

700 Series

# Proportional Pressure Reducing Valve

### Mod∈I 720-PD

- Long downhill lines
  - Serial pressure reduction
  - Leakage and burst protection
- High differential pressure systems
  - Protection against cavitation damage
  - Throttling noise reduction

The Model 720-PD Proportional Pressure Reducing Valve is a hydraulically operated, diaphragm actuated control valve that reduces higher upstream pressure to lower downstream pressure at a fixed ratio.



### Features and Benefits

- Line pressure driven Independent operation
- Elegant simplicity
  - Most cost effective
  - Simple to maintain
  - Minimal external accessories
- Variety of reduction ratios Perfect mission matching
- Built-in check feature Replacing line sized check valve
- In-line serviceable Easy maintenance
- Double chamber
  - Moderated valve reaction
  - Protected diaphragm
- Flexible design Easy addition of features
- Semi-straight flow Non-turbulent flow
- Stainless Steel raised seat Cavitation damage resistant
- Obstacle free, full bore Uncompromising reliability
- V-Port Throttling Plug Low flow stability

# **Major Additional Features**

- Solenoid control 720-PD-55
- Closing & opening speed control **720-PD-03**
- Emergency pressure reducing valve 720-PD-59
- Pressure Sustaining **723-PD**

See relevant BERMAD publications.





700 Series Model 720-PD

# **Operation**

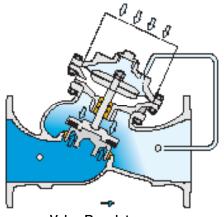
The Model 720-PD is a pilotless, double chambered, control valve. The downstream pressure is applied as the closing force on the top side of both the diaphragm and the seal disk areas. The upstream pressure is applied as the opening force on the bottom side of the seal disk area.

The net force, resulting from the two opposing dynamic forces acting on the actuator's diaphragm and seal, determines the degree to which the valve is open. The valve seeks the point where these forces are equal. As the ratio of the areas of the seal disk and the diaphragm is constant, the ratio of the upstream and downstream pressures is constant as well.

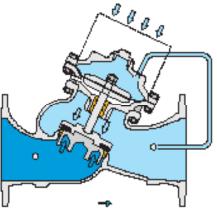
A rise in downstream pressure causes a momentary increase of the closing force. As a result, the valve throttles closed reducing downstream pressure according to the constant ratio.

Adding a V-Port Throttling Plug modifies valve ratio by increasing the effective diaphragm area.

When demand is zero, downstream pressure rises in proportion to the ratio, causing the valve to shut off.







Valve Closed (no system demand)

# **Reduction Ratios Table**

Valve	Size	700; 7	700EN	700ES						
inch	mm	Flat-Disc	V-Port	Flat-Disc	V-Port					
1.5",2",2.5"	40, 50, 65	3.7	4.0	2.8	3.2					
3"	80	2.6	2.9	2.8	3.2					
4"	100	2.5	2.8	2.6	2.9					
5"	125	-	-	2.5	2.8					
6"	150	2.5	2.7	2.5	2.8					
8"	200	2.4	2.6	2.5	2.7					
10"	250	2.3	2.5	2.4	2.6					
12"	300	2.2	2.4	2.3	2.5					
14"	350	2.2	2.4	-	-					
16"	400	2.2	2.3	2.2	2.4					
18"	450	2.2	2.3	-	-					
20"	500	2.2	2.3	2.2	2.3					

#### Notes:

- Reduction ratio may vary at extreme flow velocity & upstream pressure.
- Reduction ratios are based on flow velocity of 2.0-3.0 m/sec; 6.5-10 ft/sec
- Recommended continuous flow velocity: 0.3-6.0 m/sec; 1-20 ft/sec
- Minimum operating pressure: 0.7 bar; 10 psi.

## Pilot System Specifications

# **Standard Materials:**

**Tubing & Fittings:** 

Stainless Steel 316 or Copper & Brass

Accessories:

Stainless Steel 316 or Brass



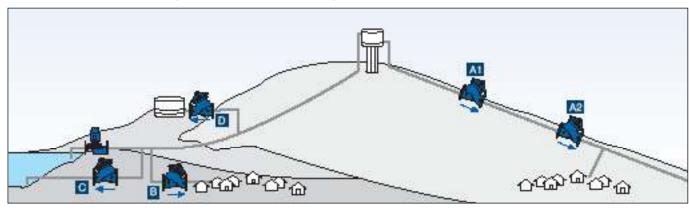


Model 720-PD 700 Series

# **Typical Applications**

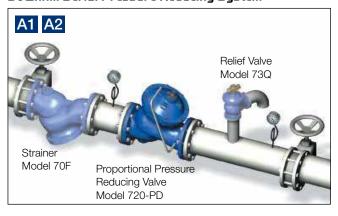
There are two major applications for the Model 720-PD Proportional Pressure Reducing Valve:

- Long downhill lines:
  - Systems A1 and A2 prevent the downhill line from exceeding its pressure rating.
- High differential pressure systems:
  - System B reduces cavitation damage and noise level by distributing the load of the high differential pressure.
  - System C illustrates protecting a circulation valve from high differential pressure and resultant severe cavitation.
  - System D shows protecting a level control valve from high differential pressure.

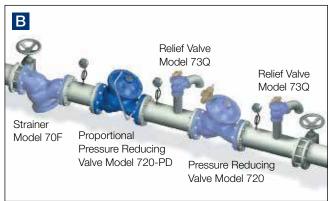


# **Typical Installations**

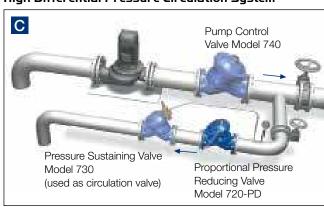
## Downhill Serial Pressure Reducing System



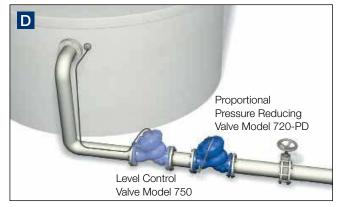
# High Differential Pressure Reducing System



# High Differential Pressure Circulation System



# High Differential Pressure Level Control System







700 Series

# **Technical Data**

Size Range: DN40-900 ; 11/2-36" End Connections (Pressure Ratings):

Flanged: ISO PN16, PN25 (ANSI Class 150, 300)

Threaded: BSP or NPT Others: Available on request

Valve Patterns: "Y" (globe) & angle, globe (DN600-900; 24"-36")

Working Temperature: Water up to 80°C; 180°F

Standard Materials:

Body & Actuator: Ductile Iron

Internals: Stainless Steel, Bronze & coated Steel Diaphragm: Synthetic Rubber Nylon fabric-reinforced

Seals: Synthetic Rubber

Coating: Fusion Bonded Epoxy, RAL 5005 (Blue) approved for drinking water or Electrostatic Polyester Powder

# Differential Pressure Calculation

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

 $\Delta P$  = Differential Pressure for fully open valve (bar; psi)

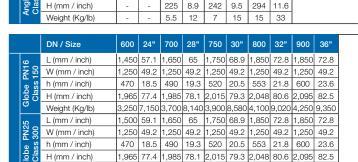
Q = Flow rate (m<sup>3</sup>/h; gpm)

**Kv** = Metric system - valve flow coefficient (flow in m³/h at 1 bar ΔP with 15°C water)

Cv = US system - Valve flow coefficient (flow in gpm at 1 psi  $\Delta P$  with 60°F water) Cv = 1.155 Kv

# Flow Data & Dimensions Table

		DN / Size	40	1.5"	50	2"	65	2.5"	80	3"	100	4"	150	6"	200	8"	250	10"	300	12"	350	14"	400	16"	450	18"	500	20"
Flow Data	ES	Kv / Cv - Flat	54	62	57	66	60	69	65	75	145	167	395	456	610	705	905	1,045	1,520	1,756	-	-	2,250	2,599	-	-	4,070	4,701
	700ES	Kv / Cv - V-Port	46	53	48	56	51	59	55	64	123	142	336	388	519	599	769	888	1,292	1,492	-	-	1,913	2,209	-	-	3,460	3,996
	700 & 700EN	Kv / Cv - "Y" Flat	42	49	50	58	55	64	115	133	200	230	460	530	815	940	1,250	1,440	1,850	2,140	1,990	2,300	3,310	3,820	3,430	3,960	3,550	4,100
	00 Z	Kv / Cv - "Y" V-Port	36	41	43	49	47	54	98	113	170	200	391	450	693	800	1,063	1,230	1,573	1,820	1,692	1,950	2,814	3,250	2,916	3,370	3,018	3,490
		L (mm / inch)	230	9.1	230	9.1	290	11.4	310	12.2	350	13.8	480	18.9	600	23.6	730	28.7	850	33.5	-	-	1,100	43.3	-	-	1,250	49.2
ပ္သ	25	W (mm / inch)	150	5.9	165	6.5	185	7.3	200	7.9	235	9.3	300	11.8	360	14.2	425	16.7	530	20.9	-	-	626	24.6	-	-	838	33
700-ES	PN16;	h (mm / inch)	80	3.1	90	3.5	100	3.9	105	4.1	125	4.9	155	6.1	190	7.5	220	8.7	250	9.8	-	-	320	12.6	1	-	385	15.2
2		H (mm / inch)	240	9.4	250	9.8	250	9.8	260	10.2	320	12.6	420	16.5	510	20.1	605	23.8	725	28.5	-	-	895	35.2	1	-	1,185	46.7
		Weight (Kg/lb)	10	22	10.8	23.8	13.2	29	15	33	26	57.2	55	121	95	209	148	326	255	561	-	-	437	960	-	-	1,061	2,334
		L (mm / inch)	-	-	-	-	-	-	310	12.2	350	13.8	480	18.9	600	23.6	730	28.7	850	33.5	-	-	-	-	-	-	-	-
곮	25	W (mm / inch)	-	-	-	-	-	-	200	7.9	235	9.3	320	12.6	390	15.4	480	18.9	550	21.7	-	-	-	-	-	-	-	-
700-EN	PN16;	h (mm / inch)	-	-	-	-	-	-	100	3.9	118	4.6	150	5.9	180	7.1	213	8.4	243	9.6	-	-	-	-	-	-	-	-
2	<u></u>	H (mm / inch)	-	-	-	-	-	-	305	12	369	14.5	500	19.7	592	23.3	733	28.9	841	33.1	-	-	-	-	-	-	-	-
		Weight (Kg/lb)	-	-	-	-	-	-	21	46.2	31	68.2	70	154	115	253	198	436	337	741	-	-	-	-	-	-	-	-
		L (mm / inch)	205	8.1	210	8.3	222	8.7	250	9.8	320	12.6	415	16.3	500	19.7	605	23.8	725	28.5	733	28.9	990	39	1,000	39.4	1,100	43.3
	N16 150	W (mm / inch)	155	6.1	165	6.5	178	7	200	7.9	223	8.8	320	12.6	390	15.4	480	18.9	550	21.7	550	21.7	740	29.1	740	29.1	740	29.1
	<u>Б</u> 8	h (mm / inch)	78	3.1	83	3.3	95	3.7	100	3.9	115	4.5	143	5.6	172	6.8	204	8	242	9.5	268	10.6	300	11.8	319	12.6	358	14.1
ed	Ľ da	H (mm / inch)	239	9.4	244	9.6	257	10.1	305	12	366	14.4	492	19.4	584	23	724	28.5	840	33.1	866	34.1	1,108	43.6	1,127	44.4	1,167	45.9
Flanged		Weight (Kg/lb)	9.1	20	10.6	23	13	29	22	49	37	82	75	165	125	276	217	478	370	816	381	840	846	1,865	945	2,083	962	2,121
		L (mm / inch)	205	8.1	210	8.3	222	8.7	264	10.4	335	13.2	433	17	524	20.6	637	25.1	762	30	767	30.2	1,024	40.3	1,030	40.6	1,136	44.7
700	PN25	W (mm / inch)	155	6.1	165	6.5	185	7.3	207	8.1	250	9.8	320	12.6	390	15.4	480	18.9	550	21.7	570	22.4	740	29.1	740	29.1	750	29.5
	R SS	h (mm / inch)	78	3.1	83	3.3	95	3.7	105	4.1	127	5	159	6.3	191	7.5	223	8.8	261	10.3	295	11.6	325	12.8	357	14.1	389	15.3
	"≺" Clas	H (mm / inch)	239	9.4	244	9.6	257	10.1	314	12.4	378	14.9	508	20	602	23.7	742	29.2	859	33.8	893	35.2	1,133	44.6	1,165	45.9	1,197	47.1
		Weight (Kg/lb)	10	22	12.2	27	15	33	25	55	43	95	85	187	146	322	245	540	410	904	434	957	900	1984	967	2,132	986	2,174
	20	L (mm / inch)	155	6.1	155	6.1	212	8.3	250	9.8																		



122 4.8 122 4.8 163 6.4

18 | 17 | 37

1.9

6.3

163 6.4

115 4.5

55 2.2

209 8.2 264 10.4

4.8 122 4.8

12 8

4.8 140 5.5 159

121

122

40 1.6 48

83 3.3 102 4

122 4.8

7.9 202 8

40 1.6 40 1.6 48 1.9 56 2.2

201

55 12 55

W (mm / inch) h (mm / inch)

H (mm / inch)

Weight (Kg/lb)

L (mm / inch)

W (mm / inch)

R (mm / inch)

h (mm / inch)

Weight (Kg/lb)





_	Coating
	Voltage & main valve position
	Tubing & Fittings materials

Specify when ordering:

- Operational data (according to model)
- Pressure data
- Flow data

Size

Main model

Body material

End connection

Pattern

Coating

Additional features

- Reservoir level data
- Settings
- Use Bermad's Waterworks Ordering Guide



3,500 7,700 3,700 8,140 3,900 8,580 4,100 9,020 4,250 9.370