Pulsation Dampers are hydro-pneumatic devices designed to remove pulsations, vibrations and noise caused by positive displacement pumps in fluid systems.

Using pulsation dampers on positive displacement pumped systems will result in improved instrument readings, increased pump life, lower maintenance costs, and lower running costs. They eliminate the possibility of pipe fracture caused by vibration and safeguard personnel from the risk of leaks.

**Principles of Operation**
FlowGuard Pulsation Dampers operate by employing a small volume of gas, usually nitrogen, contained within a flexible membrane fitted inside a non-corrosive shell. Each time a pulse comes from the pump, part of the pulse goes into the damper and the gas is compressed slightly. As the flow decreases the pulse stored in the damper will be pushed back into the line. The result is a smooth flow which will keep pressure fluctuations within the required limits (level of damping).

**Designed Efficiency**
Superior, uncomplicated, and efficient designs ensure levels of performance unmatched by traditional adapted hydraulic accumulators. Their basic, yet rugged, construction makes them economically priced and easy to maintain.

**Exceptionally Durable**
Our standard housings are made of non-corrosive 316 stainless steel, polypropylene, or of special alloys like titanium, Hastelloy®, Monel™, etc. The membrane is available in 10 different types of rubber or PTFE (Teflon®) bellows or diaphragm.

**Broad Range to Fit Your Needs**
Our wide range of FlowGuard pulsation dampers fulfil most pressure requirements (from 10 bars/150psi to 1000 bars/15,000psi) and may be custom made to meet any specification or a particular duty requirement.

**Certified High Quality**
Designed and manufactured to the highest standards, FlowGuard pulsation dampers conform to internationally recognized pressure vessel codes and may be supplied with full material certification (ASME Coded) if required.
Common Applications

FlowGuard Pulsation Dampers are fitted to metering pumps, multi-plunger pumps, air-operated-diaphragm pumps, and peristaltic pumps in the following industries:

**Oil & Gas**
Used widely in the industry for:
- Corrosion/scale inhibitors
- Oxygen scavengers
- Biocides
- Pour point depressants
- Polyelectrolyte pumps
- Chemical injection pumps
- Methanol injection pumps
- Multi-plunger pumps for glycol regeneration and condensate recovery

**Chemical & Petrochemical**
For effectively handling slurries, solvents, acids, alkanes, olefins, amines, several other difficult materials as well as water and non aggressive fluids – pump applications include:
- Metering pumps
- Air-driven diaphragm pumps
- Multiplunger pumps
- Peristaltic pumps
- Boiler feed
- Low/high pressure metering and transfer duties

**Confectionary & Chocolate**
Used on blending and spraying applications and on filling machines

**Detergents and Toiletries**
Fitted to blending pumps for perfumes, colourings, and other additives. Also used for air-operated-diaphragm pumps for bulk transport of base products and inlets of filling machines

**Food Dairy and Beverage**
Used on metering pumps for blending, spray drying, mixing applications, and to remove high-frequency-pressure pulsations from homogenisers

**Paper & Textiles**
Used for spraying applications with both air-operated-diaphragm pumps and proportioning pumps – also useful on blending and bulk transfer duties

**Paints & Varnishes**
Found on peristaltic pumps, filling machines, air-operated-diaphragm, and blending pumps for a variety of applications

**Water and Effluent Treatment**
Used on dosing pumps, peristaltic pumps, and air-operated-diaphragm pumps for the metering of treatment chemicals and for the transfer of industrial and domestic effluent

**Water Jetting**
Our In-line pulsation dampers are fitted to high-speed, multi-plunger pumps on mobile sewer cleaning rigs, rodding pumps, jet cutting, and cleaning applications to stop hose wear due to snaking and pipe vibration – and to reduce damage to valves

**Reverse Osmosis**
Used in plants for desalination, dewatering of foodstuffs, and concentration of pharmaceutical products – they reduce the noise and vibration from high-speed multi-plunger pumps and protect the RO membranes

**FlowGuard Pulsation Dampers**
- Remove pressure fluctuations and surges
- Stop vibration & shaking of pipes
- Ensure a continuous, steady flow
- Reduce noise in problem systems
- Reduce overload on pump motors and gearboxes where there are long pipe runs
- Prevent pump overdelivery
- Prevent cavitation caused by poor suction conditions, long suction lines, etc.

**Other Features of FlowGuard Pulsation Dampers**
- Unrestricted inlet port (no poppet valve) for improved damping efficiency
- Welded flange connections as well as BSP & NPT threaded
- Very simple gas charging system
- One-piece, moulded membranes (no glued joints) on all standard sizes
- In-line (2 port) available as an option with a choice of port orientation
- Easy-to-service membrane can be changed without removing damper from the line
- Fully coded and approved welding with 100% x-ray if required
FD Series
P.T.F.E. DIAPHRAGM DAMPERS

TYPE A TYPE B TYPE C TYPE E TYPE F

DESIGNED FOR EASE OF SERVICING LIFTING EYE FOR HEAVIER MODELS STAINLESS, DOUBLE SEATED GAS CHARGING VALVE P.T.F.E. DIAPHRAGM FOR ARDUIOUS CHEMICALS

FD Series
Diaphragm Dampers

FD - Type A
Shell Material: 316 Stainless Steel, Polypropylene & PVC, Titanium, Hastelloy C, Monel 400

Documentation: Standard Certification to DIN 50049 3.1b

Features:
- 316 stainless, polypropylene & P.V.C. construction
- Ex-stock delivery.
- Easy to fit.
- Proven performance.
- Threaded or flanged connections.
- Simple maintenance.
- Full technical assistance.
- Swift response.

<table>
<thead>
<tr>
<th>Model</th>
<th>Volume (litres)</th>
<th>Pressure (bar)</th>
<th>Connection</th>
<th>Diameter (mm)</th>
<th>Length (mm)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD 05</td>
<td>0.05</td>
<td>95</td>
<td>NPT female</td>
<td>139</td>
<td>73</td>
<td>7</td>
</tr>
<tr>
<td>FD 10</td>
<td>0.1</td>
<td>95</td>
<td>¼”</td>
<td>157</td>
<td>87</td>
<td>9.5</td>
</tr>
<tr>
<td>FD 20</td>
<td>0.25</td>
<td>85</td>
<td>½”</td>
<td>188</td>
<td>103</td>
<td>15.5</td>
</tr>
<tr>
<td>FD 30</td>
<td>0.5</td>
<td>67</td>
<td>1”</td>
<td>227</td>
<td>113</td>
<td>26.5</td>
</tr>
<tr>
<td>FD 40</td>
<td>1.0</td>
<td>63</td>
<td>1 ¼”</td>
<td>265</td>
<td>136</td>
<td>39.5</td>
</tr>
<tr>
<td>FD 50</td>
<td>2.0</td>
<td>10</td>
<td>2”</td>
<td>300</td>
<td>230</td>
<td>17</td>
</tr>
<tr>
<td>FD 60</td>
<td>5.0</td>
<td>10</td>
<td>2”</td>
<td>380</td>
<td>261</td>
<td>33</td>
</tr>
<tr>
<td>FD 80</td>
<td>15</td>
<td>10</td>
<td>2”</td>
<td>500</td>
<td>379</td>
<td>75</td>
</tr>
</tbody>
</table>

Pressures are calculated in accordance with PD5500 and are based on 316 stainless steel at a design temperature of 100°C. The shell material is stainless steel as standard but can be polypropylene (depending on pressure) as an option. FDSO, 60, 80 shells are made from metal spinnings with sheradized carbon steel flange rings. The full FlowGuard Range includes models OP, OS, FB, FBITO, FG, VG, FGirD, FL & HG, RO and can cover the following parameters: Maximum Volume: 2000 litre, Maximum Pressure: 1050 bar, Connections: Single & Twin, Threaded, or Welded Flanged.

NOTE: Specifications may change without notice.
### DP and DV Series

**Polypropylene and PVC Pulsation Dampers**

<table>
<thead>
<tr>
<th>Model</th>
<th>Volume (litres)</th>
<th>Pressure (bar)</th>
<th>Connection</th>
<th>Diameter (mm)</th>
<th>Length (mm)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP10</td>
<td>0.1</td>
<td>10</td>
<td>1/2&quot; BSP</td>
<td>75</td>
<td>155</td>
<td>0.5</td>
</tr>
<tr>
<td>DP20</td>
<td>0.25</td>
<td>10</td>
<td>1/2&quot; BSP</td>
<td>95</td>
<td>190</td>
<td>1.0</td>
</tr>
<tr>
<td>DP30</td>
<td>0.5</td>
<td>10</td>
<td>1&quot; BSP</td>
<td>100</td>
<td>255</td>
<td>1.3</td>
</tr>
<tr>
<td>DP40</td>
<td>1.0</td>
<td>10</td>
<td>1 1/4&quot; BSP</td>
<td>125</td>
<td>255</td>
<td>1.9</td>
</tr>
<tr>
<td>DP50</td>
<td>2.0</td>
<td>10</td>
<td>1 1/4&quot; BSP</td>
<td>125</td>
<td>400</td>
<td>2.6</td>
</tr>
<tr>
<td>DP57</td>
<td>3.5</td>
<td>10</td>
<td>1 1/4&quot; BSP</td>
<td>150</td>
<td>435</td>
<td>5.0</td>
</tr>
<tr>
<td>DP60</td>
<td>5.0</td>
<td>10</td>
<td>2&quot; BSP</td>
<td>190</td>
<td>440</td>
<td>6.6</td>
</tr>
<tr>
<td>DP70</td>
<td>10</td>
<td>10</td>
<td>2&quot; BSP</td>
<td>190</td>
<td>570</td>
<td>9.4</td>
</tr>
</tbody>
</table>

### DS Series

**316 Stainless Steel Dampers**

<table>
<thead>
<tr>
<th>Model</th>
<th>Volume (litres)</th>
<th>Pressure (bar)</th>
<th>Connection</th>
<th>Diameter (mm)</th>
<th>Length (mm)</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS10</td>
<td>0.1</td>
<td>332</td>
<td>1/2&quot; NPT</td>
<td>66.3</td>
<td>157</td>
<td>3</td>
</tr>
<tr>
<td>DS20</td>
<td>0.25</td>
<td>325</td>
<td>1/2&quot; NPT</td>
<td>82.2</td>
<td>196</td>
<td>5.5</td>
</tr>
<tr>
<td>DS30</td>
<td>0.5</td>
<td>278</td>
<td>1&quot; NPT</td>
<td>95</td>
<td>253</td>
<td>8.5</td>
</tr>
<tr>
<td>DS40</td>
<td>1.0</td>
<td>230</td>
<td>1 1/4&quot; NPT</td>
<td>120</td>
<td>258</td>
<td>13</td>
</tr>
<tr>
<td>DS50</td>
<td>2.0</td>
<td>111</td>
<td>1 1/4&quot; NPT</td>
<td>114.3</td>
<td>400</td>
<td>14</td>
</tr>
<tr>
<td>DS52</td>
<td>2.5</td>
<td>111</td>
<td>1 1/4&quot; NPT</td>
<td>114.3</td>
<td>519</td>
<td>16.5</td>
</tr>
<tr>
<td>DS57</td>
<td>3.5</td>
<td>92</td>
<td>1 1/4&quot; NPT</td>
<td>141.3</td>
<td>447</td>
<td>22.5</td>
</tr>
<tr>
<td>DS60</td>
<td>5.0</td>
<td>56</td>
<td>2&quot; NPT</td>
<td>168.3</td>
<td>438</td>
<td>26</td>
</tr>
<tr>
<td>DS70</td>
<td>7.5</td>
<td>56</td>
<td>2&quot; NPT</td>
<td>168.3</td>
<td>548</td>
<td>29.5</td>
</tr>
</tbody>
</table>

**Bladder-Type Pulsation Damper**

**DP & DV Series Shell Material:** Polypropylene (DP Series) or PVC (DV Series)

**Documentation:** Hydrostatic Test Certificate; Installation Operation & Maintenance Instruction

Pressures are based on polypropylene at a design temperature of 30°C.

- Ex-stock availability; economical
- Proven performance; reliable
- Full technical back-up
- Simple maintenance and installation
- Resistant to a wide range of chemicals
- ISO 9001 Company

**Bladder-Type Pulsation Damper**

**DS Series Shell Material:** 316 Stainless Steel

**Documentation:** Hydrostatic Test Certificate; Installation Operation & Maintenance Instruction

- Ex-stock availability
- Threaded or flanged connection
- Full technical back-up
- Simple maintenance & installation
- Proven performance
- ISO 9001 Company
- Suitable for most processes
Static liquid, subject to even a modest temperature rise, will expand. This can result in extremely high pressures being generated by the expanding liquid. Unless compensated for, the excessive pressure build up will rupture pipework causing damage to instrumentation, pipework, vessels and equipment – therefore, expensive downtimes. Costly leakage of product from flanges and fittings can result in a serious risk to the safety of personnel and possible contravention of environmental regulations.

The installation of a FlowGuard Thermal Expansion Compensator, correctly sized, will allow expanding liquid to collect into the chamber of a pressure vessel. The gas-filled membrane automatically contracts to allow more fluid into the chamber. As the temperature falls, the compensator allows the contracting fluid to return to the pipeline – thus preventing pipeline ruptures and consequential leakage.

**Problems**
- Temperature increases
- Contamination from relief valves
- Unwanted spillages
- Excess pressures
- Broken pipelines
- Liquid expansion
- Leaks

**Solution**
A rapid valve closure or a sudden pump stoppage will cause a pipeline of fluid flow to rebound back along the pipe. This rebound is a shock wave traveling at the speed of sound and contains all the energy of the preceding flow. The pressures reached can be many times more than the normal operating pressure of the pipeline and, indeed, can often greatly exceed the design pressure of pipework and pipeline equipment. This results in catastrophic failure at the weakest points.

**Problems**
- Frequent breakages
- Water hammer
- Pipe vibrations
- Ruptured flanges
- Cracked casings
- Leaks

**Solution**

The FlowGuard Surge Absorber, correctly sized, is located near the source of the problem. The internal gas-filled membrane will contract instantaneously to cushion the shock waves. FlowGuard Surge Absorbers are computer designed to alleviate energy spikes and assists with difficult pump start-ups.

Avoid the Risk of Unwanted Spillage

Flanged or threaded connections to suit your requirements.
PROVEN DESIGN, TECHNOLOGY, AND METHODS

FlowGuard Pulsation Dampers Are Used In The Following Processes and Conditions:

Spraying – to obtain uniform thickness of spray coatings
Dosing – for continuous, steady flow of chemical additives
Filling – to ensure accuracy and repeatability at high filling rates
Blending and Proportioning – to ensure continuous, steady flow, thus achieving uniformity of product
Metering – to increase pump metering accuracy and repeatability
Prevention – to prevent relief valves lifting and premature rupture of bursting discs
Protection – to protect pipework, heat exchangers, vessels & reactors from the damaging effects of pressure peaks
Safety – to prevent leaks from flanges and pipe joints due to over-pressurisation which can contravene health & safety and environmental regulations
Mixing – to ensure continuous flow of product to enhance performance of static and dynamic in line mixers

FlowGuard Ltd. has over 30 years of proven applications experience in various industries. Whatever and wherever the problem, our experienced engineering staff will determine the optimal combination of materials and designs for process liquid and pressure compatibility.

Membranes: Nitrile, Butyl, EPDM, Viton, PTFE, and many more.
Designed for strength; PD5500, ASME 8.
Catering for temperatures to suit

For more information on CoorsTek Ceramics or any of our other state-of-the-art products: call us at +1.405.601.4371 or email us at stabilizers@coorstek.com.