Product Bulletin
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Fisher™ CVX Steam Conditioning Valve

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General Application

The Fisher CVX Steam Conditioning Valve is designed to handle the moderate to severe applications in today's cycling power plants as well as provide precise pressure and temperature control for process applications. The CVX incorporates over 30 years of steam conditioning experience and product development. The valve body is designed with the latest finite element analysis (FEA) and computational fluid dynamics (CFD) tools to optimize performance and reliability for demanding steam systems.

The CVX valve design provides an exceptional combination of performance and maintainability. The simplified trim configuration is thermally compensated to handle rapid changes in temperatures, as expected during a turbine trip, without any sticking or binding.

Water atomization and vaporization are key elements in any steam conditioning application. The CVX design incorporates a spraywater manifold of variable geometry AF nozzles that produce an optimized spray pattern over a wide operating range. These nozzles are strategically placed to achieve optimal mixing and quick vaporization at all flowing conditions. Years of research in spray atomization and vaporization were key to optimizing the water injection system. Extensive use of CFD analysis, in addition to field performance feedback, was used to validate spray system enhancements.

Features

- **Total Steam Control** — Combines pressure and temperature control in a single valve.
- **Full Pressure Drop Capability** — Rugged cage-guided design enables handling of full pressure drop of main steam.
- **Forged Valve Body** — FEA designed valve body can handle the most demanding applications without thermal stress problems.
- **High Temperature Capability with Available Class V Shutoff** — Use of the Fisher Bore Seal trim gives capability of Class V shutoff up to 621°C / 1150°F. This unique balanced trim is field-proven. See Figure 3.
- **Thermally Compensated Trim** — The cage is nitrided for maximum life and is allowed to grow during thermally induced excursions. The plug is continuously guided and employs cobalt-based overlays for guide bands and tight metal-to-metal shutoff against the seat.
- **Easy Maintenance Seat Ring** — Clamped seat ring design provides Class V shutoff and long life. Seat ring may be refinished or replaced as needed. Optional bolted and welded seat rings are available. Welded seat ring has deep Alloy 6 overlay and can be refinished multiple times to maintain tight shutoff.

- **Spiral-Wound Gaskets for Excellent Bonnet Sealing Under All Service Conditions** — Premium gaskets provided with N07750 or N06600 windings and graphite filler material.
- **Precise Spraywater Injection** — CFD designed spray manifold determines water injection point and insertion depth to maximize mixing and quick vaporization.
- **High Turndown** — Available with wide rangeability in standard trims and increased rangeability with special constructions. Contact your Emerson sales office if you have specific capacity requirements that need accommodation.
- **Quick Stroking Actuation** — High performance pneumatic piston actuators with FIELDVUE™ digital valve controllers can achieve full stroke in less than 2 seconds while still maintaining highly accurate step response. Optimized digital valve controllers are available when high stroke speeds are required. Contact your Emerson sales office for assistance.
- **Performance Diagnostics** — With the self-diagnostic capability, questions can be answered about a valve's performance, without pulling the valve from the line. The present valve/actuator signature (seat load, friction, etc.) can be compared against previously stored signatures to discover performance changes before they cause process control problems.
- **More compact body and trim profile** — Creating a lighter valve that requires less support without compromising structural integrity.

Options

- **Startup Trim** — Protects the working trim and machined surfaces of the valve body during steam blow.
- **Hydro-Plug** — Provides a convenient way to establish hydrotest boundaries associated with using a split pressure class valve.
- **Split Functionality** — When piping dictates, the CVX valve can be provided as separate components allowing the pressure control in the valve body and separate temperature reduction downstream in a steam cooler.
- **Commissioning Service** — Proper installation of flushing trim and hydro-plug fixtures, along with reassembly and calibration of turbine bypass valves, is critical for the valves to be ready for service when needed. Let skilled Emerson technicians take care of this vital commissioning service to protect this very important plant asset.
- **Diagnostic Services** — The Emerson Diagnostic Services Group delivers world class services and innovative technologies for top performance of critical service valves and other production assets.
- **Enhanced Low Noise Diffuser Technology** — Helps eliminate noise generated by recirculated and expanded flow.
- **Seat Ring Diffusers** — Incorporate bolted or clamped seat ring with diffuser technology for easy maintenance.

Table 1. Physical Specifications

End Connection Sizes[1]	Flow Characteristics[3]
■ Inlet: NPS 4 to 24 ■ Outlet: NPS 8 to 60	Linear
End Connection Types	**Flow Direction**
■ Buttweld (all sizes) ■ Raised face flanges (all sizes) ■ Ring type joint flanges (all sizes)	Flow Down
Configuration	**Port Diameter and Maximum Travel**
Angle pattern (Flow Down)	See Table 2
Valve Body Ratings[2][4]	**Bonnet Type**
See Table 2	Bolted
Maximum Pressure Drop[1]	**Shutoff Classifications per ANSI/FCI 70-2 and IEC 60534-4**
Valve bodies and trim capable of full ASME rated pressure drops	■ Class V (standard) ■ Class IV (optional)

1. Standard end connection sizes. Contact your Emerson sales office for additional options.
2. Not all valve sizes are available in all pressure ratings.
3. Contact your Emerson sales office for special characterized cages.
4. Intermediate classes above CL2500 available upon request. PN pressure ratings available per pressure requirements of EN1092-1. Contact your Emerson sales office for additional options.

Table 2. Port Diameter and Maximum Travel Offerings for Fisher CVX Trim[1][2]

SEAT RING TYPE	INLET PRESSURE RATING	PORT DIAMETER		MAXIMUM TRAVEL		MAXIMUM CAPACITY[1]	
		mm	in.	mm	in.	C_v	X_t
Welded Seat	CL150 to CL2500	120	4.70	89	3.5	373	0.65
		159	6.25	102	4	544	0.65
		194	7.62	146	5.75	960	0.65
		234	9.20	178	7	1412	0.65
	CL150 to CL1500	285	11.20	203	8	2078	0.65
		349	13.75	267	10.5	3208	0.65
	CL150 to CL900	424	16.70	318	12.5	4627	0.65
Bolted Seat	CL150 to CL2500	87	3.44	70	2.75	200	0.65
		120	4.70	89	3.5	373	0.65
		159	6.25	102	4	544	0.65
		194	7.62	146	5.75	960	0.65

- continued -

Table 2. Port Diameter and Maximum Travel Offerings for Fisher CVX Trim[1][2] (continued)

SEAT RING TYPE	INLET PRESSURE RATING	PORT DIAMETER		MAXIMUM TRAVEL		MAXIMUM CAPACITY[1]	
		mm	in.	mm	in.	C_v	X_t
Bolted Seat	CL150 to CL1500	234	9.20	178	7	1412	0.65
		285	11.20	203	8	2078	0.65
	CL150 to CL900	349	13.75	267	10.5	3208	0.65
		424	16.70	318	12.5	4627	0.65
Clamped Seat	CL150 to CL2500	36	1.42	29	1.13	29	0.65
		45	1.77	35	1.38	58	0.65
		56	2.20	38	1.50	82	0.65
		68	2.68	51	2.00	129	0.65
		82	3.23	51	2.00	159	0.65
		82E	3.23	64	2.50	189	0.65
		90	3.54	70	2.75	212	0.65
		100	3.94	76	3.00	263	0.65
		110	4.33	83	3.25	325	0.65
		120	4.72	89	3.50	387	0.65
		132	5.20	102	4.00	450	0.65
		145	5.71	102	4.00	541	0.65
		160	6.30	102	4.00	601	0.65
		160E	6.30	121	4.75	688	0.65
		175	6.89	127	5.00	832	0.65
		195	7.68	146	5.75	979	0.65
		215	8.46	159	6.25	1203	0.65
		235	9.25	178	7.00	1421	0.65
	CL150 to CL1500	260	10.24	197	7.75	1888	0.65
		285	11.22	203	8.00	2092	0.65
		315	12.40	235	9.25	2616	0.65
		350	13.78	267	10.50	3111	0.65
	CL150 to CL900	385	15.16	292	11.50	3786	0.65
		425	16.73	318	12.50	4685	0.65

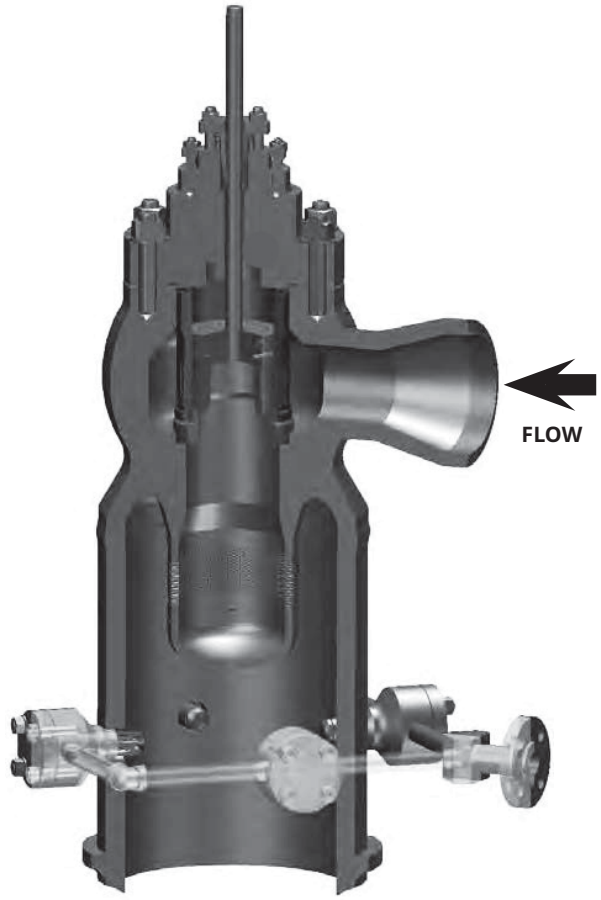
1. Value shown is trim capacity only. Overall valve capacity will be affected by outlet diffuser sizing requirements.
2. Contact your Emerson sales office for additional options.

Table 3. Material Specifications

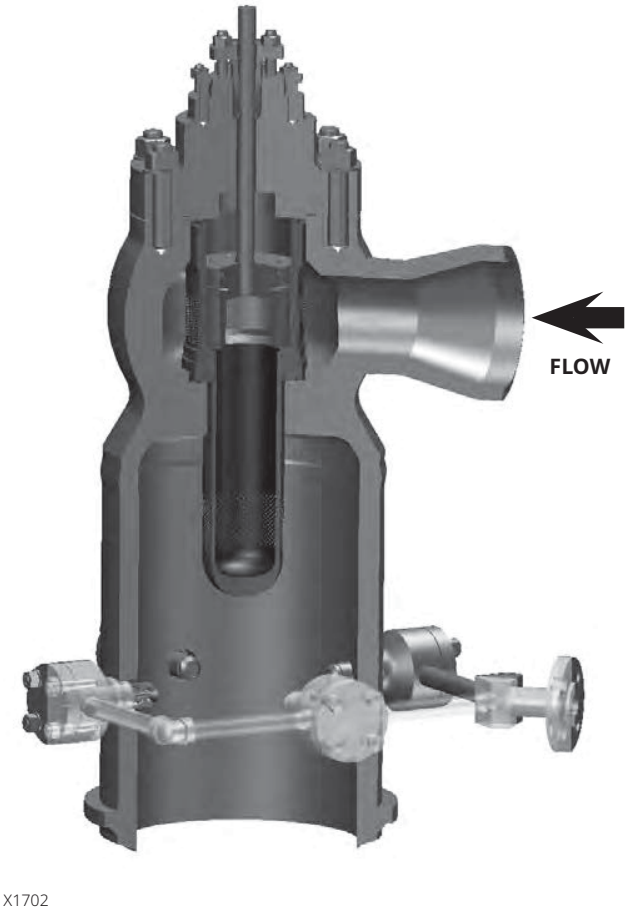
Body/Bonnet	**Clamped Seat/Clamped Seat and Diffuser (standard)**
■ SA105 (Carbon steel) ■ SA182 Grade F22 (2.25 Cr-1 Mo) ■ SA182 Grade F91 (9 Cr-1 Mo-V) ■ SA182 Grade F92 (9 Cr-2 W-V)	■ 2.25 Cr-1 Mo with Alloy 6 seating surface[1] ■ 9 Cr-1 Mo-V with Alloy 6 seating surface[2]
Bonnet Bolting	**Welded Diffuser**
■ SA105 Valve Body — SA193 Grade B7 up to 427°C / 800°F ■ SA182 Grade F22 Valve body — SA193 Grade B16 up to 524°C / 950°F, N07718 above 524°C / 950°F to maximum of 566°C / 1050°F ■ SA182 Grade F91 or F92 Valve body — N07718 up to 621°C / 1150°F	■ Carbon steel ■ 2.25 Cr-1 Mo ■ 9 Cr-1 Mo-V ■ 9 Cr-2 W-V
Control Plug	**Bolted Diffuser**
■ 2.25 Cr-1 Mo with Alloy 6 guiding and seating surfaces[1] ■ 9 Cr-1 Mo-V with Alloy 6 guiding and seating surfaces[2]	■ 2.25 Cr-1 Mo ■ 9 Cr-1 Mo-V
Stem	**Piston Rings**
■ SA479 Type S20910 ■ N07718	Alloy 6 with N07750 Expander
Cage	**Bore Seal**
■ 2.25 Cr-1 Mo Nitrided[1] ■ 9 Cr-1 Mo-V Nitrided[2]	N07718
Welded Seat (optional)	**Gaskets**
■ SA105 Valve body — Carbon steel with Alloy 6 seating surface ■ SA182 Grade F22 Valve Body — 2.25 Cr-1 Mo with Alloy 6 seating surface ■ SA182 Grade F91 Valve Body — 9 Cr-1 Mo-V with Alloy 6 seating surface	N07750/Graphite and N06600/Graphite
	Packing
	Graphite/Flexible Graphite
Bolted Seat (optional)	**Nozzles**
■ 2.25 Cr-1 Mo with Alloy 6 seating surface up to 482°C / 900°F ■ N06625 with Alloy 6 seating surface up to 593°C / 1100°F ■ N07718 with Alloy 6 seating surface up to 593°C and over 1100°F	■ S41000 SST ■ N07718

1. For use with SA105 or F22 valve body.
2. For use with F91 valve body.

Figure 1. Fisher CVX with Clamped Trim

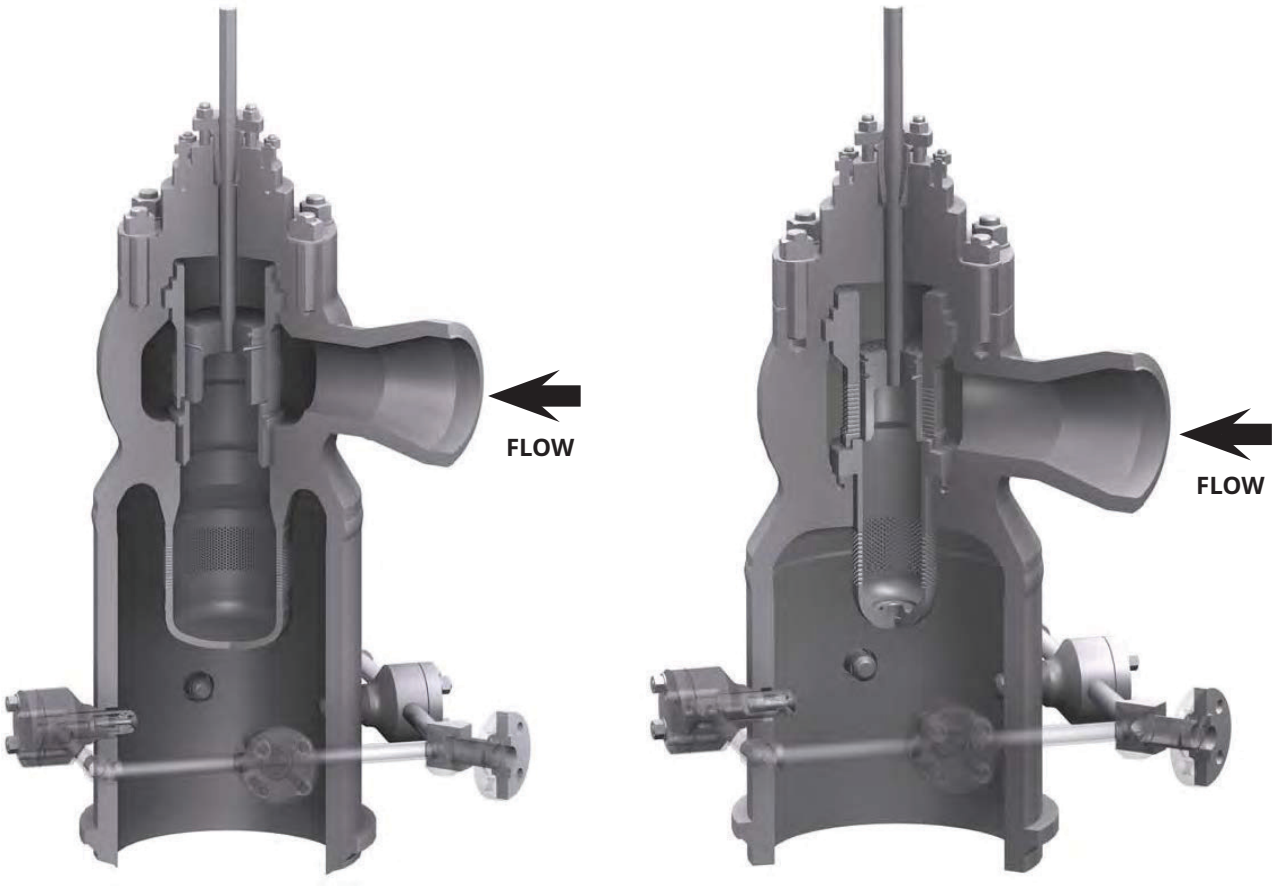


CVX WITH CLAMPED TRIM AND WELDED DIFFUSER



CVX WITH CLAMPED TRIM AND DIFFUSER

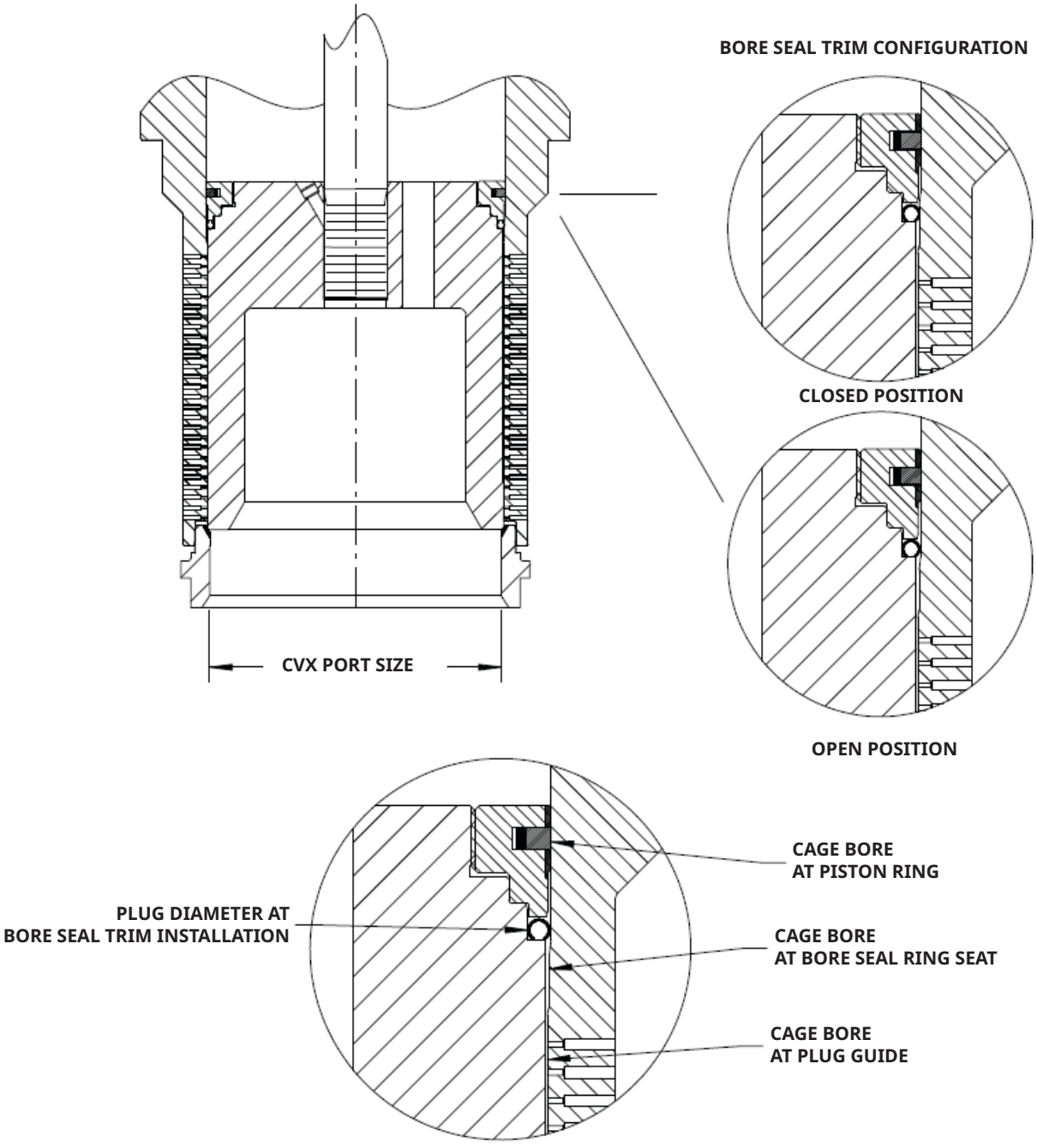
Figure 2. Fisher CVX



CVX WITH WELDED DIFFUSER

CVX WITH BOLTED SEAT RING DIFFUSER

Figure 3. Fisher CVX Bore Seal Trim in Closed Position



Ordering Information

Application Information

When ordering, specify:

1. Steam Flow, PPH (Inlet/Outlet)
2. Inlet Pressure, PSIA
3. Outlet Pressure, PSIA
4. Inlet Temperature, °F
5. Outlet Temperature, °F
6. Water Pressure, PSIA
7. Water Temperature, °F
8. Required Noise Level, dBA
9. Pipeline Size, inches (Inlet/Outlet)

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