IndiTech

Control Valves

Series 210

ISO 9001 QUALITY ASSURANCE

IndiTech Valves Pvt. Ltd.

Values 'n' Valves

Ver. 1.1 (2017)

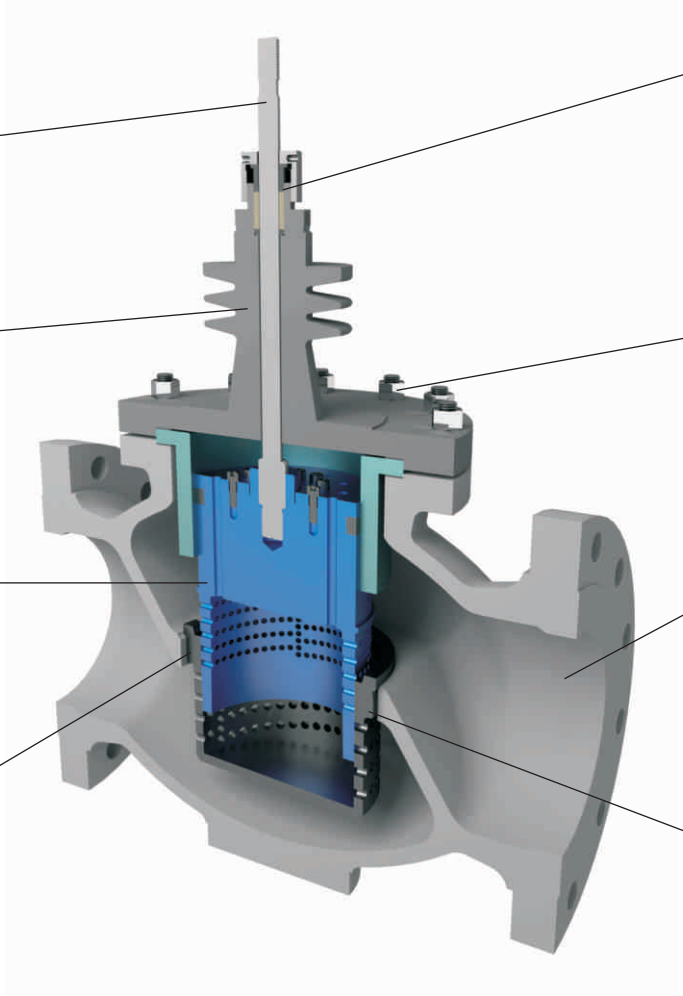
Introduction

A control valve is a power operated device which modifies the fluid flow or pressure in a process control system. It consists of a valve connected to an actuator mechanism that is capable of changing the position of a flow controlling element in the valve in response to a signal from the controlling system. The design of the seat and the plug determines the flow coefficient (K_v) and the flow characteristic, as well as the seat leakage rate of a control valve.

The IndiTech Series 210 control valves offers a variety of valve sizes, materials and trim options to cover a wide range of control applications within the power, process and other industries. The valve bodies are specially designed using latest CFD techniques, to ensure a smooth flow pattern and reduced turbulence. The valve internals are optimized based on the specific application, with special designs available for severe service applications requiring anti-cavitation or low-noise trims. In order to increase the service life, metallic seats and plugs can also be provided with a Stellite hard facing. A variety of shut-off classes from Class IV to Class VI are available to meet the process requirements.

The complete range of Series 210 control valves offers excellent controllability, and easy maintenance. Customized valve constructions to meet customer specifications can be engineered. Further versions are available with heating jacket for applications where the process media may solidify below a certain temperature. For applications where high noise levels are anticipated, additional silencers can be provided along with the control valves.

The Series 210 control valves have interchangeable parts, thereby reducing inventory costs. Thanks to their modular design, the control valves can be equipped with various accessories like positioners, limit switches, solenoid valves etc. Pneumatic actuators of different sizes can be coupled depending on the actuating force required. Optionally, electric or electro hydraulic actuators are also available.



Technical Data

Valve Size	½"to 24" NB
Pressure Rating	ANSI #150 to #2500 (Refer Table 1)
Design Standard	ASME B16.34 ISA 75.01.01
Body Configurations	Globe Angle
End Connections	Flanged Socket Weld Butt Weld
Face-to-Face Dimensions	ISA 75.08
Materials	Refer Table 2
Compliance	IBR NACE
Trim Options	Standard Parabolic (SP) Multi Stage Parabolic (MSP) Parabolic with Perforated Cage (PPC) One Stage Perforated Cage (1PC) Two Stage Perforated Cage (2PC) Three Stage Perforated Cage (3PC)
Inherent Flow Chracteristics	Linear Modified Linear Equal Percentage On-Off
Flow Coefficient (K_v)	Refer Table 3
Seat Leakage (FCI 70.2)	Class IV Class V Class VI
Bonnet	Standard Bolted Cooling Finned Pressure Seal
Actuator	Pneumatic Electrical Electro-Hydraulic
Instrument Options	Positioner (Pneumatic / Electropneumatic / SMART) Air Filter Regulator Position Transmitter Air Lock Relay Limit Switch Solenoid Valve Volume Booster

Applications

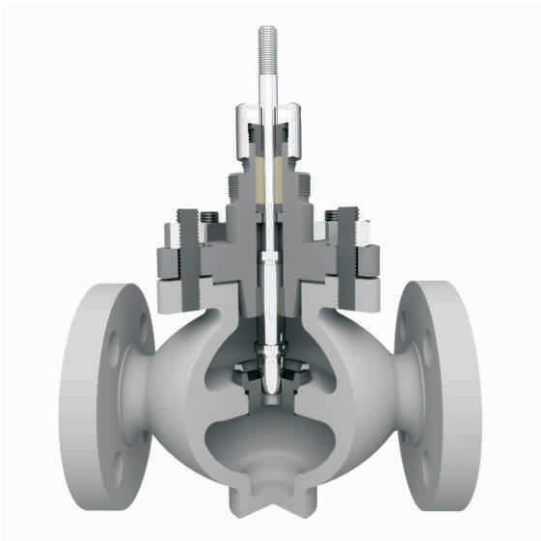
Power

Process

Chemicals

Oil & Gas

Trim Options

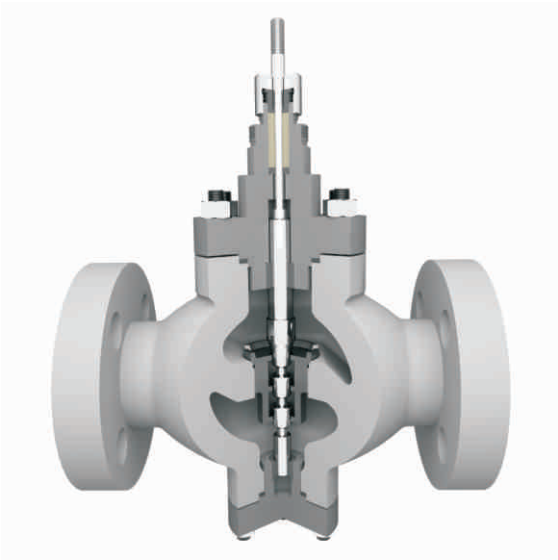


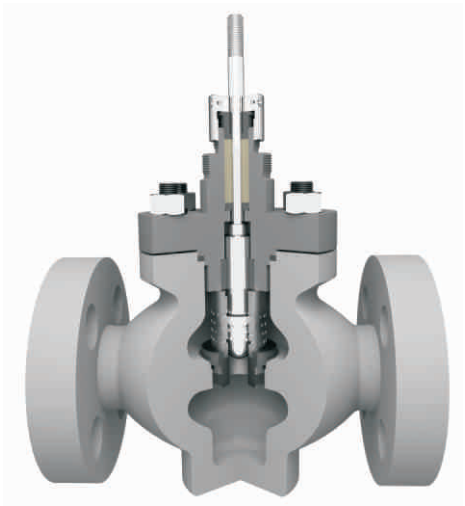
Standard Parabolic (SP)

The standard parabolic trim is the most versatile solution to control a majority of fluids at low pressure differentials. It consists of a post-guided single stage parabolic plug, and a screwed in seat. Post guiding provides valve plug stability at all points in its travel range. The plug profile determines the flow characteristic through the valve, and it can be modified based on the application. Additionally, stellited hard facings or hardened trims can be provided. Metal sealing is standard for all general applications over a wide range of pressure drops and temperatures. Soft sealing is optional, for applications with stringent shutoff requirements. Both balanced and unbalanced versions are available. The standard parabolic trim is one of the most economical designs, due to its simplicity and low parts count.

Multi Stage Parabolic (MSP)

The multi stage parabolic trim is ideal for reducing pressure of liquids at extremely high differential pressures. The multiple stages of pressure reduction do not allow the local pressure to drop below the fluid vapor pressure, thereby eliminating the potentially erosive effects of cavitation. The control of velocity at every stage reduces the high wear rates normally associated with high pressure drop applications. The number of stages is optimised for specific service conditions. Guiding is provided along the full length of the plug, which minimizes any vibration effects and results in excellent dynamic stability. The multi stage parabolic plug is manufactured using high precision machining. Owing to the severe service duty, the trim is provided with stellited hard facing as standard. The top entry design allows for quick inspection or trim change.





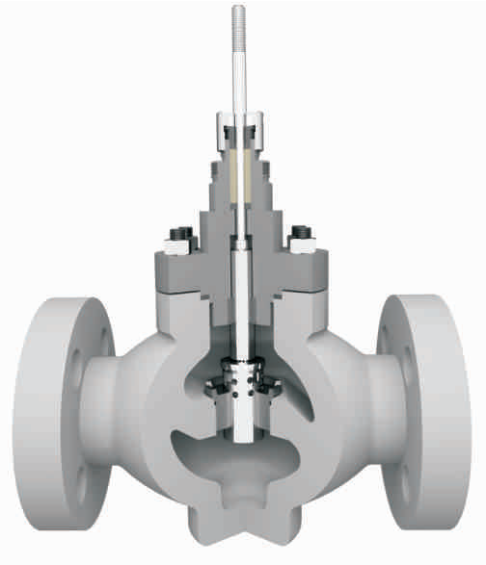
Parabolic with Perforated Cage (PPC)

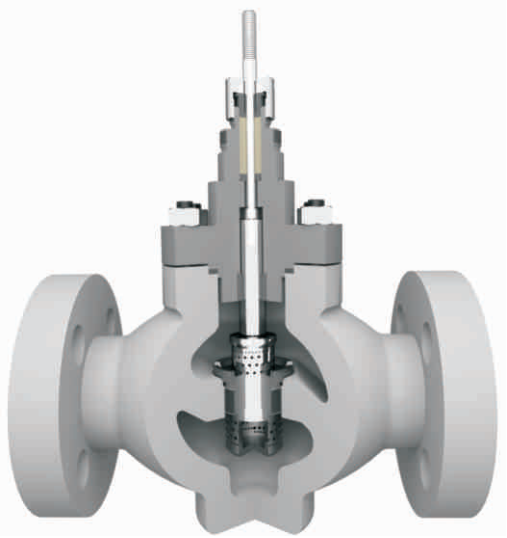
The parabolic with perforated cage trim is an advancement over the standard parabolic trim, and it is optimized for low noise pressure letdown of liquids at moderate to high differential pressures. Most high pressure drop applications involve erosion, noise or vibration which can affect process control. This trim is ideally suited for such applications. The parabolic plug is guided inside the perforated cage. The parabolic plug is stellited, while the perforated cage is hardened. The multiple holes in the perforated cage provide equal pressurization around the plug, and help to divide the flow into numerous small flows. This reduces the susceptibility to cavitation and erosion, and helps to protect the trim and reduce the noise level. This trim can be equipped with 1, 2 or 3 perforated cages with different staging ratios to cover the vast majority of high pressure liquid letdown services.

Trim Options

One Stage Perforated Cage (1PC)

High mass flow or pressure drop in compressible fluids like gas or steam is a major source of noise and accompanies vibration in the system. The perforated cage trim provides proven performance in such applications. It has a single cage with multiple drilled holes that provide noise attenuation for gases, along with a standard screwed in seat. The flow is conventionally from outside to inside the trim, so that jet impingement is controlled within the confines of the perforated cage. Impingement of the jets within the perforated cage produces a more stable downstream flow, and provides a smaller scale turbulence structure in the valve outlet. Also, the cage-guided construction reduces plug vibration and provides stable performance throughout travel. The modular design allows for easy up gradation to either two stage or three stage perforated cage trims, and ensures easy repair.



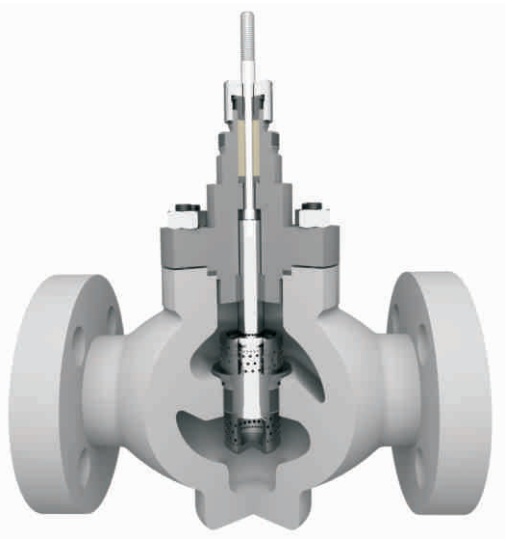


Two Stage Perforated Cage (2PC)

The two stage perforated cage trim is a further advancement over the standard perforated cage trim. It is best suited for applications with moderate to high pressure differentials, where a single stage of pressure reduction will prove inadequate. This trim incorporates a bottom extended seat having a number of radial holes drilled into it, in addition to the perforated cage. The trim exit velocity is controlled at both stages, thereby minimizing the possibility of erosion and wear. Both the plug and seat are manufactured to close tolerances, to eliminate annular flow between the cage and seat, and subsequently hardened. The holes in the cage and seat are manufactured with a carefully calculated increase in flow area to ensure correct apportionment of the pressure drop in each stage. Both sets of holes have an offset arrangement, which rules out the possibility of reciprocal covering of holes.

Three Stage Perforated Cage (3PC)

The three stage perforated cage trims are used for extremely high pressure differentials, where high noise levels or cavitation would be predicted with even two stage of pressure reduction. This trim incorporates a top and bottom extended seat having multiple drilled holes, in addition to the perforated cage. By directing the flow through a series of staged pressure drops, this trim eliminates cavitation in liquids and provides noise attenuation in compressible fluids undergoing critical pressure drops. The holes in the cage and seat are manufactured with a carefully calculated increase in flow area to ensure correct apportionment of the pressure drop in each stage. The trim is so designed that the opening of the plug affects several holes at any one time, thereby providing smooth control and excellent rangeability.



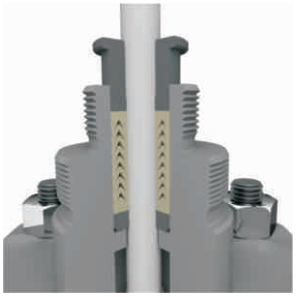
Pressure Balancing

Balanced Trim

Unbalanced Trim

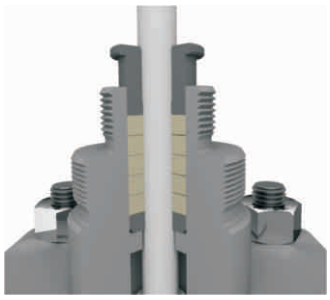
Pressure balancing is utilized when the actuator cannot generate enough force to open/close the valve against the fluid pressure. The pressure balanced trim has multiple transfer holes drilled into the plug, so as to equalize the fluid pressure above and below the plug. This effectively nullifies the unbalanced force acting on the plug due to the fluid pressure, thereby reducing the actuator thrust requirement. Thus control valves with balanced trim can be operated even by very small actuators. The annular leakage past the plug is prevented by additional sealing rings around the top of the plug.

Gland Packing



PTFE V-ring Packing

The plug stem is sealed by the gland packing. The packing is made up of virgin PTFE V-rings for applications where the fluid temperature is up to 200°C.



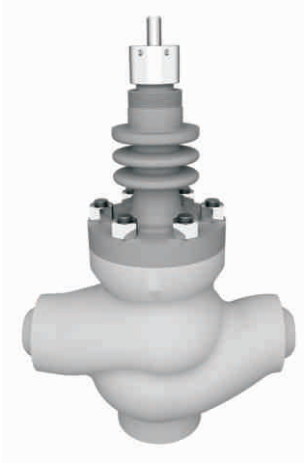
Pure Graphite Packing

The gland packing is made up of endless pure graphite rings for applications where the fluid temperature is up to 566°C.

Bonnet

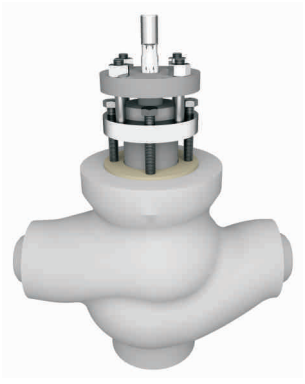
Standard Bolted Bonnet

The standard bolted bonnet is commonly used for low and medium pressure applications having fluid temperatures up to 300°C. The body flange and bonnet flange are joined by studs and nuts, with a gasket of suitable material inserted between the flange faces to facilitate sealing.



Cooling Finned Bonnet

For high temperature applications with fluid temperatures above 300°C, it is necessary to protect the gland packing set from the process fluid heat. For this purpose, the cooling finned bonnet is designed with fins to dissipate the heat and keep the packing below its maximum permissible temperature.



Pressure Seal Bonnet

The pressure seal bonnet is the ideal solution for high pressure applications. This design utilizes the system pressure itself to create a tight body-bonnet seal. Therefore, in pressure seal valves, higher the pressure, tighter the seal.

Table 1: Manufacturing Range

Valve Size (mm)	Pressure Rating (ANSI)					
	#150	#300	#600	#900	#1500	#2500
15	✓	✓	✓	✓	✓	✓
25	✓	✓	✓	✓	✓	✓
40	✓	✓	✓	✓	✓	✓
50	✓	✓	✓	✓	✓	✓
80	✓	✓	✓	✓	✓	✓
100	✓	✓	✓	✓	✓	✓
150	✓	✓	✓	✓	✓	✓
200	✓	✓	✓	✓	✓	✓
250	✓	✓	✓	✓		
300	✓	✓	✓			
350	✓	✓	✓			
400	✓	✓	✓			
500	✓	✓	✓			
600	✓	✓				

Table 2: Materials

Body & Bonnet	A216 WCB / WCC, A217 WC6 / WC9 A105, A182 F11 / F22 A351 CF8 / CF8M / CF3M
Trim	SS 304, SS 316, SS 316L, SS 410, SS 431 SS 440C, 17-4 PH, DIN 1.4922, Monel (All above trim materials can be provided with stelliting / nitriding)
Gasket	PTFE Graphite with SS reinforcement Spiral Wound SS with Graphite
Gland Packing	PTFE V-ring Pure Graphite

Other materials against specific request

Table 3: Flow Coefficient (K_V) Values

Valve Size (mm)	Stroke (mm)	Parabolic Trim	Perforated Cage Trim	
		Linear / EQ%	Linear	EQ%
15	20	0.1, 0.16, 0.25, 0.4, 0.63, 1, 1.6, 2.5, 4	1 - 2.3	1 - 2.1
25	20	All above and 7, 11	1 - 6.7	1 - 5.5
40	20	11, 18, 26	6.7 - 18	5.5 - 10
50	30	18, 26, 43	18 - 40	10 - 24
65	30	26, 43, 68	27 - 60	17 - 36
80	30	43, 68, 100	40 - 70	24 - 40
100	30	68, 100, 150	60 - 85	40 - 50
150	60	150, 260, 380	85 - 350	50 - 180
200	60	260, 380, 650	240 - 375	180 - 250
250	100	380, 650, 900	400 - 785	250 - 550
300	100	650, 900, 1300	575 - 1215	550 - 800
350	100	900, 1300, 1800	785 - 1350	800 - 870
400	100 / 120	1300, 1800, 2500	1215 - 2100	870 - 1400
500	180	1800, 2500, 3500	1350 - 3500	1400 - 2500
600	250	2500, 3500, 5000	2100 - 4500	2000 - 3800

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