

# Fisher® CL600 Control-Disk™ Valve

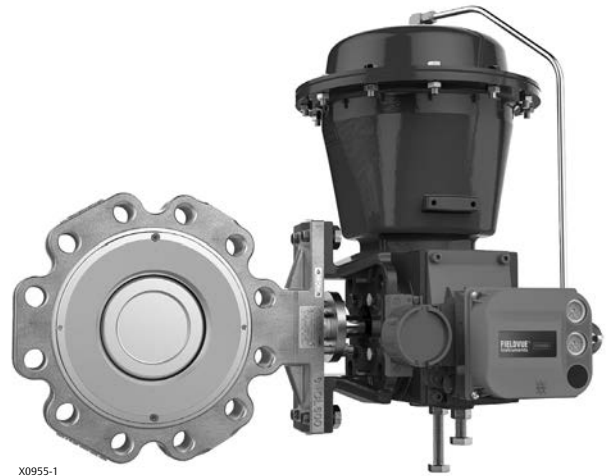
The Fisher CL600 Control-Disk valve provides outstanding performance in a wide range of pressure and temperature conditions.

The CL600 Control-Disk valve is available in a lugged body design. A splined drive shaft can combine with a variety of spring-and-diaphragm or pneumatic piston actuators to make the Control-Disk valve a reliable control valve for a variety of throttling applications in the process industries.

The CL600 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 helps provide excellent shutoff against the full ASME class pressure range for the CL600 Control-Disk valve.

## 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.
- **Excellent Shutoff Integrity**-- The pressure-assisted seal design provides tight shutoff and permits the use of smaller, less expensive actuators in applications requiring full ASME B16.34 shutoff capabilities.



- **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).
- **Sour Service Capability**-- Trim and bolting materials are available for applications involving sour liquids and gases. These constructions comply with NACE MR0175-2002, MR0175-2003, MR0103, and MR0175 / ISO 15156.
- **Easy Installation**-- The valve body self-centers on the line flange bolts as a fast, accurate means of centering the valve in the pipeline.

*(continued on page 3)*



# CL600 Control-Disk Valve Specifications and Materials of Construction

**Table 1. Fisher CL600 Control-Disk Valve Specifications**

Specifications	ASME
Valve Body Size	NPS 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24
Pressure Rating	CL600 per ASME B16.34
Valve Body Materials	WCC or CF8M (std)
	LCC, CD3MN, M35-2, and CW2M
Disk Materials	CF8M (std), CD3MN, M35-2, and CW2M
Disk Edge Coating	Chrome Plate (std)
	Chrome Coat
	Chromium Carbide Coating
End Connections	Mates with RF Flanges per ASME B16.5 Optional construction mates with RTJ Flanges per ASME B16.5
Valve Body Style	Lugged (Single Flange) or Lugged with drilled through flange holes
Shaft Connection Style	NPS 3-24: Splined (std) NPS 3-12: Square NPS 14-24: Keyed
Face-to-Face Dimensions	Meets MSS SP68, API 609, ASME B16.10, and EN 558 standards
Shutoff	Soft Seal: Class VI
	Metal Seal: Class IV, reverse direction only
	Phoenix III Seal: Class VI; reverse direction preferred, forward direction optional
	High Pressure Seal: Class VI, reverse direction only
Flow Direction	Standard (reverse flow) is with the flow into the shaft side of the disk
Flow Characteristic	Equal Percentage
Disk Rotation	Clockwise (CW) to close

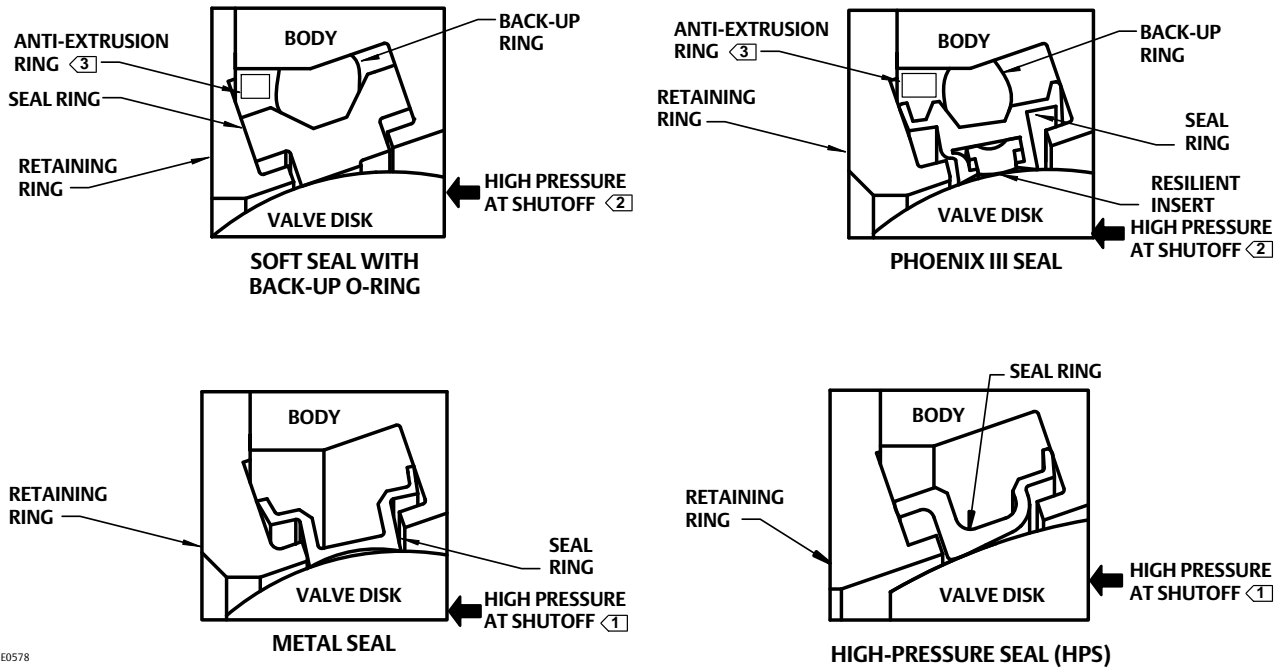
**Table 2. Materials (Other Valve Components)**

Component	Material
Shafts and Pins	S17400 H1025
	S20910
	N07718
Anti-Blowout Ring (NPS 3-8 only)	N07718
Seal Ring	Soft: ETFE
	Metal: S21800
	Phoenix III: S31600/ETFE HPS: S21800 nitrided
Bearings	PEEK, S31600 Nitrided, R30006 (Alloy 6)
Packing	PTFE/carbon-filled PTFE (standard), graphite die-molded ribbon, ENVIRO-SEAL PTFE packing, ENVIRO-SEAL graphite packing

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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.
- ③ NPS 3 only.

## Features (continued)

- **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.
- **True Bidirectional Shutoff Performance**-- A feature of the valve design is that the torque necessary to open and close the valve is the same regardless of the direction in which the differential pressure is applied.
- **Shaft Retention**-- Redundant shaft retention provides added protection. The packing follower, anti-blowout ring, and shaft groove interact to hold the shaft securely in the valve body in NPS 3 through 10 (see figure 4). The NPS 12 through 24 utilize a stepped packing follower and stepped shaft to hold the shaft securely in the valve body.
- **Powder Paint as Standard**-- The Emerson Process Management powder paint finish offers an excellent corrosion-resistant finish to all steel parts.

## Standard Seal Configurations

- **Standard Soft Seal**-- A resilient dynamic seal with an elastomeric back-up ring for low to moderate temperature applications.
- **Metal Seal**-- This stainless steel seal is available for severe service and high-temperature applications to 538°C (1000°F).
- **Phoenix III Seal**-- This three-component, metal-and-polymeric seal is available for severe service with low to moderate temperature applications.
- **High-Pressure Seal**-- This robust, stainless steel seal is available for severe service, cryogenic, and high-temperature applications to 538°C (1000°F).

**Figure 2. CL600 Control-Disk Valve, NPS 6, Drivetrain Detail**



## Installation

Preferred valve orientation for the CL600 Control-Disk valve is reverse flow direction. Reverse flow direction is into the side of the valve body opposite the retaining ring or into the shaft side of the disk.

For erosive and many severe service applications, valves with bidirectional seals can and should be installed with the shaft horizontal and in the forward flow direction to prevent direct impingement of the process media on the seal, and to minimize the exposure of the shaft bearings to the process media.

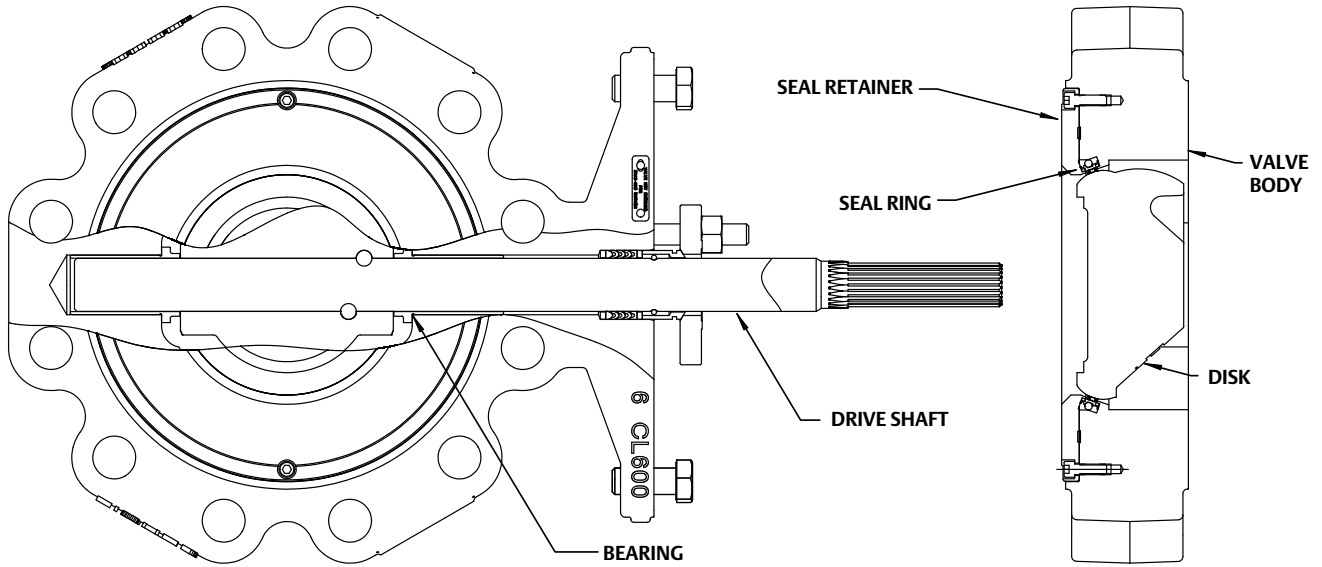
The standard soft seal and the Phoenix III seal both offer bidirectional shutoff. Valves using either metal or HPS are unidirectional and must be installed in the reverse flow orientation.

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

Dimensions and weights are shown in figure 6 and table 6.

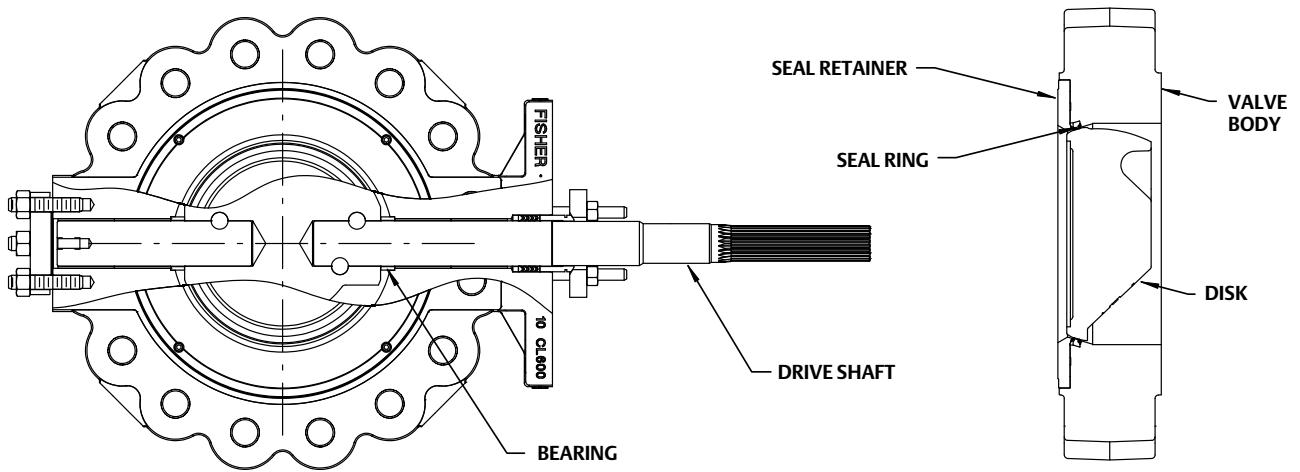


**Figure 3. CL600 Control-Disk Valve, NPS 3 to 6, Valve Body Assembly**



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**Figure 4. CL600 Control-Disk Valve, NPS 8 to 24, Valve Body Assembly**



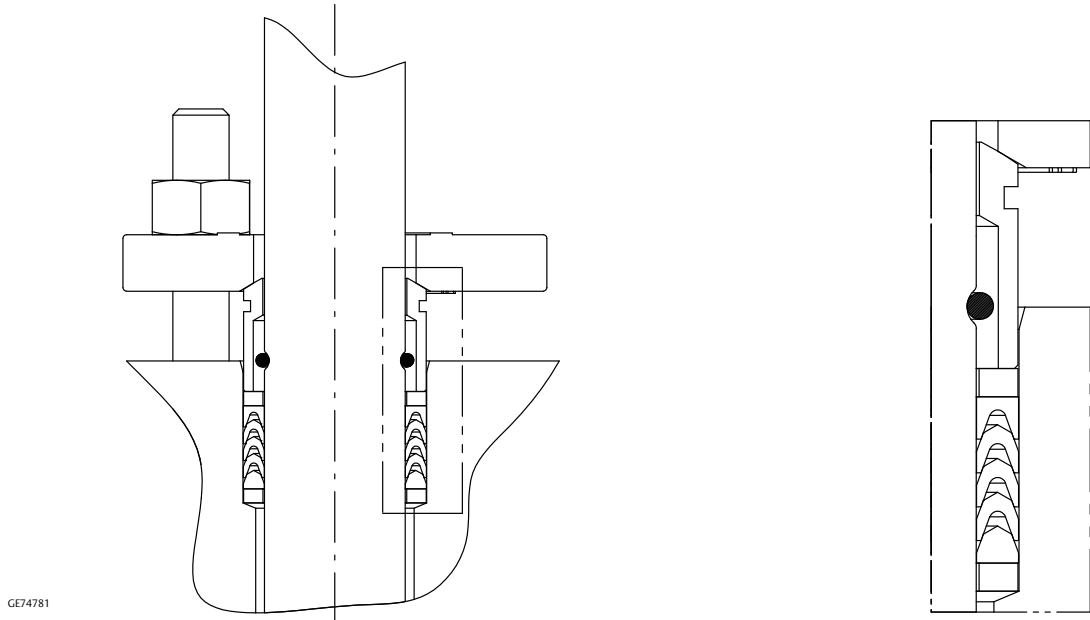
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**Table 3. Material Temperature Ranges<sup>(1)</sup>**

PART NAME	MATERIAL	TEMP °C	TEMP °F
Valve Body	WCC Steel	-29 to 427	-20 to 800
	CF8M	-254 to 538	-425 to 1000
	LCC	-45 to 343	-50 to 650
	CD3MN	-51 to 316	-60 to 600
	M35-2	-198 to 482	-325 to 900
	CW2M	-198 to 538	-325 to 1000
Disk	CF8M with Chrome Plated Disk Edge	-254 to 427	-425 to 800
	CF8M with Chrome Coated Disk Edge	-254 to 538	-425 to 1000
	CF8M with Chromium Carbide Disk Edge	-254 to 538	-425 to 1000
	CD3MN (no plating) <sup>(2)</sup>	-51 to 316	-60 to 600
	M35-2 (no plating) <sup>(2)</sup>	-198 to 482	-325 to 900
	CW2M (no plating) <sup>(2)</sup>	-198 to 538	-325 to 1000
Shaft	S17400 (H1025)	-46 to 427	-50 to 800
	S20910	-198 to 538	-325 to 1000
	S31803	-51 to 316	-60 to 600
	N05500	-198 to 482	-325 to 900
	N10276	-198 to 538	-325 to 1000
	N07718	-254 to 538	-425 to 1000
Bearings	PEEK <sup>(3)</sup>	-73 to 149	-100 to 300
	S31600 Nitrided	-254 to 538	-425 to 1000
	R30006 (Alloy 6)	-198 to 538	-325 to 1000
Seal	<b>ETFE Soft Seal Ring</b>		
	ETFE Soft Seal Ring with FKM Backup Ring	-29 to 149	-20 to 300
	ETFE Soft Seal Ring with EPR Backup Ring	-54 to 149	-65 to 300
	<b>S31600/ETFE Phoenix III Seal Ring</b>		
	S31600/ETFE Phoenix III Seal Ring with FKM Backup Ring	-40 to 149	-40 to 300
	S31600/ETFE Phoenix III Seal Ring with EPR Backup Ring	-62 to 149	-80 to 300
	<b>Metal Seal</b>		
	S21800	-198 to 538	-325 to 1000
	S20910	-198 to 538	-325 to 1000
	<b>High Pressure Seal</b>		
	S21800 Nitrided	-198 to 538	-325 to 1000
	S20910 Nitrided	-198 to 538	-325 to 1000
Packing	PTFE /Carbon-filled PTFE (standard)	-45 to 232	-50 to 450
	ENVIRO-SEAL PTFE	-45 to 232	-50 to 450
	Graphite Die-molded Ribbon	-198 to 538	-325 to 1000
	ENVIRO-SEAL Graphite	-198 to 371	-325 to 700

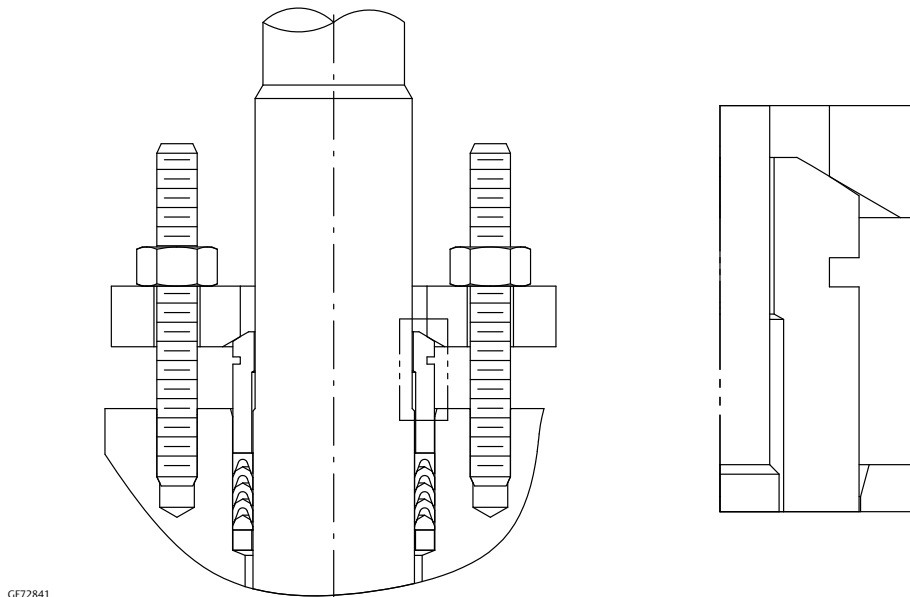
1. The maximum allowable temperature of the CL600 Control-Disk valve is 538°C (1000°F).  
2. For use with soft seal only.  
3. Contact your [Emerson Process Management sales office](#) for use in higher temperature applications.

**Figure 5. Anti-Blowout Protection**



GE74781

**NPS 3 THROUGH 8 WITH ANTI-BLOWOUT RING**



GE72841

**NPS 10 THROUGH 24 WITH STEPPED SHAFT**

## 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 CW2M, M35-2, 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<sup>(1)</sup> (The tables for both trim and body limits must be consulted)**

TEMPERATURE RANGE	PRESSURE RANGE			
	CL600			
	WCC <sup>(2)</sup>	CF8M <sup>(2)</sup>	LCC <sup>(2)</sup>	CD3MN
°C	Bar			
-254 to -29	---	99.3	---	103.4
-29 to 38	103.4	99.3	103.4	103.4
93	103.4	85.5	103.4	102.7
149	100.3	77.2	100.3	92
204	96.9	70.7	96.9	84.8
260	91.7	65.8	91.7	80
316	83.4	62.1	83.4	76.9
343	81.0	61.0	81.0	---
371	76.5	60.0	---	---
399	70.0	59.0	---	---
427	56.9	58.3	---	---
454	---	57.6	---	---
482	---	57.2	---	---
510	---	53.4	---	---
538	---	50.0	---	---
°F	Psi			
-425 to -20	---	1440	---	1500
-20 to 100	1500	1440	1500	1500
200	1500	1240	1500	1490
300	1455	1120	1455	1335
400	1405	1025	1405	1230
500	1330	955	1330	1160
600	1210	900	1210	1115
650	1175	885	1175	---
700	1110	870	---	---
750	1015	855	---	---
800	825	845	---	---
850	---	835	---	---
900	---	830	---	---
950	---	775	---	---
1000	---	725	---	---

1. For pressure/temperature rating of other materials, contact your [Emerson Process Management sales office](#).  
2. WCC, LCC, and CF8M valve bodies use S31600 seal retainers and blind flanges.



**Table 5. Maximum Allowable Shutoff Pressure Drops based on Trim<sup>(1)</sup>**

**Note: Do not exceed the ASME pressure/temperature ratings of the valve or mating flanges.**

Trim	Temperature, °C	NPS											
		3	4	6	8	10	12	14	16	18	20	24	
		Bar											
ETFE Seal, PEEK Bearings	-46 to 37	Contact factory			103	103	102	103	103	103	103	103	100
	93	Contact factory			84	84	84	84	84	84	84	84	84
	121	Contact factory			46	46	46	46	46	46	46	46	46
	149	Contact factory			7	7	7	7	7	7	7	7	7
Phoenix III Seal, PEEK Bearings	-46 to 37	Contact factory			103	103	81	103	102	103	103	80	80
	93	Contact factory			103	103	73	103	92	103	103	73	73
	121	Contact factory			62	62	62	62	62	62	62	62	62
	149	Contact factory			21	21	21	21	21	21	21	21	21
Phoenix III Seal, Metal Bearings	-46 to 37	91	99	103	103	103	62	103	78	103	103	61	
	93	77	93	103	100	96	56	103	71	103	101	56	
	121	62	62	62	62	62	54	62	62	62	62	54	
	149	21	21	21	21	21	21	21	21	21	21	21	
Metal Seal, PEEK Bearings	-46 to 37	Contact factory			103	103	86	103	103	103	103	92	
	149	Contact factory			99	103	73	103	95	103	103	79	
Metal Seal, Metal Bearings	-46 to 37	103	99	103	103	103	66	103	84	103	103	69	
	316	74	80	86	78	81	49	86	65	86	86	54	
	427 <sup>(2)</sup>	69	69	69	69	69	46	69	62	69	69	51	
HPS Seal, Metal Bearings	-46 to 37	25	44	89	80	89	57	103	78	103	103	67	
	316	13	28	67	59	68	43	86	60	86	86	52	
	427 <sup>(2)</sup>	11	26	63	56	64	41	69	57	69	69	50	
		psi											
ETFE Seal, PEEK Bearings	-50 to 100	Contact factory			1500	1500	1481	1500	1500	1500	1500	1456	
	200	Contact factory			1220	1220	1220	1220	1220	1220	1220	1220	
	250	Contact factory			660	660	660	660	660	660	660	660	
	300	Contact factory			100	100	100	100	100	100	100	100	
Phoenix III Seal, PEEK Bearings	-50 to 100	Contact factory			1500	1500	1173	1500	1476	1500	1500	1156	
	200	Contact factory			1493	1500	1056	1500	1340	1500	1500	1052	
	250	Contact factory			900	900	900	900	900	900	900	900	
	300	Contact factory			300	300	300	300	300	300	300	300	
Phoenix III Seal, Metal Bearings	-50 to 100	1317	1432	1500	1500	1500	905	1500	1134	1500	1500	888	
	200	1122	1346	1500	1458	1395	816	1500	1030	1500	1463	808	
	250	900	900	900	900	900	786	900	900	900	900	782	
	300	300	300	300	300	300	300	300	300	300	300	300	
Metal Seal, PEEK Bearings	-50 to 100	Contact factory			1500	1500	1243	1500	1500	1500	1500	1328	
	300	Contact factory			1435	1500	1052	1500	1382	1500	1500	1148	
Metal Seal, Metal Bearings	-50 to 100	1500	1437	1500	1500	1500	953	1500	1221	1500	1500	999	
	600	1076	1163	1250	1127	1176	713	1250	940	1250	1250	777	
	800 <sup>(2)</sup>	1000	1000	1000	1000	1000	674	1000	894	1000	1000	741	
HPS Seal, Metal Bearings	-50 to 100	360	640	1285	1154	1290	830	1500	1124	1500	1500	979	
	600	183	408	968	862	982	623	1250	865	1250	1250	761	
	800 <sup>(2)</sup>	155	371	917	815	932	589	1000	824	1000	1000	726	

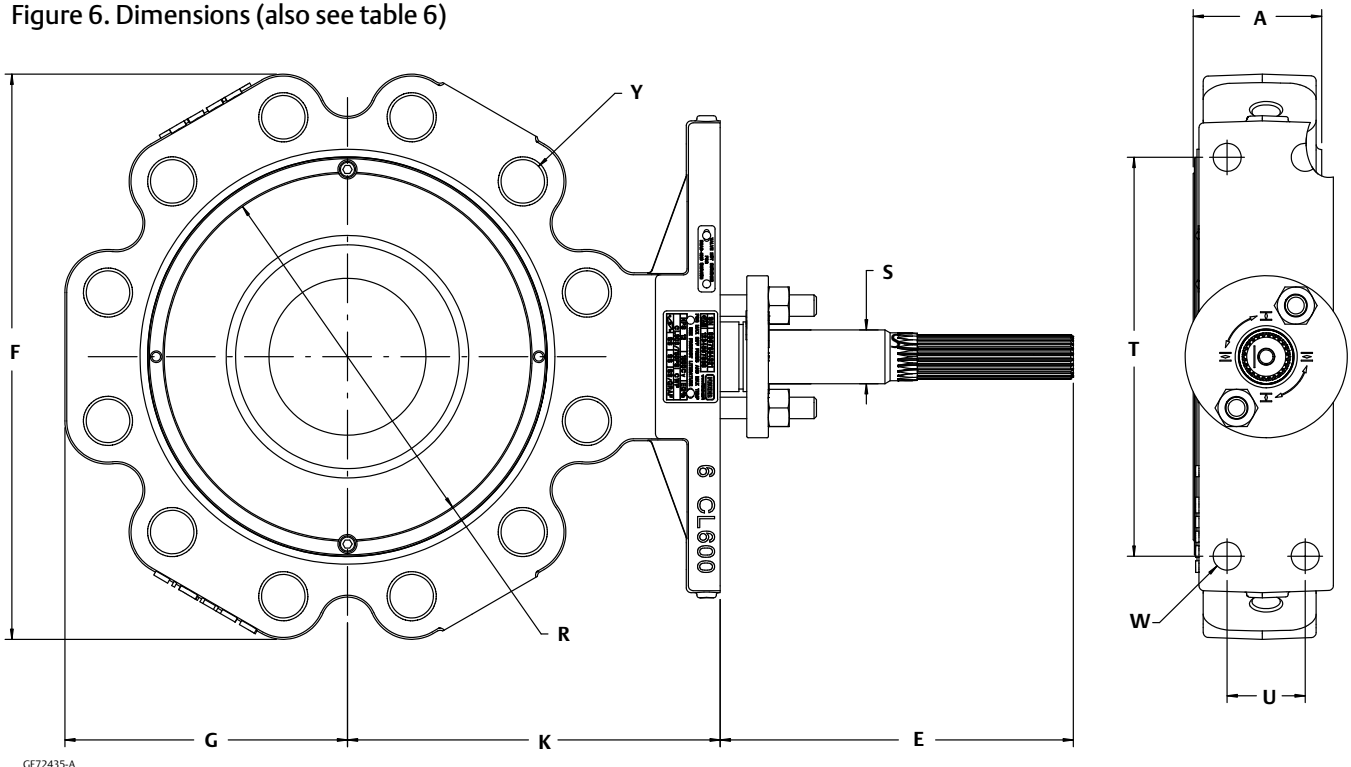
1. Trim ratings based on S17400 H1025 shaft. For other shaft materials, please contact factory.  
2. The temperature limit of S17400 H1025 shaft material is 427°C (800°F). For higher temperatures another shaft material option must be selected.

**Table 6. Dimensions and Weights**

Valve Size	A	E	F	G	K	R	S <sup>(1)</sup>	T	U	γ <sup>(2)</sup>	W <sup>(2)</sup>	Approximate Weight
	mm											kg
NPS 3	52	187	198	98	123	127	15.9	117	--	3/4-10	1/2-13	10.8
NPS 4	62	214	259	128	150	157	19.1	152	32	7/8-9	1/2-13	21.6
NPS 6	76	208	333	166	220	216	31.8	235	46	1-8	5/8-11	45.9
NPS 8	102	208	407	241	234	270	38.1	235	46	1-1/8-8	5/8-11	81.5
NPS 10	116	356	506	312	302	324	44.5	273	51	1-1/4-8	3/4-10	160
NPS 12	140	356	553	339	332	381	50.8	273	51	1-3/8-8	3/4-10	217
NPS 14	157	356	597	370	348	413	63.5	337	76	1-1/2-8	7/8-9	287
NPS 16	178	356	678	408	386	470	63.5	337	76	1-5/8-8	7/8-9	405
NPS 18	198	508	735	451	427	533	76.2	533	127	1-5/8-8	1-1/4-8	577
NPS 20	216	508	807	478	446	584	76.2	533	127	1-5/8-8	1-1/4-8	739
NPS 24	230	508	933	544	513	692	76.2	533	127	1-7/8-8	1-1/4-8	1036
	Inches											lbs
NPS 3	2.04	7.38	7.80	3.85	4.84	5.00	0.63	4.62	--	3/4-10	1/2-13	24
NPS 4	2.44	8.44	10.20	5.04	5.89	6.19	0.75	6.00	1.25	7/8-9	1/2-13	48
NPS 6	2.98	8.19	13.11	6.54	8.65	8.50	1.25	9.25	1.81	1-8	5/8-11	102
NPS 8	4.00	8.19	16.02	9.49	9.20	10.62	1.50	9.25	1.81	1-1/8-8	5/8-11	181
NPS 10	4.56	14.00	19.92	12.28	11.90	12.75	1.75	10.75	2.00	1-1/4-8	3/4-10	355
NPS 12	5.51	14.00	21.77	13.35	13.07	15.00	2.00	10.75	2.00	1-3/8-8	3/4-10	482
NPS 14	6.18	14.00	23.50	14.57	13.70	16.25	2.50	13.25	3.00	1-1/2-8	7/8-9	637
NPS 16	7.00	14.00	26.69	16.06	15.20	18.50	2.50	13.25	3.00	1-5/8-8	7/8-9	900
NPS 18	7.81	20.00	28.94	17.76	16.81	21.00	3.00	21.00	5.00	1-5/8-8	1-1/4-8	1280
NPS 20	8.50	20.00	31.77	18.82	17.57	23.00	3.00	21.00	5.00	1-5/8-8	1-1/4-8	1640
NPS 24	9.06	20.00	36.73	21.42	20.20	27.25	3.00	21.00	5.00	1-7/8-8	1-1/4-8	2300

1. This is the nominal valve shaft diameter to be used when selecting Fisher actuators.  
 2. Threaded hole per ASME B1.1.

**Figure 6. Dimensions (also see table 6)**



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