

Fisher® D4 Control Valve Assembly

The Fisher D4 control valve is a compact, rugged globe valve designed primarily for high-pressure throttling applications using either pneumatic or electric control. This valve is ideal for use on pressure and flow control applications within the oil and gas production industry. The D4 is an excellent control valve for high-pressure separators, scrubbers, and other processing equipment. These valves are especially useful for either throttling or on/off control of liquids or gases which are gritty, sticky, or which have a tendency to build up on internal valve parts.

If the control valve requires maintenance, the trim and packing can be maintained by removing the deep-bore hammer nut and lifting the actuator/bonnet assembly off the valve without disassembling the actuator.

Features

Electric and Pneumatic

- **Safer Bonnet / Valve Body Connection**— Unique design provides additional protection if disassembly of bonnet/valve body connection is inadvertently started while there is still pressure in the valve body. Pins mounted in the valve bonnet help ensure the bonnet disengages from the valve body as the hammer nut is removed, while the threads are still engaged.
- **Heavy-Duty Guiding**—Massive guiding (figures 1 and 2) positively aligns the valve plug in the seat ring for reliable service. The screwed-in seat ring completely encloses the seat ring gasket.
- **Live-loaded Packing System**—The packing system provides an improved stem seal to help prevent the loss of valuable or hazardous process fluids or gases. It features Fisher ENVIRO-SEAL™ packing technology to provide reduced packing maintenance.



W9933-1

FISHER D4 CONTROL VALVE WITH easy-Drive™ ELECTRIC ACTUATOR (NPS 2 RF FLANGED END CONNECTION)



W8531

FISHER D4 CONTROL VALVE (NPS 2 NPT END CONNECTION)



Features (continued)

Electric and Pneumatic

- **NACE Constructions**—NACE compatible trim is available with the D4 control valve. These constructions meet the metallurgical requirements of NACE MR0175 / ISO 15156.
- **Quick-Change Valve Plug**—Removable groove pin allows quick, easy valve plug replacement.
- **Severe Service Capability with Tungsten Carbide Trim**—D4 valves are available with tungsten carbide trim for erosive service. This trim is designed specifically for severe service applications in the oil and gas industry. Durable tungsten carbide trim may benefit your application by wearing better and lasting longer.
- **Easy Installation**—Compact design allows installation where space is a premium. Screwed valve bodies feature compact face-to-face dimensions while flanged valve bodies conform to ISA-75 standards for maximum versatility.
- **Easy Maintenance**—Hammer nut bonnet/body joint allows repair or maintenance with a minimum of tools, without removing the valve body from the piping system. Seat ring can be removed with the same service tools used with a Fisher D valve.
- **Integral Bonnet Flange**—Bonnet has an integral flange that accepts hammer nut force when making the bonnet-to-body connection. There are no snap rings subject to possible failure in sour service or in atmospheric corrosion.
- **Standard Trim for Throttling or On-Off Service**—Micro-Form trim is standard for throttling or on-off service at no extra cost.
- **Application Flexibility**—Choices of port diameters up to 31.8 mm (1.25 inches), end connections, and trim materials suit these valves to many applications, including sour service.

Electric

- **Low Power Consumption**-- The Fisher easy-Drive electric actuator operates with 12 or 24VDC and less than 0.1 watt hours per operation, using Modbus, 4-20 mA, 1-5VDC, or dry contact control signals.
- **Low Temperature**-- The easy-Drive electric actuator design allows use in ambient temperatures as low as -20°C (-4°F) without use of a heater.
- **Easy Installation**--The compact design allows installation where space is a premium. Fisher easy-Drive calibrates by simply opening and closing the valve.
- **Remote Monitoring and Configuration**-- Loss of signal position is programmable over Modbus.

Pneumatic

- **Low Temperature Materials**--Valve construction materials allow use in applications as low as -40°C (-40°F) for the pneumatic actuator.

Installation

D4 control valves may be installed in any position, but normally the actuator is vertical and above the valve. Install the control valve so the flow direction arrow on the side of the valve body indicates the direction of the process flow.

Dimensions are shown in tables 12 and 13 and figures 1 and 2.

D4 Valve

Valve Specifications

Available Actuation Configurations

Spring-To-Close Pneumatic
Spring-To-Open Pneumatic
Electric

Valve Sizes and End Connection Styles⁽¹⁾

See table 3

Dimensions

See tables 12 and 13 and figures 1 and 2.

Face-to-face dimensions for flanged valves conform to ISA-75.03 (CL150-600) and ANSI/ISA-75.16 Short (CL900/1500)

Maximum Inlet Pressures and Temperatures⁽¹⁾

Flanged connections are consistent with the ASME B16.34 pressure-temperature class, subject to Material Temperature Capabilities for the Valve Body Assembly (see following specification). For NPT end connections, the valve body rating is 4250 psig.

Maximum Pressure Drops⁽¹⁾

See tables 7, 8, 9, 10, and 11

Shutoff Classification per ANSI/FCI 70-2 and IEC 60534-4

Class IV

Flow Characteristic

Equal percentage

Flow Direction

Flow up only

Flow Coefficients

See Fisher Catalog 12

Port Diameters

See table 3

Construction Materials

Valve Body and Bonnet: ASME SA 352 LCC

Valve Plug and Seat: See table 5

Valve Stem: S20910

Actuator O-Rings: (HNBR) Hydrogenated Nitrile

Bonnet O-Ring:

Standard: HNBR

Optional: Fluorocarbon

Packing: PTFE/Carbon PTFE

Packing Springs: N07718

Packing Retainer: S17400

Actuator Diaphragm: Chloroprene

Actuator Spring: Painted steel

Seat Ring Gasket: S31600 (316 SST)

Spring Cover (Fail Up): PVC

Valve Plug Travel

19 mm (0.75 inch)

Valve Plug Style

Micro-Form valve plug

Material Temperature Capabilities

Valve Body Assembly:

Standard Bonnet O-Ring: -40 to 135°C
(-40 to 275°F)

Optional Bonnet Fluorocarbon O-Ring:
-23 to 204°C (-10 to 400°F)

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.

Actuator Specifications

ELECTRIC ACTUATOR

Material Temperature Capabilities⁽¹⁾

Electric Actuator Assembly:
-20 to 70°C (-4 to 158°F) ambient

Available Electric Actuator Configurations

easy-Drive Electric On/Off
easy-Drive Electric Positioning

Power Requirements

12 or 24VDC, minimum 4 amp power supply required
(fuse to 5 amps)

Maximum Current Draw

4 amps

Conduit Connections

Two 3/4 NPT connections

Control Signals

On/Off: Dry contact, Modbus RTU
Positioning: 1-5VDC, 4-20 mA, Modbus RTU

Electrical Classification

Hazardous Area:

CSA (C/US) — Explosion proof
FM — Explosion proof (pending)
ATEX — Flameproof (pending)
IECEX — Flameproof (pending)

Refer to table 1 for specific approval information

Electrical Housing:

CSA -- Type 4X
FM -- NEMA 4X (pending)
ATEX -- IP66 (pending)
IECEX -- IP66 (pending)

Electromagnetic Compatibility

Meets EN 61326-1 (First Edition)

Immunity: Industrial locations per table 2 of EN 61326-1 Standard. Performance is shown in table 2

Emmissions: Class A

ISM Equipment Rating: Group 1, Class A

PNEUMATIC ACTUATOR

Input Signal to Actuator

See tables 7, 8, 9, and 10

Material Temperature Capabilities⁽¹⁾

Actuator Assembly:

Fail-Down, Spring-to-Close: -40 to 93°C
(-40 to 200°F)

Fail-Up, Spring-to-Open: -40 to 93°C
(-40 to 200°F)

Available Pneumatic Actuator Configurations

Spring-to-Open
Spring-to-Close

Maximum Actuator Casing Pressure⁽¹⁾

3.4 bar (50 psig)

Actuator Diaphragm Effective Area

452 cm² (69 square inches)

Actuator Pressure Connections

1/4 NPT internal

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.

D4 Valve

Table 1. Hazardous Area Classifications - CSA (Canada and United States)

CERTIFICATION BODY	CERTIFICATION OBTAINED	ENTITY RATING	TEMPERATURE CODE	ENCLOSURE RATING
CSA	Class I, Division 1, GPC, D T6	---	T6 (Tamb ≤ 70°C)	CSA Type 4X Enclosure

Table 2. EMC Summary Results - Immunity

PORT	PHENOMENON	BASIC STANDARD	TEST LEVEL	PERFORMANCE CRITERIA ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4kV Contact 8kV Air	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m 1kHz AM at 80% 1400 to 2000 MHz @ 3V/m 1kHz AM at 80% 2000 to 2700 MHz @ 1V/m 1kHz AM at 80%	A ⁽²⁾ / B
	Rated power frequency magnetic field	IEC 61000-4-8	30 A/m @ 50 and 60 Hz	A
I/O signal/ control	Burst	IEC 61000-4-4	1kV	A
	Surge	IEC 61000-4-5	1kV cable shield, and line to ground	A
	Conducted RF	IEC 61000-4-6	3V 150 kHz to 80 MHz at 3 Vrms	A

Performance criteria is +/- 5% stem position
 1. A= No degradation during testing, B = Temporary degradation during testing, but is self recovering.
 2. Criteria A with conduit on DC and I/O cables, Criteria B without conduit

Ordering Information

When ordering, specify:

Application Information

1. Type of application
 - a. Throttling or on-off
 - b. Reducing or relief (back pressure)
2. Controlled fluid
 - a. Type (include chemical analysis, if available)
 - b. Temperature (normal and maximum anticipated)
 - c. Specific gravity
3. Range of flowing inlet pressures
4. Pressure drops

- a. Range of flowing pressure drops
- b. Maximum drop at shutoff
5. Flow rates
 - a. Minimum controlled flow
 - b. Normal flow
 - c. Maximum flow
6. Input signal range to actuator

Control Valve Assembly Information

Refer to the Specifications and review the information under each specification.

Table 3. Valve Sizes and Connection Styles

VALVE SIZE, NPS	PORT DIAMETER, (INCHES)	SCREWED	RAISED FACE (RF) FLANGED				RING TYPE JOINT (RTJ) FLANGED	
		4250 psi	CL150	CL300	CL600	CL900 and 1500	CL600	CL900 and 1500
1	0.25, 0.375, 0.5, 0.75	X	X	X	X	X	X	X
2	0.25, 0.375, 0.5, 0.75, 1, 1.25	X	X	X	X	X	X	X

X = Available construction.

Table 4. Fisher D4 Control Valves Approximate Weights, Kg (Pounds)

Valve Body Size, NPS	Pneumatic		Electric	
	1	2	1	2
Screwed	32 (71)	39 (87)	22 (49)	29 (64)
CL150	34 (74)	39 (86)	24 (52)	29 (63)
CL300 and 600	37 (81)	48 (106)	27 (59)	33 (73)
CL900 and 1500	50 (110)	66 (146)	40 (88)	51 (113)

Table 5. Typical Combinations of Metal Trim Parts

DESIGNATION	VALVE PLUG	SEAT RING
Standard	S41600 hardened to 38 HRC minimum	S17400
Sour	S17400 (NACE MR0175/ISO 15156)	S17400 (NACE MR0175/ISO 15156)
Tungsten Carbide	Tungsten carbide / S17400 (NACE MR0175/ISO 15156)	Tungsten carbide / S17400 (NACE MR0175/ISO 15156)

Table 6. Fisher D4 Environmental Limits for NACE MR0175/ISO 15156 with Sour Trim

MAXIMUM TEMPERATURE		MAXIMUM H ₂ S PARTIAL PRESSURE		COMPATIBLE WITH ELEMENTAL SULFUR?
°C	°F	MPa	psia	
204	400	1.4	200	No
199	390	2.3	330	No
191	375	2.5	360	No
149	300	2.8	400	No
135	275	No Limit		Yes

Table 7. Maximum Shutoff Pressure Drops⁽¹⁾ for Fisher D4 Control Valves with Pneumatic Actuator (Spring-to-Close) When Used with Typical Control Instrumentation⁽²⁾

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate						Heavy Rate					
INITIAL SPRING SETTING		0.77 Bar (11.2 Psig)		0.77 Bar (11.2 Psig)		0.85 Bar (12.4 Psig)		1.05 Bar (15.3 Psig)		1.18 Bar (17.1 Psig)		1.18 Bar (17.1 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	293 ⁽³⁾	4250 ⁽³⁾	293 ⁽³⁾	4250 ⁽³⁾	293	4250	293	4250	293	4250	293	4250
9.5	0.375	293 ⁽³⁾	4250 ⁽³⁾	293 ⁽³⁾	4250 ⁽³⁾	293	4250	293	4250	293	4250	293	4250
12.7	0.5	191	2765	191	2765	219	3180	288	4180	293	4250	293	4250
19.1	0.75	80	1160	80	1160	92	1340	123	1785	143	2080	143	2080
25.4	1	42	610	42	610	49	715	67	965	78	1130	78	1130
31.8	1.25	25	365	25	365	30	430	41	590	48	700	48	700

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
 2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
 3. For applications with downstream pressure in excess of 196 bar (2845 psig), use 196 bar (2845 psig) for Maximum Shutoff Pressure.

D4 Valve

Table 8. Maximum Shutoff Pressure Drops⁽¹⁾ for Fisher D4 Control Valves with Pneumatic Actuator (Spring-to-Close) When Used with Instrumentation with Restricted Output Range⁽²⁾

INPUT SIGNAL TO ACTUATOR		0.4 to 2.0 Bar (6 to 30 Psig)		0.14 to 2.3 Bar (2 to 33 Psig)	
SPRING		Heavy Rate		Heavy Rate	
INITIAL SPRING SETTING		0.97 Bar (14.0 Psig)		1.17 Bar (17.0 Psig)	
PORT DIAMETER		Maximum Pressure Drop			
mm	Inches	Bar	Psi	Bar	Psi
6.4	0.25	293 ⁽³⁾	4250 ⁽³⁾	293	4250
9.5	0.375	210 ⁽³⁾	3045 ⁽³⁾	293	4250
12.7	0.5	113	1635	282	4095
19.1	0.75	45	655	120	1750
25.4	1	23	330	65	945
31.8	1.25	13	185	39	580

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
 2. For example, an Electro-Pneumatic Transducer calibrated for 0.4-2.0 bar (6-30 psig) output pressure.
 3. For applications with downstream pressure in excess of 118 bar (1715 psig), use 118 bar (1715 psig) for Maximum Shutoff Pressure.

Table 9. Maximum Shutoff Pressure Drops⁽¹⁾ for Fisher D4 Control Valves with Pneumatic Actuator (Spring-to-Open) When Used with Typical Control Instrumentation⁽²⁾

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate				Heavy Rate							
INITIAL SPRING SETTING		0.23 Bar (3.4 Psig)		0.23 Bar (3.4 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	293 ⁽³⁾	4250 ⁽³⁾	293 ⁽³⁾	4250 ⁽³⁾	293	4250	293	4250	293	4250	293	4250
9.5	0.375	293 ⁽³⁾	4250 ⁽³⁾	293	4250 ⁽³⁾	293	4250	293	4250	293	4250	293	4250
12.7	0.5	187	2715	233	3380	293	4250	293	4250	293	4250	293	4250
19.1	0.75	78	1135	99	1430	147	2130	178	2575	198	2875	293	4250
25.4	1	41	600	53	765	80	1160	97	1410	109	1575	195	2830
31.8	1.25	24	355	32	465	49	715	60	875	68	985	123	1785

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
 2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
 3. For applications with downstream pressure in excess of 190 bar (2760 psig), use 190 bar (2760 psig) for Maximum Shutoff Pressure.

Table 10. Maximum Shutoff Pressure Drops⁽¹⁾ for Fisher D4 Control Valves with Pneumatic Actuator (Spring-to-Open) When Used with Instrumentation with Restricted Output Range⁽²⁾

INPUT SIGNAL TO ACTUATOR		0.4 to 2.0 Bar (6 to 30 Psig)		0.14 to 2.3 Bar (2 to 33 Psig)	
SPRING		Heavy Rate		Heavy Rate	
INITIAL SPRING SETTING		0.69 Bar (10.0 Psig)		0.42 Bar (6.1 Psig)	
PORT DIAMETER		Maximum Pressure Drop			
mm	Inches	Bar	Psi	Bar	Psi
6.4	0.25	293 ⁽³⁾	4250 ⁽³⁾	293	4250
9.5	0.375	293 ⁽³⁾	4250 ⁽³⁾	293	4250
12.7	0.5	196	2845	293	4250
19.1	0.75	82	1195	156	2265
25.4	1	43	630	85	1235
31.8	1.25	26	380	52	765

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
 2. For example, an Electro-Pneumatic Transducer calibrated for 0.4-2.0 bar (6-30 psig) output pressure.
 3. For applications with downstream pressure in excess of 202 bar (2925 psig), use 202 bar (2925 psig) for Maximum Shutoff Pressure.

Table 11. Fisher D4 easy-Drive Maximum Pressure Drop

PORT DIAMETER		MAXIMUM PRESSURE DROP ⁽¹⁾	
mm	Inch	Bar	psi
6.4	0.25	293	4250
9.5	0.375	293	4250
12.7	0.5	247	3576
19.1	0.75	105	1518
25.4	1	56	814
31.8	1.25	34	495

1. Downstream pressure, P2, is limited to 2250 psig.

Table 12. Dimensions - Pneumatic Actuator⁽¹⁾

END CONNECTION STYLE	NPS 1 VALVE BODY						NPS 2 VALVE BODY					
	A		D		G		A		D		G	
	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches
Screwed	155	6.12	209	8.24	46	1.81	230	9.00	215	8.47	70	2.75
CL150 RF Flg	184	7.25	209	8.24	46	1.81	254	10.00	215	8.47	70	2.75
CL300 RF Flg	197	7.75	209	8.24	46	1.81	267	10.50	215	8.47	70	2.75
CL600 RF Flg	210	8.25	209	8.24	46	1.81	286	11.25	215	8.47	70	2.75
CL600 RTJ Flg	210	8.25	209	8.24	46	1.81	289	11.38	215	8.47	70	2.75
CL900/1500 RF Flg	273	10.75	209	8.24	46	1.81	340	13.38	215	8.47	70	2.75
CL900/1500 RTJ Flg	273	10.75	209	8.24	46	1.81	343	13.50	215	8.47	70	2.75

1. Also see figures 1 and 2.

Table 13. Dimensions - Pneumatic Actuator⁽¹⁾

FAIL ACTION	C		E		F	
	mm	Inches	mm	Inches	mm	Inches
Fail Down, Spring-To-Close	333	13.12	312	12.30	241	9.47
Fail Up, Spring-To-Open	333	13.12	324	12.74	---	---

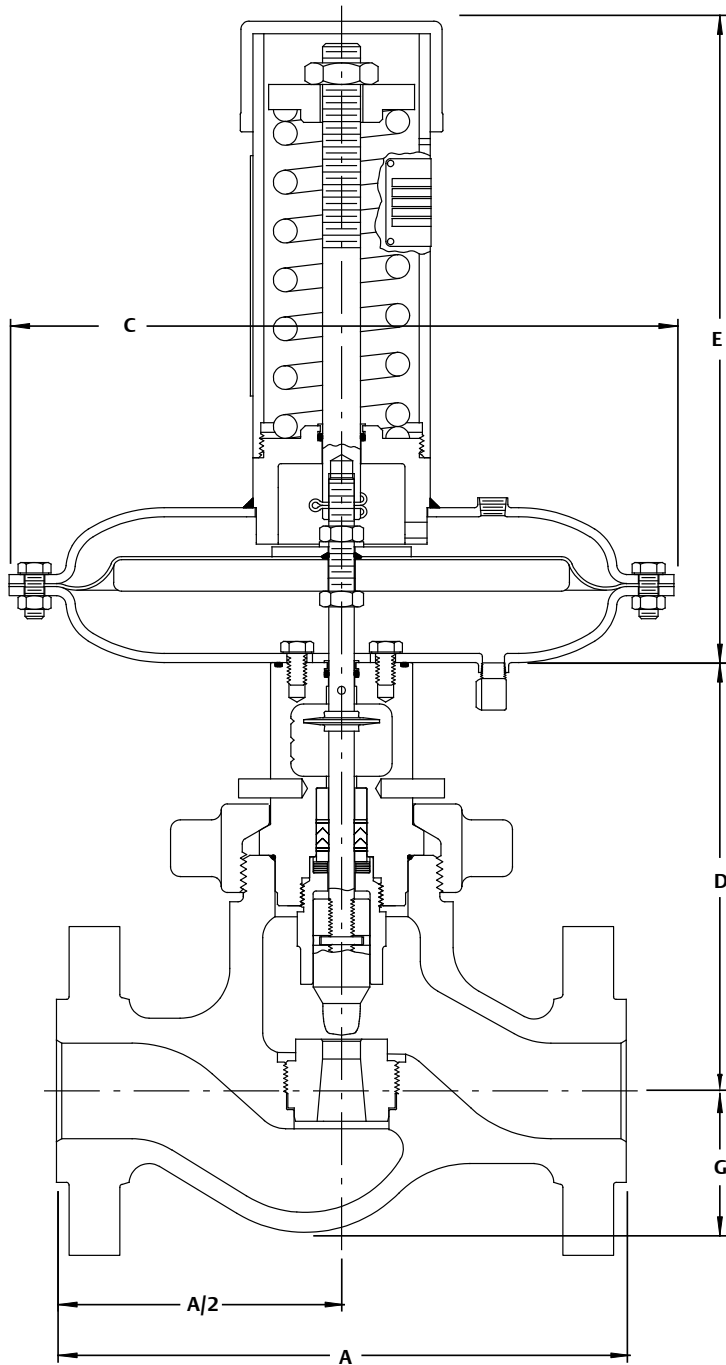
1. Also see figures 1 and 2.

Table 14. Dimensions - Electric Actuator⁽¹⁾

END CONNECTION STYLE	NPS 1 VALVE BODY						NPS 2 VALVE BODY						NPS 1 AND 2 VALVE BODY	
	A		B		C		A		B		C		D	
	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches
Screwed	155	6.12	46	1.81	414	16.29	230	9.00	70	2.75	438	17.24	275	10.83
CL150 RF Flg	184	7.25	46	1.81	414	16.29	254	10.00	70	2.75	438	17.24	275	10.83
CL300 RF Flg	197	7.75	46	1.81	414	16.29	267	10.50	70	2.75	438	17.24	275	10.83
CL600 RF Flg	210	8.25	46	1.81	414	16.29	286	11.25	70	2.75	438	17.24	275	10.83
CL600 RTJ Flg	210	8.25	46	1.81	414	16.29	289	11.38	70	2.75	438	17.24	275	10.83
CL900/1500 RF Flg	273	10.75	46	1.81	414	16.29	340	13.38	70	2.75	438	17.24	275	10.83
CL900/1500 RTJ Flg	273	10.75	46	1.81	414	16.29	343	13.50	70	2.75	438	17.24	275	10.83

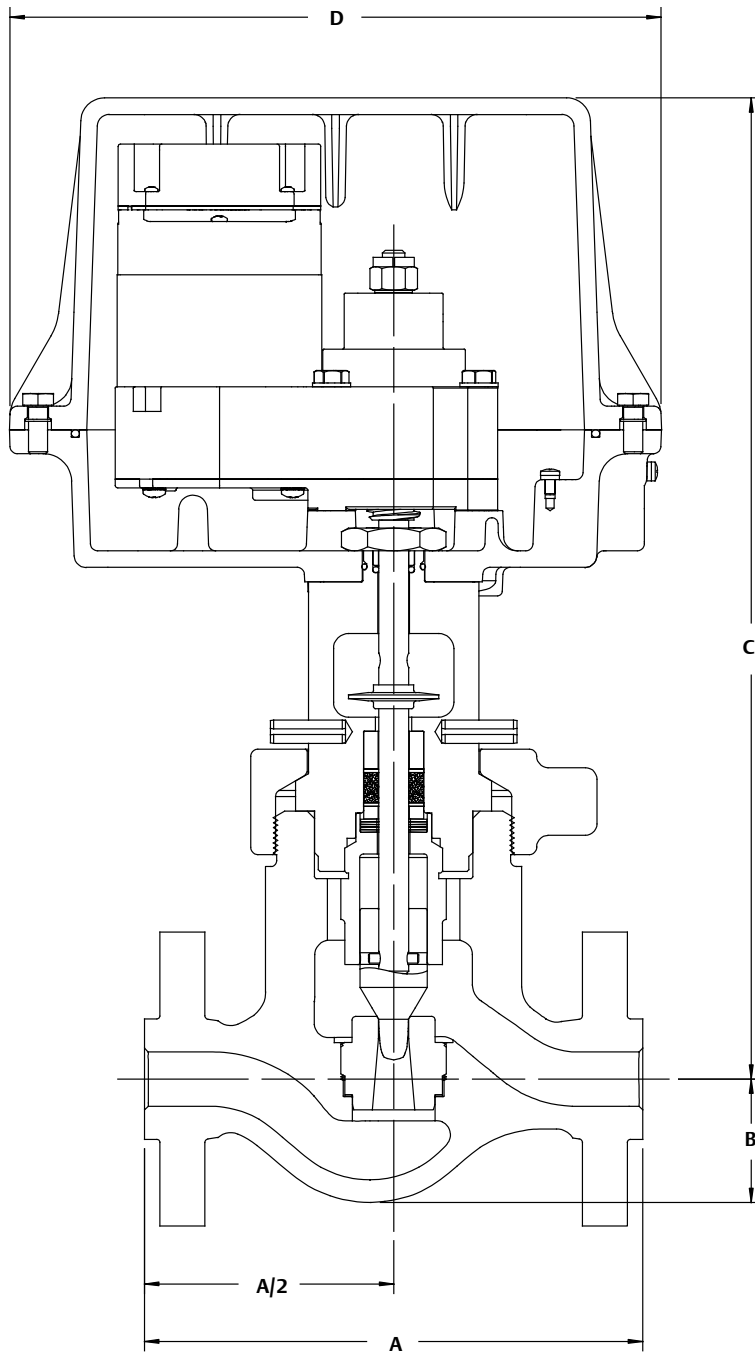
1. Also see figure 3.

Figure 2. Fisher D4 Valve Dimensions, Spring-To-Open (also see tables 12 and 13)



GE02330-E

Figure 3. Fisher D4 Control Valve with easy-Drive Electric Actuator and NPS 2 Flanged Valve Body



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