

# Fisher™ A31A Cryogenic High Performance Butterfly Valve

The Fisher A31A Cryogenic High Performance Butterfly Valve (HPBV) is designed for extreme temperature cryogenic services and features a valve body extension which positions the packing system and the actuator away from the extreme temperatures. The NPS 3 through 12 valves feature a unique one-piece investment cast extension housing. The NPS 14 through 24 valves employ a two-piece fabricated extension housing. The valve also features a metal NOVEX seal as standard providing tight shutoff, low operating torques and the rugged durability needed for cryogenic service.

The A31A Cryogenic HPBV has been developed as a valve/actuator package with a Double D drive shaft (standard for NPS 3 through 12) to allow easy, direct mounting to the Fisher 1035 Rack and Pinion actuator, eliminating the need for external coupling systems. Also available are keyed shaft (standard for NPS 14 through 24) and splined drive shafts to allow easy mounting to other Fisher actuators.

The A31A Cryogenic HPBV is available in either flangeless (wafer) or single flange styles, and S31600 is the standard valve body and disk material. This valve is offered in full rated CL150 and CL300 pressure classes.



W7451-1

**FISHER A31A CRYOGENIC VALVE WITH 1035 ACTUATOR**

## Specifications

### Valve Body Sizes and Ratings

NPS ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, and ■ 12  
CL150 and 300  
■ NPS 14 through 24 valves are also available in  
CL150 and 300

### End Connection Style

■ Flangeless, wafer-style or ■ single flange valve  
body designed to fit between raised-face mating  
flanges per ASME B16.5 CL150 or 300

### Maximum Inlet Pressure/Temperature<sup>(1)</sup>

Consistent with CL150 and CL300  
pressure/temperature ratings per ASME B16.34,  
except that 38°C (100°F) rating is applicable to  
-254°C (-425°F). NOVEX seal maximum  
pressure/temperature rating is the same as the valve  
body. See figure 3 for rating of CTFE seal.

### Temperature Range<sup>(1)</sup>

-234 to 260°C (-425 to 500°F)

### Available Seal Configurations

See figure 2 and table 2

### Standard Construction Materials

Valve Body and Disk: ASTM grades of S31600  
stainless steel  
Disk Coating: Hardcoating Standard (Chrome or  
Nickel)  
Shaft: ■ ASTM grade of S17400 H1150M SST,  
■ N05500 (Optional), ■ N07718 (Optional)  
Seal Ring: ■ S31600 NOVEX Std for CL 150,  
■ S21800 NOVEX Std for CL300, ■ CTFE<sup>(2)</sup> optional,  
or ■ CTFE<sup>(2)</sup> with Aluminum Back-up ring optional  
Packing: ■ PTFE V-ring, or ■ graphite (optional)  
Bearings: ■ PTFE Composition, or ■ bronze  
(optional)

### Valve Body Classification

Face-to-face dimensions are in compliance with MSS  
SP68 and API 609 standards; valve bodies are  
designed for installation between ASME B16.5 CL150  
or 300 raised-face flanges

### Shutoff Classification

Unidirectional Reverse flow. Per ANSI/FCI 70-2 and  
IEC 60534-4 at ambient temperature

NOVEX Seal: Class VI

CTFE Seal with Aluminum back-up ring:  
Class VI

### Flow Characteristic

Modified equal percentage

### Flow Coefficients

See Fisher Catalog 12

### Noise Levels

See Catalog 12 for sound pressure level prediction

### Available Actuators

■ Rack and Pinion 1035 for NPS 3 through 12,  
■ Bettis G Series for keyed shaft  
NPS 14 through 24 or  
■ Rotary Diaphragm 1051 and 1052 for splined  
shafts

### Disk Rotation

Clockwise to close

### Valve Dimensions and Approximate Weights

See figures 5, 6, 7, 8, 9, 10, 11, and 12 and tables 1, 3,  
4, 5, 6, 7, 8, 9, and 10.

1. The pressure/temperature limits in this bulletin, and any application code or standard limitation, should not be exceeded.  
2. CTFE not recommended for fast cycling, less than 2 seconds.

Figure 1. Fisher A31A Cryogenic Valve, Single Flange Style



W7449

Table 1. Approximate Weights

VALVE SIZE, NPS	WAFER CL150		SINGLE FLANGE CL150		WAFER CL300		SINGLE FLANGE CL300	
	kg	lbs	kg	lbs	kg	lbs	kg	lbs
3	12	27	16	36	12	27	16	35
4	21	46	22	48	21	46	24	52
6	24	53	28	61	24	53	28	61
8	34	75	40	89	47	104	52	115
10	57	125	67	148	80	176	100	220
12	74	164	93	206	103	227	135	298
14	87	191	120	265	142	314	249	548
16	133	294	182	401	213	470	325	716
18	170	374	231	510	259	570	434	956
20	210	463	302	665	401	884	582	1282
24	326	719	455	1004	512	1128	863	1903

## Features

- **Cryogenic Seal Improvement**— The NOVEX pressure-assisted metal seal design provides tight shutoff (ANSI Class VI, ambient) and permits the use of smaller, less expensive actuators in applications requiring full ASME B16.34 shutoff capabilities. The NOVEX seal is standard on all A31A Cryogenic valves.
- **Direct Actuation**—The A31A Cryogenic NPS 3 through 8 Double D shaft allows direct mounting with the 1035 actuator, eliminating the need for a coupler.
- **Excellent Shutoff Integrity**—Concentric rotation enables the valve disk to remain in the closed

position in spite of line pressure surges or actuator failure.

- **Safety**—Redundant shaft retention provides added protection. The packing follower and shaft step interact to hold the shaft securely in the valve body. The NPS 3 through 12 valves use a one-piece packing follower, and the NPS 14 through 24 valves use a two-piece follower (see figure 4).
- **Strength**— The cast S31600 one-piece extensions are welded directly onto the NPS 3 through 8 valves for greater strength under service conditions.
- **Easy Installation**—The valve body self-centers on the line flange bolts as a fast, accurate means of centering the valve in the pipeline.
- **Reliable Flange Gasketing Surface**—Seal retainer screws are located so there is no interference with the sealing function of either flat sheet or spiral wound line flange gaskets.

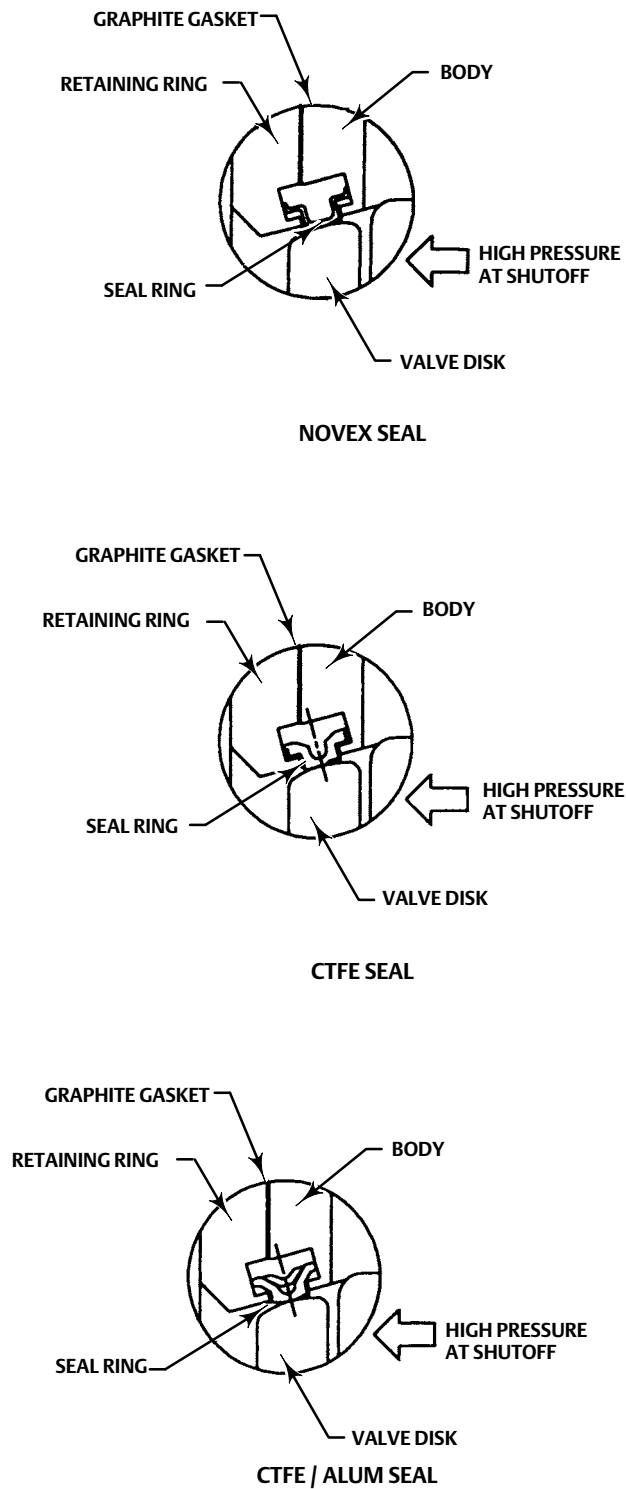
## Installation

Recommended installation for the A31A Cryogenic valve is with the shaft upstream of the seal (reverse flow).

Dimensions for wafer-style and single-flange valves are shown in figures 5, 6, 7, 8, 9, 10, 11, and 12 and tables 3, 4, 5, 6, 7, 8, 9 and 10.

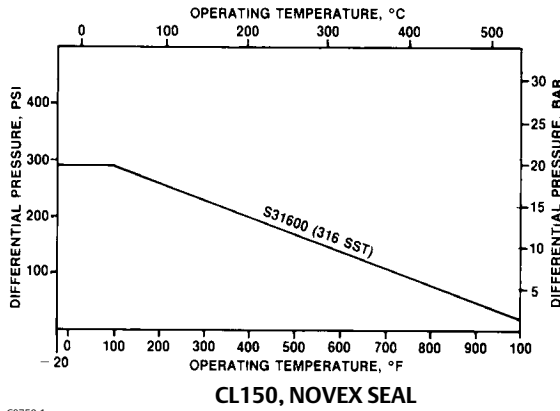
For assistance in selecting the appropriate combination of actuator action and open valve position, consult your [Emerson sales office](#).

Figure 2. Available Seal Configurations

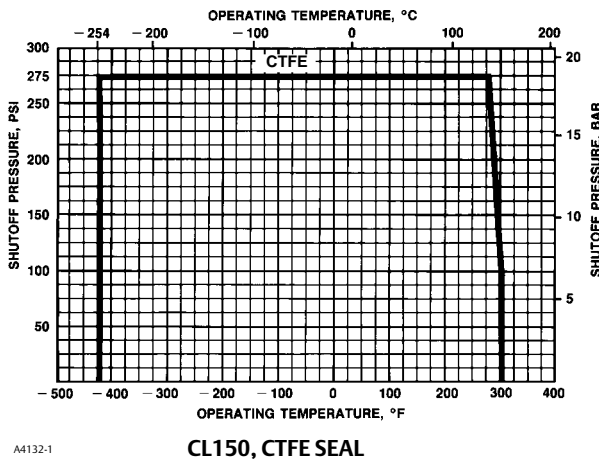
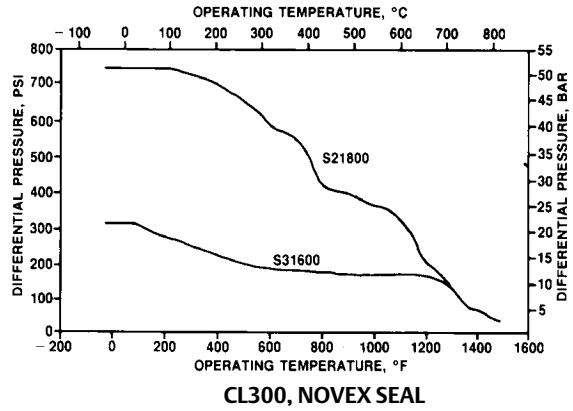


1685083

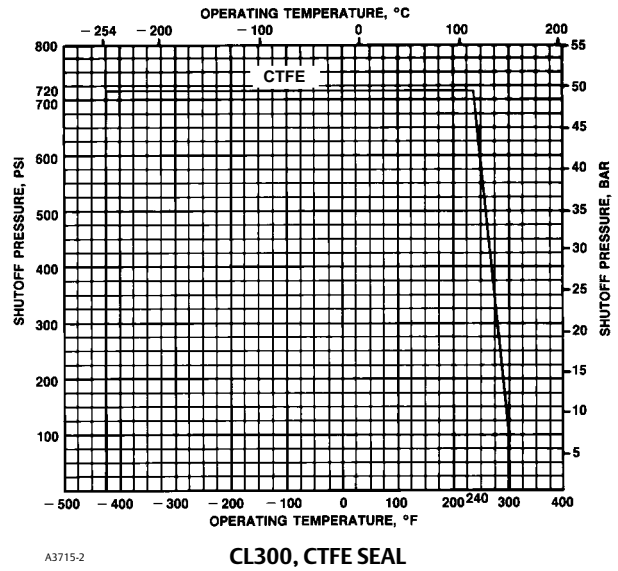
Figure 3. Maximum Pressure/Temperature Ratings



C0759-1



A4132-1



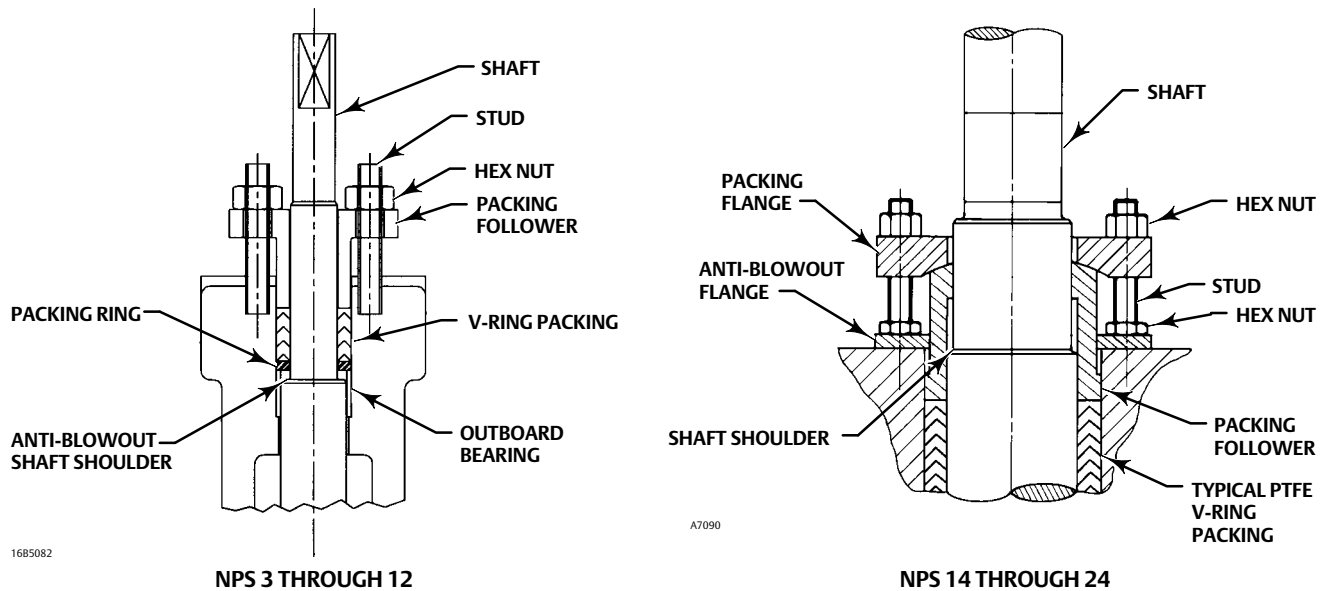
A3715-2

**Table 2. Material Temperature Ratings**

COMPONENT AND MATERIAL OF CONSTRUCTION		TEMPERATURE RANGE	
		°C	°F
Valve Body CF8M (316 SST) CL150 and 300		-254 to 260	-425 to 500
Disk CF8M (316 SST)		-254 to 260	-425 to 500
Disk Coating Hard Coating <sup>(1)</sup>		-254 to 260	-425 to 500
Shaft S17400 H1150M (standard) N05500 N07718		-196 to 260 -198 to 260 -254 to 260	-320 to 500 -325 to 500 -425 to 500
Bearings PTFE Composition Rexnord (standard) Bronze		-254 to 163 -254 to 260	-425 to 325 -425 to 500
Packing PTFE Packing (standard) Graphite		-254 to 232 -254 to 260	-425 to 450 -425 to 500
Seal Ring	NOVEX S31600 Seal Ring (CL150) (standard)	-254 to 260	-425 to 500
	NOVEX S21800 Seal Ring (CL300) (standard)	-254 to 260	-425 to 500
	CTFE Cryogenic Seal Ring	-254 to 149	-425 to 300

1. The material for hard coating on the disk is either hard chrome plating or Electroless Nickel Coating (ENC) depending upon availability.

**Figure 4. Anti-Blowout Protection**



1685082

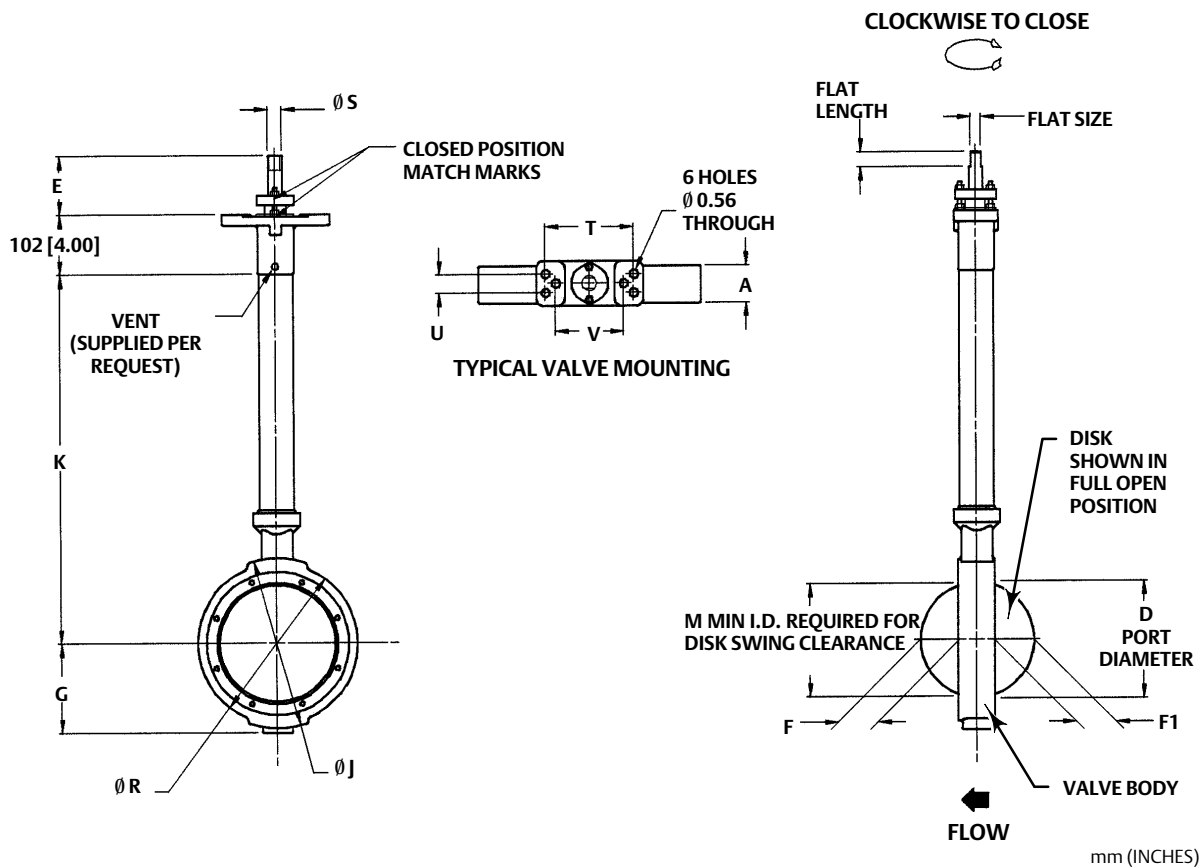
A7090

Table 3. Dimensions, Wafer Style Valves, CL150, NPS 3 through 8

VALVE SIZE, NPS	A	D	E	F	F1	G	J	K	M <sup>(2)</sup>	R <sup>(1)</sup>	S	T	U	V	FLAT LENGTH	FLAT SIZE
mm																
3	48	87	83	10	19	79	146	375	71	133	16	152	32	117	25	11
4	54	113	83	22	25	95	178	451	94	171	19	152	32	117	25	14
6	57	165	83	41	51	127	248	489	148	219	25	152	32	117	25	17
8	64	210	83	65	68	152	---	679	197	273	25	152	32	117	25	17
Inches																
3	1.88	3.44	3.25	0.38	0.75	3.13	5.75	14.75	2.82	5.25	0.625	6.0	1.25	4.63	1.0	0.436
4	2.13	4.44	3.25	0.88	1.0	3.75	7.0	17.75	3.69	6.75	0.75	6.0	1.25	4.63	1.0	0.561
6	2.25	6.50	3.25	1.63	2.0	5.0	9.75	19.25	5.82	8.63	1	6.0	1.25	4.63	1.0	0.687
8	2.50	8.25	3.25	2.57	2.69	6.0	---	26.75	7.75	10.75	1	6.0	1.25	4.63	1.0	0.687

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance.

Figure 5. Dimensions, Wafer Style Valves, CL150, NPS 3 through 8 (also see table 3)



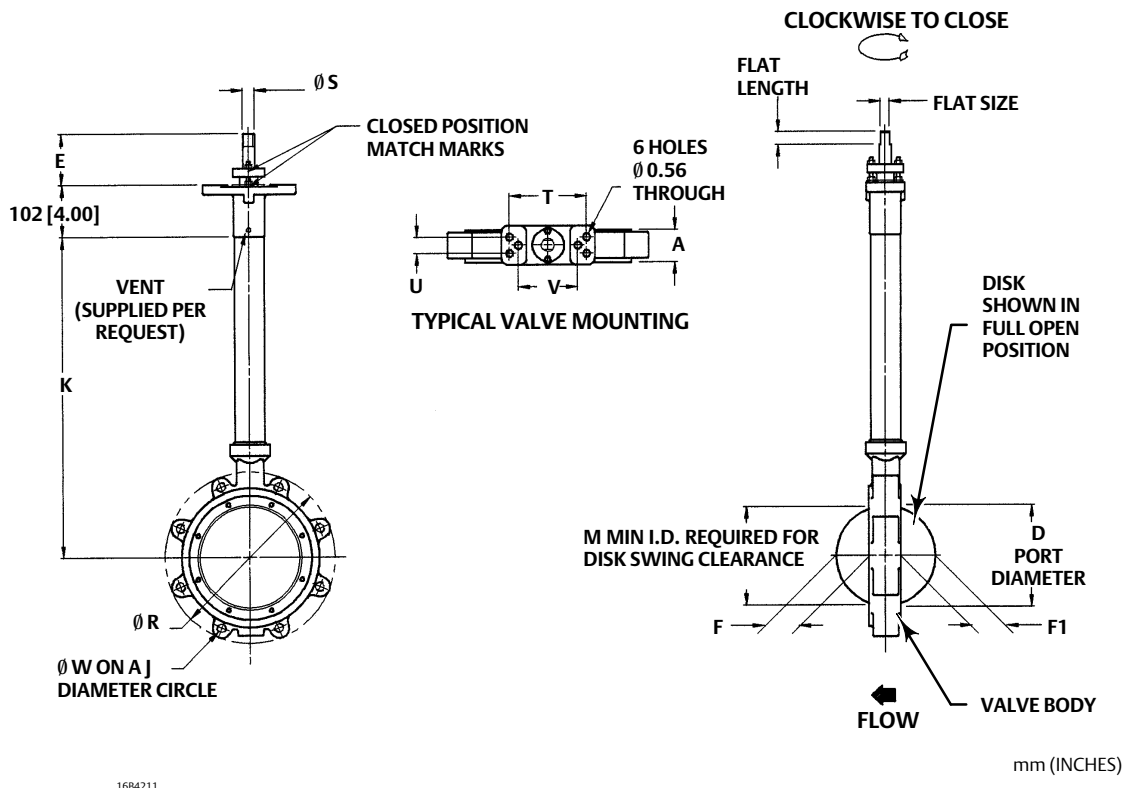
16B4210

Table 4. Dimensions, Single Flange Style Valves, CL150, NPS 3 through 8

VALVE SIZE, NPS	A	D	E	F	F1	J	K	M <sup>(2)</sup>	R <sup>(1)</sup>	S	T	U	V	W	FLAT LENGTH	FLAT SIZE
mm																
3	48	87	83	10	19	152	375	71	207	16	152	32	117	See thread information below	25	11
4	54	113	83	22	25	191	451	94	238	19	152	32	117		25	14
6	57	165	83	41	51	241	489	148	308	25	152	32	117		25	17
8	64	210	83	65	68	298	679	197	336	25	152	32	117		25	17
Inches																
3	1.88	3.44	3.25	0.375	0.75	6.0	14.75	2.82	8.25	0.625	6.0	1.25	4.63	0.625-11 4 holes	1.0	0.436
4	2.13	4.44	3.25	0.875	1.0	7.5	17.75	3.69	9.38	0.75	6.0	1.25	4.63	0.625-11 8 holes	1.0	0.561
6	2.25	6.50	3.25	1.63	2.0	9.5	19.25	5.82	12.13	1	6.0	1.25	4.63	0.75-10 8 holes	1.0	0.687
8	2.50	8.25	3.25	2.57	2.69	11.75	26.75	7.75	13.25	1	6.0	1.25	4.63	0.75-10 8 holes	1.0	0.687

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
 2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance.

Figure 6. Dimensions, Single Flange Style Valves, CL150, NPS 3 through 8 (also see table 4)



1684211

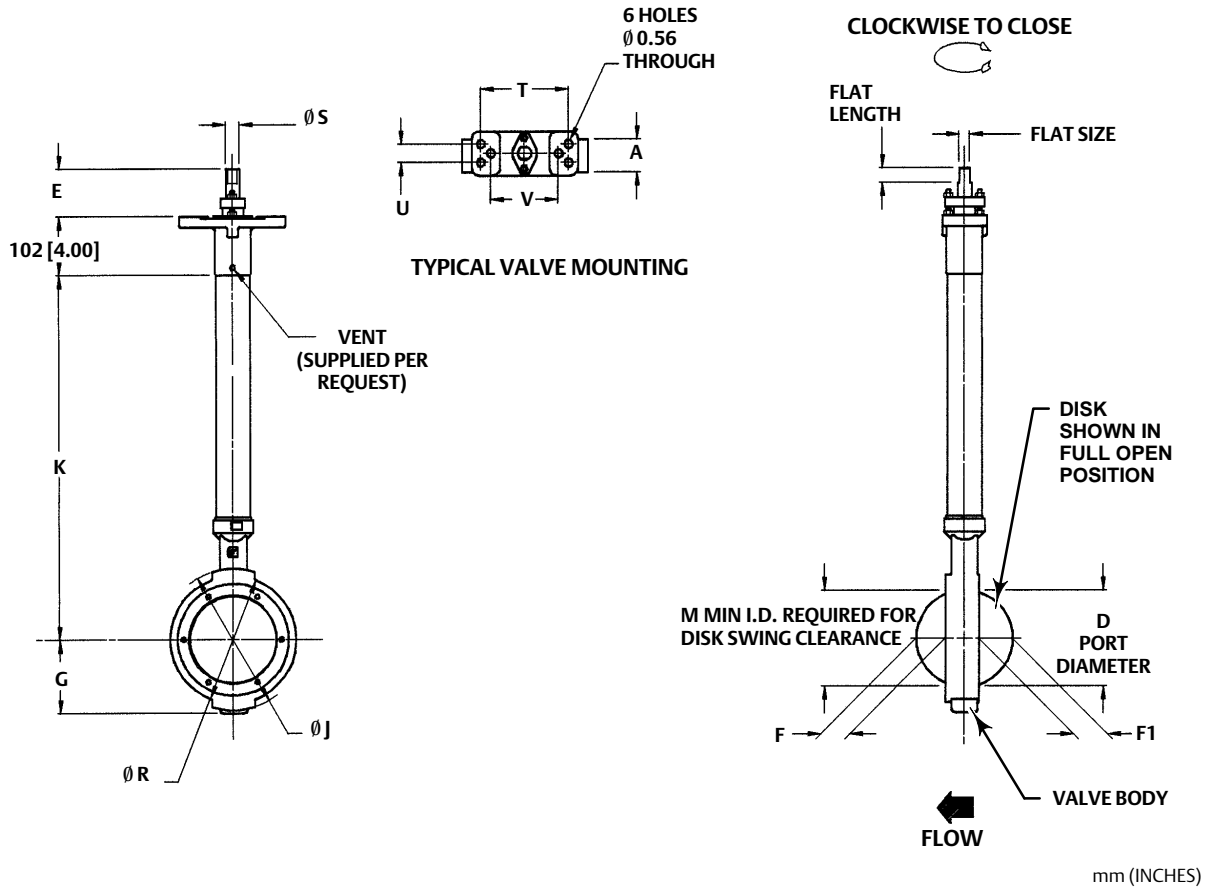


Table 5. Dimensions, Wafer Style valves, CL300, NPS 3 through 6

VALVE SIZE, NPS	A	D	E	F	F1	G	J	K	M <sup>(2)</sup>	R <sup>(1)</sup>	S	T	U	V	FLAT LENGTH	FLAT SIZE
mm																
3	48	87	83	10	19	79	146	375	71	133	16	152	32	117	25	11
4	54	113	83	22	25	95	178	451	94	171	19	152	32	117	25	14
6	57	164	83	41	48	127	248	489	146	219	25	152	32	117	25	17
Inches																
3	1.88	3.44	3.25	0.375	0.75	3.13	5.75	14.75	2.81	5.25	0.625	6.0	1.25	4.63	1.0	0.436
4	2.13	4.44	3.25	0.875	1.0	3.75	7.0	17.75	3.69	6.75	0.75	6.0	1.25	4.63	1.0	0.561
6	2.25	6.44	3.25	1.63	1.88	5.0	9.75	19.25	5.75	8.63	1	6.0	1.25	4.63	1.0	0.687

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance.

Figure 7. Dimensions, Wafer Style valves, CL300, NPS 3 through 6 (also see table 5)



1684212

Table 6. Dimensions, Single Flange Style Valves, CL300, NPS 3 through 6

VALVE SIZE, NPS	A	D	E	F	F1	J	K	M <sup>(2)</sup>	R <sup>(1)</sup>	S	T	U	V	W	FLAT LENGTH	FLAT SIZE
mm																
3	48	87	83	10	19	168	375	71	207	16	152	32	117	See thread information below	25	11
4	54	113	83	22	25	200	451	94	238	19	152	32	117		25	14
6	57	164	83	41	48	270	489	146	308	25	152	32	117		25	17
Inches																
3	1.88	3.44	3.25	0.375	0.75	6.63	14.75	2.81	8.13	0.625	6.0	1.25	4.63	0.75-10 8 holes	1.0	0.436
4	2.13	4.44	3.25	0.875	1.0	7.88	17.75	3.69	9.75	0.75	6.0	1.25	4.63	0.75-10 8 holes	1.0	0.561
6	2.25	6.44	3.25	1.63	1.88	10.63	19.25	5.75	12.63	1	6.0	1.25	4.63	0.75-10 12 holes	1.0	0.687

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
 2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance.

Figure 8. Dimensions, Single Flange Style Valves, CL300, NPS 3 through 6 (also see table 6)

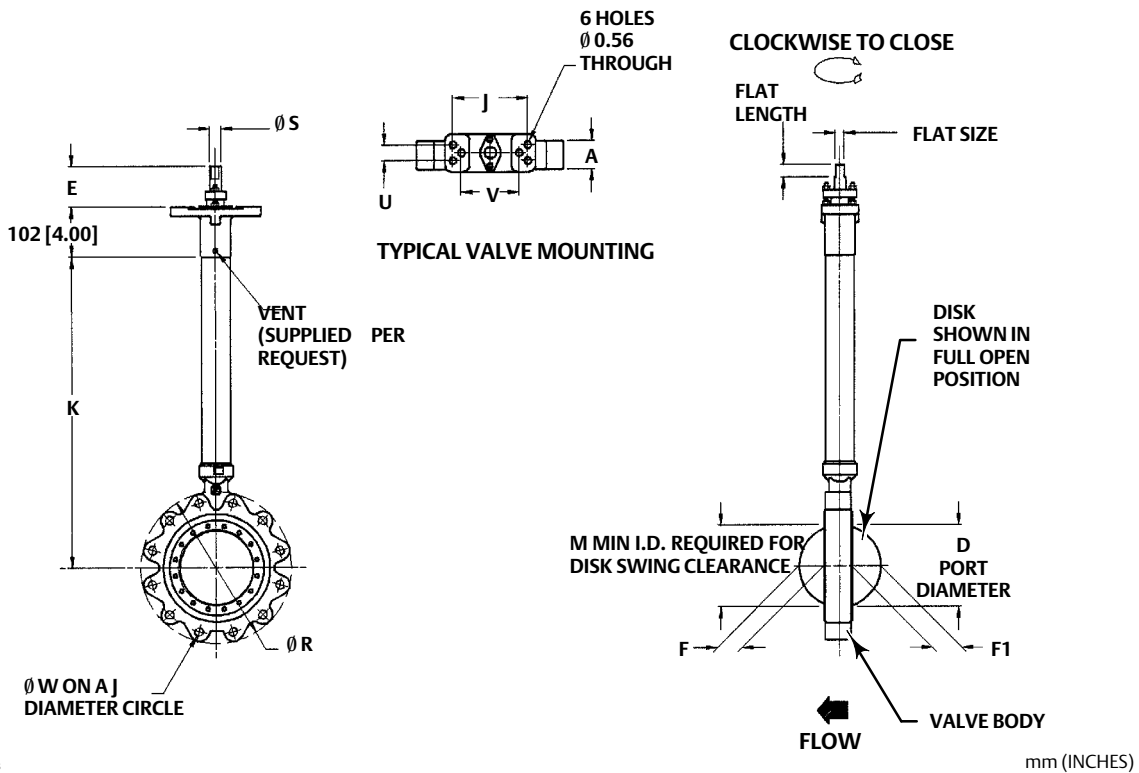
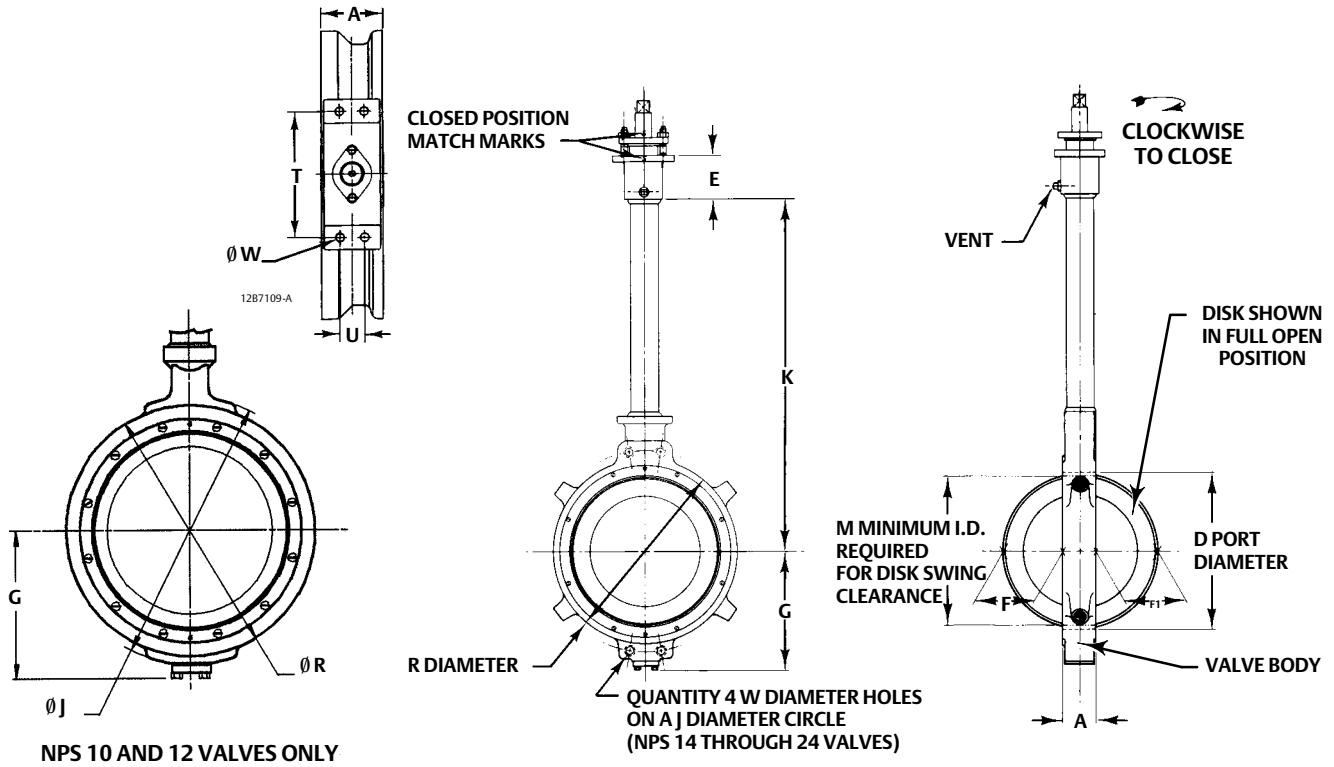


Table 7. Dimensions, Wafer Style Valve, CL150, NPS 10 through 24

VALVE SIZE, NPS	A <sup>(1)</sup>	D	E	F	F1	G	J	K	M <sup>(2)</sup>	R	S <sup>(3)</sup>	T	U	W
mm														
10	71	265	89	83	98	187	---	724	254	337	32	235	46.0	---
12	81	316	89	105	113	224	406	851	298	381	38	235	46.0	---
14	92	338	102	122	117	240	476	914	330	448	30.2	235	46.0	29
16	102	384	102	143	133	276	540	914	378	511	31.8	235	46.0	29
18	114	432	102	162	149	341	578	914	429	533	38.1	273	50.8	32
20	127	479	102	182	162	375	635	914	470	584	44.5	273	50.8	32
24	154	594	102	227	203	432	749	914	575	692	57.2	337	76.2	35
Inches														
10	2.82	10.44	3.5	3.25	3.81	7.38	---	28.5	10	13.25	1.25	9.25	1.81	---
12	3.19	12.44	3.5	4.13	4.44	8.82	16.0	33.5	11.75	15.0	1.5	9.25	1.81	---
14	3.6	13.3	4	4.80	4.61	9.45	18.75	36	13	17.64	1.1875	9.25	1.81	1.125
16	4	15.1	4	5.63	5.25	10.87	21.25	36	14.88	20.11	1.25	9.25	1.81	1.125
18	4.5	17	4	6.38	5.87	13.43	22.75	36	16.89	21	1.5	10.75	2.00	1.25
20	5	18.86	4	7.17	6.38	14.75	25	36	18.5	23	1.75	10.75	2.00	1.25
24	6.06	23.38	4	8.94	8	17	29.5	36	22.64	27.25	2.25	13.25	3.00	1.375

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
 2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance.  
 3. Shaft diameter at key.

Figure 9. Dimensions, Wafer Style Valve, CL150, NPS 10 through 24 (see also table 7)



1684210  
A7244

Table 8. Dimensions, Single Flange Style Valve, CL150, NPS 10 through 24

VALVE SIZE, NPS	A <sup>(1)</sup>	D	E	F	F1	G	J	K	M <sup>(2)</sup>	R	S <sup>(3)</sup>	T	U	W
<b>mm</b>														
10	71	265	89	83	98	---	362	724	254	406	32	235	46.0	See thread information below
12	81	316	89	105	113	---	432	851	298	476	32	235	46.0	
14	92	338	102	122	117	240	476	914	330	533	30.2	235	46.0	
16	102	384	102	143	133	316	540	914	378	597	31.8	235	46.0	
18	114	432	102	162	149	341	578	914	429	635	38.1	273	50.8	
20	127	479	102	182	162	375	635	914	470	705	44.5	273	50.8	
24	154	594	102	227	203	432	749	914	575	813	57.2	337	76.2	
<b>Inches</b>														
10	2.82	10.44	3.5	3.25	3.82	---	14.25	28.5	10.0	16.0	1.25	9.25	1.81	0.875-9 12 holes
12	3.19	12.44	3.5	4.13	4.38	---	17.0	33.5	11.75	18.75	1.25	9.25	1.81	0.875-9 12 holes
14	3.62	13.30	4	4.8	4.60	9.45	18.75	36	13	21	1.1875	9.25	1.81	1-8 12 holes
16	4	15.12	4	5.63	5.25	12.44	21.25	36	14.88	23.5	1.25	9.25	1.81	1-8 16 holes
18	4.5	17	4	6.38	5.86	13.43	22.75	36	16.89	25	1.5	10.75	2.00	1.125-8 16 holes
20	5	18.85	4	7.17	6.38	14.75	25	36	18.50	27.75	1.75	10.75	2.00	1.125-8 20 holes
24	6.06	23.38	4	8.94	8	17	29.50	36	22.64	32	2.25	13.25	3.00	1.25-8 20 holes

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
 2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance.  
 3. Shaft diameter at key.

Figure 10. Dimensions, Single Flange Style Valve, CL150, NPS 10 through 24 (see also table 8)

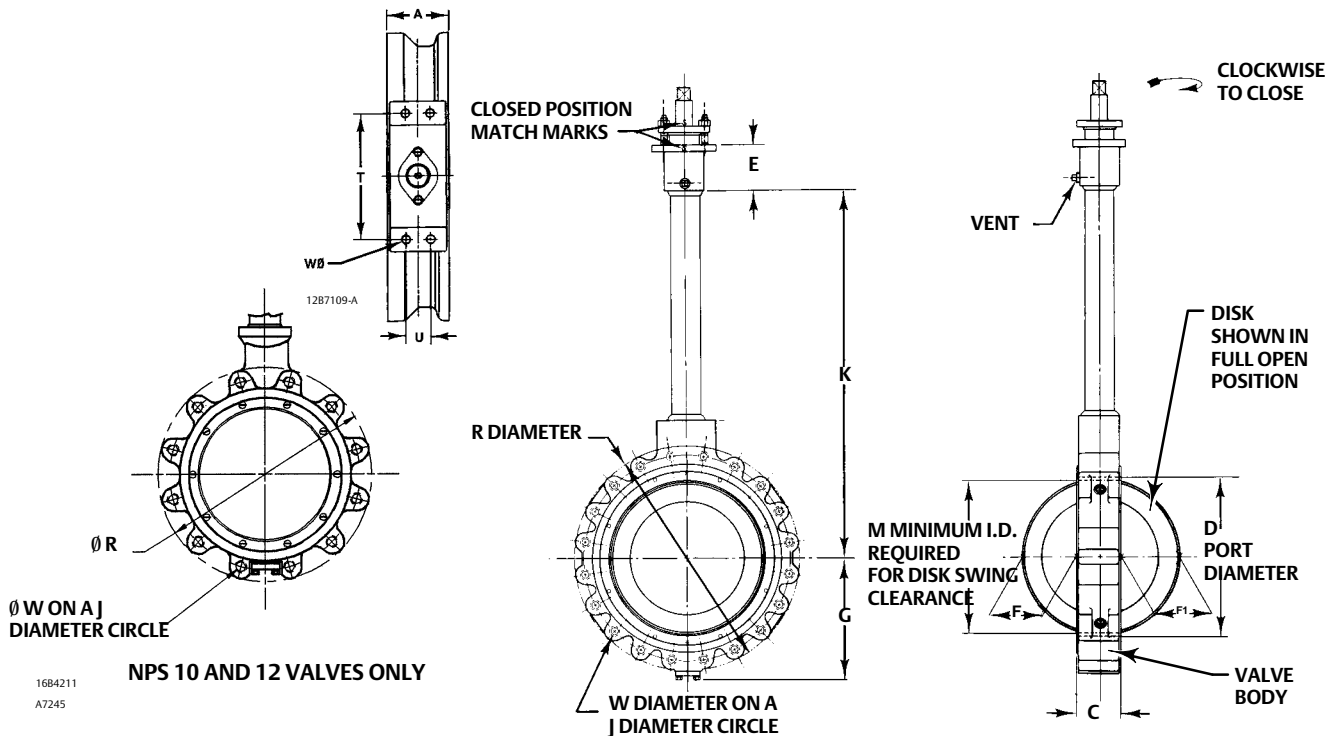
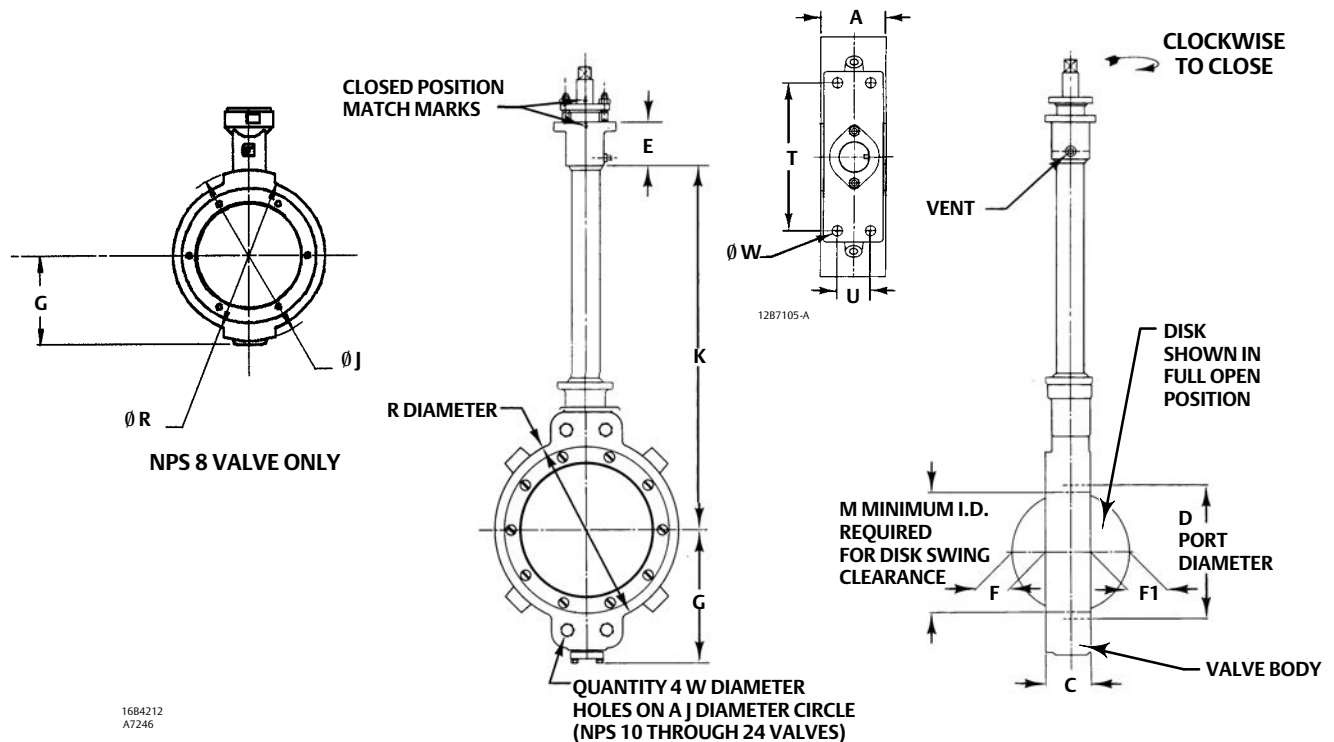


Table 9. Dimensions, Wafer Style Valve, CL300, NPS 8 through 24

VALVE SIZE, NPS	A <sup>(1)</sup>	D	E	F	F1	G	J	K	M <sup>(2)</sup>	R	S <sup>(3)</sup>	T	U	W
mm														
8	73	195	89	51	62	173	305	679	186	279	32	235	46.0	See thread information below
10	85	246	89	75	75	265	387	724	230	349	38	235	46.0	
12	94	292	89	93	99	281	451	851	282	394	44	273	50.8	
14	117	321	102	100	97	314	514	914	305	432	44.5	273	50.8	
16	133	367	102	117	105	348	572	914	349	489	44.5	273	50.8	
18	149	413	152	129	125	379	629	914	391	546	57.2	337	76.2	
20	159	468	152	149	146	410	686	914	442	600	69.9	337	76.2	
24	181	551	152	176	173	476	813	914	523	711	69.9	337	76.2	
Inches														
8	2.88	7.69	3.5	2.0	2.44	6.81	12.0	26.75	7.31	11.0	1.25	9.25	1.81	---
10	3.36	9.69	3.5	2.94	2.94	10.44	15.25	28.5	9.06	13.75	1.5	9.25	1.81	1-8
12	3.70	11.5	3.5	3.88	3.88	11.06	17.75	33.5	11.09	15.5	1.75	10.75	2.00	1.125-8
14	4.60	12.64	4	3.93	3.82	12.36	20.25	36	12	17	1.75	10.75	2.00	1.125-8
16	5.25	14.45	4	4.60	4.13	13.7	22.50	36	13.75	19.25	1.75	10.75	2.00	1.25-8
18	5.86	16.25	6	5.08	4.92	14.92	24.75	36	15.40	21.5	2.25	13.25	3.00	1.25-8
20	6.25	18.43	6	5.86	5.75	16.14	37	36	17.40	23.62	2.75	13.25	3.00	1.25-8
24	7.13	21.69	6	6.93	16.81	18.75	32	36	20.59	28	2.75	13.25	3.00	1.5-8

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
 2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance.  
 3. Shaft diameter at key.

Figure 11. Dimensions, Wafer Style Valve, CL300, NPS 8 through 24 (also see table 9)

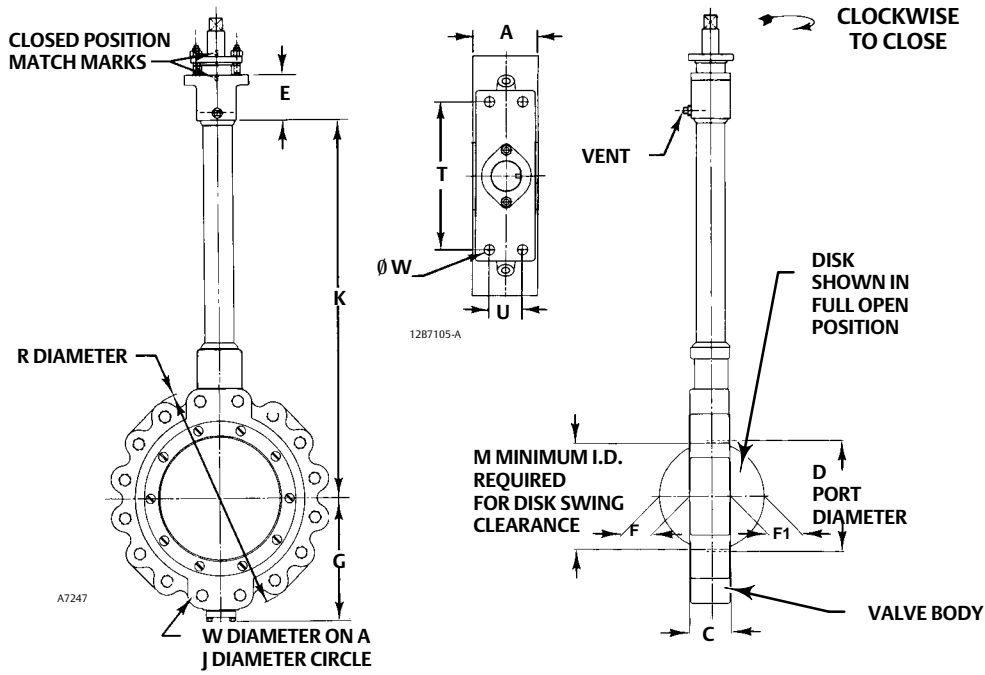


16B4212  
A7246

Table 10. Dimensions, Single Flange Style Valve, CL300, NPS 8 through 24

VALVE SIZE, NPS	A <sup>(1)</sup>	D	E	F	F1	G	J	K	M <sup>(2)</sup>	R	S <sup>(3)</sup>	T	U	W
<b>mm</b>														
8	73	195	89	51	62	214	330	679	186	375	32	235	46.0	See thread information below
10	85	246	89	75	75	265	387	724	230	438	38	235	46.0	
12	94	292	89	93	99	281	451	851	282	514	47.6	273	50.8	
14	117	321	102	100	97	314	514	914	305	584	44.5	273	50.8	
16	133	367	102	117	105	348	572	914	349	648	44.5	273	50.8	
18	149	413	152	129	125	379	629	914	391	711	57.2	337	76.2	
20	159	468	152	149	146	410	686	914	442	775	69.9	337	76.2	
24	181	551	152	176	173	476	813	914	523	914	69.9	337	76.2	
<b>Inches</b>														
8	2.88	7.69	3.5	2.0	2.44	8.44	13.0	26.75	7.32	14.75	1.25	9.25	1.81	0.875-9 12 holes
10	3.36	9.69	3.5	2.94	2.94	10.44	15.25	28.5	9.06	17.25	1.5	9.25	1.81	1-8 16 holes
12	3.70	11.5	3.5	3.69	3.88	11.06	17.75	33.5	11.09	20.25	1.875	10.75	2.00	1.125-8 16 holes
14	4.60	12.63	4	3.94	3.82	12.36	20.25	36	12	23	1.75	10.75	2.00	1.125-8 20 holes
16	5.25	14.45	4	4.60	4.13	13.70	22.50	36	13.75	25.5	1.75	10.75	2.00	1.25-8 20 holes
18	5	16.25	6	5.08	4.92	14.92	24.75	36	15.39	28	2.25	13.25	3.00	1.25-8 24 holes
20	6.25	18.43	6	5.87	5.75	16.14	37	36	17.40	30.5	2.75	13.25	3.00	1.25-8 24 holes
24	7.13	2121.69	6	6.93	6.81	18.75	32	36	20.59	36	2.75	13.25	3.00	1.5-8 24 holes
1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications. 2. Minimum I.D. is the minimum pipe or flange I.D. required for disk swing clearance. 3. Shaft diameter at key.														

Figure 12. Dimensions, Single Flange Style Valve, CL300, NPS 8 through 24 (also see table 10)



Neither Emerson, Emerson Automation Solutions, nor any of their affiliated entities assumes responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use, and maintenance of any product remains solely with the purchaser and end user.

Fisher is a mark owned by one of the companies in the Emerson Automation Solutions business unit of Emerson Electric Co. Emerson Automation Solutions, Emerson, and the Emerson logo are trademarks and service marks of Emerson Electric Co. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available upon request. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

**Emerson Automation Solutions**  
Marshalltown, Iowa 50158 USA  
Sorocaba, 18087 Brazil  
Cernay, 68700 France  
Dubai, United Arab Emirates  
Singapore 128461 Singapore

[www.Fisher.com](http://www.Fisher.com)

