

# ACCU-PULSE Pulsation Dampener Sizing Guide

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

## 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:)

$$\frac{\text{gallons per hour}}{60 \text{ minutes}} = \text{gallons per minute}$$

$$\frac{\text{gallons per minute}}{\text{strokes per minute}} = \text{gallons per stroke}$$

$$V = \text{cubic inch per stroke} = \text{Gallons per stroke} \times 231$$

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

$$\text{cubic inch per stroke} = .7854 \times (\text{inch bore diameter})^2 \times \text{inch stroke length}$$

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

Desired pressure fluctuations

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

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

## Chart #4: K Type of Pump

	Single Acting	Double Acting
Simplex	.60 (most common)	.25
Duplex	.25	.15
Triplex	.13	.06
Quadruplex	.10	.06

## Formula #5: Cubic inch size required

$$\text{Cubic inch req'd} = \frac{V \times K (P/P_{\min})^n}{1 - (P/P_{\max})^n}$$

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

## 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

$$\text{Formula \#1: } = \frac{90 \text{ gallons per hour}}{60 \text{ minutes}}$$

$$= 1.5 \text{ GPM}$$

$$= \frac{1.5 \text{ GPM}}{144 \text{ SPM}}$$

$$= 0.01042 \text{ gallons per stroke}$$

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

## Step 2:

Calculate P = pressure fluctuations using

### Formula #3:

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

$$= 100 - (100 \times 0.05)$$

$$= 100 - 5$$

$$P_{\min} = 95$$

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

$$= 100 + (100 \times 0.05)$$

$$= 100 + 5$$

$$P_{\max} = 105$$

## Step 3:

Calculate Cubic Inch Required using

### Formula #5:

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

$$= \frac{2.41 \times 0.6 \times 1.0526}{1 - 0.9524}$$

$$= \frac{1.522}{0.0476}$$

$$= 32$$

Final Size = 32 cubic inches required

# 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.

<i>A O D D P u m p D i s c h a r g e</i>	<i>A C C U - P U L S E D a m p e n e r</i>		<i>D a m p e n e r C a p a c i t y</i>
1/4 "	AP -I	D o m e T o p	10 cubic inch
3/8 "	AP -I	D o m e T o p	10 cubic inch
1/2 "	AP -II	F l a t T o p	36 cubic inch
3/4 "	AP -II	D o m e T o p	85 cubic inch
1 "	AP -II	D o m e T o p	85 cubic inch
1 1/4 "	AP -III	F l a t T o p	175 cubic inch
1 1/2 "	AP -III	F l a t T o p	175 cubic inch
2 "	AP -III	D o m e T o p	370 cubic inch
3 "	AP -IV		4.8 gallon
4 "	AP -IV		4.8 gallon

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



**PRIMARY FLUID  
SYSTEMS INC.**

Call Toll Free 1-800-776-6580  
Tel (905) 333-8743 Fax (905) 333-8746

E-Mail: [primary@primaryfluid.com](mailto:primary@primaryfluid.com)  
<http://www.primaryfluid.com>

# Dampener Sizing Guide

---

## 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.

<i>Capacity per Revolution</i>	<i>ACCU-PULSE Dampener</i>		<i>Dampener Capacity</i>
0.0058 gallon	AP -I	Dome Top	10 cubic inch
0.022 gallon	AP -II	Flat Top	36 cubic inch
0.079 gallon	AP -II	Dome Top	85 cubic inch
0.165 gallon	AP -III	Flat Top	175 cubic inch
0.35 gallon	AP -III	Flat Top	175 cubic inch
0.76 gallon	AP -III	Dome Top	370 cubic inch
1.77 gallon	AP -III	Dome Top	370 cu inch
3.09 gallon	AP -IV		4.8 gallon
5.28 gallon	AP -IV		4.8 gallon

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



**PRIMARY FLUID  
SYSTEMS INC.**

**Call Toll Free 1-800-776-6580  
Tel (905) 333-8743 Fax (905) 333-8746**

**E-Mail: [primary@primaryfluid.com](mailto:primary@primaryfluid.com)  
<http://www.primaryfluid.com>**