Bear CSX Throttling Solution

Solar Ready and Low Maintenance

A reliable throttling valve requires outstanding performance in both the actuator and valve. To achieve this Calscan uses the low power and extensively tested Bear BAQ electric actuator combined with the Hydroplex CSX valve with its low maintenance twin tungsten carbide disc trim technology. Reliable and zero-emission, using Bear Throttling solutions will help modernize your separator design.

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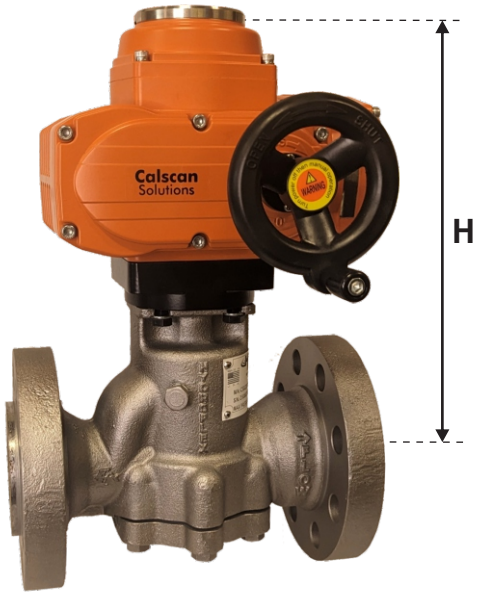


The Bear electric actuator is direct mounted to the CSX control valve to reduce height H = 12 inches

Electric Motor Features and Specifications

Calscan is continuously testing a 24 VDC electric motor by fully opening and closing every 30 seconds at twice the required max torque of the CSX valves. With over ¾ million cycles so far the motor is performing flawlessly, indicating the Bear BAQ Quarter Turn Actuator can give outstanding long term reliability.

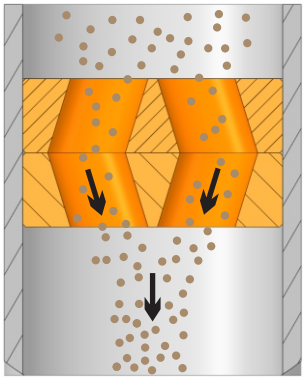
- Open/Close time 9 Seconds for differential pressures < 3000psi (20700 kPa)
- Explosion Proof Class I Div1/Zone 1 Certified
- Power and RTU fail safe operation when used with the Bear FSC and Bear UPS
- Fail on Loss of Signal (Open or Closed)
- Actuator is sealed water tight, so no heater required
- No Disk Springs (Belleville Washers) to wear out
- 4-20mA Control and Feedback
- Low quiescent current: <40mA
- 21 to 32 VDC @ <0.7 amp of operating current at 1000psi differential
- For complete electrical information see: BAQ-10GEY-15S/50 in the "Bear BAQ 24VDC Quarter Turn Actuators" data sheet

Precision Trim Details

The CSX throttling valve has a unique Twin Disc trim that is specifically designed for high repeatability that maintains unparalleled precision control of liquids and gases in severe service applications.

There are two quarter-turn tungsten carbide concentric discs with matching orifices. Each are diamond-polished to ± 0.00002in to achieve positive shutoff. One disc is stationary in the valve and the other rotates to adjust the flow path. The tungsten carbide discs are abrasion resistant and direct the flow to the centerline of the piping which greatly extends the service life of the throttling valve body.

A unique property of the twin disc format is it separates the sealing surface from the control surface. As **the sealing surface is not exposed to the fluid media**, such as sand, the CSX can maintain a more reliable longer lasting shut off seal.



Tungsten Carbide Trim directs sand in flow media to center of piping to protect the softer valve body

Tungsten Carbide Trim Options

Color Indicator on trim shows size

Orifice Size Inches	Cv	64th inch Equivalent Diameter	Hole Geometry
1/8	0.74	11.3	Round
3/16	1.66	16.97	Round
1/4	2.95	22.6	Round
3/8	6.63	33.9	Round
1/2	11.78	45.3	Round
3/4	22.31	62.3	Pie

Note: Generally when throttling under high pressure drops, the valves would be set at: >40% open for liquids and >30% for gas

Abrasion Resistant Tungsten Trim rotates to throttle flow without exposing sealing surface to sand

Cv vs Percent Open Chart

Orifice Size	Flow Coefficient	Dead Band (Closed)	Valve Opening-Percent of Total Travel									
			10	20	30	40	50	60	70	80	90	100
1/8"	Cv	0° ---------- 21.46°			0.02	0.07	0.15	0.25	0.36	0.48	0.61	0.74
	Kv				0.01	0.06	0.13	0.21	0.31	0.41	0.52	0.63
3/16"	Cv	0° ---------- 20.03°			0.05	0.18	0.36	0.58	0.82	1.09	1.37	1.66
	Kv				0.04	0.16	0.31	0.50	0.71	0.94	1.18	1.43
1/4"	Cv	0° ---------- 19.41°			0.11	0.34	0.66	1.04	1.47	1.94	2.44	2.95
	Kv				0.09	0.29	0.57	0.90	1.27	1.68	2.10	2.54
3/8"	Cv	0° ---------- 19.28°		0.00	0.23	0.76	1.48	2.34	3.31	4.37	5.49	6.63
	Kv			0.00	0.20	0.66	1.28	2.02	2.86	3.77	4.73	5.71
3/8" Dump Trim	Cv	0° ---------- 51.43°						0.13	1.21	2.79	4.65	6.63
	Kv							0.12	1.05	2.41	4.00	5.71
1/2"	Cv	0° ---------- 20.03°			0.35	1.28	2.55	4.08	5.83	7.73	9.73	11.78
	Kv				0.30	1.10	2.20	3.52	5.02	6.66	8.39	10.16
3/4"	Cv	0° - 8.58°	0.01	1.44	3.72	6.24	8.82	11.41	14.01	16.61	19.22	21.84
	Kv		0.01	1.24	3.20	5.38	7.60	9.83	12.07	14.32	16.57	18.83

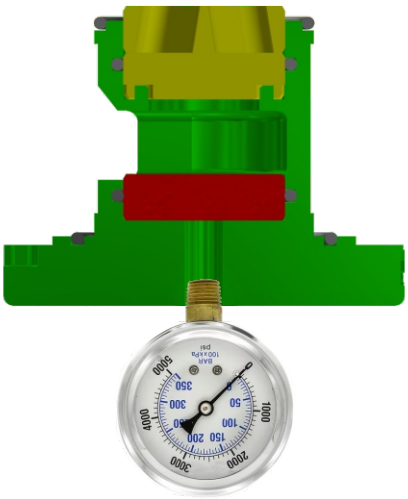
Trim Cartridge Assembly - With Maintenance Detection

The most significant benefit of this CSX design is that the valve body will not wear under normal operating conditions. All potential wear components are contained in the field removable cartridge, protecting the body from high velocity fluids and solids.

By adding a pressure sensor/gauge to the trim cartridge ¼ inch pressure port, it will notify the operator of impending maintenance requirements by detecting if the trim or wear plates start to leak.

When this happens the CSX Trim cartridge assembly allows for valve service and trim change in-place. Field service can be performed without removing the valve from the production line.

***Note:** Valve must be isolated and depressurized prior to cartridge removal.



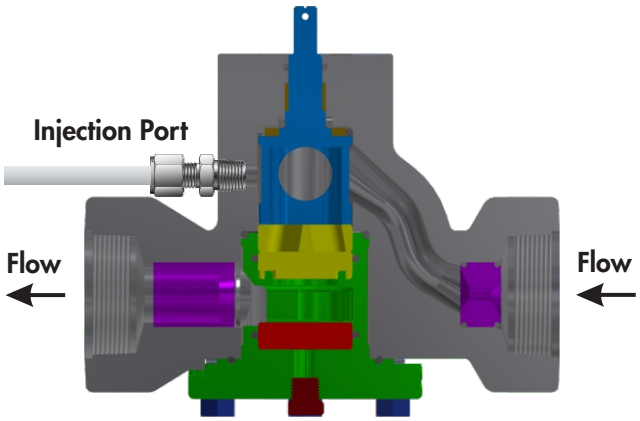
Adding a pressure sensor to the CSX valve allows you to detect when the valve needs maintenance

CSX Valve Options

Integrated Methanol Saving Injection Port

The CSX has a built in chemical injection port that allows methanol to be fed right where its needed, after the pressure drop in the valve. This is the point where it's the most cold and where hydrates start to form.

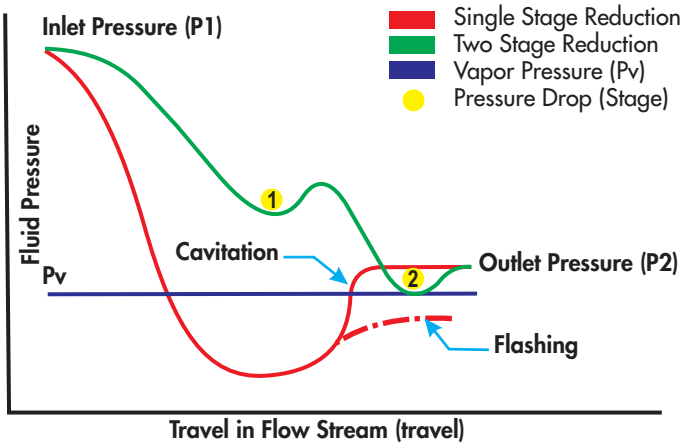
By spraying directly in the valve you can minimize the amount of methanol needed to prevent hydrates thereby reducing your operation expenses.



Optional Multistage Throttling Assembly

CSX patented multistage valve option allows it to handle extreme pressure drops reducing potential damage due to severe flow conditions and minimize freezing.

This is primarily used in high pressure drop scenarios that exceed 50% of absolute upstream pressure. By using multiple throttling stages it reduces fluid velocity, which is a major factor in erosion, vibration, and excessive noise. In addition it can reduce cavitation and flashing in liquid service, as well as reduce freezing in wet gas services due to the Joule-Thomson effect.



The images above shows a CSX valve dropping liquid flow over two stages. This lowers the risk of valve damage by reducing the pressure over two smaller stages instead of the trim set only.

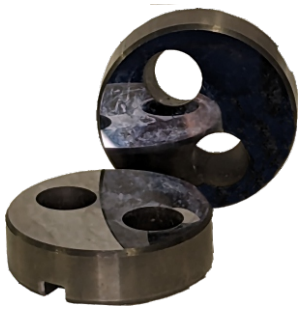
Optional Wear Sleeve

Typically, throttling valves wear on the downstream side requiring a complete valve replacement. With this patented hub design only the downstream wear sleeve would be exchanged, preserving the remainder of the valve.

The wear sleeve is made from a durable Stellite for abrasive or turbulent environments extending valve life. This option reduces the effects of cavitation and mechanical erosion typically present in the fluid recovery process after pressure reduction.

Do not replace the whole valve from wear, just the sleeve

CSX Valve Specifications



- 5000 psi (34400 kPa) MAWP
- Open/Close time 9 Seconds for differential pressures < 3000psi (20700 kPa)
- ANSI FCI 70-2 (ANSI B16.104) Class IV shutoff seal
- CSX Body - WCB Carbon Steel
- Seals - Peroxide Cured Buna N 90D
- Disc - Tungsten Carbide with Nickel Binder
- Internals or Rotators -ANSI Type S17400 PH
- High Repeatability Rate maintains unparalleled control in throttling applications

CSX Valve Cut-Away

1 - Valve Body: Durable carbon steel body

2 - Stem Assembly

3 - Thrust Bearing

4 - Tungsten Carbide Control Discs: All valves come standard with Tungsten carbide Trim available in sizes up to 3/4in

5 - Optional Fixed Orifice Bean: Removable fixed size choke for multistage throttling

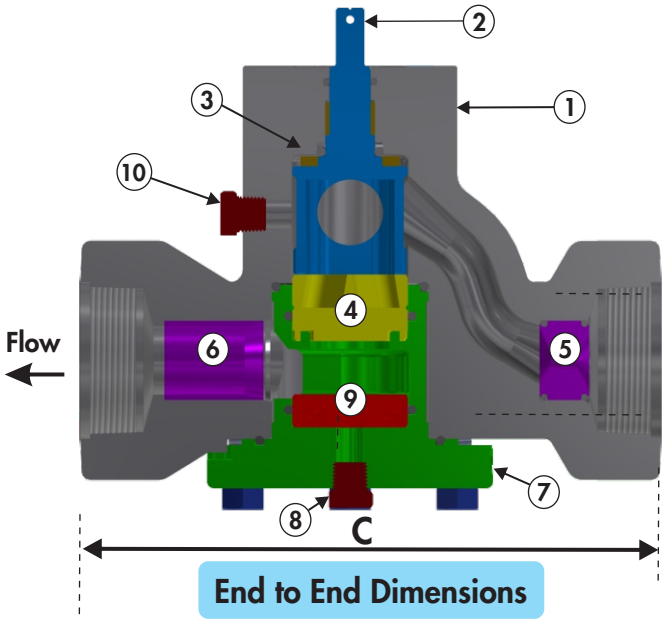
6 - Optional Wear Sleeve: The wear sleeve is made from a durable Stellite for abrasive or turbulent environments extending valve life

7 - Cartridge Assembly: Removable cartridge allows for easy assembly and disassembly of all internal valve components

8 - Maintenance Detection Port: A pressure sensor can be added here for early detection of valve wear

9 - Wear Disc: Removable cartridge allows for easy assembly and disassembly of all internal valve components

10 - Methanol Injection Port: Optionally inject methanol right where its needed, where the pressure drops and the hydrates form



End to End Dimensions

Connection Size	Length C
1 inch FNPT	10.37in
2 inch FNPT	8.625in
2 inch 150RF	10.0in
2 inch 300RF	14.125
2 inch 600RF	9.75in
2 inch 1500RF	17.125

Ordering Information

Bear CSX Valve

BCSX - **Port** - **Fail** - **Trim** - **Options**

Port	Fail	Trim	Options
1 = 1 inch FNPT 2 = 2 inch FNPT 150 = 150RF Flange 300 = 300RF Flange 600 = 600RF Flange	C = Closed O = Open	750 = 3/4in 500 = 1/2in 375 = 3/8in 250 = 1/4in 187 = 3/16in 125 = 1/8in 375D = 3/8in Dump Trim	M = Methanol Port W = Wear Sleeve B = Orifice Bean

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