Hydra-Cell®

Industrial Pumps

Pulsation Dampeners

WANNER ENGINEERING INC

Pulsation Dampeners

Positive Displacement (PD) pumps create pulsation and hydraulic shock due to the reciprocating nature of their stroking action, potentially damaging the entire pumping system. Hydra-Cell Pulsation Dampeners remove virtually all hydraulic shock, and thus enhancing the all-around performance and reliability of fluid handling equipment in industrial, chemical transfer, and precision metering applications.

Benefits

- Produces a near steady fluid flow up to 99% pulsation and vibration free
- Protects pipes, valves, fittings, meters and in-line instrumentation from destructive pulsations, vibrations, cavitation, and water hammer
- Creates steady and continuous flow when dosing, blending or proportioning additives
- Insures accuracy, longevity, and repeatability of in-line meters
- Enables uniform application of material in spraying and coating systems
- Reduces product agitation, foaming, splashing and degradation of product

Features:

- Sizes available for all Hydra-Cell positive displacement pumps
- Simple, reliable design and quick installation
- Easy in-line maintenance
- Pressure ranges up to 4000 PSI (276 BAR) available from stock
- Temperature ranges from -60°F to 350°F (-51°C to 176°C) available from stock
- Custom models available
- Bodies available in a full range of chemical resistant materials
- Bladders available to match all Hydra-Cell diaphragm materials

Markets Served

- Chemical Process
- Pulp, Paper & Textile
- Gas, Oil, & Petrochemical
- Biotech/Pharmaceutical
- Paint & Coating
- Food & Beverage
- Consumer Products
- Water Treatment

Applications

- Transferring
- Filtering
- Printing
- Dosing
- Filling
- Metering
- Spraying
- Coating
- Injecting
- Mixing

Bladder Options

Bladder Material	Application Recommendations
Neoprene	Good abrasion resistance and flex; use with moderate chemicals
Buna-N	Good flex life; use with petroleum, solvents and oil-based fluids
EPDM	Good for extreme cold; good chemical resistance with ketones, caustics
Viton	Good for hot & aggressive fluids; use with aromatics, solvents, acids & oils
PTFE	Bellows design; excellent flex life; use with highly aggressive fluids

Air Control Options

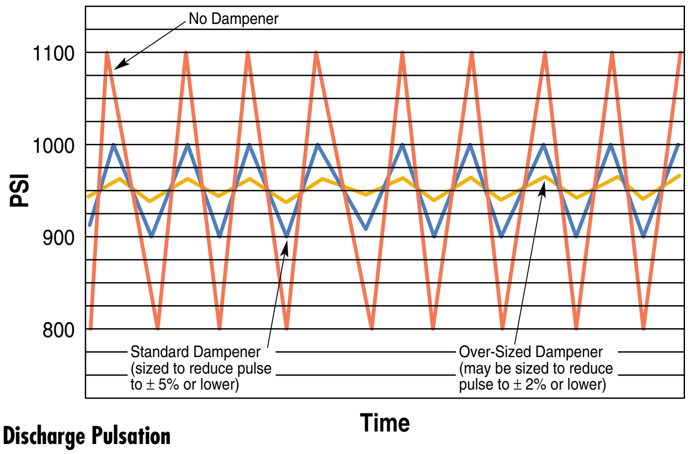
Chargeable

The chargeable model has a Schrader-type charging valve that allows for a predetermined pressure charge to be applied and held in the dampener. No permanent source of compressed gas is required to be attached to the unit. The chargeable models are used primarily with metering pumps for pulsation dampening.

J-Style

The inlet stabilizer air control consists of a compound pressure gauge, a pressure/vacuum tight ball valve, and a venturi valve. When compressed air is passed through the venturi valve at high speed, a low pressure area is created, which is used to evacuate the air from the stabilizer, and thus creating an internal vacuum. Conversely, when the flow of air through the venturi valve is diverted into the stabilizer, a pressure charge is obtained. When pump inlet conditions are optimized, pump efficiency is maximized.

Principle of Operation



Discharge Pulsation

Compressed air or gas is introduced into the air chamber of the pulsation dampener to a specified pressure. The gas is entrapped by the elastomeric bladder, which prevents contact between the process fluid and compressed gas. (Without the bladder, the gas would dissolve into the fluid, dampening would become ineffective, and product contamination would occur due to absorbed gas.)

During the pump discharge stroke, fluid enters the wetted chamber of the pulsation dampener displacing the bladder, compressing the gas and absorbing the shock. During pump inlet stroke, liquid pressure decreases, the dampener gas expands, pushing fluid back into the process line. System shock and pulsation is significantly reduced.

For pumps with multiple pumping chambers and overlapping discharge strokes, maximum pulsation occurs during the overlap portion between adjacent pumping chambers. Peak pressures produced at the pump discharge are absorbed by the pulsation dampener (compressing gas on the air side of the bladder). Pressure dips are filled in by the pulsation dampener as the compressesd gas expands, providing fluid back into the system. Very smooth discharge pressure and flow are the result.

Inlet Stabilization

Without a sufficient supply of fluid, a pump will not perform efficiently. Reciprocating pumps emit high frequency pressure waves created by the inlet valves opening and closing. In high inlet pressure situations, a pump's inlet valves create water hammer by the opening and closing action; increasing pipe and pump damage and draining system efficiency. In suction lift and horizontal suction applications, the pump's inlet valve action actually decreases inlet fluid pressure. A "starved" or cavitating pump will be unable to produce specified flow rates due to the incomplete filling of cylinders and liquid chambers; pressure available to fill pump chambers may not meet NPSHr of the pump throughout 360° of pump shaft rotation. In addition, cavitation will result in the premature failure of pump parts.

An inlet stabilizer at the pump's suction will act as an accumulator, reducing pressure fluctuations and aiding in filling the pump head with fluid during each inlet stroke. The inlet stabilizer removes, or fills in the pressure dips, or "negative peaks" at the pump inlet so flow demand (NPSHr) can be met throughout 360° of shaft rotation.

Dampener Selection Process

Determine application

- Discharge pulsation
- Inlet stabilization
  - High inlet pressure
    - >30 psig
  - Low inlet pressure
    - Suction lift
    - <30 psig positive pressure

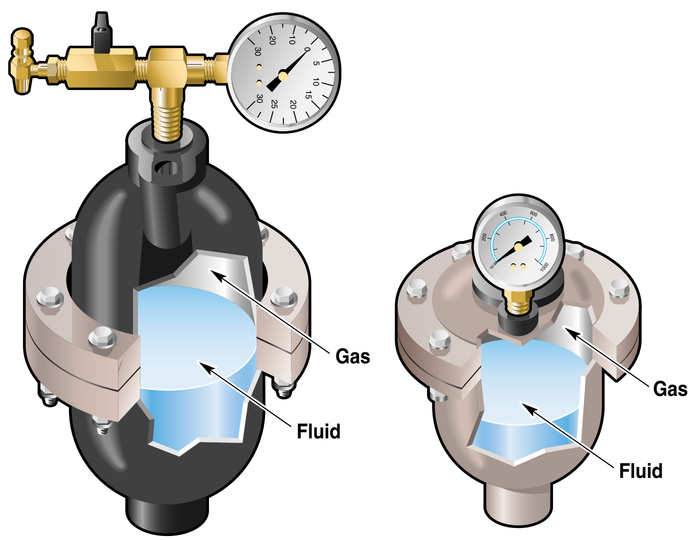
Select dampener size

- Based on pump model and application, select the appropriate cubic inch size from chart below:

	Application			
	Discharge Pulsation		Inlet Stabilization	
Air Control	Chargeable	Chargeable	Chargeable	"J" Style
Pump Model	<1000 psig	>1000 psig	>30 psig	<30 psig
F-20	4 C.I.	12 C.I.	4 C.I.	10 C.I.
D-03	4 C.I.	12 C.I.	4 C.I.	10 C.I.
D-04	4 C.I.	12 C.I.	4 C.I.	10 C.I.
D-10	4 C.I.	N/A	4 C.I.	10 C.I.
D-12	4 C.I.	N/A	4 C.I.	10 C.I.
D-15	4 C.I.	12 C.I.	10 C.I.	10 C.I.
D-17	4 C.I.	12 C.I.	10 C.I.	10 C.I.
H-25	10 C.I.	N/A	36 C.I.	85 C.I.
D-35	36 C.I.	12 C.I.	36 C.I.	85 C.I.

Select Dampener model

- Use the appropriate dampener size charts which follow to select the specific model with the desired housing materials, bladder material, pressure and temperature performance. Contact Wanner Engineering for special order units with other construction materials and temperature limits.



4 Cubic Inch Dampeners

- 1/2” FNPT inlet
- Bolted fasteners
- Choice of housing construction and bladder materials
- Chargeable air control standard; to configure any of these pulsation dampeners with “J” style control (for inlet stabilization applications), order kit 110-901 as an add-on item. Operating pressure range of unit configured with “J” style control is vacuum to 30 PSIG.

Polypropylene Construction

Bladder	Max PSI	Temperature – °F (°C) Min	Max	Part Number
Buna-N	150	32 (0)	175 (79)	110-000
Neoprene	150	32 (0)	175 (79)	110-002
EPDM	150	32 (0)	175 (79)	110-003
Viton	150	32 (0)	175 (79)	110-005
PTFE	150	40 (5)	175 (79)	110-008

PVDF Construction

Bladder	Max PSI	Temperature – °F (°C) Min	Max	Part Number
Buna-N	150	10 (-12)	190 (88)	110-020
Neoprene	150	10 (-12)	200 (93)	110-022
EPDM	150	10 (-12)	250 (121)	110-023
Viton	150	10 (-12)	250 (121)	110-025
PTFE	150	40 (5)	250 (121)	110-028

CS Construction

Bladder	Max PSI	Temperature – °F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-040
Neoprene	1000	0 (-18)	200 (93)	110-042
EPDM	1000	-40 (-40)	280 (140)	110-043
Viton	1000	-10 (-23)	350 (177)	110-045
PTFE	600	40 (5)	250 (121)	110-048

SST Construction

Bladder	Max PSI	Temperature – °F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-060
Neoprene	1000	0 (-18)	200 (93)	110-062
EPDM	1000	-40 (-40)	280 (140)	110-063
Viton	1000	-10 (-23)	350 (177)	110-065
PTFE	600	40 (5)	250 (121)	110-068

Hastelloy C Construction

Bladder	Max PSI	Temperature – °F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-090
Neoprene	1000	0 (-18)	200 (93)	110-092
EPDM	1000	-40 (-40)	280 (140)	110-093
Viton	1000	-10 (-23)	350 (177)	110-095
PTFE	600	40 (5)	250 (121)	110-098

10 Cubic Inch Dampeners

- 1/2" FNPT inlet
- Bolted fasteners
- Choice of housing construction and bladder materials
- Chargeable air control standard; to configure any of these pulsation dampeners with "J" style control (for inlet stabilization applications), order kit 110-901 as an add-on item. Operating pressure range of unit configured with "J" style control is vacuum to 30 PSIG.
- Standard Inlet Stabilizer with "J" Style Control available in PVC Construction

Polypropylene Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	150	32 (0)	175 (79)	110-200
Neoprene	150	32 (0)	175 (79)	110-202
EPDM	150	32 (0)	175 (79)	110-203
Viton	150	32 (0)	175 (79)	110-205
PTFE	150	40 (5)	175 (79)	110-208

PVDF Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	150	10 (-12)	190 (88)	110-220
Neoprene	150	10 (-12)	200 (93)	110-222
EPDM	150	10 (-12)	250 (121)	110-223
Viton	150	10 (-12)	250 (121)	110-225
PTFE	150	40 (5)	250 (121)	110-228

Standard Inlet Stabilizer with "J" Style Control

PVC Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	30	32 (0)	140 (60)	110-210-J
Neoprene	30	32 (0)	140 (60)	110-212-J
EPDM	30	32 (0)	140 (60)	110-213-J
Viton	30	32 (0)	140 (60)	110-215-J
PTFE	30	40 (5)	140 (60)	110-218-J

CS Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-240
Neoprene	1000	0 (-18)	200 (93)	110-242
EPDM	1000	-40 (-40)	280 (140)	110-243
Viton	1000	-10 (-23)	350 (177)	110-245
PTFE	150	40 (5)	250 (121)	110-248

SST Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-260
Neoprene	1000	0 (-18)	200 (93)	110-262
EPDM	1000	-40 (-40)	280 (140)	110-263
Viton	1000	-10 (-23)	350 (177)	110-265
PTFE	150	40 (5)	250 (121)	110-268

Hastelloy C Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-290
Neoprene	1000	0 (-18)	200 (93)	110-292
EPDM	1000	-40 (-40)	280 (140)	110-293
Viton	1000	-10 (-23)	350 (177)	110-295
PTFE	150	40 (5)	250 (121)	110-298

12 Cubic Inch Dampeners

- 1/2” FNPT inlet
- PTFE: Bolted fasteners
  Buna-N, EPDM, and Viton: Ring fasteners
- Choice of bladder materials
- Chargeable air control

12ci dampener with PTFE bladder (left); all other materials (right).

SST Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	4000	10 (-12)	190 (88)	110-360
EPDM	4000	-40 (-40)	280 (140)	110-363
Viton	4000	-10 (-23)	350 (177)	110-365
PTFE	2000	40 (5)	250 (121)	110-368

36 Cubic Inch Dampeners

- 1” FNPT inlet
- CS, SST, and Hastelloy C : Bolted fasteners
  Polypropylene and PVDF: Metal ring flange fasteners
- Choice of housing construction and bladder materials
- Chargeable air control standard; to configure any of these pulsation dampeners with “J” style control (for inlet stabilization applications), order kit 110-902 as an add-on item. Operating pressure range of unit configured with “J” style control is vacuum to 30 PSIG.

Polypropylene Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	150	32 (0)	175 (79)	110-600
Neoprene	150	32 (0)	175 (79)	110-602
EPDM	150	32 (0)	175 (79)	110-603
Viton	150	32 (0)	175 (79)	110-605
PTFE	150	40 (5)	175 (79)	110-608

PVDF Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	150	32 (0)	175 (79)	110-620
Neoprene	150	32 (0)	175 (79)	110-622
EPDM	150	32 (0)	175 (79)	110-623
Viton	150	32 (0)	175 (79)	110-625
PTFE	150	40 (5)	175 (79)	110-628

CS Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-640
Neoprene	1000	0 (-18)	200 (93)	110-642
EPDM	1000	-40 (-40)	280 (140)	110-643
Viton	1000	-10 (-23)	350 (177)	110-645
PTFE	600	40 (5)	250 (121)	110-648

SST Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-660
Neoprene	1000	0 (-18)	200 (93)	110-662
EPDM	1000	-40 (-40)	280 (140)	110-663
Viton	1000	-10 (-23)	350 (177)	110-665
PTFE	600	40 (5)	250 (121)	110-668

Hastelloy C Construction

Bladder	Max PSI	Temperature – ° F (°C) Min	Max	Part Number
Buna-N	1000	10 (-12)	190 (88)	110-690
Neoprene	1000	0 (-18)	200 (93)	110-692
EPDM	1000	-40 (-40)	280 (140)	110-693
Viton	1000	-10 (-23)	350 (177)	110-695
PTFE	600	40 (5)	250 (121)	110-698

85 Cubic Inch Stabilizer

- 1" FNPT inlet
- Standard Inlet Stabilizer with "J" Style Control"
- Plastic ring flange fasteners
- Choice of bladder materials

PVC Construction

		Temperature – ° F (°C)		
Bladder	Max PSI	Min	Max	Part Number
Buna-N	30	32 (0)	140 (60)	110-710-J
Neoprene	30	32 (0)	140 (60)	110-712-J
EPDM	30	32 (0)	140 (60)	110-713-J
Viton	30	32 (0)	140 (60)	110-715-J
PTFE	30	40 (5)	140 (60)	110-718-J

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