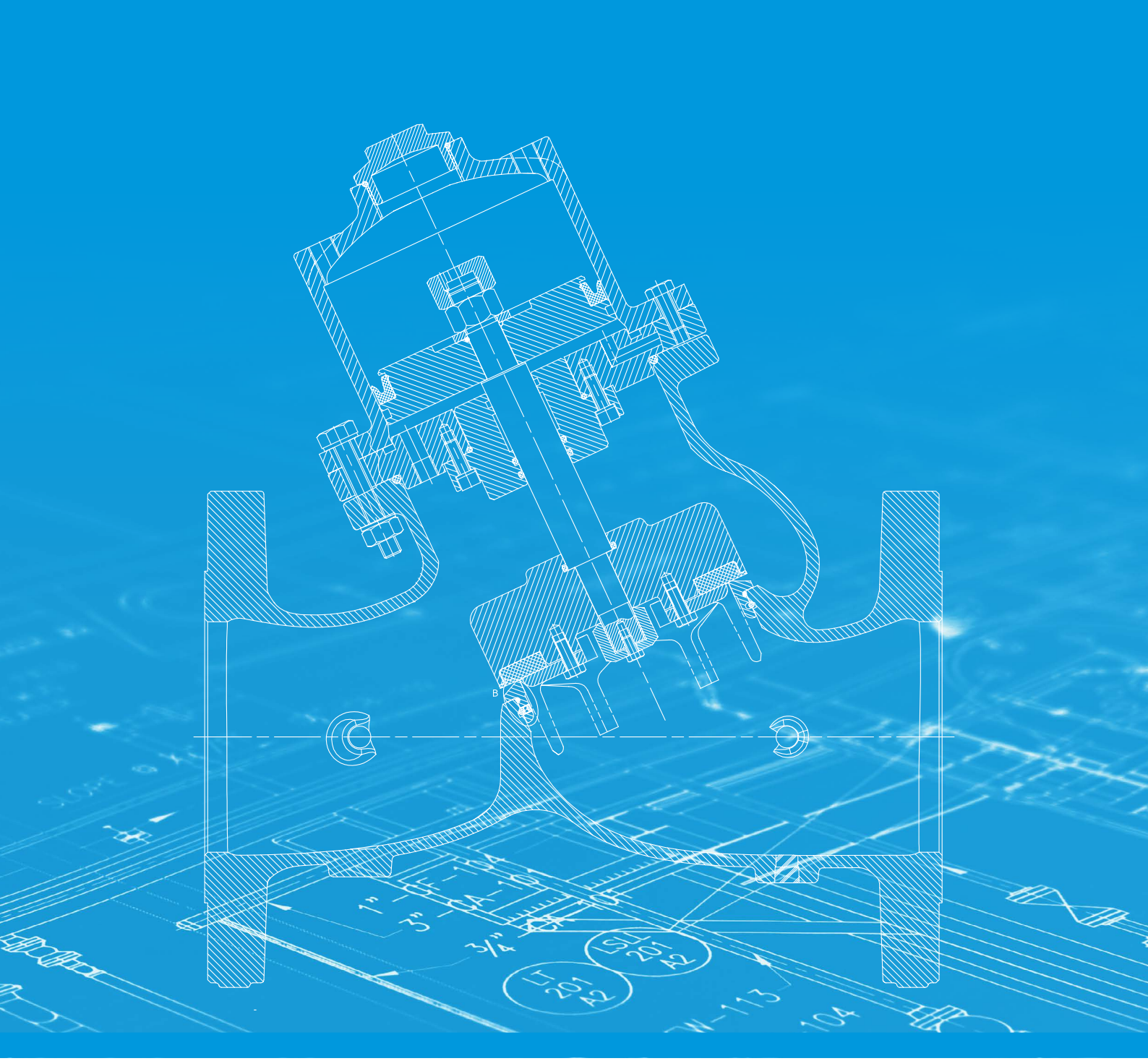

BERMAD 800 SERIES

ENGINEERING DATA

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800 SERIES FAMILY

BERMAD 800 series are hydraulically operated, piston actuated globe valves designed for high pressure operation with excellent flow capacity and double chamber unitized actuator, that can be disassembled from the body as a separate integral unit without removing the valve body from the pipeline.

The valves hydrodynamic body is designed for unobstructed flow path and provides excellent and highly effective modulation capacity for high differential pressure applications.
The 800 series valves are threaded, grooved or flanged to meet all standards and are available in either standard oblique (Y) or angle (A) pattern design.

800 "Y" Pattern

800 Angle Pattern

Features and Benefits

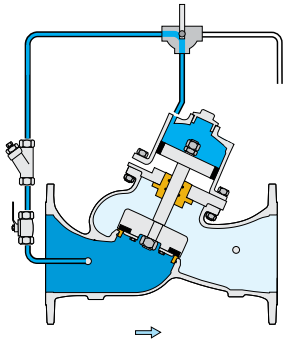
- Double-Chambered Actuator.
  - Actuator assembly removes as a single unit for faster maintenance.
  - Easy on-site conversion between single and double chambered actuators.
- Wide Body-Oblique "Y" or Angle pattern design.
- Hydrodynamic design for efficient flow, minimal pressure loss, and excellent cavitation resistance.
- Unobstructed valve port area with no ribs or stem guides, increasing capacity by 25% over standard globe valves.
- Valves are compatible with hydraulic or electric control.
- Self-operated valves requiring no external power source.
- Piston Type Actuator.
  - Robust design allows operation at high pressures.
  - The piston and seal are durable, ensuring smooth operation.
  - The piston and seal are fully protected from stones and debris by the separation partition.
- Flexible design allows easy addition of various options:
  - V-Port plug.
  - Cavitation cages (Single or Double).
  - Visual position indicator.
  - Limit switches.
  - Analog opening output.
  - Large selection of control accessories.

Typical Applications

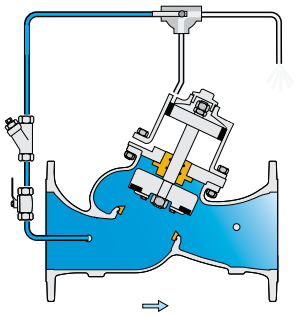
- 800 series valves are ideal for diverse applications in high pressure and variable flow conditions.
- Conditions requiring double chamber actuator:
  - Proportional "Pilotless" pressure reducing valves.
  - Pump control, active check valve.
  - Power closing control valves.
  - "Close and lock" burst control valves.

Principle of Operation

On-Off Modes

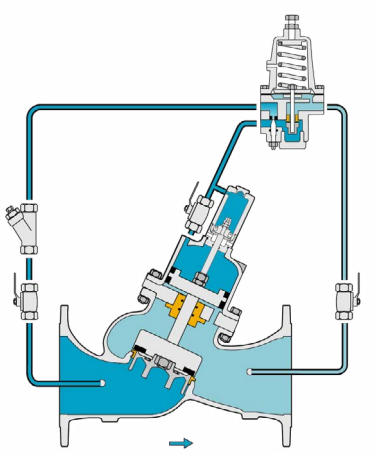


Closed Position
Line pressure applied to the upper control chamber generates a superior force, moving the valve to the closed position and ensuring drip-tight sealing.

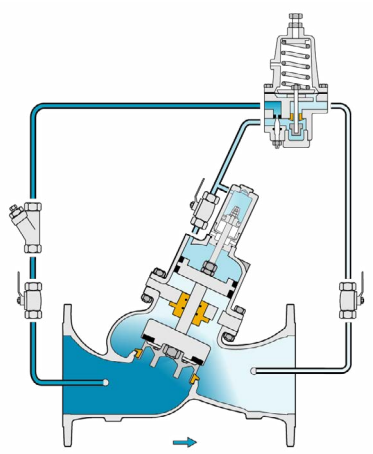


Open Position
Discharging pressure from the upper control chamber to atmosphere or a lower pressure zone allows the line pressure on the seal-disk to move the valve to the open position.

2-Way Modulating Mode - Pressure Reducing

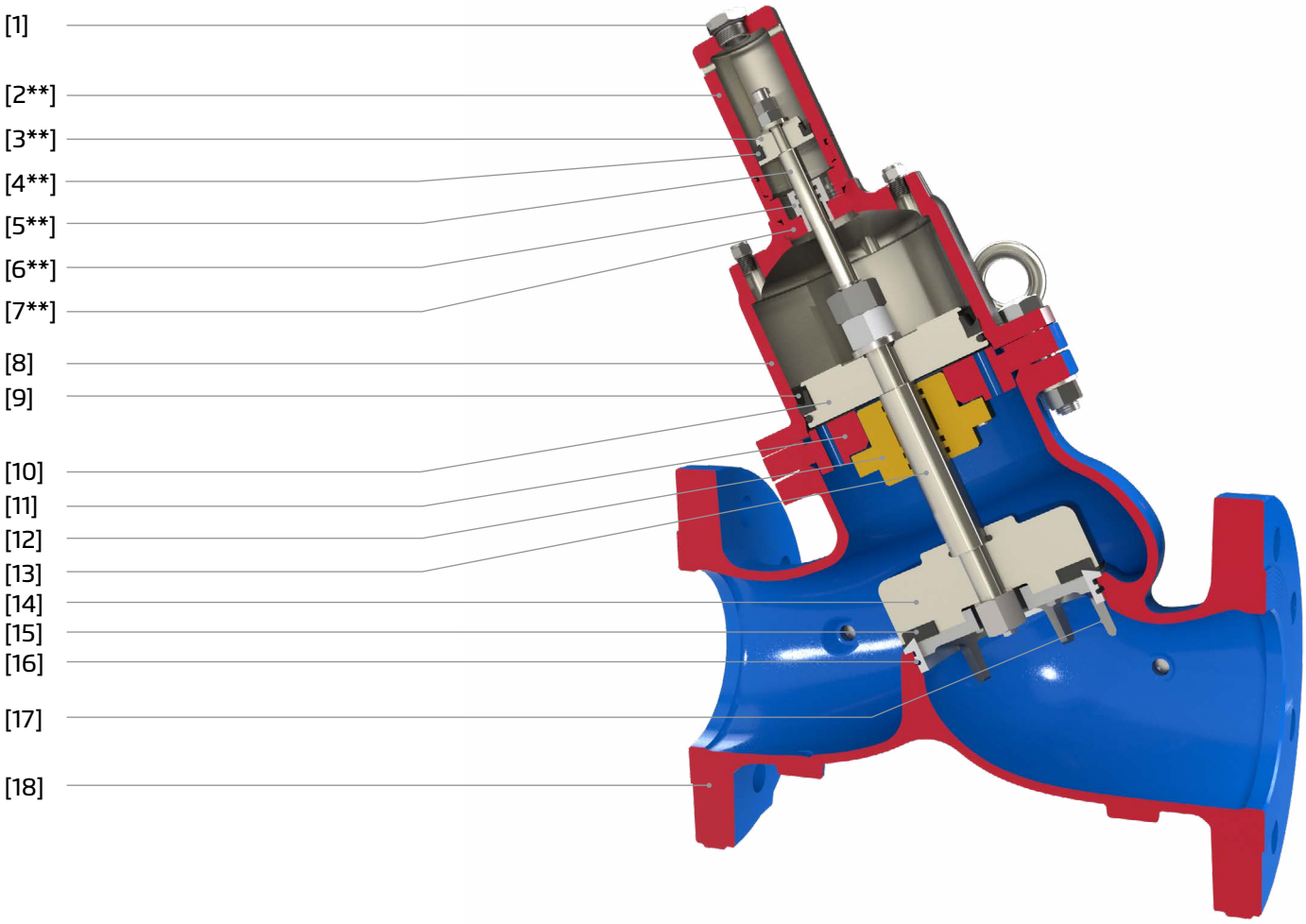


Closed Position
The closed adjustable pilot valve traps line pressure in the upper control chamber, generating a superior closing force that moves the valve to the fully closed position and ensures drip-tight sealing.



Modulating Position
The pilot valve senses line pressure changes, opening or closing accordingly. It controls pressure in the upper control chamber, causing the main valve to modulate and maintain the preset pressure.

Material Specifications



Item Number	Description	Material (Standard) *
1	Upper Plug	Stainless Steel, AISI 316
2**	Auxiliary Piston Cylinder	Stainless Steel, AISI 316
3**	Auxiliary Piston	Stainless Steel, AISI 304
4**	Auxiliary Piston Seal	Synthetic Rubber
5**	Auxiliary Piston Shaft	Stainless Steel, AISI 303
6**	Auxiliary Piston Bearing	Tin Bronze
7**	Auxiliary Piston Base	Stainless Steel, AISI 316
8	Cover	Stainless Steel, SS316
9	Piston Seal	Synthetic Rubber
10	Piston	Stainless Steel, AISI 304
11	Separating Partition	Fusion bonded Epoxy Carbon Steel. ST37
12	Bearing	Bronze
13	Shaft	Stainless Steel, AISI 303
14	Closure	Stainless Steel, AISI 410
15	Closure Seal	Synthetic Rubber
16	Seat	Stainless Steel, AISI 304
17	V-Port	Tin Bronze
	Flat Disc	Stainless Steel, AISI 410
18	Valve Body (1½"-10")	Fusion bonded Epoxy Coated Ductile Iron, EN 1563 or ASTM A-536
	Valve Body (12"-20")	Fusion bonded Epoxy Coated Cast Steel, ASTM A216
	O Rings	Synthetic Rubber
	Internal Bolts, Nuts & Discs	Stainless Steel, AISI 316/304
	External Bolts, Studs, Nuts & Discs	Stainless Steel, AISI 316

* Other Materials Available on Reqesut
** Single Chambered Valve (DN150; 6" and larger)

DN40-100; 1½"-4" single chambered valves features a closing spring.

Plug Options

BERMAD's 800 series has various plug options to enable different valve characteristics and applications.

BERMAD's 800 series plugs can be easily change before or after valve installation on site.

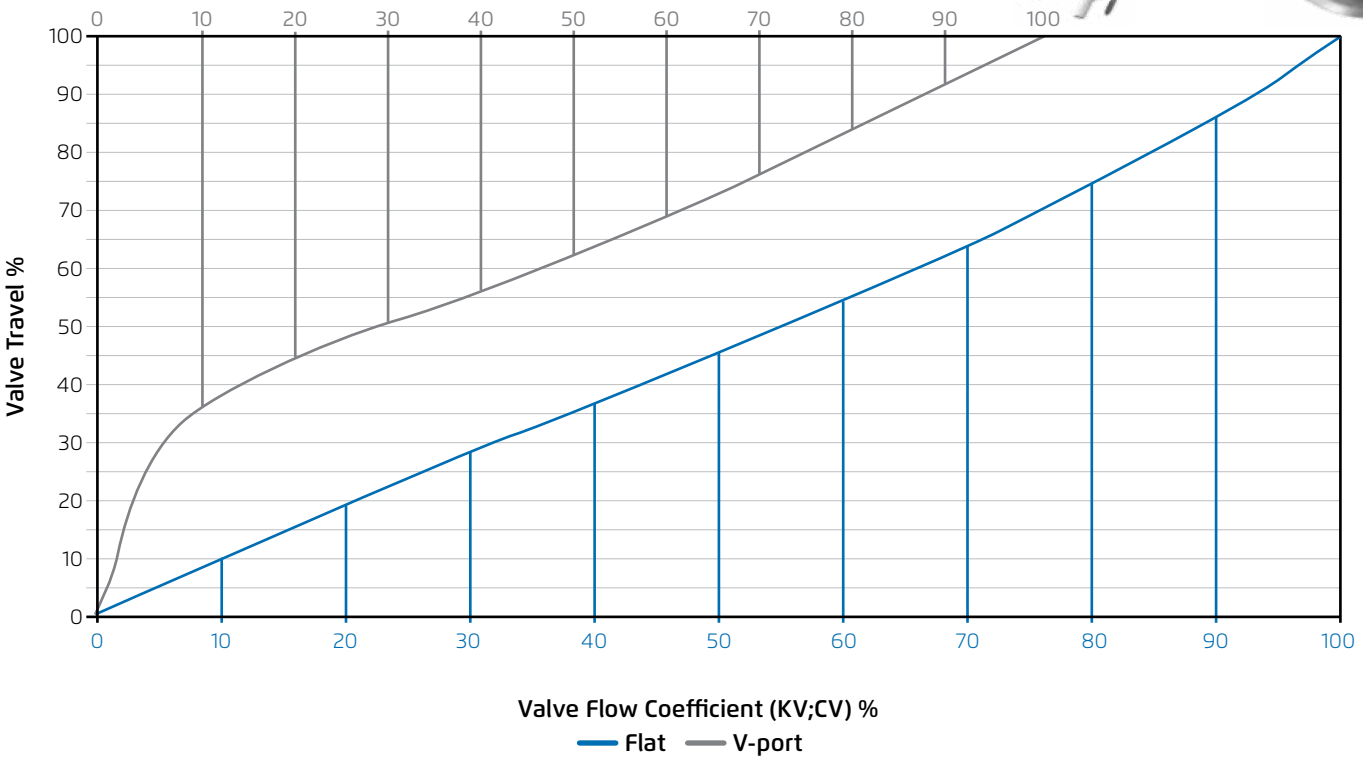
Flat plug - standard plug for on-off and high flow applications.

V-Port plug - uniquely designed throttling plug. It changes the ratio of flow to stem travel allowing very wide flow range with relatively high pressure reduction and provides more accurate, stable and smoother response during pressure and flow regulation, while reducing noise and vibration.

Flat plug

V-Port plug

Valve Plugs Characteristics



Metric

Cavitation

The cavitation phenomenon has a significant affect on control valve and system performance.

When the fluid's pressure reaches liquid vapor pressure, vapor cavities (bubbles) form and grow until they violently implode by the recovered pressure downstream to the valve seat.

The implosion of these cavities generates high-pressure surges, micro jets and intensive heat, which erode valve components and downstream piping. In its final stage, cavitation flashes and chokes the flow.

Noise constraints:

The imploding vapor bubbles in the cavitation phenomena create a sonic wave in the fluid that upon impact with the pipe wall create vibrations that can result in disturbing noise levels.

Many factors affect the noise level generated by pipe fixtures, such as pipe material and wall thickness, installation rigidness, acoustic conditions in the installation space, fluid physical and chemical characteristics and many more.

In terms of hydraulic conditions, working at values greater than σ=0.5 with control valve can significantly reduce noise generation.

The Cavitation Guide is based on the formula commonly used in the valve industry:

$$\sigma = (P2-Pv) / (P1-P2)$$

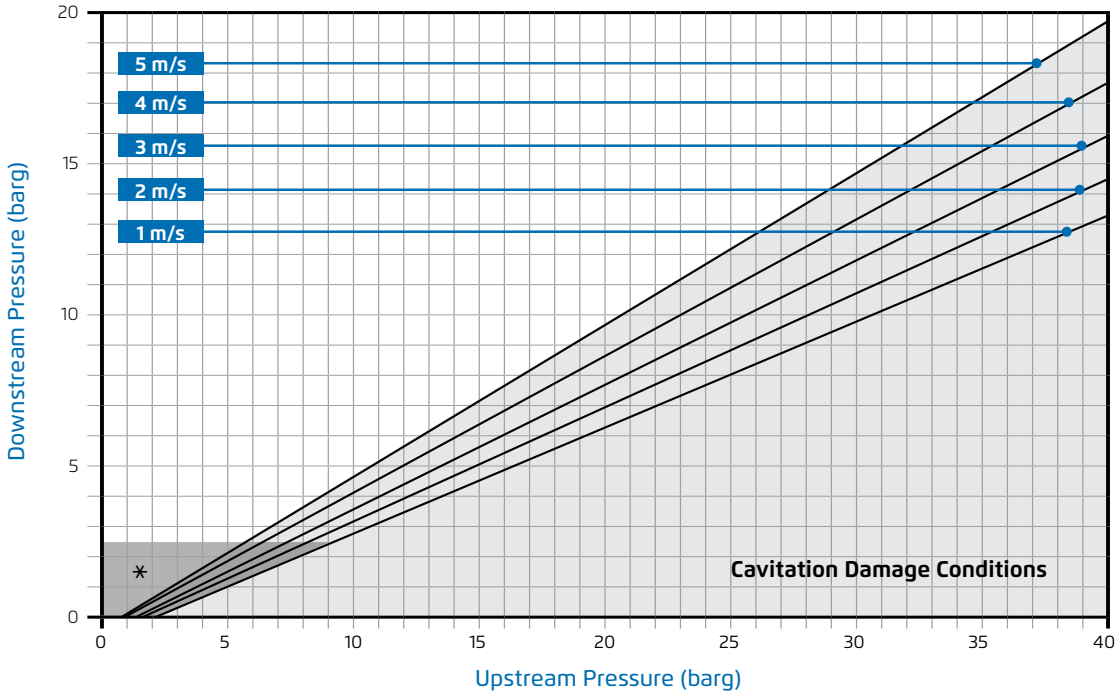
Where:

σ	=	Sigma, cavitation index, dimensionless
P1	=	Upstream pressure, absolute
P2	=	Downstream pressure, absolute
Pv	=	Liquid vapor pressure, absolute (Water, 18°C => 0.02 bara)

Notes:

1. An alternate cavitation index formula introduced by ISA is: σISA = (P1-Pv) / (P1-P2) which equals σ+1
2. The below charts should be considered only as a general guide.
3. Charts represent Flat plug.
4. Velocity values refer to flow velocity in pipe line.
5. For optimum system and control valve application please refer to Bermad Sizing or consult Bermad.

Cavitation Chart



* Consider back pressure orifice, or consult BERMAD

US units

Cavitation

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The Cavitation Guide is based on the formula commonly used in the valve industry:

$$\sigma = (P2-Pv) / (P1-P2)$$

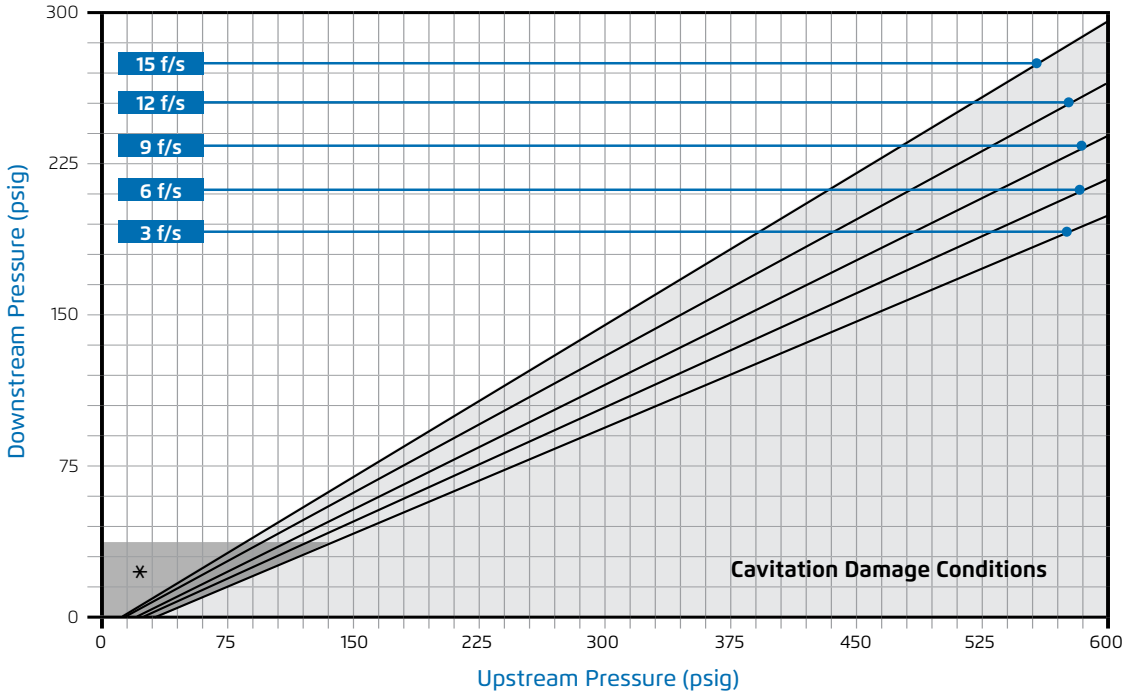
Where:

σ	=	Sigma, cavitation index, dimensionless
P1	=	Upstream pressure, absolute
P2	=	Downstream pressure, absolute
Pv	=	Liquid vapor pressure, absolute (Water, 65°F => 0.3 psia)

Notes:

1. An alternate cavitation index formula introduced by ISA is: σISA = (P1-Pv) / (P1-P2) which equals σ+1
2. The below charts should be considered only as a general guide.
3. Charts represent Flat plug.
4. Velocity values refer to flow velocity in pipe line.
5. For optimum system and control valve application please refer to Bermad Sizing or consult Bermad.

Cavitation Chart



* Consider back pressure orifice, or consult BERMAD

Cavitation Cage

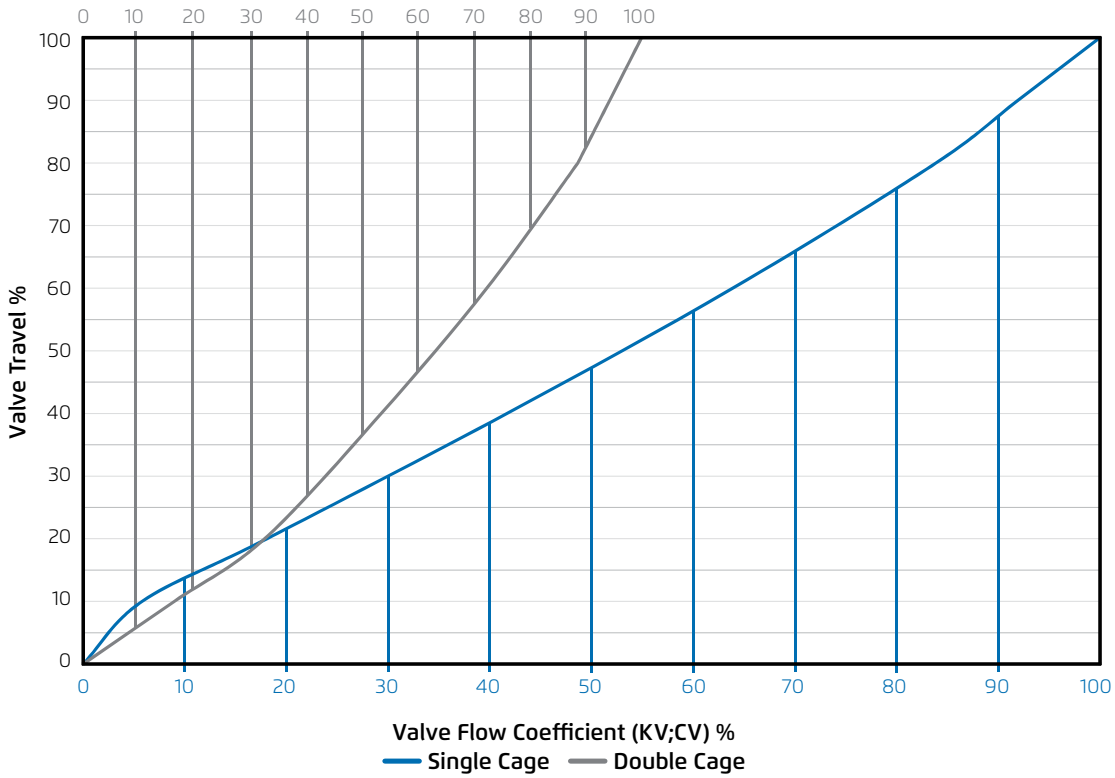
Single Cavitation Cage - C1

The BERMAD Single Cavitation Cage trim is designed to reduce cavitation, noise and vibration under higher differential pressure operation, as well as smart pressure reducing.

Double Cavitation Cage - C2

The BERMAD Double Cavitation Cage trim is designed to resist cavitation, cavitation damage, noise and vibration under extreme differential pressure operation, as well as smart pressure reducing.

Valve Cages Characteristics



Metric

800

Technical Data

Valve Patterns: "Y" (Globe); "A" (Angle)
Pressure Rating: 25 bar; 40 bar
End Connections: Flanged (all standards), Grooved
Plug Types: Flat disc, V-port, Cavitation cage
Working Temperature: Water up to 60°C
Higher temperature: Available on request

Standard Materials:

Body:
"Y" Pattern (Flanged):
DN40-250: Ductile Iron, EN 1563 GJS-450-12 / ASTM A536 GR.65-45-12
DN300-500: Cast Steel, ASTM A216 GR.WCB
"Y" Pattern (Grooved):
DN40-200: Ductile Iron, EN 1563 GJS-450-12 / ASTM A536 GR.65-45-12
"A" Angle:
DN40-250: Ductile Iron, EN 1563 GJS-450-12 / ASTM A536 GR.65-45-12
DN300-450: Cast Steel, ASTM A216 GR.WCB

Cover: Stainlees Steel 316
Bolts & Nuts: Stainless Steel
Internals: Stainless Steel & Tin Bronze
Control Trim: Brass, Bronze accessories
Stainless Steel 316 fittings & tubing
or forged Brass fittings & Copper tubing
Seals: Synthetic rubber
Coating: Dark blue Fusion Bonded Epoxy

Optional Materials:

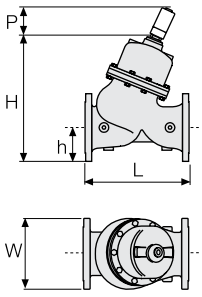
Body: Stainless Steel 316 ASTM A351 GR.CF8M / Cast Steel ASTM A216 GR.WCB (DN40-DN300)
Control Trim: Stainless Steel 316
Seals: EPDM, FPM

Consult BERMAD for final specification.

Dimensions & Weights

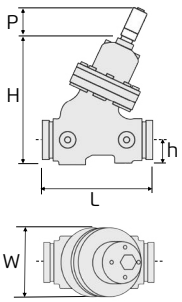
"Y" Pattern - Flanged

		Ductile Iron Body								Cast Steel Body				
Size	inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
	mm	40	50	65	80	100	150	200	250	300	350	400	450	500
L	mm	230	230	290	310	350	480	600	730	762	733	1024	1030	1136
W	mm	155	165	180	210	255	320	398	475	521	535	700	713	777
h	mm	80	85	92	108	130	163	193	223	255	270	325	357	389
H	mm	265	270	315	354	436	565	690	800	950	960	1175	1208	1242
P*	mm	N/A	N/A	N/A	N/A	N/A	135	135	160	160	160	200	200	200
Weight	kg	14.0	15	30.0	32.0	56	106	190	307	505	549	1070	1095	1129



"Y" Pattern - Grooved

Size	inch	1.5"	2"	2.5"	3"	4"	6"	8"
	mm	40	50	65	80	100	150	200
L	mm	205	210	215	250	320	415	500
W	mm	122	122	122	153	200	282	353
h	mm	33	40	40	60	74	95	125
H	mm	215	222	223	287	369	478	600
P*	mm	N/A	N/A	N/A	N/A	N/A	135	135
Weight	kg	7.8	9	9.9	24	42	79	146

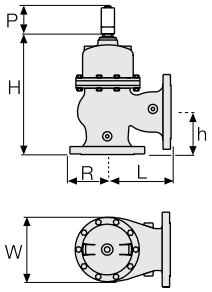


* P – Add-on height for Auxiliary Piston or Balanced Shaft Assembly

Metric

"A" Angle - Flanged

Size	inch	Ductile Iron Body								Cast Steel Body		
		1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	18"
	mm	40	50	65	80	100	150	200	250	300	350	450
L	mm	124	124	149	159	200	234	277	336	415	419	467
W	mm	155	165	190	210	254	318	381	446	522	586	711
R	mm	78	83	95	105	127	159	191	223	261	293	355
h	mm	84	84	109	108	135	165	216	236	294	299	386
H	mm	250	250	273	342	397	491	632	733	933	937	1150
P*	mm	N/A	N/A	N/A	N/A	N/A	135	135	160	160	160	200
Weight	kg	11.8	15	18.4	30.0	54	101	179	292	481	523	1051

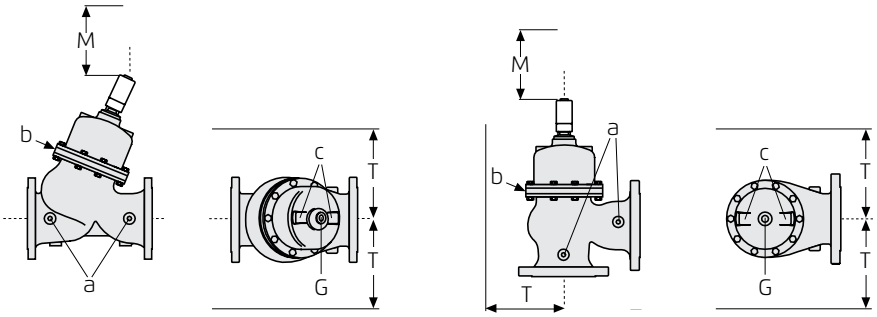


* P – Add-on height for Auxiliary Piston or Balanced Shaft Assembly

Actuator, Trim Ports and Service Clearance

Size	inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
	mm	40	50	65	80	100	150	200	250	300	350	400	450	500
Control Chamber Volume	Liters	0.04	0.04	0.12	0.12	0.3	1.1	2.3	4.0	8.0	8.0	18.7	18.7	18.7
Valve travel	mm	17	17	20	23	30	50	58	66	100	100	135	135	135
M	mm	180	180	180	230	275	385	460	580	685	685	965	965	965
T	mm	350	350	350	370	395	430	475	520	545	545	645	645	645
a	inch	¼" NPT			⅜" NPT				½" NPT			1" BSP		
b	inch	⅛" NPT								¼" NPT				
c	inch	⅛" NPT				¼" NPT		⅜" NPT				¾" BSP		
G	inch	¾" G					2" G		3" G					

M - Actuator Service Clearance
T - Maximal control trim space for left or right side trim



Metric

Flow Factors

Nominal Diameter		inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
		mm	40	50	65	80	100	150	200	250	300	350	400	450	500
Y-Pattern Flat Disc		Kv	57	62	98	130	200	540	905	1480	1850	2106	3080	3080	3080
		K	1.2	2.6	2.9	3.8	3.9	2.7	3.1	2.8	3.7	5.9	3.7	5.5	7.8
Y-Pattern V-Port		Kv	46	48	73	102	140	453	767	1310	1573	1790	2600	2600	2600
		K	1.9	4.3	5.3	6.2	8.0	3.9	4.3	3.6	5.1	8.2	5.1	7.6	10.8
Angle Flat Disc		Kv	46	55	61	127	220	506	897	1375	2035	2200	N/A	3350	N/A
		K	1.9	3.2	7.6	4.0	3.2	3.1	3.1	3.2	3.1	4.9	N/A	4.5	N/A
Angle V-Port		Kv	39	47	51	108	187	430	762	1169	1730	1900	N/A	2850	N/A
		K	2.6	4.5	10.6	5.6	4.5	4.3	4.3	4.5	4.2	6.8	N/A	6.2	N/A

Differential Pressure & Flow Calculation

Valve flow coefficient, Kv $Kv = Q\sqrt{\frac{Gf}{\Delta P}}$

Where:

Kv = Valve flow coefficient (flow in m^3/h at 1bar ΔP)

Q = Flow rate (m^3/h)

ΔP = Differential pressure (bar)

Gf = Liquid specific gravity (Water = 1.0)

Practical formulas for water:

$Q = Kv\sqrt{\Delta P}$ $\Delta P = \left(\frac{Q}{Kv}\right)^2$

Flow resistance or Head loss coefficient, $K = \Delta H \frac{2g}{V^2}$

Where:

K = Flow resistance or Head loss coefficient (dimensionless)

ΔH = Head loss (m)

V = Nominal size flow velocity (m/sec)

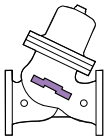
g = Acceleration of gravity (9.81 m/sec^2)

Practical formula:

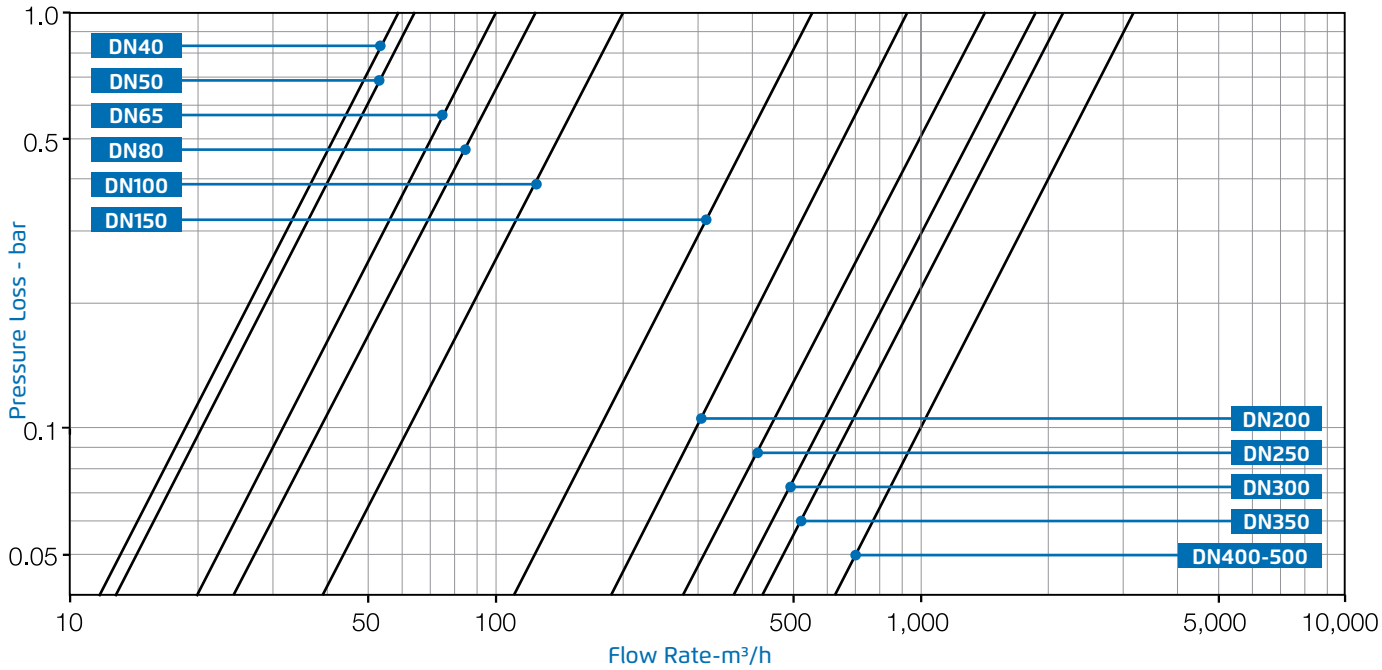
$\Delta H = K \frac{V^2}{2g}$

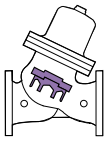
Metric

Flow Charts

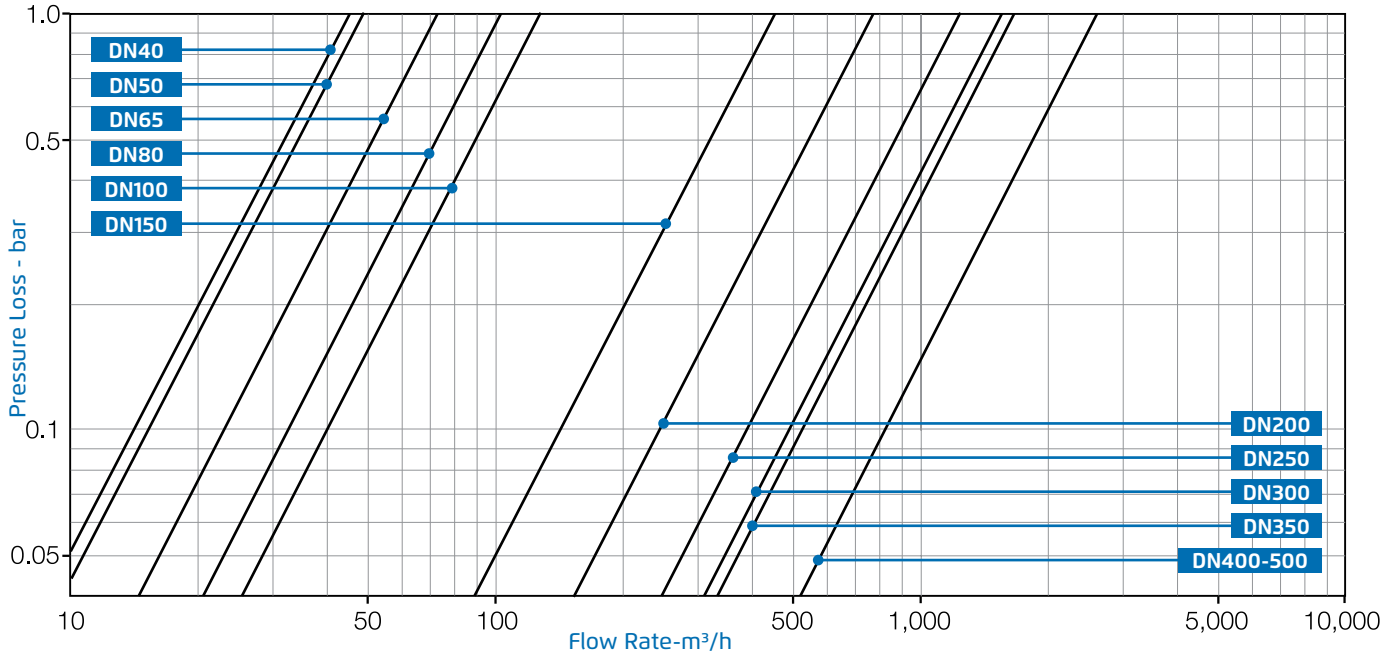


Y Pattern, Flat Disc





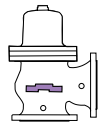
Y Pattern, Throttling Plug (V-Port)

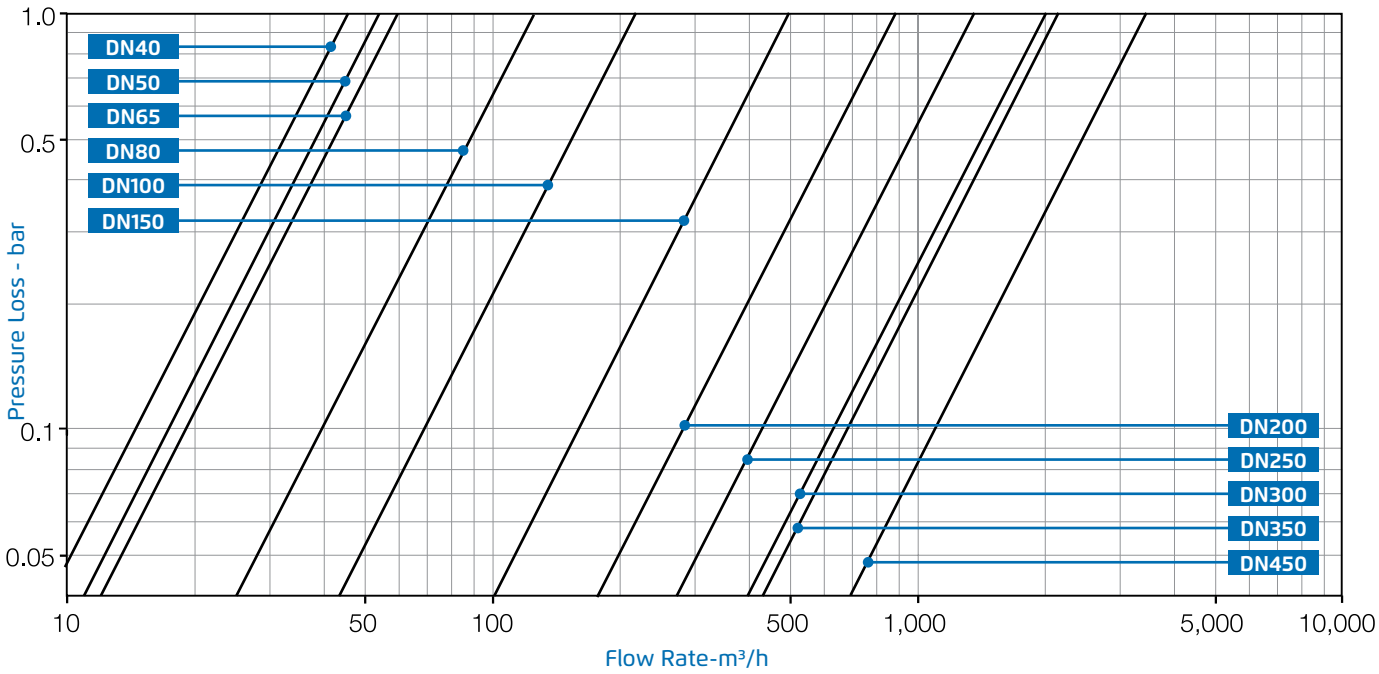


Metric

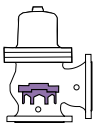
Flow Charts

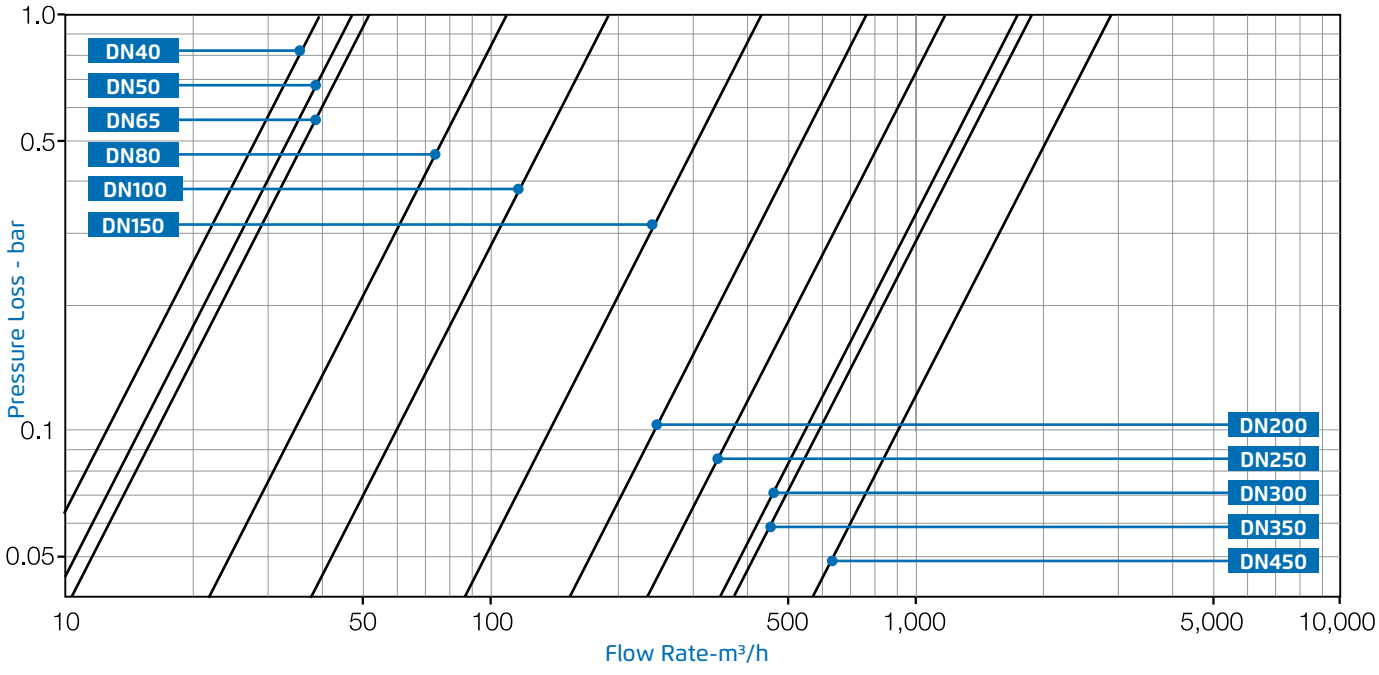
Angle Pattern, Flat Disc





Angle Pattern, Throttling Plug (V-Port)





US Units

800

Technical Data

Valve Patterns: "Y" (Globe); "A" (Angle)
Pressure Rating: 400 psi; 600 psi
End Connections: Flanged (all standards), Grooved
Plug Types: Flat disc, V-port, Cavitation cage
Working Temperature: Water up to 140°F
Higher temperature: Available on request

Standard Materials:

Body:
"Y" Pattern (Flanged):
1.5"-10": Ductile Iron, ASTM A536 GR.65-45-12
12"-20": Cast Steel, ASTM A216 GR.WCB
"Y" Pattern (Grooved):
1.5"-8": Ductile Iron, ASTM A536 GR.65-45-12
"A" Angle:
1.5"-10": Ductile Iron, ASTM A536 GR.65-45-12
10"-18": Cast Steel, ASTM A216 GR.WCB

Cover: Stainlees Steel 316
Bolts & Nuts: Stainless Steel
Internals: Stainless Steel & Tin Bronze
Control Trim: Brass, Bronze accessories
Stainless Steel 316 fittings & tubing
or forged Brass fittings & Copper tubing
Seals: Synthetic rubber
Coating: Dark blue Fusion Bonded Epoxy

Optional Materials:

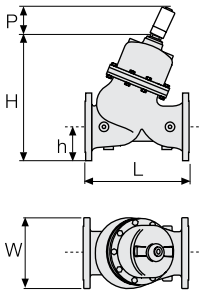
Body & Cover: Stainless Steel 316 ASTM A351 GR.CF8M / Cast Steel ASTM A216 GR.WCB (1.5"-12")
Control Trim: Stainless Steel 316
Seals: EPDM, FPM

Consult BERMAD for final specification.

Dimensions & Weights

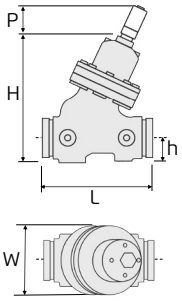
"Y" Pattern - Flanged

		Ductile Iron Body								Cast Steel Body				
Size	inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
	mm	40	50	65	80	100	150	200	250	300	350	400	450	500
L	inch	9.06	9.06	11.42	12.20	13.78	18.90	23.62	28.74	30.00	28.86	40.31	40.55	44.72
W	inch	6.10	6.50	7.09	8.27	10.04	12.60	15.67	18.70	20.51	21.06	27.56	28.07	30.59
h	inch	3.15	3.35	3.62	4.25	5.12	6.42	7.60	8.78	10.04	10.63	12.80	14.06	15.31
H	inch	10.43	10.63	12.40	13.94	17.17	22.24	27.17	31.50	37.40	37.80	46.26	47.56	48.90
P*	inch	N/A	N/A	N/A	N/A	N/A	5.31	5.31	6.30	6.30	6.30	7.87	7.87	7.87
Weight	lbs	31	33	66	71	123	234	419	677	1113	1210	2359	2414	2489



"Y" Pattern - Grooved

Size	inch	1.5"	2"	2.5"	3"	4"	6"	8"
	mm	40	50	65	80	100	150	200
L	inch	8.07	8.27	8.46	9.84	12.60	16.34	19.69
W	inch	4.80	4.80	4.80	6.02	7.87	11.10	13.90
h	inch	1.30	1.57	1.57	2.36	2.91	3.74	4.92
H	inch	8.46	8.74	8.78	11.30	14.53	18.82	23.62
P*	inch	N/A	N/A	N/A	N/A	N/A	5.31	5.31
Weight	lbs	17	20	22	53	93	174	322

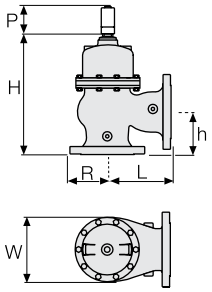


* P – Height of optional auxiliary closing piston or shaft balancing assembly

US Units

A" Angle - Flanged

Size	inch	Ductile Iron Body								Cast Steel Body		
	mm	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	18"
		40	50	65	80	100	150	200	250	300	350	450
L	inch	4.88	4.88	5.87	6.26	7.87	9.21	10.91	13.23	16.34	16.50	18.39
W	inch	6.10	6.50	7.48	8.27	10.00	12.52	15.00	17.56	20.55	23.07	27.99
R	inch	3.07	3.27	3.74	4.13	5.00	6.26	7.52	8.78	10.28	11.54	13.98
h	inch	3.31	3.31	4.29	4.25	5.31	6.50	8.50	9.29	11.57	11.77	15.20
H	inch	9.84	9.84	10.75	13.46	15.63	19.33	24.88	28.86	36.73	36.89	45.28
P*	inch	N/A	N/A	N/A	N/A	N/A	5.31	5.31	6.30	6.30	6.30	7.87
Weight	lbs	26	33	41	66	119	223	395	644	1060	1153	2317

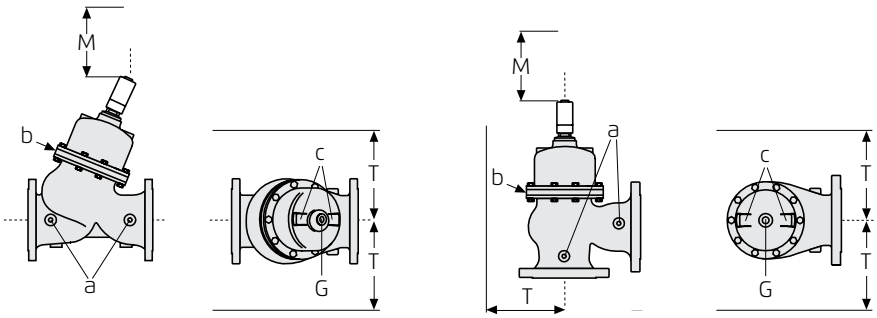


* P – Add-on height for Auxiliary Piston or Balanced Shaft Assembly

Actuator, Trim Ports and Service Clearance

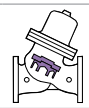
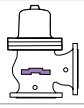
Size	inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
	mm	40	50	65	80	100	150	200	250	300	350	400	450	500
Control Chamber Volume	Gallons	0.01	0.01	0.03	0.03	0.08	0.29	0.61	1.06	2.11	2.11	4.94	4.94	4.94
Valve travel	inch	0.67	0.67	0.79	0.91	1.18	1.97	2.28	2.60	3.94	3.94	5.31	5.31	5.31
M	inch	7	7	7	9	11	15	18	23	27	27	38	38	38
T	inch	14	14	14	15	16	17	19	20	21	21	25	25	25
a	inch	¼" NPT			⅜" NPT				½" NPT			1" BSP		
b	inch	⅛" NPT								¼" NPT				
c	inch	⅛" NPT				¼" NPT	⅜" NPT					¾" BSP		
G	inch	¾" G					2" G		3" G					

M - Actuator Service Clearance
T - Maximal control trim space for left or right side trim



US units

Flow Factors

Nominal Diameter		inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
		mm	40	50	65	80	100	150	200	250	300	350	400	450	500
Y-Pattern Flat Disc		Cv	66	72	113	150	231	624	1045	1709	2137	2432	3557	3557	3557
		K	1.2	2.6	2.9	3.8	3.9	2.7	3.1	2.8	3.7	5.9	3.7	5.5	7.8
Y-Pattern V-Port		Cv	53	55	84	118	162	523	886	1513	1817	2067	3003	3003	3003
		K	1.9	4.3	5.3	6.2	8.0	3.9	4.3	3.6	5.1	8.2	5.1	7.6	10.8
Angle Flat Disc		Cv	53	64	70	147	254	584	1036	1588	2350	2541	N/A	3869	N/A
		K	1.9	3.2	7.6	4.0	3.2	3.1	3.1	3.2	3.1	4.9	N/A	4.5	N/A
Angle V-Port		Cv	45	54	59	125	216	497	880	1350	1998	2195	N/A	3292	N/A
		K	2.6	4.5	10.6	5.6	4.5	4.3	4.3	4.5	4.2	6.8	N/A	6.2	N/A

Differential Pressure & Flow Calculation

Valve flow coefficient, Cv $Cv = Q\sqrt{\frac{Gf}{\Delta P}}$

Where:

Cv = Valve flow coefficient (flow in gpm at 1psiΔP)

Q = Flow rate (gpm)

ΔP = Differential pressure (psi)

Gf = Liquid specific gravity (Water = 1.0)

Practical formulas for water:

$$Q = Cv\sqrt{\Delta P} \qquad \Delta P = \left(\frac{Q}{Cv}\right)^2$$

Flow resistance or Head loss coefficient, $K = \Delta H \frac{2g}{V^2}$

Where:

K = Flow resistance or Head loss coefficient (dimensionless)

ΔH = Head loss (feet)

V = Nominal size flow velocity (feet/sec)

g = Acceleration of gravity (32.18 feet/sec^2)

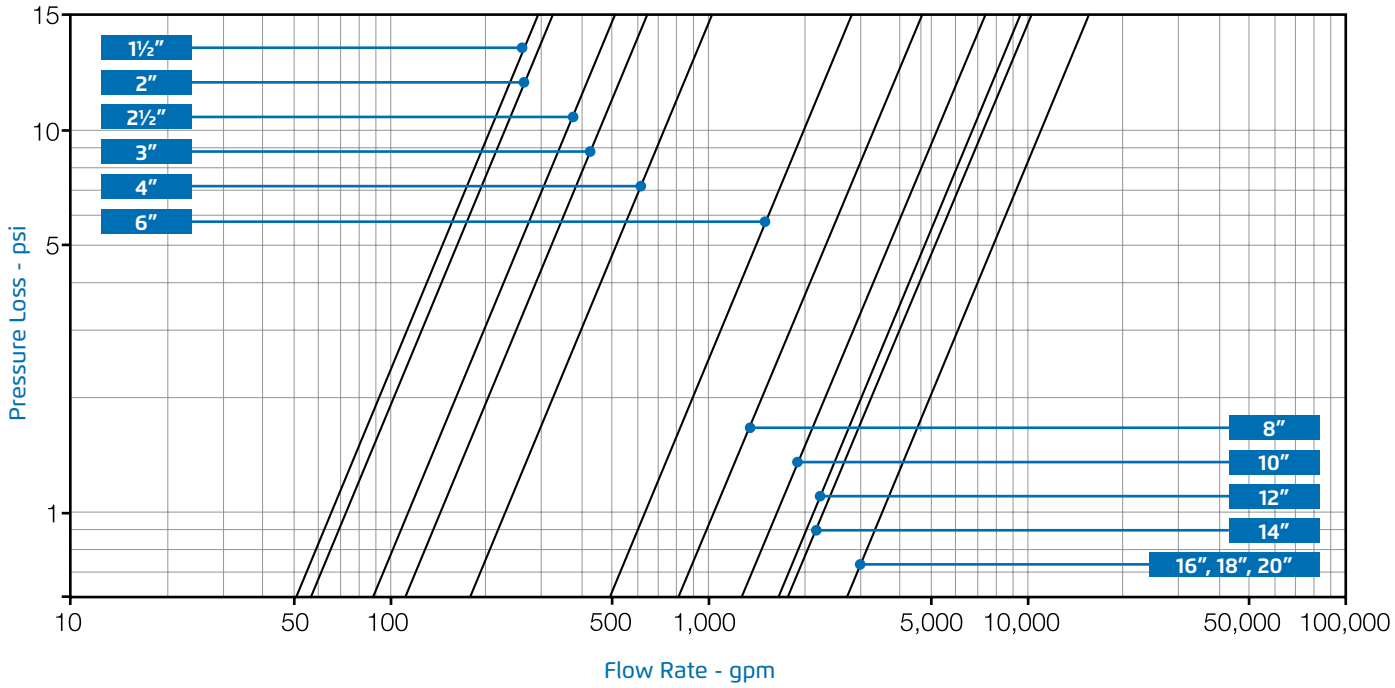
Practical formula:

$$\Delta H = K \frac{V^2}{2g}$$

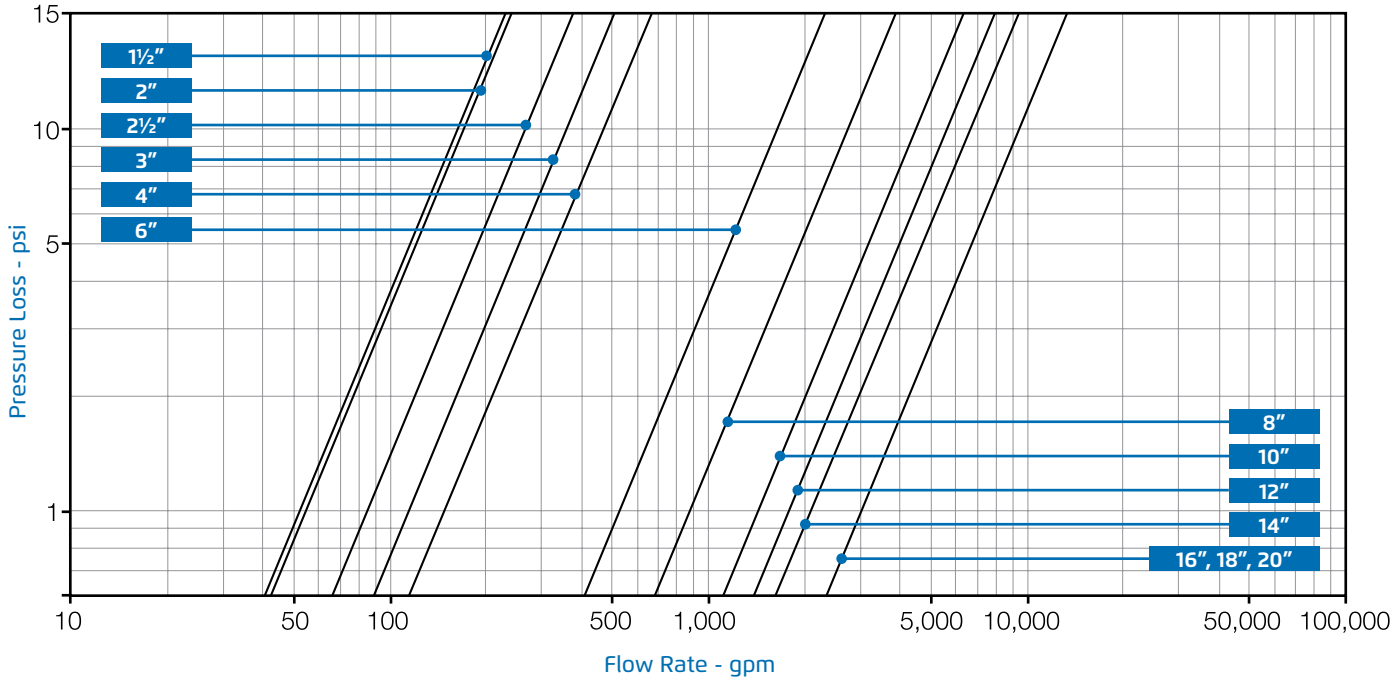
US Units

Flow Charts

Y Pattern, Flat Disc



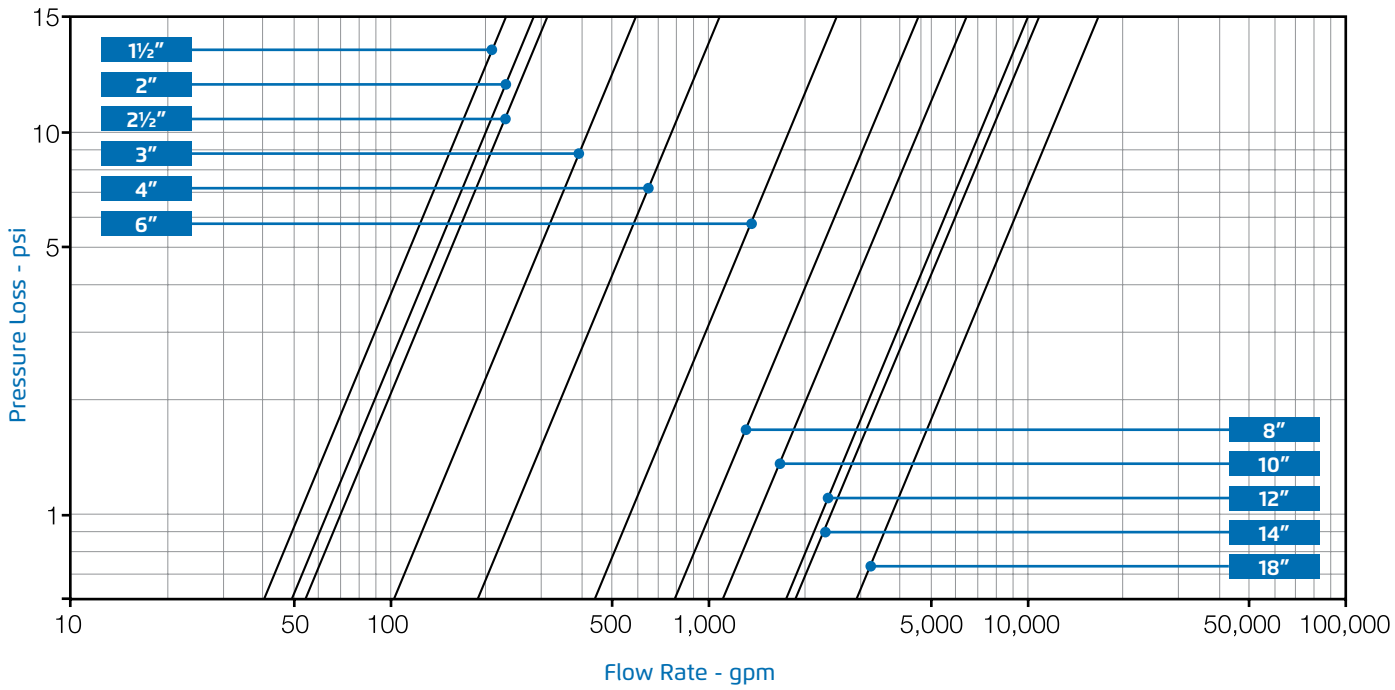
Y Pattern, Throttling Plug (V-Port)



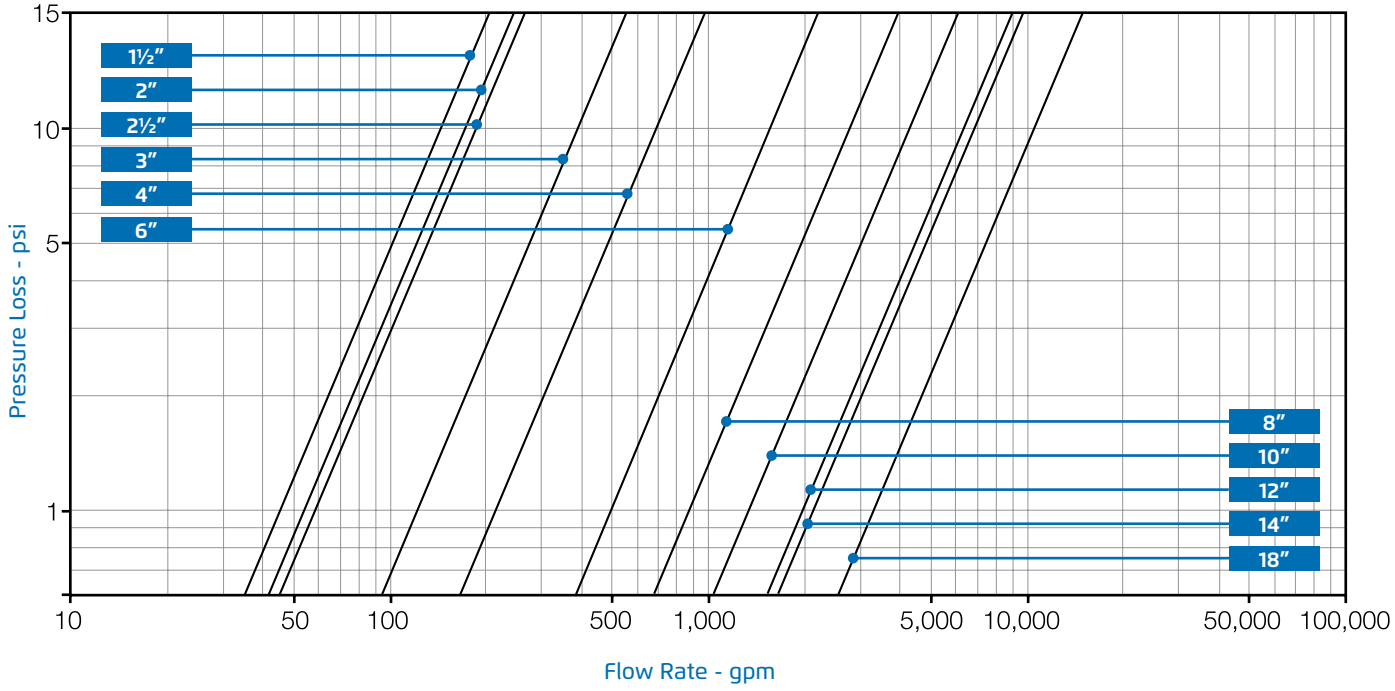
US units

Flow Charts

Angle Pattern, Flat Disc



Angle Pattern, Throttling Plug (V-Port)



Valve Options and Features

Valve Position Indicator - Code I

The BERMAD Valve Position Indicator Assembly provides a visual indication of valve opening and regulation behavior.

Press for details

Single Limit Switch - Code S

The BERMAD Single Limit Switch Assembly includes mechanical electrical change over contacts (NO + NC), enabling remote signaling of the closed valve position.

Press for details

Flow Stem - Code M

The BERMAD Flow Stem Assembly enables limiting the opening stroke of the control valve or for safety ensured mechanical closure.

Press for details

For more details refer to relevant accessory product page.

www.bermad.com

January 2025