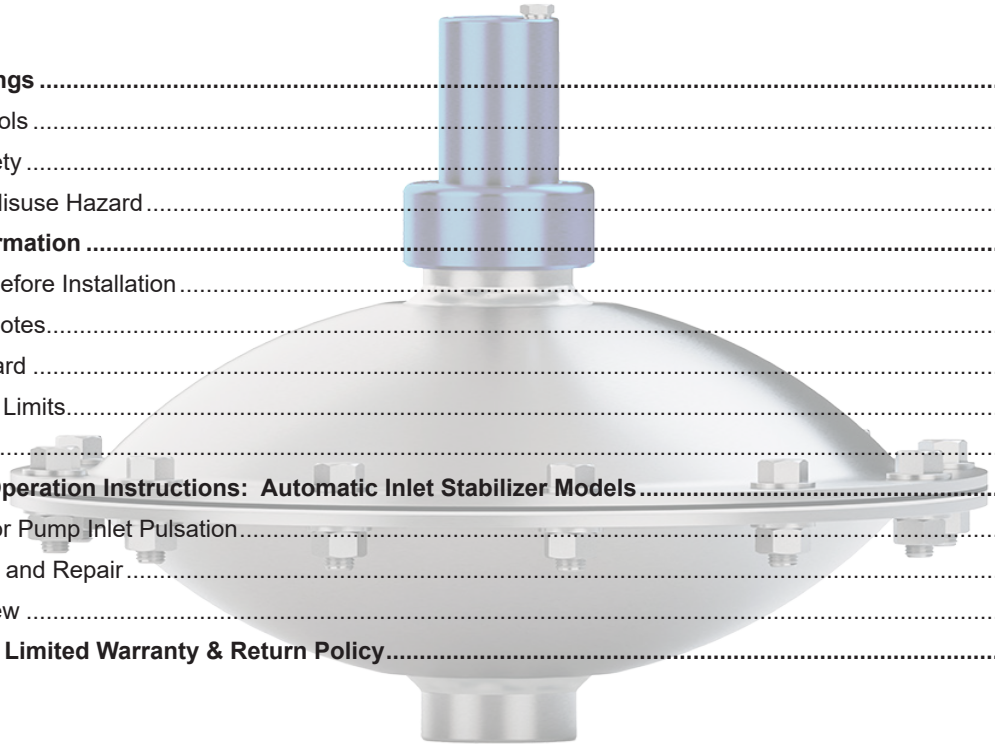
Automatic Inlet Stabilizer

BLACOH™
INDUSTRIES

Installation and Operation Manual



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.

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.
- Automatic Inlet Stabilizer models are designed to operate with compressed air **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 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 diaphragm 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 diaphragm.

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 clean compressed air only. **DO NOT USE OXYGEN.**

Dampener Diaphragm Failure

Automatic Inlet Stabilizer models utilize a PTFE diaphragm to separate system fluid from the air supply. When failure occurs, system fluid may be expelled from the air valve. Always perform preventive maintenance and replace diaphragm before excessive wear occurs.

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 clean compressed air 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.

Due to the nature of the material, PTFE diaphragm will *cold flow*. Prior to installation, tighten bolts to torque specification on dampener tag.

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 diaphragm from a system pressure test, prior to test dampener must be equipped with a constant source of compressed air with pressure equal to or greater than system test pressure.

Install dampener 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.

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.

Material	Temperature Limits	
PTFE Diaphragm	+40°F to +220°F	(+4°C to +104°C)
Buna-N Backup Diaphragm	+10°F to +180°F	(-12°C to +82°C)

Maintenance

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

Dampeners require very little maintenance.

PTFE diaphragm replacement should be part of a preventive maintenance program. 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.

Installation & Operation Instructions: Automatic Inlet Stabilizer Models

Inlet Stabilizer dampener models are for use on the inlet side of pumps only.

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.

Equip dampener with constant source of clean compressed air. **DO NOT USE OXYGEN.**

DO NOT exceed 50 psi (3.4 bar) maximum allowable working pressure (MAWP). Check maximum pressure rating specified on dampener. 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 disassembly, 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, an air line with a constant source of compressed air must be attached to dampener to avoid possible damage to diaphragms.

Installation for Pump Inlet Pulsation

Due to the nature of the material, PTFE diaphragm will *cold flow*. Prior to installation, tighten bolts to torque specification on dampener tag.

Step 1 — Installation Position

Install the dampener 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 — Air Line Connection

Supply compressed air to the dampener using a 1/4" or larger air line to ensure adequate air supply to the dampener. Automatic Inlet Stabilizer models have an automatic valve with two NPT ports fitted in the non-wetted housing. Using a suitable 1/8" NPT adapter, connect the air line to the NPT inlet connection indicated on the air control housing.

Attach the air line to the existing pump air supply line before any regulator used at the pump's air valve (Figure 1). The compressed air pressure to the dampener must be regulated to between 30 psi/2 bar and 50 psi/3.4 bar.

Compressed air should be applied to the dampener charge port at all times for proper operation. In case the compressed air supply to the dampener is interrupted, it is recommended that a check valve be added to the compressed air supply line after the air regulator to prevent the charge from escaping through the air inlet while the dampener is depressurized.

The exhaust port in the automatic valve is supplied with a muffler. Dampener will not operate if the exhaust port is blocked or, if an air supply is attached to that port.

If a diaphragm failure occurs, it is possible for the pumped product to enter the dampener air chamber and into the compressed air line. It is recommended that a one-way check valve be installed at the air connection to prevent backflow of product.

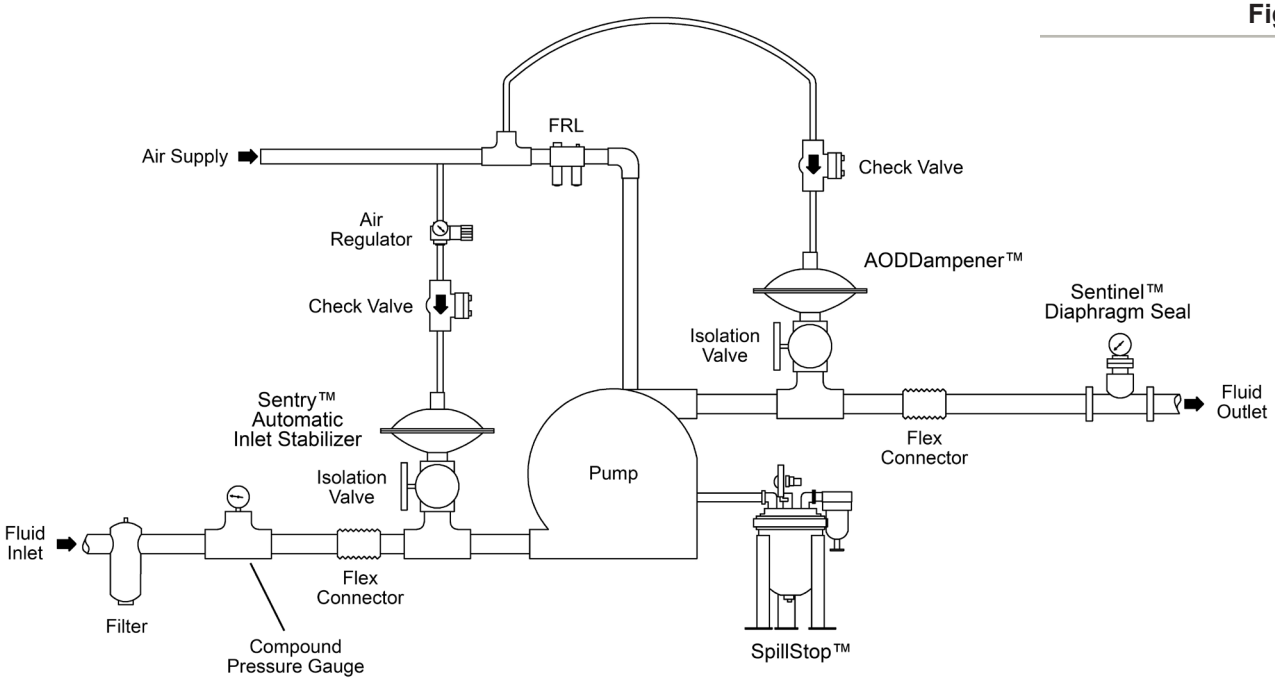
If a diaphragm failure occurs, it is possible for the pumped product to enter the dampener air chamber and be expelled from the dampener exhaust. It is recommended that the exhaust be plumbed to a safe area or to a Blacoh SPILLSTOP™ unit if the dampener location and/or the nature of the pumped product presents a hazard.

Step 3 — Startup

To avoid damage to diaphragms, DO NOT start the pump before compressed air is supplied to dampener.

Prior to starting the pump, dampener must have the air supply connected and available to the dampener to avoid possible damage to diaphragms. Once the air supply connection is complete, the dampener is fully functional and will operate automatically when the pump is started.

Figure 1



Maintenance and Repair

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.

Regularly inspect compressed air line for damage. If compressed air to dampener is reduced or stopped, diaphragm failure will occur.

Replacement Kits and Tools

Diaphragm replacement kits include all parts necessary for replacement, including PTFE diaphragm, backup diaphragm, hardware and O-rings. The optional O-Ring Installation Tool Set is intended for use when installing O-rings in the automatic valve of the Automatic Inlet Stabilizer to ensure proper O-ring placement on reassembly.

Automatic Inlet Stabilizer Model	AIS-15 (1.5”)	AIS-20 (2”)
PTFE Diaphragm Kit	AIS-15-100	AIS-20-100
O-Ring Installation Tool Set	AS00-032	AS00-032

Diaphragm Replacement

Disassembly

1. Turn pump off and allow system pressure to drop to zero pressure. Disconnect compressed air line to dampener.

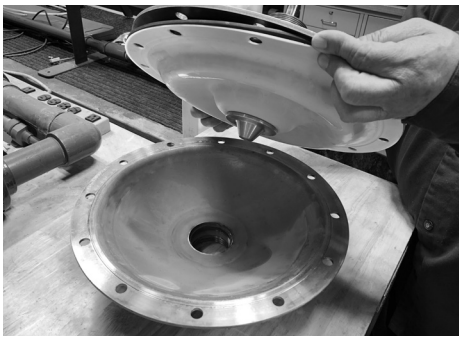
   Pump must be turned off and system pressure must be zero prior to dampener disassembly. In systems with a static head pressure, it is not sufficient to simply isolate the dampener. To prevent damage to the PTFE diaphragm, fluid system pressure must be relieved prior to removing charge pressure from dampener.

2. Close isolation valve (if installed) on dampener inlet. Dampener can be repaired in place however, the preferred method is to remove dampener from the system.
3. Remove and clean any thread sealant at the connection to the piping system.
4. There should be no residual pressure in dampener, however; slowly loosen all fasteners first to slowly release any remaining pressure before removing fasteners. Discard used fasteners. New fasteners are included in diaphragm replacement kits.

   Replace nut and bolt fasteners at each reassembly with fasteners of equal/greater strength value. DO NOT reuse old nuts and bolts.

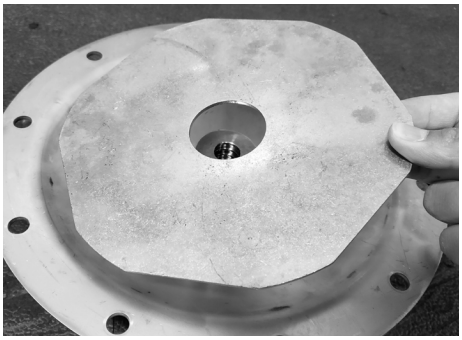
5. Remove the non-wetted housing and the attached diaphragm assembly.

   Process liquid may be present if diaphragm failure has occurred. Always wear safety glasses and other appropriate safety equipment when disassembling dampener.



6. The PTFE diaphragm and backup diaphragm are attached to the air control shaft with an anti-extrusion button. Gently pull down on the diaphragms to slide the entire assembly out from the automatic valve in the non-wetted housing and discard the assembly. Take necessary precautions not to scratch or otherwise damage the assembly shaft or the automatic valve when removing the assembly, otherwise, the automatic valve may not function properly.

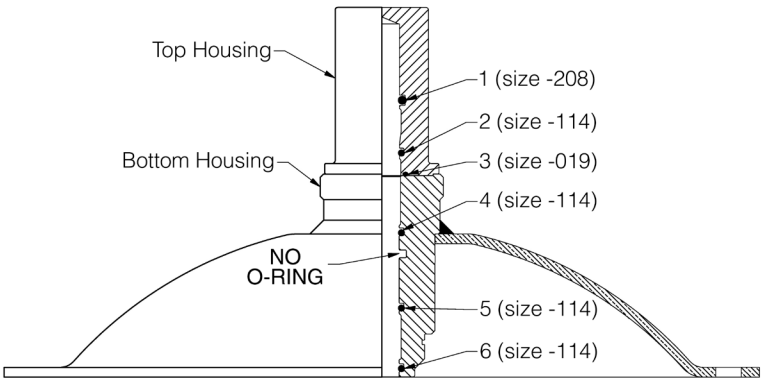
7. Automatic Inlet Stabilizer models are equipped with a backup plate attached to the non-wetted housing to minimize damage to the diaphragm if the dampener loses charge. The backup plate is held in place by a retaining ring. It is not necessary to remove the backup plate during disassembly, except when necessary to clean any oil residue or remove debris from the non-wetted housing. To remove the backup plate, remove the retaining ring using snap ring pliers and lift the backup plate off the housing.



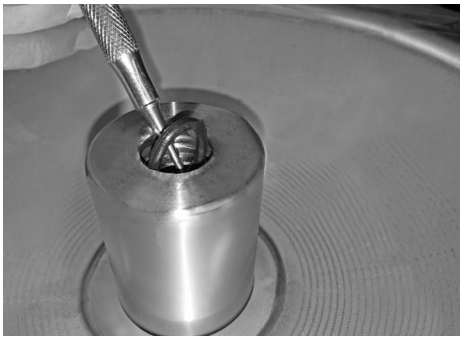
O-Ring Replacement

1. There are seven grooves in the automatic valve with O-ring seals installed in grooves 1 through 6 as shown Figure 2. Care must be taken not to install an O-ring seal in the groove shown as “NO O-RING” in Figure 2. O-rings in the automatic valve should be replaced with each diaphragm replacement. New O-rings are included in diaphragm replacement kits.
2. Using a pin wrench tool, remove the captive nut from automatic valve by turning the nut counterclockwise. Clean sealant from the captive nut threads. Lift up on the automatic valve top housing to remove it from the bottom valve housing. Secure the dampener non-wetted housing into a vise with soft jaws with the inside (interior) of the dampener housing facing up.

Figure 2



3. There are three O-ring seals in the top automatic valve housing and three in the bottom housing (Figure 2). Using an O-ring pick, remove O-rings from the both the top and bottom valve housings and discard.



4. Apply a thin coat of lubricant (such as Molykote® 55 or equivalent) to new O-rings. In the automatic valve **top** housing, install new -208 O-ring in groove 1, new -114 O-ring in groove 2, and new -019 O-ring in groove 3 (Figure 2). In the automatic valve **bottom** housing, install new -114 O-rings in grooves 4, 5 and 6. The automatic valve will not operate if the O-rings are installed in the wrong grooves (Figure 2).

   Install O-Rings *with* O-Ring Installation Tool:

   △ It is highly recommended that the Automatic Inlet Stabilizer O-Ring Installation Tool Set be used to install O-rings in the automatic valve to ensure proper placement on reassembly. The set includes a tool for each of the automatic valve housings (top and bottom) that are engineered to properly install O-rings one at time in the correct position. Refer to *Replacement Kits and Tools* above.

   Automatic Valve Top Housing

   a. Using the Automatic Valve Top O-Ring Installation Tool, insert the O-ring tool slide into the body of the tool until O-ring grooves align. Position the larger -208 O-ring into the first groove on the tool. Use your finger to cover the top of slide to prevent the O-ring from slipping out of place and push the slide forward to properly position the O-ring on the tool.

   b. With the slide held in place, insert the tool into the valve top housing until the shoulder of the tool is flush with the top of the housing. Hold the tool in place and carefully remove the slide from the tool body. Remove the entire tool from the valve housing and confirm the O-ring is properly seated in groove 1.

   c. Reinsert the O-ring tool slide into the body of the tool until O-ring grooves align and repeat steps above using the second groove on the tool to install the -114 O-ring in groove 2 of the valve housing. Install the -019 O-ring in groove 3 on the face of the valve top housing by hand.

   Automatic Valve Bottom Housing

   a. Using the Automatic Valve Bottom O-Ring Installation Tool, insert the O-ring tool slide into the body of the tool until O-ring grooves align. Position one of the -114 O-rings into the first groove on the tool. Use your finger to cover the top of slide to prevent the O-ring from slipping out of place and push the slide forward to properly position the O-ring on the tool.

   b. With the slide held in place, insert the tool into the valve bottom housing until the shoulder of the tool is flush with the top of the housing. Hold the tool in place and carefully remove the slide from the tool body. Remove the entire tool from the valve housing and confirm the O-ring is properly seated in groove 6.

   c. Reinsert the O-ring tool slide into the body of the tool until O-ring grooves align and repeat steps above to install the remaining two -114 O-rings. Use the second groove on the tool to install the second O-ring in groove 5 of the valve housing, and the third groove to install the third O-ring in groove 4 of the valve housing.

Install O-Rings *without* O-Ring Installation Tool:

△ Installing O-rings using a pick, or any instrument other than the specifically designed O-Ring Installation Tool Set, is not recommended as it may result in improper placement and/or damage to O-rings. Take care not scratch or otherwise damage the interior of automatic valve housing when using a pick or other instrument to install O-rings.

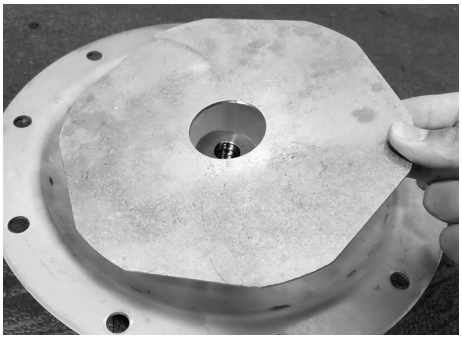
a. Use an O-ring pick to push the -208 O-ring into the automatic valve **top** housing past groove 2 and then pull the O-ring back into groove 1. Repeat the same process for installing the -114 O-ring in groove 2. Install the -019 O-ring in groove 3 on the face of the valve top housing by hand.

b. Use an O-ring pick to push the first -114 O-ring into the automatic valve **bottom** housing past groove 6 and then pull the O-ring back into groove 5. Repeat the same process for installing the remaining two -114 O-rings in grooves 4 and 6 of the automatic valve bottom housing. Care must be taken not to install an O-ring seal in the groove shown as “NO O-RING” in Figure 2.

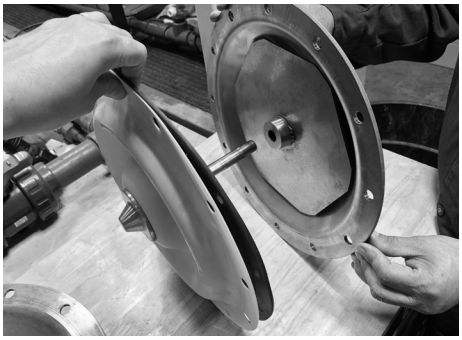
5. Inspect the automatic valve to ensure the correct O-rings are properly installed in grooves 1 through 6. If not, use an O-ring pick to carefully remove O-rings and discard. Repeat installation steps using new O-rings.
6. Apply a thin coat of lubricant (such as Molykote® 55 or equivalent) on the inside of the automatic valve top and bottom housings, ensuring O-rings are adequately coated.
7. In the automatic valve **top**, apply a thin coat of lubricant (such as Molykote® 55 or equivalent) to the bottom facing O-ring in groove 3 to keep the O-ring in place.

Reassembly

1. If removed on disassembly, reinstall the backup plate. Clean and dry the internal housing surface, taking particular care to ensure the flange area is completely clean and dry. Slide the backup plate over the automatic valve and onto the non-wetted dampener housing until it rests on the shoulder of the dampener housing. Reinstall the retaining ring using snap ring pliers.



2. There are no special tools required to install the new diaphragm and shaft assembly. Ensure the shaft is clean and free of any debris. Install the assembly by inserting the shaft straight into the automatic valve bottom housing. Place your hand on the anti-extrusion button at the bottom of the assembly and slowly push the shaft into the valve housing as far as possible. When the shaft is fully inserted, the backup diaphragm on the assembly will be touching the valve housing. Take necessary precautions not to scratch or damage the shaft, otherwise, the automatic valve may not function properly.



3. Reattach the automatic valve top housing to the valve bottom housing. Ensure housings are aligned with the locating pin attached to the automatic valve top housing and the bottom facing O-ring in groove 3 has not come out of place. Lubricate aluminum captive nut threads with zinc anti-seize compound (Loctite® LB 8044 or equivalent). For models with optional stainless steel automatic valve assembly, lubricate stainless steel captive nut threads with nickel anti-seize compound (Loctite® LB 771 or equivalent). Reinstall the captive nut on the automatic valve by turning the nut clockwise. Use a pin wrench tool to torque to **80 ft-lbs**.

4. Before proceeding with reassembly, test the automatic valve to ensure proper operation.

   △ **IMPORTANT!** When replacing dampener diaphragms the automatic valve must be tested for proper function before dampener is reassembled.

   a. With air **off**, attach a compressed air line through a regulator set to no more than 10 psi/0.6 bar to the air inlet port on the top of the dampener.

   b. Push the diaphragm anti-extrusion button up and into the automatic valve until it stops. Turn on the air supply. Compressed air should now be flowing into the air chamber. If there is no airflow, one or more O-rings are damaged or installed in the wrong groove.

   c. Slowly pull the diaphragm and shaft assembly out of the automatic valve until compressed air stops flowing. If air flow does not stop, one or more O-rings are damaged or installed in the wrong groove.

   d. Slowly pull the diaphragm and shaft assembly further out of the automatic valve until air flow starts flowing out of the exhaust port on the automatic valve top housing. If air flow does not start, one or more O-rings are damaged or installed in the wrong groove. Take care not to remove the diaphragm and shaft assembly completely from the automatic valve. If necessary, shut the air off and reinsert the assembly.

   e. Remove the compressed air line from the dampener.

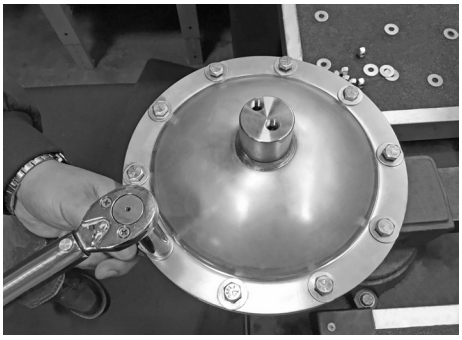
5. Place the dampener wetted housing in a vise with soft jaws. Clean and dry the internal service, taking particular care to ensure the flange area is completely clean and dry.

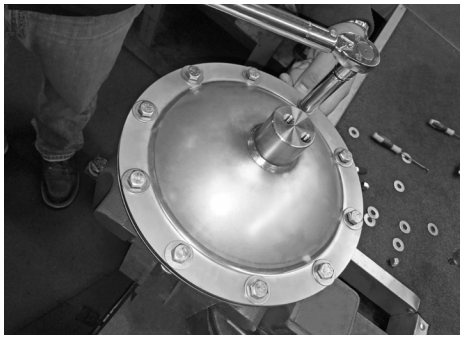
6. Place the entire top housing assembly over the wetted housing while ensuring the bolt holes in the diaphragms and housings are aligned. Ensure the diaphragms fit together snugly to minimize any air between them.

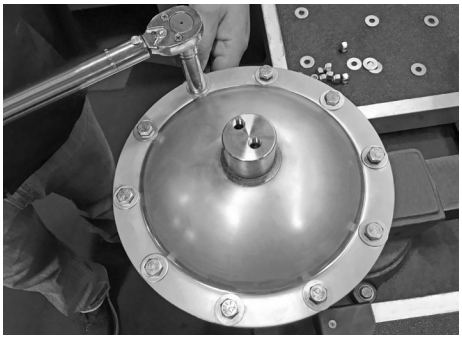
7. Insert bolts with flat washers through the top side. Attach flat washers and lock nuts on the bottom side for each bolt. Lubricate bolt threads with anti-seize compound or oil before installing nuts to prevent galling.

8. Torque bolts in a star pattern according to the following torque specifications:

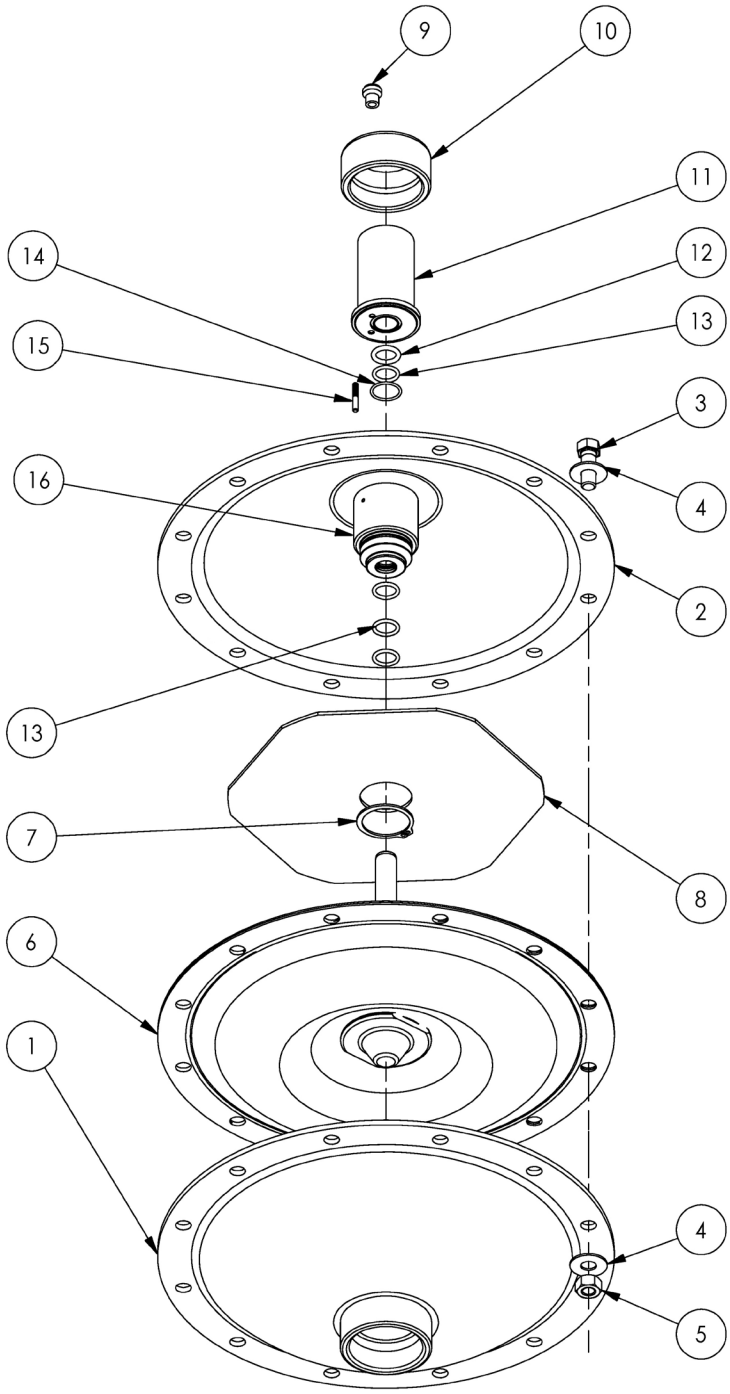
   - AOD-15 and AOD-20, 1.5” and 2” inlet models, (12) 7/16” bolts – **30 ft-lb / 40 Nm**







Exploded View



Item	Description
1	Dampener Wetted Housing
2	Dampener Non-wetted Housing
3	Bolt
4	Washer
5	Nut
6	Diaphragm and Shaft Assembly
7	Retaining Ring
8	Backup Plate
9	Muffler
10	Automatic Valve Captive Nut
11	Automatic Valve Top Housing
12	-208 O-Ring
13	-114 O-Rings
14	-019 O-Ring
15	Automatic Valve Locating Pin
16	Automatic Valve Bottom Housing

Manufacturer’s Limited Warranty & Return Policy

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

BLACOH™
INDUSTRIES

PROUDLY MANUFACTURED IN THE USA

Blacoh Headquarters − Offices Worldwide
601 Columbia Ave, Bldg D, Riverside, CA 92507 USA
951.342.3100
Sales@Blacoh.com
Blacoh.com

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