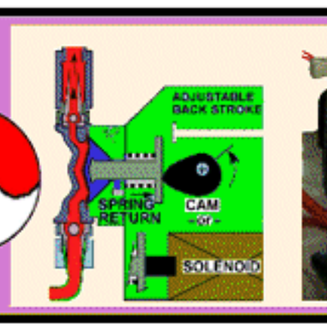
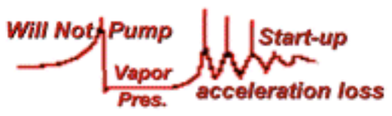
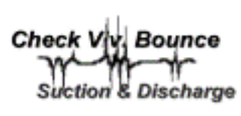
Check List :- for Attenuator "bottle" selection to intercept pressure pulsation, with in line Flow-Through flushability before service, ensuring safety with concenrated strong chemicals.

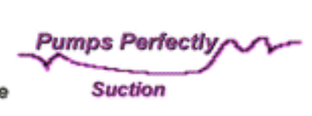
Meeting the safe use requirements of ISO 1400, OSHA, and the CE Pressure Equipment directive.



® PULSEGUARD
Guards Against Pulsation







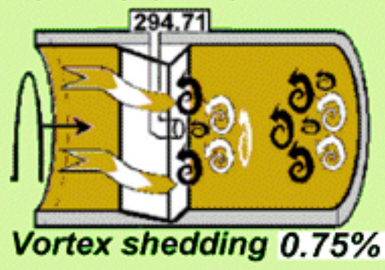
To Stop Pressure Pulses for Instruments & Control review all System Specifics, plus items 8,9,&10

1. Suitable allowable level, residual pressure pulsation, % of system pressure . Example from right, a damper for use with a "DP" Meter is 20 times larger than for preventing pump damage.
2. How much of the suction system acceleration head losses are to be recovered ?
3. Vertical height from minimum liquid supply level in the supply tank to the centerline of the pump.
4. Pipe run distance from tank outlet to pump inlet.
5. Internal diameter supply pipe. 6. SG of liquid 7. cP

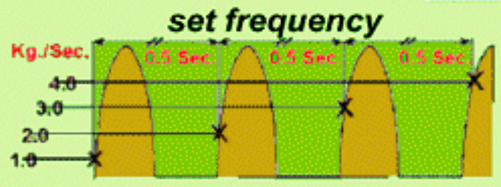
8. Pump SPM 9. Nbr. of pistons or plungers 10. GPH

Allowable Pressure Pulsation %

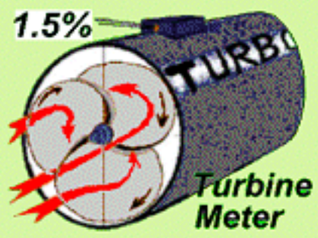
Make your pipe System work with a :- 1.



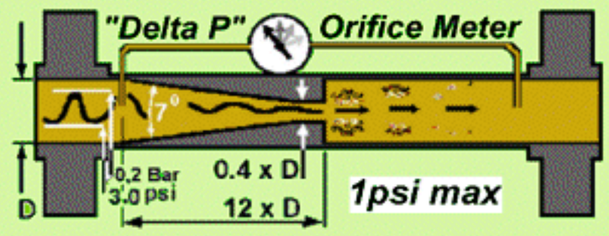
Vortex shedding 0.75%

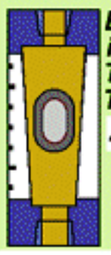


Pulsed Magnetic Field "Mag Meter" 3.0%

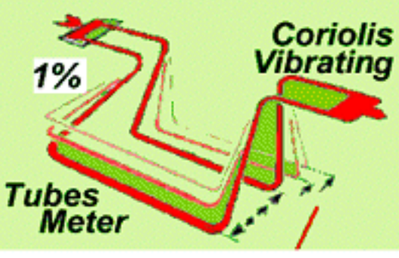


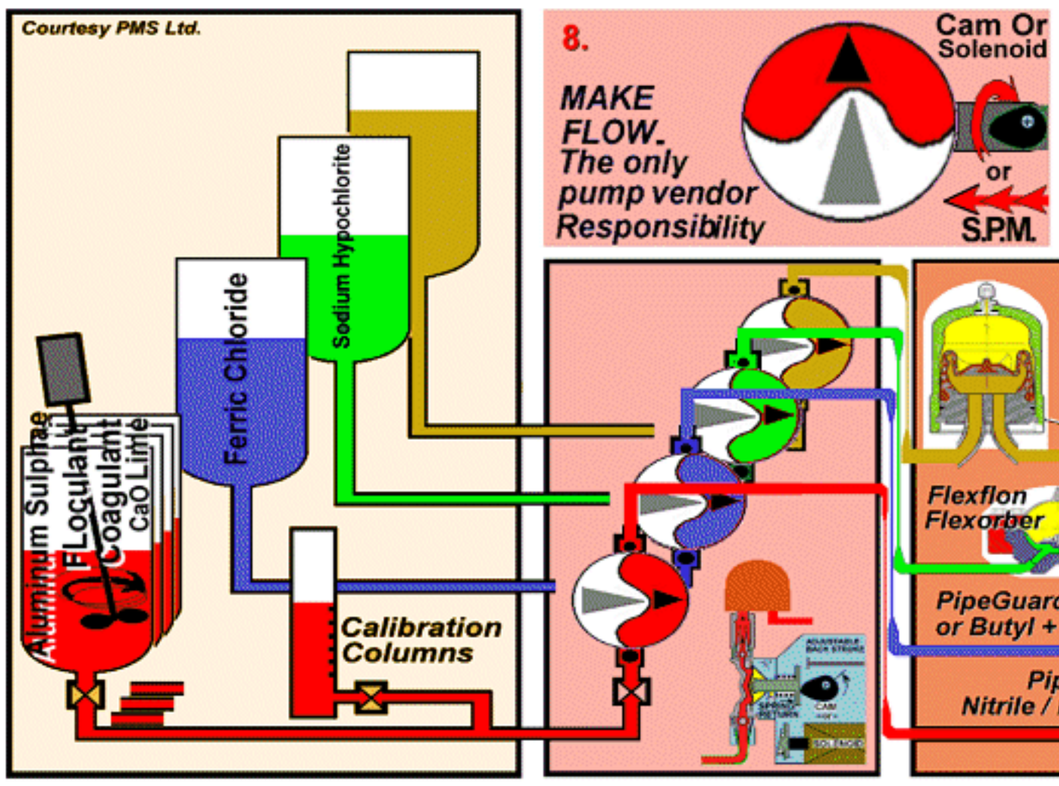
Turbine Meter





Paddle Wheel Meter





11. Strainer DP. 12. Filter DP 13. Heat exchanger DP
14. Is there a spill back loop ? 15. Back to tank. 16. Froth back to suction 17. Is there a pressurised gas "pad" in the supply tank forcing gas into absorption, which then flashes out and causes suction side gas lock? 18. Are there modulating devices after the pump putting pulsation back in the system
19. DP from restrictions 20. DP from valves 21 final resistance. psi 22. Pipe Length pump to end & ID.

Simple size calc. for pump flow fluctuation reduction.
(This disregards system presure response pulsation entirely)

$$\frac{100 \times \text{Volume of One Stroke of One Plunger}}{\text{Number of displacers}^2 \times F \times \text{The Percentage figure of allowable residual fluctuation}}$$

Example of N^2 :- 4 Pumps on one shaft phased at 90 Degrees to each other, delivering to one common Damper (made from PVDF & Flexflon) then a static mixer, the N^2=4x4 =16

Abbreviation $\frac{100 \bullet V}{N^2 \bullet F \bullet \%\text{age fig.}}$

"F" is a correction Factor on the square of number of displacers, Example , Centrifugals are intrinsically good - have a high F=7. F for a lost motion limited back stop, or solenoid pump is low, because they create shocks F= 0.6

N : N Squared, N^2 N Exponent 2, means multiply the Number of displacers by that same number.

"%age figure" : 3.5% allowable residual fluctuation - use the figure 3.5 in the equation, for a residual fluctuation

An 8 ml (0.5in3) per 100% stroke cam operated pump is set to stroke rapidly but at only 33% of stroke produces a 2.64 ml shock or 0.161 in3 = V

F=0.6 • •• $\frac{100 \times V}{N^2 \times F \times 3.5} = \frac{100 \times 0.161}{1 \times 0.6 \times 3.5} = \frac{16.1}{2.1} = 7.667$ an 8 Cubic Inches DAMPER

Check your system need.	TO STOP :-	Residual % fluctuation allowed.	SOME TYPICAL SYSTEM REQUIREMENTS
	Pump Parts Fatigue Drive tooth wear, Belt breakage,	12 %	
	Burst Disc fracture. Relief weep.	9 %	
	Unreadable pres. Indication.	6 %	
	Spray blobs, have atomization.	5 %	
	Gasket extrusion, weld fracture. Pipe shake.	4 %	
	First in 1st out bad static mixing with -out continuous flow	3.5%	Pulseless in Mixed out

For a Quotation:-

Please fax a copy of this work sheet to USA 011 910-270-2739 or UK 01144-(0)161-443-1486 or GOTO:→

PUMPS make FLOW, SYSTEMS cause PRESSURE, pressure pulsation is a system response, AND a system responsibility NOT a pump manufacturers liability. E&OE

Suitability for purpose recommendations made on the basis of data & calculations above are with with the following normal responsibilities of the parties :- System Design S.D. to consider. Pump Vendor. Bottle Peddler.

http://www.pulseguard.com/pulsation_dampening/select_smooth_percentage/how_smooth_percentage.htm