

**STABILUS**

## Oil Hydraulic Dampers

**STAB-O-SHOC®**



... technology gives comfort

# We Move Things – Gas Springs and Dampers from STABILUS

## **A life without gas springs and dampers – inconceivable!**

With its innovations in the field of gas springs and hydraulic dampers, STABILUS has greatly contributed to making life safer and more comfortable in many areas.

Every year, we produce more than 100 million units, using state-of-the-art production technology while complying with the most stringent quality standards. Customer satisfaction, customer proximity, and service are some of the major company goals.

The range of our applications is virtually unlimited: Nowadays, gas springs and dampers from STABILUS are regularly seen – in cars, homes, swivel chairs, automotive design, or industrial systems.

STABILUS ...Technology Gives Comfort.

## **We assume responsibility and offer continued support.**

Around the globe, our actions are marked by responsibility towards our customers, employees and a partnership with our suppliers. In production, we greatly value environmentally friendly manufacturing and disposal thanks to state-of-the-art production technology.

At STABILUS, product individuality means taking a standard product and customizing it according to the requirements and wishes of our customers. We assign the highest priority to completely new developments – as well as improving existing products.

Your satisfaction is our goal.





**Dampers from STABILUS  
– Overview**

In numerous applications, we achieve and optimize damping of vibration and impact during opening and closing – with an eye on the customer and the future.

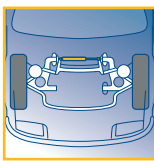
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# Automotive and Commercial Vehicle Applications

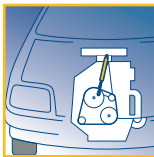
## Vibration dampers



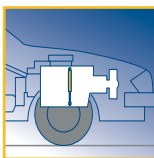
**Driver's seat dampers for commercial vehicle seats:**  
STABILUS oil hydraulic dampers also support standard-compliant spring comfort and thus a positive seating experience.



**Dampers for steering and trailer systems:**  
Oil hydraulic TA dampers from STABILUS were developed specifically for the use in steering systems and therefore guarantee a high level of damping and safety.



**Dampers for belt tensioning systems:**  
STABILUS oil hydraulic dampers are especially suited for reducing vibrations in belt tensioning systems. Permanent pretension of the belt, and reduced vibrations ensure smooth running and a long service life of the belt tensioning system.



**Engine dampers, engine pitch motion dampers:**  
Special oil hydraulic dampers that increase the driving comfort and life span of the vehicle structure.

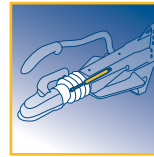


**Dampers for shift linkage and passenger compartments:**  
STABILUS oil hydraulic dampers prevent the transmission of vibration and shocks into the interior of the vehicle compartment. Ideal for passenger compartments that are separated from the chassis.



**Dampers in farming equipment:**

Various oil hydraulic dampers from STABILUS ensure smooth and safe operation of farming equipment, such as field sprayers.



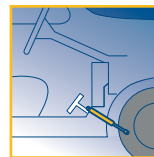
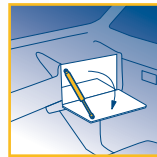
**Dampers for overrunning brake systems:**

Special oil hydraulic STABILUS dampers affect the vibrations at the brake lever, thereby preventing force peaks at the brake cable. The damper controls the response behavior of the automatic overrun brake, thus ensuring application and safety-relevant functioning of the brake.

**Motion dampers, flap dampers, and end stop dampers**

**Dampers for glove compartments and small consoles:**

The simple and affordable STABILUS plunger damper ensures smooth and comfortable opening and closing of glove compartments and various consoles.

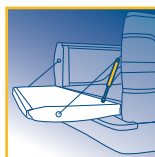


**Dampers for foot-operated parking brakes:**

This oil hydraulic damper from STABILUS prevents the sudden return of the foot pedal when releasing the brake.

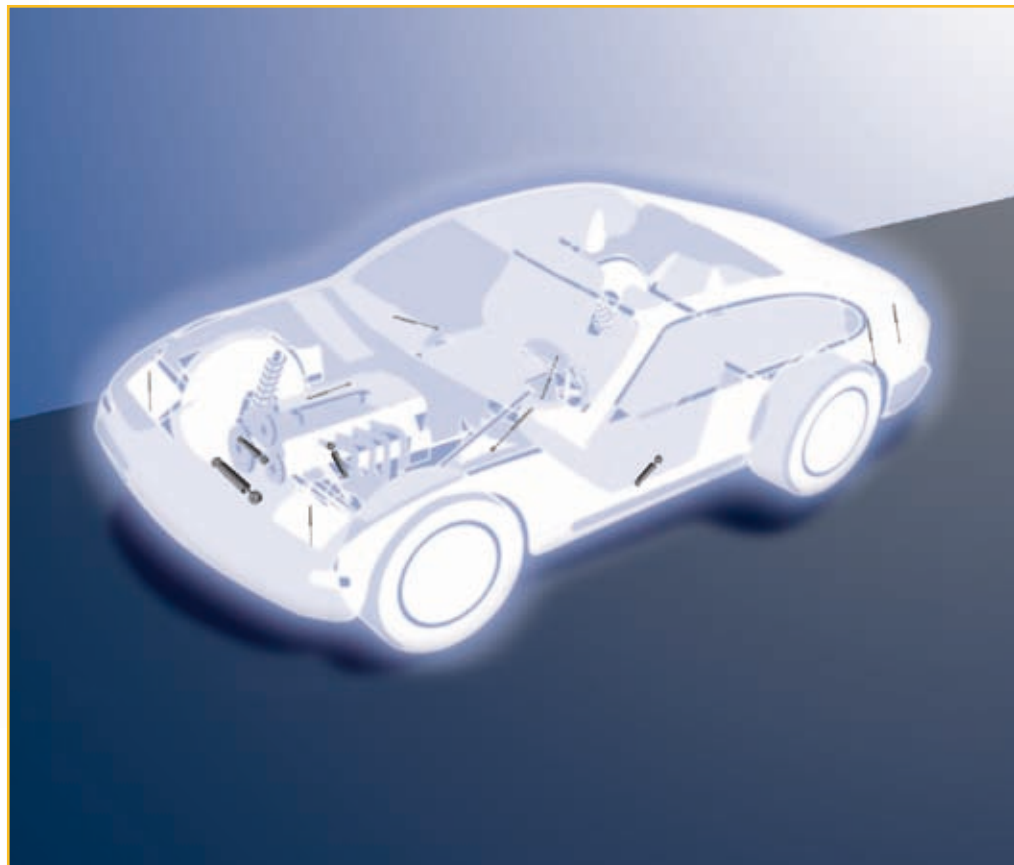
**Dampers for trunk lids:**

The oil hydraulic damper element from STABILUS provides defined opening and closing. An individual and comfortable opening motion comes to life.



**Dampers for pickup truck doors:**

When it comes to gentle and safe opening of pickup truck doors, STABILUS offers the EZ-Down retrofit damper set. This retrofitting package includes all parts and tools for easy mounting.



# General Industrial Applications



## Vibration dampers

### Dampers for washers:

The oil hydraulic dampers from STABILUS prevents the drum from stopping during the spin cycle, thereby providing safe footing for the machine.



### Dampers for industrial machines:

STABILUS oil hydraulic dampers reduce vibrations caused by the high dynamics in the machining process and provide a high level of safety and long life.



### Dampers for collectors:

Here, too, the dynamics create unnecessary vibrations that can be minimised by oil hydraulic dampers from STABILUS.



**Motion dampers, flap dampers, and end stop dampers**



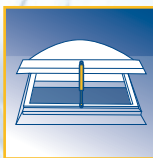
**Dampers for cabinet doors, drawers, storage shelves, swing doors, maintenance doors, and tanning beds:**

STABILUS oil hydraulic dampers provide safe, comfortable opening and closing of flaps.



**Dampers for top loader washers and similar household appliances, such as stove, oven, dishwasher:**

Protected opening and closing with oil hydraulic dampers from STABILUS



**Dampers for smoke exhaust hoods in building technology:**

In emergencies and during maintenance work, the oil hydraulic dampers from STABILUS prevent hard stops of the smoke exhaust hood in the end position.



**Dampers for seat tilt and seat backrest in office chairs:**

Oil hydraulic dampers from STABILUS provide support for the adjustment of seats, thereby enhancing comfort.



**Dampers in hospital beds:**

Oil hydraulic dampers from STABILUS ensure safe, comfortable, and standardised lowering of the head panel and the side rails.



# STABILUS – Vanguard in Quality, Service, Consulting and Innovation

## Quality at its best

We guarantee the highest product quality – worldwide. For us, quality management of any process starts with preliminary planning. From product idea to series maturity – we have specialised testing labs to monitor the quality of products and processes.

Because STABILUS dampers are maintenance-free. Designed for the respective requirements, they work uninterrupted for years.

This applies not only to end products – all production lines designed by STABILUS are monitored on a regular basis to ensure consistent quality. Our goal is “zero defect production!” This is how we meet the exact demands of international standards, such as DIN EN ISO 9001-2000, ISO / T S 16949-2002, ISO 14001-2004.

For us, flawless quality is a must.

**You can bank on it.**

## Service and Application Consulting

We are motivated by providing individual solutions for your task, since each installation situation has different demands.

Service – for STABILUS, this means application consulting and installation proposal, intensive product and design consultation,

as well as system and standard specifications from a single source, all in close collaboration with our customers.

Specialists will be by your side, from the initial idea to series maturity.

Creative and constructive cooperation fosters trust and customised products.

Our application engineers bring many years of expertise to the table; combined with powerful simulation and installation proposal programs, this results in optimised individual solutions.

**Put us to the test! We will grow with your demands.**

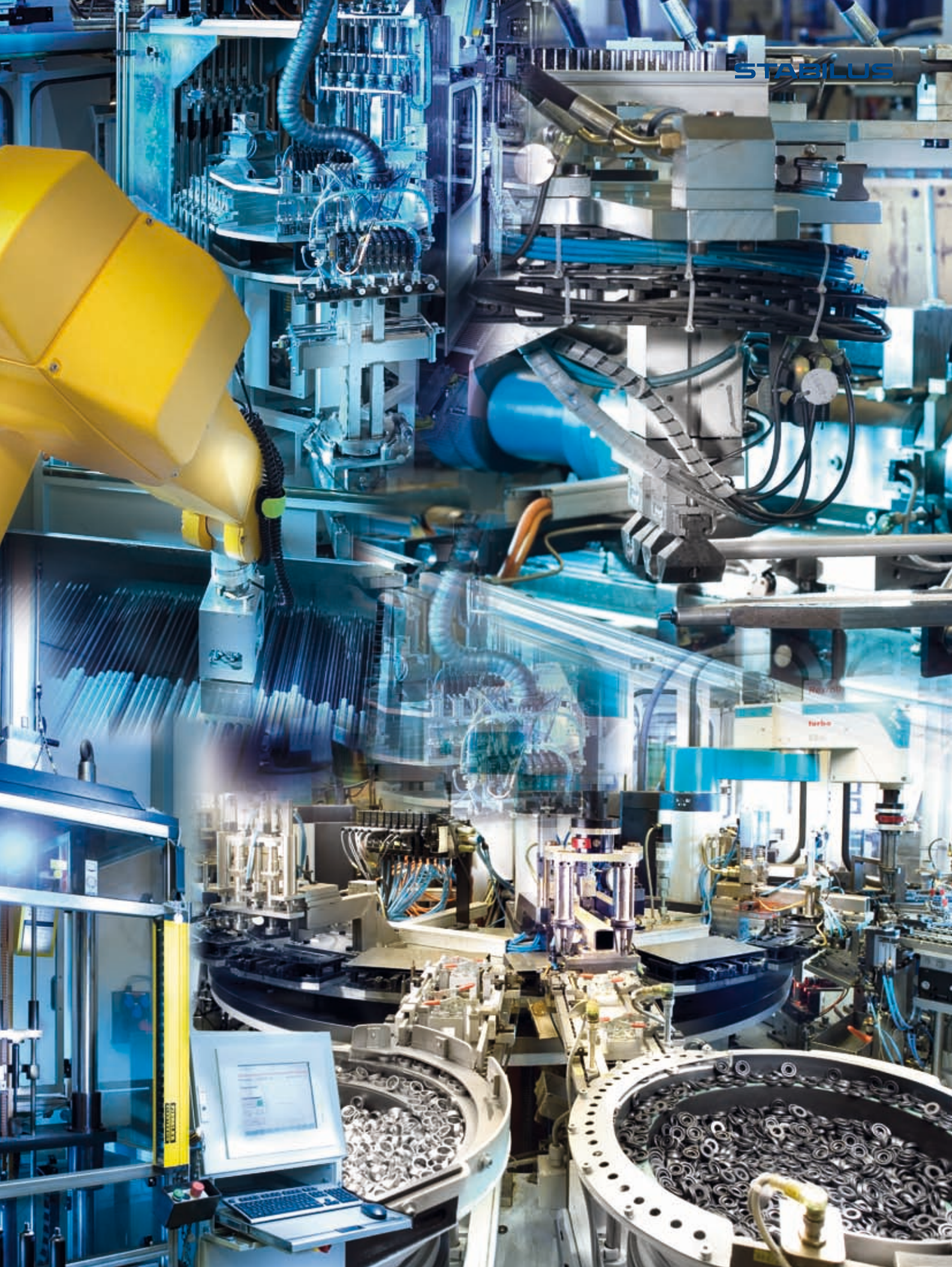
## Innovation

Lighter, bigger, stronger – there’s always something to do. Regardless of customer inquiries, we will always face the new challenges of progress. Our employees continually work on technical innovations. Existing products and manufacturing methods thus become even more reliable and efficient.

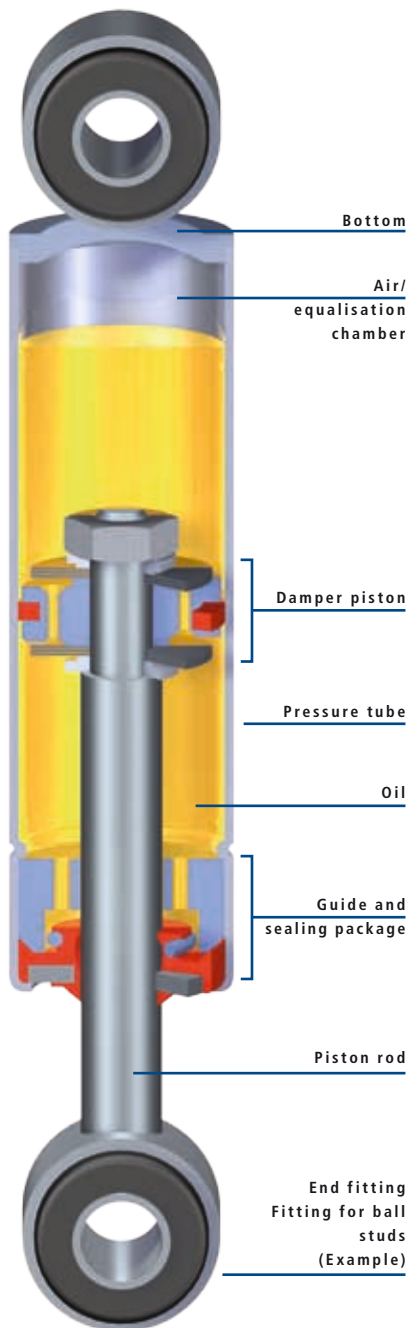
**What can we do for you?**







# Structure and Function of Oil Hydraulic Dampers



Basically, all oil hydraulic single tube dampers consist of a piston rod and the attached damper piston as the carrier of the damper valves.

Furthermore, they have a pressure tube, which on one end is connected to the bottom; on the other end, it is closed off by a piston rod seal and a piston rod guide.

The pressure tube is filled with damping oil.

Each damper can absorb the displacement volume of the piston rod and oil expansion volume resulting from heating.

Therefore, the air chamber acts as an equalisation chamber.

Through a broad spectrum of fittings, the vibration system transmits motion into the oil hydraulic damper.

This creates a relative movement between the piston system and the pressure tube.

The damping force results from the flow resistance of the damping oil at the reducing locations of the piston. Here, motion energy is transformed into thermal energy.

***Remember: Damping forces are always dependent on the piston speed.***

A modular piston system enables the setting of tensile and compression forces appropriate for the application. If needed, they can differ in strength.



# Characteristics of Oil Hydraulic Dampers

An oil hydraulic vibration damper is often characterised by a symmetric force distribution in the tension and compression directions. **Dampers for flap applications** dampen in just one direction of motion, depending on the application. The damping force characteristic curves are determined at different speeds.

## Characteristics of the damping function:

**Mounting position independent:** can be installed in any position

**Mounting position dependent:** installation with piston rod pointing down (preferred) or up; certain inclined positions are permissible.

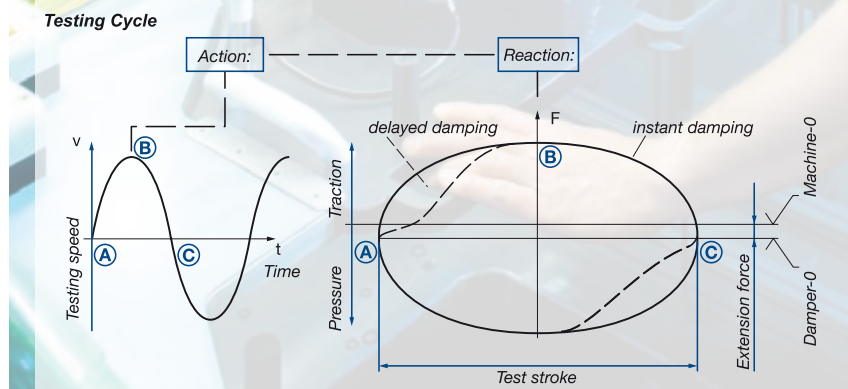
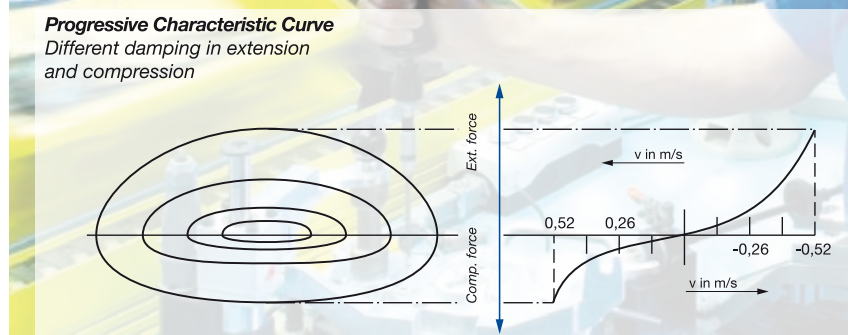
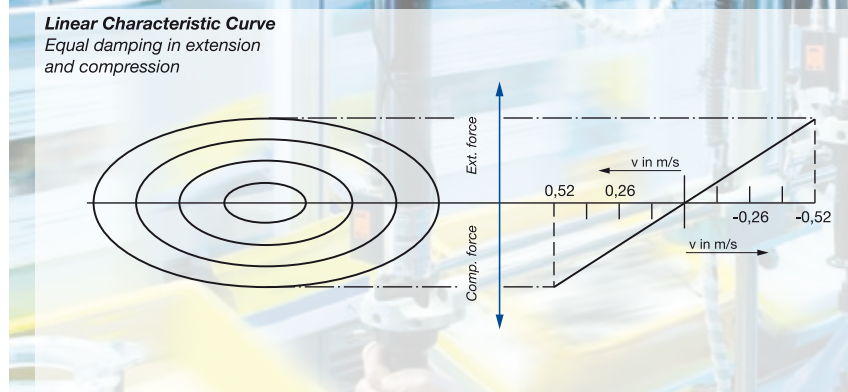
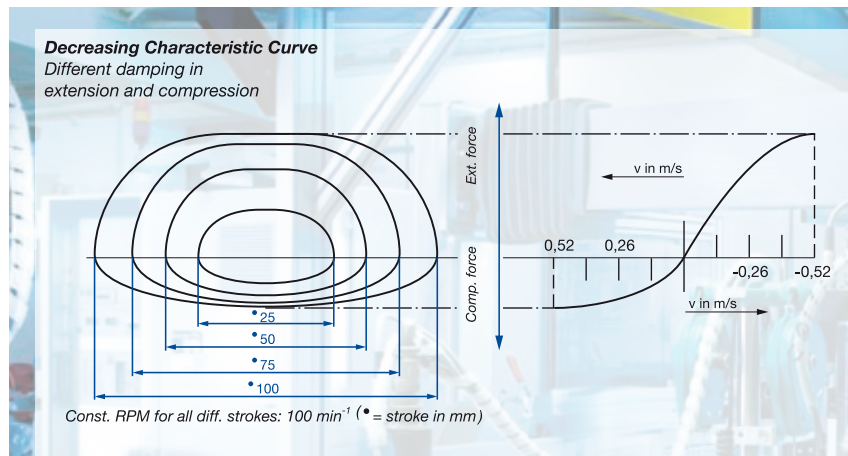
**Instant damping:** When the load is reversed, the damping force kicks in immediately. The force is transmitted without a return stroke.

**Delayed damping:** When the load is reversed, the damping force is delayed. The force is transmitted with a return stroke.

**Extension force:** For some damper types, a static extension force of the piston rod can be specified.

## Testing of damping forces:

One way of measuring damping forces is with a harmonic motion on a crank mechanism test stand. The static extension force, also called the mean gas force, is measured in the test stroke center position. It is the difference between machine 0 and damper 0 test.



# Selection and Application of Oil Hydraulic Dampers

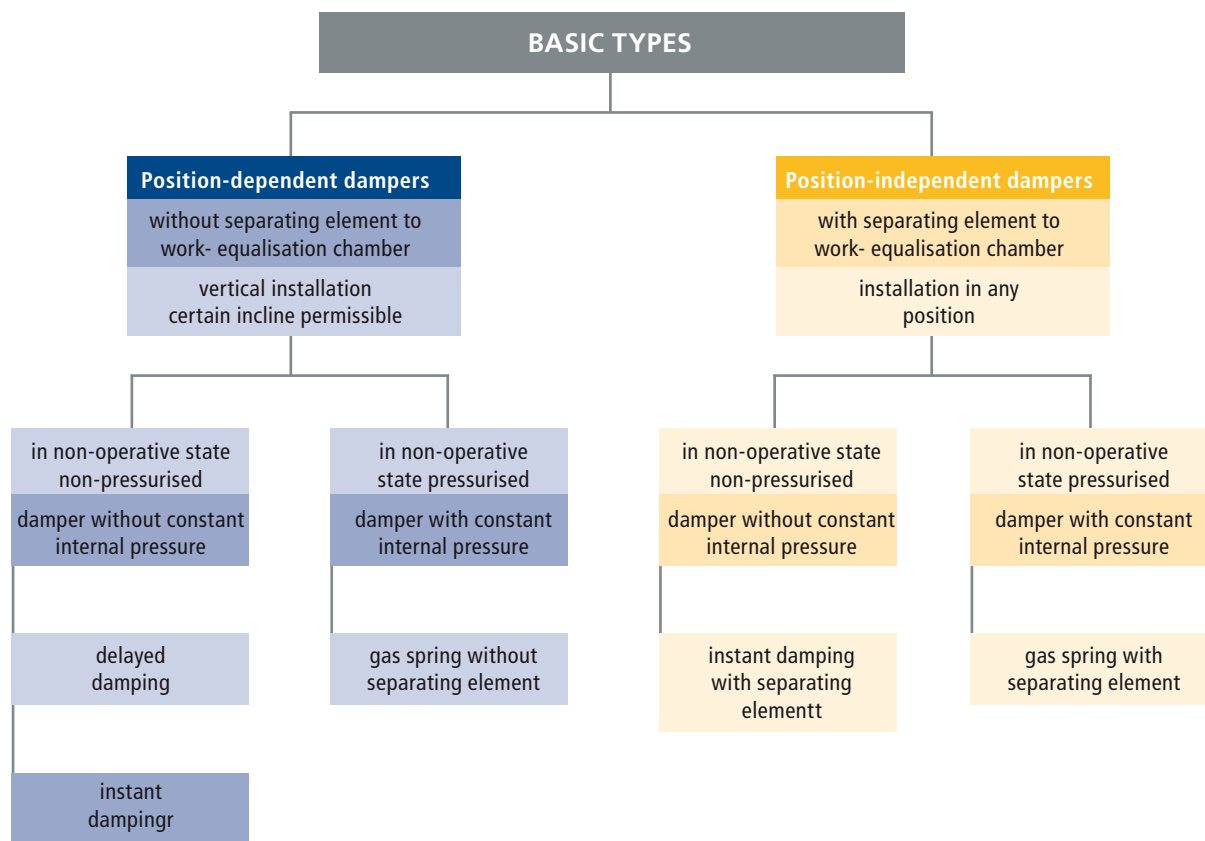
## Standard product line for dampers:

As the world market leader, STABILUS develops individual solutions with its customers, while strictly adhering to existing guidelines and specifications of our customers. The procedure for application-specific development is described in the Integrated Management System. A small selection of oil hydraulic single-tube dampers is included in our standard product line.

Thanks to steady availability, we can make devices available at short notice; for example, for initial practice trials. Within a short time, you will get a "feel" for the use of oil hydraulic dampers in your application. This first impression will then help with further decision-making – up to the series solution.

## Dimensions and model types upon request:

The oil hydraulic damper is available in various types with different outer dimensions. Due to the respective structural designs, the individual model types meet different demands.



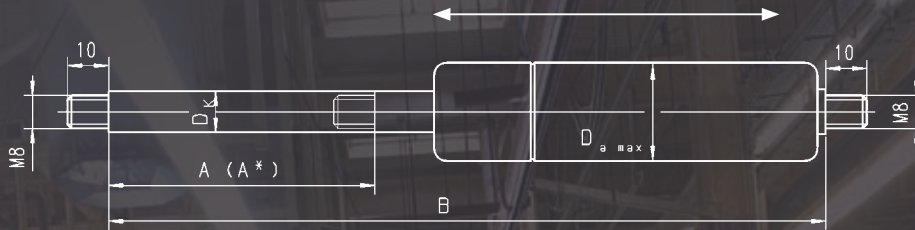
### Models of position-dependent dampers:

STAB-O-SHOC HD15	STAB-O-SHOC HD29
STAB-O-SHOC GD15	STAB-O-SHOC GD29
STAB-O-SHOC HD24	
STAB-O-SHOC GD24	
STAB-O-SHOC HD24BV	

### Models of position-independent dampers:

STAB-O-SHOC GD15SP	STAB-O-SHOC GD29BVSP
STAB-O-SHOC GD24SP	STAB-O-SHOC TA20
STAB-O-SHOC HD24MB	STAB-O-SHOC TA30
STAB-O-SHOC GD24BVSP	STAB-O-SHOC TA40
STAB-O-SHOC GD29SP	

# Function Overview and Selection Matrix



Product description	Damping forces* [N] Testing speed 104 mm/s		Dimensions In individual cases, even larger overall lengths are possible				Return		Mounting position independent		Push-out force	
	Comp. max [N] FD	Tract. max [N] FZ	D <sub>k</sub> [mm]	D <sub>a max</sub> [mm]	[B] L <sub>max</sub> [mm]	[A] Stroke [mm]	yes	no	yes	no	yes	no
STAB-O-SHOC HD15	800	800	6	15,6	500	200	X			X		X
STAB-O-SHOC GD15	800	800	6	15,6	500	200	X			X	X	
STAB-O-SHOC GD15SP	800	800	6	15,6	500	200		X	X		X	
STAB-O-SHOC HD24	6000	6000	8/10	24	1000	400	X			X		X
STAB-O-SHOC GD24	6000	6000	8/10	24	1000	400	X			X	X	
STAB-O-SHOC GD24SP	3000	6000	8/10	24	700	250		X	X		X	
STAB-O-SHOC HD24MB	2000	6000	8/10	24	225	60		X	X			X
STAB-O-SHOC HD24BV	2000	6000	8/10	24	700	250		X		X		X
STAB-O-SHOC GD24BVSP	2000	6000	8/10	24	700	250		X	X		X	
STAB-O-SHOC HD29	9000	9000	10	29	1000	400	X			X		X
STAB-O-SHOC GD29	9000	9000	10	29	1000	400	X			X	X	
STAB-O-SHOC GD29SP	6000	9000	10	29	700	250		X	X		X	
STAB-O-SHOC GD29BVSP	9000	9000	10	29	700	250		X	X		X	
STAB-O-SHOC TA 20	3000	3000	8	39	750	300		X	X			X
STAB-O-SHOC TA 30	3000	3000	11	50	1000	400		X	X			X
STAB-O-SHOC TA 40	3000	3000	14	64	1000	400		X	X			X

**Legend:** HD: Hydraulic Damping, GD: Gas Compression, SP: Separating Piston, BV: Bottom Valve, MB: Membrane, TA: Steering Damper (telescope equalization chamber)

\*The damping forces in the selection matrix refer to test speeds of 104 mm/s. They are based on a test stroke of 20 mm and a test speed of 100 rpm (crank drive test). Higher damping forces are possible in special cases.

- Options (in addition to standard program):**
- Protective tube for piston rod
  - Elastomer buffers for extra end position damping
  - Bellows
  - Protective cap
  - Special paint colors
  - Broad variety of end fittings

# Product Overview

## STAB-O-SHOC HD15/GD15

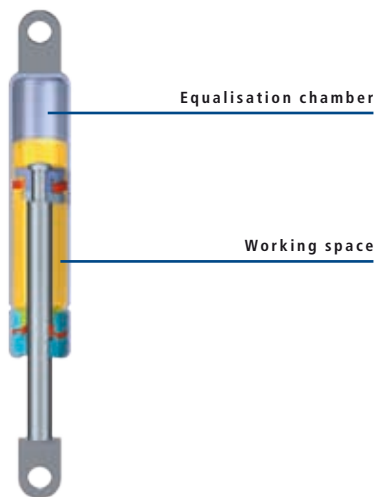
### STAB-O-SHOC HD15

The standard STAB-O-SHOC is a mounting position-dependent, non-pressurised oil hydraulic damper. Preferably it is installed vertically.

Direct force transmission without a return stroke is only possible in one direction of motion.

What is special about this so-called "plunger damper" is its simple structure.

- Damping force max. 800 N
- Damping forces one-sided, in special cases on both sides
- Non-pressurised, no push-out force
- Return stroke, delayed damping
- Position-dependent mounting, with piston rod down or up



#### Applications:

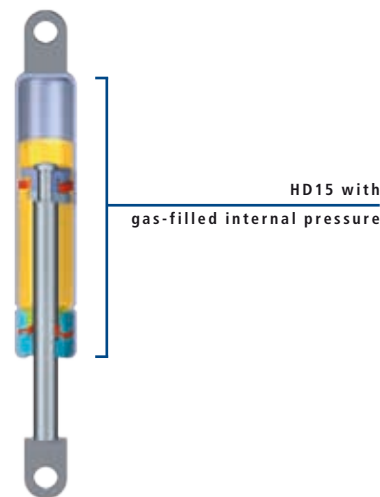
- Glove compartment
- Bar cabinets
- Kitchen cabinets
- Storage shelves
- Regulating dampers (vibration dampers) for injection pumps and various machines
- Lid dampers

### STAB-O-SHOC GD15 Gas damper

In addition to the standard STAB-O-SHOC, this gas damper also has an increased internal pressure. The resulting push-out force extends the piston rod automatically.

In the compression direction, the damping force increases by the amount of the push-out force.

- Damping force max. 800 N
- Damping forces one-sided, in special cases on both sides
- With push-out force
- Return stroke, delayed damping
- Position-dependent mounting, with piston rod down or up



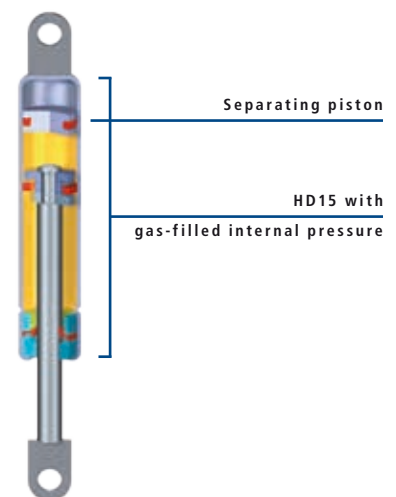
#### Applications:

- Seat damper (horizontal vibration load)
- Consoles
- Light doors
- Roof dampers, e.g., convertible tops
- Foot-operated parking brakes

### STAB-O-SHOC GD15SP Gas damper with separating piston

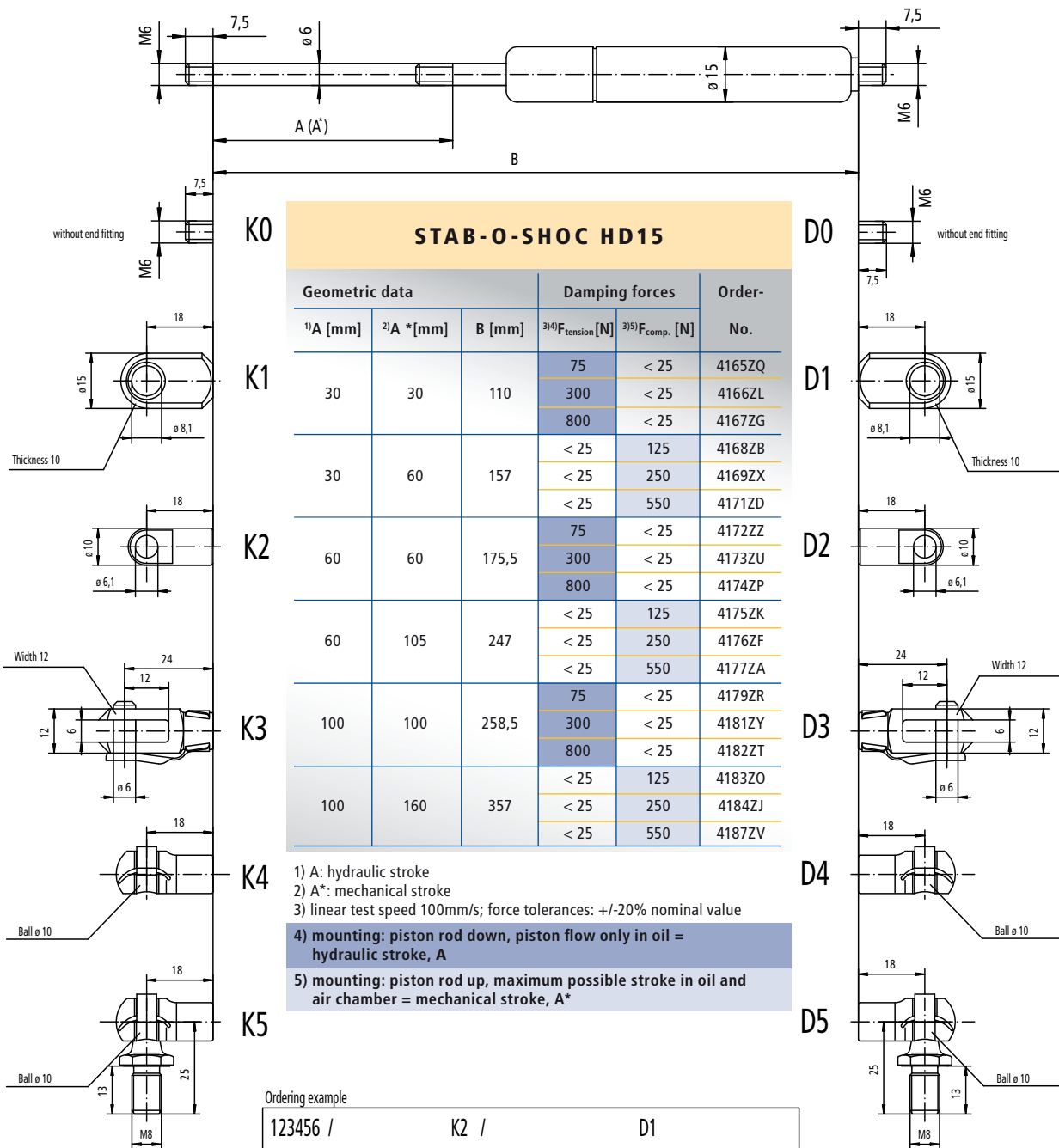
A separating element divides the work chamber and equalisation chamber. This provides force transmission without a return stroke in both directions of motion. The damper is under increased internal pressure.

- Damping force max. 800 N
- Damping forces on one or both sides
- With push-out force
- No return stroke, direct instant damping
- Position-independent mounting, installation of piston rod in any orientation



#### Applications:

- Seat damper (horizontal vibration load)
- Consoles
- Light doors
- Machine tools



STAB-O-SHOC HD15					
Geometric data			Damping forces		Order-
<sup>1)</sup> A [mm]	<sup>2)</sup> A* [mm]	B [mm]	<sup>3)</sup> <sup>4)</sup> F <sub>tension</sub> [N]	<sup>3)</sup> <sup>5)</sup> F <sub>comp.</sub> [N]	No.
30	30	110	75	< 25	4165ZQ
			300	< 25	4166ZL
			800	< 25	4167ZG
30	60	157	< 25	125	4168ZB
			< 25	250	4169ZX
			< 25	550	4171ZD
60	60	175,5	75	< 25	4172ZZ
			300	< 25	4173ZU
			800	< 25	4174ZP
60	105	247	< 25	125	4175ZK
			< 25	250	4176ZF
			< 25	550	4177ZA
100	100	258,5	75	< 25	4179ZR
			300	< 25	4181ZY
			800	< 25	4182ZT
100	160	357	< 25	125	4183ZO
			< 25	250	4184ZJ
			< 25	550	4187ZV

- 1) A: hydraulic stroke
- 2) A\*: mechanical stroke
- 3) linear test speed 100mm/s; force tolerances: +/-20% nominal value
- 4) mounting: piston rod down, piston flow only in oil = hydraulic stroke, A
- 5) mounting: piston rod up, maximum possible stroke in oil and air chamber = mechanical stroke, A\*

Ordering example  
 123456 /                      K2 /                      D1  
 order.-No.                      piston rod end fitting                      pressure tube end fitting

Installation according to STAB-Spec.10145882 / Dimensions in mm / We reserve the right to make modifications



eyelet D1



eyelet D2



clevis D3



ball socket D4



ball stud

# Product Overview

## STAB-O-SHOC HD24/29 and GD24/29

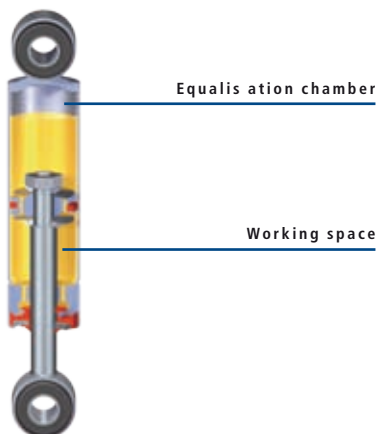


### STAB-O-SHOC HD24/29

The STABILUS STAB-O-SHOC HD24/HD29 is a standard single-tube damper for various applications. Due to a special piston system with valve plates and a base piston with different reduction cross sections, this model is the ideal vibration damper.

Because of the "open" equalisation chamber, the damping force is delayed (slip or return stroke).

- Damping forces to 9000 N
- Damping forces in tension and compression directions can be set independent of each other by the factory
- Non-pressurised, no push-out force
- Return stroke, delayed damping
- Position-dependent mounting, with piston rod down or up



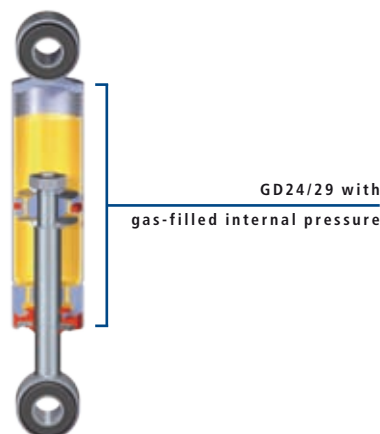
#### Applications:

- Washing machine damper
- Commercial vehicle seats
- Smoke exhausts
- Heavy flaps and doors that open vertically

### STAB-O-SHOC GD24/29 Gas damper

Due to the increased internal pressure, the piston rod extends automatically. Structure and damping properties are very similar to those of the standard Stabilus damper STAB-O-SHOC HD24.

- Damping forces to 9000 N
- Damping forces in tension and compression directions can be set independent of each other
- With push-out force
- Return stroke, delayed damping
- Position-dependent mounting, with piston rod down or up



#### Applications:

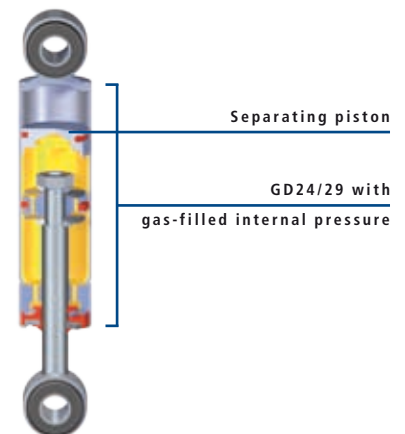
- Seat damper (vertical vibration damping)
- Car roof damper, e.g., convertible top

### STAB-O-SHOC GD24/29 Gas damper with separating piston

The position-independent mounting orientation is achieved with a separating piston. When the direction of movement is reversed, the damping force is immediate and slip-free.

The special piston structure guarantees superior damping properties.

- Damping force max. 9000 N
- Damping forces in tension and compression direction can be set independent of each other by the factory
- With push-out force
- No return stroke, direct instant damping
- Mounting in any orientation



#### Applications:

- Overrunning brake damper
- Seat damper (vertical vibration damping)
- Car roof damper, e.g., convertible top





**STAB-O-SHOC HD24**

Geometric data			Damping forces		Order-
<sup>1)</sup> A [mm]	<sup>2)</sup> A* [mm]	B [mm]	<sup>3)4)</sup> F <sub>tension</sub> [N]	<sup>3)5)</sup> F <sub>comp.</sub> [N]	No.
80	80	231	650	< 100	4196ZU
			1500	< 100	4197ZP
			5000	< 100	4199ZF
80	129	308	< 100	650	4201ZL
			< 100	1500	4202ZG
			< 100	3000	4203ZB
			650	< 100	4204ZX
120	120	320	1500	< 100	4205ZS
			5000	< 100	4206ZN
			< 100	650	4207ZI
			< 100	1500	4208ZD
120	188	426	< 100	3000	4211ZF
			650	< 100	4212ZA
			1500	< 100	4213ZW
200	200	498	5000	< 100	4214ZR
			< 100	650	4216ZH
			< 100	1500	4217ZC
200	305	660	< 100	3000	4218ZY

1) A: hydraulic stroke  
 2) A\*: mechanical stroke  
 3) linear test speed 100mm/s; force tolerances: +/-20% nominal value  
 4) mounting: piston rod down, piston flow only in oil = hydraulic stroke, A  
 5) mounting: piston rod up, maximum possible stroke in oil and air chamber = mechanical stroke, A\*

Ordering example

123456 /	K2 /	D1
order-No.	piston rod end fitting	pressure tube end fitting

Installation according to STAB-Spec.10145883 / Dimensions in mm / We reserve the right to make modifications

Dimensions:

**STAB-O-SHOC HD24**

with 24 mm pressure tube outer diameter and 1.5 mm wall thickness

**STAB-O-SHOC HD29**

with 29 mm pressure tube outer diameter and 1.5 mm wall thickness

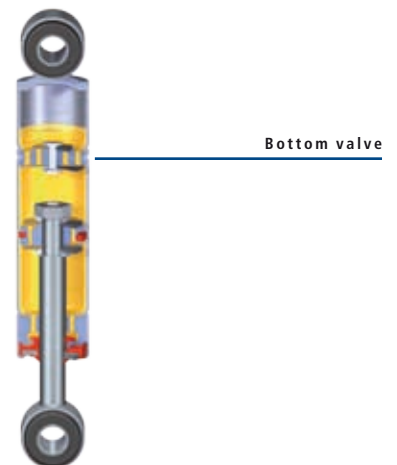
## Product Overview

### STAB-O-SHOC HD24/29BV and HD24MB

#### STAB-O-SHOC HD24/29BV with bottom valve

In a vertical installation with the piston rod pointing down, the bottom valve allows slip-free and thus direct force transmission.

- Damping forces up to 9000 N in tension direction
- Damping forces in compression direction up to 2000 N
- Damping forces in tension and compression directions can be set independent of each other by the factory
- Non-pressurised, no push-out force
- No return stroke, direct instant damping
- Position-dependent mounting, only with piston rod down



#### Applications:

- Belt tensioning damper
- Engine vibration damper
- Engine pitch motion dampers
- Chassis damper



**STAB-O-SHOC HD24MB with bottom valve and diaphragm**

The diaphragm in the pressure tube combines the special features of the bottom valve with position-independent mounting. The damper is non-pressurised, so that the piston rod stays in the pressure tube.

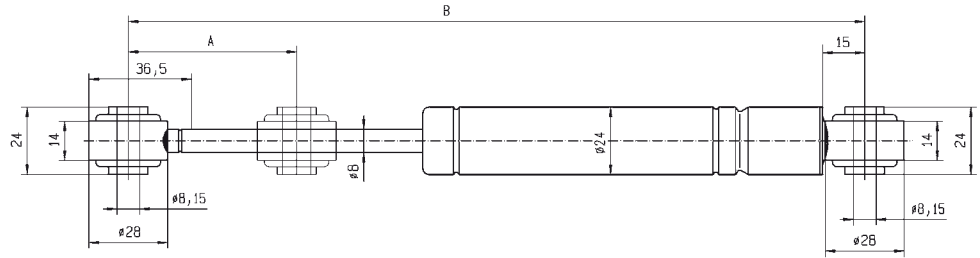
- Damping forces up to 9000 N in direction of tension
- Damping forces in compression direction up to 2000 N
- Damping forces in tension / and compression direction can be set independent of each other by the factory
- Non-pressurised, no push-out force
- No return stroke, direct instant damping
- Mounting in any orientation



Bottom valve with diaphragm

**Applications:**

- Belt tensioning damper
- Engine vibration damper
- Engine pitch motion damper



**STAB-O-SHOC HD24MB**

Geometric data		Damping forces		Order-No
A [mm]	B [mm]	<sup>1)2)</sup> F <sub>tension</sub> [N]	<sup>1)2)</sup> F <sub>comp.</sub> [N]	
30	213,5	100	100	2529YM
		400	400	2546YP
		1000	1000	2548YF
60	273,5	100	100	2598YC
		400	400	2602YZ
		1000	1000	2611YY

- 1) test speed 104 mm/s  
crank drive test: test stroke 20 mm/ test speed 100 rpm  
force tolerances: +/-20% nominal value
- 2) mounting in any position  
mounting instructions according to STAB-Spec. 10005593  
waste disposal according to STAB-Spec. 10009375



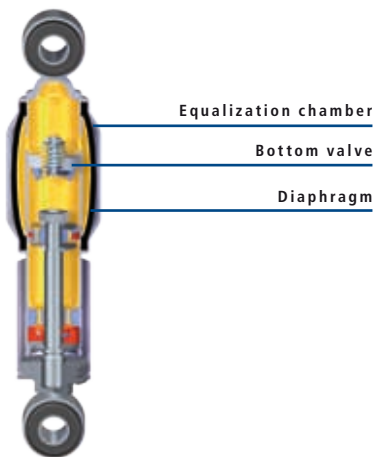
# Product Overview

## STAB-O-SHOC TA Damper

### STAB-O-SHOC TA

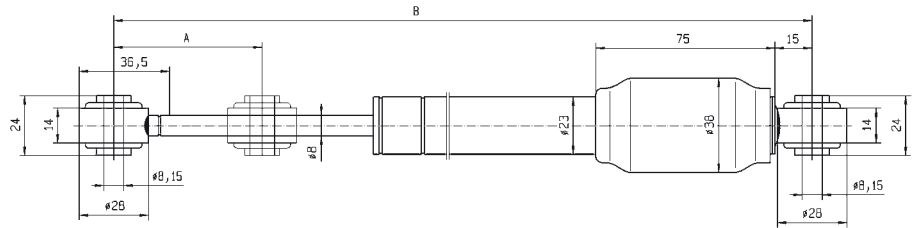
The diaphragm, adjacent to the outside of the pressure tube, absorbs the additional piston rod volume with the shortest possible overall length. This provides slip-free force transmission in any mounting orientation. Due to the special piston system with valve plates, the damping forces can be set variably and independent of each other.

- Damping forces up to 3000 N in tension and compression direction
- Damping forces in tension and compression direction can be set independent of each other by the factory
- Non-pressurised, no push-out force
- No return stroke, direct instant damping
- Mounting in any orientation



#### Applications:

- Steering dampers
- Trailer axles
- Lowering of head panel in hospital beds
- Vibration damping in farming equipment



### STAB-O-SHOC TA20

Geometric data		Damping forces		Order- No.
A [mm]	B [mm]	<sup>1)</sup> F <sub>tension</sub> [N]	<sup>1)</sup> F <sub>comp.</sub> [N]	
60	249	100	100	2366YR
		550	550	2424YR
		1000	1000	2426YH
120	369	100	100	2443YK
		550	550	2433YQ
		1000	1000	2456YQ
200	529	100	100	2466YK
		550	550	2474YO
		1000	1000	2476YE

1) test speed 104 mm/s  
crank drive test: test stroke 20 mm/ test speed 100 rpm  
force tolerances: +/-20% nominal value

2) **mounting in any position**  
mounting instructions according to STAB-Spec. 10005593  
waste disposal according to STAB-Spec. 10009375

#### Dimensions:

##### STAB-O-SHOC TA20

with 23 mm pressure tube  
outer diameter and 1.5 mm  
wall thickness

##### STAB-O-SHOC TA30

with 34 mm pressure tube  
outer diameter and 2.0 mm  
wall thickness

##### STAB-O-SHOC TA40

with 44 mm pressure tube  
outer diameter and 2.0 mm  
wall thickness

### Maintenance-free for Life

Hydraulic vibration dampers from STABILUS have a maintenance-free service life! We use special sealing systems for particularly high numbers of stress cycles and extreme conditions.

Thus our dampers can easily withstand millions of stress cycles and work impeccably for many years.

# One-on-One Solutions

## Step-by-step to custom-tailored products

Already, there is an abundance of applications for our hydraulic vibration and motion dampers – and our customers think of new ones all the time.

“We can do it. You can help” is the motto for our application engineers, who design new products and applications together with the customer. Your ideas inspire us.

We have developed special programs that we use to simulate the desired motions and propose installation ideas. Together with the customer we design tailored solutions – from improvements of existing products to completely new product developments.

We are here to support you with our expertise.

For more than 70 years, STABILUS has been designing innovative solutions for active safety and increased comfort for people and technology.

**If you want to move something – talk to us!**



# Inquiry Form

Please copy and fax, mail, or e-mail to:

Stabilus GmbH, Wallersheimer Weg 100, D-56070 Koblenz, fax: +49 261-8900-204, e-mail: info@de.stabilus.com

Customer: \_\_\_\_\_

Contact: (name/phone/e-mail) \_\_\_\_\_

Application (short description of sketch):

- Vibrating damping                       Braking a weight

Quantity (one-time/annually): \_\_\_\_\_

Comparison type: \_\_\_\_\_

Compressed length in mm                      min: \_\_\_\_\_                      max: \_\_\_\_\_

Extended length in mm:                      min: \_\_\_\_\_                      max: \_\_\_\_\_

Stroke in mm:

hydraulic                      min: \_\_\_\_\_                      max: \_\_\_\_\_

mechanical                      min: \_\_\_\_\_                      max: \_\_\_\_\_

Mounting orientation:

horizontal                       vertical                       inclined (approx. degree) \_\_\_\_\_

Mounting orientation:

pointing up                       down                       angle to perpendicular \_\_\_\_\_

Force and speed occurring in tension direction:                      F[N]: \_\_\_\_\_                      V[m/s]: \_\_\_\_\_

Force and speed occurring in compression direction:                      F[N]: \_\_\_\_\_                      V[m/s]: \_\_\_\_\_

Extension force required?                       yes                       by spring  
(indicate in N or as spring rate):                       no                       by gas

End fittings:                       eyelet                       thread                       clevis  
 ball socket/angle joint                       eyelet with rubber cushion                       others

Max. outer diameter in mm: \_\_\_\_\_

Ambient temperature in °C: min:                      min: \_\_\_\_\_                      max: \_\_\_\_\_



- Production
- Sales office

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