Proportional Pressure Reducing Valve

Model 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.
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.

Reduction Ratios Table

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>700; 700EN</th>
<th>700ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
<td>mm</td>
<td>Flat-Disc</td>
</tr>
<tr>
<td>1.5&quot;, 2&quot;, 2.5&quot;</td>
<td>40, 50, 65</td>
<td>3.7</td>
</tr>
<tr>
<td>3&quot;</td>
<td>80</td>
<td>2.6</td>
</tr>
<tr>
<td>4&quot;</td>
<td>100</td>
<td>2.5</td>
</tr>
<tr>
<td>5&quot;</td>
<td>125</td>
<td>-</td>
</tr>
<tr>
<td>6&quot;</td>
<td>150</td>
<td>2.5</td>
</tr>
<tr>
<td>8&quot;</td>
<td>200</td>
<td>2.4</td>
</tr>
<tr>
<td>10&quot;</td>
<td>250</td>
<td>2.3</td>
</tr>
<tr>
<td>12&quot;</td>
<td>300</td>
<td>2.2</td>
</tr>
<tr>
<td>14&quot;</td>
<td>350</td>
<td>2.2</td>
</tr>
<tr>
<td>16&quot;</td>
<td>400</td>
<td>2.2</td>
</tr>
<tr>
<td>18&quot;</td>
<td>450</td>
<td>2.2</td>
</tr>
<tr>
<td>20&quot;</td>
<td>500</td>
<td>2.2</td>
</tr>
</tbody>
</table>

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
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 cavititation 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 cavititation.
  - System D shows protecting a level control valve from high differential pressure.

Typical Installations

Downhill Serial Pressure Reducing System

- A1 A2
  - Strainer Model 70F
  - Proportional Pressure Reducing Valve Model 720-PD
  - Relief Valve Model 73Q

High Differential Pressure Reducing System

- B
  - Strainer Model 70F
  - Proportional Pressure Reducing Valve Model 720-PD
  - Pressure Reducing Valve Model 720
  - Relief Valve Model 73Q

High Differential Pressure Circulation System

- C
  - Pump Control Valve Model 740
  - Pressure Sustaining Valve Model 730 (used as circulation valve)
  - Proportional Pressure Reducing Valve Model 720-PD

High Differential Pressure Level Control System

- D
  - Level Control Valve Model 750
  - Proportional Pressure Reducing Valve Model 720-PD
### Technical Data

**Size Range:** DN40-900 ; 1 1/2 – 36"

**End Connections (Pressure Ratings):**
- 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

### Flow Data & Dimensions Table

<table>
<thead>
<tr>
<th>DN / Size</th>
<th>40</th>
<th>50</th>
<th>65</th>
<th>80</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
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<th>550</th>
<th>600</th>
<th>700</th>
<th>800</th>
<th>900</th>
<th>1000</th>
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</thead>
<tbody>
<tr>
<td>Kv / Cv - Flat</td>
<td>54</td>
<td>62</td>
<td>57</td>
<td>66</td>
<td>69</td>
<td>65</td>
<td>75</td>
<td>146</td>
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<td>395</td>
<td>456</td>
<td>610</td>
<td>705</td>
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<tr>
<td>Kv / Cv - V-Port</td>
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<td>53</td>
<td>48</td>
<td>56</td>
<td>51</td>
<td>59</td>
<td>64</td>
<td>123</td>
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<td>769</td>
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<tr>
<td>Kg / lb - 700 Series</td>
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<td>91</td>
<td>332</td>
<td>91</td>
<td>332</td>
<td>91</td>
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<tr>
<td>Kg / lb - 700 Series</td>
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<td>59</td>
<td>165</td>
<td>6.5</td>
<td>185</td>
<td>7.3</td>
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<td>Kg / lb - 700 Series</td>
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<td>11.2</td>
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<td>83.2</td>
<td>89.2</td>
<td></td>
</tr>
</tbody>
</table>

### Differential Pressure Calculation

\[
\Delta P = \left( \frac{Q}{(Kv \times Cv)} \right)^n
\]

- **ΔP** = Differential Pressure for fully open valve (bar; psi)
- **Q** = Flow rate (m³/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 ΔP with 60°F water)

**Cv = 1.155 Kv**

### Flow Specifying Guide

- **Size**
- **Model**
- **Additional features**
- **Pattern**
- **Body material**
- **End connection**
- **Coating**
- **Voltage & main valve position**
- **Tubing & fittings material**
- **Operational data (according to model)**
- **Pressure data**
- **Flow data**
- **Reservoir level data**
- **Settings**

*Use BERMAD's Waterworks Ordering Guide*

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** Bermad Waterworks**

700 Series

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