USER MANUAL
Pulsepro

Read the user's manual carefully before starting to use the unit or software.
Producer reserves the right to implement changes without prior notice.

GENERAL NOTES

Pump Discharge Installation

1. Position

The Pulsepro dampener should be installed as close the pump discharge or outlet as possible in order to capture the pulse before any downstream equipment are effected. It is recommended that the Pulsepro be installed in a vertical position, this allows for better drainage.

2. Pneumatic Connection

The Pulsepro PV Series air inlet port is located on the top of the upper chamber of the dampener.

GENERAL NOTES

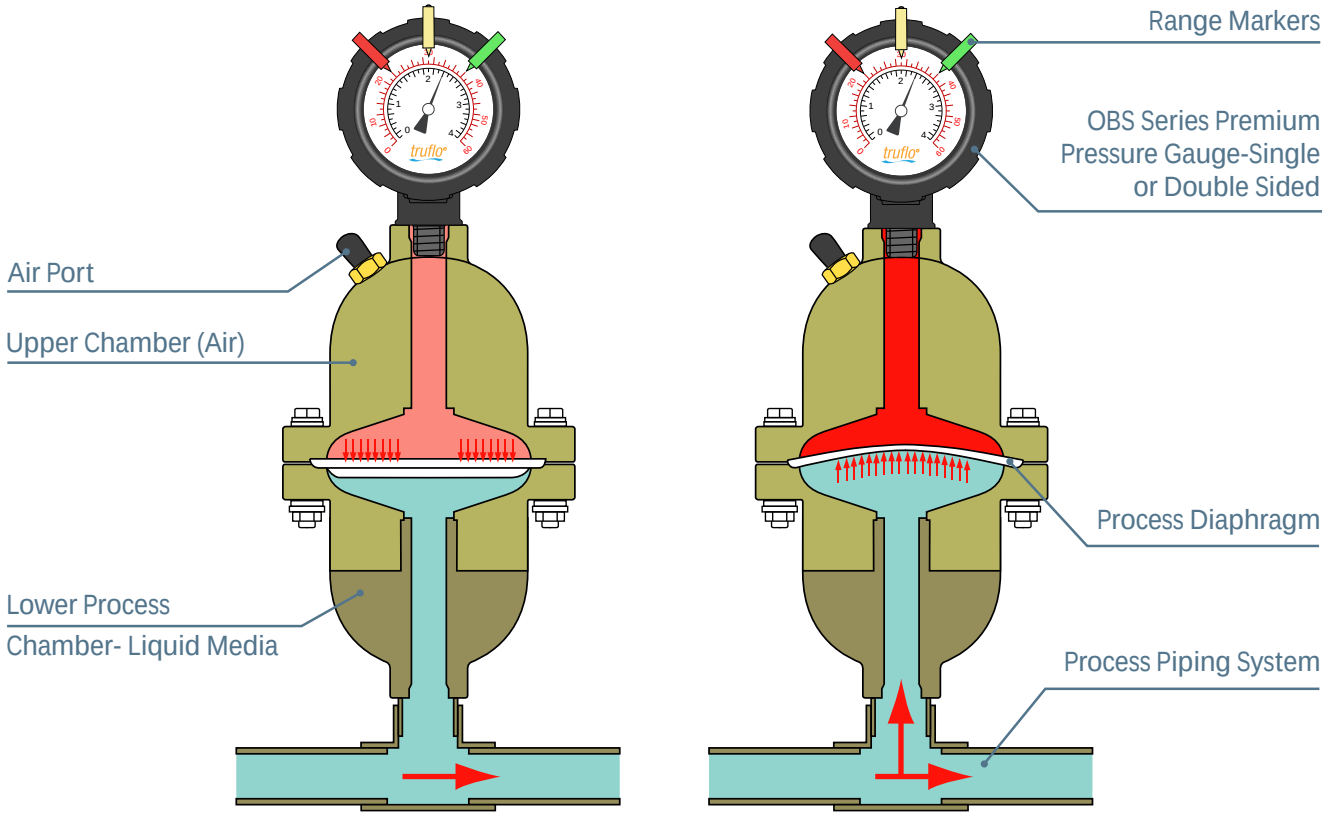
The **Pulsepro** dampeners are accessories for the AOSD, AODD pumps designed to dampen the variations Spikes and Pulses in flow and pressure on the pump discharge side.

⚠ Ensure that the chemical resistance characteristics of the fluid have been correctly evaluated prior to installation. The maximum temperature referred to water in continuous operation depends on the version of the materials and on the environment in which the pump will be installed:

The ambient temperature interval is related to the choice of materials

OPERATING PRINCIPLE

The Pulsepro PV Series dampener consists of two chambers separated by heavy duty diaphragm. The bottom chamber is connected to the piping from the pump outlet and the upper chamber is charged with air. The pressure that the pumped liquid exerts on the lower process or wet side of the diaphragm is countered with a pneumatic force in the opposing direction.



INSTALLATION AND USE INSTRUCTIONS

TRANSPORT

- Ensure the hydraulic connections are covered
- Lift without mechanical stress

INSTALLATION

- Ensure that no foreign material from shipping is left inside the Pulsepro. Remove safety caps on the hydraulic connections.
- Ensure that all of the Pulsepro PV Series screws are well tightened
- Position and secure the Pulsepro PV Series (see diagram next page)
- Place the Pulsepro PV Series nearest to pump discharge side
- The Pneumatic Supply to the Pulsepro must be filtered, dry and oil free

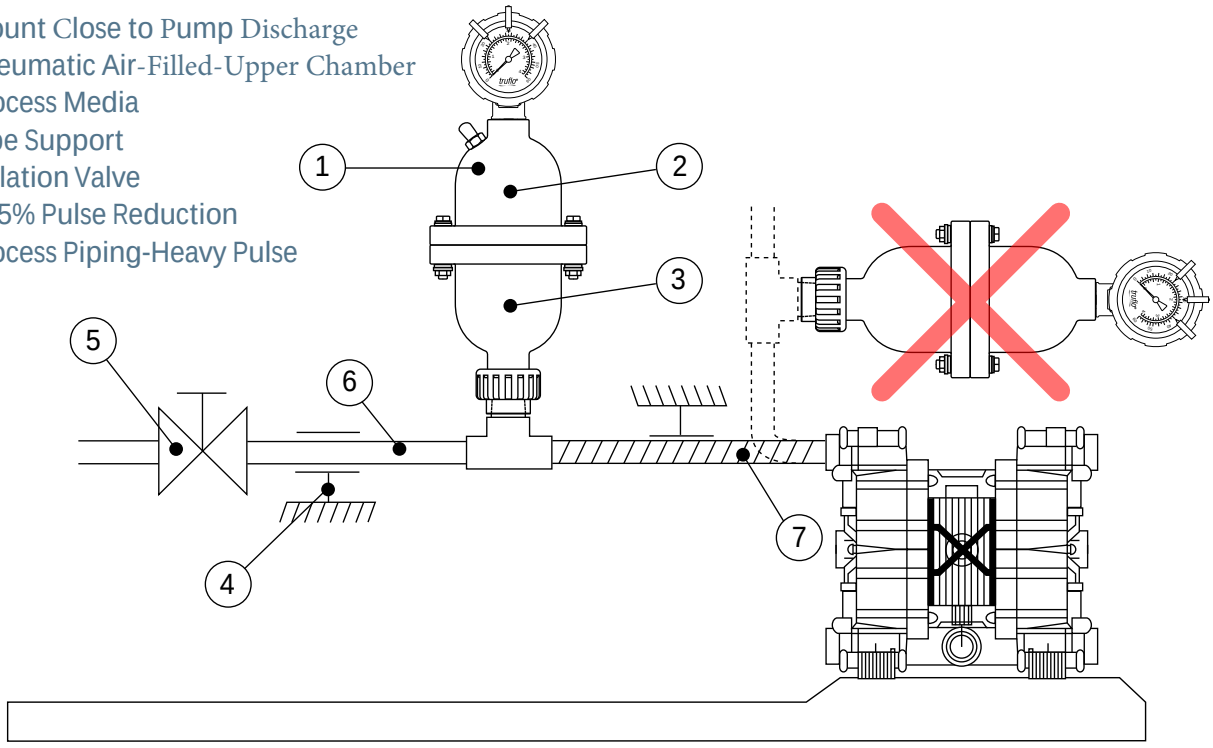
Follow the instructions indicated in the following diagram:

1. Installation of the process pipe downstream from the pulsation dampener must not be smaller than the dampener connection size. The pipe downstream (discharge side) from the dampener can be rigid and made from material compatible with the fluid to be pumped.
2. Pipe anchoring; the piping must be sufficiently strong to avoid stress deformation.
3. Shut-off valve must be the same diameter as the pump inlet (not smaller) to capture the fluid in case of spills and/or when servicing the pump.

- Ensure all process fluids which may be inside the dampener is removed.
- Support the dampener if necessary to avoid stressing the pipe.
- Arrange for enough room around the dampener for the movement of an operator.
- Identify the presence of aggressive fluid with suitable colored labels in accordance with safety standards.

Hydraulic connections

1. Mount Close to Pump Discharge
2. Pneumatic Air-Filled-Upper Chamber
3. Process Media
4. Pipe Support
5. Isolation Valve
6. >95% Pulse Reduction
7. Process Piping-Heavy Pulse



- Do not install the Pulsepro PV Series dampener near heat sources.
- Do not install the Puslepro PV dampener in places solids or liquids are dropping.
- Do not install the Pulsepro PV dampener close to fixed workplaces or visited areas
- Install additional protection shield, for the pump if deemed as appropriate. If the diaphragm breaks the fluid may enter into the pneumatic circuit and come out from the pump charging port
- Ascertain that the fluid treated does not contain large solids or sharp solids
- Ensure that the intake port is not obstructed
  Ascertain that the connection piping is strong enough and cannot be deformed by the dampener's weight. Also check that the dampener is not burdened by the weight of the piping
- **WARNING** : The use of dampeners for flammable liquids is forbidden

- **Prior to starting the pump,** Pre-Charge the dampener to approximately 80% of expected system pressure and replace fill valve cap. **DO NOT USE OXYGEN**. The Pre-Charge pressure in the Dampener must always be lower than pump discharge pressure. Generally, pulsation is most effectively minimized when the pre-charge is 80% of system pressure. Start the pump to generate system pressure. The dampener charge pressure may need to be adjusted up or down to be most effective in reducing pulsations.
  NOTE : The most effective method to set the proper dampener charge is to install a pressure gauge downstream of the dampener and adjust dampener to minimize needle movement on the guage.

- **Once system pressure is in contact with the bladder/bellows, the air charge will be compressed to the system pressure and the dampener gauge will read the system pressure, not the initial charge pressure.** Once working pressure is achieved, adjustment may be necessary. Gradually increase or decrease the air charge in the dampener by bleeding or filling the through the valve port located on the upper chamber. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments.

START UP

- Check that the intake and delivery pipes of the liquid circuit are correctly connected
- Open the intake and delivery valves of the pump hydraulic circuit
- Do not operate at the limits of the operation curves: the maximum head or maximum delivery (total absence of leaks and intake height in the delivery circuit) Check that there are no anomalous vibrations or noise due to an elastic support structure, unsuitable fastening or cavitation It is recommended that after 2 hours of operation stop the pump correctly and check the tightening of all the bolts on the dampener

USE

- Do not operate valves during the pump operation
- Risk of harmful water hammer in case of incorrect or sudden operations (valves must be operated only by trained personnel)
- Empty and wash accurately inside the dampener in case different fluids must be pumped
- Insulate or empty the dampener if the fluid crystallization temperature is equal to or below the ambient temperature Stop
- the pump if the fluid temperature exceeds the maximum allowed temperature of the Pulsepro material- PVC

- Stop the pump and close the valves in case of a leak
- Wash with water only if chemical compatibility allows it ; alternatively use the suitable solvent that does not generate hazardous exothermic reactions
- Consult the fluid supplier to decide the most suitable method
- Empty the dampener in case of long periods of disuse (particularly with fluids which are particularly tending to crystallize)
- Check that there is no gas in the delivering fluid, if there is stop the pump

WARNING : never stop the dampener and the pump when it is running and/or when the pneumatic circuit is under pressure by closing the intake and/or delivery valves on the fluid circuit: danger of premature wear and/or breakage of the diaphragm may result

WARNING : never stop the pump and dampener by totally closing the suction and/or delivery valves of the hydraulic circuit

MAINTENANCE

- All the operation must be carried out by qualified personnel
- Do not carryout maintenance and/or repairs without proper training
- Carry out periodic inspections (2 ÷ 30 days in accordance with the fluid pumped) to check the filtering elements cleaning
- Carry out periodic inspections (3 ÷ 5 months in accordance with the fluid pumped and with the environment conditions)
- to ensure the correct operation of the system start/stop units
- The presence of fluid under the dampener casing may indicate failures to the dampener
- Damaged parts must be replaced with complete original parts and not with repaired parts
- The replacement of damaged parts must be carried out in a clean and dry place
- Remove the powder deposits from the external surfaces of the pulsation dampener with a cloth soaked in suitable neutral detergents
- Periodically control and clean the internal surfaces with a damp cloth

RECOMMENDATIONS

WARNING : before performing any maintenance or repair work on the pump and dampener, disconnect the pump from the air supply line. Disconnect the hydraulic connections and discharge the product that is being pumped

All these operations must be carried out by qualified personnel using gloves, goggles and acid-resistant clothing when disconnecting from the system and washing the dampener before carrying out maintenance operations Do Not dispose the washing fluid into the environment

DISASSEMBLY

Bolts are the type with right thread
Clean all the dampner external surfaces using a damp cloth

DIAPHRAGMS REMOVAL
Separate the dampener's casing removing the fixed screws clean all the dampner surfaces using a damp cloth remove the cap (if present)

INSPECTION

Check for :

- Excessive abrasion of the thermoplastic parts
- Clots and/or plugging deposits from to the pumped fluid
- Deformations and/or surface lesions of the diaphragms
- Deformations and/or surface lesions of the dampener casing
- Replace the parts: broken, cracked, deformed
- Reopen all the clogged ducts and eliminate any chemical slurries, deposits
- Clean all the surfaces before reassembly, particularly the OR gaskets seats (risk of leaks for dripping)
- **WARNING:** Should the dampener be returned to the manufacturer or service center, you must empty it out completely. In toxic, noxious or other types of dangerous products have been used, the dampener must be suitably treated and washed before it is sent

CLEANING AND REPLACING THE DIAPHRAGMS

Control and Internal cleaning every 500.000 cycles
Diaphragm Check every 5.000.000 cycles
Diaphragm Replacement every 20.000.000 cycles

SAFETY RULES

WARNING! CHEMICAL RISK. Pumps are intended for operation with different types of liquids and chemical solutions. Follow the specific internal instructions for decontamination during the inspection or maintenance operations.

WARNING: the diaphragms (in contact with the product) are components subject to wear. Their duration is strongly affected by the conditions of the service and by chemical and related physical stresses.

WARNING! In the case that the diaphragms fails, the fluid may enter in the pneumatic circuit, damage it and come out from the charging port.

WARNING! In situations where the user foresees the possibility of exceeding the temperature limits indicated in this manual, it is necessary to install a protection device on the equipment that prevents to achieve the maximum operating temperature allowed. If exceeded, respect to the maximum marking temperature is not guaranteed.

REMEMBER! Safety risks to persons are mainly caused by improper use or accidental damage.

WARNING: when using the pump with aggressive or toxic liquids or with liquids that may represent a health hazard you must install suitable protection to contain, collect and signal any spills: danger of pollution, contamination, injuries and/ or death
WARNING: the dampener cannot be used with fluids that are not compatible with its material construction or in a place containing incompatible fluids.
WARNING: installing the dampeners without on-off valves on the intake and delivery sides to intercept the product in case of spillage is forbidden: danger of uncontrolled product spillage.
WARNING: the use of dampeners for flammable liquids is forbidden if they are made of non-conductive materials that charge statically (plastic materials) and without suitable grounding danger of explosion caused by static charges
WARNING: Aggressive, toxic or dangerous liquids may cause serious injuries or damage health, therefore it is forbidden to return a dampener containing such products to the manufacturer or to a service center. You must empty the internal circuits from the product first and wash and treat it
WARNING: the components in the pneumatic side, including the steel shaft and are made from materials that are not specifically resistant to chemical products. In case the diaphragm break, replace these elements completely if they have come into contact with the product
WARNING: ascertain that no anomalous noises can be heard during operation. If they occur, stop the dampener immediately
WARNING: ascertain that the fluid at the delivery side does not contain gas.
WARNING: periodic controls must be made to ensure that there is no powder and/or deposits on the external internal surfaces of the dampener and, if necessary, clean them with a damp cloth

Important General Elements :

A - All the operations must be carried out by skilled personnel or monitored by qualified personal
B - Implement personal protection works (when the dampener is installed in places involving more than occasional visits) against splashes of fluorescent fluid for accidental breakage and conveying works (always) of possible fluid leakages towards collection tanks
C - Wear acid-resistant clothing and protection whenever operating on the pump
D - Make sure that the Intake and delivery valves are correctly closed during the disassembly
E - Make sure that there is no supply to the pneumatic circuit during the disassembly

MAINTENANCE AND OPERATIONAL PERSONNEL

Interventions allowed to general operators (after training on the correct use of the plant):

- Dampener starting and stopping
- Opening and closing of valves with the pump at rest
- Emptying and washing of the pump body via special valves and piping
- Cleaning of filtering elements

All Maintenance should be done by qualified personnel (technical capacities required: general knowledge of the mechanical, electrical and chemical features of the plant being fed by the pump and of the pump itself):

- Verification of environmental conditions
- Certification of the condition of the liquid being pumped
- Inspections of the control/stop devices of the pump
- Inspections of the bolts and nuts of the dampener
- Trouble shooting

PERSONNEL RESPONSIBLE FOR REPAIRS

Under the supervision of qualified personnel :

- Stopping of the dampener
- Closing of the valve
- Emptying of pump body
- Disconnection of piping from fittings
- Removal of anchoring bolts
- Washing with water or suitable solvent as needed

Work by qualified personnel (technical capacities required: general knowledge of machining operations, awareness of possible damage to parts due to abrasion or shocks during handling, know-how of required bolt and screw tightening required on different materials such as plastics and metals, use of precision measuring instruments): opening and closing of the dampener body removal and replacement of rotating parts

WASTE DISPOSAL

Materials : Separate plastic from metal parts. Dispose of by authorized companies.

TROUBLESHOOTING AND POSSIBLE CAUSES

	DEFECT	CAUSE	SUGGESTION
1	The dampener does not dampening the flow	Insufficient air pressure	Adjust pressure
		Flow Pulse Higher than expected	Check that piping and accessories have suitable passage
		Broken diaphragm	Check if any air comes out from the product delivery pipe. If so, replace diaphragm.
2	The dampener is not performing at its best	The product pipe is clogged and obstructed	Disassemble the product pipe and clean it
		The product being pumped is too viscous	A larger damper is required