

Fisher® Control-Disk™ Valve NPS 14-24

The Fisher Control-Disk valve provides outstanding performance under extreme pressure and temperature conditions. The Control-Disk valve maintains tight shutoff, is available in a fire-tested version, and can be specified for cryogenic applications.

The Control-Disk valve is available as a flangeless (wafer), lugged, or double flange design. A splined drive shaft combines with a variety of spring-and-diaphragm or pneumatic piston actuators to make the Control-Disk a reliable control valve for a variety of throttling applications in the various process industries.

The Control-Disk valve can be supplied with one of several dynamic seals (figure 1) that can be used in a variety of demanding applications. With the appropriate seal selection and materials of construction, the pressure-assisted seal provides excellent shutoff against the full CL150 or 300 pressure ratings.

Features

- **Equal percentage flow characteristic**— An equal percentage flow characteristic provides an improved throttling range comparable to that of a segmented ball valve. This improved capability allows you to control closer to the target set point, regardless of process disturbances, which results in a reduction in process variability.
- **Economical Tight Shutoff**— The pressure-assisted seal design provides tight shutoff against the full pressure rating of the specified valve.



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Fisher Control-Disk Valve

- **Shaft Retention**— Shaft blowout protection is designed into the Control-Disk valve (figure 2). The anti-blowout gland fits securely over the valve shaft which has been turned down to form a circumferential shoulder that contacts the anti-blowout gland.
- **Excellent Flow Control**—With a modified equal percentage flow characteristic, the Control-Disk can be used for throttling applications through 90 degrees of disk rotation. Rangeability is 100 to 1.
- **High-Temperature / Cryogenic Capabilities**— Optional valve constructions allow this valve to meet both high-temperature and cryogenic applications.
- **Sour Service Capability**— Trim and bolting materials are available for applications involving sour liquids and gases. These constructions comply with NACE MR0175-2002, MR0103, and MR0175 / ISO 15156.
- **Spline-ended Shaft**— The splined shaft with clamped lever and single-pivot linkage reduces lost motion between the actuator and the valve shaft.



- **Application Versatility**—Standard construction materials and seal assemblies provide long life and outstanding performance in a broad range of liquid and gas applications.
- **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.
- **Powder paint as standard**—The Emerson Process Management™ powder paint finish offers an excellent corrosion-resistant finish to all steel parts.
- **Excellent Emissions Capabilities**—The optional ENVIRO-SEAL™ packing systems, are designed with very smooth shaft surfaces and live-loading to provide improved sealing, guiding, and loading force transmission. The seal of the ENVIRO-SEAL system can control emissions to below 100 ppm (parts per million).

Control-Disk NPS 14-24 Valve Specifications and Materials of Construction

Table 1. Fisher Control-Disk NPS 14-24 Valve Specifications

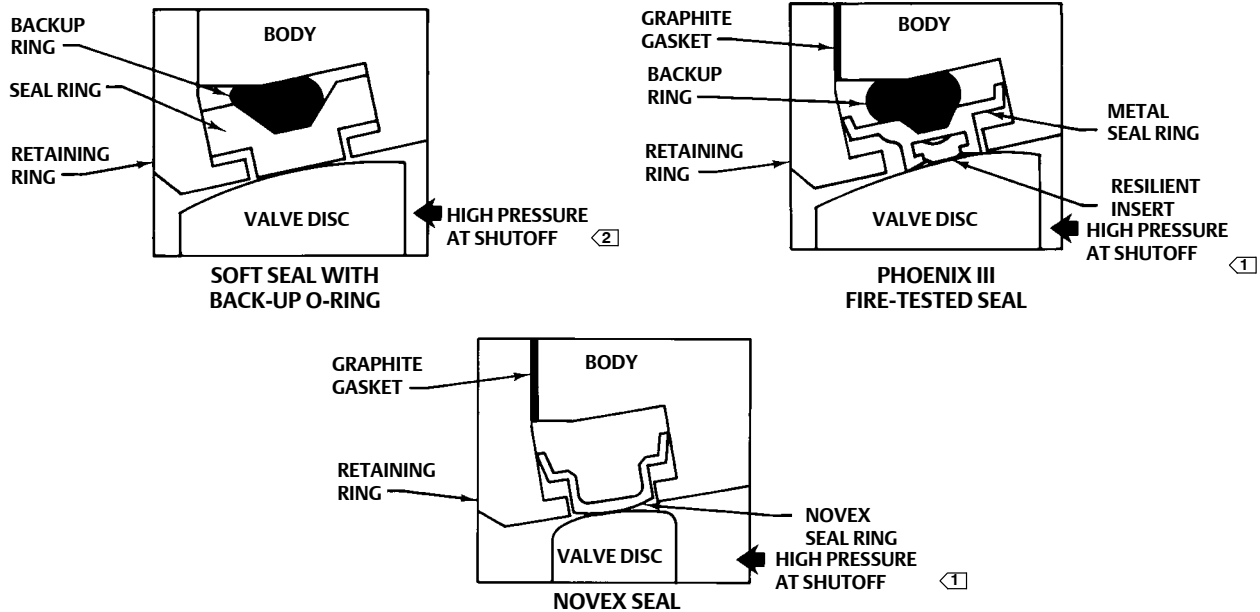
SPECIFICATION	ASME
Valve Body Size	NPS 14, 16, 18, 20, and 24
Pressure Rating	Consistent with CL150 and 300 per ASME B16.34 ⁽¹⁾
Valve Body Materials	WCC Steel
	CF8M Stainless Steel
Disk Materials	CF8M Stainless Steel
End Connections	Mates with RF flanges per ASME B16.5
Valve Body Style	Wafer, Lugged, or Double Flange
Shaft Connection	Spline
Face-to-Face Dimensions	Wafer and Lugged: MSS SP68 and API 609
	Double Flange Class 150: ISO 5752 Butterfly Valve Short Series
	Double Flange Class 300: ISO 5752 Butterfly Valve Long Series
Shutoff	Soft Seal: Bidirectional ANSI/FCI 70-2 Class VI
	NOVEX Seal: Unidirectional ANSI/FCI 70-2 1% of Class IV
	Phoenix III Seal: ANSI/FCI 70-2 Class VI
Flow Direction	Reverse (flow direction is into the shaft side of the disk)
Flow Characteristic	Equal Percentage
Disk Rotation	Clockwise (CW) to close

1. See tables 4 and 5 for additional information. The pressure/temperature limits in this bulletin and any applicable standard limitation should not be exceeded.

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Figure 1. Available Seal Configurations



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Notes:

- ① This unidirectional seal must be installed so that the retaining ring is downstream from the high pressure side of the valve at shutoff, as shown.
- ② For this bidirectional seal, The "preferred" valve orientation places the retaining ring downstream from the high pressure side of the valve at shutoff.

Installation

Recommended or "preferred" installation for Control-Disk NPS 14-24 valves is with the flow into the shaft side of the disk (retaining ring downstream from the high pressure side of the valve).

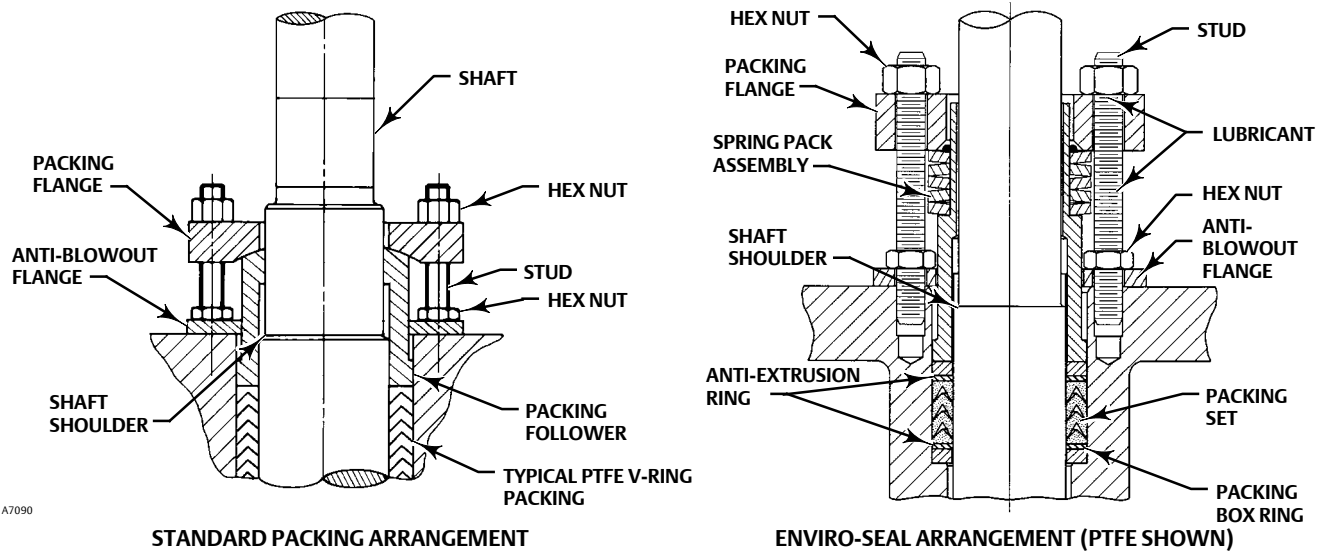
The standard soft seal offers ANSI/FCI 70-2 Class VI, bidirectional shutoff. The Phoenix III seal should be installed in the preferred direction to obtain optimal shutoff performance, and it must be installed in the preferred direction for fire-tested applications. The NOVEX seal is uni-directional and should be installed in the preferred direction.

For assistance in selecting the appropriate combination of actuator action and open valve position, contact your Emerson Process Management sales office.

Standard Seal Configurations

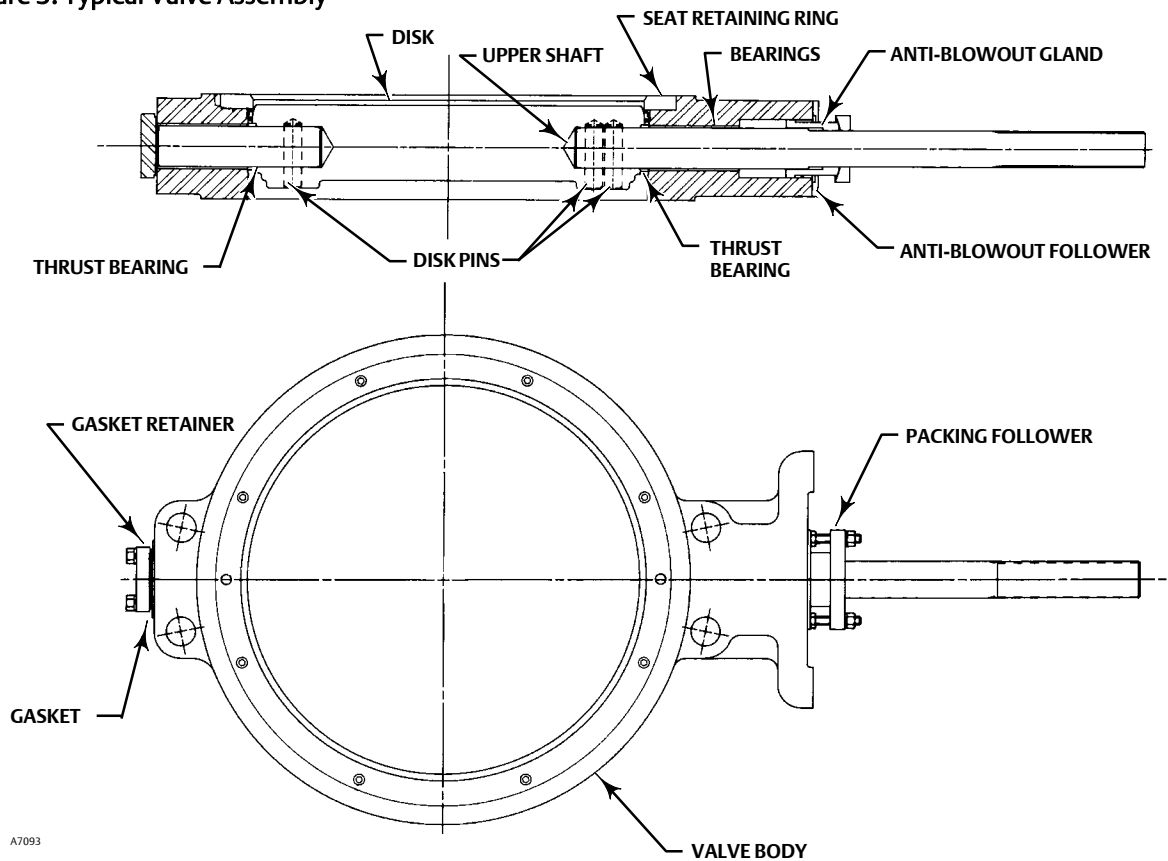
- **Standard Soft Seal (PTFE)**-- A resilient dynamic seal with an elastomeric back-up ring for low to moderate temperature applications.
- **NOVEX Seal**-- The NOVEX stainless steel seal is available for severe service, Cryogenic, and high-temperature applications.
- **Phoenix III Seal**-- This three-component, metal-and-polymeric seal is available for severe service with low to moderate temperature applications.

Figure 2. Blowout Protection



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Figure 3. Typical Valve Assembly



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Table 2. Materials of Construction and Temperature Ratings

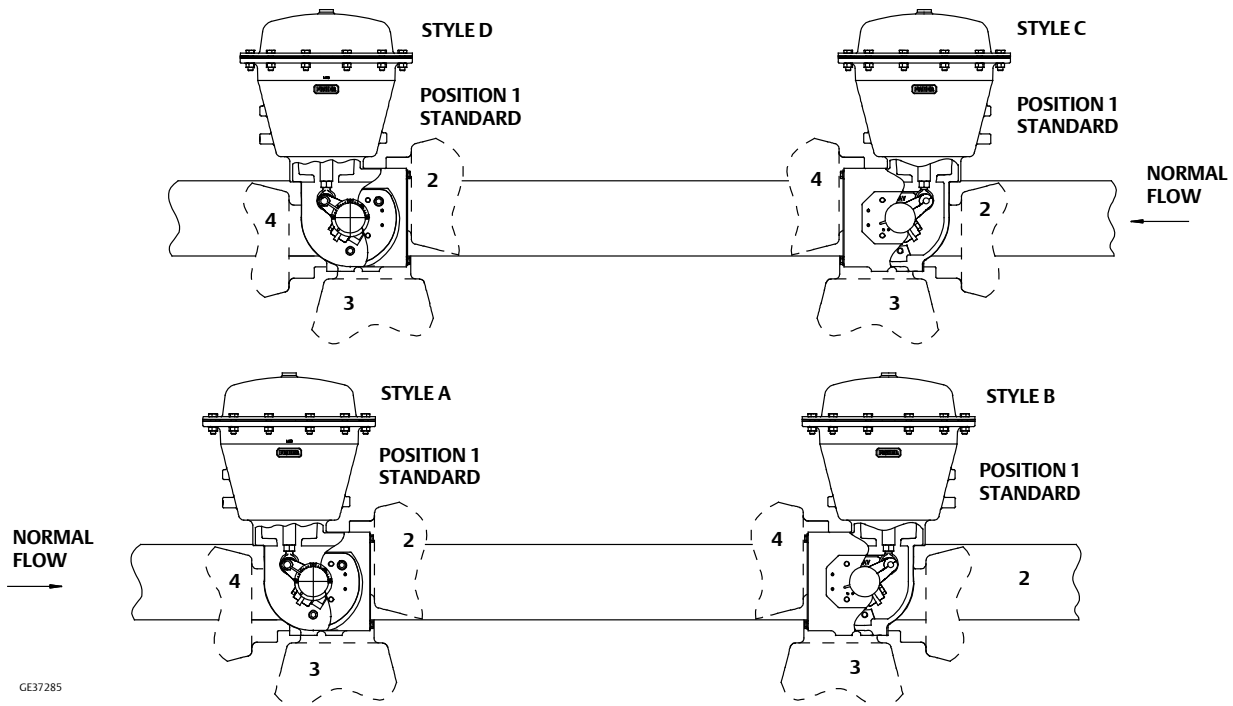
COMPONENTS AND MATERIALS OF CONSTRUCTION		TEMPERATURE RANGE	
		°C	°F
Valve Body WCC CF8M (316 SST)		-29 to 427 -198 to 538	-20 to 800 -325 to 1000
Disk CF8M (316 SST)		-198 to 538	-325 to 1000
Disk Edge Coating Chrome Plating (Standard with NOVEX or Phoenix III Seals) Chrome Coating Chrome Carbide Coating		-254 to 316 -254 to 593 -254 to 816	-425 to 600 -425 to 1100 -425 to 1500
Shaft S20910 S17400 (H1025) N00550 N07718		-198 to 538 -73 to 427 -254 to 482 -254 to 704	-325 to 1000 -100 to 800 -425 to 900 -425 to 1300
Bearings⁽³⁾ PEEK (standard) S31600 Nitrided ⁽¹⁾ R30006 (Alloy 6)		-73 to 149 -198 to 816 -198 to 816	-100 to 300 -325 to 1500 -325 to 1500
Packing PTFE Packing and PTFE ENVIRO-SEAL Packing Graphite packing Graphite packing with oxidizing media Graphite ENVIRO-SEAL Packing		-198 to 232 -198 to 916 -198 to 538 -198 to 315	-325 to 450 -325 to 1500 -325 to 1000 -325 to 600
Seal Ring	PTFE Seal Ring Nitrile Backup O-Ring Chloroprene Backup O-Ring EPR Backup O-Ring Fluorocarbon Backup O-Ring	-29 to 93 -43 to 149 -54 to 182 -29 to 204	-20 to 200 -45 to 300 -65 to 360 -20 to 400
	UHMWPE⁽²⁾ Seal Ring (CL150 Only) Nitrile Backup O-Ring Chloroprene Backup O-Ring EPR Backup O-Ring Fluorocarbon Backup O-Ring	-29 to 93 -43 to 93 -54 to 93 -29 to 93	-20 to 200 -45 to 200 -65 to 200 -20 to 200
	Phoenix III and/or Fire Tested Construction S31600 and PTFE Seal Ring with Nitrile Backup O-Ring Chloroprene Backup O-Ring EPR Backup O-Ring Fluorocarbon Backup O-Ring	-40 to 149 -54 to 149 -62 to 204 -40 to 232	-40 to 300 -65 to 300 -80 to 400 -40 to 450
	NOVEX S31600 Seal ⁽¹⁾ Ring NOVEX S21800 Seal ⁽¹⁾ Ring (CL300 only)	-29 to 816 -29 to 816	-20 to 1500 -20 to 1500
<p>1. For a complete material description, contact your Emerson Process Management sales office. 2. UHMWPE stands for ultra high molecular weight polyethylene. 3. Special thrust bearings are required for high temp. applications over 343°C (650°F) (with 6 and 12-inch shaft extensions). Constructions with carbon steel valves and SST disks may require special thrust bearings at temps. less than 343°C (650°F).</p>			

Table 3. Valve/Actuator Combinations

TEMPERATURE RANGE	SELECTION GUIDELINES
	1052, 1061 or 2052
From -46 to 343°C (-50 to 650°F)	Valve (select appropriate trim) and standard actuator
From 343 to 426°C (650 to 800°F)	Mounting positions 1 and 3
	Valve (select appropriate trim) and standard actuator
From 426 to 538°C (800 to 1000°F) ⁽¹⁾	Mounting positions 1 and 3
	Valve (select appropriate trim) and standard actuator

1. Consult your Emerson Process Management sales office.

Figure 4. Mounting Styles and Positions



Pressure Drops

Pressure drop limits of any given valve are based on valve body, and trim material limits. To find the appropriate pressure drop limitation, choose the desired valve size and temperature range. Then search table 4 for body limitations and table 5 for trim limitations. Information on limits for S31254, CW2M,

M35-1 and other alloy constructions can be obtained by contacting your Emerson Process Management sales office. The lowest number from the tables is the appropriate limit. **The tables for both trim and body limits must be consulted.**

Table 4. Maximum Allowable Shutoff Pressure Drops (Valve Ratings) Based on Carbon Steel and Stainless Steel Valve Types (The tables for both trim and body limits must be consulted.)

TEMPERATURE RANGE	PRESSURE RANGE			
	CL150		CL300	
	WCC	CF8M	WCC	CF8M
°C	Bar			
-254 to -29	---	19.0	---	49.6
-29 to 38	20	19.0	51.7	49.6
93	17.9	16.2	51.7	42.7
149	15.9	14.8	50.3	38.6
204	13.8	13.4	48.6	35.5
260	11.7	11.7	45.9	33.1
316	9.7	9.7	41.7	31.0
343	8.6	8.6	40.7	30.3
371	7.6	7.6	38.3	30.0
399	6.6	6.6	34.8	29.3
427	5.5	5.5	28.3	29.0
454	---	4.5	---	29.0
482	---	3.4	---	28.6
510	---	2.4	---	26.5
538	---	1.4	---	25.2
°F	Psi			
-450 to -20	---	275	---	720
-20 to 100	290	275	750	720
200	260	235	750	620
300	230	215	730	560
400	200	195	705	515
500	170	170	665	480
600	140	140	605	450
650	125	125	590	440
700	110	110	555	435
750	95	95	505	425
800	80	80	410	420
850	---	65	---	420
900	---	50	---	415
950	---	35	---	385
1000	---	20	---	365

**Table 5. Maximum Allowable Shutoff Pressure Drops⁽¹⁾ Metric
Based on Trim (Seal and Bearing) and with S17400 (H1025) Shaft Except Where Noted**

TRIM	TEMPERATURE RANGE	CL150, VALVE BODY SIZE, NPS					CL300, VALVE BODY SIZE, NPS				
		14	16	18	20	24	14	16	18	20	24
	°C	Pressure Range, Bar									
Soft Seal and PEEK Bearing	-46 to 38	20.0	20.0	20.0	20.0	20.0	51.7	51.7	51.7	51.7	51.7
	38 to 93	20.0	20.0	20.0	20.0	20.0	43.6	43.6	43.6	43.6	43.6
	93 to 149	20.0	20.0	20.0	20.0	20.0	27.6	27.6	27.6	27.6	27.6
NOVEX (S31600) Seal and PEEK Bearing	-46 to 38	20.0	20.0	20.0	20.0	20.0	22.1	22.1	22.1	22.1	22.1
	38 to 93	17.9	17.9	17.9	17.9	17.9	22.1	22.1	22.1	22.1	22.1
	93 to 149	15.9	15.9	15.9	15.9	15.9	22.1	22.1	22.1	22.1	22.1
NOVEX (S21800) ⁽²⁾ Seal and PEEK Bearing	-46 to 38						51.7	44.7	51.7	51.7	51.7
	38 to 93						49.0	40.6	51.7	51.7	51.7
	93 to 149						46.1	38.1	50.3	50.3	50.3
Phoenix III Seal and PEEK Bearing	-46 to 38	20.0	20.0	20.0	19.2	20.0	51.7	47.6	51.7	51.7	51.7
	38 to 93	20.0	20.0	20.0	16.9	20.0	51.7	43.2	51.7	51.7	51.7
	93 to 149	20.0	18.5	19.2	15.6	20.0	39.3	39.3	39.3	39.3	39.3
Phoenix III Seal and S31600 Nitrided Bearing	-46 to 38	20.0	17.1	18.8	15.3	20.0	48.6	36.3	51.7	51.7	51.7
	38 to 93	18.1	14.8	16.6	13.5	20.0	44.2	32.6	51.7	51.5	51.7
	93 to 149	16.5	13.5	15.4	12.5	20.0	39.3	30.5	39.3	39.3	39.3
	149 to 204	15.4	12.6	14.5	11.7	20.0	26.9	26.9	26.9	26.9	26.9
	204 to 232	15.0	12.2	14.1	11.4	20.0	20.7	20.7	20.7	20.7	20.7
NOVEX (S31600) Seal and S31600 Nitrided Bearing	-46 to 38	20.0	20.0	20.0	20.0	20.0	22.1	22.1	22.1	22.1	22.1
	38 to 93	17.9	17.9	17.9	17.9	17.9	22.1	22.1	22.1	22.1	22.1
	93 to 149	15.9	15.9	15.9	15.9	15.9	22.1	22.1	22.1	22.1	22.1
	149 to 232	12.8	12.8	12.8	12.8	12.8	17.5	17.5	17.5	17.5	17.5
	232 to 343	8.6	8.6	8.6	8.6	8.6	13.7	13.7	13.7	13.7	13.7
	343 to 427	5.5	5.5	5.5	5.5	5.5	12.8	12.8	12.8	12.8	12.8
	427 to 482 ⁽³⁾	3.4	3.4	3.4	3.4	3.4	12.5	12.5	12.5	12.5	12.5
482 to 538 ⁽³⁾	1.4	1.4	1.4	1.4	1.4	12.3	12.3	12.3	12.3	12.3	
NOVEX (S21800) ⁽²⁾ Seal and S31600 Nitrided Bearing	-46 to 38						43.3	34.5	51.7	51.7	51.7
	38 to 93						39.3	31.1	51.7	51.7	51.7
	93 to 149						36.9	29.0	50.3	50.3	50.3
	149 to 232						34.5	27.0	47.2	47.2	47.2
	232 to 343						32.4	25.1	40.0	40.0	40.0
	343 to 427						31.2	24.0	29.0	29.0	29.0
	427 to 482 ⁽³⁾						28.6	28.6	28.6	28.6	28.6
482 to 538 ⁽³⁾						25.2	25.2	25.2	25.2	25.2	

1. Consult your Emerson Process Management sales office if higher pressure drops are required.
2. NOVEX S21800 seal is available for CL300 only.
3. N07718 shaft must be specified above 427°C.

**Table 6. Maximum Allowable Shutoff Pressure Drops⁽¹⁾ U.S. Traditional Units
Based on Trim (Seal and Bearing) and with S17400 (H1025) Shaft Except Where Noted**

TRIM	TEMPERATURE RANGE	CL150, VALVE BODY SIZE, NPS					CL300, VALVE BODY SIZE, NPS				
		14	16	18	20	24	14	16	18	20	24
	°F	Pressure Range, Psi									
Soft Seal and PEEK Bearing	-50 to 100	290	290	290	290	290	750	750	750	750	750
	100 to 200	290	290	290	290	290	633	633	633	633	633
	200 to 300	290	290	290	290	290	400	400	400	400	400
NOVEX (S31600) Seal and PEEK Bearing	-50 to 100	290	290	290	290	290	320	320	320	320	320
	100 to 200	260	260	260	260	260	320	320	320	320	320
	200 to 300	230	230	230	230	230	320	320	320	320	320
NOVEX (S21800) ⁽²⁾ Seal and PEEK Bearing	-50 to 100						750	649	750	750	750
	100 to 200						711	589	750	750	750
	200 to 300						668	553	730	730	730
Phoenix III Seal and PEEK Bearing	-50 to 100	290	290	290	278	290	750	691	750	750	750
	100 to 200	290	290	290	245	290	750	627	750	750	750
	200 to 300	290	269	278	226	290	570	570	570	570	570
Phoenix III Seal and S31600 Nitrided Bearing	-50 to 100	290	248	272	222	290	705	526	750	750	750
	100 to 200	262	215	241	196	290	641	473	750	747	750
	200 to 300	240	196	223	181	290	570	442	570	570	570
	300 to 400	224	183	210	170	290	390	390	390	390	390
	400 to 450	217	177	204	166	290	300	300	300	300	300
NOVEX (S31600) Seal and S31600 Nitrided Bearing	-50 to 100	290	288	290	290	290	320	320	320	320	320
	100 to 200	260	258	260	260	260	320	320	320	320	320
	200 to 300	230	230	230	230	230	320	320	320	320	320
	300 to 450	185	185	185	185	185	254	254	254	254	254
	450 to 650	125	125	125	125	125	198	198	198	198	198
	650 to 800	80	80	80	80	80	186	186	186	186	186
	800 to 900 ⁽³⁾	50	50	50	50	50	182	182	182	182	182
900 to 1000 ⁽³⁾	20	20	20	20	20	179	179	179	179	179	
NOVEX (S21800) ⁽²⁾ Seal and S31600 Nitrided Bearing	-50 to 100						628	501	750	750	750
	100 to 200						570	451	750	750	750
	200 to 300						535	421	730	730	730
	300 to 450						501	391	685	685	685
	450 to 650						470	364	580	580	580
	650 to 800						452	348	420	420	420
	800 to 900 ⁽³⁾						415	415	415	415	415
	900 to 1000 ⁽³⁾						365	365	365	365	365

1. Consult your Emerson Process Management sales office if higher pressure drops are required.
2. NOVEX S21800 seal is available for CL300 only.
3. N07718 shaft must be specified above 800°F.

Figure 5. Dimensions and Weights, CL150 (also see table 7)

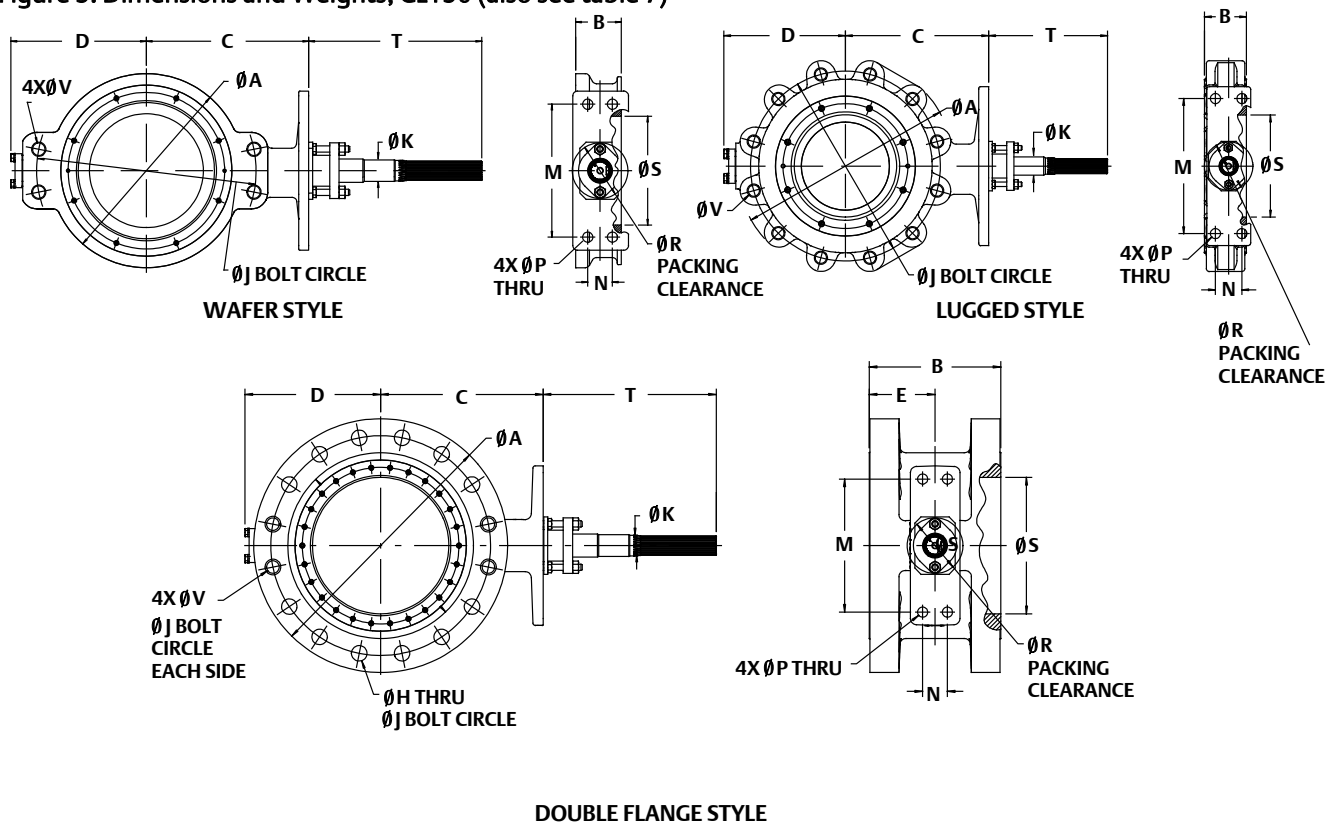


Table 7. Dimensions, CL150

VALVE SIZE, NPS	CL150 DIMENSION																	
	A			B		C	D	E	H	J	K	M	N	P	R	S	T	V ⁽⁴⁾
	(1)	(2)	(3)	(1,2)	(3)													
	mm																	
14	422	530	533	91.9	191	327	295	95.3	1-1/8 8 holes	476	31.8	235	46.0	17.5	117	338	208	1-8 12 holes
16	465	607	597	102	216	371	318	108	1-1/8 12 holes	540	31.8	235	46.0	17.5	117	384	208	1-8 16 holes
18	529	645	635	114	222	400	349	111	1-1/4 12 holes	578	39.7	273	50.8	20.6	133	432	356	1 1/8-8 16 holes
20	584	695	699	127	229	432	381	114	1-1/4 16 holes	635	44.5	273	50.8	20.6	133	480	356	1 1/8-8 20 holes
24	692	822	813	154	267	492	438	133	1-3/8 16 holes	749	57.2	337	76.2	23.9	155	594	356	1 1/4-8 20 holes
	inches																	
14	16.62	20.88	21.00	3.62	7.50	12.88	11.62	3.75	1-1/8 8 holes	18.75	1-1/4	9.25	1.81	0.69	4.62	13.31	8.19	1-8 12 holes
16	18.31	23.88	23.50	4.00	8.50	14.62	12.50	4.25	1-1/8 12 holes	21.25	1-1/4	9.25	1.81	0.69	4.62	15.12	8.19	1-8 16 holes
18	20.81	25.38	25.00	4.50	8.75	15.75	13.75	4.38	1-1/4 12 holes	22.75	1-9/16	10.75	2.00	0.81	5.25	17.00	14.00	1 1/8-8 16 holes
20	23.00	27.38	27.50	5.00	9.00	17.00	15.00	4.50	1-1/4 16 holes	25.00	1-3/4	10.75	2.00	0.81	5.25	18.88	14.00	1 1/8-8 20 holes
24	27.25	32.38	32.00	6.06	10.50	19.38	17.25	5.25	1-3/8 16 holes	29.50	2-1/4	13.25	3.00	0.94	6.12	23.38	14.00	1 1/4-8 20 holes

1. Wafer Style Valve
 2. Lugged Style Valve
 3. Double Flange Style Valve
 4. Wafer and Double Flange styles have 4 holes

Figure 6. Dimensions and Weights, CL300 (also see table 8)

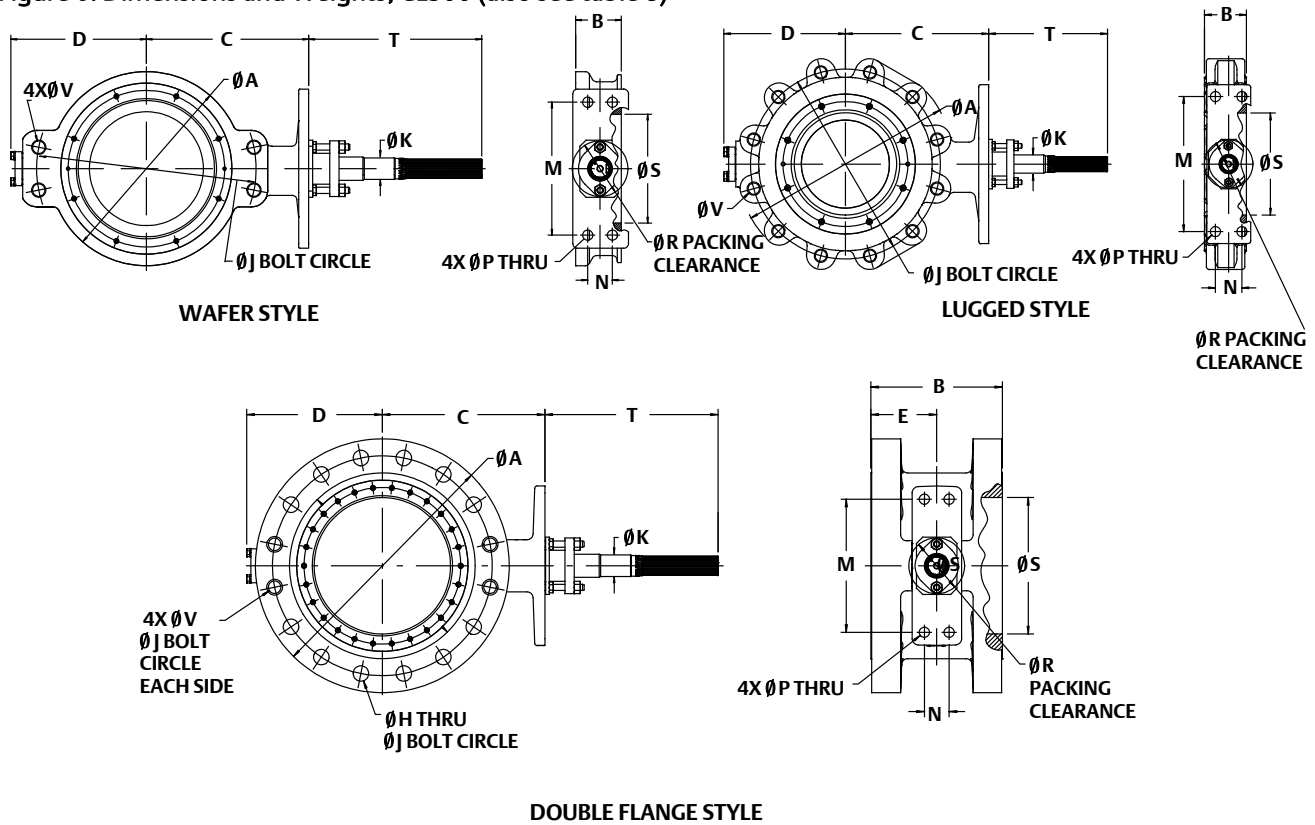


Table 8. Dimensions, CL300

VALVE SIZE, NPS	CL300 DIMENSION																		
	A			B		C	D	E	H	J	K	M	N	P	R	S	T	V ⁽⁴⁾	
	(1)	(2)	(3)	(1,2)	(3)														
	mm																		
14	436	594	584	117	290	363	319	145	1-1/4	16 holes	514	44.5	273	50.8	20.6	124	339	356	1 1/8-8 16 holes
16	498	657	648	133	310	397	353	155	1-3/8	16 holes	572	44.5	273	50.8	20.6	130	383	356	1 1/4-8 20 holes
18	556	721	711	149	330	419	384	165	1-3/8	20 holes	629	57.2	337	76.2	23.9	143	430	356	1 1/4-8 24 holes
20	605	784	767	159	350	483	416	175	1-3/8	20 holes	686	76.2	337	76.2	23.9	187	478	265	1 1/4-8 24 holes
24	716	924	914	181	390	546	483	195	1-5/8	20 holes	813	76.2	337	76.2	23.9	202	575	265	1 1/2-8 24 holes
	inches																		
14	17.19	23.38	23.00	4.62	11.41	14.31	12.56	5.70	1-1/4	16 holes	20.25	1-3/4	10.75	2.00	0.81	4.88	12.65	14.00	1 1/8-8 16 holes
16	19.62	25.88	25.50	5.25	12.20	15.63	13.88	6.10	1-3/8	16 holes	22.50	1-3/4	10.75	2.00	0.81	5.12	15.07	14.00	1 1/4-8 20 holes
18	21.88	28.38	28.00	5.88	13.00	16.50	15.12	6.50	1-3/8	20 holes	24.75	2-1/4	13.25	3.00	0.94	5.62	16.91	14.00	1 1/4-8 24 holes
20	23.81	30.88	30.20	6.25	13.78	19.00	16.38	6.89	1-3/8	20 holes	27.00	3	13.25	3.00	0.94	7.38	18.80	10.44	1 1/4-8 24 holes
24	28.19	36.38	36.00	7.12	15.35	21.50	19.00	7.67	1-5/8	20 holes	32.00	3	13.25	3.00	0.94	7.94	21.69	10.44	1 1/2-8 24 holes

1. Wafer Style Valve
2. Lugged Style Valve
3. Double Flange Style Valve
4. Wafer and Double Flange styles have 4 holes

Product Bulletin

51.3:Control-Disk NPS 14-24
October 2013

Control-Disk NPS 14-24 Valve
D103471X012

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