



PENNANT

Control Valves 2-Way Globe Control Valves

DESCRIPTION:

1. High flow capacity & rangeability
2. Large type of trim designs for various duty conditions
3. Top opening for easy trim inspection without disturbing the piping.
4. Tight closure even in extreme operating conditions
5. Designed and tested to deliver 100% performance under specified operating conditions
6. Wide selection of actuators to meet most requirements

SIZES: DN15, 25, 50, 80, 100, 150, 200, 250
(NPS ½, ¾, 1, 2, 3, 4, 6, 8, 10)

PRESSURE RATINGS: ANSI #150 #300 & #600
(Higher ratings on request)

BODY MATERIALS: ASTM A216 Gr. WCB
ASTMA A 351 Gr. CF8M

(Other special materials on request)

BONNET: Standard

END CONNECTIONS: Flanged to ANSI #300 / 600
BS /DIN Drillings on request

INTERNALS: SS 410 / 304 / 316 (Hard facing when required. Other materials on request)

TRIM DESIGN: Contoured parabolic / Cage guided /
Pressure balanced

CHARACTERISTIC: Linear / Equal percentage /
ON - OFF (Quick opening)

RANGEABILITY : 1 : 40

GLAND PACKING: PTFE upto 200 °C.
Graphite upto 600 °C.

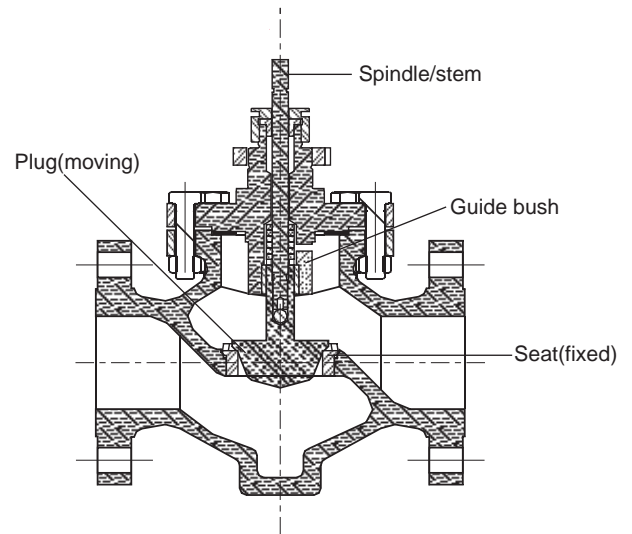
ACCESSORIES: Actuator (Pneumatic / electrical)
Valve positioner, Electro pneumatic convertor,
Solenoid valves. Air set limit switches, air lock relays,
baffle plates (for noise control)

LEAKAGE CLASS: ANSI B.16.104 CL IV for metal to
metal seating. (Class V & Class VI leak tightness with
soft seating on request)

ACTUATOR: Diaphragm & Spring type. Air to open /
Fail to close as a standard. (Piston actuators /
electrical actuators on request)

POSITIONER: Pneumatic valve positioner -
Input 3 to 15 psig (0.2 to 1kg/cm²)
Output 0 to 50 psig (0 to 3.5 kg/cm²)

SELECTION: Each valve is selected for material, trim
size & characteristics depending upon duty
conditions. All calculations computerized.



FLOW CHARACTERISTICS:

The flow characteristic of a valve is the relationship between the valve plug position and the flow through the valve. The flow characteristic of a non-compressible fluid flowing under constant pressure differential is called inherent flow characteristic, which is usually expressed by plotting the valve travel (y-axis) against the flow percentage under constant pressure differential (X-axis)

The two most significant types of inherent flow characteristics are termed linear and equal percentage.

In almost all valves operating in actual conditions, the pressure differential changes in response to a change in the valve opening and the relation between the valve travel and the flow rate deviates from the inherent flow characteristic. Such a characteristic is referred to as effective flow characteristic.

Since the effective flow characteristic of a valve is a reflection of the process characteristics such as inherent flow characteristic of the valve, piping resistance and characteristics of the pressure vessels and pumps all combined, the same valve when used for a different process would inevitably exhibit a different effective flow characteristic.

Linear Characteristic:

In valves of linear characteristic, the flow is directly proportional to the valve travel.

The graph shows the curve plotted on a rectangular coordinate.

Equal Percentage Characteristic:

With an equal percentage plug each increment of plug movement produces a change in the flow which is proportional to the amount flowing before the change occurred.

In the illustration presented alongside, both equal percentage and linear characteristics are plotted for comparison on the semi-logarithmic coordinate system.

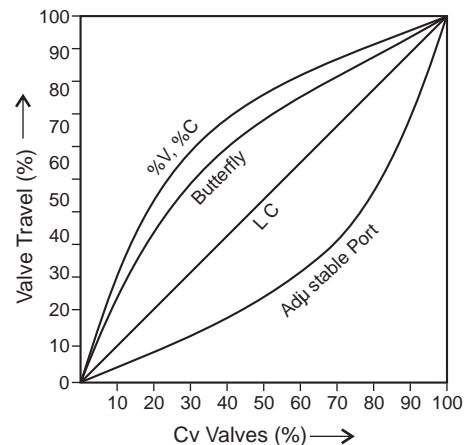
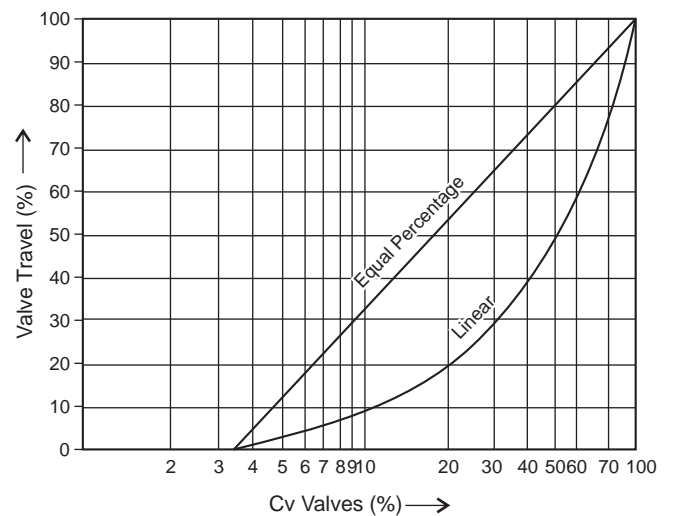
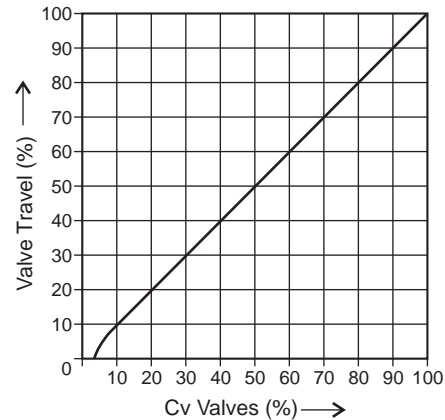
In valves of equal percentage characteristic, the flow change to the lift is small when the valve travel is small. As the valve travel becomes larger, however, the flow change corresponding to the same lift tends to become greater.

Rangeability:

The rangeability of a control valve is defined as the ratio of the maximum controllable flow to the minimum controllable flow. The inherent rangeability of a valve is the ratio of the maximum and minimum flow controllable under constant pressure differential. Hence, it is expressed as $C_v \text{ max.}$ divided by $C_v \text{ min.}$

When the load changes over a wide range, calculations shall be made to obtain $C_v \text{ max.}$ corresponding to

maximum flow and $C_v \text{ min.}$ corresponding to the minimum flow. Then it will be checked whether the valve selected on this basis of $C_v \text{ max.}$ is capable of covering $C_v \text{ min.}$



ORDERING INFORMATION

The following information is required to select and size the valve .

Flow medium

Flow: kg/hr or NM³/hr . - Max. / Min. / Normal

Inlet pressure: kg / cm² (g) - Max. / Min. / Normal

Outlet pressure: kg/cm² (g)

Max. allowable diff. pressure: kg / cm²

Density of medium: kg / m³

Viscosity : CP

Operating temp. Deg. C

Design Press. / temp.

End connection

Material of construction desired

Leak tightness required

Actuator: Pneumatic / electrical

Max. compressed air pressure available: kg / cm²

Control instruments: Required / not required

Incompressible Media - Liquids

$$K_v = \frac{Q}{31,6} \sqrt{\frac{\rho_1}{\Delta p}} \left[\frac{m^3}{h} \right]$$

$$\text{resp. } K_v = \frac{G}{31,6} \sqrt{\frac{1}{\rho_1 \cdot \Delta p}} \left[\frac{m^3}{h} \right]$$

Key:

Q (m ³ / h)	→ p ₁ ↔ p ₂ (bar abs)
Q _N (Nm ³ /h)	Δp (bar)
G (kg/h)	V (m ³ /kg) at 0.5 p ₁ and t ₁
ρ ₁ (kg/m ³)	V ₂ (m ² /kg)
Standard density ρ _N (kg/Nm ³)	T ₁ = 273 + t ₁ (Kelvin)
	t ₁ (°C)

Compressible Media - Steam

if Δp < 0.5 p₁
p₂ > 0.5 p₁

= subcritical pressure drop -

$$K_v = \frac{G}{31,6} \sqrt{\frac{V_2}{\Delta p}} \left[\frac{m^3}{h} \right]$$

if Δp > 0.5 p₁ noise
Δp₂ < 0.5 p₁ problems !

= overcritical pressure drop -

$$K_v = \frac{G}{31,6} \sqrt{\frac{V}{0,5 p_1}} \left[\frac{m^3}{h} \right]$$

Medium	Temp	Velocity of sound
	(°C)	M(m/s)
Steam	150	504
	200	532
Super heated	250	560
	275	573
	300	586
	400	635
	500	680

Requested output velocities smaller than 0.3 M

Compressible Media - Gases

if Δp < 0.5 p₁
p₂ > 0.5 p₁

= subcritical pressure drop -

$$\text{is } K_v = \frac{G}{514} \sqrt{\frac{T_1}{\rho_N \cdot \Delta p \cdot p_2}} \left[\frac{m^3}{h} \right]$$

$$\text{resp. } K_v = \frac{Q_N}{514} \sqrt{\frac{\rho_N \cdot T_1}{\Delta p \cdot p_2}} \left[\frac{m^3}{h} \right]$$

if Δp > 0.5 p₁ noise
p₂ < 0.5 p₁ problems !

= overcritical pressure drop -

$$\text{is } K_v = \frac{G}{257 \cdot p} \sqrt{\frac{T_1}{\rho_N}} \left[\frac{m^3}{h} \right]$$

$$\text{resp. } K_v = \frac{Q_N}{257 \cdot p_1} \sqrt{\rho_N \cdot T_1} \left[\frac{m^3}{h} \right]$$

Medium	Temp	Velocity of sound
	(°C)	M(m/s)
Air	20	343
CO ₂	20	278
Ammonia	20	430
Methane	20	445
N ₂	20	350
O ₂	20	326
H ₂	20	1300
Helium	20	1000

Max. admissible diff. pressure Δp (bar).
 Flow against closing direction of plug. (For single seated control valves)

	DN	Actuator Size & Number	Control Pressure	Actuator Spring & Number	** Kv=01 to 1.6	2.5	4	7	11	26	43	68	100	150	260	380	650	
Opening function (Air opens - spring closes)	15 to 40	A1	1.2	X3000100304	45	35	14	9	5	1.2								
			1.8		260	209	98	69	42	17								
	25 to 40	A1	1.2	X3000100306	73	58	25	17	10	3.2								
			1.8		400	320	150	107	66	30								
	50 to 100	A1	1.2	X3000100305						3.2	1.4	0.5	0.16	-				
			1.8						27	15	9	6	3.9					
		A2	1.2	X3000100301						10.6	5.8	3.1	2	1.2				
			2						77	45	27	19	12.5					
	150 to 200	A2	1.2	X3000100302										1.2	0.5	0.2	-	
			1.6											8	4.6	3.2	1.7	
		A2	1.2	X3000100303										3.4	1.9	1.2	0.6	
			1.8											21.5	12.9	9.2	3.9	
Closing function (Air closes - spring opens)	15 to 40	A1	1.2	X3000100304	45	35	14	9.5	5	1.2								
			3		520	430	200	142	88	36								
			4.3		880	710	343	244	151	62								
	25 to 40	A1	1.2	X3000100306	78	58	25	17	10	3.2								
			3		-	-	300	220	136	56								
			3.2		-	-	343	244	151	62								
	50 to 100	A1	1.2	X3000100305						3.2	1.4	0.5	0.16	-				
			3						56	33	19	14	9					
			4.5						101	60	35	25	16					
		A2	1.2	X3000100301						10.6	5.8	3.1	2	1.2				
			3						130	77	46	33	21					
			3.2						146	86	51	36	23					
	150 to 200	A2	1.2	X3000100302										1.2	0.5	0.2	-	
			3										21	13	9	5		
			4.5											38	23	16	9	
		A2	5.4											48	29	21	12	
			1.2	X3000100303										3.4	1.9	1.2	0.6	
			3										44	26	19	10.7		
Kv Value →					0.1 to 1.6	2.5	4	7	11	26	43	68	100	150	260	380	650	
DN →							15	20	25	40	50	80	100	150		200		

** Kv value steps: 0.1, 0.16, 0.25, 0.4, 0.65, 1, 1.6

Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interest of development and improvement of the product, we reserve the right to change the specifications without prior notice.