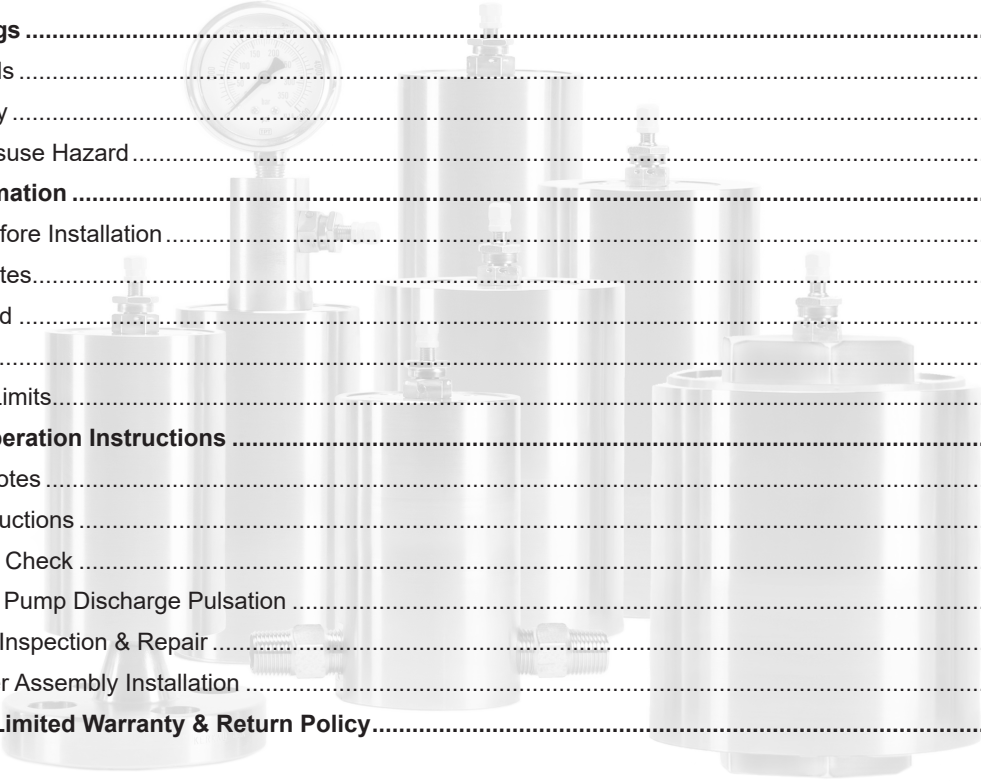




Installation and Operation Manual

A background image showing several cylindrical high-pressure dampeners of various sizes and a pressure gauge with a needle, all in a light grey, semi-transparent style.

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

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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

- 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.**

Equipment Misuse Hazard

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) unless specified otherwise on unit.

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 bladder or 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 a bladder or 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 and gaskets for Stainless Steel metal bellows cannot be reused.





Maintenance Hazards






Never overtighten 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 disassembly, use new fasteners and torque fasteners according to specification on dampener tag. 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 inline 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 are intended for use in potentially explosive atmospheres and meet the requirements of ATEX directive 2014/34/EU. These models have the AT designation at the end of the part number, comply with ISO 80079-36, and have an ATEX rating of II 2GD Ex h IIB T4 Gb Db. 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 bladders or 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 disassembly, use new fasteners and torque fasteners according to specification on dampener tag. 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

- ① 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.
- ① **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
	°F	°C	
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.
Viton®	-10°F to +350°F	(-23°C to +177°C)	Use with hot and aggressive fluids; good with aromatics, solvents, acids and oils.

Non-Metallic Body Materials	Temperature Limits		Applications
	°F	°C	
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.

- ① Maximum allowable working pressure is reduced slightly for metal bellows at temperatures above 400°F (204°C). Apply an appropriate derating factor to determine maximum allowable working pressure (MAWP).

Metal Bellows	Temperature Limits		Applications
	°F	°C	
SS w/Gaskets*	-200°F to +800°F	(-129°C to +426°C)	Excellent for applications pumping frigid and molten fluids, outdoor applications in extreme temperatures, chemical applications where elastomers or PTFE would fail.

* Contact Blacoh for more information regarding temperatures below -200°F (-129°C).

[T22E11_030]

Installation & Operation Instructions

- ⓘ XP High Pressure models are proof tested to a minimum of 1.3 times maximum allowable working pressure (MAWP). All pressure is removed from dampener prior to shipment; however, standard models do not have a factory installed pressure gauge – always assume dampener is pressurized.
- ⓘ Only charging systems with components designed to be used at or above the maximum allowable working pressure (MAWP) specified on dampener can be used for charging. The source of Nitrogen (tank or bottle) must be equipped with a regulator set at no more than the MAWP specified on dampener.
- ⓘ ATEX models must be grounded (earthed) before operation.
- ⚠ **IMPORTANT! High pressure is dangerous. Only qualified persons are allowed to charge, install and repair high pressure models.**
- ⚠ 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 clean dry Nitrogen to charge dampener. **DO NOT USE OXYGEN.**
- ⚠ **DO NOT exceed maximum allowable working pressure (MAWP) specified on dampener.** MAWP is rated at 70°F (21°C) unless specified otherwise on unit.
- ⚠ 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.
- ⚠ **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

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 charging valve, always replace the charging valve cap after charging.** A proper gas charge is the key to dampener effectiveness and bladder/bellows life.

Charging Instructions

- ⚠ Dampener can only be properly charged when fluid pressure is zero.
1. Point dampener charging valve in a safe direction. To verify dampener is not pressurized, remove charging valve cap and use a suitable wrench to slowly open charging valve by turning valve opening nut counterclockwise (Figure 1).
 2. Use a BLACOH high pressure XP Charging Kit or equivalent to charge dampener. **Note:** The source of Nitrogen (tank or bottle) must be equipped with a regulator set at no more than the maximum allowable working pressure (MAWP) specified on dampener.
 3. Close valve at Nitrogen source and thread charging hose connection securely to dampener charging valve. Make sure charging valve is completely open by turning valve opening nut counterclockwise as far as it will go (Figure 1).
 4. Slowly open valve at Nitrogen source and charge dampener to 100 psi (6.8 bar). Inspect charging valve and cap thread area for leaks by spraying with a solution of soap and water. If any leaks are observed, remove pressure from dampener by slowly loosening charging hose connection to charging valve or, if used, slowly open bleed valve on BLACOH charging hose manifold. Determine cause of leaks and repair before recharging (see **Pressure Seal Checks** section below).
 5. Slowly increase Nitrogen pressure in dampener until desired pressure, usually 80% of system pressure, is stabilized on charging hose gauge.
 6. Close charging valve completely by turning valve opening nut clockwise approximately 4-5 revolutions. Use a suitable wrench to tighten firmly.
 7. Turn off valve at Nitrogen source and slowly loosen charging hose connection to charging valve or, if used, slowly open bleed valve on BLACOH charging hose manifold. Wait to let all pressure in charging hose escape. It will take up to one minute to release all pressure in charging hose.
 8. Remove charging hose connection and reinstall charging valve cap tightly on charging valve. (The charging valve cap seals the charging valve to prevent slow, long term pressure loss.)

Pressure Seal Check

After charging, test for Nitrogen leaks by spraying a solution of soap and water on charging valve and cap threads. **If any leaks are observed, refer to Maintenance, Inspection & Repair section below to remove all pressure from dampener before proceeding.** After all pressure has been removed from dampener, follow steps below to determine cause of leaks and repair before recharging. Repeat pressure seal check until no leaks observed.

1. If bubbles appear at charging valve opening, charging valve needs to be tightened. Use a suitable wrench to turn charging valve opening nut clockwise until it is tightly closed (Figure 1). If bubbles appear at base of charging valve, check that charging valve is properly tightened into dampener cap. Use a 3/4" (19 mm) deep socket and torque wrench to thread charging valve and torque to specifications below based on dampener maximum allowable working pressure (MAWP). Pressurize dampener and repeat pressure seal check. If leaks continue, proceed to next step.

Torque Specifications:	0 to 10,000 psi	23-25 ft lbs (32-34 Nm)
	10,001 to 15,000 psi	30-35 ft lbs (41-47 Nm)

2. Use a 3/4" (19 mm) deep socket to remove charging valve. Inspect charging valve O-ring and replace if damaged. For models with optional Gauge Adapter Assembly (Figure 2), use a suitable wrench to remove assembly fitting from dampener cap. Inspect assembly O-rings and replace if needed. Pressurize dampener and repeat pressure seal check. If leaks continue, proceed to next step.
3. If bubbles appear around cap threaded holes, there is a problem with the bladder/bellows seal with the cap. Refer to **Maintenance, Inspection & Repair** section below to disassemble charging valve and dampener cap. Inspect and replace parts as instructed.

Figure 1 Charging Valve

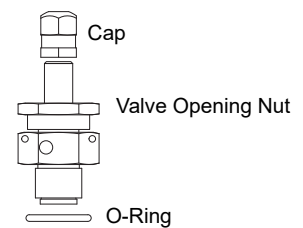
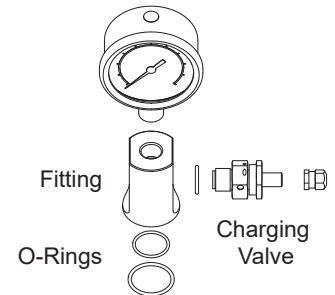


Figure 2 Gauge Adapter Assembly



Installation for Pump Discharge Pulsation

Depending on individual system conditions, dampener may require bracing. If necessary, a support fixture must be installed before dampener operation. The dampener tee and system piping must be of sufficient strength for high pressure applications. An isolation valve of proper pressure rating can be installed between the dampener and the tee to aid in dampener maintenance and repair.

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 (Figure A). 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, or settling of solid material which could result in shortened bladder/bellows life and/or reduced dampening performance.

XPH Models with Flow Through Inlets: XPH dampeners can be connected with the fluid inlet on one side and the outlet on the other side, or connected with the fluid inlet on the bottom and the outlet on either side. For best performance, manufacturer recommends that the fluid outlet be on the side and not on the bottom. Dampener will work with the outlet on the bottom but dampening performance may be slightly reduced. Dampener will function as a standard dampener with one inlet/outlet on any of the three dampener ports; however, high frequency dampening performance may be reduced. If a single inlet/outlet configuration is desired, best performance will be obtained from the bottom port. Performance in this configuration will be essentially the same as a standard XP model dampener with a single inlet port. XPH dampener models ship with factory installed plug in the bottom port (Figure B). This plug can be moved to any of the other two ports as needed. Any of the three dampener ports can be the inlet or outlet port, or the dampener can be used as a tee using all three ports.

Figure A

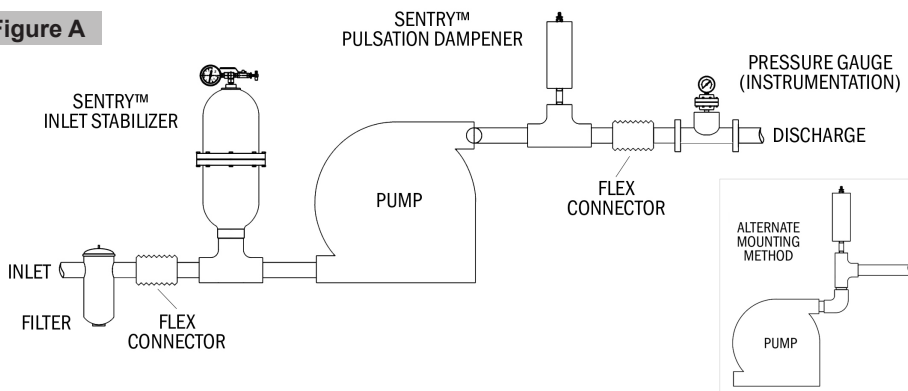
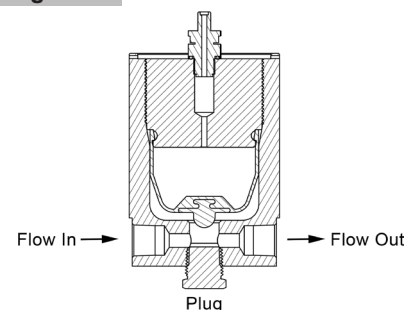


Figure B



Step 2 Startup

Start the pump and observe the system pressure gauge, which should be mounted downstream of dampener. After approximately one minute, pressure fluctuations should be reduced to a minimum. If pulsations are not minimal, the probable cause is an improper pressure charge in dampener. Turn off the pumping system and repeat the steps in the **Charging Instructions** section above, making certain dampener charge is at 80% of system pressure. **Note:** Dampener pressure charge may need to be adjusted slightly above or below the 80% level to maximize performance.

Maintenance, Inspection & Repair

- ⚠ **CAUTION!** Extreme pressure and/or possible hazardous chemicals are involved in dampener disassembly. Only properly trained persons can perform dampener maintenance and repair.
- ⚠ Process liquid and Nitrogen may escape if bladders/bellows fail. Always wear safety glasses and other appropriate safety equipment when disassembling dampener.

Depending on system conditions such as temperature and duty cycle, very little maintenance is required. Dampener's pre-charge should be checked periodically, usually every 60 to 90 days or whenever pulsation and/or vibration become more pronounced.

XP, XPH and XPX dampener models have single cap or dual hex nut caps depending on the model, and are fitted with an elastomer bladder or PTFE bellows. Refer to appropriate instructions below for the specific XP dampener model based on cap design and fittings.

Disassembly

- ⚠ **Pump must be turned off and system pressure must be zero prior to disassembly.**

⚠ **ASME Stamp Units: Dampener cap(s) and housing must remain permanently paired; parts are not interchangeable and cannot be replaced. Prior to disassembly, mark cap and housing to ensure original parts are paired and reassembled as received from factory.**

1. Close isolation valve if installed or remove dampener from pumping system.
2. If the dampener is fitted with eye bolts for lifting, rotate eye bolt nuts up bolt threads slightly (away from cap). Turn bolts counterclockwise to completely remove from cap.
3. Remove all pressure from dampener before disassembly. Point dampener charging valve in a safe direction. To verify dampener is not pressurized, remove charging valve cap and use a suitable wrench to slowly open charging valve by turning valve opening nut counterclockwise (Figure 1).

⚠ **Nitrogen becomes extremely cold and can burn bare skin when released under pressure. Also, ice may form and clog the charging valve which will prevent complete pressure charge release. Wait at least one minute after all pressure has been released before continuing with disassembly.**

4. After all pressure has been removed from dampener, loosen safety wire bolt, untwist safety wire to separate and remove from dampener. For dual cap models, remove safety wire from both non-wetted and wetted caps.
5. Use a 3/4" (19 mm) deep socket to remove charging valve (Figure 1). Inspect charging valve O-ring and replace if damaged. For models with optional Gauge Adapter Assembly (Figure 2), use a suitable wrench to remove assembly fitting from dampener cap. Inspect assembly O-rings and replace if needed.
6. Mark dampener cap(s) and housing to ensure parts are reassembled in their original factory pairing (ASME Stamp units only). Remove dampener cap(s) from dampener housing. Depending on model, dampener will have a single cap or dual hex nut caps.

Single Cap Model. Thread two 3" 5/16–18 Grade 8 bolts into threaded bolt holes in cap. Insert rod or heavy duty screwdriver with long shank between the two bolts and remove cap by turning counterclockwise (Figure 3).

Dual Cap Model. Use appropriate tool to remove both hex nut caps by turning counterclockwise.

7. Inspect dampener bladder/bellows and O-rings, and replace as needed. Consult factory for replacement parts.

Figure 1 Charging Valve

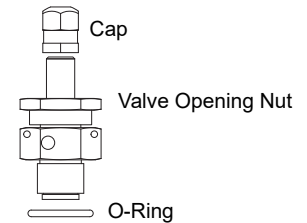


Figure 2 Gauge Adapter Assembly

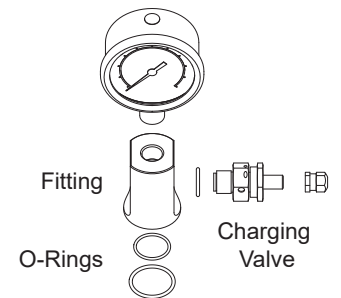
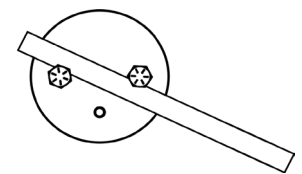


Figure 3 Single Cap



Reassembly

- ⚠ Safety wire must be re-installed on reassembly (see Safety Wire section below).
- ⚠ Use caution not to cross-thread dampener cap(s) on reassembly.
- ⚠ Make certain all components are clean and free of corrosion before reassembly.

Step 1 Housing & Cap(s)

To reassemble housing and cap(s), refer to the appropriate instructions below for the specific XP dampener model.

△ **ASME Stamp Units: Dampener cap(s) and housing must remain permanently paired; parts are not interchangeable and cannot be replaced. Prior to disassembly, mark cap and housing to ensure original parts are paired and reassembled as received from factory.**

Single Cap Elastomer Bladder Model (Figure 4)

1. Install bladder onto non-wetted cap, making sure internal bladder bead is seated in cap bead groove.
2. Lubricate non-wetted cap threads with LOCTITE C-5A Copper Anti-Seize, Molykote G-n Metal Assembly Paste or similar anti-seize compound. Apply paste **sparingly** by hand or with a stiff brush, rubbing paste into cap threads.
3. Spray bladder and inside of wetted housing with a solution of soap and water that is slippery to the touch.
4. Thread two 3" 5/16-18 Grade 8 bolts into threaded bolt holes in non-wetted cap (if bolts were removed on disassembly).
5. Insert cap/bladder assembly straight down into wetted housing, using caution not to cut or damage bladder on housing threads.
6. Using a rod or long shank screwdriver and the two bolts, thread non-wetted cap (clockwise) into wetted housing carefully to avoid cross-threading (Figure 3). Cap must be tightened firmly into housing to ensure a proper seal. Remove the two bolts from non-wetted cap.

Single Cap PTFE Bellows Model (Figure 5)

1. Install PTFE encapsulated O-ring onto wetted cap, making sure O-ring is seated in cap bead groove.
2. Snap anti-extrusion button into recess in center of PTFE bellows.
3. Snap PTFE bellows onto wetted cap, making sure top of bellows is touching cap lip.
4. Install rubber O-ring onto O-ring groove in PTFE bellows, making sure O-ring is seated in bellows bead groove.
5. Lubricate wetted cap threads and rubber O-ring installed on PTFE bellows with LOCTITE C-5A Copper Anti-Seize, Molykote G-n Metal Assembly Paste or similar anti-seize compound. Apply paste **sparingly** by hand or with a stiff brush, rubbing paste into cap threads.
6. Spray bellows and inside of non-wetted housing with a solution of soap and water that is slippery to the touch.
7. Thread two 3" 5/16-18 Grade 8 bolts into threaded bolt holes in wetted cap (if bolts were removed on disassembly).
8. Insert cap/bellows assembly straight down into non-wetted housing, using caution not to cut or damage PTFE bellows/O-rings on housing threads.
9. Using a rod or long shank screwdriver and the two bolts, thread wetted cap (clockwise) into non-wetted housing carefully to avoid cross-threading (Figure 3). Cap must be tightened firmly into housing to ensure a proper seal. Remove the two bolts from wetted cap.

Figure 4 Single Cap Elastomer Bladder Model

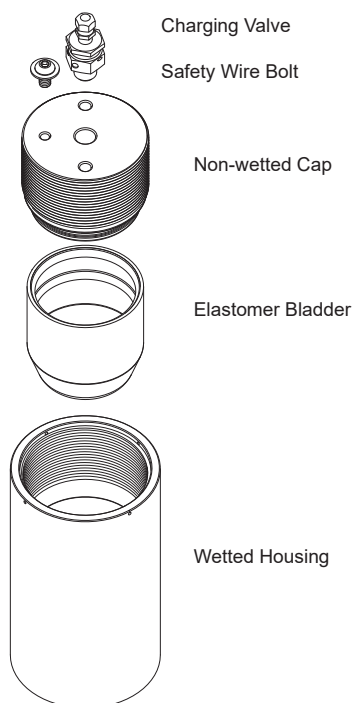
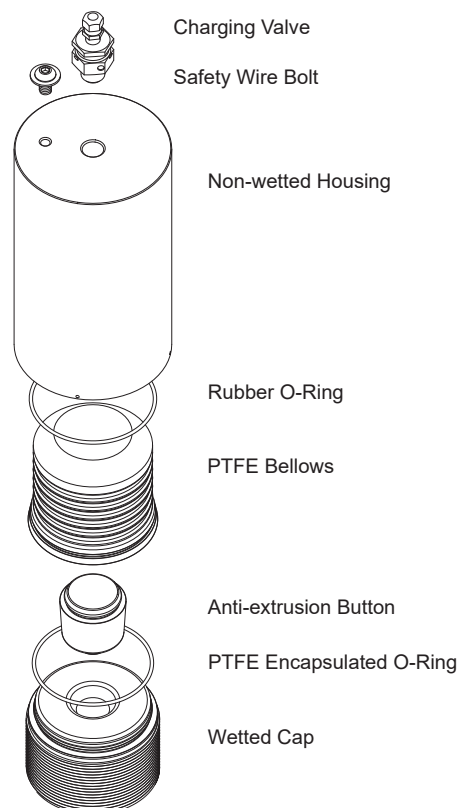


Figure 5 Single Cap PTFE Bellows Model



Dual Cap Elastomer Bladder Model (Figure 6)

1. Install O-ring onto wetted cap, making sure O-ring is seated in cap bead groove.
2. Lubricate wetted cap threads with LOCTITE C-5A Copper Anti-Seize, Molykote G-n Metal Assembly Paste or similar anti-seize compound. Apply paste sparingly by hand or with a stiff brush, rubbing paste into cap threads.
3. Thread wetted cap into housing and torque to 80 ft lbs (108 Nm) with appropriate tool.
4. Snap anti-extrusion button into recess in center of bladder (wetted side).
5. Snap bladder onto non-wetted cap, making sure bladder is firmly attached.
6. Lubricate non-wetted cap threads with LOCTITE C-5A Copper Anti-Seize, Molykote G-n Metal Assembly Paste or similar anti-seize compound. Apply paste sparingly by hand or with a stiff brush, rubbing paste into cap threads.
7. Spray bladder and inside of housing with a solution of soap and water that is slippery to the touch.
8. Insert non-wetted cap/bladder assembly straight down into housing, using caution not to cut or damage bladder on housing threads. Thread assembly into housing and torque to 80 ft lbs (108 Nm) with appropriate tool.

Dual Cap PTFE Bellows Model (Figure 7)

1. Snap anti-extrusion button into recess into center of PTFE bellows (wetted side).
2. Install O-ring onto O-ring groove in PTFE bellows, making sure O-ring is seated in bellows bead groove.
3. Snap bellows onto wetted cap, making sure bellows is firmly attached.
4. Lubricate wetted cap threads with LOCTITE C-5A Copper Anti-Seize, Molykote G-n Metal Assembly Paste or similar anti-seize compound. Apply paste sparingly by hand or with a stiff brush, rubbing paste into cap threads.
5. Spray bellows and inside of housing with a solution of soap and water that is slippery to the touch.
6. Insert wetted cap/bellows assembly straight down into housing, using caution not to cut or damage bladder on housing threads. Thread assembly into housing and torque to 80 ft lbs (108 Nm) with appropriate tool.
7. Install O-ring onto non-wetted cap, making sure O-ring is seated in cap bead groove.
8. Lubricate non-wetted cap threads with LOCTITE C-5A Copper Anti-Seize, Molykote G-n Metal Assembly Paste or similar anti-seize compound. Apply paste sparingly by hand or with a stiff brush, rubbing paste into cap threads.
9. Thread non-wetted cap into housing and torque to 80 ft lbs (108 Nm) with appropriate tool.

Figure 6 Dual Cap Elastomer Bladder Model

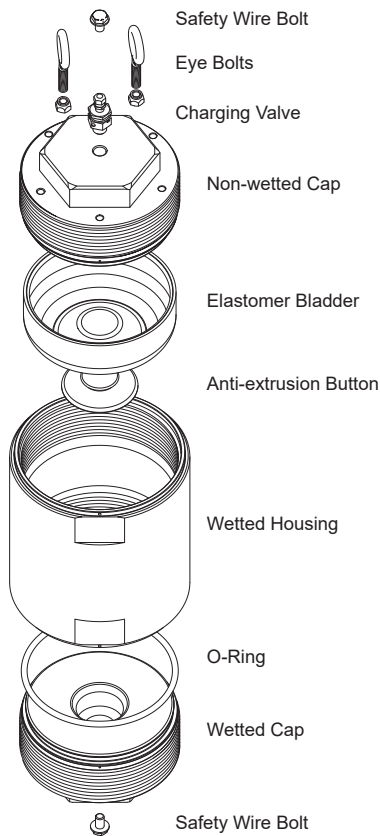
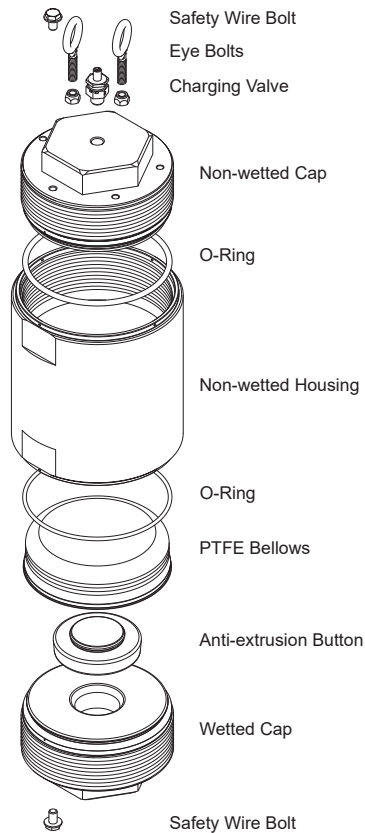


Figure 7 Dual Cap PTFE Bellows Model



Step 2 Charging Valve and Optional Gauge Adapter Assembly

Inspect charging valve O-ring and replace if needed (Figure 1). Install charging valve into dampener charging valve port or, if applicable, into Gauge Adapter Assembly fitting, making sure charging valve O-ring is properly installed. Use a 3/4" (19 mm) deep socket and torque wrench to thread charging valve and torque to specifications below based on dampener maximum allowable working pressure (MAWP).

Torque Specifications:	0 to 10,000 psi	23-25 ft lbs (32-34 Nm)
	10,001 to 15,000 psi	30-35 ft lbs (41-47 Nm)

Models with Gauge Adapter Assembly. Inspect assembly O-rings and replace if needed. Ensure fitting O-rings are installed in O-ring grooves (Figure 2). Spray adapter fitting O-rings with a solution of soap and water. Install assembly into dampener charging valve port. Tighten until flush (metal to metal) using a suitable wrench. While tightening, ensure adapter fitting O-rings remain seated in O-ring grooves.

Step 3 Charging & Pressure Seal Check

- ⓘ Dampener must be charged and pressure seal checked for Nitrogen leaks prior to reinstalling safety wire.

Refer to **Charging Instructions** and **Pressure Seal Check** sections above to properly charge dampener and check pressure seal before proceeding to next step.

Step 4 Safety Wire and Bolts, Eye Bolts

- ⓘ All XP high pressure dampeners are equipped with safety wire and bolts which must be reinstalled after disassembly (Figure 8).
- ⓘ Eye bolts installed on dual cap models for lifting must be reinstalled after disassembly.

Single Cap Model Non-wetted Cap/Housing & Dual Cap Model Non-wetted Cap

Loop safety wire through wire port in charging valve, twist loose wires together tightly and pull taut from charging valve to the wire port in housing lip that is in the next clockwise position below cap safety bolt. (If dampener is fitted with optional Gauge Adapter Assembly, pull twisted wire from charging valve clockwise around assembly fitting and then to housing lip port.) Feed one loose wire end through housing lip port and twist remaining wire lengths together tightly. Pull twisted wire taut up to cap safety wire bolt which should be located counterclockwise above housing lip port and wrap **clockwise** once around safety wire bolt.

For single cap models fitted with PTFE bellows where charging valve is installed on non-wetted housing, pull twisted safety wire taut from charging valve directly to safety wire bolt in housing.

For dual cap models with a second safety wire bolt in housing lip in lieu of a port, pull twisted wire taut from charging valve and wrap clockwise once around safety wire bolt in cap; pull remaining length taut and wrap once around second safety wire bolt in housing lip.

Ensure no slack in full length of safety wire. Tighten safety wire bolt(s) to secure. Bend wire ends back and down so sharp ends do not protrude. Reinstall cap eye bolts (dual cap models only).

Dual Cap Model Wetted Cap

Loop safety wire through wire port in housing lip that is in the next clockwise position below cap safety bolt. Twist loose wires together tightly and pull taut from housing lip up to cap safety wire bolt which should be located counterclockwise above housing lip port and wrap **counterclockwise** once around safety wire bolt.

For models with a second safety wire bolt in housing lip in lieu of a port, pull twisted wire taut from charging valve and wrap **clockwise** once around safety wire bolt in cap. Pull remaining length taut and wrap once around second safety wire bolt in housing lip. Ensure no slack in full length of safety wire. Tighten safety wire bolt(s) to secure. Bend wire ends back and down so sharp ends do not protrude.

Figure 1 Charging Valve

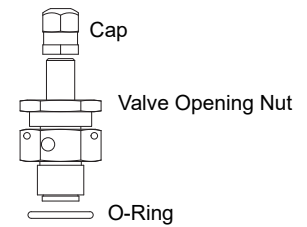


Figure 2 Gauge Adapter Assembly

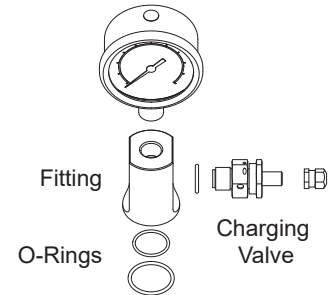


Figure 8 Safety Wire & Bolts



Single Cap Model
Non-wetted Cap



Single Cap Model
Non-wetted Housing



Dual Cap Model
Non-wetted Cap



Dual Cap Model
Wetted Cap

Gauge Adapter Assembly Installation

XP High Pressure models are available with optional Gauge Adapter Assembly, either factory installed or purchased separately (Figure 2). When purchased separately, Gauge Adapter Assembly includes charging valve. Follow instructions below to install optional Gauge Adapter Assembly when purchased separately.

△ Pump must be turned off and system pressure must be zero prior to disassembly.

1. Close isolation valve if installed or remove dampener from pumping system.
2. If the dampener is fitted with eye bolts for lifting, rotate eye bolt nuts up bolt threads slightly (away from cap). Turn bolts counterclockwise to completely remove from cap.
3. Remove all pressure from dampener before disassembly. Point dampener charging valve in a safe direction. To verify dampener is not pressurized, remove charging valve cap and use a suitable wrench to slowly open charging valve by turning valve opening nut counterclockwise (Figure 1).

⚠ Nitrogen becomes extremely cold and can burn bare skin when released under pressure. Also, ice may form and clog the charging valve which will prevent complete pressure charge release. Wait at least one minute after all pressure has been released before continuing with disassembly.

4. After all pressure has been removed from dampener, loosen safety wire bolt, untwist safety wire to separate and remove from dampener.
5. Use a 3/4" (19 mm) deep socket to remove charging valve from dampener cap and discard.
6. Ensure gauge adapter fitting O-rings are seated in O-ring grooves (Figure 2). Spray O-rings with a solution of soap and water.
7. Install complete assembly into dampener charging valve port. Tighten until flush (metal to metal) using a suitable wrench. While tightening, ensure fitting O-rings remain seated in O-ring grooves.
8. Refer to **Charging Instructions** and **Pressure Seal Check** sections above to properly charge dampener and check pressure seal before proceeding to next step.
9. Reinstall safety wire and bolts:

Loop safety wire through wire port in charging valve, twist loose wires together tightly and pull taut from charging valve clockwise around assembly fitting to wire port in housing lip. Feed one loose wire end through housing lip port and twist remaining wire lengths together tightly. Pull twisted wire taut and wrap clockwise once around safety wire bolt in cap.

For single cap models fitted with PTFE bellows where charging valve is installed on non-wetted housing, pull twisted safety wire taut from charging valve directly to safety wire bolt in housing.

For dual cap models with a second safety wire bolt in housing lip in lieu of a port, pull twisted wire taut from charging valve and wrap clockwise once around safety wire bolt in cap; pull remaining length taut and wrap once around second safety wire bolt in housing lip.

Ensure no slack in full length of safety wire. Tighten safety wire bolt(s) to secure. Bend wire ends back and down so sharp ends do not protrude. Reinstall cap eye bolts (dual cap models only).

Figure 1 Charging Valve

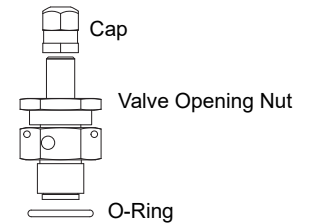
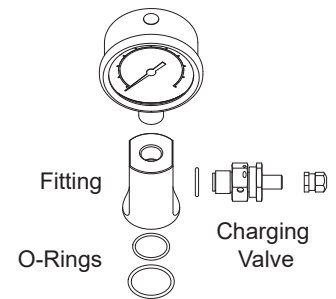


Figure 2 Gauge Adapter Assembly



Manufacturer's Limited Warranty & Return Policy

Details regarding warranty and return policy are available on Blacoh's website at www.Blacoh.com



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