

Flexible solutions for automotive engineering

WITZENMANN

managing flexibility



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HYDRA

Quality by Witzenmann



DECOUPLING
ELEMENTS



RETURN PIPES



SPECIAL
APPLICATIONS

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WHEREVER YOU NEED US. ACROSS THE GLOBE.



America
Brazil
USA

Asia
China
India
Korea

Worldwide

Europe
Austria
Belgium
Czech Republic
France
Germany
Italy
Poland
Russia
Slovakia
Spain
Sweden
United Kingdom

At Witzemann, outstanding customer relations are core to our daily and ongoing objectives. To facilitate these relationships we are located in all the key markets across the globe, adjacent to our customers.

Our specialist technical knowledge in automotive engineering is backed up by many years of experience not only in this field, but also in other industrial applications. These synergies are evidenced by our product solutions.

These solutions are available globally (or Worldwide). Some 3000 staff, at our headquarters and in over 23 subsidiaries, are working constantly to provide you with solutions tailored to each of your technical and supply needs, combining optimum quality with maximum cost-effectiveness. Our group-wide integrated logistics system ensures that you receive all product when and where you require.

For Witzemann, this mission is in full accord with our tradition. We are, after all, the major flex supplier in Europe and a leading company worldwide.

MAKING TRACKS – FOR MORE THAN 100 YEARS.

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Pioneers and partners

Witzenmann has always been at the cutting edge of the market. Whether it be in 1885 as the inventor of metal hose or with any one of the 2000 other inventions patented during the history of company. Today, with some 150 years of experience behind us, it is piezo technology or CO₂ hoses which are being built with Witzenmann's expertise.

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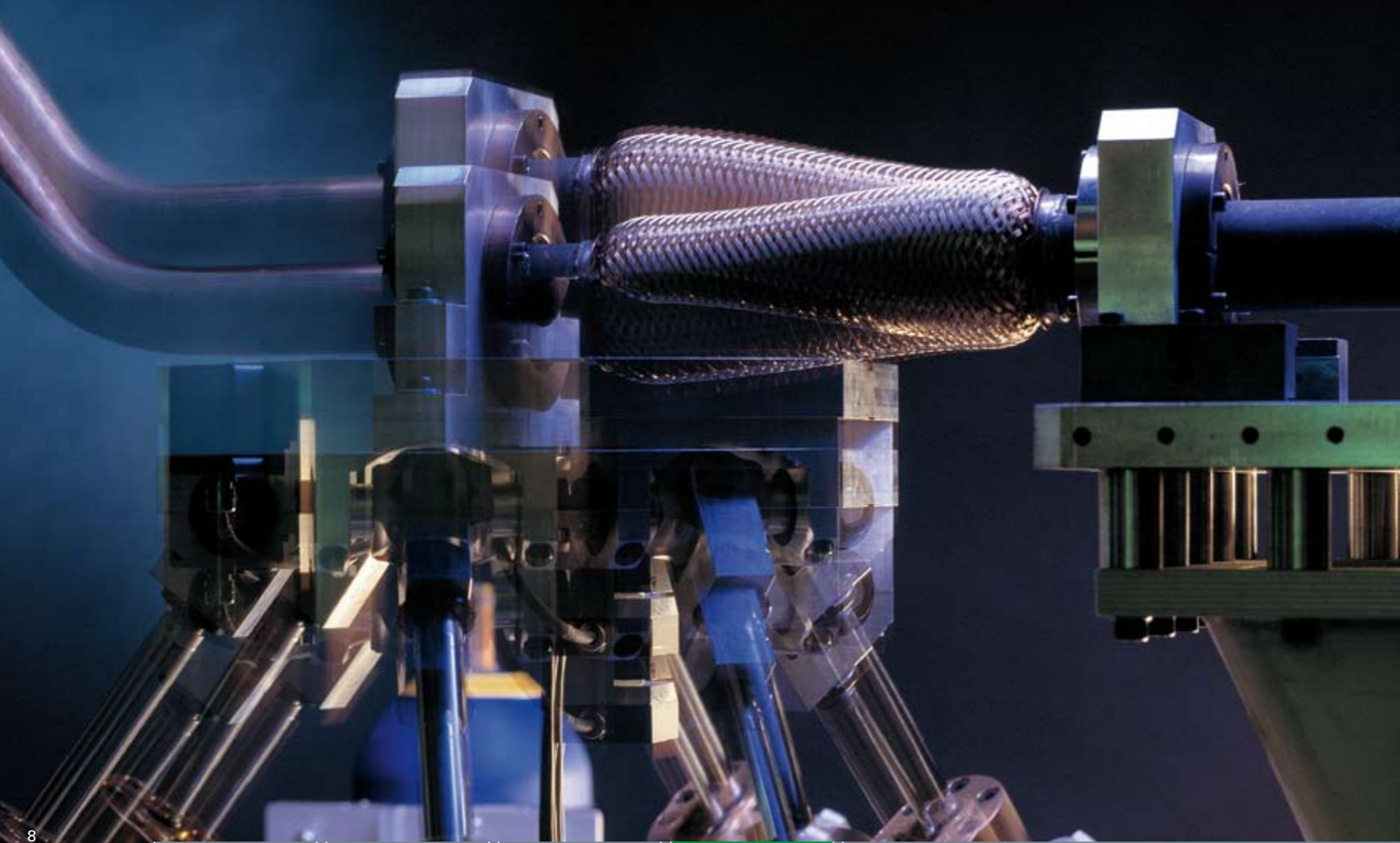
Mobility is a fundamental aspect of our age. People, information and goods are transported from one place to another with increasing speed. As people's ties to a specific location are reduced, their need for more comfortable, safe and environmentally sound vehicles increases.

It is essential that people have complete confidence in their vehicles under all driving conditions. The challenge to Witzenmann is to develop innovative product solutions which maintain performance and durability within all conceivable environmental conditions.

To execute this challenge we are constantly researching new approaches. Refining our visions to produce new products with highly demanding quality standards that perform perfectly under all possible conditions.

At Witzenmann we work with a passion that makes us the perfect partner and manufacturer for extremely flexible hoses, decoupling elements for exhaust systems, for exhaust and oil return pipes and much more.

All major European and American car and truck manufactures already rely on our product solutions which are used on all the World's roads and highways.



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Engineering-partners

Our headquarters in Pforzheim has a team of engineers working on the development of tailored product solutions for our customers. The team is supported by cutting-edge testing equipment, for example, the 6-axis vibration rig.

ENGINEERING IS THE FOUNDATION. SOLUTIONS ARE THE GOAL.



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The range of applications for vehicles is diverse and complex. We know that solving a problem requires more than just technical expertise. It requires vision and creativity, a sixth sense for new technology as well as an understanding and a sensitivity to the requirements of the customer. Our experts will accompany you from the very first project meeting, right through to detailed product development. Specialists will support your team from construction of the first prototype to completion of comprehensive testing and from pilot build through to full production.

Our development capacities, 150 years of production experience and our team of engineers offer you custom-made solutions that combine optimum quality and cost-effectiveness. This builds on our own high expectations which have always resulted in Witzenmann retaining technological leadership.

Witzenmann's outstanding product quality and reliability is achieved by comprehensive predictive analysis. Followed by a rigorous test program utilizing electrodynamic vibration rigs, hot gas and operational life test rigs and corrosion evaluation. This process ensures that when a product starts production it will have the ideal configuration withstanding all operational loads over the required service life.

DIVERSITY. QUALITY. ECONOMY.



References

- Alfa Romeo
- Audi
- BMW
- Citroen
- DaimlerChrysler
- Ferrari
- Fiat
- Hyundai
- Kia
- Mitsubishi
- Opel
- Peugeot
- Porsche
- Renault
- Rover
- Saab
- Seat
- Skoda
- VW
- Volvo

In order to ensure ongoing optimum quality components from production are regularly tested on our durability rigs, often beyond the design life.

Witzenmann highest measure of quality is your assessment of the quality of our products. A high level of customer satisfaction is for us the greatest motivation to optimize quality.

That we have been pursuing these goals consistently for many years is evidenced by the fact that we were the first in our sector to acquire DIN ISO 9001 certification in 1994 and that we have been accredited ISO TS 16949 since 2003.

These are just a few of the reasons why our customer list reads like a Who's Who of European automobile manufacturers and system suppliers. Manufacturers and suppliers throughout the world are also increasingly relying on quality products from Witzenmann.

Reason enough for us to continue promoting our cooperation with you and to constantly further develop our product solutions. Which is something that we are regularly proving at both national and international level.



Solutions

We offer customized product solutions combining optimum quality and cost-effectiveness. Such solutions unite technical expertise with vision, creativity and sensitivity to the requirements of the customer.

TAILORED SOLUTIONS ARE STOCK IN TRADE



Decoupling elements

For installation in the vicinity of the engine, short, load-bearing elements are the components of choice. To enable almost complete decoupling, extremely flexible elements are available in a wide range of models. All Witzemann bellows designs meet the most stringent leak test requirements.

Return pipes

These are used to reduce emissions of harmful substances from engines and to ensure the oil supply to engines and turbochargers. They compensate for thermal expansion, assembly tolerances, vibrations and power unit movements even at extreme temperatures. Combining rigid and flexible components makes for

a blend of simple assembly and reliable compensation of the assembly tolerances and power unit movement while meeting the highest possible safety requirements.

Special applications

Bellows solutions for current and future engine technologies ensure smoother running engines and improved fuel efficiency. Flexible metallic systems are the perfect solutions for fuel or CO₂ pipes. The range of applications for our products is practically unlimited. This, coupled with the solution skills of our engineers guarantees you the ideal product for your special application.



Installation



Fields of application

- Decoupling of movements in exhaust systems and angular, lateral and axial engine vibrations
- Universal application, particularly suited for frontpipe installation close to the engine
- Also for use as exhaust expansion elements for special requirements

Available forms

- Currently available in all common connection diameters
- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios

Technical characteristics

- Compact design
- Technically gas-tight due to metal bellows
- Self-supporting
- Element with specifically adapted damping properties
- Flow channeling through stripwound hose as a liner
- Temperature-resistant due to suitable selection of materials and multilayer construction
- Corrosion-resistant due to suitable selection of materials



Installation



Fields of application

- Decoupling of movements and engine vibrations, primarily angular
- Universal application, particularly suited for frontpipe installation close to the engine
- Also for use as exhaust expansion elements for special requirements

Available forms

- Currently available in all common connection diameters
- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios

Technical characteristics

- Compact design
- Technically gas-tight due to metal bellows
- Self-supporting, good load-bearing properties, in particular perpendicular to the longitudinal axis
- Element with damping properties, particularly in the high-frequency range
- Flow channeling through inner pipe
- Temperature-resistant due to suitable selection of materials and multilayer construction
- Corrosion-resistant due to suitable selection of materials



Installation



Fields of application

- Universal application, particularly suited for frontpipe installation close to the engine
- Decoupling of movements and angular, axial and lateral engine vibrations in the vicinity of the frontpipe

Available forms

- Currently available in all common connection diameters
- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios

Technical characteristics

- Linear component characteristics within the working area:
 - no progression without inner liner
- Compact design
- Technically gas-tight due to metal bellows
- Element with damping characteristics for solid-borne noise
- Flow channeling through flow pipe or inner braiding
- Temperature-resistant due to suitable selection of materials
- Corrosion-resistant due to suitable selection of materials

Fields of application

- Decoupling of movements in large exhaust systems and angular and lateral engine vibrations as well as axial vibrations with suitable design
- Universal application throughout entire exhaust system

Available forms

- Hose with external braiding
- Hose with exterior mesh
- Hose with oval cross-section
- Hose with liner
- Hose with inner braiding

Technical characteristics

- Technically gas-tight due to metal bellows
- Element with damping properties when using stripwound hose liner design
- Flow channeling with stripwound hose liner or inner braiding design
- Temperature-resistant due to suitable selection of materials
- Currently available in all common connection diameters and lengths
- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios



Installation

Fields of application

In the vicinity of the manifold, used to take up thermal expansion

Available forms

- Wire-clamped, as vibration damper, prevents noise emission
- Single-layer or multilayer
- Customer-specific connections
- Currently available in all common connection diameters

Technical characteristics

- Technically gas-tight due to metal bellows
- Temperature-resistant due to suitable selection of materials
- Corrosion-resistant due to suitable selection of materials
- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios



Installation

Fields of application

Decoupling of high-frequency vibrations caused by an exhaust turbocharger

Available forms

- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios
- Customer-specific connection formats

Technical characteristics

- Short, compact construction
- The bell-end allows for a removable connection to the exhaust turbocharger
- Technically gas-tight due to metal bellows
- Self-supporting with very high static rigidity
- Flow channeling through flow pipe
- Temperature-resistant due to suitable selection of materials and multilayer construction
- Corrosion-resistant due to suitable selection of materials



Installation

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Fields of application

Exhaust gas return pipes for use on petrol and diesel engines

Available forms

- Designed to customer specifications
- Bent in the smooth or corrugated sections
- Connection diameters of 8 - 32 mm using flange, V end-connection or according to customer specification
- Bending radius up to 1x diameter
- With insulation
- Wall thicknesses of 0.3 - 1.0 mm

Technical characteristics

- Compensation of vibrations, thermal expansion, assembly tolerances
- Technically gas proof due to all-metal construction
- Temperature-resistant due to suitable selection of materials
- Corrosion-resistant due to suitable selection of materials
- Lightweight due to thin walled output pipe



Installation

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Fields of application

Oil return pipes for use on turbocharged petrol and diesel engines.

Available forms

- Designed to customer specifications
- Bent in the smooth or corrugated sections
- Connection using flange, screw joint or according to customer specification

Technical characteristics

- Compensation of vibrations, thermal expansion, assembly tolerances
- Technically oil-proof due to all-metal construction
- Temperature-resistant due to suitable selection of materials
- Corrosion-resistant due to suitable selection of materials
- Lightweight due to thin walled output pipe

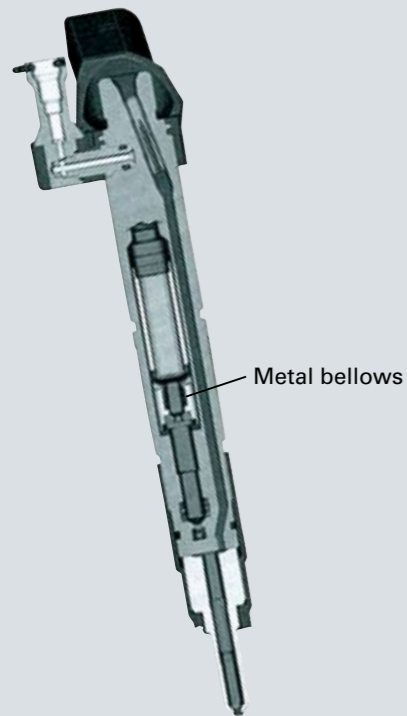
Millimeters



Installation

Fields of application

Metal bellows as highly dynamic seal in piezo injectors



Technical characteristics

- Flexible sealing of piezo element against fuel
- Pressure-resistant up to and above 300 bar
- Durable construction for movement and pressure pulses: >1,000,000,000 load cycles
- Special test rigs and corresponding expertise for component validation
- Corrosion-resistant to all known fuels
- Special materials available
- Cost-effective manufacture due to state-of-the-art manufacturing technologies
- Can be supplied as bellows or as a complete assembly
- Individually optimized design with regard to functions, installation space, ease of installation, costs

Fields of application

- Fluid pipes for use close to the engine
- Decoupling of engine movements and angular, lateral and axial vibrations

Available forms

- Currently available in all common connection diameters
- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios

Technical characteristics

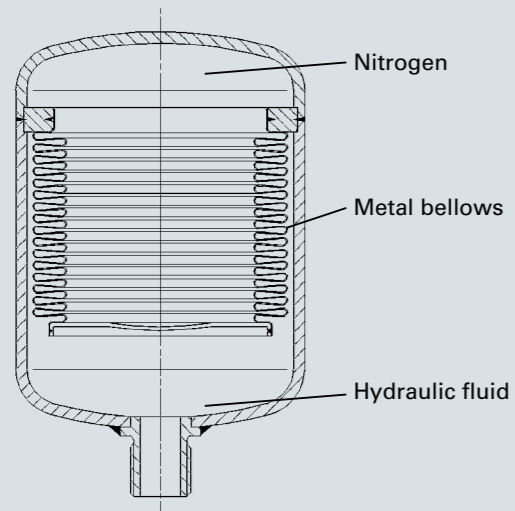
- Permeation-proof due to metal hose
- Suitable for high system pressures
- Temperature-resistant due to suitable selection of materials and multilayer construction
- Corrosion-resistant due to suitable selection of materials



Fields of application

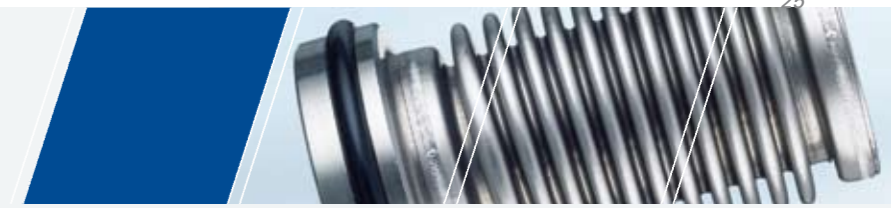
Diffusion-proof separation diaphragm for gas pressure accumulators for private vehicle brake systems and other hydraulic systems

Functional principle



Technical characteristics

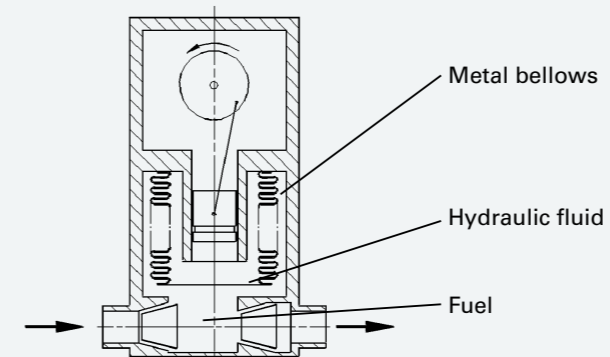
- Diffusion-proof and permanent separation of gases and fluids in systems with pressures up to and above 200 bar
- Corrosion-resistant to all known brake fluids and hydraulic oils
- Resistant to aging and practically free from wear, requiring no replacement
- Endurance tested design to individual customer specifications
- Individually optimized design with regard to functions, installation space, ease of installation, costs
- Special test rigs and corresponding expertise for component validation
- Cost-effective manufacture due to state-of-the-art manufacturing technologies
- Delivery of complete bellows assembly including responsibility for procurement of purchased parts



Application

Durable separation diaphragm for high-pressure fuel pumps

Functional principle



Technical characteristics

- Diffusion-proof, flexible seal between hydraulic oil and fuel
- Durable construction for movement and pressure fluctuations: >1,000,000,000 load cycles
- Resistant to aging and free from wear, requiring no maintenance
- Special test rigs and corresponding expertise for component validation
- Corrosion-resistant to all known fuels
- Cost-effective manufacture due to state-of-the-art manufacturing technologies
- Supplied as bellows unit ready for installation
- Individually optimized design with regard to functions, installation space, ease of installation, costs



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Installation

Fields of application

The metal bellows is employed in power steering systems in conjunction with a torsion bar

Functional description

The metal bellows creates additional torsion resistance at the very beginning of a steering movement.

This effect ensures excellent steering stability (responsiveness) at high speeds.

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Fields of application

- Damps mechanical tappet movements directly in the engine
- Less wear, smoother running, safer design compared with external pressure damper
- Higher engine speeds are possible

Available forms

- Geometrical and technical properties can be adapted to the given customer-specific installation scenarios

Technical characteristics

- Manufactured completely from stainless steel
- Resistant to aggressive substances such as petrol or oils
- Various profiles designed with FEA and tested
- Individually optimized for pressure and volume
- Extremely thin walls