

# BLACOH™

INDUSTRIES



## Capabilities Guide 4.0

ISO 9001:2015 Certified

WBENC Woman Owned Business

ASME Section VIII Division 1

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## SINCE 1976

From common pumping system problems to complex issues involving fluid dynamics, Blacoh has been improving the performance, reliability, safety and productivity of pumping systems for more than 46 years.

## FULL SYSTEM SOLUTIONS

As the industry's leader and foremost expert in the design and manufacture of fluid control products, Blacoh has the most expansive offering in the marketplace, all proudly made in the USA and backed by our team of engineering and application experts.

## SURGE SOLUTIONS

Blacoh designs and develops customized solutions and transient pressure monitoring in large scale applications where more in-depth analysis and support are required to solve critical issues with water hammer and hydraulic surge.

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# Pulsation Dampeners

## **Pulsation and Surge Dampeners**

SENTRY™ Pulsation and Surge Dampeners with pressure ratings up to 15,000 psi minimize pulsation, eliminate vibration, prevent water hammer, and ensure a consistent and laminar fluid flow in systems using positive displacement pumps.

## **Inlet Stabilizer Dampeners**

SENTRY™ Inlet Stabilizer Dampeners stabilize pressure and fluid flow on the pump inlet side, preventing water hammer and eliminating acceleration head loss to extend the service life of pump diaphragms and inlet system components.

## **The Original AODDampener™**

These cost effective 316 stainless steel pulsation dampeners are designed and pre-sized for AODD pump applications and feature a unique fully automatic air control that reduces air consumption to save on energy costs.

## **Hybrid Valve™ Dampener Plus Back Pressure Valve**

Blacon's patented Hybrid Valve™ combines the steady flow control of a pulsation dampener with the regulation of a back pressure valve in a single unit that outperforms systems using a pulsation dampener in series with a back pressure valve.

# SENTINEL™ System Accessories

Back Pressure Valves and Pressure Relief Valves

Diaphragm Seals (Gauge Guards)

Calibration Columns

Injection Quills

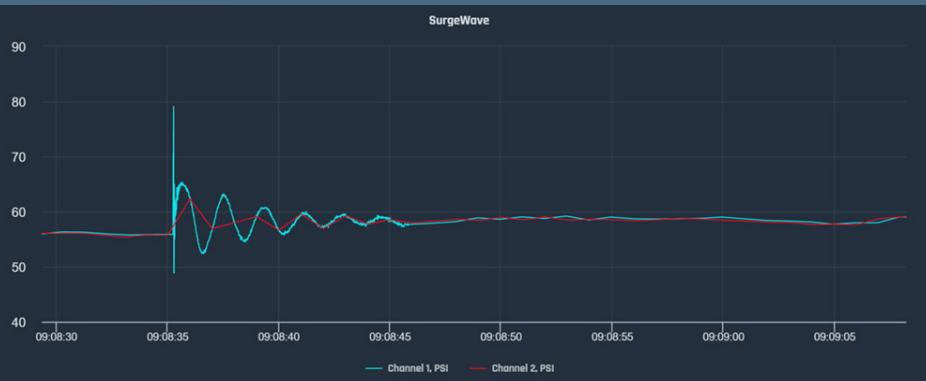
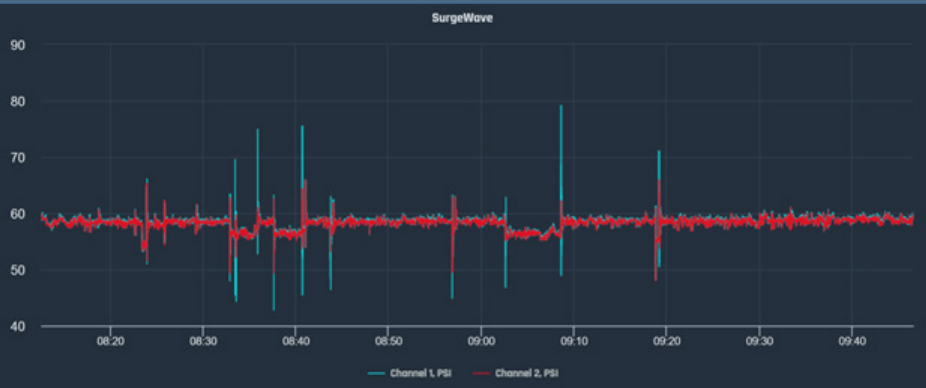
Automatic Degassing Valves

Normally Closed Shutoff Valves

# SPILLSTOP™ Leak Prevention and Spill Containment System

# SurgeWave™ Transient Pressure Monitoring

Blacoh's patented SurgeWave™ addresses the need for pipeline operators and maintenance engineers to detect and record transient pressure events occurring in water, wastewater, and petroleum/chemical pipelines. The system is unique in that it employs a system of dynamic pressure transducers and digital technology to monitor pipelines for indefinite periods of time. When a transient such as a pressure spike or water hammer event is detected, the system activates a high speed data recorder to record the event up to 100 times per second.



# Blacoh Surge Hydropneumatic Vessels

## Bladder

True to their name, bladder vessels utilize an internal membrane to separate the liquid from the gas charge. Most commonly, bladder vessels are fitted with controls to monitor the liquid level and are manually pre-charged.

## Compressor (Air/Water)

Similar to a bladder vessel, compressor vessels have a gas charge. However, there is no internal membrane separating the liquid from the charge. They are often referred to as compressor vessels because they require a compressor on standby to maintain the gas charge.

## Dipping Tube

Also referred to as hybrid vessels, dipping tube vessels are a low maintenance option ideal for low pressure applications. An internal tube recharges the vessel via atmospheric pressure.



# Online at Blacoh.com

## Pumping System Solutions

Blacoh offers engineered fluid control products manufactured to exacting standards, in a wide variety of sizes, materials and pressure ratings to suit virtually every application. View our products in a pumping system overview to see how we can help you.

## Tools and Resources

Quick and easy access to quotes, drawings and 3D models, and our exclusive e-Configurator for building Blacoh models.

## Media and Training

Be informed, inspired and entertained with videos on Blacoh TV. Increase your knowledge of fluid processing and pumping systems with complimentary PDH credits at Blacoh University.

## Industries and Applications

As a world renowned industrial fluid solutions provider, Blacoh serves many of the largest water, oil and gas, pharmaceutical, food, chemical, and petrochemical companies in the world.

Chemical Process

Paint and Coating

Water Transmission and Treatment

Biotech and Pharmaceutical

Gas, Oil and Petrochemical

Mining

Pulp, Paper and Textile

Wastewater

Consumer Goods

Food and Beverage

Power Generation

Aerospace

Fire Protection

# BLACOH™ UNIVERSITY

A complimentary and convenient learning tool dedicated to the discovery, development, communication and application of knowledge relating to fluid control processes across a variety of industries.

## Distributors

Enhance your knowledge and grow professionally with convenient online learning. Watch videos and complete online exams to earn certificates for completed courses.

## Engineers

Video lecture series by industry experts with online exams for engineering professionals. Engineers earn PDH credits and certificates.

## Maintenance

Brief video tutorials for plant professionals using Blacoh products. Watch and learn how to install, assemble and maintain products for ease of operation and optimum productivity.

**Damper Sizing Calculations**

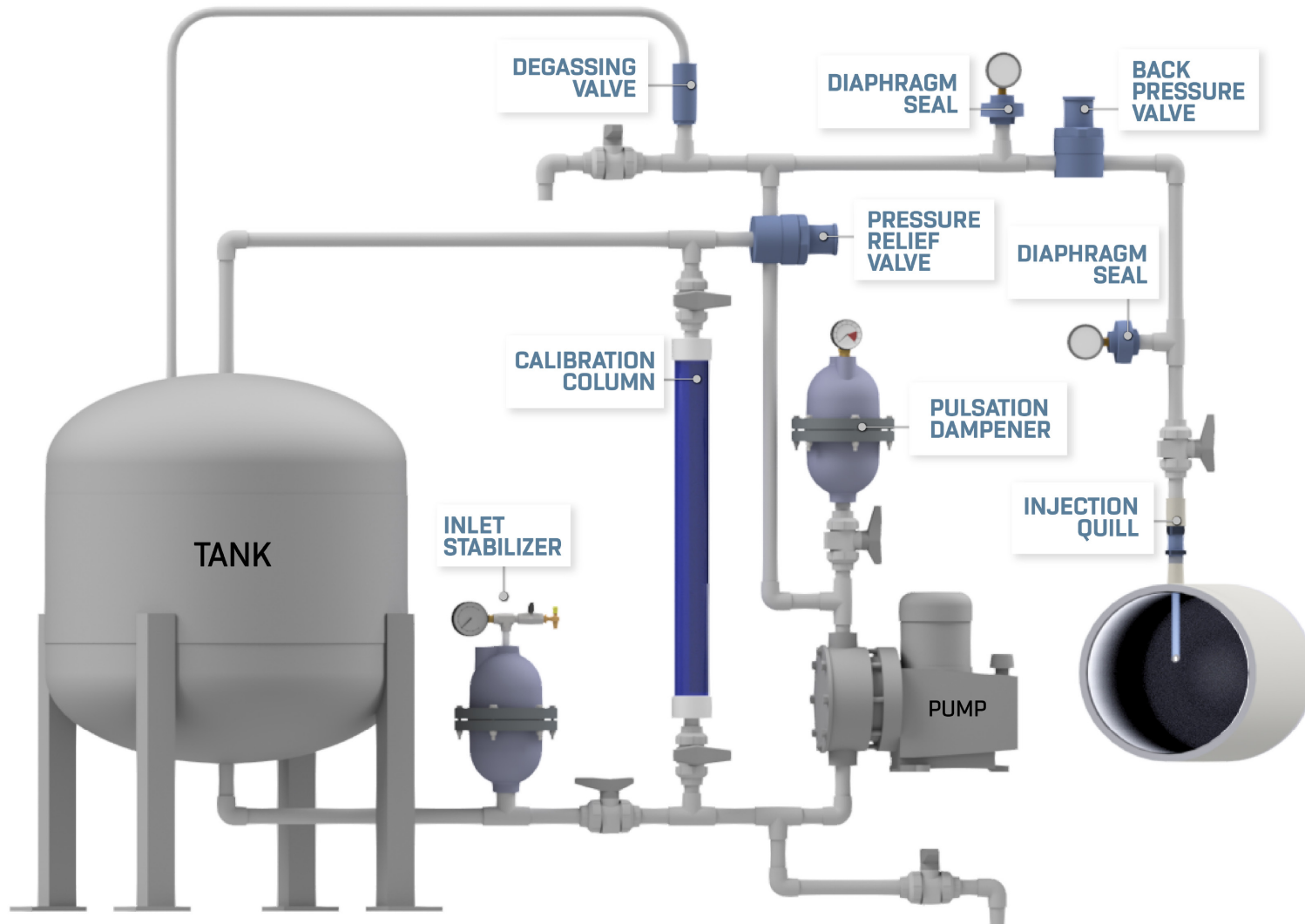
$w$  = ratio of specific heats  $C_p/C_v = 1.4$  for air and nitrogen at room temp.  
 $P_1$  = initial gas pressure (absolute not gauge) (pressure units must match)  
 $P_2$  = inlet 2 damper and line pressure (absolute not gauge)  
 $P_3$  = pressure gas [2] (20 to 40 degree approximations)  
 $V_2$  = Final damper volume (absolute units must match)  
 $V_3$  = Paktor volume  
 $P_3$  = measured maximum pressure (absolute not gauge)  
for temp factor

$$V_2 = \left( \frac{P_1 + P_3}{P_2} \right) \cdot \left( 1 - \left( \frac{P_2}{P_1} \right)^{\frac{1}{w}} \right)$$
$$V_3 = \frac{w \cdot w \cdot (P_2)^{\frac{1}{w}}}{w - \left( \frac{P_2}{P_1} \right)^{\frac{1}{w}}}$$
$$P_3 = \left( \frac{(P_1 + P_3)}{(V_2 + V_3)} - P_2 \cdot P_1 \right)^w + P_1$$

The image also shows a photograph of a man in a blue shirt and tie, a photograph of a damper assembly, and a graph showing pressure over time with multiple colored lines representing different data series.

# Blacoh Full System Solutions

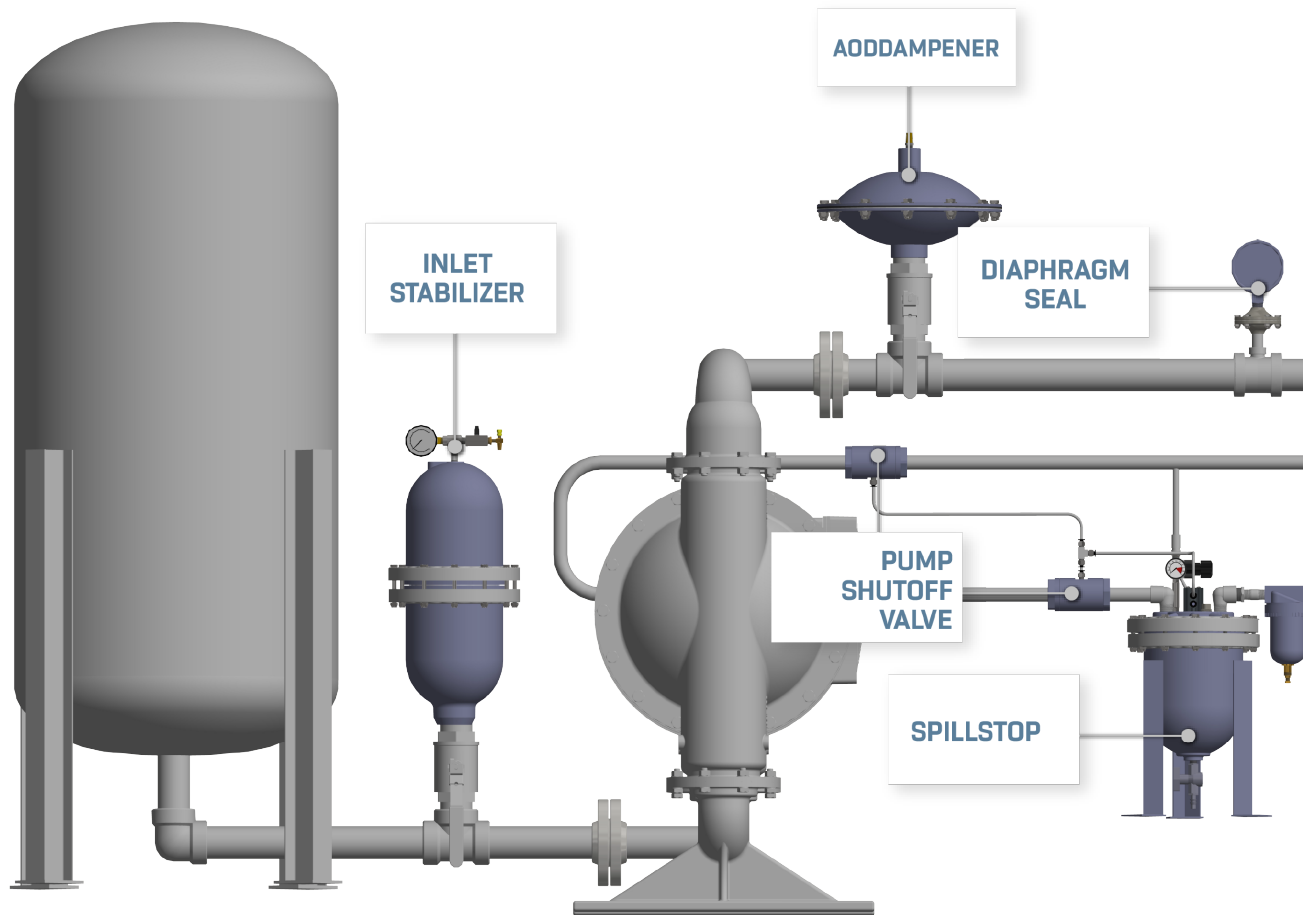
## Metering Pump System Overview



With the most expansive product offering in the marketplace and backed by our team of engineers and application experts, Blacoh offers full system solutions to improve fluid process system performance, reliability, safety and productivity.

# Blacoh Full System Solutions

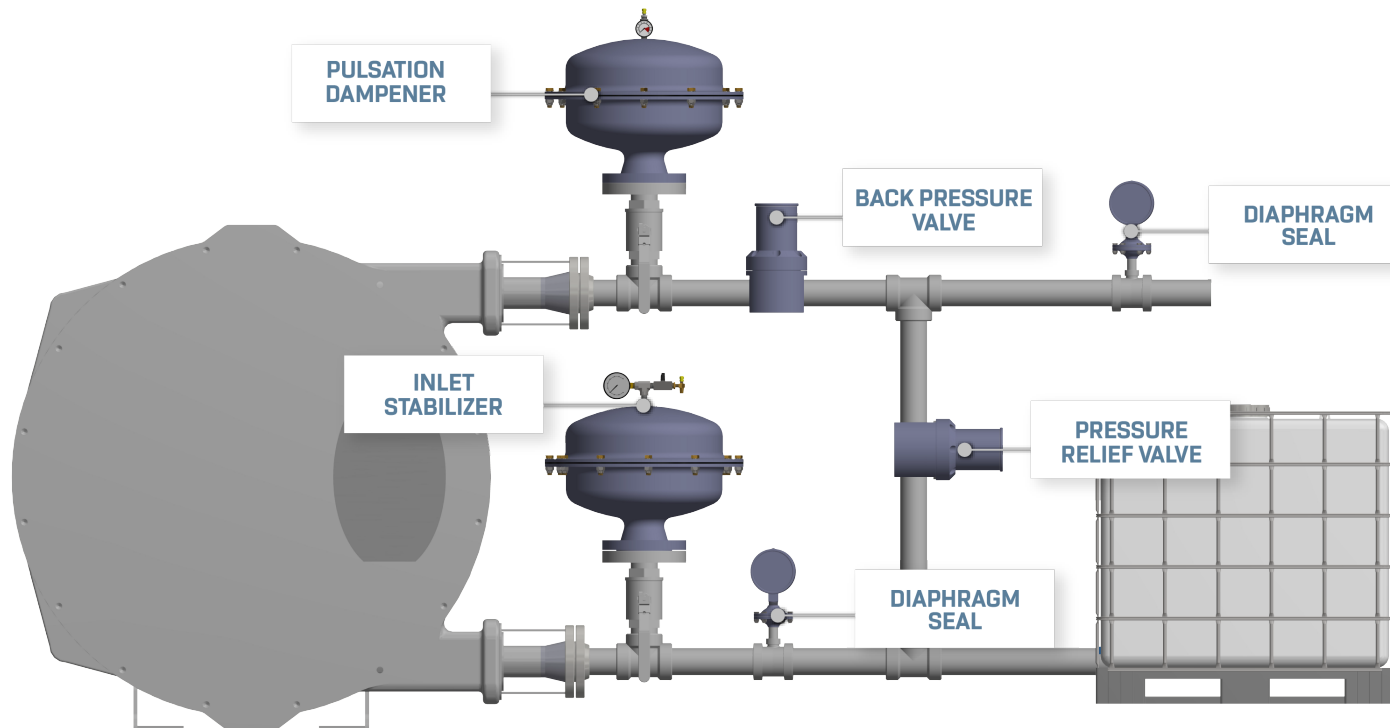
## AODD Pump System Overview



With the most expansive product offering in the marketplace and backed by our team of engineers and application experts, Blacoh offers full system solutions to improve fluid process system performance, reliability, safety and productivity.

# Blacoh Full System Solutions

## Peristaltic/Hose Pump System Overview



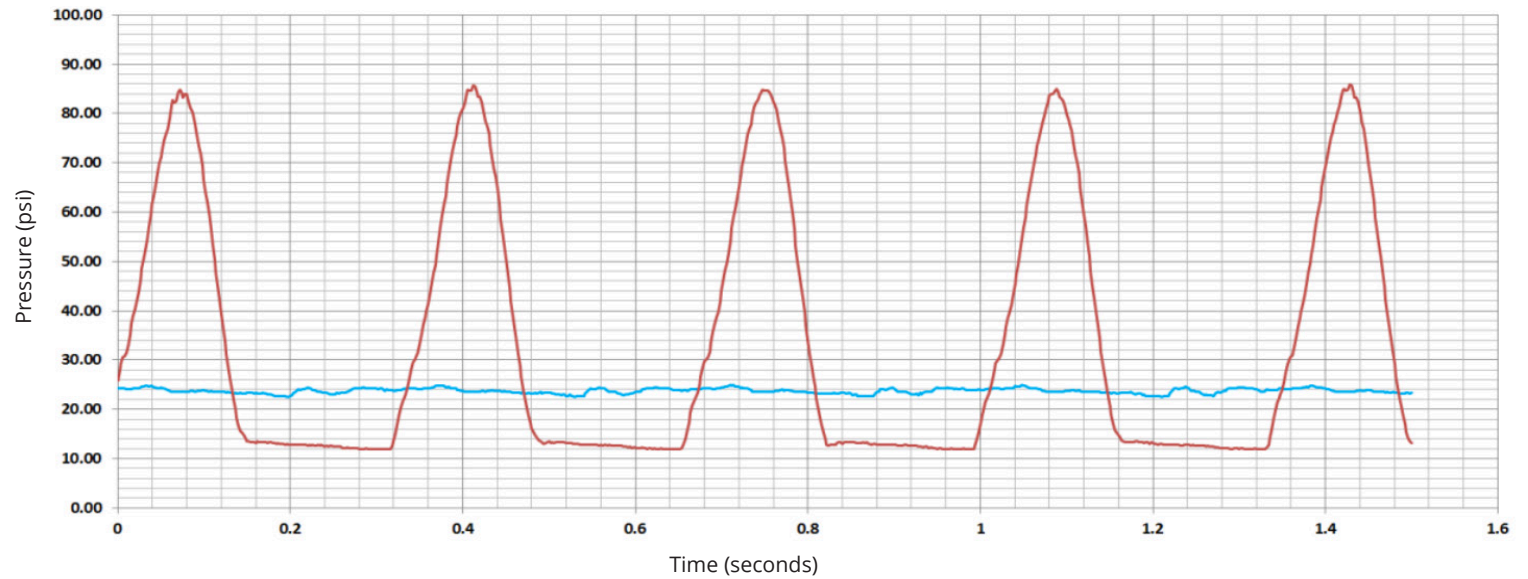
With the most expansive product offering in the marketplace and backed by our team of engineers and application experts, Blacoh offers full system solutions to improve fluid process system performance, reliability, safety and productivity.



# Performance Charts: SENTRY™ Dampener and AODDampener™ Metering and AODD Pumps

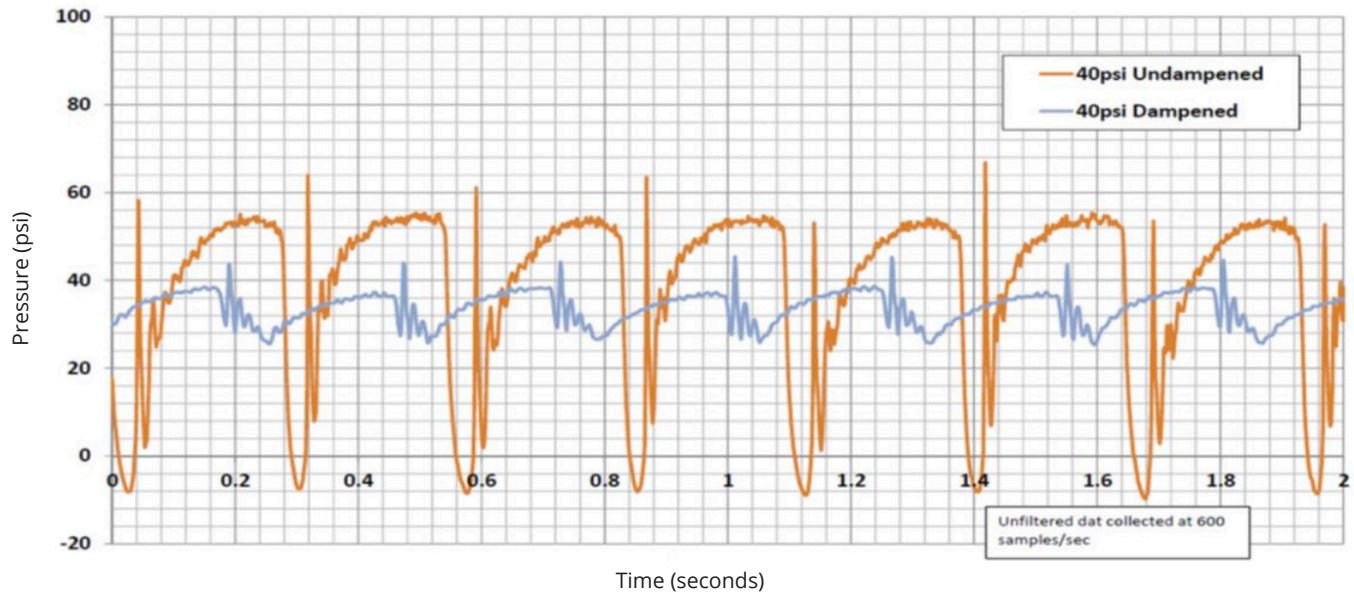
1" Metering Pump  
with SENTRY II Dampener

- Without Dampener
- With Dampener



1" AODD Pump  
with 1" AODDampener

- Without Dampener
- With AODDampener

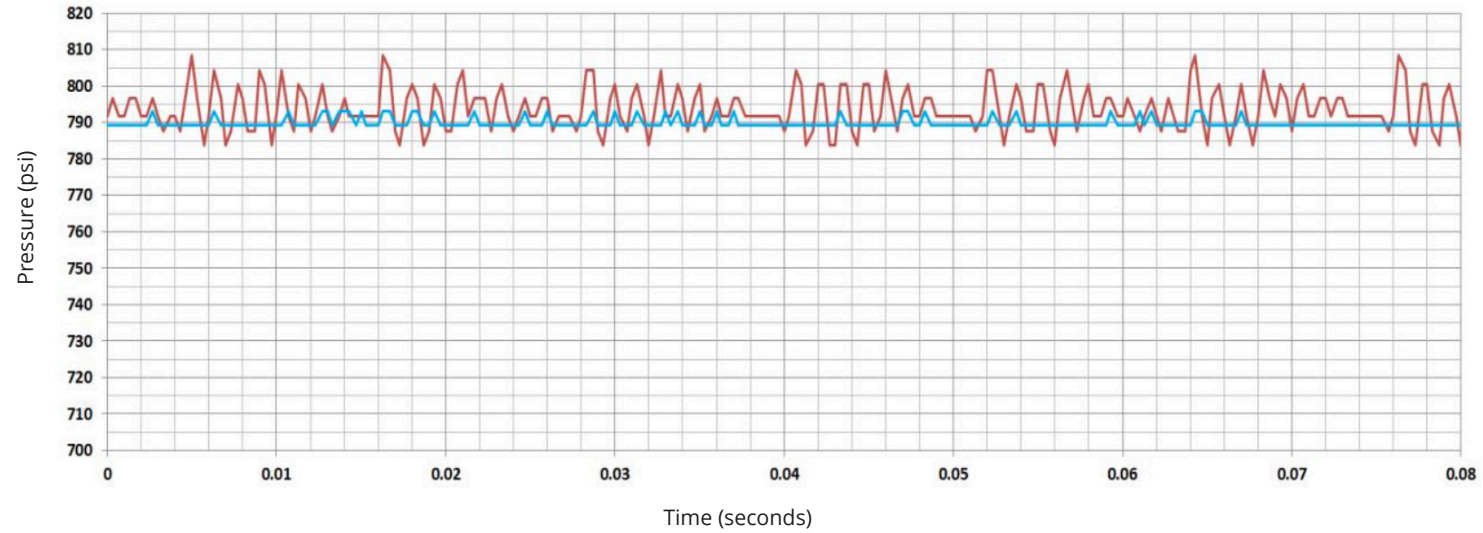


# Performance Charts: SENTRY™ XP High Pressure Dampeners

## Triplex Pump

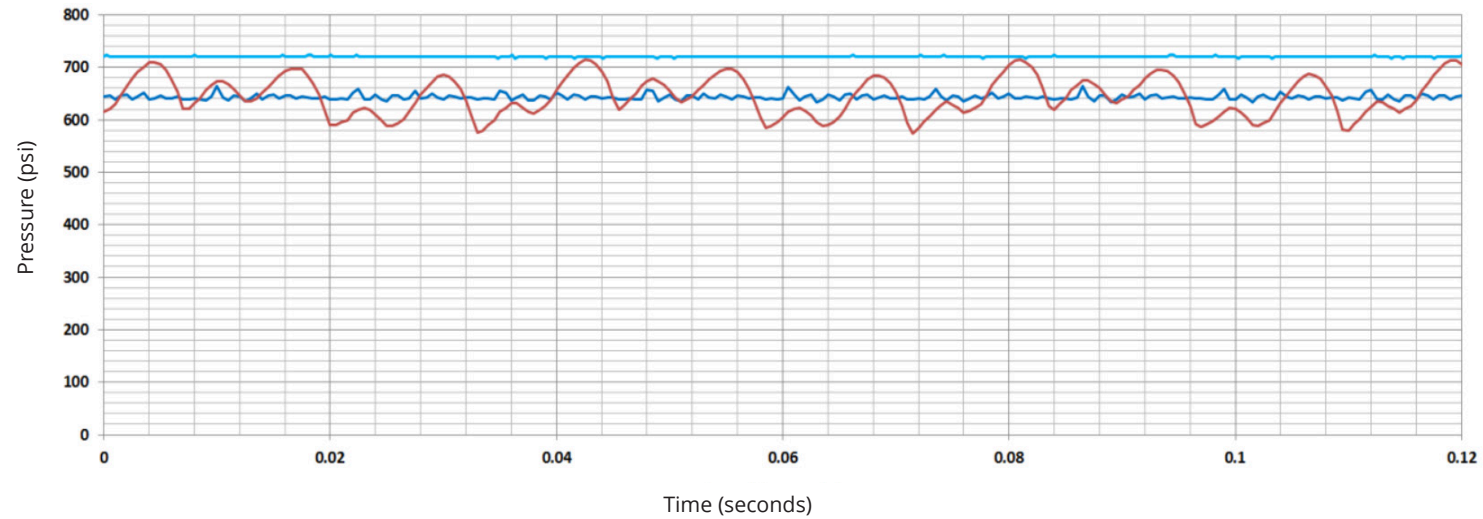
Triplex Pump  
with SENTRY XPH Dampener

- Without Dampener (1715 rpm, 757 pulses/sec)
- With XPH Flow Through Dampener ( $\pm 4$  PSI)

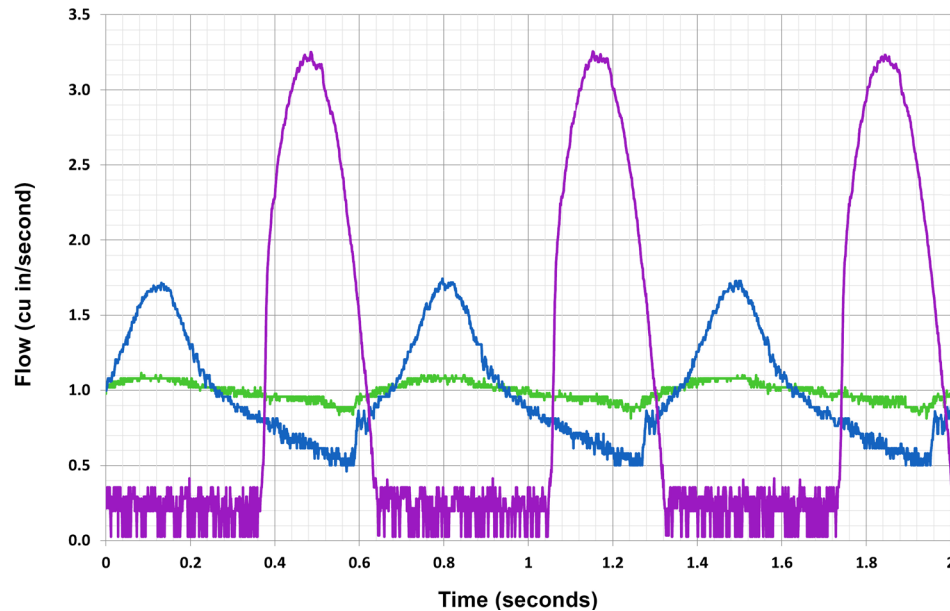


Triplex Pump  
with SENTRY XP & XPH Dampener

- Without Dampener
- With XP Dampener
- With XPH Flow Through Dampener



# Performance Chart: Hybrid Valve™ Dampener Plus Back Pressure Valve



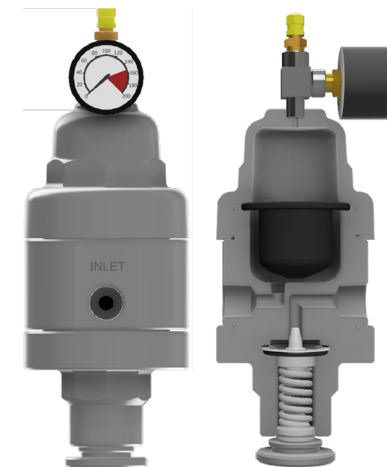
## The Performance is in the Numbers.

Engineered with proven principles for optimum performance, maximum efficiency and simplicity, the Blacoh Hybrid Valve is the all-in-one smart choice in any pumping system. Tests performed using a back pressure valve alone showed no improvement in fluid flow (purple line in graph). Fluid flow improves significantly with a pulsation dampener in series (shown in blue) but, the dampener is not operating at peak efficiency. Nothing matches the outstanding results when the back pressure valve and dampener are replaced with the single construction Hybrid Valve (shown in green).

## A Simplified Solution.

Using a back pressure valve alone does nothing to improve fluid flow. Adding a pulsation dampener will improve flow, but standard back pressure valves are not designed to work with dampeners. As pressure varies in the dampener, the back pressure valve negates the dampening effect by opening and closing before the dampener is able to capture a full pulse. Combining the functionality of a pulsation dampener and back pressure valve into a single piece of equipment optimizes the performance of both.

The quick opening and closing of a standard back pressure valves also creates too much flow (gain), resulting in inefficiency and chatter. Blacoh's Hybrid Valve with patented flow stabilization technology ensures maximum dampening, applies continuous back pressure, and acts as an anti-siphon valve to create a smooth laminar flow with no valve chatter.



# SENTRY III Pulsation Dampeners 4 in3 (0.06L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
CPVC Polypropylene PTFE PVC PVDF	Buna-N EPDM Hypalon Neoprene PTFE Santoprene	0.375" (10mm) 0.50" (15mm)	FNPT BSP ANSI Flange DN Flange Socket Weld Tri-Clamp Union	150 psi (10.3 bar) PVDF 200 psi (13.7 bar)	Adjustable Chargeable	1-4 lbs (0.4-1.8 kg)	ATEX NSF CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
Alloy 20 Hastelloy C Stainless Steel Stainless Steel 30 RA Polish	Silicone Food Grade Viton	0.375" (10mm) 0.50" (15mm) 0.75" (20mm) Tri-Clamp		1000 psi (68.9 bar)	SS Chargeable (V Model)	4-7 lbs (1.8-3.1 kg)	

Plastic Series	Wetted / Nonwetted
04PP	Polypropylene
04PVC	PVC
04X	CPVC
04K	PVDF
1050	PTFE

Metal Series	Wetted / Nonwetted
1120	Stainless Steel
1170	Alloy 20
1175	Alloy 20 / Stainless Steel
1185	Hastelloy C / Stainless Steel
7325	Stainless Steel (Tri-Clamp)
8325	Stainless Steel 30 RA Polish (Tri-Clamp)

Accessories
Charging Kits Spare Bladder Kits Hardware Kits Diaphragm Seals Custom Gauges Pressure Relief Valves Back Pressure Valves Spill Containment for AODD Calibration Columns Injection Quills Degassing Valves

# SENTRY III Pulsation Dampeners 10 in3 (0.16L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
Acetal CPVC Polypropylene PTFE PVC PVDF	Buna-N EPDM Hypalon Neoprene PTFE Santoprene	0.375" (10mm) 0.50" (15mm)	FNPT BSP ANSI Flange DN Flange Socket Weld Tri-Clamp Union	150 psi (10.3 bar) PVDF 200 psi (13.7 bar)	Adjustable Chargeable	1-5 lbs (0.4-2.2 kg)	ATEX NSF CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
Alloy 20 Hastelloy C Stainless Steel Stainless Steel 30 RA Polish	Silicone Food Grade Viton	0.375" (10mm) 0.50" (15mm) 0.75" (20mm) Tri-Clamp		1000 psi (68.9 bar)	SS Chargeable (V Model) Inlet Stabilizer (J Model)	4-8 lbs (1.8-3.6 kg)	


Plastic Series	Wetted / Nonwetted
10D	Acetal
10PP	Polypropylene
10PVC	PVC
10X	CPVC
10K	PVDF
T1000	PTFE

Metal Series	Wetted / Nonwetted
1020	Stainless Steel
1070	Alloy 20
1075	Alloy 20 / Stainless Steel
1085	Hastelloy C / Stainless Steel
7320	Stainless Steel (Tri-Clamp)
8320	Stainless Steel 30 RA Polish (Tri-Clamp)

Accessories
Charging Kits
Spare Bladder Kits
Hardware Kits
Diaphragm Seals
Custom Gauges
Pressure Relief Valves
Back Pressure Valves
Spill Containment for AODD
Calibration Columns
Injection Quills
Degassing Valves

# SENTRY Tef-Guard Dampeners 12 in3 (0.2L)



Housing Wetted / Nonwetted	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Certifications & Testing
Stainless Steel Hastelloy C / SS	PTFE	0.50" (15mm)	FNPT BSP ANSI Flange	 2,000 psi (137.8 bar)	Chargeable	ATEX CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified

Series	Wetted / Nonwetted	Accessories
TG12SS TG12HS	Stainless Steel Hastelloy C / Stainless Steel	Charging Kits Spare Bladder Kits Hardware Kits Diaphragm Seals Custom Gauges Pressure Relief Valves Back Pressure Valves Spill Containment for AODD Calibration Columns Injection Quills Degassing Valves

# SENTRY II Pulsation Dampeners 36 in3 (0.59L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
Acetal CPVC Polypropylene PTFE PVC PVDF	Aflas Buna-N Buna-N Food Grade EPDM Hypalon Neoprene PTFE Santoprene Silicone Food Grade Viton	0.50" (15mm) 0.75" (20mm) 1" (25mm)	FNPT BSP ANSI Flange DN Flange Socket Weld Tri-Clamp Union	150 psi (10.3 bar)	Adjustable Automatic Chargeable	7-15 lbs (3.1-6.8 kg)	ATEX NSF CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
Alloy 20 Carbon Steel Hastelloy C Stainless Steel Stainless Steel 30 RA Polish		0.75" (20mm) 1" (25mm) 1.5" (40mm) Tri-Clamp		1000 psi (68.9 bar)	SS Chargeable (V Model)	13-19 lbs (5.8-8.6 kg)	

Plastic Series	Wetted / Nonwetted
601	PTFE
1301	Polypropylene
1305	Polypropylene (0.50")
1311	PVC
1315	PVC (0.50")
1341	CPVC / PVC
1345	CPVC / PVC (0.50")
1401	PVDF / Polypropylene
1801	Acetal / Polypropylene

Metal Series	Wetted / Nonwetted
3120	Stainless Steel
3124	Stainless Steel / Carbon Steel
3140	Carbon Steel
3175	Alloy 20 / Stainless Steel
3185	Hastelloy C / Stainless Steel
7225	Stainless Steel (Tri-Clamp)
8225	Stainless Steel 30 RA Polish (Tri-Clamp)

Accessories
Charging Kits
Spare Bladder Kits
Hardware Kits
Diaphragm Seals
Custom Gauges
Pressure Relief Valves
Back Pressure Valves
Spill Containment for AODD
Calibration Columns
Injection Quills
Degassing Valves

# SENTRY II Pulsation Dampeners 85 in3 (1.4L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
Acetal Conductive Polypropylene CPVC Polypropylene PTFE PVC PVDF	Aflas Buna-N Buna-N Food Grade EPDM Hypalon Neoprene PTFE Santoprene Silicone Food Grade Viton	0.50" (15mm) 0.75" (20mm) 1" (25mm)	FNPT BSP ANSI Flange DN Flange Socket Weld Tri-Clamp Union	150 psi (10.3 bar) PVDF 250 psi (17.2 bar)	Adjustable Automatic Chargeable SS Chargeable (V Model) Inlet Stabilizer (J Model)	7-16 lbs (3.1-7.2 kg)	ATEX NSF CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
Alloy 20 Carbon Steel Hastelloy C Stainless Steel Stainless Steel 30 RA Polish	Santoprene Silicone Food Grade Viton	0.75" (20mm) 1" (25mm) 1.5" (40mm) Tri-Clamp		1000 psi (68.9 bar)		13-19 lbs (5.8-8.6 kg)	

Plastic Series	Wetted / Nonwetted
301	Polypropylene
305	Polypropylene (0.50")
311	PVC
315	PVC (0.50")
321	Conductive Polypropylene
331	CPVC
335	CPVC (0.50")
401	PVDF / Polypropylene
421	PVDF
651	PTFE
801	Acetal / Polypropylene


Metal Series	Wetted / Nonwetted
3020	Stainless Steel
3024	Stainless Steel / Carbon Steel
3040	Carbon Steel
3075	Alloy 20 / Stainless Steel
3085	Hastelloy C / Stainless Steel
7220	Stainless Steel (Tri-Clamp)
8220	Stainless Steel 30 RA Polish (Tri-Clamp)

Accessories
Charging Kits
Spare Bladder Kits
Hardware Kits
Diaphragm Seals
Custom Gauges
Pressure Relief Valves
Back Pressure Valves
Spill Containment for AODD
Calibration Columns
Injection Quills
Degassing Valves



# SENTRY I Pulsation Dampeners 175 in3 (2.87L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
Polypropylene PTFE PVC PVDF	Aflas Buna-N EPDM Hypalon Neoprene PTFE Santoprene	1.5" (40mm) 2" (50mm)	 FNPT BSP ANSI Flange DN Flange Socket Weld Tri-Clamp Union	150 psi (10.3 bar)	Adjustable Automatic Chargeable SS Chargeable (V Model)	15-26 lbs (6.8-11.7 kg)	ATEX NSF CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
Alloy 20 Hastelloy C Stainless Steel Stainless Steel 30 RA Polish	Silicone Food Grade Viton	2" (50mm) 2.5" (65mm) Tri-Clamp		1000 psi (68.9 bar)		30-45 lbs (13.6-20.4 kg)	

Plastic Series	Wetted / Nonwetted
501	PTFE
901	Polypropylene / Noryl
905	Polypropylene / Noryl (1.5")
911	PVC / Noryl
915	PVC / Noryl (1.5")
1201	PVDF / Noryl

Metal Series	Wetted / Nonwetted
2175	Alloy 20 / Stainless Steel
2185	Hastelloy C / Stainless Steel
2500	Stainless Steel / Noryl
2520	Stainless Steel
7125	Stainless Steel (Tri-Clamp)
8125	Stainless Steel 30 RA Polish (Tri-Clamp)

Accessories
Charging Kits Spare Bladder Kits Hardware Kits Diaphragm Seals Custom Gauges Pressure Relief Valves Back Pressure Valves Spill Containment for AODD Calibration Columns Injection Quills Degassing Valves

# SENTRY I Pulsation Dampeners 370 in3 (6.06L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
Polypropylene PTFE PVC PVDF	Aflas Buna-N EPDM Hypalon Neoprene PTFE Santoprene Silicone Food Grade Viton	1.5" (40mm) 2" (50mm)	FNPT BSP ANSI Flange DN Flange Socket Weld Tri-Clamp Union	150 psi (10.3 bar) PVDF 200 psi (13.7 bar)	Adjustable Automatic Chargeable SS Chargeable (V Model) Inlet Stabilizer (J Model)	18-27 lbs (8.1-12.2 kg)	ATEX NSF CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
Alloy 20 Hastelloy C Stainless Steel Stainless Steel 30 RA Polish	SS Metal Bellows (Series 2420)	2" (50mm) 2.5" (65mm) Tri-Clamp		1000 psi (68.9 bar) 16 Bolt SS 1250 psi (86.1 bar)		32-52 lbs (14.5-23.5 kg)	

Plastic Series	Wetted / Nonwetted
101	Polypropylene
105	Polypropylene (1.5")
111	PVC
115	PVC (1.5")
201	PVDF / Polypropylene
221	PVDF
551	PTFE

Metal Series	Wetted / Nonwetted
2075	Alloy 20 / Stainless Steel
2085	Hastelloy C / Stainless Steel
2400	Stainless Steel / Polypropylene
2420	Stainless Steel
7120	Stainless Steel (Tri-Clamp)
8121	Stainless Steel 30 RA Polish (Tri-Clamp)

Accessories
Charging Kits
Spare Bladder Kits
Hardware Kits
Diaphragm Seals
Custom Gauges
Pressure Relief Valves
Back Pressure Valves
Spill Containment for AODD
Calibration Columns
Injection Quills
Degassing Valves

# SENTRY IV Pulsation Dampeners 1155 in3 (18.93L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
Polypropylene	Buna-N EPDM EPDM Food Grade Hypalon Neoprene PTFE Silicone Food Grade Viton	3" (80mm)	FNPT ANSI Flange DN Flange Tri-Clamp	150 psi (10.3 bar)	Adjustable Automatic Chargeable  SS Chargeable (V Model)  Inlet Stabilizer (J Model)	35 lbs (15.8 kg)	ATEX CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
Aluminum Epoxy Coated Aluminum Alloy 20 Carbon Steel Epoxy Coated Carbon Steel Hastelloy C Stainless Steel Stainless Steel 30 RA Polish		3" (80mm) 4" (100mm) 6" (150mm)		275 psi (18.9 bar)		30-79 lbs (13.6-35.8 kg)	

Plastic Series	Wetted / Nonwetted	Metal Series	Wetted / Nonwetted	Accessories
P4000	Polypropylene	4000	Aluminum	Charging Kits Spare Bladder Kits Hardware Kits Diaphragm Seals Custom Gauges Pressure Relief Valves Back Pressure Valves Spill Containment for AODD Calibration Columns Injection Quills Degassing Valves
		4020	Stainless Steel	
		4030	Carbon Steel / Aluminum	
		4040	Carbon Steel	
		4050	Stainless Steel / Aluminum	
		4060	Stainless Steel / Carbon Steel	
		4075	Alloy 20 / Stainless Steel	
		4080	Hastelloy C	
		4085	Hastelloy C / Stainless Steel	
		7420	Stainless Steel (Tri-Clamp)	
		8420	Stainless Steel 30 RA Polish (Tri-Clamp)	
Epoxy Coated	Wetted / Nonwetted			
4010	Epoxy Coated Aluminum / Aluminum			
4015	Epoxy Coated Aluminum			
4045	Epoxy Coated Carbon Steel			
4046	Epoxy Coated Carbon Steel / Aluminum			
4065	Stainless Steel / Epoxy Coated Carbon Steel			

# SENTRY V Pulsation Dampeners 2310 in3 (37.85L)



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Est Ship Weight	Certifications & Testing
Carbon Steel Epoxy Coated Carbon Steel Stainless Steel	Buna-N EPDM EPDM Food Grade Hypalon Neoprene Silicone Food Grade Viton	3" (80mm) 4" (100mm) 6" (150mm)	FNPT ANSI Flange DN Flange	275 psi (18.9 bar)	Adjustable Automatic Chargeable  SS Chargeable (V Model)  Inlet Stabilizer (J Model)	146 lbs (66.2 kg)	ATEX CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified

Metal Series	Wetted / Nonwetted
5020	Stainless Steel
5040	Carbon Steel
5045	Epoxy Coated Carbon Steel

Accessories
Charging Kits Spare Bladder Kits Hardware Kits Diaphragm Seals Custom Gauges Pressure Relief Valves Back Pressure Valves Spill Containment for AODD Calibration Columns Injection Quills Degassing Valves

# SENTRY XP High Pressure Dampeners 8 to 122 in3 (0.13 to 2L)

Capacity	Housing Wetted / Nonwetted	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Certifications & Testing
8 cu in (0.13L) 12 cu in (0.2L) 24 cu in (0.39L)	Stainless Steel Hastelloy C / SS (PTFE) Alloy 20 / SS (PTFE) Duplex Stainless Steel	Buna-N EPDM PTFE Viton	0.50" (15mm)	FNPT BSP ANSI Flange FNPT Flow Through Autoclave	2,000 to 15,000 psi (137.8 to 1034.2 bar)	Chargeable Optional Gauge Adapter	ATEX CRN PED ARRA 3.1 Cert Material Cert Cert of Origin Hydrostatic Dye Penetrant Radiography (X-Ray) PMI Bolt Tensile Customer Specified
36 cu in (0.59L) 60 cu in (0.98L) 91 cu in (0.1.5L) 122 cu in (2L)			0.75" (20mm) 1" (25mm) 1.5" (40mm) 2" (50mm)	FNPT BSP ANSI Flange FNPT Flow Through	2,600 to 8,000 psi (179.2 to 551.5 bar)		



## High Frequency Solved.

SENTRY XPH flow through models are engineered to remove high frequency pulses greater than 15 Hz, as well as low frequency pulses. This unique flow through design allows the XPH model to effectively remove both hydraulic pulses and acoustic pulses for exceptionally smooth pressure and flow. With a properly sized XPH dampener, residual pulsation of less than 1% can be achieved.

# The Original AODDampener™

Multiple Applications. Multiple Fluids. One AODDampener.

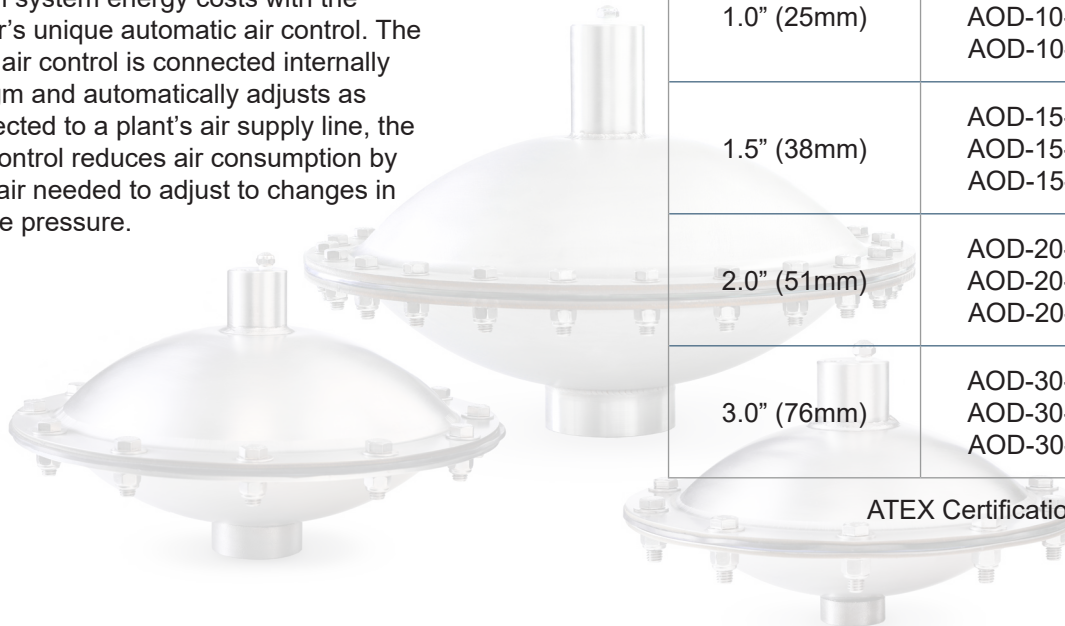
These cost effective 316 stainless steel pulsation dampeners are designed and pre-sized for AODD pump applications and feature a unique fully automatic air control that reduces air consumption to save on energy costs.



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Air Control Type	Certifications & Testing
316 Stainless Steel	PTFE	1" (25mm) 1.5" (40mm) 2" (50mm) 3" (80mm)	FNPT BSP ANSI Flange	150 psi (10.3 bar)	Fully Automatic	ATEX Material Cert Cert of Origin Hydrostatic Test

## Reduced Air Consumption.

Save on overall system energy costs with the AODDampener's unique automatic air control. The fully automatic air control is connected internally to the diaphragm and automatically adjusts as needed. Connected to a plant's air supply line, the automatic air control reduces air consumption by using only the air needed to adjust to changes in pump discharge pressure.



Pump Size	Model	Inlet	Spare Kit
1.0" (25mm)	AOD-10-NPT AOD-10-BSP AOD-10-FLG	1" NPT 1" BSP 1" 150# Flange	AOD-10-100
1.5" (38mm)	AOD-15-NPT AOD-15-BSP AOD-15-FLG	1.5" NPT 1.5" BSP 1.5" 150# Flange	AOD-15-100
2.0" (51mm)	AOD-20-NPT AOD-20-BSP AOD-20-FLG	2" NPT 2" BSP 2" 150# Flange	AOD-20-100
3.0" (76mm)	AOD-30-NPT AOD-30-BSP AOD-30-FLG	3" NPT 3" BSP 3" 150# Flange	AOD-30-100

ATEX Certification add -AT to end of model number.

# Hybrid Valve™ Dampener Plus Back Pressure Valve

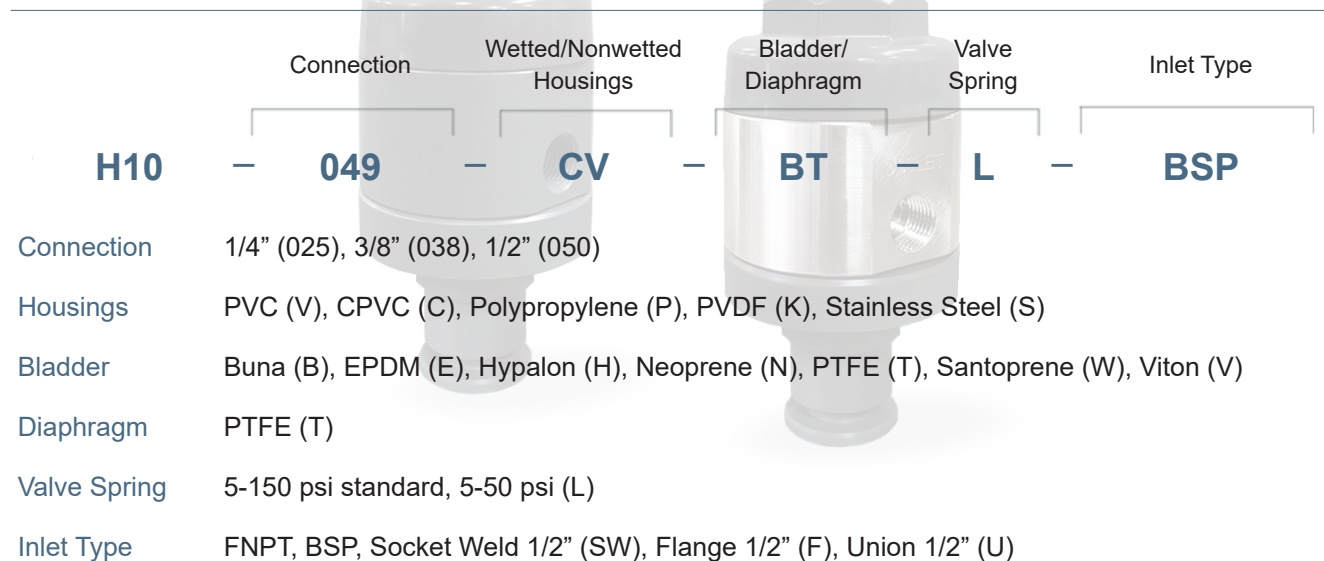
The All-in-One Smart Choice.

Blacoh's patented Hybrid Valve™ combines the steady flow control of a pulsation dampener with the regulation of a back pressure valve in a single unit that outperforms systems using a pulsation dampener in series with a back pressure valve. This simple and efficient design has a smaller footprint that is ideal for today's more compact skid designs, fewer connections for fewer leak points, and flow stabilization technology to eliminate valve chatter. US Patent 10,353,409.



Wetted/Nonwetted Housings	Dampener Bladder	Valve Diaphragm	Connection	Inlet Type	Max Pressure	Air Control Type
CPVC Polypropylene PVC PVDF Stainless Steel (Wetted)	Buna-N EPDM Hypalon Neoprene PTFE Santoprene Viton	PTFE	0.25" (8mm) 0.375" (10mm) 0.5" (15mm)	FNPT BSP Socket Weld ANSI Flange Union	150 psi (10.3 bar)	Automatic

## MODELS



# SENTINEL™ Back Pressure Valves and Pressure Relief Valves

Improve Flow, Extend Service Life, and Eliminate Valve Chatter.

Redesigned from the inside out, Blacoh's patented Back Pressure Valves and Pressure Relief Valves feature unique flow stabilization technology to deliver improved flow, extend valve service life, and eliminate dreaded valve chatter. US Patent 11,194,352.

Back Pressure Valves				Pressure Relief Valves		
Flow at 150 PSI pressure drop across valve:						
Size	Part #	Pulsating US GPH	Continuous US GPM	Part #	Pulsating US GPH	Continuous US GPM
1/4"	BP-025-_-T	240	12	PR-025-_-*	560	28
3/8"	BP-038-_-T	260	13	PR-038-_-*	620	31
1/2"	BP-049-_-T	288	14	PR-049-_-*	660	33
1/2"	BP-050-_-T	600	30	PR-050-_-*	1240	62
3/4"	BP-075-_-T	640	32	PR-075-_-*	1260	63
1"	BP-100-_-T	710	36	PR-100-_-*	1300	65
1 1/2"	BP-150-_-T	1500	75	PR-150-_-*	3000	150
2"	BP-200-_-T	2000	100	PR-200-_-*	4300	215

**\_Body Material** PVC (PVC), Polypropylene (PP), CPVC (CPVC), PVDF (PVDF), 316L Stainless Steel (SS), additional materials may be available on request

**\* Diaphragm** PTFE (T)  
EPDM (E), Viton (V) option on Pressure Relief Valves

**Inlet Type** NPT, Socket Weld (SW), BSP (BSP), Flange (F), Union (U)  
150# flange, 300# flange standard on 50-250 psi high pressure valves

**Configuration** Back Pressure Valves 2 Port 180° (BP), 2 Port 90° (BP90)  
Pressure Relief Valves 3 Port (PR), 2 Port 180° (PR2P), 2 Port 90° (PR90)

**Spring Pressure** 5-150 psi  
5-50 psi (L), 5-250 psi valves up to 1" (M), 50-350 psi metal valves (H)

**Valve Top** PVC, 316L Stainless Steel standard on 50-250 psi high pressure valves  
CPVC (CPVC), 316L Stainless Steel (SS) available on request



# SENTINEL™ Diaphragm Seals (Gauge Guards)

Isolate and Protect Process System Instrumentation.

Without proper protection, process fluids regularly contaminate and damage inline instrumentation. SENTINEL Diaphragm Seals, also referred to as gauge guards or gauge isolators, employ a chemically resistant diaphragm to isolate and protect system instrumentation from corrosive process fluids, freezing and slurries.



Housing Material	Bladder Material	Inlet Size	Inlet Type	Max Pressure	Est Ship Weight	Certifications & Testing
CPVC Polypropylene PVC PVDF	EPDM PTFE Viton	0.25" (8mm) 0.5" (15mm) 0.75" (20mm)	FNPT BSP ANSI Flange Socket Weld Tri-Clamp Union	200 psi (13.7 bar) PVDF 250 psi (17.2 bar)	1-4 lbs (0.4-1.8 kg)	ATEX NSF ARRA 3.1 Cert Material Cert Cert of Origin Customer Specified
Alloy 20 Stainless Steel				1000 psi (68.9 bar)		

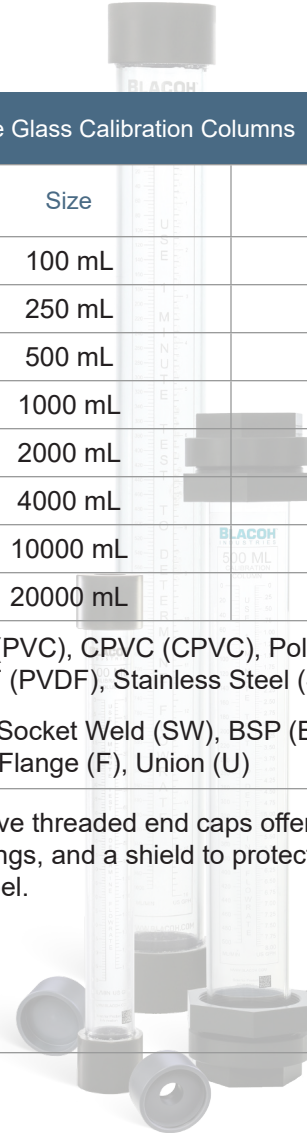
Series	Wetted / Nonwetted
RC RP RPVC GK GA GS	CPVC Polypropylene PVC PVDF Alloy 20 Stainless Steel

# SENTINEL™ Calibration Columns

Accurately Calibrate Metering Pump Flow Rates.

SENTINEL Calibration Columns, also referred to as calibration cylinders, provide a simple and accurate method for measuring and calibrating pump flowrates in chemical dosing applications. Choose from PVC columns with PVC end caps or, borosilicate glass columns with a variety of end cap options for more corrosive applications. Each column features a laminated calibration scale in mL/min and US GPH for accurate measurement in a one minute test.

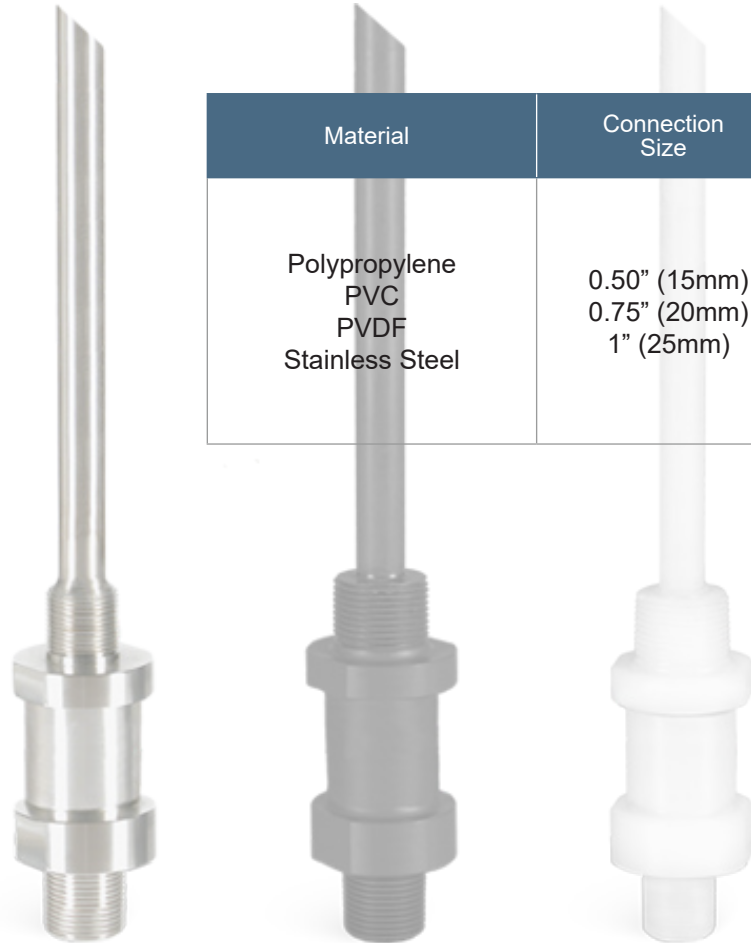
PVC Calibration Columns			Borosilicate Glass Calibration Columns		
Model #	Size	Connection	Model #	Size	Connection
CP-100_	100 mL	1/2" NPT	CG-_100	100 mL	1/2" NPT
CP-250_	250 mL	1/2" NPT	CG-_250	250 mL	1/2" NPT
CP-500_	500 mL	3/4" NPT	CG-_500	500 mL	3/4" NPT
CP-1000_	1000 mL	3/4" NPT	CG-_1000	1000 mL	3/4" NPT
CP-2000_	2000 mL	1" NPT	CG-_2000	2000 mL	1" NPT
CP-4000_	4000 mL	1" NPT	CG-_4000	4000 mL	1" NPT
CP-10K_	10000 mL	2" NPT	CG-_10K	10000 mL	2" NPT
CP-20K_	20000 mL	2" NPT	CG-_20K	20000 mL	2" NPT
<b>Cap Options_</b>	Sealed (S), Loose (L), Removable (R)		<b>Material_</b>	PVC (PVC), CPVC (CPVC), Polypropylene (PP), PVDF (PVDF), Stainless Steel (SS)	
<b>Connections</b>	NPT, Socket Weld (SW), BSP (BSP), 150# Flange (F), Union (U)		<b>Connections</b>	NPT, Socket Weld (SW), BSP (BSP), 150# Flange (F), Union (U)	
<p>PVC calibration columns feature three top end cap options. Sealed and removable cap models have a permanent vent connection and are used in applications where there is positive suction head. The sealed cap is glued to the cylinder. The removable cap is sealed with an O-ring so that the cap can be easily removed for cleaning. Loose cap models are used in applications where there is no positive suction head. The loose cap is a dust cover only and the cylinder is manually filled from the top.</p>			<p>Glass calibration columns have threaded end caps offered in a variety of materials, two sealing O-rings, and a shield to protect the inner glass tube and calibration scale label.</p>		



# SENTINEL™ Injection Quills

Deliver Chemicals into Process Pipelines Safely and Efficiently.

SENTINEL Injection Quills are designed to safely and efficiently disperse chemicals into process pipelines. Chemicals are injected directly and evenly into the center of the process flow away from the pipe wall and where flow velocity is highest. This direct injection into the center of the flow avoids chemical contact with pipe walls and ensures more even mixing with the process fluid. The integral spring-loaded check disk prevents backflow of pressurized process fluid into the chemical feed when the pump is off or the chemical feed is disconnected.



Material	Connection Size	Connection Type	O-Rings	Quill Length	Max Pressure
Polypropylene PVC PVDF Stainless Steel	0.50" (15mm) 0.75" (20mm) 1" (25mm)	FNPT	EPDM Viton	4" Standard Custom quill lengths on request.	150 psi (10.3 bar)

## MODELS

Material/  
Connection  
Size

O-Ring

Custom  
Quill  
Length

**IQ - SS075 - E -**

Choose from EPDM (E) or Viton (V) O-rings.

For custom quills lengths add length in inches at the end of model number.

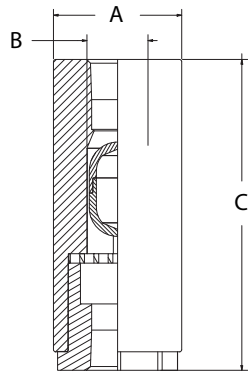
# SENTINEL™ Automatic Degassing Valves

Automatically Vent Gasses and Vapors in Pumping Systems.

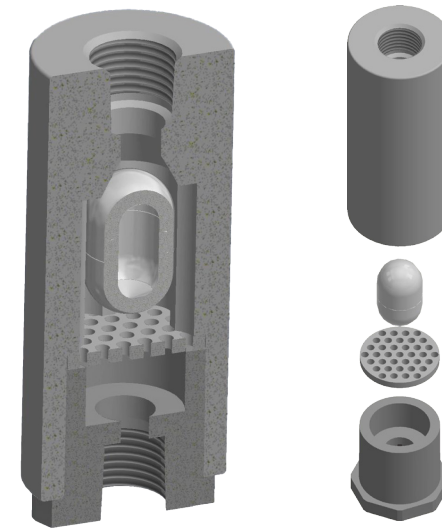
Certain chemicals commonly used in metering and dosing applications are prone to outgassing. Other chemicals produce hazardous vapors that can escape the system at pump startup. A metering pump that has been off for a period of time can lose its prime and won't pump fluid due to gas in the pump and discharge line. In all of these situations, gasses and vapors in a pumping system must be properly vented.

Materials	Connection Size	Connection Type	Max Pressure
CPVC PVC PVDF	0.50" (15mm) 0.75" (20mm) 1" (25mm)	FNPT BSP Socket Weld Union	150 psi (10.3 bar)

## MODELS



Valve Dimensions		
A	B	C
Ø1.70" (Ø43.2mm)	0.81" (20.5mm)	4.12" (104.6mm)

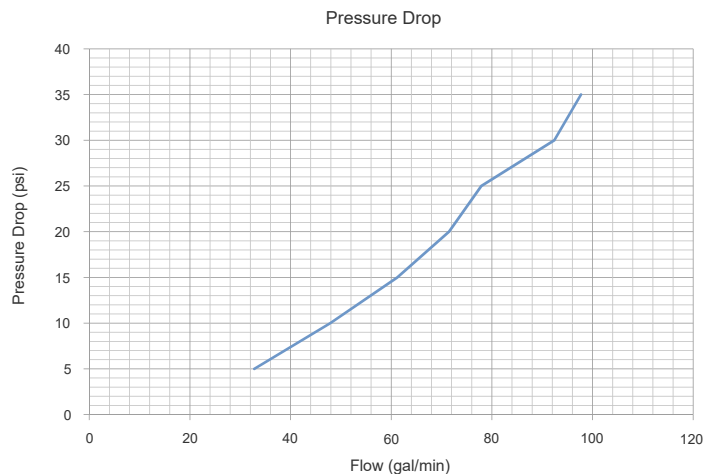
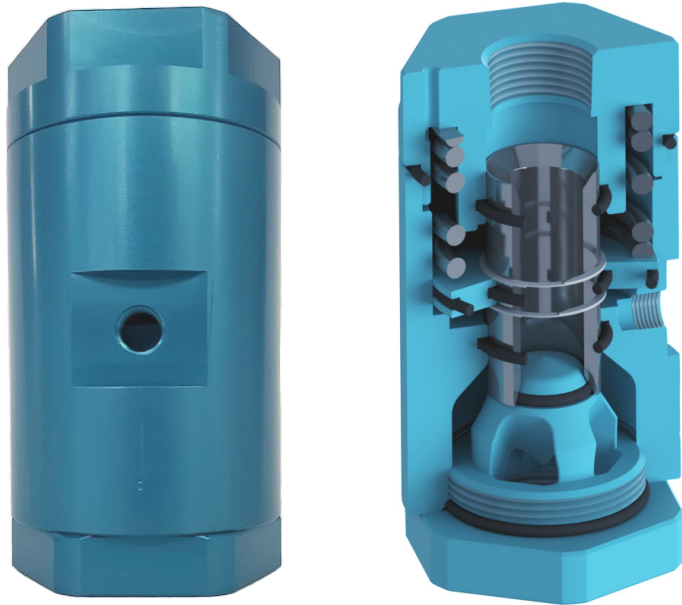


All components used, including the internal float, are constructed of a single material for maximum chemical and thermal compatibility.

Unique internal mesh secures the float in place and filters out larger particles.

# SENTINEL™ Normally Closed Shutoff Valve

SENTINEL Normally Closed Shutoff Valves offer an excellent high flow coefficient and a low pressure drop that equates to overall faster and smoother fluid flow. Valves are pneumatically controlled and use an internal piston to allow or prevent air or fluid flow. The normally closed valve opens when air pressure is applied to the pneumatic control port.



## Features

- Fully Pneumatic – No Batteries or Electronics
- Anodized to Prevent Rust and Corrosion
- Enclosed Internal Components
- Compact Design
- Quick Installation and Low Maintenance

## Materials

- 6061-T6 Anodized Aluminum
- 300 Series Stainless Steel Center Shaft
- Buna O-Rings

## Specifications

- 3/4" NPT Process Connections
- 1/8" NPT Control Port Connection
- 150 psi Maximum Allowable Working Pressure
- Control Pressure > 40 psi up to 100 psi

## CV Factors

Size 3/4" NPT : Coefficient of Flow 14.7

# SPILLSTOP™ Leak Prevention and Spill Containment System

Prevent Product Loss and Hazardous Spills.

The fully pneumatic SPILLSTOP system safely captures leaked product and automatically shuts down failed pumps to avoid costly product loss and prevent hazardous spills. Optional warning alarm and backup pump switchover further minimize system downtime for maximum productivity.



Wetted Housing	Nonwetted Lid	Internal Float	Options	Est Ship Weight	Certifications & Testing
Polypropylene PVC PVDF Stainless Steel Hastelloy C	Noryl PVDF Stainless Steel TFE Coated SS	Polypropylene Stainless Steel TFE Coated SS	Pneumatic Whistle Pneumatic-to-Electric Switch Additional Shutoff Valves	25-55 lbs (11.3 to 25.0 kg)	ATEX ARRA 3.1 Cert Material Cert Cert of Origin





## When Pump Diaphragms Fail.

SPILLSTOP is a fully pneumatic device that attaches directly to the exhaust of an AODD pump. When the pump's diaphragm fails, process fluid that would have been expelled out through the pump's exhaust is captured in the SPILLSTOP's housing receptacle. The contained fluid raises the internal float to automatically shut down the failed pump.

SPILLSTOP can also be equipped with an optional warning alarm whistle, pneumatic-to-electric switch to power warning lights or connect to a SCADA panel, and additional pump shutoff valves for multiple pumps, high suction tank applications, and/or backup pump startup.

Series	Wetted / Nonwetted / Float
SPS-10	Polypropylene / Noryl / Polypropylene
SPS-11	PVC / Noryl / Polypropylene
SPS-20	Stainless Steel / Noryl / Stainless Steel
SPS-21	Stainless Steel
SPS-30	PVDF / Noryl / Stainless Steel
SPS-31	PVDF / PVDF / Stainless Steel
SPS-33	PVDF / PVDF / TFE Coated SS
SPS-39	PVDF / Noryl / Polypropylene
SPS-81	Hastelloy C / TFE Coated SS
SPS-82	Hastelloy C / Stainless Steel

# SENTRY™ Dampener Air Controls

Type	Description	Max Pressure	Installation
<p><b>Adjustable</b></p> 	<p>The adjustable air control assembly is mounted on a single port with a self-relieving regulator to set dampener pressure and includes a gauge and one-way brass check valve. A compressed air line must be permanently attached to the regulator.</p> <p>The regulator allows for an easy, convenient method to adjust dampener pressure with system pressure changes. Simply charge the dampener to 80% of system operating pressure and then fine tune for maximum performance.</p>	<p>150 psi (10.3 bar)</p>	<p>Locate dampener within 10 pipe diameters of pump discharge. Connect to a constant source of air. <b>DO NOT USE OXYGEN.</b></p> <p>Charge dampener to 80% of operating pressure. Adjust dampener psi to minimize pulse level.</p>
<p><b>Automatic</b></p> 	<p>The automatic air control has a gauge mounted on a side port with an automatic valve assembly on the center port, with a one-way brass check valve connected to an internal poppet valve assembly.</p> <p>The poppet valve located in the nonwetted portion of the dampener allows for an increase in compressed air pressure to balance an increase in system pressure. As system pressure increases the bladder is pushed further up into the dampener until it makes contact with the internal valve which then opens, allowing compressed air to enter the dampener.</p> <p>The dampener automatically self-adjusts as system pressure increases or decreases, and resets to be ready to start dampening again when the system restarts.</p>	<p>150 psi (10.3 bar)</p>	<p>Locate dampener within 10 pipe diameters of pump discharge. Connect to a constant source of air. <b>DO NOT USE OXYGEN.</b></p> <p>Dampener gauge will read system pressure. When the pump is started the dampener gauge will read system pressure. No further adjustments are needed.</p>
<p><b>Chargeable</b></p> 	<p>The standard chargeable model has a gauge and Schrader-type charging valve on separate ports to pressurize and hold dampener pressure. The <i>V Model</i> assembly has a machined stainless steel charging valve and seal for rugged leak-proof operation in corrosive environments.</p> <p>No permanent source of compressed gas is required. With the gas fill valve the dampener can be manually bled or charged to the required pressure setting.</p>	<p>15,000 psi (1034.2 bar)</p>	<p>Locate dampener within ten pipe diameters of pump discharge or valve, depending on use. Charge dampener to recommended percentage of system operating pressure with compressed air or clean dry Nitrogen. <b>DO NOT USE OXYGEN.</b></p>
<p><b>Inlet Stabilizer</b></p> 	<p>The inlet stabilizer <i>J Model</i> air control allows for pressure or vacuum settings and is adjustable for suction lift or positive inlet conditions.</p> <p>The air control consists of a compound pressure gauge, a pressure/vacuum tight ball valve, and a venturi valve. Compressed air passes through the venturi valve at high speed creating a low pressure area that evacuates air from the stabilizer creating an internal vacuum. Conversely, when the air flow through the venturi valve is diverted into the stabilizer a pressure charge results.</p>	<p>30 inHg 30 psi (2 bar)</p>	<p>Locate inlet stabilizer within ten pipe diameters of pump inlet. Use a compressed air line and air chuck to pressurize or create a vacuum. <b>DO NOT USE OXYGEN.</b></p> <p>For suction lift, vacuum charge to 5-7 inHg. For flooded suction charge to 50% of static inlet pump pressure.</p>

# Reference: Testing and Certifications

Listed below are just a few of the tests and certifications available from Blacoh and is provided for reference only. Contact Blacoh for more information.

Testing & Engineering	Parts	Item Number
STANDARD UNIT TEST CERTIFICATION	ALL UNITS	DOC-TEST CERT
HYDROSTATIC TEST & CERTIFICATE	ALL UNITS	DOC-HYDRO
XRAY/RADIOGRAPHY & DYE PENETRANT TEST	METAL FLANGE WELDS	DOC-XRAYDYE
DYE PENETRANT TEST	METAL FLANGE WELDS	DOC-DYE
XRAY/RADIOGRAPHY	METAL FLANGE WELDS	DOC-XRAY
POSITIVE MATERIAL IDENTIFICATION (PMI)	METAL HOUSINGS	DOC-PMI
BOLT TENSILE TEST REPORT	BOLTS	DOC-BOLT
CUSTOMER OR THIRD PARTY INSPECTION	CONSULT FACTORY	
ASME CALCULATIONS	CONSULT FACTORY	

Material Certification	Parts	Item Number
3.1 (EN10204) CERTIFICATION	WETTED HOUSING (METAL)	DOC-CERT 3.1-W
3.1 (EN10204) CERTIFICATION	WETTED/NONWETTED HOUSING (METAL)	DOC-CERT 3.1-WN
3.1 CERTIFICATION (EN 10204) , WETTED/NONWETTED W/HYDRO TEST	WETTED/NONWETTED/HYDRO TEST	DOC-CERT 3.1-H
MTR - CHEMICALS & HEAT NUMBER, WETTED HOUSING	WETTED HOUSING (METAL)	DOC-MTR-MTL-W
MTR - CHEMICALS & HEAT NUMBER, WETTED/NONWETTED HOUSING	WETTED/NONWETTED HOUSING (METAL)	DOC-MTR-MTL-WN
MATERIAL ID & CERTIFICATE OF CONFORMANCE (NO MTR)	SENTRY UNIT	DOC-MC-SENTRY
MATERIAL ID & CERTIFICATE OF CONFORMANCE (NO MTR)	SPILLSTOP UNIT	DOC-MC-SS
MATERIAL ID & CERTIFICATE OF CONFORMANCE (NO MTR)	DIAPHRAGM SEAL (GAUGE GUARD)	DOC-MC-GG
MATERIAL ID & CERTIFICATE OF CONFORMANCE (NO MTR)	BLADDER	DOC-MCB
MATERIAL ID & CERTIFICATE OF CONFORMANCE (NO MTR)	WETTED/NONWETTED HOUSING	DOC-MCWN
MATERIAL ID & CERTIFICATE OF CONFORMANCE (NO MTR)	WETTED HOUSING, BLADDER	DOC-MCWB
MATERIAL ID & CERTIFICATE OF CONFORMANCE (NO MTR)	WETTED/NONWETTED HOUSING, BLADDER	DOC-MCWNB
CE, CATEGORY 1, GROUP 1	VARIOUS	DOC-CE1

Order Documentation	Parts	Item Number
CERTIFICATION OF ORIGIN	ALL	DOC-COO
CERTIFICATE OF CONFORMANCE TO PO	ANY ORDER	DOC-COC
EC ATEX DECLARATION OF CONFORMITY	ALL ATEX UNITS	DOC-EC
EC PED DECLARATION OF CONFORMITY	ALL PED UNITS	DOC-EC-PED





ISO 9001:2015 Certified

WBENC Certified Woman Owned Business

ASME Section VIII Division 1

CRN Canadian Registration

NSF/ANSI/CAN 61 & NSF/ANSI 372

ATEX Certification European Union

PED Classification

BIS Export Compliant

ARRA Buy American Compliant

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