Beeco Control Valves

Diaphragm Actuated Disk-Type Globe Valves
All these are “Control Valves”, but they are not Hydraulic (Automatic) Control Valves
Beeco Control Valves

It consists of three major components:
1) Body  2) Diaphragm assembly  3) Cover
• The opening force = Line pressure \times Seal disk area

F_1 = P_1 \times A
The closing force = $F_2$

$F_2 = \text{Line pressure} \times \text{Diaphragm area}$, which is bigger than the opening force $F_1$.

- Closing force: $50 \times 10 = 500$ lbs
- Opening force: $50 \times 7.75 = 387$ lbs
- Difference: $113$ lbs

$A = 10 \text{ in}^2$

$B = 7.75 \text{ in}^2$
Pressure\Flow regulation is achieved by holding the valve at an intermediate position.

- This is done by “locking” the volume of water in the valve control chamber.
For the plug to seal tightly against the seat and to avoid vibrations during regulation, the seal trim shaft must be guided by bearings.
Shaft Guidance in most of the common valves is done by using slide bearings at both shaft ends.

- **Advantage** - excellent shaft stability.
- **Disadvantage** - Complicated & expensive seat.
Shaft Guidance in the BEECO ACV utilizes bearings at both shaft ends (vanes for bottom guide!):

- Stable, friction free and reliable guidance.
- No complications in seat design and valve maintainability.
Most of the ACV products in the marketplace utilize a flat disk-type plug. This presents poor low flow regulation abilities due to the rapid change in the cross section area of the water passage.

**THIS IS THE MAIN CAUSE OF CHATTER**

Flow characteristics chart:
(Small plug movements cause large flow rate changes)
• For better regulation, some companies developed a throttling plug, featured by different flow characteristics.

• **V-PORT** - A throttling device with better regulation characteristics in comparison to the flat disk plug.
V-PORT

Low flow stability
Limitations:

• The near zero flow regulation is still unstable. A small diameter by-pass regulator is used for low flow regulation, in addition to installation of a V-PORT in the main valve.

• Creates high head losses at high flow rates!
The Beeco Control standard plug is assembled with a linear flow characteristic throttling device (LTP®):
Enables uniform regulation throughout the entire stroke and corresponds with low head losses in the fully open position.
Low flow stability

Pressure logging results of a 4” (100mm) PRV:

Saughton Hall under 100mm DOROT 300 Series CX Pilot Control

Pressures logged at 1 Minute Intervals  Flow logged at 15 Minute intervals

Inlet Pressure  Outlet Pressure  Flow
For low-flow regulation with the Beeco valve:

There is no need for a V-Port

There is no need for a by-pass valve
## Size Selection Table

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>40 (1½&quot;&quot;)</th>
<th>50 (2&quot;&quot;)</th>
<th>65 (2½&quot;&quot;)</th>
<th>80 (3&quot;&quot;)</th>
<th>100 (4&quot;&quot;)</th>
<th>150 (6&quot;&quot;)</th>
<th>200 (8&quot;&quot;)</th>
<th>250 (10&quot;&quot;)</th>
<th>300 (12&quot;&quot;)</th>
<th>350 (14&quot;&quot;)</th>
<th>400 (16&quot;&quot;)</th>
<th>450 (18&quot;&quot;)</th>
<th>500 (20&quot;&quot;)</th>
<th>600 (24&quot;&quot;)</th>
<th>700 (28&quot;&quot;)</th>
<th>800 (32&quot;&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. recommended flow rate for continuous operation (m³/h, V = 5.5m/s)</td>
<td>25</td>
<td>40</td>
<td>40</td>
<td>90</td>
<td>160</td>
<td>350</td>
<td>620</td>
<td>970</td>
<td>1400</td>
<td>1900</td>
<td>2500</td>
<td>3100</td>
<td>3900</td>
<td>5600</td>
<td>7600</td>
<td>9900</td>
</tr>
<tr>
<td>Max. recommended flow rate for continuous operation (Gpm, V = 18f/s)</td>
<td>110</td>
<td>180</td>
<td>180</td>
<td>400</td>
<td>700</td>
<td>1600</td>
<td>2800</td>
<td>4300</td>
<td>6200</td>
<td>8400</td>
<td>11000</td>
<td>17000</td>
<td>17000</td>
<td>24700</td>
<td>33500</td>
<td>43600</td>
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<tr>
<td>Min. recommended flow rate (&lt; 1m³/h, &lt; 5 gpm)</td>
<td></td>
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</tbody>
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### Globe Type

| Flow Rate Factor: | Kv (Metric) | Cv (US) | 43 | 50 | 43 | 50 | 103 | 120 | 167 | 195 | 407 | 475 | 676 | 790 | 1160 | 1360 | 1600 | 1900 | 1600 | 1900 | 3000 | 3500 | 3150 | 3700 | 3300 | 3860 | 7000 | 8200 | 7000 | 8200 |
| Head Loss Factor K (dimensionless) | 2.2 | 5.4 | 15.4 | 6.7 | 5.6 | 4.8 | 5.5 | 4.5 | 5 | 9 | 3.8 | 6 | 5.9 | 4.2 | 7.8 | 13.4 |

### Angle Type

| Flow Rate Factor: | Kv (Metric) | Cv (US) | 60 | 70 | 60 | 70 | 140 | 164 | 190 | 222 | 460 | 537 | 770 | 900 | 1310 | 1533 |
| Head Loss Factor K (dimensionless) | 1.3 | 2.8 | 3.3 | 4.3 | 4.3 | 4.3 | 4.2 | 3.6 |

For head Loss of fully open valves use the following equations:

\[
H \text{ (Bar)} = \left(\frac{Q \text{ [m}^3\text{/h]}}{K_v}\right)^2 \\
H \text{ (Psi)} = \left(\frac{Q \text{ [gpm]}}{C_v}\right)^2 \\
H = K \frac{V^2}{2g}
\]
ACV PART NUMBERS

ACV4.00-HF-PR list $8,201
HF IS HIGH FLOW OR FULL PORT.

ACV4.00-PR list $6,045  26% savings
REduced PORT

ACV4.00-HF5PR $5,005
LOW COST ANGLE VALVE PAGE 9
• Replaceable SST seat ensuring durability in the toughest conditions.
• Ductile Iron body, resistant to high mechanical stress.
• Closing pace is slowed at the end, preventing pressure surge.
• The control loop is equipped with a self flushing SST filter, ensuring jam free pilot operation and eliminating the need for frequent periodic filter cleaning.
• All Stainless-Steel internals thru 6” Diameter are furnished as standard to prevent corrosion!
• Stainless Steel diaphragm washers can be furnished as an option above 6” diameter.
• All Control Porting is furnished with a Stainless-Steel Liner to prevent corrosion in the most critical part of the valve. The control circuit!
• All Stainless-Steel Bolting up to 6”
Main Applications

- Level Control
- Pressure Control
- Pump Control
- Flow Control
- Electronic Control
- Safety Valves
WHERE ARE ACV’S USED

Commercial Plumbing
High Rise Buildings
Schools & Universities
Hotels & Condominiums
Hospitals and Prisons
Institutional and Plants
Sizes typically range from 1.50” through 8.00”

Fire Protection
Overhead Sprinkler
OEM & Specialty Systems
Sizes typically range from 2.00” through 6.00”
FLOAT CONTROL
Controlled by vertical On-Off Float Pilot

*Hydraulically Controlled On-Off Float Valve
*Opens Fully when commanded by Float Pilot
*Closes when commanded by Float Pilot / Solenoid
*Allows water in tank to “cycle”
Adjustable from 1’ – 4’
Pressure Reducing Valve

*The valve maintains a fixed predetermined downstream pressure.
*Regardless of flow rate fluctuations.
*Regardless of upstream pressure changes.
*Controlled by Pressure Reducing Pilot.
Pressure Sustaining Valve

*The valve maintains a minimal, predetermined pressure, upstream of its location
*Regardless of demand flow rate fluctuations.
*Controlled by Pressure Sustaining Pilot
*In case the inlet pressure is lower than the set-value, the valve will fully close.
The Beeco altitude control valves is ideal for maintaining a preset maximum water level.

*The Valve allows normal forward flow to fill the storage tank to the maximum level, then closes drip-tight at the set-point.

*It opens to refill the tank once the level drops an adjustable
Control Solutions:

*A full range of hydraulic control solutions using a wide variety of control devices
*Pressure Control applications
*Flow control application
*Water level control solutions
*Safety and protection devices for water-supply systems, pumping systems etc.
*Water hammer\Surge prevention
*Automated & Remote control of the hydraulic parameters
Thank you for your attention!