

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 operates via an adjust air inlet port on the top of the dampener, flexible hose is recommended.

Note : It is important the available shop air supply is equal too or greater than the pressure of the process or pump i.e. Process Pressure or Line Pressure - 60:PSI, available air supply should be 60 PSI + ensuring that there will always be enough pressure in the upper chamber to ensure correct functioning of the Pulsepro.

3. Start-Up-Charging Upper Chamber

Prior to initial start-up ensure that the air pressure into the upper chamber is regulated to be flower than system or pump discharge pressure. It is recommended that the allowable air pressure initially put into the upper chamber is 3-8 PSI below that of the discharge or line pressure of the system.

Once the pump is started the pressure in the Pulsepro will adjust to equalize the pulses being caused by the pump

It is very important that the air supply is connected to the upper chamber prior to initial pump start up to avoid possible damage to the diaphragm.

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IDENTIFICATION CODE

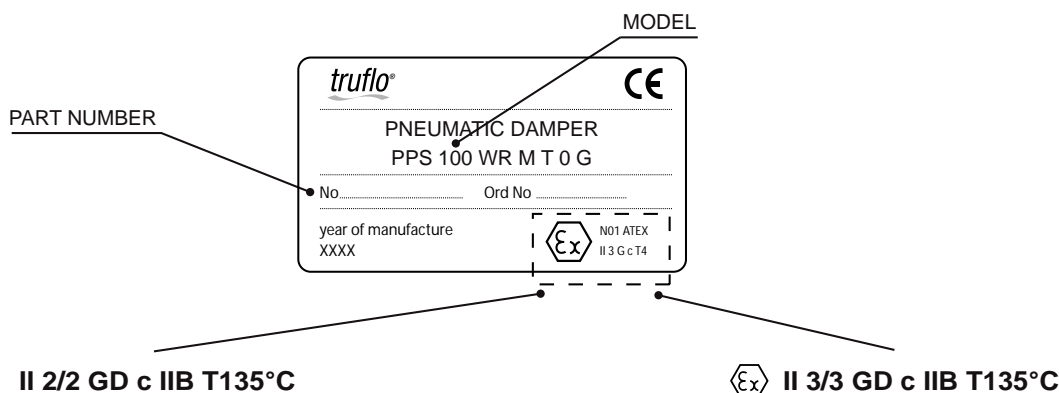
Range	Model	Materials					Connection
		Chambers	ATEX	Diaphragm	O-Ring	Tipe	
PPS	75 (¾")	WR GFR-PP	X	H keyflex®	N (NBR)	G Filetto BSP	
	100 (1")	FC CF+PVDF	X	M santoprene®	V (FKM)		
	150 (1½")	DF PVDF		D EPDM	E (EPDM)		
	200 (2")	AL Alluminio	X	N NBR	T (PTFE)		
		SS AISI 316	X	U Poliuretano	O (no o-ring)		
		SP Polished AISI 316		HT Keyflex® + PTFE			
				MT Santoprene®+ PTFE			
					T PTFE		

Year of manufacture : _____

Part Number : _____

Each damper is supplied with the model abbreviation and the serial number on the plate, which is riveted onto the support side. Check these data upon receiving the goods. Any discrepancy between the order and the delivery must be communicated immediately.

In order to be able to trace data and information, the abbreviation, model and serial number of the pump must be quoted in all correspondence.



II 2/2GD: surface equipment for use in areas with the presence of gases, vapors or mists in addition to clouds of combustible dust in the air that occur occasionally during normal operation (EN 1127- 1 par. 6.3), both in external and internal areas (ZONE 1).

c: protection by constructional safety (EN 13463-5).

IIB: excluding the following products hydrogen, acetylene, carbon disulphide.

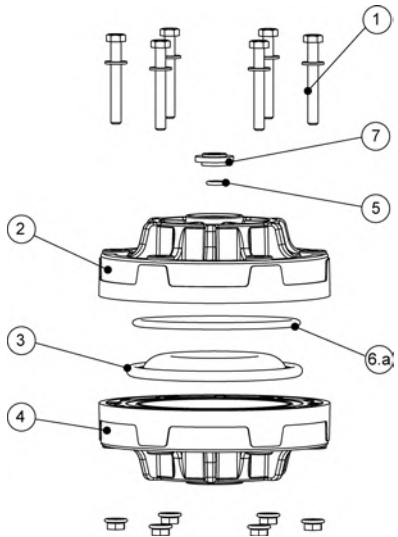
T135°C: class of admitted temperatures. The processed fluid temperature value must fall within such class range and the user must comply with the instructions contained in the manual and with the current laws. Furthermore, the user must take into account the ignition point of the gases, vapors and mists in addition to clouds of combustible powder in the air existing in the area of use.

II 3/3GD: surface equipment used in areas where the presence of gas, vapors or mists in addition to clouds of combustible powder in the air is unlikely during normal operation both in external and internal areas and, if it does occur, it will only persist for a short period (ZONE 2).

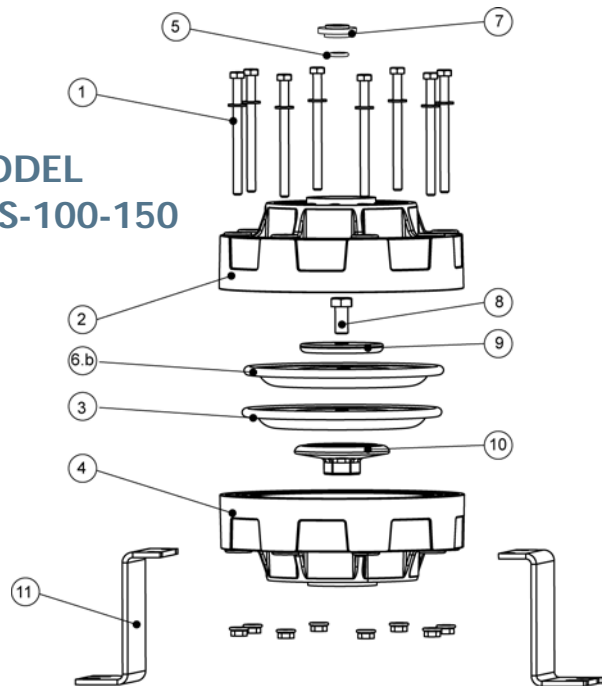
c: protection by constructional safety (EN 13463-5). IIB: excluding the following products hydrogen, acetylene, carbon disulphide.

T135°C: class of admitted temperatures. The processed fluid temperature value must fall within such class range and the user must comply with the instructions contained in the manual and with the current laws. Furthermore, the user must take into account the ignition point of the gases, vapors and mists in addition to clouds of combustible powder in the air existing in the area of use.

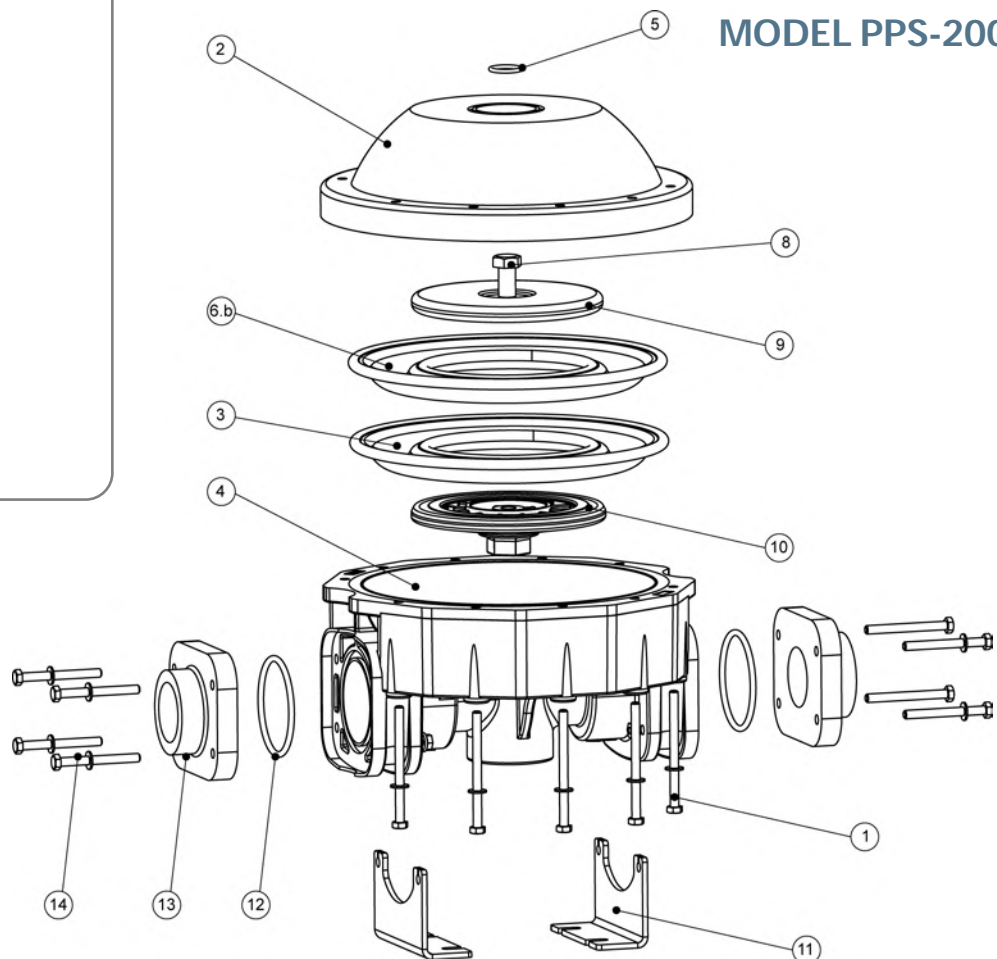
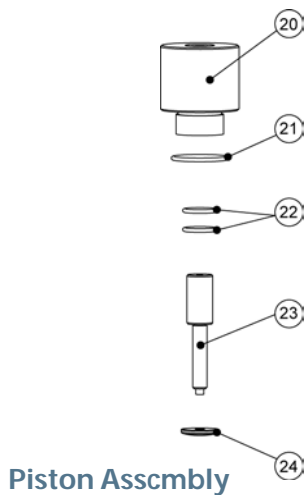
MODEL PPS-75



MODEL PPS-100-150



MODEL PPS-200



LEGEND

Note	Ref.	Pos.	Description	Qty	Disassembling Steps Sequence											
					1	2	3	4	5	6	7	8	9	10	11	12
	910.1	1	Connections Dampener Casing	1	●											
	102.1	2	Air side casing	1		●										
	135.1	3	Wet side diaphragm	1			●									
	102.2	4	Wet side casing	1		●										
	412.1	5	O-ring	1		●										
	412.2	6.a	O-ring	1			●									
	135.2	6.b	Air side diaphragm	1			●									
	514	7	Anello di battuta	1			●									
	910.2	8	Cap connection	1				●								
	488	9	Air side cap	1					●							
	260.1	10	Wet side cap	1					●							
	182	11	Base (optional for 150)	2		●										
	412.3	12	O-ring	2				●								
		13	Adaptor fitting	2			●									
	910.3	14	Connection wet side casing / Adaptor fitting	2	●											
Pneumatic Valve																
	675	20	Valve body	1	●											
	412.4	21	O-ring	1				●								
	412.5	22	O-ring	2				●								
	210	23	Probe	1			●									
	260.2	24	Probe cap	1		●										

GENERAL NOTES

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

The dampener performances (flow rate, head, and minimum pressure) are based on actual contortion model number is indicated on the nameplate.



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 (indicated on the nameplate) and on the environment in which the pump will be installed:

Version	MAX Temperature (°C / °F)	MAX Temperature (°C / °F)
	Zone 1 (atex)	Zone 2 (atex)
WR	60°C / 140°F	60°C / 140°F
FC	80°C / 176°F	90°C / 194°F
DF	NA	90°C / 194°F
SS	80°C / 176°F	95°C / 203°F
AL	80°C / 176°F	95°C / 203°F
SP	80°C / 176°F	95°C / 203°F

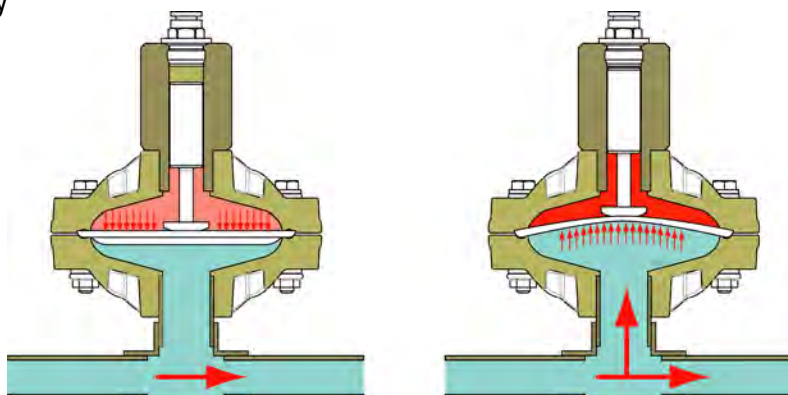
The ambient temperature interval is related to the choice of materials (specified on the identification plate):

Version	MAX
WR	0÷80°C / 14÷176°F
FC	0÷80°C / 14÷176°F
DF	0÷80°C / 14÷176°F
SS	0÷80°C / 14÷176°F
AL	0÷80°C / 14÷176°F
SP	0÷80°C / 14÷176°F

OPERATING PRINCIPLE

The **Pulsepro** damper consists of two chambers separated by heavy duty diaphragm. The bottom chamber is connected to the pump outlet and the upper chamber is charged with air.

The pressure that the pumped liquid exerts on the lower wet side of the diaphragm is countered with equal force in the opposing direction. This deformation moves the piston that Controls the pneumatic valve that charges or discharging air as a function of the position assumed by the Piston. The frequency and capacity are automatically adjusted without any intervention and set up according to the actual product circuit requirements Plus & Play



INSTALLATION AND USE INSTRUCTIONS

TRANSPORT

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

INSTALLATION

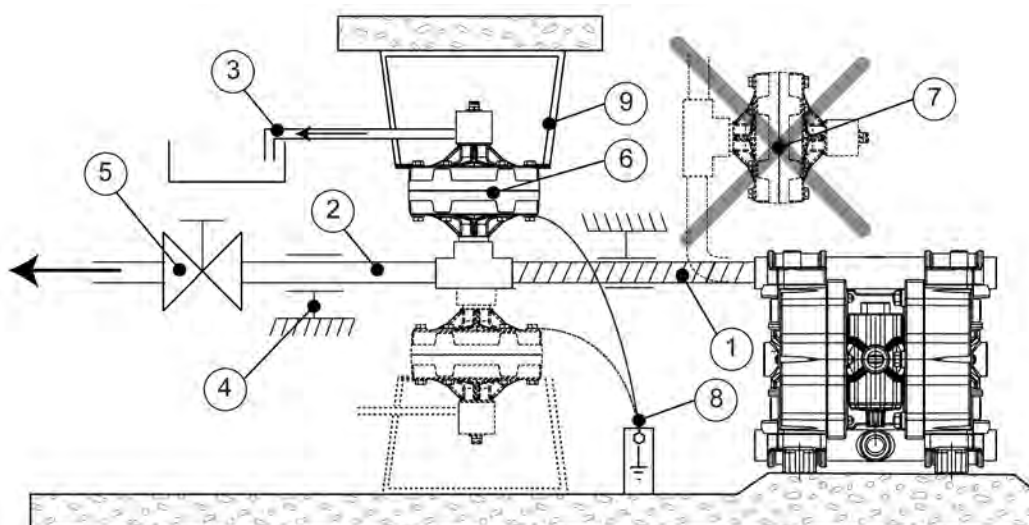
- Ensure that no foreign material from shipping are left in the Pulsepro. Remove safety caps on the hydraulic connections.
- Ensure that all of the Pulsepro screws are well tightened
- Position and secure the Pulsepro horizontally (see diagram next page)
- Place the Pulsepro nearest to pump discharge side
- Only fittings with cylindrical gas threads in materials compatible with both the fluid to be pumped and the dampener's construction materials must be used for the connections to the Pulsepro wetted side.
- Pneumatic supply to the Pulsepro must be made using filtered, it must be dry and oil free at a pressure of not less than 1 bars (15psi) and not more than 7 bars (105psi).

Follow the instructions indicated in the following diagram:

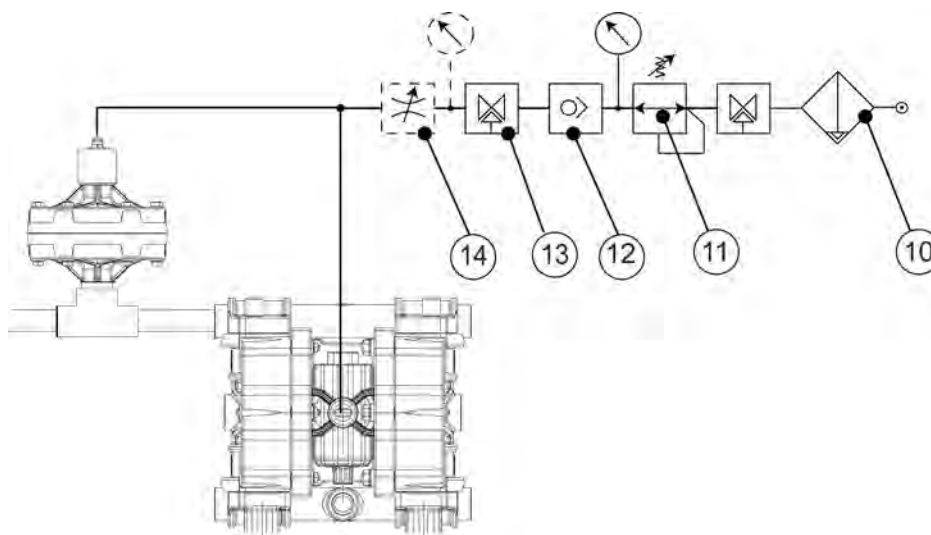
1. YES : Use flexible connection reinforced hose with rigid spiral to connect the hydraulic circuit to supply side of the pump. Rigid piping may cause strong vibrations and manifold breaking. Do not use pipes with a nominal diameter smaller than the diameter of the pump connections. For negative installations and/or viscous fluids use pipe with greater diameter related to the nominal diameter of the pump
2. YES : Install and connect the pipe downstream from the pulsation dampener. However diameter the must not be smaller than the connection. The pipe downstream (discharge side) from the dampener can be rigid and made from material compatible with the fluid to be pumped
3. YES : Pipe for safety discharge; if the diaphragms is completely torn, the fluid may enter the air circuit damage it, and be discharged through the exhaust port. It is therefore necessary that the air exhaust be conveyed by tubing into a piping reaching a safe area.
4. YES : Pipe anchoring; the piping must be sufficiently strong to avoid stress deformation.
5. YES : Shut-off valve must be the same diameter as the pump inlet (not smaller) to capture the fluid correctly in case of spills and/or when servicing the pump
6. YES : Horizontal mounting
7. NO : Vertical mounting
8. YES : Carry out effective grounding using a suitable size of cable on each pump casing to discharge static currents
9. YES : Dampener Anchoring
10. YES : Trap
11. YES : Pressure regulator with gauge
12. YES : Check valves on the air supply piping to prevent the pumped liquid from entering the pneumatic circuit if the diaphragms are broken is forbidden
13. YES : Three-way valve for stop the dampener
14. YES : Flow regulator

- Ensure drainage of fluid which may come out of the dampener.
- Anchor the dampener 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 coloured labels in accordance with safety standards.

Hydraulic connections



Pneumatic connections



- Do not install the plastic dampener near heat sources
- Do not install the dampener in places with risk of fall of solids or fluids
- Do not install the dampener close to fixed workplaces or visited areas
- Install additional protection shield, for the pump or for the persons as appropriate. If the diaphragm breaks the fluid may enter into the pneumatic circuit and come out from the pump discharge port
- If the dampener is made from conductive materials and is suitable for flammable products, each casing must be equipped with a suitable earthing cable: DANGER OF EXPLOSION AND/OR FIRE
- **WARNING :** The dampener must always be grounded irrespective of any organ to which they are connected. Lack of grounding or incorrect grounding will cancel the requirements for safety and protection against the risk of explosion



For installation and use in a potentially explosive environment, comply with these general precautions:

- Ascertain that the dampener is full

Plastic Pulsepro® Pulsation Dampener



- Ascertain that the fluid treated does not contain large solids or sharp solids
- Ensure that the intake or delivery ports are 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
- if the dampener is to stay in disuse for a long period of time, clean it carefully by running a non-flammable liquid detergent through it that is compatible with the dampener's construction materials
- **WARNING** : The use of dampeners for flammable liquids is forbidden if they are made of non-conductive (Plastic)
- Materials that charge statically (plastic materials) and without suitable grounding DANGER OF EXPLOSION CAUSED BY STATIC CHARGES

START UP

- Check the correct execution of what indicated in the INSTALLATION paragraph
- Check that the intake and delivery pipes of the hydraulic circuit are correctly connected
- Open the intake and delivery valves of the pump hydraulic circuit
- Open the 3-way valve on the air circuit
- Set the operation point requested for the pump: properly adjust the air pressure and delivery that supplies the pump. With pressure values under (15 psi) bar the pump may stall, with pressure values above (105 psi) bar it is possible that breakdowns and/or yields may occur with consequent spillage
- for pumps with split manifold the two pumped fluids must have the same viscosity value, very different viscosity values may lead to stall problems and/or diaphragms breaking
- 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

USE

- Do not operate valves during the pump operation
- Risk of harmful water hammers 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 indicated in the GENERAL NOTES; if the exceeding temperature is about 20% it is necessary to inspect the status of the internal parts
- 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 fire-prevention 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

STOP

- To stop the pump and dampener, use only the air supply closing the 3-way valve, discharging in this way eliminates residual pressure from the pneumatic side of the pump.



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

Plastic Pulsepro® Pulsation Dampener

MAINTENANCE

- All the operation must be carried out by qualified personnel
- Do not carry out maintenance and/or repairs with the air circuit under pressure; only the air supply must be used to stop the dampener by closing the three-way valve to discharge any residual pressure from the dampener's pneumatic circuit
- Discharge the product being pumped and close the product on/off valves
- 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)

PNEUMATIC VALVE REMOVE

Unscrew the valve from the casing

WARNING: to avoid incorrect reassembly and subsequent malfunction of the dampener the automatic valve must not be open

INSPECTION

Check the absence of:

- Excessive abrasion of the thermoplastic parts
- Clots and/or plugging deposits from 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. By tests carried out on thousands of pumps installed with head value from 0° to 18°C, the ordinary life exceeds one hundred million cycles. For safety reasons, in environments with explosion risk it is necessary to disassemble and check the diaphragms every five million cycles and to replace them every twenty million cycles.



WARNING! In the case of diaphragms total breaking, the fluid may enter in the pneumatic circuit, damage it and come out from the discharge port. Therefore it is necessary to convey the air discharge in piping or tubins to a safe area.



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. These risks may be of hand injury for operators working on the open pump, or caused by the nature of the fluids that are conveyed by this type of pump. Therefore it is extremely important to diligently carry out all the instructions contained in this manual in order to eliminate the causes of accidents that may lead to the pump failure and to the subsequent outcome of fluid hazardous to persons and to the environment.

For installation and use in a potentially explosive environment, comply with these general precautions:

WARNING: the air supply pressure must never be over 7 bar or below 105psi - 15psi bar

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: installing the dampeners without on-off, three-way or check valves on the air supply piping to prevent the pumped liquid from entering the pneumatic circuit if the diaphragms are broken is forbidden: danger of fluid entering the compressed air circuit and being discharged into the environment

WARNING: should the user think that the temperature limits set forth in this manual may be exceeded during service, a protective device must be installed on the system that prevents the maximum allowed process temperature from being reached. If exceeded, respect of the maximum temperature displayed on the marking is not guaranteed

Plastic Pulsepro® Pulsation Dampener

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 : dampeners containing aluminium parts or components coming into contact with the product cannot be used to pump iii-trichloroethane, methylene chloride or solvents based on other halogenated hydrocarbons: danger of explosion caused by a chemical reaction

WARNING : the PDA dampeners cannot use with Acetylene, Hydrogen, Carbon disulfide

WARNING : the components in the pneumatic side, including the steel shaft 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 : avoid using lubricated air - air must be dry.

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 and

However five general elements are important:

- 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

INSTALLATION AND START-UP PERSONNEL

Interventions allowed only to specialised personnel who may eventually delegate to others some operations depending on specific evaluations (technical capability required: specialisation in industrial plumbing or electric systems as needed).

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

Interventions allowed to 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
- Cerification of the condition of the liquid being pumped
- Inspections of the control/stop devices of the pump
- Inspections of the rotating parts 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

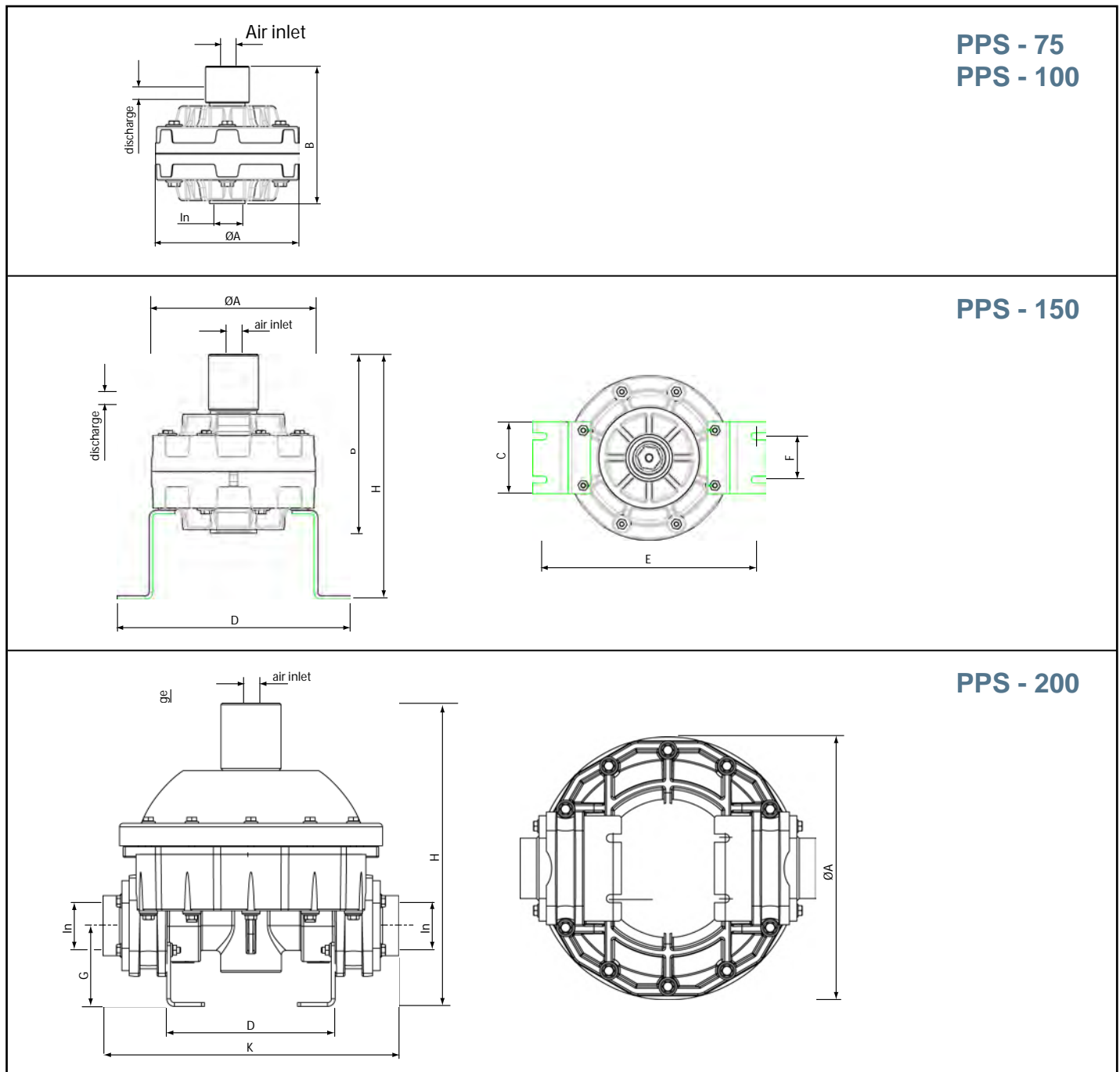
WASTE DISPOSAL

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

TROUBLESHOOTING AND POSSIBLE CAUSES

	DEFECT	CAUSE	SUGGESTION
1	The dampener doesn't run and/or it doesn't start	No air in the circuit	Check circuit, valves and connections
		Insufficient air pressure	Adjust pressure on the relevant reducer
		Insufficient air flow rate	Check that piping and accessories have suitable passage
		Damaged control valve	Check and replace
		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	There is an air leak in the valve.	Replace the air valve
		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
		The air is dirty, full of condensate or oil	Check the air feed line.
		Air volume or pressure is insufficient	Ensure that all the air control equipment has sufficient flow

DIMENSIONS



Model	In	Air Inlet	Discharge	ØA	B	C	D	E	F	G	H	K
PPS 75	3/4"	1/4"	1/4"	120	130	/	/	/	/	/	/	/
PPS 100	1"	3/8"	1/4"	182	180	/	/	/	/	/	/	/
PPS 150	1 1/2"	3/8"	1/4"	231	250	100	327	296	60	/	345	/
PSS 200 (WR-FC)	2"	1/2"	1/2"	350	/	140	224	153	80	108	405	404