
**Z-Disc™ Technology
Utilizing Keystone &
Bray Platforms**



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Z-Disc™ Utilizing Keystone Platform 990 & 920

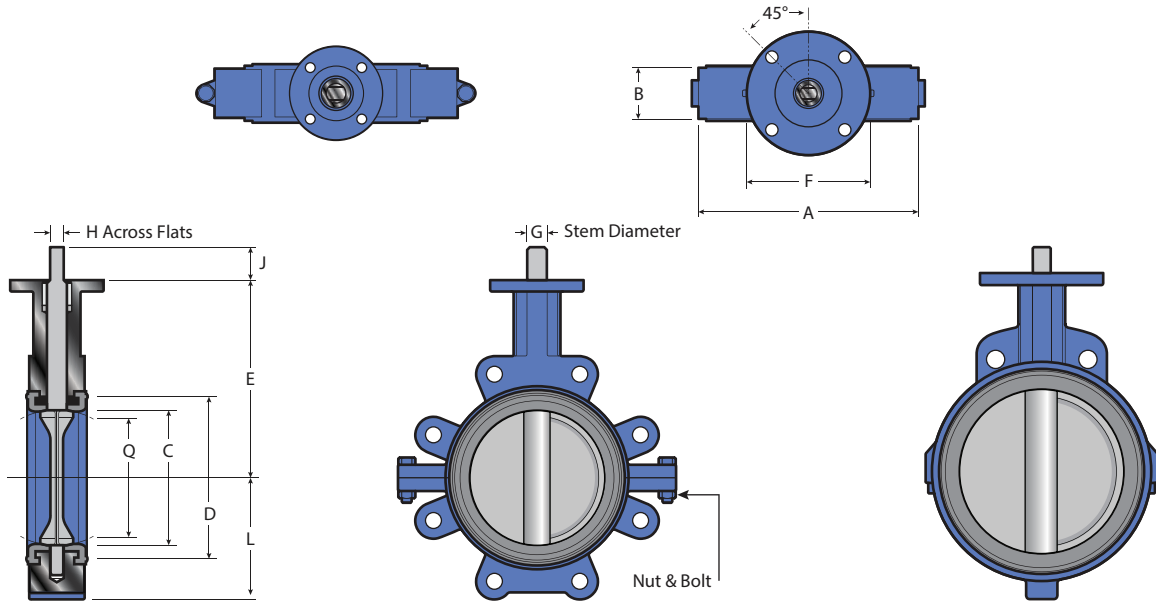


DIMENSIONS

Size	A	B	C	D	E	F	G	H*	Q	Top Plate Drilling				Tapped Lug Data			Weight		Adapt Code
										Key	Bolt Circle	No. Holes	Hole Dia.	Bolt Circle	No. Holes	Tap Size	990	920	
IN 2	2.00	4.125	5.50	1.625	4.00	1.125	.5625	.375	1.375	N/A	3.25	4	.4375	4.75	4	.625 - 11 UNC	6	7	BAB
MM 50	52	105	140	41	102	29	14	10	35		83	4	11	121			2.7	3.2	
IN 2.5	2.50	4.625	6.00	1.75	4.00	1.125	.5625	.375	2.0625	N/A	3.25	4	.4375	5.50	4	.625 - 11 UNC	8	9.75	BAB
MM 65	64	117	152	44	102	29	14	10	52		83	4	11	140			3.6	4.4	
IN 3	3.00	5.125	6.25	1.75	4.00	1.125	.5625	.375	2.5625	N/A	3.25	4	.4375	6.00	4	.625 - 11 UNC	9	10	BAB
MM 75	76	130	159	44	102	29	14	10	65		83	4	11	152			4.1	4.5	
IN 4	4.00	6.375	7.00	2.00	4.00	1.125	.625	.4375	3.625	N/A	3.25	4	.4375	7.50	8	.625 - 11 UNC	11	16.75	BAC
MM 100	102	162	178	52	102	29	16	11	92		83	4	11	191			5	7.6	
IN 5	5.00	7.375	7.50	2.125	4.00	1.125	.75	.50	4.75	N/A	3.25	4	.4375	8.50	8	.75 - 10 UNC	15.5	22	BAD
MM 125	127	187	191	54	102	29	19	13	121		83	4	11	216			7	10	
IN 6	5.75	8.50	8.00	2.125	4.00	1.125	.75	.50	5.50	N/A	3.25	4	.4375	9.50	8	.75 - 10 UNC	17.5	24.125	BAD
MM 150	146	216	203	54	102	29	19	13	140		83	4	11	241			8	10.9	
IN 8	7.75	10.6875	9.50	2.50	6.00	1.125	.8750	.625	7.5	N/A	5.00	4	.5625	11.75	8	.75 - 10 UNC	30	42	CAE
MM 200	197	271	241	64	152	29	22	16	191		127	4	14	298			13.6	19.1	

Note: Dimension the same for GRW/GRL platform.

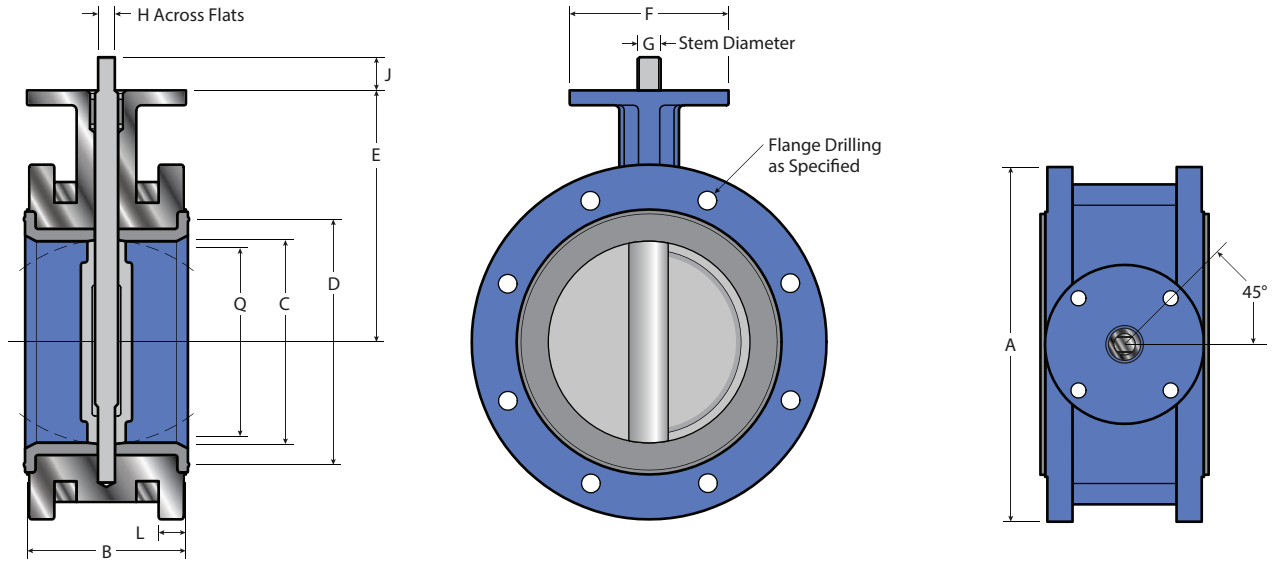
Z-Disc™ Utilizing Bray Platform: Series 21 Lug & 20 Wafer



DIMENSIONS																	LUG BOLTING DATA				
Size	A	B	C	D	E	F	Top Plate Drilling			G	H	J	Q	L		Adapter Code	Weight		Bolt Circle	# Holes	Threads ISO Course
							BC	# Holes	Dia.					Wafer	Lug		Wafer	Lug			
IN 2	3.69	1.62	2.00	2.85	5.50	3.54	2.76	4	.39	.55	.39	1.25	1.32	2.22	2.30	A	5.5	7.0	4.75	4	.5/8-11
MM 50	94	43	51	72	140	90	70		9.5	14	10	32	34	56	58		2.5	3.2	125		M16
IN 2.5	4.19	1.75	2.50	3.36	6.00	3.54	2.76	4	.39	.55	.39	1.25	1.91	2.47	2.57	A	6.5	9.0	5.50	4	.5/8-11
MM 65	106	46	64	85	152	90	70		9.5	14	10	32	49	63	65		2.9	4.1	145		M16
IN 3	4.88	1.75	3.00	4.15	6.25	3.54	2.76	4	.39	.55	.39	1.25	2.55	2.81	2.81	A	7.0	9.5	6.00	4	.5/8-11
MM 80	124	46	76	102	159	90	70		9.5	14	10	32	65	71	71		3.2	4.3	160		M16
IN 4	6.06	2.00	4.00	5.16	7.00	3.54	2.76	4	.39	.63	.43	1.25	3.57	3.56	4.09	B	11.0	15.0	7.50	8	.5/8-11
MM 100	154	52	102	131	178	90	70		9.5	16	11	32	91	90	104		5	7	180		M16
IN 5	7.06	2.12	5.00	6.16	7.50	3.54	2.76	4	.39	.75	.51	1.25	4.63	4.28	4.61	C	14.0	22.0	8.50	8	.3/4-10
MM 125	181	56	127	156	190	90	70		9.5	19	13	32	118	109	117		6	10	210		M16
IN 6	8.12	2.12	5.75	7.02	8.00	3.54	2.76	4	.39	.75	.51	1.25	5.45	4.78	5.08	C	17.0	25.0	9.50	8	.3/4-10
MM 150	206	56	146	178	203	90	70		9.5	19	13	32	138	121	129		8	11	240		M16
IN 8	10.50	2.50	7.75	9.47	9.5	5.91	4.92	4	.57	.87	.63	1.25	7.45	6.03	6.12	D	32.0	45.0	11.75	12	.3/4-10
MM 200	267	60	197	240	241	150	125		14	22	16	32	189	153	155		15	20	295		M20

Note: Dimensions are the same for Series 31 lug and 30 wafer platform. The “Q” dimension on both tables is disc chordal dimension at valve face.

Z-Disc™ Utilizing Bray Platform: Series 3A Double Flanged



DIMENSIONS															LUG BOLTING DATA				
Size	A	B	C	D	E	F	Top Plate Drilling			G	H - Key Size	J	Q	L Wafer	Adapter Code	Weight Wafer	Bolt Circle	# Holes	Threads ISO Course
							BC	# Holes	Dia.										
IN 2	3.69	1.62	2.00	2.85	5.50	3.54	2.76	4	.39	.55	.39	1.25	1.32	2.22	A	5.5	4.75	4	.625-11
MM 50	94	43	51	72	140	90	70	4	10	14	10	32	34	56	A	2.5	121	4	.625-11
IN 2.5	4.19	1.75	2.50	3.36	6.00	3.54	2.76	4	.39	.55	.39	1.25	1.91	2.47	A	7.0	5.50	4	.625-11
MM 65	106	46	64	85	152	90	70	4	10	14	10	32	49	63	A	3	140	4	.625-11
IN 3	4.88	1.75	3.00	4.15	6.25	3.54	2.76	4	.39	.55	.39	1.25	2.55	2.81	A	7.5	6.00	4	.625-11
MM 80	124	46	76	102	159	90	70	4	10	14	10	32	65	71	A	3.5	152	4	.625-11
IN 4	6.06	2.00	4.00	5.16	7.00	3.54	2.76	4	.39	.63	.43	1.25	3.57	3.41	B	11.5	7.50	8	.625-11
MM 100	154	52	102	131	178	90	70	4	10	16	11	32	91	87	B	5	191	8	.625-11
IN 5	7.06	2.12	5.00	6.16	7.50	3.54	2.76	4	.39	.75	.51	1.25	4.63	4.03	C	14.0	8.50	8	.75-10
MM 125	181	56	127	156	190	90	70	4	10	19	13	32	118	102	C	6	216	8	.75-10
IN 6	8.12	2.12	5.75	7.02	8.00	3.54	2.76	4	.39	.75	.51	1.25	5.45	4.53	C	17.0	9.50	8	.75-10
MM 150	206	56	146	178	203	90	70	4	10	19	13	32	138	115	C	8	241	8	.75-10
IN 8	10.50	2.50	7.75	9.47	9.5	5.91	4.92	4	.57	.87	.63	1.25	7.45	5.75	D	34.0	11.75	8	.75-10
MM 200	267	60	197	240	241	150	125	4	14.5	22	16	32	189	146	D	15	298	8	.75-10
IN 10	15.94	6.50	9.75	11.47	10.75	5.91	4.92	4	.57	1.18	.87	2.00	7.35	1.26	E	132	14.25	12	.875-9
MM 250	405	165	248	291	273	150	125	4	14.5	30	22	51	187	32	E	60	362	12	.875-9
IN 12	19.00	7.01	11.75	13.47	12.25	5.91	4.92	4	.57	1.18	.87	2.00	9.53	1.26	E	178	17.00	12	.875-9
MM 300	483	178	298	342	311	150	125	4	14.5	30	22	51	242	32	E	81	432	12	.875-9
IN 14	21.00	7.48	13.25	15.28	13.62	5.91	4.92	4	.57	1.38	.39x.39	2.00	11.07	1.42	F	258	18.75	12	1-8
MM 350	533	190	337	388	346	150	125	4	14.5	35	10x10	51	281	36	F	117	476	12	1-8
IN 16	23.50	8.51	15.25	17.41	14.75	5.91	4.92	4	.57	1.38	.39x.39	2.00	12.81	1.50	F	318	21.75	16	1-8
MM 400	597	216	387	442	375	150	125	4	14.5	35	10x10	51	352	38	F	144	540	16	1-8
IN 18	25.20	8.74	17.25	19.47	16.00	8.27	6.50	4	.81	1.97	.47x.39	2.50	15.02	1.65	G	459	22.75	16	1.125-7
MM 450	640	222	438	495	406	210	165	4	50	50	12x10	64	381	42	G	208	578	16	1.125-7
IN 20	28.15	9.02	19.25	21.29	17.25	8.27	6.50	4	.81	1.97	.47x.39	2.50	17.15	1.65	G	534	25.00	20	1.125-7
MM 500	715	229	489	549	438	210	165	4	50	50	12x10	64	436	42	G	242	635	20	1.125-7

Valve Installation and Maintenance

FLANGE REQUIREMENTS

The Keystone platform 990 & 920 and Bray platform Series 20 & 21 valves are designed for installation between ANSI Class 125/150 flat or raised faced flanges. Gaskets are not required. Lined pipe, heavy wall pipe or flanges must have a minimum allowable inside diameter (see appropriate SMO drawing at back of manual for the specific valve's "Q" dimension) at the centered body face to clear the disc sealing edge when opening the valve.

STORAGE

The valves should be stored on a pallet or "skid" in a clean, dry warehouse. If the valves must be stored outside, the following applies:

1. Valves must be kept off the ground and high enough to avoid standing water.
2. Cover the valves with a water repellent cover (not supplied by Lilly Engineering Company, Inc.).

INSTALLATION

The Keystone platform 990 & 920 and Bray platform Series 20 & 21 valves are bi-directional and will control flow equally well in either direction. For the best results in slurry service regarding sedimentation, position the valve assembly so that the valve stem is in the horizontal position and the lower disc edge opens down-stream. This will create a self-flushing effect, thereby extending the service life of the valve.

Consideration should be given to the location of the valves in the piping system. The valve should not be placed too close to other valves, elbows, etc. As its performance may be affected. It is recommended the valve have a minimum of six pipe diameters upstream (see Figure 1) And four pipe diameters downstream between it and other valves, elbows, etc. In the piping system. If the valve must be installed less than six pipe diameters of a piping disturbance, the preferred orientation is mounting with the stem parallel to the inlet pipe axis.

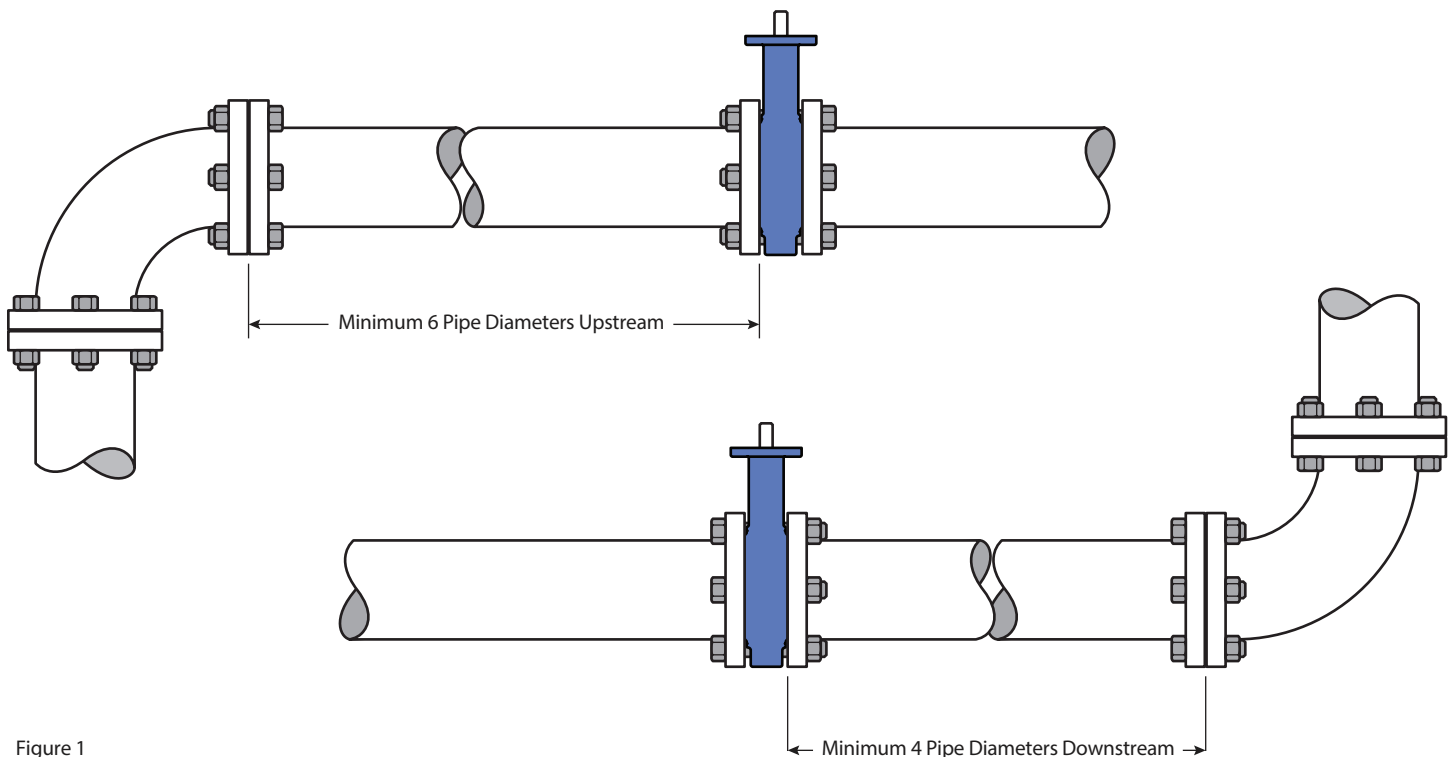


Figure 1

INSTALLATION BETWEEN PRE-EXISTING ANSI FLANGES (Figure 1)

1. To prevent distortion and/or damage to the sealing face of the seat, spread the pipe flanges to exceed the valve's face-to-face dimension by 3/16" before installing the valve.

Note: Remove protective covers from valve prior to installation.

2. Open the valve (counterclockwise) so that the disc is at least 3/8" away from the body face. With the flanges spread, center the valve body between the flanges and span the valve body with all flange bolts possible.
3. Turn the disc to the "fully open" position and tighten the bolting hand tight. Slowly close the valve clockwise to check for adequate disc clearance.
4. Return the disc to the "fully open" position and cross-tighten all bolting to the proper torque specification.
5. Again, check for adequate disc clearance. If the installation is satisfactory, the valve is ready for service and/or installing the valve actuator.

INSTALLATION IN NEW CONSTRUCTION USING ANSI WELDING TYPE FLANGES

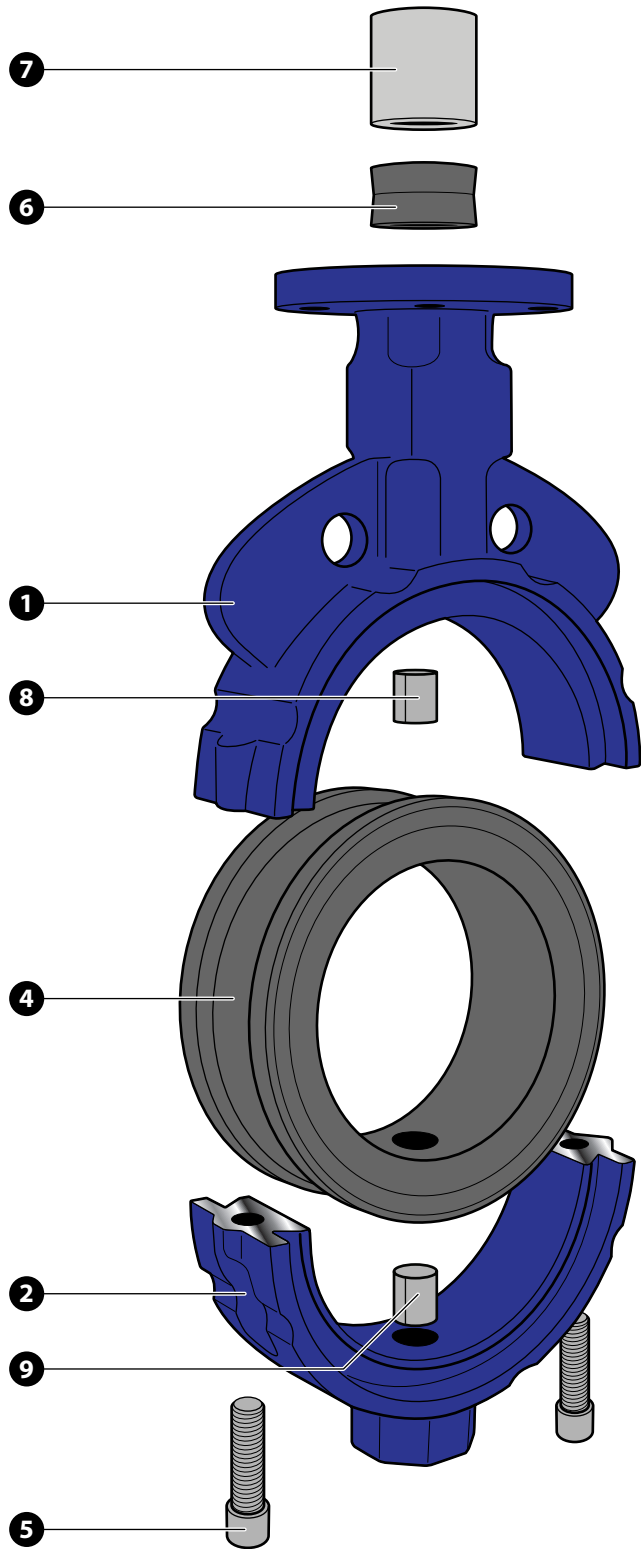
1. With the disc in the "nearly closed" position (10° or less), align and center the companion flange bolt holes to the body scallops (if present) or body lugs.
2. Assemble the body and flanges with the flange bolting and make-up the bolting.
3. Use the flange-body-flange assembly for fit-up and centering to the pipe.
4. Tack weld the flanges to the pipe.
5. Remove the flange bolting and valve assembly from between the flanges.

Caution: Do not finish weld the flanges to the pipe with the valve bolted between the flanges as this will result in serious heat damage to the valve seat.

6. Finish welding the flanges to the pipe and allow the flanges to cool completely before proceeding.

Caution: Remove and clean weld spatter from pipe ID.

7. Follow steps 2 thru 5 of "installation between pre-existing ANSI flanges."



Valve Expanded View Stainless Body 2" thru 6"

BILL OF MATERIALS

NUMBER	PART	MATERIAL
1	Upper Body	Ductile Iron
2	Lower Body	316 Stainless Steel
3	Z-Disc™	316 Stainless Steel
4	Liner	NBR Food Grade (0°F – 212°F) EPDM Food Grade (-40°F – 250°F) PTFE Lined EPDM (-20°F – 300°F) PTFE Lined NBR (0°F – 250°F)
5	Machine Bolt	316 Stainless Steel
6	Stem Seal	NBR
7	Upper Stem Bushing	Polyester
8	Upper Shaft Bearing	Stainless Steel
9	Lower Shaft Bearing	Stainless Steel

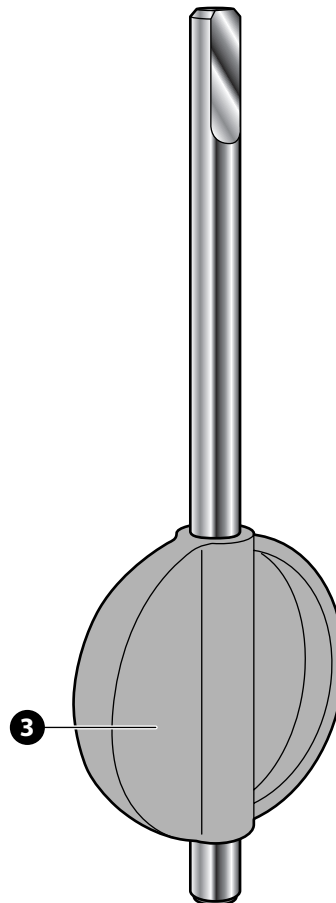
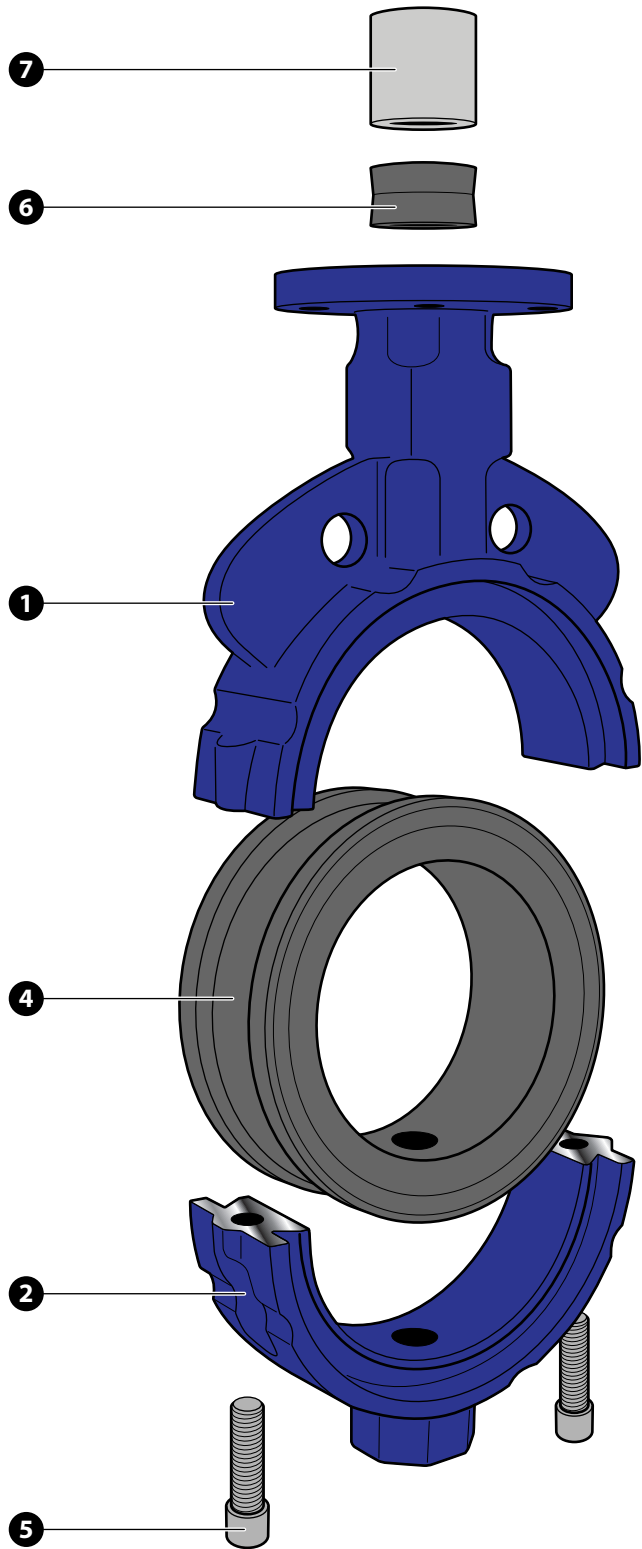


Figure 2

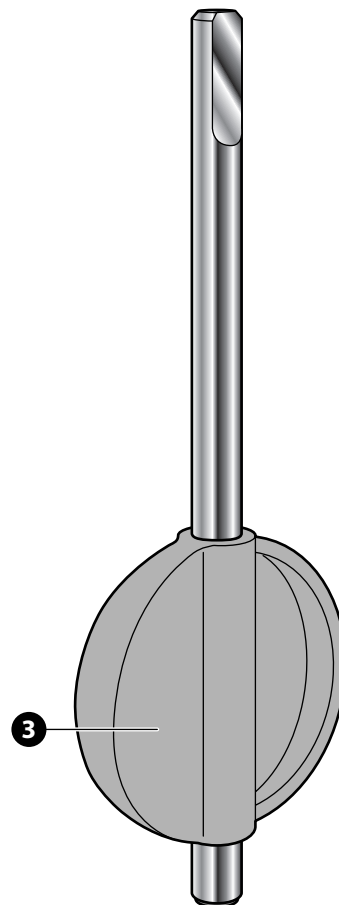


Valve Expanded View Iron Body 2" thru 8"

BILL OF MATERIALS

NUMBER	PART	MATERIAL
1	Upper Body	Ductile Iron
2	Lower Body	316 Stainless Steel
3	Z-Disc™	316 Stainless Steel
4	Liner	NBR Food Grade (0°F – 212°F) EPDM Food Grade (-40°F – 250°F) PTFE Lined EPDM (-20°F – 300°F) PTFE Lined NBR (0°F – 250°F)
5	Machine Bolt	316 Stainless Steel
6	Stem Seal	NBR
7	Upper Stem Bushing	Polyester

Figure 3



MAINTENANCE

Routine maintenance or lubrication is not required.

VALVE DISASSEMBLY

Caution: Do not attempt to remove an actuator from a valve that is under pressure! Doing so may cause the actuator to swing violently! Isolate the valve by closing the valves that are just upstream and then downstream (in that order) of the valve before attempting to remove the actuator or dose upstream valves and assure the line is vented.

1. Turn the disc to the “nearly closed” position (10° or less), loosen and remove all flange bolting. Spread the flanges if necessary and remove the valve from the pipeline.
2. Turn the disc to where it is almost out of the seat. Remove the actuator if still mounted.
3. Remove body screws for the 990 valves (Figure 2 & 3, Part 3), or the body screws (See Figure 2, Part 3) and nuts (see Figure 2, Part 8) for the 920 valves and separate the body halves.
4. Remove the upper and lower body halves from the seat (Figure 2 & 3, Part 4) and the stem shafts.
5. Remove the seat (Figure 2 & 3, Pc. 4) from the disc-stem (Figure 2 & 3, Part 2) by elongating the seat (oval shape) in the direction of the stem shaft and remove the lower stem from the seat the entire disc-stem (Figure 2 & 3, Part 2) may then be removed from the seat (Figure 2 & 3, Part 4).
6. If needed, remove the upper bushing (Figure 2 & 3, Part 5) and inspect for damage. Replace if needed.
7. If needed, remove the stem packing (Figure 2 & 3, Part 6) after bushing removal and inspect for tears or deterioration. Replace if removed from stem bore.

VALVE ASSEMBLY

1. Clean all reusable parts. If possible use silicone base oil or lubricant to facilitate assembly. (Hydrocarbon base lubricants may damage some elastomer seat materials).
2. Assemble the disc-stem (Figure 2 & 3, Part 2) into the new seat in reverse order of disassembly.
3. Install body halves on upper and lower stem shafts in the same orientation as they were prior to disassembly.
4. Seat body halves into the dove tail of the seat such that upper and lower body halves meet at the splits.
5. Install body screws (Figure 2 & 3, Part 3) for 990 valves and tighten snugly. 920 Valves will have nuts (Figure 2 & 3, Part 8) that are used to tighten the screws snugly.
6. Cycle the valve to check operability and proper disc closure.
7. Install the packing (Figure 2 & 3, Part 6).
8. Install the upper stem bushing (Figure 2 & 3, Part 5).

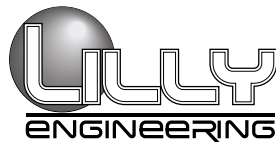
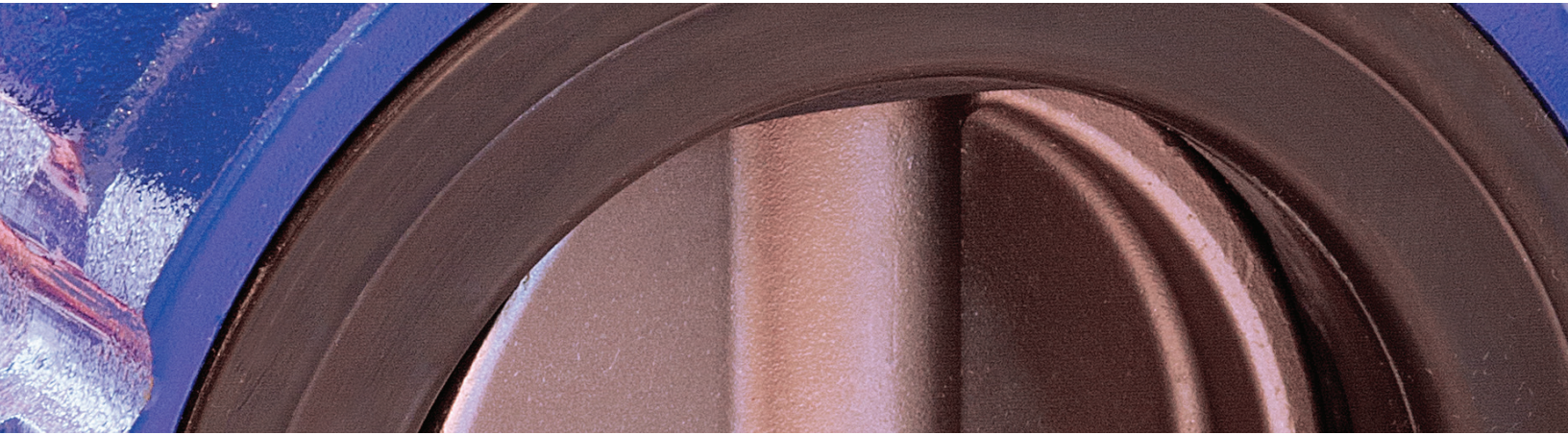
TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	SOLUTION
Valve opens only a few degrees and stops (it will not open to the full angle desired)	Improper installation. The valve is improperly aligned	Loosen the flange bolts, realign the valve with flanges, and retighten the flange bolts to correct torque per ANSI requirements
Leakage past the flange face	Flange bolts are not evenly torqued	Loosen the flange bolts and tighten the flange bolts to correct torque per ANSI requirements
	Improper flanges	Refer to “flange requirements” on page 1
Leakage in the closed position (leakage in the pipeline)	The disc is not closing fully: Actuator is not properly adjusted or seating torque exceeds actuator output capacity	Refer to actuator adjustment procedures or consult the factory (or local rep.)
	Damaged seat	Replace seat
	Line pressure exceeds valve’s working pressure	Reduce line pressure to valve working pressure
	Damaged valve disc	Replace disc
Leakage at the valve stem	Packing/bushing failure	1. Refer to “valve disassembly procedures
Leakage at body split connection	Stem hole in seat (secondary seal) damaged during assembly	1. Replace seat
Water hammer	The valve is closing too quickly	Adjust the actuator
Excessively high torque	Obstruction in the pipeline	Remove valve from pipeline and remove obstruction
	Valve stem or disc bent	Return valve to factory for disc/stem replacement (check for water hammer or freezing of line material)
	Scale build-up on disc or seat	Open and close the valve several times. Operate the valve at least once a month. Check the valve seat for deterioration
	Seat damage	Check seat for damage and replace if necessary
	Valve improperly installed	Disassembly valve and re-assembly per instructions

Z-DISC™

CONTROL VALVES

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