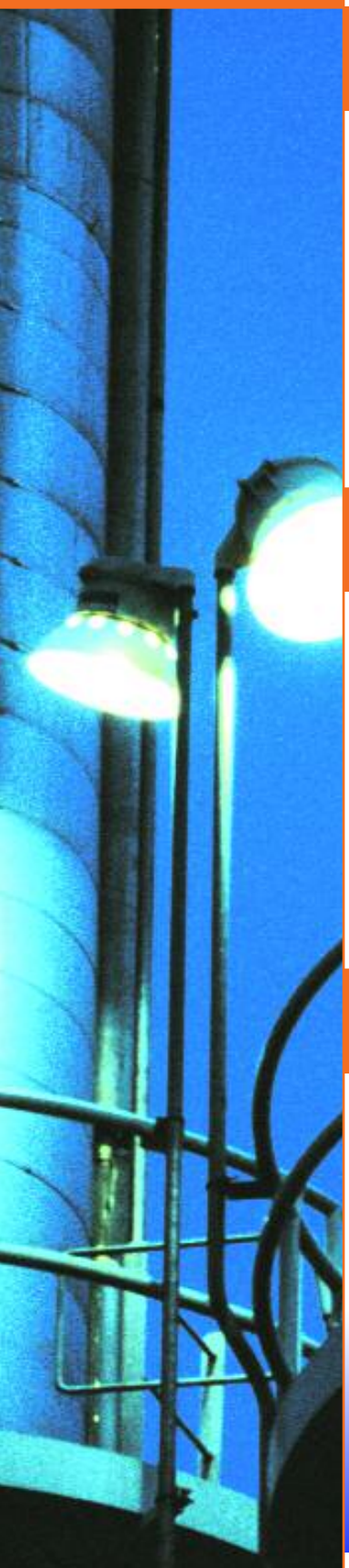
FLO-DYNE

ADVANCED CONTROL TECHNOLOGY

A specialist range for the control of noise, pressure pulsations and surges created by moving fluids and gases

A WORLDWIDE, WORLD-CLASS SERVICE

FLO-DYNE



UNRIVALLED KNOWLEDGE AND EXPERIENCE OF NOISE AND PULSATION CONTROL

Drawing on over thirty years of experience, Flo-Dyne design and supply customised solutions for industrial silencing, pulsation dampeners, diffusers and surge equipment to control noise and pulsation in moving gases and liquids. Used extensively throughout the world by gas, water, power, chemical and processing industries, our equipment provides cost effective solutions that deliver guaranteed results.

Please get in touch for details of any aspect of our range of products

VENT SILENCERS

Release of high pressure air, steam and gas to atmosphere generates noise that is dangerous to plant personnel and environmentally unacceptable. Flo-Dyne technology provides the most economical solution with optimised silencer design and guaranteed performance. Flexible design practice allows easy customisation for each individual solution combining advanced technology, suitable materials and best practice in construction techniques. Standard design solutions are available for relief valve, steam vent, process gas vent and steam ejector duties.

CONTROL VALVE SILENCERS

Built to withstand the high pressure, high noise level environment downstream of pressure control valves, Flo-Dyne Control Valve Silencers, when used in conjunction with standard trim valves, provide the most cost effective means of valve silencing. Using our pressure vessel construction experience and applying the acoustic technology from the vent silencer range, this solution often avoids the need for costly quiet trim valves.

COMPRESSOR INLINE SILENCERS

Centrifugal and axial compressors generate broad band noise with a distinctive peak at the blade passing frequency of the rotor. The custom designed Flo-Dyne silencer is built to treat these special noise problems and will reduce the noise radiated by the suction and discharge pipework, reducing the need for expensive acoustic lagging systems. Inside the silencer the acoustic packing is protected by glass fibre cloth and stainless steel mesh to prevent loss of fibre into the gas stream and is arranged for low pressure drop to minimise power losses.

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Model BOS

Vent Silencer

A Vent Silencer for safety relief and atmospheric duties

The Flo-Dyne Vent Silencer is used to reduce unwanted noise from vent or safety relief lines and stacks that discharge to atmosphere. Gases handled include steam, oxygen, carbon dioxide, air, nitrogen, as well as natural gas and the many process gases used in industry.

Construction utilises our experience from building pressure vessels to build a robust piece of equipment that can withstand high temperature steam, high inlet velocities as well as significant local loads from wind, earthquake and pipework expansion. Full penetration welds are used throughout the construction using ASME qualified welders.

The inlet diffuser is built like a pressure vessel and receives the full force of the incoming flow. Strength is important to prevent disintegration and erosion under continuous and cyclic operating conditions. Flo-Dyne diffusers are built from standard pipe sizes or rolled from heavy duty perforated sheet.

The internal acoustic core is built using long strand glass fibre and will withstand temperatures up to 800 deg. F; for higher temperatures, mineral or ceramic fibres are used. Main shells are constructed from steel boiler plate; for high temperature duties stainless steels or high alloy steels are used and for low temperature duties stainless steels are used. Internal construction will utilise corrosion resistant Cor-ten, carbon steel or 300 series stainless steel for the perforated baffles with the acoustic pack designed to accommodate thermal expansion to give stress free operation.

Equipment may be self supporting or supplied with pad or cradle type supports. Installation orientation may be either vertical or horizontal with no change in performance.

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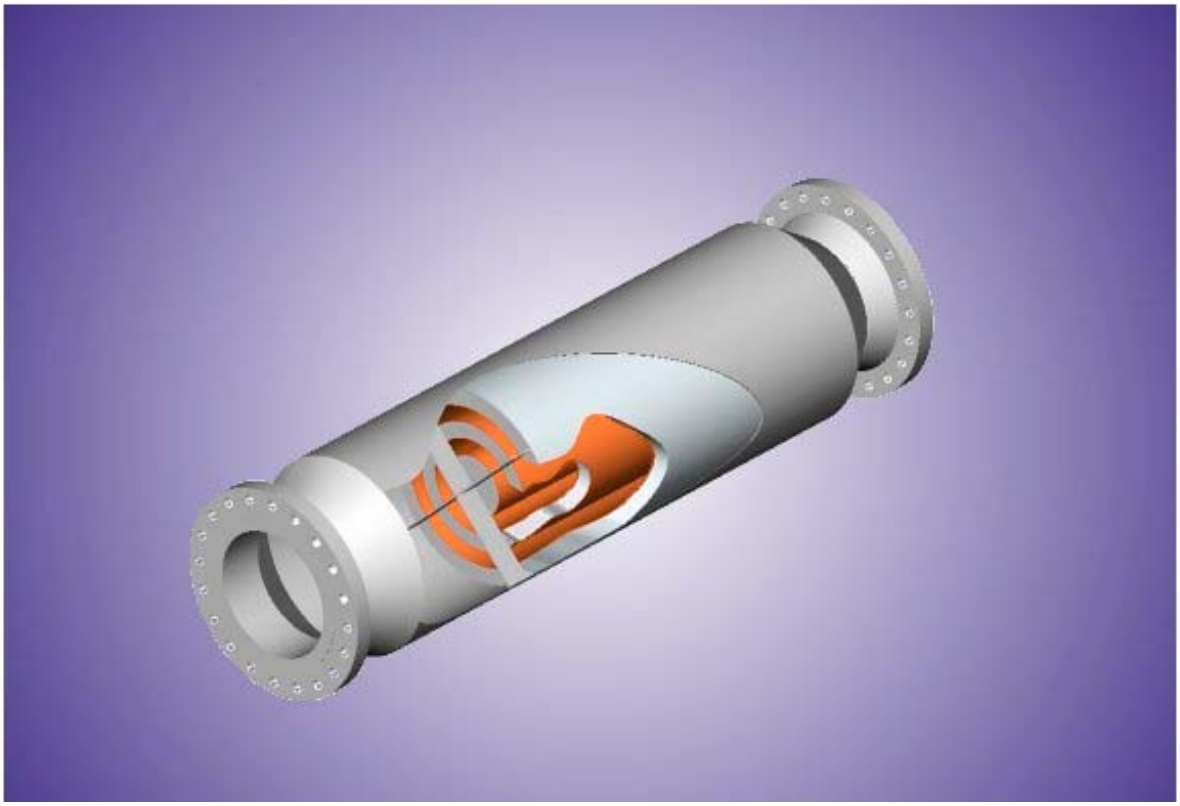
Model CIS

Compressor In-Line Silencer

An Absorptive Silencer designed to handle the special problems created by air and process gas centrifugal compressors.



COMPUTER DESIGNED
The CIS Compressor Silencer is an absorptive type silencer, designed for the short acoustic wave lengths produced by centrifugal and axial compressors.
Each silencer is custom engineered, using a computer program. This program enables the components of the acoustic and flow characteristics of the system to match the silencer.

CUSTOM ENGINEERED PACKING
Sound is absorbed by viscous drag in the interstices of the glass fibre packing. It is important to match the packing resistance, which creates this drag to the characteristic resistance of the gas handled at its operating condition. To adjust the pack resistance Flo-Dyne changes packing density, thickness and fibre diameter.

CUSTOM ENGINEERED SLOT WIDTH
A high-speed dynamic compressor produces a certain noise signature. The silencer must be engineered specifically to handle this frequency spectrum. In the Flo-Dyne design, the silencer slot width or distance between the annular packed sections is adjusted for each application.

APPLICATION
The CIS is used to silence the inlet or outlet of high-speed dynamic compressors handling gas at any pressure. For lower speed, positive displacement vane and rotary compressors, see the Flo-Dyne data sheet describing the RCS silencer.

ACOUSTIC SPECIFICATIONS
The CIS silencer provides 20 to 40 dB attenuation. Flo-Dyne will supply specific attenuation performance for each application.

MECHANICAL FEATURES
The CIS internal configuration consists of a series of packed annular cores spaced in accordance with the needs of the application. For pressure applications these cores are contained in a pressure vessel shell which may be built to ANSI B31.3 piping code or alternatively ASME or any European construction.
The packing consists of long strand glass fibre which is wound on to annular cores, providing a continuous blanket effect. Support studs are welded to the facing at regular intervals to act as anchor points for the packing. Layers of fibreglass cloth and stainless steel screen are applied and enclosed with heavy perforated metal facing. This triple protection assures against loss of packing into the gas

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Model CVS

Control Valve Silencer

A combination reactive/absorptive silencer designed to treat control valve noise in gas and vapour service.

Control valves with high-pressure ratios across them are generally very noisy. For stringent silencing requirements Flo-Dyne has designed the Model CVS Control Valve Silencer which includes a high performance diffuser and an absorptive section. This combination silencer is capable of providing fluid borne noise reduction up to 50 dB.

Each CVS silencer is custom engineered for the particular installation. The diffuser drilling pattern is selected to provide a reshaped noise spectrum and optimum back pressure for the valve. The packed section is designed so that the slot width and length can be varied to provide the correct attenuation of the diffuser noise spectrum.

FEATURES

- Custom Acoustic Performance

Computer aided design allows an infinite variation of the silencer acoustic parameters of slot width and packed length. The optimum combination of these elements is used for each application to provide the required noise reduction.

- Custom Flow Performance

Flo-Dyne engineers design the diffuser and packed section to provide the exact amount of pressure drop required for each application. For high pressure and high noise application the diffusers can be designed to efficiently share pressure drop with the control valve. For low pressure drop requirements the silencers can be designed to minimise loss.

- Drilled Diffuser

Heavy duty construction of the diffuser using drilled pipe and full penetration butt welds prevents mechanical failure.

- Annular Core Construction

The packed section consists of a series of annular cores with the long strand fibreglass spooled into place and anchored by packing support studs. This exclusive Flo-Dyne construction guarantees consistent packing density and prevents shifting of the packing.

- Triple Layer Pack Protection

The long strand glass fibre acoustic packing material is protected by 1) a heavy gauge perforated facing, 2) a layer of fibreglass cloth and 3) a stainless steel screen. This triple protection prevents loss of packing into the gas stream.

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GAS DIFFUSER SILENCER

Type GDS, GDI, GDV

A Reactive type silencer designed to control excessive in-line valve noise for control and regulating valves discharging to pipework or atmosphere.

High-pressure drop across a valve creates excessive noise and deterioration of valve components. The function of the Gas Diffuser Silencer is to share pressure drop with the valve, thereby substantially reducing this noise and wear.

To accomplish this pressure reduction the diffuser passes the flow through many small holes. Correct hole size and spacing are critical to diffuser performance. It is also important to match the diffuser flow capabilities to the individual system requirements. Each diffuser is custom designed for the particular valve and piping system it is to be used with.

All standard models are used immediately downstream of the system control valve and will control valve noise whether the system is discharging to atmosphere or to downstream pipework.

The Gas Diffusers can be used in conjunction with any manufacturer's valve to achieve a quieter noise environment while reducing the requirements for expensive valve trims.

Our engineers will balance system pressure drop to minimise valve generated noise. A diffuser will be selected with the exact flow coefficient to create the required back pressure at the valve. In the cases where the desired noise levels cannot be achieved by the installation of a diffuser alone, recommendations will be made for pipe insulation and jacketing or for an absorptive type silencer.

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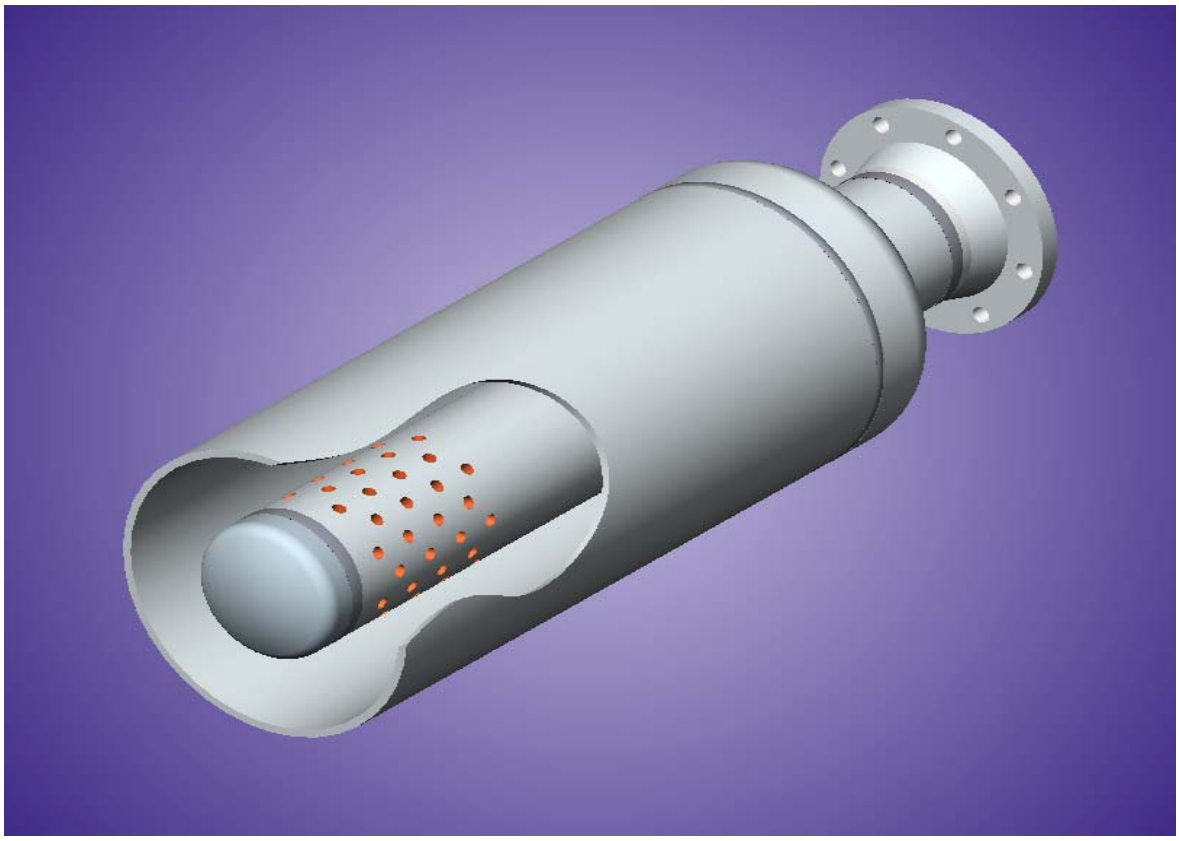
HUSH PUP

Vent Silencer

A non-packed, reactive silencer for quieting
the noise produced by air, gas and steam vents



DESIGN

The Flo-Dyne HUSH PUP is a non-packed, reactive silencer. It works by expanding the incoming flow through many small holes. The expansion creates a reduction and a frequency shift of vent noise. By correct selection of hole size, spacing and pattern this reduction can be optimised to produce an overall quieting effect equal to older style packed silencers. This simple yet effective silencing concept has been tested and proven in thousands of applications as a component part of Flo-Dyne's line of vent silencers.

APPLICATION

The HUSH PUP can be used in any high pressure vent application where a moderate degree of silencing is required. Typical applications include steam relief valve discharge, air compressor vents, boiler blowdown lines, gas plant vents and product dump vents.

ACOUSTIC PERFORMANCE

The HUSH PUP will provide a 15 to 20 dB reduction on most vent applications. The attenuation curve shown is the typical performance for a high pressure air vent. For more critical silencing application the Flo-Dyne Vent Silencer is available.

MECHANICAL SPECIFICATION

All steel construction allows the handling of high temperature gas or steam. Designed like a pressure vessel, the HUSH PUP can be subjected to high pressure, high impact flow with no problems. Hole sizes, equal or greater than those of quiet trim valves, prevents clogging problems encountered in some sintered metal type silencers. The all welded design provides years of non-maintenance, trouble free service.

BENEFITS

1. Rugged construction
2. Effective silencing in non-critical applications
3. Simple installation; comes with 150# RF inlet flange
4. Long life
5. Economical

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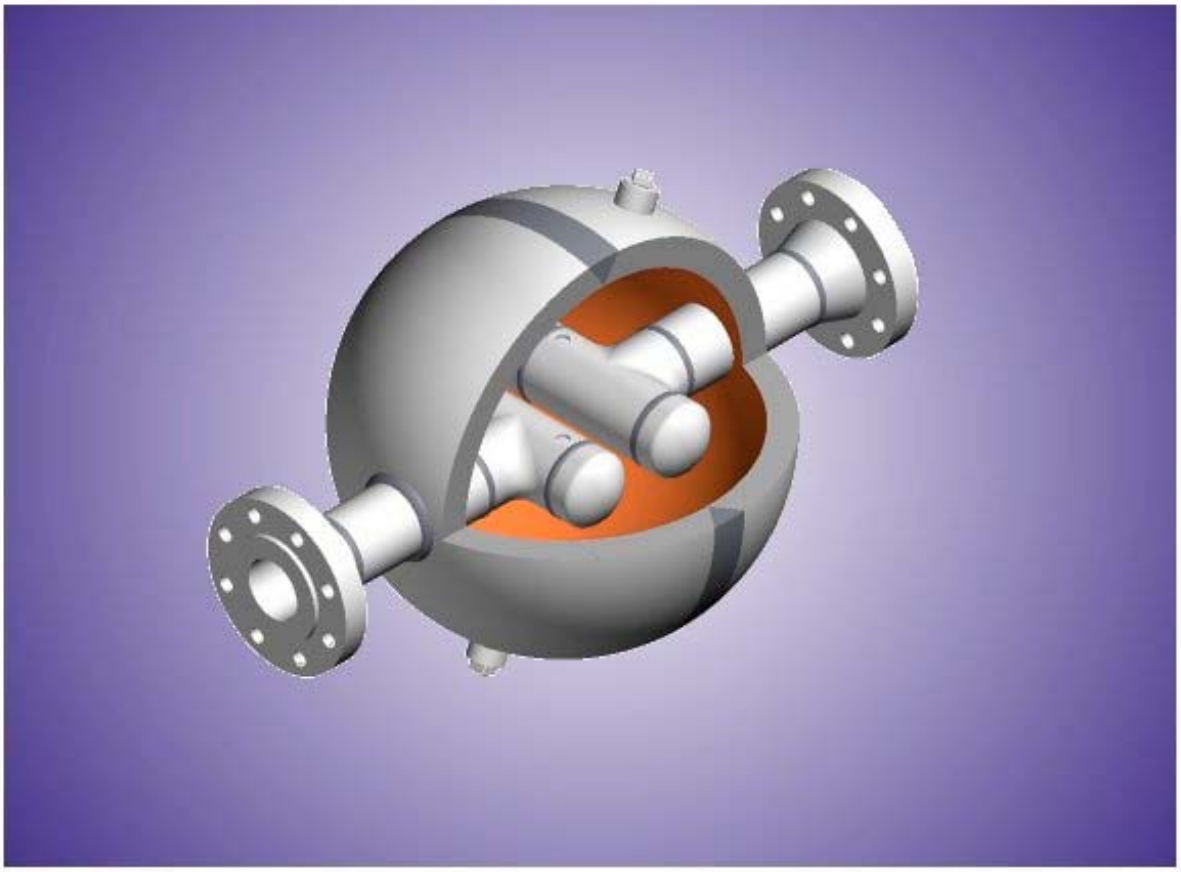
Model PDS

Liquid Pulsation Dampener

An inline device to eliminate pulsation and reduce maintenance in power pump discharge lines



GENERAL

The Flo-Dyne Liquid Pulsation Dampener reduces discharge pressure pulsation by approximately 75%. Actual performance depends on the type of pump, connected piping system and liquid handled.
The spherical shape is the strongest arrangement for pressure-containing service … up to 6000 psi, design pressure is standard.
Maintenance free, the dampener can be permanently welded in the line, saving flange costs and potential flange leaks. Inline configuration eliminates special support problems

DESIGN

Completely liquid filled, with no moving parts, this dampener removes the maintenance and gas charging requirements.
The stationary internals guide the incoming flow into a rotating path within the spherical shell. The spinning liquid mass creates a system smoothing/flywheel effect. Viscous drag on the sphere walls and the capacitance effect of the relatively large volume located next to the pump further help to dampen pressure pulsation.

CONSTRUCTION

The dampener is all steel construction, with no bladders to fill or replace and virtually no temperature limitation. With nozzles bevelled for weld, the unit becomes a part of the piping. Construction may be in carbon steel, 300 series stainless steel or a variety of duplex and super duplex steels.

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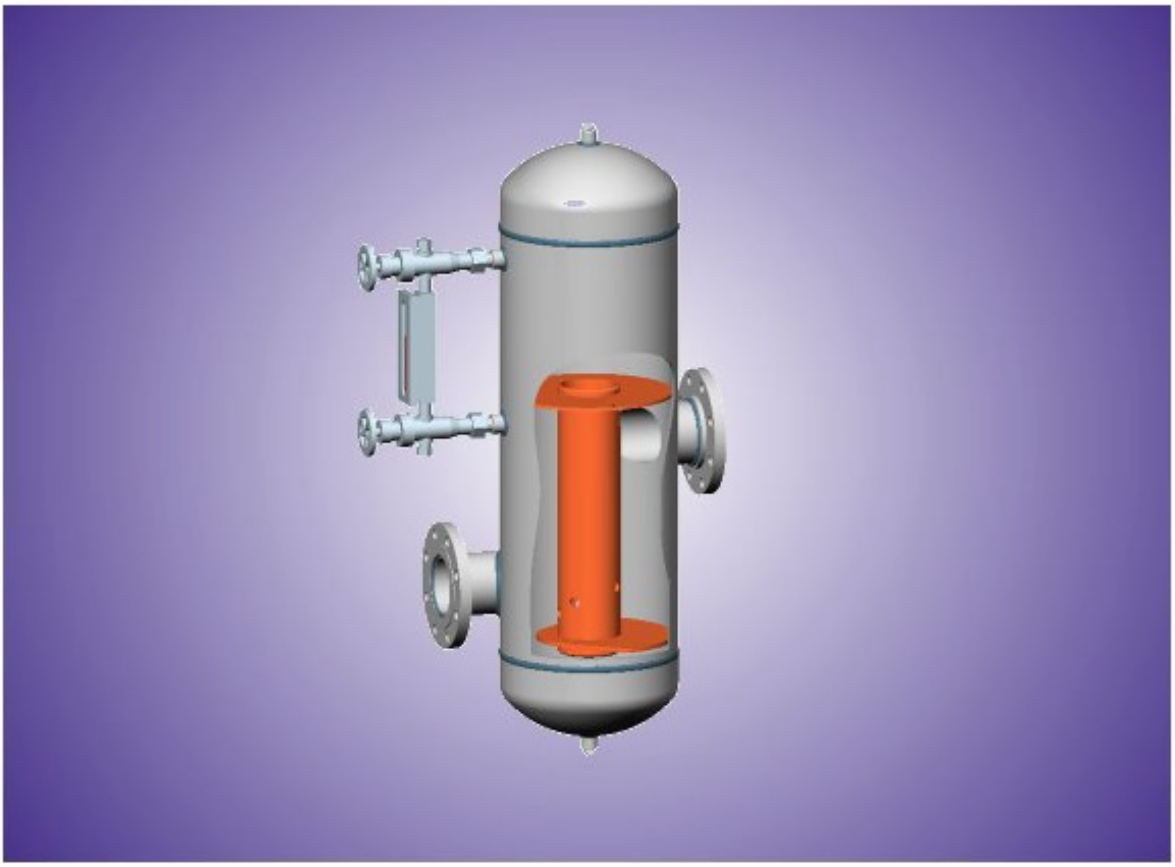
Model SSC

Stabiliser/Separator

An inline device to eliminate pulsation, cavitation and entrained gas in power pump suction lines.



GENERAL

The Flo-Dyne Stabiliser/Separator, close coupled to the pump suction flange, provides three basic functions necessary for smooth, low maintenance operation.

Volume Effect - Acting as a mini storage tank, the Stabiliser/Separator provides a full charge of liquid when the pump valves open. In systems with marginal available net positive suction head (NPSH), it prevents cavitation. Also because of its location it acoustically uncouples the pump from the line eliminating acceleration head consideration.

Dampening Effect - The gas charge provides a capacitance or spring effect to absorb pulsation created by the abrupt flow change as the valves open and close.

Separation Effect - Entrained gas or vapour is removed before it can enter the pump suction manifold where the sudden pressure changes can cause gas to break out of solution and create partial cavitation.

DESIGN

Flow enters and leaves the Stabiliser/Separator tangentially, forming a low-velocity vortex. This vortex and the increased path length created by the elevation difference between inlet and outlet stimulates the release of any entrained gas. The freed gas moves through the perforated centre tube to the gas or air pocket maintained at the top of the unit.

The only maintenance required is the periodic replenishment of the gas charge. In some applications with gas-rich liquids, it is necessary to vent off the separated gas. Gas/liquid level can be visually observed through the sightglass. Since disassembly is not required, normal operating personnel can safely recharge the Stabiliser/Separator.

CONSTRUCTION

The Stabiliser/Separator is of welded steel construction. Standard models are rated 100 psig in accordance with ANSI B31.3 code. Inlet and outlet connections are selected to match the pump suction flange. ASME code construction is available.

A sight gauge with shutoff valves is furnished for visual observation of liquid/gas level. Gas fill and drain connections may be flanged or couplings - as required.

Any gas compatible with the fluid can be used as a charging medium. Air or nitrogen are commonly used. In highly corrosive service the stabiliser can be supplied with non-corrodible internals and epoxy coating of wetted steel surfaces.

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Model SAC/SAB

Surge Arrestor

A custom designed hydropneumatic surge arrestor to control water hammer in pipe lines.

GENERAL

The Flo-Dyne Surge Arrestor is located on the discharge suction side of centrifugal pumps handling water wh potential water hammer problems can occur on pu shutdown, and is also used to control water hammer crea by rapid valve closure.

Pump Shutdown - Flowing water in a pipeline posses kinetic energy because of its mass velocity. When the wa column velocity is abruptly changed (pump shutdown due power failure, for example) this energy is converted pressure. This pressure occurs in the form of a shock w (water hammer) which can cause the piping or other syst components to fail.

Valve Closure - In the event of rapid valve closure the sa deceleration of the water column and resultant shock w occurs as in pump shutdown. Shock pressures of 3 to 4 tir the design pressure of the system are not uncommon.

The solution to the above problems is to allow the fluid colu to decelerate gradually. The Flo-Dyne surge arrestor provi a simple, effective method of accomplishing this effect.

DESIGN

Flow enters and leaves the surge arrestor through the energy dissipater in the connecting nozzle. The gas charge provides capacitance in the system to absorb the high pressure surge by compression and re-expansion. Required volume of the surge arrestor and necessary resistance in the energy dissipater are established by computer analysis of the connected piping system. The only maintenance required is a periodic check of the gas charge pressure. The gas charge pressure is established by Flo-Dyne engineers to satisfy the specific operating conditions of the application.

CONSTRUCTION

The surge arrestor is of welded carbon steel construction. Standard models are constructed to PD5500 or ASME Pressure Vessel Code, with CE marking as standard. Alternate materials of construction such as stainless steel are also available to suit the specific application requirements.

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ADVANCED PROGRAMMES

We were the first company to use the sophisticated 'Method of Characteristics' programme to solve surge and water hammer problems. Since then we have continued to embrace new developments to ensure we remain at the cutting edge of design and manufacture.

Our programme capabilities now encompass all product lines including silencer design and performance prediction, structural design, coding calculations and material selection.

FLO-DYNE

LIQUID PULSATION DAMPENERS

Multi-plunger high pressure reciprocating plunger power pumps produce damaging levels of pulsation and vibration. Reduction of these detrimental forces can be achieved by fitting the Flo-Dyne liquid filled liquid pulsation dampener. The spherical design offers a low weight and low cost solution which is maintenance free with a low cost of ownership. Units are manufactured to all European and American pressure vessel codes, can be CE marked and produced in a variety of carbon, duplex or super duplex stainless steels.

PUMP SUCTION STABILISERS

Insufficient positive inlet pressure, or NPSHA, at the inlet of a multi-plunger reciprocating power pump will result in too high an acceleration head leading to damaging cavitation within the pump. Installing a Flo-Dyne Pump Suction Stabiliser at the inlet to the pump will eliminate this excessive acceleration head. Entrained gases in the liquid column are encouraged to separate by the internal design so that the most complete liquid charge possible is provided to the pump.

SURGE ARRESTORS

Flo-Dyne offers a total service from surge analysis, field survey and measurement to the design supply, installation and commissioning of hydro-pneumatic surge vessels for pumped potable, raw water and sewage mains with automated controls and high quality ancillaries. Accumulators and bladder type surge vessels are offered from a standard range with a variety of bladder materials to enable use with fluids normally aggressive to the basic butyl rubbers.

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PRODUCT MANUFACTURING

FLO-DYNE

Flo-Dyne offer UK and European manufacture to British, European and American pressure vessel codes and standards with full quality control to ISO9001; CE marking will be applied when required. Uncoded equipment is manufactured in the UK to high standards and all products can be made in a wide range of materials from ordinary carbon steels through to duplex and super duplex stainless steels.

REACTIVE SILENCERS

With rugged construction and a design free of an absorptive pack, Flo-Dyne multi-chamber reactive silencers are designed to eliminate the noise and pulsation of the predominant frequency due to the rotational speed of lobe type and multi-vane compressors.
This reactive silencer design achieves highly effective reductions in tonal radiation from air mains, for example on sewage treatment works, and large reductions in in-pipe pulsation levels, for example on VSA plants.

GAS PULSATION DAMPENING

Reciprocating gas compressors can generate high levels of pulsation in the suction, inter-stage and discharge lines, which can lead to excessive vibration levels and pipe failure. Flo-Dyne gas pulsation dampeners will eliminate these harmful pulsations with minimal pressure loss and power consumption.
Robust design combined with pressure vessel construction provides the most economical solution possible.

GAS DIFFUSER SILENCERS

High pressure drop across valves causes excessive noise and deterioration of valve components. Sharing the pressure drop between the valve and a Flo-Dyne diffuser will reduce valve wear and noise levels and often eliminate the need for expensive valve quiet trims. Built like a pressure vessel, the diffuser will be designed with the exact flow coefficient to deliver the correct back pressure at the valve to ensure optimum performance.

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