

Troubleshooting for:



PREVENTATIVE MAINTENANCE

SENTRY Pulsation Dampeners require very little maintenance. The rubber bladder or PTFE bellows is the only wear part of the unit.

Bladder replacement should be part of the system preventive maintenance program. Bladder life is a function of many variables. Normal life can be from a few months to several years depending upon usage, proper charge and dampener size, system design, and/or the harshness of the process fluid and application temperature.

SENTRY units used in conjunction with diaphragm pumps should have the rubber bladders replaced at least every second time the diaphragms in the pump are replaced. This does not apply to PTFE bellows. As with any pumping system, component wear is dependent upon many factors; therefore, this suggested maintenance program might need to be adjusted based upon specific applications.

Periodic inspection of units should be as follows:

1. SENTRY housings and fasteners should be inspected for signs of over pressurization, stress, fatigue, corrosion, or UV attack. Housings and fasteners must be replaced at the first indication of deterioration.
2. Fastener tightness should be checked before initial start-up. Consult factory for torque specifications.
3. Fasteners on metal units should be replaced at each re-assembly.
4. Check the gas pre-charge in the unit while no system pressure is present. If system pressure is present, the gauge will display system pressure, NOT the pre-charge pressure.
5. Check the unit pressure gauge during operation. If the dampener is properly charged, the gauge needle should be fluctuating with each pump discharge stroke. Replace the gauge if needed.
6. Adjust the regulator on adjustable models to insure maximum dampening. Replace the self-relieving regulator if needed.

EFFECTIVE DAMPENING TIPS

The primary factors that determine the level of dampening obtained with a SENTRY dampener are capacity, location, and the pressure charge.

CAPACITY: The dampener must be properly sized so that the volume of compressed gas inside is enough to absorb fluid shock, and also enough liquid volume capacity to accumulate the fluid pulse. A key element of effective dampening is the relationship of the gas charge to the fluid volume necessary for the pressure range required. An undersized dampener will result in insufficient dampening and can lead to excessive bladder wear and early failure.

The capacity of a pulsation dampener must be in the correct ratio to the volume per stroke of the pump and the number of pump heads. The larger the ratio is, the higher the level of dampening will be. For an Air Operated Diaphragm Pump the ratio between the dampener capacity and the pump stroke volume should be from 1.5:1 to 5:1, based upon the level of dampening required. For a metering pump the ratio is 10:1 to 30:1, based upon the level of dampening required.

LOCATION: Location is important because of wave frequency and fluid dynamics. Location directly effects dampener performance. The pulsation dampener should be installed as close as possible to the pump discharge and no further away than 10 pipe diameters. Installation should be on a tee in the fluid flow path. Do not install the dampener on a branch or riser. The farther away the dampener inlet is from the pump discharge, the less effective the unit will be.

A dampener installed on a riser or dead-end leg of pipe can actually increase pulsation. A pulse traveling toward the dampener has another pulse directly behind it. When the first pulse is reversed after contact with the dampener, it crashes into the next pulse disrupting the entire wave sequence. This action can change the system's fluid harmonics, which may lead to increased pulsation.

CHARGE: The compressed gas charge applied to any dampener will vary with each application and can have a significant effect on performance. To properly charge the unit, an accurate reading of the system fluid pressure is required. A pressure gauge should be installed on the system piping downstream from the unit. Any time the gas charge is equal to or greater than the system pressure, the dampener will not function properly. An over charged unit will force the internal bladder down, covering the inlet port – shutting off the dampener.

TROUBLESHOOTING

NO DAMPENING OR INSUFFICIENT DAMPENING EFFECT

1. Check the location of the dampener. Dampeners should be mounted within 10 pipe diameters of the pump discharge on a tee in the fluid flow path. The use of elbows and risers will decrease dampener performance.
2. Check the capacity of the dampener in relation to the pump stroke volume. An undersized dampener will decrease dampener performance and shorten bladder life.
3. Check the discharge head. Dampeners do perform better under a little discharge pressure (at least 5 psi). A slow stroking pump may not be filling the discharge pipe completely, creating zero discharge head between strokes. A slight discharge head can be created with a ball valve or back pressure valve.
4. Check for bladder failure. Replace bladder.
5. Check the dampener inlet fluid port for any blockage or restriction.

LEAKING FLUID OR AIR

1. All plastic and PTFE components take an initial set after manufacture. The fasteners may need tightening. Consult factory for torque specifications.
2. Check the air controls and gauge threads for an airtight seal. Tighten if needed. Consult factory for torque specifications.
3. Check the ring flange or clamp band bolts for proper torque. Tighten if needed. Consult factory for torque specifications.
4. Check for a bladder rupture. Replace the bladder if it has failed.

BLADDER RUPTURE OR FAILURE

CAUTION: IF A SYSTEM PRESSURE TEST IS TO BE PERFORMED, THE UNIT MUST BE CHARGED WITH 80% OF THE SYSTEM TEST PRESSURE PRIOR TO THE TEST. FAILURE TO CHARGE THE DAMPENER CAN CAUSE BLADDER FAILURE.

1. **Chemical Attack**
Swelling, hardening, and distortion are some of the indications of chemical attack. Check the chemical compatibility charts. Consult factory for assistance.
2. **Cut Bladder**
Check for a sharp object that may have been introduced into the dampener through the pumped fluid.
3. **Torn Bladder**
 - Check for an insufficient air charge in the dampener. Properly charge the unit for the application.
 - Check for a transient high-pressure spike created by pump start up, pump shut down, vertical pipe runs, or a quick closing valve, all of which can destroy a bladder. A Surge Suppressor should be installed at the location where a pressure spike originates.
4. **Excessive Bladder Wear**
 - Check the size of the unit. An undersized unit does not have the capacity to absorb the volume of the pump stroke, forcing the bladder to be overworked.
 - Check the air charge in the unit. An undercharged unit will cause the bladder to rub excessively and wear against the body housing.



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PREVENTATIVE MAINTENANCE

CAUTION: PLASTIC UNITS CANNOT BE USED FOR SURGE OR WATER HAMMER CONTROL

SENTRY Surge Suppressors require very little maintenance. The rubber bladder is the only wear part of the unit.

Bladder replacement should be part of the system preventive maintenance program. Bladder life is a function of many variables. Normal life can be from a few months to several years depending upon usage, proper charge and size, system design, and/or the harshness of the process fluid and application temperature.

With any pumping system, component wear is dependent upon many factors; therefore, this suggested maintenance program might need to be adjusted based upon the specific application.

Periodic inspection of units should be as follows:

1. SENTRY housings and fasteners should be inspected for signs of over pressurization, stress, fatigue, corrosion, or UV attack. Housings and fasteners must be replaced at the first indication of deterioration.
2. Fastener tightness should be checked before initial start-up. Consult factory for torque specifications.
3. Fasteners on metal units should be replaced at each re-assembly.
4. Check the gas pre-charge in the unit while no system pressure is present. If system pressure is present, the gauge will display system pressure, NOT the pre-charge pressure.

EFFECTIVE DAMPENING TIPS

The primary factors that determine the level of dampening obtained with a SENTRY suppressor are capacity, location, and the pressure charge.

CAPACITY: The suppressor must be properly sized so that the volume of compressed gas inside is enough to absorb fluid shock, and there is enough liquid volume capacity to accumulate the fluid surge. A key element of effective surge control is the relationship of the gas charge to the fluid volume necessary for the pressure range required. An undersized suppressor will result in insufficient dampening, but also lead to excessive bladder wear and early failure.

LOCATION: Location is important because of the natural phenomena of water hammer. When a valve in the fluid system is closed quickly, a pressure spike 4 to 8 times greater than normal flowing pressure is created. To effectively absorb this pressure spike a surge suppressor must be located upstream of the valve within ten pipe diameters.

CHARGE: The compressed gas charge applied to a surge suppressor will vary with each application and can have a significant effect on the device's performance. Normally, the charge will be 95% to 98% of normal flowing pressure. To properly charge the suppressor, an accurate reading of the system fluid pressure is required. A pressure gauge should be installed on the system piping downstream from the suppressor.

NOTE: The system pressure must be at zero when charging the suppressor or an inaccurate charge will occur.

TROUBLESHOOTING

INSUFFICIENT OR NO SURGE SUPPRESSION

1. Check flowing system pressure. If the pressure charge in the suppressor is improper, the suppressor will not function properly and bladder wear will increase. The pressure charge in the suppressor should be set at 95% to 98% of the normal system flowing pressure.
2. Check for bladder failure. Replace bladder.
3. Check the inlet fluid port of the suppressor for blockage or restriction. Clear obstruction or remove restriction.
4. Check location of suppressor. The surge suppressor should be mounted within 10 pipe diameters of the quick closing valve or other pressure spike causing device, normally upstream or on the high pressure side.
5. Check the size of the surge suppressor. An undersized suppressor will not effectively dampen the pressure spike. Consult Blacoh for assistance in evaluating proper size.

LEAKING FLUID OR AIR

1. All plastic and PTFE components take an initial set after manufacture. The fasteners may need tightening. Consult factory for torque specifications.
2. Check the air controls and gauge threads for an airtight seal. Tighten if needed. Consult factory for torque specifications.
3. Check the ring flange bolts for proper torque. Tighten if needed. Consult factory for torque specifications.
4. Check for a bladder rupture. Replace the bladder if it has failed.

BLADDER RUPTURE OR FAILURE

CAUTION: IF A SYSTEM PRESSURE TEST IS TO BE PERFORMED, THE UNIT MUST BE CHARGED WITH 90% to 95% OF THE SYSTEM TEST PRESSURE PRIOR TO THE TEST. FAILURE TO CHARGE THE SUPPRESSOR CAN CAUSE BLADDER FAILURE.

1. Chemical Attack
Swelling, hardening, and distortion are some of the indications of chemical attack. Check the chemical compatibility charts. Consult factory for assistance.
2. Cut Bladder
Check for a sharp object that may have been introduced into the suppressor through the pumped fluid.
3. Torn Bladder
Check for an insufficient air charge in the suppressor. Properly charge the unit for the application.
4. Excessive Bladder Wear
 - A. Check the size of the unit. An undersized unit does not have the capacity to absorb the volume of liquid necessary, forcing the bladder to be overworked.
 - B. Check the gas charge in the unit. An undercharged unit will cause the bladder to rub excessively and wear against the internal body housing.



PREVENTATIVE MAINTENANCE

SENTRY Inlet Stabilizers require very little maintenance. The rubber bladder is the only wear part of the unit.

Bladder replacement should be part of the system preventive maintenance program. Bladder life is a function of many variables. Normal life can be from a few months to several years depending upon usage, system design, and/or the harshness of the process fluid and application temperature.

SENTRY units used in conjunction with diaphragm pumps should have the rubber bladder replaced at least every second time the diaphragms in the pumps are replaced. As with any pumping system, component wear is dependent upon many factors; therefore, this suggested maintenance program might need to be adjusted based upon specific applications.

Periodic inspection of units should be as follows:

1. The housings and fasteners should be inspected for signs of over pressurization, stress, fatigue, corrosion, or UV attack. Housings and fasteners must be replaced at the first indication of deterioration.
2. Fastener tightness should be checked before initial start-up. Consult factory for torque specifications.
3. Fasteners on metal units should be replaced at each re-assembly.
4. Check the gas pre-charge in the unit while no system pressure is present. If there is system pressure present, the gauge will display the system pressure, NOT the pre-charge pressure.
5. Check the pressure gauge during operation. If the stabilizer is properly charged, the gauge needle should be fluctuating with each pump discharge stroke. Replace the gauge if needed.

EFFECTIVE DAMPENING TIPS

The primary factors that determine the level of inlet stabilization obtained with a SENTRY unit are capacity, location, and the charge in the stabilizer.

CAPACITY

The unit must be properly sized so that the volume of compressed gas inside is enough to absorb fluid shock, and also enough liquid volume capacity to accumulate the fluid pulse. A key element of effective dampening is the relationship of the gas charge to the fluid volume necessary for the pressure range required. An undersized unit will result in insufficient dampening and lead to excessive bladder wear and early failure.

The capacity of an inlet stabilizer must be in the correct ratio to the volume per stroke and the number of heads on the pump. The larger the ratio, the higher the level of stabilization. For an Air Operated Diaphragm pump the ratio between the dampener capacity and the pump stroke volume should be from 1.5:1 to 5:1, based upon the level of stabilization required. For a metering pump the ratio is 10:1 to 30:1, based upon the level of stabilization required.

LOCATION

Location is important because of wave frequency and fluid dynamics. The location of the stabilizer has a direct bearing on its performance. The stabilizer must be no further than 10 pipe diameters from the pump inlet and installed on a tee in the fluid flow path. Do not install the stabilizer on a branch or riser. The farther away the inlet stabilizer's fluid port is from the pump inlet, the less effective the unit will be.

CHARGE

The gas charge in the stabilizer will vary by application. The charge in the unit is critical to the units' performance. To properly charge the unit, an accurate reading of the system fluid pressure is required. A compound pressure/vacuum gauge should be installed on the system piping upstream from the unit. Any time the gas charge in the stabilizer is equal to or greater than the system pressure, the unit will not function. Over charging will force the internal bladder down, covering the inlet port. This in effect shuts off the unit. See the Troubleshooting section on the next page.

The patented "J" Model Inlet Stabilizer includes a venturi valve, an airtight ball valve and a compound pressure/vacuum gauge. It does not require a permanent air/gas supply. For suction lift, a vacuum must be created in the air chamber of the unit. For positive inlet pressure, the unit must be pre-charged prior to the introduction of the system's fluid pressure. Refer to the installation instructions for more detail.

TROUBLESHOOTING

NO STABILIZING OR INSUFFICIENT STABILIZING EFFECT

First observe the needle on the inlet stabilizer's pressure gauge. The needle should be cycling in sequence with the minimum and maximum pressure fluctuations created by the pump's stroking action. If the needle is steady, the stabilizer is either over pressurized, contains no pressure, or the fluid inlet port is restricted.

1. Check the air charge setting of the unit. Inlet Stabilizers in positive suction applications need the air charge to be set at 50% of the static inlet pressure. In suction lift applications the Stabilizer needs to be set at approximately 5-6 inches of vacuum. Refer to the Installation Instructions for charging information.
2. Check the location of stabilizer. It should be mounted on a tee in the fluid flow path within 10 pipe diameters or closer to pump inlet. The use of elbows and risers will decrease performance.
3. Check the capacity of the stabilizer in relation to the pump stroke volume. An undersized stabilizer will decrease performance and shorten bladder life.
4. Check for bladder failure. Replace the bladder.
5. Check the inlet fluid port of the unit for blockage or restriction. Clear the obstruction or remove the restriction and re-install the unit according to the installation instructions.

LEAKING FLUID OR AIR

1. All plastic and PTFE components take an initial set after manufacture. The fasteners may need tightening. Consult factory for torque specifications.
2. Check the air controls and gauge threads for an airtight seal. Tighten if needed. Consult factory for torque specifications.
3. Check the ring flange or clamp band bolts for proper torque. Tighten if needed. Consult factory for torque specifications.
4. Check for a bladder rupture. Replace the bladder if it has failed.

BLADDER RUPTURE OR FAILURE

CAUTION: IF A SYSTEM PRESSURE TEST IS TO BE PERFORMED, THE UNIT MUST BE CHARGED WITH 80% OF THE SYSTEM TEST PRESSURE PRIOR TO THE TEST. THIS WILL AVOID POSSIBLE BLADDER DAMAGE. **MAXIMUM PRESSURE IS 30 PSI.**

1. **Chemical Attack**
Swelling, hardening, and distortion are some of the indications of chemical attack. Check the chemical compatibility charts. Consult factory for assistance.
2. **Cut Bladder**
Check for a sharp object that may have been introduced into the stabilizer through the pumped fluid.
3. **Torn Bladder**
 - A. Check for an insufficient air charge in the unit during operation. Properly charge the unit for the application.
 - B. A transient high-pressure spike created by pump start up, pump shut down, a vertical pipe run, or quick closing valve can destroy a bladder. A Surge Suppressor should be installed at the location where a pressure spike originates.
4. **Excessive Bladder Wear**
 - A. Check the size of the unit. An undersized unit does not have the capacity to absorb the volume of the pump stroke, forcing the bladder to be overworked.
 - B. Check the air charge in the unit. An undercharged unit will allow the bladder to excessively rub and wear against the internal body housing.

