

## PULSATION DAMPENERS

The acceleration or deceleration of a fluid in a pipeline causes pulsation, which is an uncontrolled form of kinetic energy that can be seen in plumbing vibration or spikes on a pressure gauge. It is frequently caused by the sudden start or stop of a positive displacement pump. This energy continues to rock back and forth in a plumbing system until it dissipates through friction loss or damages the system itself. This happens because, for all practical purposes, liquids are not compressible -- they don't absorb or cushion energy pulses, they just transmit them. A typical system can accept as much as a ten to fifteen percent pressure fluctuation. Systems with larger pressure changes should include a pulsation dampener.

Pulsation dampeners use potential energy to absorb pressure spikes and smoothly meter out the fluid being pumped. In addition to protecting the system, dampeners help to eliminate plug flow by improving the mixing of the pumped fluid into the process stream. This works because gas is compressible, even though liquid is not. A dampener uses an elastomeric bladder to separate liquid and gas chambers within the device. Since the gas volume is inversely proportional to the incoming pressure spike, providing a calculated gas pressure into that chamber can reduce pulsation by as much as ninety-nine percent.

**Table 1** has been included to simplify the selection of a pulsation dampener for use with an LMI Metering Pump. Other styles of pump, like gear or centrifugal pumps, are considered to be non-pulse generating. If you'd like more information about how some different types of pump work, please see [Metering Pump Basics](http://www.furrowpump.com) on our web page ([www.furrowpump.com](http://www.furrowpump.com)).

## SURGE SUPPRESSORS

Pulsation dampeners primarily deal with the pressure spikes that result from the acceleration, or sudden start, of a positive displacement pump. Surge suppressors deal with the effects of the sudden stop of a moving fluid – the deceleration. Surge suppressors are the same type of device as a pulsation dampener, except that they are sized for different conditions. When a liquid is stopped, often by a quick-closing valve (one with a closing time of less than one and one-half seconds), a hydraulic surge is created within the system. This kinetic energy is released through friction loss or as pressure, which can spike up to as much as six times the system's normal operating pressure. Hydraulic surge (or shock) is often referred to as water hammer – the best example of this I've heard relates this to a hammer hitting a concrete wall, where some of the energy goes into the wall, some is lost to friction, and most of it goes back into an arm from the vibrating hammer.

Another source of hydraulic shock is back surge, which occurs when a pump that is pumping “up” stops. The fluid reverses direction and even gains in velocity as it travels back toward the pump. A surge suppressor on the pump's discharge will absorb this pressure spike. A pulsation dampener or surge suppressor can be used successfully to prevent cavitation at a pump's suction, or to smooth out a spraying or coating job. They can even be used as a thermal expansion chamber – give us a call about your process application.

**Table 1. BLACOH PULSATION DAMPENERS FOR LMI PUMPS**

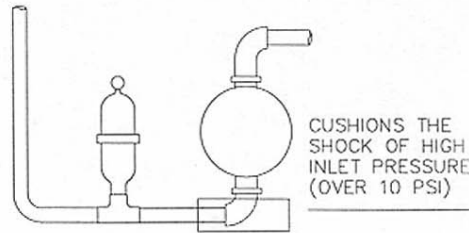
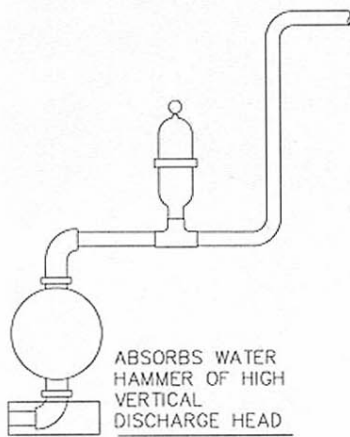
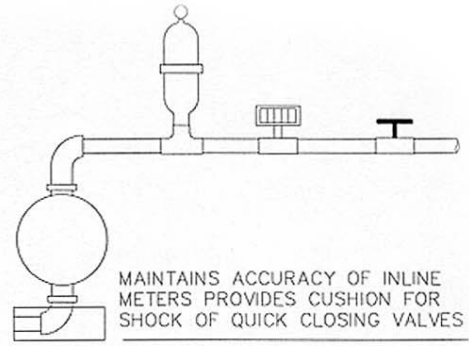
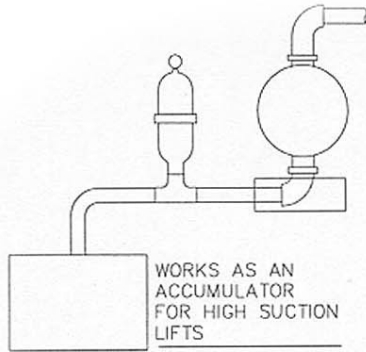
Pump Model	Dampener Cu. In.	Blacoh Model Series	Body Material	Bladder Material	Part Number	Price (02-03-11)
A BX1* BX2 SD2	4	Sentry III Plastic Flat Top	PVC	EPDM	CTP1110ND	170.00
				Hypalon	CTP1110H	184.00
				Viton	CTP1110V	217.00
				Teflon	CTP1110T	398.00
		Kynar	EPDM	CTK1105ND	236.00	
			Hypalon	CTK1105H	250.00	
			Viton	CTK1105V	284.00	
			Teflon	CTK1105T	469.00	
BX3 BX4 CX0 CX1 CX2 CX3 C77 SD4	10	Sentry III Plastic Dome Top	PVC	EPDM	CTP1010ND	195.00
				Hypalon	CTP1010H	208.00
				Viton	CTP1010V	240.00
				Teflon	CTP1010T	422.00
		Kynar	EPDM	CTK1005ND	263.00	
			Hypalon	CTK1005H	277.00	
			Viton	CTK1005V	309.00	
			Teflon	CTK1005T	495.00	
		Sentry "Revolution"	PVC	EPDM	RC-10X-E50	208.00
				Hypalon	RC-10X-H50	221.00
				PVC	RC-10X-X50	194.00
				Viton	RC-10X-V50	254.00
Teflon	RC-10X-T50	436.00				
CX4 C78	36	Sentry II Plastic Flat Top	PVC	EPDM	C1311ND	454.00
				Hypalon	C1311H	482.00
				Viton	C1311V	546.00
				Teflon	C1311T	843.00
		Kynar	EPDM	C1401ND	690.00	
			Hypalon	C1401H	719.00	
			Viton	C14101V	784.00	
			Teflon	C1401T	1,088.00	
SG5 SD7 SD8	85	Sentry II Plastic Dome Top	PVC	EPDM	C311ND	466.00
				Hypalon	C311H	495.00
				Viton	C311V	558.00
				Teflon	C311T	857.00
		Kynar	EPDM	C401ND	711.00	
			Hypalon	C401H	732.00	
			Viton	C401V	912.00	
			Teflon	C401T	1,116.00	
SG6	175	Sentry I Plastic Flat Top	PVC	EPDM	C911ND	645.00
				Hypalon	C911H	672.00
				Viton	C911V	740.00
				Teflon	C911T	1,500.00
		Kynar	EPDM	CT1201ND	1,484.00	
			Hypalon	CT1201H	1,559.00	
			Viton	CT1201V	1,675.00	
			Teflon	CT1201T	2,668.00	
SG7	370	Sentry I Plastic Dome Top	PVC	EPDM	C111ND	665.00
				Hypalon	C111H	692.00
				Viton	C111V	761.00
				Teflon	C111T	1,587.00
		Kynar	EPDM	CT201ND	1,844.00	
			Hypalon	CT201H	1,919.00	
			Viton	CT201V	2,036.00	
			Teflon	CT201T	3,029.00	

\*LMI uses an "X" to designate different control options. For example, BX1 could stand for a B111, B711 or B911 pump Drive Assembly (The X stands for a 1, 7 or 9 in each of these models).

Notes:

1. The dampeners shown here have a pressure limit of 150 psi. Many other materials and pressure capabilities are available, according to your needs. Give us a call.
2. The 4 & 10 cubic inch models are flow thru, with a tee built in, while larger units are appendage style, where the installer provides the mounting tee. All units are chargeable (compressed air or nitrogen), and include both a pressure gauge and gas fill valve.

TYPICAL LOCATIONS OF SUPPRESSORS, INSTALLED TO PROTECT  
PIPING SYSTEMS COMPONENTS



CAUTION: DO NOT EXCEED 125 PSIG AIR  
PRESSURE ON STANDARD MODELS AND  
600 PSIG AIR PRESSURE ON  
HIGH PRESSURE (HP) MODELS.

