**ACCU-PULSE Pulsation Dampener Sizing Guide**

The following formula sizes pulsation dampeners for use on diaphragm, piston and plunger type metering pumps.

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**Information Required for Sizing:**

- **V** = volume per pump stroke in cubic inches
- **K** = type of pump (K factor)
- **P** = mean operating pressure
- **D** = allowable pressure fluctuation as a percentage (+/- from mean)
  - Typical is 5% (in decimal form 0.05)
- **n** = exponent for type of gas used (Nitrogen = 0.714; Air = 1.0)

**Formula #1: Calculated V** (Volume per stroke calculations:)

\[
gallons \ per \ hour = \ \frac{gallons \ per \ minute}{60 \ minutes}
\]

\[
gallons \ per \ minute = \ \frac{gallons \ per \ stroke}{strokes \ per \ minute}
\]

\[
V = \frac{cubic \ inch \ per \ stroke}{Gallons \ per \ stroke \times 231}
\]

**Formula #2: Optional calculation for Piston metering pump**

cubic inch per stroke = \(0.7854 \times \frac{\text{inch bore diameter}^2}{2} \times \text{inch stroke length}\)

**Formula #3: Calculated P** (mean operating pressure)

Desired pressure fluctuations

Minimum Pressure \(P_{min} = P - (P \times D)\)

Maximum Pressure \(P_{max} = P + (P \times D)\)

**Chart #4: K Type of Pump**

<table>
<thead>
<tr>
<th></th>
<th>Single Acting</th>
<th>Double Acting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplex</td>
<td>.60 (most common)</td>
<td>.25</td>
</tr>
<tr>
<td>Duplex</td>
<td>.25</td>
<td>.15</td>
</tr>
<tr>
<td>Triplex</td>
<td>.13</td>
<td>.06</td>
</tr>
<tr>
<td>Quadruplex</td>
<td>.10</td>
<td>.06</td>
</tr>
</tbody>
</table>

**Formula #5: Cubic inch size required**

\[
\text{Cubic inch req’d} = \frac{V \times K \left(\frac{P}{P_{min}}\right)^n}{1 - \left(\frac{P}{P_{max}}\right)^n}
\]

---

**Example:**

**Application flow rate:**

90 gallons per hour @ 144 strokes per minute

- **K = 0.60**  
  K factor of pump use **Chart 4**

- **P = 100 PSI**  
  Operating pressure

- **D = 5% = 0.05**  
  Pressure fluctuation

**Step 1:**

Calculate \(V\) = cubic inches per stroke using **Formula #1**:

\[
\frac{90 \ \text{gallons per hour}}{60 \ \text{minutes}} = 1.5 \ \text{GPM}
\]

\[
\frac{1.5 \ \text{GPM}}{144 \ \text{SPM}} = 0.01042 \ \text{gallons per stroke}
\]

\[
V = 0.01042 \times 231 = 2.41 \ \text{cubic inch per stroke}
\]

**Step 2:**

Calculate \(P\) = pressure fluctuations using **Formula #3**:

Minimum pressure \(P_{min} = P - (P \times D)\)

\[
= 100 - (100 \times 0.05)
\]

\[
= 100 - 5
\]

\[
P_{min} = 95
\]

Maximum pressure \(P_{max} = P + (P \times D)\)

\[
= 100 + (100 \times 0.05)
\]

\[
= 100 + 5
\]

\[
P_{max} = 105
\]

**Step 3:**

Calculate Cubic Inch Required using **Formula #5**:

\[
= \frac{2.41 \times 0.6 (100/95)^1}{1 - (100/105)^1}
\]

\[
= 2.41 \times 0.6 \times 1.0526
\]

\[
= 1.522
\]

Final Size = 32 cubic inches required

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**NOTE:** CRN is available on certain Accu-Pulse Dampeners. Please contact factory for price and availability.
Dampener Sizing Guide

Air Operated Double Diaphragm Pumps

The following chart shows the pulsation dampener and inlet stabilizer models for use on Air Operated Double Diaphragm (AODD) pumps.

The models stated will produce a flow up to 92% pulsation free. If a higher level of dampening is desired, the next larger capacity should be chosen.

The same models are required for both pump inlet stabilization and discharge pulsation dampening. Pricing pages listed are for standard plastic and metal models. Other models include: Teflon, food grade and sanitary.

<table>
<thead>
<tr>
<th>A O D D P u m p D i s c h a r g e</th>
<th>A C C U - P U L S E D a m p e n e r</th>
<th>D a m p e n e r C a p a c i t y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 &quot;</td>
<td>A P - I</td>
<td>Dome Top</td>
</tr>
<tr>
<td>3/8 &quot;</td>
<td>A P - I</td>
<td>Dome Top</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2 &quot;</td>
<td>A P - II</td>
<td>Flat Top</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/4 &quot;</td>
<td>A P - II</td>
<td>Dome Top</td>
</tr>
<tr>
<td>1 &quot;</td>
<td>A P - II</td>
<td>Dome Top</td>
</tr>
<tr>
<td>1 1/4 &quot;</td>
<td>A P - III</td>
<td>Flat Top</td>
</tr>
<tr>
<td>1 1/2 &quot;</td>
<td>A P - III</td>
<td>Flat Top</td>
</tr>
<tr>
<td>2 &quot;</td>
<td>A P - III</td>
<td>Dome Top</td>
</tr>
<tr>
<td>3 &quot;</td>
<td>A P - IV</td>
<td></td>
</tr>
<tr>
<td>4 &quot;</td>
<td>A P - IV</td>
<td></td>
</tr>
</tbody>
</table>

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Peristaltic (Hose) Pumps

The following chart shows the pulsation dampener and inlet stabilizer models for use on two shoe Peristaltic (Hose) type pumps.

The models stated will produce a flow up to 95% pulsation free. If a higher level of dampening is desired, the next larger capacity should be chosen.

The same models are required for both pump inlet stabilization and discharge pulsation dampening. Pricing pages listed are for standard plastic and metal models. Other models include: Teflon, food grade and sanitary.

<table>
<thead>
<tr>
<th>Capacity per Revolution</th>
<th>ACCU-PULSE Damper</th>
<th>Damper Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0058 gallon</td>
<td>AP-I</td>
<td>Dome Top 10 cubic inch</td>
</tr>
<tr>
<td>0.022 gallon</td>
<td>AP-II</td>
<td>Flat Top 36 cubic inch</td>
</tr>
<tr>
<td>0.079 gallon</td>
<td>AP-II</td>
<td>Dome Top 85 cubic inch</td>
</tr>
<tr>
<td>0.165 gallon</td>
<td>AP-III</td>
<td>Flat Top 175 cubic inch</td>
</tr>
<tr>
<td>0.35 gallon</td>
<td>AP-III</td>
<td>Flat Top 175 cubic inch</td>
</tr>
<tr>
<td>0.76 gallon</td>
<td>AP-III</td>
<td>Dome Top 370 cubic inch</td>
</tr>
<tr>
<td>1.77 gallon</td>
<td>AP-III</td>
<td>Dome Top 370 cubic inch</td>
</tr>
<tr>
<td>3.09 gallon</td>
<td>AP-IV</td>
<td>4.8 gallon</td>
</tr>
<tr>
<td>5.28 gallon</td>
<td>AP-IV</td>
<td>4.8 gallon</td>
</tr>
</tbody>
</table>

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