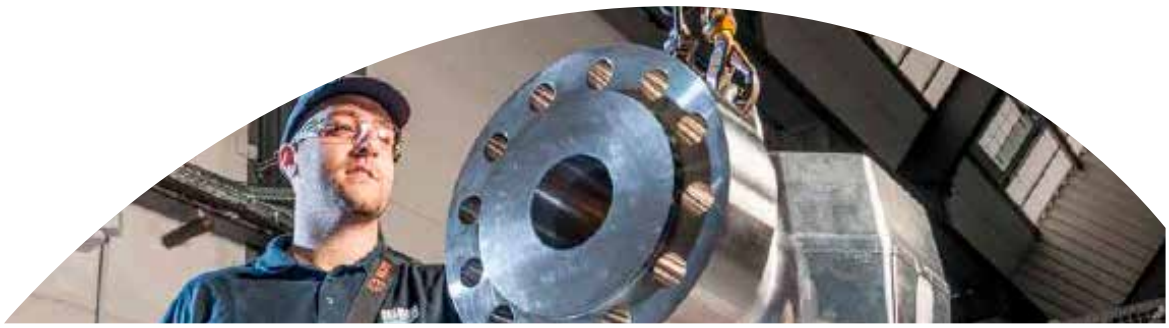
BLAKEBOROUGH®
CONTOUR TRIM & 3-WAY VALVES



TRILLIUM FLOW TECHNOLOGIES™

TRILLIUMFLOW.COM

QUALITY ASSURANCE

Trillium is qualified to industry standards and working practices including:

- ASME BPVC Section III (N and NPT Stamp)
- NQA-1 Quality system
- 10CFR50 App. B
- 10CFR50 Part 21
- RCC-E
- RCC-M
- CSA Z299
- Performance testing and qualifica
  - ASME QME-1
  - ASME B16.41
  - IEEE 323
  - IEEE 344
  - IEEE 382
- ISO 9001:2008
- ISO 14001
- PED 97/23/CE
- API Q1 TO API LICENCES:
  - API 6D (6D-0182)
  - API 6A (64-0445)
- OHSAS 18001
- ATEX 94/9/CE
- Lean manufacturing practices

FPAL empowered by Achilles

Member of BVAA

ATWOOD & MORRILL®

Engineered Isolation & Check Valves

BATLEY VALVE®

Butterfly Valves

RED POINT®

Tailor-Made Valve

BLAKEBOROUGH®

Control, Choke & Steam Condtioning Valves

HOPKINSONS®

Isolation Valves

SARASIN-RSBD®

Safety & Safety Relief Valves

SEBIM®

Nuclear Pilot Operated Safety Valves

TRICENTRIC®

Triple Offset Butterfly Valves

Portfolio of engineered service solutions and aftermarket support

A PROVEN TRACK RECORD

We have extensive references and a proven track record in the supply of valves across a number of key industries. Our valves are industry renowned brands, each with an established reputation for quality engineering and reliability.

VALVE TESTING

All pressure containing items are hydrostatically tested, seat leakage tested and functionally tested. We can also perform gas, packing emission, cryogenic and advanced functional testing, as well as seismic testing for nuclear plications.

MATERIAL TESTING

- Non-destructive examination by radiography, ultrasonics, magnetic particle and liquid penetrant
- Chemical analysis by computer controlled direct reading emission spectrometer
- Mechanical testing for tensile properties at ambient and elevated temperatures, bend and hardness testing. Charpy testing at ambient, elevated and sub-zero temperatures

AFTERMARKET SOLUTIONS

Our valve aftermarket solutions are based on our engineering heritage, applying our OEM knowledge and expertise to maintenance strategies, life extension and upgrade projects.

Trillium Control & Choke Valves provides a wide range of control valves for the process industry. These include severe service, choke, desuperheating and turbine bypass applications.

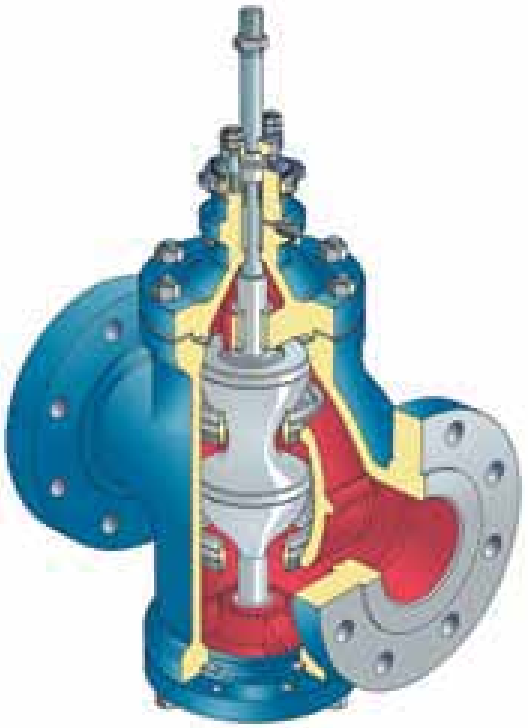
Our world-wide reputation is based on engineering excellence applied to a comprehensive range of specialist products and effective customer support.

CONTENTS

BV800/1/2/3 TOP & BOTTOM GUIDED VALVES

DESIGN FEATURES

- Single & double seated
- Wide range of trim options
- Balanced & unbalanced designs
- Field reversible
- High capacity



PRESSURE RATING

- Class 150 to 1500
- PN10 to PN250

PRESSURE RATING

- Class 150 to 1500

DESCRIPTION

Description The Trillium range of top and bottom guided valves are suited to a wide range of general process applications, such as water, steam, oil, gases and the majority of chemical services. The basic design incorporates a standard contour or 'V' Port plug form as the control element, however, the valves construction allows more specialised trims to be fitted.

The BV800 and BV801 double seated valve offers high capacity on low to medium pressure drop applications.

The design is inherently balanced allowing the use of diaphragm actuators for the majority of applications. For higher pressure drop conditions, the valve can be supplied with multi-flow sleeves to give low pressure recovery. The design is not suited for tight shut-off applications.

The BV 802 and BV 803 series are single seated valves. They offer high rangeability, tight shut-off capability and can also be fitted with anticavitation/ low noise trims.

DESIGN FEATURES

- Top and bottom guided
- Wide range of trim options
- High capacity (BV800/1)
- Excellent rangeability
- Action is field reversible
- High integrity closure (BV802/3)
- Inherently characterised trim
- BV801/BV803 are 'pull stem' to close

PRESSURE RATING

- ASME Class 150 to 1500
- PN10 to PN250

SIZES

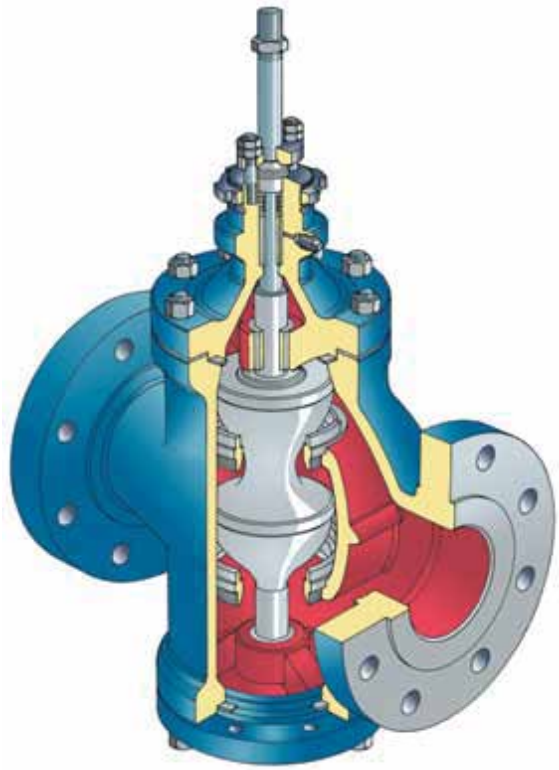
- 40mm to 600mm (BV800/1)
  1 1/2" to 24" (BV800/1)
- 40mm to 250mm (BV802/3)
  1 1/2" to 10" (BV802/3)

TRAVELS

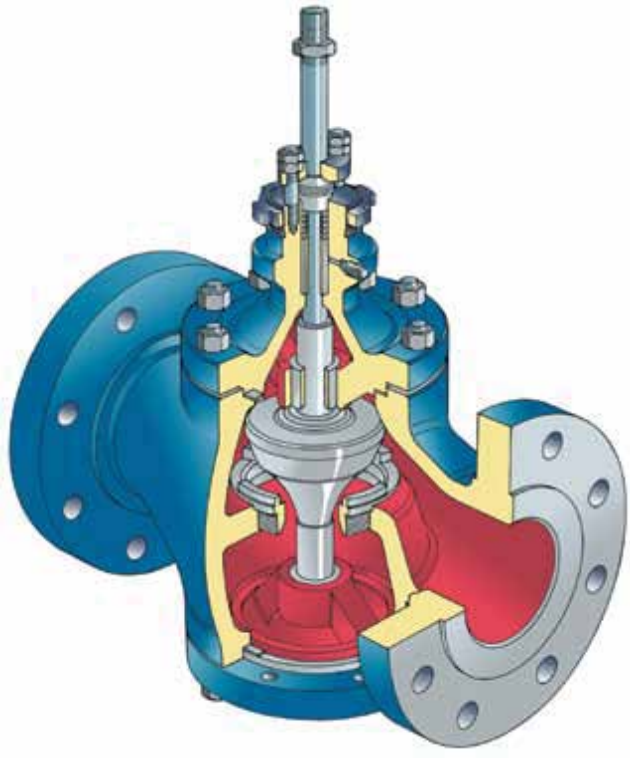
- 28.5mm to 152mm
  1 1/8" to 6"

END CONNECTIONS

- Flanged
- Butt weld
- Socket weld
- Screwed



BV800/1 top and bottom guided valve, double seated type, arranged for pull stem to open. The valve illustrated is shown with linear contoured trim. There are a variety of other trim design options.



BV802/3 top and bottom guided valve, single seated type, arranged for pull stem to open. The valve illustrated is shown with linear contoured trim. There are a variety of other trim design options.

TRIM OPTIONS

CONTOUR/"V" PORT

Several trim options are available as standard in the top and bottom guided series of valves. The contour "V" port trim presents a smooth profile to the flow leading to relatively high pressure recovery which is ideal for low pressure drop flow control applications. These designs are suitable for the majority of control applications.

CHARACTERISTICS SEAT OPTIONS

- Equal percent
- Metal to metal
- Linear
- Resilient seal
- Quick open
- Hard faced

MULTI-FLOW TRIM

The multi-flow trim is designed for applications where customers require the top and bottom guided style of valve associated with the benefits of the traditional cage guided valve.

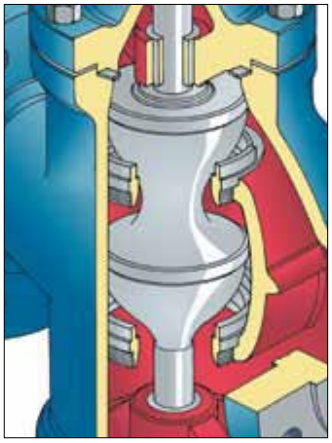
- Low noise
- Anti cavitation
- Low pressure recovery

The trim option can also be inverted if it is desired to change the actuator action.

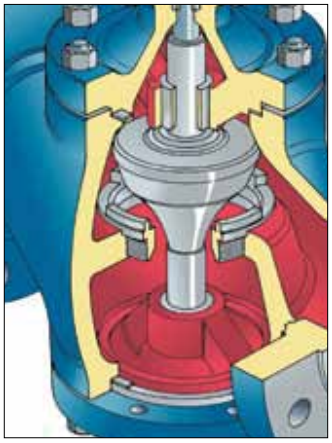
BV802/BV803 VALVES WITH SOFT FACE TRIM

The soft face trim option is specified on applications where bubble tight closure is required. It is only available on the single seated valves where the un-balanced nature of the valve allows a better class of seat closure.

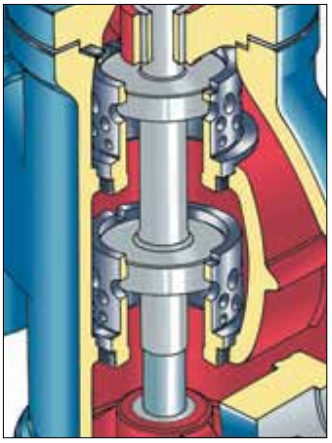
The soft seal is fitted into the plug head and retained by a shroud. The seat is designed with a lip so that when the plug head contacts the seat, the seat face is deformed to produce a high integrity seal.



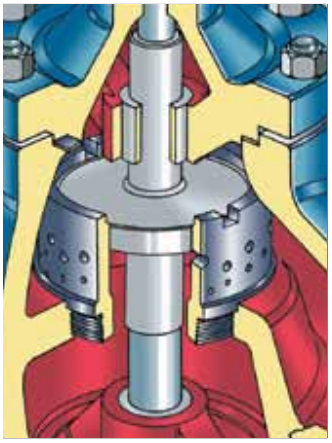
BV800/1 valve with contour trim.



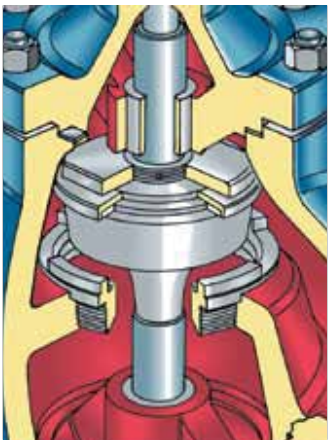
BV802/3 valve with contour trim.



BV800/1 valve with multi-flow trim.



BV802/3 valve with multi-flow trim.



BV802/3 valve with soft face trim.

Standard contour trims. Plugs can be inverted to change the 'fail' action of the valve.

VALVE SELECTION GUIDELINES

Valve flow coefficient

All valves are sized using the valve flow coefficient, Cv, in accordance with ISA 75.01.01 as detailed in the Trillium sizing and selection manual. Design Cv values are given in table 6.

Body Selection

The valve body size and style is selected on the basis of supporting the selected trim design and Cv. In addition consideration is made of the velocity and the required pressure drop application. Liquid velocities are limited mainly due to erosion considerations, whereas gas or vapour flow velocities are limited for trim stability noise and vibration considerations.

Trim Selection

The selection criteria of the valve trim ranges through valve flow coefficient, rangeability, pressure drop, cavitation, flashing and noise consideration. Trillium sizing and selection manual details the various calculation methods and selection limitations for each trim design.

TABLE 1 - STANDARD MATERIAL COMBINATIONS

BODY BONNET BOTTOM FLANGE	CARBON STEEL	CHROME MOLY CAST OR WROUGHT	304 OR 304L ST.ST.	347 ST.ST.	316 ST.ST.	HASTELLOY B OR C	MONEL	ALLOY 20	DUPLEX
Body Gasket	316 ST.ST.	316 ST.ST.	316 ST.ST.	316 ST.ST.	316 ST.ST.	PTFE	PTFE	PTFE	PTFE
Body Studs/ Nuts	B7/2H	B7/2H or B16/7	B8/8	B8/8	B8/8	B8/8	B8/8	B8/8	B8/8

TABLE 2 - TRIM MATERIAL COMBINATIONS

Plug	316 ST.ST.	316 Stellite Faced	316 Full Stellite	Hastelloy B/C	Monel 400	Alloy 20	17-4PH ST.ST.	NACE 316 ST.ST.	Duplex
Seat	316 ST.ST.	316 Stellite Faced	316 Full Stellite	Hastelloy B/C	Monel 400	Alloy 20	17-4PH ST.ST.	316 ST.ST.	Duplex
Stem	316 ST.ST.	316 ST.ST.	316 ST.ST.	Hastelloy B/C	Monel 400	Alloy 20	316 ST.ST.	316 ST.ST.	Duplex
Guide Bush	440C ST.ST.	440C ST.ST.	Stellite	Stellite	Monel K500	Stellite	440C ST.ST.	Stellite	Stellite
Packing Parts	316 ST.ST.	316 ST.ST.	316 ST.ST.	Hastelloy B/C	Monel 400	Alloy 20	316 ST.ST.	316 ST.ST.	Duplex

PTFE gaskets are suitable for temperatures up to 232oC (450oF); above this the gasket material is specifically considered. Materials listed are standard combination only. Other material combinations can be accommodated. Trim materials specified can be supplied to conform to NACE Specification. Material can be supplied to UOP spec. Other material combinations are available.

TABLE 3 – RECOMMENDED LIMITING INLET VELOCITIES FOR CONTROL VALVES

VALVE SIZE	LIQUID M/S	LIQUID FT/S	STEAM OR GAS M/S	STEAM OR GAS FT/S	MAX OUTLET (STEAM OR GAS)
40 & 50mm (11/2" & 2")	12	40	105	350	0.65 x SONIC
80 & 100mm (3" & 4")	11	36	100	315	
150 & 200mm (6" & 8")	10.5	30	90	275	
250 to 600mm (10" to 24")	7.5	25	70	225	

Note: 0.3 sonic for low noise applications

TABLE 4 – CONTROL VALVE LEAK RATES IN ACCORDANCE WITH ASME/FCI 70-2 (IEC 60534-4)

VALVE SIZE	TRIM STYLE	LEAKAGE CLASS	MAXIMUM ALLOWABLE LEAKAGE
BV800 & BV801 Double Seated Valves	Metal Faced	Class III	0.1% of Rated Capacity
BV802 & BV803 Single Seated Valves	Unbalanced Metal to Metal	Class IV	0.01% Rated Capacity
BV802 & BV803 Single Seated Valves	Unbalanced Metal to Metal Lapped Seats	Class V	0.0005ml/min of water per Inch of Port Diameter per PSI differential
BV802 & BV803 Single Seated Valve	Unbalanced Resilient Seat	Class VI	Bubble Tight

TABLE 5 – RANGEABILITY FOR CONTROL VALVES

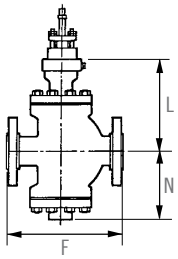
VALVE SIZE	BV800 & BV801 DOUBLE SEATED			BV802 & BV803 SINGLE SEATED		
	FULRATE	MIDRATE	LORATE	FULRATE	MIDRATE	LORATE
40 & 50mm (1½" & 2")	30:1	30:1	20:1	30:1	30:1	20:1
80 & 100mm (3" & 4")	40:1	30:1	30:1	40:1	30:1	30:1
150 & 200mm (6" & 8")	45:1	40:1	30:1	45:1	40:1	30:1
250 to 600mm (10" to 24")	50:1	45:1	30:1	50:1	45:1	30:1

Note: Standard/inherant rangeability of linear characteristic trims is 20:1 corresponding to a valve opening of 5%. Control at openings less than 5% is not recommended for prolonged periods.

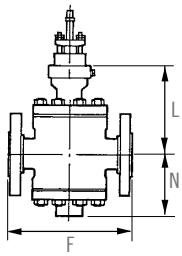
TABLE 6 – DESIGN CV VALUES

TRIM TYPE	BODY SIZE	BV800 & BV801 DOUBLE SEATED			BV802 & BV803 SINGLE SEATED		
		FULRATE	MIDRATE	LORATE	FULRATE	MIDRATE	LORATE
LINEAR	40mm (1½")	37	25	17	30	20	13
	50mm (2")	65	37	25	52	30	20
	80mm (3")	140	100	65	110	85	52
	100mm (4")	255	140	100	190	110	85
	150mm (6")	575	415	255	390	285	190
	200mm (8")	1000	575	415	650	390	285
	250mm (10")	1440	1000	575	950	650	390
	300mm (12")	1850	1440	1000	1430	950	650
	400mm (16")	2800	2200	1850	CF	CF	CF
	500mm (20")	5500	2800	2200	CF	CF	CF
	600mm (24")	7950	5500	2800	CF	CF	CF
EQUAL %	40mm (1½")	32	20	13	28	20	13
	50mm (2")	60	32	20	52	28	20
	80mm (3")	140	100	60	115	76	52
	100mm (4")	255	140	100	170	115	76
	150mm (6")	520	375	255	340	240	170
	200mm (8")	780	520	375	550	340	240
	250mm (10")	1350	780	520	900	550	340
	300mm (12")	1700	1350	780	1350	900	555
	400mm (16")	2560	2100	1700	CF	CF	CF
	500mm (20")	5100	2560	2100	CF	CF	CF
	600mm (24")	7400	5100	2560	CF	CF	CF
QUICK OPEN	40mm (1½")	37	25	17	30	25	15
	50mm (2")	65	37	25	58	30	25
	80mm (3")	140	100	65	125	80	58
	100mm (4")	255	140	100	230	125	80
	150mm (6")	575	415	255	450	340	230
	200mm (8")	1000	575	415	800	450	340
	250mm (10")	1440	1000	575	1250	800	450
	300mm (12")	1850	1440	1000	1650	1250	800
	400mm (16")	2800	2200	1850	CF	CF	CF
	500mm (20")	5000	2800	220	CF	CF	CF
	600mm (24")	8200	5800	2800	CF	CF	CF

CF = Consult factory



BV800 valve



BV802 valve

TABLE 7 – VALVE DIMENSIONS

		40MM (1 1/2")	50MM (2")	80MM (3")	100MM (4")	150MM (6")	200MM (8")	250MM (10")	300MM (12")	400MM (16")	500 MM (20")	600 MM (24")
Up to ASME 300 and PN40 (F)		235 (9 1/4)	267 (10 1/2)	317 (12 1/2)	368 (14 1/2)	473 (18 5/8)	568 (22 3/8)	717 (28 1/4)	819 (32 1/4)	940 (37)	1410 (55 1/2)	1470 (57 7/8)
ASME 600 and PN100 (F)		251 (9 7/8)	286 (11 1/4)	337 (13 1/4)	394 (15 1/2)	508 (20)	610 (24)	762 (30)	889 (35)	990 (39)	1413 (55 5/8)	1600 (63)
Up to ASME 300 Ring Joint (F)		248 (9 3/4)	283 (11 1/8)	333 (13 1/8)	384 (15 1/8)	489 (19 1/4)	584 (23)	733 (28 7/8)	835 (32 7/8)	956 (37 5/8)	1425 (56 1/8)	1486 (58 1/4)
ASME 600 Ring Joint (F)		251 (9 7/8)	286 (11 1/4)	340 (13 3/8)	397 (15 5/8)	511 (20 1/8)	613 (24 1/8)	765 (30 1/8)	892 (35 1/8)	993 (39 1/8)	1425 (56 1/8)	1616 (63 5/8)
Up to 300 Butt/Socket/SCW (F)		251 (9 7/8)	286 (11 1/4)	337 (13 1/4)	394 (15 1/2)	508 (20)	610 (24)	762 (30 1/8)	775 (30 1/2)	1108 (43 5/8)	CF	CF
Up to 600 Butt/Socket/SCW (F)		251 (9 7/8)	286 (11 1/4)	337 (13 1/4)	394 (15 1/2)	508 (20)	610 (24)	762 (30)	820 (32 1/4)	1108 (43 5/8)	CF	CF
BV 800/	Plain (L)	191 (7 1/2)	197 (7 3/4)	235 (9 1/4)	251 (9 7/8)	356 (14)	381 (15)	464 (18 1/8)	502 (19 3/4)	689 (27 1/8)	902 (35 1/2)	1220 (48)
BV 801	Normalising (L)	311 (12 1/4)	323 (12 7/8)	352 (13 7/8)	400 (15 3/4)	464 (18 1/4)	530 (20 7/8)	705 (27 3/4)	791 (31 1/8)	1041 (41)	1260 (49 5/8)	1441 (56 3/4)
	Bellows (L)	365 (14 3/8)	378 (14 7/8)	464 (18 1/4)	476 (18 3/4)	660 (26)	673 (26 1/2)	895 (35 1/4)	910 (35 7/8)	CF	CF	CF
BV 802/	Plain (L)	159 (6 1/4)	165 (6 1/2)	203 (8)	194 (7 5/8)	311 (12 1/4)	376 (10 7/8)	349 (13 3/4)	CF	CF	CF	CF
BV 803	Normalising (L)	283 (11 1/8)	295 (11 5/8)	321 (12 5/8)	343 (13 1/2)	419 (16 1/2)	422 (16 5/8)	591 (23 1/4)	CF	CF	CF	CF
	Bellows (L)	337 (13 1/4)	346 (13 5/8)	432 (17)	422 (16 5/8)	578 (22 3/4)	578 (22 3/4)	778 (18 5/8)	CF	CF	CF	CF
BV800/1 (N)		156 (6 1/8)	168 (6 3/8)	210 (8 1/4)	222 (8 3/4)	330 (13)	356 (14)	438 (30 5/8)	473 (18 5/8)	660 (26)	839 (33)	965 (38)
BV802/3 (N)		127 (5)	137 (5 3/8)	178 (7)	165 (6 1/2)	238 (9 3/8)	245 (9 5/8)	311 (12 1/4)	CF	CF	CF	CF
Valve Travel		28.6 (1 1/8)	28.6 (1 1/8)	38.1 (1 1/2)	38.1 (1 1/2)	57.2 (2 1/4)	57.2 (2 1/4)	88.9 (3 1/2)	88.9 (3 1/2)	88.9 (3 1/2)	152 (6)	152 (6")

CF = Consult factory. Consult factory for dimensions of 900 & 1500 rated valves

TABLE 7 – VALVE DIMENSIONS

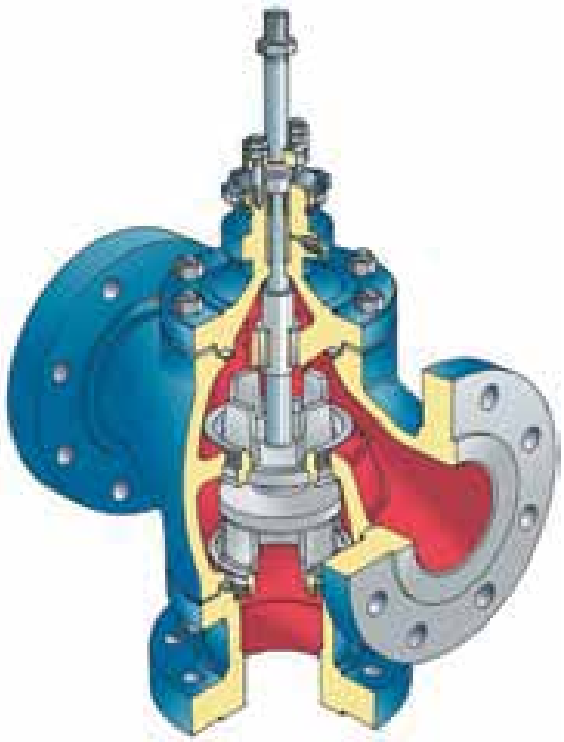
			40MM (1 1/2")	50MM (2")	80MM (3")	100MM (4")	150MM (6")	200MM (8")	250MM (10")	300MM (12")	400MM (16")	500 MM (20")	600 MM (24")
BV800 & BV801	CLASS 300 (NP40)	Plain	19	28	53	76	155	285	426	686	1530	3048	CF
		Norm	22	31	57	81	160	290	433	696	1541	3089	CF
		Bellows	29	38	71	105	192	337	470	740	1600	CF	CF
	CLASS 600 (NP100)	Plain	20	31	58	100	190	347	507	750	1620	CF	CF
		Norm	23	34	62	106	195	352	520	770	1640	CF	CF
		Bellows	30	41	76	129	227	399	560	800	1690	CF	CF
BV802 & BV803	CLASS 300 (NP40)	Plain	19	29	43	61	135	209	330	NA	NA	CF	CF
		Norm	22	32	47	66	140	215	340	NA	NA	CF	CF
		Bellows	29	39	61	90	172	261	430	NA	NA	CF	CF
	CLASS 600 (NP100)	Plain	20	31	46	80	180	250	400	NA	NA	CF	CF
		Norm	23	34	49	85	185	256	415	NA	NA	CF	CF
		Bellows	30	41	64	109	217	302	485	NA	NA	CF	CF

CF = Consult factory

BV830 & BV831 3-WAY CONTROL VALVES

DESIGN FEATURES

- Top & skirt guided
- High capacity
- High stability
- Easy maintenance
- Wide range of trim options



PRESSURE RATING

- ASME Class 150 to 1500
- PN10 to PN250

PRESSURE RATING

- 40mm to 400mm (1 1/2” to 16”)

DESCRIPTION

The BV830/831 valves are designed for either blending two different flows or for dividing a flow into two proportional amounts. The valves can be used on a wide range of process applications for air, water, steam, oil, gases and chemical services.

The BV830 has two inlets and a common outlet branch: it is used for proportional blending of two flows into one stream, on such applications as control of process fluid temperature downstream of heat exchangers, or as mixing valves to control the composition of service media. It can also be used for flow splitting duties. The total capacity is constant irrespective of plug position.

The BV831 valve is used for proportional control on flow splitting applications. This valve has two outlets and a common inlet branch. They are used for proportional flow splitting, diverting a portion of the process medium from one part of a system to another.

A typical application is on the upstream side of heat exchangers to control the temperature of the process fluid.

DESIGN FEATURES

- Top and Skirt guided
- Wide range of trim sizes
- High Capacity
- High Stability
- Balanced

PRESSURE RATING

- ASME Class 150 to 1500
- PN10 to PN250

SIZES

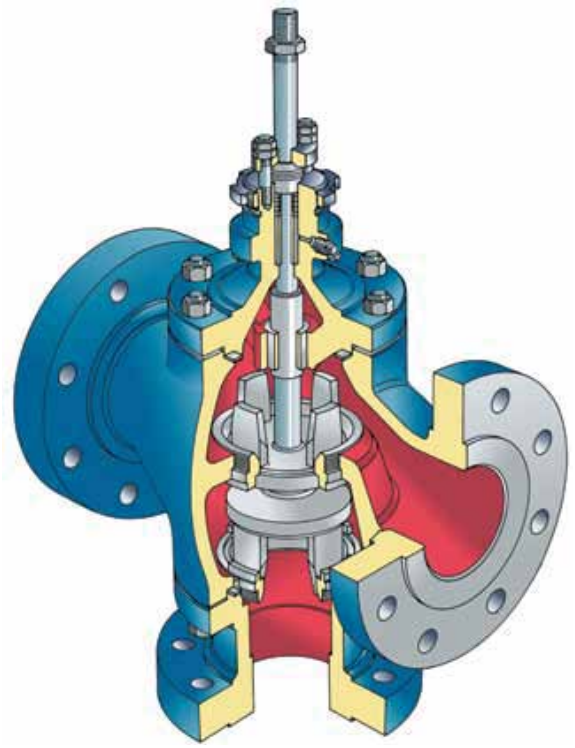
- 40mm to 400mm
  1 1/2” to 16”

TRAVELS

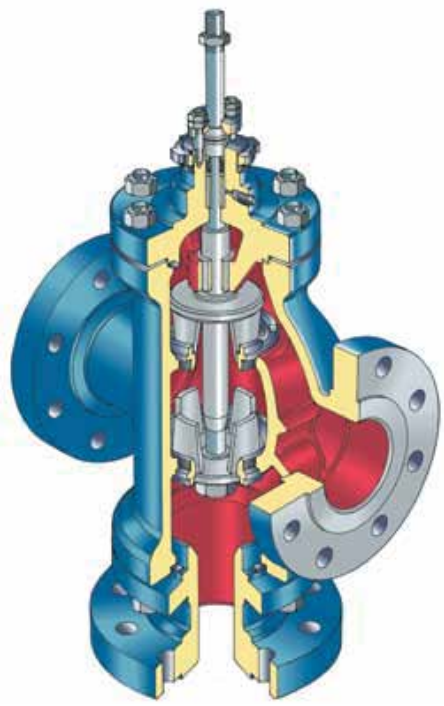
- 28.5mm to 89mm
  1 1/2” to 3 1/2”

END CONNECTIONS

- Flanged
- Butt weld (on special request)
- Socket weld (on special request)
- Screwed (on special request)



BV830 three way valve for flow mixing applications. The valve can also be used for flow splitting if the flow is in reverse



BV831 three way valve for flow splitting applications

TRIM OPTIONS

"V" PORT STANDARD TRIM

The standard trim design for three way applications is the "V" port plug. This design provides high flow capacity, high rangeability and good leakage capability. Other trim options are available as semi-special in the three way valve.

CHARACTERISTICS

- Linear
- Equal percentage (special applications)
- Linear cascade (multi-stage)

SEAT OPTIONS

- Metal to metal
- Soft face
- Hard faced

BV830/BV831 VALVES WITH SOFT FACE TRIM

The soft face trim option is specified on applications where bubble tight closure is required.

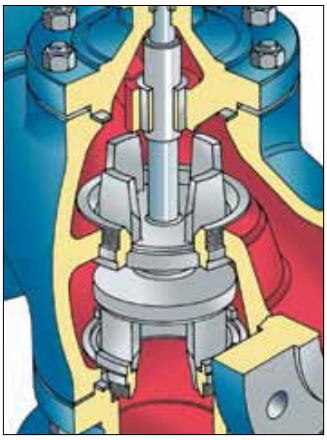
The soft seal is fitted into the plug head and retained by a shroud. The seat is designed with a lip so that when the plug head contacts the seat a high integrity valve closure is achieved.

SEVERE SERVICE TRIM

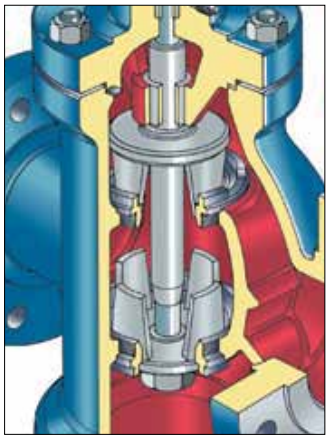
Specialist severe service trims can be accommodated within the BV830 body design.

The cascade trim is normally used for applications where the flow requires treatment at source to prevent cavitation and high noise levels on high pressure drop liquid and gas applications.

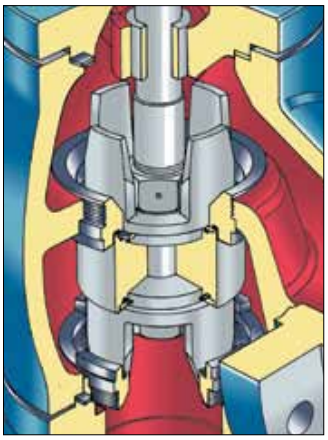
- Low noise
- Anti-cavitation
- Low pressure recovery



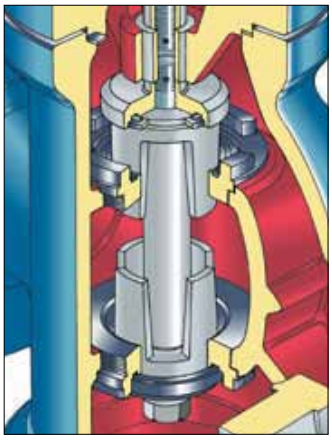
BV830 valve standard contour trim



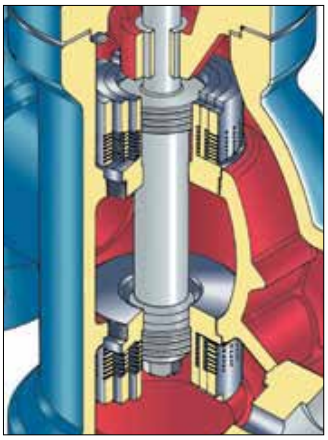
BV831 valve standard contour trim



BV830 valve with soft face trim

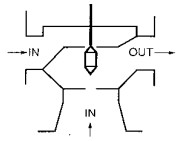


BV831 valve with soft face trim

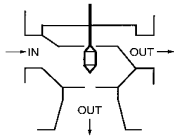


BV831 valve with cascade trim

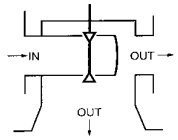
FLOW DIRECTION



BV830
Normal Flow
Mixing (Blending)



BV830
Reverse Flow
Splitting (Diverting)



BV831
Normal Flow
Splitting (Diverting)

CHARACTERISTICS

Valve flow coefficient

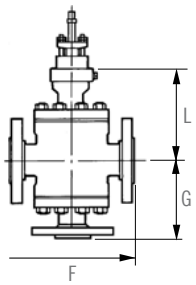
All valves are sized using the valve flow coefficient, Cv, in accordance with ISA 75.01.01 as detailed in the Trillium sizing and selection manual. Design Cv values are given in table 4.

Body Selection

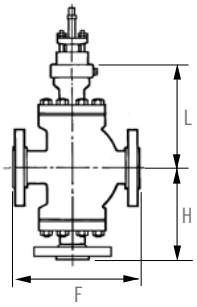
The valve body size and style is selected on the basis of supporting the selected trim design and design Cv. In addition, consideration is made of the velocity and the required pressure drop application. Liquid velocities are limited mainly due to erosion considerations, whereas gas or vapour flow velocities are limited for trim stability noise and vibration considerations.

Trim Selection

The selection criteria of the valve trim ranges through valve flow coefficient, rangeability, pressure drop, cavitation, flashing and noise consideration. Trillium sizing and selection manual details the various calculation methods and selection limitations for each trim design.



BV830 valve



BV831 valve

TABLE 1 – STANDARD MATERIAL COMBINATIONS

BODY BONNET BOTTOM FLANGE	CARBON STEEL	CHROME MOLY STEEL	304 OR 304L ST.ST.	347 ST.ST.	316 ST.ST.	HASTELLOY B OR C	MONEL	ALLOY 20	DUPLEX
Body Gasket	316 ST.ST	316 ST.ST	316 ST.ST	316 ST.ST	316 ST.ST	PTFE	PTFE	PTFE	PTFE
Body Studs/Nuts	B7/2H	B7/2H or B16/7	B8/8	B8/8	B8/8	B8/8	B8/8	B8/8	B8/8

TABLE 2 – TRIM MATERIAL COMBINATIONS

Plug	316 ST.ST.	316 Stellite Faced	316 Full Stellite	Hastelloy B/C	Monel 400	Alloy 20	17-4PH ST.ST.	NACE 316 ST.ST.	Duplex
Seat	316 ST.ST.	316 Stellite Faced	316 Full Stellite	Hastelloy B/C	Monel 400	Alloy 20	17-4PH ST.ST.	316 ST.ST.	Duplex
Stem	316 ST.ST.	316 ST.ST.	316 ST.ST.	Hastelloy B/C	Monel 400	Alloy 20	316 ST.ST.	316 ST.ST.	Duplex
Guide Bush	440C ST.ST.	440C ST.ST.	Stellite	Stellite	Monel K500	Stellite	440C ST.ST.	Stellite	Duplex
Packing Parts	316 ST.ST.	316 ST.ST.	316 ST.ST.	Hastelloy B/C	Monel 400	Alloy 20	316 ST.ST.	316 ST.ST.	Duplex

PTFE gaskets are suitable for temperatures up to 232ºC (450ºF); above this the gasket material is specifically considered. Materials listed are standard combination only. Other material combinations can be accommodated. Trim materials specified can be supplied to conform to NACE Specification. Material can be supplied to UOP spec. Other material combinations are available.

TABLE 3 – RECOMMENDED LIMITING INLET VELOCITIES FOR CONTROL VALVES

VALVE SIZE	LIQUID M/S	LIQUID FT/S	STEAM OR GAS M/S	STEAM OR GAS FT/S	MAX OUTLET (STEAM OR GAS)
40 & 50mm (11/2" & 2")	12	40	105	350	0.65 x SONIC
80 & 100mm (3" & 4")	11	36	100	315	
150 & 200mm (6" & 8")	10.5	30	90	275	
250 to 600mm (10" to 24")	7.5	25	70	225	

Note: 0.3 sonic for low noise applications

TABLE 4 – FLOW COEFFICIENTS CV (US UNITS)

TRIM TYPE	BODY SIZE	BV830 FULRATE	BV831 FULRATE
LINEAR	40mm (1 1⁄2")	27	27
	50mm (2")	40	40
	80mm (3")	90	90
	100mm (4")	145	130
	150mm (6")	300	340
	200mm (8")	550	500
	250mm (10")	775	725
	300mm (12")	1200	1100
	400mm (16")	2200	2100

TABLE 5 – NORMAL CONTROL VALVES LEAK RATES

TRIM STYLE	ASME LEAKAGE CLASS	MAXIMUM ALLOWABLE LEAKAGE
Unbalanced Metal to Metal	Class IV	0.01% Rated Capacity
Unbalanced Metal to Metal Lapped Seats	Class V	0.0005 ml of water per inch of port diameter per PSI differential
Unbalanced Soft Face	Class VI	Bubble Tight

TABLE 6 – VALVE DIMENSIONS

		40MM (1 1/2")	50MM (2")	80MM (3")	100MM (4")	150MM (6")	200MM (8")	250MM (10")	300MM (12")	400MM (16")
Up to ASME 300 and PN40	F	235 (9 1/4)	267 (10 1/2)	317 (12 1/2)	368 (14 1/2)	473 (18 5/8)	568 (22 3/8)	718 (28 1/4)	775 (38 1/2)	940 (37)
	G	157 (6 3/16)	168 (6 5/8)	200 (7 7/8)	216 (8 1/2)	273 (10 3/4)	306 (12 1/16)	413 (16 1/4)	433 (17)	508 (20)
	H	187 (7 3/8)	200 (7 7/8)	232 (9 1/8)	273 (10 3/4)	319 (12 9/16)	379(14 15/16)	540 (21 1/4)	562 (22 1/8)	635 (25)
ASME 600 and PN100	F	251(9 7/8)	286 (11 1/4)	337 (13 1/4)	394 (15 1/2)	508 (20)	610 (24)	762 (30)	820 (32 1/4)	990 (39)
	G	164 (6 7/16)	178 (7)	229 (9)	267 (10 1/2)	319 (12 9/16)	368 (14 1/2)	440 (17 5/16)	455(17 15/16)	533 (21)
	H	195 (7 11/16)	210 (8 1/4)	260 (10 1/4)	324 (12 3/4)	367 (14 7/16)	435 (17 1/8)	562 (22 1/8)	584 (23)	660 (26)
Up to ASME 300 Ring Joint	F	248 (9 3/4)	283 (11 1/8)	333 (13 1/8)	384 (15 1/8)	489 (19 11/4)	584 (23)	733 (28 7/8)	791 (31 1/8)	956 (37 5/8)
	G	160 (6 5/16)	172 (6 3/4)	204 (8)	220 (8 5/8)	277 (11)	310 (12 1/8)	417 (16 3/8)	437 (17 1/4)	515 (20 1/4)
	H	190 (7 1/2)	204 (8)	236 (9 1/4)	277 (10 7/8)	323(12 11/16)	383 (15 1/16)	565 (22 1/4)	565 (22 1/4)	638 (25 1/8)
ASME 600 Ring Joint	F	251 (9 7/8)	289	340	397	511	613	765	823	993 (39 1/8)
	G	167 (6 9/16)	181 (7 1/8)	332 (9 1/8)	270 (9 1/4)	322(12 11/16)	371 (14 5/8)	443 (17 7/16)	458 (18)	536 (21 1/8)
	H	196 (7 3/4)	211 (8 5/16)	261 (10 5/16)	325 (12 3/16)	368(14 1/2)	436 (17 3/16)	563 (22 3/16)	585 (23 1/16)	661 (26 1/16)
Plain (L)	L	159 (6 1/4)	165 (6 1/2)	203 (8)	194 (7 5/8)	311 (12 1/4)	376 (10 7/8)	349 (13 3/4)	CF	CF
Normalising (L)	L	283 (11 1/8)	295 (11 5/8)	321 (12 5/8)	343 (13 1/2)	419 (16 1/2)	422 (16 5/8)	591 (23 1/4)	CF	CF
Plain (L)	L	191 (7 1/2)	197 (7 3/4)	235 (9 1/4)	251 (9 7/8)	356 (14)	381 (15)	464 (18 1/8)	502 (19 3/4)	689 (27 1/8)
Normalising (L)	L	311 (12 1/4)	323 (12 7/8)	352 (13 7/8)	400 (15 3/4)	464 (18 1/4)	530 (20 7/8)	705 (27 3/4)	791 (31 1/8)	1041 (41)
Bellows (L)	L	365 (14 3/8)	378 (14 7/8)	464 (18 1/4)	476 (18 3/4)	660 (26)	673 (26 1/2)	895 (35 1/4)	910 (35 7/8)	CF
Valve Travel		28.6 (1 1/8)	28.6 (1 1/8)	38.1 (1 1/2)	38.1 (1 1/2)	57.2 (2 1/4)	57.2 (2 1/4)	88.9 (3 1/2)	88.9 (3 1/2)	88.9 (3 1/2)

CF = Consult factory

TABLE 7 – WEIGHTS (FLANGED VALVES - KG)

			40MM (1 1/2")	50MM (2")	80MM (3")	100MM (4")	150MM (6")	200MM (8")	250MM (10")	300MM (12")	400MM (16")
BV830	CLASS 300 (NP40)	Plain	20	35	50	68	150	253	401	CF	CF
		Norm	22	38	54	73	155	259	411	CF	CF
	CLASS 600 (NP100)	Plain	22	38	55	95	210	320	510	CF	CF
		Norm	24	44	59	115	255	365	580	CF	CF
BV831	CLASS 300 (NP40)	Plain	23	34	64	91	186	342	515	823	CF
		Norm	26	38	68	98	192	348	520	835	CF
		Bellows	35	46	85	126	230	405	516	888	CF
	CLASS 600 (NP100)	Plain	24	37	70	120	228	416	480	836	CF
		Norm	28	41	75	127	234	422	498	850	CF
		Bellows	36	49	91	155	272	479	582	960	CF

CF = Consult factory

CHARACTERISTICS

Standard
For applications where the temperature of the controlled fluid is between -18˚C (0˚F) and 232˚C (450˚F). May be used with graphite packing up to 315˚C (600 ˚F). Although modern packagings are suitable for much higher temperatures, it is recommended that the normalising bonnet be fitted in cases where the temperatures exceed the above values to accommodate lagging of the control valve body.

Normalising
For protection of the gland packing at temperatures above 232˚C (450˚F) and below -18˚C (0˚F) down to -100 ˚C (-150˚F) The bonnet is designed with fins which dissipate the heat from process fluid and help protect the packings and actuator assembly from high temperatures. In addition, the normalising bonnet is longer than the standard bonnet so that the valve can easily be lagged without interference with the actuator.

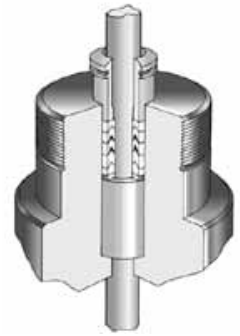
Bellows Seal
A positive leakproof stem seal for cases where gland leakage cannot be permitted. The standard bellows material is 321 stainless steel, although many other materials are available on request. The design consists of a welded flexible steel bellows which is clamped in an extended bonnet/ bonnet hood. This effectively cuts out any possible leakage path around the plug stem and therefore prevents emissions from the valve packings. Packings are fitted in these valves but only act as a backup to the bellows.

Cryogenic
Used for temperatures below -100˚C (-150˚F). The bonnet designed with a long necked section which distances the packing away from the process fluid. The necked section is designed with a minimum wall section to minimise heat transfer. Cold box extension/cryogenic bonnets are also available.

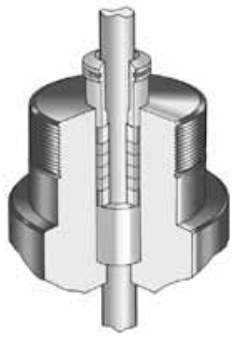
PTFE Chevron
Used for applications where the temperature is between cryogenic and 232˚C (450˚F).

Grafoil
Used on high temperature applications where the temperature exceeds 232˚C (450˚F).

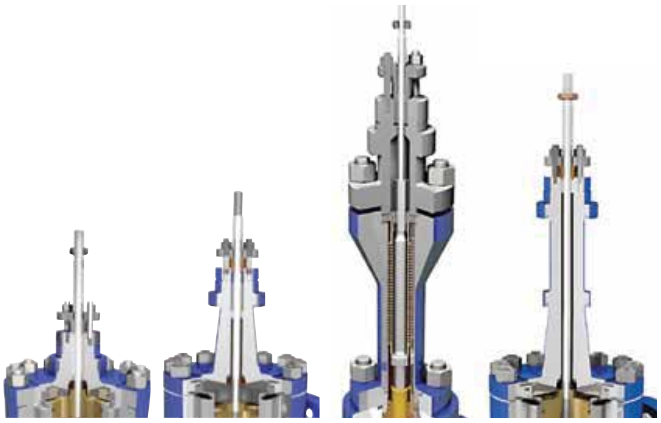
Other packing types can be accommodated as required.



PTFE Chevron



Grafoil



Standard Normalising Bellows Seal Cryogenic

PACKING

Packings are selected based on fluid temperature and fluid type. The most common packing system materials are PTFE for low temperature and graphite for high temperature. For hydrocarbon service and where emission levels need to be controlled, further types of packings are available. Packings have been tested to prove emission levels of less than 500 parts per million over 50,000 cycles and under thermal cycling conditions.

SILENCERS

Silencers/Dynamic Attenuator
This equipment is used on gas/vapour services to control fluid velocity and to produce dynamic attenuation. Each silencer is designed for its specific application and is considered in conjunction with the selection of the upstream control valve/trim. In selecting the silencer design, all operating conditions are considered to ensure acceptable performance.

CHARACTERISTICS

Linear

This characteristic provides a flow rate which is directly proportional to the valve lift. The proportional relationship produces a characteristic with a constant slope, so that with constant pressure drop the valve gain will be the same at all flows. The linear valve plug is commonly specified for liquid level control and for flow control applications requiring constant gain.

Equal Percentage

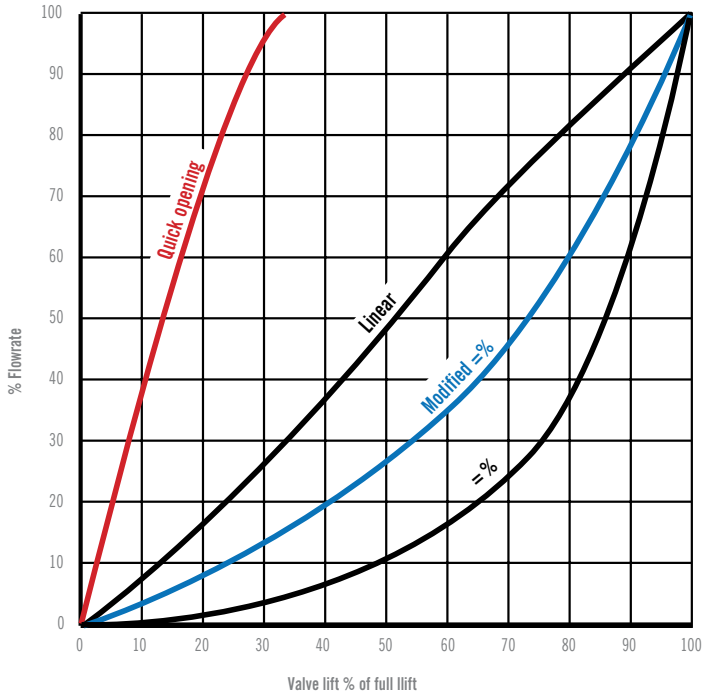
Equal increments of valve lift produce equal percentage changes in the fluid flow. The change in flow rate is always proportional to the flow rate just before the change in plug position is made. The equal percentage characteristic is generally used on pressure control applications, and on other applications where a large percentage of pressure drop is normally absorbed by the system itself. Valves with this characteristic should also be considered where highly varying pressure drop conditions occur or high rangeability is required.

Quick Opening

This provides for maximum change in flow rate at low valve lifts with a fairly linear relationship. Additional increases in valve lift give sharply reduced changes in flow rate. When the valve plug nears the wide open position, the change in flow rate approaches zero.

Intermediate

Other intermediate or special characteristics are available on request to meet specific control requirements.



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TRILLIUM FLOW TECHNOLOGIES UK LTD

Britannia House, Huddersfield Road, Elland, West Yorkshire, HX5 9JR, England
T: +44 (0) 1422 282 000;
F: +44 (0) 1422 282 100;
E: controlvalves@trilliumflow.com

TRILLIUMFLOW.COM