

INSTALLATION & OPERATION MANUAL



SENTRY™ PULSATION & SURGE CONTROL

DAMPENER (CIP MODEL)

SENTRY dampeners are pressure vessels containing a flexible bladder or bellows inside that separates an inert pressurized gas (air or Nitrogen) from a system fluid in the lower chamber. Depending on how dampeners are configured, they are used as PULSATION DAMPENERS, INLET STABILIZERS or SURGE SUPPRESSORS to control pressure fluctuations and spikes in liquid piping systems.

Dampeners work on the principle that volume is inversely proportional to pressure ($P1V1=P2V2$). Compressed air or Nitrogen (**never** Oxygen) is introduced into the non-wetted side of the dampener. The gas charge is contained by the bladder or bellows preventing contact between the system fluid and the gas.

When the dampener is sized correctly, properly installed and charged according to the instructions provided, it will greatly reduce the damaging effects of pressure variations in piping systems and significantly improve the efficiency of transferring liquids.

All dampeners manufactured by BLACOH use pressure bodies made in the USA to insure quality. Prior to shipment, each and every dampener is factory tested at design pressure or higher to assure proper function and leak-free operation.

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MODEL SPECIFICATIONS & INSTALLATION INFORMATION

Model No.	Serial No.	Installation Date	
/			
Body Material: Wetted / Non-wetted	Bladder/Bellows Material	Pump Area and Number	
Purchased From	Contact	Phone	E-Mail

THE WORD "DAMPENER", AS USED IN THIS MANUAL, HAS THE SAME MEANING AS PULSATION DAMPENER, INLET STABILIZER, OR SURGE SUPPRESSOR.

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SAFETY WARNINGS

Dampeners should only be installed, operated and repaired by experienced and trained professional mechanics. Read and observe all instructions and safety warnings in this Manual before installing, operating or repairing dampeners.

SAFETY SYMBOLS

The following symbols indicate cautions, warnings and notes that must be observed for safe and satisfactory installation, operation and maintenance of dampener.



WARNINGS Danger of serious injury or death could occur if these warnings are ignored.



CAUTIONS Equipment damage, injury or death could occur if these cautions are not observed.



NOTES Special instructions for safe and satisfactory installation, operation and maintenance.

GENERAL SAFETY



CAUTION!

- Observe all safety symbols in installation and operation instructions.
- The internal dampener pressure will equal the maximum fluid pressure of the system in which it is installed.
- **DO NOT** exceed maximum allowable working pressure (MAWP) specified on dampener serial tag or marked on dampener. If serial tag is missing, **DO NOT** use dampener without consulting distributor or factory for maximum pressure rating.
- Always make sure safety shutoff valves, regulators, pressure relief valves, gauges, etc. are working properly before starting system or assembly.
- Verify dampener model received against purchase order and shipper.
- Before starting a system or assembly make certain the discharge point of the piping system is clear and safe, and all persons have been warned to stand clear.
- **DO NOT** put your face or body near dampener when the system or assembly is operating, or dampener is pressurized.
- **DO NOT** operate a dampener that is leaking, damaged, corroded or otherwise unable to contain internal fluid, air or gas pressure.
- **DO NOT** pump incompatible fluids through dampener. Consult distributor or factory if you are not sure of the compatibility of system fluids with dampener materials.
- Dampeners are designed to operate with compressed air or clean dry Nitrogen **only**. Other compressed gases have not been tested and may be unsafe to use. **DO NOT USE OXYGEN.**
- Always shut off air supply, remove internal dampener pressure, and shut dampener isolation valve before performing dampener maintenance or repair.
- Remove all pressure from dampener AND pumping system before disassembly, removal or maintenance.
- **Static spark can cause an explosion resulting in severe injury or death. Ground dampeners and pumping system when pumping flammable fluids or operating in flammable environments.**
- **NOTE:** EC standard EN-13463-1 and EN-13463-5 (ATEX) require grounding (earthing) on dampeners when the potential for static sparking is present. A grounding point is located and marked on ATEX specific dampener models.

EQUIPMENT MISUSE HAZARD

⚠ CAUTION!

General Safety

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 (MAWP) is specified on dampener serial tag or marked on dampener. Maximum allowable working pressure (MAWP) is rated at 70°F (21°C).

Temperature Limits

DO NOT exceed the operating temperature limits for the body and/or elastomer materials being used. Excessive temperature will result in dampener failure. For temperature limits, refer to the "Temperature Limits" section of the Manual. Temperature limits are stated at zero psi/bar.

Installation and Start-Up Hazards

Install dampener before charging or pressurizing. **DO NOT** start system or assembly without first charging or pressurizing dampener. Failure to charge may result in damage to the elastomeric bladder or PTFE bellows.

Temperature & Pressure Hazard

Temperature and pressure reduce the strength and chemical resistance of plastic, metal, elastomers and PTFE.

Charging / Pressurization

Charge or pressurize dampener with compressed air or clean dry Nitrogen only. **DO NOT USE OXYGEN.**

Dampener Bladder/Bellows Failure

Dampeners utilize an elastomeric membrane (bladder) or PTFE bellows to separate system fluid from the air supply or gas charge. When failure occurs, system fluid may be expelled from the air valve. Always perform preventive maintenance and replace bladder/bellows before excessive wear occurs. O-rings for PTFE bellows cannot be re-used.

Maintenance Hazards

Never over-tighten fasteners. This may cause leakage of system fluid and damage to dampener body. Bolts on metal models should not be reused as re-torquing reduces bolt strength. **AFTER MAINTENANCE OR RE-ASSEMBLY OF METAL MODELS, USE NEW FASTENERS AND TORQUE FASTENERS ACCORDING TO SPECIFICATION ON DAMPENER TAG.**

GENERAL INFORMATION



For safe and satisfactory operation of dampener, read all safety warnings and caution statements, and this complete Manual before installation, startup, operation or maintenance.

MUST READ BEFORE INSTALLATION



DO NOT use Oxygen to charge dampener. Use compressed air or clean dry Nitrogen only.



DO NOT exceed maximum allowable working pressure (MAWP) specified on dampener serial tag or marked on dampener.



Turn pump off and remove all pressure from system prior to dampener installation.



Always wear safety glasses and other appropriate safety equipment when installing, charging or repairing dampener.



Danger of static spark! Grounding precautions must be considered when dampener is used in flammable or explosive environments.



ATEX Models must be grounded (earthed) before operation.



DO NOT operate a dampener that is leaking, damaged, corroded or otherwise unable to contain internal fluid, air or gas pressure.



Temperature, pressure and chemicals affect the strength of plastic, elastomer, and metal components.



Many plastics lose strength rapidly as temperature increases. Consult factory if in doubt.

INSTALLATION NOTES

- △ Dampening of flow pulsations can only be effective if minimum of 5 to 10 psi (0.4 to 0.7 bar) back pressure downstream of dampener is available. A BLACOH back pressure valve may be required downstream of dampener.
- △ It is recommended that a BLACOH pressure relief valve be installed in all pump systems to ensure compliance with pressure limits on system equipment.
- △ To avoid possible damage to bladder/bellows from a system pressure test, do the following: **Adjustable and Chargeable models** — charge dampener to 80% of the system test pressure prior to test. **Automatic models** — dampener must be equipped with a constant source of compressed air prior to test; connect a compressed air line and dampener will pressurize itself.
- △ Install dampener in-line, as close to the pump discharge/inlet or quick closing valve as possible. Dampener installation should be no more than ten pipe diameters from pump discharge/inlet or quick closing valve.
- △ It is recommended that an isolation valve be installed between the dampener and system piping.

ATEX STANDARD

- △ Certain models made for the European market comply with the ATEX standard for use in potentially explosive atmospheres. These models have the AT designation at the end of the part number and comply with EC standard EN-13463-5 with protection degree of II 2GD TXC. AT models have a grounding lug and must be grounded (earthed) before operation.

MAINTENANCE



Remove all pressure from dampener AND pumping system before disassembly, removal or maintenance.

Dampeners require very little maintenance. There is only ONE wear part – the elastomeric bladder or the PTFE bellows. There is no need for lubrication.

Elastomeric bladder replacement should be part of a preventive maintenance program. Dampeners used in conjunction with diaphragm pumps should have the bladders replaced at least every second time the diaphragms in the pump are replaced. As with any pumping system, wear is dependent on many factors including material, temperature, chemicals, fluid abrasiveness and system design. This suggested maintenance program may need to be adjusted according to specific applications.

Periodic inspection of the dampener and fasteners should be conducted to visually check for signs of over-pressurization, fatigue, stress, or corrosion. Body housings and fasteners must be replaced at first indication of deterioration.



CAUTION! Replace nut and bolt fasteners on metal models at each re-assembly with fasteners of equal grade/strength value. DO NOT re-use old nuts and bolts.

After the initial torque of fasteners, bolts will usually lose up to 20% of their strength when re-torqued. Failure to replace both nuts and bolts upon each vessel reassembly will void the product warranty given by Blacoh Fluid Control, Inc. and Blacoh Fluid Control, Inc. will have no liability whatsoever for any vessel failure or malfunction.

Where dampeners are used in corrosive environments, nut and bolt fasteners should be regularly inspected and replaced with nut and bolt fasteners of equal grade/strength value if corrosion is observed. Failure to conduct such regular inspections and replacement will void the product warranty given by Blacoh Fluid Control, Inc. and Blacoh Fluid Control, Inc. will have no liability whatsoever for any vessel failure or malfunction.



IMPORTANT! AFTER MAINTENANCE OR RE-ASSEMBLY OF METAL MODELS, USE NEW FASTENERS AND TORQUE FASTENERS ACCORDING TO SPECIFICATION ON DAMPENER TAG.



DO NOT use dampener if the fasteners (nuts and bolts) are corroded. Check for fastener corrosion frequently, especially in atmospheres containing salt or corrosive chemicals, or if dampener leakage has occurred.

TEMPERATURE LIMITS

! Operating temperatures are based on the maximum temperature of the wetted dampener components only. Non-wetted dampener components may have a lower temperature limit. Temperature and certain chemicals may reduce the maximum allowable working pressure (MAWP) of the dampener.

Elastomer Materials	Temperature Limits	Applications
Aflas	0°F to +400°F (-18°C to +204°C)	High temperature, petroleum based chemicals, strong acids and bases.
Buna	+10°F to +180°F (-12°C to +82°C)	Good flex life; use with petroleum, solvents and oil-based fluids.
FDA Buna	+10°F to +180°F (-12°C to +82°C)	FDA-approved food grade; similar characteristics of regular Buna.
EPDM	-60°F to +280°F (-51°C to +138°C)	Use in extreme cold; good chemical resistance with ketones, caustics.
Hypalon	-20°F to +275°F (-29°C to +135°C)	Excellent abrasion resistance; good in aggressive acid applications.
Neoprene	0°F to +200°F (-18°C to +93°C)	Good abrasion resistance and flex; use with moderate chemicals.
PTFE	+40°F to +220°F (+4°C to +104°C)	Bellows design; excellent flex life; use with highly aggressive fluids.
Santoprene	-20°F to +225°F (-29°C to +107°C)	Excellent choice as a low cost alternative for PTFE in many applications.
FDA Silicone	-20°F to +300°F (-29°C to +149°C)	FDA-approved food grade material; for use in food and pharmaceutical processing.
USP Class VI Silicone	-20°F to +300°F (-29°C to +149°C)	Pharmaceutical grade material; for use in food and pharmaceutical processing.
Viton	-10°F to +350°F (-23°C to +177°C)	Use in hot and aggressive fluids; good with aromatics, solvents, acids and oils.

! **CAUTION!** Plastic materials lose strength as temperature increases which reduces the maximum pressure sustainable by the material.

Non-Metallic Body Materials	Temperature Limits	Applications
PVC	See chart below.	Good general chemical resistance; loses strength quickly as temperature rises.
CPVC	+32°F to +180°F (0°C to +82°C)	Chlorinated PVC (CPVC) retains strength to higher temperatures.
Acetal*	+32°F to +175°F (0°C to +79°C)	Good flex life; low moisture sensitivity; high resistance to solvents and chemicals.
Noryl	+32°F to +220°F (0°C to +104°C)	Good resistance to acids and bases; good temperature stability.
Polypropylene*	+32°F to +175°F (0°C to +79°C)	Good general purpose plastic; broad chemical compatibility at medium temperatures.
PTFE	+40°F to +220°F (+4°C to +104°C)	Use with highly aggressive fluids.
PVDF	+10°F to +200°F (-12°C to +93°C)	Excellent resistance to most acids and bases; highest temperature plastic available.

* Conductive Acetal and Conductive Polypropylene available.

! **CAUTION!** PVC loses strength more rapidly than other plastic materials as temperature increases. Certain chemicals can also affect material strength reducing maximum pressure ratings. The chart below shows reduced maximum pressure ratings based on temperature for **PVC only**. Note that these are general guidelines only; selection of dampener materials must be determined by each individual application to avoid equipment damage and unsafe operation.

! PVC Maximum Pressure Guidelines by Temperature

Temperature	73.4°F (23°C)	80°F (27°C)	90°F (32°C)	100°F (38°C)	110°F (43°C)	120°F (48°C)	130°F (54°C)
Maximum Pressure	150 psi (10.3 bar)	142.5 psi (9.8 bar)	135 psi (9.3 bar)	112.5 psi (7.6 bar)	97.5 psi (6.7 bar)	90 psi (6.2 bar)	75 psi (5.2 bar)

INSTALLATION & OPERATION INSTRUCTIONS: DAMPENER (CIP MODEL)

- ⚠ **ATEX MODELS MUST BE GROUNDED (EARTHED) BEFORE OPERATION.**
- ⚡ Turn pump off and remove all pressure from system prior to dampener installation.
- ⚡ Remove all pressure from dampener AND pumping system before disassembly, removal or maintenance.
- ⚡ Use compressed air or clean dry Nitrogen to charge dampener. **DO NOT USE OXYGEN.**
- ⚡ **DO NOT** exceed 150 psi (10.3 bar) maximum allowable working pressure (MAWP). **Check maximum pressure rating specified on dampener serial tag.**
- ⚡ **Always wear safety glasses and other appropriate safety equipment when installing, charging or repairing dampener.**
- ⚡ **READ ALL SAFETY WARNINGS AND INSTALLATION & OPERATION INSTRUCTIONS IN THE MANUAL BEFORE INSTALLATION.**
- ⚠ Before performing a system pressure test, dampener must be charged with 30% of system test pressure to avoid possible damage to bladder.
- ⚠ Dampener must be cleaned and/or sanitized before use in a sanitary system.

READ BEFORE INSTALLATION

CHARGE NOTES

READ BEFORE INSTALLATION

- ⚠ To be effective, dampener must be properly charged with compressed air or clean dry Nitrogen. **DO NOT USE OXYGEN.** The gas used to charge the dampener may be required to meet standards established by 3A, EHEDG and/or other agencies. The dampener cannot be charged until properly installed in the system.

The CIP dampener is available with two types of control units for gas charging.

Adjustable Model

The adjustable model uses a self-relieving regulator and pressure gauge to set and control the gas charge in the dampener. This model provides a means to easily adjust pressure to maximize dampener response but, a compressed air line must be permanently attached to the dampener.

Chargeable Model

The chargeable model uses a Schrader type fill valve and pressure gauge to *pre-charge* the dampener. This type of control is generally used when no source of compressed air is available near the dampener.

- ⚡ **IMPORTANT! Do not charge dampener to more than 30% of pump discharge pressure. Overcharging dampener may result in bladder failure. If dampener is overcharged compared to pump discharge pressure, bladder will close and pump flow will be reduced or stopped. Symptoms of overcharging include reduced flow, dampener vibration and/or pump shutdown.**

READ BEFORE INSTALLATION

INSTALLATION FOR PUMP DISCHARGE PULSATION

READ BEFORE INSTALLATION

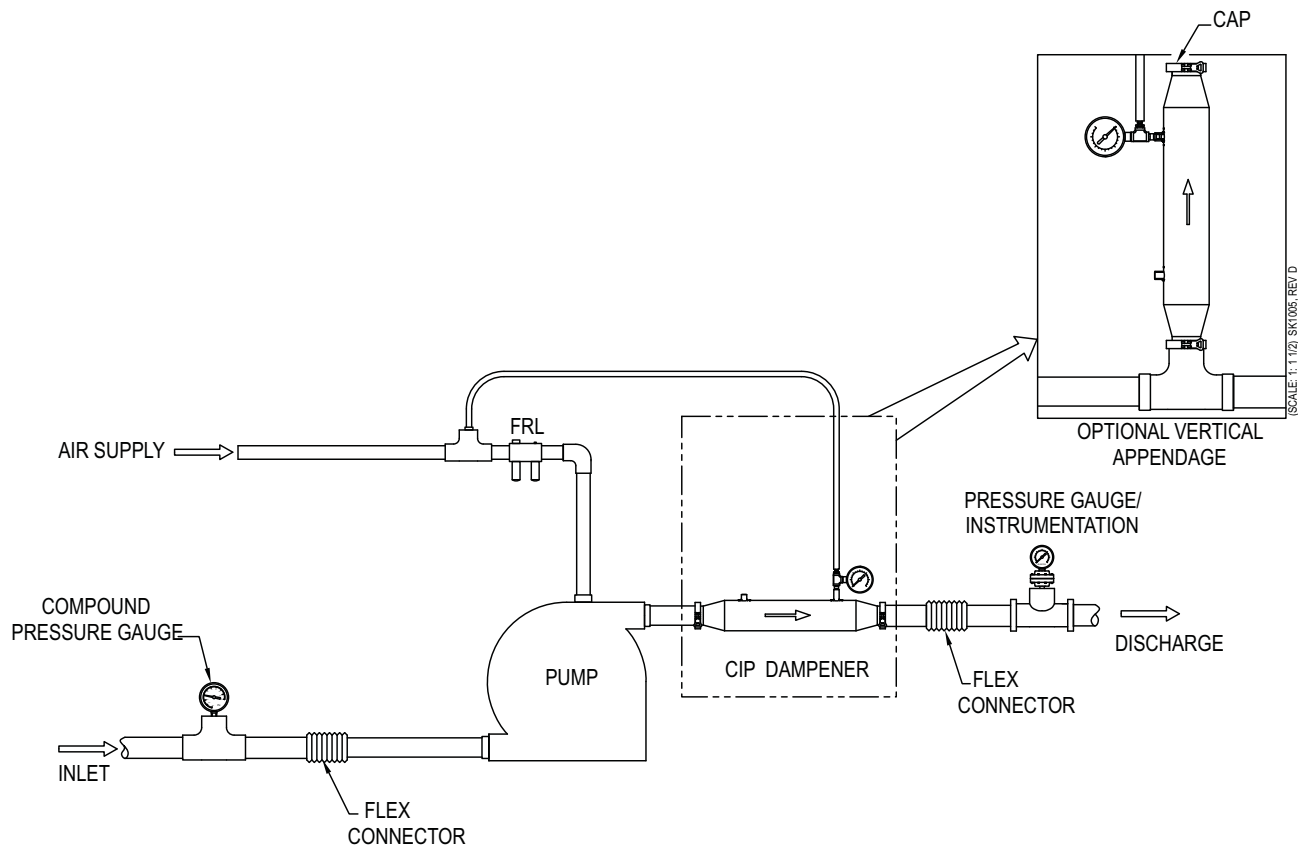
Installation Position

The CIP dampener is a flow-through design with 2 ½" tri-clamp connections on each end and should be installed in-line, as close to the pump discharge as possible to absorb the pulse at its source and before any downstream equipment such as risers, valves, elbows, meters, or filters. Dampener installation should be no more than ten pipe diameters from pump discharge. For mechanical cleanability (clean-in-place or CIP), dampener can be installed in a downward angled position to assure complete drainage. Vertical or horizontal installation is acceptable for in-line application (see FIGURE 1).

- ⚡ **IMPORTANT! Dampener must be installed in the system with the arrow on the dampener body pointing away from the pump and in the direction of fluid flow.**
- ⚡ **IMPORTANT! The tri-clamp style clamps used to install the dampener in the system must be installed correctly and tightened completely, the clamps create product seal AND provide compressed gas sealing so the dampener will hold the pressure charge.**

Dampener can be installed vertically on a tee in the system piping. Vertical installation requires a cap be installed on the top end of dampener. This type of installation, referred to as appendage installation, will cause product holdup and cannot be used for mechanical (CIP) applications. If a flexible connector is used in the piping system, attach dampener to the pump's discharge outlet and connect the flexible connector to the downstream end of dampener.

FIGURE 1



CHARGEABLE MODEL:

Charging and Start-Up (see Charge Notes)

Chargeable models do not require an air line connection. Dampener should be pre-charged with 3A standard approved compressed air or clean dry Nitrogen. Use a hand pump, Nitrogen tank or air compressor to charge dampener. **DO NOT USE OXYGEN.** Charging hose kits are available from BLACOH.

Prior to starting the pump, pre-charge the dampener to approximately **30%** 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. 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 pulsation. **NOTE:** The most effective method to set the proper dampener charge is to install a glycerin-filled pressure gauge downstream of the dampener and adjust the dampener to minimize needle movement on the gauge.

Once system pressure is in contact with the bladder, the gas 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 gas charge in the dampener by bleeding or filling through the gas valve. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments. **NOTE:** It is important to replace the charge valve cap tightly after charging because pressure can be slowly lost through a valve without a cap.

ADJUSTABLE MODEL:

Step 1 — Air Line Connection

Using a 1/4" flexible air hose (I.D. of the hose must be 1/4" or 6.4 mm minimum) run an air line from a compressed gas source to the one-way check valve on the dampener's regulator.

DO NOT remove one-way check valve. The check valve prevents fluid back flow through the air hose in case of bladder failure. The air supply pressure to the dampener must be greater than the pump discharge and/or system pressure. If the dampener is being used in conjunction with a pneumatically operated pump, a tee can be used to run the air line to the dampener from the existing pump air supply line (see FIGURE 1). The tee should be placed **before** any in-line pump instrumentation such as a filter, regulator, lubricator or other pump control valve.

Step 2 — Charging and Startup

Prior to starting the pump, adjust the regulator on dampener to approximately **30%** of expected system pressure at the pump's **discharge** outlet. For example, if the liquid pressure at the pump discharge is 60 psi (4.1 bar), initial dampener charge should be 20 psi (1.4 bar).

Note: Dampener **must** be charged before the pump is started. If dampener pressure charge is set too high, then the bladder will be squeezed and flow will be restricted. The most effective way to set the proper dampener charge is to install a glycerin-filled pressure gauge downstream of the dampener and adjust the dampener to minimize needle movement on the gauge. After the pump is started minor pressure adjustments to the dampener may be required to maximize dampener performance. Since the dampener regulator is the self-relieving type, it is easy to raise or lower the dampener pressure to obtain best dampening results.

Once system pressure is in contact with the bladder, the air charge will be compressed to the system pressure and the dampener gauge will read approximately 1/3 to 1/2 of 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 through the self-relieving pressure regulator. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments.

READ BEFORE INSTALLATION

MAINTENANCE AND REPAIR

READ BEFORE INSTALLATION

The only maintenance required is the periodic checking of the gas pressure charge on the Chargeable model. Normally, if dampener is properly installed, pre-charge pressure should be checked every two to three months or when dampener effectiveness is reduced, which indicates a loss of charge. Refer to charging instructions above.

Bladder Replacement



IMPORTANT! Bladder must be installed in one direction only or bladder damage will occur. The side of the bladder has an arrow molded in it indicating the direction of fluid flow inside the dampener. The arrow on the bladder must point in the same direction as the arrow on the dampener body. Dampener must be installed in the system with the arrow on the dampener body pointing away from the pump in the direction of fluid flow.

1. Before replacing the bladder, dampener must be removed from the pipe system.
2. To remove the bladder, fold the bladder lip seal down into the center of the bladder while pulling the bladder out from the opposite end of dampener body.
3. To install a new bladder, insert the bladder into one end of dampener body as far as it will go. Reach into the opposite end, fold the lip seal edges toward the bladder center and pull the bladder end out of the body. Pushing the bladder from the opposite end while pulling will assist in bladder installation. A sanitary/food grade oil can be applied to the lip seal to help with installation.
4. If dampener is used in a sanitary application, dampener body must be cleaned and sanitized internally before reuse after repair.

NOTES

MANUFACTURER'S LIMITED WARRANTY & RETURN POLICY

Standard Product Limited Warranty

Subject to the limitations set forth below, Blacoh Fluid Controls, Inc. ("Blacoh") warrants its products to be free from defects in material and workmanship under normal use, service, and maintenance in accord with Blacoh's published specifications for a period of two years from date of shipment by Blacoh (the "Warranty"). The EXCLUSIVE REMEDY for any product defect covered under this Warranty shall be one of the following, as determined by Blacoh in Blacoh's sole discretion: (a) refund of the purchase price; or (b) replacement or repair of the defective part or parts at Blacoh's facility. This Warranty will be null and void if the product is used in an inappropriate application or if the product has been altered, misapplied, improperly installed, or not properly inspected and maintained. To the maximum extent allowed by applicable law, Blacoh will not be responsible for nor have any liability for any "Damage," which means any of the following, whether the claim sounds in breach of contract, breach of warranty, tort, strict liability, implied contractual indemnity, or otherwise: (i) any damage, loss, or injury of any kind, or destruction, or death, whether or not caused by any defect in a Blacoh product and whether or not the Blacoh product is installed, used, operated, and/or maintained in accord with Blacoh instructions, to other products, machinery, buildings, property, or persons, and (ii) any costs, expenses, losses, or incidental, consequential, or special damages of any kind or nature, including but not limited to loss of profits, arising from or related to any Blacoh product, whether or not caused by any defect in a Blacoh product and whether or not the Blacoh product is installed, used, operated, and/or maintained in accord with Blacoh instructions. Damage resulting from chemical incompatibility or from over-pressurization of a product, whether from gas or fluid, is not covered under this Warranty, nor will Blacoh be responsible in any way for any such Damage. Because Blacoh does not determine and cannot anticipate or control the many different conditions under which its products may be used, Blacoh does not warranty the applicability, suitability, or fitness of any of its products for any particular use or purpose. Statements concerning the possible use of Blacoh products are not intended and shall not be interpreted as warranties of fitness for any specific use of such products. Each user of Blacoh products must conduct its own engineering analysis and tests to determine the suitability of each Blacoh product for the user's intended uses or purposes, including but not limited to chemical compatibility and pressurization, and any written or oral assistance from Blacoh in this regard does not relieve the user from exclusive responsibility for such engineering analysis and testing. Blacoh products are sold with only this limited Warranty, and each buyer assumes all responsibility for Damage (as defined above), including but not limited to, Damage arising from defects in Blacoh products and/or from the handling and use of Blacoh products whether used in accordance with Blacoh's directions or otherwise. Any products sold by Blacoh which are manufactured by and sold under the name of another company are NOT WARRANTED by Blacoh under the foregoing Warranty or otherwise. The buyer must rely exclusively on the product warranty, if any, given by such other company. Products manufactured by Blacoh as an original equipment manufacturer (OEM) to be sold by a customer under the customer's brand and name are warranted by Blacoh only under the above Warranty, and Blacoh shall have no liability whatsoever with respect to any representation or warranty given by such customer (or such customer's representatives, distributors, agents, employees, or independent contractors) to any of its buyers which is different in any respect whatsoever from the foregoing Warranty. EXCEPT FOR THE WARRANTY GIVEN ABOVE, WHICH IS SUBJECT TO THE ADDITIONAL LIMITATIONS STATED ABOVE, AND EXCEPT FOR THE ADDITIONAL LIMITED WARRANTY ON BLACOH'S PTFE BELLOWS STATED BELOW, BLACOH GIVES NO WARRANTY OF ANY NATURE WHATSOEVER, EXPRESS OR IMPLIED, WITH RESPECT TO ANY OF ITS PRODUCTS, INCLUDING WITHOUT LIMITATION NO WARRANTY OF MERCHANTABILITY AND NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. NO COURSE OF DEALING, USAGE OF TRADE, OR OTHER ORAL OR WRITTEN STATEMENTS SHALL MODIFY THE FOREGOING WARRANTY PROVISIONS AND LIMITATIONS IN ANY RESPECT WHATSOEVER. This Warranty shall be governed by and construed in accordance with the laws of the State of California.

PTFE Bellows Limited Warranty

In addition to Blacoh's Standard Product Limited Warranty and subject to the limitations set forth below, Blacoh warrants that its PTFE Bellows equipment ("PTFE Bellows") on Blacoh's PTFE Bellows-fitted pulsation dampener will perform in accordance with Blacoh's written product description for three years from date of shipment ("PTFE Bellows Warranty"). This PTFE Bellows Warranty applies only to PTFE Bellows that are sized, charged, installed, used, operated, and maintained strictly in accordance with all installation, use, operation, and maintenance instructions provided by Blacoh, and failure to properly size, charge, install, use, operate, and maintain the PTFE Bellows (or failure to do any of them) shall make the PTFE Bellows Warranty null and void. This PTFE Bellows Warranty does not include applications where failure of performance is due to an unbalanced pressure load or a transient pressure spike (sometimes called a water hammer). The EXCLUSIVE REMEDY for breach of this PTFE Bellows Warranty is replacement of the PTFE Bellows at Blacoh's facility, and not any other equipment or parts whatsoever, and Blacoh will not be responsible for any Damage or any other loss of any kind, including but not limited to incidental, consequential, or special damages (including but not limited to loss of profits), in any way arising from failure of the PTFE Bellows to perform in accordance with Blacoh's written product description. This PTFE Bellows Warranty shall be governed and construed in accordance with the laws of the State of California.

Warranty Claims

1. Prior to returning any product to Blacoh based on a claim of breach of Warranty or PTFE Bellows Warranty, a Blacoh Return Request form must be completed. The form will be reviewed by Blacoh to determine if a Return Merchandise Authorization (RMA) number will be issued. The issuance of an RMA number does not constitute Blacoh's acknowledgment or agreement that the warranty claim is justified or correct.
2. If an RMA number is issued by Blacoh, customer should then deliver the product in question to the address specified on the RMA, freight prepaid.
3. All products so returned to Blacoh based on a claim of breach of Warranty or of PTFE Bellows Warranty must be cleaned, sanitized and neutralized prior to shipment to Blacoh. Blacoh will not accept any part that contains corrosive chemicals, organic cultures, blood, any harmful residue or air borne materials that might contaminate a breathable atmosphere or put at risk any person or property. Any shipment that does not comply will be returned at the expense of the customer, or the customer will be required to arrange for pickup.
4. **HAZMAT SHIPMENTS WILL BE REMOVED AND PROCESSED AT CUSTOMER'S EXPENSE.**
5. Receipt by Blacoh of a return does not constitute Blacoh's agreement that Blacoh is in breach of its Warranty or PTFE Bellows Warranty.
6. If Blacoh determines that a defect in workmanship or material of a part has occurred, customer is not entitled to a complete unit replacement. In the event of such a defect, Blacoh will repair or replace the defective part or parts or refund the purchase price, as Blacoh determines in Blacoh's sole discretion.

New Product Returns

1. If a customer wishes to return a new, unused product, the customer must first request a Return Merchandise Authorization (RMA) number from Blacoh. Blacoh will determine if the unit can be returned for possible credit.
2. Product to be returned must be new, unused, and of current design and purchased within thirty (30) days of the return request. In addition the product must not have been damaged after original shipment by Blacoh.
3. Product returns must be delivered, freight prepaid.
4. Blacoh has the right to inspect all returned products prior to acceptance or rejection.
5. ALL RETURNS are subject to a minimum \$25.00 or 20% restocking fee, whichever is greater. (Higher restocking fees may be charged on special items and some models may not be eligible for return). Returns accepted by Blacoh will be credited to the customer's account less the re-stocking fee. Refunds will not be issued.
6. Any outsourced product supplied by Blacoh will be subject to the warranty, return policy and re-stock fee charged by the manufacturer of the outsourced product.

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