

1400 Series Control Valves

The **1400 series control valves** are designed to be used in rugged, demanding applications like those found in the oil and gas industry. These valves are time tested to deliver increased reliability in the most demanding applications around the world. Each model is designed to provide superior performance and solve industry specific challenges.

Applications

The 1400 series control valves are designed specifically to be used in conjunction with oil production equipment. The 1450 is a close coupled control valve designed for high pressure separators and scrubbers, and other processing equipment. The 1451 is a compact, uniquely designed product, to allow the plug and the seat to be constantly submerged in the process media, giving the valve its “freezeless” characteristic. The 1400 series control valves can be used as direct replacements for competitive units already in service or packaged with other SOR® products for new construction of oil and gas production equipment.



Model 1451
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Model 1450
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Features and Benefits

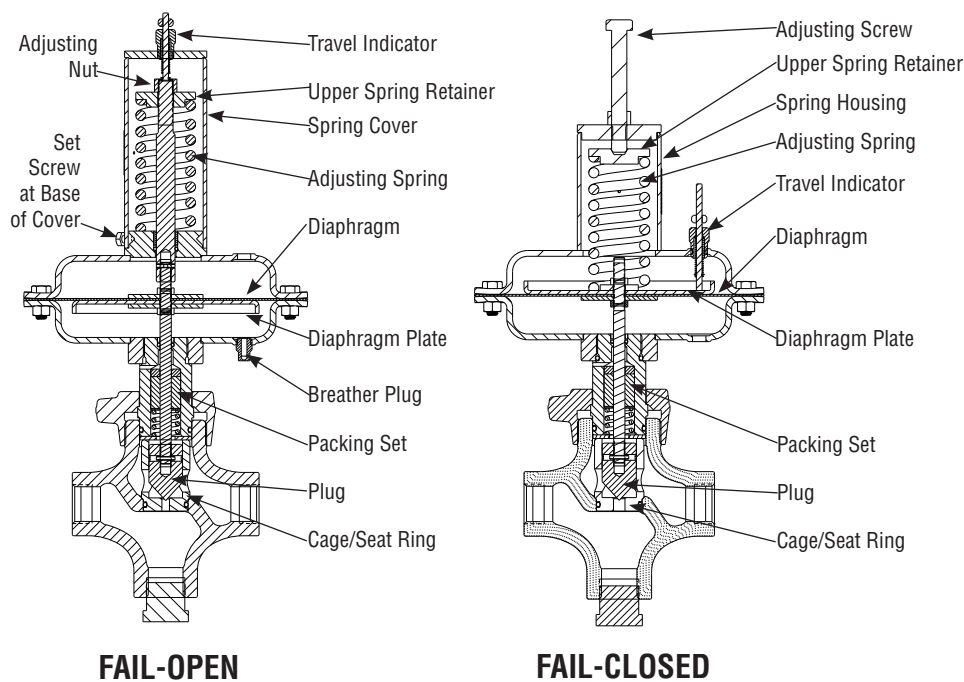
- Fail-open or fail-close configurations available
- Easy to maintain with no special tools required
- Field repairable with multiple kits available
- Optional Tungsten carbide hardened trim for erosive applications
- NACE and high-temperature configurations available
- NPT, flanged, socket weld and butt weld end connections
- Designed to ANSI class IV shutoff classification
- CRN certification is available

1400 Series Control Valves

Principles of Operation

The 1400 series control valves are modeled after an industry standard design of control valves specifically designed to be used in oil and gas production equipment. The 1400 series control valves are intended to be used in tandem with a level controller that provides a pneumatic signal to operate the valve.

All 1400 series control valves require a pneumatic input to operate. The pneumatic signal operates a force balance system consisting of: an adjusting spring, a diaphragm, a stem, a plug and seat. The force of the adjusting spring opposes the force of the pneumatic signal on the diaphragm. As pressure is either increased or reduced on the diaphragm, the plug is raised and lowered from the seat – this allows process fluid to flow through the valve.



The plug and the seat are very important components to the operation of the valve. The surface finish of the plug and seat determines if the valve will seal effectively. The shape of the plug determines the flowing characteristics of the valves. On/off trim is designed to only allow the valve to be completely open or completely shut. Throttling trim is designed to provide a percentage of full flow capacity at designated pneumatic inputs.

The 1450 series control valves are offered with either globe or tee body styles. The globe style body allows the process fluid to flow either direction – over the trim or under the trim. The tee body has three ports allowing a plug to be placed in one port to change the direction of flow from globe style to angle style body.

1400 Series Control Valves

1450 Control Valve

The SOR 1450 valve is a close-coupled control (dump) valve and is designed to meet the high pressure and erosive applications common to the oil and gas industry. These valves are ideally suited for process media control applications including: separators, scrubbers, wellheads and other oilfield equipment. The ease of maintenance, rugged steel construction, flexibility to meet a wide variety of applications, and safety features make these control valves the preferred choice of production operators worldwide.

Features

- Ease of maintenance
 - No special tools
 - Field repairable
 - Field replaceable trim
- Bonnet safety pressure relief
- NACE and high-temperature configurations available
- Optional Tungsten carbide hardened trim for erosive applications
- Reverse and direct acting options
- Bi-directional flow
- Product holds a Canadian Registration Number (CRN) in all provinces



Model 1450

Product Specifications

Available configurations	Close-coupled (Model 1450) Fail-open or fail-close	Shutoff classification	ANSI class IV (Stainless steel or Tungsten carbide trim)
Flow characteristic	Modified percent (throttling) Quick opening (on/off)	Flow direction	Either direction, to suit the application Flow up (under the seat) recommended for throttling applications
Body styles	Globe (1" & 2") & tee (1" only)	Air pressure to actuator	3-15 spring 0 to 20 psi control signal recommended 6-30 spring 0 to 35 psi control signal recommended
End connections	NPT(F), flanged, socket weld & butt weld	Weight	Threaded ≈ 33 lbs. Flanged Consult Factory
Pressure ratings	3750 psi at 100°F		
Assembled valve temperature range	-40 to 200°F (-40 to 93°C)		
Available trim sizes	1/4", 3/8", 1/2", 3/4" & 1"		

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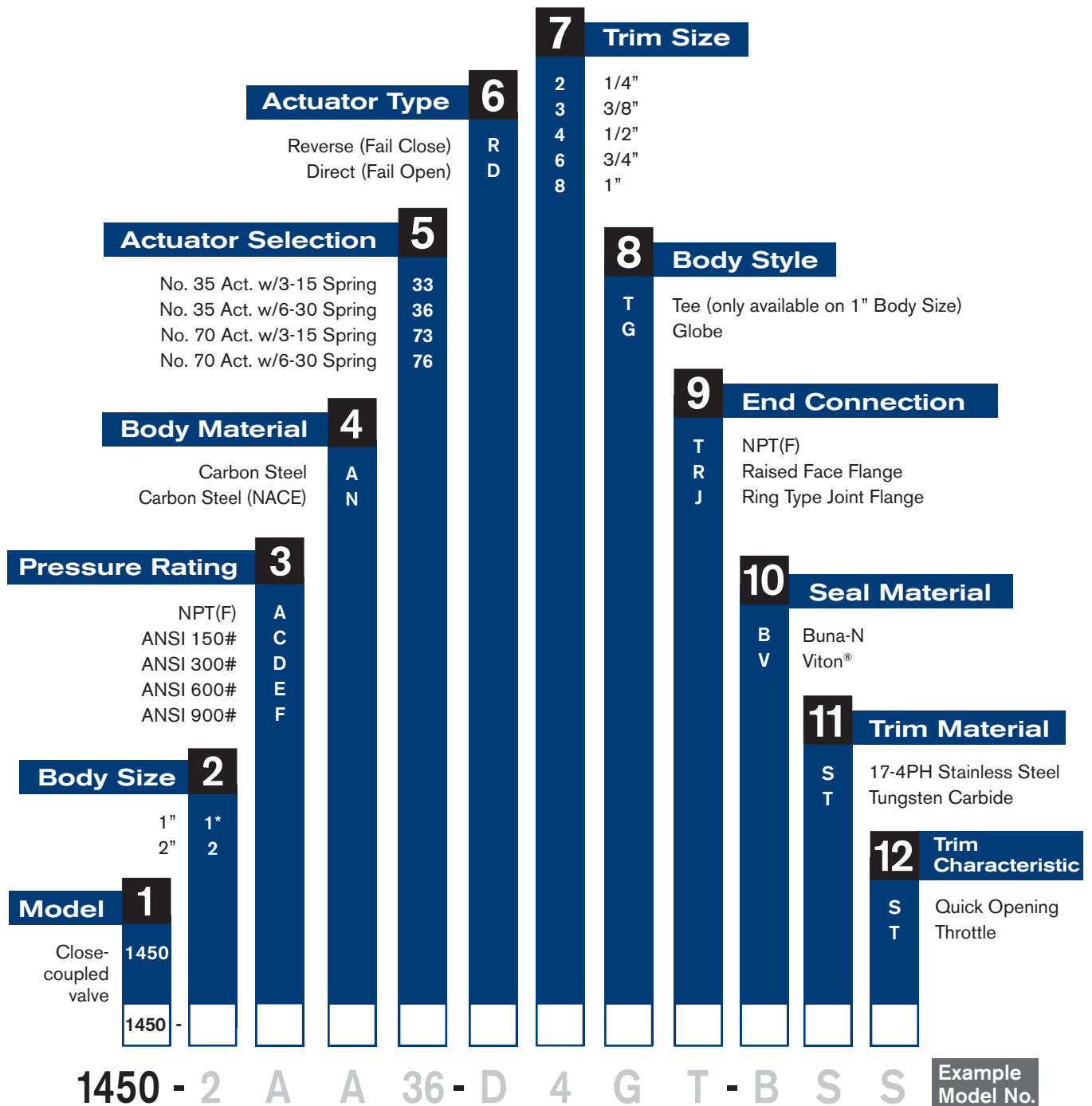
1400 Series Control Valves

1450 Control Valve

How to Order

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- You must select a designator for each component
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* 1" body size only available with NPT(F) pressure rating.

1400 Series Control Valves

1450 Options

Materials of Construction

Valve Component	Options
Body	ASTM A216 Gr. WCC
Bonnet	316 Stainless Steel
Hammer Nut	4140 Steel
Stem	316 Stainless Steel
Packing	TFE V Ring
Packing Spring	302 Stainless Steel
Packing Washer	CSTL
Packing Retainer	17-4 PH
O-Ring Wetted	Nitrile
	Viton
Diaphragm	Neoprene/Nylon
O-Ring Non Wetted	Nitrile
	Viton
Actuator Spring	Steel
Adjust. Screw	CSTL/PLtd.
Diaphragm Housing	CSTL
Diaphragm Plate	CSTL
Travel Indicator	Stainless Steel
Actuator Pressure Connection Size	1/4" - 18 NPT Thread

Body End Connections and Pressure Ratings

Body Size		Pressure Rating		NPT	Body Style
in.	mm	psi	bar		
1.00	25	3750	259	X	Globe, "T"
2.00	50	3300	228	X	Globe

Estimated Flow Coefficient (C_v) Globe Body

Body Size		Trim Size		Valve Opening - Percent of Total Travel										Quick Opening	
in.	mm	in.	mm	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%	
1.00	25	0.25	6.4	.28	.51	.66	.77	.88	.99	1.1	1.2	1.3	1.4	1.7	
		0.38	9.5	.31	.62	.94	1.3	1.6	2.1	2.5	2.9	3.4	3.7	3.8	
		0.50	12.7	.56	1.1	1.7	2.3	2.9	3.6	4.3	5.0	5.4	5.6	5.6	
		0.75	19.1	.75	1.6	2.4	3.4	4.6	6.1	7.9	9.7	11	11	12	12
		1.0	25.4	.98	2.0	3.4	6.1	8.9	12	14	14	15	15	15	15
2.00	50	0.25	6.4	.28	.51	.66	.77	.88	.99	1.1	1.2	1.3	1.4	1.7	
		0.38	9.5	.31	.62	.94	1.3	1.6	2.1	2.5	2.9	3.4	3.7	3.8	
		0.50	12.7	.59	1.2	1.8	2.3	3.0	3.7	4.6	5.5	6.0	6.1	6.1	
		0.75	19.1	.88	1.8	2.8	3.8	5.1	6.6	8.5	11	12	13	13	
		1.0	25.4	1.0	2.0	3.6	6.5	9.4	12	14	15	17	17	18	

1400 Series Control Valves

1450 Options

Actuator Maximum Allowable Shutoff Pressure Drops, Reverse Acting (Fail Close)

Trim Size		Flow Direction	Signal to No. 35 Actuator				Signal to No. 70 Actuator			
			3-15 Spring		6-30 Spring		3-15 Spring		6-30 Spring	
in.	mm		3-15 psi	0-20 psi	6-30 psi	0-35 psi	3-15 psi	0-20 psi	6-30 psi	0-35 psi
0.25	6.4	Up	3750	3860	3750	3750	3750	3750	3750	3750
0.38	9.5		2050	3200	3400	3750	3750	3750	3750	3750
0.50	12.7		1100	1600	1800	2300	1650	3200	3750	3750
0.75	19.1		300	500	700	950	500	950	2000	2800
1.0	25.4		100	200	300	500	200	400	950	1450
0.25	6.4	Down	3750	3800	3750	3750	3750	3750	3750	3750
0.38	9.5		3750	3800	3750	3750	3750	3750	3750	3750
0.50	12.7		3350	3800	3750	3750	3750	3750	3750	3750
0.75	19.1		1550	2300	2500	3200	2000	2800	3750	3750
1.0	25.4		750	1100	1200	1700	950	1450	2500	2950

Actuator Maximum Allowable Shutoff Pressure Drops, Direct Acting (Fail Open)

Trim Size		Flow Direction	Signal to No. 35 Actuator ¹		Signal to No. 70 Actuator ¹		Flow Direction	Signal to No. 35 Actuator ¹		Signal to No. 70 Actuator ¹	
in.	mm		3-15 Spring	6-30 Spring	3-15 Spring	6-30 Spring		3-15 Spring	6-30 Spring	3-15 Spring	6-30 Spring
0.25	6.4	Up	3750	3750	3750	3750	Down	3750	3750	3750	3750
0.38	9.5		2700	3750	3750	3750		3750	3750	3750	3750
0.50	12.7		1350	2850	2550	3750		3800	3750	3750	3750
0.75	19.1		400	1050	700	2000		1750	1950	3750	3750
1.0	25.4		150	500	200	950		850	950	1850	2800

¹Actual signal pressure to actuator includes an additional 5 psi (0.3 bar) of supply pressure to the controller.

Diaphragm Effective Area & Housing Max. Pressure

Actuator Size	Diaphragm Effective Area	Housing Maximum Pressure
No. 35	35 in ²	50 psi
No. 70	70 in ²	35 psi

1400 Series Control Valves

1450 Options

Only genuine SOR replacement parts should be used to make repairs. Please contact your local representative for ordering information.

Repair Kits

Trim Replacement Kits					
Quick Opening	1/4"	3/8"	1/2"	3/4"	1"
17-4PH SST (BUNA-N O-Ring)	5678400P	5678401P	5678402P	5678403P	5678404P
17-4PH SST (VITON O-Ring)	5678405P	5678406P	5678407P	5678408P	5678409P
Tungsten (BUNA-N O-Ring)	5678410P	5678411P	5678412P	5678413P	5678414P
Tungsten (VITON O-Ring)	5678415P	5678416P	5678417P	5678418P	5678419P
Throttling					
17-4PH SST (BUNA-N O-Ring)	5678420P	5678421P	5678422P	5678423P	5678424P
17-4PH SST (VITON O-Ring)	5678425P	5678426P	5678427P	5678428P	5678429P
Tungsten (BUNA-N O-Ring)	5678430P	5678431P	5678432P	5678433P	5678434P
Tungsten (VITON O-Ring)	5678435P	5678436P	5678437P	5678438P	5678439P

Actuator Repair Kits	
35 in ² Actuator	
Direct Acting BUNA-N O-Rings	5678488P
Direct Acting VITON O-Rings	5678489P
Reverse Acting BUNA-N O-Rings	5678486P
Reverse Acting VITON O-Rings	5678487P
70 in ² Actuator	
Direct Acting BUNA-N O-Rings	5678492P
Direct Acting VITON O-Rings	5678493P
Reverse Acting BUNA-N O-Rings	5678490P
Reverse Acting VITON O-Rings	5678491P

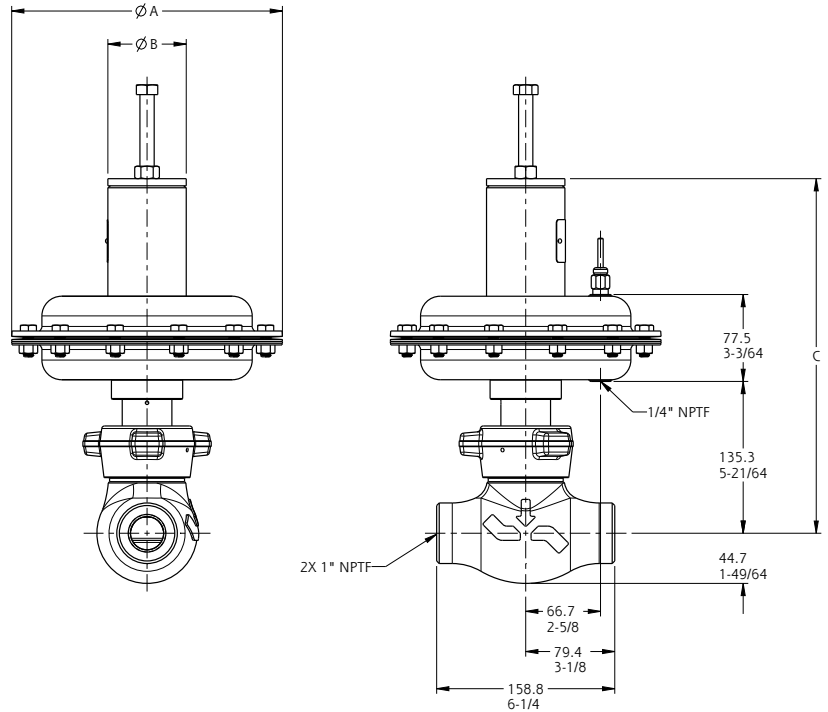
Packing Kits	
Direct Acting BUNA-N Packing	5678495P
Direct Acting VITON Packing	5678497P
Reverse Acting BUNA-N Packing	5678494P
Reverse Acting VITON Packing	5678496P

1400 Series Control Valves

1450 Dimensions

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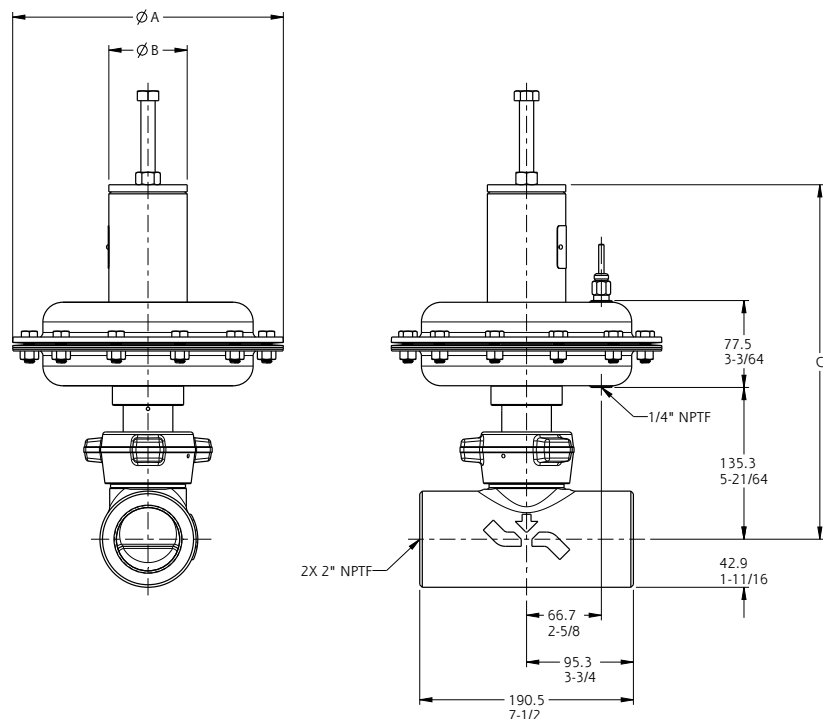
1 Inch Globe Fail-Closed



Drawing 5678455

ACTUATOR SELECTION	DIM A	DIM B	DIM C
35/3-15	241.3 9-1/2	69.9 2-3/4	316.0 12-7/16
35/6-30	241.3 9-1/2	108.0 4-1/4	363.5 14-5/16
70/3-15	317.5 12-1/2	108.0 4-1/4	363.5 14-5/16
70/6-30	317.5 12-1/2	108.0 4-1/4	439.7 17-5/16

2 Inch Globe Fail-Closed



Drawing 5678456

ACTUATOR SELECTION	DIM A	DIM B	DIM C
35/3-15	241.3 9-1/2	69.9 2-3/4	316.0 12-7/16
35/6-30	241.3 9-1/2	108.0 4-1/4	363.5 14-5/16
70/3-15	317.5 12-1/2	108.0 4-1/4	363.5 14-5/16
70/6-30	317.5 12-1/2	108.0 4-1/4	439.7 17-5/16

1400 Series Control Valves

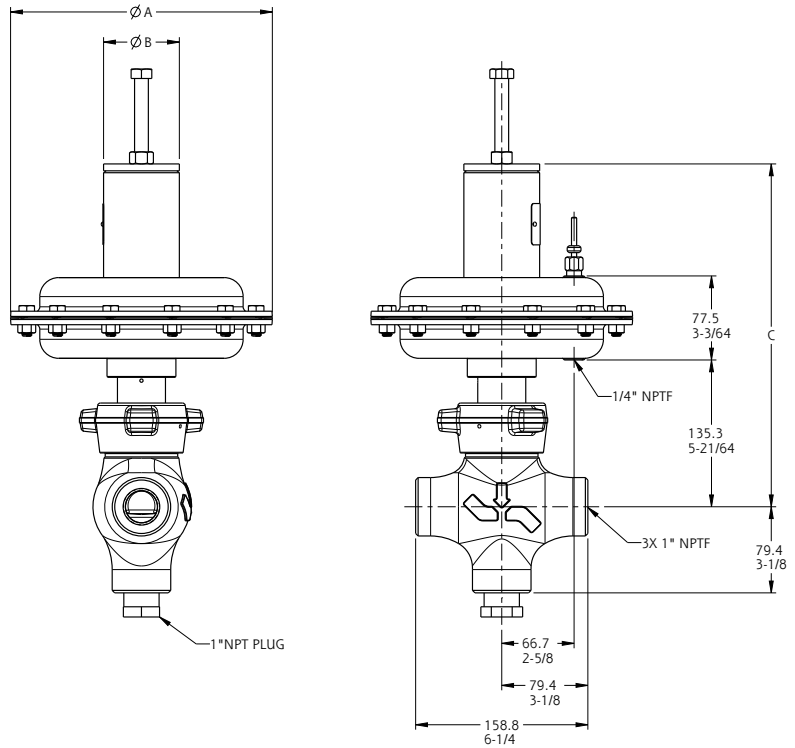
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1 Inch Tee Fail-Closed

Drawing 5678453

ACTUATOR SELECTION	DIM A	DIM B	DIM C
35/3-15	241.3 9-1/2	69.9 2-3/4	316.0 12-7/16
35/6-30	241.3 9-1/2	108.0 4-1/4	363.5 14-5/16
70/3-15	317.5 12-1/2	108.0 4-1/4	363.5 14-5/16
70/6-30	317.5 12-1/2	108.0 4-1/4	439.7 17-5/16



1400 Series Control Valves

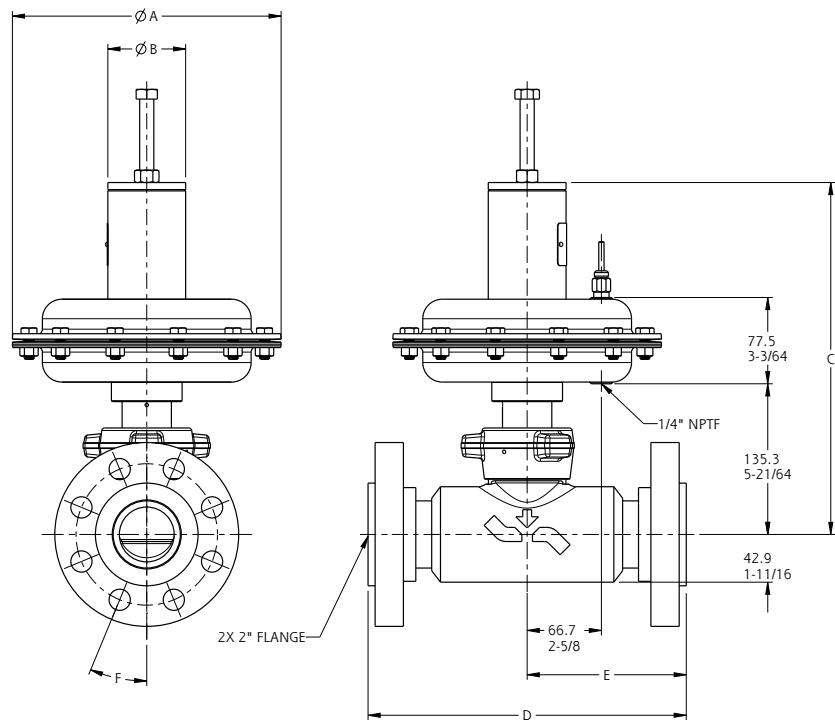
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2 inch FLG globe Fail-Closed

Drawing 5678448

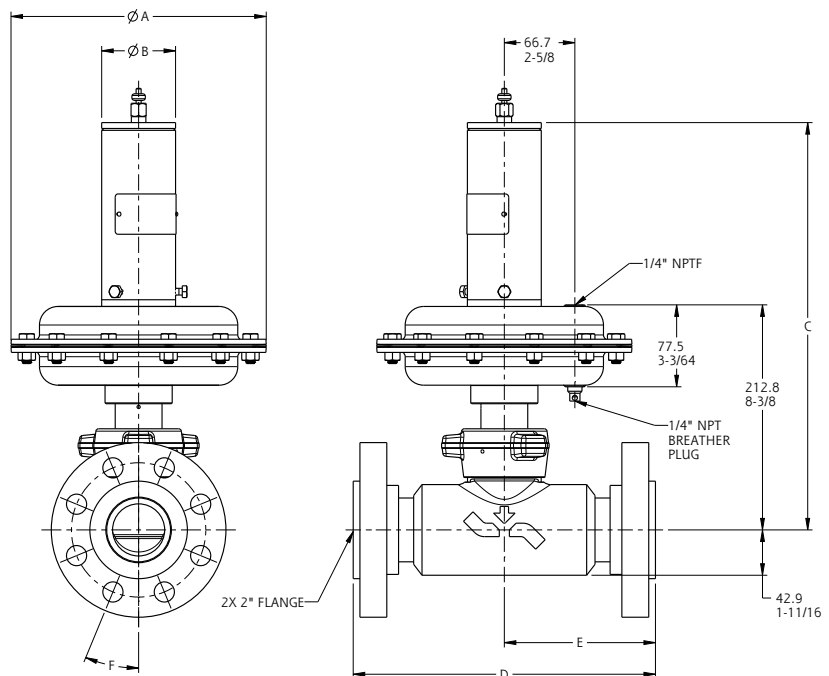
ACTUATOR SELECTION	DIM A	DIM B	DIM C
35/3-15	241.3 9-1/2	69.9 2-3/4	316.0 12-7/16
35/6-30	241.3 9-1/2	108.0 4-1/4	363.5 14-5/16
70/3-15	317.5 12-1/2	108.0 4-1/4	363.5 14-5/16
70/6-30	317.5 12-1/2	108.0 4-1/4	439.7 17-5/16



2 inch FLG globe Fail-Open

Drawing 5678449

ACTUATOR SELECTION	DIM A	DIM B	DIM C
35/3-15	241.3 9-1/2	69.9 2-3/4	385.1 15-5/32
35/6-30	241.3 9-1/2	108.0 4-1/4	430.4 16-15/16
70/3-15	317.5 12-1/2	108.0 4-1/4	430.4 16-15/16
70/6-30	317.5 12-1/2	108.0 4-1/4	514.6 20-1/4



1400 Series Control Valves

1451 Control Valve

The **SOR 1451** control valves are “freezeless” dump valves and are perfectly suited for fluid control in oil and gas separators and other process vessels. The valve body design allows the plug and seat to be constantly submerged in the process media, thus giving the valve its “freezeless” characteristic.

Features

- NACE option available
- Stainless Steel Trim
- Compact size
- Product holds a Canadian Registration Number (CRN) in all provinces



Model 1451

Product Specifications

Process Connection	1" MNPT x 1/2" FNPT 1" MNPT x 1" FNPT 2" MNPT x 1" FNPT	Actuator	
Body Style	"Freezeless" angle	Air supply Connection	1/4" NPT(F)
Maximum Operating Pressure	2220 psi at 100°F	Action	Reverse (fail close)
Operating Temperature Range	-40° to 200°F (-40° to 93°C)	Effective area	35 sq. in
		Maximum Supply Pressure	50 psi
		Trim Characteristic	Quick opening (on/off)
		Port Diameter/Flow coefficient (C _v)	0.38"/2 C _v

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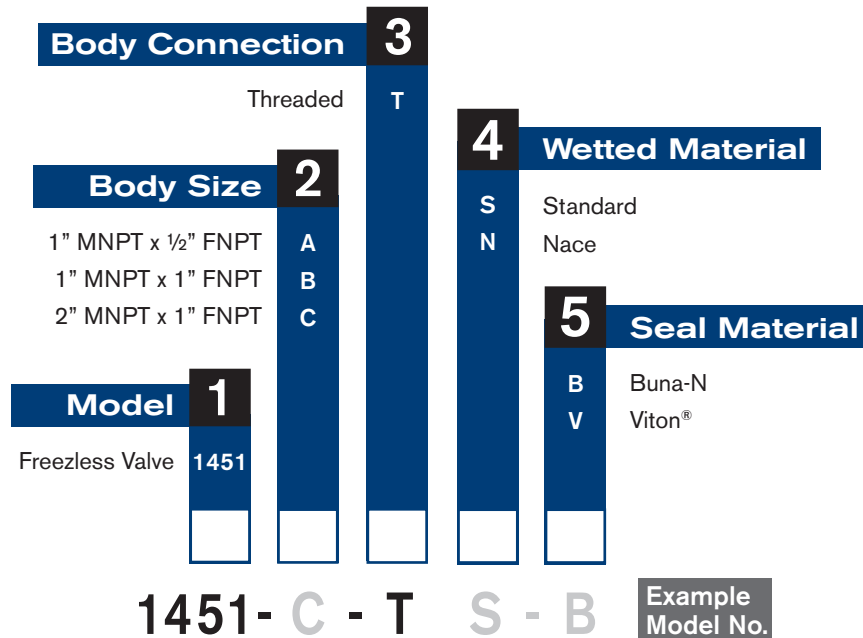
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1451 Control Valve

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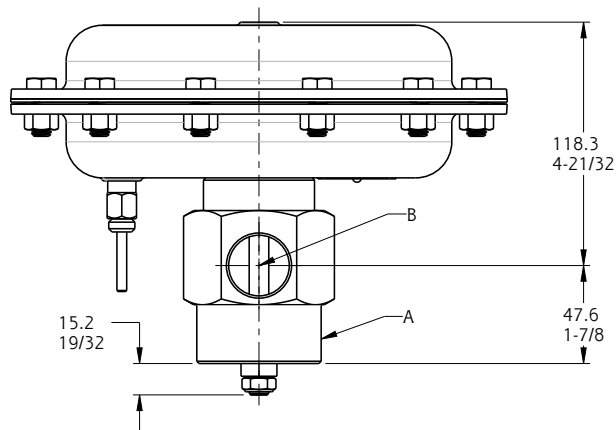
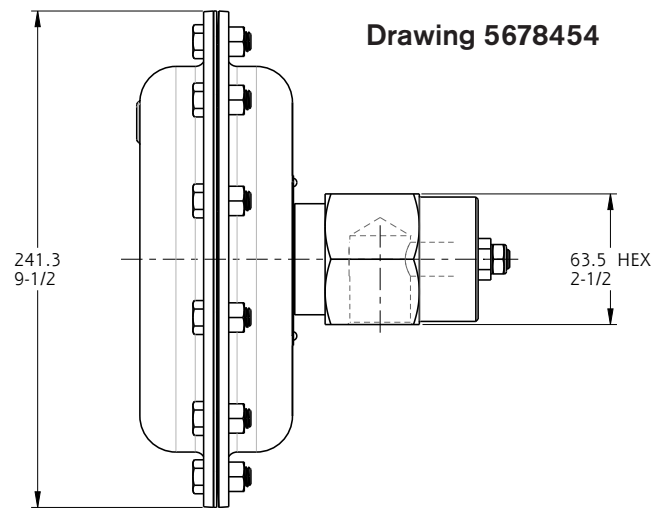
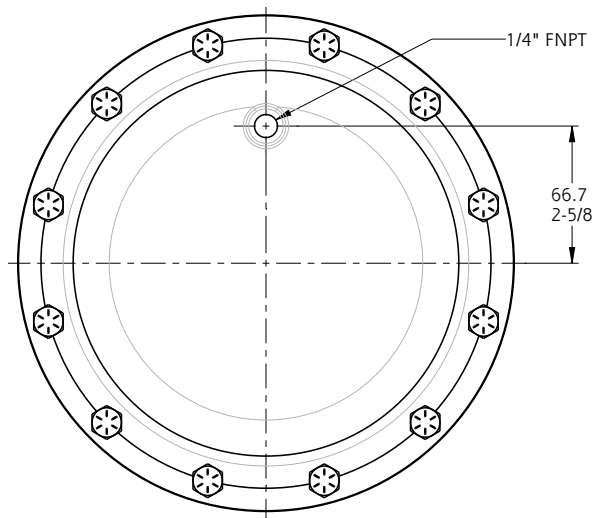
1451 Control Valve

Materials of Construction

Description	Material
Liquid Chamber	Carbon Steel
Cover	Carbon Steel
Body	Carbon Steel
Plug	17-4 Stainless Steel
Seat	17-4 Stainless Steel
Valve Stem	316 Stainless Steel
Seals	Buna-N Viton® (Opt.)
Actuator Housing	Carbon Steel

Dimensions

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BODY SIZE	DIM A	DIM B
(A) 1" MNPT X 1/2" FNPT	1" MNPT	1/2" FNPT
(B) 1" MNPT X 1" FNPT	1" MNPT	1" FNPT
(C) 2" MNPT X 1" FNPT	2" MNPT	1" FNPT



MEASUREMENT AND CONTROL

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