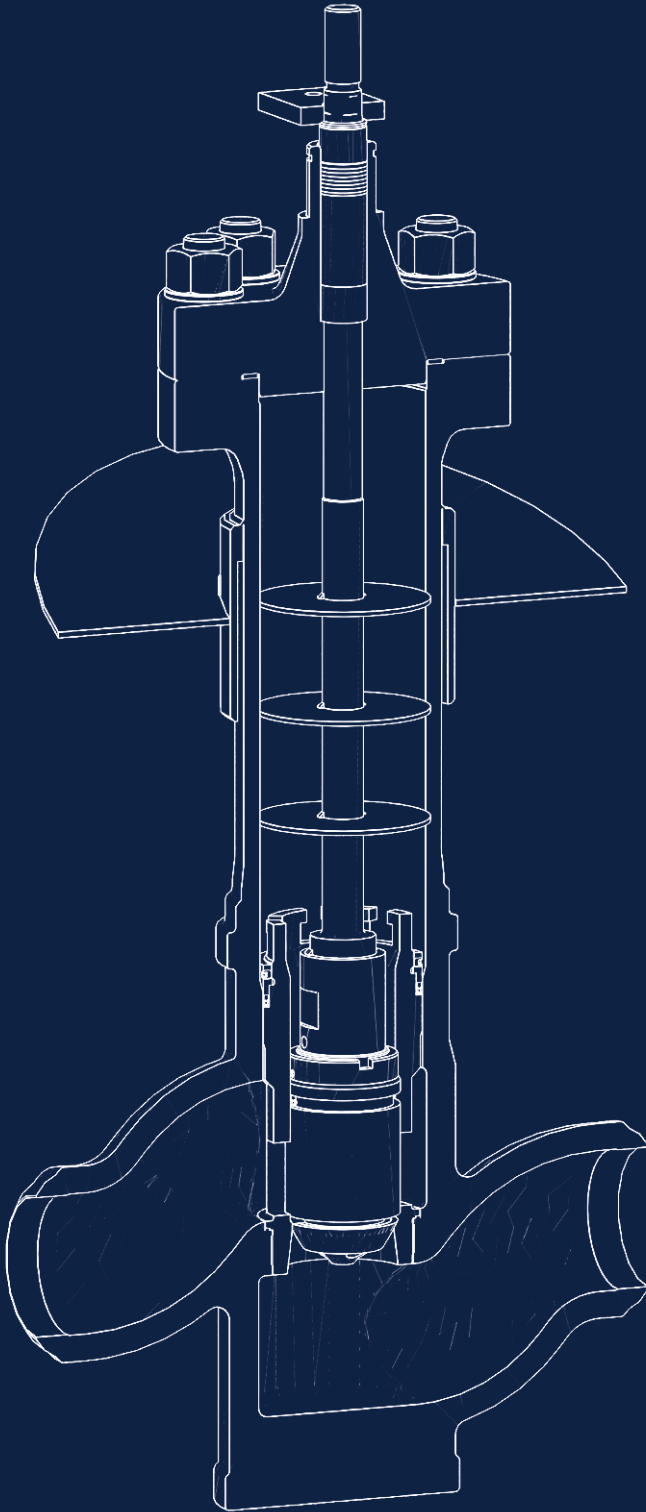




# 4000 Series Cryogenic Valves

For ratings ANSI 150 – 600



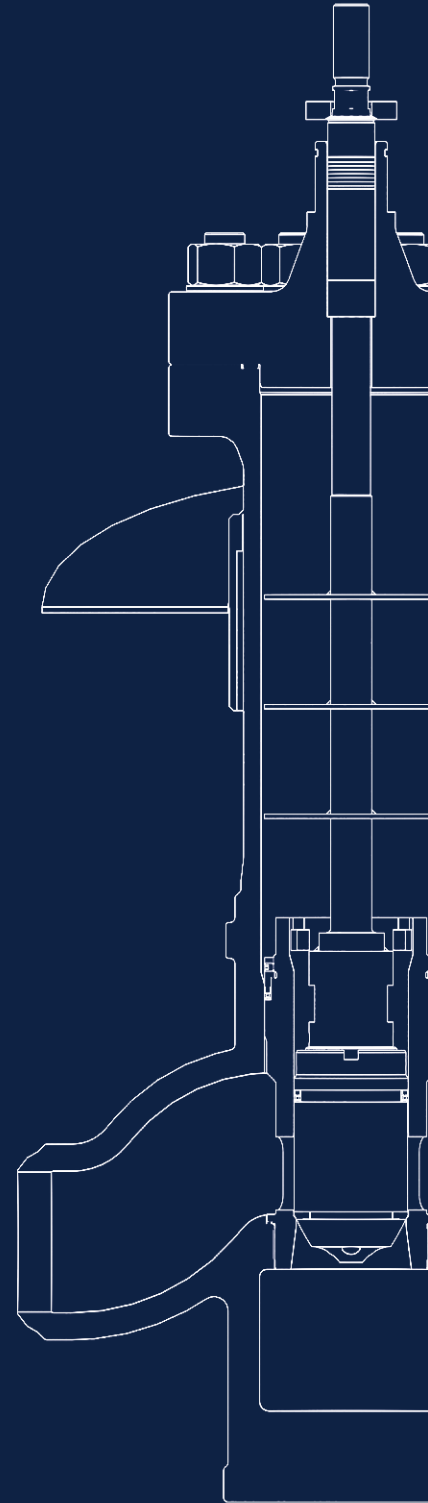
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# 4000

## SERIES

The Severn 4000 Series was initially developed over two decades ago specifically to satisfy the installation in cryogenic ASU and Hyco cold box's of an all welded in construction thus preventing any possibility of process leakage within the insulated area, while giving full access to the valve trim from outside the cold box. As such the 4000 Series now benefits from extensive experience in providing cost effective and easily maintained valves in an industry which makes stringent demands from its suppliers.

Construction materials of the body is either stainless steel (model 4400) or aluminium (model 4300) to suit adjoining pipework. Internal surface finish is considered to be of major importance to ensure degrees of cleanliness that are necessary for the Industrial Gas Market and therefore all valves are cleaned and assembled suitable for oxygen service as standard.



# Engineering Data

## Design features

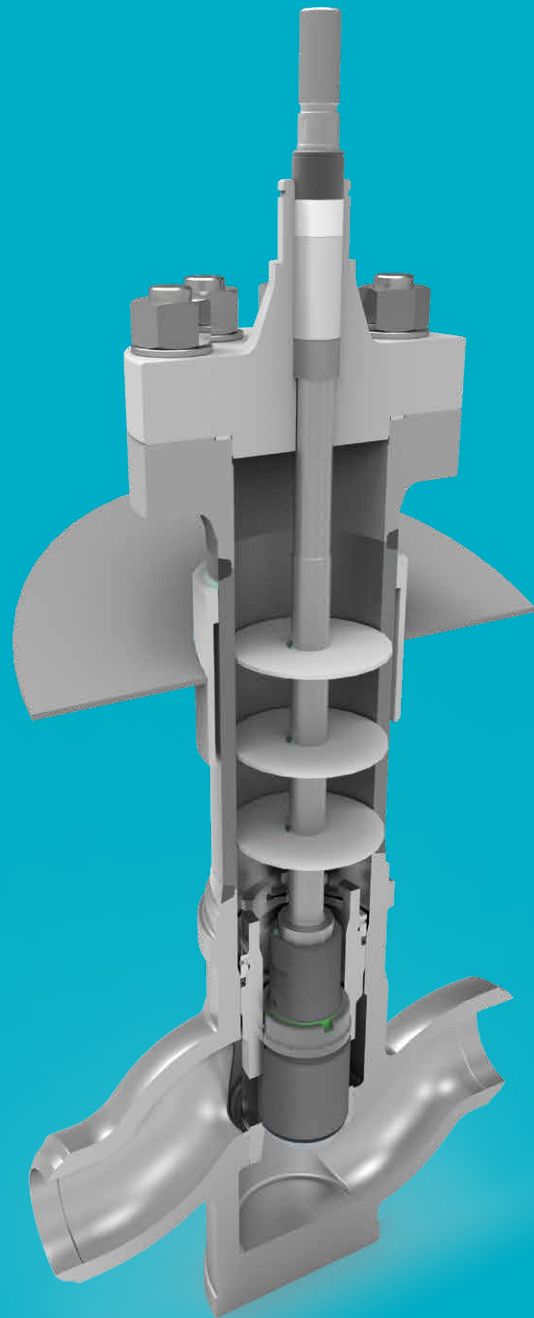
- ✓ Model 4400 – one piece stainless steel body/ extension
- ✓ Model 4300 – aluminium body / stainless steel extension factory assembled with lifetime seal
- ✓ Smooth profile globe body construction
- ✓ Extension lengths to suit installation
- ✓ Cold box flange adjustable or welded
- ✓ Screwed in seat standard, cartridge cage trim options
- ✓ Large choice of trim sizes available with low noise and anti-cavitation options
- ✓ Robust parts for trouble free service and low cost of ownership
- ✓ Inherently characterised trims available in linear, equal percentage or semi-throttle
- ✓ Cleaned and degreased for Oxygen service as standard
- ✓ Soft seat insert option for ANSI Class VI
- ✓ Various options of end connection

## Quality engineered

- ✓ Extensive proven on-site performance
- ✓ BS EN ISO 9001

## Benefits

- ✓ Top-entry servicing with direct access to plug and seat
- ✓ Reduced inspection and maintenance costs
- ✓ Extensive trim selection
- ✓ Reliable leakage performance, bubble tight shut off available
- ✓ High interchangeability between sizes and other products
- ✓ X-ray option available on all welds



# Engineering Data

## General

The 4000 Series range of cryogenic valves was developed to provide a cost effective, reliable and easily maintained control valve capable of being applied in a flexible manner to accommodate various approaches to insulated cold box or valve chest design. Reliability and ease of maintenance are essential features of any good control valve and the quick change trim provides for easily accessible seat and trim components to minimise any parts replacement times.

### End connection sizes/types

1/2in (12mm) – 10in (250mm)

### Design standards

ANSI B16.34 and design rated.

### Valve body ratings

ANSI 150 – ANSI 600.

### Body face to face dimensions

ISA S75.03 see Table 6.

### Valve plug options

Unbalanced Top Guided. Balanced for port diameters see Table 1.

### Actuation

Various types of actuation are available including: Series P Linear Spring pneumatic cylinder manually operated.

### Standard bonnet packing

Braided PTFE, PTFE Chevrons, Graphite and Low Emission and Fugitive Emission.

The specially designed extended bodies incorporate top guided contoured trim configuration which provides excellent rigidity and resistance to vibration and service wear. The valve is designed to accommodate other options within the Severn range e.g CC cages and anti-cavitation trims.

### Instruments

A wide range of control instruments are available from Severn including: Positioners, Volume Boosters, Solenoid Valves, Switches and Air File Regulators etc.

### Trim options

Unbalanced Contoured, Cage, Multi-step and Tickle.

### Inherent trim characteristics

Equal %, Linear and Semi-throttle.

### Maximum plug / Seat leakage class

ANSI/ FCI 70-2 Class IV as standard Class IV with soft seat.

### Materials of construction

The standard body materials are Stainless steel and Aluminium. For full listing see table page 4.

### Temperature range

-196°C to 220°C (-320°F to 428°F). For temperatures outside this range consult factory.

### Available connection styles

End Connection: Valve size: Rating Screwed, Socket Weld and Flanged.

## Valve body style options

The Severn 4000 Series valve is available in three body styles of either globe, angle or Z pattern. Many parts are interchangeable, with exception of the valve bodies. The angle pattern has an optional venturi seat which may be specified in order to provide additional protection to the valve outlet.

### Bonnet

The standard bonnet provides a deep packing box together with a long guide housing, which is a robust and vibration resistant assembly. The standard packings used are Teflon rings which are suitable for application temperatures of -196°C up to 220°C.

### Extended body

The body extension is available in a selection of lengths to suit the depth of associated pipework. The guide design located in close proximity to the plug head and allows controlled gassing off to occur into the body extension chamber thereby protecting the packing from coming into contact with liquid gas.

### Bellows seal option

This arrangement provides for a positive metallic gland seal, within the rated pressure and temperature of the bellows material selected. Generally used on semi UHP service to ensure non ingress of impurities into the process. An auxiliary packing in the bonnet serving as a back-up seal in the unlikely event of a bellows failure.

### Cold box flanges

A sliding weather proof or welded cold box flange of any size or shape can be fitted as required.

**Table 1. Materials of Construction**

Valve Body Material	Bonnet	Valve Plug / Stem Assembly	Seat Ring	Soft Seat Option	Cage Option
Aluminium ASTM 5083	Stainless Steel (AISI 321)	Stainless Steel (AISI 316)	Stainless Steel (AISI 321)	PTFE	Stainless Steel (AISI 321)
Stainless Steel	Alloy Steel	Stainless Steel/ HT Brass	HT Brass	PCTFE (KELF)	Monel
Monel		Stainless Steel/ Stellite 6	Stainless Steel/ Stellite 6	Copper	Alloy Steel
HT Brass		Monel	Monel	Aluminium	

## Severn 4000 Series – Design Cv Values

### Flow Coefficient Cv

The values detailed in the tables are stated in US units. The figures by definition are related to the flow of water (SG=1) through the valve at full tilt in US Gallons per minute with a pressure drop of 1lb/in.

**Table 2. Contoured and multi-step trims**

Valve Size		Available Trim Cv's													
in	mm	0.01	0.05	0.10	0.15	0.25	0.5	2.5							
1/2	12	<b>0.01</b>	<b>0.05</b>	<b>0.10</b>	<b>0.15</b>	<b>0.25</b>	<b>0.5</b>	2.5							
3/4	20	<b>1</b>	<b>1.5</b>	<b>2.5</b>	<b>4</b>	7									
1	25	<b>1</b>	<b>1.5</b>	<b>2.5</b>	<b>4</b>	7	15								
1 1/2	40				<b>4</b>	7	16	20	30						
2	50						16	20	30	50					
3	80							20	30	50	80	120			
4	100									50	80	120	195	215	
6	150										120	215	325	400	440
8	200											215	325	440	650

Note: Multi-step trim range in bold digits. For other options – Consult Factory.

**Table 3. Single Stage Cage Trims**

Valve Size		Available Trim Cv's													
in	mm														
1	25				4	7	15								
1 1/2	40					15	20	30							
2	50						20	30	50						
3	80							50	75	110					
4	100							50	75	110	195				
6	150								110	195	275	400			
8	200												400	650	
10	250												650	1000	

Note: For valve and trim sizes outside this range – Consult Factory.

Table 4

Valve Size		A		B		C		D/E		F		G		H		Actuator Selection
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	
0.5	12.5	8.25	210	2.375	60.3	1.9	48	3.93	100	2.375	60.3	9.438	250	2.25	143	A
0.75	19	8.25	210	2.375	60.3	1.9	48	3.93	100	2.375	60.3	9.438	250	2.25	143	A
1	25	8.25	210	2.375	60.3	1.9	48	3.93	100	2.375	60.3	9.438	250	2.25	143	A
1.5	40	9.875	251	2.88	73	2.88	73	4.92	125	2.88	73	10.82	275	2.75	165	A/B
2	50	11.25	286	3.5	88.9	3.25	82.5	4.92	125							A/B
3	80	13.25	337	4.5	115	4.5	115	6.10	155							B/C
4	100	15.5	394	5.55	142	5.55	142	7.25	184							B/C
6	150	18.62	473	8.62	219											B/C
6	150	20	508	8.62	219											C
8	200	22.37	568	10.75	273											D
8	200	24	610	10.75	273											D
10	250	26	660	12.75	324											D
10	250	28	711	12.75	324											D

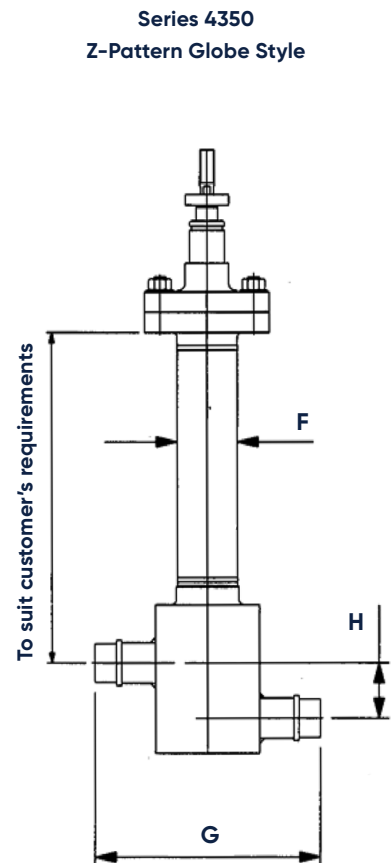
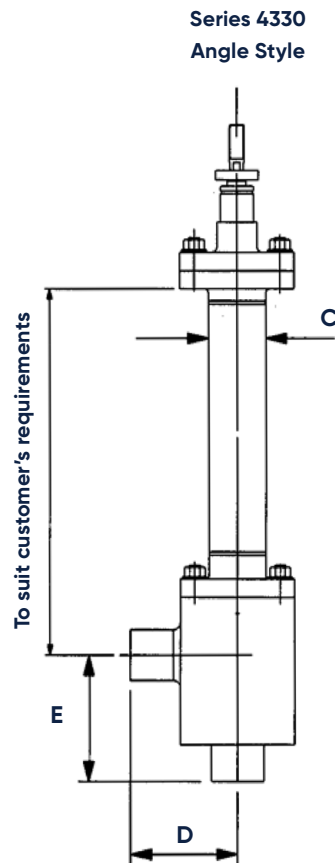
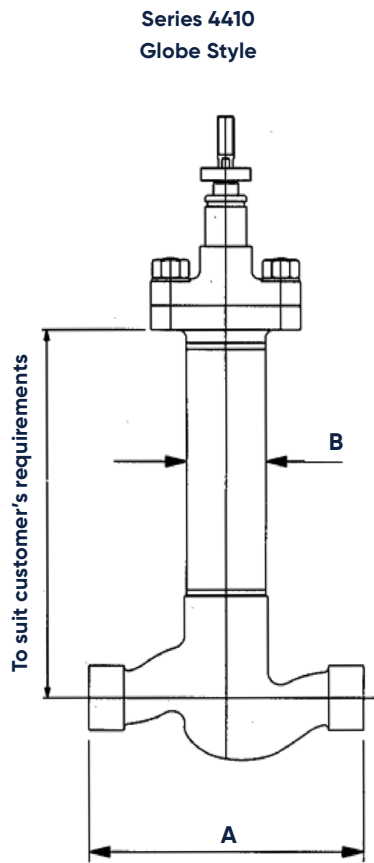


Table 5. Weights

Size	in	1	1.5	2	3	4	6	8	10
Weight	lb	77	82	88	154	205	310	580	750
Weight	kg	35	37	40	70	93	140.6	263	340

Note: weights apply to Stainless Steel bodied valve, actuator, positioner and airstet.



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