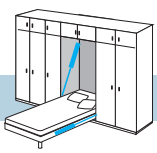
SUSPA

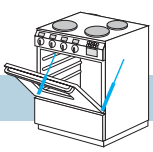
softline

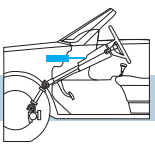
Hydraulic Dampers.

soft*line* – quick and to the point

Contents







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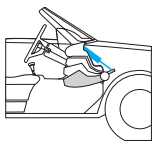
Areas of Application – Safety and Comfort in Automotive Technology

SUSPA – Partner in the Automotive Industry

By damping impacts, shocks and vibration occurring in driving, we provide for comfort and safety for driver and vehicle in the automotive branch with our damper program.

Driver's seat damping in commercial vehicles

Damping of oscillation and vibration for comfortable and health-oriented sitting in commercial vehicles.

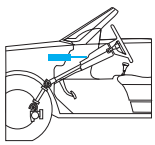


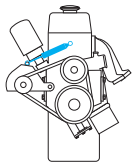
Glove compartment dampers

Damping for easy and quiet opening and closing of the glove compartment.

Steering column adjustment in automobiles

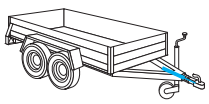
The steering column adjustment for optimal distance between driver and steering wheel for pleasant and safe driving, even over longer distances.





Damping for belt tensioners

Damping prevents the belt from knocking and thus ensures operating safety and increases service life.

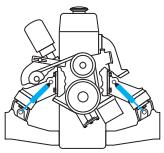


Dampers for overrun brakes

The damper regulates the response performance of the trailer brake when a change in speed occurs and thus ensures operating safety.

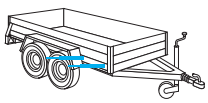
Motor damping in automobiles

Damping for the protection of the motor and increased driving comfort through compensation of oscillations occurring in driving.



Undercarriage dampers for small trailers

Driving comfort is increased through damping.



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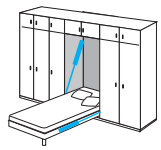
Areas of Application – Safety and Comfort at Home, in Leisure Time and at Work

SUSPA – Your Partner in the Furniture and Household Appliance Industry

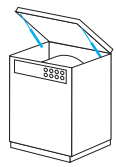
Our extensive program damps oscillation and impacts in the household and at work comfortably and safely, for example in swinging doors in kitchen cabinets, seat damping in office chairs, etc.

Foldaway cupboard bed

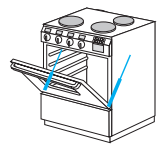


Seating surface damping

Toploading washing machine lid



Stove/oven door



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Design and Functional Principles

Damping as Core Competence

Hydraulic dampers are damping elements that convert the kinetic energy of moving components into thermal energy and thereby reduce hard shocks or avoid too high oscillation amplitudes.

Hydraulic dampers consist of a pressure tube, a piston rod with a special piston system, and the damping medium oil.

The piston rod is located within the oil-filled pressure tube with its special seal and guiding system which hermetically seals the inner compartment of the hydraulic damper against the atmosphere, also under extreme environmental influences.

The damping medium oil is pressed through the damping bores in the piston system through the movement of the piston rod.

The damping forces are therefore always also dependent upon the piston speed.

Because the damping borings can be closed respectively to either side by way of valve washers, it is possible to regulate the damping forces in extension and compression directions largely independent of one another.

The damping force upon compression determines the hardness of a shock absorber upon retraction.

The damping force upon extension regulates the extension speed.

Damping characteristics that can be set linear, progressive or degressive make a damper design oriented on the application possible.

A broad spectrum of fittings for pressure tube and piston rod also belongs to our program, ensuring an optimal connection to your individual application.

As your specialist for damping technology, we are capable of realizing your individual wishes and requirements for optimal damping performance, highest service life and perfect function.

Quality and Trust as a Maxim

Over 30 years of experience in the area of damping technology stand for the name SUSPA. This experience is reflected in the high level of quality of our hydraulic dampers.

Quality is not only a catchword for us, but rather a maxim that characterizes the entire company. We have proven this, for example, in the implementation of an effective and wide-spread quality management system, from purchasing to production to sales.

The demand for quality has steadily increased in the automobile industry as well as in other industrial branches. Certification in accordance with DIN EN ISO 9001 has therefore long gone without saying at SUSPA.

The high standard of quality in our company is further cemented by the fact that SUSPA was certified as one of the first companies according to ISO/TS 16949. This is a new standard, developed by the international automobile industry, that summarizes and broadens the already high demands of the certification standards QS 9000, VDA 6.1, EAQV and AVSQ. This certification is recognized by both the American and European automobile industry and represents the highest quality recognition currently possible in the automotive branch.

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soft*line*-Hydraulic Dampers – Selection Matrix

Selection Criteria	Force Classes				Idle Stroke		Independence Of Position		Extension Force		Characteristics			Adjustability	
Model Hydraulic Damper	0 - 100 N	100 - 1.000 N	1.000 - 3.000 N	over 3.000 N	yes	no	yes	no	yes	no	linear	pro-gressive	de-gressive	yes	no
HD 15	•	max. 500 N			•			•		•		•			•
HD 15 GD	•	max. 500 N				•		•	•			•			•
HD 15 GDTK	•	max. 500 N				•	•		•			•			•
HD 22		•	•		•			•		•		•			•
HD 24		•	•		•			•		•	•	•	•		•
HD 24 GD		•	•			•	•		•		•	•	•		•
HD 24 GDTK		•	•			•	•		•		•	•	•		•
HD 24 BV		•	•			•		•		•	•	•	•		•
HD 24 BVM		•	•			•	•			•	•	•	•		•
HD 28		•	•	•	•			•		•	•	•	•		•
HD 28 GD		•	•	•		•	•		•		•	•	•		•
HD 28 GDTK		•	•	•		•	•		•		•	•	•		•
HD 28 BV		•	•	•		•		•		•	•	•	•		•
HD 28 BVM		•	•	•		•	•			•	•	•	•		•
HD 28 adjustable		•	•	•	•			•		•	•	•	•	•	
HD twin-tube oval		•	•			•		•		•	•	•	•		•
HD twin-tube adjustable		•	•	•		•		•		•	•	•	•	•	

Legend: GD: gas pressure, GDTK: gas pressure and separator piston, BV: bottom valve, BVM: bottom valve and diaphragm

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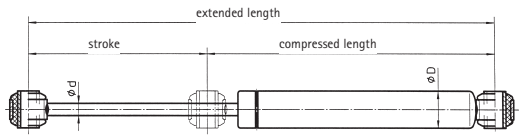
Your Individual Design Data

Area of Application	Description of the application for which you wish to use a damper	_____
Quantity per Year	Annual requirement of dampers	_____ requirement (pcs.):
Compression and Extension Force	Hardness (or response performance) of the damper upon retraction	_____ force (in N)
Idle Stroke	With idle stroke: damping force occurs with delay upon load reversal Without idle stroke: damping force occurs immediately upon load reversal	☐ with ☐ without
Independence of Position	Any installation position of the damper can be chosen	☐ yes ☐ no
Force of Extension	Desired force of extension	_____ with (force in N) ☐ without
Characteristics	Progress of damping force (F) over speed (v) 	☐ linear ☐ degressive ☐ progressive
Adjustability	Must the damping force be adjustable?	☐ yes ☐ no
Available Installation Space	Installation dimensions according to drawing 	_____ extended length (in mm) _____ compressed length (in mm) _____ stroke (in mm)

Your Contact Data:

_____
Customer Name / Company

_____ _____
Date Department, Contact Person

_____
Street

_____
Zip Code, Town or City

_____
Country

_____
Phone Fax

_____
Signature

For information please fill out and fax to: +49 (9187) 930-313

The staff of our Applications Technology Department **soft***line*-Hydraulic Dampers is available to answer any questions you might have. Just give us a call!

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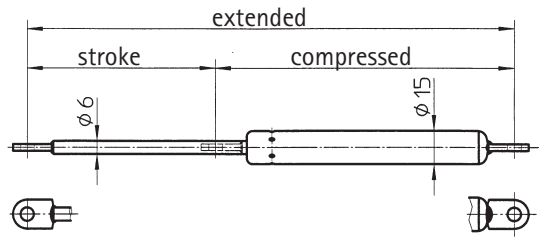
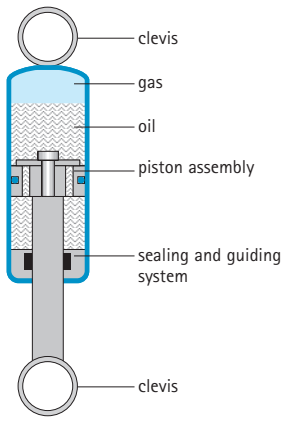
HD 15



HD 15 Standard

Standard damper for diverse applications in low force areas. A vacant space remains in the pressure tube for the volume of the piston rod. A slight idle stroke results, meaning that damping force only occurs after several millimeters of path.

- Damping force max. 500 N
- Without extension force F_1
- With idle stroke
- Fixed position (installation with piston rod pointing downward)



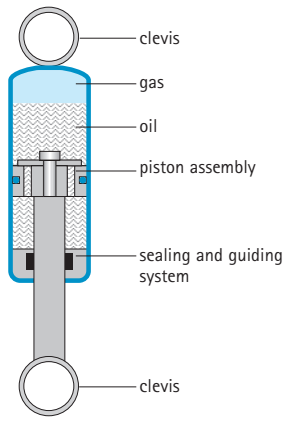
Applications:
- Glove compartments
- Office shelf systems
- Kitchen cabinets
- Commercial vehicle seats
- Laundry dryer lids
- Universally usable

HD 15 GD

(with gas pressure)

The vacant space is filled with gas in this version. This damper is therefore usable independent of installation position.

- Damping force max. 500 N
- Without extension force F_1
- Without idle stroke
- Independent position (installation with piston rod in any position)



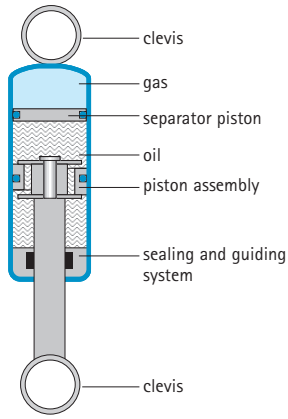
Applications:
- Glove compartments
- Automobile trunks
- Hinges
- Various flaps

HD 15 GDTK

(with gas pressure and separator piston)

In this version, the oil chamber is separated from the gas compartment, which is under pressure, by a sealing separator piston. The damper can therefore be installed in any position desired and possesses no idle stroke. This has as a consequence that the damping force immediately sets in upon load condition.

- Damping force max. 500 N
- With extension force F_1
- Without idle stroke
- Independent position (installation with piston rod in any position)



Applications:
- Seat adjustments (horizontal)

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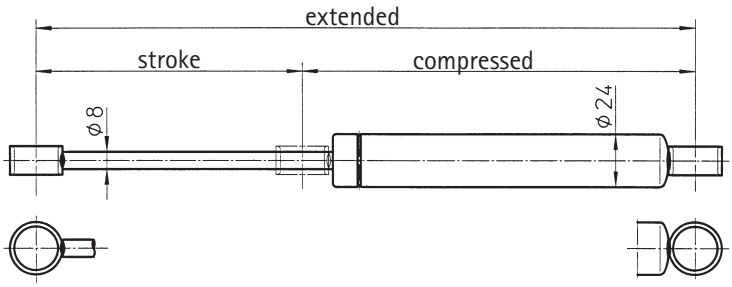
HD 24

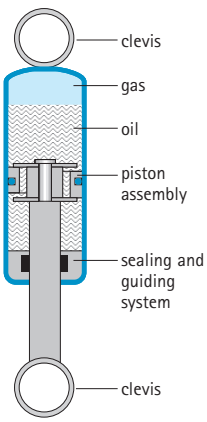
Technical Information



HD 24 Standard

The classical hydraulic damper with throttling port and valve system for diverse applications. A vacant space remains in the pressure tube for the volume of the piston rod. A slight idle stroke results, meaning that damping force only occurs after several millimeters of path.

- Damping force max. 4000 N
- Without extension force F_1
- With idle stroke
- Fixed position (installation with piston rod pointing downward)



Applications:

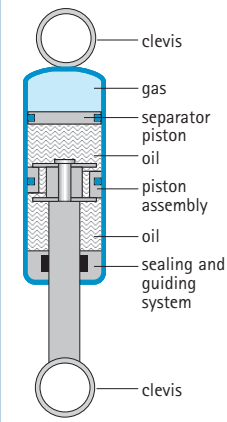
- Kitchen cabinets
- Commercial vehicle seats
- Universally usable

HD 24 GDTK

(with gas pressure and separator piston)

In this version, the oil chamber is separated from the gas compartment, which is under pressure, by a sealing separator piston. The damper can therefore be installed in any position desired and possesses no idle stroke. This has as a consequence that the damping force immediately sets in upon load condition.

- Damping force max. 4000 N
- With extension force F_1
- Without idle stroke
- Independent position (installation with piston rod in any position)



Applications:

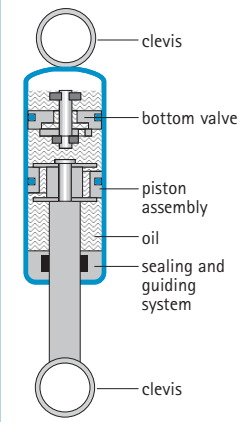
- Overrun brakes

HD 24 BV

(with bottom valve)

The oil chamber is separated from the gas compartment by way of a bottom valve in this type of damper. For specific applications: Idle stroke freedom is achieved without extension force.

- Damping force max. 2500 N
- Without extension force F_1
- Without idle stroke
- Fixed position (installation with piston rod pointing downward)



Applications:

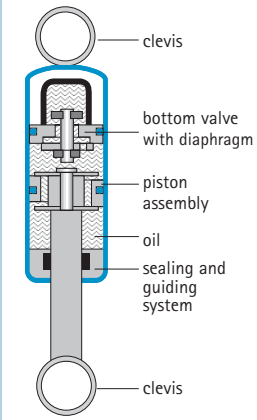
- Belt tensioners
- Motor vibration dampers

HD 24 BVM

(with bottom valve and diaphragm)

The diaphragm in the balance chamber, behind the bottom valve, expands upon load (compression) and contracts upon extension. For specific applications: Idle stroke freedom without extension force is achieved for independent choice of installation position.

- Damping force max. 2500 N
- Without extension force F_1
- Without idle stroke
- Independent position (installation with piston rod in any position)



Applications:

- Overrun brakes
- Belt tensioners
- Commercial vehicle seats

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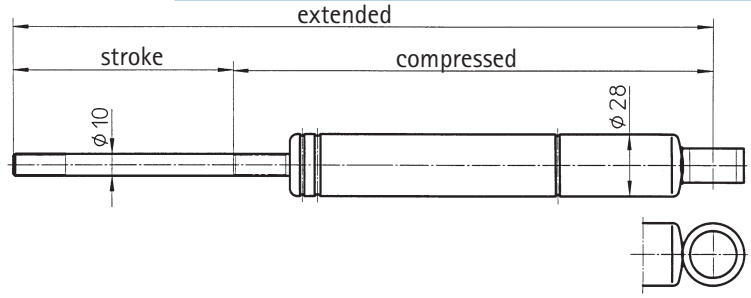
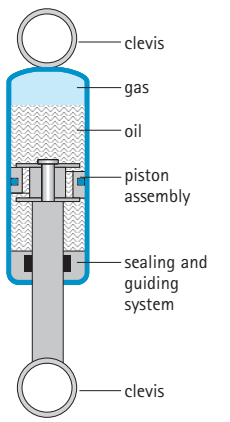
HD 28



HD 28 Standard

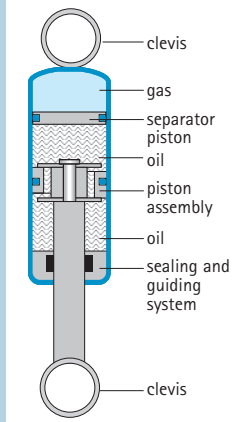
- Damping force max. 8000 N
- Without extension force F_1
- With idle stroke
- Fixed position (installation with piston rod pointing downward)



Applications:
- Commercial vehicle seats
- Universally usable

HD 28 GDTK

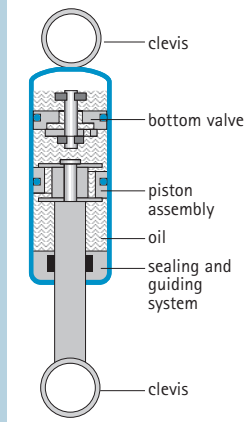
- Damping force max. 8000 N
- With extension force F_1
- Without idle stroke
- Independent position (installation with piston rod in any position)



Applications:
- Overrun brakes

HD 28 BV

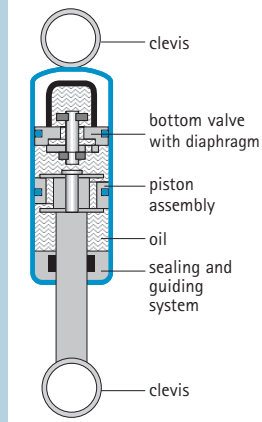
- Damping force max. 5000 N
- Without extension force F_1
- Without idle stroke
- Fixed position (installation with piston rod pointing downward)



Applications:
- Belt tensioners
- Motor vibration dampers
- Overrun brakes

HD 28 BVM

- Damping force max. 5000 N
- Without extension force F_1
- Without idle stroke
- Independent position (installation with piston rod in any position)



Applications:
- Overrun brakes
- Belt tensioners
- Commercial vehicle seats

This line of damper models corresponds functionally to the HD 24 line of models (see page 9).

The increased size makes higher damping forces possible.

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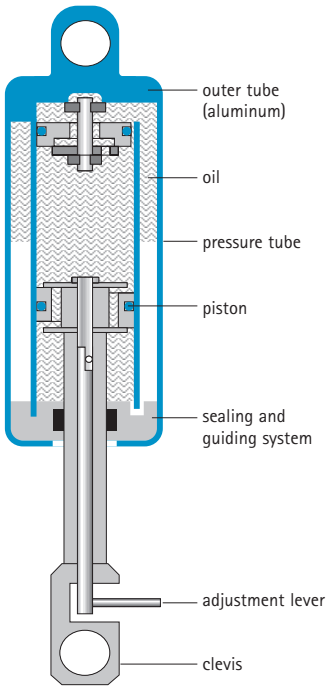
HD Twin-Tube

Technical Information



HD Twin-Tube Adjustable

Two tubes with unlike diameters are arranged concentrically. The inner tube represents the working area. The space between the inner and outer tubes is the balance chamber that takes up the oil pressed out by the retracting piston rod.

Especially worthy of mention are the freely adjustable damping forces – according to need even unlike in extension and compression directions. In addition, the extremely light weight of the damper – achieved by the use of an aluminum outer pipe.

- Ø outer tube 38 mm (aluminum tube)
- Ø piston rod 10 mm
- Damping force max. 6000 N
- Without extension force F_1
- Without idle stroke
- Fixed position (installation with piston rod pointing upward)

Special features:

- Damping force freely adjustable
- Various damping forces in compression and extension direction possible

Applications:

- Commercial vehicle seats (vertical damping)

HD Twin-Tube Oval

The HD oval tube is based on the same twin-tube principle: The inner tube represents the working area and the space between the inner and outer tubes is the balance chamber that takes up the oil pressed out by the retracting piston rod. The damping force is not adjustable in this type of damper.

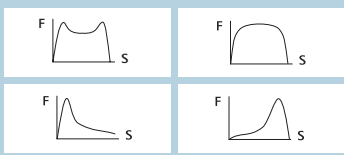
The equalizing volume of the damper is increased through the oval form of the tubes. This means that the greatest possible stroke with a relative small total length of the damper can be realized. The advantage is obvious: The damper is also suitable for very small and narrow installation spaces.

A further advantage is the reduction of weight through the use of an aluminum outer tube.

- Aluminum outer tube
- Ø piston rod 8 mm
- Damping force max. 4000 N
- Without extension force F_1
- Without idle stroke
- Fixed position (installation with piston rod pointing upward)

Special features:

- Damping performance path-dependent
- The level of damping force (F) can be variously determined by the stroke (s).



Applications:

- Commercial vehicle seats (vertical damping)

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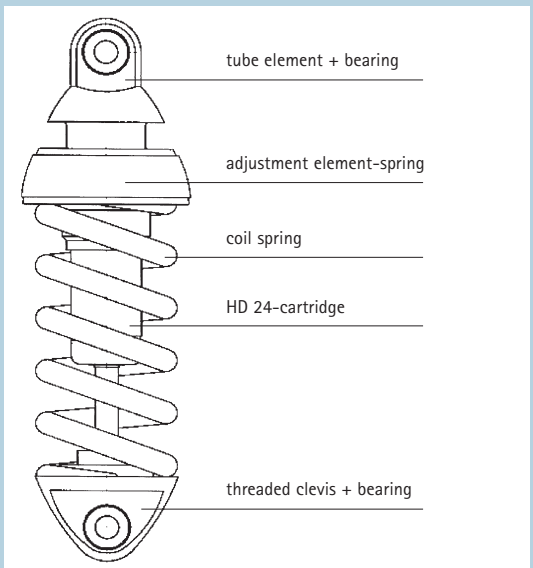
Suspension Strut for Bicycles

Highest reliability and unmistakable design distinguish the newest line of products from SUSPA. Suspension struts for bicycles are used today in mountain, trekking and city bikes. The SUSPA Tau combines the proven technology of the HD 24 standard dampers with the high demands put on design and individuality in the bicycle branch.

High loading capacity and long service life are achieved among others through the special articulated mountings to take up lateral loads. Further special features are the capability to exchange the damping cartridge, as well as the exact and practical adjustment of the spring pre-load by way of the handy spring washer. Spring and grip band are available in all RAL colors.

We are capable of realizing product adaptations and also complete new developments already before series production. We attend you through the complete product cycle, from the kinematic design to the special damping characteristics.



Locking and Adjustment Element

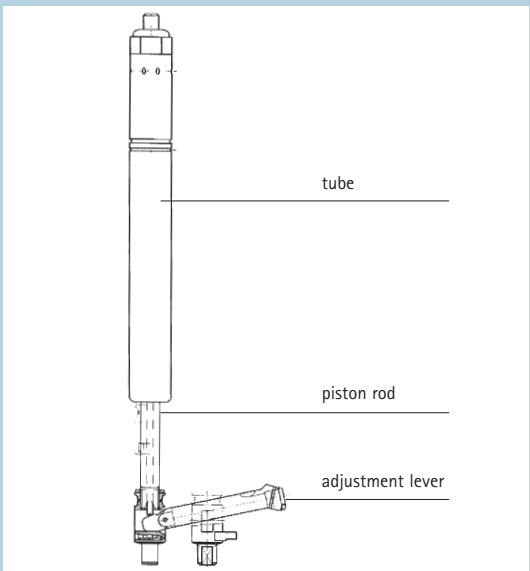
This product was developed for complicated adjustments in the automotive branch and in medical technology and must fulfill high demands in comfort and safety. The special inner design of this locking and adjustment element makes a high degree of accuracy in positioning through low breakaway and adjustment forces possible.

The undesirable post-springing that often occurs upon locking in other systems is impossible because the function is carried out without gas pressure e.g. without extension force. This product is therefore particularly suitable for applications in which highest precision is important, for example in the height adjustment of surgical tables.

- Ø tube 22 mm
- Ø piston rod 10 mm
- Damping force < 50 N
- Without extension force F1
- Without idle stroke
- Independent position (installation with piston rod in any position)
- Extension length 266 mm
- Stroke 45 mm

Applications:

- Steering column adjustment in automobiles
- Height adjustment for surgical tables
- Rehabilitation technology



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MRF Damper

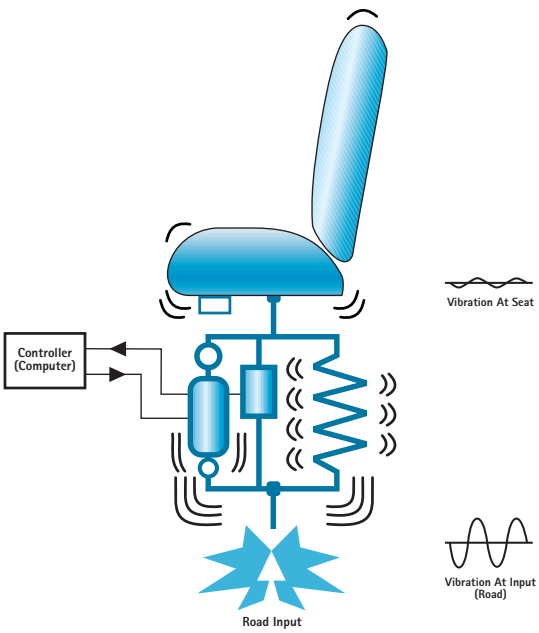
Magnetorheological liquids (MRF) are substances that, under the influence of a controlled magnetic field, change from a liquid to a nearly solid state within a matter of milliseconds.

Damping technology that is based on such fluids is particularly suitable for applications in areas in which large vibration fluctuations occur, such as in the damping of drivers' seats. MRF dampers independently take over the regulation of damping by adapting themselves automatically to the varying impacts or vibrations and changing the damping force correspondingly – up to 500 times per second. The controller of the MRF damper actively determines the damping according to each individual vibration and thereby prevents the breakdown of the damper in case of vibration peaks. An adjustment, for example according to particular road conditions, is no longer necessary with the MRF damper.

Magnetorheological substances, marketed under the name Rheonetic™ Fluids, provide product development in the area of vibration isolation and the electronic regulation of movement occurrences a completely new dimension.

Applications:

- Damping of drivers' seats



Hydraulic Adjustment Systems

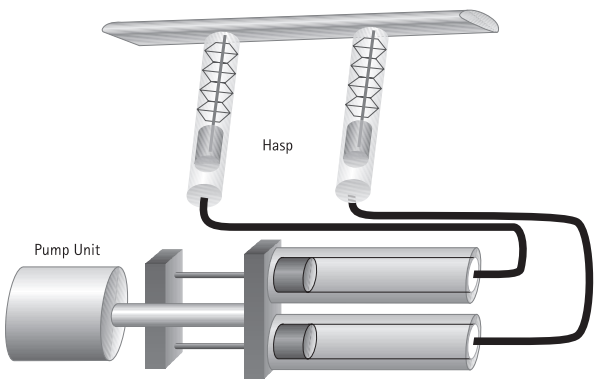
A new field of business for the automotive and industrial field is opening in the development of electro-hydraulic and electromechanical adjustment systems.

SUSPA develops special drives with the primary functions of adjustment, regulation, guiding and movement especially for recess applications.

The individually developed drive concepts are applied in vehicles for the height adjustment of rear spoilers and above all in the interior for servo functions.

The engineers in our development and technology center SuspaTec will be happy to advise you individually.

Please call us at the following telephone number:
+49 (91 87) 9 30-253.



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Environmentally Sound and Innovative

Our Contribution to the Environment

We see environmental protection in all processes and facets of our business as our responsibility, beginning with procurement, continuing through production, in distribution and finally to the application phase and recycling.

Certification in accordance with ISO 14001 and the integration of an effective environmental management in the existing quality management system are important milestones in this concept.

For production processes, this means that no polluting heavy metals are used. In addition, lacquering of the pressure tubes is carried out with an environmentally sound three-component epoxy-resin-water lacquer system.

Our environmental program includes a wide spectrum of individual measures for the improvement of industrial environmental protection.

Appropriate Disposal

All SUSPA hydraulic dampers contain oil and must be appropriately disposed of.

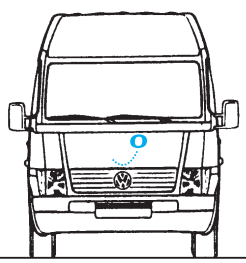
Should you have questions regarding disposal, please contact our environmental experts.

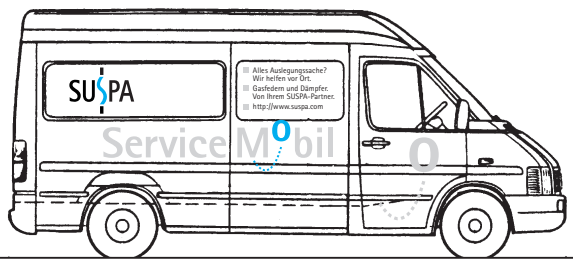
Mobile Service

SUSPA maintains a worldwide sales organization that is always available to our customers for consultation.

We will be happy to support you in the selection of a suitable hydraulic damper and in its professional installation.

We are available to help you on-site. Any time.





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R & D – Basis for Innovation and Success

Our goal is to achieve high performance in research and development to support our worldwide excellent reputation as a competent and innovative company, also in the future. We therefore continually invest in our most important resources, in particular in the know-how of SUSPA employees – the source of our creativity and abundance of new ideas.

The innovative potential of our employees was united in an independent development and technology center: The SuspaTec carries out not only internal, but also external development projects.

We consistently follow through on our employees' inventiveness for the benefit of our customers and can so guarantee not only a high level of quality, but also – as an established development partner – close cooperation with our customers. We have successfully proven this among others in the automotive, office furniture and household appliance industries.

A sign of our success in innovation is the number of patents, both for products as well as company-internal processes. The SUSPA Oval-Tube-HD and the new suspension struts for bicycles are legally protected by patents.

Not without good reason do our customers have such trust in the intelligent solutions and the branch know-how of our engineers and technicians.

When may we greet you as a customer?

Simply call us or visit us in the Internet:

Telephone: +49 (91 87) 9 30-294

http://www.suspa.com

Our employees look forward to giving you further information.

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