High Pressure, Proportional Pressure Reducing Valve

Model 820-PP

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

The Model 820-PP High Pressure, Proportional Pressure Reducing Valve is a hydraulically operated, piston actuated control valve that reduces higher upstream pressure to lower downstream pressure at a fixed ratio.

Features and Benefits
- Robust structure, piston actuated – High pressure service
- Line pressure driven – Independent operation
- Elegant simplicity
  - Most cost effective
  - Simple to maintain
  - Minimal external accessories
- Built-in check feature – Replacing line sized check valve
- In-line serviceable – Easy maintenance
- Double chamber – Moderated valve reaction
- 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 – 820-PP-55
- Closing & opening speed control – 820-PP-03
- Emergency pressure reducing valve – 820-PP-59
- Pressure sustaining – 823-PB
Operation

The Model 820-PP is a pilotless, double chambered control valve. The downstream pressure is applied as the closing force on the top side of both the piston 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 piston 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 piston 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.

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

Pilot System Specifications

Standard Materials:
- Tubing & Fittings: Stainless Steel 316 or Copper & Brass
- Accessories: Stainless Steel 316 or Brass

Notes:
- Recommended continuous flow velocity: 0.3-6.0 m/sec; 1-20 ft/sec
- Minimum operating pressure: 2.0 bar; 30 psi

Reduction Ratios Table

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Reduction Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>1.5&quot;</td>
<td>40</td>
</tr>
<tr>
<td>2&quot;</td>
<td>50</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>65</td>
</tr>
<tr>
<td>3&quot;</td>
<td>80</td>
</tr>
<tr>
<td>4&quot;</td>
<td>100</td>
</tr>
<tr>
<td>6&quot;</td>
<td>150</td>
</tr>
<tr>
<td>8&quot;</td>
<td>200</td>
</tr>
<tr>
<td>10&quot;</td>
<td>250</td>
</tr>
<tr>
<td>12&quot;</td>
<td>300</td>
</tr>
<tr>
<td>14&quot;</td>
<td>350</td>
</tr>
<tr>
<td>16&quot;</td>
<td>400</td>
</tr>
<tr>
<td>18&quot;</td>
<td>450</td>
</tr>
<tr>
<td>20&quot;</td>
<td>500</td>
</tr>
</tbody>
</table>
Typical Applications

There are two major applications for the Model 820-PP High Pressure, 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 protection of a circulation valve from high differential pressure and resultant severe cavitation.
  - System D shows protection of a level control valve from high differential pressure.

Typical Installations

**Downhill Serial Pressure Reducing System**

- **A1, A2**
- Strainer Model 80F
- High Pressure, Proportional Pressure Reducing Valve Model 820-PP
- Relief Valve Model 83Q

**High Differential Pressure Circulation System**

- **C**
- Pump Control Valve Model 840
- Pressure Sustaining Valve Model 730 (used as circulation valve)
- High Pressure Proportional Pressure Reducing Valve Model 820-PP

**High Differential Pressure, Pressure Reducing System**

- **B**
- Strainer Model 80F
- High Pressure, Proportional Pressure Reducing Valve Model 820-PP
- Pressure Reducing Valve Model 720
- Relief Valve Model 83Q
- Relief Valve Model 73Q

**High Differential Pressure Level Control System**

- **D**
- High Pressure, Proportional Pressure Reducing Valve Model 820-PP
## Technical Data

**Size Range:** DN40-500 ; 1 1/2 – 20”

### End Connections (Pressure Ratings):
- Flanged: ISO PN16, PN25, PN40 ; ANSI Class 150, 300, 400

### Threaded:
- BSP or NPT

### Others:
- Available on request

### Valve Patterns:
- "Y" (globe) & angle

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

### Standard Materials:
- **Body:** Cast Carbon Steel; Ductile Iron; Stainless Steel 316
- **Cover:** Stainless Steel 316; Bronze
- **Internals:** Stainless Steel & Bronze
- **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>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
<th>20”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kv / Cv - “Y” Port</strong></td>
<td>42</td>
<td>49</td>
<td>50</td>
<td>58</td>
<td>64</td>
<td>65</td>
<td>67</td>
<td>113</td>
<td>135</td>
<td>170</td>
<td>200</td>
<td>250</td>
<td>280</td>
<td>300</td>
</tr>
<tr>
<td><strong>Kv / Cv - “A” Port</strong></td>
<td>46</td>
<td>53</td>
<td>56</td>
<td>64</td>
<td>61</td>
<td>70</td>
<td>127</td>
<td>146</td>
<td>220</td>
<td>250</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td><strong>Kv / Cv - “A” Flat</strong></td>
<td>39</td>
<td>45</td>
<td>47</td>
<td>54</td>
<td>51</td>
<td>59</td>
<td>108</td>
<td>124</td>
<td>187</td>
<td>210</td>
<td>250</td>
<td>300</td>
<td>350</td>
<td>400</td>
</tr>
</tbody>
</table>

### Differential Pressure Calculation

\[ \Delta P = \left( \frac{Q}{K_v} \right)^2 \]

- **\( Q \)**: Flow rate (m³/h; gpm)
- **\( K_v \)**: Metric system - valve flow coefficient (flow in m³/h at 1 bar \( \Delta P \) with 15°C water)
- **\( C_v \)**: US system - Valve flow coefficient (flow in gpm at 1 psi \( \Delta P \) with 60°F water)

### Additional Features

- **Main model**
- **Size**
- **Specify when ordering:**
  - **Tubing & Fittings materials**
  - **Operational data (according to model)**
  - **Pressure data**
  - **Flow data**
  - **Reservoir level data**
  - **Settings**
  - Use Bermad’s Waterworks Ordering Guide

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**Flow Data & Dimensions Table**

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<tr>
<th>DN / Size</th>
<th>40</th>
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<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L (mm) / inch</strong></td>
<td>205.7</td>
<td>210.8</td>
<td>213.3</td>
<td>216.0</td>
<td>220.0</td>
<td>226.0</td>
<td>257.2</td>
<td>278.0</td>
<td>323.2</td>
<td>355.4</td>
<td>387.6</td>
<td>457.2</td>
<td>497.0</td>
<td>497.0</td>
</tr>
<tr>
<td><strong>W (mm) / inch</strong></td>
<td>156.1</td>
<td>166.5</td>
<td>190.0</td>
<td>205.7</td>
<td>231.1</td>
<td>247.6</td>
<td>308.0</td>
<td>345.7</td>
<td>406.3</td>
<td>455.9</td>
<td>505.5</td>
<td>601.4</td>
<td>647.8</td>
<td>647.8</td>
</tr>
<tr>
<td><strong>H (mm) / inch</strong></td>
<td>78.1</td>
<td>83.3</td>
<td>95.1</td>
<td>100.8</td>
<td>105.6</td>
<td>110.4</td>
<td>154.0</td>
<td>173.6</td>
<td>195.7</td>
<td>206.7</td>
<td>217.8</td>
<td>296.0</td>
<td>327.1</td>
<td>327.1</td>
</tr>
<tr>
<td><strong>Weight (Kg) / (lb)</strong></td>
<td>11.8</td>
<td>15.3</td>
<td>15.3</td>
<td>14.2</td>
<td>14.6</td>
<td>15.4</td>
<td>16.1</td>
<td>15.1</td>
<td>15.4</td>
<td>15.4</td>
<td>15.4</td>
<td>35.6</td>
<td>14.1</td>
<td>14.1</td>
</tr>
</tbody>
</table>

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**“Y” Pattern**

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**Angle Pattern**

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**Specify when ordering:**

- **Size**
- **Main model**
- **Additional features**
  - **Pattern**
  - **Body material**
  - **End connection**
  - **Coating**
  - **Voltage & main valve position**

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**Technical Support:**
- **info@bermad.com** • **www.bermad.com**

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