

# PULSATION DAMPENER/SURGE SUPPRESSOR SERIES PDS

## INSTALLATION AND MAINTENANCE MANUAL

### I. SPECIFICATIONS

The PDS is available in 3 capacities, with a 1", 2", or 3" NPT connection standard. For other connections consult factory.

**Maximum inlet pressure is 150 PSIG under flow conditions** – water hammer spikes will be higher. Maximum temperature is 225°F for PVDF, 180°F for PP & CP, 140°F for PVC- all with pressure deratings.

### II. GENERAL SAFETY INFORMATION – READ BEFORE INSTALLING

DO NOT misuse dampener, including but not limited to over-pressurization, modification of parts, using incompatible chemicals, or operating with worn or damaged parts. DO NOT use any gases other than compressed air or clean dry Nitrogen to charge dampener. DO NOT USE OXYGEN. Any misuse could result in serious bodily injury, death, fire, explosion or property damage.

#### Over-Pressurization

Never exceed the maximum pressure rating for the dampener model being used. Maximum allowable working pressure is specified on dampener. Maximum allowable working pressure is rated at 70°F (21°C).

#### Temperature Limits

**Pressure & Temperature Deratings for Water\***

BODY MAT'	77°F (25°C)	105°F (40°C)	at MAX. TEMP.
PVC	150 PSI; 10 Bar	100 PSI; 7 Bar	40 PSI @ 140°F; 3 Bar @ 60°C
CPVC	150 PSI; 10 Bar	120 PSI; 8 Bar	40 PSI @ 180°F; 3 Bar @ 80°C
PP*	150 PSI; 10 Bar	120 PSI; 8 Bar	40 PSI @ 180°F; 3 Bar @ 80°C
PVDF**	150 PSI; 10 Bar	120 PSI; 8 Bar	30 PSI @ 225°F; 2 Bar @ 107°C

\* or compatible chemical – Ratings may be reduced for some applications.

\*\* Maximum temperature for PVDF is based on other components.

DO NOT exceed the operating temperature limits for the body and/or elastomer materials being used. Excessive temperature will result in dampener failure. Temperature and pressure reduce the strength and chemical resistance of plastic, metal, elastomers and PTFE.

#### Installation and Start-Up Hazards

Turn pump off and remove all pressure from system prior to dampener installation. Install dampener before charging or pressurizing.

DO NOT start system or assembly without first charging or preloading dampener. Failure to preload may result in premature wear to the bladder and decreased efficiency. For very low operating pressures, no preload may be optimum. A good **starting point for the preload dome pressure is 5 PSI below the minimum line pressure**. Set the preload when the system is depressurized. Some systems may require more or less preload pressure for optimum dampening.

Always wear safety glasses and other appropriate safety equipment when installing, charging or repairing dampener. Always relieve preload pressure before servicing.

### Dampener Bladder/Bellows Failure

Dampeners utilize an elastomeric membrane (bladder) to separate system fluid from the air supply or gas charge. When failure occurs, system fluid may be expelled from the air valve when preload is relieved.

### Maintenance Hazards

Never over-tighten fasteners. This may cause leakage of system fluid and damage to dampener components

## III. MATERIALS

WETTED PARTS: Either PVC, CPVC, Polypro or PVDF plastic, and EPDM or FKM elastomer. There are no wetted metals in the unit.

**CAUTION:** Plastic materials will degrade in ultra-violet (UV) light or sunlight.

## IV. INSTALLATION

For best results, the tee and nipples used to connect the PDS to the pipeline should be at least one pipe size larger than the pipe being dampened in order to let the pressure transfer as quickly as possible. A full port ball valve should be installed between the PDS and the system. The PDS can be installed in any direction but vertical is preferred. Use brackets or hangers to support these units when installed.

The air preload in the damper can be adjusted for best results in every system. Factors such as the specific gravity of the fluid being pumped, length of downstream piping, back pressure, and other equipment in the flow path can change the optimum preload pressure. Make sure that the gauge isolation valve is closed when in use to avoid damaging the pressure gauge.

Maximum air preload is 145 PSI. **DANGER:** Do not exceed 145 PSI. Use only a hand pump or filtered, regulated air.

The sizing charts provided are general guidelines. If the dampening in a particular system is not sufficient, an additional damper or suppressor or a larger damper or suppressor may be required to meet the requirements of a particular system.

POM pulsation dampeners, surge suppressors, water hammer arrestors, and inlet stabilizers have inlet ports larger than competitive designs to transfer fluid and forces faster. This allows slightly smaller and lighter units to be used as opposed to larger and heavier ones.

### INSTALLATION (continued)

#### Inlet Suction Stabilizer

The PDS can be used on the inlet side of the pump as an inlet stabilizer to prevent cavitation and upstream vibration. Using one of these units as an intake stabilizer will make a noticeable difference in how smooth the pump works and extend the life of the pump. To function as a suction or inlet stabilizer, the PDS must be installed upstream of the pump inlet, i.e., between the liquid supply (tank or main) and the pump. Position the PDS as close to the pump as possible.

#### Surge Suppressor/Pulsation Dampener

To function as a surge suppressor or pulsation dampener, the PDS must be installed downstream of the pump. A small amount of back pressure in the system created by a valve, nozzle, flow limiter, or equipment will make pulses much smoother, especially with long duration pulses. 10 to 15 psi back pressure on POM pulsation dampeners is optimal in most cases. Install as close to pump as possible.

#### Water Hammer Arrestor

To function as a water hammer arrestor or preventer, the PDS should be installed on a tee downstream of any pressure controls and upstream of any quick-closing valves within 6 feet of valve or as close as possible. i.e., install it between any pressure controls and quick-closing valves or other points of use that may cause water hammer.

### V. PIPING CONNECTIONS

**Threaded Connections:** A suitable thread sealant (e.g. PTFE tape) should be applied to male tapered threads to assure a “leak-tight” seal. The assembly need only be made “hand-tight” followed by a quarter (1/4) turn with a strap wrench. Do not over tighten or use pipe wrenches on plastic pipe and components.

**Caution:** PTFE tape will “string” as pipe threads are joined. Loose “strings” could clog the screen. To avoid this problem, clean out the old tape, and do not apply tape to the first thread.

**Caution:** Connection should be made only to plastic fitting; metal pipe should only be installed with an intervening plastic nipple. Metal pipe and straight threaded pipe tend to cut, stretch, and distort the plastic bodies, which could result in failure.

### VI. MAINTENANCE:

Plast- O-Matic recommends establishing a periodic inspection and maintenance plan.

Should the PDS be installed in salt solutions or other liquids which have the possibility of precipitating solids out of solution, it is recommended to periodically clean the unit in lukewarm water to remove debris and/or precipitated salts from the screen.

### VII. CAPACITY SELECTION

Selecting a PDS Dampener(s) with sufficient capacity or volume is determined by a number of factors depending on the application (pulsation dampening or water hammer arrest).

#### To Calculate Size When Used As Pulsation Dampener :

- K:** Type of dosing/piston metering pump. Use appropriate factor...  
 Most Common - Simplex: Single Acting = .60; Double Acting = .25  
 Duplex: Single Acting = .25; Double Acting = .15  
 Triplex: Single Acting = .25; Double Acting = .15  
 For double diaphragm pumps use K=0.30
- V:** Volume/Stroke of dosing pump in cubic inches
- P:** System mean operating pressure
- Pmax & Pmin:** Min and max desired operating pressure
- n:** Factor based on dampener charge  
 For Compressed Air use 1.0; for Nitrogen use .714

#### Calculation:

$$C = \frac{(V) \times (K) \times (P/P_{min})^n}{1 - (P/P_{max})^n}$$

C = Required Dampener Capacity in Cubic Inches

PDS for pulsation dampening may be determined by the type of pump, pump volume, etc. and PDS for water hammer arrest may be determined by pipe size, flow rate, etc. as shown on the following two pages of tables.

The suitability of the PDS as defined by the following tables may not be appropriate for every application for a variety of factors, including but not limited to liquid velocity, presence of entrained air or gas in the pipeline, distance from pump or quick closing valves, specific gravity and/or liquid viscosity, temperature, variances in pressure, and a host of other factors. For applications in question, a calculation to determine Pulsation Dampener/Surge Suppressor capacity follows the general charts.

Please remember that the user is ultimately responsible for the suitability of a PDS Dampener for any given application. An improperly specified or installed dampener can result in leaks, fugitive emissions, explosion, catastrophic failure, property damage, injury or death.

### WATER HAMMER ARRESTOR SELECTION CHART

ALL FLOW RATES ARE FOR 5 FEET / SECOND

SCD. 80 PIPE DIA.	LENGTH OF PIPE (FEET)	FLOW RATE (GAL. / MIN.)	RECOMMENDED POM DAMPENER	
			60 PSI LINE PRESSURE	100 PSI LINE PRESSURE
1/4"	25	1.02	PDS010	PDS010
1/4"	50	1.02	PDS010	PDS010
1/4"	100	1.02	PDS010	PDS010
1/4"	200	1.02	PDS010	PDS010
3/8"	25	2.03	PDS010	PDS010
3/8"	50	2.03	PDS010	PDS010
3/8"	100	2.03	PDS010	PDS010
3/8"	200	2.03	PDS010	(2) PDS010
1/2"	25	3.41	PDS010	PDS010
1/2"	50	3.41	PDS010	PDS010
1/2"	100	3.41	PDS010	(2) PDS010
1/2"	200	3.41	PDS010	PDS050
3/4"	25	6.42	PDS010	PDS010
3/4"	50	6.42	PDS010	(2) PDS010
3/4"	100	6.42	PDS010	PDS050
3/4"	200	6.42	(2) PDS010	PDS050
1"	25	10.7	PDS010	PDS010
1"	50	10.7	PDS010	(2) PDS010
1"	100	10.7	(2) PDS010	PDS050
1"	200	10.7	PDS050	(2) PDS050
1-1/2"	25	26.67	PDS010	PDS050
1-1/2"	50	26.67	(2) PDS010	PDS050
1-1/2"	100	26.67	PDS050	(2) PDS050
1-1/2"	200	26.67	(2) PDS050	PDS180
2"	25	44.8	(2) PDS010	PDS050
2"	50	44.8	PDS050	(2) PDS050
2"	100	44.8	(2) PDS050	PDS180
2"	200	44.8	PDS180	PDS180 + PDS050

Note that (1) PDS050 can be used instead of (2) PDS010 water hammer arrestors.

Note that (1) PDS180 can be used instead of (2) PDS050 water hammer arrestors.

Always set bladder preload pressure at 5 psi less than line pressure when flowing.

For flow parameters not listed consult factory.

# SIZING CHART FOR PULSATION DAMPENING

## PERISTALTIC PUMP

PORT SIZE	(HOSE PUMP) GALLONS PER REVOLUTION	RECOMMENDED POM DAMPENERS
1/4"	UP TO 0.010	PDS010
3/8"	UP TO 0.010	PDS010
1/2"	UP TO 0.010	PDS010
3/4"	UP TO 0.025	PDS050
1"	UP TO 0.075	PDS050
1-1/2"	UP TO 0.4	PDS180
2"	UP TO 0.9	(2)PDS180

## AIR OPERATED DOUBLE DIAPHRAGM PUMP

PORT SIZE	RECOMMENDED POM DAMPENERS
1/4"	PDS010
3/8"	PDS010
1/2"	PDS050
3/4"	PDS050
1"	PDS050
-1/4"	PDS180
1-1/2"	PDS180
2"	(2) PDS180

## PISTON METERING PUMP

PORT SIZE	MINIMUM PUMP CYCLES PER MINUTE	MINIMUM REQUIRED BACK PRESSURE PSI	VOLUME PER STROKE GPM	RECOMMENDED POM DAMPENER
1/4"	40	27	0.03	PDS010
1/4"	40	35	0.037	PDS010
1/4"	30	30	0.024	PDS010
1/4"	20	20	0.062	(2) PDS010
1/4"	15	25	0.076	(2) PDS010
3/8"	40	25	0.075	(2) PDS010
3/8"	30	25	0.066	(2) PDS010
3/8"	20	30	0.086	(2) PDS010
1/2"	30	15	0.085	PDS050
1/2"	30	12	0.09	PDS050
1/2"	15	15	0.085	PDS050
1/2"	6	8	0.085	PDS050
3/4"	30	15	0.12	PDS050
3/4"	30	12	0.2	(2) PDS050
3/4"	15	10	0.25	(2) PDS050
3/4"	6	15	0.32	(2) PDS050
1"	30	15	0.12	PDS050
1"	15	10	0.25	(2) PDS050
1"	6	15	0.32	(2) PDS050
1-1/2"	24	15	0.19	(2) PDS050
1-1/2"				
1-1/2"				

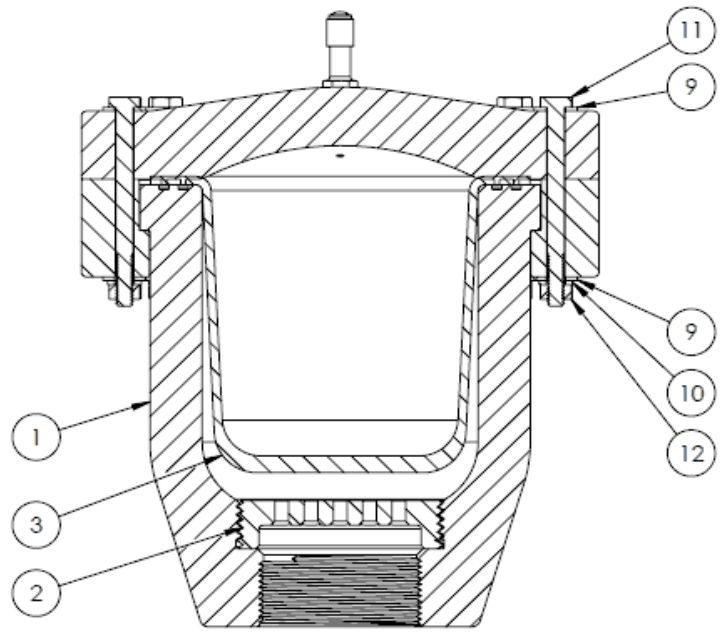
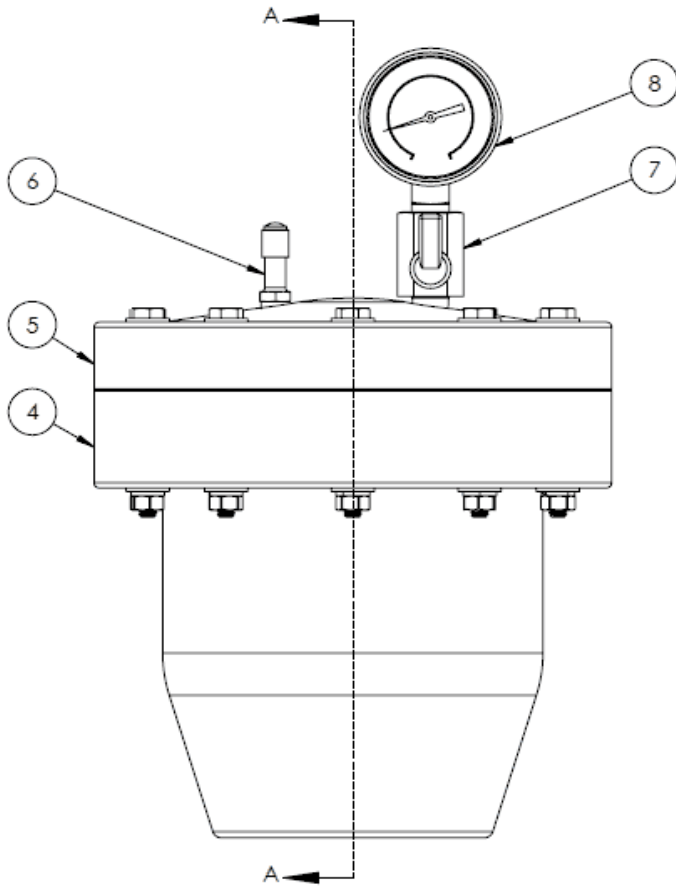
ONE PDS050 UNIT CAN BE USED INSTEAD OF 2 PDS010 UNITS AND ONE PDS180 CAN BE USED INSTEAD OF 2 PDS050 UNITS.

NOTE THAT "MINIMUM PUMP CYCLES", "MINIMUM BACK PRESSURE", AND "VOLUME" RECOMMENDATIONS ARE FOR NEAR SMOOTH OUTLET FLOW CONDITIONS.

AS A GENERAL RULE, THESE CHARTS WILL ELIMINATE APPROXIMATELY 75% OF TYPICAL PULSATIONS. FOR GREATER REDUCTIONS, USE THE FORMULA PROVIDED AT PLASTOMATIC.COM.

ALWAYS SET BLADDER PRELOAD PRESSURE AT 5 PSI LESS THAN LINE PRESSURE WHEN FLOWING.

### PULSATION DAMPENER/SURGE SUPPRESSOR SERIES PDS PARTS DRAWING



SECTION A-A

ITEM NO.	DESCRIPTION
1	BULB BODY
2	INLET SCREEN
3	BLADDER
4	CLAMP RING
5	DOMES TOP,
6	AIR INLET VALVE, PDS
7	GAUGE ISOLATION VALVE, PDS
8	0-160 PSI PRESSURE GAUGE, LOWER MOUNT
9	STAINLESS FLAT WASHER
10	SS LOCKWASHER
11	SS CAP SCREW HEX HEAD
12	SS HEX NUT

### DISCLAIMER:

The Plast-O-Matic Series PDS Pulsation Dampener and Surge Suppressor -- also referred to as a Water Hammer Arrestor and Pump Inlet Suction Stabilizer -- is a pressure vessel. It must be suitable for use with the pump and piping system.

The following factors must be considered prior to installing:

- System Pressure & Temperature
- Ambient Temperature
- Pipe Size and Vessel Capacity
- Bladder Material Compatibility
- Compatibility with Pump
- Chemical Compatibility of Media
- Other Factors Unique to the Application

Plast-O-Matic PDS Dampeners and Suppressors are specified by body material, seal material, and vessel capacity. Selection of these, as well as the suitability and the capacity and/or quantity of units required for any application must be determined by the user. Although the data and selection charts provided are believed to be accurate, these were determined in a controlled laboratory test environment and are not necessarily suitable for every application or pumping process.

Your application may have variables that affect the performance of the material. Plast-O-Matic presents this information and any links solely as a convenience. Your distributor can help with compatibility questions, and you are welcome to contact our Technical Group at (973) 256-3000, but the ultimate determination of suitability of any information, product or material, for use contemplated by the user, the manner of that use, and whether there is any infringement of patents, is the sole responsibility of the user. To the extent that any hazards are listed, we neither suggest nor guarantee that such hazards are the only ones that exist.

**Temperature & Pressure:** Plast-O-Matic provides generic operating pressure and temperature derating charts as a general guideline only. The ultimate determination of the pressure and temperature suitability of a suppressor/dampener in the user's application is the sole responsibility of the user.

**Body & Seal Materials:** There are many variables that affect success or failure of a particular material with any given chemical, including concentration, temperature, and the specific compound of the plastic. A material deemed suitable for a specific application is not necessarily suitable for every application, nor that every version of that material is suitable. Plastic compounds vary between manufacturers, and the design of the PDS and the pump and piping system may affect compatibility as well.

It is important to note that any information obtained should be used only as a guide. In many cases a physical test of the material and product under operating conditions is the only way to ensure the success of a particular material for that application.

**Vessel Capacity & Bladder Compatibility Warning:** Use of an improper, insufficient or incompatible dampener/suppressor may be extremely dangerous. Incorrect or inappropriate use may result in leaks, system failure, hazardous emissions, explosions, property damage, personal injury or death.

We recommend that anyone intending to rely on any recommendation, or use of any equipment, processing technique, or material mentioned in this website/documentation, linked websites, accompanying documentation, or manufacturer's claims, should satisfy themselves as to suitability, and that all applicable health and safety standards are met. We strongly recommend the user seek and adhere to material manufacturers' and chemical suppliers' current instructions for installation and handling. Determination of and adherence to all of these is the responsibility of the user.

The only guarantee given by Plast-O-Matic Valves, Inc. with respect to its products is set forth on the company website ([www.plastomatic.com](http://www.plastomatic.com)) or is available directly from Plast-O-Matic Valves, Inc.