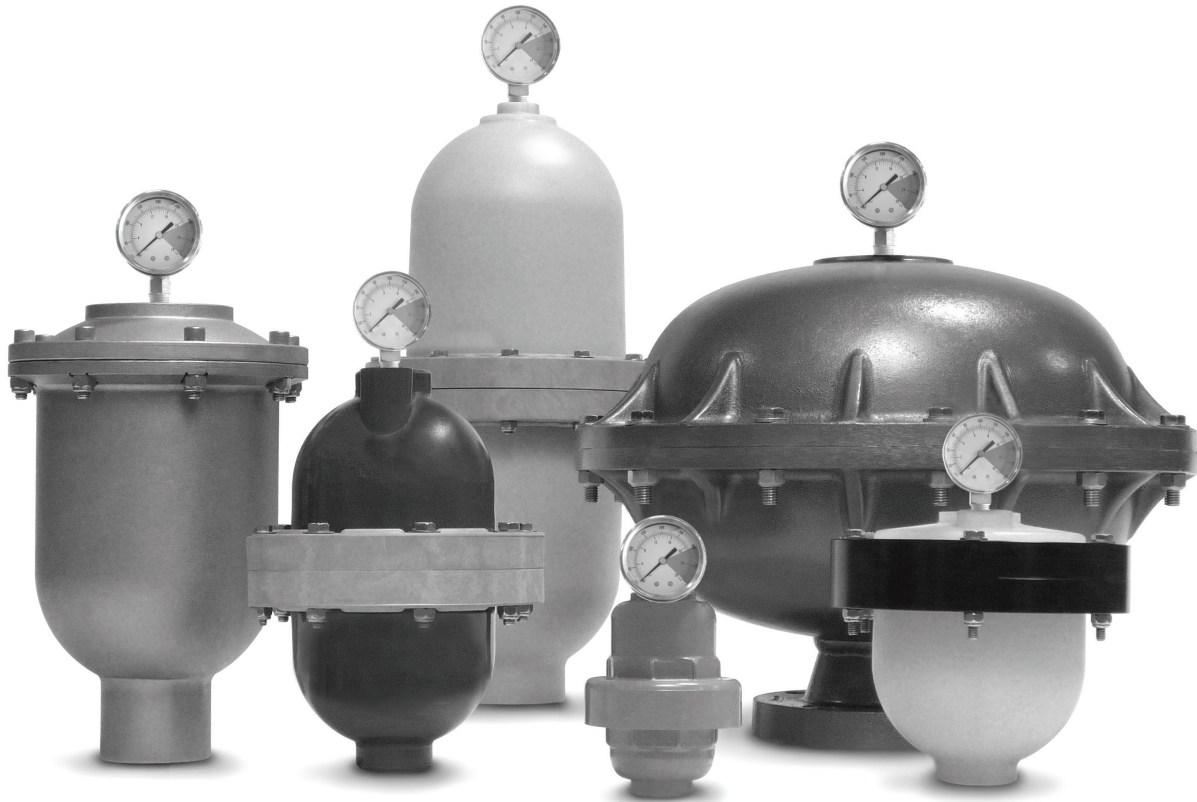


SENTRY™

PULSATION & SURGE CONTROL



Installation and Operation Manual

Chargeable Dampener Models

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 ($P_1V_1=P_2V_2$). 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 ensure quality. Prior to shipment, each and every dampener is factory tested at design pressure or higher to assure proper function and leak-free operation.

Visit www.Blacoh.com for literature in multiple languages.

BLACOH™
FLUID CONTROL

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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	Email

The word “dampener”, as used in this Manual, has the same meaning as Pulsation Dampener, Inlet Stabilizer or Surge Suppressor. Depending on the specific model, the word “bladder” is used to reference the dampener’s elastomeric diaphragm.

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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 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 this Manual. Temperature limits are stated at zero psi/bar.

Installation and Startup 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 reused.

Maintenance Hazards

Never over-tighten fasteners. This may cause leakage of system fluid and damage to dampener body. Bolts should not be reused as re-torquing reduces bolt strength.

After dampener maintenance or reassembly, use new fasteners and torque fasteners according to specification on dampener serial tag or marked on dampener. If missing, consult distributor or factory for torque specifications.

GENERAL Information



For safe and satisfactory operation of dampener read all safety warnings, 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 a 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, except when dampener is used as an inlet stabilizer for the inlet side of the pump.
- △ 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:
 - Adjustable and Chargeable models** — charge dampener to 80% of the system test pressure prior to test.
 - Automatic model** — prior to test, dampener must be equipped with a constant source of compressed air with pressure equal to or greater than system test pressure.
 - Inlet Stabilizer model** — maximum pressure test 30 psi (2.0 bar), charge to 20 psi (1.3 bar) for system pressure test.
- △ 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 2 GD IIB T4. 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 no need for lubrication with elastomeric bladder or PTFE bellows.

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 at each reassembly with fasteners of equal grade/strength value. DO NOT reuse old nuts and bolts.**

After the initial torque of fasteners, bolts may lose strength when re-torqued. Failure to replace both nuts and bolts upon each vessel reassembly will void the product warranty given by the manufacturer and the manufacturer 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 the manufacturer and the manufacturer will have no liability whatsoever for any vessel failure or malfunction.

- ✦ **IMPORTANT!** After maintenance or reassembly, use new fasteners and torque fasteners according to specification on dampener serial tag or marked on dampener. If missing, consult distributor or factory for specifications.

- ⚠ **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.
- ❗ **CAUTION!** Plastic (non-metallic) body materials lose strength as temperature increases, which reduces the maximum pressure sustainable by the material. All plastic materials must have an appropriate derating factor applied when working at elevated temperatures above 73.4°F (23°C) to determine maximum allowable working pressure (MAWP).

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-N	+10°F to +180°F	(-12°C to +82°C)	Good flex life; use with petroleum, solvents and oil-based fluids.
FDA Buna-N	+10°F to +180°F	(-12°C to +82°C)	FDA-approved food grade; similar characteristics of regular Buna-N.
EPDM	-60°F to +280°F	(-51°C to +138°C)	Use in extreme cold; good chemical resistance with ketones, caustics.
FDA EPDM	-50°F to +225°F	(-45°C to +107°C)	FDA-approved food grade; similar characteristics of regular EPDM.
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 Diaphragm	+40°F to +220°F	(+4°C to +104°C)	Use with highly aggressive fluids.
PTFE Bellows	-20°F to +220°F	(-29°C to +104°C)	Exclusive bellows design with 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.

Non-Metallic Body Materials	Temperature Limits		Applications
Acetal*	+32°F to +175°F	(0°C to +79°C)	Good flex life; low moisture sensitivity; high resistance to solvents and chemicals.
CPVC	+32°F to +180°F	(0°C to +82°C)	Chlorinated PVC (CPVC): Good general chemical resistance; loses strength as temperature rises.
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, high temperatures.
PVC	+32°F to +140°F	(0°C to +60°C)	Good general chemical resistance; loses strength as temperature rises.
PVDF	+10°F to +200°F	(-12°C to +93°C)	Excellent resistance to most acids and bases; high temperatures.

* Conductive Acetal and Conductive Polypropylene available.

Installation & Operation Instructions: CHARGEABLE Models

- ❗ **DO NOT** use plastic models as Surge Suppressors at quick closing valves. Use metal Surge Suppressors for water hammer or quick closing valve applications. Consult factory for options.
- ❗ **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 maximum allowable working pressure (MAWP) specified on dampener serial tag.** If missing, consult distributor or factory for specifications.
- ⚠ Always wear safety glasses and other appropriate safety equipment when installing, charging or repairing dampener.
- ⚠ Read and observe all safety warnings and instructions in this Manual before installation, operation or repair.
- ⚠ **IMPORTANT! After maintenance or reassembly, use new fasteners and torque fasteners according to specification on dampener tag.** If missing, consult distributor or factory for specifications.
- ⚠ Before performing a system pressure test, dampener must be charged with 80% of system test pressure to avoid possible damage to bladder/bellows.

Pre-Charge Notes

Read Before Installation

- ❗ The following pre-charge notes are for all plastic dampener models; and, metal dampener models with a maximum pressure rating up to 300 psi (20.6 bar). **NOTE: Dampener can be pre-charged with compressed air up to a maximum pressure of 150 psi (10.3 bar). If maximum pressure will exceed 150 psi (10.3 bar), dampener must be pre-charged with Nitrogen only. DO NOT USE OXYGEN.**

Pre-charge pressure should be checked at least monthly as gas molecules will diffuse through bladders/bellows, the speed of which depends on the material, temperature and pressure. Checks must occur when no system pressure is present or inaccurate readings will be recorded. If temperature is above 72°F (22°C) and/or pressure is over 300 psi (20.6 bar), checks should be performed more frequently. **To prevent pre-charge loss through the fill valve, always replace the fill valve cap after charging.** A proper gas charge is the key to dampener effectiveness and bladder/bellows life.

Installation for Pump Discharge Pulsation

Read Before Installation

Step 1 — Installation Position

Install the dampener 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. If using a flexible connector on the discharge side of the pump between the pump and system piping, the dampener should be installed at the pump discharge manifold. The flexible connector should be attached to the dampener's tee and system piping (see FIGURE 1). Since pressure is equal in all directions, the dampener can be installed in a vertical, horizontal or upside-down position. A vertical installation is recommended for better drainage of the dampener. Limitations for horizontal and upside-down mounting include high specific gravity, high viscosity, settling of solid material or possible air entrapment which could result in shortened bladder/bellows life and/or reduced dampening performance.

Step 2 — Charging and Startup (see Pre-Charge Notes)

Chargeable models do not require an air line connection. Dampener can be pre-charged with compressed air up to a maximum pressure of 150 psi (10.3 bar). If maximum pressure will exceed 150 psi (10.3 bar), dampener must be pre-charged with Nitrogen only. Use a hand pump, Nitrogen tank or air compressor to charge dampener. **DO NOT USE OXYGEN.** Charging kits are available from BLACOH.

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 gas 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 pulsation. **NOTE:** The most effective method to set the proper dampener charge is to install a 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/bellows, 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.

Installation for Pump Inlet

Read Before Installation

Step 1 — Installation Position

Install the dampener in-line as close to the pump inlet as possible and after any upstream equipment such as risers, valves, elbows, meters or filters. Dampener installation should be no more than ten pipe diameters from pump inlet. If using a flexible connector on the inlet side of the pump between the system piping and pump, the dampener should be installed on a tee at the pump inlet manifold. The flexible connector should be attached to the dampener's tee and system piping (see FIGURE 1). A compound pressure gauge should be installed upstream of the dampener to aid in proper dampener adjustment.

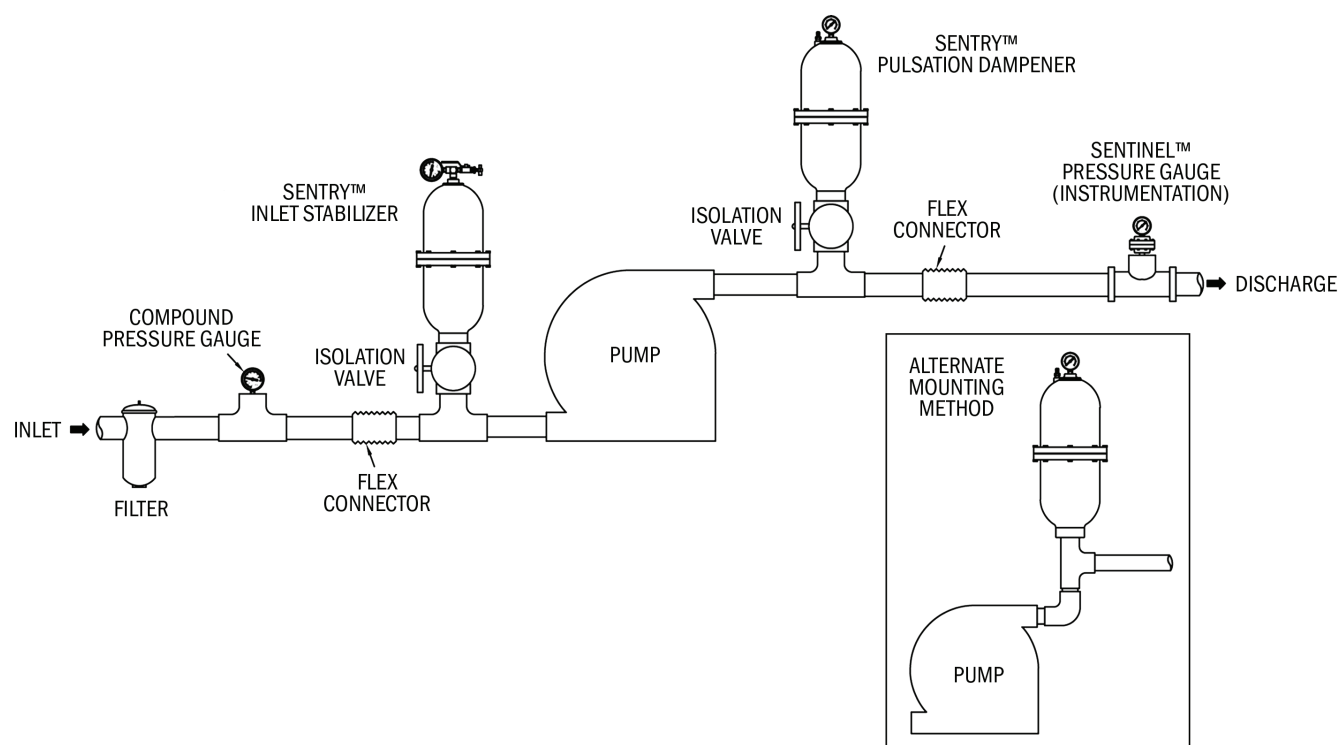
Step 2 — Charging and Startup (see Pre-Charge Notes)

Chargeable models do not require an air line connection. Dampener must be pre-charged with compressed air or Nitrogen using a hand pump, Nitrogen tank/bottle or compressor. **DO NOT USE OXYGEN.** Charging kits are available from BLACOH.

A. Suction Lift/Dampener: When using the dampener in a suction lift application no pre-charge is required. Start the pump to generate working pressure. As system pressure and vacuum is created, the acceleration head created with each suction stroke will compress the air trapped in the bladder/bellows.

B. Positive Inlet Pressure: Pre-charge the dampener with 50% of the static system pressure realized at the pump inlet. Start the pump to generate working pressure. Minor pressure adjustments may be required. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments.

FIGURE 1



Installation for Surge / Water Hammer

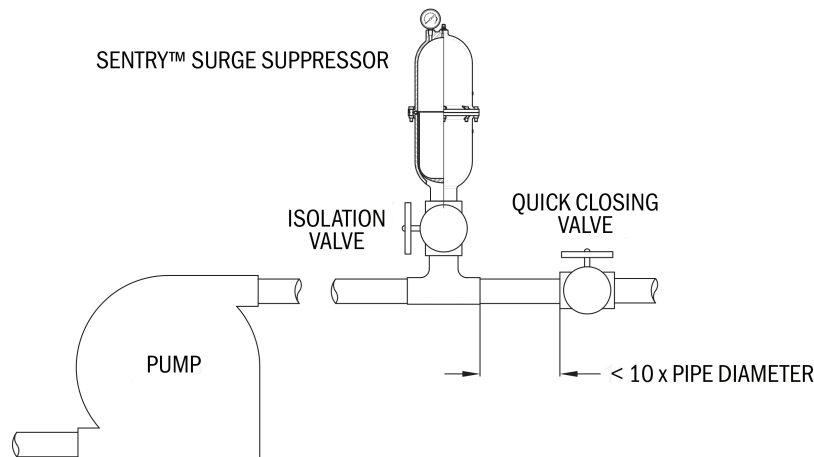
Read Before Installation

- ⚠ **CAUTION! DO NOT use plastic models as Surge Suppressors at quick closing valves. Use metal Surge Suppressors for water hammer or quick closing valve applications. Consult factory for options.**

Step 1 — Installation Position

Install the dampener in-line as close as possible to and before the device causing the water hammer pressure spike (see FIGURE 2). For example, if a quick closing valve is causing water hammer, install the dampener on a tee or elbow as close as possible upstream of the valve. Dampener installation should be no more than ten pipe diameters from the valve. **It is advisable to install an isolation valve between the dampener inlet and the mounting tee so maintenance and pressure checks can be done while the system is operating.**

FIGURE 2



Step 2 — Charging and Startup (see Pre-Charge Notes)

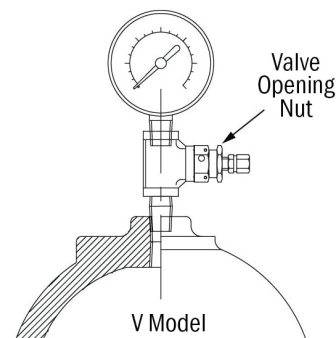
Chargeable models do not require an air line connection. Dampener can be pre-charged with compressed air up to a maximum pressure of 150 psi (10.3 bar). If maximum pressure will exceed 150 psi (10.3 bar), dampener must be pre-charged with Nitrogen only. Use a hand pump, Nitrogen tank or air compressor to charge dampener. **DO NOT USE OXYGEN.** Charging kits are available from BLACOH.

The dampener must be pre-charged **after** installation but prior to system operation. The only method to get an accurate pressure charge in the dampener is to charge it prior to system startup or with a closed isolation valve at the dampener inlet. Pre-charge the dampener with 90% to 95% of expected system pressure. **DO NOT USE OXYGEN.** A fill valve similar to a Schrader type tire valve but designed for suppressors is mounted to the top of the dampener. Replace fill valve cap after charging dampener and recheck dampener charge every month.

Pre-Charge Instructions for V Model Air Controls

Read Before Installation

The Chargeable V Model air control assembly has a machined stainless steel charging valve and seal for rugged leak-proof operation in corrosive environments. To pre-charge V Model dampeners, turn the Valve Opening Nut clockwise to open for charging. The valve on these dampeners has no valve core to prevent the air charge from escaping. Because there is no valve, the pressure in the dampener will escape if the valve is not closed prior to removing the charging hose. To close the valve, turn the Valve Opening Nut counterclockwise.



SUPPORTING Products

SENTRY™ Bladder Kits

Available for all SENTRY™ models, bladder/bellows kits contain all parts necessary for replacement, including hardware as needed (nuts, bolts, washers). Replacement O-rings are included with PTFE bellows kits. For XPA and XPH models, PTFE bellows kits include cap assembly.



SENTRY™ Charging Kits

For SENTRY™ chargeable air control models, charging kits include an 8' (2.4 m) length of hose with a 1/4" (6mm) NPT male fitting at one end for connection to a regulator at the Nitrogen source and a charging fitting and gauge at the opposite end.

SENTINEL™ Diaphragm Seals & Gauge Guards

ISOLATE AND PROTECT SYSTEM PROCESS INSTRUMENTATION

SENTINEL™ Diaphragm Seals, also referred to as Gauge Guards, employ a chemically resistant diaphragm to effectively isolate process fluids from gauges and other process instrumentation. This durable diaphragm allows SENTINEL™ to accurately transfer process pressure without direct contact with hazardous or corrosive fluids. SENTINEL™ Diaphragm Seals are easily installed, come in a variety of chemically resistant materials, and work in both pressure and vacuum conditions.



SENTINEL™ Back Pressure and Pressure Relief Valves

PROTECT PROCESS SYSTEMS FROM FLUCTUATING PRESSURE OR BLOCKAGE

SENTINEL™ Back Pressure Valves enhance system performance by applying a continuous back pressure to the pump. The diaphragm is held against the valve seat by an internal ring. When the valve's present pressure is exceeded, the diaphragm is forced up and system fluid flows through the valves to the injection point.

SENTINEL™ Pressure Relief Valves protect pumping systems from over-pressure damage caused by defective equipment or a blockage in the system line. They consist of a spring and diaphragm that is pushed down on a seat to a preset adjustable pressure setting. Once the pressure is exceeded, the seat is lifted off the relief port and the excess fluid pressure flows back to a holding tank or the suction side of the pump. When the pressure is reduced, the spring pushes the seat back over the discharge port.



SENTINEL™ 316 Stainless Steel Check Valves

O-RING POPPET VALVES & BALL CHECK VALVES

SENTINEL™ 316 Stainless Steel Check Valves ensure chemical flow only goes in one direction, with quality machined construction for reliability and maximum performance. By preventing reverse flow, check valves can be used as one-way valves, injection valves, or to prevent backflow. Check valves allow flow in one direction, automatically prevent backflow when process fluid in the line reverses direction, and will work even if the system loses air or electricity. Installed in the process pipe, check valves are flow sensitive and rely on the line fluid to open and close. The internal ball or poppet functions as a positive shutoff to ensure process fluid does not go back up the line.



SENTRY Series™ Pulsation Dampeners

PULSATION DAMPENERS, SURGE SUPPRESSORS & INLET STABILIZERS

Positive displacement pumps create destructive pulsation and hydraulic shock due to the reciprocating nature of their stroking action, potentially damaging piping and system components. SENTRY™ Pulsation Dampeners and Surge Suppressors remove virtually all system shock, enhancing the performance and reliability of fluid flow in municipal, industrial, sanitary and chemical transfer applications. SENTRY™ Inlet Stabilizers minimize pressure fluctuations and acceleration head losses by preventing fluid column separation at the pump's inlet.

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 \$50.00 or 30% 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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