Damping technology

Industrial
+ Industrial shock absorbers
+ Profile dampers

Soft Close
+ Damping for drawers
+ Damping for sliding doors
+ Damping for lids
+ Damping for hinges
+ Retrofit sets

THE KNOW-HOW FACTORY

ZIMMER group

"WE ARE PLEASED TO BE TAKING A MAJOR STEP INTO THE FUTURE WITH ZIMMER GROUP. THE UMBRELLA BRAND ZIMMER GROUP SYMBOLIZES OUTWARDLY WHAT WE HAVE ALREADY INTERNALIZED – THE UNITY OF PREVIOUSLY SEPARATE COMPANIES.

AS ZIMMER GROUP, OUR FAMILY-RUN ENTERPRISE CAN DELIVER EVEN GREATER VALUE AND SUPPORT FOR OUR CUSTOMERS.
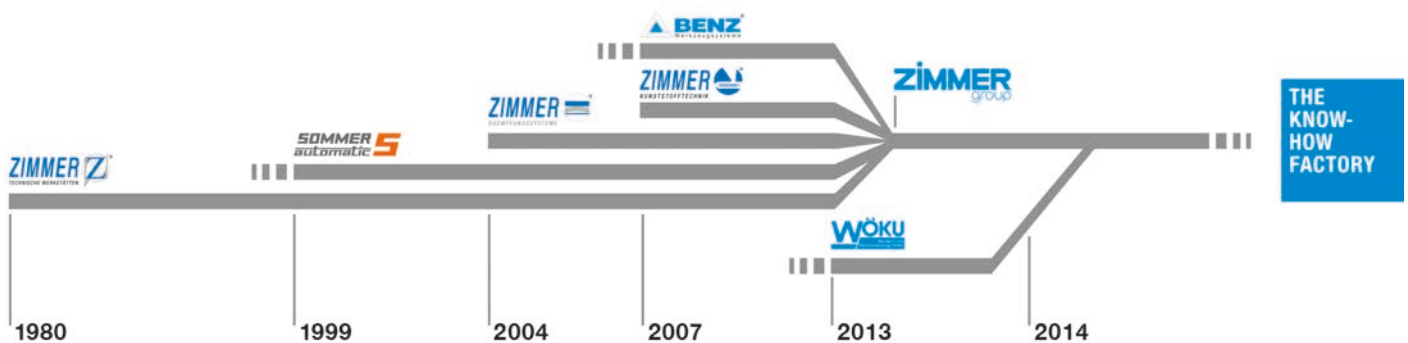NOW AND IN THE FUTURE. CONTINUING OUR INTERNATIONALIZATION, ENGAGING WITH ALL INDUSTRIES, AND SOLVING ALL TYPES OF DEVELOPMENT TASKS ARE SOME OF THE CHALLENGES THAT WE WILL OVERCOME AS THE KNOW-HOW FACTORY."

GÜNTHER ZIMMER, MARTIN ZIMMER AND ACHIM GAUSS
Managing Directors, from left to right

ZIMMER GROUP
COMMITTED
TO OUR CUSTOMERS

WE HAVE SUCCEEDED FOR YEARS BY OFFERING OUR CUSTOMERS INNOVATIVE AND INDIVIDUALIZED SOLUTIONS. ZIMMER HAS GROWN CONTINUOUSLY AND TODAY WE HAVE REACHED A NEW MILESTONE: THE ESTABLISHMENT OF THE KNOW-HOW FACTORY. IS THERE A SECRET TO OUR SUCCESS?

Foundation. Excellent products and services have always been the foundation of our company's growth. Zimmer is a source of ingenious solutions and important technical innovations. This is why customers with high expectations for technology frequently find their way to us. When things get tricky, Zimmer Group is in its best form.

Style. We have an interdisciplinary approach to everything we do, resulting in refined process solutions in six areas of technology. This applies not just to development but to production as well. Zimmer Group serves all industries and stands ready to resolve even unique and highly individualized problems. Worldwide.

Motivation. Customer orientation is perhaps the most important factor of our success. We are a service provider in the complete sense of the word. Even our decision to identify ourselves as Zimmer Group reflects this reality. With Zimmer Group, our customers now have a single, centralized contact for all of their needs. We approach each customer's situation with a high level of competence and a broad range of possible solutions.

TECHNOLOGIES

HANDLING TECHNOLOGY

WITH MORE THAN 30 YEARS OF EXPERI-ENCE AND INDUSTRY KNOWLEDGE, OUR PNEUMATIC, HYDRAULIC AND ELECTRICAL HANDLING COMPONENTS AND SYSTEMS ARE GLOBAL LEADERS.

Components. More than 2000 standardized gripper systems, positioning systems, robotools and much more. We offer a complete selection of technologically superior products that are ready for rapid delivery.

Semistandard. Our modular approach to design enables custom configurations and high rates of innovation for process automation.

Systems. We are particularly strong in providing custom system solutions for handling technologies, robotics and vacuum engineering.

DAMPING TECHNOLOGY

INDUSTRIAL DAMPING TECHNOLOGY AND SOFT CLOSE PRODUCTS EXEMPLIFY THE INNOVATION AND PIONEERING SPIRIT OF THE KNOW-HOW FACTORY.

Industrial damping technology. Whether standard or customized solutions, our products stand for the highest cycle rates and maximum energy absorption with minimal space requirements.

Soft Close. Development and mass production of pneumatic and fluid dampers with extraordinary quality and rapid delivery.

OEM und direct. Whether they need components, returning mechanisms or complete production lines – we are the trusted partner of many prestigious customers.

LINEAR TECHNOLOGY

WE DEVELOP LINEAR COMPONENTS AND SYSTEMS THAT ARE INDIVIDUALLY ADAPTED TO OUR CUSTOMERS' NEEDS.

Clamping and braking elements. We offer more than 4000 types for profiled and rounded rails as well as for a variety of guide systems from all manufacturers. It makes no difference whether you prefer manual, automatic, electric or hydraulic drive.

Individualized systems. The unique functionality and precision of our clamping and braking elements open up numerous possibilities for custom applications such as active or semi-active braking and damping.

PROCESS TECHNOLOGY

MAXIMUM EFFICIENCY IS ESSENTIAL FOR SYSTEMS AND COMPONENTS USED IN PROCESS TECHNOLOGY. HIGH-LEVEL CUSTOM SOLUTIONS ARE OUR TRADEMARK.

A rich reservoir of experience. Our know-how ranges from the development of materials, processes and tools through product design to production of series products. Challenge us!

Deep production capabilities. The Zimmer Group pairs these capabilities with flexibility, quality and precision, even when making custom products.

Series production. We manufacture demanding products out of metal (MIM), elastomers and plastics with flexibility and speed.

TOOLING TECHNOLOGY

ZIMMER GROUP DEVELOPS INNOVATIVE METAL, WOOD AND COMPOSITE MATERIAL PROCESSING TOOL SYSTEMS FOR ALL INDUSTRIES. NUMEROUS CUSTOMERS CHOOSE US AS THEIR SYSTEMS AND INNOVATION PARTNER.

Knowledge and experience. Industry knowledge and a decades-long development partnership for exchangeable assemblies, tool interfaces and tool systems predestine us for new challenges around the world.

Components. We deliver numerous standard components from stock and develop innovative, customized systems for OEM and end users – far beyond just the metal and wood processing industries.

Variety. Whether you have machining centres, lathes, or flexible production cells, the power tools, holders, assemblies and drilling heads of Zimmer Group are ready for action.

MACHINE TOOLING TECHNOLOGY

AS A DRIVING FORCE IN OUR INDUSTRY, WE DELIVER HIGH-VALUE SOLUTIONS IN THE FIELD OF MECHANICAL ENGINEERING, FULLY ACCORDING TO THE NEEDS OF OUR CUSTOMERS.

Development partner. We accompany you from brainstorming to inspection of the final machine, always according to your expectations.

Components. We deliver series products and modules, five-axis heads, motor spindles, gearbox swivelling heads, add-on assemblies and motors.

Systems. The Know-how Factory stands for solutions in the fields of mechanical engineering systems, specialty solutions, custom assemblies and mechanical modules. We manufacture and configure multiple-spindle and large-angles as well as large boring heads.
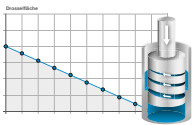
www.zimmer-group.com ▶ Data, Drawings, 3-D Models, Operating Instructions

COMPLETE PROGRAM
IN OVERVIEW

INDUSTRIAL DAMPING TECHNOLOGY

INTRODUCTION
INTRODUCTION

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INDUSTRIAL SHOCK ABSORBER POWERSTOP
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INDUSTRIAL SHOCK ABSORBER POWERSTOP
COMPONENTS

INDUSTRIAL SHOCK ABSORBER POWERSTOP
CUSTOM SOLUTIONS AND SYSTEMS

INDUSTRIAL SHOCK ABSORBER POWERSTOP
PRESS
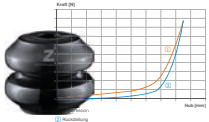
PROFILE DAMPERS BASICSTOP
TECHNICAL INFORMATION

PROFILE DAMPERS BASICSTOP
COMPONENTS

$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1{}^2 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = m \cdot g \cdot s - \frac{M}{R} \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

GENERAL
CALCULATION

PLEASE MARK:

☒ ☐ ☐

GENERAL
CHECKLIST

GENERAL
TIPS AND TRICKS

SOFT CLOSE DAMPING TECHNOLOGY

SOFT CLOSE DAMPERS
TECHNICAL INFORMATION

SOFT CLOSE DAMPERS
COMPONENTS

SOFT CLOSE DAMPERS
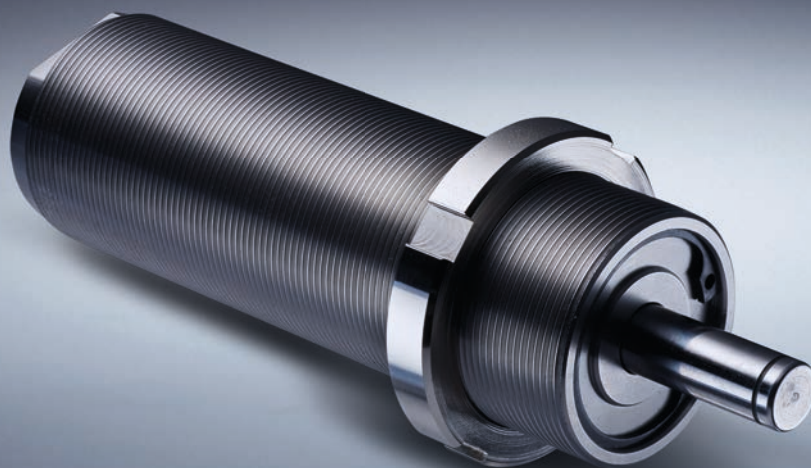**SYSTEMS**

SOFT CLOSE DAMPERS
SPECIAL SOLUTIONS

For Usage Notes, see pages 140-141

DAMPING TECHNOLOGY
INDUSTRIAL DAMPING TECHNOLOGY

INTRODUCTION
INTRODUCTION

Use of shock absorbers

Machines carry out increasingly complex tasks today. The systems are also pushed to their limits in order to increase productivity and profitability. For the machinery this means that, in addition to the number of moving parts, their velocities and thus their kinetic energy also increase. However, in order to avoid collisions, high impact forces and strong vibrations, which could lead to damage and consequently to the reduction of the service life, the surplus energy must be removed from the system. The solution lies in the use of energy dissipation, in the context of which kinetic energy is transformed into thermal energy (heat) through friction, which is better known under the term damping.

In order to reduce wear and increase the effectiveness of a machine during a process, friction is reduced to a minimum with the help of tribological (friction technology) knowledge. Energy and raw material resources can in this way be saved in the course of cost reduction and environmental protection. However, this has the consequence that special components, such as the products of the Zimmer Group from the Industrial Damping Technology division, are required to remove kinetic energy in a targeted fashion at those points and in those situations at which damage could be caused. In the case of shock absorption, this serves to brake and stop moving masses prior to end stops.

The shock absorbers of the Zimmer Group thus present the following advantages for your machinery and systems:
▶ Increased service life of the machinery through reduction of damaging force peaks and fluctuations, which reduces failure times and maintenance costs and increases the operational velocities of the machine
▶ Increased safety for collisions and stops caused by emergencies
▶ Increased productivity and efficiency of the machinery
▶ Reduction of noise levels by reducing noise emissions in production

The integration of the shock absorbers results in safer operation due to a reduction of loads with a simultaneous increase in machinery utilization. Dynamics and velocities can be controlled with the help of the shock absorbers.

Operating modes of shock absorbers: Continuous operation and emergency stop operation

There are two different operating modes for shock absorbers. Continuous operation represents regular loading of the shock absorber with a certain number of cycles per unit of time. This results in the heating up of the shock absorber, which results in a certain operating temperature prevailing from the thermal balance between heat absorption due to damping and heat dissipation to the surroundings.

With emergency stop operation, the shock absorber is only used in exceptional situations or emergencies, e.g. a failure of the machine control system. In this case there is no number of cycles per time unit, but instead, in the best case scenario the load does not even occur, or comes at irregular or unpredictable intervals. Some shock absorbers are conceived such that they can absorb even more energy per stroke in emergency stop operation than they can in continuous operation.
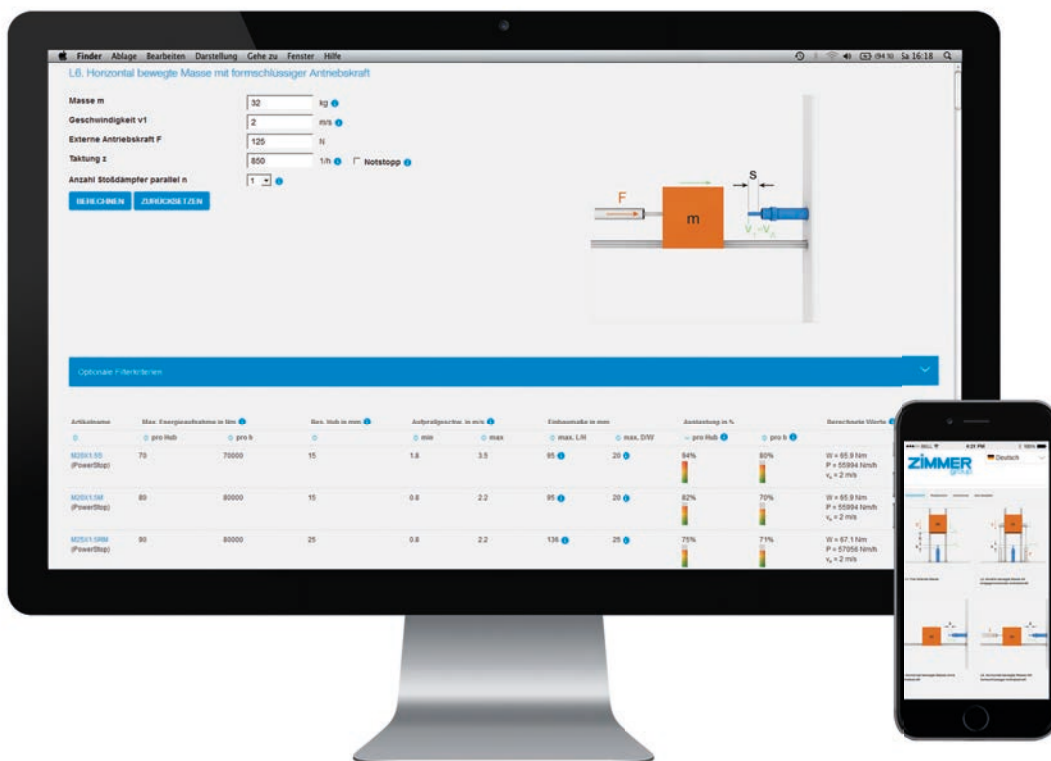
INTRODUCTION
SHOCK ABSORBERS SELECTION GUIDE

Calculate and select shock absorbers more quickly

Users receive a high-performance tool that allows them to make well-founded selection decisions quickly and combines calculation, selection guide and configurator functions in one tool.

Convenient calculation delivers fast results

A choice between a large number of different load cases appropriate to the case can be selected very easily.
The procedure is very simple: All one has to do is select the right load case and then specify the required values to obtain a reliable result.

Clearly arranged selection guide

The available dampers that meet these specifications are shown to the user in an overview table.
The energy absorption for each damper is individually calculated in the table and its load is displayed.

Advanced search using a filter

Using filters, additional marginal conditions can be entered. These include especially high or low temperatures, use in the pressure chamber, contaminated environments or large angles for the impact of the load.
The software returns suitable versions and necessary accessories or equipment options based on the selected filter.

Appealing solution, available as a mobile application

Since the calculation program is available online, customers do not have to install any software and can access it using any computer or laptop, as well as with any smartphone or tablet.

INTRODUCTION
PRODUCT PORTFOLIO

INDUSTRIAL SHOCK ABSORBERS

Brand:	PowerStop
Damping type:	hydraulic
Know-how:	Spiral groove technology
Series:	High Energy – The high-end solution
	Standard Energy – The standard version
Thread diameter:	M4 – M45
Degrees of hardness:	Supersoft W
	Soft S
	Medium M
	Hard H

PROFILE DAMPERS

Brand:	BasicStop
Damping type:	Viscoelastic
Know-how:	Material TPC
	Conditioning process
	Structure design
Series:	Axial Standard – Axial design
	Axial Advanced – Axial design for heavy load
	Radial Standard – Radial design
Degrees of hardness:	Medium M Shore 40D
	Hard H Shore 55D

▶ DEFINITION OF COMPONENTS

▶ **Versatile components**
Zimmer Group offers a wide variety of standard components right at your disposal, as well as semi-standard components adapted to your needs.

▶ Components from Zimmer Group are products of the highest level of quality for integration into your existing or newly developed systems.

▶ Take advantage of our expert sales advice. We would be happy to help you.

▶ DEFINITION OF SYSTEMS
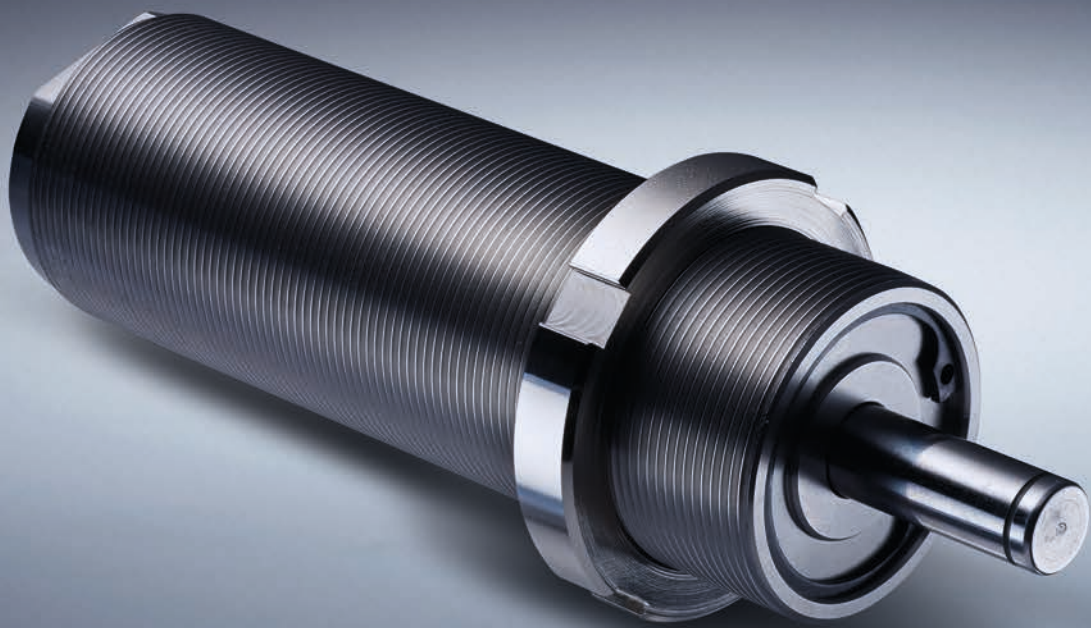

▶ **Universal units**
Zimmer Group not only specializes in individual components, but also develops complete systems for your specific applications.

▶ Our expert consulting and flexible, innovative development area would be happy to help and advise you.

# INDUSTRIAL SHOCK ABSORBERS
POWERSTOP

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
KNOW-HOW

PowerStop®

The unique spiral groove technology is a defining feature of PowerStop brand industrial shock absorbers.
In contrast with conventional industrial shock absorbers with throttle bores, the constantly tapering spiral groove causes precise, low-vibration shock absorption. This means that PowerStop achieves maximum energy absorption with the smallest space.
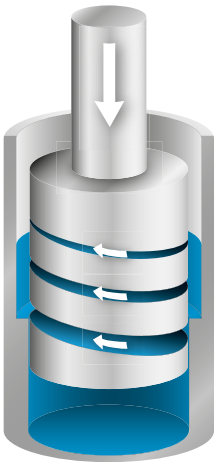
Our expertise – your advantages:

► Highest quality for the most extreme requirements and loads

► High energy absorption thanks to maximum utilization in each piston position

► Low-vibration and precise braking due to the constantly narrowing spiral groove

► Less wear thanks to the hydrostatic piston guide

► High level of operational safety and reliability

► Corrosion protection from using stainless steel

► Individual configuration for customized solutions

Function

▶ An industrial shock absorber absorbs the energy of a moving mass and transforms the kinetic energy 100% into heat through the friction of the internal oil flow (**hydraulic damping**).

Degree of hardness

▶ The degree of hardness of a hydraulic shock absorber stands for the range of impact velocity for which the shock absorber is optimally configured. In this velocity range, the shock absorber reaches its maximum energy absorption per stroke.

▶ Below the minimum speed, the shock absorber functions with a reduced energy absorption capacity due to the reduced throttle effect.
There is a risk of bouncing when the impact velocity is exceeded. This means that the mass lifts slightly or recoils upon impact, because the oil at the throttle point cannot flow away quickly enough.

▶ The softer the degree of hardness, the higher the velocity range. This means that in the range from the degree of hardness "Hard" to "Soft", the optimal impact velocity increases.
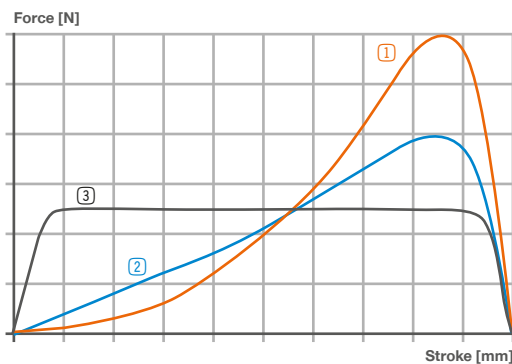
1 Soft/Supersoft
2 Medium
3 Hard

Characteristics of the shock absorber curve

▶ As a default, the individual degrees of hardness tend to demonstrate the following characteristics in the force over stroke shock absorber curve.

▶ Due to the throttling, the characteristic depends upon the impact velocity and can thus only be indicated as a trend.
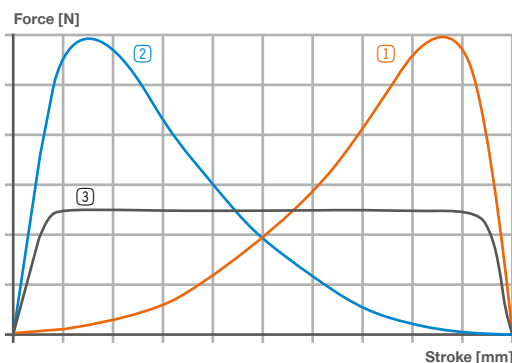
1 Inclining
2 Declining
3 Linear-constant

Individual damping characteristics

▶ The spiral groove makes it possible for the shock absorber to demonstrate unique, customized characteristics. This means that the force curve can be configured progressively for a gentle increase in force, linear-constantly for a constant force curve with the lowest possible maximum force or on a diminishing scale for a weak end position force. By adjusting the spiral groove curve, the shock absorber can be optimally configured for your application when necessary.

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
KNOW-HOW

POWERSTOP INDUSTRIAL SHOCK ABSORBERS

THROTTLE MECHANISM

**Spiral groove technology as a damping principle.
In the case of the PowerStop industrial shock absorbers, the throttle effect necessary for damping is provided optimally and free of vibration by the circumferential, tapering spiral groove in the piston.**
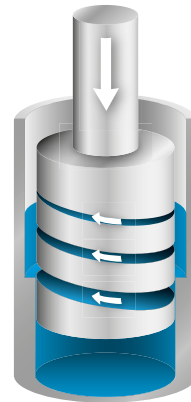
Throttle characteristic

▶ The spiral groove tapers toward the top in the depth. With a retracting piston, the throttle cross-section affecting the trailing edge lessens.

▶ A constant decrease of the throttle surface results from the continuous progression of the spiral groove depth. This means that the shock absorber adapts ideally to the velocity reducing through the stroke and is optimally utilized for maximum energy absorption capacity in every piston position. In addition, the stress on the oil is reduced to a minimum.

Throttle surface
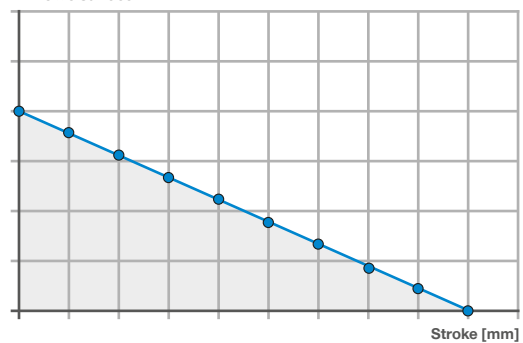
Stroke [mm]

Shock absorber curve

▶ The constant throttle characteristic results in a low-vibration, almost ideal force-stroke curve. The prevention of vibrations upon impact not only preserves the relevant components and systems, but also ensures jerk-free braking of the moving masses.

Force [N]

②

①

Stroke [mm]

① Ideal line
② PowerStop
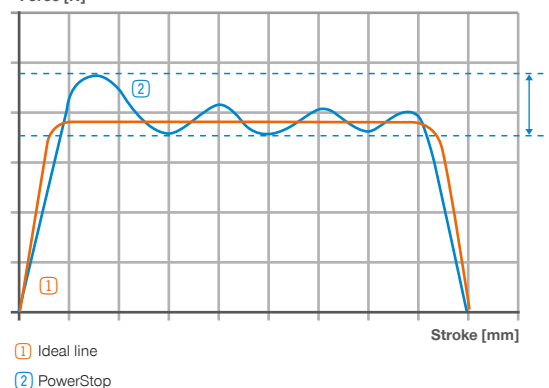
Hydrostatic piston guide

▶ In addition to jerk-free damping, the spiral groove technology also provides reduced wear hydrostatic piston movement. Thanks to the spiral groove, oil is located between the piston and the running surface during the entire stroke. The relatively moving parts are separated by an anti-friction film, which minimizes wear. This guarantees a high degree of reliability.
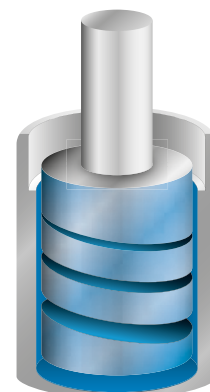
CONVENTIONAL INDUSTRIAL SHOCK ABSORBERS

THROTTLE MECHANISM

In the case of conventionally designed industrial shock absorbers, the throttle effect necessary for damping is provided in steps and burdened with vibrations by the throttle bores positioned in a sleeve.

Throttle surface
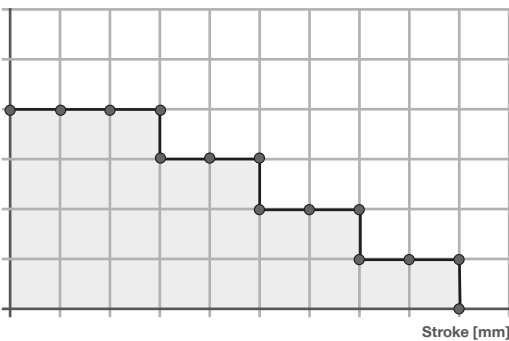
Stroke [mm]

Throttle characteristic

► The retracting piston gradually wears away the throttle bores laid out in the stroke direction, which reduces the throttle cross-section step by step.
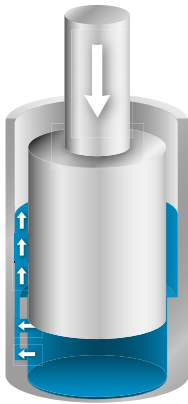
► This results in an unsteady reduction of the throttle surface. This results in the shock absorber adapting only in certain areas to the velocity being reduced through the stroke. The oil is also greatly stressed by the forced detour.

Force [N]
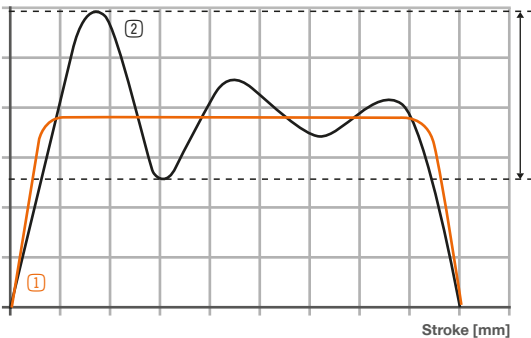
Stroke [mm]

1 Ideal line
2 Conventional shock absorbers

Shock absorber curve

► The force-stroke characteristic curve is characterized by the inconsistent throttle characteristics that cause vibrations in the force curve. This in turn leads to vibrations and thus to damage to the machines, which is precisely what should be prevented by a shock absorber.

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
THE SERIES AT A GLANCE

Housing (stainless steel)
Return valve
Damping piston with spiral groove
Pressure sleeve
Return spring
Piston rod (stainless steel)
Volume compensation (spring)
Oil reserve storage
Low-pressure chamber
High-pressure chamber
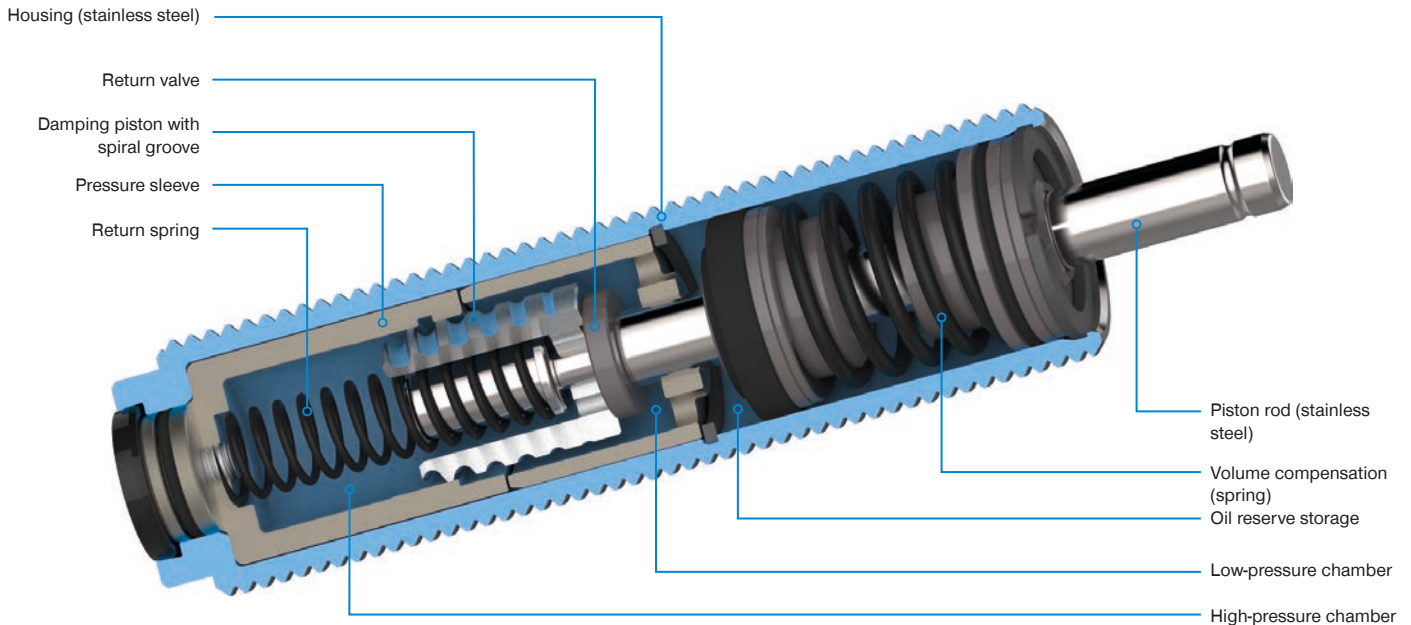
HIGH ENERGY

▶ The high-end solution: High energy absorption for long service life

▶ Thread diameter: M4 to M45

▶ Degrees of hardness: Supersoft W, Soft S, Medium M, Hard H

▶ Head: without, with steel head, with plastic head, with bellow

▶ Energy absorption per stroke: 0.5 - 2800 Nm

▶ Corrosion protection with stainless steel

▶ Can be used in pressure chamber up to 10 bar

▶ Volume compensation: Spring

Oil reserve

▶ The shock absorbers of the High Energy series are filled with oil so that the volume compensation spring is under pre-load. This creates a chamber with an oil reserve that acts as external hydraulic pressure storage. Oil loss can be compensated for by readjustment of the spring, which results in a long running time.

Housing (stainless steel)

Return valve

Damping piston with spiral groove

Return spring

Piston rod (stainless steel)

Volume compensation (cellular rubber)

Low-pressure chamber

High-pressure chamber
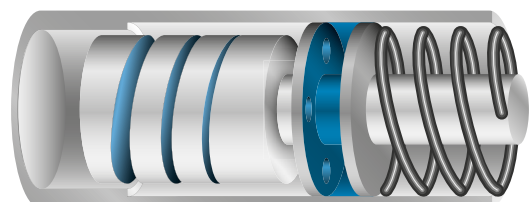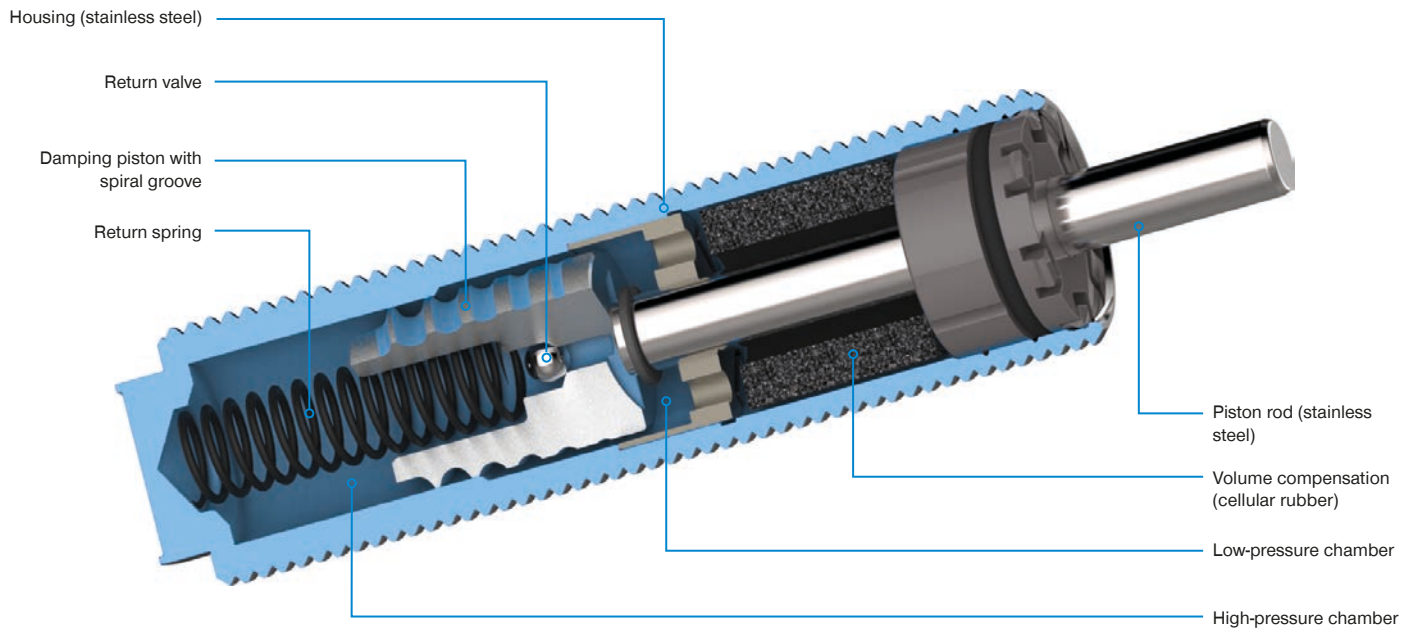
STANDARD ENERGY

► The standard version: Energy absorption at standard level with service life usual for the market

► Thread diameter: M8 to M45

► Degrees of hardness: Soft S, Medium M, Hard H

► Head: without, with steel head, with plastic head

► Energy absorption per stroke: 1.5 - 350 Nm

► Corrosion protection with stainless steel

► Cannot be used in a pressure chamber

► Volume compensation: Cellular rubber

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
FUNCTIONAL SEQUENCE

1. Home position

Return valve is opened and the high-pressure chamber is filled with hydraulic medium (oil)
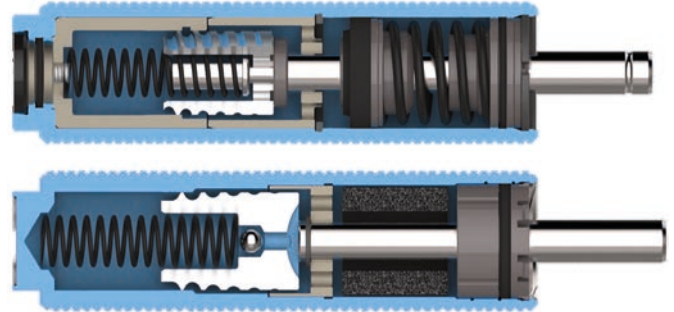
2. Retraction with damping

External force or kinetic energy (impact) pushes the piston rod in together with the piston
► Pressure build-up in the high-pressure chamber
► Return valve closes
► Oil flows from the high-pressure chamber into the low-pressure chamber and the oil reserve storage via the spiral groove
► Throttle effect of the spiral groove
► Due to the throttle effect, a force (damping or supporting force) is generated via the stroke to the retracting piston that counters the movement.
► Due to the friction of the throttled oil flow, the kinetic energy is converted into heat (**hydraulic damping**), whereby 100% of the kinetic energy is damped
► The volume compensation compression compensates for the volume of the retracting piston rod

Force [N]

①

Stroke [mm]

① Energy absorption = Damping energy
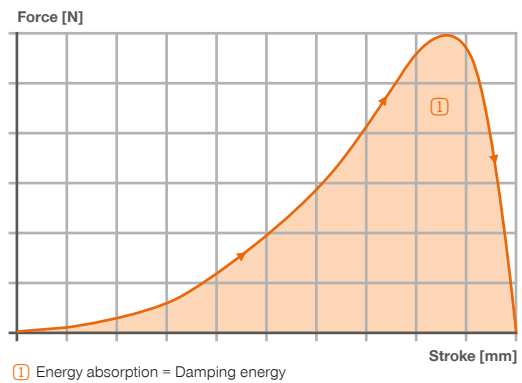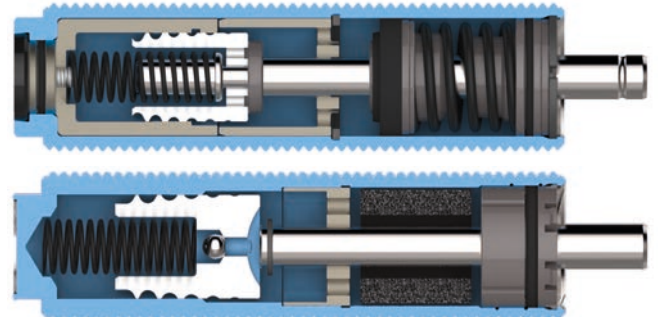
3. Returning

Removal of external force from the piston rod
► Return spring pushes the piston rod back together with the piston
► Return valve opens for quick oil return flow
► Oil flows from the low-pressure chamber back into the high-pressure chamber via the return valve
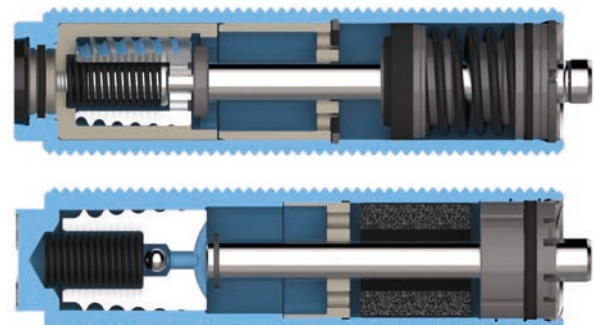
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
PRODUCT KEY

Selection of industrial shock absorbers

► according to thread, series, stroke, degree of hardness and head

M25x1.5	R	L	M	S

Head

" "	No head
S	Mounted with steel head
K	Mounted with plastic head
B	Mounted with bellow

Degree of hardness

W	Supersoft
S	Soft
M	Medium
H	Hard

Stroke

" "	Standard stroke
L	Long stroke

Series

" "	High Energy
R	Standard energy

Thread

″M25 ...″	Thread rated diameter
″... x1.5″	Thread pitch
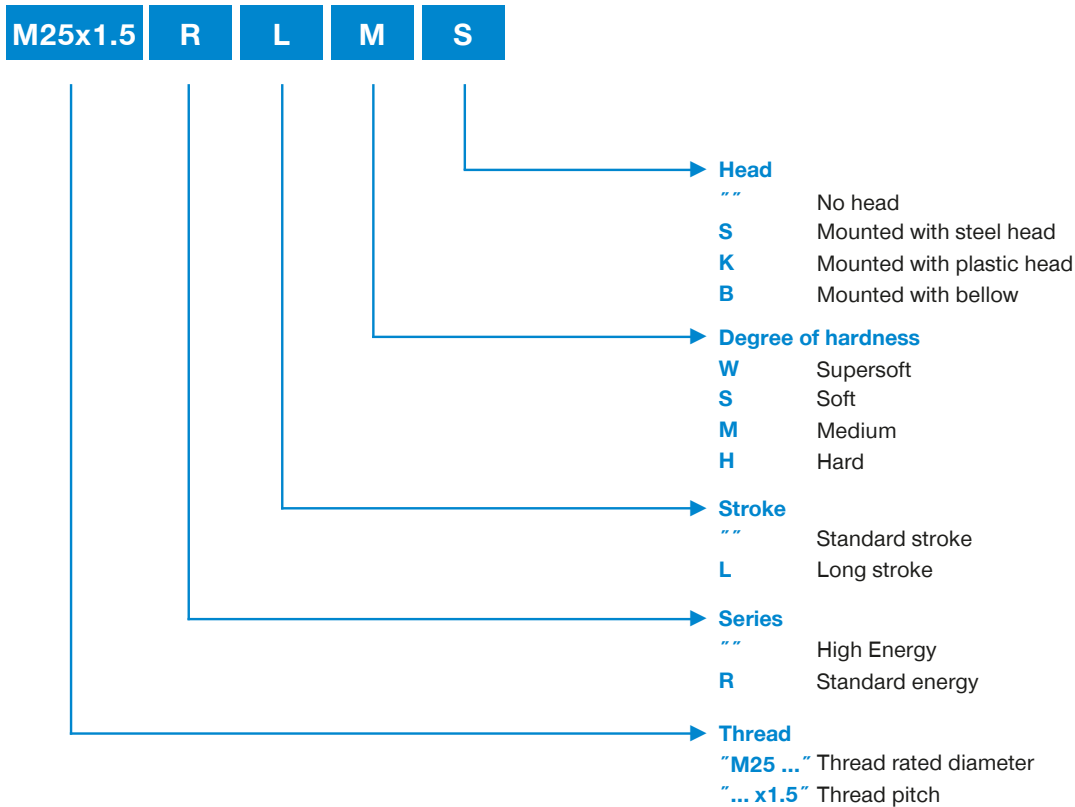
Notes:

► Delivery including a steel locknut for simple and safe installation.

► The degree of hardness specifies the velocity range (from degree of hardness W to H; velocity decreases as hardness increases).

► The energy absorption and the impact velocity can be determined with the help of the shock absorber selection guide online at **www.zimmer-group.com/pdti** or with the formulas and calculations listed in the attachment.

Head:

► steel head **(S)**
Using a steel head reduces the contact pressure during impact due to the enlarged surface.
The steel head is mostly used for soft opposing materials on the other side.

► plastic head **(P)**
Using a plastic head is recommended for reducing the amount of noise that is generated.

► bellow **(B)**
The bellow of PTFE (Teflon):
- offers high level of protection for use in dirty environments against liquids like coolants, oil and cleaning agents, as well as against dirt and chips.
- when used in the clean room, prevents the discharge of particles from the shock absorber

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
APPLICATIONS
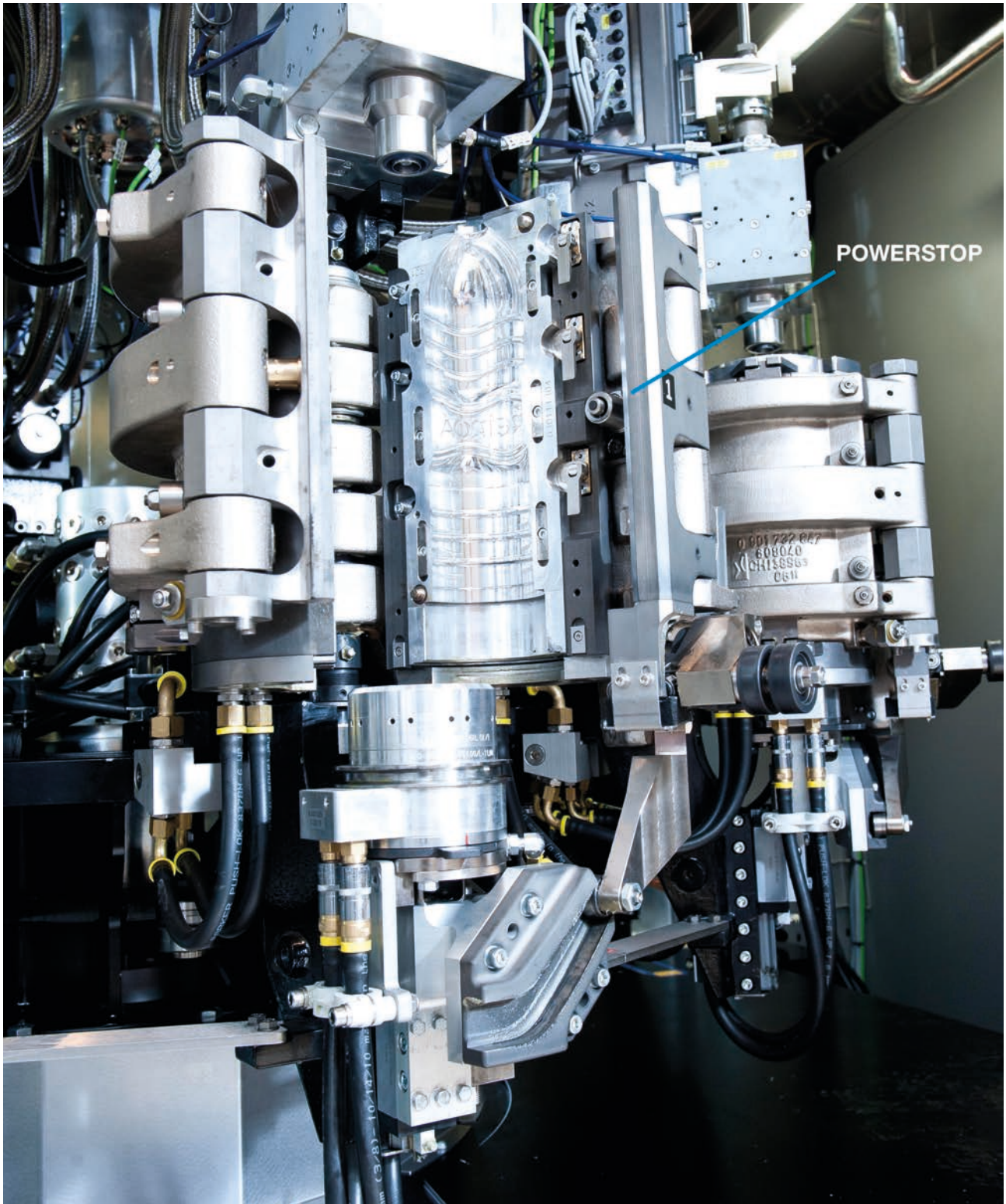
POWERSTOP

▶ Gentle closing of the stretch-blow molds by PowerStop HighEnergy dampers in Krones systems for the manufacture of PET bottles

▶ Linear Cylinders

▶ Swivel unit
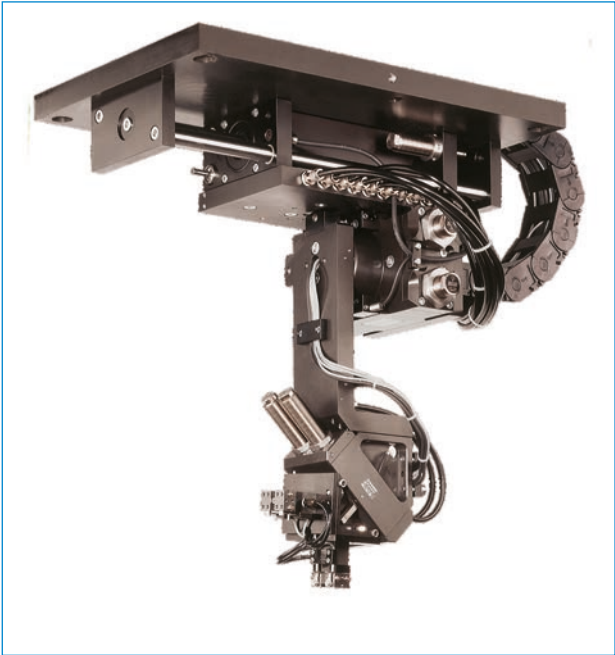
▶ Automatic placement system
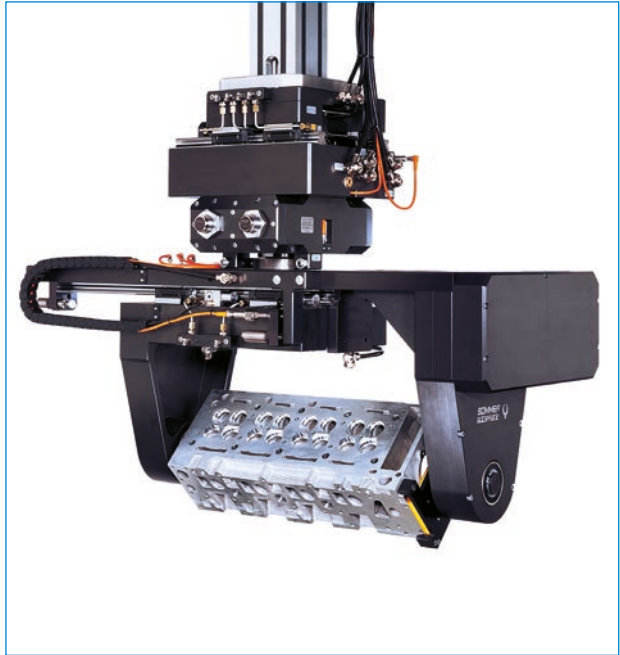
▶ Cylinder head handling

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
ACCESSORIES

LOCKNUT
Available for M4-M45
Steel locknut
A nut made of nickel-plated steel is supplied for each shock absorber. An additional nut is required for installation in a hole with no threading.
Stainless steel locknut
Alternatively, a nut made from stainless steel provides increased corrosion protection.

STOP SLEEVE
Available for M6-M45
The PowerStop may not be used as a fixed stop. Using a stop sleeve is recommended. This lets you set the end stop individually using the additional locknut by screwing the sleeve onto the outer thread of the shock absorber. The stop sleeve, including the additional locknut, is made of stainless steel.

CLAMPING FLANGE
Available for M6-M45
You can use a clamping flange to connect the shock absorber to the construction more easily. The shock absorber is clamped tight together with the clamping flange in the screwed-in state with the provided screws and fastened to the construction, which makes the locknut unnecessary.

SIDE LOAD ADAPTER/AIR BARRIER ADAPTER
Available for M10-M45
With this article, consisting of a stainless steel piston rod and a housing of burnished steel, two requirements are met at once:
Side load adapter
A side load adapter must be provided if the system applies a force to the shock absorber at an impact angle higher than the permitted misalignment of 2°. This increases the permitted impact angle up to 30°.
Air barrier adapter
An air barrier adapter is recommended if there is increased dirt buildup. Connecting a compressed air supply enables an air cushion to protect the shock absorbers from the ingress of dirt particles. This option is only available for the High Energy series.

COOLING NUT
Available for M10-M45
The energy absorption per hour (at an ambient temperature of 20 °C) can be increased up to 1.5 x by using a surface-enlarging aluminum cooling nut so that the 70 °C operating temperature of the PowerStop shock absorber is not exceeded even during shorter cycle times. This enables shorter cycle times to be attained.

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
OVERVIEW OF PRODUCTS

Installation size	Series	Max. energy per stroke [Nm]		Stroke [mm]	Length without head [mm]	Page
		Duration	Emergency stop			
M4X0.5	High Energy	0,5	0,5	3	25	28
M5X0.5	High Energy	0,8	0,8	4	29	30
M6X0.5	High Energy	1,5	1,5	4	38	32
M8X0.75/M8X1	High Energy	3	3	5	49,5	34/36
	Standard Energy	1,5	1,5	5	49,5	34/36
M10X1	High Energy	4-12	4-12	8	62	38
	Standard Energy	3	3	8	62	38
M12X1	High Energy	10-18	10-27	10	69,5	40
	Standard Energy	9	9	10	69,5	40
M14X1/M14X1.5	High Energy	18-32	18-45	12	83	42/44
	Standard Energy	20	20	12	83	42/44
M20X1.5	High Energy	35-80	35-150	15	95	46
	Standard Energy	32	32	15	95	46
M20X1.5L	High Energy	100-120	170-220	30	131	48
M25X1.5	High Energy	100-210	100-450	25	136	50
	Standard Energy	90	90	25	136	50
M25X1.5L	High Energy	250-350	500-750	40	171	52
M27X1.5/M27X3	High Energy	100-210	100-450	25	136	54/56
	Standard Energy	90	90	25	136	54/56
M33X1.5	High Energy	300-350	500-850	30	165	58
	Standard Energy	180	180	30	165	58
M33X1.5L	High Energy	450-500	1100-1200	50	204	60
M45X1.5	High Energy	600-650	1400-1600	25	170	62
	Standard Energy	350	350	25	170	62
M45X1.5L	High Energy	1000-1200	2600-2800	50	250	64

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M4X0.5

► PRODUCT SPECIFICATIONS

PowerStop

►	**Angle of Impact max.**	2 [°]
►	**Piston return time**	0.15 [s]
►	**Permitted temperature range**	-10 ... +70 [°C]
►	**Max. High Energy pressure (abs.)**	10 [bar]
►	**Max. locknut tightening torque**	2 [Nm]
►	**PWIS-free**	Yes
►	**RoHS compliant**	Yes
►	**REACH compliant**	Yes

► TECHNICAL DATA

► Installation Size: **M4X0.5**

	Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
		Continuous operation		Emergency stop operation						
		per stroke	per hour	per stroke		min.	max.	min.	max.	
		[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
HIGH ENERGY	**M4X0.5M**	0.5	1,200	0.5	3	0.2	2	1	2	2

▶ TECHNICAL DRAWINGS

▶ ACCESSORIES

▶ Installation Size: **M4X0.5**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MVM4X0.5**	Stainless steel locknut	0.5	

①
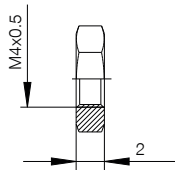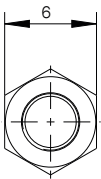
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M5X0.5

► PRODUCT SPECIFICATIONS

PowerStop

►	**Angle of Impact max.**	2 [°]
►	**Piston return time**	0.15 [s]
►	**Permitted temperature range**	-10 ... +70 [°C]
►	**Max. High Energy pressure (abs.)**	10 [bar]
►	**Max. locknut tightening torque**	2 [Nm]
►	**PWIS-free**	Yes
►	**RoHS compliant**	Yes
►	**REACH compliant**	Yes

► TECHNICAL DATA

► Installation Size: **M5X0.5**

	Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
		Continuous operation		Emergency stop operation						
		per stroke	per hour	per stroke		min.	max.	min.	max.	
		[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
HIGH ENERGY	**M5X0.5M**	0.8	1,800	0.8	4	0.2	2	1	2	3

▶ TECHNICAL DRAWINGS

▶ ACCESSORIES

▶ **Installation Size: M5X0.5**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MVM5X0.5**	Stainless steel locknut	0.5	

①
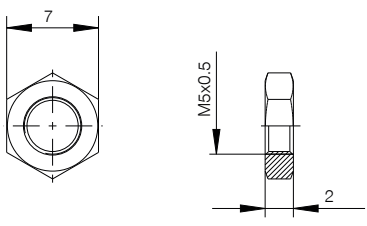
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M6X0.5

▶ **PRODUCT SPECIFICATIONS**

▶	**Angle of Impact max.**	2 [°]
▶	**Piston return time**	0.15 [s]
▶	**Permitted temperature range**	-10 ... +70 [°C]
▶	**Max. High Energy pressure (abs.)**	10 [bar]
▶	**Max. locknut tightening torque**	4 [Nm]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ **TECHNICAL DATA**

▶ Installation Size: **M6X0.5**

	Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
		Continuous operation		Emergency stop operation						
		per stroke	per hour	per stroke		min.	max.	min.	max.	
		[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
HIGH ENERGY	**M6X0.5S**	1.5	3,200	1.5	4	1.8	3.5	1	3	6
	M6X0.5SS	1.5	3,200	1.5	4	1.8	3.5	1	3	6
	M6X0.5SK	1.5	3,200	1.5	4	1.8	3.5	1	3	6
	M6X0.5M	1.5	3,200	1.5	4	0.8	2.2	1	3	6
	M6X0.5MS	1.5	3,200	1.5	4	0.8	2.2	1	3	6
	M6X0.5MK	1.5	3,200	1.5	4	0.8	2.2	1	3	6
	M6X0.5H	1.5	3,200	1.5	4	0.2	1.2	1	3	6
	M6X0.5HS	1.5	3,200	1.5	4	0.2	1.2	1	3	6
	M6X0.5HK	1.5	3,200	1.5	4	0.2	1.2	1	3	6

► **TECHNICAL DRAWINGS**

S: assembled with steel head

K: assembled with plastic head
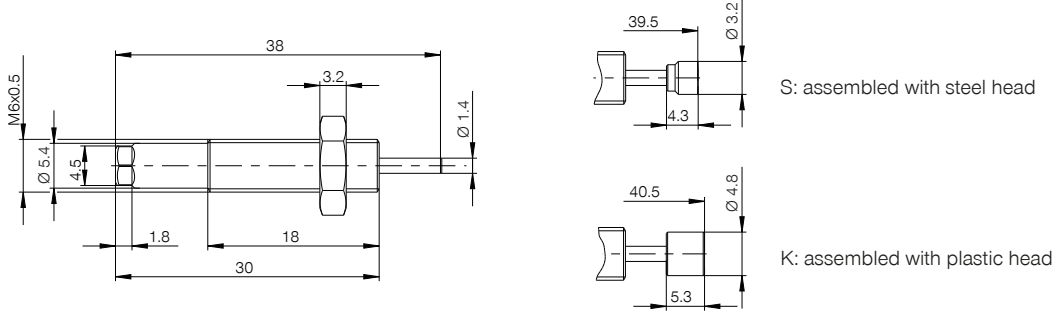
► **ACCESSORIES**

► Installation Size: **M6X0.5**

Pos.	Order no.	Accessories	Weight [g]	Remarks
1	**MSM6X0.5**	Steel locknut	2	
1	**MVM6X0.5**	Stainless steel locknut	2	
2	**MAH6X0.5**	Stop sleeve	6	Including 1x MVM6X0.5
3	**MKF6X0.5**	Clamping flange	10	Max. tightening torque of the screws 1 Nm
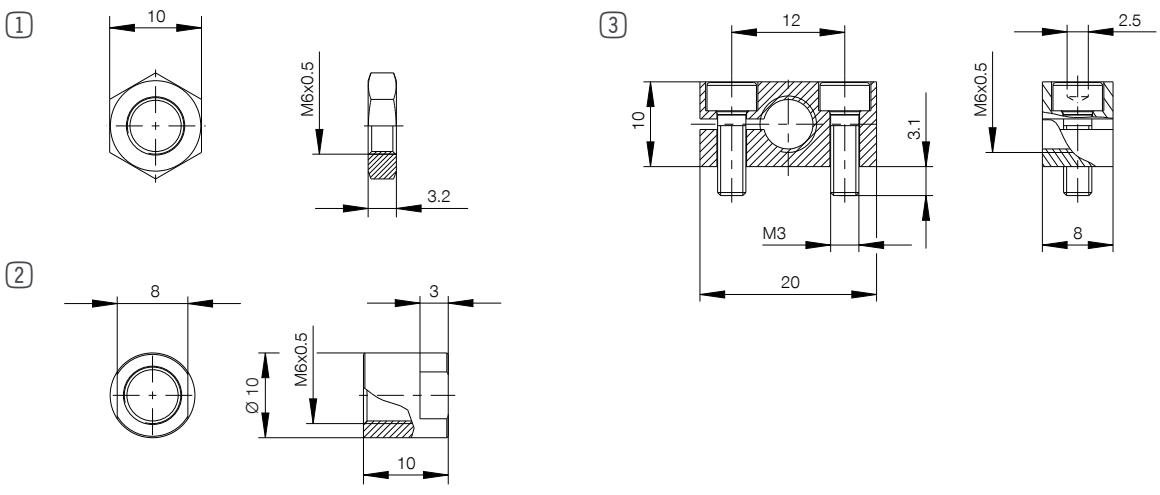
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M8X0.75

▶ PRODUCT SPECIFICATIONS

PowerStop®

▶	**Angle of Impact max.**	2 [°]
▶	**Piston return time**	0.15 [s]
▶	**Permitted temperature range**	-10 ... +70 [°C]
▶	**Max. High Energy pressure (abs.)**	10 [bar]
▶	**Max. Standard Energy pressure (abs.)**	1 [bar]
▶	**Max. locknut tightening torque**	6 [Nm]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M8X0.75**

	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M8X0.75S	3	8,000	3	5	1.8	3.5	1	4	12
M8X0.75SS	3	8,000	3	5	1.8	3.5	1	4	13
M8X0.75SK	3	8,000	3	5	1.8	3.5	1	4	13
M8X0.75M	4	9,000	4	5	0.8	2.2	1	4	12
M8X0.75MS	4	9,000	4	5	0.8	2.2	1	4	13
M8X0.75MK	4	9,000	4	5	0.8	2.2	1	4	13
M8X0.75H	4	9,000	4	5	0.2	1.2	1	4	12
M8X0.75HS	4	9,000	4	5	0.2	1.2	1	4	13
M8X0.75HK	4	9,000	4	5	0.2	1.2	1	4	13

HIGH ENERGY

Order no.									
M8X0.75RS	1.5	5,000	1.5	5	1.8	3.5	1	3	13
M8X0.75RSS	1.5	5,000	1.5	5	1.8	3.5	1	3	14
M8X0.75RSK	1.5	5,000	1.5	5	1.8	3.5	1	3	14
M8X0.75RM	1.5	5,000	1.5	5	0.8	2.2	1	3	13
M8X0.75RMS	1.5	5,000	1.5	5	0.8	2.2	1	3	14
M8X0.75RMK	1.5	5,000	1.5	5	0.8	2.2	1	3	14
M8X0.75RH	1.5	5,000	1.5	5	0.2	1.2	1	3	13
M8X0.75RHS	1.5	5,000	1.5	5	0.2	1.2	1	3	14
M8X0.75RHK	1.5	5,000	1.5	5	0.2	1.2	1	3	14

STANDARD ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head
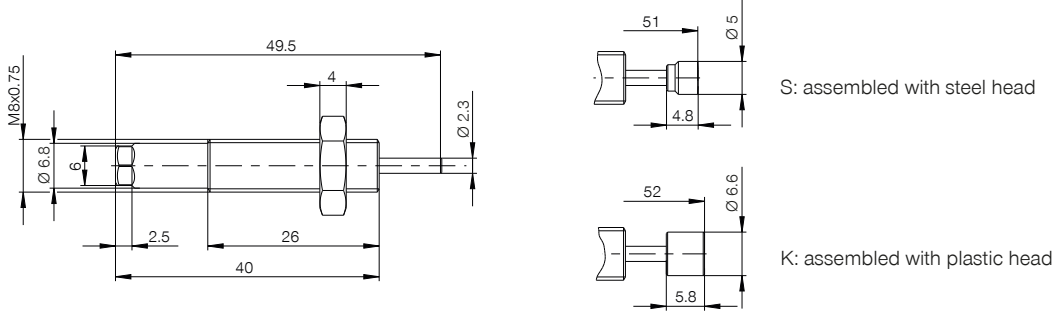
▶ ACCESSORIES

▶ Installation Size: **M8X0.75**

Pos.	Order no.	Accessories	Weight [g]	Remarks
1	**MSM8X0.75**	Steel locknut	3	
1	**MVM8X0.75**	Stainless steel locknut	3	
2	**MAH8X0.75**	Stop sleeve	10	Including 1x MVM8X0.75
3	**MKF8X0.75**	Clamping flange	20	Max. tightening torque of the screws 2.5 Nm
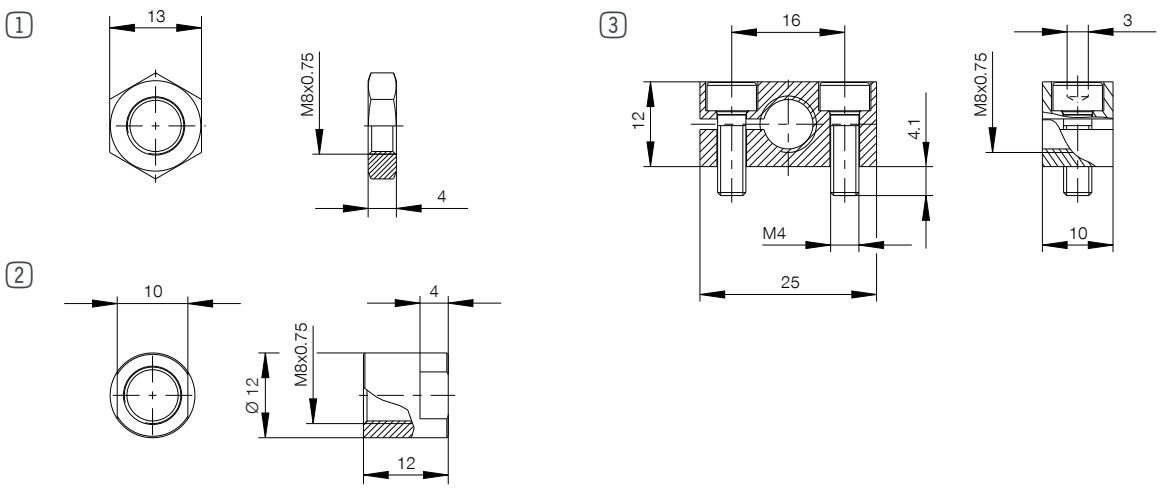
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
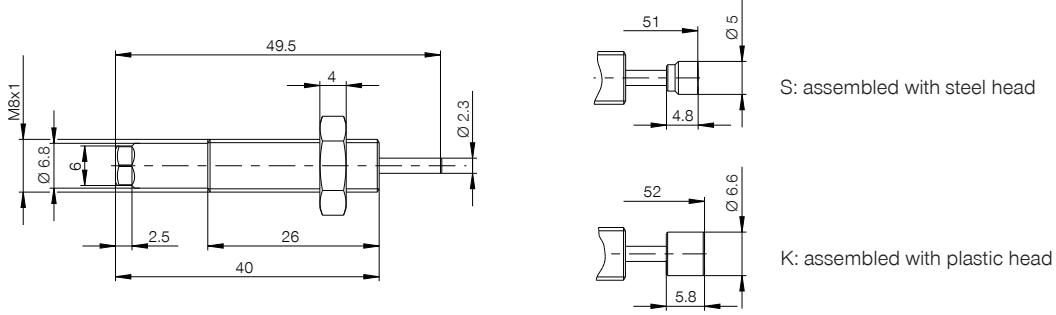# INSTALLATION SIZE M8X1

▶ PRODUCT SPECIFICATIONS

PowerStop

▶	Angle of Impact max.	2 [°]
▶	Piston return time	0.15 [s]
▶	Permitted temperature range	-10 ... +70 [°C]
▶	Max. High Energy pressure (abs.)	10 [bar]
▶	Max. Standard Energy pressure (abs.)	1 [bar]
▶	Max. locknut tightening torque	6 [Nm]
▶	PWIS-free	Yes
▶	RoHS compliant	Yes
▶	REACH compliant	Yes

▶ TECHNICAL DATA

▶ Installation Size: M8X1

Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M8X1S	3	8,000	3	5	1.8	3.5	1	4	12
M8X1SS	3	8,000	3	5	1.8	3.5	1	4	13
M8X1SK	3	8,000	3	5	1.8	3.5	1	4	13
M8X1M	4	9,000	4	5	0.8	2.2	1	4	12
M8X1MS	4	9,000	4	5	0.8	2.2	1	4	13
M8X1MK	4	9,000	4	5	0.8	2.2	1	4	13
M8X1H	4	9,000	4	5	0.2	1.2	1	4	12
M8X1HS	4	9,000	4	5	0.2	1.2	1	4	13
M8X1HK	4	9,000	4	5	0.2	1.2	1	4	13

HIGH ENERGY

Order no.									
M8X1RS	1.5	5,000	1.5	5	1.8	3.5	1	3	13
M8X1RSS	1.5	5,000	1.5	5	1.8	3.5	1	3	14
M8X1RSK	1.5	5,000	1.5	5	1.8	3.5	1	3	14
M8X1RM	1.5	5,000	1.5	5	0.8	2.2	1	3	13
M8X1RMS	1.5	5,000	1.5	5	0.8	2.2	1	3	14
M8X1RMK	1.5	5,000	1.5	5	0.8	2.2	1	3	14
M8X1RH	1.5	5,000	1.5	5	0.2	1.2	1	3	13
M8X1RHS	1.5	5,000	1.5	5	0.2	1.2	1	3	14
M8X1RHK	1.5	5,000	1.5	5	0.2	1.2	1	3	14

STANDARD ENERGY

► **TECHNICAL DRAWINGS**

S: assembled with steel head

K: assembled with plastic head

► **ACCESSORIES**

► Installation Size: **M8X1**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM8X1**	Steel locknut	3	
①	**MVM8X1**	Stainless steel locknut	3	
②	**MAH8X1**	Stop sleeve	10	Including 1x MVM8X1
③	**MKF8X1**	Clamping flange	20	Max. tightening torque of the screws 2.5 Nm
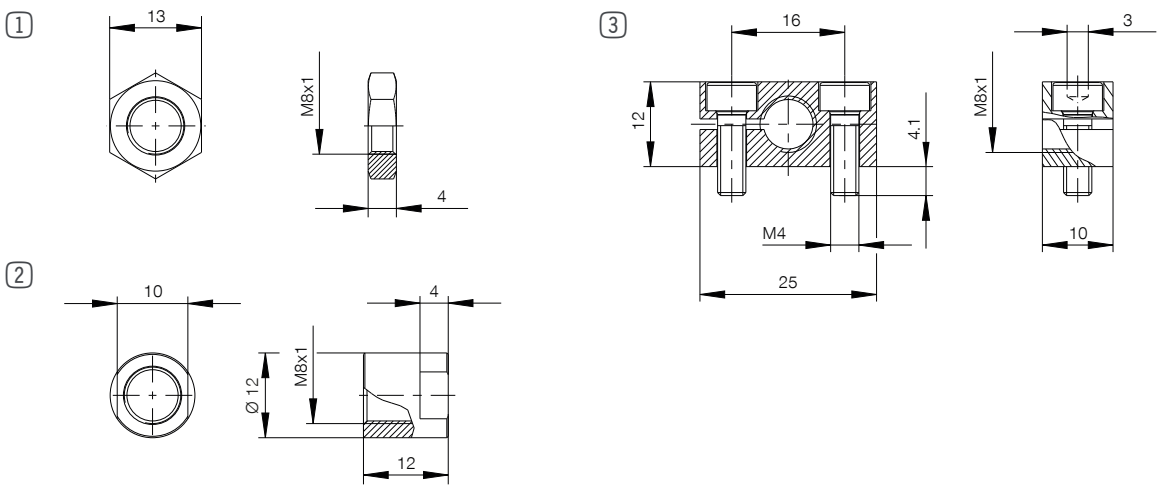
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M10X1

► PRODUCT SPECIFICATIONS
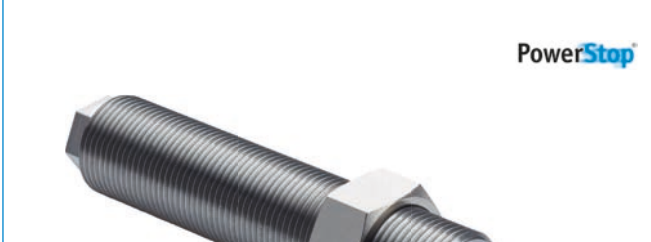
PowerStop

►	**Angle of Impact max.**	2 [°]
►	**Piston return time**	0.15 [s]
►	**Permitted temperature range**	-10 ... +70 [°C]
►	**Max. High Energy pressure (abs.)**	10 [bar]
►	**Max. Standard Energy pressure (abs.)**	1 [bar]
►	**Max. locknut tightening torque**	8 [Nm]
►	**PWIS-free**	Yes
►	**RoHS compliant**	Yes
►	**REACH compliant**	Yes

► TECHNICAL DATA

► Installation Size: **M10X1**

	Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
		Continuous operation		Emergency stop operation						
		per stroke	per hour	per stroke		min.	max.	min.	max.	
		[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
HIGH ENERGY	M10X1W	4	9,000	4	8	1.8	4	4	10	25
	M10X1WS	4	9,000	4	8	1.8	4	4	10	26
	M10X1WK	4	9,000	4	8	1.8	4	4	10	26
	M10X1S	10	18,000	10	8	1.8	3.5	4	10	25
	M10X1SS	10	18,000	10	8	1.8	3.5	4	10	26
	M10X1SK	10	18,000	10	8	1.8	3.5	4	10	26
	M10X1M	12	20,000	12	8	0.8	2.2	4	10	25
	M10X1MS	12	20,000	12	8	0.8	2.2	4	10	26
	M10X1MK	12	20,000	12	8	0.8	2.2	4	10	26
	M10X1H	12	20,000	12	8	0.2	1.2	4	10	25
	M10X1HS	12	20,000	12	8	0.2	1.2	4	10	26
	M10X1HK	12	20,000	12	8	0.2	1.2	4	10	26

	Order no.									
STANDARD ENERGY	M10X1RS	3	8,000	3	8	1.8	3.5	3	8	29
	M10X1RSS	3	8,000	3	8	1.8	3.5	3	8	30
	M10X1RSK	3	8,000	3	8	1.8	3.5	3	8	30
	M10X1RM	3	8,000	3	8	0.8	2.2	3	8	29
	M10X1RMS	3	8,000	3	8	0.8	2.2	3	8	30
	M10X1RMK	3	8,000	3	8	0.8	2.2	3	8	30
	M10X1RH	3	8,000	3	8	0.2	1.2	3	8	29
	M10X1RHS	3	8,000	3	8	0.2	1.2	3	8	30
	M10X1RHK	3	8,000	3	8	0.2	1.2	3	8	30

► TECHNICAL DRAWINGS
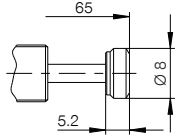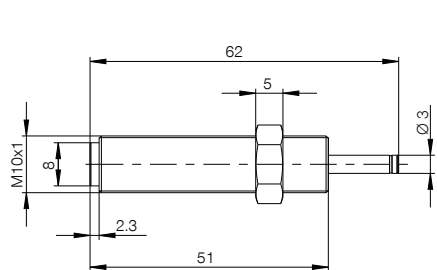
S: assembled with steel head
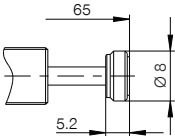
K: assembled with plastic head

► ACCESSORIES

► Installation Size: **M10X1**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM10X1**	Steel locknut	3	
①	**MVM10X1**	Stainless steel locknut	3	
②	**MAH10X1**	Stop sleeve	17	Including 1x MVM10X1
③	**MKF10X1**	Clamping flange	24	Max. tightening torque of the screws 2.5 Nm
④	**MRA10X1**	Side load adapter / air barrier adapter	55	Max. angle of impact 30°, Additional return force: 15 to 18 N, Suitable MSM, MVM, MAH and MKF on request, Including cylinder screw in compressed air connection M5
⑤	**MKM10X1**	Cooling nut	9	Increase of the energy absorption per hour up to 1.5 times
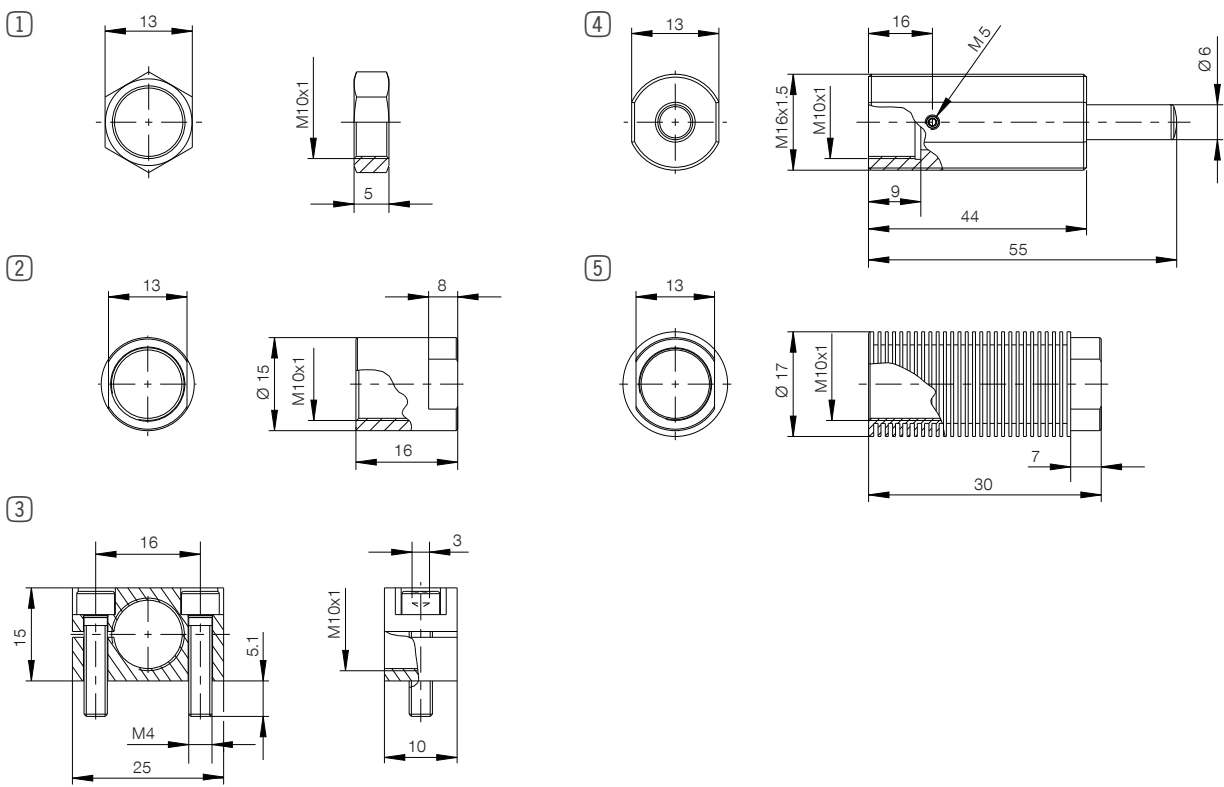
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
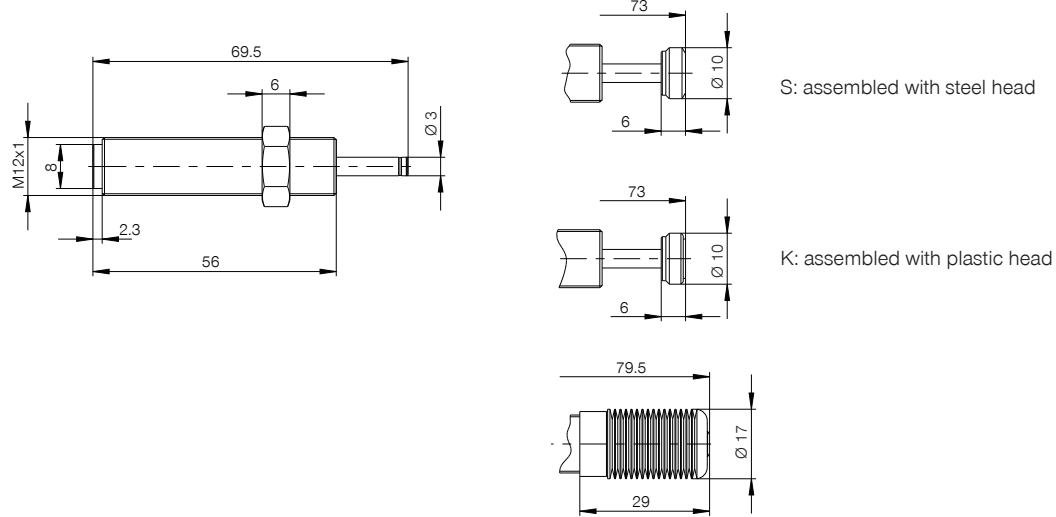# INSTALLATION SIZE M12X1

▶ PRODUCT SPECIFICATIONS
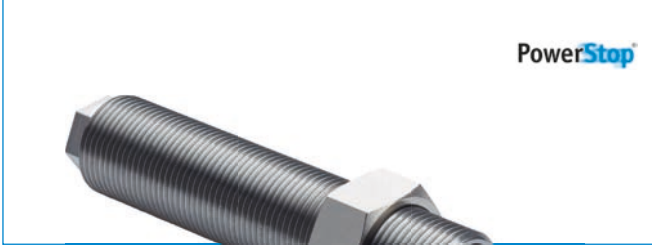
PowerStop®

▶ **Angle of Impact max.**	2 [°]
▶ **Piston return time**	0.2 [s]
▶ **Permitted temperature range**	-10 ... +70 [°C]
▶ **Max. High Energy pressure (abs.)**	10 [bar]
▶ **Max. Standard Energy pressure (abs.)**	1 [bar]
▶ **Max. locknut tightening torque**	10 [Nm]
▶ **PWIS-free**	Yes
▶ **RoHS compliant**	Yes
▶ **REACH compliant**	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M12X1**

Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M12X1W	10	18,000	10	10	1.8	4	6	10	35
M12X1WS	10	18,000	10	10	1.8	4	6	10	40
M12X1WK	10	18,000	10	10	1.8	4	6	10	40
M12X1WB	10	18,000	10	10	1.8	4	20	80	45
M12X1S	16	30,000	22	10	1.8	3.5	6	10	35
M12X1SS	16	30,000	22	10	1.8	3.5	6	10	40
M12X1SK	16	30,000	22	10	1.8	3.5	6	10	40
M12X1SB	16	30,000	22	10	1.8	3.5	20	80	45
M12X1M	18	33,000	25	10	0.8	2.2	6	10	35
M12X1MS	18	33,000	25	10	0.8	2.2	6	10	40
M12X1MK	18	33,000	25	10	0.8	2.2	6	10	40
M12X1MB	18	33,000	25	10	0.8	2.2	20	80	45
M12X1H	18	33,000	27	10	0.2	1.2	6	10	35
M12X1HS	18	33,000	27	10	0.2	1.2	6	10	40
M12X1HK	18	33,000	27	10	0.2	1.2	6	10	40
M12X1HB	18	33,000	27	10	0.2	1.2	20	80	45

HIGH ENERGY

Order no.									
M12X1RS	9	20,000	9	10	1.8	3.5	3	7	40
M12X1RSS	9	20,000	9	10	1.8	3.5	3	7	45
M12X1RSK	9	20,000	9	10	1.8	3.5	3	7	45
M12X1RM	9	20,000	9	10	0.8	2.2	3	7	40
M12X1RMS	9	20,000	9	10	0.8	2.2	3	7	45
M12X1RMK	9	20,000	9	10	0.8	2.2	3	7	45
M12X1RH	9	20,000	9	10	0.2	1.2	3	7	40
M12X1RHS	9	20,000	9	10	0.2	1.2	3	7	45
M12X1RHK	9	20,000	9	10	0.2	1.2	3	7	45

STANDARD ENERGY

► TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head

► ACCESSORIES

► Installation Size: M12X1

Pos.	Order no.	Accessories	Weight [g]	Remarks
1	MSM12X1	Steel locknut	5	
1	MVM12X1	Stainless steel locknut	5	
2	MAH12X1	Stop sleeve	20	Including 1x MVM12X1
3	MKF12X1	Clamping flange	40	Max. tightening torque of the screws 5 Nm
4	MRA12X1	Side load adapter / air barrier adapter	70	Max. angle of impact 30°, Additional return force: 5 to 8 N, Suitable MSM, MVM, MAH and MKF on request, Including cylinder screw in compressed air connection M5
5	MKM12X1	Cooling nut	15	Increase of the energy absorption per hour up to 1.5 times

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M14X1

1

▶ PRODUCT SPECIFICATIONS

PowerStop®

▶	**Angle of Impact max.**	2 [°]
▶	**Piston return time**	0.2 [s]
▶	**Permitted temperature range**	-10 ... +70 [°C]
▶	**Max. High Energy pressure (abs.)**	10 [bar]
▶	**Max. Standard Energy pressure (abs.)**	1 [bar]
▶	**Max. locknut tightening torque**	30 [Nm]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M14X1**

	Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
		Continuous operation		Emergency stop operation						
		per stroke	per hour	per stroke		min.	max.	min.	max.	
		[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
HIGH ENERGY	**M14X1W**	18	33,000	18	12	1.8	4	8	15	65
	M14X1WS	18	33,000	18	12	1.8	4	8	15	70
	M14X1WK	18	33,000	18	12	1.8	4	8	15	70
	M14X1S	30	45,000	35	12	1.8	3.5	8	15	65
	M14X1SS	30	45,000	35	12	1.8	3.5	8	15	70
	M14X1SK	30	45,000	35	12	1.8	3.5	8	15	70
	M14X1M	32	50,000	40	12	0.8	2.2	8	15	65
	M14X1MS	32	50,000	40	12	0.8	2.2	8	15	70
	M14X1MK	32	50,000	40	12	0.8	2.2	8	15	70
	M14X1H	32	50,000	45	12	0.2	1.2	8	15	65
	M14X1HS	32	50,000	45	12	0.2	1.2	8	15	70
	M14X1HK	32	50,000	45	12	0.2	1.2	8	15	70

	Order no.									
STANDARD ENERGY	**M14X1RS**	20	35,000	20	12	1.8	3.5	4	8	70
	M14X1RSS	20	35,000	20	12	1.8	3.5	4	8	75
	M14X1RSK	20	35,000	20	12	1.8	3.5	4	8	75
	M14X1RM	20	35,000	20	12	0.8	2.2	4	8	70
	M14X1RMS	20	35,000	20	12	0.8	2.2	4	8	75
	M14X1RMK	20	35,000	20	12	0.8	2.2	4	8	75
	M14X1RH	20	35,000	20	12	0.2	1.2	4	8	70
	M14X1RHS	20	35,000	20	12	0.2	1.2	4	8	75
	M14X1RHK	20	35,000	20	12	0.2	1.2	4	8	75

► TECHNICAL DRAWINGS

83
8
Ø 4
M14X1
10
3.5
66

86.5
Ø 11
7
S: assembled with steel head

86.5
Ø 11
7
K: assembled with plastic head
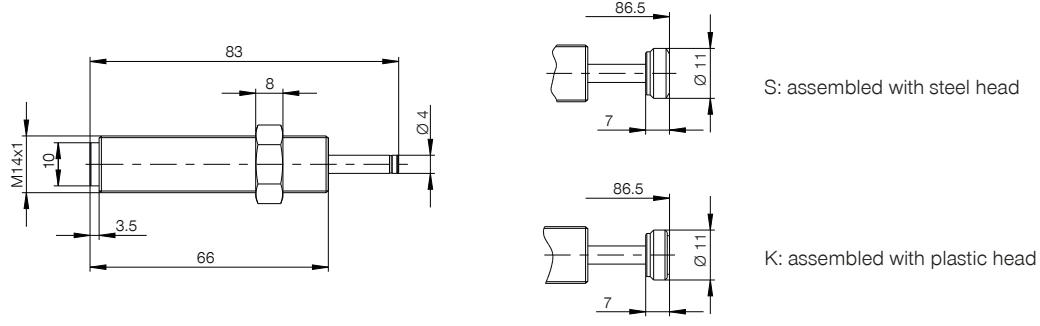
► ACCESSORIES

► Installation Size: M14X1

Pos.	Order no.	Accessories	Weight [g]	Remarks
1	MSM14X1	Steel locknut	10	
1	MVM14X1	Stainless steel locknut	10	
2	MAH14X1	Stop sleeve	35	Including 1x MVM14X1
3	MKF14X1	Clamping flange	50	Max. tightening torque of the screws 5 Nm
4	MRA14X1	Side load adapter / air barrier adapter	85	Max. angle of impact 30°, Additional return force: 1 to 3 N, Suitable MSM, MVM, MAH and MKF in the size M20X1.5, Including cylinder screw in compressed air connection M5
5	MKM14X1	Cooling nut	25	Increase of the energy absorption per hour up to 1.5 times

1
17
M14x1
8

4
17
16
M5
Ø 8
M20x1.5
M14x1
12
45
62

2
16
8
Ø 18
M14x1
25

5
19
Ø 23
M14x1
8
50

3
20
3
20
M14x1
5.6
M5
12
32
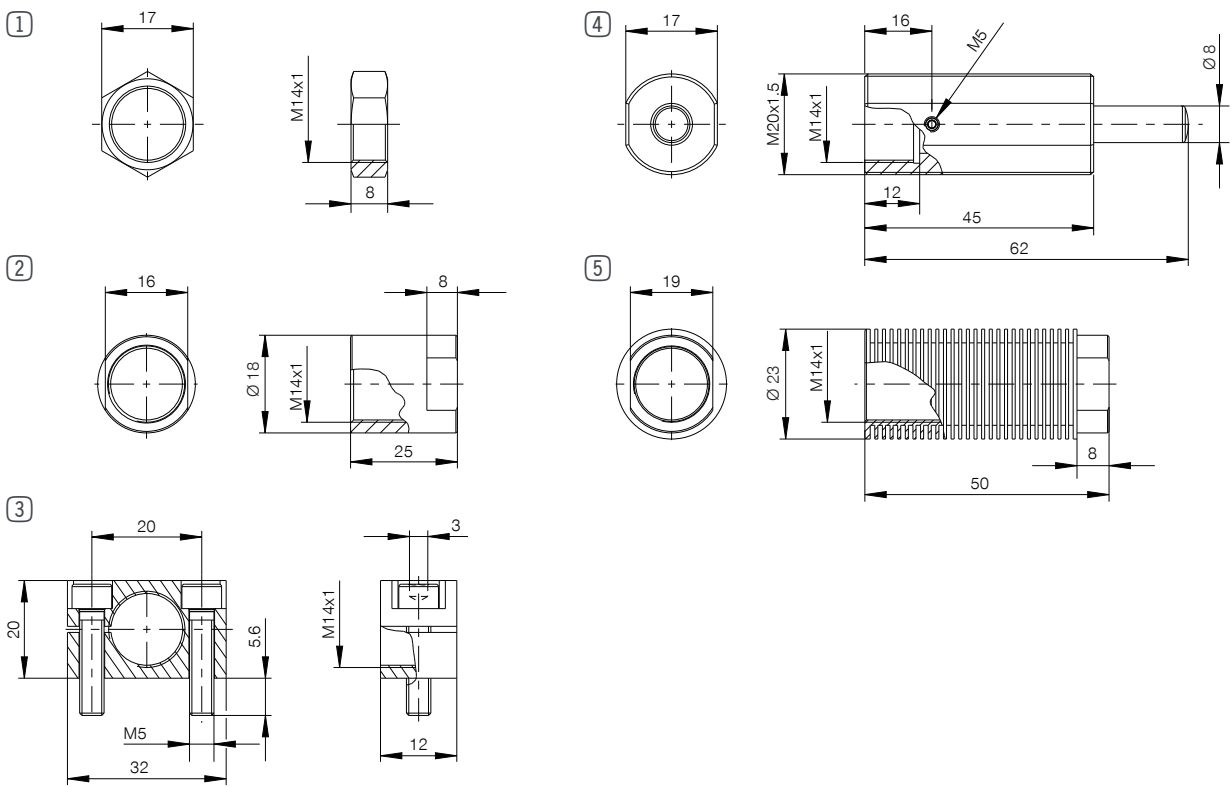
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M14X1.5

▶ PRODUCT SPECIFICATIONS
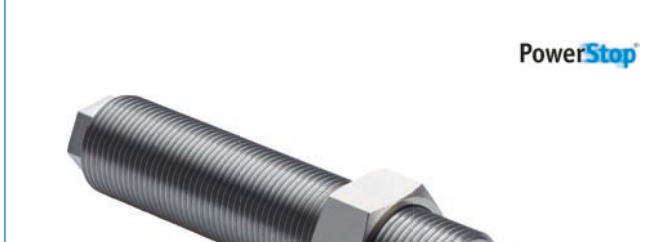
PowerStop®

▶	Angle of Impact max.	2 [°]
▶	Piston return time	0.2 [s]
▶	Permitted temperature range	-10 ... +70 [°C]
▶	Max. High Energy pressure (abs.)	10 [bar]
▶	Max. Standard Energy pressure (abs.)	1 [bar]
▶	Max. locknut tightening torque	30 [Nm]
▶	PWIS-free	Yes
▶	RoHS compliant	Yes
▶	REACH compliant	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M14X1.5**

	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M14X1.5W	18	33,000	18	12	1.8	4	8	15	65
M14X1.5WS	18	33,000	18	12	1.8	4	8	15	70
M14X1.5WK	18	33,000	18	12	1.8	4	8	15	70
M14X1.5WB	18	33,000	18	12	1.8	4	20	110	80
M14X1.5S	30	45,000	35	12	1.8	3.5	8	15	65
M14X1.5SS	30	45,000	35	12	1.8	3.5	8	15	70
M14X1.5SK	30	45,000	35	12	1.8	3.5	8	15	70
M14X1.5SB	30	45,000	35	12	1.8	3.5	20	110	80
M14X1.5M	32	50,000	40	12	0.8	2.2	8	15	65
M14X1.5MS	32	50,000	40	12	0.8	2.2	8	15	70
M14X1.5MK	32	50,000	40	12	0.8	2.2	8	15	70
M14X1.5MB	32	50,000	40	12	0.8	2.2	20	110	80
M14X1.5H	32	50,000	45	12	0.2	1.2	8	15	65
M14X1.5HS	32	50,000	45	12	0.2	1.2	8	15	70
M14X1.5HK	32	50,000	45	12	0.2	1.2	8	15	70
M14X1.5HB	32	50,000	45	12	0.2	1.2	20	110	80

HIGH ENERGY

Order no.									
M14X1.5RS	20	35,000	20	12	1.8	3.5	4	8	70
M14X1.5RSS	20	35,000	20	12	1.8	3.5	4	8	75
M14X1.5RSK	20	35,000	20	12	1.8	3.5	4	8	75
M14X1.5RM	20	35,000	20	12	0.8	2.2	4	8	70
M14X1.5RMS	20	35,000	20	12	0.8	2.2	4	8	75
M14X1.5RMK	20	35,000	20	12	0.8	2.2	4	8	75
M14X1.5RH	20	35,000	20	12	0.2	1.2	4	8	70
M14X1.5RHS	20	35,000	20	12	0.2	1.2	4	8	75
M14X1.5RHK	20	35,000	20	12	0.2	1.2	4	8	75

STANDARD ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head
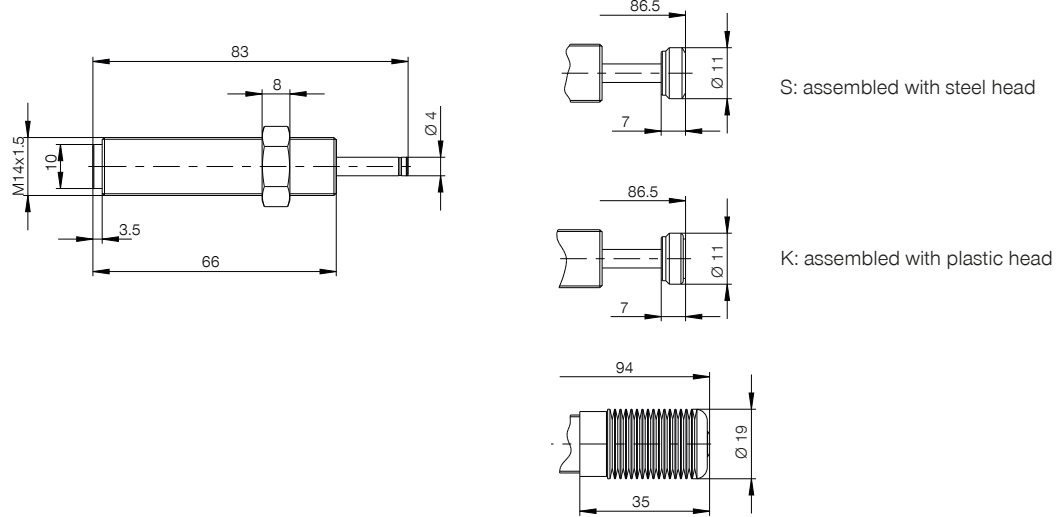
▶ ACCESSORIES

▶ Installation Size: M14X1.5

Pos.	Order no.	Accessories	Weight [g]	Remarks
1	MSM14X1.5	Steel locknut	10	
1	MVM14X1.5	Stainless steel locknut	10	
2	MAH14X1.5	Stop sleeve	35	Including 1x MVM14X1.5
3	MKF14X1.5	Clamping flange	50	Max. tightening torque of the screws 5 Nm
4	MRA14X1.5	Side load adapter / air barrier adapter	85	Max. angle of impact 30°, Additional return force: 1 to 3 N, Suitable MSM, MVM, MAH and MKF in the size M20X1.5, Including cylinder screw in compressed air connection M5
5	MKM14X1.5	Cooling nut	25	Increase of the energy absorption per hour up to 1.5 times
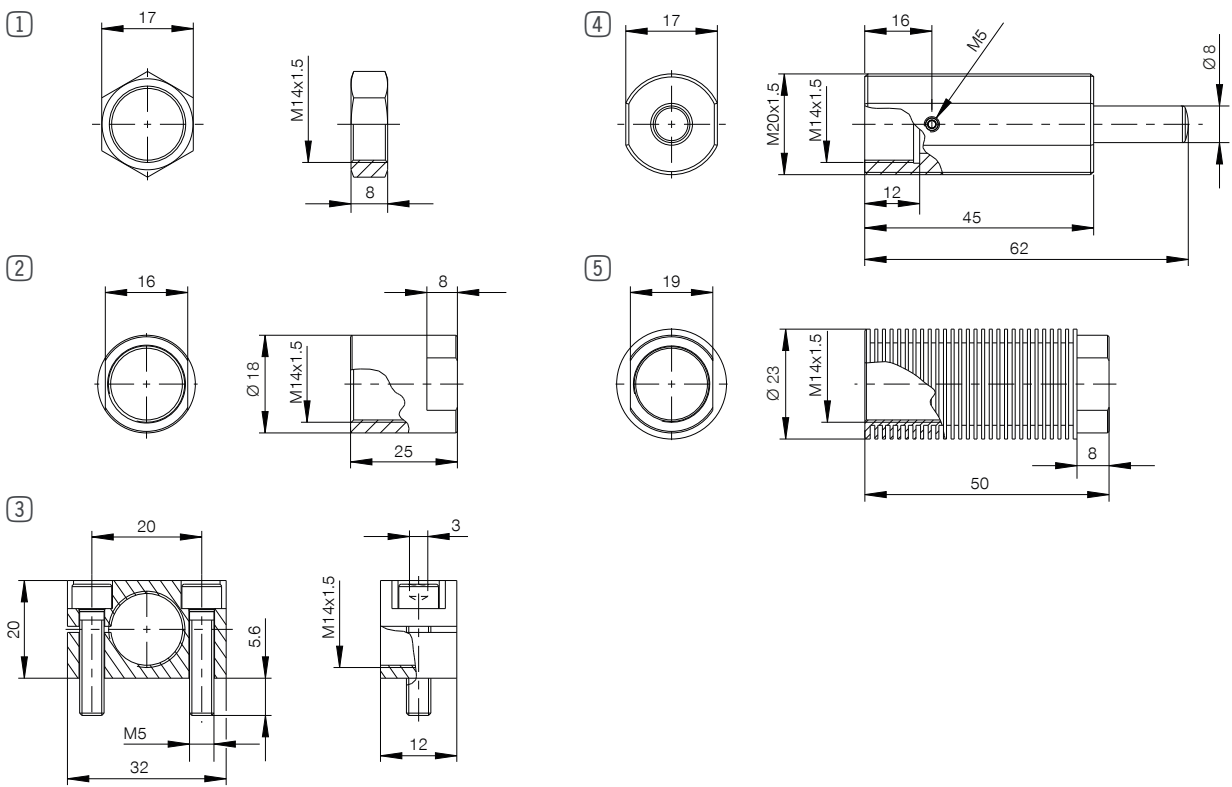
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M20X1.5

▶ PRODUCT SPECIFICATIONS

PowerStop®
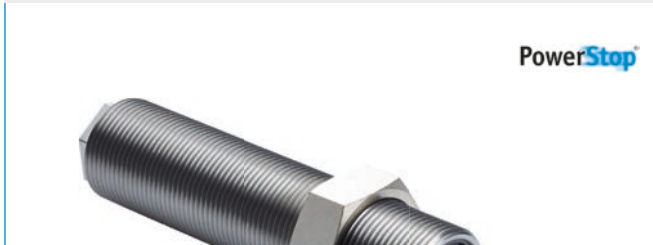
▶ **Angle of Impact max.**	2 [°]
▶ **Piston return time**	0.3 [s]
▶ **Permitted temperature range**	-10 ... +70 [°C]
▶ **Max. High Energy pressure (abs.)**	10 [bar]
▶ **Max. Standard Energy pressure (abs.)**	1 [bar]
▶ **Max. locknut tightening torque**	50 [Nm]
▶ **PWIS-free**	Yes
▶ **RoHS compliant**	Yes
▶ **REACH compliant**	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M20X1.5**

	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M20X1.5W	35	40,000	35	15	1.8	4	15	30	135
M20X1.5WS	35	40,000	35	15	1.8	4	15	30	145
M20X1.5WK	35	40,000	35	15	1.8	4	15	30	145
M20X1.5WB	35	40,000	35	15	1.8	4	35	150	170
M20X1.5S	70	70,000	100	15	1.8	3.5	15	30	135
M20X1.5SS	70	70,000	100	15	1.8	3.5	15	30	145
M20X1.5SK	70	70,000	100	15	1.8	3.5	15	30	145
M20X1.5SB	70	70,000	100	15	1.8	3.5	35	150	170
M20X1.5M	80	80,000	120	15	0.8	2.2	15	30	135
M20X1.5MS	80	80,000	120	15	0.8	2.2	15	30	145
M20X1.5MK	80	80,000	120	15	0.8	2.2	15	30	145
M20X1.5MB	80	80,000	120	15	0.8	2.2	35	150	170
M20X1.5H	80	80,000	150	15	0.2	1.2	15	30	135
M20X1.5HS	80	80,000	150	15	0.2	1.2	15	30	145
M20X1.5HK	80	80,000	150	15	0.2	1.2	15	30	145
M20X1.5HB	80	80,000	150	15	0.2	1.2	35	150	170

HIGH ENERGY

Order no.									
M20X1.5RS	32	40,000	32	15	1.8	3.5	10	30	130
M20X1.5RSS	32	40,000	32	15	1.8	3.5	10	30	140
M20X1.5RSK	32	40,000	32	15	1.8	3.5	10	30	140
M20X1.5RM	32	40,000	32	15	0.8	2.2	10	30	130
M20X1.5RMS	32	40,000	32	15	0.8	2.2	10	30	140
M20X1.5RMK	32	40,000	32	15	0.8	2.2	10	30	140
M20X1.5RH	32	40,000	32	15	0.2	1.2	10	30	130
M20X1.5RHS	32	40,000	32	15	0.2	1.2	10	30	140
M20X1.5RHK	32	40,000	32	15	0.2	1.2	10	30	140

STANDARD ENERGY

► **TECHNICAL DRAWINGS**

S: assembled with steel head

K: assembled with plastic head
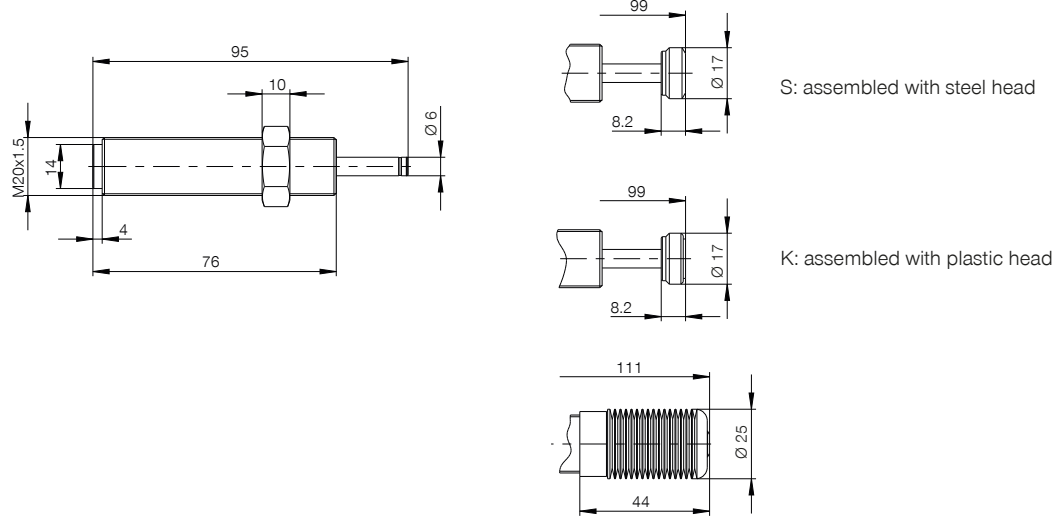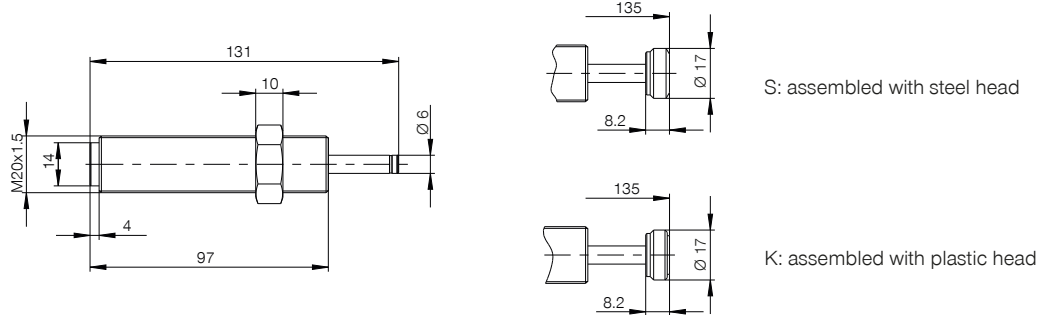
► **ACCESSORIES**

► Installation Size: **M20X1.5**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM20X1.5**	Steel locknut	20	
①	**MVM20X1.5**	Stainless steel locknut	20	
②	**MAH20X1.5**	Stop sleeve	60	Including 1x MVM20X1.5
③	**MKF20X1.5**	Clamping flange	110	Max. tightening torque of the screws 9 Nm
④	**MRA20X1.5**	Side load adapter / air barrier adapter	160	Max. angle of impact 30°, Suitable MSM, MVM, MAH and MKF in the size M25X1.5 Including setscrew in compressed air connection M5
⑤	**MKM20X1.5**	Cooling nut	40	Increase of the energy absorption per hour up to 1.5 times
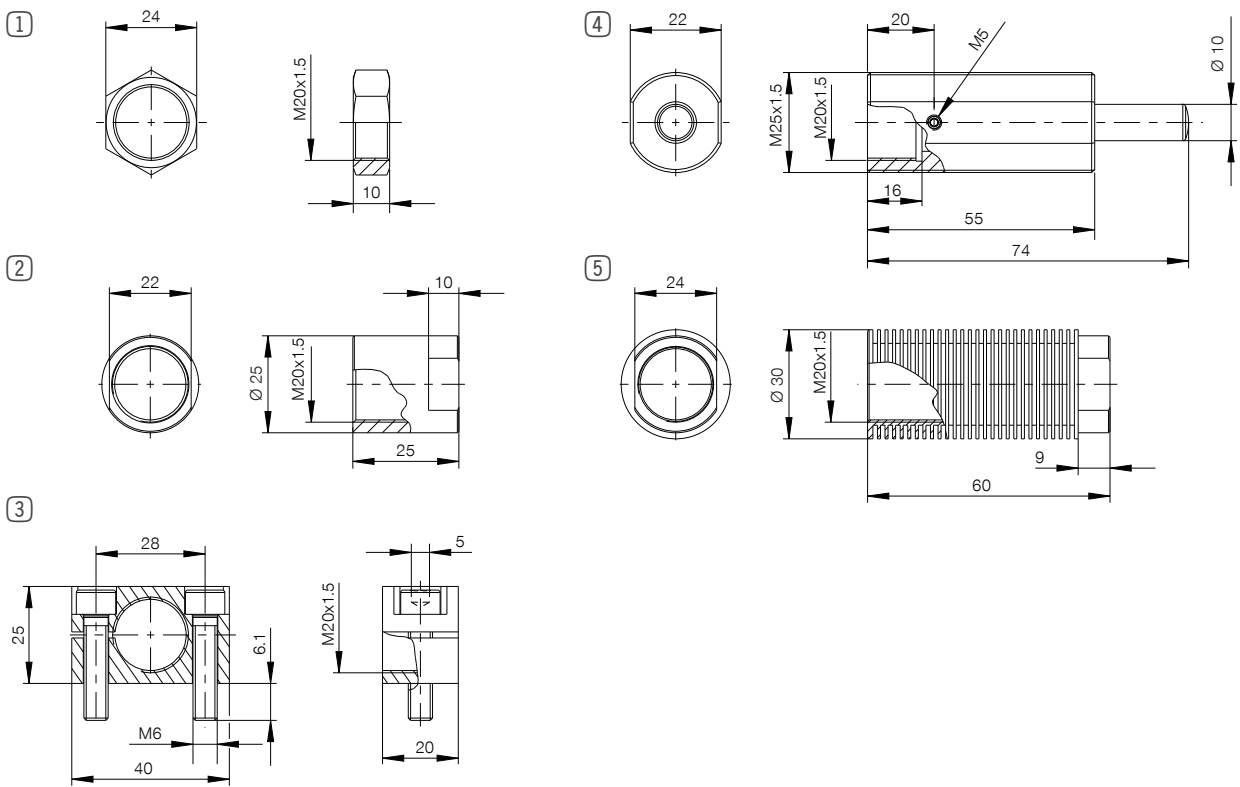
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M20X1.5L

▶ PRODUCT SPECIFICATIONS

PowerStop

▶	**Angle of Impact max.**	2 [°]
▶	**Piston return time**	0.5 [s]
▶	**Permitted temperature range**	-10 ... +70 [°C]
▶	**Max. High Energy pressure (abs.)**	10 [bar]
▶	**Max. locknut tightening torque**	50 [Nm]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M20X1.5L**

	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M20X1.5LS	100	100,000	170	30	1.8	3.5	10	25	180
M20X1.5LSS	100	100,000	170	30	1.8	3.5	10	25	190
M20X1.5LSK	100	100,000	170	30	1.8	3.5	10	25	190
M20X1.5LM	120	120,000	220	30	0.8	2.2	10	25	180
M20X1.5LMS	120	120,000	220	30	0.8	2.2	10	25	190
M20X1.5LMK	120	120,000	220	30	0.8	2.2	10	25	190

HIGH ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head

▶ ACCESSORIES

▶ Installation Size: M20X1.5L

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	MSM20X1.5	Steel locknut	20	
①	MVM20X1.5	Stainless steel locknut	20	
②	MAH20X1.5	Stop sleeve	60	Including 1x MVM20X1.5
③	MKF20X1.5	Clamping flange	110	Max. tightening torque of the screws 9 Nm
④	MRA20X1.5L	Side load adapter / air barrier adapter	205	Max. angle of impact 30°, Suitable MSM, MVM, MAH and MKF in the size M25X1.5 Including setscrew in compressed air connection M5
⑤	MKM20X1.5	Cooling nut	40	Increase of the energy absorption per hour up to 1.5 times
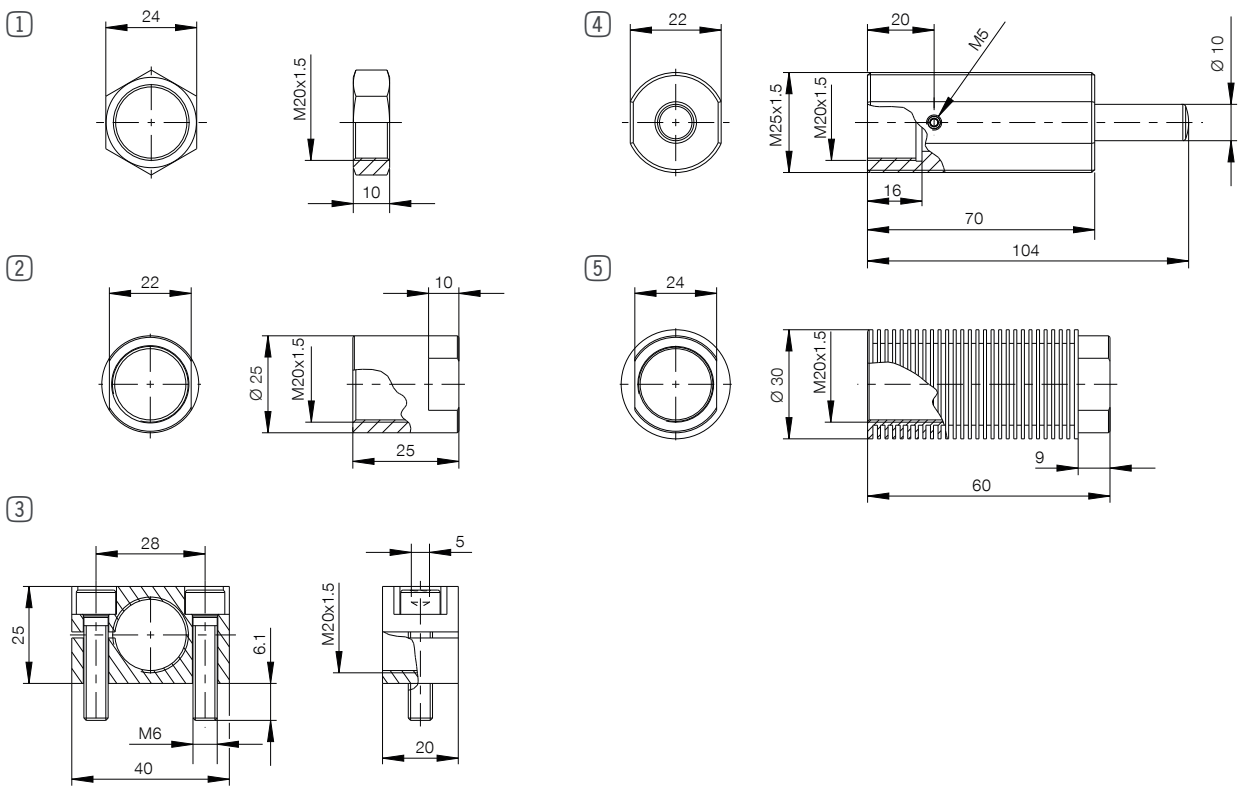
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M25X1.5

▶ PRODUCT SPECIFICATIONS
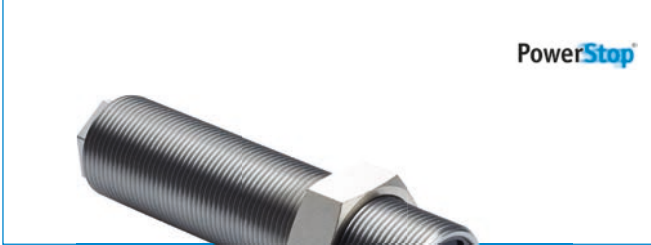
PowerStop®

▶	Angle of Impact max.	2 [°]
▶	Piston return time	0.4 [s]
▶	Permitted temperature range	-10 ... +70 [°C]
▶	Max. High Energy pressure (abs.)	10 [bar]
▶	Max. Standard Energy pressure (abs.)	1 [bar]
▶	Max. locknut tightening torque	60 [Nm]
▶	PWIS-free	Yes
▶	RoHS compliant	Yes
▶	REACH compliant	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M25X1.5**

	Max. energy absorption		Stroke	Impact speed		Return force		Weight
	Continuous operation	Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M25X1.5W	100	80,000	100	25	1.8	4	25	50	300
M25X1.5WS	100	80,000	100	25	1.8	4	25	50	325
M25X1.5WK	100	80,000	100	25	1.8	4	25	50	320
M25X1.5WB	100	80,000	100	25	1.8	4	35	350	345
M25X1.5S	190	100,000	300	25	1.8	3.5	25	50	300
M25X1.5SS	190	100,000	300	25	1.8	3.5	25	50	325
M25X1.5SK	190	100,000	300	25	1.8	3.5	25	50	320
M25X1.5SB	190	100,000	300	25	1.8	3.5	35	350	345
M25X1.5M	210	120,000	400	25	0.8	2.2	25	50	300
M25X1.5MS	210	120,000	400	25	0.8	2.2	25	50	325
M25X1.5MK	210	120,000	400	25	0.8	2.2	25	50	320
M25X1.5MB	210	120,000	400	25	0.8	2.2	35	350	345
M25X1.5H	210	120,000	450	25	0.2	1.2	25	50	300
M25X1.5HS	210	120,000	450	25	0.2	1.2	25	50	325
M25X1.5HK	210	120,000	450	25	0.2	1.2	25	50	320
M25X1.5HB	210	120,000	450	25	0.2	1.2	35	350	345

HIGH ENERGY

Order no.									
M25X1.5RS	90	80,000	90	25	1.8	3.5	10	35	285
M25X1.5RSS	90	80,000	90	25	1.8	3.5	10	35	310
M25X1.5RSK	90	80,000	90	25	1.8	3.5	10	35	305
M25X1.5RM	90	80,000	90	25	0.8	2.2	10	35	285
M25X1.5RMS	90	80,000	90	25	0.8	2.2	10	35	310
M25X1.5RMK	90	80,000	90	25	0.8	2.2	10	35	305
M25X1.5RH	90	80,000	90	25	0.2	1.2	10	35	285
M25X1.5RHS	90	80,000	90	25	0.2	1.2	10	35	310
M25X1.5RHK	90	80,000	90	25	0.2	1.2	10	35	305

STANDARD ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head
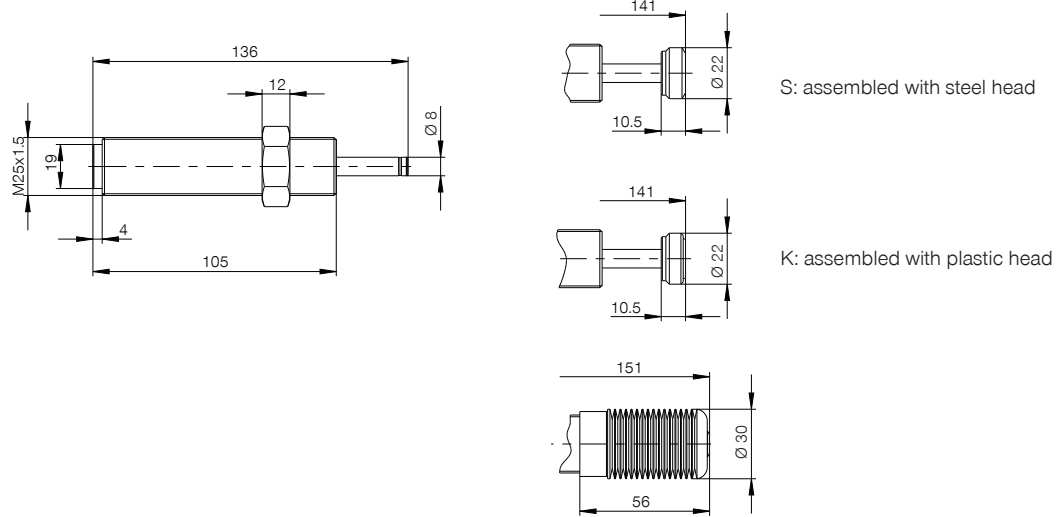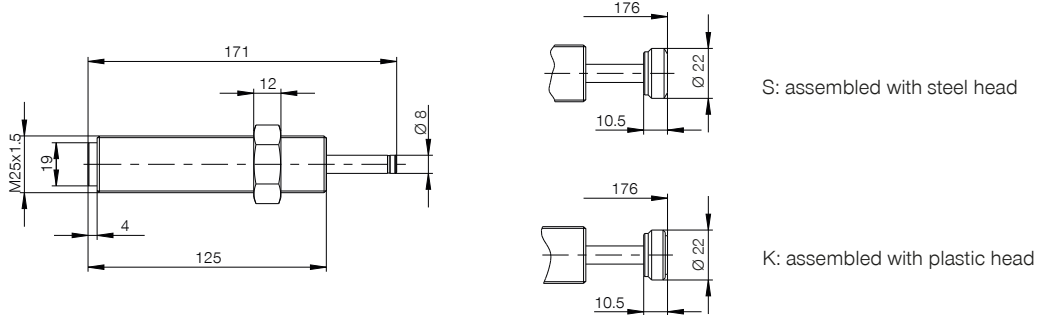
▶ ACCESSORIES

▶ **Installation Size: M25X1.5**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM25X1.5**	Steel locknut	35	
①	**MVM25X1.5**	Stainless steel locknut	35	
②	**MAH25X1.5**	Stop sleeve	130	Including 1x MVM25X1.5
③	**MKF25X1.5**	Clamping flange	235	Max. tightening torque of the screws 22 Nm
④	**MRA25X1.5**	Side load adapter / air barrier adapter	385	Max. angle of impact 30°, suitable MSM, MVM, MAH and MKF in the size M33X1.5 Including setscrew in compressed air connection M5
⑤	**MKM25X1.5**	Cooling nut	65	Increase of the energy absorption per hour up to 1.5 times
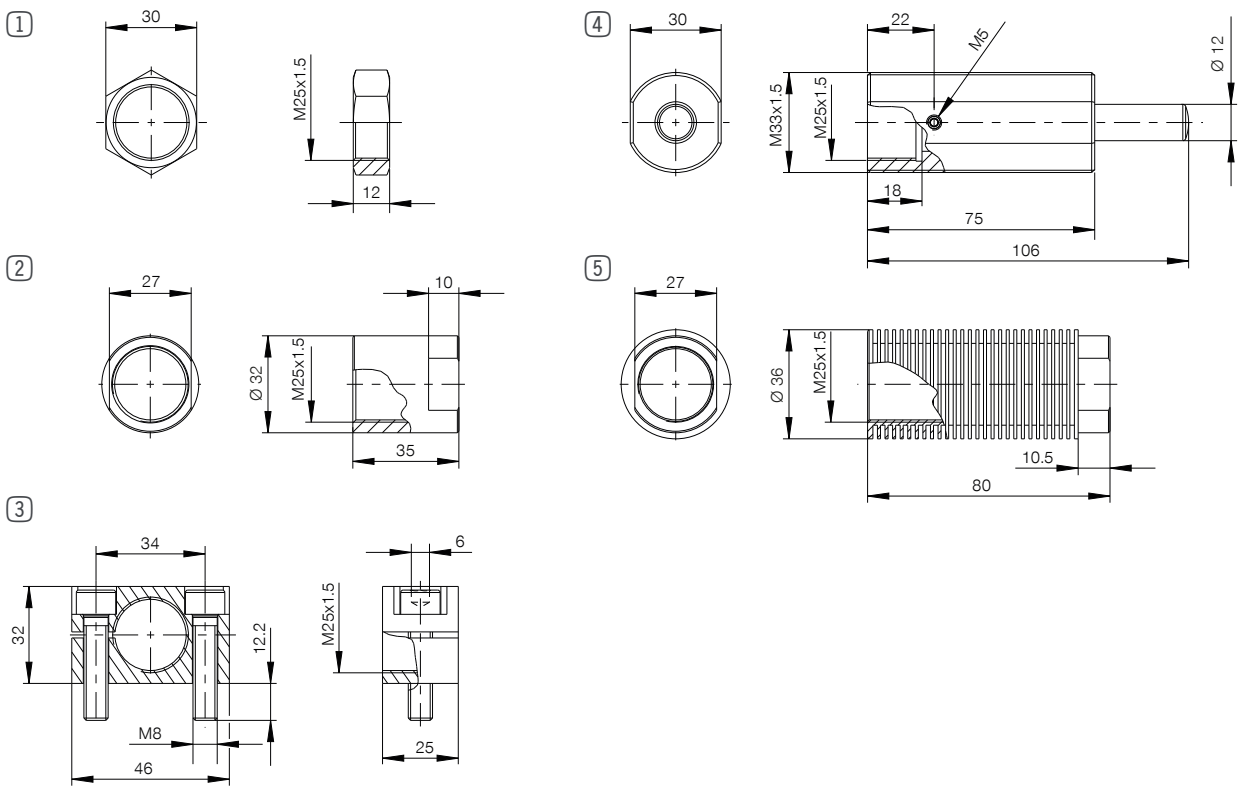
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M25X1.5L

► **PRODUCT SPECIFICATIONS**

PowerStop

►	**Angle of Impact max.**	2 [°]
►	**Piston return time**	0.6 [s]
►	**Permitted temperature range**	-10 ... +70 [°C]
►	**Max. High Energy pressure (abs.)**	10 [bar]
►	**Max. locknut tightening torque**	60 [Nm]
►	**PWIS-free**	Yes
►	**RoHS compliant**	Yes
►	**REACH compliant**	Yes

► **TECHNICAL DATA**

► Installation Size: **M25X1.5L**

Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M25X1.5LS	250	135,000	500	40	1.8	3.5	25	55	365
M25X1.5LSS	250	135,000	500	40	1.8	3.5	25	55	390
M25X1.5LSK	250	135,000	500	40	1.8	3.5	25	55	385
M25X1.5LM	350	150,000	750	40	0.8	2.2	25	55	365
M25X1.5LMS	350	150,000	750	40	0.8	2.2	25	55	390
M25X1.5LMK	350	150,000	750	40	0.8	2.2	25	55	385

HIGH ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head

▶ ACCESSORIES

▶ Installation Size: **M25X1.5L**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM25X1.5**	Steel locknut	35	
①	**MVM25X1.5**	Stainless steel locknut	35	
②	**MAH25X1.5**	Stop sleeve	130	Including 1x MVM25X1.5
③	**MKF25X1.5**	Clamping flange	235	Max. tightening torque of the screws 22 Nm
④	**MRA25X1.5L**	Side load adapter / air barrier adapter	460	Max. angle of impact 30°, suitable MSM, MVM, MAH and MKF in the size M33X1.5 Including setscrew in compressed air connection M5
⑤	**MKM25X1.5**	Cooling nut	65	Increase of the energy absorption per hour up to 1.5 times
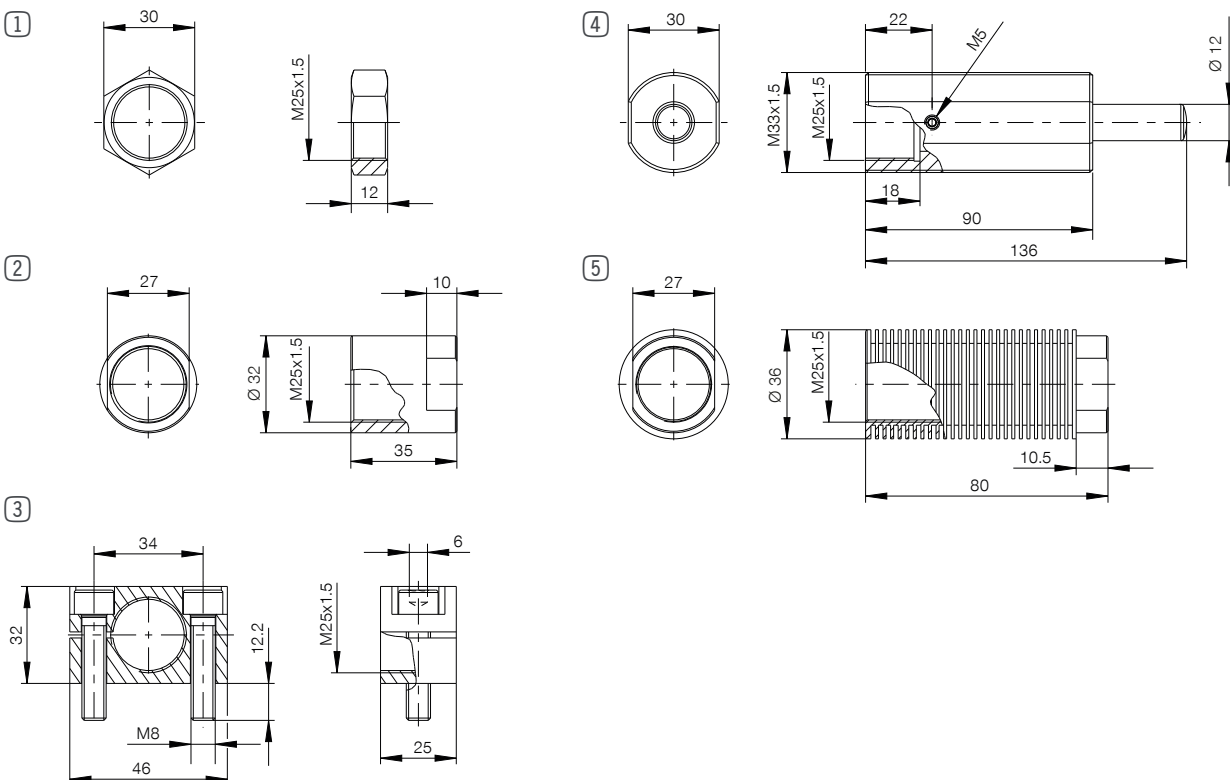
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M27X1.5

▶ PRODUCT SPECIFICATIONS
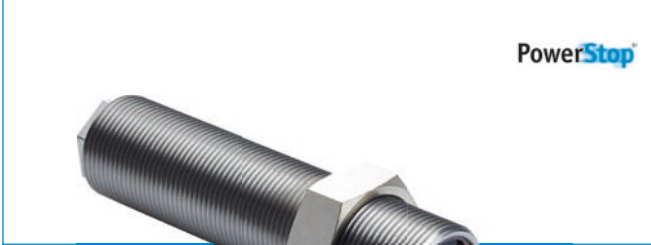
PowerStop®

▶	**Angle of Impact max.**	2 [°]
▶	**Piston return time**	0.4 [s]
▶	**Permitted temperature range**	-10 ... +70 [°C]
▶	**Max. High Energy pressure (abs.)**	10 [bar]
▶	**Max. Standard Energy pressure (abs.)**	1 [bar]
▶	**Max. locknut tightening torque**	60 [Nm]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M27X1.5**

	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M27X1.5W	100	80,000	100	25	1.8	4	25	50	370
M27X1.5WS	100	80,000	100	25	1.8	4	25	50	395
M27X1.5WK	100	80,000	100	25	1.8	4	25	50	390
M27X1.5S	190	100,000	300	25	1.8	3.5	25	50	370
M27X1.5SS	190	100,000	300	25	1.8	3.5	25	50	395
M27X1.5SK	190	100,000	300	25	1.8	3.5	25	50	390
M27X1.5M	210	120,000	400	25	0.8	2.2	25	50	370
M27X1.5MS	210	120,000	400	25	0.8	2.2	25	50	395
M27X1.5MK	210	120,000	400	25	0.8	2.2	25	50	390
M27X1.5H	210	120,000	450	25	0.2	1.2	25	50	370
M27X1.5HS	210	120,000	450	25	0.2	1.2	25	50	395
M27X1.5HK	210	120,000	450	25	0.2	1.2	25	50	390

HIGH ENERGY

Order no.									
M27X1.5RS	90	80,000	90	25	1.8	3.5	10	35	355
M27X1.5RSS	90	80,000	90	25	1.8	3.5	10	35	380
M27X1.5RSK	90	80,000	90	25	1.8	3.5	10	35	375
M27X1.5RM	90	80,000	90	25	0.8	2.2	10	35	355
M27X1.5RMS	90	80,000	90	25	0.8	2.2	10	35	380
M27X1.5RMK	90	80,000	90	25	0.8	2.2	10	35	375
M27X1.5RH	90	80,000	90	25	0.2	1.2	10	35	355
M27X1.5RHS	90	80,000	90	25	0.2	1.2	10	35	380
M27X1.5RHK	90	80,000	90	25	0.2	1.2	10	35	375

STANDARD ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head
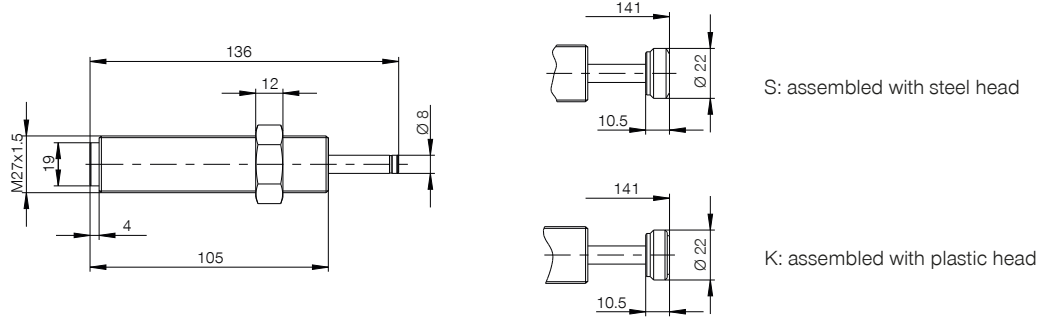
▶ ACCESSORIES

▶ Installation Size: M27X1.5

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM27X1.5**	Steel locknut	40	
①	**MVM27X1.5**	Stainless steel locknut	40	
②	**MAH27X1.5**	Stop sleeve	155	Including 1x MVM27X1.5
③	**MKF27X1.5**	Clamping flange	255	Max. tightening torque of the screws 22 Nm
④	**MRA27X1.5**	Side load adapter / air barrier adapter	380	Max. angle of impact 30°, suitable MSM, MVM, MAH and MKF in the size M33X1.5 Including setscrew in compressed air connection M5
⑤	**MKM27X1.5**	Cooling nut	85	Increase of the energy absorption per hour up to 1.5 times
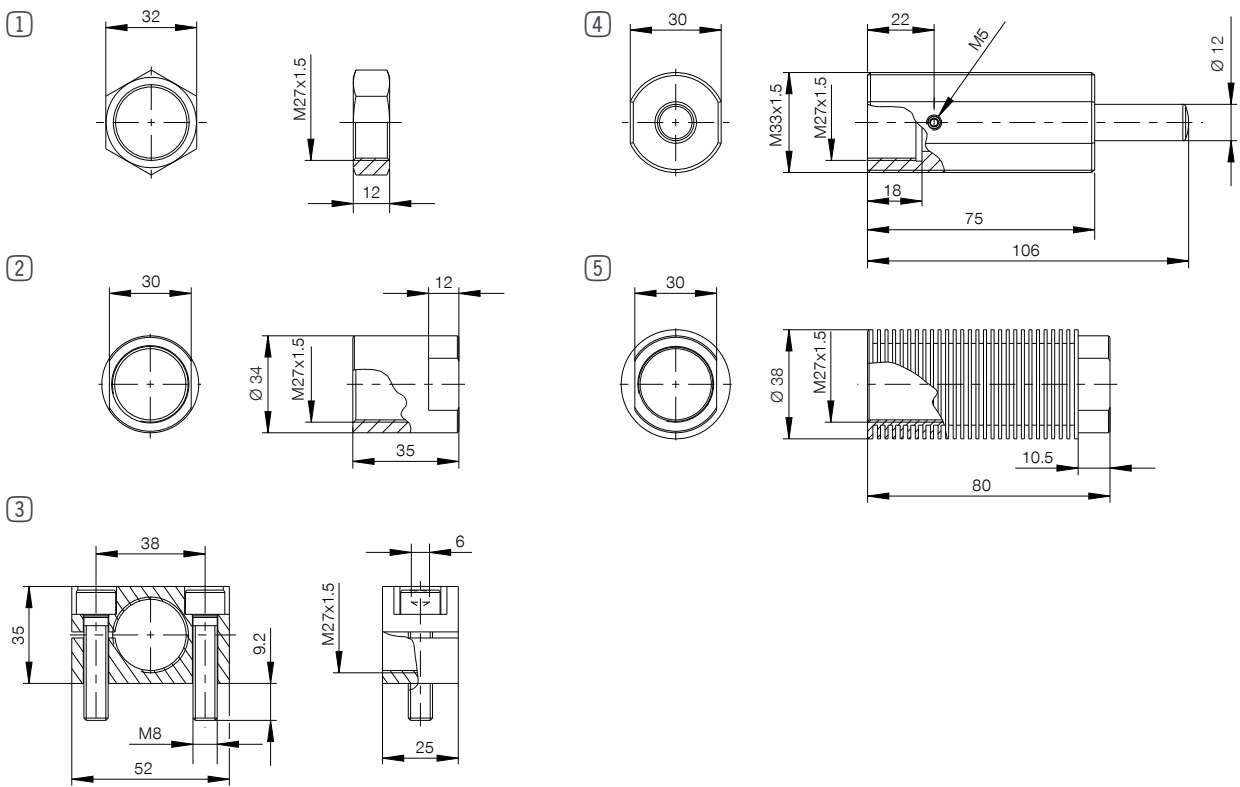
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M27X3

▶ PRODUCT SPECIFICATIONS
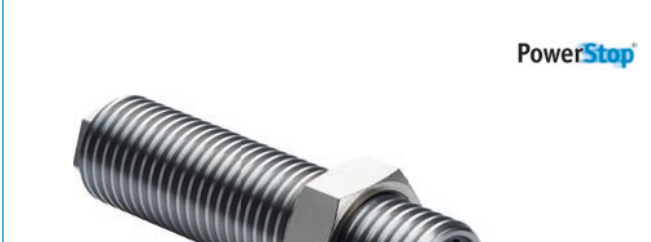
PowerStop®

▶	**Angle of Impact max.**	2 [°]
▶	**Piston return time**	0.4 [s]
▶	**Permitted temperature range**	-10 ... +70 [°C]
▶	**Max. High Energy pressure (abs.)**	10 [bar]
▶	**Max. Standard Energy pressure (abs.)**	1 [bar]
▶	**Max. locknut tightening torque**	60 [Nm]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ TECHNICAL DATA

▶ Installation Size: **M27X3**

	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M27X3W	100	80,000	100	25	1.8	4	25	50	370
M27X3WS	100	80,000	100	25	1.8	4	25	50	395
M27X3WK	100	80,000	100	25	1.8	4	25	50	390
M27X3S	190	100,000	300	25	1.8	3.5	25	50	370
M27X3SS	190	100,000	300	25	1.8	3.5	25	50	395
M27X3SK	190	100,000	300	25	1.8	3.5	25	50	390
M27X3M	210	120,000	400	25	0.8	2.2	25	50	370
M27X3MS	210	120,000	400	25	0.8	2.2	25	50	395
M27X3MK	210	120,000	400	25	0.8	2.2	25	50	390
M27X3H	210	120,000	450	25	0.2	1.2	25	50	370
M27X3HS	210	120,000	450	25	0.2	1.2	25	50	395
M27X3HK	210	120,000	450	25	0.2	1.2	25	50	390

HIGH ENERGY

Order no.									
M27X3RS	90	80,000	90	25	1.8	3.5	10	35	355
M27X3RSS	90	80,000	90	25	1.8	3.5	10	35	380
M27X3RSK	90	80,000	90	25	1.8	3.5	10	35	375
M27X3RM	90	80,000	90	25	0.8	2.2	10	35	355
M27X3RMS	90	80,000	90	25	0.8	2.2	10	35	380
M27X3RMK	90	80,000	90	25	0.8	2.2	10	35	375
M27X3RH	90	80,000	90	25	0.2	1.2	10	35	355
M27X3RHS	90	80,000	90	25	0.2	1.2	10	35	380
M27X3RHK	90	80,000	90	25	0.2	1.2	10	35	375

STANDARD ENERGY

► TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head
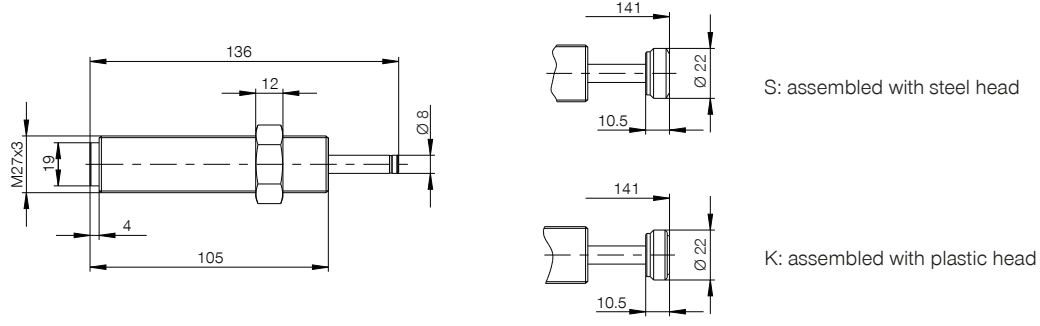
► ACCESSORIES

► Installation Size: **M27X3**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM27X3**	Steel locknut	40	
①	**MVM27X3**	Stainless steel locknut	40	
②	**MAH27X3**	Stop sleeve	155	Including 1x MVM27X3
③	**MKF27X3**	Clamping flange	255	Max. tightening torque of the screws 22 Nm
④	**MRA27X3**	Side load adapter / air barrier adapter	380	Max. angle of impact 30°, suitable MSM, MVM, MAH and MKF in the size M33X1.5 Including setscrew in compressed air connection M5
⑤	**MKM27X3**	Cooling nut	85	Increase of the energy absorption per hour up to 1.5 times
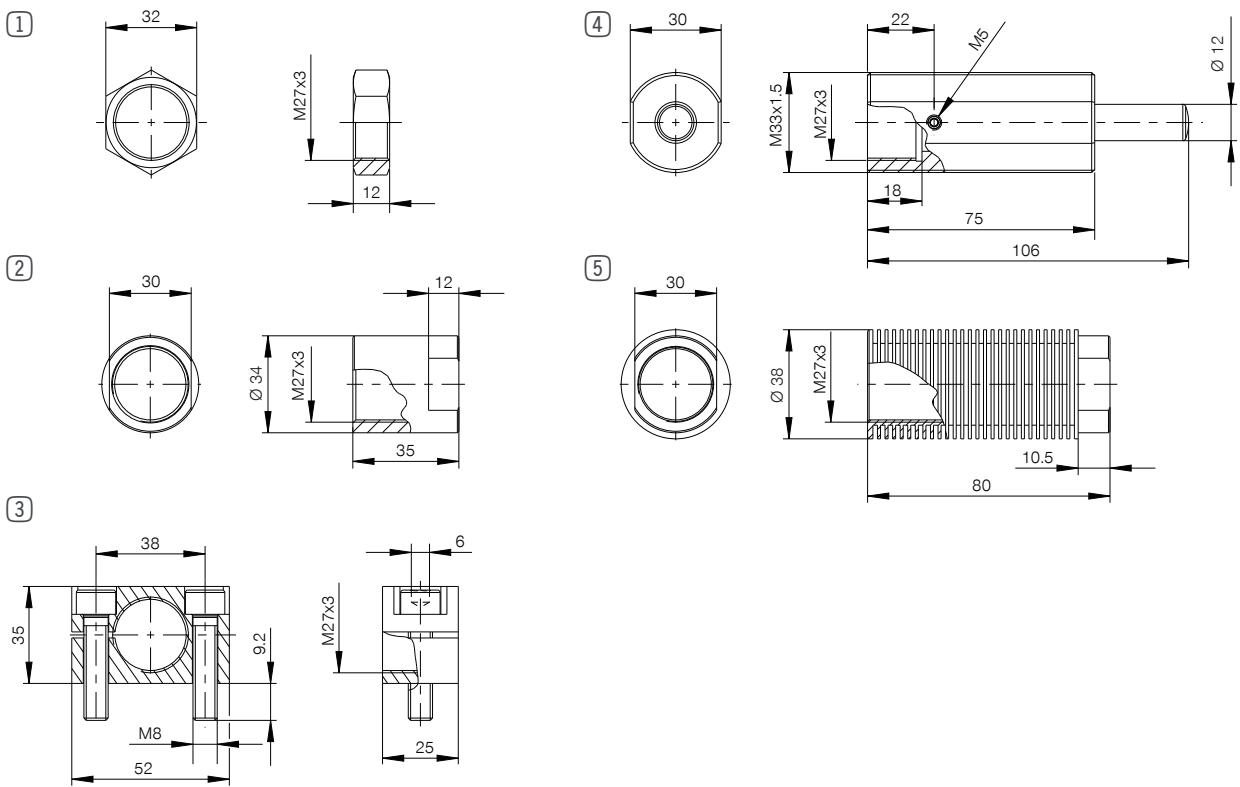
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M33X1.5

► PRODUCT SPECIFICATIONS

PowerStop

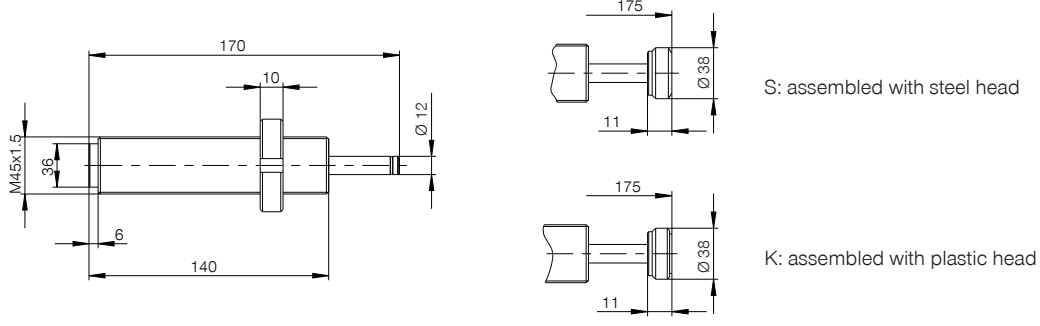|		
►	Angle of Impact max.	2 [°]
►	Piston return time	0.4 [s]
►	Permitted temperature range	-10 ... +70 [°C]
►	Max. High Energy pressure (abs.)	10 [bar]
►	Max. Standard Energy pressure (abs.)	1 [bar]
►	Max. locknut tightening torque	80 [Nm]
►	PWIS-free	Yes
►	RoHS compliant	Yes
►	REACH compliant	Yes

► TECHNICAL DATA

► Installation Size: **M33X1.5**

		Max. energy absorption		Stroke	Impact speed		Return force		Weight
		Continuous operation							
		per stroke	per hour	Emergency stop operation per stroke		min.	max.	min.	max.	
	Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
HIGH ENERGY	M33X1.5S	300	120,000	500	30	1.8	3.5	30	55	650
	M33X1.5SS	300	120,000	500	30	1.8	3.5	30	55	695
	M33X1.5SK	300	120,000	500	30	1.8	3.5	30	55	685
	M33X1.5SB	300	120,000	500	30	1.8	3.5	35	500	765
	M33X1.5M	350	140,000	750	30	0.8	2.2	30	55	650
	M33X1.5MS	350	140,000	750	30	0.8	2.2	30	55	695
	M33X1.5MK	350	140,000	750	30	0.8	2.2	30	55	685
	M33X1.5MB	350	140,000	750	30	0.8	2.2	35	500	765
	M33X1.5H	350	140,000	850	30	0.2	1.2	30	55	650
	M33X1.5HS	350	140,000	850	30	0.2	1.2	30	55	695
	M33X1.5HK	350	140,000	850	30	0.2	1.2	30	55	685
	M33X1.5HB	350	140,000	850	30	0.2	1.2	35	500	765

	Order no.									
STANDARD ENERGY	M33X1.5RS	180	100,000	180	30	1.8	3.5	20	65	600
	M33X1.5RSS	180	100,000	180	30	1.8	3.5	20	65	645
	M33X1.5RSK	180	100,000	180	30	1.8	3.5	20	65	635
	M33X1.5RM	180	100,000	180	30	0.8	2.2	20	65	600
	M33X1.5RMS	180	100,000	180	30	0.8	2.2	20	65	645
	M33X1.5RMK	180	100,000	180	30	0.8	2.2	20	65	635
	M33X1.5RH	180	100,000	180	30	0.2	1.2	20	65	600
	M33X1.5RHS	180	100,000	180	30	0.2	1.2	20	65	645
	M33X1.5RHK	180	100,000	180	30	0.2	1.2	20	65	635

► TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head

► ACCESSORIES

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM33X1.5**	Steel locknut	40	
①	**MVM33X1.5**	Stainless steel locknut	40	
②	**MAH33X1.5**	Stop sleeve	150	Including 1x MVM33X1.5
③	**MKF33X1.5**	Clamping flange	445	Max. tightening torque of the screws 9 Nm
④	**MRA33X1.5**	Side load adapter / air barrier adapter	890	Max. angle of impact 30°, suitable MSM, MVM, MAH and MKF in the size M45X1.5 Including setscrew in compressed air connection M5
⑤	**MKM33X1.5**	Cooling nut	135	Increase of the energy absorption per hour up to 1.5 times

► Installation Size: **M33X1.5**

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M33X1.5L

► PRODUCT SPECIFICATIONS

PowerStop®

►	Angle of Impact max.	2 [°]
►	Piston return time	0.8 [s]
►	Permitted temperature range	-10 ... +70 [°C]
►	Max. High Energy pressure (abs.)	10 [bar]
►	Max. locknut tightening torque	80 [Nm]
►	PWIS-free	Yes
►	RoHS compliant	Yes
►	REACH compliant	Yes

► TECHNICAL DATA

► Installation Size: **M33X1.5L**

	Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
		Continuous operation		Emergency stop operation						
		per stroke	per hour	per stroke		min.	max.	min.	max.	
		[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
HIGH ENERGY	M33X1.5LS	450	170,000	1100	50	1.8	3.5	30	55	750
	M33X1.5LSS	450	170,000	1100	50	1.8	3.5	30	55	795
	M33X1.5LSK	450	170,000	1100	50	1.8	3.5	30	55	785
	M33X1.5LM	500	180,000	1200	50	0.8	2.2	30	55	750
	M33X1.5LMS	500	180,000	1200	50	0.8	2.2	30	55	795
	M33X1.5LMK	500	180,000	1200	50	0.8	2.2	30	55	785

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head
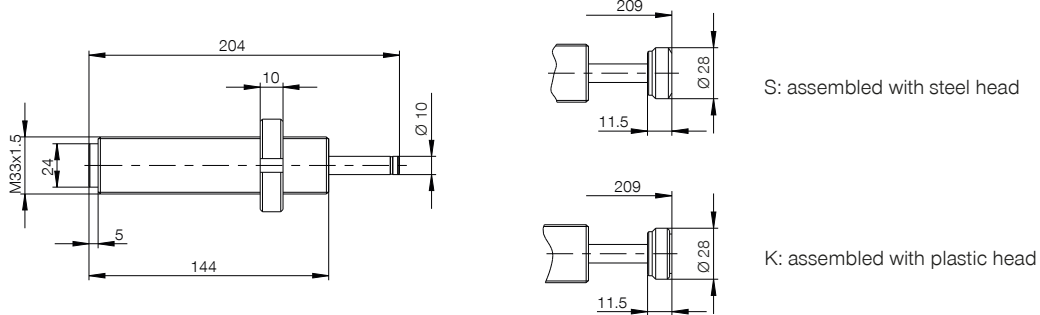
▶ ACCESSORIES

▶ Installation Size: **M33X1.5L**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM33X1.5**	Steel locknut	40	
①	**MVM33X1.5**	Stainless steel locknut	40	
②	**MAH33X1.5**	Stop sleeve	150	Including 1x MVM33X1.5
③	**MKF33X1.5**	Clamping flange	445	Max. tightening torque of the screws 9 Nm
④	**MRA33X1.5L**	Side load adapter / air barrier adapter	1100	Max. angle of impact 30°, suitable MSM, MVM, MAH and MKF in the size M45X1.5 Including setscrew in compressed air connection M5
⑤	**MKM33X1.5**	Cooling nut	135	Increase of the energy absorption per hour up to 1.5 times

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M45X1.5

► PRODUCT SPECIFICATIONS

PowerStop

►	Angle of Impact max.	2 [°]
►	Piston return time	0.4 [s]
►	Permitted temperature range	-10 ... +70 [°C]
►	Max. High Energy pressure (abs.)	10 [bar]
►	Max. Standard Energy pressure (abs.)	1 [bar]
►	Max. locknut tightening torque	100 [Nm]
►	PWIS-free	Yes
►	RoHS compliant	Yes
►	REACH compliant	Yes

► TECHNICAL DATA

► Installation Size: **M45X1.5**

	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M45X1.5S	600	150,000	1400	25	1.8	3.5	30	60	1290
M45X1.5SS	600	150,000	1400	25	1.8	3.5	30	60	1380
M45X1.5SK	600	150,000	1400	25	1.8	3.5	30	60	1360
M45X1.5M	650	170,000	1500	25	0.8	2.2	30	60	1290
M45X1.5MS	650	170,000	1500	25	0.8	2.2	30	60	1380
M45X1.5MK	650	170,000	1500	25	0.8	2.2	30	60	1360
M45X1.5H	650	170,000	1600	25	0.2	1.2	30	60	1290
M45X1.5HS	650	170,000	1600	25	0.2	1.2	30	60	1380
M45X1.5HK	650	170,000	1600	25	0.2	1.2	30	60	1360

HIGH ENERGY

Order no.									
M45X1.5RS	350	140,000	350	25	1.8	3.5	35	65	1190
M45X1.5RSS	350	140,000	350	25	1.8	3.5	35	65	1280
M45X1.5RSK	350	140,000	350	25	1.8	3.5	35	65	1260
M45X1.5RM	350	140,000	350	25	0.8	2.2	35	65	1190
M45X1.5RMS	350	140,000	350	25	0.8	2.2	35	65	1280
M45X1.5RMK	350	140,000	350	25	0.8	2.2	35	65	1260
M45X1.5RH	350	140,000	350	25	0.2	1.2	35	65	1190
M45X1.5RHS	350	140,000	350	25	0.2	1.2	35	65	1280
M45X1.5RHK	350	140,000	350	25	0.2	1.2	35	65	1260

STANDARD ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head

▶ ACCESSORIES

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM45X1.5**	Steel locknut	100	
①	**MVM45X1.5**	Stainless steel locknut	100	
②	**MAH45X1.5**	Stop sleeve	550	Including 1x MVM45X1.5
③	**MKF45X1.5**	Clamping flange	865	Max. tightening torque of the screws 22 Nm
④	**MRA45X1.5**	Side load adapter / air barrier adapter	1040	Max. angle of impact 30°, Suitable MSM, MVM, MAH and MKF on request Including setscrew in compressed air connection M5
⑤	**MKM45X1.5**	Cooling nut	295	Increase of the energy absorption per hour up to 1.5 times

▶ Installation Size: **M45X1.5**
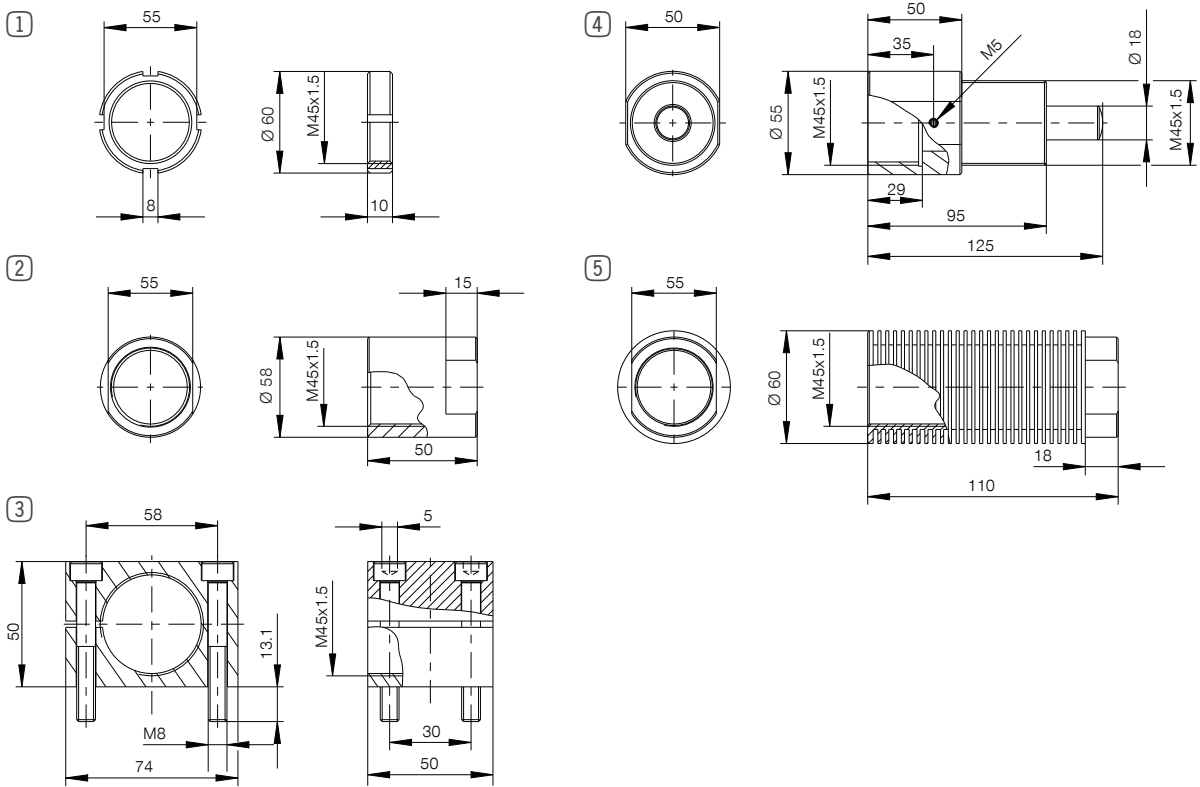
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
INSTALLATION SIZE M45X1.5L

► PRODUCT SPECIFICATIONS

PowerStop

►	Angle of Impact max.	2 [°]
►	Piston return time	0.8 [s]
►	Permitted temperature range	-10 ... +70 [°C]
►	Max. High Energy pressure (abs.)	10 [bar]
►	Max. locknut tightening torque	100 [Nm]
►	PWIS-free	Yes
►	RoHS compliant	Yes
►	REACH compliant	Yes

► TECHNICAL DATA

► Installation Size: M45X1.5L

Order No.	Max. energy absorption			Stroke	Impact speed		Return force		Weight
	Continuous operation		Emergency stop operation						
	per stroke	per hour	per stroke		min.	max.	min.	max.	
	[Nm]	[Nm/h]	[Nm]	[mm]	[m/s]		[N]	[N]	[g]
M45X1.5LS	1000	200,000	2600	50	1.8	3.5	50	130	1740
M45X1.5LSS	1000	200,000	2600	50	1.8	3.5	50	130	1830
M45X1.5LSK	1000	200,000	2600	50	1.8	3.5	50	130	1810
M45X1.5LM	1200	220,000	2800	50	0.8	2.2	50	130	1740
M45X1.5LMS	1200	220,000	2800	50	0.8	2.2	50	130	1830
M45X1.5LMK	1200	220,000	2800	50	0.8	2.2	50	130	1810
M45X1.5LH	1200	220,000	2800	50	0.2	1.2	50	130	1740
M45X1.5LHS	1200	220,000	2800	50	0.2	1.2	50	130	1830
M45X1.5LHK	1200	220,000	2800	50	0.2	1.2	50	130	1810

HIGH ENERGY

▶ TECHNICAL DRAWINGS

S: assembled with steel head

K: assembled with plastic head
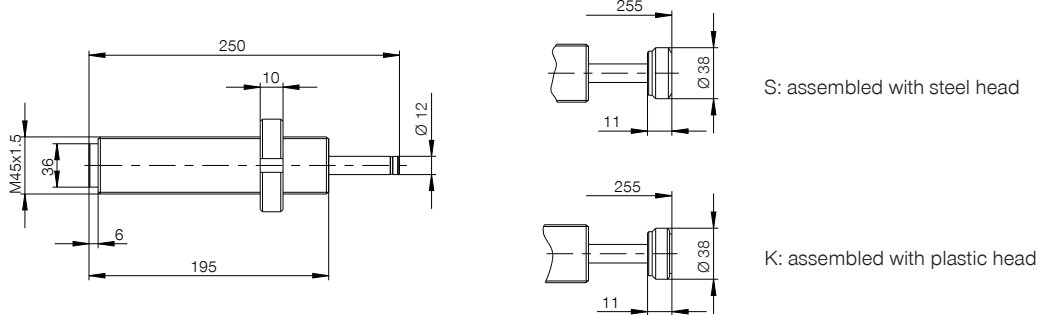
▶ ACCESSORIES

▶ Installation Size: **M45X1.5L**

Pos.	Order no.	Accessories	Weight [g]	Remarks
①	**MSM45X1.5**	Steel locknut	100	
①	**MVM45X1.5**	Stainless steel locknut	100	
②	**MAH45X1.5**	Stop sleeve	550	Including 1x MVM45X1.5
③	**MKF45X1.5**	Clamping flange	865	Max. tightening torque of the screws 22 Nm
④	**MRA45X1.5L**	Side load adapter / air barrier adapter	1320	Max. angle of impact 30°, Suitable MSM, MVM, MAH and MKF on request Including setscrew in compressed air connection M5
⑤	**MKM45X1.5**	Cooling nut	295	Increase of the energy absorption per hour up to 1.5 times
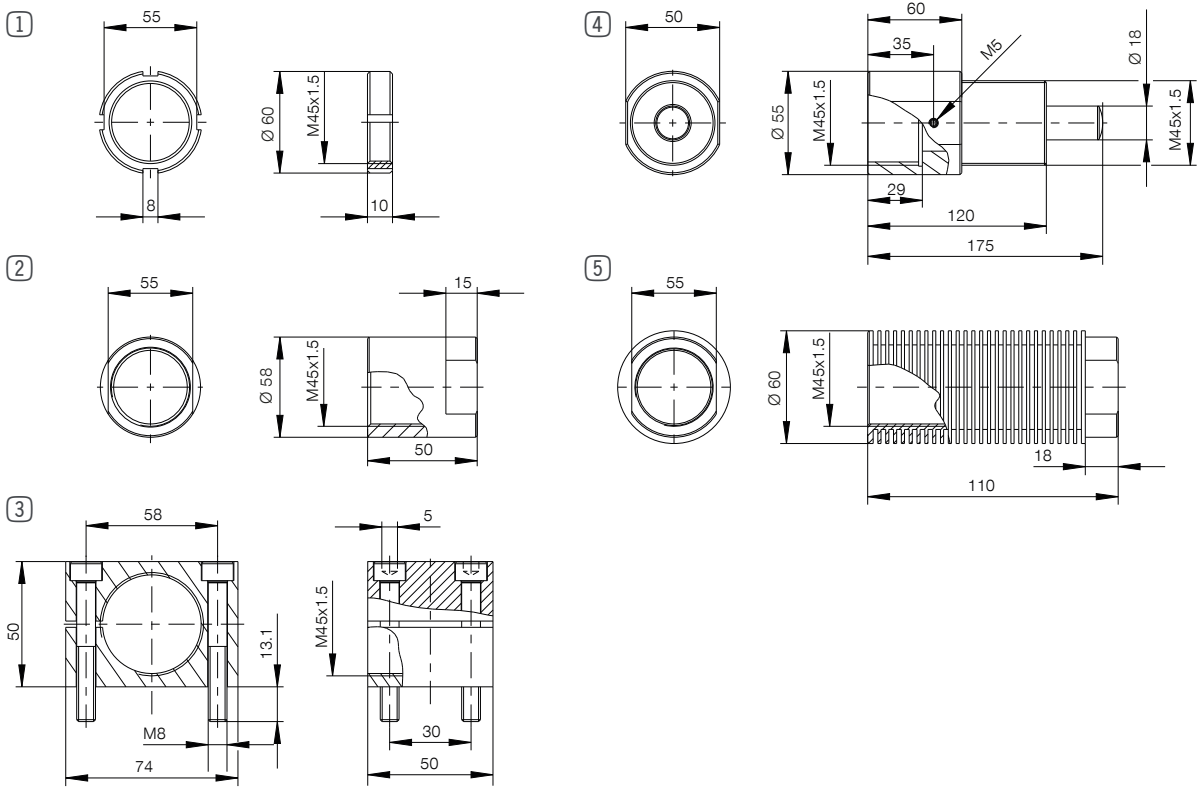
INDUSTRIAL SHOCK ABSORBERS POWERSTOP
CUSTOM SOLUTIONS AND SYSTEMS

▶ SPECIAL SOLUTIONS

Certifications and approvals

▶ Upon customer request, we develop components and systems that meet various approval specifications, certification requirements or standards classifications.

▶ Examples of these include CE marking or EC type examination, explosion protection, electric protection type, RoHS conformity, REACH conformity, freedom from paint-wetting impairment substances, cleanroom classification, medical product approval, suitability for foodstuffs, sea water resistance.

Shock absorbers for pallet circulation systems

▶ Specially tailored shock absorbers for applications with greatly varying, moving masses and/or velocities, whereby, however, the end position should always be reached.

▶ Integrated valve connections make it possible to cover large energy and velocity ranges with independent adjustment so that the mass reaches the end position safely

▶ Ideal for use in pallet circulation systems.

Heavy load emergency stop damper

▶ Customer-specific special solutions for robot portal systems.

▶ Dampers made from coated steel with an energy absorption of 6,500 Nm per stroke.

▶ The damper has a damping stroke of 100 mm and an outer diameter of 60 mm.

Sliding door dampers

▶ Customer-specific special solutions for sliding glass doors.

▶ Dampers made from high-strength aluminum with an energy absorption of 100 Nm per stroke.

▶ The damper has a damping stroke of 30 mm and an outer diameter of 20 mm.

Adjustable shock absorbers

- ► Manually adjustable degree of hardness (velocity range).
- ► Combination of spiral groove technology with an adjustable bypass bore.
- ► Custom adjustment to different load ranges.

I-Class emergency stop shock absorber

- ► The intelligent solution for emergency stop applications where the shock absorber is operated constantly but damping only occurs in an emergency.
- ► Damping is triggered only after reaching a preset velocity.
- ► For example, use on machine tool axles that do not require damping during workpiece machining, but which move with rapid traverse in the event of an emergency stop.

Twin damping as accessory

- ► Installation of a shock absorber in the twin damping accessory enables the activation of the shock absorber from both sides.
- ► This space- and cost-saving solution transforms a single-action into a dual-action shock absorber.
- ► For a representation of the principle see Tip 5 page 100.

Rifle stock recoil absorber
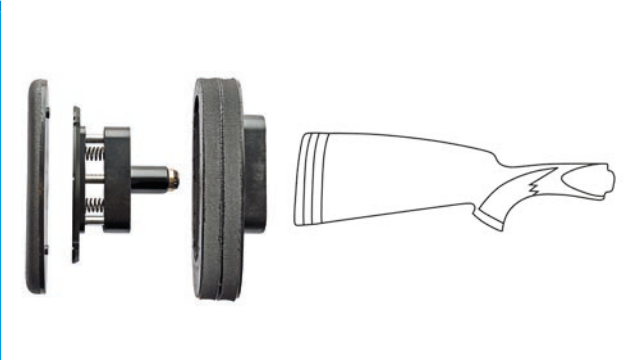
- ► Shock absorber with spiral groove technology integrated into a rifle stock.
- ► The system features an all-purpose rifle stock that is suitable for any type of rifle.
- ► Dampens recoil when firing a shot by approx. 50%.

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
SPECIAL SOLUTIONS AND SYSTEMS

▶ **SYSTEMS**

Dampers for Ottobock prosthetic knee and hip joints

The medical technology company Ottobock, with its head office in Duderstadt, Germany, is the global market leader in the prosthetics segment. The goal of returning mobility to people with handicaps and protecting the functions they still have encompasses the entire product world of the company.

ottobock.

For many years now, the "Knee and Hip Development" department of Ottobock has been working together closely with the "Industrial Damping Technology" division of Zimmer Group. Zimmer is active here as an innovative development partner. Many dampers have been developed together and are used in leg external prosthetic devices from Ottobock.

▶ Use in prosthetic knee and hip joints for damping swing and standing phases

▶ Individually adjustable dampers in pull and push directions

▶ Adjustment of the curve to movement processes

▶ High energy absorption for the smallest space

INDUSTRIAL SHOCK ABSORBERS POWERSTOP
SHOCK ABSORBERS WITH A DNA STRUCTURE

1

When James Watson and Francis Crick revealed the structure of human DNA in 1953, they answered the question of how so much genetic information can be stored biologically in such a small space: the simple, yet ingenious, helix structure. From a geometric perspective, a helix is a strand of material wound around a cylinder to create a spiral shape. Everyday examples include pressure springs or the threads of a screw. Today, the same structure that fascinated biochemical researchers at that time is revolutionizing the way industrial shock absorbers work. This industrial helix structure is called a spiral groove.

Technologies: Spiral groove vs. throttle bores
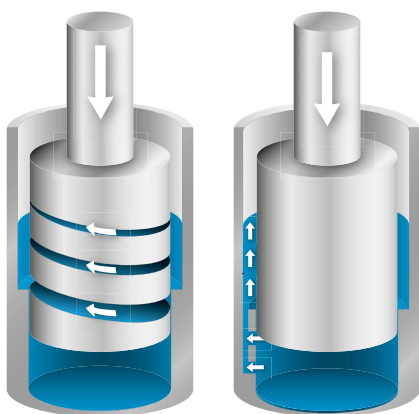
Confronted with the question of how to overcome the drawbacks of conventional throttle bore shock absorbers used in industry, researchers at Zimmer Group developed spiral groove technology, which provides the necessary throttling of an oil flow in a completely new way. This innovative technology, which has since been used in the "PowerStop" shock absorbers from Zimmer Group (technology area: Industrial Damping Technology), places competitor products in the shade with regard to the highest energy absorption in the smallest space and low-vibration damping of moving masses.

Conventional industrial shock absorbers work according to the throttle bore principle, which utilizes holes to throttle the flow of oil. The damping effect is produced as the retracting piston causes openings arranged above the stroke to close one at a time. Unfortunately, this design creates a multi-step damping characteristic, resulting in oscillation. These vibrations can cause damage to the system and result in uneven breaking of the mass. Of course, this defeats the purpose of dampers, which are used specifically to avoid damage to components and achieve smooth stopping of an object.

Throttle bores:
Throttle type and characteristics

Throttle surface

Stroke [mm]

Force [N]

Stroke [mm]
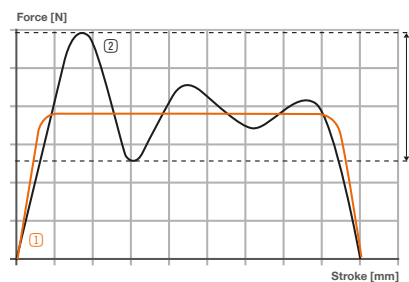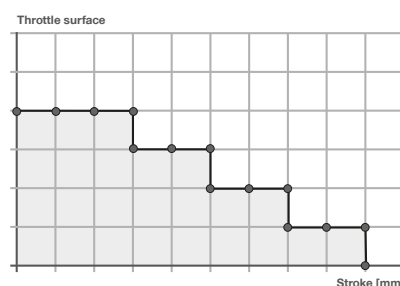
1 Ideal line
2 Conventional shock absorbers

Spiral groove:
Throttle type and characteristics

Throttle surface

Stroke [mm]

Force [N]

Stroke [mm]
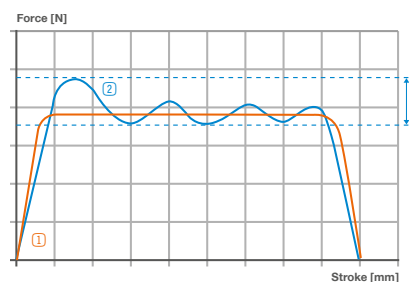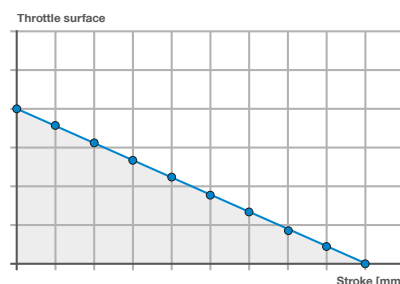
1 Ideal line
2 PowerStop

Even throttle behavior

Only PowerStop shock absorbers with the unique spiral groove technology can achieve these goals. In the process, a spiral groove around the circumference of the piston ensures even throttle behavior. The groove itself tapers as it moves up the piston, resulting in smooth and even damping characteristics. Only this design can achieve low-oscillation damping and smooth braking of an object in motion.

At the same time, optimized loads at every piston position enable maximum energy absorption with low space requirements. On top of this, the flow of oil in the spiral groove ensures that there is always a film of oil between the moving piston and the housing. This hydrostatic piston movement lays the foundation for low-wear components that maximize service life.

A wide variety of standard components for the most varied damping requirements is available for your systems and equipment. In addition, through flexible adaptation of the spiral groove, a special damper designed for particular uses can be provided as a semi-standard component. Developers from the Industrial Damping Technology division can also create complete, customized system solutions for you.

Individual damping characteristics

Force [N]

Stroke [mm]
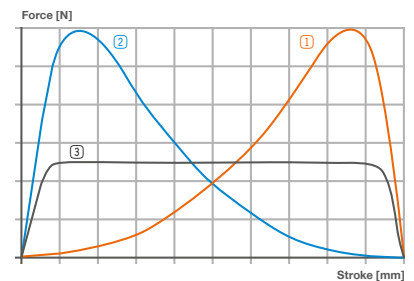
1 Inclining
2 Declining
3 Linear-constant

Zimmer Group has the experience and know-how to support its customers as a development partner in the field of damping technology. Its PowerStop series of industrial shock absorbers provides users with complete solutions for virtually any set of requirements and operating conditions, ensuring that the customer always has the optimal damping tool possible, true to the motto, "When in doubt, damp it out!"

PROFILE DAMPERS
BASICSTOP

PROFILE DAMPERS BASICSTOP
KNOW-HOW

The BasicStop profile dampers feature high-performance plastic and a specifically developed profile.
It acquires its unique properties after receiving a special treatment. These properties allow it to absorb maximum amounts of energy even under the toughest conditions, while also achieving high damping rates.

Our expertise – your advantages:

► TPC high-performance plastic:
  Thermoplastic elastomer on a copolyester basis
  High durability and resistance to media*
  No swelling, embrittlement or decomposition of the material, as is the case with rubber*
  Large temperature range

► Special process for conditioning the material:
  High damping percentage and high energy absorption in the smallest space
  Reliable return behavior
  Increased service life in comparison to rubber pads

► Design of the structure:
  Standard product portfolio with 3 series x 2 degrees of hardness
  Individual configuration for customized solutions possible

► Expertise in design and production at Zimmer

► Usability independent of velocity

► 100% recyclable due to thermoplastic properties

* For chemical and media resistance see page 76

Function

► Unlike hydraulic industrial shock absorbers, material dampers do not damp 100% of the absorbed energy. Instead, they convert only a specific percentage of the kinetic energy into heat. This is called the damping percentage. The residual energy, on the other hand, is stored in the material as spring energy, which is released again when the damper is reset.

► Conventional rubber pads only have a very small damping percentage and are more of a spring than a damper. Use of these pads hardly takes any kinetic energy from the system, which in turn can lead to damage to the system.

► This is where the BasicStop brand profile dampers are setting new standards in the realm of material damping with their high damping percentage. Through the friction in the material, a large part of the kinetic energy is converted into heat, whereupon the structural damper returns to its original form (viscoelastic damping).

Damping vs. suspension
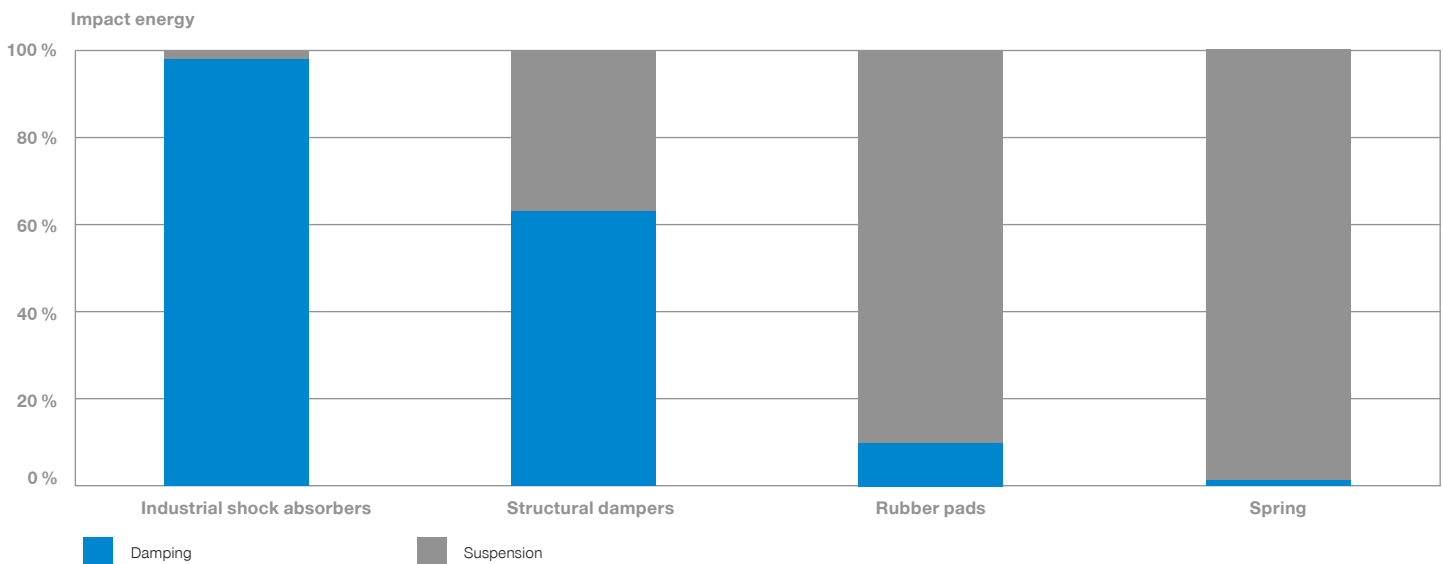
Service life

► Rubber materials fail after certain intervals of time due to settling losses, creep behavior, media incompatibility or overloading, which results in high maintenance costs for the user. With BasicStop, long service life is achieved even under the toughest conditions, which dispenses with unnecessary maintenance costs.

Characteristics and damping percentage of the shock absorber curve

► The characteristic of the shock absorber curve for force over stroke is dependent upon the structural design of the respective series, but, in contrast with hydraulic shock absorbers, the impact velocity has no effect on the characteristic. This is why material dampers can be used irrespective of the velocity.

► However, the damping percentage depends upon the impact velocity. This increases in certain areas with increasing velocity, until it reaches its maximum. The damping percentage also increases with an increasing degree of hardness of the TPC.

PROFILE DAMPERS BASICSTOP
THE SERIES AT A GLANCE

Axial Standard
► Design: Axial

► Degrees of hardness: 55D, 40D

► Energy absorption per stroke: 2 - 2,951 Nm

► Damping percentage: up to 75%

Force [N]

Stroke [mm]

① Compression
② Release
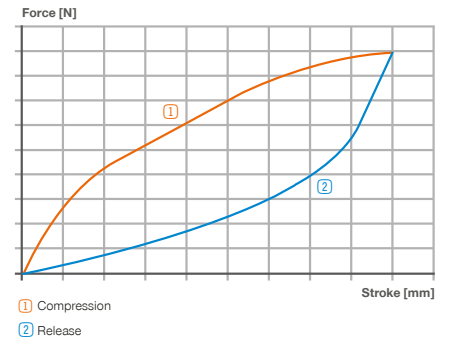
Axial Advanced
► Design: Axial

► Degrees of hardness: 55D, 40D

► Energy absorption per stroke: 450 - 17,810 Nm

► Damping percentage: up to 65%

Force [N]

Stroke [mm]

① Compression
② Release
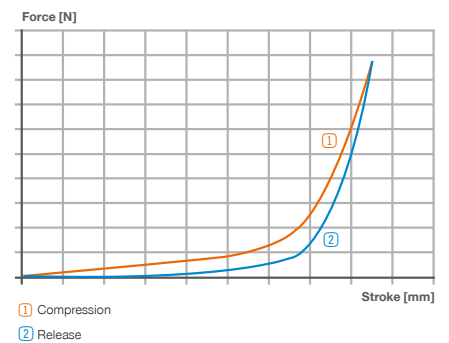
Radial Standard
► Design: Radial

► Degrees of hardness: 55D, 40D

► Energy absorption per stroke: 1.2 - 427 Nm

► Damping percentage: up to 60%

Force [N]

Stroke [mm]

① Compression
② Release
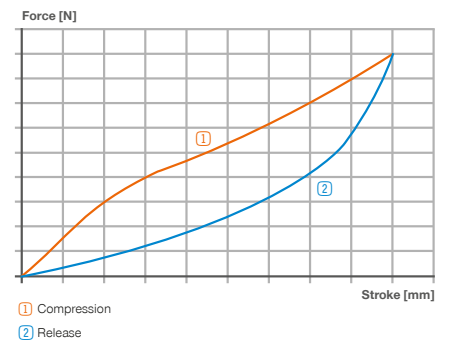
PROFILE DAMPERS BASICSTOP
FUNCTIONAL SEQUENCE
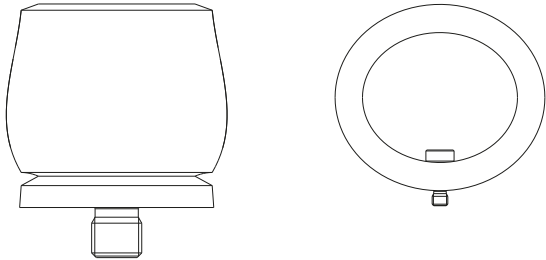
1. Home position

Unstressed in unshaped state.
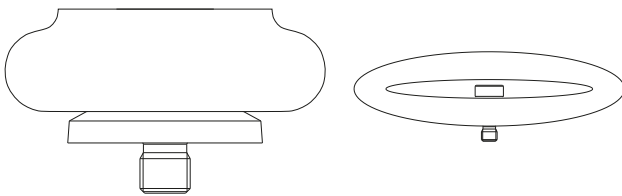
2. Compression with damping

External force or kinetic energy (impact) compresses the profile damper

▶ Walls are deformed by the stroke and expand or curve outward due to the structural design.

▶ Due to the structural structure of the material body, a force (damping or supporting force) is generated via the stroke that counters the movement.

▶ Due to the friction inside the TPC material, a large proportion of the kinetic energy is transformed into heat (**viscoelastic damping**).

Force [N]

Stroke [mm]

① Energy absorption
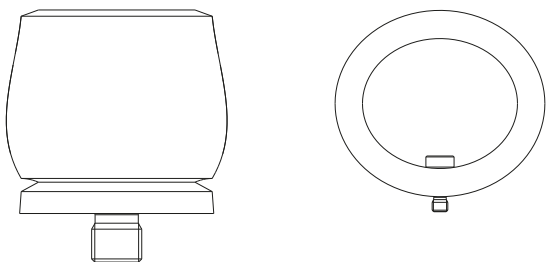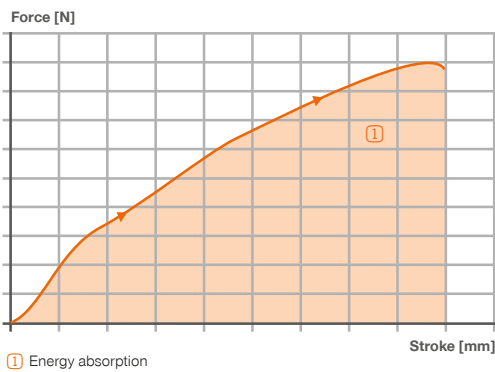
3. Returning

▶ The part of the kinetic energy that is not damped during the stroke is stored as spring energy in the material body (**viscoelastic damping**).

▶ This spring energy causes a return of the body to the starting position via the return stroke (**viscoelastic damping**).

▶ Rebound of the mass as long as the acting force of the mass is less than the return force of the structural damper.

▶ Ratio of damping energy to kinetic energy in the impact is designated as damping percentage.

Force [N]

Stroke [mm]

① Damping energy
② Spring energy
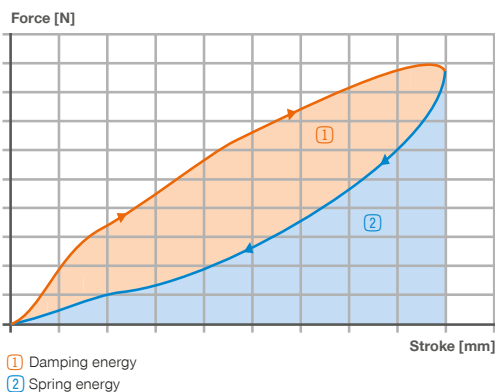
PROFILE DAMPERS BASICSTOP
CHEMICAL AND MEDIA RESISTANCE

Chemicals	Effect
Acetone	Weak
Acetylene	None
Formic acid (diluted)	Weak
Aniline	Strong
ASTM oil No. 1 (149°C)	None
ASTM oil No. 3 (149°C)	None
ASTM reference fuel A	None
ASTM reference fuel B (70°C)	None
ASTM reference fuel C (70°C)	Weak
ASTM reference fuel C	None
Gasoline	None
Benzene	Weak
Beer	None
Bromine, liquid free of water	Strong
Butane	None
Butyl acetate	Weak
Calcium chloride solutions	None
Chlorine gas, wet and dry	Strong
Chloroacetic acid	Strong
Chlorobenzene	Strong
Chloroform	Strong
Chlorosulfuric acid	Strong
Citric acid solutions	None
Cyclohexane	None
Steam (110°C)	Strong
Dibutyl phthalate	None
Diethyl sebacate	None
Dioctyl phthalate	None
Iron(III)-chloride solutions	Weak
Glacial acetic acid	None
Epichlorohydrin	Strong
Acetic acid, 20% - 30%	None
Ethanol	None
Ethyl acetate	Weak
Ethyl chloride	Strong
1,2-dichloroethane	Strong
Ethylene glycol	None
Ethylene oxide	None
Fluoric acid, 48%	Strong
Fluoric acid, 75%	Strong
Fluoric acid, free from water	Strong
Formaldehyde, 40%	Weak
Freon 11, 12, 114	None
Freon 113 (54°C)	None
Glycerin	None
Isooctane	None
Isopropanol	None
Jet Fuel JP-4	None
Potassium hydroxide solutions (diluted)	None
Kerosene	Weak
Carbon dioxide	None
Carbon monoxide	None
Copper chloride solutions	None
Copper sulfate solutions	None
Paint solvent	Weak
Linseed oil	Strong
Magnesium chloride solutions	Strong

Chemicals	Effect
Magnesium hydroxide solutions	Strong
Sea water	None
Methanol	None
Methylene chloride	Strong
Butanone	Weak
Mineral oil	None
Naphtha	None
Naphthalene	Weak
Sodium chloride solutions	None
Sodium hydroxide, 20%	None
n-hexane	None
Nitrobenzene	Strong
Oil SAE 10	None
Oleum, 20% - 25%	Strong
Oleic acid	None
Palmitic acid	None
Perchlorethylene	Strong
Phenol	Strong
Pyridine	Strong
Nitric acid, 10%	Weak
Nitric acid, 30% - 70%	Strong
Nitric acid, strong/red fuming	Strong
Hydrochloric acid, 20%	Weak
Hydrochloric acid, 37%	Strong
Sulfuric acid, 50%	Strong
Sulfurous acid	Weak
Soap solutions	None
Silicone grease	None
Skydrol 500B	None
Tannin, 10%	None
Carbon tetrachloride	Strong
Tetrahydrofuran	Weak
Toluene	Weak
Trichlorethylene	Strong
Triethanolamine	Strong
Trisodium phosphate solution	None
Tung oil	Weak
Water (70°C)	Weak
Hydrogen	None
Xylene	Weak
Zinc chloride solutions	None

Classification of effect:

▶ **None:** No sustained reaction, as almost no absorption and almost no effect on mechanical properties.

▶ **Weak:** Minor effect due to a certain absorption with slight swelling and slight worsening of the mechanical properties.

▶ **Strong:** Use not recommended, as material changes for the worse in a short time.

No guarantee or liability is provided or assumed for this chemical and media resistance list. It is only meant as a point of reference. Other chemical and media resistances upon request or checking through own tests.

PROFILE DAMPERS BASICSTOP
PRODUCT KEY

Selection of profile dampers

▶ by series, size and degree of hardness

TPC	-	AS	45	X	50	H

Degree of hardness

M Medium (Shore 40D)

H Hard (Shore 55D)

Ø Axial design [mm]

Depth Radial design [mm]

Height [mm]

Series

AS Axial Standard

AA Axial Advanced

RS Radial Standard

Material

TPC Thermoplastic elastomer on copolyester basis
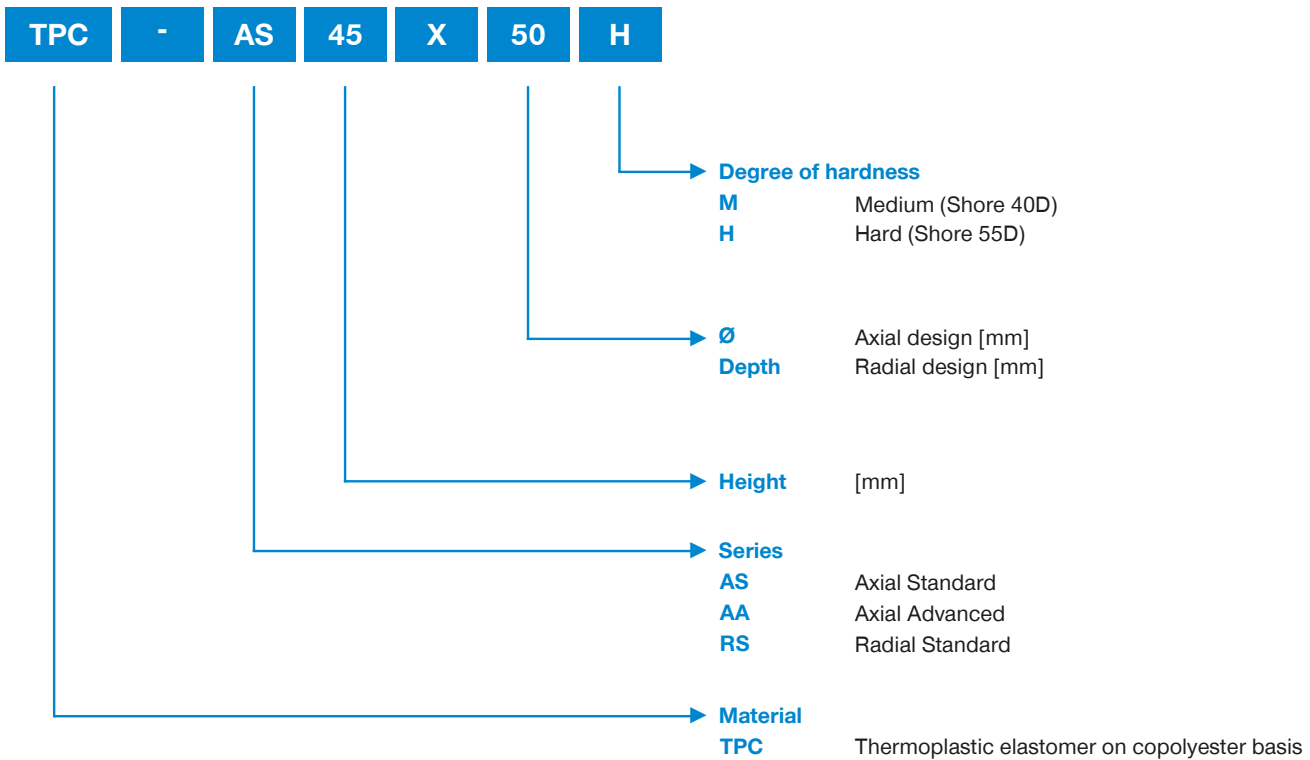
Notes:

▶ Delivery including a nickel-plated special screw for simple and safe installation.

▶ The energy absorption and the impact velocity can be determined with the help of the shock absorber selection guide online at **www.zimmer-group.com/pdti** or with the formulas and calculations listed in the catalog.

▶ For the installation space, use the dimensions without loads and at complete deformation.

PROFILE DAMPERS BASIC
APPLICATIONS

► Emergency stop protection in the movement axis of a spindle tailstock
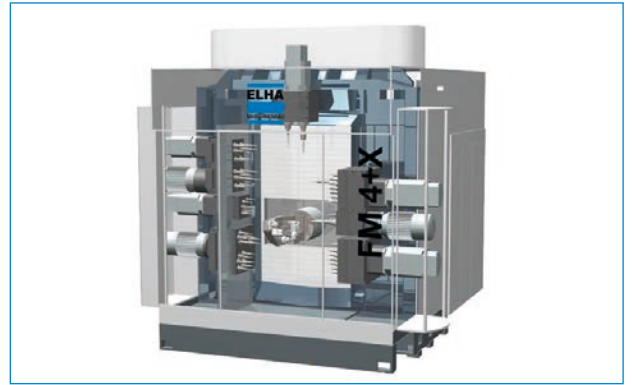
► End-position damping in the linear axes of production modules from ELHA

► Machine door damping in a machining center
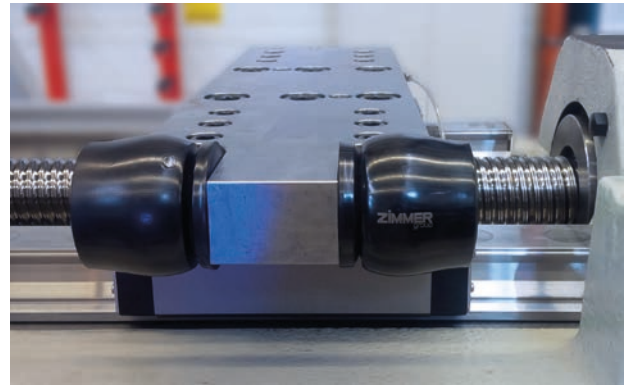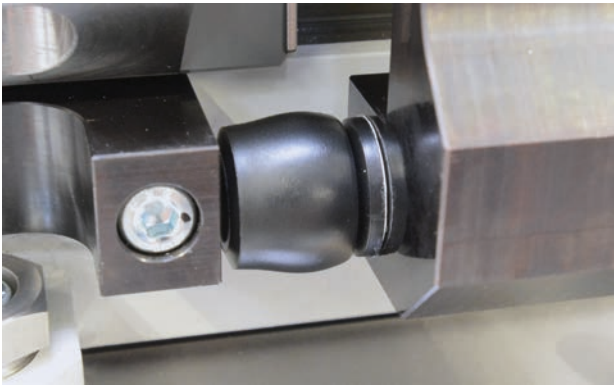
► Emergency stop damping on a portal crane
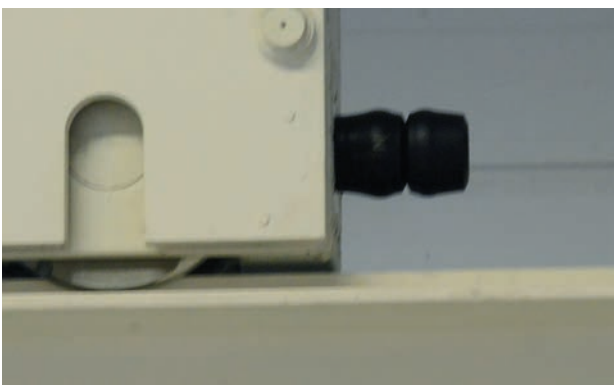
PROFILE DAMPERS BASICSTOP
OVERVIEW OF PRODUCTS

Series	Degree of hardness	Max. energy per stroke [Nm]		Stroke [mm]	Thread M	Page
		Duration	Emergency stop			
Axial Standard	Shore 55D	2-2014	3-2951	5-47	M3-M16	80
	Shore 40D	2-902	3-966	7-56	M4-M16	80
Axial Advanced	Shore 55D	1640-8330	2295-11660	30-67	M12-M16	82
	Shore 40D	450-12725	630-17810	30-198	M12-M16	82
Radial Standard	Shore 55D	2,7-290	5,7-427	15-56	M5-M8	84
	Shore 40D	1,2-115	1,8-146	17-60	M5-M8	84

PROFILE DAMPERS BASICSTOP
SERIES AXIAL STANDARD

► PRODUCT SPECIFICATIONS

►	**Design**	Axial
►	**Shore hardness, hard**	55D
►	**Shore hardness, medium**	40D
►	**Damping proportion hard**	up to 75 %
►	**Damping proportion medium**	up to 65 %
►	**Impact speed**	0 ... 10 [m/s]
►	**Permitted temperature range**	-50 ... +90 [°C]
►	**Angle of Impact max.**	15 [°]
►	**PWIS-free**	Yes
►	**RoHS compliant**	Yes
►	**REACH compliant**	Yes

► TECHNICAL DATA

Force [N]

① Compression
② Release
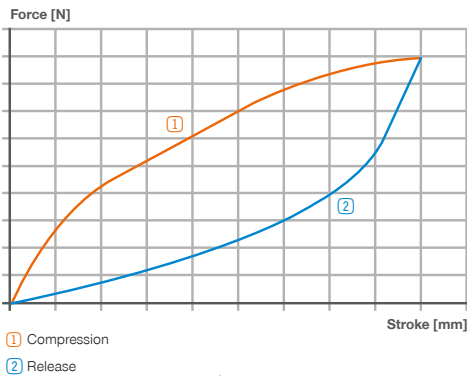
► Installation instructions

Thread M	Wrench size [mm]	Max. tightening torque [Nm]
M3	2	1.3
M4	2.5	2.9
M5	3	4.5
M6	5	7
M8	6	17
M12	10	60
M16	14	180

The profile dampers must completely contact the underside

Load direction
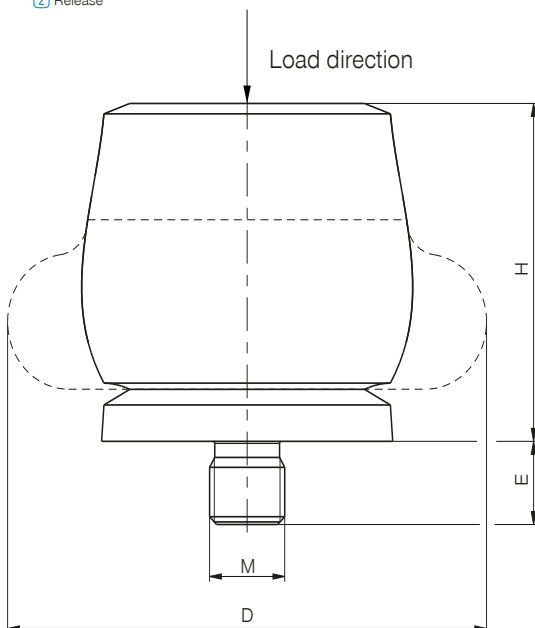
► TECHNICAL DATA

► Axial Standard

	Max. energy absorption			Stroke max.	Height H	Diameter D		Screw-in depth max. E	Thread M	Weight
	Continuous operation		Emergency stop operation							(incl. screw)
	per stroke	per hour	per stroke		Stroke=0	Stroke=0	Stroke=max.			
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]		[g]
TPC-AS11X12H	2	60	3	5	11	12	15	3	M3	2
TPC-AS16X17H	6	180	9	7	16	17	22	4	M4	4
TPC-AS19X20H	10	300	16	9	19	20	26	5	M5	7
TPC-AS19X22H	11.5	345	21	9	19	22	27	6	M6	8
TPC-AS26X28H	29	870	46	12	26	28	36	6	M6	15
TPC-AS30X34H	48	1,440	87	14	30	34	43	6	M6	22
TPC-AS33X37H	65	1,950	112	16	33	37	48	6	M6	29
TPC-AS35X39H	82	2,460	130	16	35	39	51	8	M8	41
TPC-AS38X43H	112	3,360	165	18	38	43	55	8	M8	51
TPC-AS41X46H	140	4,200	173	19	41	46	59	12	M12	75
TPC-AS45X50H	170	5,100	223	22	45	50	64	12	M12	85
TPC-AS47X53H	201	6,030	334	22	47	53	68	12	M12	103
TPC-AS51X57H	242	7,260	302	24	51	57	73	12	M12	115
TPC-AS54X62H	304	9,120	361	25	54	62	77	12	M12	132
TPC-AS57X65H	374	11,220	468	27	57	65	82	12	M12	152
TPC-AS60X69H	421	12,630	524	29	60	69	86	12	M12	175
TPC-AS65X71H	482	14,460	559	31	65	71	91	16	M16	264
TPC-AS69X79H	570	17,100	831	32	69	79	100	16	M16	314
TPC-AS74X82H	683	20,490	921	35	74	82	105	16	M16	348
TPC-AS76X85H	797	23,910	1043	36	76	85	109	16	M16	385
TPC-AS80X89H	934	28,020	1249	38	80	89	114	16	M16	424
TPC-AS86X97H	1147	34,410	1555	40	86	97	123	16	M16	512
TPC-AS101X116H	2014	60,420	2951	47	101	116	146	16	M16	794

Order No.										
TPC-AS15X14M	2	60	3	7	15	14	19	4	M4	2
TPC-AS19X17M	4	120	6	9	19	17	24	5	M5	6
TPC-AS21X20M	6	180	7	10	21	20	27	6	M6	8
TPC-AS28X26M	11.5	345	15	14	28	26	37	6	M6	13
TPC-AS32X31M	23	690	26	16	32	31	44	6	M6	19
TPC-AS36X35M	30	900	36	19	36	35	48	6	M6	25
TPC-AS38X37M	34	1,020	42	19	38	37	51	6	M6	29
TPC-AS41X41M	48	1,440	63	21	41	41	55	12	M12	61
TPC-AS45X44M	63	1,890	72	23	45	44	60	12	M12	70
TPC-AS49X48M	81	2,430	91	25	49	48	64	12	M12	80
TPC-AS52X51M	92	2,760	114	26	52	51	69	12	M12	95
TPC-AS55X54M	122	3,660	158	28	55	54	73	12	M12	105
TPC-AS59X58M	149	4,470	154	31	59	58	78	12	M12	122
TPC-AS62X61M	163	4,890	169	32	62	61	83	16	M16	201
TPC-AS66X64M	208	6,240	254	34	66	64	87	16	M16	222
TPC-AS69X68M	227	6,810	272	35	69	68	92	16	M16	247
TPC-AS75X75M	291	8,730	408	38	75	75	101	16	M16	288
TPC-AS79X77M	352	10,560	459	40	79	77	105	16	M16	314
TPC-AS84X82M	419	12,570	620	44	84	82	110	16	M16	347
TPC-AS85X84M	475	14,250	635	43	85	84	115	16	M16	377
TPC-AS92X90M	580	17,400	778	47	92	90	124	16	M16	455
TPC-AS109X107M	902	27,060	966	56	109	107	147	16	M16	687

HARD

MEDIUM

PROFILE DAMPERS BASICSTOP
SERIES AXIAL ADVANCED

▶ **PRODUCT SPECIFICATIONS**

▶	**Design**	Axial
▶	**Shore hardness, hard**	55D
▶	**Shore hardness, medium**	40D
▶	**Damping proportion hard**	up to 65 %
▶	**Damping proportion medium**	up to 65 %
▶	**Impact speed**	0 ... 10 [m/s]
▶	**Permitted temperature range**	-50 ... +90 [°C]
▶	**Angle of Impact max.**	15 [°]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ **TECHNICAL DATA**

Force [N]

① Compression
② Release

Stroke [mm]

▶ **Installation instructions**

Thread M	Wrench size	Max. tightening torque
	[mm]	[Nm]
M12	10	60
M16	14	180

The profile dampers must completely contact the underside

Load direction

Load direction

► TECHNICAL DATA

► **Axial Advanced**

	Max. energy absorption			Stroke max.	Height H	Diameter D		Number of steps	Screw-in depth max. E	Thread M	Weight
	Continuous operation		Emergency stop operation								
	per stroke	per hour	per stroke		Stroke=0	Stroke=0	Stroke=max.				(incl. screw)
Order No.	[Nm]	[Nm/h]	[Nm]	[mm]	[mm]	[mm]	[mm]		[mm]		[g]
TPC-AA79X64M	450	13,500	630	62	79	64	89	2	12	M12	177
TPC-AA96X74M	980	29,400	1372	75	96	74	114	2	12	M12	241
TPC-AA57X88M	1210	36,300	1695	40	57	88	133	1	12	M12	285
TPC-AA68X88H	1640	49,200	2295	49	68	88	124	1	12	M12	286
TPC-AA84X100M	1785	53,550	2500	59	84	100	149	1	12	M12	515
TPC-AA53X108H	1900	57,000	2660	30	53	108	133	1	12	M12	394
TPC-AA94X85M	1940	58,200	2715	74	94	85	127	2	12	M12	325
TPC-AA98X102H	1970	59,100	2760	63	98	102	140	1	16	M16	645
TPC-AA129X116M	3710	111,300	5195	97	129	116	187	1	16	M16	1062
TPC-AA106X136H	4250	127,500	5950	65	106	136	178	1	16	M16	1195
TPC-AA114X137M	6350	190,500	8890	89	114	137	216	1	16	M16	1129
TPC-AA224X152M	7260	217,800	10165 *	176	224	152	241	2	16	M16	2370
TPC-AA186X140M	7310	219,300	10230 *	144	186	140	214	2	16	M16	1596
TPC-AA118X146H	8330	249,900	11660 *	67	118	146	191	2	16	M16	1535
TPC-AA241X149M	8860	265,800	12400 *	178	241	149	224	2	16	M16	2589
TPC-AA166X168M	10100	303,000	14140 *	124	166	168	260	1	16	M16	2297
TPC-AA252X177M	12725	381,750	17810 *	198	252	177	279	2	16	M16	3161

MEDIUM / HARD

* Limit angle of impact in emergency stop operation to 2°

PROFILE DAMPERS BASICSTOP
SERIES RADIAL STANDARD

▶ PRODUCT SPECIFICATIONS

▶	**Design**	Radial
▶	**Shore hardness, hard**	55D
▶	**Shore hardness, medium**	40D
▶	**Damping proportion hard**	up to 60 %
▶	**Damping proportion medium**	up to 50 %
▶	**Impact speed**	0 ... 10 [m/s]
▶	**Permitted temperature range**	-50 ... +90 [°C]
▶	**Angle of Impact max.**	30 [°]
▶	**PWIS-free**	Yes
▶	**RoHS compliant**	Yes
▶	**REACH compliant**	Yes

▶ TECHNICAL DATA

Force [N]

① Compression
② Release
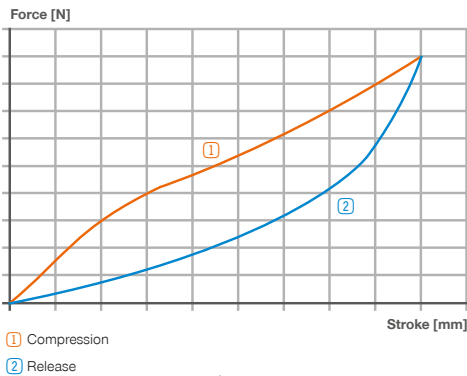
Stroke [mm]

▶ Installation instructions

Thread M	Wrench size	Max. tightening torque
	[mm]	[Nm]
M5	3	4.5
M6	5	7
M8	6	17

The profile dampers must completely contact the underside

Load direction

H

E

M

W

T
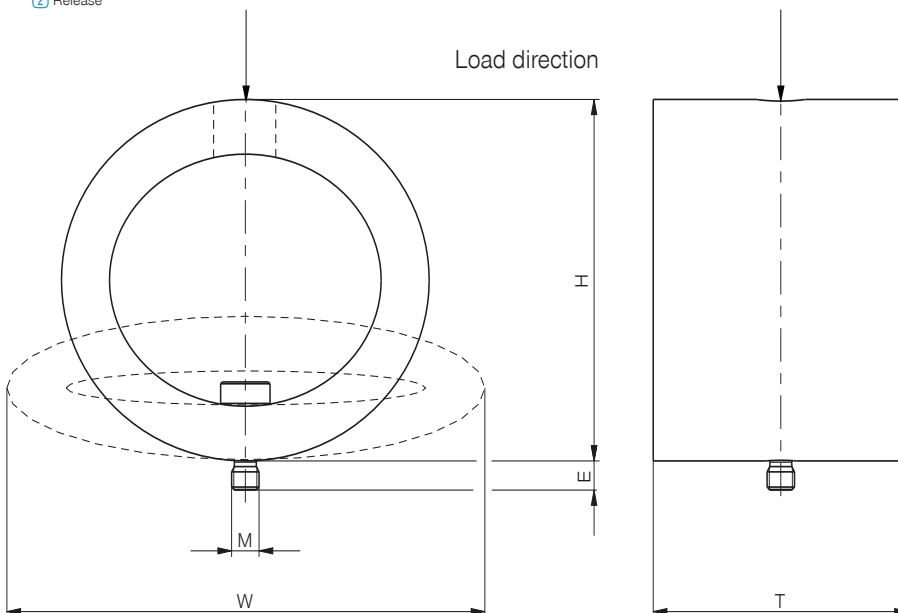
▶ TECHNICAL DATA

▶ Radial Standard

Order No.	Max. energy absorption		Emergency stop operation	Stroke max.	Height H	Width W		Depth D	Screw-in depth max. E	Thread M	Weight
	Continuous operation										(incl. screw)
	per stroke	per hour	per stroke		Stroke=0	Stroke=0	Stroke=max				
	[Nm]	[Nm/h]	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		[g]
HARD											
TPC-RS23X13H	2.7	81	5.7	15	23	30	38	13	5	M5	4
TPC-RS30X19H	6	180	18	19	30	39	50	19	5	M5	11
TPC-RS36X20H	8.7	261	24	23	36	45	58	20	5	M5	16
TPC-RS42X34H	11.7	351	20	32	42	52	68	34	5	M5	25
TPC-RS53X43H	25	750	46	41	53	64	87	43	5	M5	51
TPC-RS56X46H	66.5	1,995	98	37	56	68	88	46	5	M5	80
TPC-RS64X46H	81.5	2,445	106	42	64	79	102	46	6	M6	105
TPC-RS69X51H	124	3,720	206	45	69	86	109	51	6	M6	146
TPC-RS68X67H	158	4,740	261	46	68	86	111	67	8	M8	190
TPC-RS77X82H	228	6,840	342	50	77	95	124	82	8	M8	266
TPC-RS84X81H	290	8,700	427	56	84	102	133	81	8	M8	319

Order No.											
MEDIUM											
TPC-RS25X13M	1.2	36	1.8	17	25	28	38	13	5	M5	6
TPC-RS32X19M	2.3	69	5.4	21	32	37	50	19	5	M5	13
TPC-RS37X20M	3.5	105	8.1	25	37	42	58	20	5	M5	17
TPC-RS44X35M	5.8	174	8.3	34	44	50	68	35	5	M5	26
TPC-RS55X43M	12	360	17	43	55	63	87	43	5	M5	51
TPC-RS59X46M	23	690	33	40	59	66	88	46	5	M5	77
TPC-RS67X46M	34.5	1,035	43	46	67	76	102	46	6	M6	104
TPC-RS73X51M	45	1,350	74	50	73	83	109	51	6	M6	142
TPC-RS73X67M	68	2,040	92	50	73	85	111	67	8	M8	206
TPC-RS83X83M	92	2,760	122	57	83	93	124	83	8	M8	297
TPC-RS88X81M	115	3,450	146	60	88	100	133	81	8	M8	335
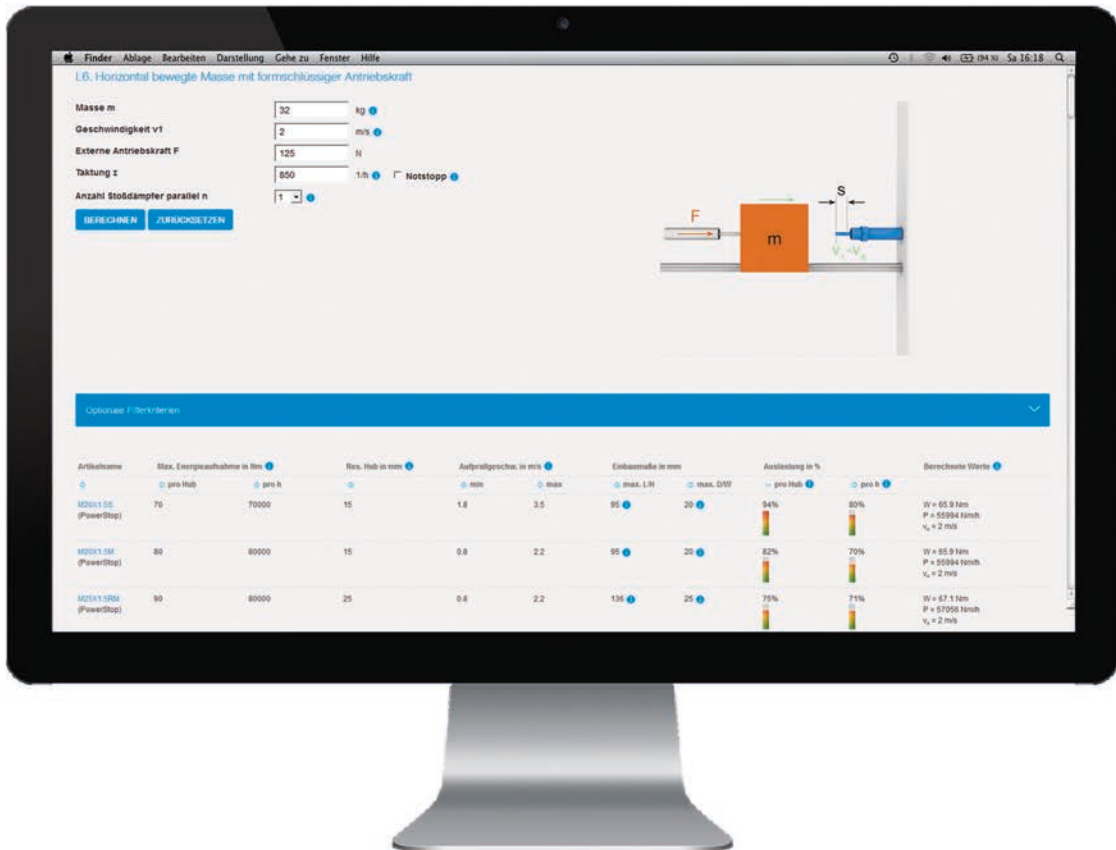
GENERAL
CALCULATION

▶ BASES FOR CALCULATION

▶ Overview of formula symbols

Formula symbols	Explanation	Unit
F	External drive force	N
g	Gravitational acceleration g=9.81m/s2	m/s^2
h	Height	m
J	Moment of inertia	$kg·m^2$
L	Distance of center of mass from the instant center	m
m	Moved mass to be damped	kg
M	External drive torque	Nm
n	Number of parallel shock absorbers	-
P_{ges}	Total energy per hour	Nm/h
P	Energy per hour per damper	Nm/h
R	Shock absorber distance to the instant center	m
s	Shock absorber stroke	m
v_o	Initial velocity of the mass in the center of mass	m/s
v_1	Velocity of the mass in the center of mass at the mark	m/s
v_A	Impact velocity of the mass on the shock absorber	m/s
W_1	Kinetic energy at impact	Nm
W_2	Additional kinetic energy during stroke	Nm
W_{ges}	Total energy per stroke	Nm
W	Energy per stroke per damper	Nm
z	Number of strokes per hour	1/h
α	Angle of impact	°
β	Pitch angle	°
μ	Coefficient of friction	-
$ω_0$	Initial velocity of the mass in the center of mass	1/s
$ω_1$	Angular velocity of the mass in the center of mass at the mark	1/s
$ω_A$	Impact angular velocity of the mass on the shock absorber	1/s

▶ General formulas

Energy		Formula
Kinetic energy at impact	Translational movement:	$W_1 = \dfrac{1}{2} \cdot m \cdot v_A{}^2$
	Rotational movement:	$W_1 = \dfrac{1}{2} \cdot J \cdot \omega_A{}^2 = \dfrac{1}{2} \cdot m \cdot \left(v_A \cdot \dfrac{L}{R} \right)^2$
Energy per stroke	Total:	$W_{ges} = W_1 + W_2$
	Per damper:	$W = W_{ges} : n = (W_1 + W_2) : n$
Energy per hour	Total:	$P_{ges} = W_{ges} \cdot z$
	Per damper:	$P = P_{ges} : n = (W_{ges} \cdot z) : n = W \cdot z$
Angle of impact	Translational movement:	α according to information
	Rotational movement:	$\alpha = arc\ sin\ \dfrac{s}{R}$

▶ Calculation of W1, W2 and VA according to the example load cases listed below, where they are sub-classified into translational and rotational movements.

GENERAL
CALCULATION

▶ LOAD CASES: TRANSLATIONAL

L1. Free-falling mass
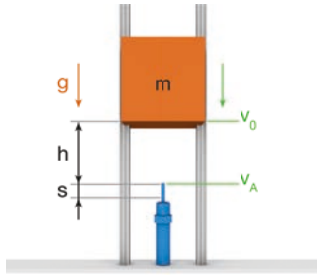
$$W_1 = \frac{1}{2} \cdot m \cdot v_0{}^2 + m \cdot g \cdot h$$

$$W_2 = m \cdot g \cdot s$$

$$v_A = \sqrt{v_0{}^2 + 2 \cdot g \cdot h}$$
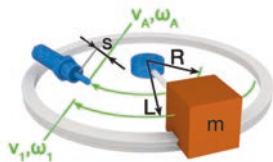
L2. Downward moving mass with opposing drive force
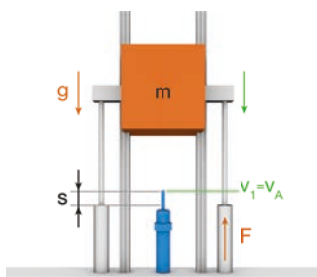
$$W_1 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = m \cdot g \cdot s - F \cdot s$$

$$v_A = v_1$$

R1. Freely oscillating mass
a) at horizontal impact
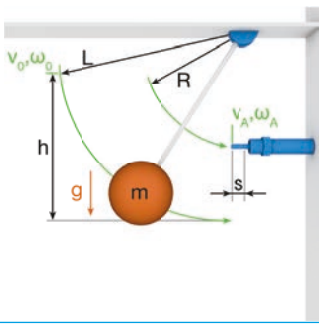
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_0{}^2 + m \cdot g \cdot h = \frac{1}{2} \cdot m \cdot v_0{}^2 + m \cdot g \cdot h$$

$$W_2 = 0$$

$$v_A = \sqrt{(\omega_0 \cdot L)^2 + 2 \cdot g \cdot h} \cdot \frac{R}{L} = \sqrt{v_0{}^2 + 2 \cdot g \cdot h} \cdot \frac{R}{L}$$

R1. Freely oscillating mass
b) at vertical impact
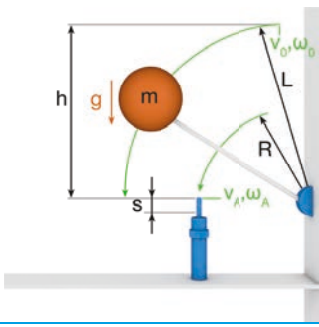
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_0{}^2 + m \cdot g \cdot h = \frac{1}{2} \cdot m \cdot v_0{}^2 + m \cdot g \cdot h$$

$$W_2 = m \cdot g \cdot s$$

$$v_A = \sqrt{(\omega_0 \cdot L)^2 + 2 \cdot g \cdot h} \cdot \frac{R}{L} = \sqrt{v_0{}^2 + 2 \cdot g \cdot h} \cdot \frac{R}{L}$$

R2. Downward pivoting mass with opposing drive torque
## a) at horizontal impact
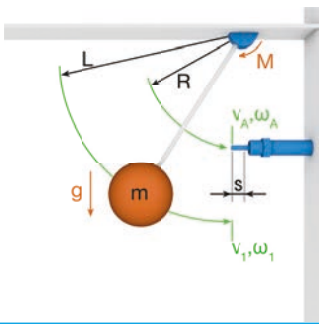
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1{}^2 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = -\frac{M}{R} \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

R2. Downward pivoting mass with opposing drive torque
b) at vertical impact
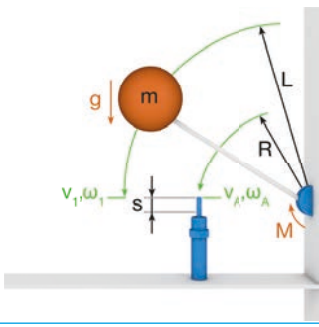
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1{}^2 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = m \cdot g \cdot s - \frac{M}{R} \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

GENERAL
CALCULATION

▶ LOAD CASES: TRANSLATIONAL

L3. Downward moving mass with drive force
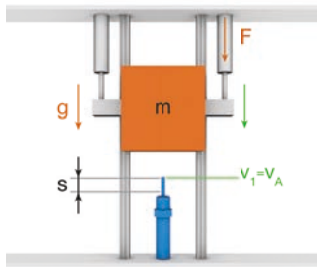
$$W_1 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = F \cdot s + m \cdot g \cdot s$$

$$v_A = v_1$$

L4. Upward moving mass with drive force
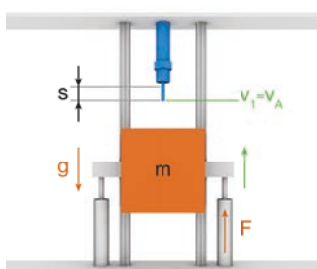
$$W_1 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = F \cdot s - m \cdot g \cdot s$$

$$v_A = v_1$$

R3. Downward pivoting mass with drive torque
a) at horizontal impact
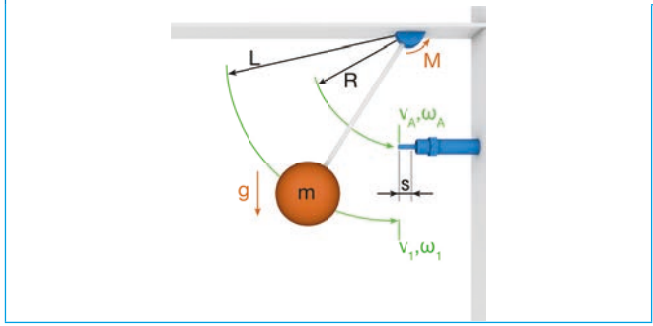
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1^2 = \frac{1}{2} \cdot m \cdot v_1^2$$

$$W_2 = \frac{M}{R} \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

R3. Downward pivoting mass with drive torque
b) at vertical impact
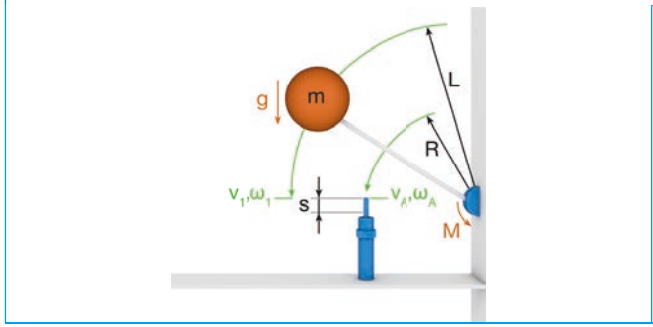
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1^2 = \frac{1}{2} \cdot m \cdot v_1^2$$

$$W_2 = \frac{M}{R} \cdot s + m \cdot g \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

R4. Upward pivoting mass with drive torque
a) at horizontal impact
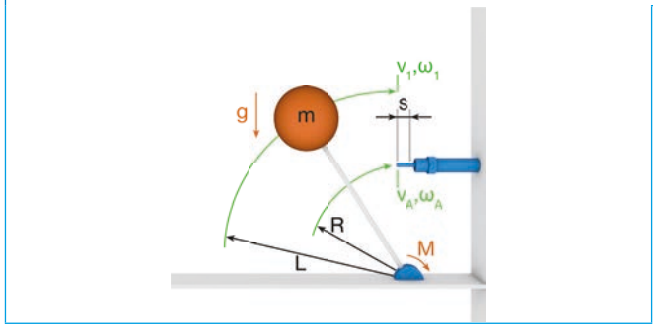
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1^2 = \frac{1}{2} \cdot m \cdot v_1^2$$

$$W_2 = \frac{M}{R} \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

R4. Upward pivoting mass with drive torque
b) at vertical impact
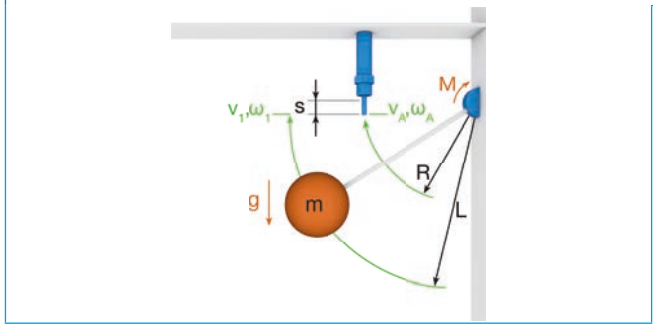
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1^2 = \frac{1}{2} \cdot m \cdot v_1^2$$

$$W_2 = \frac{M}{R} \cdot s - m \cdot g \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

GENERAL
CALCULATION

▶ LOAD CASES: TRANSLATIONAL

L5. Horizontally moving mass without drive force
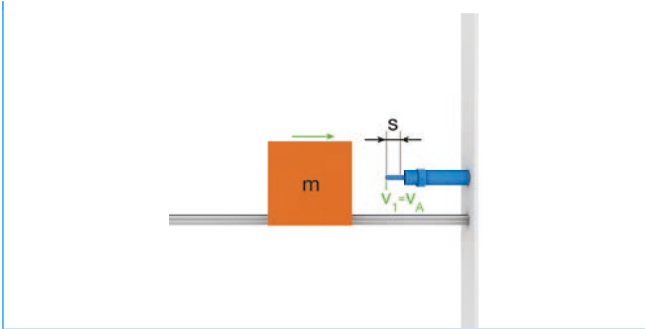
$$W_1 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = 0$$

$$v_A = v_1$$

L6. Horizontally moving mass with form-fit drive force
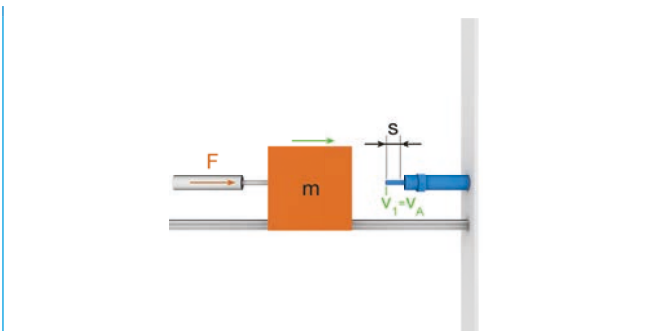
$$W_1 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = F \cdot s$$

$$v_A = v_1$$

L7. Horizontally moving mass with frictional drive force
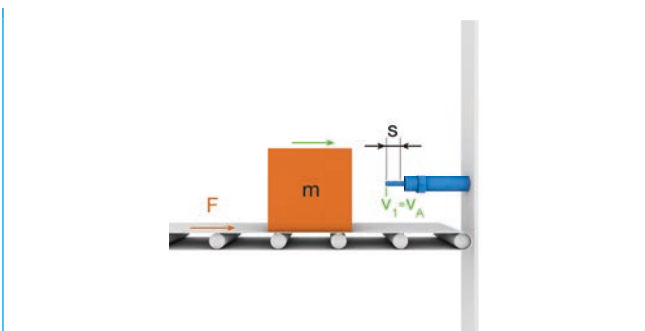
$$W_1 = \frac{1}{2} \cdot m \cdot v_1{}^2$$

$$W_2 = \mu \cdot m \cdot g \cdot s$$

$$v_A = v_1$$

L8. Falling mass on an inclined plane

$$W_1 = \frac{1}{2} \cdot m \cdot v_0{}^2 + m \cdot g \cdot h$$

$$W_2 = sin\beta \cdot m \cdot g \cdot s$$

$$v_A = \sqrt{v_0{}^2 + 2 \cdot g \cdot h}$$

R5. Horizontally pivoting mass without drive torque

$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1^2 = \frac{1}{2} \cdot m \cdot v_1^2$$

$$W_2 = 0$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

R6. Horizontally pivoting mass with form-fit drive torque
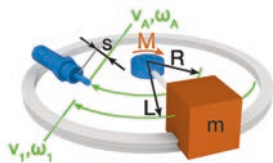
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1^2 = \frac{1}{2} \cdot m \cdot v_1^2$$

$$W_2 = \frac{M}{R} \cdot s$$

$$v_A = \omega_1 \cdot R = v_1 \cdot \frac{R}{L}$$

R7. Horizontally pivoting mass with frictional drive torque
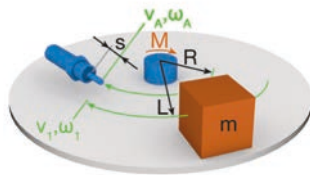
$$W_1 = \frac{1}{2} \cdot J \cdot \omega_1^2 = \frac{1}{2} \cdot m \cdot v_1^2$$

$$W_2 = \mu \cdot m \cdot g \cdot s \cdot \frac{L}{R}$$

$$v_A = \omega_0 \cdot R = v_0 \cdot \frac{R}{L}$$

Note on rotational movement

► To simplify the calculations, it is assumed that the rotationally moving mass at the impact on the damper leaves the path tangentially and the damper acts on this tangential path. Thus the rotational movement energy is completely converted in translational movement energy. For small angles, this simplification provides a sufficient approach.
In addition, if the mass moment of inertia is unknown, for the calculation it can be assumed that all the mass acts from the center of mass, what leads to the method of calculation by using the translational parameters. The method of calculation for the rotational load cases with translational parameters can only work, if the axis of rotation doesn't coincide with the center of mass, what means that the mass doesn't rotate about itself, otherwise the calculation with rotational parameters is inevitable.

GENERAL
CHECKLIST

ZIMMER group

1

Customer number	Phone number
Company	Fax number
Contact Mr. ☐ Ms. ☐	E-mail
	Article

Sales database

Processed by		Desired price
Desired delivery date		Other
Amount		Date

Possible / desired damping

☐ Hydraulic (100% damping) ▶ Industrial shock absorbers (PowerStop) ☐ Viscoelastic ▶ Profile dampers (BasicStop)

Installation conditions

SA = shock absorber

Application

Replacing SA from the competition	☐ Yes	Manufacturer		Type		Thread	

Max. installation space Length/height _____ mm Diameter/width _____ mm Depth _____ mm

Environment Temperature min. _____ °C max. _____ °C Pressure _____ bar

☐ Chips ☐ Dirt ☐ Oil/grease ☐ Cooling lubricant Other _____

Fixed stop Fixed stop through shock absorber ☐ Yes ☐ No

Operating conditions

Load case _____ Number of parallel SA _____

Operation mode	☐ Duration ▶	Cycle time _____	Strokes/h _____	Number of cycles _____	Strokes
	☐ Emergency stop ▶	Number of cycles _____	Strokes		
Movement	☐ Translational ▶	Drive force _____ N		Angle of impact _____ °	
	☐ Rotational ▶	Drive torque _____ Nm			
		Swivel radius SA _____ mm		Swivel radius mass _____ mm	
Speed	☐ Translational ▶	min. _____ m/s		max. _____ m/s	
	☐ Rotational ▶	min. _____ 1/s		max. _____ 1/s	
Mass / moment of inertia	☐ Translational ▶	min. _____ kg		max. _____ kg	
	☐ Rotational ▶	min. _____ kg m²		max. _____ kg m²	

Other (depending on the load case) Height _____ mm Coefficient of friction _____ Pitch angle _____ °

Industrial shock absorbers accessories

Head ☐ No head ☐ Mounted with steel head ☐ Mounted with plastic head ☐ Mounted with bellow

Accessories ☐ Steel locknut ☐ Air barrier adapter ☐ Stop sleeve ☐ Cooling nut

☐ Stainless steel locknut ☐ Side load adapter ☐ Clamping flange

Special industrial shock absorbers

☐ Adjustability Approvals (such as RoHS, LABS, EG, CE, explosion protection, cleanroom) _____

Other (oil, curve, stroke, size, thread type, wiper) _____

LOAD CASES

Translational

L1. Free-falling mass

L2. Downward moving mass with opposing drive force

L3. Downward moving mass with drive force

L4. Upward moving mass with drive force

Rotational
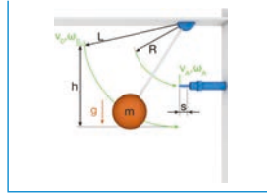
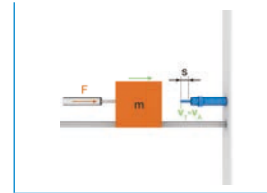**R1. Freely oscillating mass**
   a) at horizontal impact
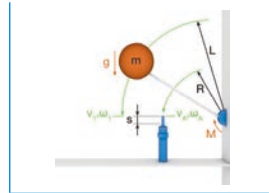
R2. Downward pivoting mass with opposing drive torque
   a) at horizontal impact

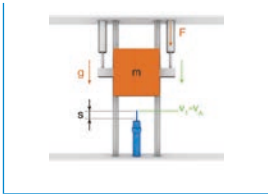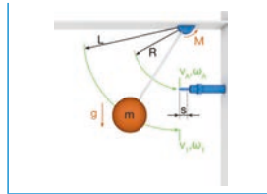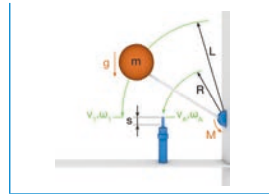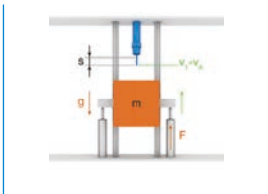**R3. Downward pivoting mass with drive torque**
   a) at horizontal impact

R4. Upward pivoting mass with drive torque
   a) at horizontal impact

R1. Freely oscillating mass
   b) at vertical impact

R2. Downward pivoting mass with opposing drive torque
   b) at vertical impact

R3. Downward pivoting mass with drive torque
   b) at vertical impact

R4. Upward pivoting mass with drive torque
   b) at vertical impact

Translational

L5. Horizontally moving mass without drive force

L6. Horizontally moving mass with form-fit drive force

L7. Horizontally moving mass with frictional drive force

L8. Falling mass on an inclined plane

Rotational

R5. Horizontally pivoting mass without drive torque

R6. Horizontally pivoting mass with form-fit drive torque
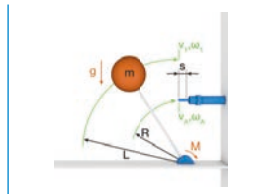
R7. Horizontally pivoting mass with frictional drive torque

GENERAL
TIPS AND TRICKS

► **TIP 1:** Series use of shock absorbers
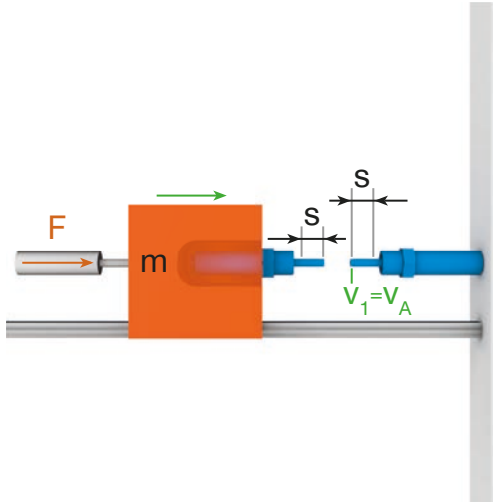
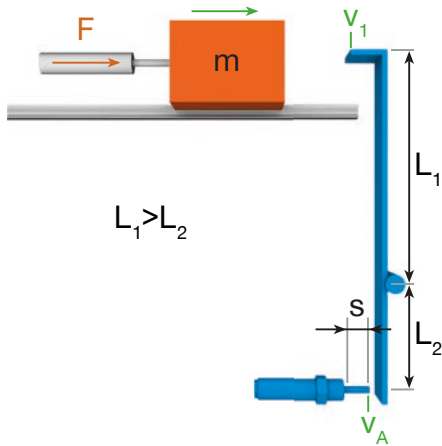With n shock absorbers in series, n-fold energy absorption capacity through n-fold stroke with the same force.
► Caution: Calculation of the energy per stroke and per hour with n-fold stroke!

► Example of 2 shock absorbers:
Total stroke = 2 x shock absorber stroke
Total shock absorber force = shock absorber force
Total energy absorption capacity = 2 x shock absorber energy absorption capacity

Equal distribution of the total energy to n shock absorbers
► Possibility in comparison to use of only one shock absorber:
Use of the same shock absorber type with reduced utilization or use of a smaller shock absorber type.

► Example of 2 shock absorbers:
Shock absorber energy absorption = Total energy absorption/2

► **TIP 3:** Lever translation

a) Translation i < 1

$L_1 > L_2$

b) Translation i > 1
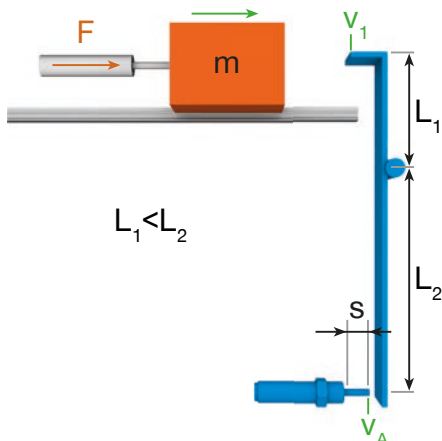
$L_1 < L_2$

Translation: $$i = \frac{L_2}{L_1}$$

Indices:
► Parameters at the top end of the lever with mass: Index 1
► Parameters at the bottom end of the lever with shock absorbers: Index A

Modulation of the parameters according to the following principles

	L1 > L2 (i<1)	L1 < L2 (i>1)	Formula
Translation of impact velocity to shock absorbers	Reduction of impact velocity	Increase of impact velocity	$v_A = v_1 \cdot i$
Translation of shock absorbers stroke to mass	Increase of the stroke of the mass	Reduction of the stroke of the mass	$s_1 = \frac{s_A}{i}$
Translation of shock absorbers force to mass	Reduction of force to mass	Increase of force to mass	$F_1 = F_A \cdot i$
Kinetic energy/energy absorption	Identical	Identical	W

► **TIP 2:** Parallel connection of shock absorbers
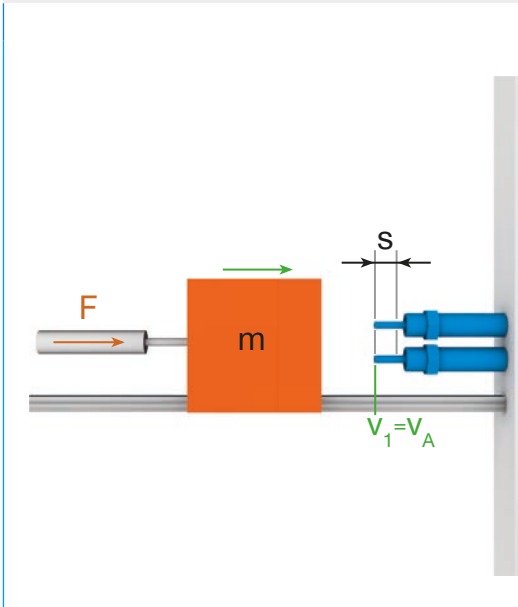
With n shock absorbers in parallel, n-fold energy absorption capacity through n-fold force with the same stroke.

► Calculation of the energy per stroke and per hour remains the same due to identical stroke!

► Example of 2 shock absorbers:
Total stroke = Shock absorber stroke
Total shock absorber force = 2 x shock absorber force
Total energy absorption capacity = 2 x shock absorber energy absorption capacity

Equal distribution of the total energy to n shock absorbers

► Possibility in comparison to use of only one shock absorber:
Use of the same shock absorber type with reduced utilization or use of a smaller shock absorber type.
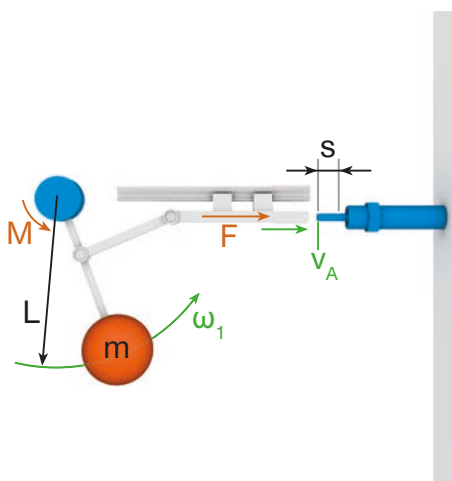
► Example of 2 shock absorbers:
Shock absorber energy absorption = Total energy absorption/2

► **TIP 4:** Transformation of rotational into translational movement
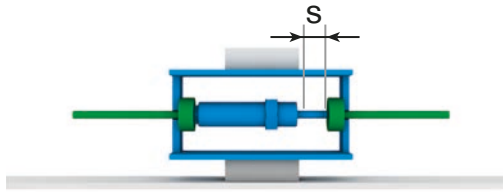
a) With gear-rack layout
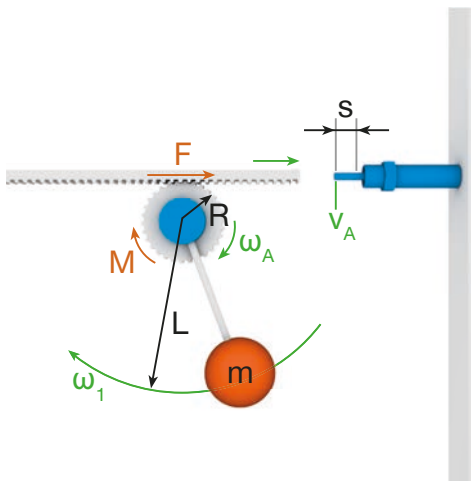
► Translation of a rotational movement into a translational movement with the help of a gear-rack layout (a) or a lever mechanism (b).

► The gear-rack layout is applied, for example, in swivel units from the Zimmer Handling Technology division.
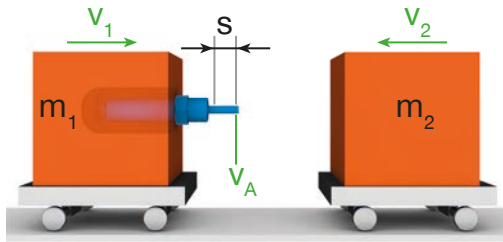
b) With lever mechanism

GENERAL
TIPS AND TRICKS

▶ **TIP 5:** Two-side damping with translational movement

▶ Damping in both directions through one shock absorber.

▶ This device transforms a single-effect into a dual-effect shock absorber.

▶ **TIP 7:** Ideally non-elastic impact with two masses moving toward one another

▶ Velocity of the entire object (both masses together) following impact:

$$v'_{12} = \frac{m_1 \cdot v_1 - m_2 \cdot v_2}{m_1 + m_2}$$

with positive sign: movement to the right
with negative sign: movement to the left

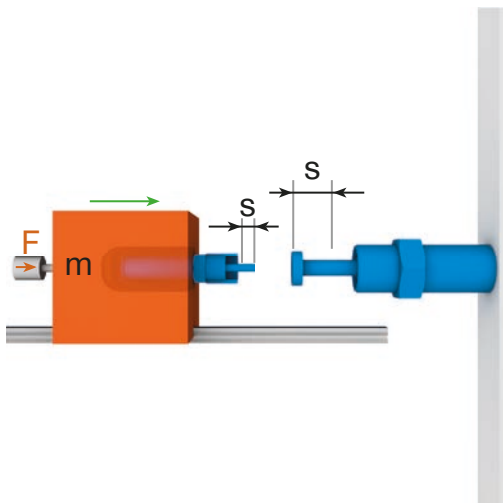▶ Calculation of energy per stroke to be damped by the damper upon impact:

$$W = \frac{1}{2} \cdot \frac{m_1 \cdot m_2}{m_1 + m_2} \cdot (v_1 + v_2)^2$$

with effect of drive forces, addition of W2 = F · s

▶ Calculation of impact velocity through calculation of relative velocity:

$$v_A = v_1 + v_2$$

▶ **TIP 9:** Cascade connection

Cascade connection of a small shock absorber that impinges upon a larger shock absorber:

▶ Continuous operation with low energy absorption:
The smaller shock absorber damps the energy and retracts until its stop sleeve rests on the head of the larger shock absorber, as a result of which this retracts to an insignificant extent due to its high energy absorption capacity.

▶ Emergency stop operation with greater energy absorption:
The smaller shock absorber retracts quickly and transfers the load through its stop sleeve to the head of the larger shock absorber, which retracts as a result and damps the high energy.

As a result of this layout, optimal damping is guaranteed for both operating modes, although no defined end position can be ensured for continuous operation.

► **TIP 6:** Two-side damping with rotational movement
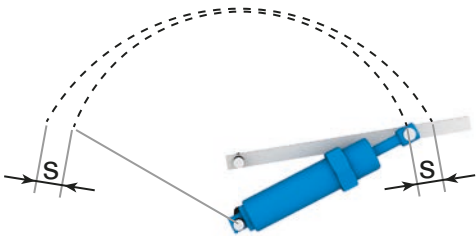
► Damping in both end positions of the rotation movement by a shock absorber.

► Due to this layout for damping both end positions, only one shock absorber is necessary.

► **TIP 8:** Ideally non-elastic impact with two masses moving in the same direction
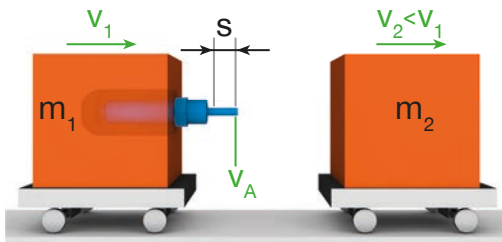
► Velocity of the entire object (both masses together) following impact:

$$v'_{12} = \frac{m_1 \cdot v_1 + m_2 \cdot v_2}{m_1 + m_2}$$

► Calculation of energy per stroke to be damped by the damper upon impact:

$$W = \frac{1}{2} \cdot \frac{m_1 \cdot m_2}{m_1 + m_2} \cdot (v_1 - v_2)^2$$

with effect of drive forces, addition of W2 = F · s

► Calculation of impact velocity through calculation of relative velocity:

$$v_A = v_1 - v_2$$

► This means that a second mass, which either stands still or moves more slowly, is accelerated gently by a more quickly moving mass without resulting in a sudden increase in velocity and without the second mass recoiling or springing away.

DAMPING TECHNOLOGY
SOFT CLOSE DAMPING TECHNOLOGY
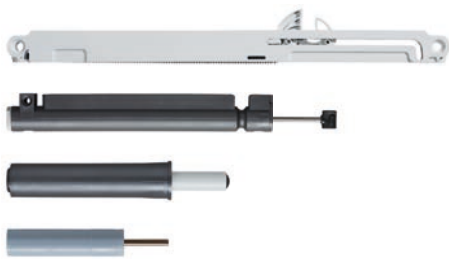
ZIMMER GMBH DAEMPFUNGSSYSTEME
UNDER THE UMBRELLA OF THE ZIMMER GROUP

Zimmer GmbH Daempfungssysteme - a success story.
Zimmer GmbH Daempfungssysteme has been researching, developing and producing individual dampers and damping systems at the highest level since 1999.

These product images show an overview of our pneumatic and fluid dampers and our automatic feeder or damping units

The beginning and the breakthrough

Zimmer GmbH Daempfungssysteme originated in 2004 as an independent company under the umbrella of the Zimmer Group. The initial requests from a renowned fitting manufacturer were still directed to the Zimmer industrial shock absorber division. After overcoming the start-up difficulties, as pioneers in the soft-close area, we were successful at convincing this initial prospective customer of our capability. **That was the breakthrough.**

Production location: Germany

After that, additional orders followed and Zimmer GmbH Daempfungssysteme growth could not be stopped. And not just in relation to the variety of its products. Because more products increased the requirements for our production plants, all of which we develop and manufacture in-house. Over the years, these became more and more complex and increasingly automated. We take pride in our production location in Germany, where several hundred-million dampers were manufactured in recent years at a quality standard that continues to rise.

For us, the focus is on the customer

As in the other companies of the Zimmer Group, at Daempfungssysteme GmbH, the customer is always in focus. In our development departments, the pneumatic and fluid dampers are adapted to customer requirements and constantly being optimized. Our product complexity increases at the same time. It also goes without saying that, along with our production, we continuously expand and optimize our quality management. A result of this is that all of our products only reach our global clientele after a 100% inspection of the dimensions and function. Along with this, our independent sales activities have also accelerated in recent years. The sales department has its finger on the pulse of the market and responds immediately to the demands of our customers.
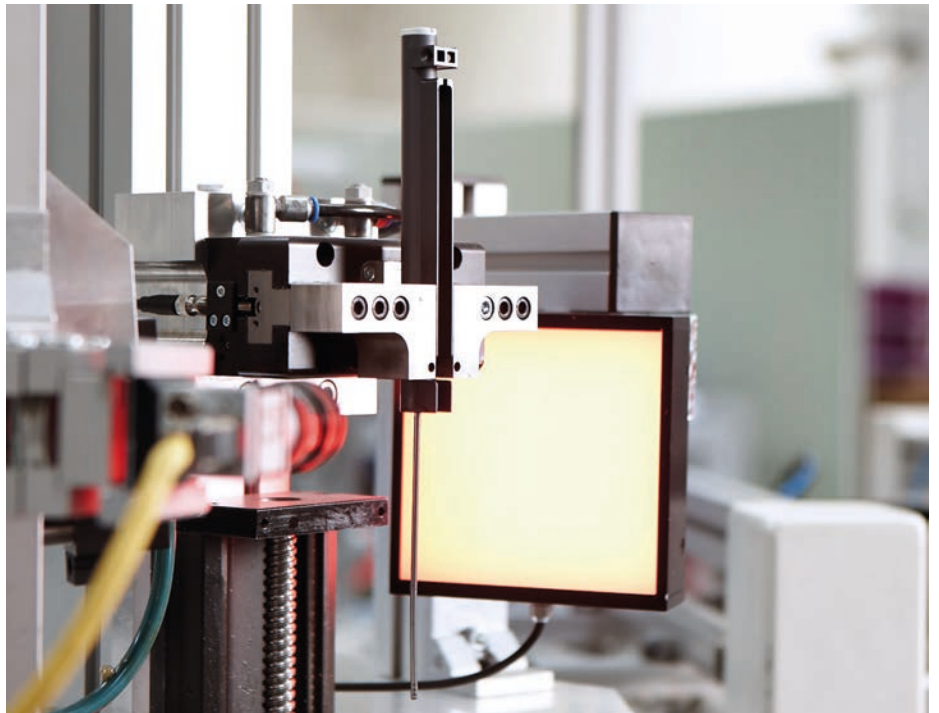
Each individual pneumatic damper is subject to an automatic visual inspection

PNEUMATIC DAMPERS
CLASSIC

Zimmer´s story of success in soft close technology goes back years and has its origins in the development and production of pneumatic dampers. The primary distinguishing feature of our pneumatic dampers is their longevity. Our ideas have been tested and proven in real-world applications and are protected by patents.

Damping process

The damping process using a pneumatic damper is characterized by a braking phase with a short stop and subsequent transition into the return phase.

Characteristics

All pneumatic dampers have similar characteristics. They exhibit a nearly parallel shift at various load bearing capacities.

Loading options

The loading options are specified in kilograms.

This figure represents the horizontally moved mass (such as the drawer weight including the load), which acts on the damper.

▶ **Pneumatic damper characteristic**

① Phase 1: Strong braking phase

② Phase 2: Short stop/reversal point

③ Phase 3: Damped return phase closing time

④ Phase 4: Returned
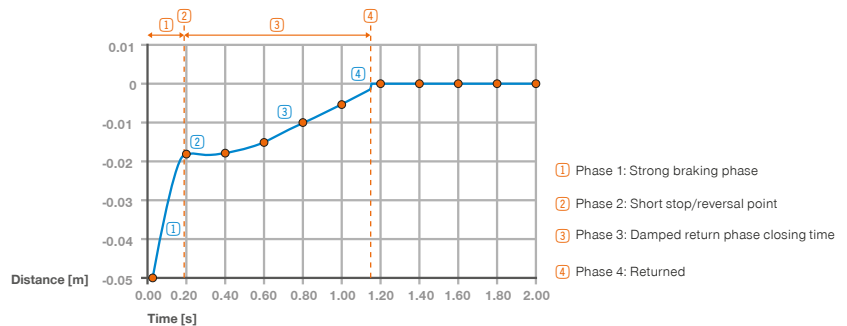
FLUID DAMPERS
HIGH PERFORMANCE

**Fluid dampers have also been an integral part of Zimmer Group's product portfolio for many years.
The fluid dampers of the Zimmer-Group do represent exhibit a high level of dependability and great load bearing capacity.**

Damping process

The damping process using a fluid damper is characterized by an almost smooth transition from the braking phase to the return phase without stopping between the two phases.

Characteristics

The characteristics differ between linear, linear-constant or S-curve characteristics depending on the fluid damper being used.

Loading options

The loading options are specified in newtons.

This figure represents the axial load on the damper. The force depends on the speed acting upon the damper. We take our measurements at a standard speed of 50 mm/s (other speeds can also be measured to fit customer requirements).

▶ **Linear fluid damper characteristic**
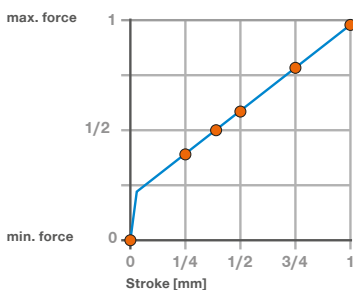
Displays the damping force based on the stroke

▶ **Linear-constant fluid damper characteristic**

Displays the damping force based on the stroke

▶ **S-curve fluid damper characteristic**

Displays the damping force based on the stroke

EXPLANATION
ITEM NUMBERS
AND FREE-RUN

Explanation of item numbers

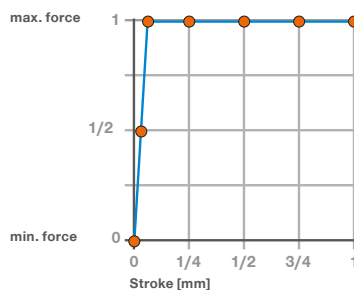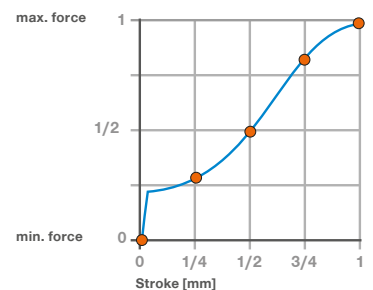The item numbers consist of the product group, the stroke (in mm), the housing diameter (in mm) as well as a sequential number.

► Example: "Calmo"

A	042	10	006
Product group	Stroke	Diameter	Sequential number
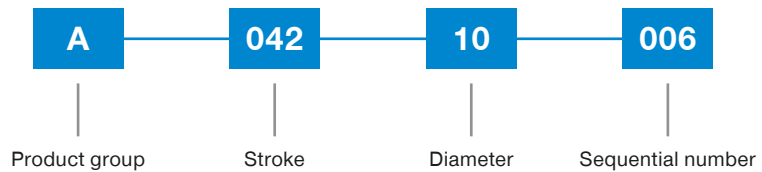
This refers to a pneumatic damper (air) with a 42 mm stroke, a housing diameter of 10 mm and the product version is 006.

► Product group/division:

A: Air (pneumatic damper)
B: Fitting
D: Miscellaneous
E: Self-closing return
F: Fluid
S: Set

Definition of free-run

In many cases, the damping process is interrupted in the last millimeters to ensure that the system is securely closed. This is necessary, for example, when using busts or if there are damping of sliding doors problems in the system. This closing support is called free-run.

SOFT CLOSE DAMPERS
PRODUCT OVERVIEW

COMPONENTS

SYSTEMS

2

COMPONENTS-SYSTEMS
THE DIFFERENCES

▶ DEFINITION OF COMPONENTS

▶ **Multi-faceted modules**
Zimmer Group is offering its customers a large selection of standardized dampers.

▶ Our individual dampers can be integrated into an existing or newly designed customer system.

▶ Zimmer Group offers a variety of individual dampers for individual systems.

▶ DEFINITION OF SYSTEMS

▶ **Universal units**
The Zimmer Group is not only specialized in individual dampers, but also develops complete damping units.

▶ In our systems, in addition to one of our dampers, a self return mechanism is integrated directly.

▶ The systems from Zimmer Group give you customized units for your specific applications.

COMPONENTS
VARIETY OF VARIANTS

▶ **PRODUCT GROUP COMPONENTS**

KNOW-HOW

THE ZIMMER GROUP IS ONE OF THE LEADING MANUFACTURERS AND DEVELOPERS OF SOFT-CLOSE DAMPERS.

Our expertise is rooted in many years of experience in the fields of both pneumatic and in the area of fluid damping.

The design, development and production of our products takes place in-house. Even the production plants for our products are designed and built by Zimmer Group.

If nothing else, we owe our success to the work of our highly qualified employees.

QUALITY - MADE IN GERMANY

QUALITY AND RELIABILITY ARE JUST SOME OF THE STRENGTHS OF ZIMMER GROUP.

We guarantee our high standard of quality through 100% inspection of our products.

We strive to continuously improve our products using constant statistical process inspection.

Even the above-average high level of automation of our production contributes to quality assurance and improvement.

This enables us to guarantee our products' high performance and longevity.

CORE SKILLS

ZIMMER GROUP'S CORE FOCUS IS IN THE FIELD OF FURNITURE TECHNOLOGY, SPECIFICALLY IN DAMPING OF: DRAWERS, SLIDING DOORS, LIDS AND HINGES

Our intelligent and innovative solutions are also very popular outside of the field of furniture technology.

The range of potential applications is immense and ideal for expanding to additional fields of use.

DAMPING OF DRAWERS
DAMPING WITH COMFORT

► PRODUCT ADVANTAGES

► **Dampers for drawers**

Drawer damping has securely established itself as an indispensable standard.

► The Zimmer Group specializes in drawer damping and supplies you with optimal comfort for your products at the highest level.

► Our individual dampers for drawer damping turn heads thanks to the multitude of options for integration into customers' systems. Due to the high adaptability of our design, Zimmer is offering a wide range of dampers as well as solutions designed specifically for a customer.

► **Precise – Flexible – Tested**

This describes our components for damping drawers.

Version: Galante

► Dimension

∅ of damper housing [mm]	Housing length [mm]	Piston rod length [mm]
8.0	80	45

► Product characteristics

Fluid damping

Compact design

Space-saving

► Technical data

Order no.	Stroke [mm]	Force [N]
F035-08-002	35	11

Version: Robusto

► Dimension

∅ of damper housing [mm]	Housing length [mm]	Piston rod length [mm]
8.0	92.1	63.5

► Product characteristics

Fluid damping

Robust

Long stroke

► Technical data

Order no.	Stroke [mm]	Maximum force [N]	Test speed [mm/s]	Miscellaneous Characteristics
F050-08-019	50	30	50	With spring return/without free-run
F050-08-018	50	40	50	With spring return/without free-run
F050-08-020	50	50	50	With spring return/without free-run
F050-08-021	50	60	50	With spring return/without free-run
F050-08-014	50	71	50	With spring return/without free-run

Version: Piccolo

▶ Dimension

∅ of damperhousing [mm]	Housing length [mm]
9.2	68

▶ Product characteristics

Pneumatic damping

Small

Solid

▶ Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod
A035-09-019	35	Cylindrical head shape	15	Yes	No	Plastics

Version: Calmo

▶ Dimension

∅ of damperhousing [mm]	Housing length [mm]
10.4	69.6

▶ Product characteristics

Pneumatic damping

Easy to assemble

Comfortable

▶ Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod	Miscellaneous Characteristics
A042-10-006	42	Tubing head Di = 4mm, Do = 7mm	20	Yes	No	Steel	No collar (shorter)
A042-10-011	42	Magnetic head with magnet	20	Yes	No	Steel	No collar (shorter) suitable for food processing
A042-10-012	42	1.5 mm steel piston rod without head	20	Yes	No	Steel	
A042-10-014	42	Magnetic head with magnet	20	Yes	No	Steel	No collar (shorter)
A042-10-016	42	Magnetic head with magnet	20	Yes	No	Steel	
A042-10-020	42	Magnetic head with magnet	20	Yes	No	Steel	Chamfer on magnet head

Version: Bajo

▶ Dimension

∅ of damperhousing [mm]	Housing length [mm]
10.4	78.1

▶ Product characteristics

Pneumatic damping

Simple

Universal

Powerful

▶ Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod	Miscellaneous Characteristics
A048-10-000	48	Ball head	25	Yes	No	Steel	
A048-10-006	48	Ball head	25	Yes	No	Steel	Suitable for use for food processing
A048-10-008	48	90° angled piston rod	25	Yes	No	Steel	
A048-10-009	48	Magnetic head with magnet	25	Yes	No	Steel	
A048-10-010	48	1.5 mm steel piston rod without head	25	Yes	No	Steel	

DAMPING OF DRAWERS
DAMPING WITH COMFORT

Version: Placido

► Dimension	
Ø of damper housing [mm]	Housing length [mm]
10.4	95.5

► Product characteristics

Pneumatic damping

Gentle

Durable

► Technical data						
Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod
A050-10-001	50	Ball head	25	Yes	Yes	Plastics
A050-10-002	50	Cylindrical head shape	25	Yes	Yes	Plastics
A050-10-022	50	Ball head	25	Yes	Yes	Steel

DAMPING OF SLIDING DOORS
DAMPING IN VOGUE

▶ PRODUCT ADVANTAGES

▶ **Dampers for sliding doors**

Sliding doors are given increasingly greater attention in the residential, working and sleeping areas due to their potential for space-saving applications.

▶ The Zimmer Group offers the newest technology for this growing market.

▶ Due to the high adaptability the dampers of the Zimmer-Group can be easily integrated within their customer´s rail system.

▶ **Intelligent – Efficient – Reliable**

Discover our dampers for sliding door damping on the following pages.

Version: Galante

▶ **Dimension**

⌀ of damperhousing [mm]	Housing length [mm]	Piston rod length [mm]
8.0	80	45

▶ **Product characteristics**

Fluid damping

Compact design

Space-saving

▶ **Technical data**

Order no.	Stroke [mm]	Force [N]
F035-08-002	35	11

Version: Robusto

▶ **Dimension**

⌀ of damperhousing [mm]	Housing length [mm]	Piston rod length [mm]
8.0	92.1	63.5

▶ **Product characteristics**

Fluid damping

Robust

Long stroke

▶ **Technical data**

Order no.	Stroke [mm]	Maximum force [N]	Test speed [mm/s]	Miscellaneous Characteristics
F050-08-019	50	30	50	With spring return/without free-run
F050-08-018	50	40	50	With spring return/without free-run
F050-08-020	50	50	50	With spring return/without free-run
F050-08-021	50	60	50	With spring return/without free-run
F050-08-014	50	71	50	With spring return/without free-run

Version: Adagio

▶ Dimension

∅ of damperhousing	Housing length
[mm]	[mm]
16	147.1

▶ Product characteristics

Pneumatic damping

Extension damping

Powerful

▶ Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod	Miscellaneous Characteristics
A110-15-010	110	Coupler	80	No	No	Steel	Extension
A110-15-028	110	Coupler	80	Yes	No	Steel	Extension

Version: Silento

▶ Dimension

∅ of damperhousing	Housing length
[mm]	[mm]
15.5	164

▶ Product characteristics

Pneumatic damping

Comfortable

Efficient

▶ Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod	Miscellaneous Characteristics
A110-15-004	110	Coupler	15	Yes	Yes	Steel	Spring channel
A110-15-005	110	Coupler	35	Yes	Yes	Steel	Spring channel
A110-15-006	110	Coupler	50	Yes	Yes	Steel	Spring channel

Version: Quieto

▶ Dimension

∅ of damperhousing	Housing length
[mm]	[mm]
15.5	118.7

▶ Product characteristics

Pneumatic damping

Robust

Practical

▶ Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod	Miscellaneous Characteristics
A070-15-001	70	Without ball head	60	Yes	No	Steel	No spring channel
A070-15-003	70	No head	60	Yes	No	Steel	No spring channel

DAMPING OF LIDS
CLOSING WITHOUT SLAMMING

▶ PRODUCT ADVANTAGES

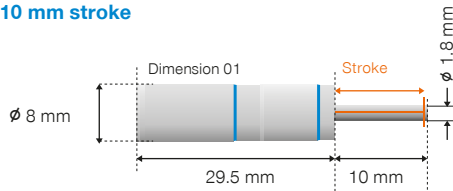▶ **Components for lids**

Closing is often associated with slamming.

▶ Using the dampers from you get rid of this connotation

▶ The defining features of our dampers for lid damping are their adaptability and the wealth of available variants.

▶ Our fluid dampers are groundbreaking in this regard. Various dimensions, force or damping characteristics – we offer the perfect product to suit your needs.
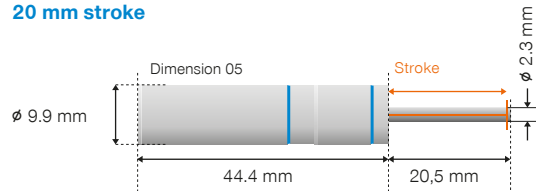
▶ **Small – Strong – Durable – Flexible**

Familiarize yourself with our fluid dampers for damping lids here.
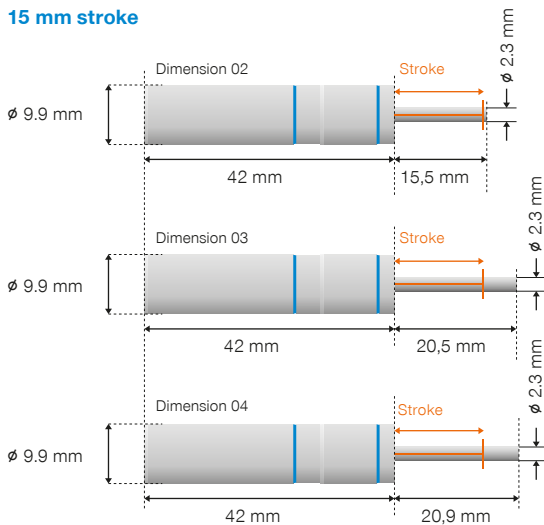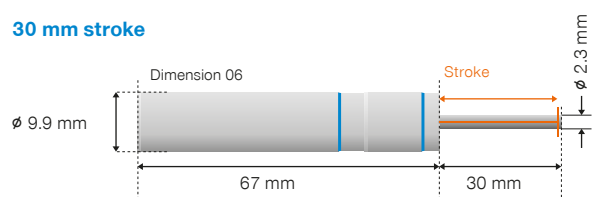
▶ PRODUCT DIFFERENCES

10 mm stroke

Dimension 01 — Stroke — ø 1.8 mm — ø 8 mm — 29.5 mm — 10 mm

20 mm stroke

Dimension 05 — Stroke — ø 2.3 mm — ø 9.9 mm — 44.4 mm — 20,5 mm

15 mm stroke

Dimension 02 — Stroke — ø 2.3 mm — ø 9.9 mm — 42 mm — 15,5 mm

Dimension 03 — Stroke — ø 2.3 mm — ø 9.9 mm — 42 mm — 20,5 mm

Dimension 04 — Stroke — ø 2.3 mm — ø 9.9 mm — 42 mm — 20,9 mm

30 mm stroke

Dimension 06 — Stroke — ø 2.3 mm — ø 9.9 mm — 67 mm — 30 mm

▶ **Available dimensions**

Zimmer Group fluid dampers are available in various dimensions.

▶ They differ in stroke, piston rod length and overall length.

▶ Further dimensions upon request.

For additional technical specifications, refer to the product sheets at **www.zimmer-group.com**

▶ **Available Force**

The fluid dampers are available in various force classes.

▶ Additional adaptations are available on request

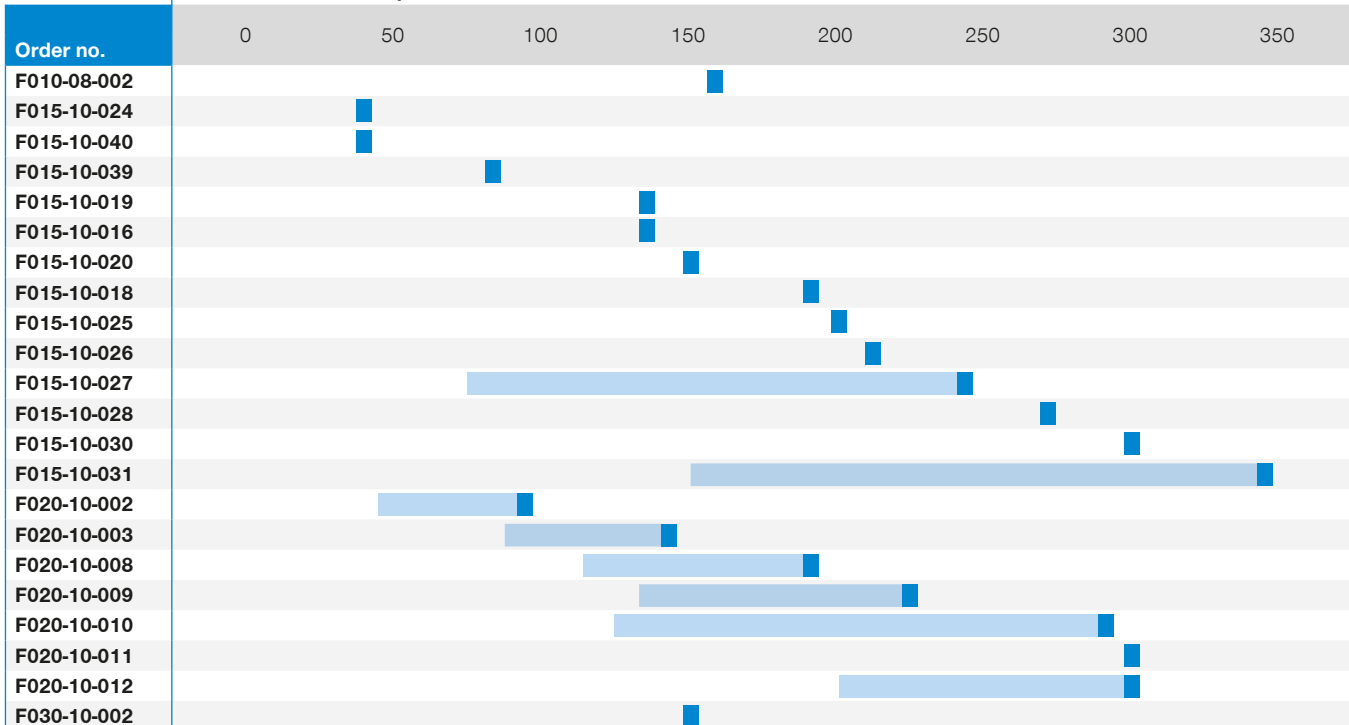▶ **Product characteristics**

Fluid damping
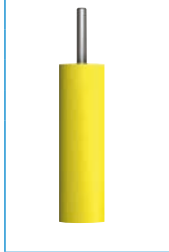
Easily adaptable

Very small

Strong

Robust

Adaptable

2

Damping of LIDS / Components / **Soft Close**

▶ **Maximum force Specification in N**

Order no.	0	50	100	150	200	250	300	350
F010-08-002				■				
F015-10-024	■							
F015-10-040	■							
F015-10-039		■						
F015-10-019				■				
F015-10-016				■				
F015-10-020			■					
F015-10-018					■			
F015-10-025					■			
F015-10-026					■			
F015-10-027			▭▭▭▭▭▭▭■					
F015-10-028							■	
F015-10-030							■	
F015-10-031				▭▭▭▭▭▭▭▭▭▭▭▭■				
F020-10-002		▭▭■						
F020-10-003			▭▭■					
F020-10-008			▭▭▭■					
F020-10-009				▭▭▭■				
F020-10-010				▭▭▭▭▭▭▭▭■				
F020-10-011							■	
F020-10-012					▭▭▭▭▭▭■			
F030-10-002			■					

DAMPING OF LIDS
CLOSING WITHOUT SLAMMING

Version: Bellino

► Dimension

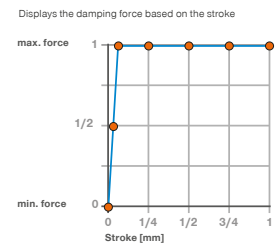| Ø of damperhousing [mm]	Housing length [mm]	Piston rod length [mm]	Ø of piston rod [mm]
8.0	29.5	10.5	1.8

► Technical data

Order no.	Stroke [mm]	Maximum force [N]
F010-08-002	10	8-170

► Linear-constant fluid damper characteristic

Displays the damping force based on the stroke

Version: Giganto

► Dimension

Ø of damperhousing [mm]	Housing length [mm]	Ø of piston rod [mm]
9.9	42	2.3

► Technical data

Order no.	Stroke [mm]	Piston rod length [mm]	Maximum force [N]
F015-10-024	15	15.5	40 ± 30
F015-10-040	15	15.5	85 ± 30
F015-10-039	15	15.5	135 ± 50
F015-10-019	15	15.5	185 ± 50
F015-10-016	15	15.5	210 ± 50
F015-10-020	15	15.5	270 ± 50
F015-10-018	15	20.5	135 ± 50
F015-10-025	15	20.9	40 ± 30
F015-10-026	15	20.9	150 ± 50
F015-10-027	15	20.9	200 ± 50
F015-10-028	15	20.9	300 ± 50

► Linear-constant fluid damper characteristic
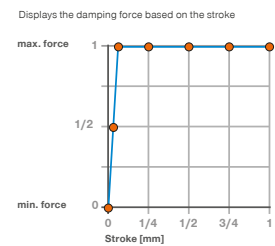
Displays the damping force based on the stroke

Version: **Giganto**

▶ Dimension

∅ of damperhousing	Housing length	Piston rod length	∅ of piston rod
[mm]	[mm]	[mm]	[mm]
9.9	42	15.5	2.3

▶ Technical data

Order no.	Stroke	Maximum force
	[mm]	[N]
F015-10-030	15	245 ± 50
F015-10-031	15	340 ± 50

▶ **Linear** fluid damper characteristic

Displays the damping force based on the stroke

Version: **Giganto**

▶ Dimension

∅ of damperhousing	Housing length	Piston rod length	∅ of piston rod
[mm]	[mm]	[mm]	[mm]
9.9	44.4	20.5	2.3

▶ Technical data

Order no.	Stroke	Maximum force
	[mm]	[N]
F020-10-002	20	300 ± 50

▶ **Linear-constant** fluid damper characteristic
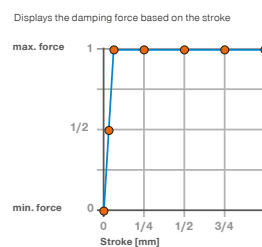
Displays the damping force based on the stroke

Version: **Giganto**

▶ Dimension

∅ of damperhousing	Housing length	Piston rod length	∅ of piston rod
[mm]	[mm]	[mm]	[mm]
9.9	44.4	20.5	2.3

▶ Technical data

Order no.	Stroke	Maximum force
	[mm]	[N]
F020-10-003	20	300 ± 50

▶ **Linear** fluid damper characteristic

Displays the damping force based on the stroke
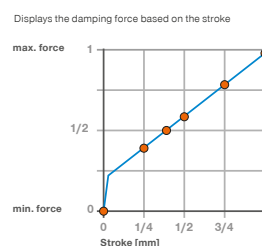
DAMPING OF LIDS
CLOSING WITHOUT SLAMMING

Version: Giganto

► **Dimension**

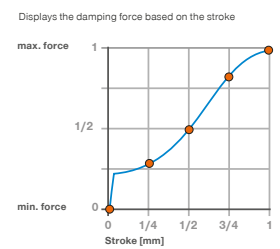| ∅ of damperhousing [mm]	Housing length [mm]	Piston rod length [mm]	∅ of piston rod [mm]
9.9	44.4	20.5	2.3

► **Technical data**

Order no.	Stroke [mm]	Maximum force [N]
F020-10-008	20	95 ± 40
F020-10-009	20	140 ± 50
F020-10-010	20	180 ± 50
F020-10-011	20	225 ± 50
F020-10-012	20	290 ± 50

► **S-curve fluid damper characteristic**

Displays the damping force based on the stroke

Version: Estremo

► **Dimension**

∅ of damperhousing [mm]	Housing length [mm]	Piston rod length [mm]	∅ of piston rod [mm]
9.9	67.0	30.5	2.3

► **Technical data**

Order no.	Stroke [mm]	Maximum force [N]
F030-10-002	30	150 ± 50

► **Linear-constant fluid damper characteristic**

Displays the damping force based on the stroke

Damping of LIDS / Components / **Soft Close**

2

DAMPING OF HINGES
THE EPITOME OF STABILITY AND FLEXIBILITY

▶ PRODUCT ADVANTAGES
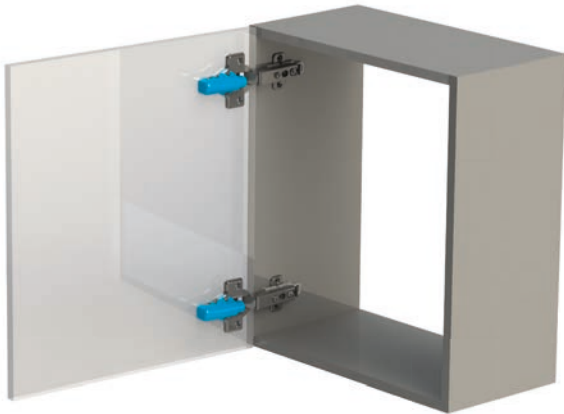
▶ **Dampers for hinges**

High performance dampers from Zimmer Group for damping hinges are retrofit solutions that can be integrated easily.

▶ Users particularly appreciate the VOLPINO's easy handling of the customizable damping force, which can be adjusted to the door weight after assembly.

▶ The "BELLINO" is appealing because it can be integrated into a (very) narrow installation space.

▶ **Powerful – Flexible – Sophisticated**

Learn more about "VOLPINO" and "BELLINO". Our power pack for damping hinges.

Version: Bellino

▶ Dimension			
∅ of damperhousing [mm]	Housing length [mm]	Piston rod length [mm]	∅ of piston rod [mm]
8.0	29.5	10.5	1.8

▶ **Product characteristics**

Fluid damping

Very small

Compact design

Order no.	▶ Technical data	
	Stroke [mm]	Maximum force [N]
F010-08-002	10	8-170

Version: Volpino

▶ Dimension	
	Housing length [mm]
	49.7

▶ **Product characteristics**

Fluid damping

Can be retrofitted

Powerful

Adjustable

Order no.	▶ Technical data			
	Stroke [mm]	∅ of concealed hinge [mm]	Color of pressure piece	Miscellaneous Characteristics
B015-10-004	15	26	Dark gray RAL 7039	Adjustable concealed damping
B015-10-007	15	26	Light gray RAL 7035	Adjustable concealed damping
B015-10-003	15	35	Dark gray RAL 7039	Adjustable concealed damping
B015-10-006	15	35	Light gray RAL 7035	Adjustable concealed damping

RETROFIT SETS FOR DAMPING LIDS AND HINGES
SHOCK ABSORPTION

► PRODUCT ADVANTAGES

► **Dampers for hinges and lids**

The product portfolio of the Zimmer Group also contains retrofit solutions for hinge and lid damping.

► The soft head of the PIANO and PIANINO pin dampers guarantee an extremely smooth and quiet closing action.

► The retrofit solutions are available as individual dampers or in a set with the appropriate mounting. Accordingly, they can be attached on the frame easily and quickly using a mounting or by drilling holes

► **Compact – Handy – Customer friendly**

These features distinguish our retrofit sets for damping hinges and lids.

Version: Piano

► Dimension

Ø of damperhousing [mm]	Housing length [mm]
9.7	56

► Product characteristics

Pneumatic damping

Elastic impact head

For drilling holes

Available with holder

Integrated return spring

► Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Miscellaneous Characteristics
A019-10-002	19.5	Pressure piece (light gray) with elastomer head	6	No	Damping with return

Version: Pianino

► Dimension

Ø of damperhousing [mm]	Housing length [mm]
9.9	45.8

► Product characteristics

Pneumatic damping

Elastic impact head

For drilling holes

Available with holder

► Technical data

Order no.	Stroke [mm]	Head shape/Connection	Mass to be braked [kg]	Free-run	Miscellaneous Characteristics
A015-09-001	15	Pressure piece (light gray) with elastomer head	4	No	Damping with return

Accesories Holders

► D000-00-011

Mounting for Piano and Pianino, Color light gray RAL 7035

SYSTEMS AND CUSTOMER-SPECIFIC SOLUTIONS
INDIVIDUAL PRODUCTS

KNOW-HOW

THE ZIMMER GROUP IS ONE OF THE LEADING MANUFACTURERS AND DEVELOPERS OF SOFT CLOSE SYSTEMS AND CUSTOMER-SPECIFIC SOLUTIONS.

We develop the **systems** ourselves as standard solutions, but how they are used is up to the customer.

Customer-specific solutions
are developed and implemented within a customer project.

Due to the development activity of recent years, we can provide our customers with target-oriented advice and offer custom-made solutions.

QUALITY - MADE IN GERMANY

THE ZIMMER GROUP STANDS FOR QUALITY AT THE HIGHEST LEVEL - MADE IN GERMANY.

At Zimmer Group, we apply the same quality requirements to systems and customer-specific solution as we do to our standard components.

This includes the inspection of critical characteristics, the characteristic properties and the 100% performance test.

Depending on the quantity and customer requirement, this quality control is implemented either with partial or full automation.

All products meet the requirements of the relevant standards (DIN ISO 9001:DIN ISO 14001, DIN ISO 50001).

CORE SKILLS

THE ZIMMER GROUP CAN REFER BACK TO ITS CORE EXPERTISE WHILE SUCCESSFULLY DEVELOPING AND PRODUCING SYSTEMS AND CUSTOMER SPECIFIC SOLUTIONS:

Customer orientation
For us, our customers' needs come first.

Solution orientation
We focus our attention on the solution, not the problem.

Future orientation
Our outlook on new challenges is always at the forefront.

Systems and customer-specific solutions / Soft Close

2

SYSTEMS
STANDARD SYSTEMS UNITS

► PRODUCT GROUP INFORMATION

► **Systems and components**

Along with components, the Zimmer Group also offers complete, nearly universal and immediately usable systems.

► Our systems are complete damping units with an integrated self return mechanism. Our customers can integrate the systems directly into their rails without requiring that the rails already be equipped with a corresponding return mechanism.

► **Universal - Innovative - Versatile**

These are the core attributes of our systems.

Function

► **Drawer and sliding door damping**

Our systems demonstrate a similar function:

► **Elements**

Soft Close systems consist of a damping unit with an integrated self closing mechanism and a locking lever.

In addition, there is an actuator available in different versions depending on the application.

Drawer
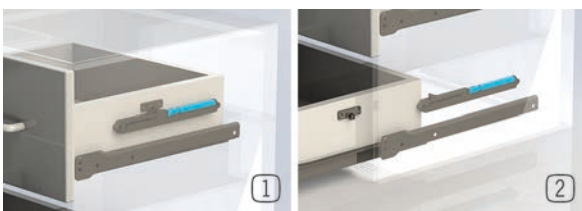
1 **Drawer home position**
   - The Retro soft close system is screwed onto the cabinet frame. The actuator is fastened to the drawer.

2 **Closing the drawer**
   - The actuator fastened to the drawer moves inwards with the drawer and edges its way toward the Retro soft close system fastened to the cabinet frame in the process. If the actuator reaches the system, the system's locking lever is triggered by the actuator and fixed in place. At this point, the damping and self return phase begins: **Soft Close!**

Sliding door

1 **Sliding door home position**
   - The Silento Forte soft close system is fastened to the rail. The actuator is fastened to the sliding door. The specific fastening options differ depending on the application.

2 **Closing the sliding door**
   - The actuator fastened to the sliding door engages the system locking lever. The self return mechanism is triggered in the process. At this point, the damping and self return phase begins: **Soft Close!**

SILENTO UNIVERSALE
THE AUTOMATIC RETURN MECHANISM
FOR DRAWER DAMPING

► PRODUCT ADVANTAGES

► Product characteristics

The SILENTO UNIVERSALE automatic self-closing unit consists of one or two fluid dampers with an integrated self return mechanism.

► The SILENTO UNIVERSALE automatic self-closing unit is available individually or in a set with an actuator.

► The geometry of the SILENTO UNIVERSALE derives primarily from its function. The focus is on the visually functional design with the most compact dimensions possible.

► The SILENTO UNIVERSALE automatic self-closing unit features a high load capacity and its modular design. For weights to be dampened of 30/50/70 kg per unit.

► The strengths of the SILENTO UNIVERSALE automatic self-closing unit are its versatile application options, high flexibility, modular design and compactness.

► The SILENTO UNIVERSALE automatic self-closing unit can be installed both horizontally and vertically without special previous knowledge.

► Customer-specific adjustments of the performance of the SILENTO UNIVERSALE automatic self-closing unit are possible in terms of damper performance and spring force.
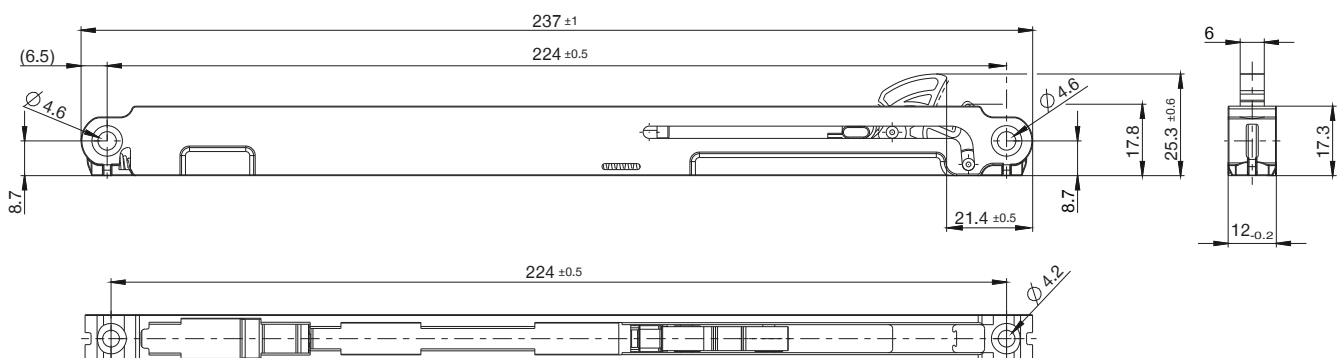
► Product characteristics

Fluid damping

The SILENTO UNIVERSALE automatic self-closing unit is also well-suited for retrofitting a drawer not yet equipped with a damping and return mechanism.

The SILENTO automatic self-closing unit provides a variety of installation options in drawers of various weight classes.

Silento Universale dimensions

▶ APPLICATIONS + SETS

System **Silento Universale**

▶ Dimension		
Housing length [mm]	Housing width [mm]	Housing height [mm]
237	12	17.3

	▶ Technical data			
Order no.	Distance between holes [mm]	Stroke [mm]	Mass to be braked [kg]	Medium
E050-08-006	224	50	30	Oil
E050-08-015	224	50	50	Oil
E050-08-016	224	50	70	Oil

Roller slide

▶ SILENTO UNIVERSALE is mounted on the frame.

SILENTO UNIVERSALE is located between the frame and drawer.

▶ The actuator is mounted on the side of the drawer.

Undermount slide

▶ SILENTO UNIVERSALE is mounted on the frame.

SILENTO UNIVERSALE is located above the drawer.

▶ The actuator is mounted on the front side of the drawer.

Single-wall frame

▶ SILENTO UNIVERSALE is mounted on the frame.

SILENTO UNIVERSALE is located between the frame and drawer on the drawer base.

▶ The actuator is mounted on the bottom of the drawer.

Actuator

RETRO
THE AUTOMATIC RETURN MECHANISM
FOR DRAWER DAMPING

▶ PRODUCT ADVANTAGES

▶ **Product characteristics**

The RETRO automatic self-closing unit consists of a pneumatic damper with integrated self return mechanism.

▶ The RETRO automatic self-closing unit is available individually or in a set with various actuators.

▶ The geometry of the RETRO automatic self-closing unit derives primarily from its function. The focus is on the visually functional design with the most compact dimensions possible.

▶ The RETRO automatic self-closing unit features a high load capacity. For weights to be dampened of 25 kg per unit.

▶ Zimmer recommends using two RETRO automatic self-closing unit per drawer to ensure the most symmetrical closing behavior possible.

▶ The strengths of the automatic self-closing unit are its versatile application options, high flexibility, modular design and compactness.

▶ The RETRO automatic self-closing unit can be installed both horizontally and vertically without special previous knowledge.
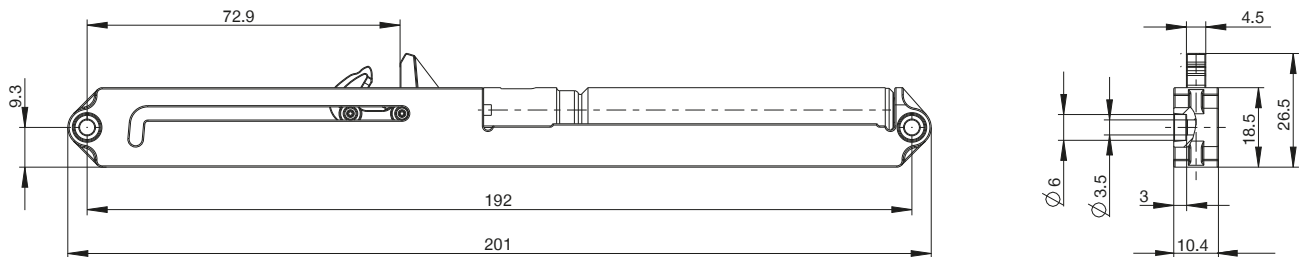
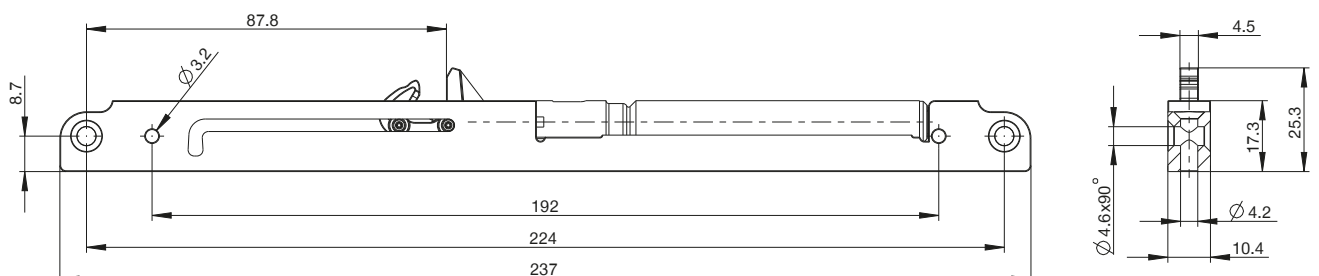▶ **Product characteristics**

Pneumatic damping

The RETRO automatic self-closing unit is also well-suited for retrofitting a drawer not yet equipped with a damping and return mechanism.

The RETRO automatic self-closing unit can be integrated in a variety of installation options in low-weight drawers.

Retro 2 dimensions

Retro 4 dimensions

Fastening options are available horizontally and vertically

► **APPLICATIONS + SETS**

System **Retro 2 + Retro 4**

►	**Dimension**	
Housing length [mm]	Housing width [mm]	Housing height [mm]
201	10.4	18.5

	► **Technical data**							
Order no.	Stroke [mm]	Distance between holes [mm]	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod	Miscellaneous Characteristics	Type
E050-10-003	50	192	25	Yes	Yes	Plastics	Low locking lever	R2
E050-10-025	50	192	25	Yes	Yes	Plastics	High locking lever	R2
E050-10-024	50	224	25	Yes	Yes	Plastics	High locking lever	R4

Roller slide

- ► RETRO is mounted on the frame. It is located between the frame and the drawer.
- ► The actuator is mounted on the side of the drawer.
- ► For installation in a roller slide, a narrow actuator is available.

Undermount slide

- ► RETRO is mounted on the frame. It is located above the drawer.
- ► The actuator is mounted on the front side of the drawer.
- ► The same actuator as the roller slide is used for installation in an undermount slide.

Single-wall frame

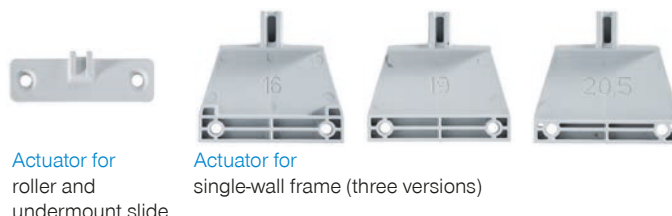- ► RETRO is mounted on the frame. It is located on the bottom of the drawer between the frame and drawer.
- ► The actuator is mounted on the bottom of the drawer.
- ► For installation in a single-wall frame, actuators of three different widths are available to guarantee a precise fit for every frame width.

System sets **Retro 2 + Retro 4**

	► **Technical data**	
Order no.	Drawer slide system	Type
S050-10-011	Roller and undermount slide	R2
S050-10-012	Single-wall frame: 16 mm	R2
S050-10-013	Single-wall frame: 19 mm	R2
S050-10-025	Single-wall frame: 20.5 mm	R2

Actuator for roller and undermount slide

Actuator for single-wall frame (three versions)

SILENTO UNIVERSALE
THE AUTOMATIC RETURN MECHANISM
FOR SLIDING DOOR DAMPING

► PRODUCT ADVANTAGES

► Product characteristics

The SILENTO UNIVERSALE automatic self-closing unit consists of one or two fluid dampers with an integrated self return mechanism.

► The SILENTO UNIVERSALE automatic self-closing unit is available individually or in a set with an actuator.

► The geometry of the SILENTO UNIVERSALE derives primarily from its function. The focus is on the visually functional design with the most compact dimensions possible.

► The SILENTO UNIVERSALE automatic self-closing unit features a high load capacity and its modular design. For weights to be dampened of 30/50/70 kg per unit.

► The strengths of the SILENTO UNIVERSALE automatic self-closing unit are its versatile application options, high flexibility, modular design and compactness.

► The SILENTO UNIVERSALE automatic self-closing unit can be installed both horizontally and vertically without special previous knowledge.

► Customer-specific adjustments of the performance of the SILENTO UNIVERSALE automatic self-closing unit are possible in terms of damper performance and spring force.
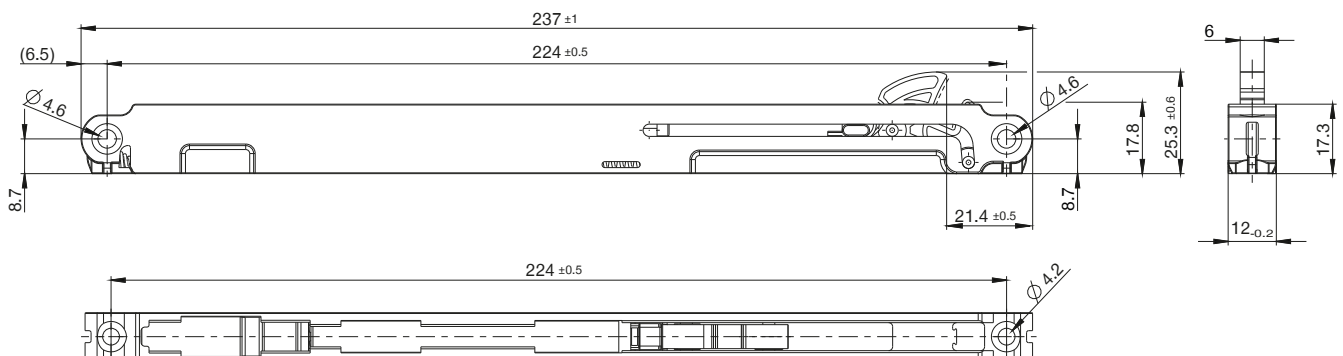
► Product characteristics

Fluid damping

The SILENTO UNIVERSALE automatic self-closing unit is also well-suited for retrofitting a drawer not yet equipped with a damping and return mechanism.

The SILENTO automatic self-closing unit provides a variety of installation options in drawers of various weight classes.

Silento Universale dimensions

System Silento Universale

► Dimension		
Housing length [mm]	Housing width [mm]	Housing height [mm]
237	12	17.3

Order no.	► Technical data			
	Distance between holes [mm]	Stroke [mm]	Mass to be braked [kg]	Medium
E050-08-006	224	50	30	Oil
E050-08-015	224	50	50	Oil
E050-08-016	224	50	70	Oil

Function

► SILENTO UNIVERSALE is integrated in the rail/on the frame. The actuator is fastened to the sliding door

► SILENTO UNIVERSALE is mounted on the sliding door. The actuator is fastened in the rail/on the frame

Actuator

SILENTO FORTE
THE AUTOMATIC RETURN MECHANISM
FOR SLIDING DOOR DAMPING

► PRODUCT ADVANTAGES

► **Product characteristics**

The SILENTO FORTE self-closing unit consists of a damper with an integrated self return mechanism.

► The SILENTO FORTE self-closing unit is available individually (in various designs) or in a set with an actuator.

► The SILENTO FORTE self-closing unit stands out due to its high loading capacity of 15 - 50 kg per unit.

► The core strengths of the SILENTO FORTE self-closing unit is versatile range of potential applications and its high level of flexibility.

► During development, special emphasis was placed on designing an universally usable system.
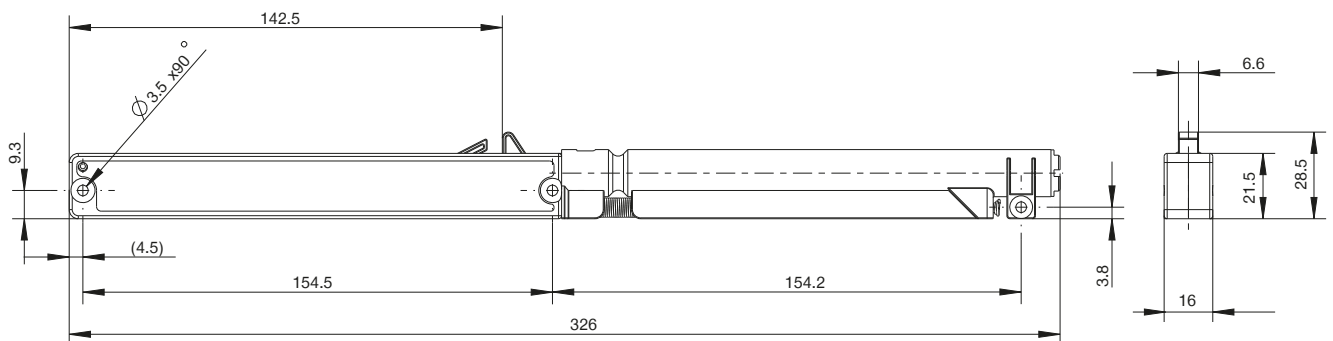
► **Product characteristics**

Pneumatic damping

SILENTO FORTE can be installed in most common sliding doors.

SILENTO FORTE is also ideal for retrofitting a sliding door that did not previously have a damping or self return mechanism.

SILENTO FORTE can also be integrated into larger drawers or larger pull-outs.

Silento Forte dimensions

System **Silento Forte**

▶ Dimension		
Housing length [mm]	Housing width [mm]	Housing height [mm]
326	16	21.5

	▶ Technical data						
Order no.	Stroke [mm]	Distance between holes [mm]	Mass to be braked [kg]	Free-run	Spring channel integrated	Material piston rod	Miscellaneous Characteristics
E110-15-006	110	154,5/154,2	15	Yes	Yes	Steel	Housing with counterbore
E110-15-094	110	154,5/154,2	25	Yes	Yes	Steel	Housing with counterbore
E110-15-007	110	154,5/154,2	35	Yes	Yes	Steel	Housing with counterbore
E110-15-008	110	154,5/154,2	50	Yes	Yes	Steel	Housing with counterbore
E110-15-009	110	154,5/154,2	50	No	Yes	Steel	Housing with counterbore

Function

▶ SILENTO FORTE is integrated in the rail/on the frame. The actuator is fastened to the sliding door

▶ SILENTO FORTE is mounted on the sliding door. The actuator is fastened in the rail/on the frame

▶ Actuator upon request

CUSTOMER-SPECIFIC SOLUTIONS
SYSTEMS AND DAMPERS

► PRODUCT GROUP INFORMATION

► **Individualized products**

Individuality is gaining more and more importance. Flexibility and inventive spirit are in high demand.

► The Zimmer Group is a qualified and reliable partner in developing customer-specific solutions. The demand for custom-fitted products is enormous.

► Intensive dialog with our customers is very important to the Zimmer Group. The Zimmer Group develops and produces in-house. We encourage the development process from the first concept to series production. In this way, we can meet the demands of our customers accurately and at the highest level of quality.

► We draw attention by adapting proven developments to our customers' specific wishes in terms of appearance, function and movement.

► **Customized – Customer-oriented – Pioneering**

Here are some products that have been developed for and with customers for existing projects.
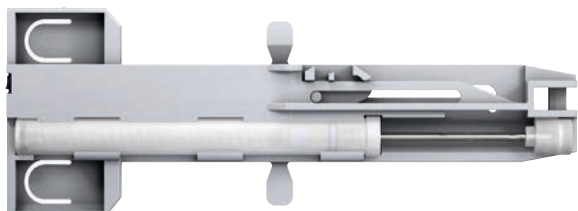
Damping of drawers

Application example 1.1

Application example 1.2

Application example 1.3

Application example 1.4

► Compact and efficient units for

► 1.1 Ball roller rail/Telescopic rail

► 1.2 Undermount rail

► 1.3 Undermount rail

► 1.4 Ball roller rail/Telescopic rail

Damping of hinges

Application example 2.1

► 2.1 Fluid damper with high damping force of up to 650 N at only a 7 mm stroke. Requires only small installation space since it is very compact.

► **SYSTEMS AND CUSTOMER SPECIFIC SOLUTIONS**

Damping for sliding doors

Application example 3.1

Application example 3.2

Application example 3.3

Application example 3.4

Application example 3.5

Application example 3.6

► 3.1 For sliding doors between 15 and 50 kg.
Installation in the rail.
Different actuators available.

► 3.2 For sliding doors between 15 and 50 kg.
Ideal as a retrofit solution.
Extension damper.

► 3.3 For sliding doors between 15 and 30 kg.
Installation with or without cover.
Extension damper.

► 3.4 For sliding doors between 25 and 50 kg.
Working in both directions.

► 3.5 Center door damping.

► 3.6 For apothecary cabinet drawer with very low pull-out force

CUSTOMER-SPECIFIC SOLUTIONS
SYSTEMS AND DAMPERS

Miscellaneous applications
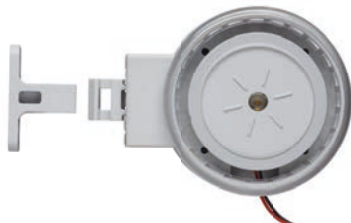
4.1 WWTL (camper touch latch)

4.2 Infinitely variable extension mechanism

4.3 Sliding door fitting set

► 4.1 Touch latch unit with integrated LED lamp.

► 4.2 Infinitely variable extension mechanism for the camper area.

► 4.3 Sliding door fitting set with upper and lower damping unit, including height adjustable activator.

USAGE NOTE
GENERAL

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All of the products listed in this catalog are designed for their intended use, e.g. machines for automation. The recognized technical regulations for safety and professional work must be followed for use and installation.

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STANDARDS

Zimmer Group has a quality management system certified in accordance with ISO 9001:2008. Zimmer Group has an environmental management system certified in accordance with ISO 14001:2004.

USAGE NOTE
INDIVIDUAL

INDIVIDUAL „INDUSTRIAL DAMPING TECHNOLOGY" – DIRECTIVES, LAWS AND STANDARDS

Harmonized EU directives

The products of the Zimmer Group comply with the standardized and harmonized directives and standards of the European Union, which apply to products for the EU single market.

CE-relevant harmonized EU directives:

The industrial shock absorbers from the Zimmer Group meet the requirements of the respective harmonized EU directives, as long as they are relevant to them. However, the following guidelines do not define a scope of validity for industrial shock absorbers:

► In accordance with the Machinery Directive, industrial shock absorbers are components for installing in machines, which means neither a EC Declaration of Conformity nor a EC Type Examination are required. In addition, no Manufacturer's Declaration is needed either.

► As per the Pressure Equipment Directive, industrial shock absorbers are components with a low potential for danger, which is why they are omitted from this scope of validity.

► Other harmonized directives contained in the German Equipment and Product Safety Act do not apply for general mechanical engineering application as components. For example, the directives for elevators, ropeways and medical products as well as the ATEX explosion protection directive require a corresponding application of shock absorbers in this area. However, this does not correspond to general use. Instead, they represent special applications that are subject to a separate directive review.

► Consequently, no general mandatory CE markings exist for the industrial shock absorbers from the Zimmer Group for general use in mechanical engineering, which is why they are not inspected in the relevant certification processes and, therefore, are not provided with the CE marking.

Other harmonized EU directives:

Waste Electrical and Electronic Equipment Directive (WEEE) and the Restriction of Hazardous Substances directive (RoHS) are also not relevant since hydraulic shock absorbers are not electrical or electronic devices. However, the products can be oriented to the respective ordinances.

ZIMMER GROUP—THE KNOW-HOW FACTORY

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