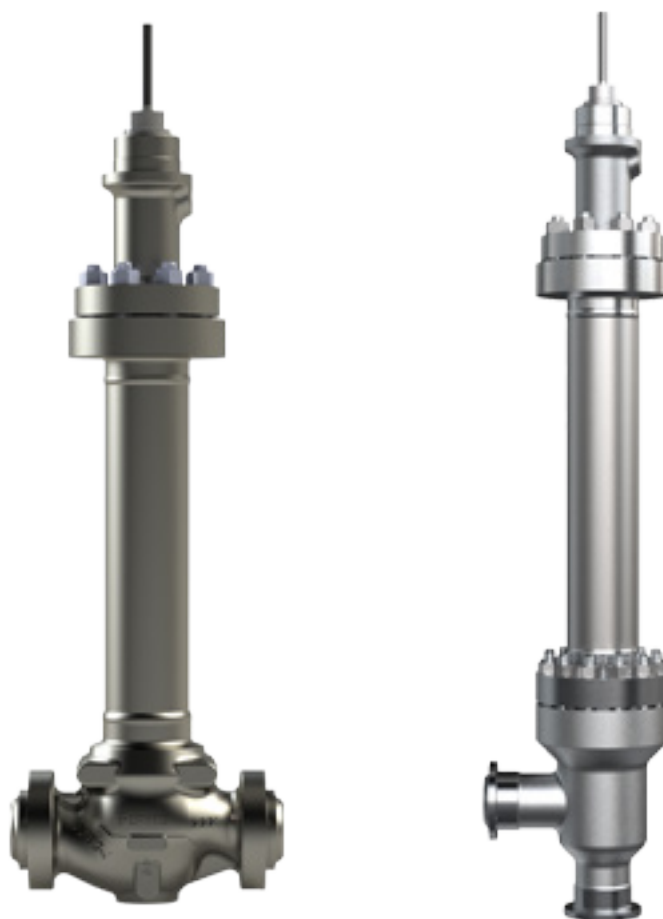


Fisher™ IC2 Cryogenic Top-Entry Sliding-Stem Control Valve



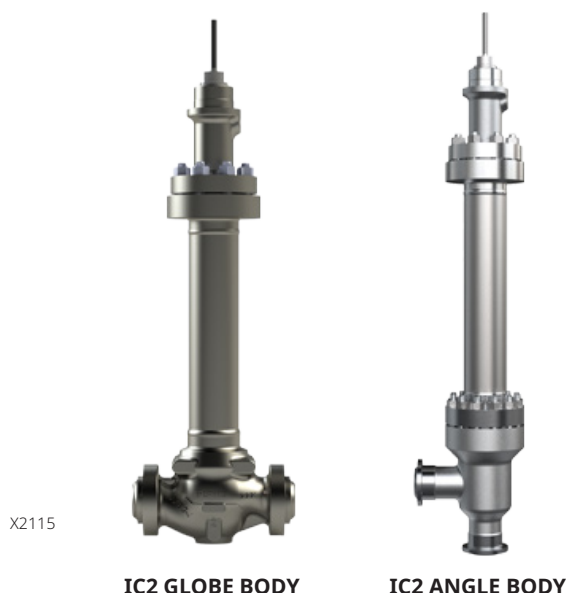
The Fisher IC2 is a top-entry control valve specifically engineered for cryogenic service in extreme temperatures. It features a globe or angle style, single-port design with stainless steel construction materials and Fisher enhanced ENVIRO-SEAL™ packing systems to provide reliable stem sealing. Additionally, an aluminum body with stainless steel extension is available. These purpose-built valves can provide throttling and on/off control of liquids and gases at cryogenic temperatures as low as -269°C / -452°F. The fabricated body extension effectively relocates the packing system and actuator away from the harsh process conditions.

The Fisher IC2 provides optimal performance and longevity, designed for use in cold box applications such as air separation units, hydrogen liquefaction and liquified natural gas production. Other applications may include refining, hydrogen shipment, semi-conductors and helium production.

Features

- **Top-entry design** — Trim is extractable through the extension, allowing maintenance while the valve is enclosed in an insulated structure.
- **Compact Profile** — Design optimized for cold box applications.
- **Long Service Life** — Hardened stainless steel trim increases wear resistance and provides long service life.
- **Ease of Service and Installation** — Reliable and easy to adjust single packing nut, single stem assembly, bellows are replaceable independent of trim, interchangeable plug and seat ring.
- **Cryogenic Design Features** — The valve body and stainless-steel extension are designed to meet low-temperature requirements. The unique metal-to-metal seat design provides repeatable excellent shutoff, reducing maintenance costs.
- **High Performance Thermal Features** — A tight-fit fluid baffle prevents circulation of cryogenic fluid into the extension and available displacer further insulating the body extension.
- **Rugged Metal Seat** — The metal-to-metal seat is designed and manufactured to provide long-lasting, reliable, shutoff at both ambient and cryogenic temperatures.
- **Fugitive Emission Protection** — The enhanced ENVIRO-SEAL™ packing systems provides a superior stem seal to help prevent the loss of valuable or hazardous process fluids, and keep emissions low. Additionally, these live-loaded packing systems can provide long life and reliability at low temperatures to help reduce maintenance costs and downtime.

Figure 1. Fisher IC2 Cryogenic Valve



Specifications

Available Configurations	Flow Directions
Single-port, globe-style control valve with body guiding, unbalanced valve plug and push-down-to-close valve plug action (see Figure 1) Single-port, angle-style control valve with body guiding, unbalanced valve plug and push-down-to-close valve plug action (see Figure 1)	Up through the seat ring only (see Figure 2)
Valve Sizes	Construction Materials
NPS ■ 1, ■ 1-1/2, ■ 2, ■ 3, ■ 4 and ■ 6	Body and Bonnet: ■ CF8M (cast 316 Stainless steel), Aluminum (5083-H112 Aluminum) Body-Bolting: ■ SA-193-B8M Class 2 studs with SA-194-8M nuts, SA-193-B8 Class 1 studs, SA-194-8 nuts Bellows Seal Assembly: ■ S31603 / Graphite
End Connection Styles ⁽¹⁾	Material Temperature Capabilities ⁽¹⁾
Butt weld end consistent with ASME B16.25 and SWE consistent with ASME B16.11. For additional options, consult your Emerson sales office .	-198 to +149°C / -325 to +300°F -254 to +149°C / -425 to +300°F -269 to +149°C / -452 to +300°F ⁽³⁾
Maximum Inlet Pressures ⁽¹⁾	Flow Coefficients
Consistent with CL600 according to ASME B16.34 for maximum bellows pressure drop capabilities see Table 4.	See Catalog 12
Trim Material	Port Diameters and Maximum Valve Plug Travels
■ 316 SST and ■ Alloy 6	See Table 3. For additional options consult your Emerson sales office .
Shutoff Classifications Per ANSI/FCI 70-2 and IEC 60534-4	Packing Arrangements
Metal Seat: ■ Class IV (Standard) ■ Class VI air (Optional) ■ Class V air (Optional) ⁽²⁾	■ enhanced ENVIRO-SEAL PTFE, ■ enhanced ENVIRO-SEAL Duplex and ■ enhanced ENVIROSEAL Graphite ULF - Enviroseal IS (ISO-Seal) See Packing Selection Guidelines for Fisher Sliding-Stem Valves Bulletin (D101986X012) for more information. For additional options, consult your Emerson sales office .
Maximum Actuator Thrust	Approximate Weights
See Table 5	Fisher IC2 Globe Valve NPS 1: 26 kg / 57 lb NPS 1-1/2: 39 kg / 86 lb NPS 2: 43 kg / 95 lb NPS 3: 74 kg / 163 lb NPS 4: 122 kg / 269 lb NPS 6: Consult Emerson sales office .
Flow Characteristics	
■ Linear and ■ Equal Percentage	Fisher IC2 Angle Body Valve NPS 1: 27 kg / 60 lb NPS 1-1/2: 38 kg / 84 lb NPS 2: 39 kg / 86 lb NPS 3: 75 kg / 165 lb NPS 4: 127 kg / 280 lb NPS 6: Consult Emerson sales office .
Typical Bonnet Styles	Additional Options
■ Plain Bonnet. See Figure 2 for standard dimensions. ■ Bellows Bonnet: See Figure 2 for standard dimensions. See Figure 3 for view of bellows bonnet.	■ Drip plate ■ Drilled and tapped connection in bonnet for leak off service ■ Displacer
1. Do not exceed the pressure or temperature limits in this bulletin or any applicable code or standard limitations. 2. Class V shutoff cannot be performed with water. The residual trapped moisture from testing with water can cause valve and trim damage from the ice crystals formed at below freezing service temperatures. 3. Certain restrictions apply. Contact your Emerson sales office for more information.	

Table 1. Fisher IC2 Typical Trim Material

Valve Stem ⁽²⁾	Plug	Seat Ring	Displacer ⁽¹⁾
S31600 SST	S31600 SST	R30006	PTFE

1. Optional for liquid service.
2. S31603 for bellows stem.

Table 2. IC2 Maximum Pressure Drop Based on Allowable Stem Loading, Bar

TEMPERATURE, °C / °F	VALVE SIZE, NPS	BONNET STEM SIZE		PORT DIAMETERS, mm / in.														
		mm	in.	6.4 / 0.25	9.5 / 0.375	12.7 / 0.5	19.1 / 0.75	25.4 / 1	38.1 / 1.5	50.8 / 2	75.2 / 3	101.6 / 4						
-269 to +20 / -452 to +68	1	9.5 and 12.7	3/8 and 1/2	99.3	99.3	99.3	99.3	99.3	Not Available									
	1.5	9.5	3/8	99.3	99.3	99.3	99.3	99.3						51.7				
		12.7	1/2	99.3	99.3	99.3	99.3	99.3						99.3				
	2	12.7	1/2	99.3	99.3	99.3	99.3	99.3	Not Available	82.7	Not Available							
		19.1	3/4	99.3	99.3	99.3	99.3	99.3		99.3								
	3	12.7	1/2	Not Available						82.7			99.3					
		19.1	3/4															
	4	12.7	1/2							Not Available						75.8	Not Available	65.5
		19.1	3/4															
20 to 100 / 68 to 212	1	9.5 and 12.7	3/8 and 1/2	99.3	99.3	99.3	99.3	99.3	Not Available									
	1.5	9.5	3/8	99.3	99.3	99.3	99.3	99.3						44.8				
		12.7	1/2	99.3	99.3	99.3	99.3	99.3						99.3				
	2	12.7	1/2	99.3	99.3	99.3	99.3	99.3	Not Available	68.9	Not Available							
		19.1	3/4	99.3	99.3	99.3	99.3	99.3		99.3								
	3	12.7	1/2	Not Available						68.9			99.3					
		19.1	3/4															
	4	12.7	1/2							Not Available						62.1	Not Available	55.2
		19.1	3/4															
100 to 150 / 212 to 302	1	9.5 and 12.7	3/8 and 1/2	99.3	99.3	99.3	99.3	99.3	Not Available									
	1.5	9.5	3/8	99.3	99.3	99.3	99.3	99.3						37.9				
		12.7	1/2	99.3	99.3	99.3	99.3	99.3						99.3				
	2	12.7	1/2	99.3	99.3	99.3	99.3	99.3	Not Available	62.1	Not Available							
		19.1	3/4	99.3	99.3	99.3	99.3	99.3		99.3								
	3	12.7	1/2	Not Available						62.1			99.3					
		19.1	3/4															
	4	12.7	1/2							Not Available						58.6	Not Available	51.7
		19.1	3/4															

Table 3. Fisher IC2 Port Diameters, Valve Plug Travel and Stem and Yoke Diameter

VALVE SIZE, NPS	PORT DIAMETER		MAXIMUM PLUG TRAVEL	VALVE STEM AND YOKE BOSS DIAMETERS			
	Equal Percentage ⁽¹⁾	Linear		Standard		Optional	
				Stem	Boss	Stem	Boss
mm							
1	6.4, 9.5, 12.7, 19.1, 25.4	25.4	19	9.5	54	12.7	71
1-1/2	6.4, 9.5, 12.7, 19.1, 25.4, 38.1	38.1					
2	6.4, 9.5, 12.7, 19.1, 25.4, 50.8	50.8	29	12.7	71	19.1	90
3	50.8, 76.2	76.2	38				
4	50.8, 101.6	101.6	51				
in.							
1	0.25, 0.375, 0.5, 0.75, 1	1	0.75	3/8	2-1/8	1/2	2-13/16
1-1/2	0.25, 0.375, 0.5, 0.75, 1, 1.5	1.5					
2	0.25, 0.375, 0.5, 0.75, 1, 2	2	1.125	1/2	2-13/16	3/4	3-9/16
3	2, 3	3	1.5				
4	2, 4	4	2				
1. 6.4 through 19.1 mm / 0.25 through 0.75 in. port diameters use Micro-Form plugs.							

Table 4. Pressure-Temperature Rating for S31603 Bellows

Valve Size, NPS	Pressure-Temperature Rating, All Port Sizes									Estimated Life Cycle
1 to 4	Temperature, °C	-269	-196	-150	-80	20	50	100	150	20,000
	bar	26	24.9	23.4	20.2	15.3	13.8	11.3	10.3	
1 to 4	Temperature, °F	-452	-320	-238	-112	68	122	212	300	20,000
	PSI	419	361	339	293	222	200	164	150	

Table 5. Maximum Allowable Actuator Thrust for Standard Bonnet Extension Length

VALVE SIZE, NPS	STEM DIAMETER		MAXIMUM ALLOWABLE STEM LOAD AT 70°F	
	mm	in.	N	lb
1	9.5	3/8	15,377	3457
	12.7	1/2	29,998	6744
1-1/2	9.5	3/8	14,683	3301
	12.7	1/2	29,153	6554
2	12.7	1/2	28,989	6517
	19.1	3/4	76,807	17,267
3	12.7	1/2	29,127	6548
	19.1	3/4	76,972	17,304
4	12.7	1/2	27,850	6261
	19.1	3/4	75,437	16,959

Table 6. Fisher IC2 Globe Body Valve Dimensions

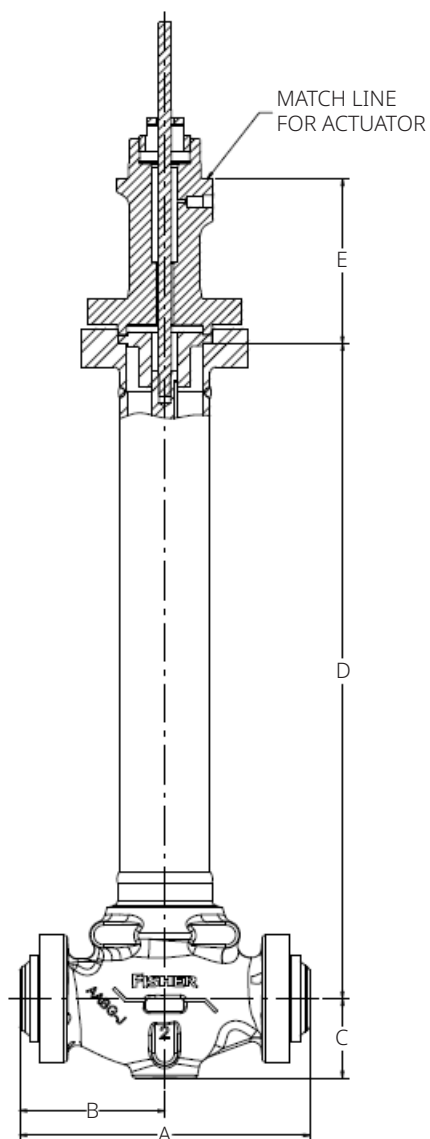
VALVE SIZE, NPS	A	C	D ⁽¹⁾		E		
			Extension Length		Yoke Boss, mm / in.		
			Standard	Optional	54 / 2-1/8	71 / 2-13/16	97 / 3-9/16
mm							
1	210	61.05	533.40	659.33	161	161	---
1-1/2	251	71.95	533.40	659.33	163	163	---
2	286	78.35	533.40	659.33	---	163	170
3	337	97.35	533.40	723.93	---	161	148
4	394	129.07	558.80	720.83	---	154	152
in.							
1	8.27	2.40	21.00	26.00	6.34	6.34	---
1-1/2	9.88	2.83	21.00	26.00	6.42	6.42	---
2	11.26	3.08	21.00	26.00	---	6.42	6.69
3	13.27	3.83	21.00	28.50	---	6.06	5.83
4	15.51	5.08	22.00	28.50	---	6.06	5.98
1. For extension lengths outside of these values, contact your Emerson sales office .							

Table 7. Fisher IC2 Angle Body Valve Dimensions

STAINLESS STEEL ANGLE VALVE							
NPS / DN	Nominal Pressure	D1	D2	D3	L1	L2	A
1 / 25	PN 63	---	130	60.3	100	100	635
1-1/2 / 40		---	165	88.9	125	125	660
2 / 50		---	165	88.9	125	125	660
3 / 80		---	200	114.3	155	155	625
4 / 100		---	260	168.3	175	175	815

ALUMINUM ANGLE VALVE							
DN	Nominal Pressure	D1	D2	D3	L1	L2	A
25	PN 63	130	130	60.3	100	100	635
40		165	165	88.9	125	125	660
50		165	165	88.9	125	125	660
80		200	200	114.3	155	155	625
100		260	260	168.3	175	175	815

Figure 2. Fisher IC2 Globe Valve Dimensions (Also See Table 6)



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NOTE:
B = A/2

Figure 3. Fisher IC2 Globe Valve with Bellows Assembly

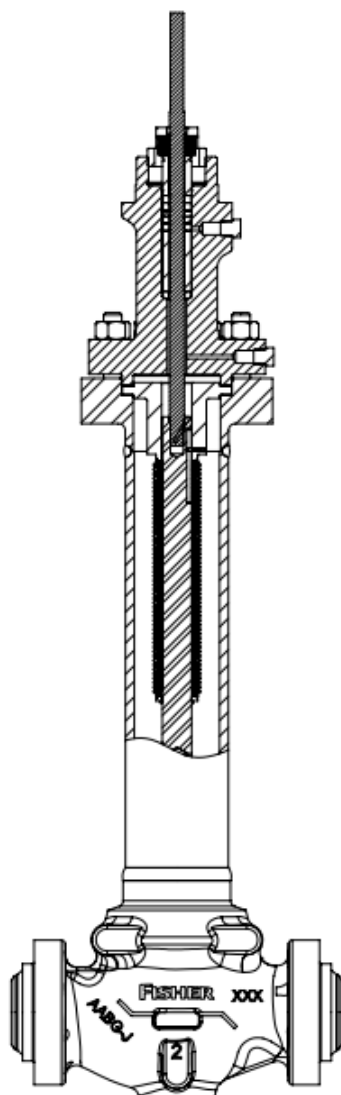
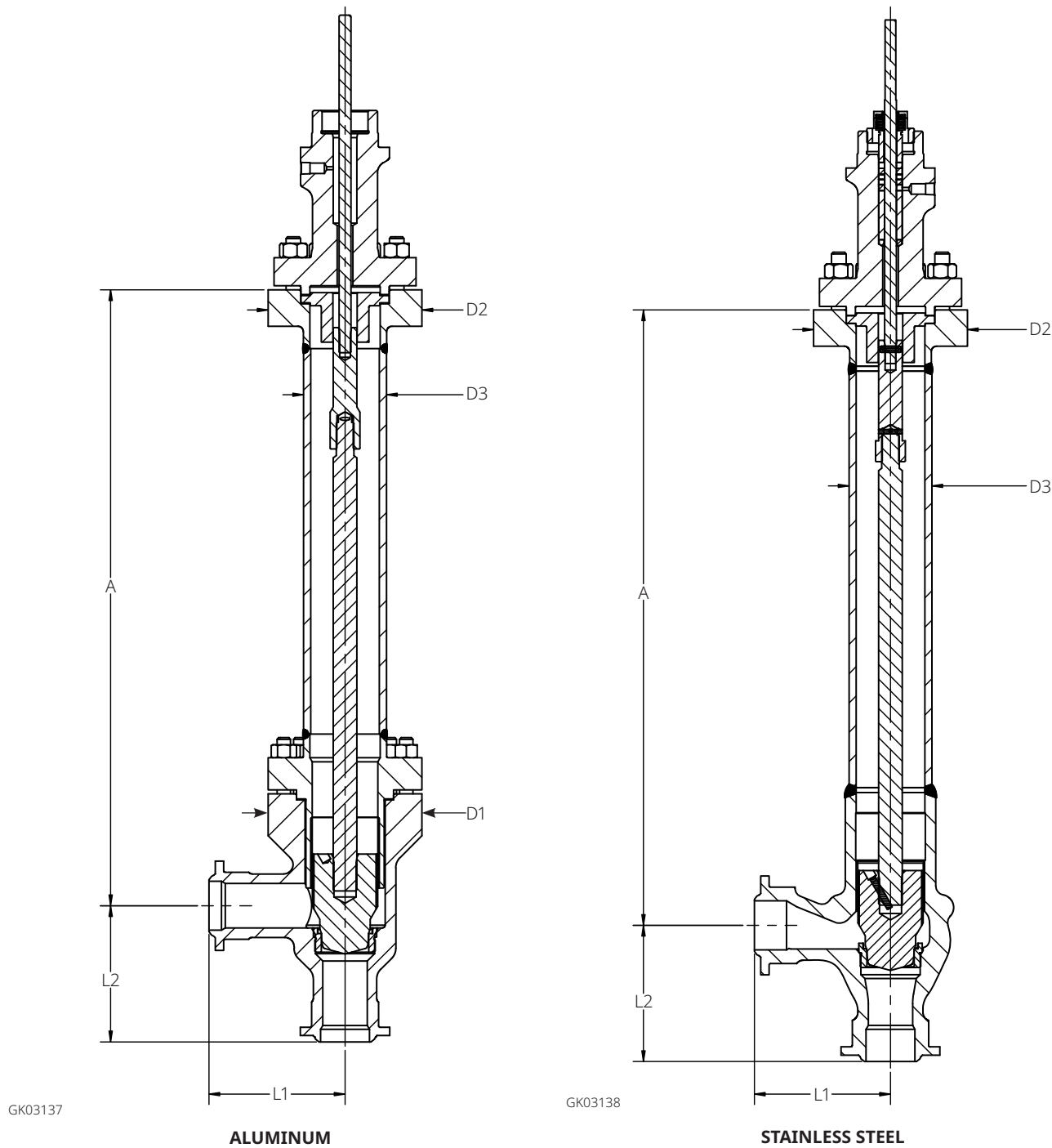


Figure 4. Fisher IC2 Angle Body Valve Dimensions (Also See Table 7)



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