



*“We make liquids flow smoothly through the pipes”
Nº1 providing dampening solutions*

SELECTION GUIDE FOR **HIDRACAR** PULSATION DAMPENERS

HIDRACAR has many different pulsation dampener designs that meet the requirements of many types of liquid dosing circuits.

The aim of this article is to help you to choose the best HIDRACAR pulsation dampener design for your dosing pump application.

In HIDRACAR, we manufacture almost all the parts of our pulsation dampeners. We are specialists in rubber vulcanization. We vulcanize our own bladders and also conform our membranes. Of course, we machine all plastic and metallic components in our pulsation dampeners.

Below, we have summarized the model selection criterion of HIDRACAR standard pulsation dampeners, in order to select the most adequate and economic solution meeting the process design requirements and providing a long life service without damage in the parts in movement.

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1. HIDRACAR STANDARD PULSATION DAMPENERS

1.1. BLADDER PULSATION DAMPENERS

If the required design pressure is lower than 10-20 barg, the design temperature is lower than 60-70 °C and the chemical is compatible with one of our rubber compounds, then the most economic and efficient solution would be our **BLADDER PULSATION DAMPENERS WITH PLASTIC BODIES.**

If the required design pressure is greater than 20 barg and/or the design temperature is greater than 60-70 °C and the chemical is compatible with one of our rubber compounds, then the most economic and efficient solution would be our **BLADDER PULSATION DAMPENERS WITH METALLIC BODIES.**

Bladder dampener is the most common type and is used for the main applications. The multiple alternative combinations for body and bladder materials allow us to cover the most common requirements. They are suitable for hygienic/sanitary applications.



Volumes available: from 0,04 liters up to 35 liters.

We manufacture our standard plastic units in PVC, polypropylene and PVDF, with design pressures up to 10 barg. Special plastic dampeners can reach design pressures up to 20 barg.

We manufacture standard metallic units with stainless steel AISI-316L and carbon steel body; we can also use duplex, superduplex, alloys, hastelloys, or others.

NOTE: We can manufacture bladder dampeners up to 2000 barg design pressure.

We manufacture our bladders (separator element between gas and process liquid) in different rubber materials such as: Nitrile, EPDM, FKM, Butyl, Silicone, Aflas, Hypalon, etc.

1.2. PTFE BELLOWS PULSATION DAMPENERS

If the chemical requires the use of PTFE as a separator element and the working pressure is lower than 100 barg, then our **PTFE BELLOWS PULSATION DAMPENERS** are the best solution. Note that because of their shape, bellows dampeners are not adequate for hygienic/sanitary purposes and for liquids containing solid suspension particles.

Bellows dampeners reduce the wetted parts of the device, only the nozzle and the PTFE bellows itself are wetted elements.



Volumes available: from 0,15 liters up to 15 liters.

We manufacture nozzles (the wetted piece that includes the connection port) in different metals or plastics. We have standard nozzles of stainless steel AISI-316L and plastic (PVDF and PTFE with design pressures of 20 barg). We can use exotic materials for the nozzle upon request.

We manufacture the bodies of our standard units in stainless steel AISI-316L; we can also use other materials (metal or plastic) upon request.

If the process liquid is not compatible with AISI316L, we can use exotic materials (duplex, super-duplex, titanium or alloys), for the construction of the nozzle. In such cases, our PTFE **BELLOWS PULSATION DAMPENERS** have a great economic benefit since the wetted parts are just reduced to the nozzle (see the brochure in our BDOS catalogue).

For high temperature requirements (above 230°C), our bellows are made with stainless steel AISI-316-Ti.

We have designed our transfer dampener (a combination of bellows and bladder dampener) for a combination of high temperature (above 240°C) and pressures above 20 bars.

1.3. PTFE MEMBRANE PULSATION DAMPENERS

If the chemical requires the use of PTFE as a separation element and bellows dampeners are not suitable because any of the following reasons:

- Design Pressures are greater than 100 barg.
- The liquid contains particles
- There are space limitations constraints
- etc.

then our **MEMBRANE DAMPENERS** are the best solution.



Volumes available: from 0,2 liters up to 15 liters.

Membrane type is the optimum solution for high pressure (up to 700 bars). The design of membrane dampeners is more compact and adequate when there are space limitation constraints.

We conform our own membranes. Our membranes are double layered. The wetted part is made of TFM (modified PTFE) and FKM is used in the gas side in order to avoid gas diffusion.

Our standard units are produced with stainless steel AISI-316L body; we can also use other materials (metal or plastic) upon request.

2. HIDRACAR PULSATION DAMPENERS FOR SPECIAL APPLICATIONS

We have available special designs that cover special process specifications requirements, below a guideline:

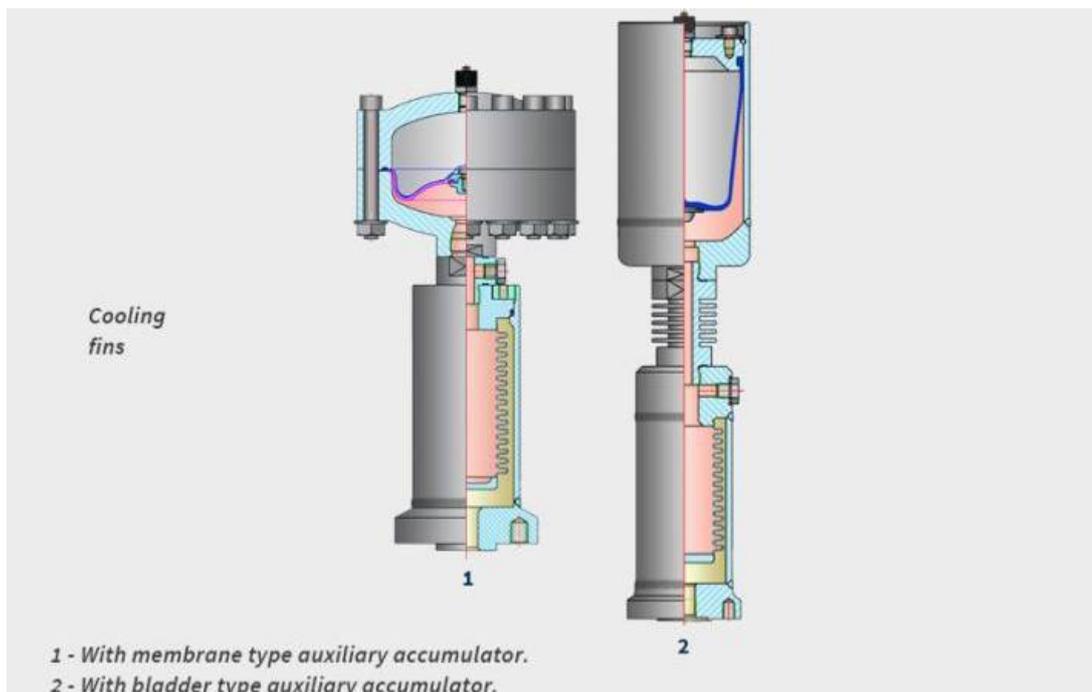
2.1. FOR VERY HIGH TEMPERATURES.

If the required design temperature is greater than 240°C, then the unique solution is our **AISI-316-Ti BELLOWS PULSATION DAMPENER.**

For pre-charge pressure below 16 barg, the solution is a single bellows dampener

For pre-charge pressure greater than 16 barg, our TRANSFER PULSATION DAMPENERS are available, which are made up of an AISI316-Ti bellows dampener acting as a pulsation transmitter and a top pulsation dampener (bladder or membrane dampener). Between these two parts, thermal oil is transmitting the pulsations and a cooler is installed when needed.

If the pressure is variable, we can place more than 1 unit with different pre-charge pressures and bellows limiting movement pin that will prevent the over elongation of the bellows when a certain working pressure is reached.



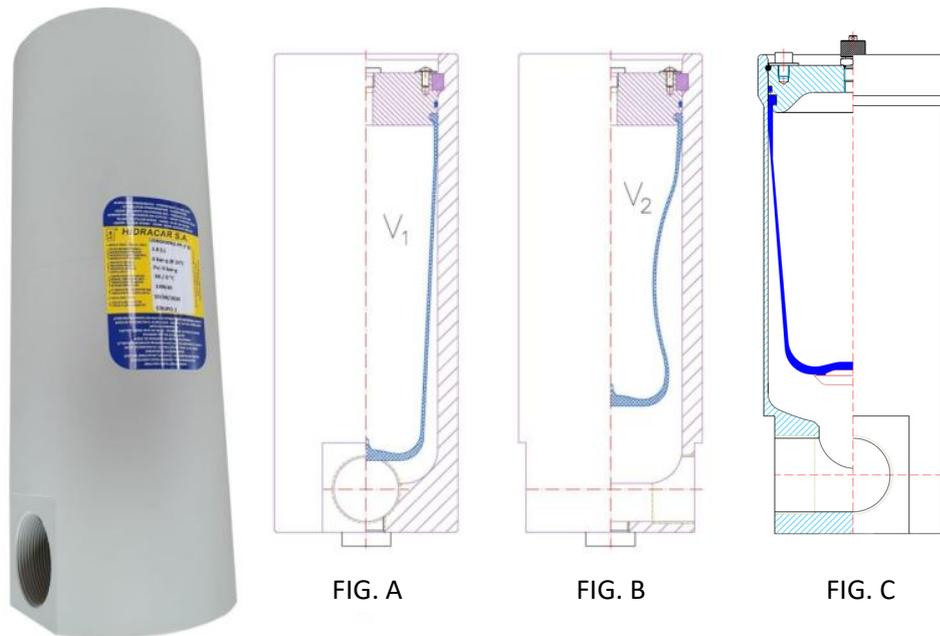
2.2. FOR SUCTION, HIGH FREQUENCY PRESSURE OSCILATIONS AND PERISTALTIC PUMPS.

In order to maximize the dampening efficiency for suction applications and also for high frequency pressure oscillations, our **BLADDER PULSATION DAMPENERS WITH 2 CONNECTION PORTS** are available.

The disposition of 2 connection ports also represents a significant benefit in **PERSITALTIC PUMPS** where discharge piping is commonly horizontal. With the utilization of our dampeners with 2 connection ports, the extra costs for the dampener implementation in the piping are reduced. This is because they can be installed aligned with the piping without using any T derivation.

The dampening efficiency is improved thanks to its special design:

- ✓ The 2 connection ports are aligned with the piping.
- ✓ The diameter of the Dampener's transversal threaded hole can be the same as the suction piping.
- ✓ The bladder is in direct contact with the vein flow.
- ✓ The pulsation dampener has a big passage hole through its interior thanks to a bigger special protection insert in the bladder.

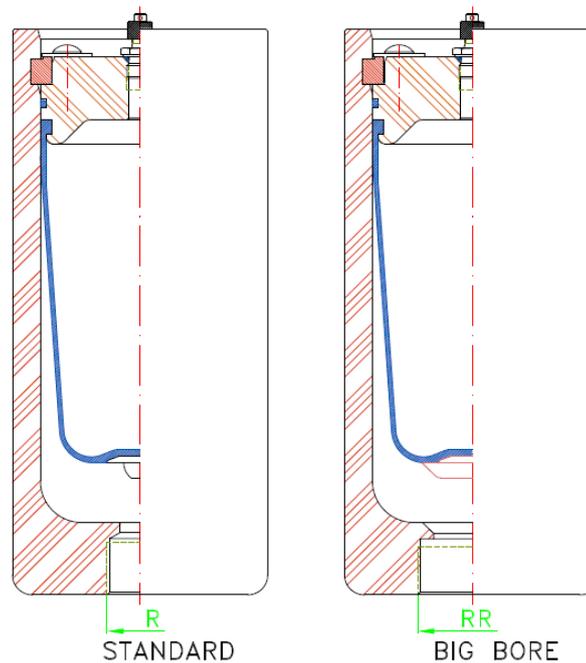


Available in polypropylene for design pressures up to 10 barg. Sizes from 0,65 to 20 liters. (FIG. A & B)
It is available in AISI-316L stainless steel for higher design pressures. Sizes from 0,65 to 35 liters. (FIG. C)

2.3. FOR APPLICATIONS WITH HIGH VISCOSITY PRODUCTS AND ALSO FOR SUCTION LINES.

In order to increase the dampening efficiency for those high viscosity fluid pumping applications, and also for suction lines, HIDRACAR considers providing a big passage hole through the dampener is crucial. For that reason, we developed our **BIG BORE BLADDER DAMPENERS**.

In these dampeners, the passage hole provided is greater than in our standard dampeners. The passage hole section provided is approximately **2 times larger (the passage section is 4 times larger)** than the one provided in the standard bladder dampener of the same volume. Bladders incorporate a special, bigger protection insert.



Available in all plastics (PVC, polypropylene and PVDF) for design pressures up to 10 barg. Sizes from 0,95 to 20 liters.

It is available in AISI-316L stainless steel for higher design pressures. Sizes from 0,95 to 35 liters.

2.4. FOR VARIABLE PRESSURE APPLICATIONS AN AOD PUMPS.

For low pressure applications, and for applications in which the pressure may vary, we designed our **ACTIVE DAMPENER**.

The active dampener is a **PTFE BELLOWS DAMPENER** or **MEMBRANE DAMPENER** where the bellows' movement is limited thanks to the action of a special active valve.

The dampener's pre-charge is automatically regulated in function of the liquid working pressure.

We have it available in 3 sizes for bellows type: F015(1,5) – F030(2,6) – F060(5,6) (liters)

We have it available in 3 sizes for membrane type: M012(1,1) – M030(2,5) – M060(5) (liters)

External housing in AISI-316L.

Nozzles for bellows type (wetted parts) are available in AISI316L, PTFE, PVDF and other plastics or exotic metals.

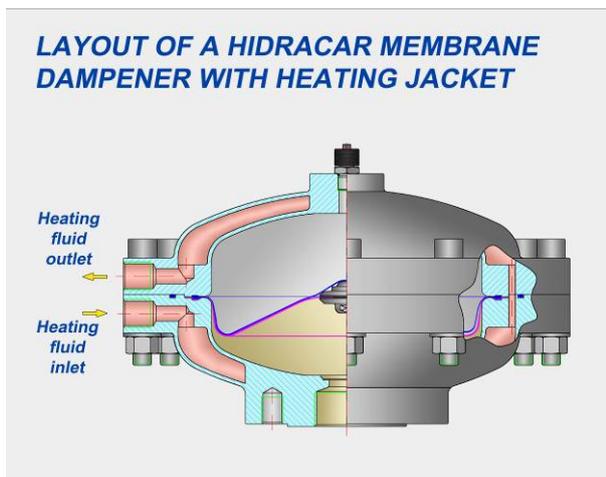
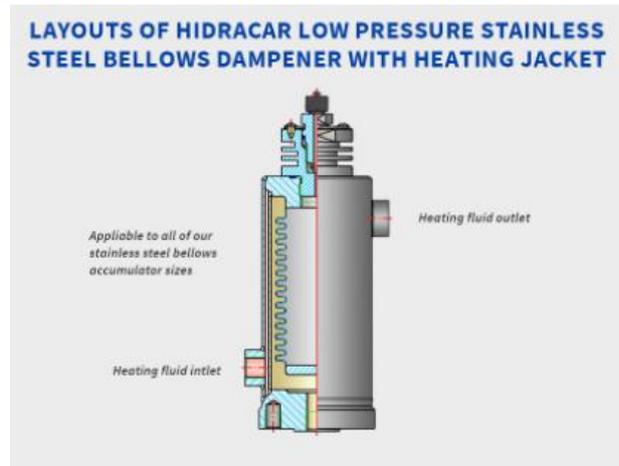
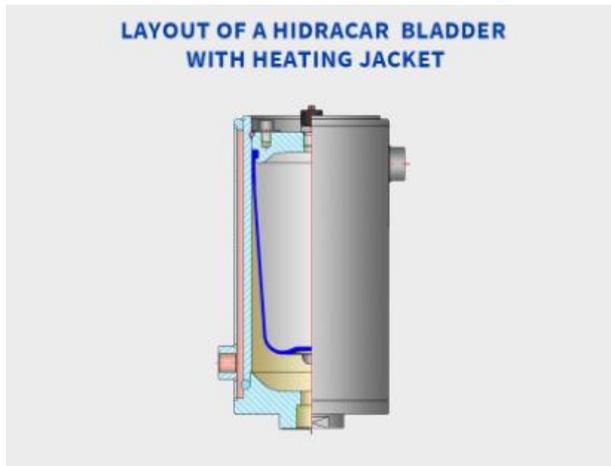
See below a picture of the active dampener cycling tests for durability verification.



2.5. FOR APPLICATIONS WHERE THE FLUID HAS TO BE HEATED OR REFRIGERATED.

For those applications where the pumped fluid requires heating or refrigerating in order to maintain its viscosity properties, we have available **HEATING JACKETS**.

All HIDRACAR pulsation dampeners (bladder, membrane and bellows type) can incorporate heating jackets.



If the installation of heating liquid is not available in the process, we can also provide the dampeners with an external envelopment of heating resistors.

3. HIDRACAR HYGIENIC/SANITARY PULSATION DAMPENERS

In HIDRACAR we have developed different designs for food/beverage and pharmaceutical industries. We have 2 options available:

3.1. IN-LINE DAMPENERS.

It is a corners free design which is suitable for **CLEAN IN PLACE processes** (CIP and SIP). The dampener has 2 connection ports and is made in AISI316L. The disposition of the dampener is aligned with the piping. Wetted AISI-316L parts are internally polished till 0,8 microns.

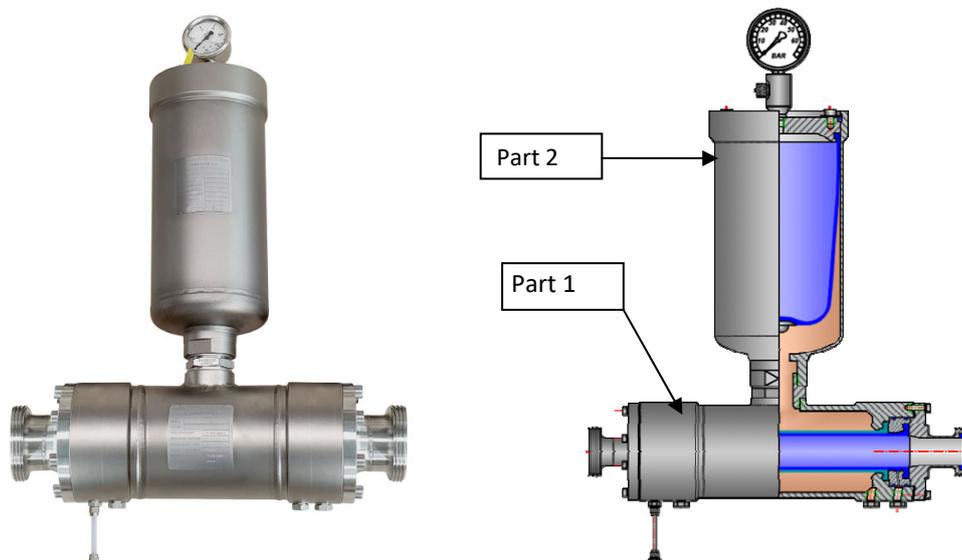
The dampener has 2 FDA rubber hoses and a breakage indicator. In case of hose rupture, a signal is evidenced and the 2nd hose will continue dampening. Therefore, the hose replacement can be done in a programmed maintenance operation. For the hose breakage indicator, we have available a visual indicator or electronic sensor also.

HIDRACAR doesn't recommend the use of the IN-LINE dampener for fluids having abrasive or edged particles since they might damage the hoses.

The IN-LINE dampener consists in 2 main parts:

- PART 1. In-line pulsation transmitter.** It is the part in contact with the process. It is aligned with the piping and transmits the pulsation to the top pulsation damper thanks to an intermediate liquid in between both. There are 2 rubber hoses and its design is corners free. We normally install a visual hose breakage indicator but we can optionally include an electrical sensor for that purpose. We currently have 3 sizes L001, L002 and L004.
- + Intermediate liquid** (distilled water or FDA silicone oil) in between the In-line pulsation transmitter and the top dampener.
- PART 2. Top pulsation dampener.** It is not in contact with the process and only with the intermediate liquid. It is a standard bladder pulsation dampener. It is pre-charged with gas. We have different volumes available from 0,04 to 5,6 liters gas volume. We always provide a pressure gauge on the top to see the pre-charge value and the pressures oscillations.

The IN-LINE pulsation dampeners are a combinations of the parts 1 and 2 described above.





3.2. HYGIENIC BLADDER DAMPENER.

It is a solution which is **CLEANABLE DISMANTLING THE BLADDER**. The dampener has one unique connection port. To be installed in a T derivation of the piping.

It is a bladder dampener in AISI316L which wetted parts are polished till 0,8 microns. The bladder is in FDA material.

If you need a 100% guarantee that the bladder and the dampener body are perfectly clean and sanitized, we can include a quick dismantling system to rapidly extract the bladder without any tools (hands only) for cleaning purposes. Once finished the cleaning pumping process, the bladder can be easily dismantled for its sanitization and then introduced again into the dampener body for the next pumping process.

TRICLAMP welded connections and other hygienic connections are available.

It is also available with 2 **connection ports or big bore** optionally.

Bladder hygienic dampener is available from 0,04 to 35 liters with different design pressures. Quick bladder dismantling system can be incorporated from 0,65 to 25 liters.



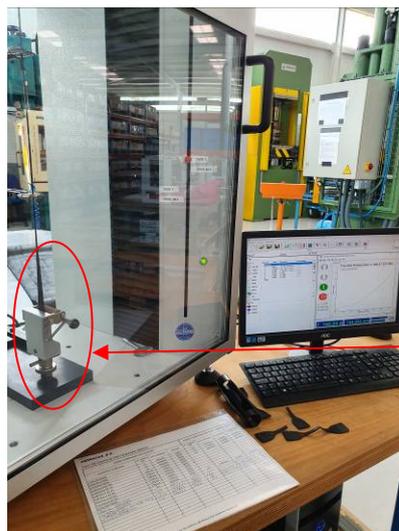
4. HIDRACAR QUALITY CONTROL

In HIDRACAR we are focused in the continuous improvement and in a 0 defects policy. In all our manufacturing processes we established very stringent quality controls included in our Quality Manual according to ISO 9001:2015. We would like to highlight the following quality control verifications:

- **PMI analysis.** We verify all incoming metallic raw materials with a PMI laser analyzer. The analyzer provides us the alloy designation and its composition in just a second.
The PMI analyzer is one of the fastest in the world and allows us to analyze 100% of incoming metallic materials.



- **RADIOACTIVITY verification.** We verify the radioactivity of all incoming metallic raw materials with a Geiger counter.
- **VULCANIZED RUBBER TENSILE STRESS-STRAIN AND TEAR STRENGTH tests.** In order to have a better quality control of the vulcanized finishing products, we have a traction/tearing testing machine. We do both tensile-strain and tear strength tests in each vulcanization batch.
The testing device is equipped with extensometer. We are able to register the rupture tensile strength of our rubber bladders and its elongation modulus.



- **POROSITY control of PTFE BELLOWS.** We test all our bellows in vacuum conditions in order to verify there's no porosity.