ACE

Automation Control Equipment

Choose the Original
Choose Success!

Main Catalogue

Edition 9/2007

- Industrial Shock Absorbers — New Models
- Safety Shock Absorbers
- TUBUS Bumpers
- Rotary Dampers
- Dampers / Feed Controls
- Industrial Gas Springs — New Models

DUPONT
VOLKSWAGEN AG
Ford
MICHELIN
DaimlerChrysler Aerospace Airbus
DAIMLERCHRYSLER
RENAULT
Audi
PEUGEOT
BMW AG
NISSAN
ThyssenKrupp Stahl
DECKEL MAHO GILDEMEISTER DMG
PIRELLI
Continental
Canon
VOITH
SONY
PILKINGTON
FEDERAL MOGUL LIGHTING PRODUCTS
ABB
PHILIPS
SIEMENS
Rexroth Bosch Group
KUKA
mannesmann engineering Dematic
IBM
BAYER
chiron
COMAU
SCHUNK Spann- und Greiftechnik
Tetra Pak
Freudenberg
Heinz
GE
SCHENCK
Parker
NORGREN
DOW Dow Plastics

Dear Reader,

This catalogue presents all aspects of damping and deceleration methods you need to reduce harmful and destructive energies effectively. ACE offers coordinated deceleration systems that help you to attain increased productivity, longer service life, greater power and speeds for your drives, motors, or systems.

ACE maintains its position as the Market Leader in motion control technology and sets the trend towards smaller and higher performance control components.

Please note the  of ACE throughout the catalogue. It will point out advantages and new products.

MC5M

The Powerful Mini

With a weight of only 3 g and a total length of 34 mm, the new MC5 absorbs up to 0.7 Nm energy per stroke.

Brilliant Support

is offered by the new standard gas springs made of stainless steel. They round off the series of V2A (1.4305) spring with diameters from 15 mm to 40 mm and extension forces of 40 N to 5000 N.

PLEASE NOTE: not contained in this catalogue, but important for your innovative products!

Special catalogues for **ACE-LOCKED** clamping elements and **ACE-SLAB** damping plates

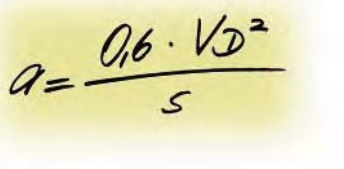
Last year the product series ACE-LOCKED and ACE-SLAB were presented as part of on-going and new developments. The new ACE-LOCKED series rounds off the range of safety elements. It contains pneumatic clamping and braking systems for linear guides, rods, piston rods, axes and shafts. The innovative ACE-SLAB damping plates made of PUR offer new prospects when it comes to damping, vibration insulation and noise reduction.

Ask for our special catalogues on page 147 and get to know our new products!

Issue 9.2007 Specifications subject to change

Index

General



The **calculation bases** have been developed over 40 years, tested in cooperation with universities and successfully confirmed in thousands of individual cases. User-friendly **software solutions** are provided free of charge as support. **Sales** are focused on **customer benefits** and cover a large range of services through a trained network of distribution partners, technical sales representatives and professional office duty staff.

Technical advice, design, documentation, construction support, CAD library and on-site or telephone training are all available.

Industrial Shock Absorbers

Industrial shock absorbers are used as hydraulic machine components for slowing down moving loads with minimal machine load.
ACE shock absorbers are characterized by the use of the most recent and innovative technologies such as the piston tube, stretch or rolling diaphragm technique. Thus, the shock absorbers offer the highest service life in connection with high energy absorption.

ACE industrial shock absorbers are machine components that are easy to use and also flexible in use with their multitude of optional parts.

Safety Shock Absorbers

Safety shock absorbers are used to provide security in emergency stop applications. Auto warehouse units, conveyors, or crane equipment, they are an inexpensive alternative to industrial shock absorbers. Safety shock absorbers are maintenance-free, self-contained and constructed with an integrated positive stop. They feature an integrated diaphragm accumulator or work with a compressed nitrogen bladder. ACE offers

safety shock absorbers with strokes from 15 to 1200 mm. At the same time we calculate and manufacture the layout of the damping orifices for your individual requirements.

TUBUS Profile Dampers

The innovative **TUBUS profile dampers** are a cost-efficient alternative for emergency stop applications. They are made from a special co-polyester elastomer. They constantly absorb energies in areas in which other materials fail. The excellent damping characteristics are achieved as a result of the special elastomer material and the world-wide-patented design. The profile dampers are constructed to absorb the emerging

energy with a damping curve that is declining (TA-series), almost linear (TS-series) or progressive (TR-series). The TUBUS series comprises five main types with over 80 individual models.

Rotary Dampers

The **rotary damper** is a maintenance-free machine component for controlling rotary or linear motion.
ACE rotary dampers ensure a controlled opening of small lids, flaps and drawers. The harmonic, soft motion sequence protects sensitive components and increases the quality and value of the product.

Hydraulic Dampers and Feed Controls

Hydraulic dampers are infinitely adjustable and provide accurate feed rate control. They are ideal for sawing, grinding and boring machines.

Feed controls are used to control traverse rates. They can control the parallel feed in both directions or be used as a compensating element for moving loads. As a

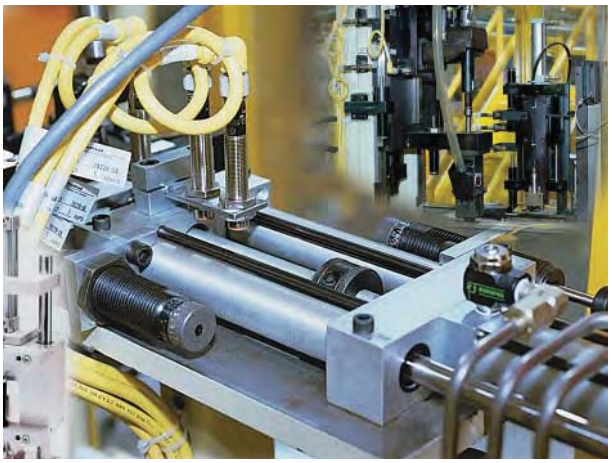
security element, they prevent the sudden retraction of devices.

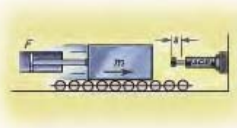
Industrial Gas Springs

Gas springs (push type) can be used with all applications in which the lifting and lowering of loads must be controlled. They support manual forces and are used to control the lifting and lowering of lids, flaps, hoods etc. They are maintenance-free, self-contained and deliverable ex stock. Their integral grease chamber provides a lower breakout force, reduced friction and extremely long life.

Industrial traction gas springs are effective in the pulling direction. Both units are fitted with a valve. This allows matching to the required force for any application.

Industrial Shock Absorbers



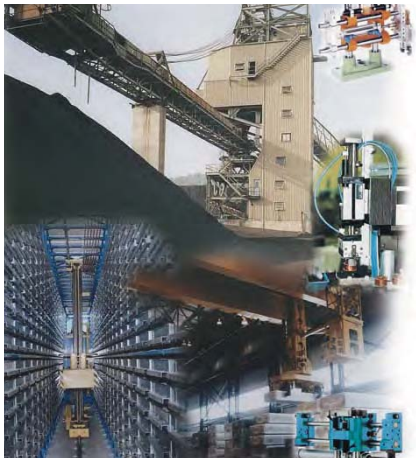


Sizes from
5 to 190 mm dia.
Stroke lengths from
4.1 to 406 mm

increase production – reduce wear and tear – minimise down time – save money

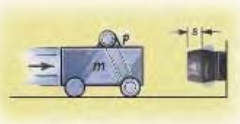
Safety Shock Absorbers

Sizes from
20 to 230 mm dia.
Stroke lengths from
15 to 1200 mm



increase safety – minimise risk – prevent damage – reduce repair costs – peace of mind

TUBUS Bumpers



Sizes from
12 to 176 mm dia.
Stroke lengths from
5 to 198 mm

increase safety – compact size – prevent damage – special elastomer – peace of mind

Industrial Gas Springs

Sizes from
8 to 70 mm body dia.
Stroke lengths from
20 to 1000 mm

increase safety – fingertip control – reduce operator effort – gain peace of mind

Hydraulic Dampers and Feed Controls

Sizes from
10 to 70 mm body dia.
Stroke lengths from
8 to 800 mm

increased control – improved product finish – reduce running costs – increase accuracy

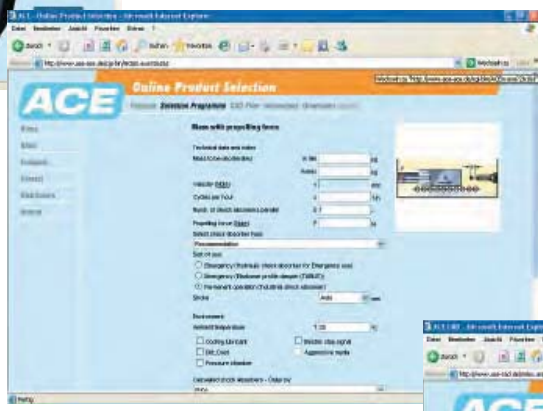
Rotary Dampers

Sizes from
10 to 80 mm body dia.
Rotary damping
about 105° to 360°

controlled rotary motion – high quality damping – low cost – improved “feel” of product

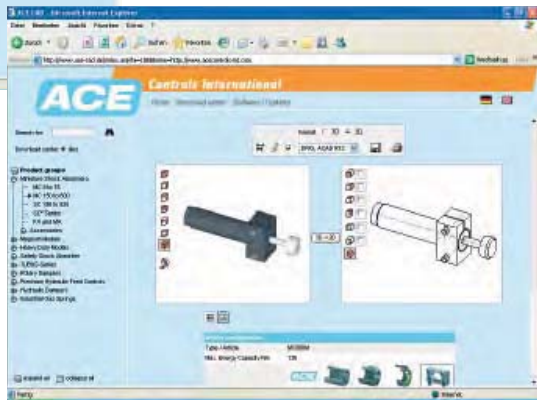
Issue 9.2007 Specifications subject to change

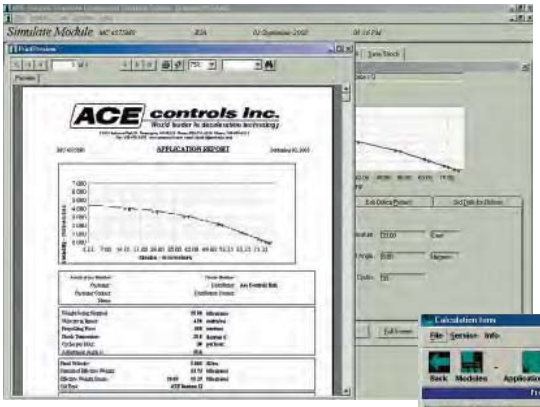
Up-to-date, Product Information, News, Technical Advice, Application Enquiry E-mail Service and Local Distributor Contact Details



Online Shock Absorber Selection Program

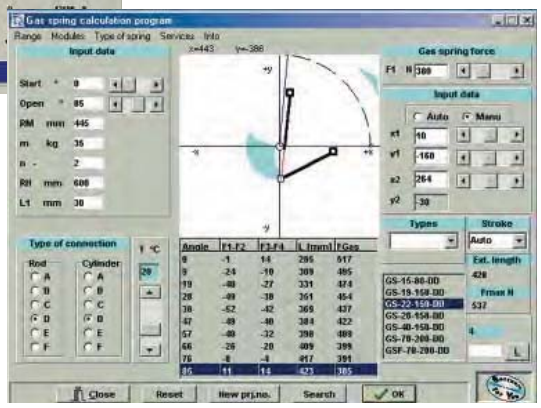
2D and 3D CAD Viewer





In-house Shock Absorber Unique Application Simulation Service

Shock Absorber Selection Program



In-house Gas Spring Application Geometry and Selection Service

Virtually all manufacturing processes involve movement of some kind. In production machinery this can involve linear transfers, rotary index motions, fast feeds etc. At some point these motions change direction or come to a stop.

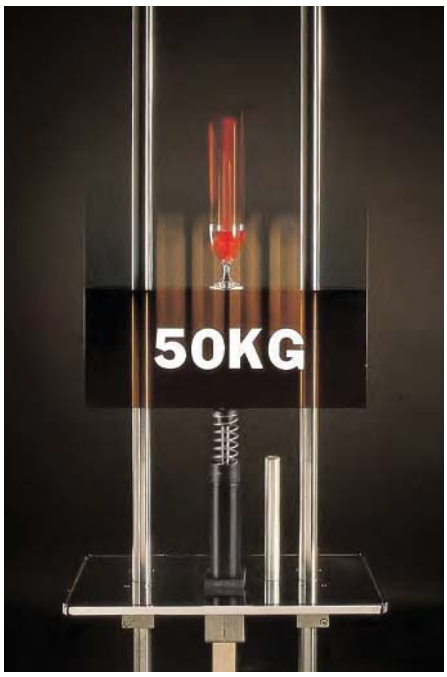
Any moving object possesses kinetic energy as a result of its motion and if the object changes direction or is brought to rest, the dissipation of this kinetic energy can result in destructive shock forces within the structural and operating parts of the machine.

Kinetic energy increases as the square of the speed and the heavier the object, or the faster it travels, the more energy it has. An increase in production rates is only possible by dissipating this kinetic energy smoothly and thereby eliminating destructive deceleration forces.

Older methods of energy absorption such as rubber buffers, springs, hydraulic dashpots and cylinder cushions do not provide this required smooth deceleration characteristic – they are non linear and produce high peak forces at some point during their stroke.

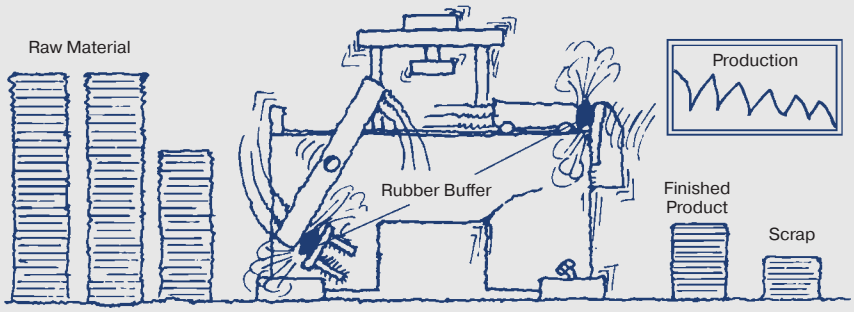
The optimum solution is achieved by an **ACE industrial shock absorber**. This utilises a series of metering orifices spaced throughout its stroke length and provides a **constant linear deceleration** with the lowest possible reaction force in the shortest stopping time.

ACE Controlled Linear Deceleration



ACE demo showing a wine glass dropping free fall 1.3 m. Decelerated by an ACE shock absorber not a drop of wine is spilled.

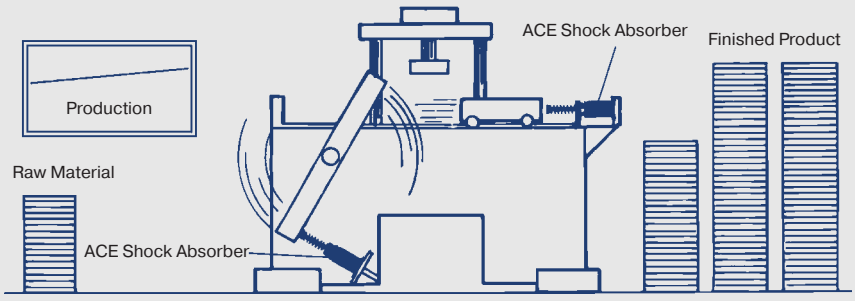
Stopping with Rubber Buffers, Springs, Dashpots or Cylinder Cushions



Result

- Loss of Production
- Machine Damage
- Increased Maintenance Costs
- Increased Operating Noise
- Higher Machine Construction Costs

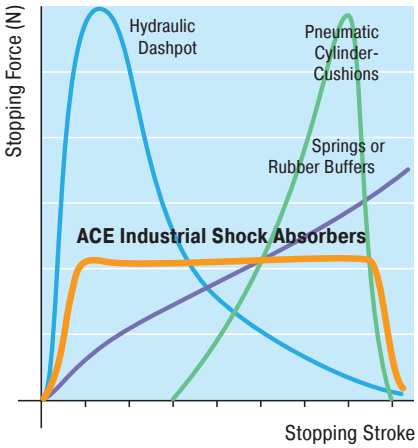
Stopping with ACE Shock Absorbers



Your Advantages

- Increased Production
- Increased Operating Life of the Machine
- Improved Machine Efficiency
- Reduced Construction Costs of the Machine
- Reduced Maintenance Costs
- Reduced Noise Pollution
- Reduced Energy Costs

Comparison



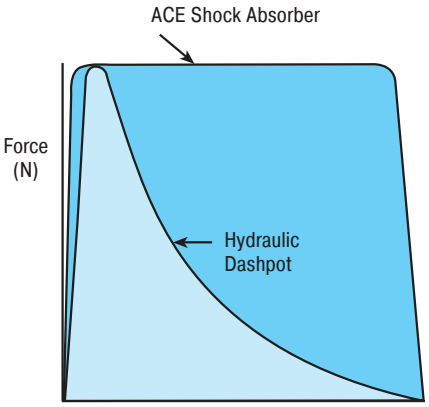
1. **Hydraulic Dashpot (High stopping force at start of the stroke).** With only one metering orifice the moving load is abruptly slowed down at the start of the stroke. The braking force rises to a very high peak at the start of the stroke (giving high shock loads) and then falls away rapidly.

2. **Springs and Rubber Buffers (High stopping forces at end of stroke).** At full compression. Also they store energy rather than dissipating it, causing the load to rebound back again.

3. **Air Buffers, Pneumatic Cylinder Cushions (High stopping force at end of stroke).** Due to the compressibility of air these have a sharply rising force characteristic towards the end of the stroke. The majority of the energy is absorbed near the end of the stroke.

4. **ACE Industrial Shock Absorbers (Uniform stopping force through the entire stroke).** The moving load is smoothly and gently brought to rest by a constant resisting force throughout the entire shock absorber stroke. The load is decelerated with the lowest possible force in the shortest possible time eliminating damaging force peaks and shock damage to machines and equipment. This is a linear deceleration force stroke curve and is the curve provided by ACE industrial shock absorbers. In addition they considerably reduce noise pollution.

Energy Capacity

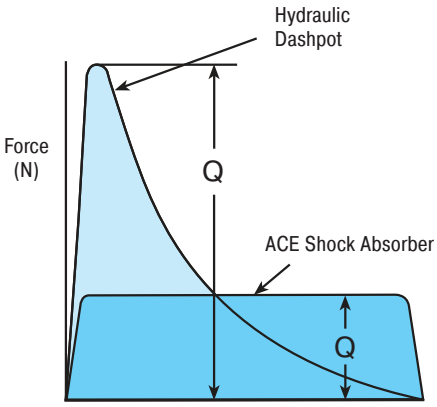


Assumption:
Same maximum reaction force.

Result:
The ACE shock absorber can absorb considerably more energy (represented by the area under the curve).

Your advantage:
By installing an ACE shock absorber production rates can be more than **doubled without increasing deceleration forces** or reaction forces on the machine.

Reaction Force (Stopping Force)

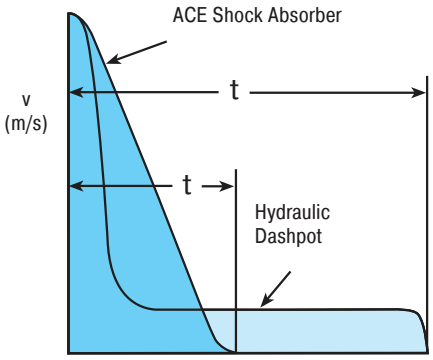


Assumption:
Same energy absorption (area under the curve).

Result:
The reaction force transmitted by the ACE shock absorber is very much lower.

Your advantage:
By installing the ACE shock absorber **the machine wear and maintenance can be drastically reduced.**

Stopping Time

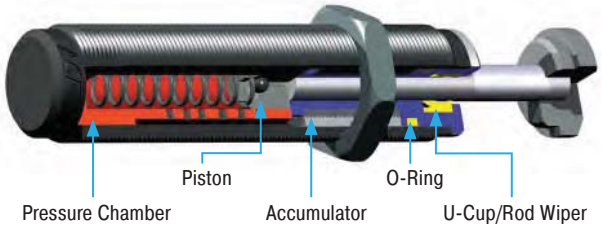


Assumption:
Same energy absorption.

Result:
The ACE shock absorber stops the moving load in a much shorter time.

Your advantage:
By installing an ACE shock absorber cycle times are **reduced giving much higher production rates.**

Comparison of Design



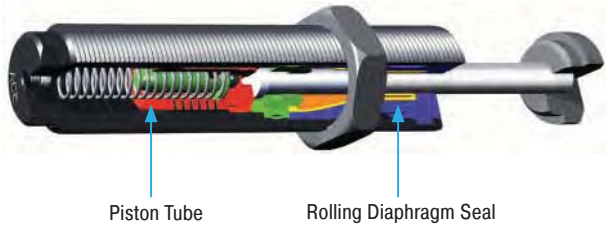
Standard Design of ACE Miniature Shock Absorbers

These miniature shock absorbers have a static pressure chamber. The dynamic piston forces the hydraulic oil to escape through the metering orifices.

The displaced oil is absorbed by the accumulator.

A static seal system containing a U-cup and a wiper seals the shock absorber internally.

The outer body and the pressure chamber are fully machined from solid with closed rear end.



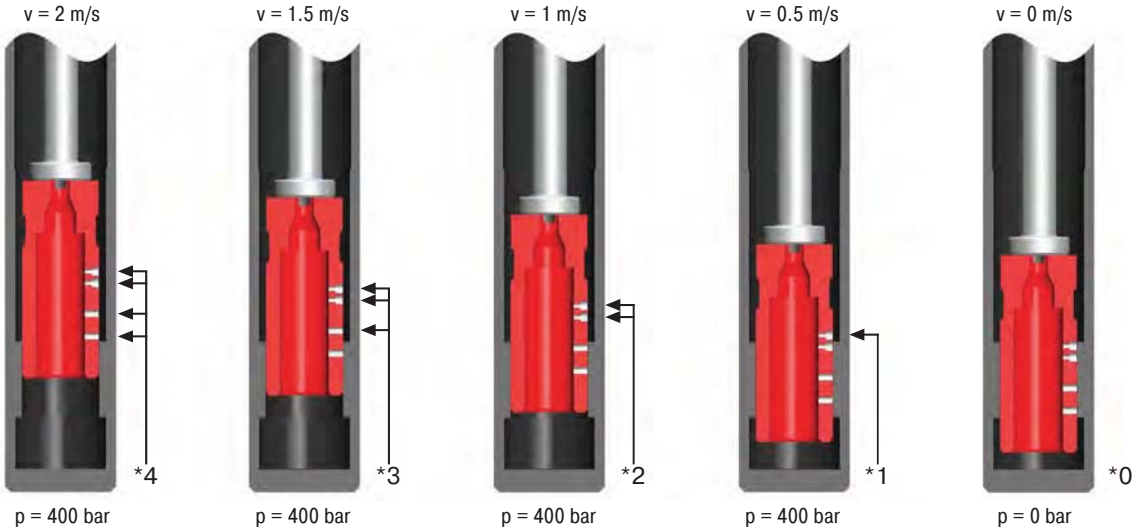
ACE Design for Higher Demands

ACE Piston Tube Technology:
The increased volume of displaced hydraulic oil provides **200 % more energy absorption capacity** in comparison with the standard design. The wider effective weight range enables these dampers to cover a much wider range of applications. The piston and inner tube are combined into a single component.

ACE Stretch and Rolling Diaphragm System:
By the proven dynamic ACE rolling diaphragm seal system the shock absorber becomes hermetically sealed and provides **up to 25 million cycles**. The rolling diaphragm seal allows direct installation into the end cover of pneumatic cylinders (up to 7 bar).

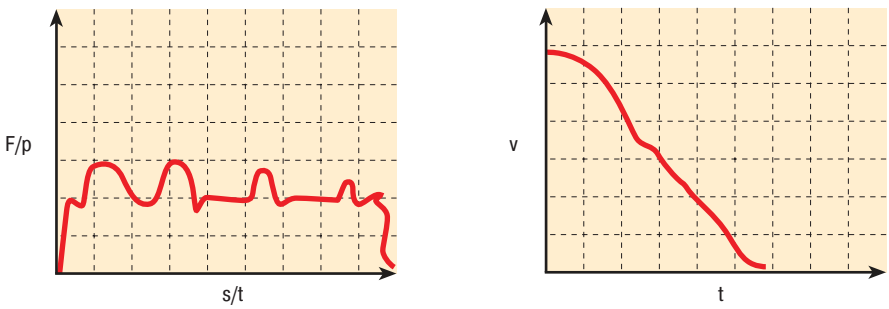
These technologies are used separately or combined on the **MC150M to MC600M, SC²25M to SC²650M, SCS300 to SCS650** and on the models **MC30M-Z and MA150M.**

General Function



* The load velocity reduces continuously as you travel through the stroke due to the reduction in the number of metering orifices (*) in action. The internal pressure remains essentially constant and thus the force vs. stroke curve remains linear.

F = Force (N)
p = Internal pressure (bar)
s = Stroke (m)
t = Deceleration time (s)
v = Velocity (m/s)



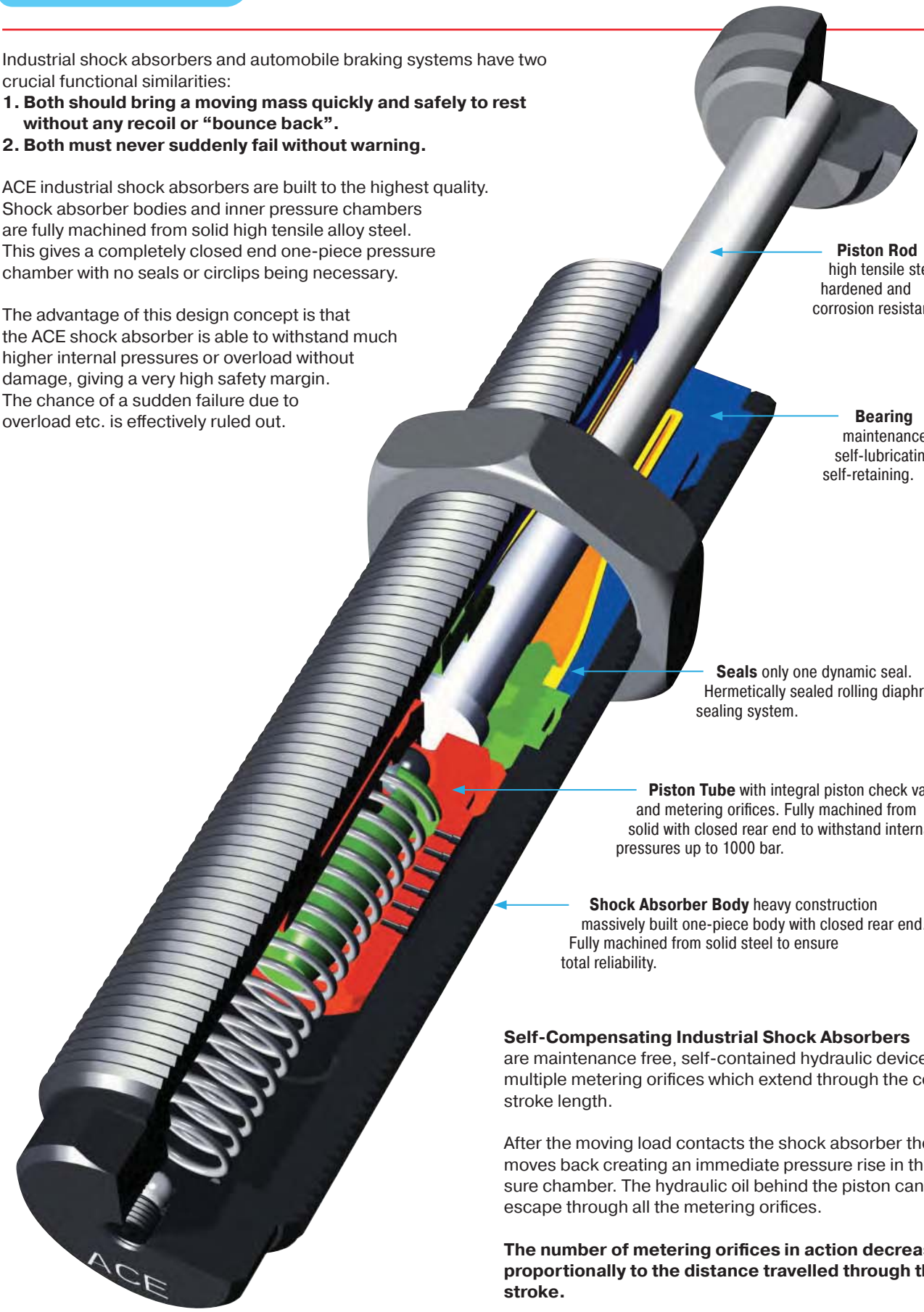
Issue 9.2007 Specifications subject to change

Industrial shock absorbers and automobile braking systems have two crucial functional similarities:

1. **Both should bring a moving mass quickly and safely to rest without any recoil or "bounce back".**
2. **Both must never suddenly fail without warning.**

ACE industrial shock absorbers are built to the highest quality. Shock absorber bodies and inner pressure chambers are fully machined from solid high tensile alloy steel. This gives a completely closed end one-piece pressure chamber with no seals or circlips being necessary.

The advantage of this design concept is that the ACE shock absorber is able to withstand much higher internal pressures or overload without damage, giving a very high safety margin. The chance of a sudden failure due to overload etc. is effectively ruled out.



Piston Rod high tensile steel hardened and corrosion resistant.

Bearing maintenance free, self-lubricating and self-retaining.

Seals only one dynamic seal. Hermetically sealed rolling diaphragm sealing system.

Piston Tube with integral piston check valve and metering orifices. Fully machined from solid with closed rear end to withstand internal pressures up to 1000 bar.

Shock Absorber Body heavy construction massively built one-piece body with closed rear end. Fully machined from solid steel to ensure total reliability.

Self-Compensating Industrial Shock Absorbers are maintenance free, self-contained hydraulic devices with multiple metering orifices which extend through the complete stroke length.

After the moving load contacts the shock absorber the piston moves back creating an immediate pressure rise in the pressure chamber. The hydraulic oil behind the piston can initially escape through all the metering orifices.

The number of metering orifices in action decreases proportionally to the distance travelled through the stroke.

The impact velocity of the moving load is smoothly reduced. The internal pressure and thus the reaction force (Q) remain essentially constant thoughout the complete stroke length providing a constant deceleration rate or:

——————► Linear Deceleration

Issue 9.2007 Specifications subject to change

ACE shock absorbers provide linear deceleration and are therefore superior to other kinds of damping element.
It is easy to calculate around 90 % of applications knowing only the following 5 parameters:

1. Mass to be decelerated (weight)	**m**	**(kg)**
2. Impact velocity at shock absorber	**v_D**	**(m/s)**
3. Propelling force	**F**	**(N)**
4. Cycles per hour	**c**	**(/h)**
5. Number of absorbers in parallel	**n**	

Key to symbols used

W_1	Kinetic energy per cycle	Nm
W_2	Propelling force energy per cycle	Nm
W_3	Total energy per cycle ($W_1 + W_2$)	Nm
[1] W_4	Total energy per hour ($W_3 \cdot c$)	Nm/hr
me	Effective weight	kg
m	Mass to be decelerated	kg
n	Number of shock absorbers (in parallel)	
[2] v	Velocity of moving mass	m/s
[2] v_D	Impact velocity at shock absorber	m/s
ω	Angular velocity	rads/s
F	Propelling force	N
c	Cycles per hour	1/hr
P	Motor power	kW

[3] ST	Stall torque factor (normally 2.5)	1 to 3
M	Propelling torque	Nm
I	Moment of inertia	kgm^2
g	Acceleration due to gravity = 9.81	m/s^2
h	Drop height excl. shock absorber stroke	m
s	Shock absorber stroke	m
L/R/r	Radius	m
Q	Reaction force	N
μ	Coefficient of friction	
t	Deceleration time	s
a	Deceleration	m/s^2
α	Side load angle	°
β	Angle of incline	°

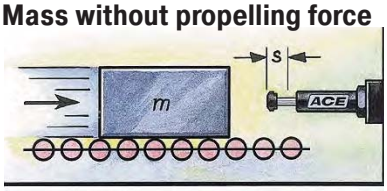
[1] All mentioned values of W_4 in the capacity charts are only valid for room temperature. There are reduced values at higher temperature ranges.

[2] v or v_D is the final impact velocity of the mass. With accelerating motion the final impact velocity can be 1.5 to 2 times higher than the average. Please take this into account when calculating kinetic energy.

[3] ST ≙ relation between starting torque and running torque of the motor (depending on the design)

In all the following examples the choice of shock absorbers made from the capacity chart is based upon the values of (W_3), (W_4), (me) and the desired shock absorber stroke (s).

1 Mass without propelling force



Formulae

$W_1 = m \cdot v^2 \cdot 0.5$
$W_2 = 0$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = v$
$me = m$

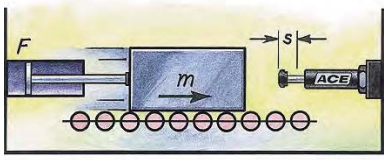
Example

m = 100 kg
v = 1.5 m/s
c = 500 /hr
s = 0.050 m (chosen)

$W_1 = 100 \cdot 1.5^2 \cdot 0.5$ = 113 Nm
$W_2 = 0$
$W_3 = 113 + 0$ = 113 Nm
$W_4 = 113 \cdot 500$ = 56 500 Nm/hr
$me = m$ = 100 kg

Chosen from capacity chart:
Model MC3350M-2 self-compensating

2 Mass with propelling force



2.1 for vertical motion upwards →
2.2 for vertical motion downwards →

Formulae

$W_1 = m \cdot v^2 \cdot 0.5$
$W_2 = F \cdot s$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = v$
$me = \frac{2 \cdot W_3}{v_D^2}$
$W_2 = (F - m \cdot g) \cdot s$
$W_2 = (F + m \cdot g) \cdot s$

Example

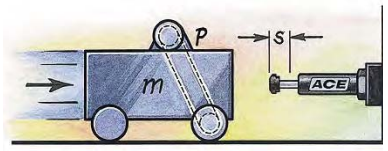
m = 36 kg
[1] v = 1.5 m/s
F = 400 N
c = 1000 /hr
s = 0.025 m (chosen)

$W_1 = 36 \cdot 1.5^2 \cdot 0.5$ = 41 Nm
$W_2 = 400 \cdot 0.025$ = 10 Nm
$W_3 = 41 + 10$ = 51 Nm
$W_4 = 51 \cdot 1000$ = 51 000 Nm/hr
$me = 2 \cdot 51 : 1.5^2$ = 45 kg

Chosen from capacity chart:
Model MC600M self-compensating

[1] v is the final impact velocity of the mass: With pneumatically propelled systems this can be 1.5 to 2 times the average velocity. Please take this into account when calculating energy.

3 Mass with motor drive



Formulae

$W_1 = m \cdot v^2 \cdot 0.5$
$W_2 = \frac{1000 \cdot P \cdot ST \cdot s}{v}$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = v$
$me = \frac{2 \cdot W_3}{v_D^2}$

Example

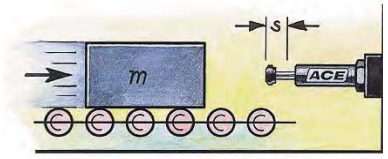
m = 800 kg
v = 1.2 m/s
ST = 2.5
P = 4 kW
c = 100 /hr
s = 0.100 m (chosen)

$W_1 = 800 \cdot 1.2^2 \cdot 0.5$ = 576 Nm
$W_2 = 1000 \cdot 4 \cdot 2.5 \cdot 0.1 : 1.2$ = 834 Nm
$W_3 = 576 + 834$ = 1 410 Nm
$W_4 = 1410 \cdot 100$ = 141 000 Nm/hr
$me = 2 \cdot 1410 : 1.2^2$ = 1 958 kg

Chosen from capacity chart:
Model MC64100M-2 self-compensating

Note: **Do not forget to include the rotational energy of motor, coupling and gearbox into calculation for W_1.**

4 Mass on driven rollers



Formulae

$W_1 = m \cdot v^2 \cdot 0.5$
$W_2 = m \cdot \mu \cdot g \cdot s$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = v$
$me = \frac{2 \cdot W_3}{v_D^2}$

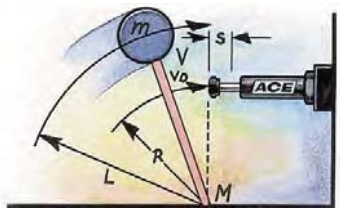
Example

m = 250 kg
v = 1.5 m/s
c = 180 /hr
(Steel/Steel) μ = 0.2
s = 0.050 m (chosen)

$W_1 = 250 \cdot 1.5^2 \cdot 0.5$ = 281 Nm
$W_2 = 250 \cdot 0.2 \cdot 9.81 \cdot 0.05$ = 25 Nm
$W_3 = 281 + 25$ = 306 Nm
$W_4 = 306 \cdot 180$ = 55 080 Nm/hr
$me = 2 \cdot 306 : 1.5^2$ = 272 kg

Chosen from capacity chart:
Model MC4550M-2 self-compensating

5 Swinging mass with propelling torque



Formulae

$W_1 = m \cdot v^2 \cdot 0.5 = 0.5 \cdot I \cdot \omega^2$
$W_2 = \frac{M \cdot s}{R}$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = \frac{v \cdot R}{L} = \omega \cdot R$
$W_2 = \frac{2 \cdot W_3}{v_D^2}$

Example

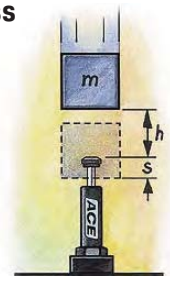
m = 20 kg
v = 1 m/s
M = 50 Nm
R = 0.5 m
L = 0.8 m
c = 1500 /hr
s = 0.012 m (chosen)

$W_1 = 20 \cdot 1^2 \cdot 0.5$ = 10 Nm
$W_2 = 50 \cdot 0.012 : 0.5$ = 1.2 Nm
$W_3 = 10 + 1.2$ = 11.2 Nm
$W_4 = 306 \cdot 180$ = 16 800 Nm/hr
$v_D = 1 \cdot 0.5 : 0.8$ = 0.63 kg
$me = 2 \cdot 11.2 : 0.63^2$ = 56 kg

Chosen from capacity chart:
Model MC150MH self-compensating

Check the side load angle, tan α = s/R, with regard to "Max. Side Load Angle" in the capacity chart (see example 6.2)

6 Free falling mass



Formulae

$W_1 = m \cdot g \cdot h$
$W_2 = m \cdot g \cdot s$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = \sqrt{2 \cdot g \cdot h}$
$me = \frac{2 \cdot W_3}{v_D^2}$

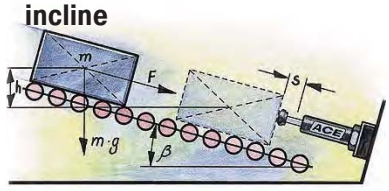
Example

m	= 30	kg
h	= 0.5	m
c	= 400	/hr
s	= 0.050	m (chosen)

$W_1 = 30 \cdot 0.5 \cdot 9.81 = 147$ Nm
$W_2 = 30 \cdot 9.81 \cdot 0.05 = 15$ Nm
$W_3 = 147 + 15 = 162$ Nm
$W_4 = 162 \cdot 400 = 64\,800$ Nm/hr
$v_D = \sqrt{2 \cdot 9.81 \cdot 0.5} = 3.13$ m/s
$me = \frac{2 \cdot 162}{3.13^2} = 33$ kg

Chosen from capacity chart:
Model MC3350M-1 self-compensating

6.1 Mass rolling/sliding down incline



6.1a propelling force up incline →
6.1b propelling force down incline →

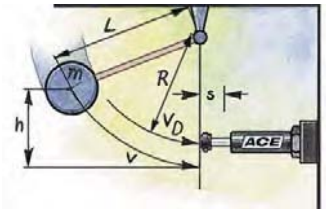
Formulae

$W_1 = m \cdot g \cdot h = m \cdot v_D^2 \cdot 0.5$
$W_2 = m \cdot g \cdot \sin\beta \cdot s$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = \sqrt{2 \cdot g \cdot h}$
$me = \frac{2 \cdot W_3}{v_D^2}$
$W_2 = (F - m \cdot g \cdot \sin\beta) \cdot s$
$W_2 = (F + m \cdot g \cdot \sin\beta) \cdot s$

6.2 Mass free falling about a pivot point

Side load angle from shock absorber axis

Calculation as per example 6.1 except $W_2 = 0$
$W_1 = m \cdot g \cdot h$
$v_D = \sqrt{2 \cdot g \cdot h} \cdot \frac{R}{L}$

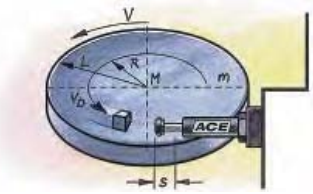


$\tan\alpha = \frac{s}{R}$

Check the side load angle, tan α = s/R, with regard to "Max. Side Load Angle" in the capacity chart

7 Rotary index table with propelling torque

Note: Formulae given are only valid for circular table with uniform weight distribution.



Formulae

$W_1 = m \cdot v^2 \cdot 0.25 = 0.5 \cdot I \cdot \omega^2$
$W_2 = \frac{M \cdot s}{R}$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = \frac{v \cdot R}{L} = \omega \cdot R$
$me = \frac{2 \cdot W_3}{v_D^2}$

Example

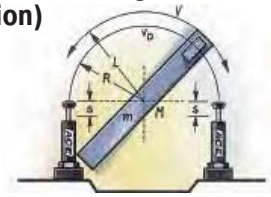
m	= 1000	kg
v	= 1.1	m/s
M	= 1000	Nm
s	= 0.050	m (chosen)
L	= 1.25	m
R	= 0.8	m
c	= 100	/hr

$W_1 = 1000 \cdot 1.1^2 \cdot 0.25 = 303$ Nm
$W_2 = 300 \cdot 0.025 : 0.8 = 63$ Nm
$W_3 = 28 + 9 = 366$ Nm
$W_4 = 37 \cdot 1200 = 36\,600$ Nm/hr
$v_D = 1 \cdot 0.8 = 0.7$ m/s
$me = 2 \cdot 37 : 0.8^2 = 1\,494$ kg

Chosen from capacity chart:
Model MC4550M-3 self-compensating

Check the side load angle, tan α = s/R, with regard to "Max. Side Load Angle" in the capacity chart (see example 6.2)

8 Swinging arm with propelling torque (uniform weight distribution)



Formulae

$W_1 = m \cdot v^2 \cdot 0.17 = 0.5 \cdot I \cdot \omega^2$
$W_2 = \frac{M \cdot s}{R}$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = \frac{v \cdot R}{L} = \omega \cdot R$
$me = \frac{2 \cdot W_3}{v_D^2}$

Example

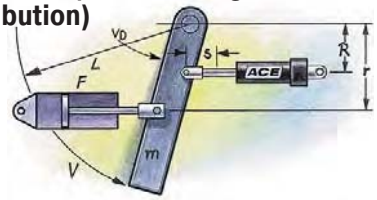
I	= 56	kgm²
ω	= 1	rad/s
M	= 300	Nm
s	= 0.025	m (chosen)
L	= 1.5	m
R	= 0.8	m
c	= 1200	/hr

$W_1 = 0.5 \cdot 56 \cdot 1^2 = 28$ Nm
$W_2 = 300 \cdot 0.025 : 0.8 = 9$ Nm
$W_3 = 28 + 9 = 37$ Nm
$W_4 = 37 \cdot 1200 = 44\,400$ Nm/hr
$v_D = 1 \cdot 0.8 = 0.8$ m/s
$me = 2 \cdot 37 : 0.8^2 = 116$ kg

Chosen from capacity chart:
Model MC600M self-compensating

Check the side load angle, tan α = s/R, with regard to "Max. Side Load Angle" in the capacity chart (see example 6.2)

9 Swinging arm with propelling force (uniform weight distribution)



Formulae

$W_1 = m \cdot v^2 \cdot 0.17 = 0.5 \cdot I \cdot \omega^2$
$W_2 = \frac{F \cdot r \cdot s}{R} = \frac{M \cdot s}{R}$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = \frac{v \cdot R}{L} = \omega \cdot R$
$me = \frac{2 \cdot W_3}{v_D^2}$

Example

m	= 1000	kg
v	= 2	m/s
F	= 7000	N
M	= 4200	Nm
s	= 0.050	m (chosen)
r	= 0.6	m
R	= 0.8	m
L	= 1.2	m
c	= 900	/hr

$W_1 = 1000 \cdot 2^2 \cdot 0.17 = 680$ Nm
$W_2 = 7000 \cdot 0.6 \cdot 0.05 : 0.8 = 263$ Nm
$W_3 = 680 + 263 = 943$ Nm
$W_4 = 943 \cdot 900 = 848\,700$ Nm/hr
$v_D = 2 \cdot 0.8 : 1{,}2 = 1.33$ m/s
$me = 2 \cdot 943 : 1.33^2 = 1066$ kg

Chosen from capacity chart:
Model CA2x2-1 self-compensating

10 Mass lowered at controlled speed

Formulae

$W_1 = m \cdot v^2 \cdot 0.5$
$W_2 = m \cdot g \cdot s$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = v$
$me = \frac{2 \cdot W_3}{v_D^2}$

Example

m	= 6000	kg
v	= 1.5	m/s
s	= 0.305	m (chosen)
c	= 60	/hr

$W_1 = 6000 \cdot 1.5^2 \cdot 0.5 = 6\,750$ Nm
$W_2 = 6000 \cdot 9.81 \cdot 0.305 = 17\,952$ Nm
$W_3 = 6750 + 17\,952 = 24\,702$ Nm
$W_4 = 24702 \cdot 60 = 1\,482\,120$ Nm/hr
$me = 2 \cdot 24702 : 1.5^2 = 21\,957$ kg

Chosen from capacity chart:
Model CA3x12-2 self-compensating

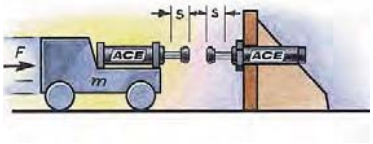
Reaction force Q (N) $Q = \frac{1.5 \cdot W_3}{s}$

Stopping time t (s) $t = \frac{2.6 \cdot s}{v_D}$

Deceleration rate a (m/s²) $a = \frac{0.75 \cdot v_D^2}{s}$

Approximate values assuming correct adjustment. Add safety margin if necessary.
(Exact values will depend upon actual application data and can be provided on request.)

19 Wagon against 2 shock absorbers



Formulae

$W_1 = m \cdot v^2 \cdot 0.25$
$W_2 = F \cdot s$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = v_1 + v_2$
$me = \frac{2 \cdot W_3}{v_D^2}$

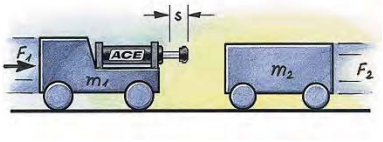
Example

m	= 5000	kg
v	= 2	m/s
c	= 10	/hr
F	= 3500	N
s	= 0.150	m (chosen)

W_1	$= 5000 \cdot 2^2 \cdot 0.25$	= 5 000	Nm
W_2	$= 3500 \cdot 0.150$	= 525	Nm
W_3	$= 5000 + 525$	= 5 525	Nm
W_4	$= 5525 \cdot 10$	= 55 250	Nm/hr
v_D	$= 2 : 2$	= 1	m/s
me	$= 2 \cdot 5525 : 1^2$	= 11 050	kg

Chosen from capacity chart:
Model CA2x6-2 self-compensating

20 Wagon against wagon



Formulae

$W_1 = \frac{m_1 \cdot m_2}{(m_1+m_2)} \cdot (v_1+v_2)^2 \cdot 0.5$
$W_2 = F \cdot s$
$W_3 = W_1 + W_2$
$W_4 = W_3 \cdot c$
$v_D = v_1 + v_2$
$me = \frac{2 \cdot W_3}{v_D^2}$

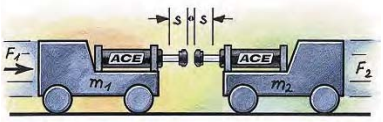
Example

m	= 7000	kg
v_1	= 1.2	m/s
c	= 20	/hr
m_2	= 10000	kg
v_2	= 0.5	m/s
F	= 5000	N
s	= 0.127	m (chosen)

W_1	$= \frac{7000 \cdot 10000}{(7000+10000)} \cdot 1.7^2 \cdot 0.5$	= 5 950	Nm
W_2	$= 5000 \cdot 0.127$	= 635	Nm
W_3	$= 5950 + 635$	= 6 585	Nm
W_4	$= 6585 \cdot 20$	= 131 700	Nm/hr
v_D	$= 1.2 + 0.5$	= 1.7	m/s
me	$= 2 \cdot 6585 : 1.7^2$	= 4 557	kg

Chosen from capacity chart:
Model CA3x5-1 self-compensating

21 Wagon against wagon 2 shock absorbers



Formulae

$W_1 = \frac{m_1 \cdot m_2}{(m_1+m_2)} \cdot (v_1+v_2)^2 \cdot 0.5$
$W_2 = F \cdot s$
$W_3 = \frac{W_1}{2} + W_2$
$W_4 = W_3 \cdot c$
$v_D = \frac{v_1 + v_2}{2}$
$me = \frac{2 \cdot W_3}{v_D^2}$

Example

m	= 7000	kg
v_1	= 1.2	m/s
x	= 20	/hr
m_2	= 10000	kg
v_2	= 0.5	m/s
F	= 5000	N
s	= 0.100	m (chosen)

W_1	$= \frac{7000 \cdot 10000}{(7000+10000)} \cdot 1.7^2 \cdot 0.5$	= 5 950	Nm
W_2	$= 5000 \cdot 0.100$	= 500	Nm
W_3	$= (5950 : 2) + 500$	= 3 475	Nm
W_4	$= 3475 \cdot 20$	= 69 500	Nm/hr
v_D	$= (1.2 + 0.5) : 2$	= 0.85	m/s
me	$= 2 \cdot 3475 : 0.85^2$	= 9 619	kg

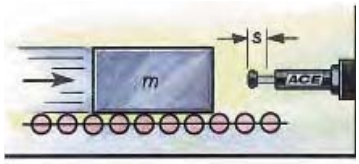
Chosen from capacity chart:
Model CA2x4-2 self-compensating

Note: When using several shock absorbers in parallel, the values (W_3), (W_4) and (me) are divided according to the number of units used.

Effective Weight (me)

A Mass without propelling force

Formula
me = m

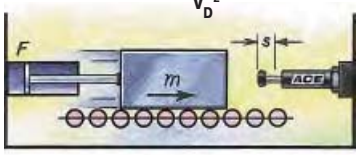


Example

m	**=**	**100 kg**
v	=	v = 2 m/s
W_1	=	W_3 = 200 Nm
me	=	$\frac{2 \cdot 200}{4}$ = **100 kg**
me	=	m

B Mass with propelling force

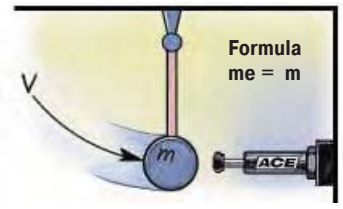
Formula
$me = \frac{2 \cdot W_3}{v_D^2}$



Example

m	**=**	**100 kg**
F	=	2000 N
v_D	=	v = 2 m/s
s	=	0.1 m
W_1	=	200 Nm
W_2	=	200 Nm
W_3	=	400 Nm
me	=	$\frac{2 \cdot 400}{4}$ = **200 kg**

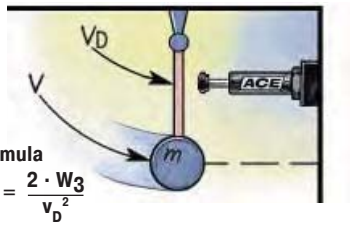
C Mass without propelling force direct against shock absorber



Example

m	**=**	**20 kg**
v_D	=	v = 2 m/s
s	=	0.1 m
W_1	=	W_3 = 40 Nm
me	=	$\frac{2 \cdot 40}{2^2}$ = **20 kg**

D Mass without propelling force with mechanical advantage



Example

m	**=**	**20 kg**
v	=	2 m/s
v_D	=	0.5 m/s
s	=	0.1 m
W_1	=	W_3 = 40 Nm
me	=	$\frac{2 \cdot 40}{0.5^2}$ = **320 kg**

The effective weight (me) can either be the same as the actual weight (examples A and C), or it can be an imaginary weight representing a combination of the propelling force or lever action plus the actual weight (examples B and D).

Capacity Chart

Type Part Number	Stroke mm	Energy Capacity W_3 Nm/Cycle	Effective Weight Self-Compensating me min. kg	 me max. kg	Page
MC5M-1-B	4	0.68	0.5	4.4	19
MC5M-2-B	4	0.68	3.8	10.8	19
MC5M-3-B	4	0.68	9.7	18,7	19
MC9M-1-B	5	1	0.6	3.2	19
MC9M-2-B	5	1	0.8	4.1	19
MC10ML-B	5	1.25	0.3	2.7	19
MC10MH-B	5	1.25	0.7	5	19
MC30M-1	8	3.50	0.4	1.9	19
MC30M-2	8	3.50	1.8	5.4	19
MC30M-3	8	3.50	5	15	19
MC25ML	6	2.80	0.7	2.2	19
MC25M	6	2.80	1.8	5.4	19
MC25MH	6	2.80	4.6	13.6	19
MC75M-1	10	9	0.3	1.1	19
MC75M-2	10	9	0.9	4.8	19
MC75M-3	10	9	2.7	36.2	19
MC150M	12	20	0.9	10	21
MC150MH	12	20	8.6	86	21
MC150MH2	12	20	70	200	21
MC150MH3	12	20	181	408	21
MC225M	12	41	2.3	25	21
MC225MH	12	41	23	230	21
MC225MH2	12	41	180	910	21
MC225MH3	12	41	816	1 814	21
MC600M	25	136	9	136	21
MC600MH	25	136	113	1 130	21
MC600MH2	25	136	400	2 300	21
MC600MH3	25	136	2 177	4 536	21
SC25M-5	8	10	1	5	25
SC25M-6	8	10	4	44	25
SC25M-7	8	10	42	500	25
SC75M-5	10	16	1	8	25
SC75M-6	10	16	7	78	25
SC75M-7	10	16	75	800	25
SC190M-0	16	25	0.7	4	23
SC190M-1	16	25	1.4	7	23
SC190M-2	16	25	3.6	18	23
SC190M-3	16	25	9	45	23
SC190M-4	16	25	23	102	23
SC190M-5	12	31	2	16	25
SC190M-6	12	31	13	140	25
SC190M-7	12	31	136	1 550	25
SC300M-0	19	33	0.7	4	23
SC300M-1	19	33	1.4	8	23
SC300M-2	19	33	4.5	27	23
SC300M-3	19	33	14	82	23
SC300M-4	19	33	32	204	23
SC300M-5	15	73	11	45	25
SC300M-6	15	73	34	136	25
SC300M-7	15	73	91	181	25
SC300M-8	15	73	135	680	25
SC300M-9	15	73	320	1 950	25
SC650M-0	25	73	2.3	14	23
SC650M-1	25	73	8	45	23
SC650M-2	25	73	23	136	23
SC650M-3	25	73	68	408	23
SC650M-4	25	73	204	1 180	23
SC650M-5	23	210	23	113	25
SC650M-6	23	210	90	360	25
SC650M-7	23	210	320	1 090	25
SC650M-8	23	210	770	2 630	25
SC650M-9	23	210	1 800	6 350	25
SC925M-0	40	110	4.5	29	23
SC925M-1	40	110	14	90	23
SC925M-2	40	110	40	272	23
SC925M-3	40	110	113	726	23
SC925M-4	40	110	340	2 088	23
MC3325M-0	25	155	3	11	38
MC3325M-1	25	155	9	40	38
MC3325M-2	25	155	30	120	38
MC3325M-3	25	155	100	420	38
MC3325M-4	25	155	350	1 420	38
MC3350M-0	50	310	5	22	38
MC3350M-1	50	310	18	70	38
MC3350M-2	50	310	60	250	38
MC3350M-3	50	310	210	840	38
MC3350M-4	50	310	710	2 830	38

Type Part Number	Stroke mm	Energy Capacity W_3 Nm/Cycle	Effective Weight Self-Compensating me min. kg	 me max. kg	Page
MC4525M-0	25	340	7	27	40
MC4525M-1	25	340	20	90	40
MC4525M-2	25	340	80	310	40
MC4525M-3	25	340	260	1 050	40
MC4525M-4	25	340	890	3 540	40
MC4550M-0	50	680	13	54	40
MC4550M-1	50	680	45	180	40
MC4550M-2	50	680	150	620	40
MC4550M-3	50	680	520	2 090	40
MC4550M-4	50	680	1 800	7 100	40
MC4575M-0	75	1 020	20	80	40
MC4575M-1	75	1 020	70	270	40
MC4575M-2	75	1 020	230	930	40
MC4575M-3	75	1 020	790	3 140	40
MC4575M-4	75	1 020	2 650	10 600	40
MC6450M-0	50	1 700	35	140	42
MC6450M-1	50	1 700	140	540	42
MC6450M-2	50	1 700	460	1 850	42
MC6450M-3	50	1 700	1 600	6 300	42
MC6450M-4	50	1 700	5 300	21 200	42
MC64100M-0	100	3 400	70	280	42
MC64100M-1	100	3 400	270	1 100	42
MC64100M-2	100	3 400	930	3 700	42
MC64100M-3	100	3 400	3 150	12 600	42
MC64100M-4	100	3 400	10 600	42 500	42
MC64150M-0	150	5 100	100	460	42
MC64150M-1	150	5 100	410	1 640	42
MC64150M-2	150	5 100	1 390	5 600	42
MC64150M-3	150	5 100	4 700	18 800	42
MC64150M-4	150	5 100	16 000	63 700	42
CA2x2-1	50	3 600	700	2 200	53
CA2x2-2	50	3 600	1 800	5 400	53
CA2x2-3	50	3 600	4 500	13 600	53
CA2x2-4	50	3 600	11 300	34000	53
CA2x4-1	102	7 200	1 400	4 400	53
CA2x4-2	102	7 200	3 600	11 000	53
CA2x4-3	102	7 200	9 100	27200	53
CA2x4-4	102	7 200	22 600	68 000	53
CA2x6-1	152	10 800	2 200	6 500	53
CA2x6-2	152	10 800	5 400	16 300	53
CA2x6-3	152	10 800	13 600	40 800	53
CA2x6-4	152	10 800	34 000	102 000	53
CA2x8-1	203	14 500	2 900	8 700	53
CA2x8-2	203	14 500	7 200	21 700	53
CA2x8-3	203	14 500	18 100	54 400	53
CA2x8-4	203	14 500	45 300	136 000	53
CA2x10-1	254	18 000	3 600	11 000	53
CA2x10-2	254	18 000	9 100	27 200	53
CA2x10-3	254	18 000	22 600	68 000	53
CA2x10-4	254	18 000	56 600	170 000	53
CA3x5-1	127	14 125	2 900	8 700	54
CA3x5-2	127	14 125	7 250	21 700	54
CA3x5-3	127	14 125	18 100	54 350	54
CA3x5-4	127	14 125	45 300	135 900	54
CA3x8-1	203	22 600	4 650	13 900	54
CA3x8-2	203	22 600	11 600	34800	54
CA3x8-3	203	22 600	29 000	87 000	54
CA3x8-4	203	22 600	72 500	217 000	54
CA3x12-1	305	33 900	6 950	20 900	54
CA3x12-2	305	33 900	17 400	52 200	54
CA3x12-3	305	33 900	43 500	130 450	54
CA3x12-4	305	33 900	108 700	326 000	54
CA4x6-3	152	47 500	3 500	8 600	55
CA4x6-5	152	47 500	8 600	18 600	55
CA4x6-7	152	47 500	18 600	42 700	55
CA4x8-3	203	63 300	5 000	11 400	55
CA4x8-5	203	63 300	11 400	25 000	55
CA4x8-7	203	63 300	25 000	57 000	55
CA4x16-3	406	126 500	10 000	23 000	55
CA4x16-5	406	126 500	23 000	50 000	55
CA4x16-7	406	126 500	50 000	115 000	55

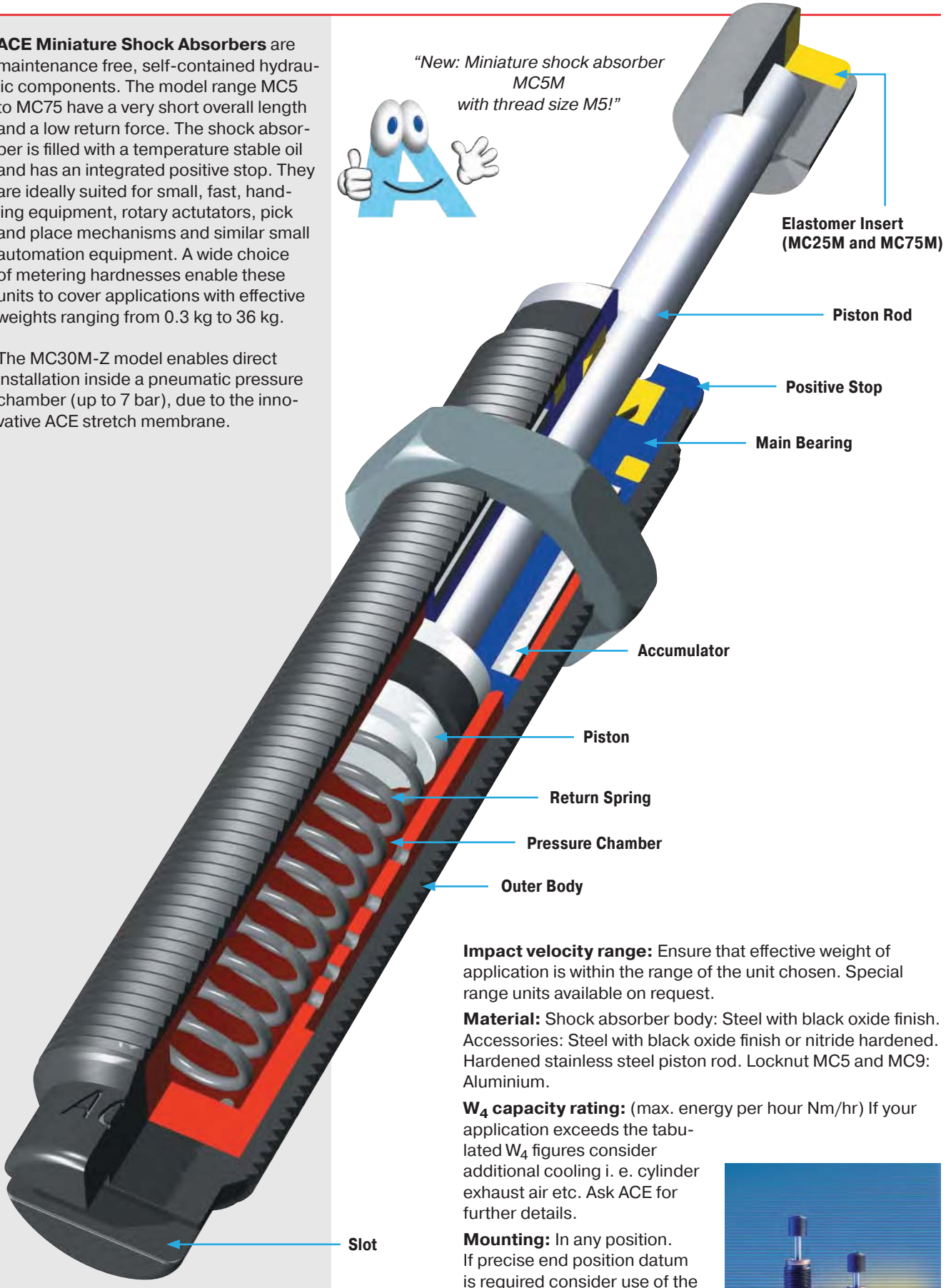
Capacity Chart

Type Part Number	Stroke mm	Max. Energy Capacity Nm W_3 Nm/Cycle	Max. Energy Capacity Nm Self-Contained W_4 Nm/h	Effective Weight me Adjustable me min. kg	Effective Weight me Adjustable me max. kg	Page
MA30M	8	3.5	5 650	0.23	15	27
FA1008VD-B	8	1.8	3 600	0.2	10	27
MA50M	7	5.5	13 550	4.5	20	27
MA35M	10	4	6 000	6	57	27
MA150M	12	22	35 000	1	109	27
MA225M	19	25	45 000	2.3	226	27
MA600M	25	68	68 000	9	1 360	27
MA900M	40	100	90 000	14	2 040	27
MA3325M	25	170	75 000	9	1 700	38
ML3325M	25	170	75 000	300	50 000	38
MA3350M	50	340	85 000	13	2 500	38
ML3350M	50	340	85 000	500	80000	38
MA4525M	25	390	107 000	40	10 000	40
ML4525M	25	390	107 000	3 000	110000	40
MA4550M	50	780	112 000	70	14 500	40
ML4550M	50	780	112 000	5 000	180 000	40
MA4575M	75	1 170	146 000	70	15 000	40
ML6425M	25	1 020	124 000	7 000	300 000	42
MA6450M	50	2 040	146 000	220	50 000	42
ML6450M	50	2 040	146 000	11 000	500 000	42
MA64100M	100	4 080	192 000	270	52 000	42
MA64150M	150	6 120	248 000	330	80 000	42
A11/2x2	50	2 350	362 000	195	32 000	52
A11/2x31/2	89	4 150	633 000	218	36 000	52
A11/2x5	127	5 900	904 000	227	41 000	52
A11/2x61/2	165	7 700	1 180 000	308	45 000	52
A2x2	50	3 600	1 100 000	250	77 000	53
A2x4	102	9 000	1 350 000	250	82 000	53
A2x6	152	13 500	1 600 000	260	86 000	53
A2x8	203	19 200	1 900 000	260	90 000	53
A2x10	254	23 700	2 200 000	320	113 000	53
A3x5	127	15 800	2 260 000	480	154 000	54
A3x8	203	28 200	3 600 000	540	181 500	54
A3x12	305	44 000	5 400 000	610	204 000	54

ACE Miniature Shock Absorbers are maintenance free, self-contained hydraulic components. The model range MC5 to MC75 have a very short overall length and a low return force. The shock absorber is filled with a temperature stable oil and has an integrated positive stop. They are ideally suited for small, fast, handling equipment, rotary actutators, pick and place mechanisms and similar small automation equipment. A wide choice of metering hardnesses enable these units to cover applications with effective weights ranging from 0.3 kg to 36 kg.

The MC30M-Z model enables direct installation inside a pneumatic pressure chamber (up to 7 bar), due to the innovative ACE stretch membrane.

"New: Miniature shock absorber MC5M with thread size M5!"



Impact velocity range: Ensure that effective weight of application is within the range of the unit chosen. Special range units available on request.

Material: Shock absorber body: Steel with black oxide finish. Accessories: Steel with black oxide finish or nitride hardened. Hardened stainless steel piston rod. Locknut MC5 and MC9: Aluminium.

W_4 capacity rating: (max. energy per hour Nm/hr) If your application exceeds the tabulated W_4 figures consider additional cooling i. e. cylinder exhaust air etc. Ask ACE for further details.

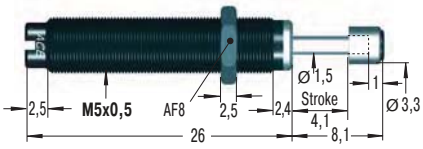
Mounting: In any position. If precise end position datum is required consider use of the optional stop collar type AH.

Operating temperature range: 0° C to 65° C

On request: the MC Series are available with weartec finish (seawater resistant) or other special finishes.

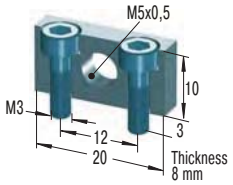
MC5M

NEW



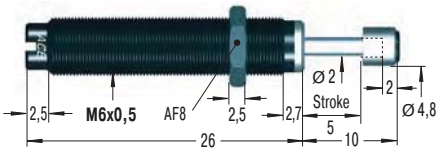
Accessories, mounting, installation ... see pages 30 to 35.

MB5SC2



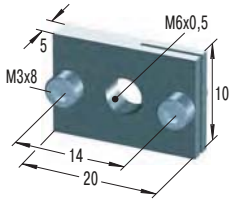
Mounting Block

MC9M



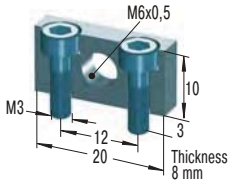
Accessories, mounting, installation ... see pages 30 to 35.

RF6



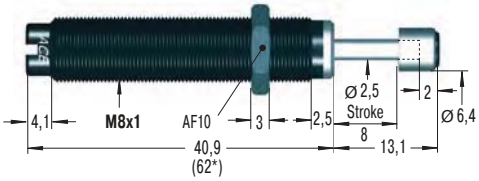
Rectangular Flange

MB6SC2



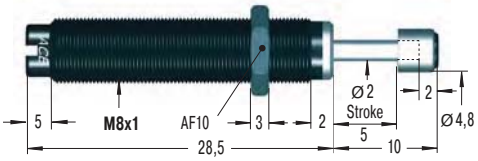
Mounting Block

MC30M for use on new installations



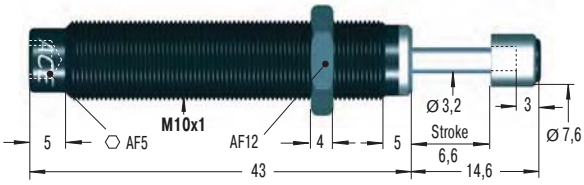
Dims. in ( ) add Suffix: -Z, type for direct installation inside a pressure chamber.
Accessories, mounting, installation ... see pages 30 to 35.

MC10M still available in future



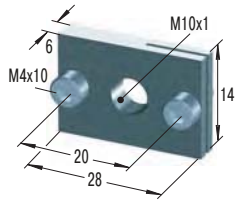
M8x0.75 also available to order

MC25M



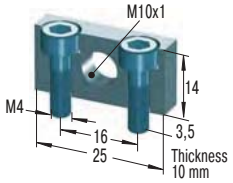
Accessories, mounting, installation ... see pages 30 to 35.

RF10



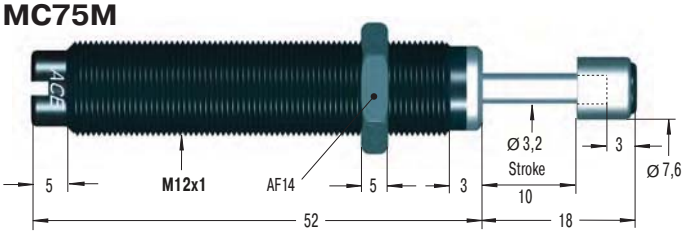
Rectangular Flange

MB10SC2



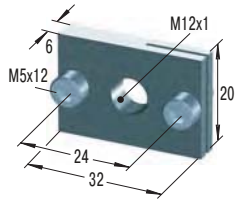
Mounting Block

MC75M



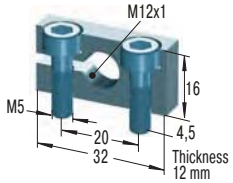
Accessories, mounting, installation ... see pages 30 to 35.

RF12



Rectangular Flange

MB12



Clamp Mount

Available without rod end button on request.

Capacity Chart

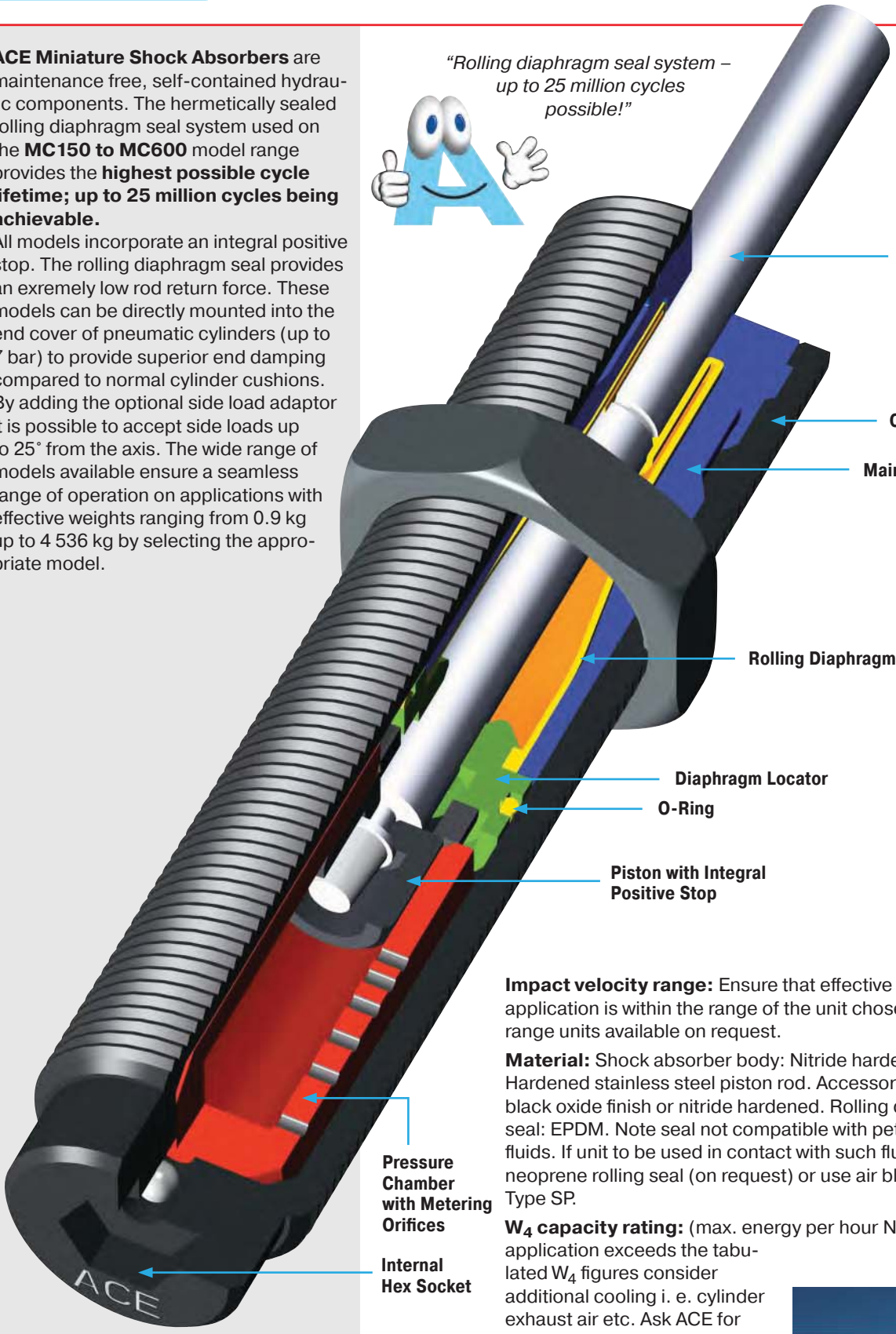
Type	Max. Energy Capacity W_3 Nm/Cycle	Max. Energy Capacity W_4 Nm/h	Effective Weight me Self-Compensating me min. kg	Effective Weight me Self-Compensating me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	[1] Max. Side Load Angle °	Weight kg
MC5M-1-B	0.68	2 040	0.5	4.4	1	5	0.2	2	0.003
MC5M-2-B	0.68	2 040	3.8	10.8	1	5	0.2	2	0.003
MC5M-3-B	0.68	2 040	9.7	18.7	1	5	0.2	2	0.003
MC9M-1-B	1	2 000	0.6	3.2	1.38	3.78	0.3	2	0.005
MC9M-2-B	1	2 000	0.8	4.1	1.38	3.78	0.3	2	0.005
MC10ML-B	1.25	4 000	0.3	2.7	2	4	0.6	3	0.010
MC10MH-B	1.25	4 000	0.7	5	2	4	0.6	3	0.010
MC30M-1	3.5	5 600	0.4	1.9	1.7	5.3	0.3	2	0.010
MC30M-2	3.5	5 600	1.8	5.4	1.7	5.3	0.3	2	0.010
MC30M-3	3.5	5 600	5	15	1.7	5.3	0.3	2	0.010
MC25ML	2.8	22 600	0.7	2.2	3	6	0.3	2	0.020
MC25M	2.8	22 600	1.8	5.4	3	6	0.3	2	0.020
MC25MH	2.8	22 600	4.6	13,6	3	6	0.3	2	0.020
MC75M-1	9	28 200	0.3	1.1	4	9	0.3	2	0.030
MC75M-2	9	28 200	0.9	4.8	4	9	0.3	2	0.030
MC75M-3	9	28 200	2.7	36.2	4	9	0.3	2	0.030

[1] For applications with higher side load angles consider using the side load adaptor (BV) pages 30 and 34.

ACE Miniature Shock Absorbers are maintenance free, self-contained hydraulic components. The hermetically sealed rolling diaphragm seal system used on the **MC150 to MC600** model range provides the **highest possible cycle lifetime; up to 25 million cycles being achievable.**

All models incorporate an integral positive stop. The rolling diaphragm seal provides an exremely low rod return force. These models can be directly mounted into the end cover of pneumatic cylinders (up to 7 bar) to provide superior end damping compared to normal cylinder cushions. By adding the optional side load adaptor it is possible to accept side loads up to 25˚ from the axis. The wide range of models available ensure a seamless range of operation on applications with effective weights ranging from 0.9 kg up to 4 536 kg by selecting the appropriate model.

"Rolling diaphragm seal system – up to 25 million cycles possible!"



Impact velocity range: Ensure that effective weight of application is within the range of the unit chosen. Special range units available on request.

Material: Shock absorber body: Nitride hardened steel. Hardened stainless steel piston rod. Accessories: Steel with black oxide finish or nitride hardened. Rolling diaphragm seal: EPDM. Note seal not compatible with petroleum based fluids. If unit to be used in contact with such fluids specify neoprene rolling seal (on request) or use air bleed adaptor Type SP.

W_4 capacity rating: (max. energy per hour Nm/hr) If your application exceeds the tabulated W_4 figures consider additional cooling i. e. cylinder exhaust air etc. Ask ACE for further details.

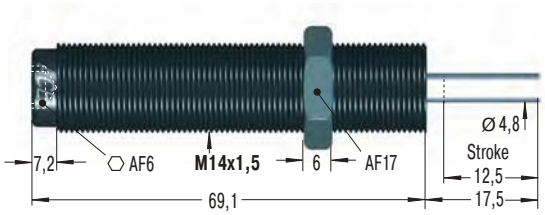
Mounting: In any position. If precise end position datum is required consider use of the optional stop collar type AH.

Operating temperature range: 0 ˚C to 66 ˚C

On request: Stainless Steel outer body. Weartec finish (sea-water resistant). Other finishes available to special order.

Issue 9.2007 Specifications subject to change

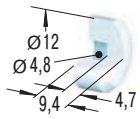
MC150M



M14x1 also available to special order

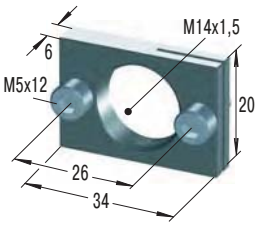
Accessories, mounting, installation ... see pages 31 to 35.

PP150



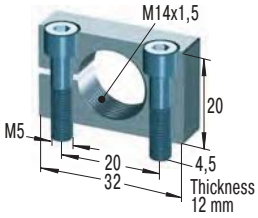
Nylon Button
W_3 max = 14 Nm

RF14



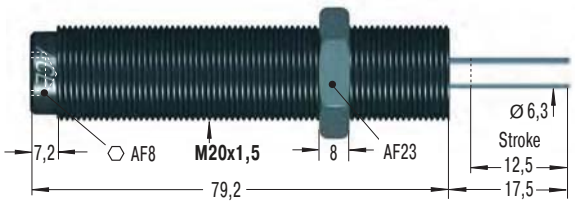
Rectangular Flange

MB14



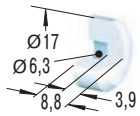
Clamp Mount

MC225M



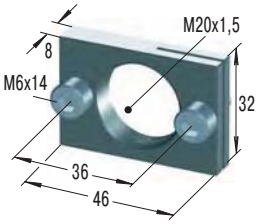
Accessories, mounting, installation ... see pages 31 to 35.

PP225



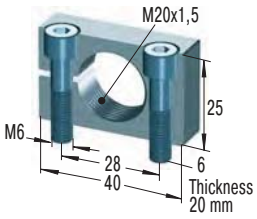
Nylon Button
W_3 max = 33 Nm

RF20



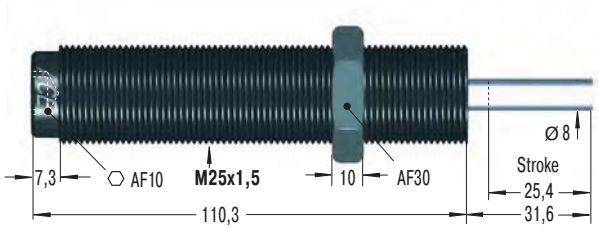
Rectangular Flange

MB20



Clamp Mount

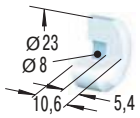
MC600M



M27x3 also available to special order

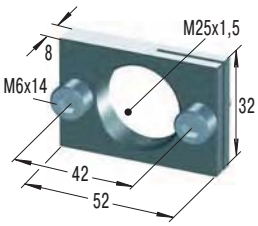
Accessories, mounting, installation ... see pages 31 to 35.

PP600



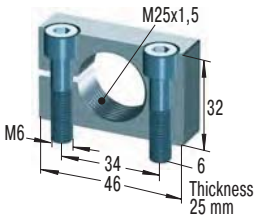
Nylon Button
W_3 max = 68 Nm

RF25



Rectangular Flange

MB25



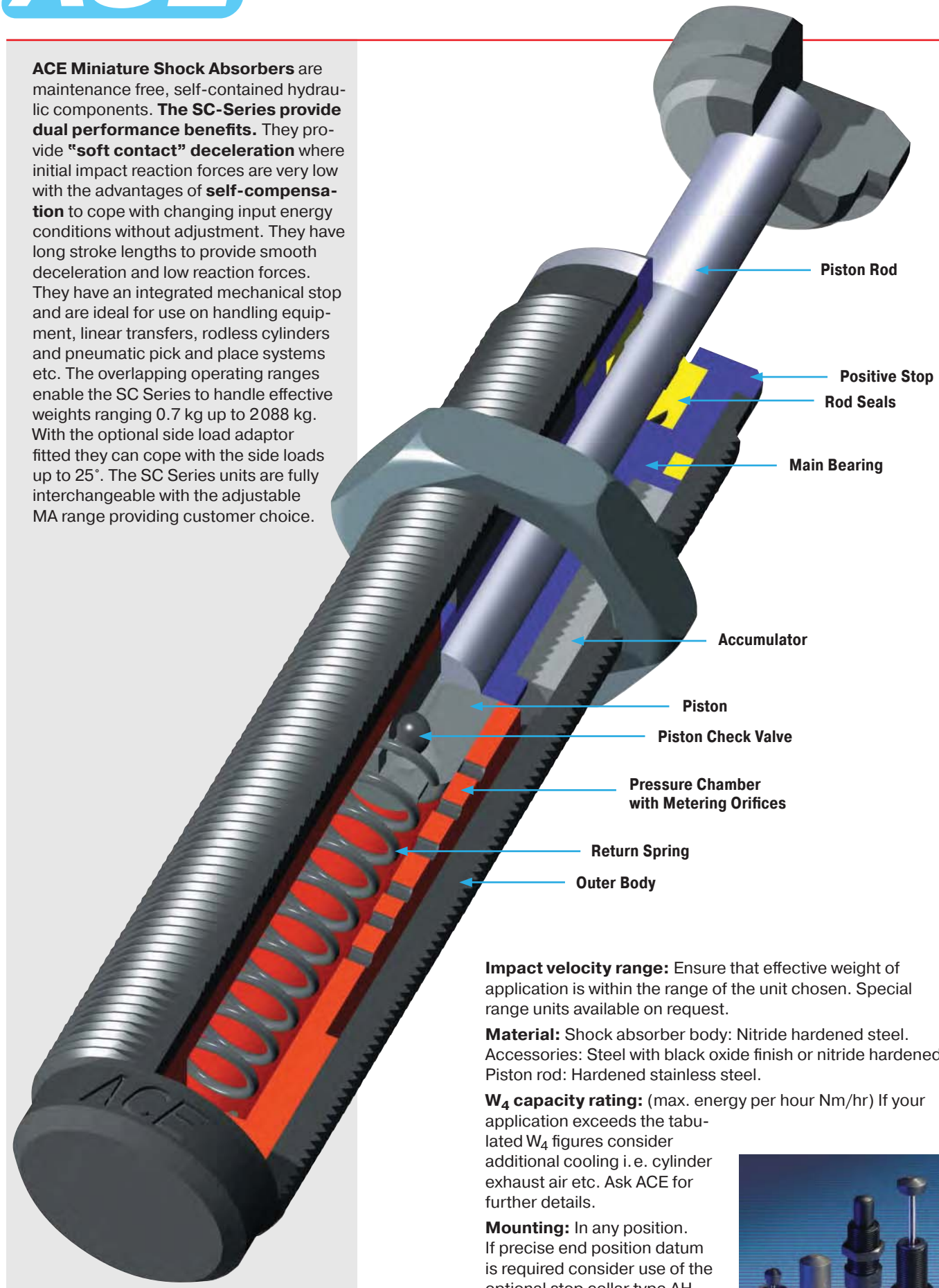
Clamp Mount

Capacity Chart

Type	Max. Energy Capacity W_3 Nm/Cycle	Max. Energy Capacity W_4 Nm/h	Effective Weight me Self-Compensating me min. kg	Effective Weight me Self-Compensating me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	[1] Max. Side Load Angle °	Weight kg
MC150M	20	34 000	0.9	10	3	5	0.4	4	0.06
MC150MH	20	34 000	8.6	86	3	5	0.4	4	0.06
MC150MH2	20	34 000	70	200	3	5	0.4	4	0.06
MC150MH3	20	34 000	181	408	3	5	1	4	0.06
MC225M	41	45 000	2.3	25	4	6	0.3	4	0.15
MC225MH	41	45 000	23	230	4	6	0.3	4	0.15
MC225MH2	41	45 000	180	910	4	6	0.3	4	0.15
MC225MH3	41	45 000	816	1 814	4	6	0.3	4	0.15
MC600M	136	68 000	9	136	5	9	0.6	2	0.26
MC600MH	136	68 000	113	1 130	5	9	0.6	2	0.26
MC600MH2	136	68 000	400	2 300	5	9	0.6	2	0.26
MC600MH3	136	68 000	2 177	4 536	5	9	0.6	2	0.26

[1] For applications with higher side load angles consider using the side load adaptor (BV) pages 30 to 34.

ACE Miniature Shock Absorbers are maintenance free, self-contained hydraulic components. **The SC-Series provide dual performance benefits.** They provide **"soft contact" deceleration** where initial impact reaction forces are very low with the advantages of **self-compensation** to cope with changing input energy conditions without adjustment. They have long stroke lengths to provide smooth deceleration and low reaction forces. They have an integrated mechanical stop and are ideal for use on handling equipment, linear transfers, rodless cylinders and pneumatic pick and place systems etc. The overlapping operating ranges enable the SC Series to handle effective weights ranging 0.7 kg up to 2088 kg. With the optional side load adaptor fitted they can cope with the side loads up to 25°. The SC Series units are fully interchangeable with the adjustable MA range providing customer choice.



Impact velocity range: Ensure that effective weight of application is within the range of the unit chosen. Special range units available on request.

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish or nitride hardened. Piston rod: Hardened stainless steel.

W_4 capacity rating: (max. energy per hour Nm/hr) If your application exceeds the tabulated W_4 figures consider additional cooling i.e. cylinder exhaust air etc. Ask ACE for further details.

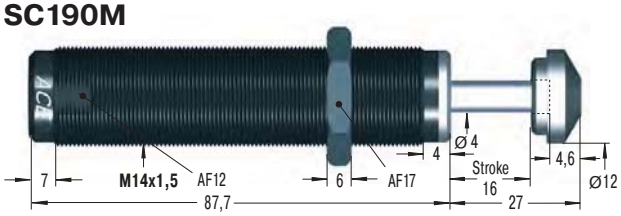
Mounting: In any position. If precise end position datum is required consider use of the optional stop collar type AH.

Operating temperature range: 0 °C to 66 °C

On request: Weartec finish (seawater resistent). Other special finishes available to special order.

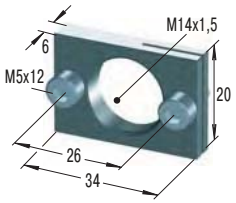
Issue 9.2007 Specifications subject to change

SC190M



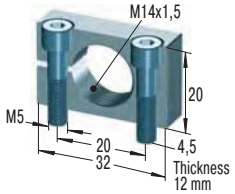
M14x1 and M16x1 also available to special order
Accessories, mounting, installation ... see pages 31 to 35.

RF14



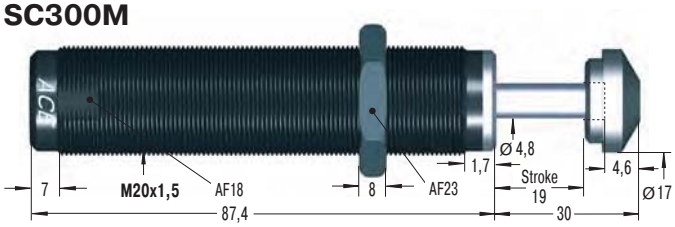
Rectangular Flange

MB14



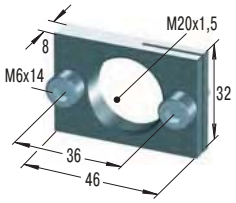
Clamp Mount

SC300M



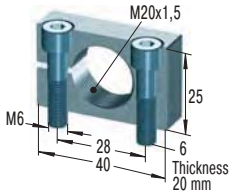
M22x1.5 also available to special order
Accessories, mounting, installation ... see pages 31 to 35.

RF20



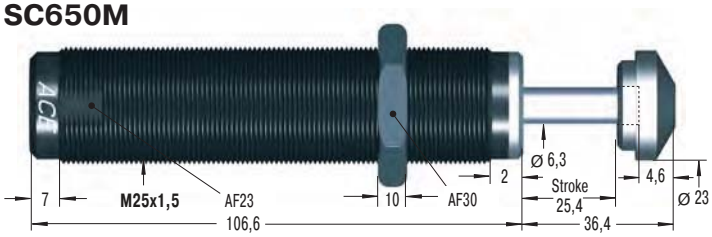
Rectangular Flange

MB20



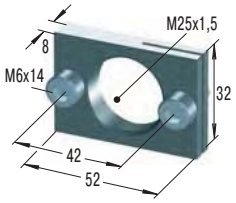
Clamp Mount

SC650M



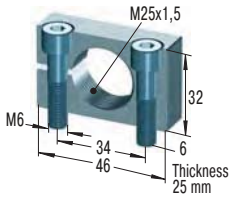
M26x1.5 also available to special order
Accessories, mounting, installation ... see pages 32 to 35.

RF25



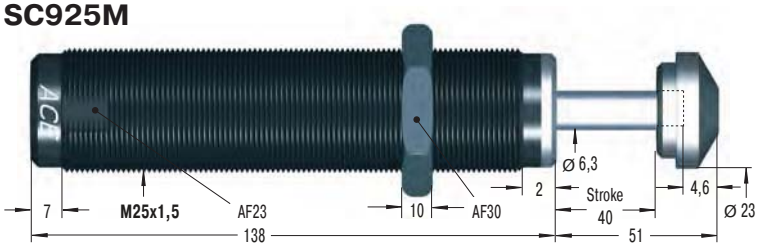
Rectangular Flange

MB25

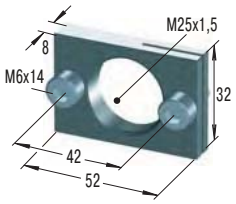


Clamp Mount

SC925M

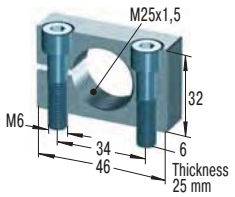


RF25



Rectangular Flange

MB25



Clamp Mount

Accessories, mounting, installation ... see pages 32 to 35.

Available without rod end button on request.

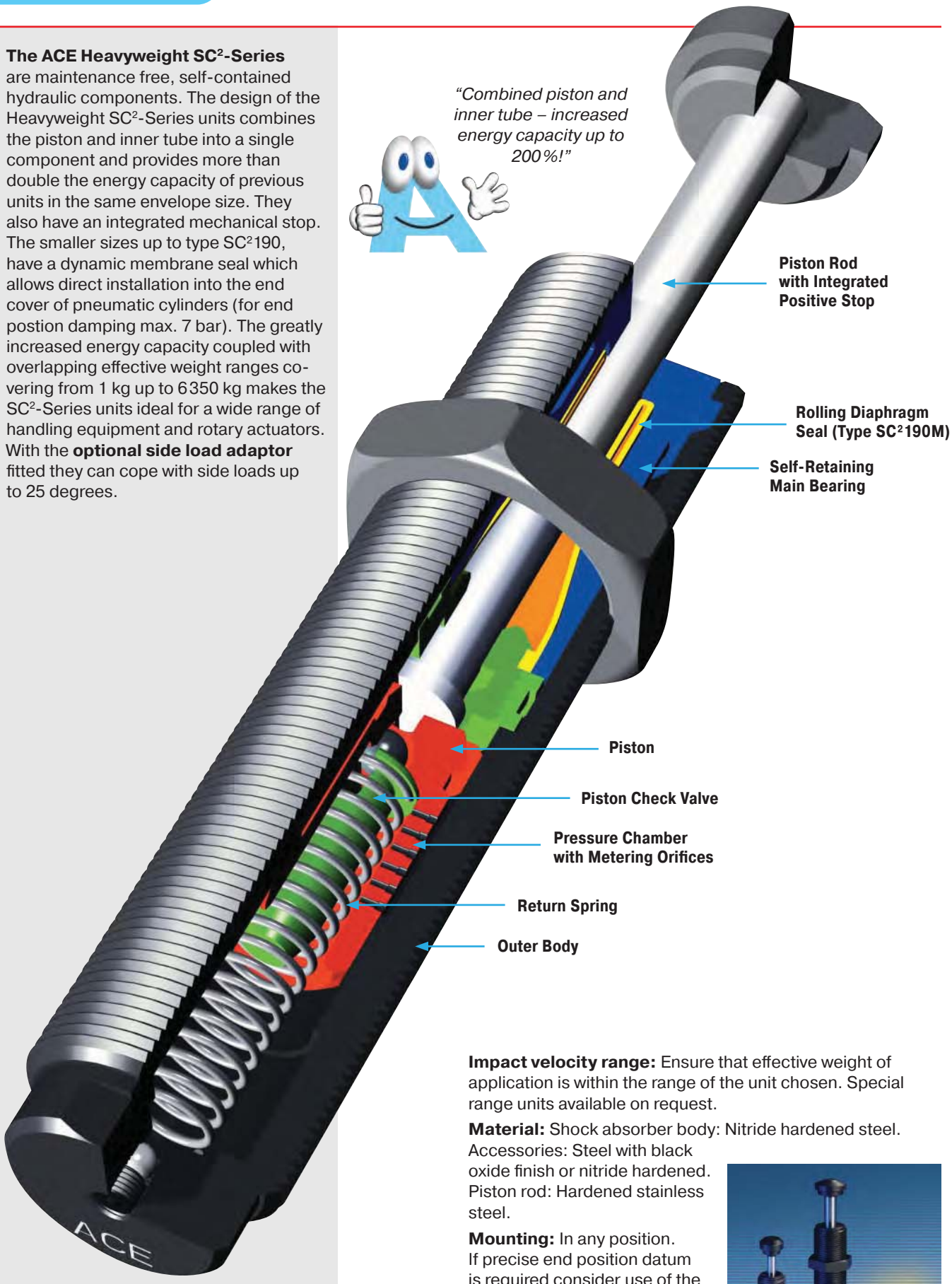
Capacity Chart

Type	Max. Energy Capacity W_3 Nm/Cycle	Max. Energy Capacity W_4 Nm/h	Effective Weight me Soft-Contact me min. kg	Soft-Contact me max. kg	Self-Compensating me min. kg	Self-Compensating me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	[1] Max. Side Load Angle °	Weight kg
SC190M-0	25	34 000	-	-	0.7	4	4	9	0.25	5	0.08
SC190M-1	25	34 000	2.3	6	1.4	7	4	9	0.25	5	0.08
SC190M-2	25	34 000	5.5	16	3.6	18	4	9	0.25	5	0.08
SC190M-3	25	34 000	14	41	9	45	4	9	0.25	5	0.08
SC190M-4	25	34 000	34	91	23	102	4	9	0.25	5	0.08
SC300M-0	33	45 000	-	-	0.7	4	5	10	0.1	5	0.11
SC300M-1	33	45 000	2.3	7	1.4	8	5	10	0.1	5	0.11
SC300M-2	33	45 000	7	23	4.5	27	5	10	0.1	5	0.11
SC300M-3	33	45 000	23	68	14	82	5	10	0.1	5	0.11
SC300M-4	33	45 000	68	181	32	204	5	10	0.1	5	0.11
SC650M-0	73	68 000	-	-	2,3	14	11	32	0.2	5	0.31
SC650M-1	73	68 000	11	36	8	45	11	32	0.2	5	0.31
SC650M-2	73	68 000	34	113	23	136	11	32	0.2	5	0.31
SC650M-3	73	68 000	109	363	68	408	11	32	0.2	5	0.31
SC650M-4	73	68 000	363	1 089	204	1 180	11	32	0.2	5	0.31
SC925M-0	110	90 000	8	25	4.5	29	11	32	0.4	5	0.39
SC925M-1	110	90 000	22	72	14	90	11	32	0.4	5	0.39
SC925M-2	110	90 000	59	208	40	272	11	32	0.4	5	0.39
SC925M-3	110	90 000	181	612	113	726	11	32	0.4	5	0.39
SC925M-4	110	90 000	544	1 952	340	2 088	11	32	0.4	5	0.39

[1] For applications with higher side load angles consider using the side load adaptor (BV) pages 30 to 34.

The ACE Heavyweight SC²-Series are maintenance free, self-contained hydraulic components. The design of the Heavyweight SC²-Series units combines the piston and inner tube into a single component and provides more than double the energy capacity of previous units in the same envelope size. They also have an integrated mechanical stop. The smaller sizes up to type SC²190, have a dynamic membrane seal which allows direct installation into the end cover of pneumatic cylinders (for end postion damping max. 7 bar). The greatly increased energy capacity coupled with overlapping effective weight ranges covering from 1 kg up to 6350 kg makes the SC²-Series units ideal for a wide range of handling equipment and rotary actuators. With the **optional side load adaptor** fitted they can cope with side loads up to 25 degrees.

"Combined piston and inner tube – increased energy capacity up to 200 %!"



Impact velocity range: Ensure that effective weight of application is within the range of the unit chosen. Special range units available on request.

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish or nitride hardened. Piston rod: Hardened stainless steel.

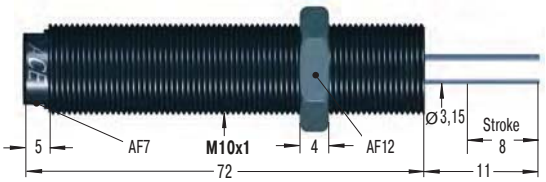
Mounting: In any position. If precise end position datum is required consider use of the optional stop collar type AH.

Operating temperature range: 0 °C to 66 °C

On request: Weartec finish (seawater resistent). Other special finishes available to special order.

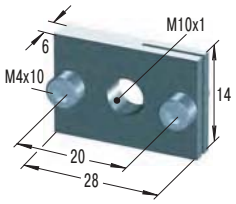
Issue 9.2007 Specifications subject to change

SC25M



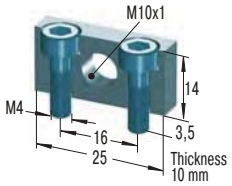
Accessories, mounting, installation ... see pages 30 to 35.

RF10



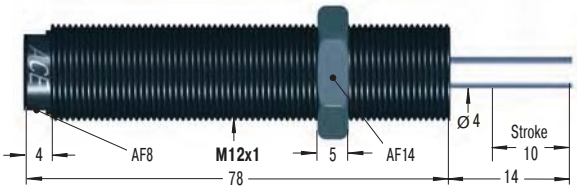
Rectangular Flange

MB10SC2



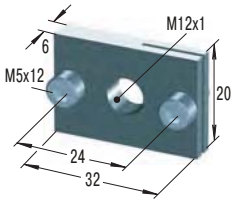
Mounting Block

SC75M



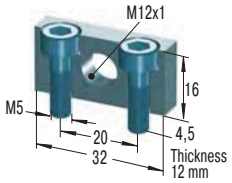
Accessories, mounting, installation ... see pages 30 to 35.

RF12



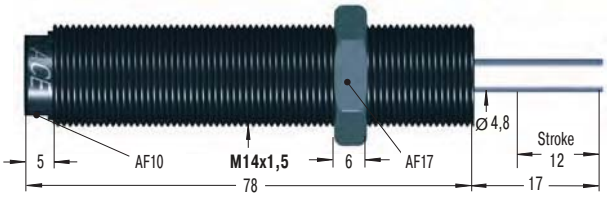
Rectangular Flange

MB12SC2



Mounting Block

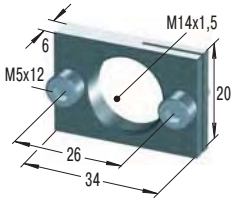
SC190M



M14 x 1 also available to special order

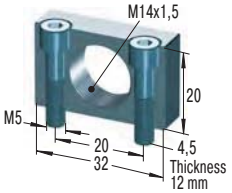
Accessories, mounting, installation ... see pages 31 to 35.

RF14



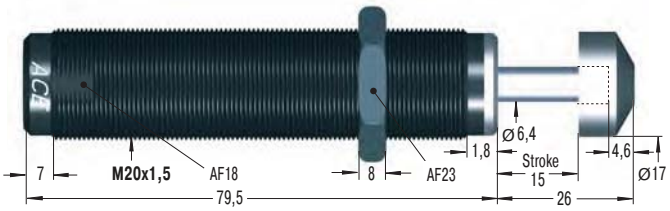
Rectangular Flange

MB14SC2



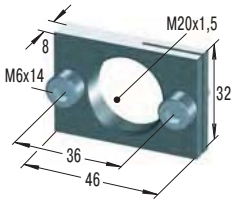
Mounting Block

SC300M



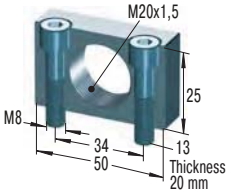
Accessories, mounting, installation ... see pages 31 to 35.

RF20



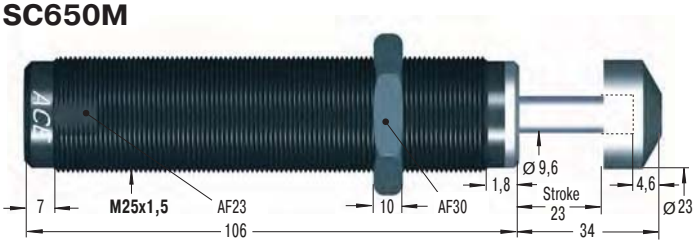
Rectangular Flange

MB20SC2



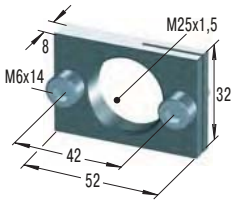
Mounting Block

SC650M



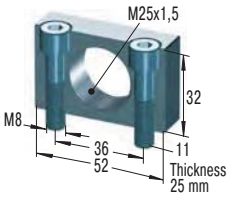
Accessories, mounting, installation ... see pages 32 to 35.

RF25



Rectangular Flange

MB25SC2



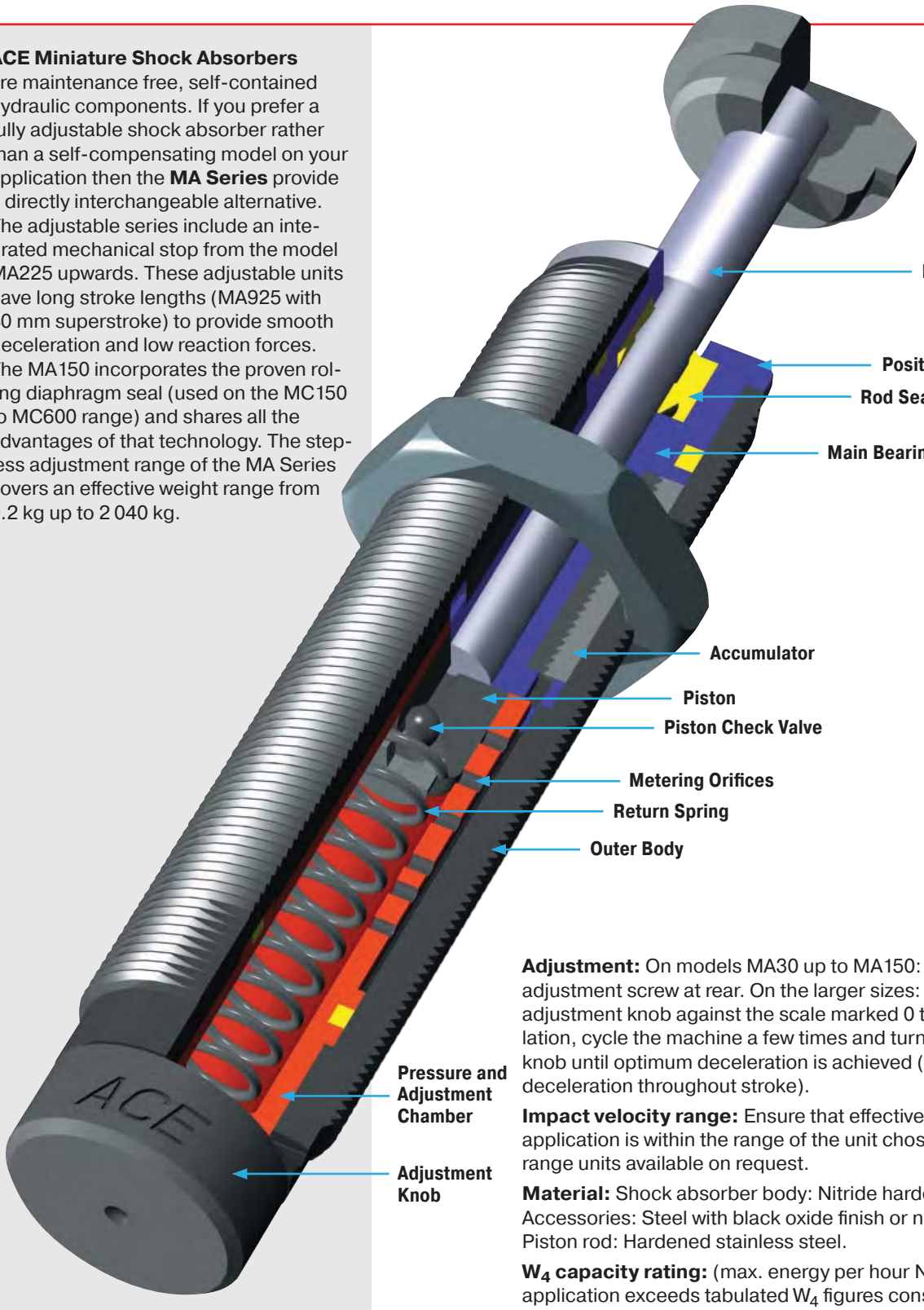
Mounting Block

Capacity Chart

Type	Max. Energy Capacity W_3 Nm/Cycle	Max. Energy Capacity W_4 Nm/h	Effective Weight me Soft/Hard -5 min kg max	-6 min kg max	-7 min kg max	-8 min kg max	-9 min kg max	Min. Return Force N	Max. Return Force N	Rod Reset Time s	[1] Max. Side Load Angle °	Weight kg
SC25M	10	16 000	1 - 5	4 - 44	42 - 500			4.5	14	0.3	2	0.03
SC75M	16	30 000	1 - 8	7 - 78	75 - 800			6	19	0.3	2	0.045
SC190M	31	50 000	2 - 16	13 - 140	136 - 1 550			6	19	0.4	2	0.06
SC300M	73	45 000	11 - 45	34 - 136	91 - 181	135 - 680	320 - 1 950	8	18	0.2	5	0.15
SC650M	210	68 000	23 - 113	90 - 360	320 - 1 090	770 - 2 630	1 800 - 6 350	11	32	0.3	5	0.35

[1] For applications with higher side load angles consider using the side load adaptor (BV) pages 30 to 34.

ACE Miniature Shock Absorbers are maintenance free, self-contained hydraulic components. If you prefer a fully adjustable shock absorber rather than a self-compensating model on your application then the **MA Series** provide a directly interchangeable alternative. The adjustable series include an integrated mechanical stop from the model MA225 upwards. These adjustable units have long stroke lengths (MA925 with 40 mm superstroke) to provide smooth deceleration and low reaction forces. The MA150 incorporates the proven rolling diaphragm seal (used on the MC150 to MC600 range) and shares all the advantages of that technology. The stepless adjustment range of the MA Series covers an effective weight range from 0.2 kg up to 2 040 kg.



Adjustment: On models MA30 up to MA150: by turning the adjustment screw at rear. On the larger sizes: by turning the adjustment knob against the scale marked 0 to 9. After installation, cycle the machine a few times and turn the adjustment knob until optimum deceleration is achieved (i.e. smooth deceleration throughout stroke).

Impact velocity range: Ensure that effective weight of application is within the range of the unit chosen. Special range units available on request.

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish or nitride hardened. Piston rod: Hardened stainless steel.

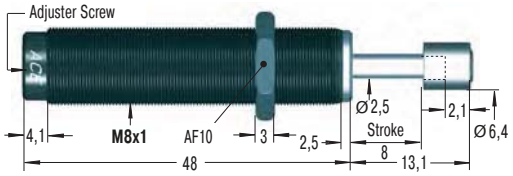
W_4 capacity rating: (max. energy per hour Nm/hr) If your application exceeds tabulated W_4 figures consider additional cooling i.e. cylinder exhaust air etc. Ask ACE for assistance.

Mounting: In any position. If precise end position datum is required consider use of the optional stop collar type AH. Install a mechanical stop 0.5 to 1 mm before end stroke on FA1008.

Operating temperature range: 0 °C to 66 °C

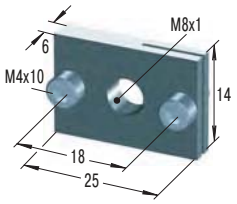
On request: Weartec finish (seawater resistent). Other special finishes available to special order.

MA30M



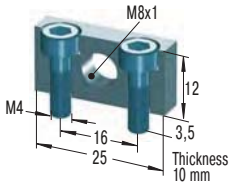
Accessories, mounting, installation ... see pages 30 to 35.

RF8



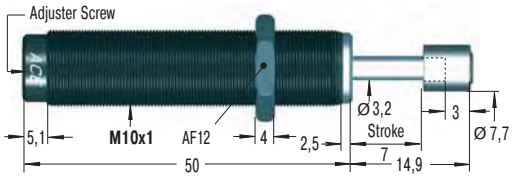
Rectangular Flange

MB8SC2



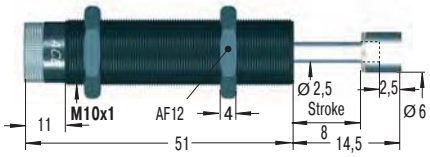
Mounting Block

MA50M for use on new installations



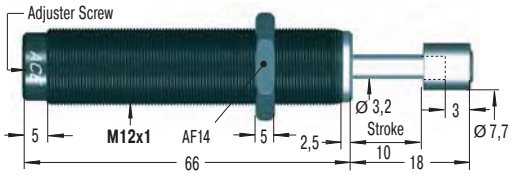
Accessories, mounting, installation ... see pages 30 to 35.

FA1008VD-B still available in future



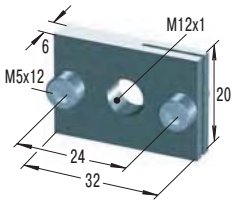
Accessories, mounting, installation ... see pages 30 to 35.

MA35M



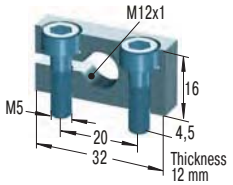
Accessories, mounting, installation ... see pages 31 to 35.

RF12



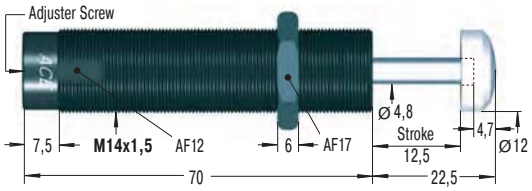
Rectangular Flange

MB12



Clamp Mount

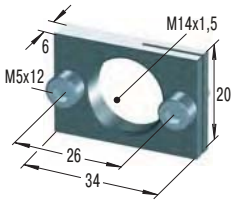
MA150M



M14 x 1 also available to special order

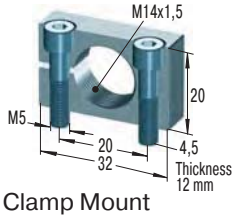
Accessories, mounting, installation ... see pages 31 to 35.

RF14



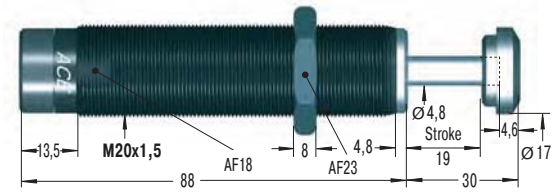
Rectangular Flange

MB14



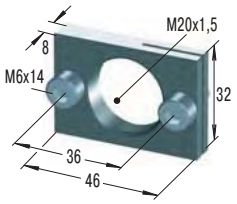
Clamp Mount

MA225M



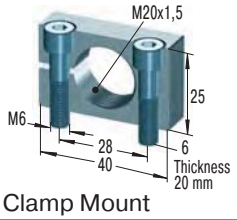
Accessories, mounting, installation ... see pages 32 to 35.

RF20



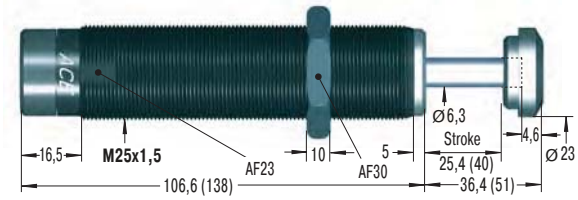
Rectangular Flange

MB20



Clamp Mount

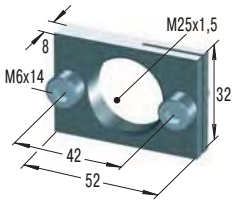
MA600M and MA900M



MA600ML with M27x3 available to special order.

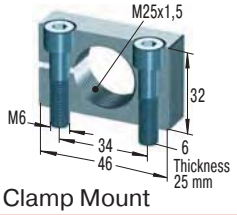
Accessories, mounting, installation ... see pages 32 to 35.

RF25



Rectangular Flange

MB25



Clamp Mount

Available without rod end button on request. Models MA600M/MA900M available with clevis mounting.

Capacity Chart

Type	Max. Energy Capacity W_3 Nm/Cycle	Max. Energy Capacity W_4 Nm/h	Effective Weight me Adjustable me min. kg	Effective Weight me Adjustable me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	[1] Max. Side Load Angle °	Weight kg
MA30M	3.5	5 650	0.23	15	1.7	5.3	0.3	2	0.009
FA1008VD-B	1.8	3 600	0.2	10	3	6	0.3	2.5	0.026
MA50M	5.5	13 550	4.5	20	3	6	0.3	2	0.030
MA35M	4	6 000	6	57	5	11	0.2	2	0.043
MA150M	22	35 000	1	109	3	5	0.4	5	0.06
MA225M	25	45 000	2.3	226	5	10	0.1	2	0.13
MA600M	68	68 000	9	1 360	10	30	0.2	2	0.31
MA900M	100	90 000	14	2 040	10	35	0.4	1	0.40

[1] For applications with higher side load angles consider using the side load adaptor (BV) pages 30 to 34.

Selection Chart for Shock Absorbers Accessories






Shock Absorber Type	Locknut KM	Stop Collar AH	Mounting Block / Clamp Mount [1] MB	Rectangular Flange RF	Universal Mount UM	Side Load Adaptor [2] BV
Thread Size M5x0.5						
MC5M	KM5	AH5	MB5SC2	-	-	-
Thread Size M6x0.5						
MC9M	KM6	AH6	MB6SC2	RF6	-	-
Thread Size M8x1						
MA30M	KM8	AH8	MB8SC2	RF8	-	BV8
MC10M	KM8	AH8	MB8SC2	RF8	-	BV8A
MC30M	KM8	AH8	MB8SC2	RF8	-	BV8
Thread Size M10x1						
MA50M	KM10	AH10	MB10SC2	RF10	UM10	BV10
MC25M	KM10	AH10	MB10SC2	RF10	UM10	BV10
SC25M	KM10	AH10	MB10SC2	RF10	UM10	BV10SC
FA1008	KM10	AH10	MB10SC2	RF10	UM10	-
Thread Size M12x1						
MA35M	KM12	AH12	MB12	RF12	UM12	BV12
MC75M	KM12	AH12	MB12	RF12	UM12	BV12
SC75M	KM12	AH12	MB12SC2	RF12	UM12	BV12SC
Thread Size M14x1.5						
MA150M	KM14	AH14	MB14	RF14	UM14	BV14
MC150M	KM14	AH14	MB14	RF14	UM14	BV14
SC190M0-4	KM14	AH14	MB14	RF14	UM14	BV14SC
SC190M5-7	KM14	AH14	MB14SC2	RF14	UM14	BV14
Thread Size M20x1.5						
MA225M	KM20	AH20	MB20	RF20	UM20	BV20SC
MC225M	KM20	AH20	MB20	RF20	UM20	BV20
SC300M0-4	KM20	AH20	MB20	RF20	UM20	BV20SC
SC300M5-9	KM20	AH20	MB20SC2	RF20	UM20	BV20SC
Thread Size M25x1.5						
MA600M	KM25	AH25	MB25	RF25	UM25	BV25SC
MA900M	KM25	AH25	MB25	RF25	UM25	-
MC600M	KM25	AH25	MB25	RF25	UM25	BV25
SC650M0-4	KM25	AH25	MB25	RF25	UM25	BV25SC
SC925M	KM25	AH25	MB25	RF25	UM25	-
SC650M5-9	KM25	AH25	MB25SC2	RF25	UM25	BV25SC

[1] Use a locknut for protection if a clamp mount MB... SC2 is installed.

[2] Only mountable on units without button.
Remove the button from the shock absorber, if there's one fitted. See page 34.

Issue 9.2007 Specifications subject to change


Steel Shroud [2]

PB


Air Bleed Collar

SP


Switch Stop Collar

AS


Steel Button

PS


Steel/Urethane Button

BP


Nylon Button

PP

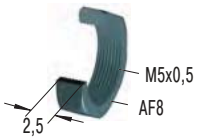
						Page
Thread Size M5x0.5						
-	-	-	-	-	-	30
Thread Size M6x0.5						
-	-	-	-	-	-	30
Thread Size M8x1						
PB8	-	-	-	-	-	30
PB8-A	-	-	-	-	-	30
PB8	-	-	-	-	-	30
Thread Size M10x1						
PB10	-	AS10	PS10	-	-	30
PB10	-	AS10	PS10	-	-	30
PB10SC	-	-	-	-	-	30
-	-	-	-	-	-	30
Thread Size M12x1						
PB12	-	AS12	PS12	-	-	31
PB12	-	AS12	PS12	-	-	31
PB12SC	SP12	AS12	PS12SC	-	-	31
Thread Size M14x1.5						
PB14	SP14	AS14	PS14	-	included	31
PB14	SP14	AS14	PS14	-	PP150	31
PB14SC	-	AS14	included	BP14	-	31
PB14	SP14	AS14	PS14	-	-	31
Thread Size M20x1.5						
PB20SC	-	AS20	included	BP20	-	32
PB20	SP20	AS20	PS20	-	PP225	32
PB20SC	-	AS20	included	BP20	-	32
PB20SC	-	AS20	included	-	-	32
Thread Size M25x1.5						
PB25SC	-	AS25	included	BP25	-	32
-	-	AS25	included	BP25	-	32
PB25	SP25	AS25	PS25	-	PP600	32
PB25SC	-	AS25	included	BP25	-	32
-	-	AS25	included	BP25	-	32
PB25	-	AS25	included	-	-	32

[2] Only mountable on units without button.
Remove the button from the shock absorber, if there's one fitted. See page 34.

Dimensions see pages 30 to 32.

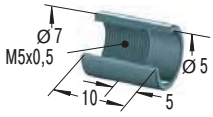
M5x0.5

KM5



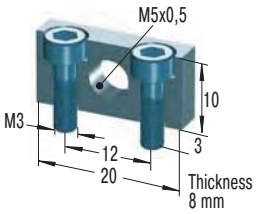
Locknut

AH5



Stop Collar

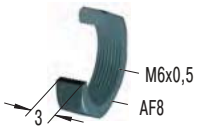
MB5SC2



Mounting Block

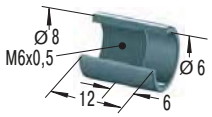
M6x0.5

KM6



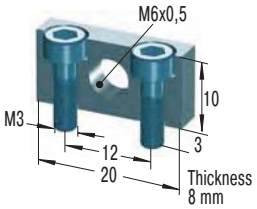
Locknut

AH6



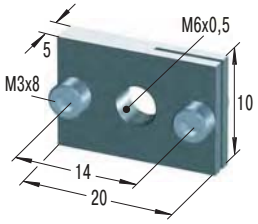
Stop Collar

MB6SC2



Mounting Block

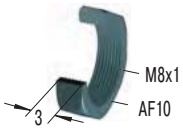
RF6



Rectangular Flange

M8x1

KM8

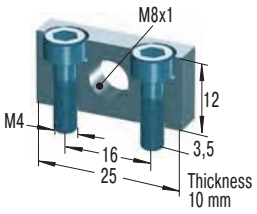


Locknut

AH8

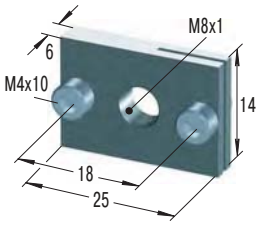
Stop Collar

MB8SC2



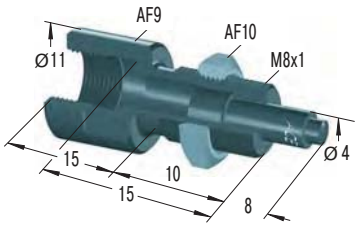
Mounting Block

RF8



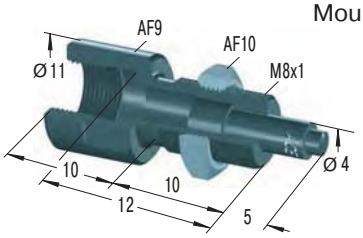
Rectangular Flange

BV8



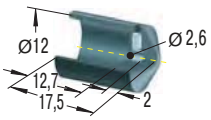
Side Load Adaptor

BV8A



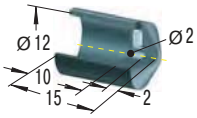
Side Load Adaptor

PB8



Steel Shroud

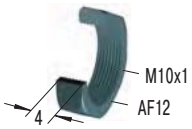
PB8-A



Steel Shroud

M10x1

KM10

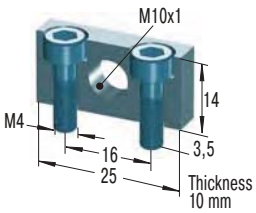


Locknut

AH10 *5*

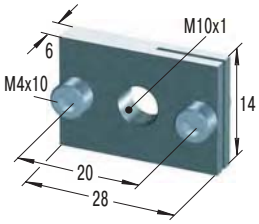
Stop Collar

MB10SC2



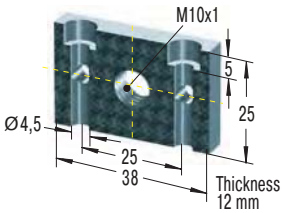
Mounting Block

RF10



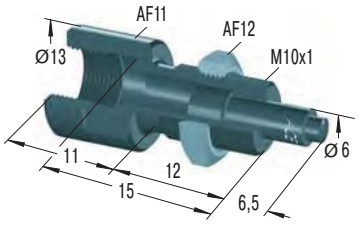
Rectangular Flange

UM10



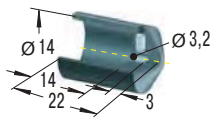
Universal Mount

BV10



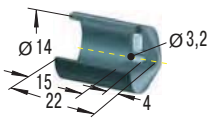
Side Load Adaptor

PB10



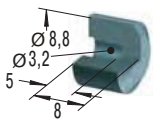
Steel Shroud

PB10SC



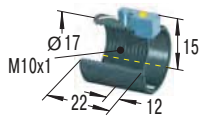
Steel Shroud

PS10



Steel Button

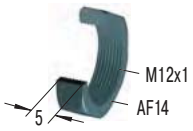
AS10



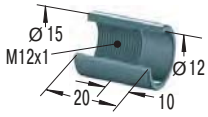
Switch Stop Collar
inc. Proximity Switch

Mounting, installation... see pages 33 to 35.

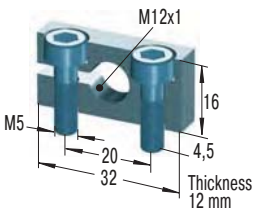
M12x1

KM12


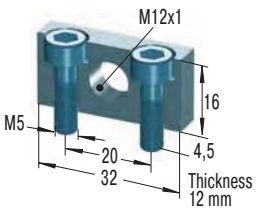
Locknut

AH12


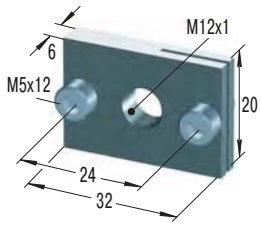
Stop Collar

MB12


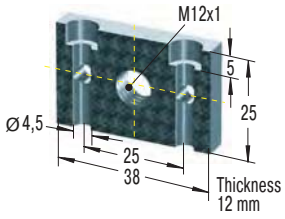
Clamp Mount

MB12SC2


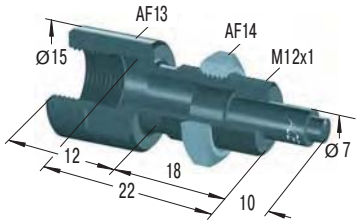
Mounting Block

RF12


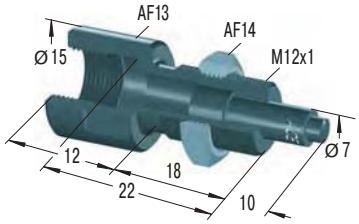
Rectangular Flange

UM12


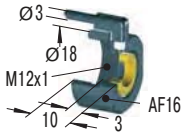
Universal Mount

BV12


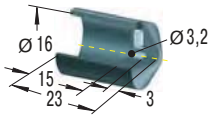
Side Load Adaptor

BV12SC


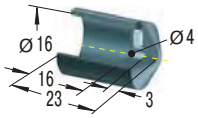
Side Load Adaptor

SP12


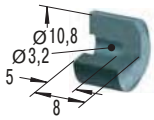
Air Bleed Collar

PB12


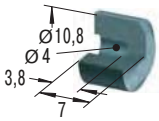
Steel Shroud

PB12SC


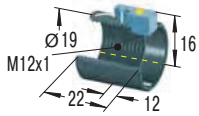
Steel Shroud

PS12


Steel Button

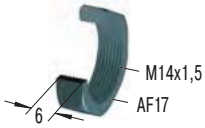
PS12SC


Steel Button

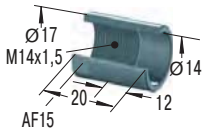
AS12


Switch Stop Collar
inc. Proximity Switch

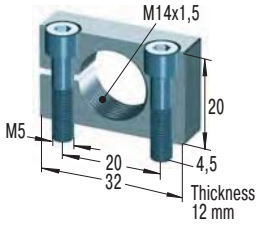
M14x1.5

KM14


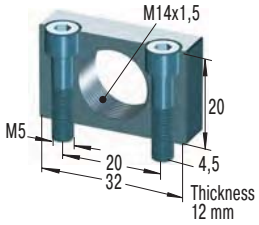
Locknut

AH14


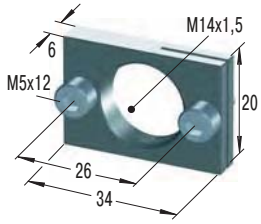
Stop Collar

MB14


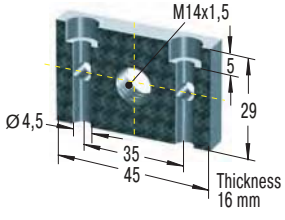
Clamp Mount

MB14SC2


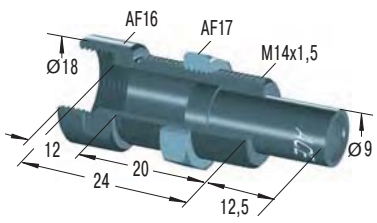
Mounting Block

RF14


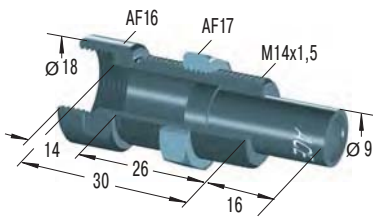
Rectangular Flange

UM14


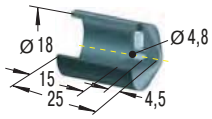
Universal Mount

BV14


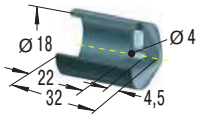
Side Load Adaptor

BV14SC


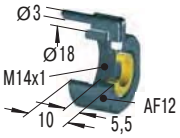
Side Load Adaptor

PB14


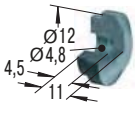
Steel Shroud

PB14SC


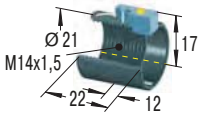
Steel Shroud

SP14


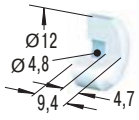
Air Bleed Collar

PS14


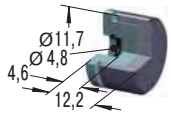
Steel Button

AS14


Switch Stop Collar
inc. Proximity Switch

PP150


Nylon Button

BP14


Steel/Urethane Button

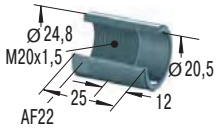
Mounting, installation... see pages 33 to 35.

M20x1.5

KM20

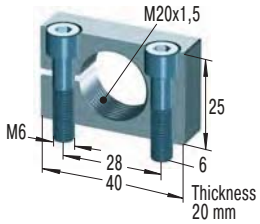
Locknut

AH20



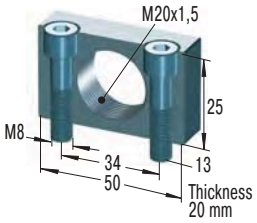
Stop Collar

MB20



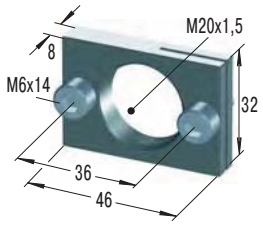
Clamp Mount

MB20SC2



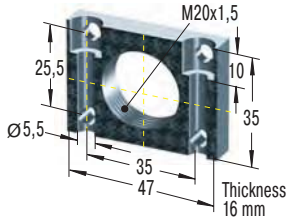
Mounting Block

RF20



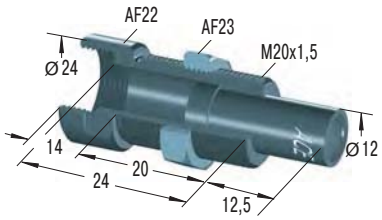
Rectangular Flange

UM20



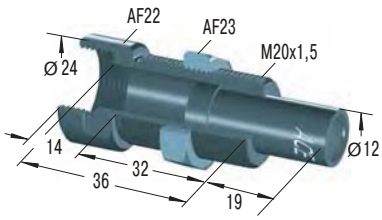
Universal Mount

BV20



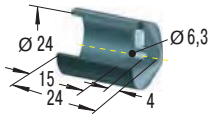
Side Load Adaptor

BV20SC



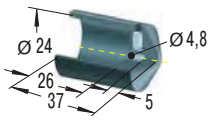
Side Load Adaptor

PB20



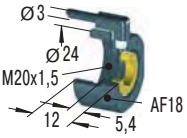
Steel Shroud

PB20SC



Steel Shroud

SP20

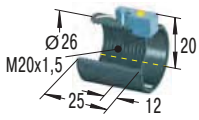


Air Bleed Collar

PS20

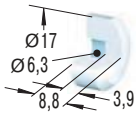
Steel Button

AS20



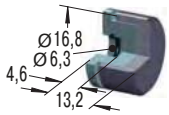
Switch Stop Collar
inc. Proximity Switch

PP225



Nylon Button

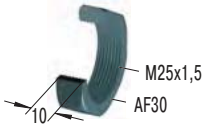
BP20



Steel/Urethane Button

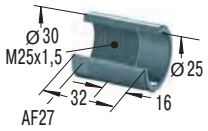
M25x1.5

KM25



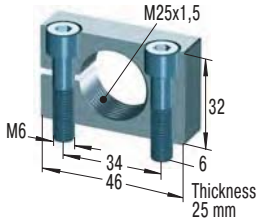
Locknut

AH25



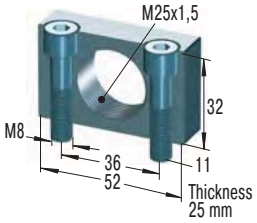
Stop Collar

MB25



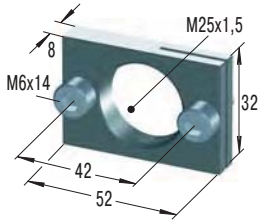
Clamp Mount

MB25SC2



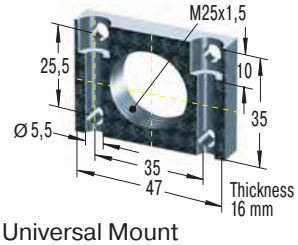
Mounting Block

RF25



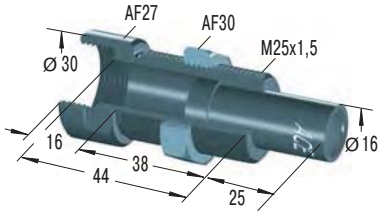
Rectangular Flange

UM25



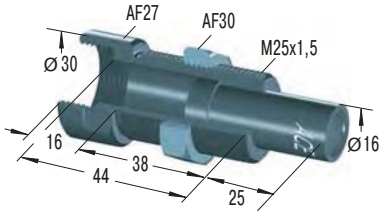
Universal Mount

BV25SC



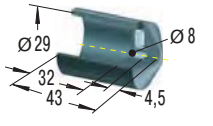
Side Load Adaptor

BV25



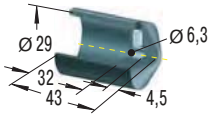
Side Load Adaptor

PB25



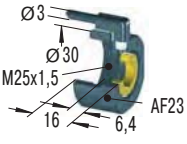
Steel Shroud

PB25SC



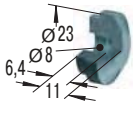
Steel Shroud

SP25



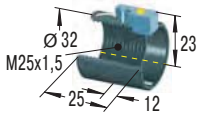
Air Bleed Collar

PS25



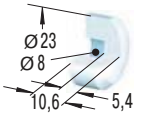
Steel Button

AS25



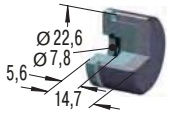
Switch Stop Collar
inc. Proximity Switch

PP600



Nylon Button

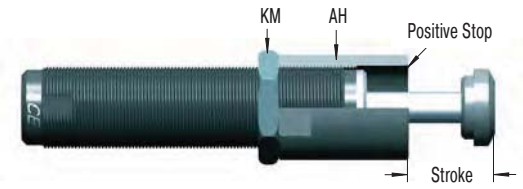
BP25



Steel/Urethane Button

Mounting, installation... see pages 33 to 35.

AH... Stop Collar



All ACE miniature shock absorbers (except FA series) have an **integral positive stop.** An **optional stop collar (AH...)** can be added if desired to give fine adjustment of final stopping position.

MB... Clamp Mount/ Mounting Block

Clamp Slot design not for use with SC²HW25 to HW650

When using the MB clamp mount no lock nut is needed on the shock absorber (split clamp action). The mounting block is very compact and allows fine adjustment of the shock absorber position by turning in and out. Two socket head screws are included with clamp mount block. **When foot mounting the types with combined piston and inner tube SC²HW25 to SC²HW650 and the types MC5M, MC9M, MC30M, MC25M and MA30M, the MB(SC²) must be used.**

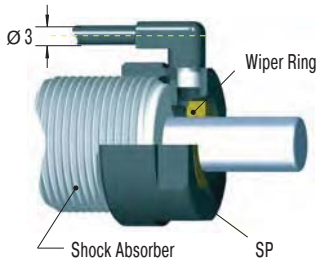
Type	Screw Size	Max. Torque	Type	Screw Size	Max. Torque
MB10	M4x14	4 Nm	MB20	M6x25	11 Nm
MB12	M5x16	6 Nm	MB25	M6x30	11 Nm
MB14	M5x20	6 Nm			

RF... Rectangular Flange

The rectangular flange provides a space saving convenient assembly and does not need a lock nut to hold the shock absorber. Therefore achieving a neat, compact and flat surface mounting.

Type	Screw Size	Max. Torque	Type	Screw Size	Max. Torque
RF6	M3x8	3 Nm	RF14	M5x12	6 Nm
RF8	M4x10	4 Nm	RF20	M6x14	11 Nm
RF10	M4x10	4 Nm	RF25	M6x14	11 Nm
RF12	M5x12	6 Nm			

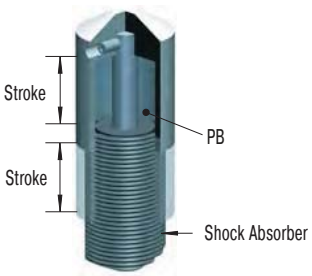
SP... Air Bleed Collar



Air bleed collar (includes integral stop collar) protects shock absorber from ingress of abrasive contaminents like cement, paper or wood dust into the rod seal area. It also prevents aggressive fluids such as cutting oils, coolants etc. damaging the seals. Air bleed supply 0.5 to 1 bar. Low air consumption. The constant air bleed prevents contaminants passing the wiper ring and entering the shock absorber seal area.

Note! Do not switch off air supply whilst machine is operating! The air bleed collar can not be used on all similar body thread sized shock absorbers. The air bleed collar is only for types MC150M to MC600M, MA150M, SC²75 and SC²190M 5-7.

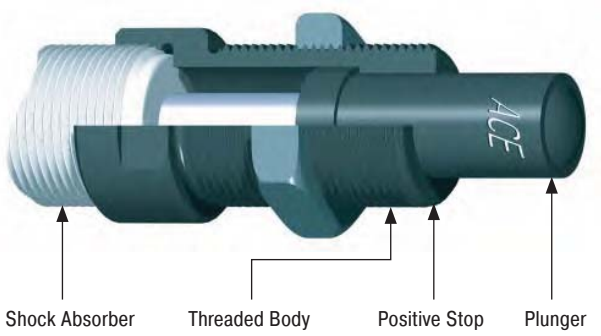
PB... Steel Shroud



Grinding beads, sand, welding splatter, paints and adhesives etc. can adhere to the piston rod. They then damage the rod seals and the shock absorber quickly fails. In many cases the installation of the optional steel shroud can provide worthwhile protection and increase lifetime.

Note! When installing don't forget to allow operating space for the shroud to move as the shock absorber is cycled. For part number MA, MC, SC please order with "M-880" suffix. Part numbers MA150M, MC150M to MC600M and SC²25M to SC²190M5-7 are supplied without a button, for advice on removing the button see page 34.

BV; BV...SC Side Load Adaptor

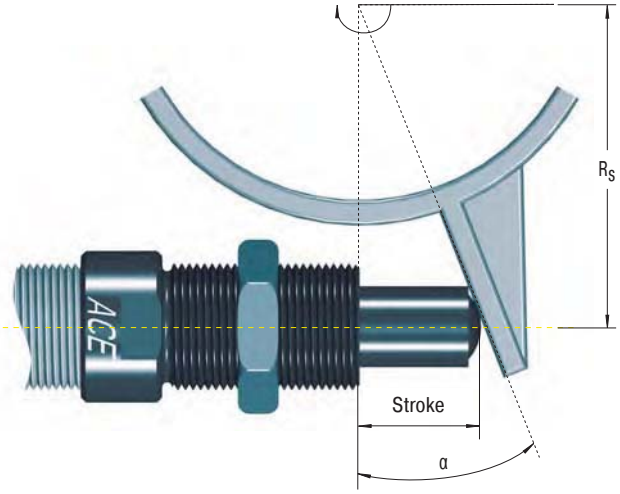


With side load impact angles of more than 3° the operation lifetime of the shock absorber reduces rapidly due to increased wear of the rod bearings. The optional BV side load adaptor provides long lasting solution. Secure the side load adaptor with Loctite or locknut on the shock absorber.

Materials: Threaded body and plunger: Hardened high tensile steel. Hardened to 610 HV1.

Note: For material combination plunger/impact plate use similar hardness values. We recommend that you install the shock absorber/side load adaptor using the thread on the side load adaptor.

Note! Installation with clamp mount MB... not possible. Use mounting block MB... SC².



Problem: Rotating impact motion causes high side load forces on the piston rod. This increases bearing wear and possibly results in rod breakage or bending.

Solution: Install side load adaptor BV.

Formulae:

$$\alpha = \tan^{-1}\left(\frac{s}{R_s}\right) \qquad R_{smin} = \frac{s}{\tan \alpha max}$$

Example:

s = 0.025 m α max = 25° (Type BV25)

R_s = 0.1 m

$$\alpha = \tan^{-1}\left(\frac{0.025}{0.1}\right) \qquad R_{smin} = \frac{0.025}{\tan 25}$$

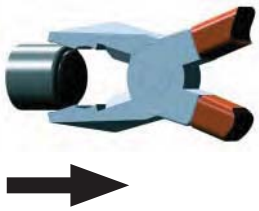
α = 14.04° R_{smin} = 0.054 m

α	= side load angle °	R_s	= mounting radius m
α max	= max. angle °	R_{smin}	= min. possible mounting radius m
s	= absorber stroke m		

Maximum angle:
BV8, BV10 and BV12 = 12,5°
BV14, BV20 and BV25 = 25°

Hint: By repositioning the centre of the stroke of the side load plunger to be at 90 degrees to the piston rod, the side load angle can be halved. The use of an external positive stop due to high forces encountered is required.

Time required for warming up the button:
up to M12x1: approx. 10 sec.
from M14x1,5 up: approx. 30 sec.

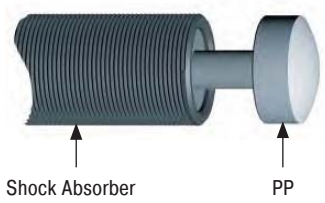


Note! The BV adaptor can only be installed onto a shock absorber without rod end button.

Part number: MA, MC, SC...-880
(Models MA150M, MC150M to MC600M and SC²25M to SC²190M5-7 are supplied as standard without buttons.)

To remove button from existing absorber: Clamp shock absorber in mounting block and warm button carefully. Grip the button with pliers and pull off along rod axis.

PP... Nylon Button

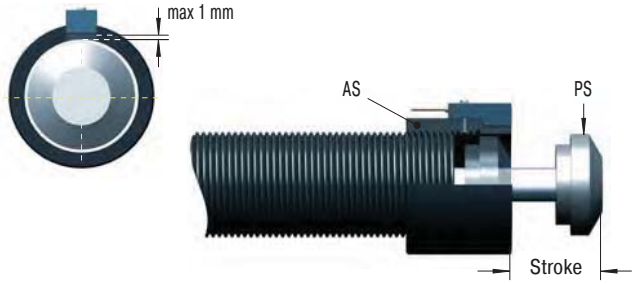


While the use of industrial shock absorbers already achieves a considerable reduction in noise levels, the additional use of PP impact buttons made of glass fibre reinforced nylon reduces noise levels even further, making it easy to fulfil the regulations of the new Noise Control Ordinance. At the same time, wear of impact surface is drastically minimized. The PP buttons are available for shock absorbers in series MC150M to MC600M. They are fitted simply by pressing onto the piston rod.

BP... Steel/Urethane Button

These new impact buttons made of urethane offer all above advantages of th PP nylon button in terms of reducing noise and wear. They fit easily onto the piston rod of the corresponding shock absorber. The head is then secured by a circlip integrated in the drilled hole of the steel base material. Please refer to the accessories table on pages 28 to 29 to see which shock absorber types the new BP buttons are available for.

PS...AS... Steel Button, Switch Stop Collar



AS inc. Proximity switch PNP

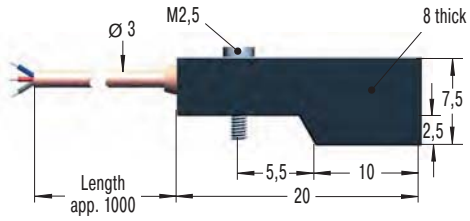
The ACE Stop Light limit switch combination can be mounted on all popular shock absorber models.

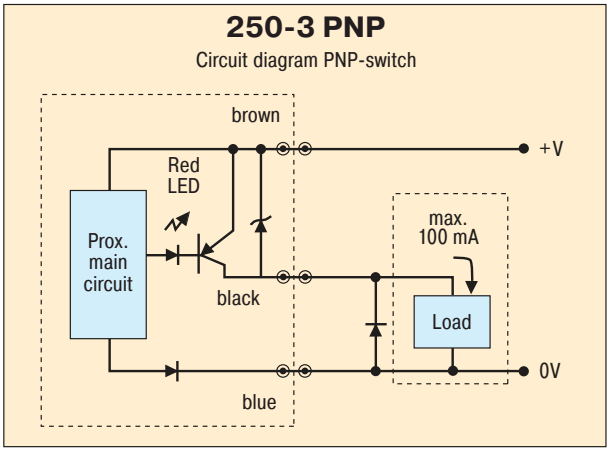
Features: Very short, compact mounting package; good price/performance combination; can be fitted to standard shock absorber; fine adjustment of stroke/signal is possible.

The steel button type PS is fitted as standard on the models SC190M0-4, SC300M0-9, SC650M0-9, SC925M0-4, MA/MVC225M, MA/MVC600M and MA/MVC900M. With all other models you must order the PS button as an optional accessory.

Installation: We recommend to fix the steel button onto the end of the piston rod using Loctite 290. Attention! Take care not to leave any adhesive on the piston rod as this will cause seal damage. Thread the switch stop collar onto the front of the shock absorber and secure in position. Switch cable should not be routed close to power cables.

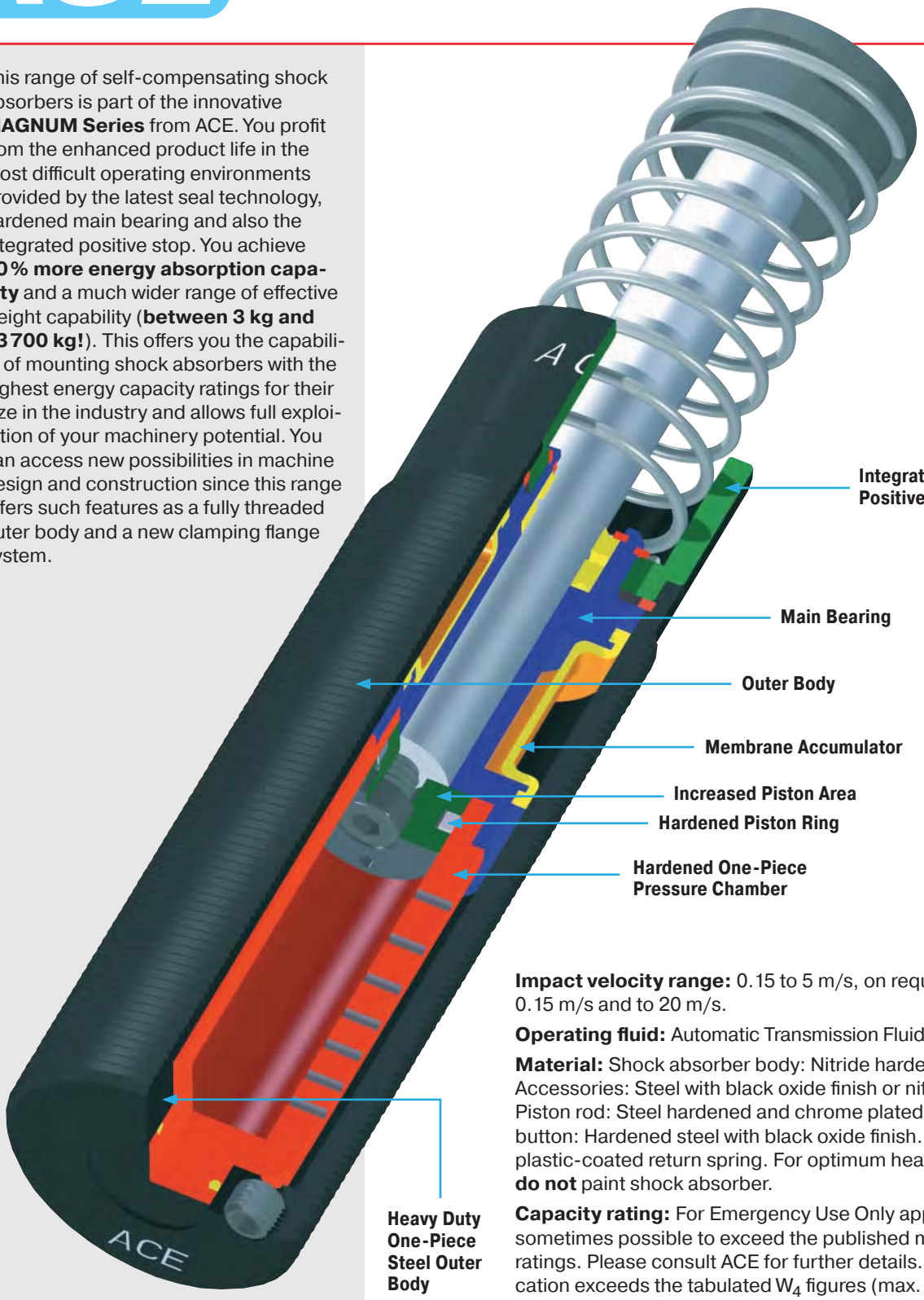
250-3 PNP Proximity Switch





PNP Proximity Switch Data:
Supply voltage: 10 -27 VDC
Ripple < 10 %
Load current max: 100 mA
Operating temperature range:
-10 °C to +60 °C
Residual voltage: max. 1 V
Protection: IP67 (IEC 144) with LED-indicator
Proximity Switch N/Open when shock absorber extended.
When shock absorber is fully compressed switch closes and LED Indicator lights.

This range of self-compensating shock absorbers is part of the innovative **MAGNUM Series** from ACE. You profit from the enhanced product life in the most difficult operating environments provided by the latest seal technology, hardened main bearing and also the integrated positive stop. You achieve **50 % more energy absorption capacity** and a much wider range of effective weight capability (**between 3 kg and 63 700 kg!**). This offers you the capability of mounting shock absorbers with the highest energy capacity ratings for their size in the industry and allows full exploitation of your machinery potential. You can access new possibilities in machine design and construction since this range offers such features as a fully threaded outer body and a new clamping flange system.



Impact velocity range: 0.15 to 5 m/s, on request under 0.15 m/s and to 20 m/s.

Operating fluid: Automatic Transmission Fluid (ATF) at 42cSt.

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish or nitride hardened. Piston rod: Steel hardened and chrome plated. Rod end button: Hardened steel with black oxide finish. Zinc plated or plastic-coated return spring. For optimum heat dissipation **do not** paint shock absorber.

Capacity rating: For Emergency Use Only applications it is sometimes possible to exceed the published max. capacity ratings. Please consult ACE for further details. If your application exceeds the tabulated W_4 figures (max. energy per hour Nm/hr) consider additional cooling. Ask ACE for further details.

Mounting: In any position

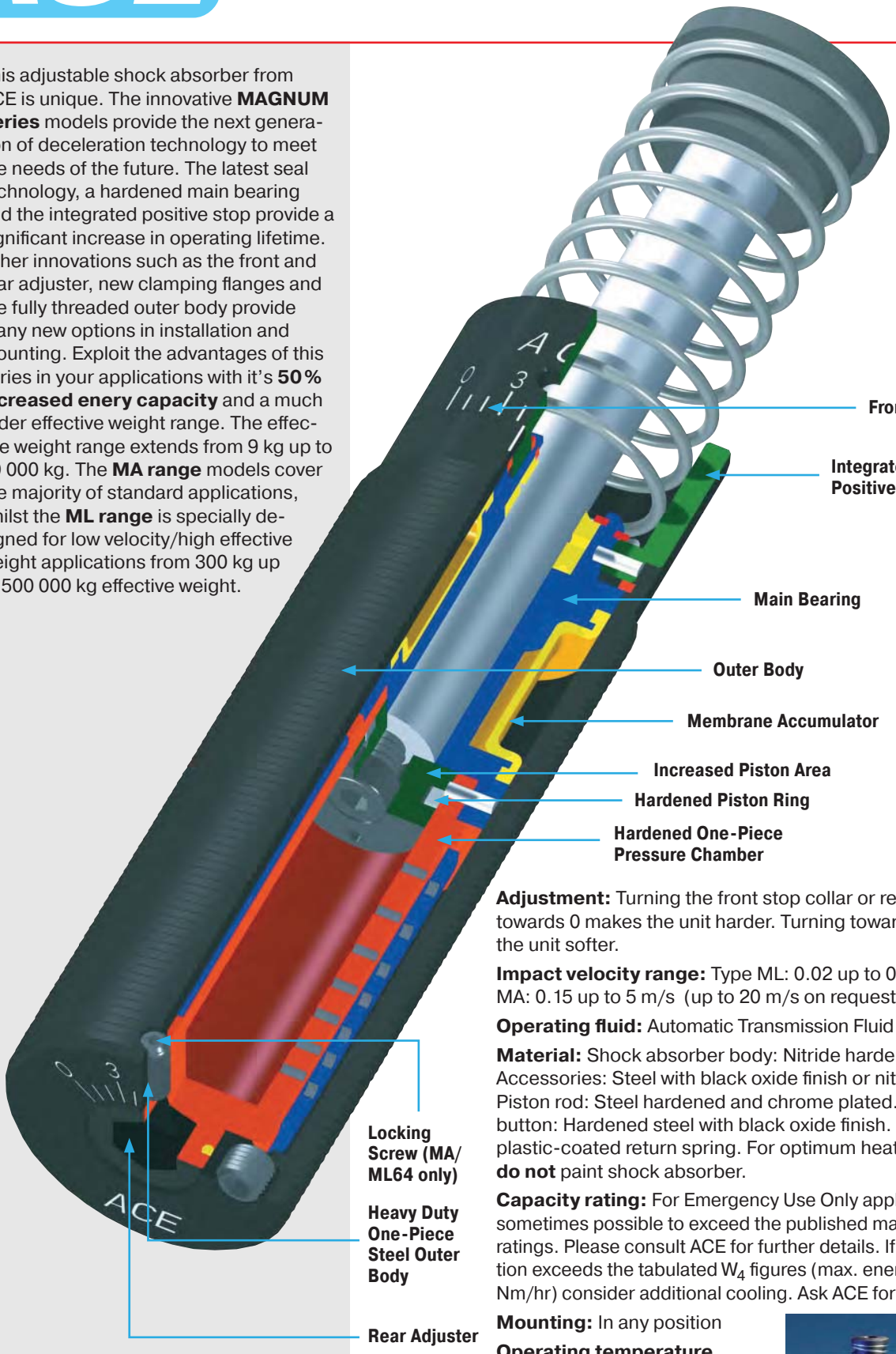
Operating temperature range: -12 °C to 70 °C. Higher temperatures see page 46.

On request: Plated finishes. Weartec finish (seawater resistant), special oils. Mounting inside air cylinders and other special options are available on request.

Noise reduction: 3 to 7 dB when using the new impact buttons with urethane insert.

Issue 9.2007 Specifications subject to change

This adjustable shock absorber from ACE is unique. The innovative **MAGNUM Series** models provide the next generation of deceleration technology to meet the needs of the future. The latest seal technology, a hardened main bearing and the integrated positive stop provide a significant increase in operating lifetime. Other innovations such as the front and rear adjuster, new clamping flanges and the fully threaded outer body provide many new options in installation and mounting. Exploit the advantages of this series in your applications with it's **50% increased enery capacity** and a much wider effective weight range. The effective weight range extends from 9 kg up to 80 000 kg. The **MA range** models cover the majority of standard applications, whilst the **ML range** is specially designed for low velocity/high effective weight applications from 300 kg up to 500 000 kg effective weight.



Adjustment: Turning the front stop collar or rear adjuster towards 0 makes the unit harder. Turning towards 9 makes the unit softer.

Impact velocity range: Type ML: 0.02 up to 0.46 m/s, Type MA: 0.15 up to 5 m/s (up to 20 m/s on request).

Operating fluid: Automatic Transmission Fluid (ATF) at 42cSt.

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish or nitride hardened. Piston rod: Steel hardened and chrome plated. Rod end button: Hardened steel with black oxide finish. Zinc plated or plastic-coated return spring. For optimum heat dissipation **do not** paint shock absorber.

Capacity rating: For Emergency Use Only applications it is sometimes possible to exceed the published max. capacity ratings. Please consult ACE for further details. If your application exceeds the tabulated W_4 figures (max. energy per hour Nm/hr) consider additional cooling. Ask ACE for further details.

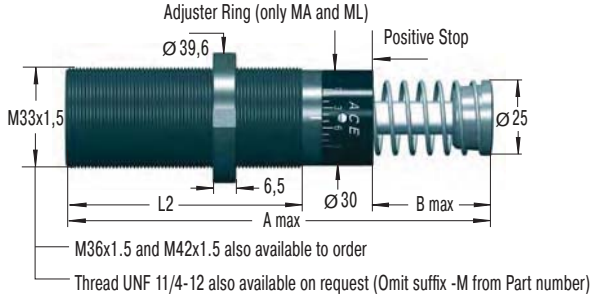
Mounting: In any position

Operating temperature range: -12 °C to 70 °C. Higher temperatures see page 46.

On request: Plated finishes. Weartec finish (seawater resistant), special oils. Mounting inside air cylinders and other special options are available on request.

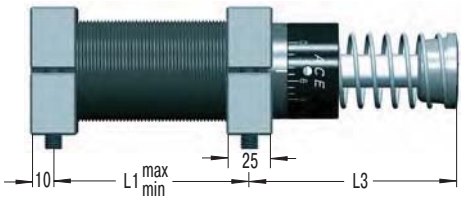
Noise reduction: 3 to 7 dB when using the new impact buttons with urethane insert.

37



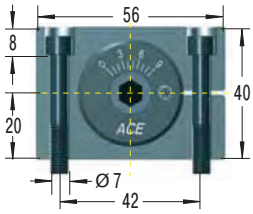
Adjuster
(only MA and ML)

S33



Side Foot Mounting Kit

S33 = 2 Flanges + 4 Screws M6x40, DIN 912



Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.

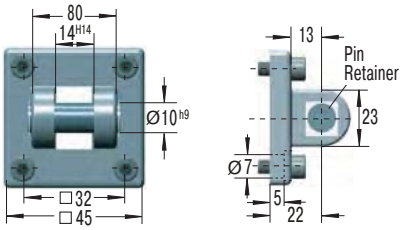
Tightening torque: 11 Nm
Clamping torque: > 90 Nm

C33

Clevis Mounting Kit

C33 = 2 Clevis eyes. Delivered assembled to shock absorber.
Use positive stop at both ends of travel.

SF33



Secure with pin or use additional bar.

Due to limited force capacity the respective ability should be reviewed by ACE.

Clevis Flange

SF33 = Flange + 4 screws M6x20 DIN 912
Tightening torque 7.5 Nm
Conforms to: Audi + VW 39D1307/2/032, VDMA 24562 part 2
Daimler Chr. B801520023641, Opel-GM M13911673

Dimensions

Type	[1] Stroke mm	A max	B max	L1 min	L1 max	L2	L3	L5 max	L6 max
MC, MA, ML3325M	25	138	23	25	60	83	68	39	168
MC, MA, ML3350M	50	189	48.5	32	86	108	93	64	218

[1] Nominal stroke length (without integral stop collar fitted).

Capacity Chart MC33

Type Self-compensating	Max. Energy Capacity [2] W_3 Nm/Cycle	W_4 Self-Contained Nm/h	W_4 with Air/Oil Tank Nm/h	W_4 with Oil Recirculation Nm/h	[1] Effective Weight me Soft ← Hard -0 min max kg	-1 min max kg	-2 min max kg	-3 min max kg	-4 min max kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
MC3325M	155	75 000	124 000	169 000	3 - 11	9 - 40	30 - 120	100 - 420	350 - 1 420	45	90	0.03	4	0.45
MC3350M	310	85 000	135 000	180 000	5 - 22	18 - 70	60 - 250	210 - 840	710 - 2 830	45	135	0.06	3	0.54

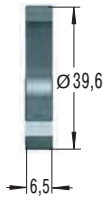
Capacity Chart MA/ML33

Type Adjustable	Max. Energy Capacity [2] W_3 Nm/Cycle	W_4 Self-Contained Nm/h	W_4 with Air/Oil Tank Nm/h	W_4 with Oil Recirculation Nm/h	[1] Effective Weight me min. kg	me max.	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
MA3325M	170	75 000	124 000	169 000	9	1 700	45	90	0.03	4	0.45
ML3325M	170	75 000	124 000	169 000	300	50 000	45	90	0.03	4	0.45
MA3350M	340	85 000	135 000	180 000	13	2 500	45	135	0.06	3	0.54
ML3350M	340	85 000	135 000	180 000	500	80 000	45	135	0.06	3	0.54

[1] The effective weight range limits can be raised or lowered to special order. [2] For Emergency Use Only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details. Specifications relate to the effective stroke length (B max.).

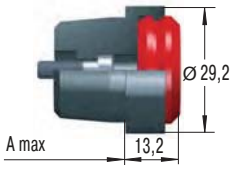
M33x1.5

NM33



Locking Ring

PP33

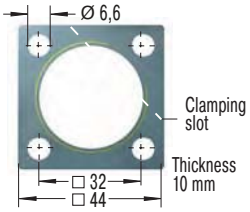


see shock absorber dims.

Poly Button

Optional button with elastomer insert for noise suppression. Option supplied ready mounted onto the shock absorber. For self installation see mounting instructions on page 48.

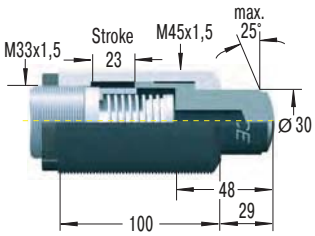
QF33



Square Flange

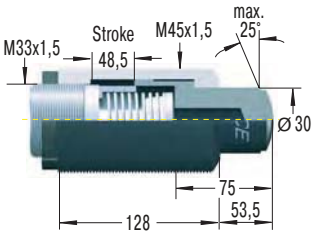
Install with 4 machine screws with tightening torque: 11 Nm
clamping torque: > 90 Nm

BV3325



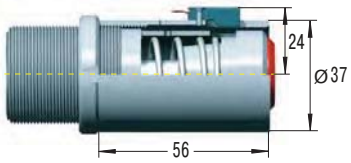
Side Load Adaptor

BV3350



Side Load Adaptor

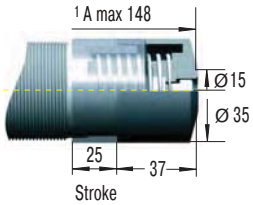
AS33



Switch Stop Collar inc. Proximity Switch and Poly Button with elastomer insert

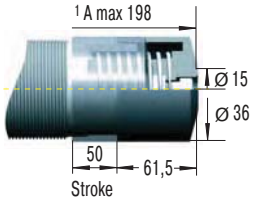
Mounting, installation etc. see pages 34 to 35 and 45.

PB3325



Steel Shroud

PB3350



Steel Shroud

[1] Total installation length of the shock absorber inc. steel shroud

Interchange parts for the earlier MC-Types available on request.

Mounting, installation etc. see pages 33 and 45.

Ordering Example

MC3325M-1

- Self-Compensating
- Thread Size M33
- Stroke 25 mm
- Metric Thread
  (omitted when using thread UNF 1 1/4-12)
- Effective Weight Range Version

Model Type Prefix

Standard Models

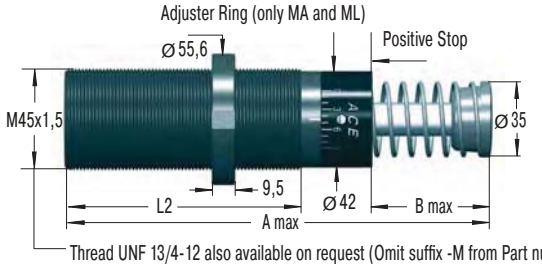
Self-Contained with Return Spring
MC self-compensating
MA adjustable
ML adjustable, for lower impact velocity

Special Models

Air/Oil Return without Return Spring
MCA, MAA, MLA

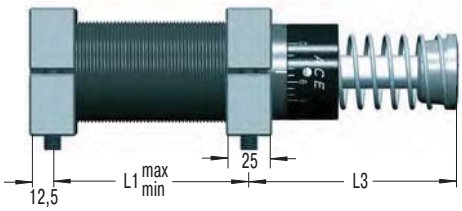
Air/Oil Return with Return Spring
MCS, MAS, MLS

Self-Contained without Return Spring
MCN, MAN, MLN



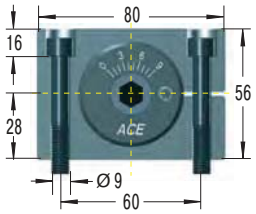
Adjuster
(only MA and ML)

S45



Side Foot Mounting Kit

S45 = 2 Flanges + 4 Screws M8x50, DIN 912



Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.

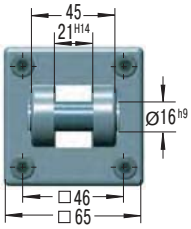
Tightening torque: 27 Nm
Clamping torque: > 350 Nm

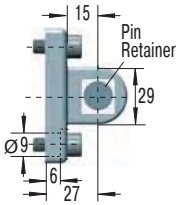
C45

Clevis Mounting Kit

C45 = 2 Clevis eyes. Delivered assembled to shock absorber.
Use positive stop at both ends of travel.

SF45





Secure with pin or use additional bar.

Due to limited force capacity the respective ability should be reviewed by ACE.

Clevis Flange

SF45 = Flange + 4 screws M8x20 DIN 912
Tightening torque 7.5 Nm, clamping torque > 140 Nm
Conforms to: Audi + VW 39D1307/2/032, VDMA 24562 part 2
Daimler Chr. B801520023647, Opel-GM M13911675

Dimensions

Type	[1] Stroke mm	A max	B max	L1 min	L1 max	L2	L3	L5 max	L6 max
MC, MA, ML4525M	25	145	23	32	66	95	66	43	200
MC, MA, ML4550M	50	195	48.5	40	92	120	91	68	250
MC, MA4575M	75	246	74	50	118	145	116	93	300

[1] Nominal stroke length (without integral stop collar fitted).

Capacity Chart MC45

Type Self-Compensating	Max. Energy Capacity [2] W_3 Nm/Cycle	W_4 Self-Contained Nm/h	W_4 with Air/Oil Tank Nm/h	W_4 with Oil Recirculation Nm/h	[1] Effective Weight me Soft -0 min max kg	Soft -1 min max kg	Soft -2 min max kg	Soft -3 min max kg	Hard -4 min max kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
MC4525M	340	107 000	158 000	192 000	7 - 27	20 - 90	80 - 310	260 - 1050	890 - 3 540	70	100	0.03	4	1.13
MC4550M	680	112 000	192 000	248 000	13 - 54	45 - 180	150 - 620	520 - 2090	1 800 - 7 100	70	145	0.08	3	1.36
MC4575M	1 020	146 000	225 000	282 000	20 - 80	70 - 270	230 - 930	790 - 3140	2 650 - 10 600	50	180	0.11	2	1.59

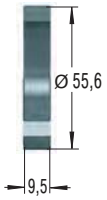
Capacity Chart MA/ML45

Type Adjustable	Max. Energy Capacity [1] W_3 Nm/Cycle	W_4 Self-Contained Nm/h	W_4 with Air/Oil Tank Nm/h	W_4 with Oil Recirculation Nm/h	[1] Effective Weight me me min. kg	me max.	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
MA4525M	390	107 000	158 000	192 000	40	10 000	70	100	0.03	4	1.13
ML4525M	390	107 000	158 000	192 000	3 000	110 000	70	100	0.03	4	1.13
MA4550M	780	112 000	192 000	248 000	70	14 500	70	145	0.08	3	1.36
ML4550M	780	112 000	192 000	248 000	5 000	180 000	70	145	0.08	3	1.85
MA4575M	1 170	146 000	225 000	282 000	70	15 000	50	180	0.11	2	1.59

[1] The effective weight range limits can be raised or lowered to special order [2] For Emergency Use Only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details. Specifications relate to the effective stroke length (B max.).

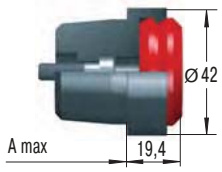
M45x1.5

NM45



Locking Ring

PP45

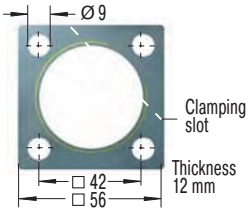


see shock absorber dims.

Poly Button

Optional button with elastomer insert for noise suppression. Option supplied ready mounted onto the shock absorber. For self installation see mounting instructions on page 48.

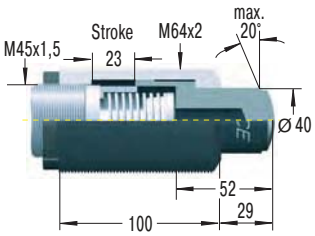
QF45



Square Flange

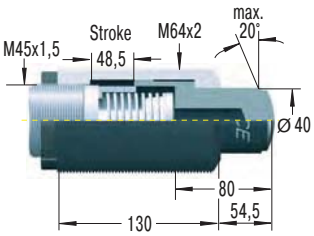
Install with 4 machine screws with tightening torque: 27 Nm
clamping torque: > 200 Nm

BV4525



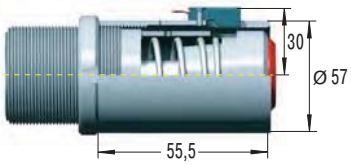
Side Load Adaptor

BV4550



Side Load Adaptor

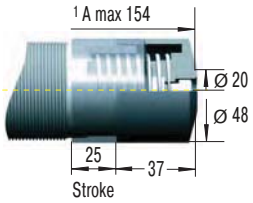
AS45



Switch Stop Collar inc. Proximity Switch and Poly Button with elastomer insert

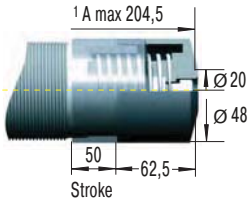
Mounting, installation etc. see pages 34 to 35 and 45.

PB4525



Steel Shroud

PB4550



Steel Shroud

[1] Total installation length of the shock absorber inc. steel shroud

Interchange Parts for the earlier MC-Types available on request.

Mounting, installation etc. see pages 33 and 45.

Ordering Example

ML4525M

Adjustable
Thread Size M45
Stroke 25 mm
Metric Thread
(omitted when using thread UNF 1 3/4-12)

Model Type Prefix

Standard Models

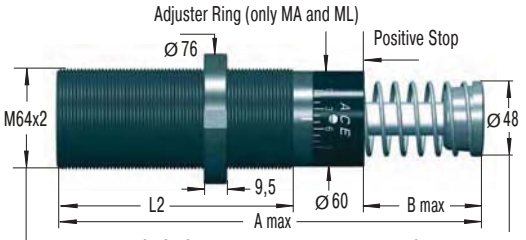
Self-Contained with Return Spring
MC self-compensating
MA adjustable
ML adjustable, for lower impact velocity

Special Models

Air/Oil Return without Return Spring
MCA, MAA, MLA

Air/Oil Return with Return Spring
MCS, MAS, MLS

Self-Contained without Return Spring
MCN, MAN, MLN

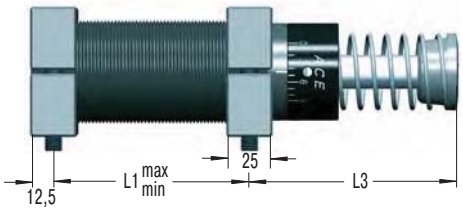


Thread UNF 2/12-12 also available on request (Omit suffix -M from Part Number)

Note: 150 mm stroke model does not include stop collar and positive stop is provided by the rod button which is 60 mm dia.

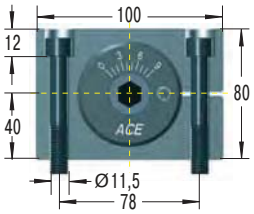
Adjuster
(only MA and ML)

S64



Side Foot Mounting Kit

S64 = 2 Flanges + 4 Screws M10x80, DIN 912



Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.

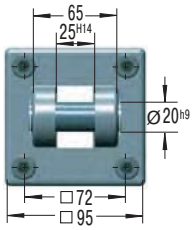
Tightening torque: 50 Nm
Clamping torque: > 350 Nm

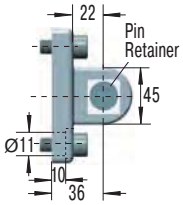
C64

Clevis Mounting Kit

C64 = 2 Clevis eyes. Delivered assembled to shock absorber.
[1] with 150 mm stroke Dia. 60 mm. Order C64/150.
Use positive stop at both ends of travel.

SF64





Secure with pin or use additional bar.

Due to limited force capacity the respective ability should be reviewed by ACE.

Clevis Flange

SF64 = Flange + 4 Screws M10x20 DIN 912
Tightening Torque 15 Nm
Conforms to: Audi + VW 39D1307/2/032, VDMA 24562 part 2
Daimler Chr. B801520023647, Opel-GM M13911675

Dimensions

Type	[1] Stroke	A max	B max	L1 min	L1 max	L2	L3	L5 max	L6 max
ML6425M	25	174	23	40	86	114	75.5	60	260
MC, MA, ML6450M	50	225	48.5	50	112	140	100	85	310
MC, MA64100M	100	326	99.5	64	162	191	152	136	410
MC, MA64150M	150	450	150	80	212	241	226	187	530

[1] Nominal stroke length (without integral stop collar fitted).

Capacity Chart MC64

Type Self-Compensating	Max. Energy Capacity [2] W_3 Nm/Cycle	W_4 Self-Contained Nm/h	W_4 with Air/Oil Tank Nm/h	W_4 with Oil Recirculation Nm/h	[1] Effective Weight me Soft -0 min kg	-0 max kg	-1 min kg	-1 max kg	-2 min kg	-2 max kg	-3 min kg	-3 max kg	Hard -4 min kg	-4 max kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
MC6450M	1 700	146 000	293 000	384 000	35	140	140	540	460	1 850	1 600	6 300	5 300	21 200	90	155	0.12	4	2.9
MC64100M	3 400	192 000	384 000	497 000	70	280	270	1 100	930	3 700	3 150	12 600	10 600	42 500	105	270	0.34	3	3.7
MC64150M	5 100	248 000	497 000	644 000	100	460	410	1 640	1 390	5 600	4 700	18 800	16 000	63 700	75	365	0.48	2	5.1

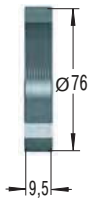
Capacity Chart MA/ML64

Type Adjustable	Max. Energy Capacity [2] W_3 Nm/Cycle	W_4 Self-Contained Nm/h	W_4 with Air/Oil Tank Nm/h	W_4 with Oil Recirculation Nm/h	[1] Effective Weight me min. kg	me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
ML6425M	1 020	124 000	248 000	332 000	7 000	300 000	120	155	0.06	5	2.5
MA6450M	2 040	146 000	293 000	384 000	220	50 000	90	155	0.12	4	2.9
ML6450M	2 040	146 000	293 000	384 000	11 000	500 000	90	155	0.12	4	2.9
MA64100M	4 080	192 000	384 000	497 000	270	52 000	105	270	0.34	3	3.7
MA64150M	6 120	248 000	497 000	644 000	330	80 000	75	365	0.48	2	5.1

[1] The effective weight range limits can be raised or lowered to special order [2] For Emergency Use Only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details. Specifications relate to the effective stroke length (B max.).

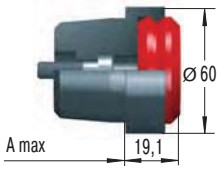
M64x2

NM64



Locking Ring

PP64

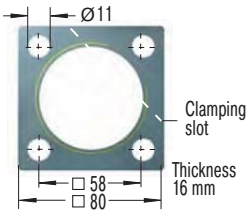


see shock absorber dims.

Poly Button

Optional button with elastomer insert for noise suppression. Option supplied ready mounted onto the shock absorber. For self installation see mounting instructions on page 48.

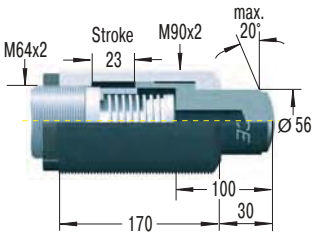
QF64



Square Flange

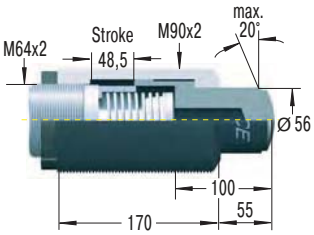
Install with 4 machine screws with tightening torque 50 Nm
clamping torque > 210 Nm

BV6425



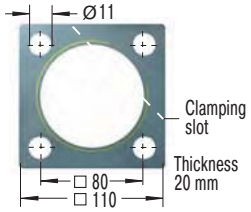
Side Load Adaptor

BV6450



Side Load Adaptor

QF90

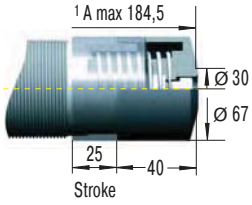


Square Flange

Install with 4 machine screws with tightening torque: 50 Nm
clamping torque: > 210 Nm

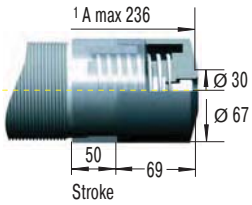
Mounting installation see pages 34 and 45.

PB6425



Steel Shroud

PB6450



Steel Shroud

[1] Total installation length of the shock absorber inc. steel shroud

Interchange Parts for the earlier MC-Types available on request.

Mounting, installation etc. see pages 33 and 45.

Ordering Example

MA6450M

Adjustable
Thread Size M64
Stroke 50 mm
Metric Thread
(omitted when using thread UNF 2 1/2-12)

Model Type Prefix

Standard Models

Self-Contained with Return Spring
MC self-compensating
MA adjustable
ML adjustable, for lower impact velocity

Special Models

Air/Oil Return without Return Spring
MCA, MAA, MLA

Air/Oil Return with Return Spring
MCS, MAS, MLS

Self-Contained without Return Spring
MCN, MAN, MLN

Earlier Model

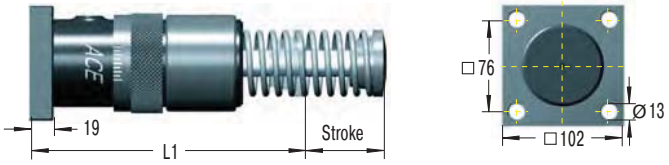
Code	Adjustable	[1] W_3	Stroke mm
1	A11/2x2 ...	2 350	50
2	A11/2x3 1/2 ...	4 150	89
3	A11/2x5 ...	5 900	127
4	A11/2x6 1/2 ...	7 700	165

MAGNUM Series

Adjustable	[1] W_3	Stroke mm	Self-Compensating	[1] W_3	Stroke mm
MA6450M ...	2 040	50	MC6450M ...	1 700	50
MA64100M...	4 080	100	MC64100M ...	3 400	100
MA64100M ...	4 080	100	MC64100M ...	3 400	100
MA64150M ...	6 120	150	MC64150M ...	5 100	150

[1] W_3 = max. energy capacity per cycle in Nm

A11/2 x ...-R (Rear Flange)



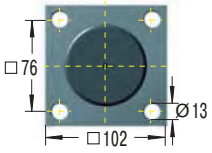
MA64 ..., MC64 ...

Flange QFR64-11/2

Dimensions

Code	L1
1	196
2	233
3	271
4	329

A11/2 x ...-F (Front Flange)



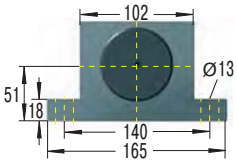
MA64 ..., MC64 ...

Flange QFF64-11/2

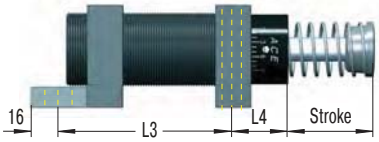
Dimensions

Code	L2
1	55
2	54
3	54
4	73

A11/2 x ...-S (Side Foot Mounting)



MA64 ..., MC64 ...

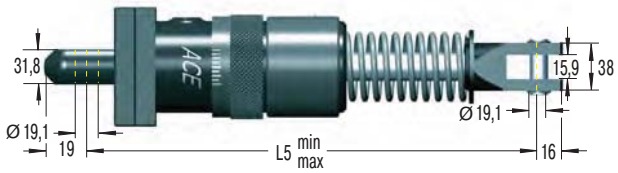


Foot Mount Set S64-11/2

Dimensions

Code	L3	L4
2	170	59
3	208	59
4	246	78

A11/2 x ...-C (Clevis Mounting)



MA64 ..., MC64 ...

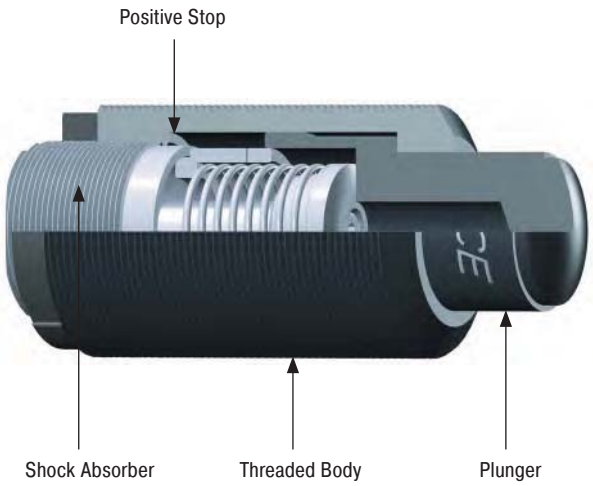
Clevis Mount Set C64-11/2

Dimensions

Code	L5 min	[1] A11/2 L5 max	[1] MA64 L5 max
1	278.0	328.6	328.0
2	317.0	405.6	417.0
3	353.0	481.8	453.0
4	412.0	577.0	562.0

[1] Note! L5 max is not the same.

BV... Side Load Adaptor



For side load impact angles from 3° to 25°

With side load impact angles of more than 3° the operation lifetime of the shock absorber reduces rapidly due to increased wear of rod bearings. The optional BV side load adaptor provides long lasting solution. Secure the side load adaptor with Loctite or locknut on the shock absorber.

BV3325 (M45x1.5) for MC, MA, ML3325M (M33x1.5)

BV3350 (M45x1.5) for MC, MA, ML3350M (M33x1.5)

BV4525 (M64x2) für MC, MA, ML4525M (M45x1.5)

BV4550 (M64x2) for MC, MA, ML4550M (M45x1,5)

BV6425 (M90x2) for ML6425M (M64x2)

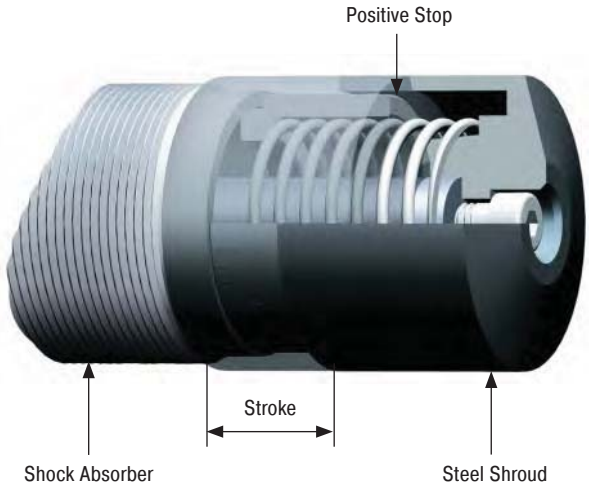
BV6450 (M90x2) for MC, MA, ML6450M (M64x2)

Material: Threaded body and plunger hardened high tensile steel.

Mounting: Directly mount the shock absorber/side mount assembly on the outside thread of the side load adaptor or by using the QF flange. You cannot use a foot mount.

Calculation example see page 34.

PB... Steel Shroud



For thread sizes M33x1.5, M45x1.5 and M64x2 with 25 or 50 mm stroke.

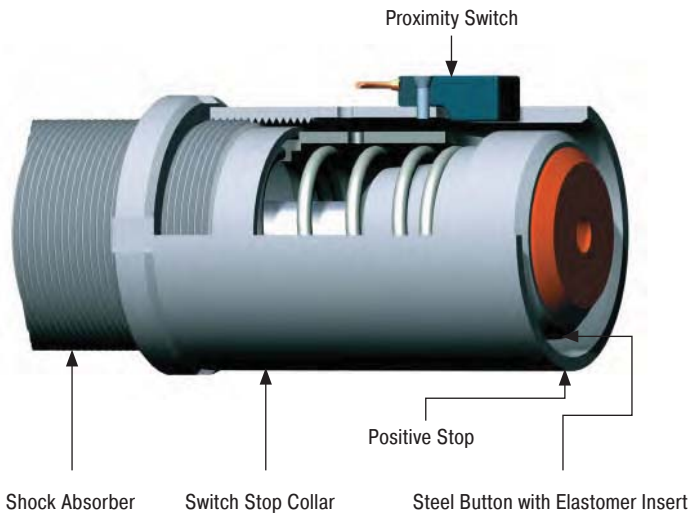
Grinding beads, sand welding, splatter, paints and adhesives etc. can adhere to the piston rod. They then damage the rod seals and the shock absorber quickly fails. In many cases the installation of the optional steel shroud can provide worthwhile protection and increase lifetime.

Material: Hardened high tensile steel.

Mounting: To mount the PB steel shroud it is necessary to remove the rod end button of the shock absorber.

Note! When installing don't forget to allow operating space for the shroud to move as the shock absorber is cycled.

AS... Switch Stop Collar

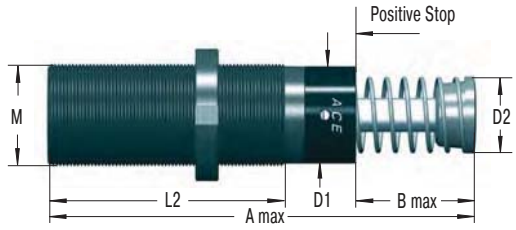


For thread sizes M33x1.5 and M45x1.5

The ACE Stop Light Switch Stop Collar combination serves as a safety element to provide stroke position information for automatically sequenced machines. The compact construction allows its use in nearly any application. The standard rod button is detected by the proximity switch at the end of its stroke to provide switch actuation. The switch is normally open when the shock absorber is extended and only closes when it has completed its operating stroke. The AS Switch Stop Collar combination is only delivered ready mounted onto the shock absorber c/w the switch.

Material: Hardened high tensile steel.

For circuit diagram of proximity switch see page 35.



Dimensions and Capacity Chart

Type	[1] Stroke							Max. Energy Capacity Nm per cycle	Nm per hour at 20 °C	Nm per hour at 100 °C	Max. Side Load Angle	Weight
Part Number	mm	A max.	B	D1	D2	L2	M	W_3 max. Nm	W_4 max. Nm	W_4 max. Nm	°	kg
MC3325M	25	138	23.0	30	25	83	M33x1.5	155	215 000	82 000	4	0.45
MC3350M	50	189	48.5	30	25	108	M33x1.5	310	244 000	93 000	3	0.54
MC4525M	25	145	23.0	42	35	95	M45x1.5	340	307 000	117 000	4	1.13
MC4550M	50	195	48.5	42	35	120	M45x1.5	680	321 000	122 000	3	1.36
MC6450M	50	225	48.5	60	48	140	M64x2	1 700	419 000	159 000	4	2.90
MC64100M	100	326	99.5	60	48	191	M64x2	3 400	550 000	200 000	3	3.70

[1] Nominal stroke length (without stop collar fitted)

The calculation and selection of the most suitable shock absorber (effective weight range) for your application should be carried out or checked by ACE Controls. Adjustable models are also available on request.

Ordering Example

MC3350M-2-HT

- Self-Compensating
- Thread Size M33
- Stroke 50 mm
- Metric Thread (omitted when using thread UNF)
- Effective Weight Range Code
- Version for High Temperature Use

Details Required when Ordering:

Load to be Decelerated	m	(kg)
Impact Velocity	v	(m/s)
Propelling Force	F	(N)
Operating Cycles per Hour	x	(/hr)
Number of Absorbers in Parallel	n	
Ambient Temperature	°C	

Technical Data

Impact velocity range: 0.15 to 5 m/s, up to 20 m/s on request.

Operating fluid: Special temperature stable synthetic oil

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish or nitride hardened. Piston rod: Steel hardened and chrome plated. Rod end button: Hardened steel with black oxide finish. Return spring: Zinc plated or plastic-coated. For optimum heat dissipation **do not** paint shock absorber.

Mounting: In any position

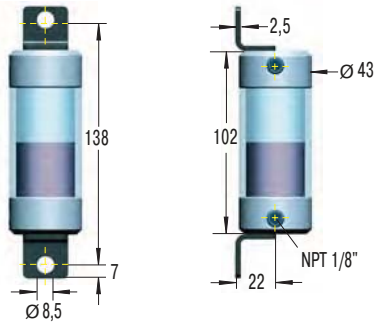
Operating temperature range: -20 °C to 150 °C

Capacity rating: For emergency applications it is sometimes possible to exceed above max. capacity ratings (please consult ACE for details). The above W_4 ratings (max. energy Nm per hour) can sometimes be increased by using an external air/oil tank (see page 47) and model version prefix **MCA** (please consult ACE for further details).

On request: Plated finishes for additional corrosion protection.

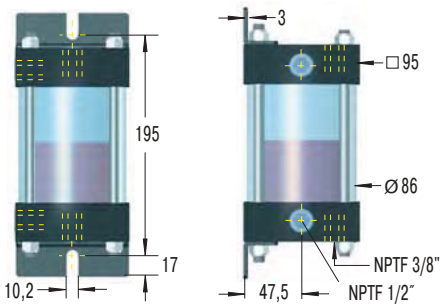
Issue 9.2007 Specifications subject to change

AO1



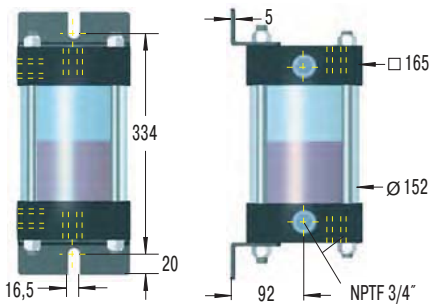
Oil capacity 20 cm³
Material: Alu. caps and polycarbonate body.

AO3



Oil capacity 330 cm³
Material: Alu. caps and steel body polycarbonate sight gauge.

AO691



Oil capacity 2600 cm³
Material: Alu. caps and steel body polycarbonate sight gauge.

Max. pressure 8 bar. Max. temperature 80 °C.

Oil filling: ATF-Oil 42 cSt at 40°C for all shock absorbers in MAGNUM Series. Mount air/oil tank higher than shock absorber. Bleed all air from system before operating.

Attention: Exhaust tank before carrying out service. Check valve holds pressure!

Suggested Air/Oil tanks in accordance with W_4 ratings

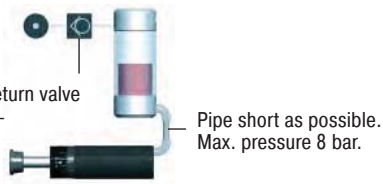
Part Numbers

Type	With Tank Examples 1-4		With Recirc. Circuits Ex. 5-6		Conn. Pipe. Ø
	Tank	Non-Return Valve	Tank	Non-Return Valve	Min.
MCA, MAA, MLA33...	AO1	CV1/8	AO3	CV1/4	4
MCA, MAA, MLA45...	AO1	CV1/8	AO3	CV3/8	6
MCA, MAA, MLA64...	AO3	CV1/4	AO691	CV1/2	8
CAA, AA2...	AO691	CV1/2	AO82	CV3/4	15
CAA, AA3...	AO691	CV1/2	AO82	CV3/4	19
CAA4...	AO82	CV3/4	AO82	CV3/4	38

AO82 details on request.

Connection Examples Air/Oil Tanks

1

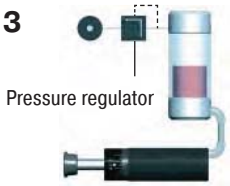


Piston rod returns immediately to extended position when load moves away. Operation without main air supply possible for short periods.

2

Return stroke may be sequenced by pneumatic valve at any desired time. No return force until valve energised.

3

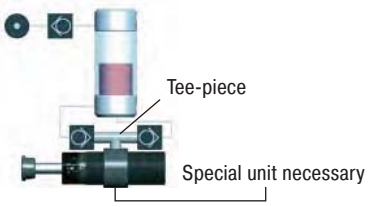


Return force can be adjusted by pressure regulator. Ensure safe minimum pressure to return shock absorber.

4

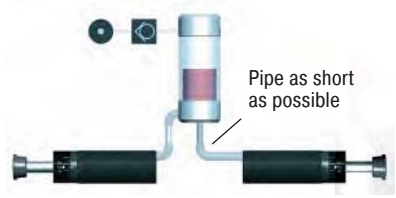
Spring return with air/oil tank.
No air supply connected.
Note: Will extend return time.

5



Oil recirculation circuit for extreme high cycle rates. Warm oil is positively circulated through air/oil tank for increased heat dissipation.

6



Connection of two shock absorbers to one air/oil tank is possible. Use next larger size tank. Combination with examples 2, 3 and 5 possible.

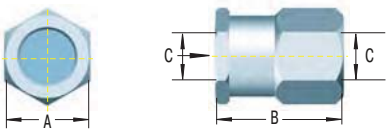
Thread Sizes for connection to air/oil tank

Type	Thread Bottom	Thread Side [2]
MCA, MAA, MLA33	G1/8 inside [1]	G1/8 inside
MCA, MAA, MLA45	G1/8 inside	G1/8 inside
MCA, MAA, MLA64	G1/4 inside	G1/4 inside

[1] adapted
[2] on request (add suffix -PG/-P)

Part Numbers CV...

Max. pressure: 20 bar
Max. temperature: 95 °C
Suitable for: Oil, air, water.
Material: Aluminium

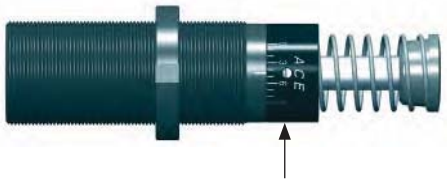


Type			
Part No.	A	B	C
CV1/8	19	24	1/8
CV1/4	29	33	1/4
CV3/8	29	33	3/8
CV1/2	41	40	1/2
CV3/4	48	59	3/4

Mechanical Stop

The MAGNUM Series units have a built in stop collar (mechanical stop) which also serves as the front adjuster.

If using a shock absorber without a stop collar it is important to install a mechanical stop 0.5 to 1mm before the end of the stroke.



Stop Collar
+ Front Adjuster [1]

Rear Adjuster [1]

[1] MA and ML only

General

For optimum heat dissipation do not paint the shock absorber. For applications in environments with acids, dusts or powders, abrasives, steam or water please protect the shock absorber and/or consider the special accessories on page 45. The shock absorber should be securely mounted onto a flat and smooth surface of adequate strength.

Self Compensating Models

The MC family of shock absorbers are self compensating. Providing the effective weight on the application remains within the band given in the capacity charts then no adjustment is necessary for changes in weights, speeds or propelling force. These units are available with five standard operating bands (me min. – me max.) and are identified by the suffix number after the model which goes from -0 (very soft) up to -4 (very hard).

The optimum deceleration is achieved when there is no abrupt change in the load velocity at the beginning or the end of the shock absorber stroke.
If there is a hard impact at the start of stroke ⟶ use the next softer version (i.e. lower suffix number).
If there is a hard setdown at the end of stroke ⟶ use the next harder version, or mount two units in parallel.
Alternatively change to a larger bore size unit. Contact ACE for further advice.

Adjustable Models

The adjustment has a graduated scale from 0 to 9. The adjuster in the body of MA/ML64 has a side mounted locking screw which should be loosened (1/2 turn max.) with a hex. key before commencing adjustment. The MAGNUM Series units can be adjusted by the hex. socket at the rear of the body – or by rotating the front stop collar. Both adjusters are internally connected and will show the same adjustment value on the scales as they are turned. After installation cycle the equipment a few times and turn the adjustment until optimum deceleration is achieved (i.e. no abrupt change in the load velocity observed at the beginning or at the end of shock absorber stroke). The shock absorber is delivered set at 5.

If there is a hard impact at start of stroke ⟶ adjust the unit softer i.e. towards 9 on the scale.
If there is a hard setdown at end of stroke ⟶ adjust the unit harder i.e. towards 0.

Adjustment approaching “0” means: a) Impact velocity is too low: consider changing to Model type ML or:
b) Shock absorber selected is too small: use next larger size or mount 2 units in parallel.

Mounting Options

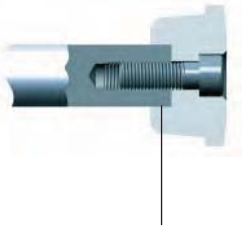
Basic Model

Flange Mounting

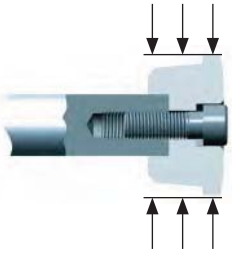
Side Foot Mounting

Clevis Mounting

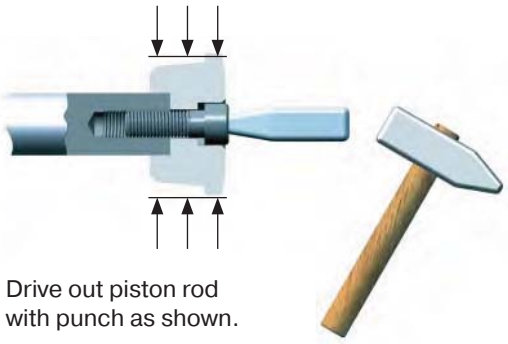
Removing Rod End Button



Press fit
(screw loctited for security).



Clamp button in vice and
loosen screw 3 or 4 turns.



Drive out piston rod
with punch as shown.

Repairs

It is possible to overhaul ACE shock absorbers in M33 sizes and larger. We would recommend that damaged or worn shock absorbers are returned to ACE for repair. You will find that this is more economic than the comparative cost of repairing yourself. Spare parts and seal kits etc. are available however if required.

ACE can also offer more than its already extensive range of standard products covering body sizes from M5 up to M130. For over 40 years we have designed and developed many customer specific “specials”. These include units with special damping characteristics for unusual applications or non-standard materials or operating fluids. Special seals and mounting accessories for customers specific applications are also available.

Below are a few examples of the thousands of special options that we have provided in the past.

Special shock absorbers with damping in the pull direction. Available in medium bore sizes from M33x1.5 to M64x2.

Ask for details.

Special shock absorbers with non-standard spring for higher return force. For sizes from M33x1.5 upwards.

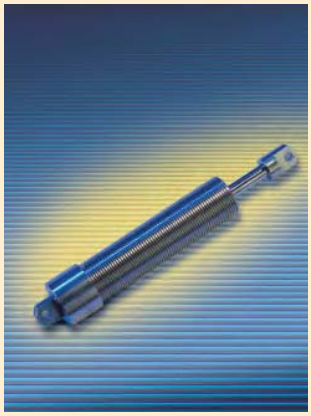
Ask for details.

Special shock absorbers with lengthened piston rods and clevis mounts for extended mounting points. Available in all sizes from M33x1.5 upwards.

Ask for details.

Special shock absorbers with guided anti-rotation head with built in roller for damping and then allowing the sideways transfer of heavy loads. Available on heavy duty units from M100x2 upwards.

Ask for details.

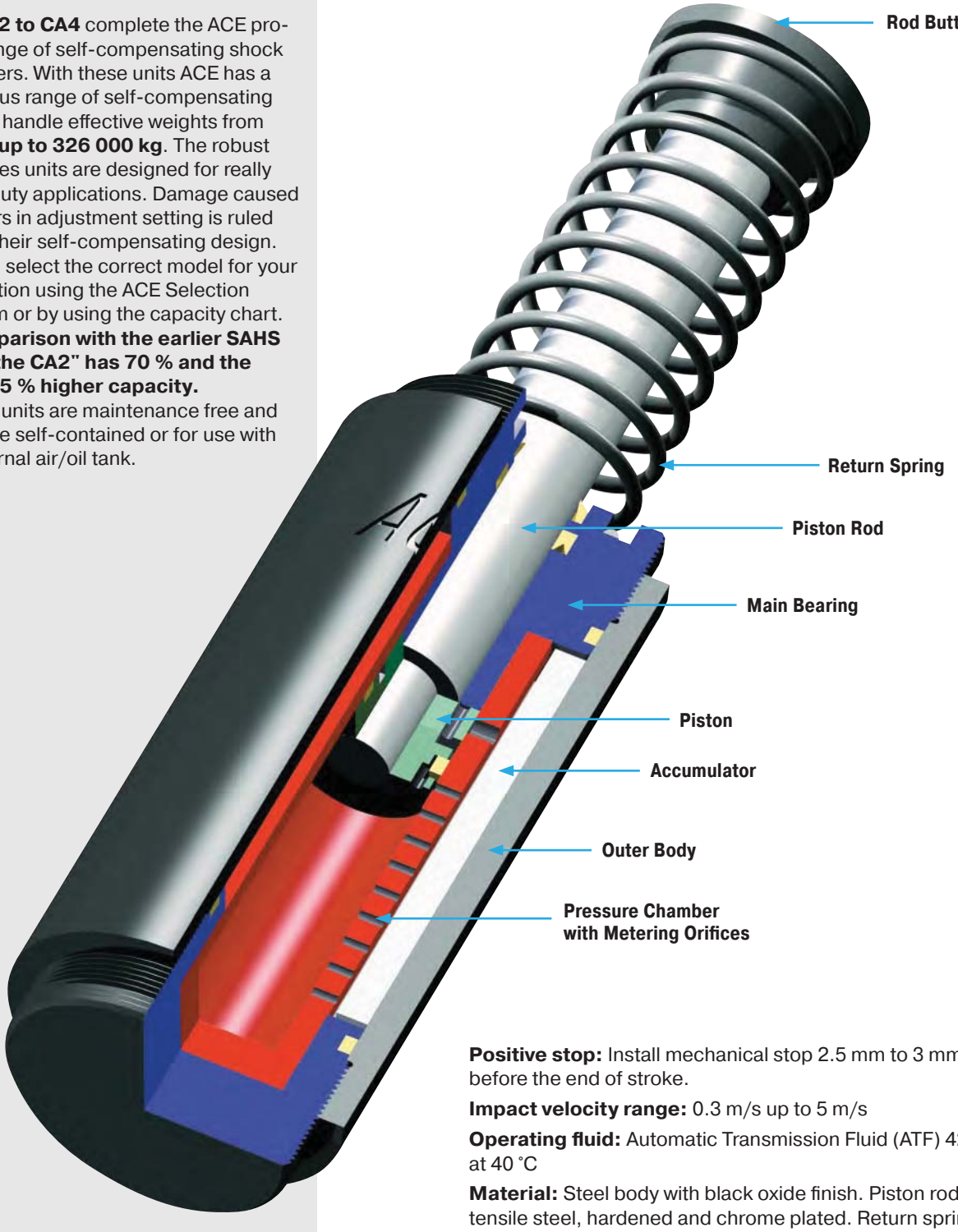


Shock absorbers with special anti-corrosion finishes. Options include plated or painted finishes, weartec finish for saltwater protection and units with all exposed parts manufactured from **V4A Stainless Steel**.

Type[1] Part No.
MC150M-V4A
MC150MH-V4A
MC150MH2-V4A
MC225M-V4A
MC225MH-V4A
MC225MH2-V4A
MC600M-V4A
MC600MH-V4A
MC600MH2-V4A

[1] For technical details see page 21.
Middle bore sizes M33x1.5 and M45x1.5 by quotation.

The **CA2 to CA4** complete the ACE product range of self-compensating shock absorbers. With these units ACE has a continous range of self-compensating units to handle effective weights from **0.3 kg up to 326 000 kg**. The robust CA Series units are designed for really heavy duty applications. Damage caused by errors in adjustment setting is ruled out by their self-compensating design. You can select the correct model for your application using the ACE Selection Program or by using the capacity chart. **In comparison with the earlier SAHS range the CA2" has 70 % and the CA3" 25 % higher capacity.**
The CA units are maintenance free and available self-contained or for use with an external air/oil tank.



Positive stop: Install mechanical stop 2.5 mm to 3 mm before the end of stroke.

Impact velocity range: 0.3 m/s up to 5 m/s

Operating fluid: Automatic Transmission Fluid (ATF) 42cSt. at 40 °C

Material: Steel body with black oxide finish. Piston rod high tensile steel, hardened and chrome plated. Return spring zinc plated. To avoid reducing heat dissipation do not paint outer body.

Capacity rating: For emergency use only applications it may be possible to exceed published energy per cycle (W_3) figures. Please consult ACE for further details.

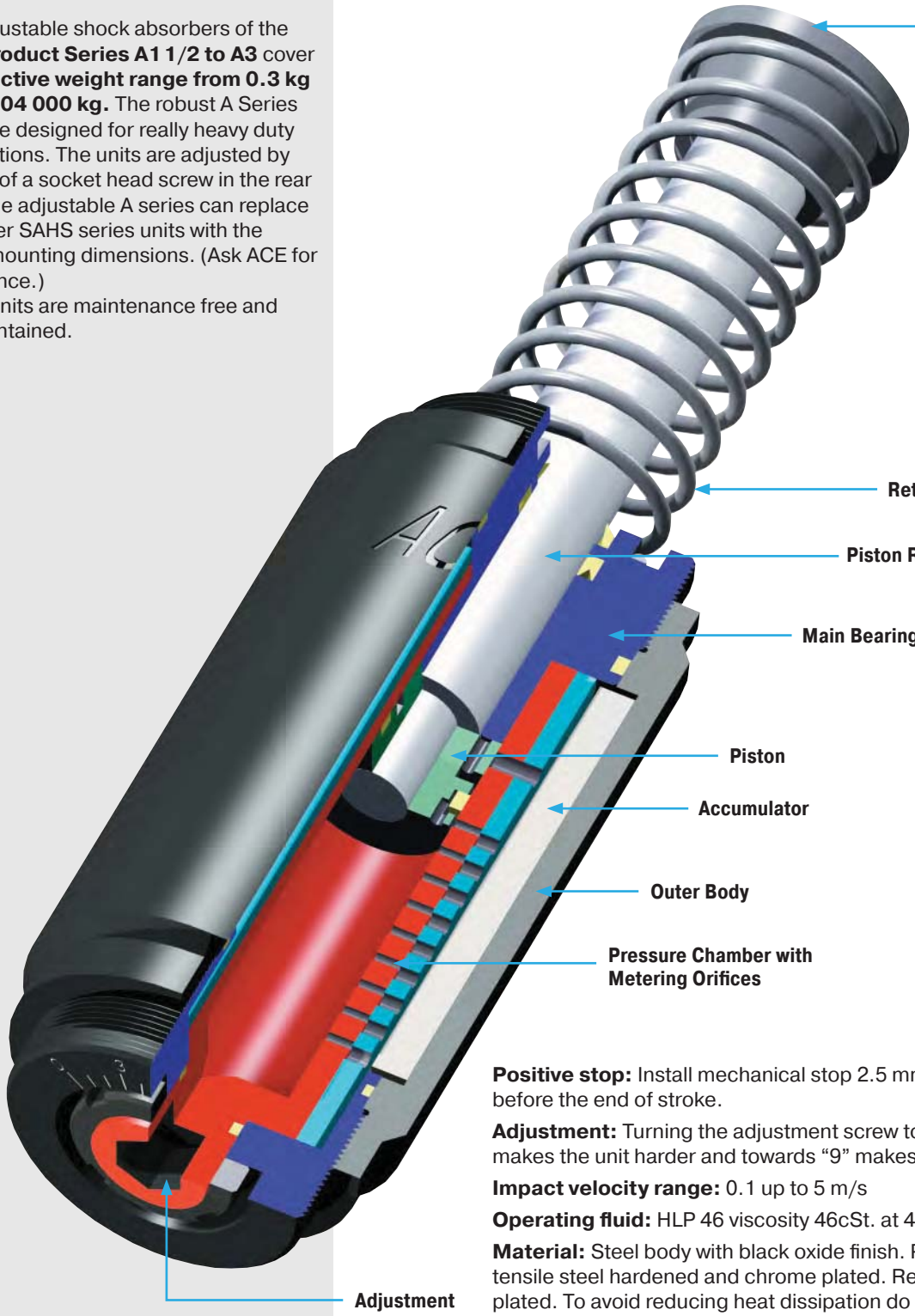
Mounting: In any position

Operating temperature range: -12° C to +85 °C

On request: Special oils, or for higher or lower impact velocities outside range shown above, or other options please consult ACE.

Issue 9.2007 Specifications subject to change

The adjustable shock absorbers of the **ACE Product Series A1 1/2 to A3** cover an **effective weight range from 0.3 kg up to 204 000 kg.** The robust A Series units are designed for really heavy duty applications. The units are adjusted by means of a socket head screw in the rear end. The adjustable A series can replace the older SAHS series units with the same mounting dimensions. (Ask ACE for assistance.)
The A units are maintenance free and self-contained.



Positive stop: Install mechanical stop 2.5 mm to 3 mm before the end of stroke.

Adjustment: Turning the adjustment screw towards “0” makes the unit harder and towards “9” makes it softer.

Impact velocity range: 0.1 up to 5 m/s

Operating fluid: HLP 46 viscosity 46cSt. at 40 °C

Material: Steel body with black oxide finish. Piston rod high tensile steel hardened and chrome plated. Return spring zinc plated. To avoid reducing heat dissipation do not paint outer body.

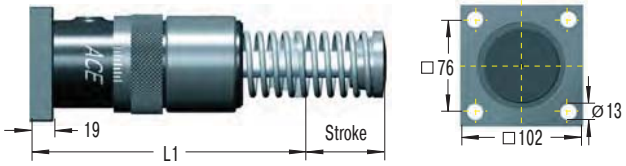
Capacity rating: For emergency use only applications it may be possible to exceed published energy per cycle (W_3) figures. Please consult ACE for further details.

Mounting: In any position

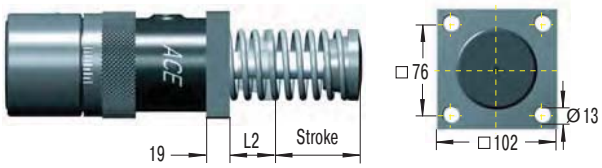
Operating temperature range: -12 °C to +85 °C

On request: Special oils, or for higher or lower impact velocities outside range shown above, or other options please consult ACE.

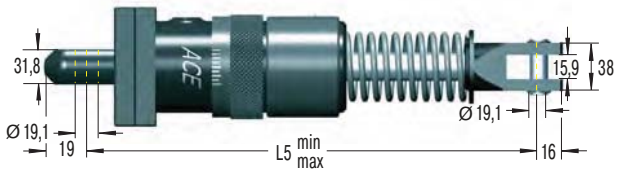
Rear Flange -R



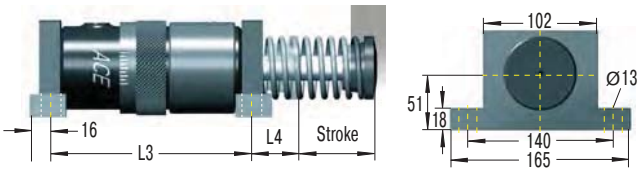
Front Flange -F



Clevis Mounting -C



Foot Mounting -S



Foot mounting not available on 2" stroke models.

Install mechanical stop 2.5 mm to 3 mm before the end of stroke.

Ordering Example

A 11/2 x 2 R

Adjustable
Bore Size Ø 1 1/2"
Stroke Length 2" = 50.8 mm
Rear Flange Mounting

Model Type Prefix

A = self-contained with return spring (This is standard model)
AA = air/oil return without return spring. Use only with external air/oil tank
NA = self-contained without return spring
SA = air/oil return with return spring. Use only with external air/oil tank

Dimensions

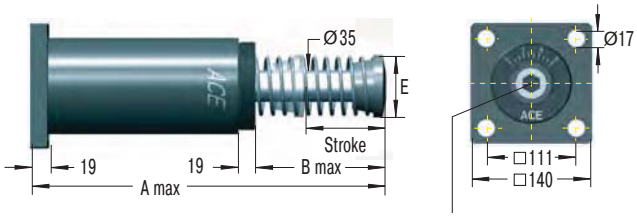
Type	Stroke mm	L1	L2	L3	L4	L5
A1 1/2x2	50	195.2	54.2	–	–	277.8 - 328.6
A1 1/2x3 1/2	89	233	54.2	170	58.6	316.6 - 405.6
A1 1/2x5	127	271.5	54.2	208	58.6	354.8 - 481.8
A1 1/2x6 1/2	165	329	73	246	78	412 - 577

Capacity Chart

Type	Max. Energy Capacity [2] W_3 Nm/Cycle	[3] W_4 Self-Contained Nm/h	[3] W_4 with Air/Oil Tank Nm/h	[1] Effective Weight me min. kg	me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
A1 1/2x2	2 350	362 000	452 000	195	32 000	160	210	0.1	5	7.5
A1 1/2x3 1/2	4 150	633 000	791 000	218	36 000	110	210	0.25	4	8.9
A1 1/2x5	5 900	904 000	1 130 000	227	41 000	90	230	0.4	3	10.3
A1 1/2x6 1/2	7 700	1 180 000	1 469 000	308	45 000	90	430	0.4	2	12

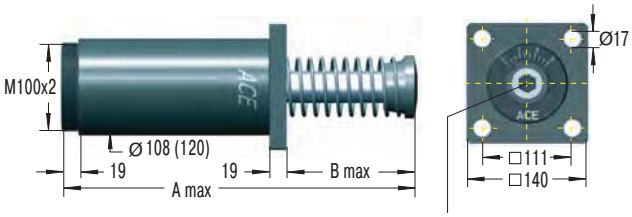
[1] The effective weight range limits can be raised or lowered to special order.
[2] For emergency use only applications it may be possible to exceed these max. capacity ratings. Please consult ACE for further details.
[3] Figures for oil recirculation systems on request.

Rear Flange -R



Adjuster – Model A2 only

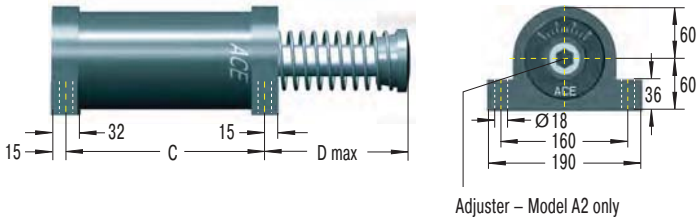
Front Flange -F



Dims. in ( ) for Model A2 only

Adjuster – Model A2 only

Foot Mounting S100



Adjuster – Model A2 only

Dimensions of clevis mountings available on request.
NOTE! For replacement of existing SAHS 2" foor mounted units order the old type foot mounting S2-A.

Ordering Example

CA 2 x 4-3 F

- Self-Compensating
- Bore Size Ø 2"
- Stroke Length 4" = 102 mm
- Effective Weight Range Version
- Front Flange Mounting

Model Type Prefix

A, CA	=	self-contained with return spring (This is standard model)
AA, CAA	=	air/oil return without return spring. Use only with external air/oil tank
NA, CNA	=	self-contained without return spring
SA, CSA	=	air/oil return with return spring. Use only with external air/oil tank

Dimensions

Type	Stroke mm	A max	B max	C	D max	E
2x2	50	313	110	173	125	70
2x4	102	414	160	224	175	70
2x6	152	516	211	275	226	70
2x8	203	643	287	326	302	92
2x10	254	745	338	377	353	108

Capacity Chart CA2

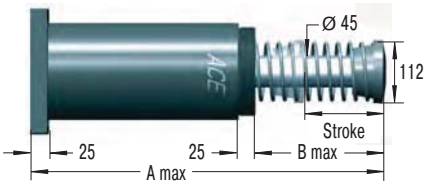
	Max. Energy Capacity			¹ Effective Weight me								
Type	² W_3 Nm/Cycle	³ W_4 Self-Contained Nm/h	³ W_4 with Air/Oil Tank Nm/h	Soft ← -1 min kg max	-2 min kg max	-3 min kg max	→ Hard -4 min kg max	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
CA2x2	3 600	1 100 000	1 350 000	700 - 2 200	1 800 - 5 400	4 500 - 13 600	11 300 - 34 000	210	285	0.25	3	12.8
CA2x4	7 200	1 350 000	1 700 000	1 400 - 4 400	3 600 - 11 000	9 100 - 27 200	22 600 - 68 000	150	285	0.5	3	14.8
CA2x6	10 800	1 600 000	2 000 000	2 200 - 6 500	5 400 - 16 300	13 600 - 40 800	34 000 - 102 000	150	400	0.6	3	16.9
CA2x8	14 500	1 900 000	2 400 000	2 900 - 8 700	7 200 - 21 700	18 100 - 54 400	45 300 - 136 000	230	650	0.7	3	19.3
CA2x10	18 000	2 200 000	2 700 000	3 600 - 11 000	9 100 - 27 200	22 600 - 68 000	56 600 - 170 000	160	460	0.8	3	22.8

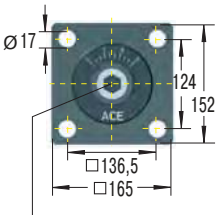
Capacity Chart A2

	Max. Energy Capacity			¹ Effective Weight me						
Type	² W_3 Nm/Cycle	³ W_4 Self-Contained Nm/h	³ W_4 with Air/Oil Tank Nm/h	me min. kg	me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
A2x2	3 600	1 100 000	1 350 000	250	77 000	210	285	0.25	3	14.3
A2x4	9 000	1 350 000	1 700 000	250	82 000	150	285	0.5	3	16.7
A2x6	13 500	1 600 000	2 000 000	260	86 000	150	400	0.6	3	19.3
A2x8	19 200	1 900 000	2 400 000	260	90 000	230	650	0.7	3	22.3
A2x10	23 700	2 200 000	2 700 000	320	113 000	160	460	0.8	3	26.3

[1] The effective weight range limits can be raised or lowered to special order.
[2] For emergency use only applications it may be possible to exceed these max. capacity ratings. Please consult ACE for further details.
[3] Figures for oil recirculation systems on request.

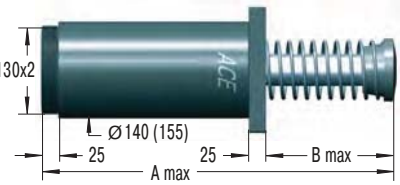
Rear Flange -R



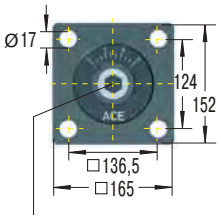


Adjuster - Model A3 only

Front Flange -F

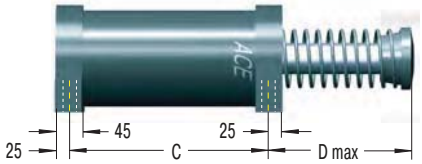


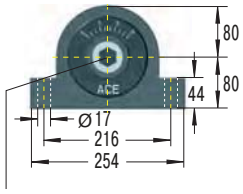
Dims. in ( ) for Model A3 only



Adjuster - Model A3 only

Foot Mounting S130





Adjuster - Model A3 only

Dimensions of Clevis Mountings available on request.
NOTE! For replacement of existing SAHS 3" foot mounted units please consult ACE.

Ordering Example

A 3 x 8 R

Adjustable
Bore Size Ø 3"
Stroke Length 8" = 203 mm
Rear Flange Mounting

Model Type Prefix

A, CA	=	self-contained with return spring (This is standard model)
AA, CAA	=	air/oil return without return spring. Use only with external air/oil tank
NA, CNA	=	self-contained without return spring
SA, CSA	=	air/oil return with return spring. Use only with external air/oil tank

Dimensions

Type	Stroke mm	A max	B max	C	D max
3x5	127	502	210	260	216
3x8	203	641	286	337	292
3x12	305	890	433	438	439

Capacity Chart CA3

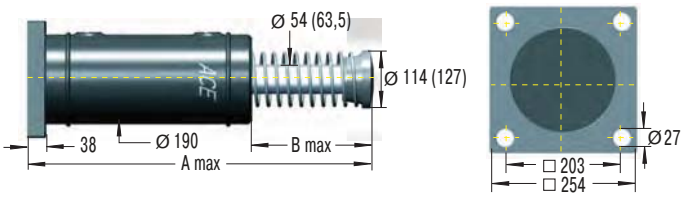
Type	[2] W_3 Nm/Cycle	[3] W_4 Self-Contained Nm/h	[3] W_4 with Air/Oil Tank Nm/h	[1] Effective Weight me Soft -1	Soft -2	Hard -3	Hard -4	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
CA3x5	14 125	2 260 000	2 800 000	2 900 - 8 700	7 250 - 21 700	18 100 - 54 350	45 300 - 135 900	270	710	0.6	3	28.9
CA3x8	22 600	3 600 000	4 520 000	4 650 - 13 900	11 600 - 34 800	29 000 - 87 000	72 500 - 217 000	280	740	0.8	3	33.4
CA3x12	33 900	5 400 000	6 780 000	6 950 - 20 900	17 400 - 52 200	43 500 - 130 450	108 700 - 326 000	270	730	1.2	3	40.6

Capacity Chart A3

Type	[2] W_3 Nm/Cycle	[3] W_4 Self-Contained Nm/h	[3] W_4 with Air/Oil Tank Nm/h	[1] Effective Weight me min. kg	me max. kg	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
A3x5	15 800	2 260 000	2 800 000	480	154 000	270	710	0.6	3	32.7
A3x8	28 200	3 600 000	4 520 000	540	181 500	280	740	0.8	3	38.5
A3x12	44 000	5 400 000	6 780 000	610	204 000	270	730	1.2	3	47.6

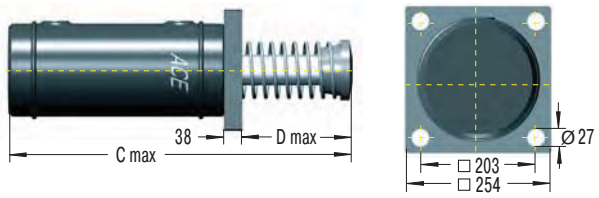
[1] The effective weight range limits can be raised or lowered to special order.
[2] For emergency use only applications it may be possible to exceed these max. capacity ratings. Please consult ACE for further details.
[3] Figures for oil recirculation systems on request.

Rear Flange -R

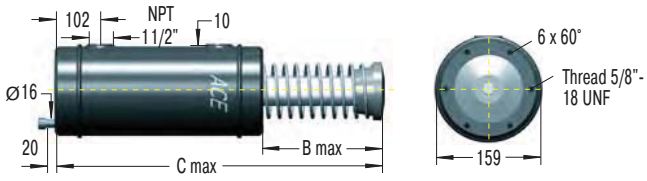


Dims. in ( ) for Model CA4x16 only

Front Flange -F



6 Tapped Holes (Primary Mounting) FRP



Foot Mounting -S

Dimensions of clevis mountings available on request.

Ordering Example

CA 4 x 8-5 R

- Self-Compensating
- Bore Size Ø 4"
- Stroke Length 8" = 203 mm
- Effective Weight Range Version
- Rear Flange Mounting

Model Type Prefix

CA = self-contained with return spring (This is standard model)

CAA = air/oil return without return spring. Use only with air/oil tank for high energy capacity per hour figures

CNA = self-contained without return spring

CSA = air/oil return with return spring. Use only with external air/oil tank

Dimensions CA/CSA

Type	Stroke mm	A	B	C	D	E	F
4x6	152	716	278	678	240	444	256
4x8	203	818	329	780	291	495	307
4x16	406	1 300	608.5	1 262.6	569	698	585

Dimensions CAA

Type	Stroke mm	A	B	C	D	E	F
4x6	152	666	228	628	190	444	206
4x8	203	767	278	729	240	495	256
4x16	406	1 174	482	1 136	444	698	460

Capacity Chart CA4

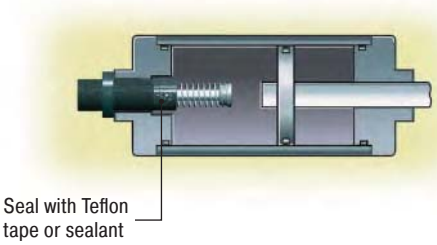
Type	Max. Energy Capacity [2] W_3 Nm/Cycle	W_4 Self-Contained Nm/h	W_4 with Air/Oil Tank Nm/h	W_4 with Oil Recirculation Nm/h	[1] Effective Weight me Soft -3	Medium -5	Hard -7	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Weight kg
CA4x6	47 500	3 000 000	5 100 000	6 600 000	3 500 - 8 600	8 600 - 18 600	18 600 - 42 700	480	1000	1.8	60
CA4x8	63 300	3 400 000	5 600 000	7 300 000	5 000 - 11 400	11 400 - 25 000	25 000 - 57 000	310	1000	2.3	68
CA4x16	126 500	5 600 000	9 600 000	12 400 000	10 000 - 23 000	23 000 - 50 000	50 000 - 115 000	310	1000	Ask	170

[1] The effective weight range limits can be raised or lowered to special order.
[2] For emergency use only applications it may be possible to exceed these max. capacity ratings. Please consult ACE for further details.

ACE Shock absorbers for pneumatic cylinders

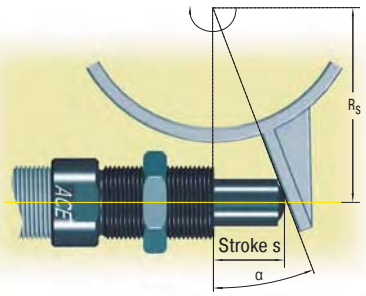
For: optimum deceleration
higher speeds
smaller cylinders
reduced air consumption
smaller valves and pipework

Example: MA3350M-Z
(cylinder mounting)



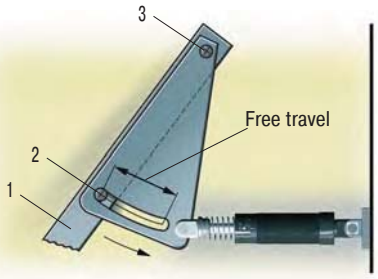
With heavy loads or high velocities normal cylinder cushions are often overloaded. This causes shock loading leading to premature cylinder failure or excessive maintenance. Using over-sized cylinders to withstand this shock loading is not the best solution since this considerably increases air consumption and costs.

2 Side load adapter for high side load angles



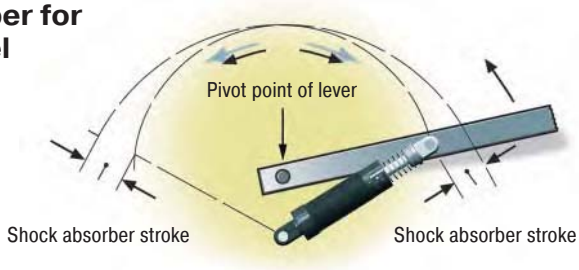
The side loading is removed from the shock absorber piston rod leading to considerably longer life. See pages 34 and 45 for more details.

3 Undamped free travel with damped end position



The lever 1 swings with the pin 2 in a slotted hole around pivot point 3. The lever is smoothly decelerated at the extreme end of its travel.

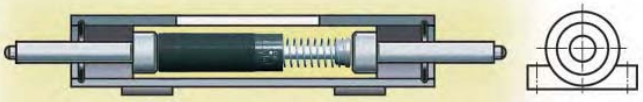
4 One shock absorber for both ends of travel



It is possible to use only one shock absorber for both end positions by using different pivot points as shown.

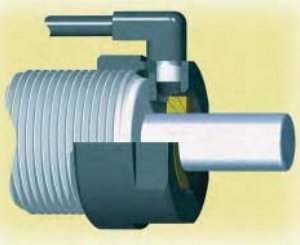
Tip: Leave approx. 1.5 mm of shock absorber stroke free at each end of travel.

5 Double acting shock absorber



With a little additional work a normal unidirectional shock absorber can be converted to work in 2 directions by using a mechanism as shown.

6 Air bleed collar

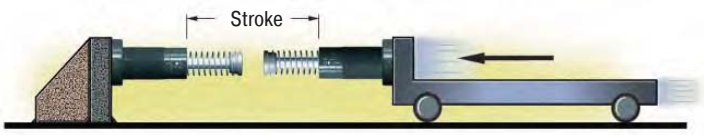


By using the air bleed adapter the operating lifetime of shock absorbers in aggressive environments can be considerably increased. The adapter protects the shock absorber seals from cutting fluids, cleaning agents, cooking oil etc. by using a low pressure air bleed.

For more details see page 33.

Issue 9.2007 Specifications subject to change

7 Double stroke length



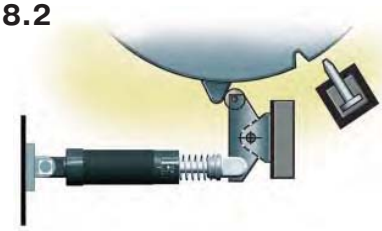
50 % lower reaction force (Q)
50 % lower deceleration (a)

By driving 2 shock absorbers against one another 'nose-to-nose', the effective stroke length can be doubled.

8 Ride over latch

8.1

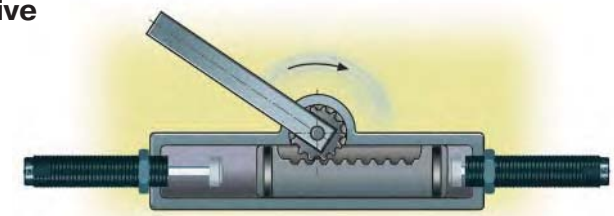
8.2



8.1 The latch absorbs the kinetic energy so that the object contacts the fixed stop gently.

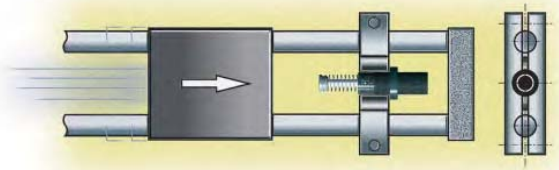
8.2 The latch absorbs the rotational energy of the turntable etc. The turntable can then be held in the datum position with a lock bolt or similar.

9 Rotary actuator or rack and pinion drive



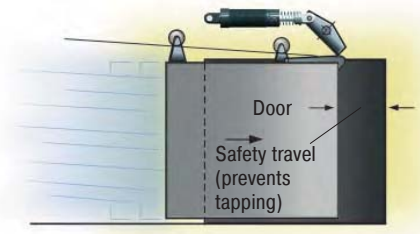
The use of ACE shock absorbers allows higher operating speeds and weights as well as protecting the drive mechanism and housing from shock loads.

10 Adjustable stop clamp e.g. for handling equipment



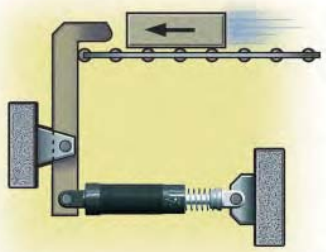
The gentle deceleration of ACE shock absorbers makes the use of adjustable stop clamps possible and removes any chance of the clamp slipping. The kinetic energy is completely removed before the mechanical stop is reached thus making high index speeds possible.

11 Ride-over latch e.g. firedoor

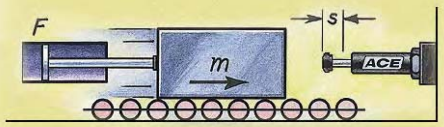


The fire door travels quickly until it reaches the lever. It is then gently decelerated by the lever mounted shock absorber and closes without shock or danger to personnel.

12 Increasing stroke length mechanically



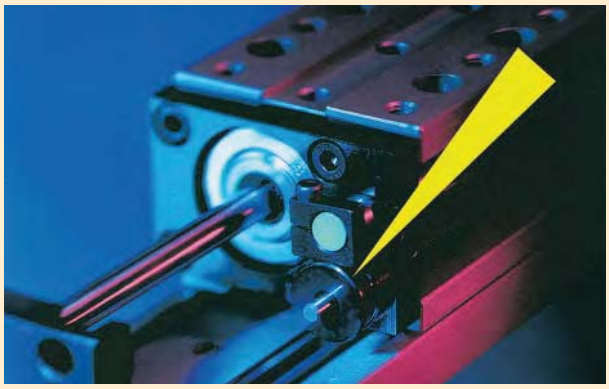
By means of a lever the effective stroke length can be increased and mounting space to the left reduced.



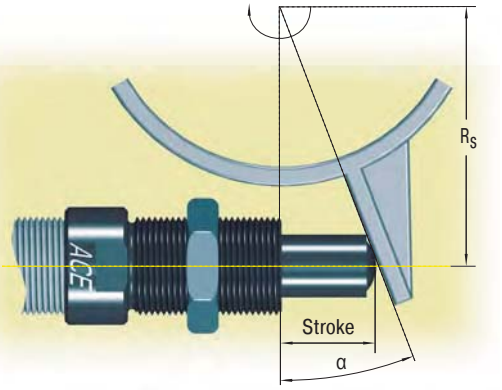
Constant resisting force

ACE Miniature Shock Absorbers are the right alternative.

This pneumatic module for high precision, high speed motion intentionally abandoned pneumatic end-of-travel damping. The compact miniature shock absorbers of the type **MC25MH-NB** decelerate the linear motion safer and faster when reaching the end-of-travel position. They accept the moving load gently and decelerate it smoothly throughout the entire stroke length. Additional advantages: simpler construction, smaller pneumatic valves, lower maintenance costs as well as reduced compressed air consumption.



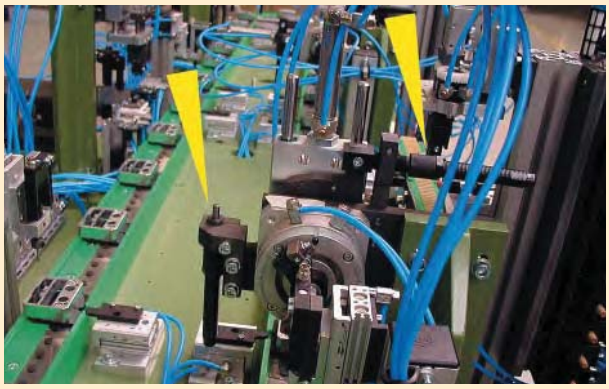
Miniature shock absorber in linear pneumatic module



Soft end-of-travel damping on rotary movements

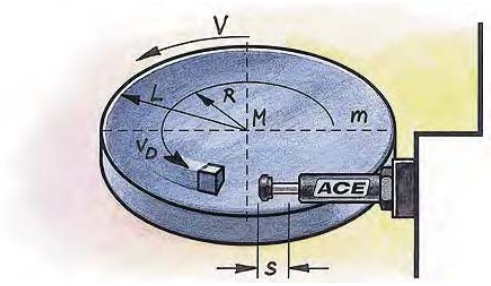
ACE Miniature Shock Absorbers optimise production with minimum expenditure.

The cycle rate for an assembly line producing electronic components was increased to 3 600 units/hr by using ACE shock absorbers. Miniature shock absorbers type **SC190M-1** decelerate the rapid transfer movements on the production line and using soft damping methods optimise the pick up and set down of components. This soft deceleration technique has increased production and reduced maintenance on the portal and rotary actuator modules. The optional side load adaptor protects the shock absorber from high side load forces and increases the operating lifetime. Using ACE shock absorbers reduces maintenance costs by 50 % and running costs by 20 %, diminishing energy consumption.



Optimalised production in the electronics industry

Issue 9.2007 Specifications subject to change

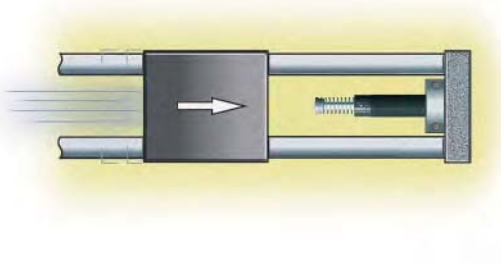


Safe swiveling

ACE industrial shock absorbers offer safety to spare for swiveling or braking of large telescope.

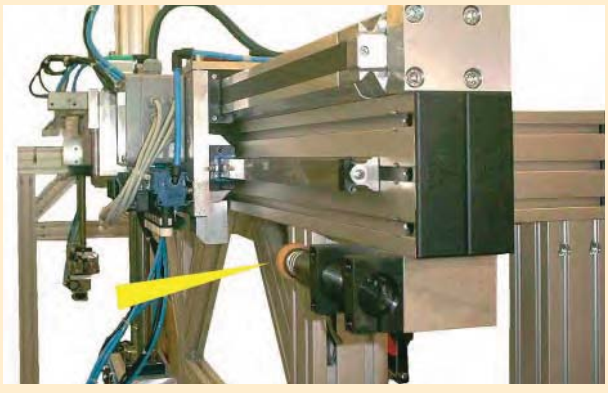
The optical system of this telescope for special observations is moveable in two space coordinates. The structure in which the telescope is mounted weighs 15 000 kg and consists of a turntable with drives and two wheel disks rotating on bearings. It enables a rotation by ± 90° from horizon to horizon. To safeguard the telescope in case of overshooting the respective swiveling limits, industrial shock absorbers of the type **ML3325M** are used as braking elements. Should the telescope inadvertently overshoot the permissible swivel range, they will safely damp the travel of the valuable telescope.

Perfect overshoot protection for precision telescope



Quicker, gentle positioning

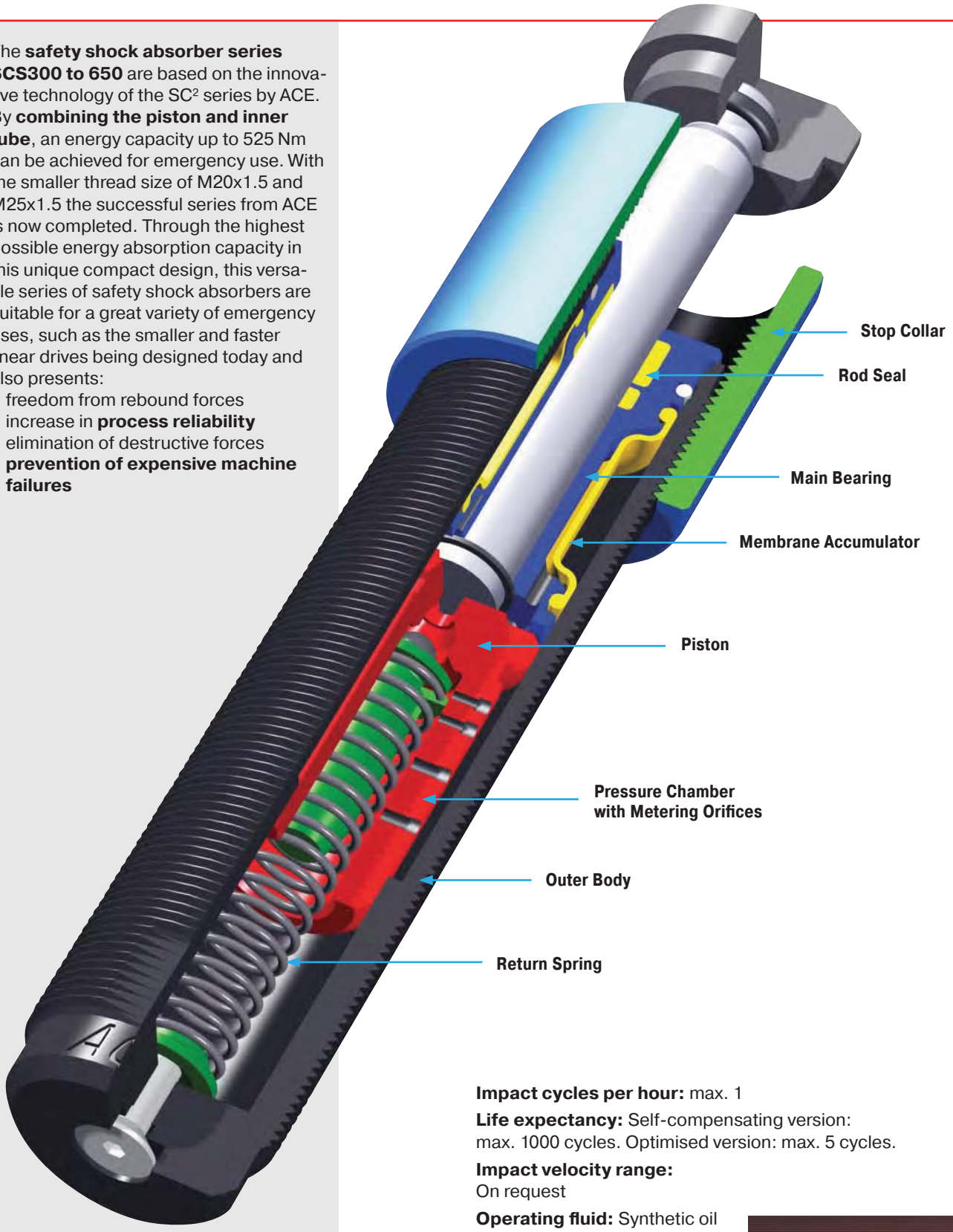
ACE industrial shock absorbers optimize portal for machine loading and increase productivity. This device driven by piston rod-less pneumatic cylinders, in which two gripper slides are moving independently of each other at speeds of 2 to 2.5 m/sec., is equipped with industrial shock absorbers as brake systems. Their function is to stop a mass of 25 kg up to 540 times per hour. The model **MC3350M-1-S** was chosen for this application, allowing easy and extremely accurate adjustment of the end positions of the adjustable limit stops. In comparison to brake systems with other function principles, shock absorbers allow higher travel speeds and shorter cycle sequences.



Industrial shock absorbers optimize portal operation

The **safety shock absorber series SCS300 to 650** are based on the innovative technology of the SC² series by ACE. By **combining the piston and inner tube**, an energy capacity up to 525 Nm can be achieved for emergency use. With the smaller thread size of M20x1.5 and M25x1.5 the successful series from ACE is now completed. Through the highest possible energy absorption capacity in this unique compact design, this versatile series of safety shock absorbers are suitable for a great variety of emergency uses, such as the smaller and faster linear drives being designed today and also presents:

- freedom from rebound forces
- increase in **process reliability**
- elimination of destructive forces
- **prevention of expensive machine failures**



Impact cycles per hour: max. 1

Life expectancy: Self-compensating version: max. 1000 cycles. Optimised version: max. 5 cycles.

Impact velocity range: On request

Operating fluid: Synthetic oil

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish. Piston rod: Hardened stainless steel.

Energy capacity W_3: At max. side load angle do not exceed 80 % of rated max. energy capacity below.

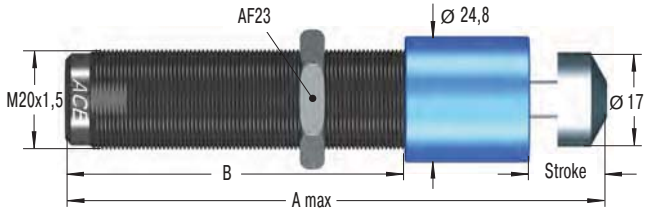
Mounting: In any position

Operating temperature range: 0 °C to 66 °C

60

Issue 9.2007 Specifications subject to change

SCS300

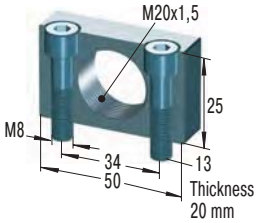


Standard Dimensions

KM20

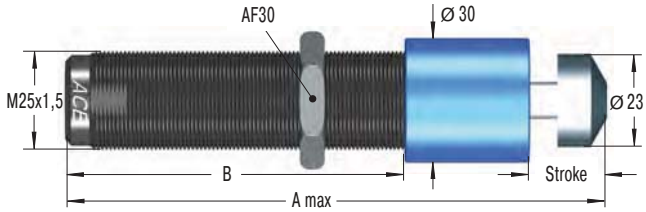
Locknut

MB20SC2



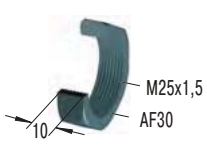
Mounting Block

SC650



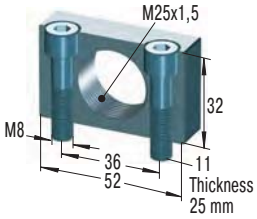
Standard Dimensions

KM25



Locknut

MB25SC2



Mounting Block

Ordering Example

SCS300-Dxxxx

Safety Shock Absorber
Size 300, Thread M20
(Size 650, Thread M25)
Identification-No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Impact Velocity Range	v	(m/s) max.
Normal Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Force	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

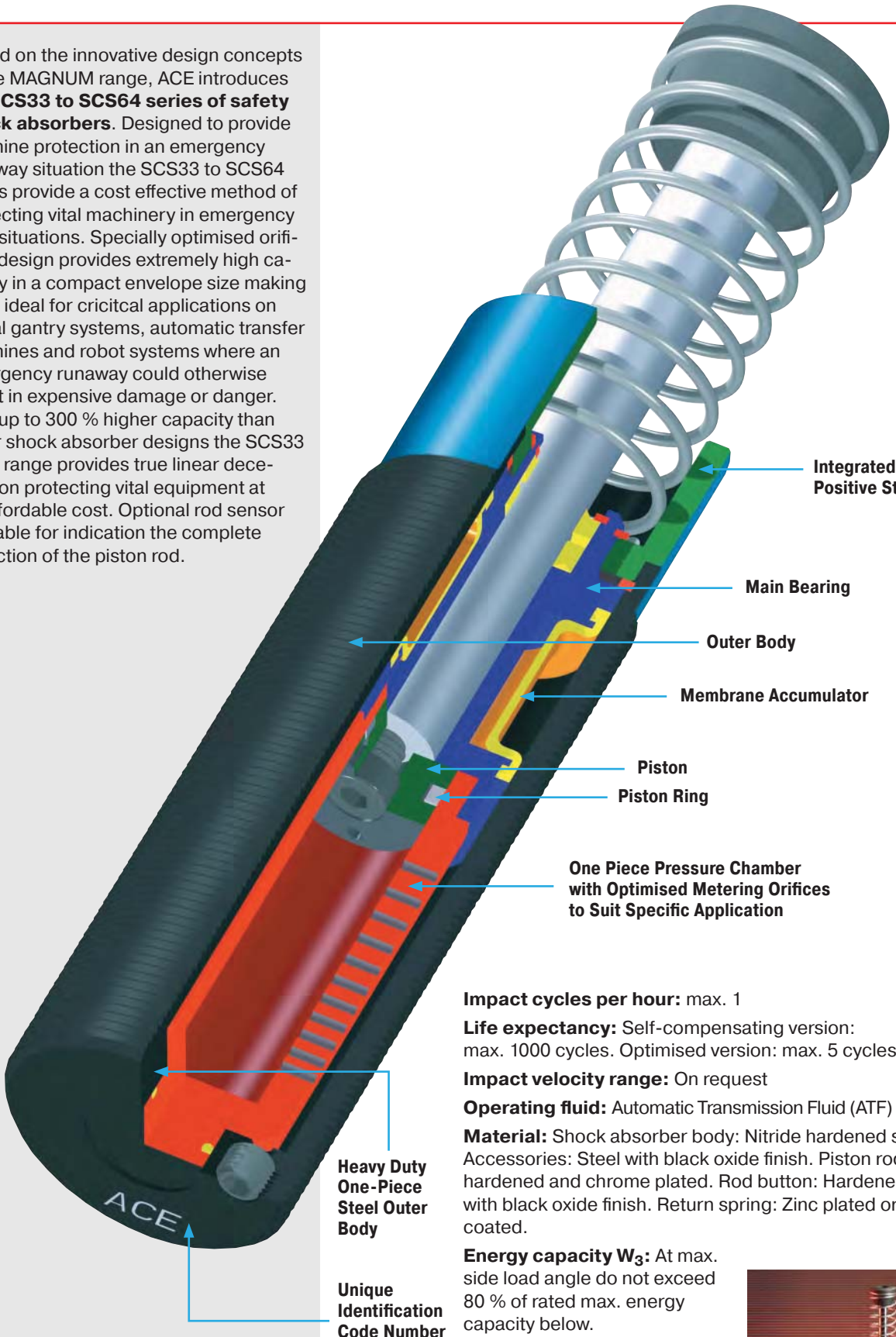
or technical data according to formulae and calculations on page 13 to 15.

The calculation and selection of the correct ACE safety shock absorber for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

Type	Stroke mm	A max	B	Max. Energy Capacity Self-Compensating W_3 Nm/Cycle	Max. Energy Capacity Optimised Version W_3 Nm/Cycle	Min. Return Force N	Max. Return Force N	Max. Side Load Angle °	Weight kg
SCS300	15	105.5	66.5	292	365	8	18	2	0.175
SCS650	23	140	86	420	525	11	33	2	0.35

Based on the innovative design concepts of the MAGNUM range, ACE introduces the **SCS33 to SCS64 series of safety shock absorbers**. Designed to provide machine protection in an emergency runaway situation the SCS33 to SCS64 series provide a cost effective method of protecting vital machinery in emergency stop situations. Specially optimised orificing design provides extremely high capacity in a compact envelope size making them ideal for cricitcal applications on portal gantry systems, automatic transfer machines and robot systems where an emergency runaway could otherwise result in expensive damage or danger. With up to 300 % higher capacity than other shock absorber designs the SCS33 to 64 range provides true linear deceleration protecting vital equipment at an affordable cost. Optional rod sensor available for indication the complete retraction of the piston rod.



Impact cycles per hour: max. 1

Life expectancy: Self-compensating version: max. 1000 cycles. Optimised version: max. 5 cycles.

Impact velocity range: On request

Operating fluid: Automatic Transmission Fluid (ATF) at 42cSt.

Material: Shock absorber body: Nitride hardened steel. Accessories: Steel with black oxide finish. Piston rod: Steel hardened and chrome plated. Rod button: Hardened steel with black oxide finish. Return spring: Zinc plated or plastic-coated.

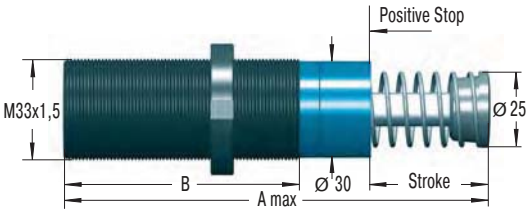
Energy capacity W_3: At max. side load angle do not exceed 80 % of rated max. energy capacity below.

Mounting: In any position

Operating temperature range: -12 °C to 70 °C. Higher temperatures on request.

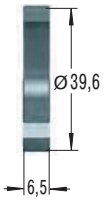
In creep speed: The shock absorber can be pushed through its stroke. In creep speed conditions the shock absorber provides minimal resistance and there is no braking effect.

Issue 9.2007 Specifications subject to change



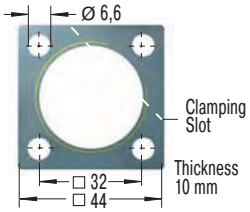
Standard Dimensions

NM33



Locking Ring

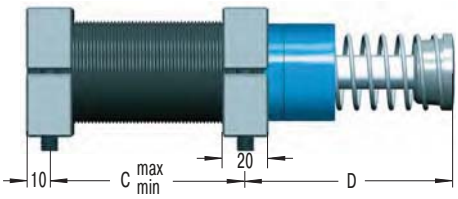
QF33



Square Flange

Install with 4 machine screws with tightening torque: 11 Nm
clamping torque: > 90 Nm

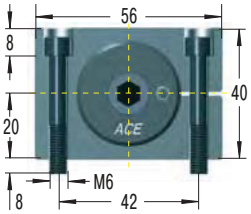
S33



Side Foot Mounting Kit

S33 = 2 Flanges + 4 Screws M6x40, DIN 912

Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.



Tightening torque: 11 Nm (Screws)
Clamping torque: > 90 Nm

Ordering Example

SCS33-50-S-Dxxxx

Safety Shock Absorber
Thread Size M33
Max. Stroke without Positive Stop 50 mm
Mounting Style: Foot
Identification-No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Emergency Impact Speed	v	(m/s) max.
Normal Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

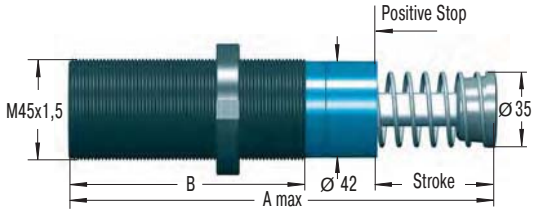
or technical data according to formulae and calculations on page 13 to 15.

The calculation and selection of the correct ACE safety shock absorber for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

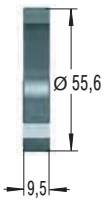
Type Part Number	Stroke mm	A max	B	C min.	C max.	D	Max. Energy Capacity Self-Compensating W_3 Nm/Cycle	Max. Energy Capacity Optimised Version W_3 Nm/Cycle	Min. Return Force N	Max. Return Force N	Max. Side Load Angle °	Weight kg
SCS33-25	23	138	83	25	60	68	310	500	45	90	3	0.45
SCS33-50	48.5	189	108	32	86	93	620	950	45	135	2	0.54

For other stroke lengths, special options (such as higher or lower impact velocity etc.), please consult ACE.



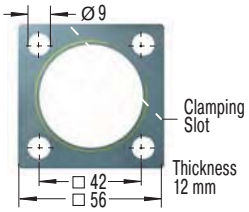
Standard Dimensions

NM45



Locking Ring

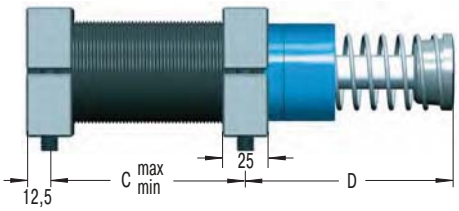
QF45



Square Flange

Install with 4 machine screws with tightening torque: 27 Nm
clamping torque: > 200 Nm

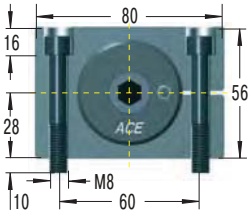
S45



Side Foot Mounting Kit

S45 = 2 Flanges + 4 Screws M8x50, DIN 912

Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.



Tightening torque: 27 Nm (Screws)
Clamping torque: > 350 Nm

Ordering Example

SCS45-75-S-Dxxxx

Safety Shock Absorber
Thread Size M45
Max. Stroke without Positive Stop 75 mm
Mounting Style: Foot
Identification-No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Emergency Impact Speed	v	(m/s) max.
Normal Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

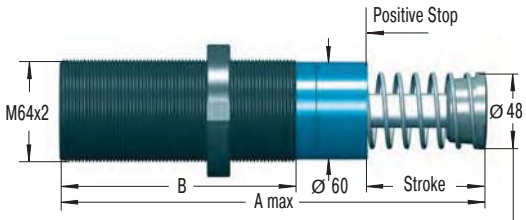
or technical data according to formulae and calculations on page 13 to 15.

The calculation and selection of the correct ACE safety shock absorber for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

Type Part Number	Stroke mm	A max	B	C min.	C max.	D	Max. Energy Capacity Self-Compensating W_3 Nm/Cycle	Max. Energy Capacity Optimised Version W_3 Nm/Cycle	Min. Return Force N	Max. Return Force N	Max. Side Load Angle °	Weight kg
SCS45-25	23	145	95	32	66	66	680	1 200	70	100	3	1.13
SCS45-50	48.5	195	120	40	92	91	1 360	2 350	70	145	2	1.36
SCS45-75	74	246	145	50	118	116	2 040	3 500	50	180	1	1.59

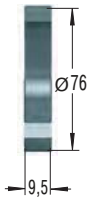
For other stroke lengths, special options (such as higher or lower impact velocity etc.), please consult ACE.



Note: 150 mm stroke model does not include stop collar and positive stop is provided by the rod button which is 60 mm dia.

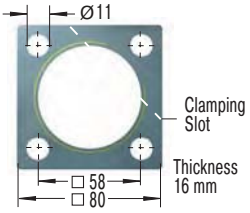
Standard Dimensions

NM64



Locking Ring

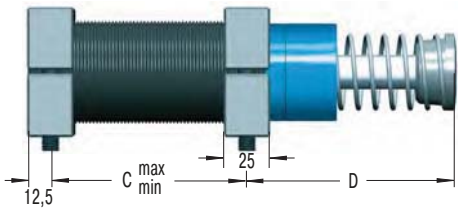
QF64



Square Flange

Install with 4 machine screws with tightening torque: 50 Nm
clamping torque: > 210 Nm

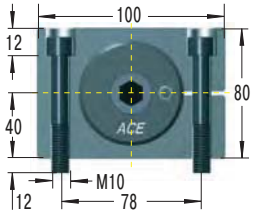
S64



Side Foot Mounting Kit

S64 = 2 Flanges + 4 Screws M10x80, DIN 912

Because of the thread pitch the fixing holes for the second foot mount should only be drilled and tapped after the first foot mount has been fixed in position.



Tightening torque: 50 Nm (Screws)
Clamping torque: > 350 Nm

Ordering Example

SCS64-50-S-Dxxxx

Safety Shock Absorber
Thread Size M64
Max. Stroke without Positive Stop 50 mm
Mounting Style: Foot
Identification-No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Emergency Impact Speed	v	(m/s) max.
Normal Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Abosrbers in Parallel	n	

or technical data according to formulae and calculations on page 13 to 15.

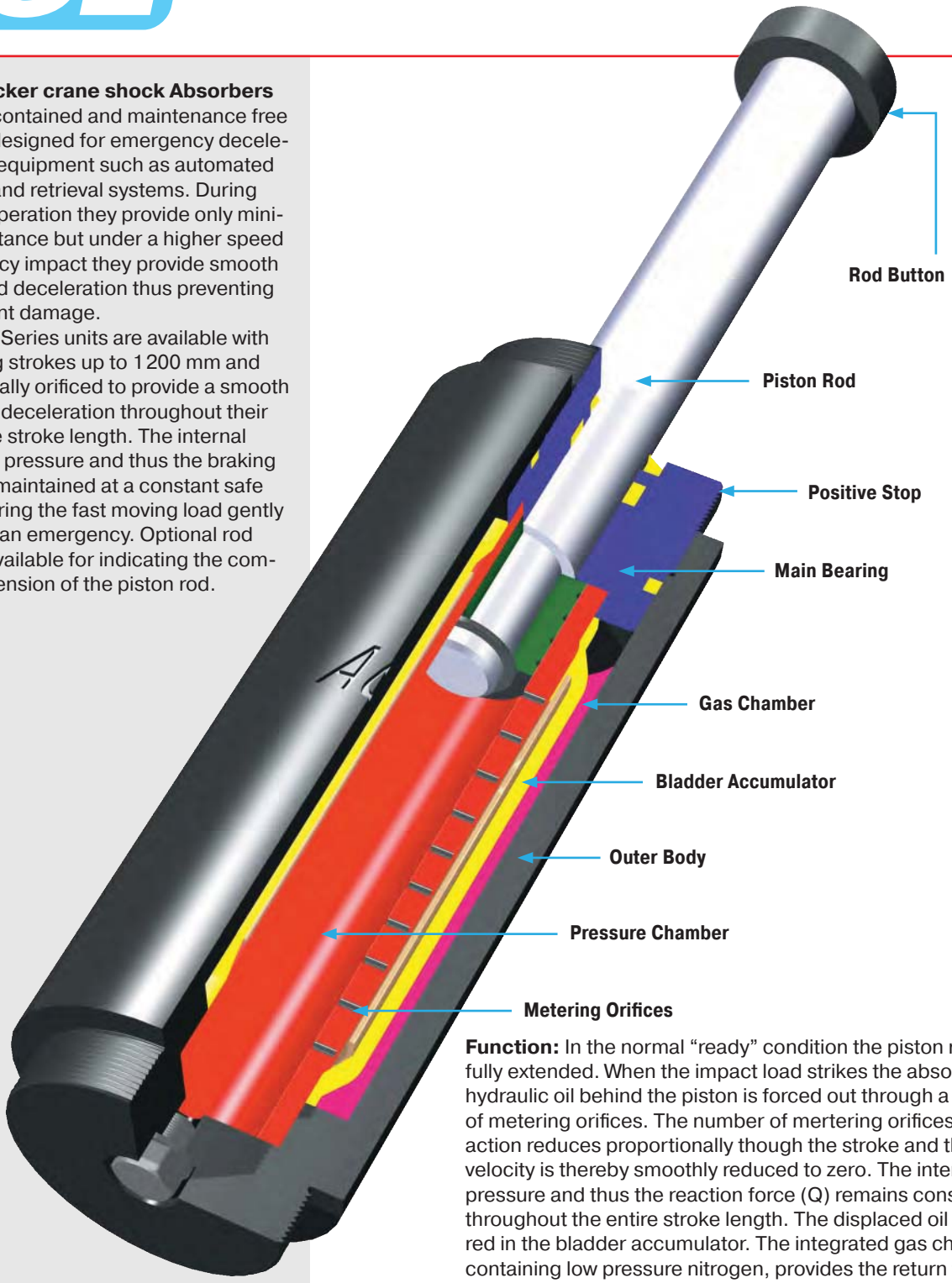
The calculation and selection of the correct ACE safety shock absorber for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

Type Part Number	Stroke mm	A max	B	C min.	C max.	D	Max. Energy Capacity Self-Compensating W_3 Nm/Cycle	Max. Energy Capacity Optimised Version W_3 Nm/Cycle	Min. Return Force N	Max. Return Force N	Max. Side Load Angle °	Weight kg
SCS64-50	48.5	225	140	50	112	100	3 400	6 000	90	155	3	2.90
SCS64-100	99.5	326	191	64	162	152	6 800	12 000	105	270	2	3.70
SCS64-150	150	450	241	80	212	226	10 200	18 000	75	365	1	5.10

For other stroke lengths, special options (such as higher or lower impact velocity etc.), please consult ACE.

ACE stacker crane shock Absorbers are self-contained and maintenance free and are designed for emergency deceleration of equipment such as automated storage and retrieval systems. During normal operation they provide only minimal resistance but under a higher speed emergency impact they provide smooth controlled deceleration thus preventing equipment damage.
The SCS Series units are available with operating strokes up to 1 200 mm and are specially orificed to provide a smooth constant deceleration throughout their complete stroke length. The internal hydraulic pressure and thus the braking force, is maintained at a constant safe level to bring the fast moving load gently to rest in an emergency. Optional rod sensor available for indicating the complete extension of the piston rod.



Function: In the normal "ready" condition the piston rod is fully extended. When the impact load strikes the absorber the hydraulic oil behind the piston is forced out through a series of metering orifices. The number of mertering orifices in action reduces proportionally though the stroke and the load velocity is thereby smoothly reduced to zero. The internal pressure and thus the reaction force (Q) remains constant throughout the entire stroke length. The displaced oil is stored in the bladder accumulator. The integrated gas chamber, containing low pressure nitrogen, provides the return force to reset the rod to its extended position and functions as an accumulator for the hydraulic oil displaced during the operation.

Material: Steel body with black oxide finish. Piston rod hard chrome plated.

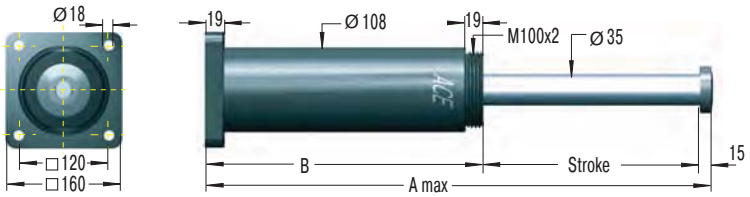
Energy capacity W_3: At max. side load angle do not exceed 80 % of rated max. energy capacity below.

Filling pressure: Approx. 2 bar

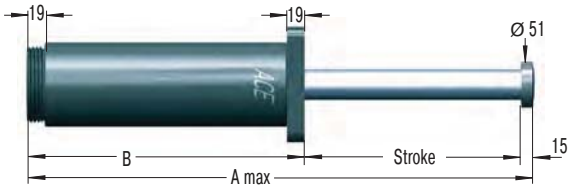
Operating temperature range: -12 °C to 66 °C

In creep speed: It is possible to use up to approx. 60 % of the buffer stroke. In creep speed conditions the shock absorber provides minimal resistance and there is no braking effect.

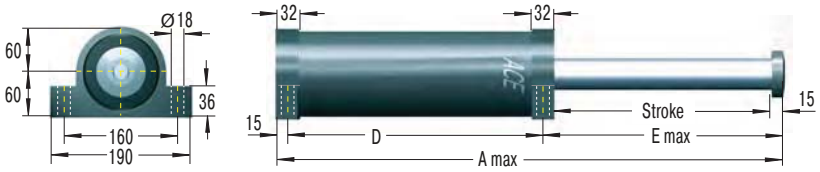
Rear Flange -R



Front Flange -F



Foot Mounting -S



Ordering Example

SCS38-400-F-X

- Stacker Crane Shock Absorber
- Bore Size Ø 38 mm
- Stroke 400 mm
- Mounting Style: Front Flange
- Identification No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Full Load Speed	v	(m/s) max.
Creep Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

or technical data according to formulae and calculations on page 13 to 15.

Technical Data

Impact velocity range: 0.9 to 4.6 m/s

Reacting force Q: At max. capacity rating = **80 kN max.**

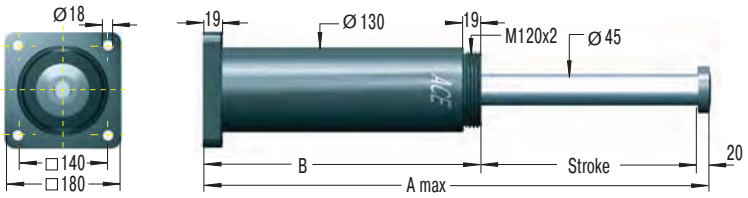
The calculation and selection of the correct ACE stacker crane shock absorber for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

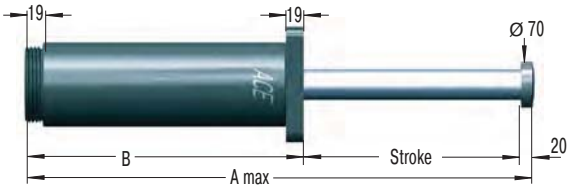
Type Part Number	Stroke mm	A max	B	D	E max	W_3 Nm/Cycle (Max. Energy Capacity)	Max. Side Load Angle ° Mounting Style F & S	Max. Side Load Angle ° Mounting Style R	Min. Return Force N	Max. Return Force N	Weight kg Mounting Style F & R	Weight kg Mounting Style S
SCS38-50	50	270	205	175	80	3 600	5	4	600	700	12	13
SCS38-100	100	370	255	225	132	7 200	5	4	600	700	14	15
SCS38-150	150	470	305	275	180	10 800	5	4	600	700	16	17
SCS38-200	200	570	355	325	230	14 400	5	4	600	700	18	19
SCS38-250	250	670	405	375	280	18 000	4.7	3.7	600	700	20	21
SCS38-300	300	785	470	440	330	21 600	3.9	2.9	600	700	22	23
SCS38-350	350	885	520	490	380	25 200	3.4	2.4	600	700	24	25
SCS38-400	400	1 000	585	555	430	28 800	3	2	600	700	26	27
SCS38-500	500	1 215	700	670	530	36 000	2.4	1.4	600	700	30	31
SCS38-600	600	1 430	815	785	630	43 200	1.9	0.,9	600	700	34	35
SCS38-700	700	1 645	930	900	730	50 400	1.6	0.6	600	700	38	39
SCS38-800	800	1 860	1 045	1 015	830	57 600	1.3	0.3	600	700	43	44

For other stroke lengths, special options (such as higher or lower impact velocity etc.), please consult ACE.

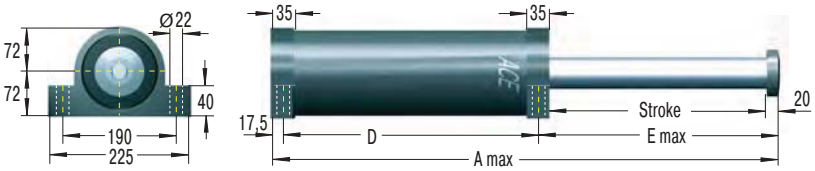
Rear Flange -R



Front Flange -F



Foot Mounting -S



Ordering Example

SCS50-400-F-X

- Stacker Crane Shock Absorber
- Bore Size Ø 50 mm
- Stroke 400 mm
- Mounting Style: Front Flange
- Identification No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Full Load Speed	v	(m/s) max.
Creep Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

or technical data according to formulae and calculations on page 13 to 15.

Technical Data

Impact velocity range: 0.6 to 4.6 m/s

Reacting force Q: At max. capacity rating = **160 kN max.**

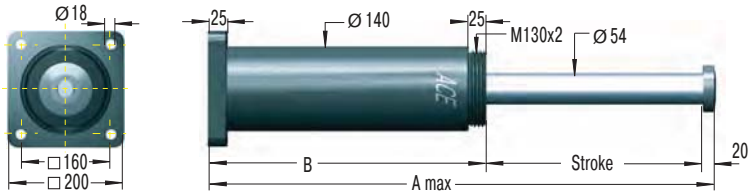
The calculation and selection of the correct ACE stacker crane shock absorber for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

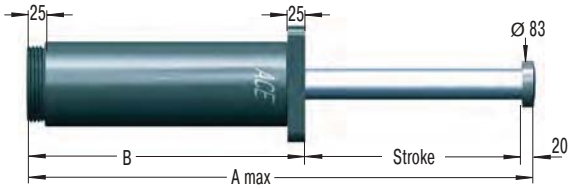
Type Part Number	Stroke mm	A max	B	D	E max	Max. Energy Capacity W_3 Nm/Cycle	Min. Return Force N	Max. Return Force N	Max. Side Load Angle ° Mounting Style F & S	Max. Side Load Angle ° Mounting Style R	Weight kg Mounting Style F & R	Weight kg Mounting Style S
SCS50-100	100	390	270	235	138	14 000	1 000	1 200	5	4	22	23
SCS50-150	150	490	320	285	188	21 000	1 000	1 200	5	4	25	26
SCS50-200	200	590	370	335	238	28 000	1 000	1 200	5	4	27	28
SCS50-250	250	690	420	385	288	35 000	1 000	1 200	4.5	3.5	30	31
SCS50-300	300	805	485	450	338	42 000	1 000	1 200	3.8	2.8	33	34
SCS50-350	350	905	535	500	388	49 000	1 000	1 200	3.3	2.3	35	37
SCS50-400	400	1 020	600	565	438	56 000	1 000	1 200	2.9	1.9	38	40
SCS50-500	500	1 235	715	680	538	70 000	1 000	1 200	2.3	1.3	44	45
SCS50-600	600	1 450	830	795	638	84 000	1 000	1 200	1.9	0.9	50	51
SCS50-700	700	1 665	945	910	738	98 000	1 000	1 200	1.6	0.6	55	57
SCS50-800	800	1 880	1 060	1 025	838	112 000	1 000	1 200	1.3	0.3	61	63
SCS50-1000	1 000	2 310	1 290	1 255	1 038	140 000	1 000	1 200	1	0	72	74

For other stroke lengths, special options (such as higher or lower impact velocity etc.), please consult ACE.

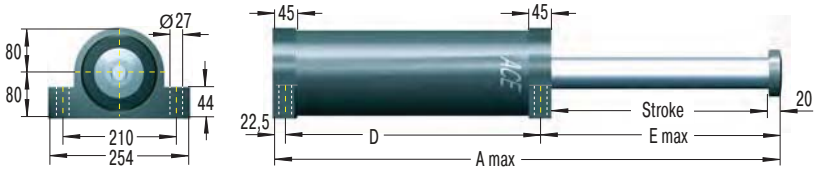
Rear Flange -R



Front Flange -F



Foot Mounting -S



Ordering Example

SCS63-400-F-X

- Stacker Crane Shock Absorber
- Bore Size Ø 63 mm
- Stroke 400 mm
- Mounting Style: Front Flange
- Identification No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Full Load Speed	v	(m/s) max.
Creep Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

or technical data according to formulae and calculations on page 13 to 15.

Technical Data

Impact velocity range: 0.5 to 4.6 m/s

Reacting force Q: At max. capacity rating = **210 kN max.**

The calculation and selection of the correct ACE stacker crane shock absorber for your application should be referred to ACE for approval and assignment of unique identification number.

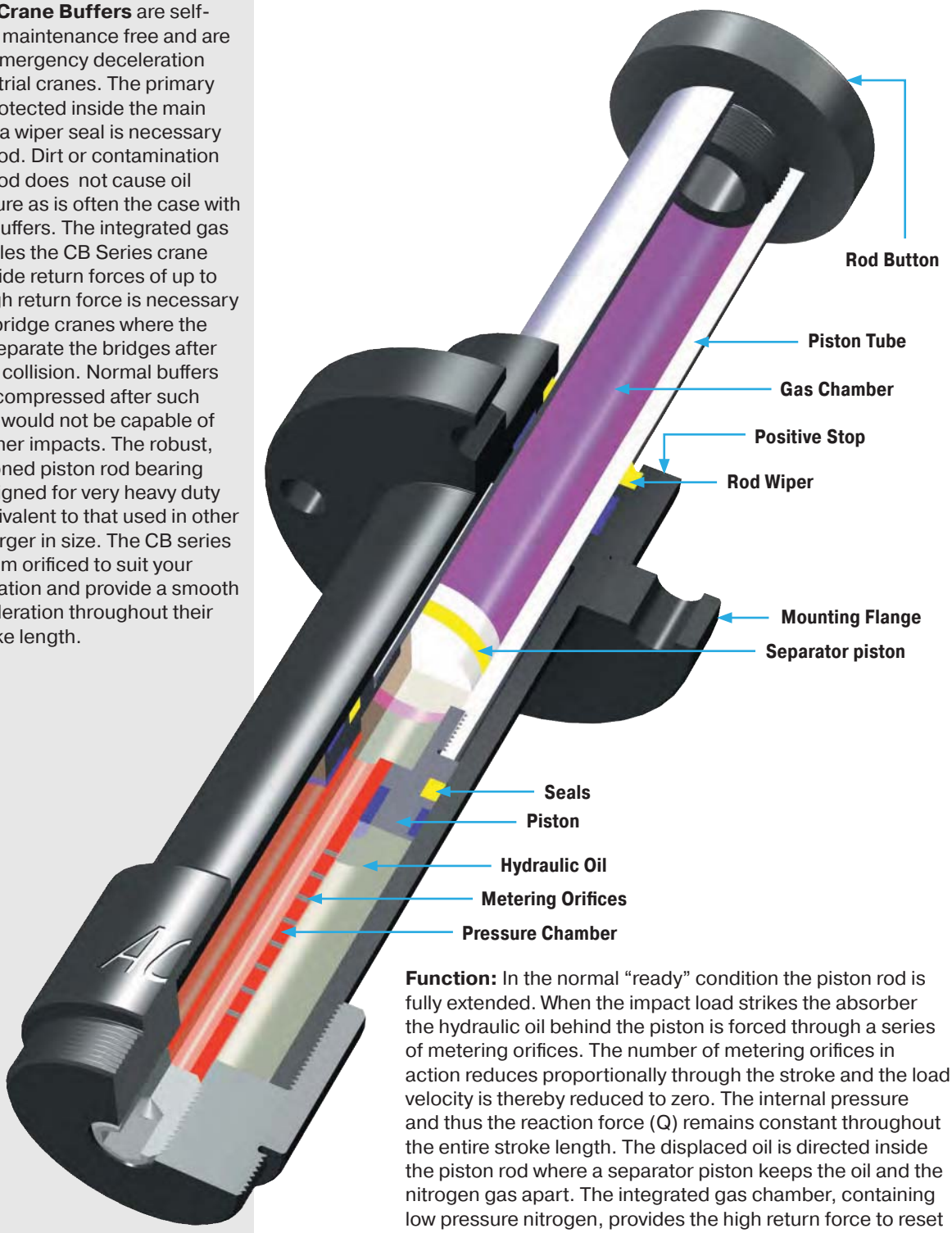
Dimensions and Capacity Chart

Max. Energy Capacity

Type Part Number	Stroke **mm**	A max	B	D	E max	W_3 **Nm/Cycle**	Min. Return Force **N**	Max. Return Force **N**	Max. Side Load Angle ° Mounting Style F u. S	R	Weight **kg** Mounting Style F & R	S
SCS63-100	100	405	285	240	143	18 000	1 500	2 500	5	4	29	32
SCS63-150	150	505	335	290	193	27 000	1 500	2 500	5	4	32	35
SCS63-200	200	605	385	340	243	36 000	1 500	2 500	5	4	35	38
SCS63-250	250	705	435	390	293	45 000	1 500	2 500	5	4	38	42
SCS63-300	300	805	485	440	343	54 000	1 500	2 500	5	4	41	45
SCS63-350	350	925	555	510	393	63 000	1 500	2 500	5	4	45	49
SCS63-400	400	1 025	605	560	443	72 000	1 500	2 500	5	4	48	52
SCS63-500	500	1 245	725	680	543	90 000	1 500	2 500	4.2	3.2	55	60
SCS63-600	600	1 445	825	780	643	108 000	1 500	2 500	3.4	2.4	62	66
SCS63-700	700	1 665	945	900	746	126 000	1 500	2 500	2.9	1.9	69	73
SCS63-800	800	1 865	1 045	1 000	843	144 000	1 500	2 500	2.5	1.5	75	79
SCS63-1000	1 000	2 285	1 265	1 220	1 043	180 000	1 500	2 500	1.9	0.9	89	93
SCS63-1200	1 200	2 705	1 485	1 440	1 243	216 000	1 500	2 500	1.4	0.4	102	106

For other stroke lengths, special options (such as higher or lower impact velocity etc.), please consult ACE.

ACE Stacker Crane Buffers are self-contained and maintenance free and are designed for emergency deceleration of heavy industrial cranes. The primary oil seals are protected inside the main body and only a wiper seal is necessary on the piston rod. Dirt or contamination on the piston rod does not cause oil leakage or failure as is often the case with conventional buffers. The integrated gas chamber enables the CB Series crane buffers to provide return forces of up to 63 kN. This high return force is necessary for multiple – bridge cranes where the buffers must separate the bridges after an emergency collision. Normal buffers would remain compressed after such a collision and would not be capable of accepting further impacts. The robust, large dimensioned piston rod bearing system, is designed for very heavy duty use and is equivalent to that used in other buffers 80 % larger in size. The CB series units are custom orificed to suit your specific application and provide a smooth constant deceleration throughout their complete stroke length.



Function: In the normal "ready" condition the piston rod is fully extended. When the impact load strikes the absorber the hydraulic oil behind the piston is forced through a series of metering orifices. The number of metering orifices in action reduces proportionally through the stroke and the load velocity is thereby reduced to zero. The internal pressure and thus the reaction force (Q) remains constant throughout the entire stroke length. The displaced oil is directed inside the piston rod where a separator piston keeps the oil and the nitrogen gas apart. The integrated gas chamber, containing low pressure nitrogen, provides the high return force to reset the rod to its extended position and generates the high return forces to comply with crane installations.

Impact velocity range: 0.5 to 4.6 m/s

Material: Steel body with black oxide finish. Piston rod hard chrome plated.

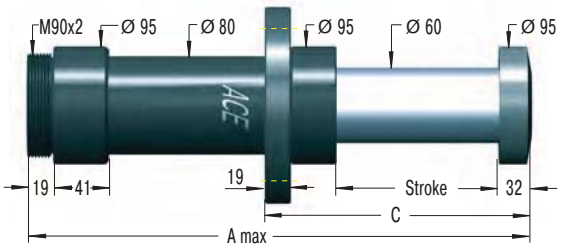
Operating temperature range: -12 °C to 66 °C

The initial fill pressure governs the rod return force.

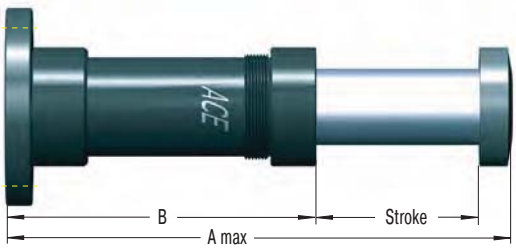
In creep speed: The shock absorber can be pushed through its stroke.

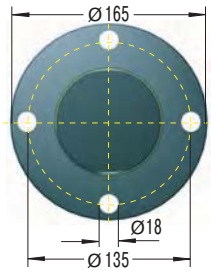
Issue 9.2007 Specifications subject to change

Front Flange -F



Rear Flange -R





Ordering Example

CB63-400-F-X

- Crane Buffer
- Bore Size Ø 63 mm
- Stroke 400 mm
- Mounting Style: Front Flange
- Identification No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Full Load Speed	v	(m/s) max.
Creep Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

or technical data according to formulae and calculations on page 13 to 15.

Technical Data

Reacting force Q: At max. capacity rating = **187 kN max.**

The calculation and selection of the correct ACE crane buffer for your application should be referred to ACE for approval and assignment of unique identification number.

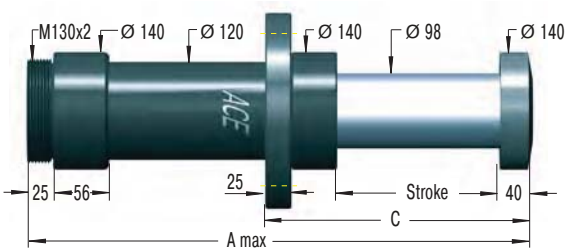
Dimensions and Capacity Chart

Type Part Number	Stroke mm	A max	B	C	Max. Energy Capacity W_3 Nm/Cycle	[1] Effective Weight me me min. kg	me max. kg	Min. Return Force N	Max. Return Force N	Max. Side Load Angle °	Weight kg
CB63-100	100	420	288	192	16 000	900	128 000	1 500	16 000	3.5	12.7
CB63-200	200	700	468	292	32 000	1 800	256 000	1 500	21 000	3	16.7
CB63-300	300	980	648	392	48 000	2 700	384 000	1 500	24 000	2.5	20.8
CB63-400	400	1 260	828	492	64 000	3 700	512 000	1 500	25 000	2	24.8
CB63-500	500	1 540	1 008	592	80 000	4 700	640 000	1 500	26 000	1.5	28.8

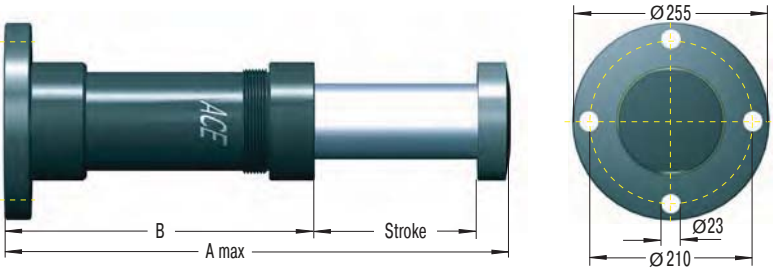
[1] The correct effective weight range for your application will be calculated by ACE and should fall within this band.
Special options: Special oils, special flanges, additional corrosion protection etc. available on request.

Issue 9.2007 Specifications subject to change

Front Flange -F



Rear Flange -R



72

Ordering Example

CB100-400-F-X

- Crane Buffer
- Bore Size Ø 100 mm
- Stroke 400 mm
- Mounting Style: Front Flange
- Identification No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Full Load Speed	v	(m/s) max.
Creep Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

or technical data according to formulae and calculations on page 13 to 15.

Technical Data

Reacting force Q: At max. capacity rating = **467 kN**.

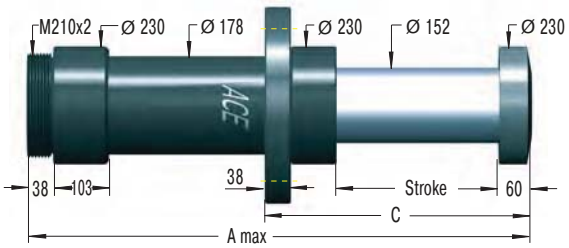
The calculation and selection of the correct ACE crane buffer for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

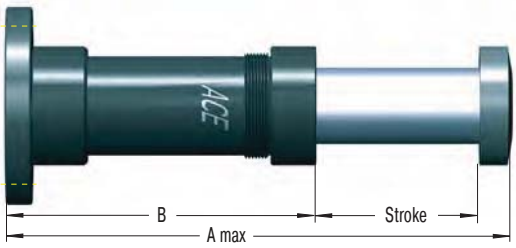
Type Part Number	Stroke mm	A max	B	C	Max. Energy Capacity W_3 Nm/Cycle	[1] Effective Weight me me min. kg	me max. kg	Min. Return Force N	Max. Return Force N	Max. Side Load Angle °	Weight kg
CB100-200	200	735	495	320	80 000	6 900	640 000	3 900	40 000	4	42.5
CB100-300	300	1 005	665	420	120 000	10 300	960 000	3 900	50 000	3.5	50.8
CB100-400	400	1 275	835	520	160 000	13 800	1 280 000	3 900	57 000	3	59.1
CB100-500	500	1 545	1 005	620	200 000	17 200	1 600 000	3 900	63 000	2.5	67.5
CB100-600	600	1 815	1 175	720	240 000	20 700	1 920 000	3 900	68 000	2	75.8

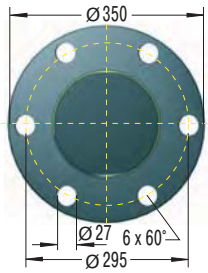
[1] The correct effective weight range for your application will be calculated by ACE and should fall within this band.
Special options: Special oils, special flanges, additional corrosion protection etc. available on request.

Front Flange -F



Rear Flange -R





Ordering Example

CB160-400-F-X

- Crane Buffer
- Bore Size Ø 160 mm
- Stroke 400 mm
- Mounting Style: Front Flange
- Identification No. assigned by ACE

Complete Details Required when Ordering

Moving Load	m	(kg)
Full Load Speed	v	(m/s) max.
Creep Speed	vs	(m/s) max.
Motor Power	P	(kW)
Stall Torque Factor	ST	(normal 2.5)
Number of Absorbers in Parallel	n	

or technical data according to formulae and calculations on page 13 to 15.

Technical Data

Reacting force Q: At max. capacity rating = **700 kN**.

The calculation and selection of the correct ACE crane buffer for your application should be referred to ACE for approval and assignment of unique identification number.

Dimensions and Capacity Chart

					Max. Energy Capacity	[1] Effective Weight me					
Type Part Number	Stroke **mm**	A max	B	C	W_3 **Nm/Cycle**	me min. **kg**	me max. **kg**	Min. Return Force **N**	Max. Return Force **N**	Max. Side Load Angle °	Weight **kg**
CB160-400	400	1400	940	600	240 000	22 700	1 920 000	9 600	63 000	4	154.6
CB160-600	600	2000	1 340	800	360 000	34 000	2 880 000	9 600	63 000	3	188
CB160-800	800	2600	1 740	1 000	480 000	45 400	3 840 000	9 600	63 000	2	221.3

[1] The correct effective weight range for your application will be calculated by ACE and should fall within this band.
Special options: Special oils, special flanges, additional corrosion protection etc. available on request.

Issue 9.2007 Specifications subject to change

Manual and Maintenance Instructions for Safety Shock Absorbers Type SCS and CB

ACE security shock absorbers are high-quality products. To achieve long-lasting and trouble free operating life please read the following instructions before installation.

Inner Pressure Tube Characteristics

The inner pressure tube is individually designed and manufactured for each specific application.

When several safety shock absorbers of the same size but with different metering orifice patterns are used in one system it is important that the mounting positions are not mixed up. Safety shock absorbers have individually designed orifice patterns depending upon application and therefore must only be installed in correct position.

The calculation and selection of the correct safety shock absorbers should be performed or checked by ACE.

Mounting

To mount the shock absorber, we recommend the use of original ACE mounting accessories shown in catalogue.

The mounting of each shock absorber must be exactly positioned so that the reaction force (Q) can be adequately transmitted into the mounting structure.

ACE recommends installation via the **front flange -F** mounting style that ensures the maximum protection against buckling. The damper must be mounted so that the moving loads are decelerated with the least possible side loading to the piston rod. The maximum permissable side load angles are detailed in our current catalogue.

The entire stroke length must be used for deceleration because only using part of the stroke can lead to overstressing and damage to the unit.

Mounting style **front flange -F**

Safety Shock Absorber SCS

Safety Shock Absorber CB

Environmental Requirements

The permissible temperature range for each shock absorber type can be found in our current catalogue.
CAUTION: Usage outside the specified temperature range can lead to premature breakdown and damage of of the shock absorbers which can then result in severe system damage or machine failures.

Trouble free operation outdoors or in damp environments is only warranted if the dampers are coated with a specific corrosion protection finish.

Initial Start-Up Checks

First impacts on the shock absorber should only be tried after correctly mounting and with reduced impact speeds and – if possible – with reduced load. Differences between calculated and actual operating data can then be detected early on, and damage to your system can be avoided. If the shock absorbers were selected on calculated data that does not correspond to the maximum possible loading (i. e. selection based on drive power being switched off or at reduced impact speed) then these restricted impact conditions must not be exceeded during initial testing or subsequent use of the system. Otherwise you risk damaging the shock absorbers and/or your machine by overstressing materials. After the initial trial check that the piston rod fully extends again and that there are no signs of oil leakage. Also check that the mounting hardware is still securely tightened. You need to satisfy yourself that no damage has occurred to the piston rod, the body, or the mounting hardware.

Fixed Mechanical Stop

Safety shock absorbers do not need an external mechanical stop. The stroke of the safety shock absorber is limited by the contact of the rod end button onto the front body of the shock absorber (with type SCS33 to SCS64 by the load contacting the integral or additional stop collar).

What Needs to be Checked after a Full Load Impact?

Safety shock absorbers that were originally checked only at reduced speed or load need to be checked again after a full load impact (i. e. emergency use) has occurred. Check that the piston rod fully extends to its full out position, that there are no signs of oil leakage and that the mounting hardware is still securely fixed. You need to satisfy yourself that no damage has occurred to the piston rod, the body, or the mounting hardware. If no damage has occurred, the safety shock absorber can be put back into normal operation (see initial start-up).

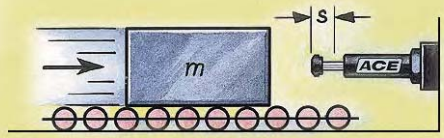
Maintenance

Safety shock absorbers are sealed systems and do not need special maintenance. Safety shock absorbers that are not used regularly (i. e. that are intended for emergency stop systems) should be checked within the normal time frame for safety checks, but **at least once a year**. At this time special attention must be paid to checking that the piston rod resets to its fully extended position, that there is no oil leakage and that the mounting brackets are still secure and undamaged. The piston rod must not show any signs of damage. Safety shock absorbers that are **in use regularly** should be checked **every three months**.

Repair Notice

If any damage to the shock absorber is detected or if there are any doubts as to the proper functioning of the unit please send the unit for service to ACE. Alternatively contact your local ACE office for further advice.

Issue 9.2007 Specifications subject to change



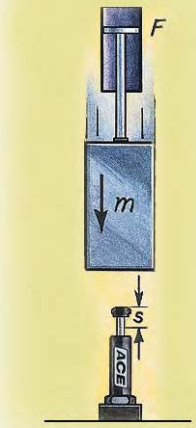
Controlled emergency stop

ACE safety shock absorbers protect precision assembly jigs for the aircraft industry.

The basic mount of this coordinate measuring machine for the production of parts in the aircraft industry is made of granite and must not be damaged. To avoid damage from operating errors or mishandling, all movement axes were equipped with safety shock absorbers of the type **SCS-45-50.**

If the turntables malfunction the safety shock absorbers decelerate the loads before expensive damage can occur to the granite measuring tables.

Optimally protected turntable



Secured manufacturing

ACE safety shock absorbers speed up the manufacturing of caravans.

In this production of caraven side panels made of compound materials, two complete production pieces are transported towards two portals with spindle-heads. The installed safety shock absorbers type **SCS-45-75** prevent 5500 kg load with speeds of up to 60 m/min nosediving into the valueable machine in case of a crash. In comparison to its predecessor, the safety features of the SCS-45-75 protect the machine structure more effectively and allow for faster processing times.

Safety shock absorbers attached to the moveable part of the production line

The **profile damper type TA** from the innovative ACE TUBUS series is a maintenance free, self-contained damping element made from a special Co-Polyester Elastomer.
As a result of the degressive damping characteristic it provides a high energy absorption at the beginning of its stroke. The excellent temperature characteristic of the material provides consistent damping performance over a temperature of -40 °C to 90 °C. The low installed weight, the economic price and the long operating life of up 1 million cycles make this an attractive alternative to hydraulic end position damping, if the moving mass does not have to stop in an exact datum position and it is not necessary to absorb 100 % of the incoming energy.
The **space-saving package size** ranges from Ø 12 mm up to Ø 116 mm and is very simply and quickly installed with the supplied specially stepped mounting screw.
The TA series have been specially developed to provide **maximum energy capacity** in the **minimum mounting space** in the capacity range from 2 Nm up to 2000 Nm.

Life expectancy is extremely high; **up to twenty times** longer than for urethane dampers, up to **ten times** longer than rubber bumpers and up to **five times** longer than steel springs.

Calculation and selection to be approved by ACE.

Impact velocity range: Up to max. 5 m/s

Environment: Resistant to oil, grease, seawater and to microbe or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Capacity rating: For emergency use only (1 cycle) it is possible to exceed the W_3 rating by +40 %.

Mounting: In any position

Dynamic force range: 980 N to 82 000 N

Operating temperature range: -40 °C to 90 °C

Energy absorption:
40 % to 66 %

Material hardness rating:
Shore 55D

Mounting screw torque:
M3: 2 Nm
M4: 4 Nm
M5: 6 Nm
M6: 10 Nm
M8: 25 Nm
M12: 85 Nm
M16: 210 Nm

On request: Special strokes, -characteristics, -spring rates, -sizes and materials.

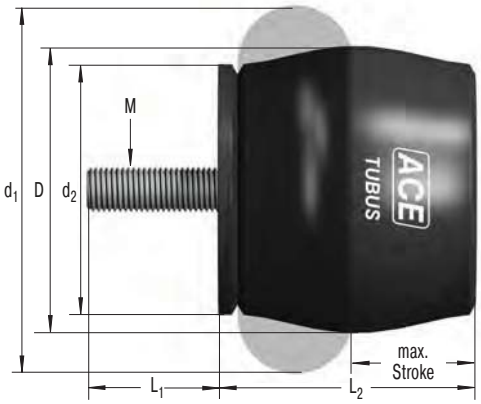
76

Issue 9.2007 Specifications subject to change

Ordering Example

TA37-16

TUBUS axial
Outer-Ø 37 mm
Stroke 16 mm



The calculation and selection of the required profile damper should be carried out or be approved by ACE.

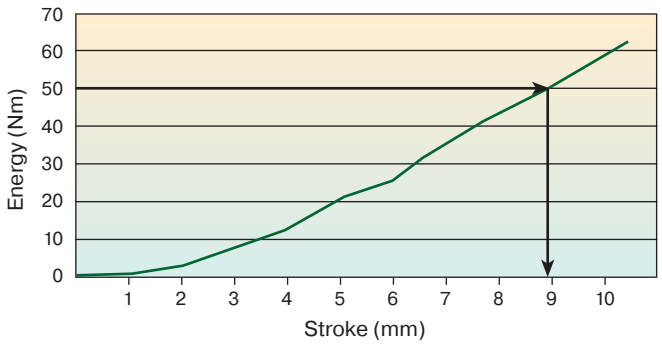
Dimensions and Capacity Chart

Type	[1] W_3 Nm/Cycle	[2] W_3 Nm/Cycle	Max. Stroke mm	D	L1	M	L2	d1	d2	Weight kg
TA12-5	2	3	5	12	3	M3	11	15	11	0.003
TA17-7	6	8.5	7	17	4	M4	16	22	15	0.004
TA21-9	10	14	9	21	5	M5	18	26	18	0.005
TA22-10	15	21	10	22	6	M6	19	27	19	0.005
TA28-12	30	42	12	28	6	M6	26	36	25	0.010
TA34-14	50	70	14	34	6	M6	30	43	30	0.020
TA37-16	65	91	16	37	6	M6	33	48	33	0.025
TA40-16	80	112	16	40	8	M8	35	50	34	0.030
TA43-18	100	140	18	43	8	M8	38	55	38	0.040
TA47-20	130	182	20	47	12	M12	41	60	41	0.050
TA50-22	160	224	22	50	12	M12	45	64	44	0.060
TA54-22	190	266	22	54	12	M12	47	68	47	0.065
TA57-24	230	322	24	57	12	M12	51	73	50	0.090
TA62-25	280	392	25	62	12	M12	54	78	53	0.105
TA65-27	350	490	27	65	12	M12	58	82	57	0.130
TA70-29	400	560	29	70	12	M12	61	86	60	0.145
TA72-31	500	700	31	72	16	M16	65	91	63	0.175
TA80-32	600	840	32	80	16	M16	69	100	69	0.225
TA82-35	700	980	35	82	16	M16	74	105	72	0.260
TA85-36	800	1 120	36	85	16	M16	76	110	75	0.300
TA90-38	900	1 260	38	90	16	M16	80	114	78	0.335
TA98-40	1 200	1 680	40	98	16	M16	86	123	85	0.425
TA116-48	2 000	2 800	48	116	16	M16	101	146	98	0.740

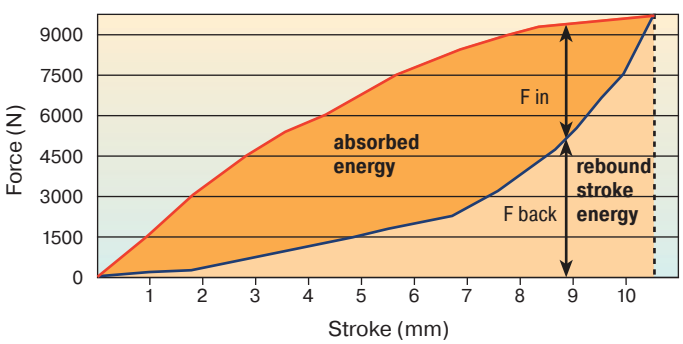
[1] Max. energy capacity per cycle for continous use.
[2] Energy capacity per cycle for emergency use.

Characteristics of Type TA37-16

Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



Force-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed.
Example: With impact energy of 50 Nm the Energy-Stroke diagram shows that a stroke of about 8.8 mm is needed.
On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.

Dynamic (v > 0.5 m/s) and static (v ⩽ 0.5 m/s) characteristics of all types are available on request.

The **profile damper type TS** from the innovative ACE TUBUS serie is a maintenance free, self-contained damping element made from a special Co-Polyester Elastomer.
As a result of the almost linear damping charcteristic it provides a very smooth energy absorption with minimum reaction loads on the machine. The excellent temperature characteristic of the material provides consistent damping performance over a temperature of -40 °C to 90 °C. The low installed weight, the economic price and the long operating life of up to 1 million cycles make this an attractive alternative to hydraulic end position damping, if the moving mass does not have to stop in an exact datum position and it is not necessary to absorb 100 % of the incoming energy.
The **space-saving package size** ranges from Ø 14 mm up to 107 mm and is very simply and quickly installed with the supplied specially stepped mounting screw.
The TS series have been specially developed to provide **maximum energy capacity** in the **minimum mounting space** in the capacity range from 2 Nm up to 910 Nm.

Life expectancy is extremely high; **up to twenty times** longer than for urethane dampers, up to **ten times** longer than rubber bumpers and up to **five times** longer than steel springs.

Calculation and selection to be approved by ACE.

Impact velocity range: Up to max. 5 m/s

Environment: Resistant to oil, grease, seawater and to microbe or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Capacity rating: For emergency use only (1 cycle) it is possible to exceed the W_3 rating by +40 %.

Mounting: In any position

Dynamic force range: 670 N to 24 000 N

Operating temperature range: -40 °C to 90 °C

Energy absorption:
26 % to 56 %

Material hardness rating:
Shore 40D

Mounting screw torque:
M4: 4 Nm
M5: 6 Nm
M6: 10 Nm
M12: 85 Nm
M16: 210 Nm

On request: Special strokes, -characteristics, -spring rates, -sizes and materials.

Issue 9.2007 Specifications subject to change

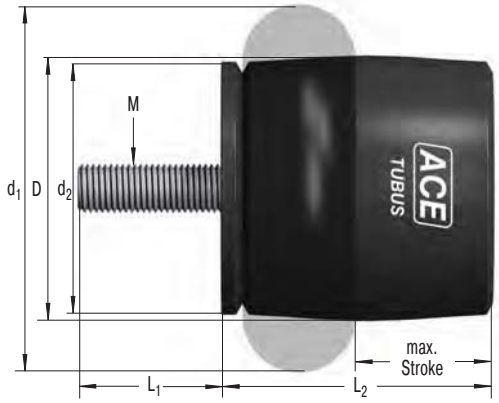
78

Ordering Example

TS44-23

TUBUS axial soft
Outer-Ø 44 mm
Stroke 23 mm

The calculation and selection of the required profile damper should be carried out or be approved by ACE.



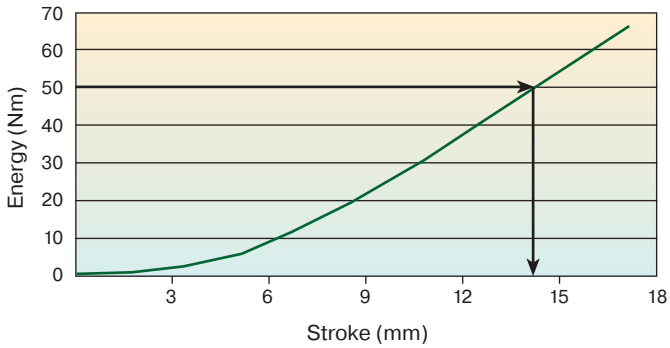
Dimensions and Capacity Chart

Type	[1] W_3 Nm/Cycle	[2] W_3 Nm/Cycle	Max. Stroke mm	D	L1	M	L2	d1	d2	Weight kg
TS14-7	2	3	7	14	4	M4	15	19	13	0.003
TS18-9	4	5.5	9	18	5	M5	18	24	16	0.004
TS20-10	6	8.5	10	20	6	M6	21	27	19	0.005
TS26-15	15	21	15	26	6	M6	28	37	25	0.010
TS32-16	25	35	16	32	6	M6	32	44	30	0.015
TS35-19	30	42	19	35	6	M6	36	48	33	0.025
TS40-19	35	49	19	40	6	M6	38	51	34	0.030
TS41-21	45	63	21	41	12	M12	41	55	38	0.040
TS44-23	65	91	23	44	12	M12	45	60	40	0.045
TS48-25	80	112	25	48	12	M12	49	64	44	0.060
TS51-27	90	126	27	51	12	M12	52	69	47	0.070
TS54-29	115	161	29	54	12	M12	55	73	50	0.080
TS58-30	135	189	30	58	12	M12	59	78	53	0.100
TS61-32	160	224	32	61	16	M16	62	83	56	0.120
TS64-34	195	273	34	64	16	M16	66	87	60	0.145
TS68-36	230	322	36	68	16	M16	69	92	63	0.165
TS75-39	285	399	39	75	16	M16	75	101	69	0.210
TS78-40	340	476	40	78	16	M16	79	105	72	0.245
TS82-44	395	553	44	82	16	M16	84	110	75	0.275
TS84-43	460	644	43	84	16	M16	85	115	78	0.300
TS90-47	565	791	47	90	16	M16	92	124	84	0.395
TS107-56	910	1 274	56	107	16	M16	110	147	100	0.615

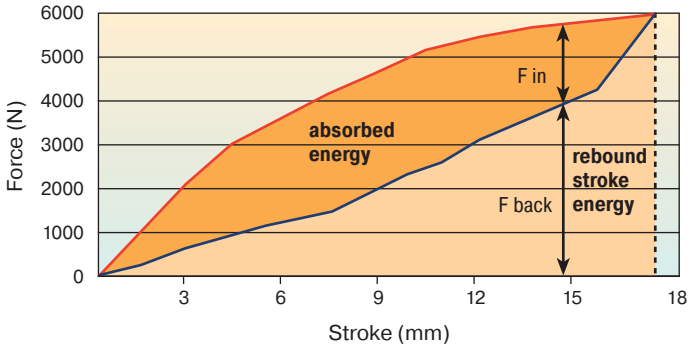
[1] Max. energy capacity per cycle for continous use.
[2] Energy capacity per cycle for emergency use.

Characteristics of Type TS44-23

Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



Force-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed.
Example: With impact energy of 50 Nm the Energy-Stroke diagram shows that a stroke of about 14 mm is needed.
On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.

Dynamic (v > 0.5 m/s) and static (v ⩽ 0.5 m/s) characteristics of all types are available on request.

The **profile damper type TR** from the innovative ACE TUBUS series is maintenance free, self-contained damping element made from a special Co-Polyester Elastomer.
The radial deformation of the TR series provides a very long and soft deceleration with a progressive energy absorption towards the end of stroke. The excellent temperature characteristic of the material provides consistent damping performance over a temperature of -40 °C to 90 °C. The low installed weight, the economic price and the long operating life of up 1 million cycles make this an attractive alternative to hydraulic end position damping, if the moving mass does not have to stop in an exact datum position and it is not necessary to absorb 100 % of the incoming energy.
The **space-saving package size** ranges from Ø 29 mm up to Ø 100 mm and is very simply and quickly installed with the supplied special stepped mounting screw. The TR Series have been specially developed to provide **maximum stroke in the minimum mounting space** in the capacity range from 2 Nm up to 115 Nm.

Life expectancy is extremely high; **up to twenty times** longer than for urethane dampers, up to **ten times** longer than rubber bumpers and up to **five times** longer than steel springs.

Calculation and selection to be approved by ACE.

Impact velocity range: Up to max. 5 m/s

Environment: Resistant to oil, grease, seawater and to microbe or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Capacity rating: For emergency use only (1 cycle) it is possible to exceed the W_3 rating by +40 %.

Mounting: In any position

Dynamic force range: 300 N to 6 200 N

Operating temperature range: -40 °C to 90 °C

Energy absorption:
17 % to 35 %

Material hardness rating:
Shore 40D

Mounting screw torque:
M5: 6 Nm
M6: 10 Nm
M8: 25 Nm

On request: Special strokes, -characteristics, -spring rates, -sizes and materials.

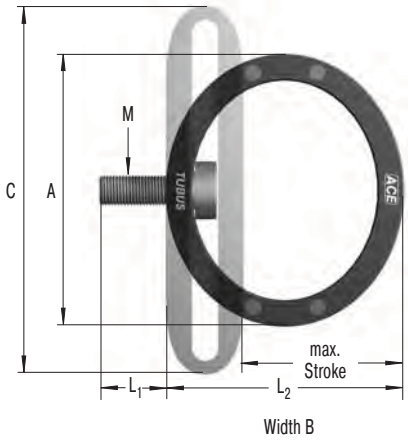
80

Ordering Example

TR93-57

TUBUS radial
Outer-Ø 93 mm
Stroke 57 mm

The calculation and selection of the required profile damper should be carried out or be approved by ACE.



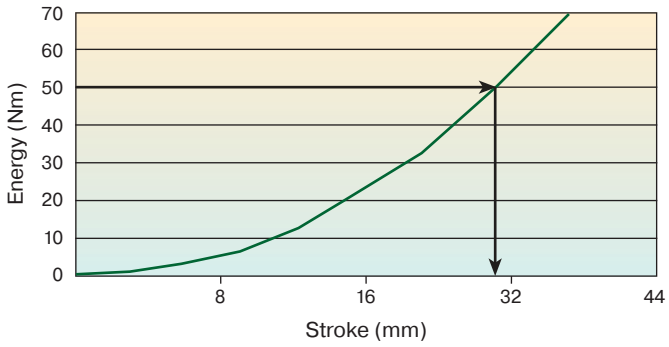
Dimensions and Capacity Chart

Type	[1] W_3 Nm/Cycle	[2] W_3 Nm/Cycle	Max. Stroke mm	A	L1	M	L2	B	C	Weight kg
TR29-17	2	3	17	29	5	M5	25	13	38	0.010
TR37-22	3	4.5	22	37	5	M5	32	19	50	0.015
TR43-25	4	5.5	25	43	5	M5	37	20	58	0.020
TR50-35	6	8.5	35	50	5	M5	44	34	68	0.025
TR63-43	15	21	43	63	5	M5	55	43	87	0.055
TR67-40	25	35	40	67	5	M5	59	46	88	0.080
TR76-46	40	56	46	76	6	M6	67	46	102	0.105
TR83-50	45	63	50	83	6	M6	73	51	109	0.150
TR85-50	70	98	50	85	8	M8	73	69	111	0.195
TR93-57	90	126	57	93	8	M8	83	83	124	0.295
TR100-60	115	161	60	100	8	M8	88	82	133	0.335

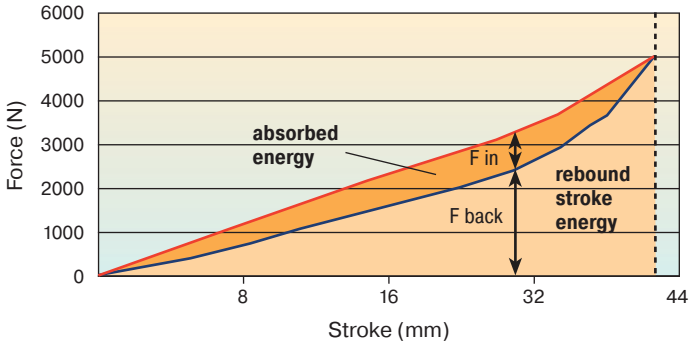
[1] Max. energy capacity per cycle for continous use.
[2] Energy capacity per cycle for emergency use.

Characteristics of Type TR93-57

Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



Force-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)



With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed.
Example: With impact energy of 50 Nm the Energy-Stroke diagram shows that a stroke of about 31 mm is needed.
On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.

Dynamic ($v > 0.5$ m/s) and static ($v \leqslant 0.5$ m/s) characteristics of all types are available on request.

TUBUS-Series Type TR-L

Profile Damper Radial Damping (Long Version)

The **radial tube damper type TR-L** from the innovative ACE TUBUS series is a maintenance free, self-contained damping element made from a special Co-Polyester Elastomer.
The radial deformation of the TR series provides a very long and soft deceleration with a progressive energy absorption towards the end of stroke. The excellent temperature characteristic of the material provides consistent damping performance over a temperature of -40 °C to 90 °C. The tube damper has been specially developed for applications that require very low reaction forces. The actual force generated depends upon the length of the tube damper chosen. The TUBUS TR-L type is suitable for a wide range of applications that require protection from shock or impact anywhere along a straight line. Typical applications include mining equipment, dockyard handling equipment and on baggage handling and conveyor systems. The TR-L series have been developed to provide **maximum stroke in the minimum mounting space**.

Life expectancy is extremely high; **up to twenty times** longer than for urethane dampers, up to **ten times** longer than rubber bumpers and up to **five times** longer than steel springs.

Calculation and selection to be approved by ACE.

Impact velocity range: Up to max. 5 m/s

Environment: Resistant to oil, grease, seawater and to microbe or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Capacity rating: For emergency use only (1 cycle) it is possible to exceed the W_3 rating by +40 %.

Mounting: In any position

Dynamic force range:
6 800 N to 286 000 N

Operating temperature range: -40 °C to 90 °C

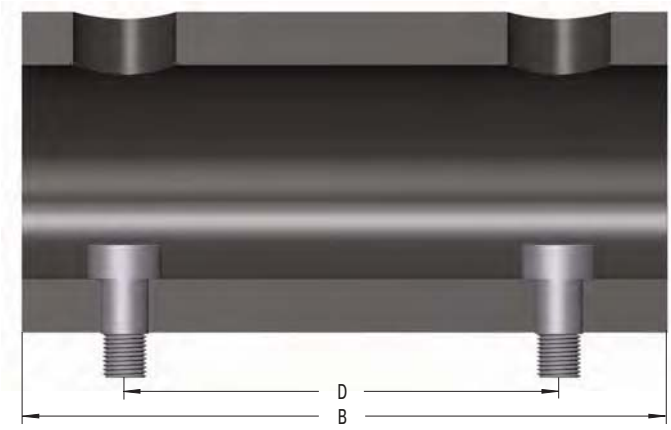
Energy absorption:
14 % to 26 %

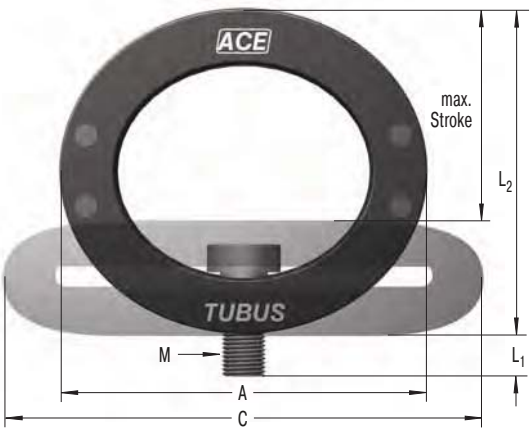
Material hardness rating:
Shore 40D

Mounting screw torque:
M5: 6 Nm
M8: 25 Nm
M16: 210 Nm

On request: Special strokes, -colours, -sizes and materials.

82





Ordering Example

TR66-40L-2

TUBUS radial long
Outer-Ø 66 mm
Stroke 40 mm
Length 2 = 305 mm

The calculation and selection of the required profile damper should be carried out or be approved by ACE.

Dimensions and Capacity Chart

Type	[1] W_3 Nm/Cycle	[2] W_3 Nm/Cycle	Max. Stroke mm	A	B	C	D	M	L1	L2	Weight kg
TR29-17L	12	17	17	29	80	38	40	M5	5	25	0.06
TR43-25L	16	22.5	25	43	80	58	40	M5	5	37	0.06
TR63-43L	30	42	43	63	80	87	40	M5	5	55	0.10
TR66-40L-1	100	140	40	66	152	87	102	M8	8	59	0.25
TR66-40L-2	200	280	40	66	305	87	254	M8	8	59	0.55
TR66-40L-3	300	420	40	66	457	87	406	M8	8	59	0.80
TR66-40L-4	400	560	40	66	610	87	559	M8	8	59	1.10
TR66-40L-5	500	700	40	66	762	87	711	M8	8	59	1.30
TR76-45L-1	135	190	45	76	152	100	102	M8	8	68	0.35
TR76-45L-2	270	378	45	76	305	100	254	M8	8	68	0.70
TR76-45L-3	400	560	45	76	457	100	406	M8	8	68	1.10
TR76-45L-4	535	750	45	76	610	100	559	M8	8	68	1.40
TR76-45L-5	670	940	45	76	762	100	711	M8	8	68	1.70
TR83-48L-1	155	217	48	83	152	106	102	M8	8	73	0.45
TR83-48L-2	315	440	48	83	305	106	254	M8	8	73	0.90
TR83-48L-3	470	660	48	83	457	106	406	M8	8	73	1.35
TR83-48L-4	625	875	48	83	610	106	559	M8	8	73	4.80
TR83-48L-5	780	1 092	48	83	762	106	711	M8	8	73	2.25
TR99-60L-1	205	287	60	99	152	130	102	M16	16	88	0.60
TR99-60L-2	410	574	60	99	305	130	254	M16	16	88	1.10
TR99-60L-3	615	861	60	99	457	130	406	M16	16	88	1.75
TR99-60L-4	820	1 148	60	99	610	130	559	M16	16	88	2.35
TR99-60L-5	1 025	1 435	60	99	762	130	711	M16	16	88	2.90
TR99-60L-6	1 230	1 722	60	99	914	130	864	M16	16	88	3.50
TR99-60L-7	1 435	2 010	60	99	1 067	130	1 016	M16	16	88	4.10
TR143-86L-1	575	805	86	143	152	191	76	M16	16	127	1.25
TR143-86L-2	1 155	1 617	86	143	305	191	203	M16	16	127	2.50
TR143-86L-3	1 730	2 422	86	143	457	191	355	M16	16	127	3.80
TR143-86L-4	2 305	3 227	86	143	610	191	508	M16	16	127	5.10
TR143-88L-5	2 880	4 032	86	143	762	191	660	M16	16	127	6.40
TR143-86L-6	3 455	4 837	86	143	914	191	812	M16	16	127	7.70
TR143-86L-7	4 030	5 642	86	143	1 067	191	965	M16	16	127	9.00
TR188-108L-1	1 350	1 890	108	188	152	245	76	M16	16	165	2.15
TR188-108L-2	2 710	3 794	108	188	305	245	203	M16	16	165	4.45
TR188-108L-3	4 060	5 684	108	188	457	245	355	M16	16	165	6.70
TR188-108L-4	5 420	7 588	108	188	610	245	508	M16	16	165	9.00
TR188-108L-5	6 770	9 478	108	188	762	245	660	M16	16	165	11.20
TR188-108L-6	8 120	11 368	108	188	914	245	812	M16	16	165	13.45
TR188-108L-7	9 480	13 272	108	188	1 067	245	965	M16	16	165	15.75

[1] Max. energy capacity per cycle for continous use.
[2] Energy capacity per cycle for emergency use.

The **profile damper type TC** from the innovative ACE TUBUS Series is a maintenance free, self-contained damping element made from a special Co-Polyester Elastomer.
They have been specially developed for crane equipment applications and fulfill the international Industry standards OSHA and CMAA. Many crane applications require a spring rate with a high return force. This is achieved with the unique **Dual-Profile Concept** of the TC-S models. For Energy-Management-Systems the TC model types provide a cost efficient solution with a high return force capability.
The very small and light package size from Ø 64 mm up to Ø 176 mm covers an energy absorption capacity ranging from 450 Nm up to 12 720 Nm/cycle. The excellent resistance to UV, seawater chemical and microbe attack together with the wide operating temperature range from -40 °C to 90 °C enables a wide range of applications.

Life expectancy is extremely high; **up to twenty times** longer than for urethane dampers, up to **ten times** longer than rubber bumpers and up to **five times** longer than steel springs.

Calculation and selection to be approved by ACE.

Impact velocity range: Up to max. 5 m/s

Environment: Resistant to oil, grease, seawater and to microbe or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.

Capacity rating: For emergency use only (1 cycle) it is possible to exceed the W_3 rating by +40 %.

Mounting: In any position

Dynamic force range:
80 000 N bis 978 000 N

Operating temperature range: -40 °C to 90 °C

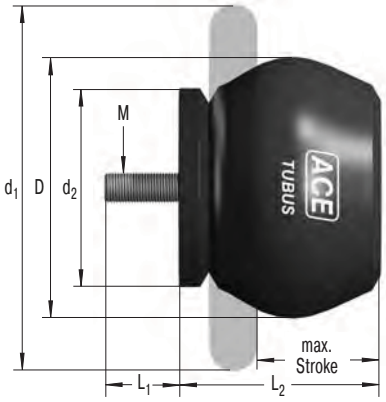
Energy absorption:
31 % to 63 %

Material hardness rating:
Shore 55D

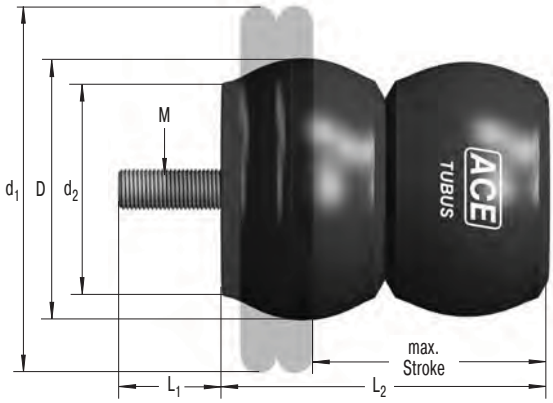
Mounting screw torque:
M12: 85 Nm
M16: 210 Nm

On request: Special strokes, -characteristics, -spring rates, -sizes and materials.

Issue 9.2007 Specifications subject to change



Model Type TC



Model Type TC-S

Ordering Example

TC83-73-S

TUBUS Crane Buffer
Outer-Ø 83 mm
Stroke 73 mm
Model Type Soft

The calculation and selection of the required profile damper should be carried out or be approved by ACE.

Dimensions and Capacity Chart

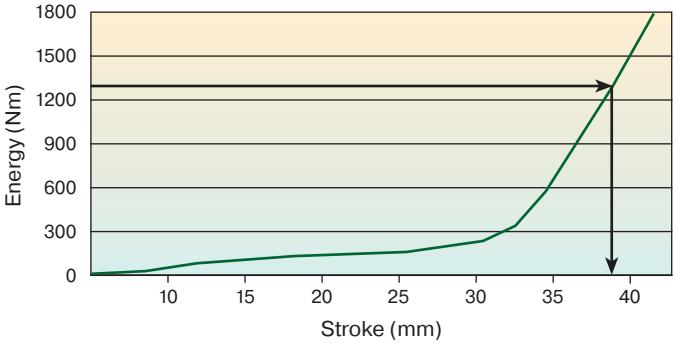
Type	[1] W_3 Nm/Cycle	[2] W_3 Nm/Cycle	Max. Stroke mm	D	L1	M	L2	d1	d2	Weight kg
TC64-62-S	450	630	62	64	12	M12	79	89	52	0.20
TC74-76-S	980	1 372	76	74	12	M12	96	114	61	0.25
TC83-73-S	1 900	2 660	73	83	12	M12	94	127	69	0.30
TC86-39	1 210	1 695	39	86	12	M12	56	133	78	0.25
TC90-49	1 630	2 282	49	90	12	M12	68	124	67	0.25
TC100-59	1 770	2 480	59	100	12	M12	84	149	91	0.50
TC102-63	1 970	2 760	63	102	16	M16	98	140	82	0.50
TC108-30	1 900	2 660	30	108	12	M12	53	133	77	0.35
TC117-97	3 710	5 195	97	117	16	M16	129	188	100	1.00
TC134-146-S	7 290	10 210	146	134	16	M16	188	215	117	1.60
TC136-65	4 250	5 950	65	136	16	M16	106	178	106	1.10
TC137-90	6 350	8 890	90	137	16	M16	115	216	113	1.10
TC146-67-S	8 330	11 660	67	146	16	M16	118	191	99	1.50
TC150-178-S	8 860	12 400	178	150	16	M16	241	224	132	2.60
TC153-178-S	7 260	10 165	178	153	16	M16	226	241	131	2.30
TC168-124	10 100	14 140	124	168	16	M16	166	260	147	2.30
TC176-198-S	12 720	17 810	198	176	16	M16	252	279	150	3.60

[1] Max. energy capacity per cycle for continous use.
[2] Energy capacity per cycle for emergency use.

Characteristics of Type TC90-49

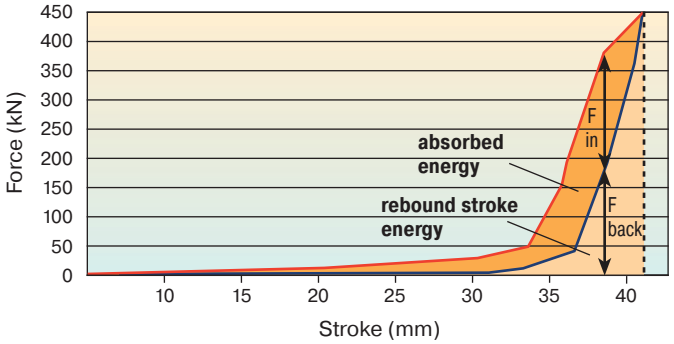
Energy-Stroke Characteristic (dynamic)

(with impact velocity over 0.5 m/s)



Force-Stroke Characteristic (dynamic)

(with impact velocity over 0.5 m/s)

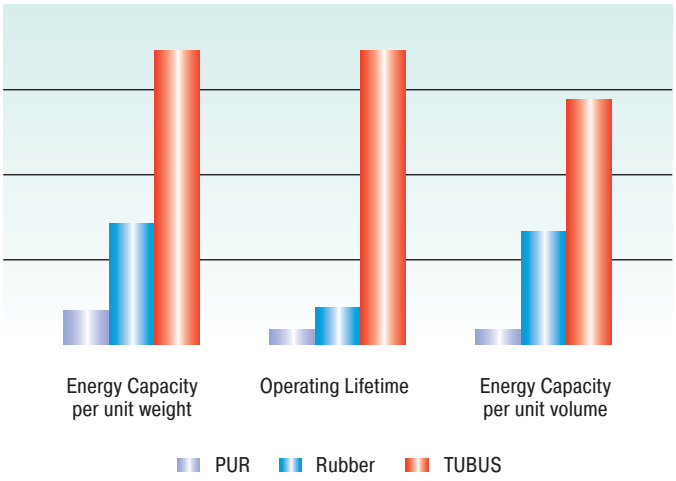


With the aid of the characteristic curves above you can estimate the proportion of the total energy that will be absorbed. Example: With impact energy of 1 300 Nm the Energy-Stroke diagram shows that a stroke of about 38 mm is needed. On the Force-Stroke diagram you can estimate the proportion of absorbed energy to rebound energy at this stroke length.

Note: With these types the return force towards the end of the stroke is significant and we recommend you try to use a minimum of 90 % of the total stroke available.

Dynamic (v > 0.5 m/s) and static (v ⩽ 0.5 m/s) characteristics of all types are available on request.

Physical Properties of TUBUS Profile Dampers



ACE TUBUS profile dampers are high performance damping elements made from a special Co-Polyester Elastomer.They have a high energy absorbing capacity compared with other materials.

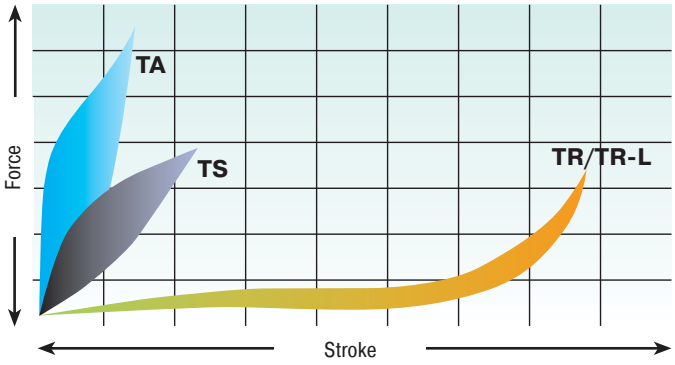
The TUBUS-series comprises 5 main types with over 80 individual models.

The excellent damping characteristics are achieved as a result of the special elastomer material and the worldwide patented construction design. This enables us to change the characteristics of the elastomer material so that individual and distinct damping curves are possible.

TUBUS dampers offer a considerable performance advantage when compared to other materials such as rubber, urethanes (PUR) and steel springs.

A further advantage compared to other damping elements is the **operating life expectancy – up to twenty times longer than with urethane dampers, up to ten times longer than with rubber dampers and up to five times longer than with steel spring dampers.**

Comparison of Damping Characteristics



Characteristics of dynamic energy absorption for impact velocity over 0.5 m/s. For impact velocities under 0.5 m/s, please request a static characteristic curve.

The innovative TUBUS dampers absorb energy while exhibiting the following damping characteristics:

Model type TA: Degressive characteristic with max. energy absorption (coloured area) with min. stroke. Energy absorption: 40 % to 66 %.

Model type TS: Almost linear characteristic with low reaction force over a short operating stroke. Energy absorption: 26 % to 56 %.

Model type TR/TR-L: Progressive characteristic with gradually increasing reaction force over a long stroke.
Energy absorption **TR**: 17 % to 35 %
Energy absorption **TR-L**: 14 % to 26 %

The material does not absorb water or swell and it is highly resistant to abrasion. Products of the TUBUS-series will work at **temperatures of -40 °C up to 90 °C** and are resistant to grease, oil, petroleum fluids, microbe and chemical attack and sea water. They also have good UV and ozone resistance. The **very long service life** of up to one million cycles, the **compact size** and the **low unit weight** differentiate the TUBUS profile dampers from all other types of elastomer damping elements.

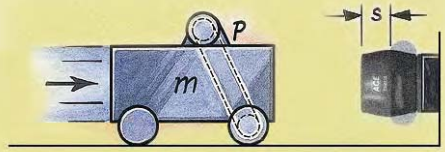
If you are looking for an economic damping solution where the load does not need to be decelerated to an exact datum position and you do not need 100 % absorption of the impact energy then TUBUS dampers are a real alternative to hydraulic end position damping. They are the preferred solution for end stop dampers in robotic systems, high bay warehouse systems and all similar automated plant and machinery.

For the crane industry we manufacture special **high capacity crane buffers** that have an ideal deceleration characteristic with high return force for this type of application and energy capacities from 450 to 12 720 Nm. This means you can have a TUBUS crane buffer capable of providing up to 900 kN of braking force in a package only weighing 3 kg and absorbing up to 50 % of the energy.

Special Damper

Besides the standard product range of the TUBUS-series there are also a large number of special products available upon request for customer-specific applications.

Issue 9.2007 Specifications subject to change



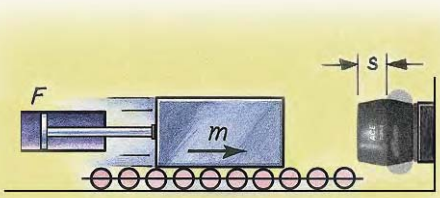
Safe end position damping

ACE TUBUS profile dampers protect the integrated loading station on a new high speed machining centre.

The ACE TUBUS damper is designed to prevent overrun on the high speed loading station of a Camshaft machining centre used in the automobile industry. In the event that the drive train fails during operation or incorrect data is inputted the ACE TUBUS damper absorbs the impact preventing costly damage to the machine. The **TA-98-40** TUBUS damper impressed engineers with this exceptionally long service life in operation.

When used as an emergency stop the TUBUS damper can absorb up to 63 % of the impact energy.

Safety with ultra high speed operation



Safe reliable cycling

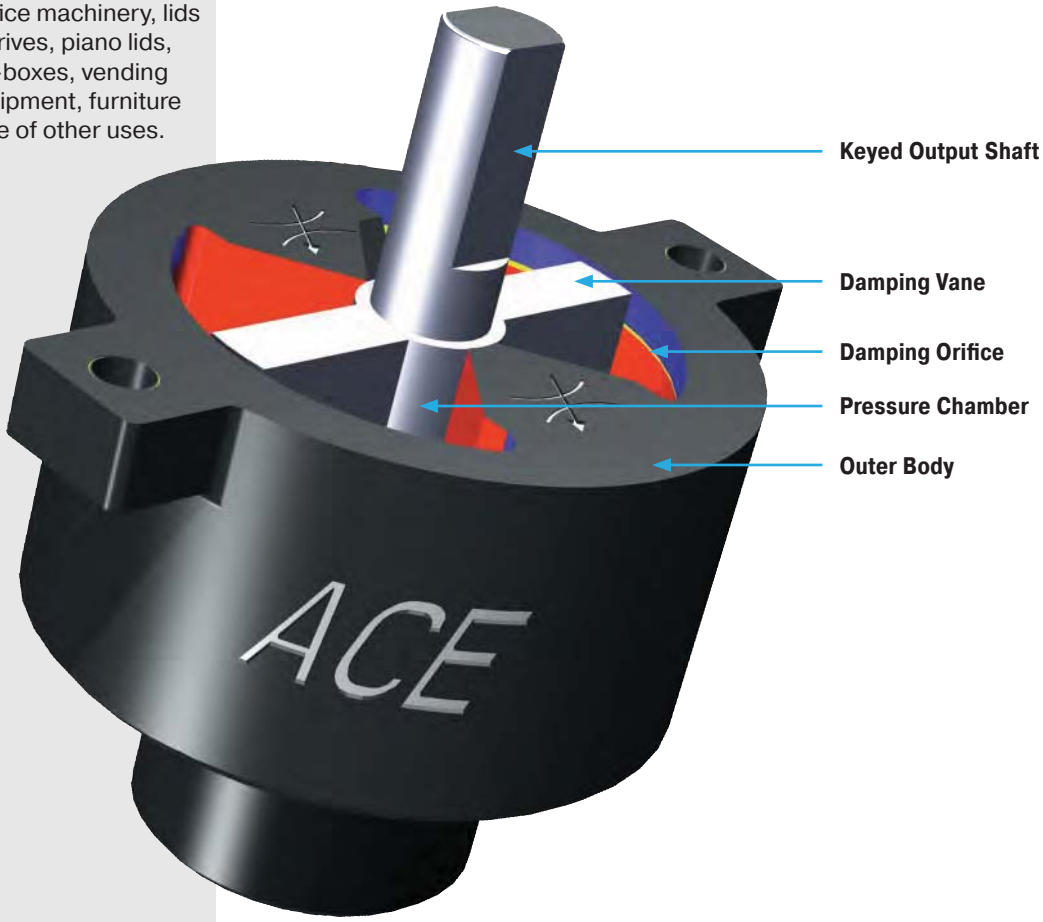
ACE TUBUS profile dampers prevent impact problems between the different directions of motion on a weigh feeder.

The illustrated weigh feeder is a critical production component and must always function correctly. A previous history of machine damage caused by the crossing of different motions in operation was eliminated by the use of TUBUS type **TA 22-10** profile dampers. Due to the co-polyester construction of TUBUS dampers a degressive damping curve could be engineered to suit the application.

The combination of superior damage protection, small size and economic cost made the TUBUS damper the ideal solution for this critical application.

Consistent, safe operation of a weigh feeder

ACE rotary dampers are sealed maintenance free units. They are available with fixed or adjustable damping rates. The damping can be clockwise, anticlockwise or in both directions. The outer body is either plastic or metal depending upon model size. The output connection can be direct onto the keyed output shaft or indirect via a plastic gear (available with 4 standard modules). Plastic racks with modules of 0.5 to 1 are also available. Applications include office machinery, lids and flaps, floppy disc drives, piano lids, CD players, auto glove-boxes, vending machines, medical equipment, furniture industry and a multitude of other uses.

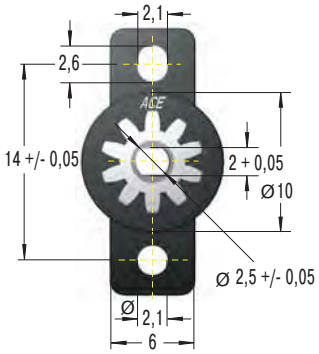


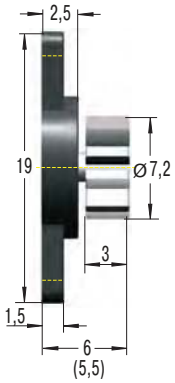
Function: ACE rotary dampers guarantee the smooth controlled opening and closing of small lids, covers and flaps. They can be mounted directly on the pivot axis or can be used to provide linear damping by using a plastic gear and rack. They enable mechanisms to operate with a smooth controlled motion giving that "touch of quality" to whatever product they are used on. ACE rotary dampers are filled with a special high viscosity fluid (silicone type) and sealed for life. The fluid is passed through an orifice or groove by a rotating vane to provide damping resistance. The damping torque generated is determined by the fluid viscosity and by the orifice configuration.

Note: With a max. rotational speed of 50 revs/min and a maximum of 10 cycles/min (12 cycles/min with the FDT/FDN types) the rotary dampers still provide more than 80% of their damping torque after a working life of 50 000 cycles.

88

FRT-E2





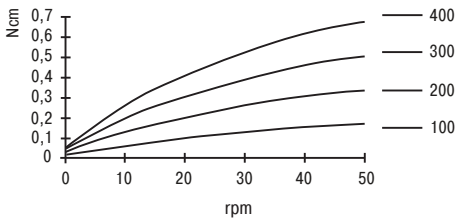
Dims. in ( ) without gear

Damping in both Directions of Rotation

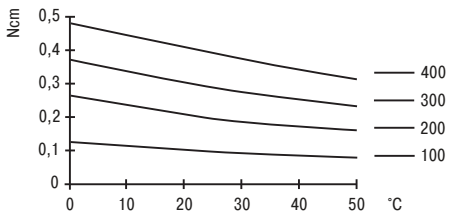
Without Gear	With Gear	Damping Torque Ncm (Nominal 20 rpm. 23°C)
FRT-E2-100	FRT-E2-100-G1	0.10 +/- 0.05
FRT-E2-200	FRT-E2-200-G1	0.20 +/- 0.07
FRT-E2-300	FRT-E2-300-G1	0.30 +/- 0.08
FRT-E2-400	FRT-E2-400-G1	0.40 +/- 0.10

Material:	Polycarbonate plastic
Temperature range:	0 °C to 50 °C
Tooth:	Involute
Module:	[1] 0.6
Pressure angle:	20 °
No. of teeth:	10
P.C.D.:	6 mm

FRT-E2 (at 23 °C)

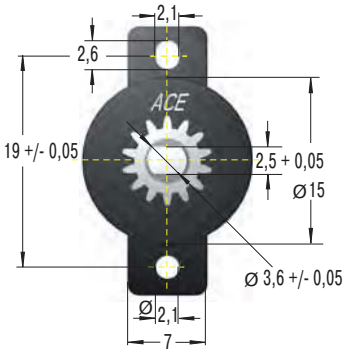


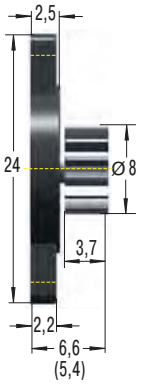
FRT-E2 (at 20 rpm)



[1] A 250 mm long plastic rack is available for use with this part see page 96.

FRT-G2





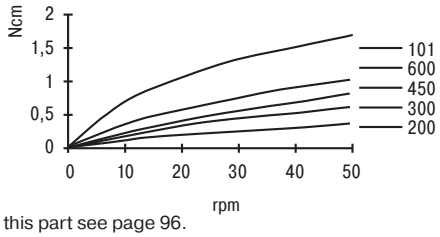
Dims. in ( ) without gear

Damping in both Directions of Rotation

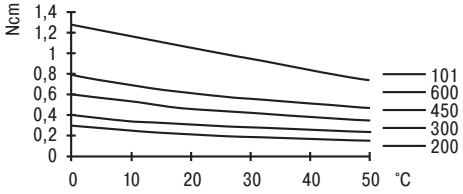
Without Gear	With Gear	Damping Torque Ncm (Nominal 20 rpm. 23 °C)
FRT-G2-200	FRT-G2-200-G1	0.20 +/- 0.07
FRT-G2-300	FRT-G2-300-G1	0.30 +/- 0.08
FRT-G2-450	FRT-G2-450-G1	0.45 +/- 0.10
FRT-G2-600	FRT-G2-600-G1	0.60 +/- 0.12
FRT-G2-101	FRT-G2-101-G1	1.00 +/- 0.20

Material:	Polycarbonate plastic
Temperature range:	0 °C to 50 °C
Tooth:	Involute
Module:	[1] 0.5
Pressure angle:	20°
No. of teeth:	14
P.C.D.:	7 mm

FRT-G2 (at 23 °C)

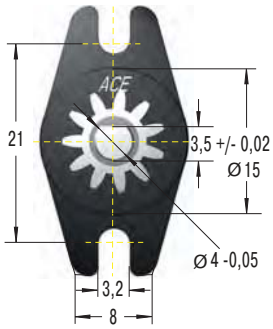


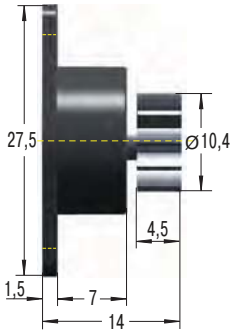
FRT-G2 (at 20 rpm)



[1] A 250 mm long plastic rack is available for use with this part see page 96.

FRT-C2 and FRN-C2

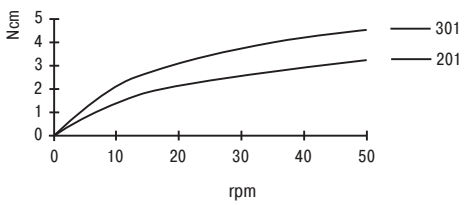




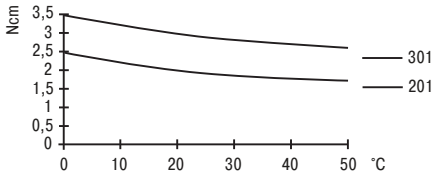
Bidirectional Damping	Right-Hand Damping (clockwise)	Left-Hand Damping (anti-clockwise)	Model	Damping Torque Ncm (Nominal 20 rpm. 23 °C)
FRT-C2-201	FRN-C2-R201	FRN-C2-L201	without gear	2 +/- 0.6
FRT-C2-201-G1	FRN-C2-R201-G1	FRN-C2-L201-G1	with gear	2 +/- 0.6
FRT-C2-301	FRN-C2-R301	FRN-C2-L301	without gear	3 +/- 0.8
FRT-C2-301-G1	FRN-C2-R301-G1	FRN-C2-L301-G1	with gear	3 +/- 0.8

Material:	Polycarbonate plastic
Temperature range:	0 °C to 50 °C
Tooth:	Involute
Module:	[1] 0.8
Pressure angle:	20°
No. of teeth:	11
P.C.D.:	8.8 mm

FRT/N-C2 (at 23 °C)

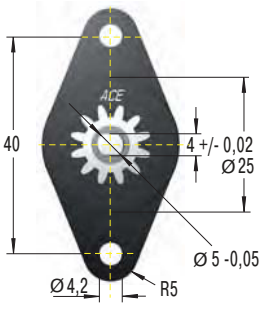


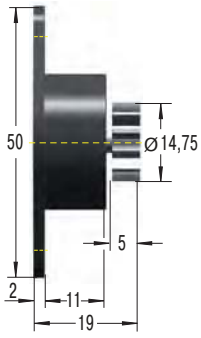
FRT/N-C2 (at 20 rpm)



[1] A 170 mm long flexible plastic rack and a 250 mm long rigid rack are available for use with this part see page 96.

FRT-D2 and FRN-D2

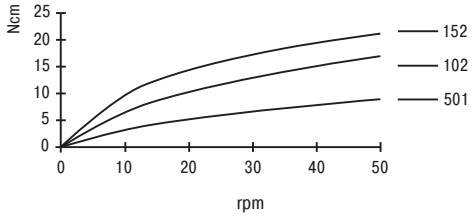




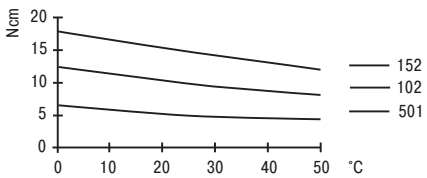
Bidirectional Damping	Right-Hand Damping (clockwise)	Left-Hand Damping (anti-clockwise)	Model	Damping Torque Ncm (Nominal 20 rpm. 23 °C)
FRT-D2-102	FRN-D2-R102	FRN-D2-L102	without gear	10 +/- 2
FRT-D2-102-G1	FRN-D2-R102-G1	FRN-D2-L102-G1	with gear	10 +/- 2
FRT-D2-152	FRN-D2-R152	FRN-D2-L152	without gear	15 +/- 3
FRT-D2-152-G1	FRN-D2-R152-G1	FRN-D2-L152-G1	with gear	15 +/- 3
FRT-D2-501	FRN-D2-R501	FRN-D2-L501	without gear	5 +/- 1
FRT-D2-501-G1	FRN-D2-R501-G1	FRN-D2-L501-G1	with gear	5 +/- 1

Material:	Polycarbonate plastic
Temperature range:	0 °C to 50 °C
Tooth:	Involute
Module:	[1] 1.0
Pressure angle:	20°
No. of teeth:	12
P.C.D.:	12 mm

FRT/N-D2 (at 23 °C)

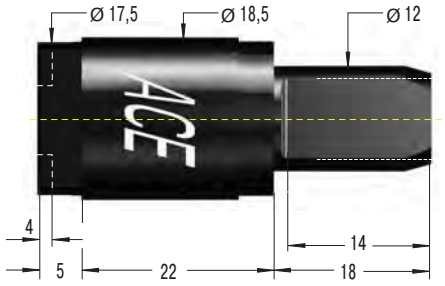


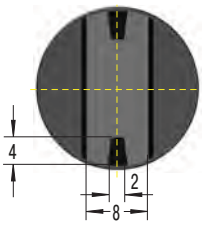
FRT/N-D2 (at 20 rpm)

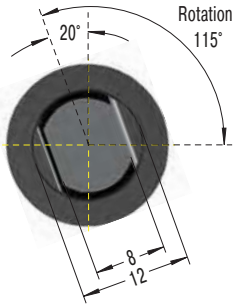


[1] A 250 mm and 500 mm long plastic rack are available for use with this part see page 96.

FYN-P1







Right-Hand Damping (clockwise) black	Left-Hand Damping (anti-clockwise) white	Damping Torque Ncm	Return Damping Torque Ncm
FYN-P1-R103	FYN-P1-L103	100	30
FYN-P1-R153	FYN-P1-L153	150	50
FYN-P1-R183	FYN-P1-L183	180	80

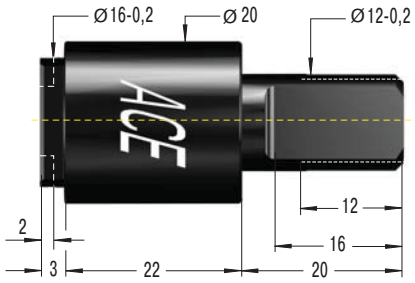
Material: Polycarbonate plastic
Temperature range: -5 °C to 50 °C
Weight: 0.010 kg
Max. rotation angle: 115°

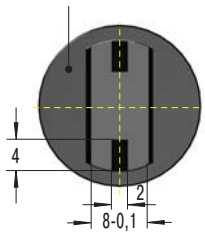
Do not use damper as final end stop.
Fit external mechanical stops at each end of travel.

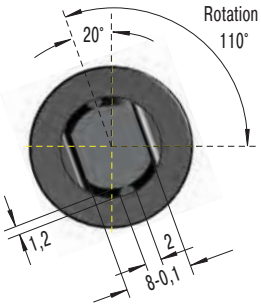
"Coloured shaft for identification of the damping direction!"

FYN-N1

white end cap: left-hand damping black end cap: right-hand damping







Right-Hand Damping (clockwise)	Left-Hand Damping (anti-clockwise)	Damping Torque Ncm	Return Damping Torque Ncm
FYN-N1-R103	FYN-N1-L103	100	20
FYN-N1-R203	FYN-N1-L203	200	40
FYN-N1-R253	FYN-N1-L253	250	40
FYN-N1-R303	FYN-N1-L303	300	80

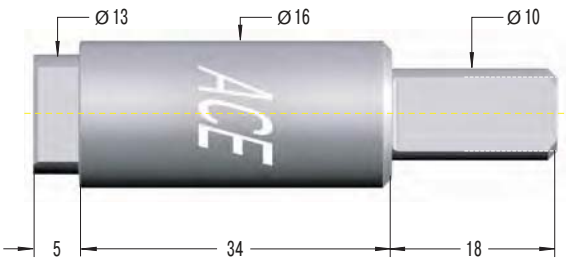
With Ø 18 mm body on request.

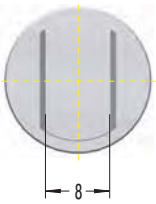
Material: Polycarbonate plastic
Temperature range: -5 °C to 50 °C
Weight: 0.012 kg
Max. rotation angle: 110°

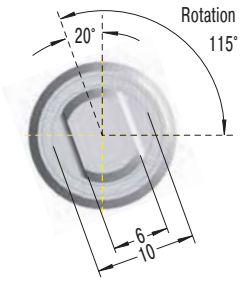
Do not use damper as final end stop.
Fit external mechanical stops at each end of travel.

"Coloured end cap for identification of the damping direction!"

FYN-U1





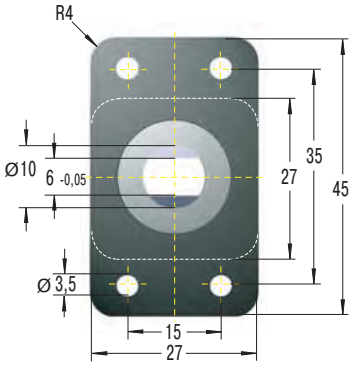


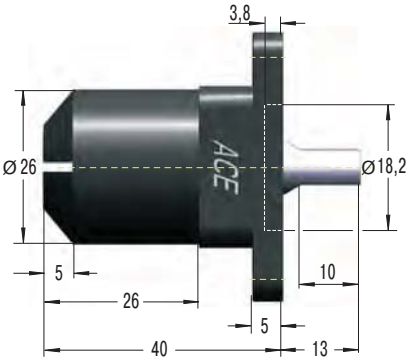
Right-Hand Damping (clockwise)	Left-Hand Damping (anti-clockwise)	Damping Torque Ncm	Return Damping Torque Ncm
FYN-U1-R203	FYN-U1-L203	200	40
FYN-U1-R253	FYN-U1-L253	250	40
FYN-U1-R303	FYN-U1-L303	300	80

Material: Zinc diecast
Temperature range: -5 °C to 50 °C
Weight: 0.04 kg
Max. rotation angle: 115°

Do not use damper as final end stop.
Fit external mechanical stops at each end of travel.

FYN-K1

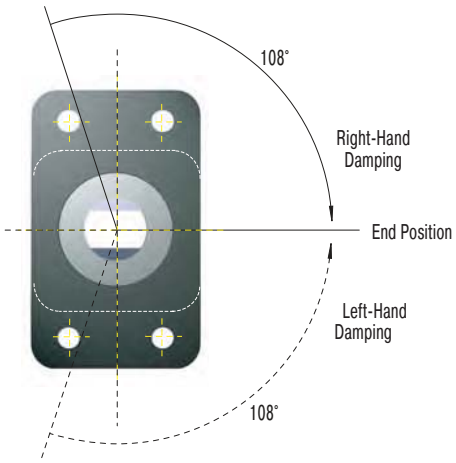




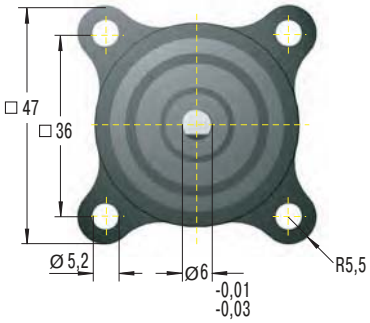
Right-Hand Damping (clockwise)	Left-Hand Damping (anti-clockwise)	Damping Torque Ncm
FYN-K1-R	FYN-K1-L	400

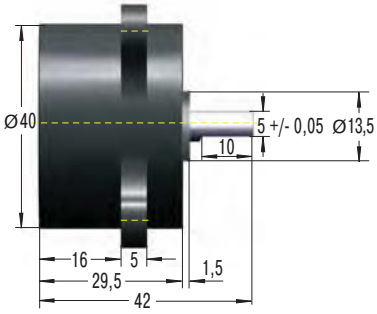
Material: Polycarbonate plastic
Temperature range: -5 °C to 50 °C
Max. rotation angle: 108°
Return damping torque: 100 Ncm
Weight: 0.035 kg

Do not use damper as final end stop.
Fit external mechanical stops at each end of travel.



FRT/FRN-K2 and FRT/FRN-F2

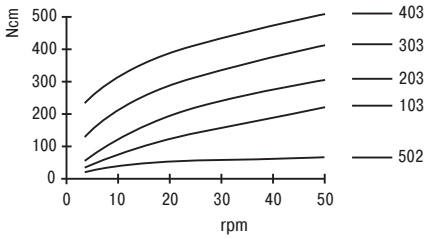




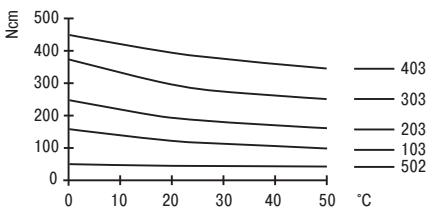
Bidirectional Damping	Right-Hand Damping (clockwise)	Left-Hand Damping (anti-clockwise)	Damping Torque Ncm (Nominal 20 rpm. 23 °C)
FRT-K2-502	FRN-K2-R502	FRN-K2-L502	50 +/- 10
FRT-K2-103	FRN-K2-R103	FRN-K2-L103	100 +/- 20
FRT-F2-203	FRN-F2-R203	FRN-F2-L203	200 +/- 40
FRT-F2-303	–	–	300 +/- 80
FRT-F2-403	–	–	400 +/- 100

Material: Polycarbonate plastic
Temperature range: 0 °C to 50 °C
Weight: max. 0.116 kg

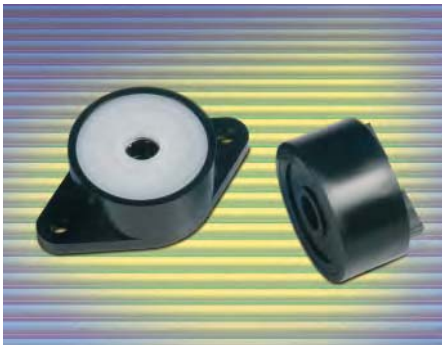
FRT-K2 and -F2 (at 23 °C)

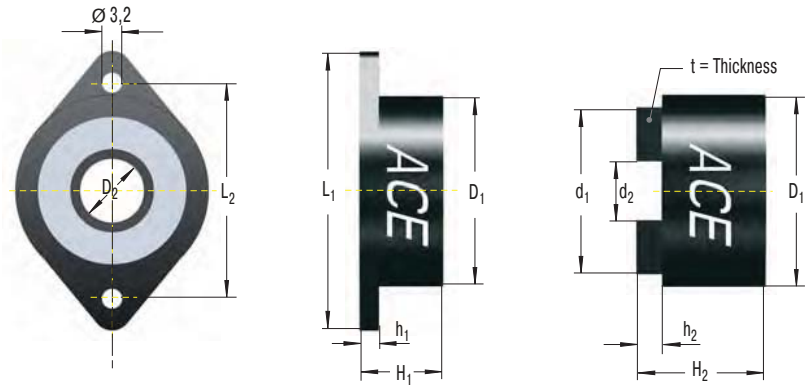


FRT-K2 and -F2 (at 20 rpm)



FFD





Flange Type

Standard Type

Model	Damping Torque Nm	Damping Option [1]	Dimensions D1	D2	Flange Type H1	h1	L1	L2	Standard Type d1	d2	H2	h2	t
FFD-25	0.1 / 0.5 / 1.0	Type S	25	6	13	3	42	34	21	6.2	16	4	4
FFD-28	0.1 / 0.5 / 1.0	Type S	28	8	13	3	44	36	24	8.2	16	4	4
FFD-30	0.1 / 0.5 / 1.0 / 1.5	Type S	30	10	13	3	46	38	26	10.2	16	4	4
FFD-25	1.0 / 1.5 / 2.0	Type W	25	6	19	3	42	34	21	6.2	22	4	4
FFD-28	1.0 / 1.5 / 2.0	Type W	28	8	19	3	44	36	24	8.2	22	4	4
FFD-30	1.5 / 2.0 / 2.5 / 3.0	Type W	30	10	19	3	46	38	26	10.2	22	4	4

[1] Damping clockwise or anti-clockwise

Material: Polycarbonate plastic
Temperature range: -10 °C to 60 °C
Rotational speed max.: 30 rpm
Cycle rate max.: 13 cycles per min.
Recommended shaft details: Ø $^{+0}_{-0.03}$

Ordering Example

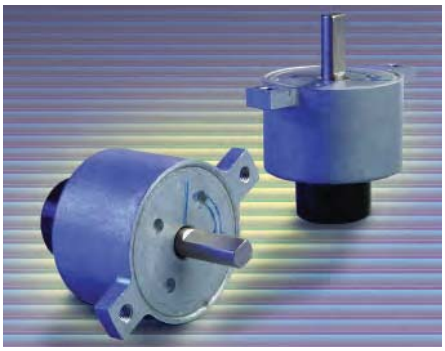
FFD-25-FS-L-102

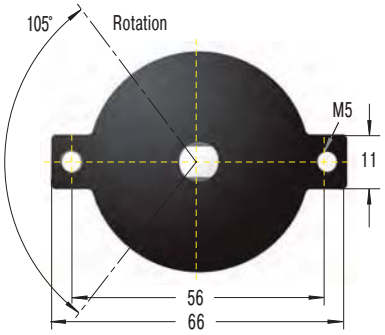
- Friction Damper
- Body Ø
- Mounting Style (Flange = F, Standard = S)
- Damping Option (S or W)
- Damping Direction (right = R, left = L)
- Damping Torque see chart

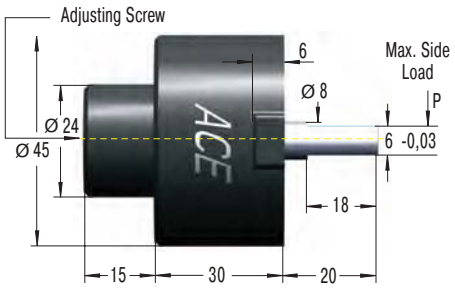
Damping Torque

102 = 1.0 Nm
502 = 0.5 Nm
103 = 1.0 Nm
153 = 1.5 Nm
203 = 2.0 Nm
253 = 2.5 Nm
303 = 3.0 Nm

FYT-H1 and FYN-H1







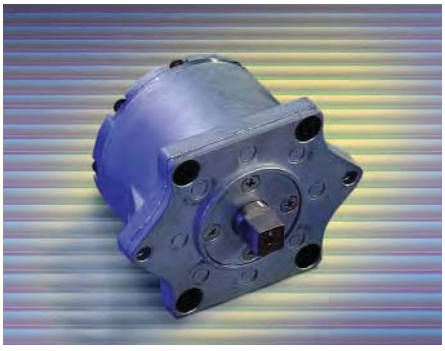
Keyed output shaft shown in mid-travel position

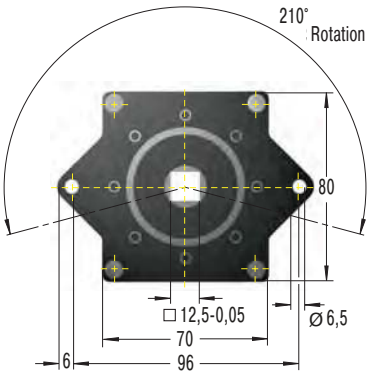
Model Adjustable			
Bidirectional Damping	**Right-Hand Damping** (clockwise)	**Left-Hand Damping** (anti-clockwise)	**Damping Torque Nm** (adjustable)
FYT-H1	FYN-H1-R	FYN-H1-L	2...10

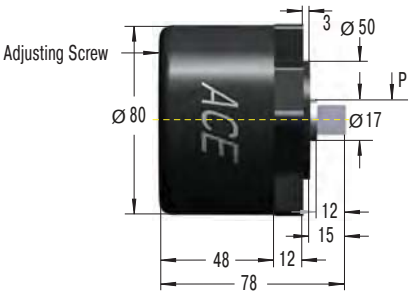
Material:	Zinc diecast, steel shaft
Temperature range:	-5 °C to 50 °C
Max. rotation angle:	105°
Return damping torque:	0.5 Nm
Maximum side load:	50 N
Weight:	0.24 kg

A play of approx. 5° can occur at the beginning of movement.
Do not use damper as final end stop.
Fit external mechanical stops at each end of travel.

FYT-LA3 and FYN-LA3







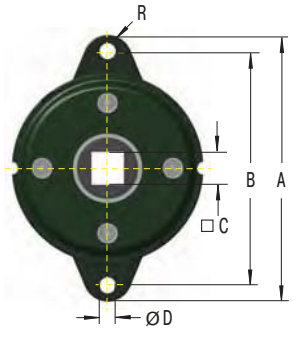
Keyed output shaft shown in mid-travel position

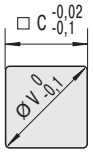
Model Adjustable			
Bidirectional Damping	**Right-Hand Damping** (clockwise)	**Left-Hand Damping** (anti-clockwise)	**Damping Torque Nm** (adjustable)
FYT-LA3	FYN-LA3-R	FYN-LA3-L	4...40

Material:	Zinc diecast, steel shaft
Temperature range:	-5 °C to 50 °C
Max. rotation angle:	210°
Return damping torque:	4 Nm
Maximum side load:	200 N
Weight:	1.75 kg

A play of approx. 5° can occur at the beginning of movement.
Do not use damper as final end stop.
Fit external mechanical stops at each end of travel.

FDT-47 to 70





Recommended Drive Shaft Size

Damping in both Directions of Rotation

Model	Damping Torque Nm (at 20 rpm, 23 °C)	Dimensions A	B	C	D	E	F	G	H	R	V
FDT-47	2.0 +/- 0.3	65	56	8	4.5	47	42.8	1.6	10.3	4.5	10
FDT-57	4.7 +/- 0.5	79	68	10	5.5	57	52.4	1.6	11.2	5.5	13
FDT-63	6.7 +/- 0.7	89	76	12.5	6.5	63	58.6	1.6	11.3	6.5	17
FDT-70	8.7 +/- 0.8	95	82	12.5	6.5	70	65.4	1.6	11.3	6.5	17

Material: Steel. Output shaft sleeve: Nylon

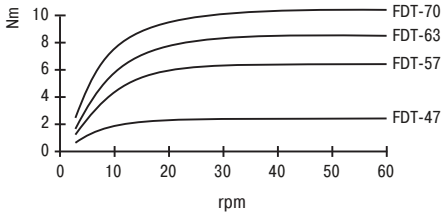
Temperature range: -10 °C to 50 °C

Rotational speed max.: 50 rpm

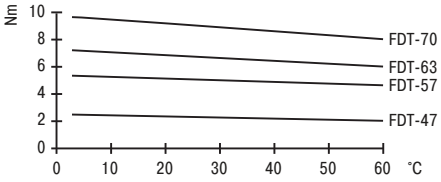
Cycle rate max.: 12 cycles per minute

Weight max.: 0.11 kg

FDT (at 23 °C)

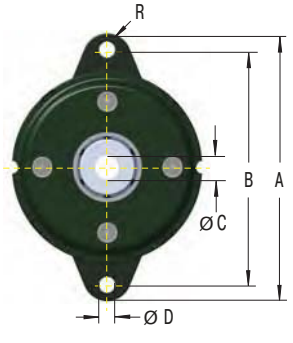


FDT (at 20 rpm)



There is no support for the output shaft within the damper structure.
External support must be provided for the shaft

FDN-47 to 70



Right-Hand Damping (clockwise)	Left-Hand Damping (anti-clockwise)	Damping Torque Nm (at 20 rpm, 23 °C)	Dimensions A	B	C	D	E	F	G	H	R
FDN-47-R	FDN-47-L	2.0 +/- 0.3	65	56	6	4.5	47	42.8	1.6	10.3	4.5
FDN-57-R	FDN-57-L	5.5 +/- 0.6	79	68	10	5.5	57	52.4	1.6	14	5.5
FDN-63-R	FDN-63-L	8.5 +/- 0.8	89	76	10	6.5	63	58.6	1.6	13.9	6.5
FDN-70-R	FDN-70-L	10.0 +/- 1.0	95	82	10	6.5	70	65.4	1.6	13	6.5

Material: Steel. Output shaft sleeve: Nylon

Temperature range: -10 °C to 50 °C

Rotational speed max.: 50 rpm

Cycle rate max.: 12 cycles per minute

Weight max.: 0.12 kg

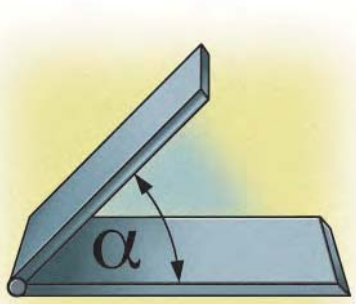
There is no support for the output shaft within the damper structure.
External support must be provided for the shaft.

Recommended shaft details:

for FDN-47 Ø 6 $^{+0}_{-0.03}$

for FDN-57 to FDN-70 Ø 10 $^{+0}_{-0.03}$

Hardness > HRC55, surface smoothness R_Z < 1 µm



Closing Torque T
$T = L / 2 \cdot m \cdot g \cdot \cos \alpha$ Ncm

Note: for a uniform lid assume centre of gravity is at distance L/2 from pivot.

Calculation of Rotary Damper for a Lid

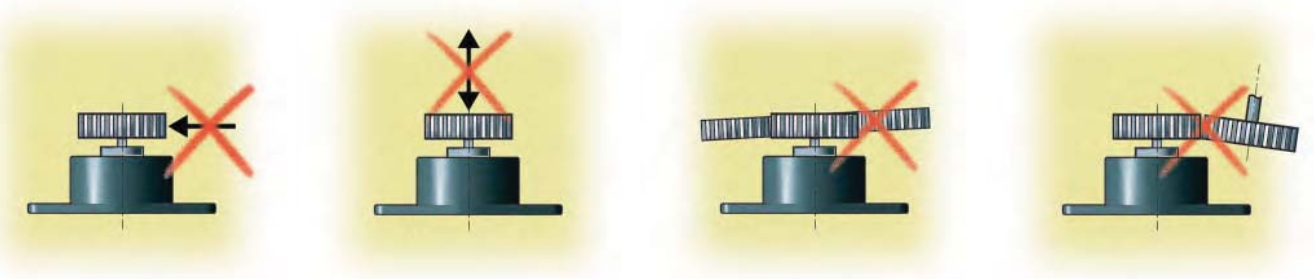
m Mass of lid (kg)
L Length of lid from pivot (cm)
n Rotation speed (r.p.m.)
g Acceleration due to gravity (= 9.81)

Calculation Steps

1) Calculate max. torque damper will be exposed to (with example shown max. torque is at α = 0).
2) Decide upon rotation speed desired.
3) Choose a rotary damper from catalogue that can handle the torque calculated above.
4) With the aid of the damper performance curves, check if the r.p.m. given at your torque corresponds to the desired closing speed of the lid.
5) If the r.p.m. is too high – choose a damper with a higher torque rating.
   If the r.p.m. is too low – choose a damper with a lower torque rating.

Mountings to Avoid

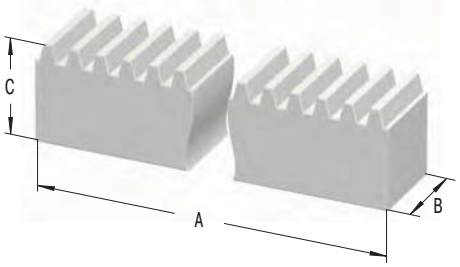
The output shaft should **not** be exposed to side loading.



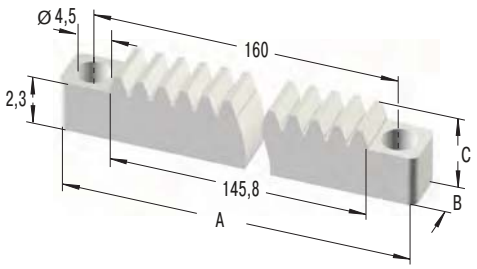
Side loading | End loading | Angular offset | Misalignment

96

Toothed Rack M0.5, M0.6, M0.8, M1.0



Toothed Rack M0.8P



Damping Direction

right hand damping = damping action in clockwise direction when looking onto the output shaft

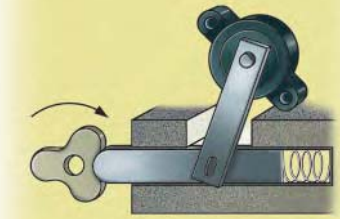
Accessories

Toothed plastic rack with modules 0.5 to 1 available.

Models Available

Toothed Rack	A	B	C	Model
M0.5	250	4	6	rigid, milled
M0.6	250	4	6	rigid, milled
M0.8	250	6	8	rigid, milled
M0.8P	170	8	4.1	flexible, milled
M1.0	250	10	10	rigid, milled
M1.0	500	10	10	rigid, milled

Metal racks available on request.



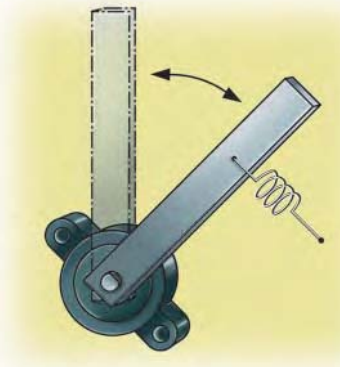
Controlling rotary motion

ACE rotary dampers installed in VIP lounges in the new Hong Kong Airport Terminal.

This modern information counter consists of a central support console with two fold away counter surfaces. With the counter surfaces folded up the passenger can check flight and baggage details on the built in monitor and keyboard. A PC and printer are housed in the central support console. After use the counter surfaces can be folded down out of the way for easier passenger access.

To provide smooth and safe operation of this sophisticated equipment, model **FYN-H1** ACE rotary dampers were installed at the pivot axis of the counter tops.

Stand console in airport terminal



Damping lever motions

ACE rotary dampers protect the keyboard.

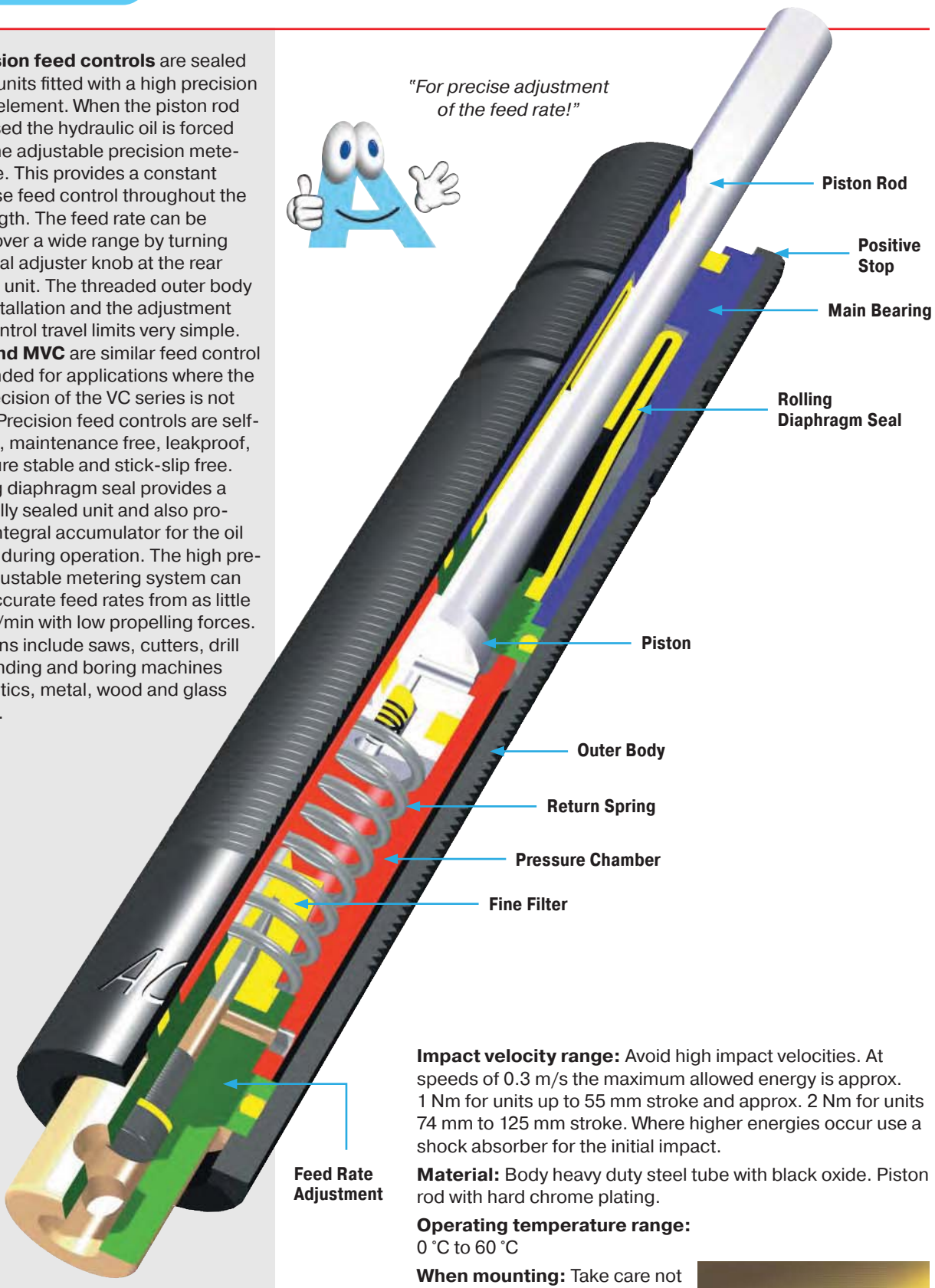
To provide long term protection in arduous and often dirty industrial applications (and also to protect against unauthorised access) the machine keyboard is installed in a lockable and pivoted housing cabinet.

ACE rotary dampers type **FRN-F1** were installed on the pivot axis to provide a smooth controlled motion to the keyboard as it is pulled down into its operating position. The damper also prevents overloading the hinge system and prevents damage to the keyboard, the housing cabinet and the hinges.

Pivoted machine keyboard

VC precision feed controls are sealed hydraulic units fitted with a high precision metering element. When the piston rod is depressed the hydraulic oil is forced through the adjustable precision metering orifice. This provides a constant and precise feed control throughout the stroke length. The feed rate can be adjusted over a wide range by turning the external adjuster knob at the rear end of the unit. The threaded outer body makes installation and the adjustment of feed control travel limits very simple. **FA, MA and MVC** are similar feed control units intended for applications where the higher precision of the VC series is not required. Precision feed controls are self-contained, maintenance free, leakproof, temperature stable and stick-slip free. The rolling diaphragm seal provides a hermetically sealed unit and also provides an integral accumulator for the oil displaced during operation. The high precision, adjustable metering system can provide accurate feed rates from as little as 12 mm/min with low propelling forces. Applications include saws, cutters, drill feeds, grinding and boring machines in the plastics, metal, wood and glass industries.

"For precise adjustment of the feed rate!"



Impact velocity range: Avoid high impact velocities. At speeds of 0.3 m/s the maximum allowed energy is approx. 1 Nm for units up to 55 mm stroke and approx. 2 Nm for units 74 mm to 125 mm stroke. Where higher energies occur use a shock absorber for the initial impact.

Material: Body heavy duty steel tube with black oxide. Piston rod with hard chrome plating.

Operating temperature range: 0 °C to 60 °C

When mounting: Take care not to damage the adjuster knob.

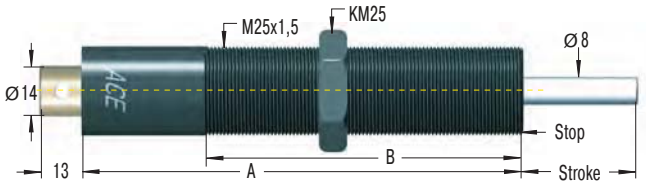
Nylon button PP600 can be fitted onto piston rod. Unit may be mounted in any position.

Only VC2515 to VC2255: Do not rotate piston rod, if excessive rotation force is applied rolling seal may rupture. In contact with petroleum base oils or cutting fluids specify optional neoprene rolling seal or install air bleed adaptor type SP25.

98

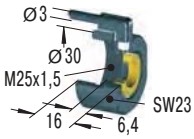
Issue 9.2007 Specifications subject to change

VC25



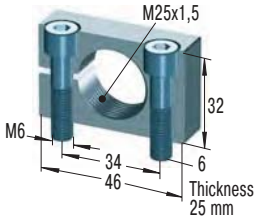
Accessories, mounting, installation ... see pages 32 to 35.

SP25



Air Bleed Collar
for VC2515FT to VC2555FT

MB25



Clamp Mount

Capacity Chart

Type Part Number	Stroke mm	A	B	Propelling Force Min. N	Propelling Force Max. N	Min. Return Force N	Max. Return Force N	Rod Reset Time s	Max. Side Load Angle °	Weight kg
VC2515FT	15	128	80	30	3 500	5	10	0.2	3	0.4
VC2530FT	30	161	110	30	3 500	5	15	0.4	2	0.5
VC2555FT	55	209	130	35	3 500	5	20	1.2	2	0.6
VC2575FT	75	283	150	50	3 500	10	30	1.7	2	0.8
VC25100FT	100	308	150	60	3 500	10	35	2.3	1	0.9
VC25125FT	125	333.5	150	70	3 500	10	40	2.8	1	1.0

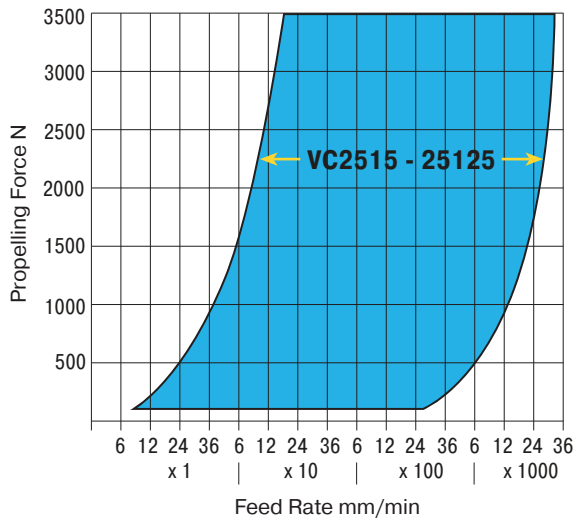
Suffix „FT“ signifies a M25x1.5 threaded body.
Suffix „F“ signifies a plain body 23.8 mm dia. (without thread) also available, with optional clamp type mounting block.

Technical Data

Feed rate range: min. 0.013 m/min with 400 N propelling force. Max. 38 m/min with 3 500 N propelling force.

Outer body: Plain body 23.8 mm dia. (without thread) is also available.

Operating Range VC



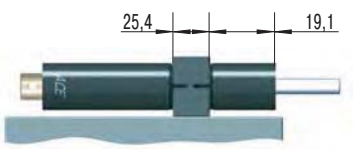
Mounting Examples

Mounting with clamp mount MB25

Installed with air bleed collar SP25

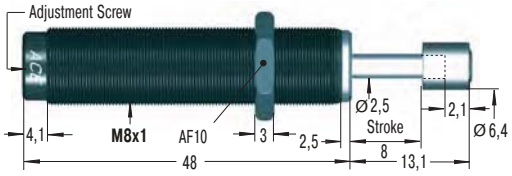
Installed with switch stop collar inc. proximity switch and steel button AS25 plus PS25

Alternative circlip grooves



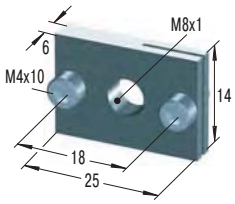
Bulkhead mounting for VC25...F with mounting block KB... (23.8 mm plain body option)

MA30M



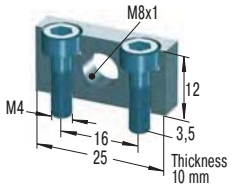
Accessories, mounting, installation ... see pages 30 to 35.

RF8



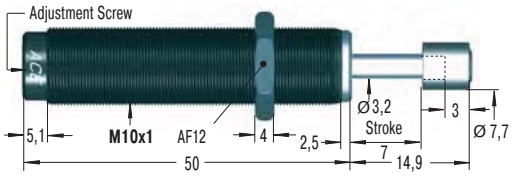
Rectangular Flange

MB8SC2



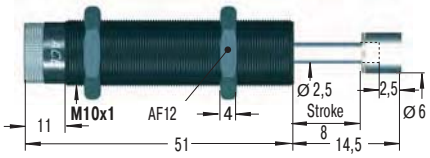
Mounting Block

MA50M for use on new installations



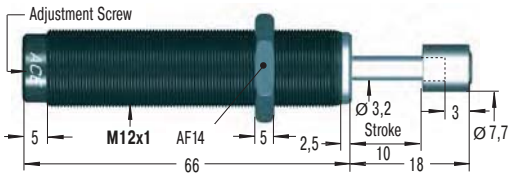
Accessories, mounting, installation ... see pages 30 to 35.

FA1008V-B



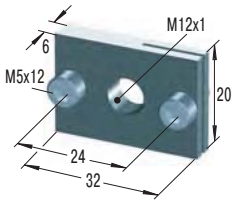
Accessories, mounting, installation ... see pages 30 to 35.

MA35M



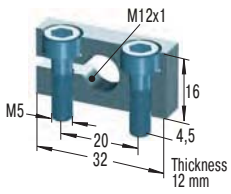
Accessories, mounting, installation ... see pages 30 to 35.

RF12



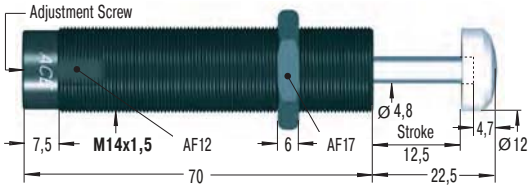
Rectangular Flange

MB12



Clamp Mount

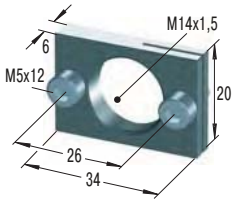
MA150M



M14 x 1 also available to special order

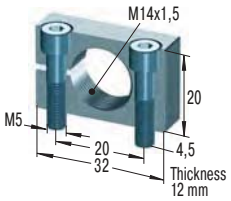
Accessories, mounting, installation ... see pages 31 to 35.

RF14



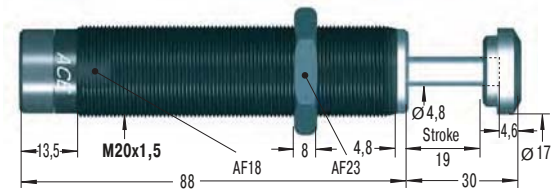
Rectangular Flange

MB14



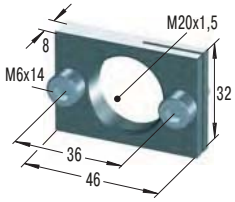
Clamp Mount

MVC225M



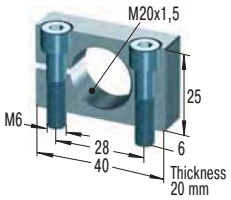
Accessories, mounting, installation ... see pages 31 to 35.

RF20



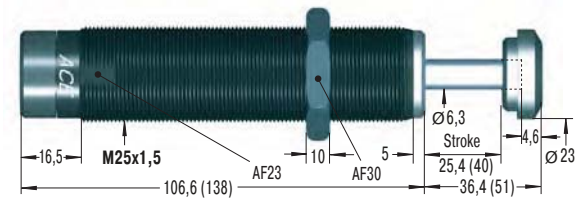
Rectangular Flange

MB20



Clamp Mount

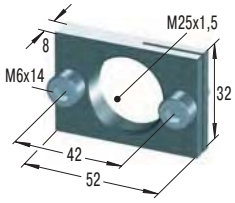
MVC600M and MVC900M



Dimensions for MVC900M in (...)

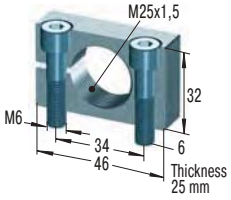
Accessories, mounting, installation ... see pages 32 to 35.

RF25



Rectangular Flange

MB25



Clamp Mount

Capacity Chart

Type Part Number	Stroke mm	Propelling Force N min. N	Propelling Force N max. N	Min. Return Force N	Max. Return Force N	Rod Reset Time s	[1] Max. Side Load Angle °	Weight kg
MA30M	8	8	80	1	5	0.3	2	0.025
MA50M	7	40	160	3	6	0.3	2	0.030
FA1008V-B	8	10	180	3	6	0.3	2.5	0.026
MA35M	10	15	200	5	11	0.2	2	0.043
MA150M	12	20	300	3	5	0.4	2	0.06
MVC225M	19	25	1 750	5	10	0.65	2	0.13
MVC600M	25	65	3 500	10	30	0.85	2	0.31
MVC900M	40	70	3 500	10	35	0.95	2	0.4

[1] For applications with higher side load angles consider using the side load adaptor (BV) pages 30 to 34.

Technical Data

Positive stop: Install mechanical stop 0.5-1 mm before end of stroke on model FA1008V-B.

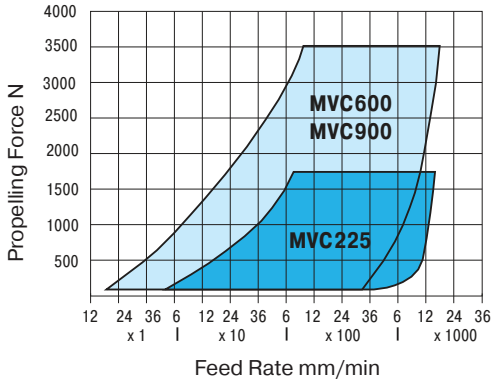
Operating temperature range: 0 °C to 66 °C

Mounting: In any position

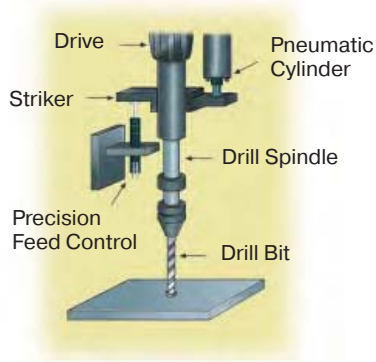
Impact velocity range: Avoid high impact velocities. At speeds of 0,3 m/s the maximum allowed energy is approx. 2 Nm. Where higher energies occur use a shock absorber for the initial impact.

Material: Steel body with black oxide finish. Stainless steel piston rod.

Operating Range MVC225 to 900



Application Examples

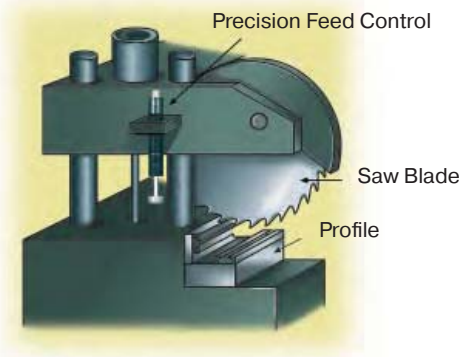


Drilling sheet metal

A high force is necessary at the start of drilling when the drill first contacts the sheet.

After the initial cut this high force causes the drill to break through. This results in jagged edges rather than a smooth clean hole and also can causes tool breakage.

By installing an **ACE VC feed control** it is possible to precisely control the rate of drill advance. As a result the drilled holes are clean and consistent and drill breakage is considerably reduced.



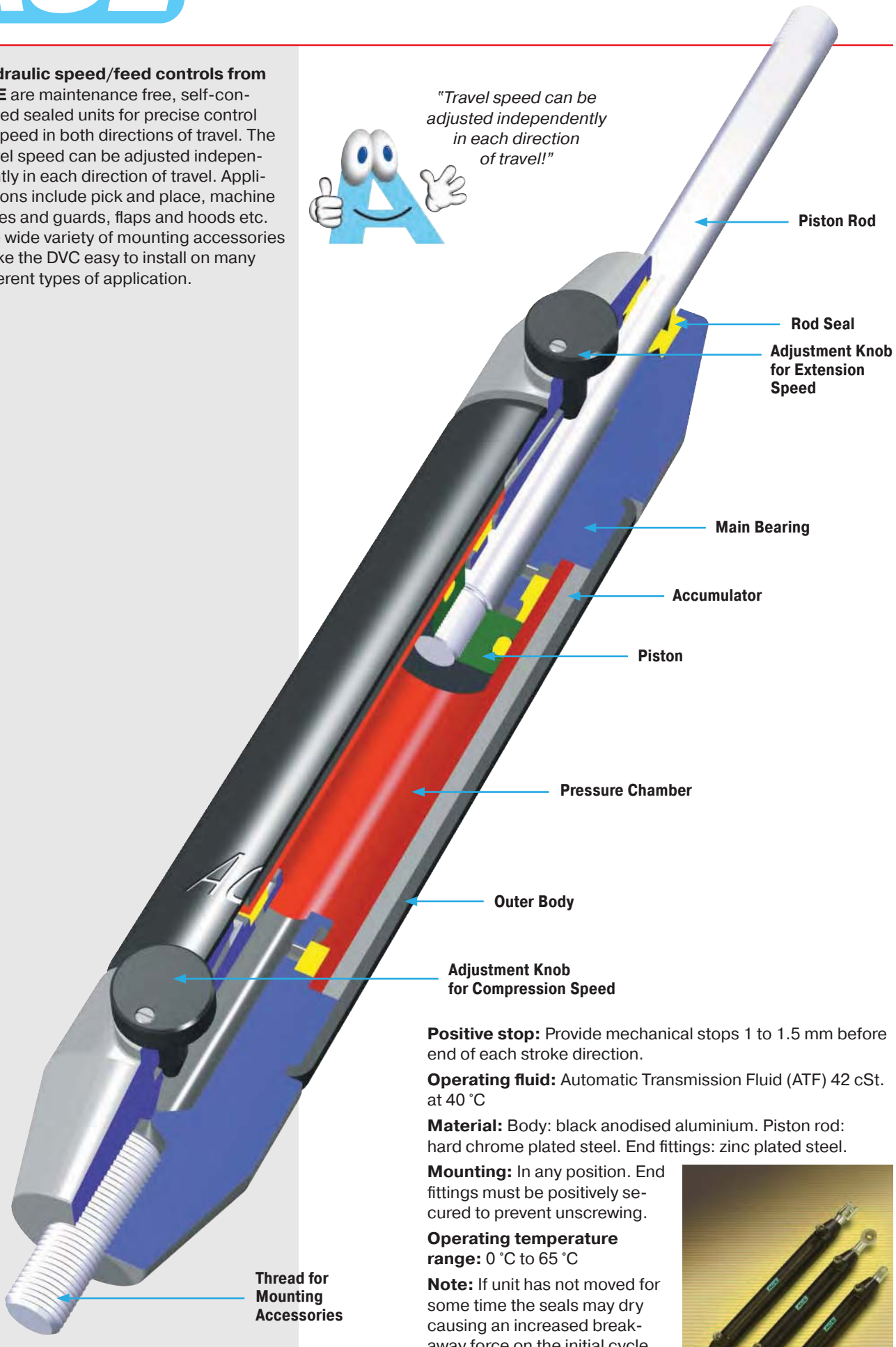
Sawing aluminium and plastic profiles

Varying material types, hardness and wear on the saw blade causes the cutting pressure to vary greatly. However the saw advance speed should remain constant as changes cause breakage of the material being cut or of the saw blade.

An **ACE VC feed control** fitted directly to the cutting head provides a simple and low cost solution. The cutting speed remains constant and can be easily preset.

Hydraulic speed/feed controls from ACE are maintenance free, self-contained sealed units for precise control of speed in both directions of travel. The travel speed can be adjusted independently in each direction of travel. Applications include pick and place, machine slides and guards, flaps and hoods etc. The wide variety of mounting accessories make the DVC easy to install on many different types of application.

"Travel speed can be adjusted independently in each direction of travel!"



Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction.

Operating fluid: Automatic Transmission Fluid (ATF) 42 cSt. at 40 °C

Material: Body: black anodised aluminium. Piston rod: hard chrome plated steel. End fittings: zinc plated steel.

Mounting: In any position. End fittings must be positively secured to prevent unscrewing.

Operating temperature range: 0 °C to 65 °C

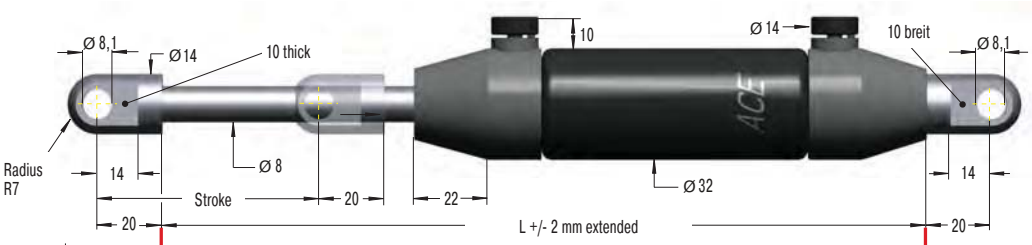
Note: If unit has not moved for some time the seals may dry causing an increased break-away force on the initial cycle.

On request: Special oils and external finishes. Uni-directional damping (free flow in reverse direction).

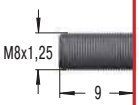
102

End Fitting — Standard Dimensions — End Fitting

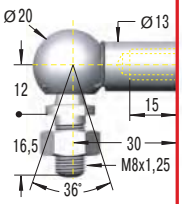
A8



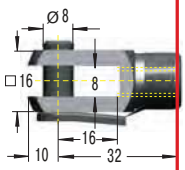
B8



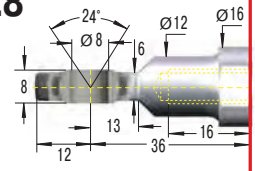
C8



D8



E8



Dimensions

Type	Stroke mm	A max	B	L	Propelling Force N Extension min.	Extension max.	Compression min.	Compression max.
DVC-32-50	50			240	42	2 000	42	2 000
DVC-32-50-XX	50	250	75.2		42	2 000	42	2 000
DVC-32-100	100			340	42	2 000	42	1 670
DVC-32-100-XX	100	350	124.4		42	2 000	42	1 670
DVC-32-150	150			440	42	2 000	42	1 335
DVC-32-150-XX	150	450	173.6		42	2 000	42	1 335

Ordering Example — DVC-32-50-DD-P

Type (Hydraulic Damper)
Body Ø (32 mm)
Stroke (50 mm)
Piston Rod End Fitting D8
Body End Fitting D8
Damping Direction (P = both directions)

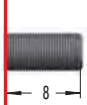
Damping Options

P = Damping in both directions (standard model)
M = Damping on out stroke only
(adjustment knob at "rear end" free flow)
N = Damping on in stroke only
(adjustment knob at "piston rod end" free flow)

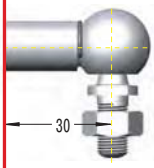
The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 142.

Eye A8

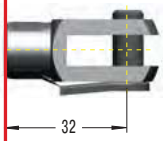
Stud Thread B8



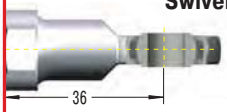
Angle Ball Joint C8
(Max. permitted force 1200 N)



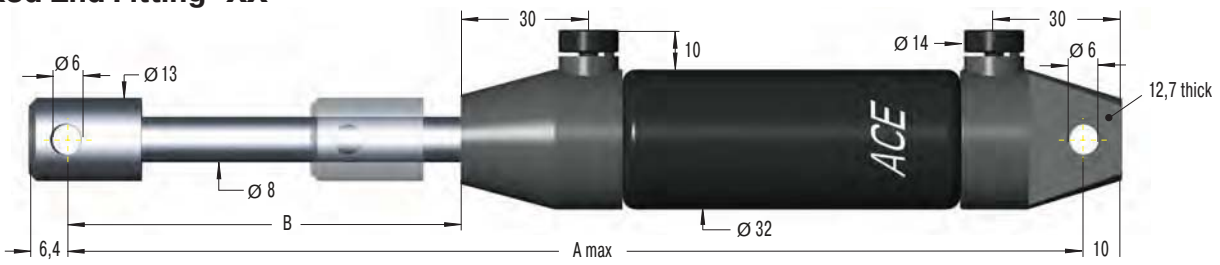
Clevis Fork D8



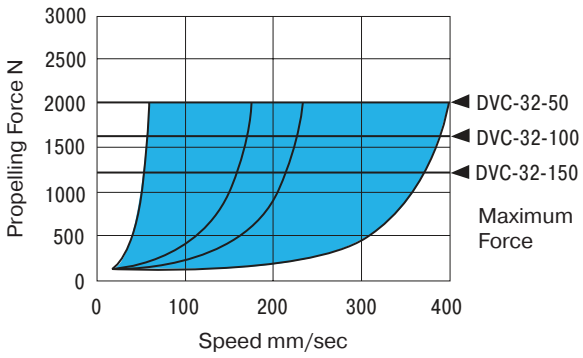
Swivel Eye E8



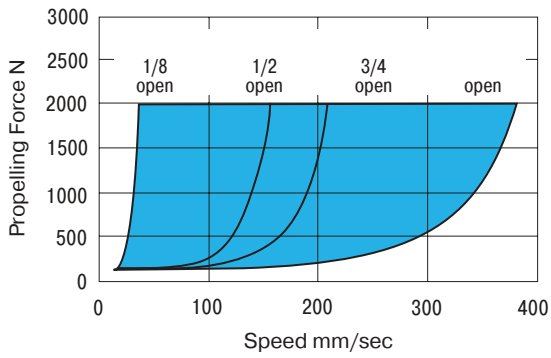
Fixed End Fitting -XX



Compression Speed Control Chart



Tension Speed Control Chart

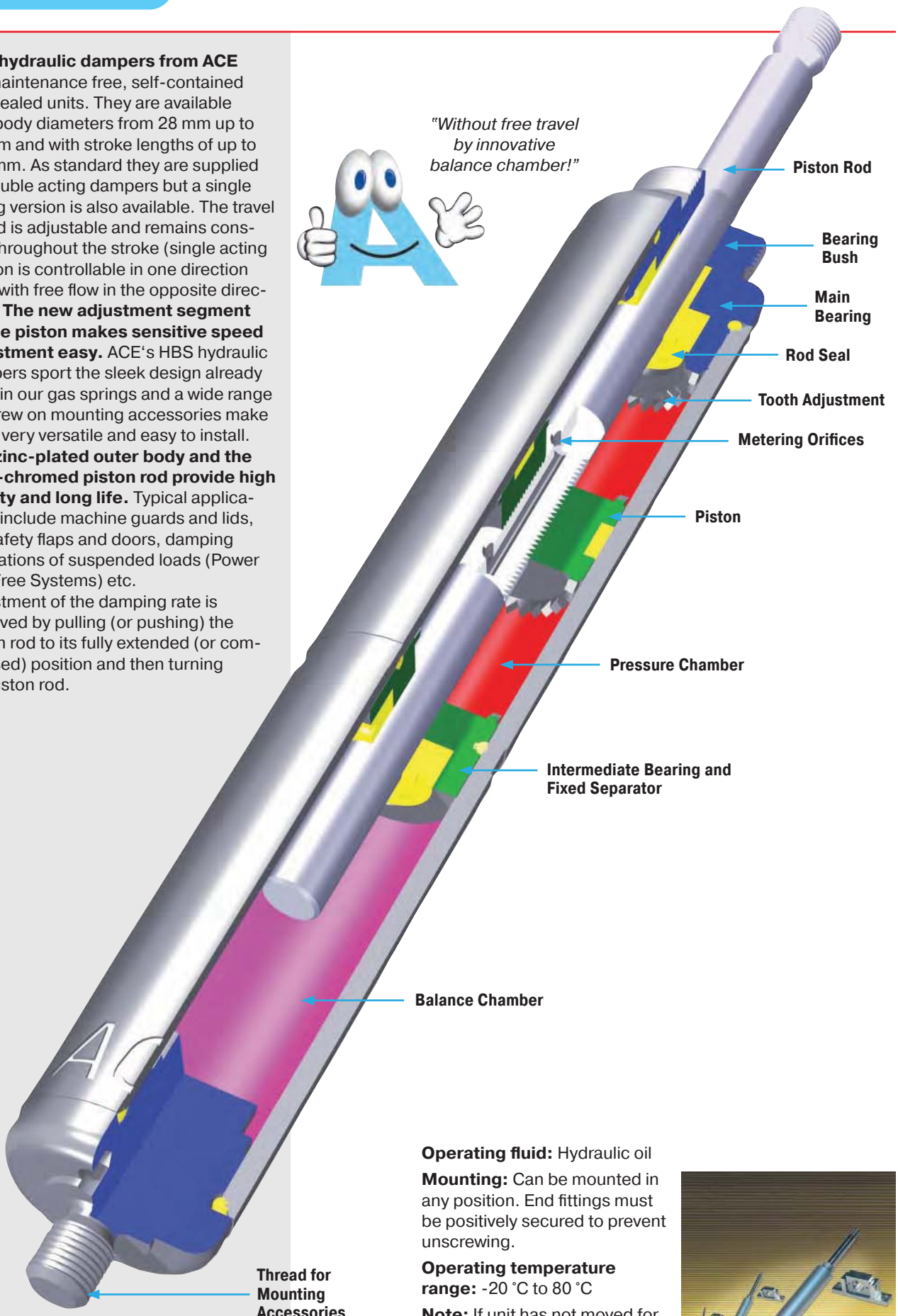


Hydraulic Dampers HBS-28 to 70

Without Free Travel

HBS hydraulic dampers from ACE are maintenance free, self-contained and sealed units. They are available with body diameters from 28 mm up to 70 mm and with stroke lengths of up to 800 mm. As standard they are supplied as double acting dampers but a single acting version is also available. The travel speed is adjustable and remains constant throughout the stroke (single acting version is controllable in one direction only, with free flow in the opposite direction). **The new adjustment segment on the piston makes sensitive speed adjustment easy.** ACE's HBS hydraulic dampers sport the sleek design already seen in our gas springs and a wide range of screw on mounting accessories make them very versatile and easy to install. **The zinc-plated outer body and the hard-chromed piston rod provide high quality and long life.** Typical applications include machine guards and lids, fire safety flaps and doors, damping oscillations of suspended loads (Power and Free Systems) etc.
Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position and then turning the piston rod.

"Without free travel by innovative balance chamber!"



Operating fluid: Hydraulic oil

Mounting: Can be mounted in any position. End fittings must be positively secured to prevent unscrewing.

Operating temperature range: -20 °C to 80 °C

Note: If unit has not moved for some time the seals may dry causing an increased break-away force on the initial cycle.

On request: Special lengths, alternative seals and end fittings.

104

End Fitting

A8

B8

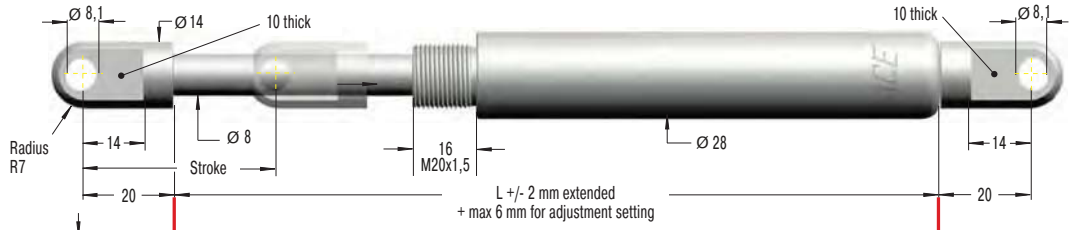
C8

D8

E8

G8

Standard Dimensions



Dimensions

Type	Stroke mm	L extended	[1] Max. Compression Force N	[1] Max. Compression Force with MBS N
HBS-28-50	50	295	3 000	3 000
HBS-28-100	100	445	1 550	3 000
HBS-28-150	150	595	900	3 000
HBS-28-200	200	745	600	3 000
HBS-28-250	250	895	440	3 000
HBS-28-300	300	1 045	330	3 000
HBS-28-350	350	1 195	260	2 500
HBS-28-400	400	1 345	200	2 000

[1] Max. extension force for all stroke lengths 3000 N.

Ordering Example

HBS-28-150-DD-M

Type (Hydraulic Damper)
Body Ø (28 mm)
Stroke (150 mm)
Piston Rod End Fitting D8
Body End Fitting D8
Damping Direction (M = out stroke only)

Damping Options

P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 140.

End Fitting

Eye A8

Stud Thread B8

Angle Ball Joint C8
(Max. permitted force 1200 N)

Clevis Fork D8

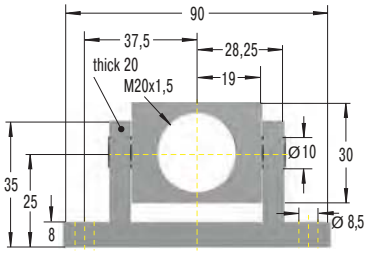
Swivel Eye E8

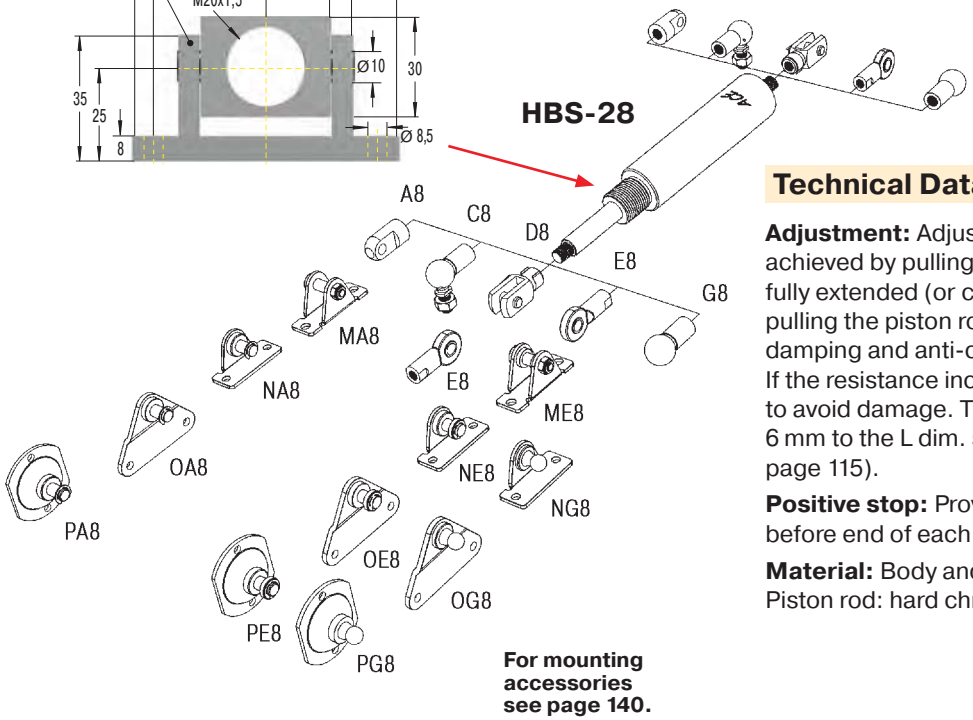
Ball Socket G8
(Max. permitted force 1200 N)

Rod Shroud
no retrofit
Ø 32, L = Stroke + 50

MBS-28

Swivel Mounting Block





For mounting accessories see page 140.

Technical Data

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) postition. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. If the resistance increases noticeably, stop adjusting to avoid damage. The adjustment can add a max. of 6 mm to the L dim. shown (adjustment instruction see page 115).

Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction.

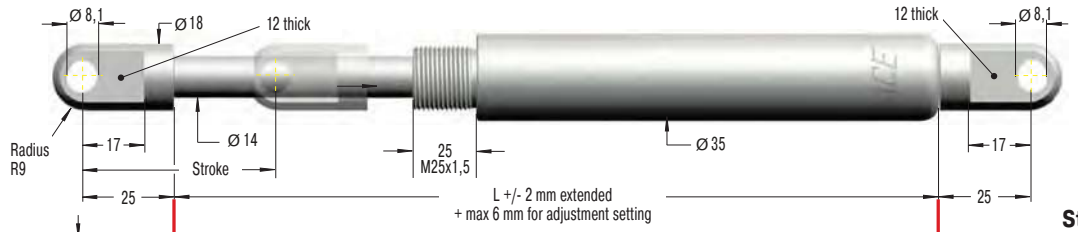
Material: Body and end fittings: zinc plated steel. Piston rod: hard chrome plated.

Hydraulic Dampers HBS-35

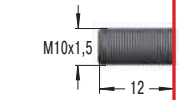
Adjustable (Compression and Extension Forces 30 N to 10 000 N)
Without Free Travel

End Fitting

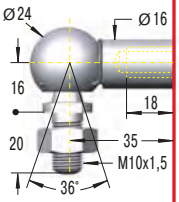
A10



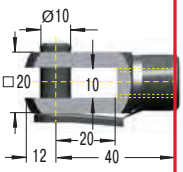
B10



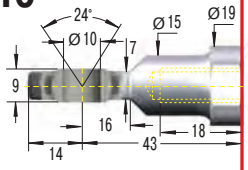
C10



D10



E10



Standard Dimensions

Dimensions

Type	Stroke mm	L extended	[1] Max. Compression Force N	[1] Max. Compression Force with MBS N
HBS-35-100	100	485	10 000	10 000
HBS-35-150	150	635	7 500	10 000
HBS-35-200	200	785	5 150	10 000
HBS-35-300	300	1 085	2 850	10 000
HBS-35-400	400	1 385	1 800	10 000
HBS-35-500	500	1 685	1 240	10 000
HBS-35-600	600	1 985	910	8 600
HBS-35-700	700	2 285	690	6 500
HBS-35-800	800	2 585	540	5 100

[1] Max. extension force for all stroke lengths 10 000 N.

Ordering Example

HBS-35-300-EE-N

Type (Hydraulic Damper)
Body Ø (35 mm)
Stroke (300 mm)
Piston Rod End Fitting E10
Body End Fitting E10
Damping Direction (N = in stroke only)

Damping Options

P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite). For mounting accessories see page 140.

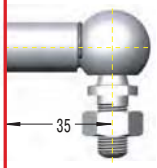
End Fitting

Eye A10

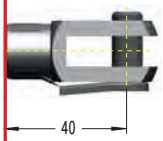
Stud Thread B10

Angle Ball Joint C10

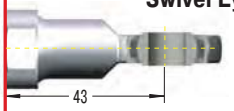
(Max. permitted force 1800 N)



Clevis Fork D10



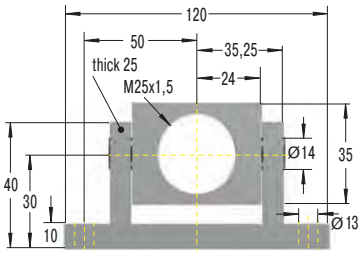
Swivel Eye E10

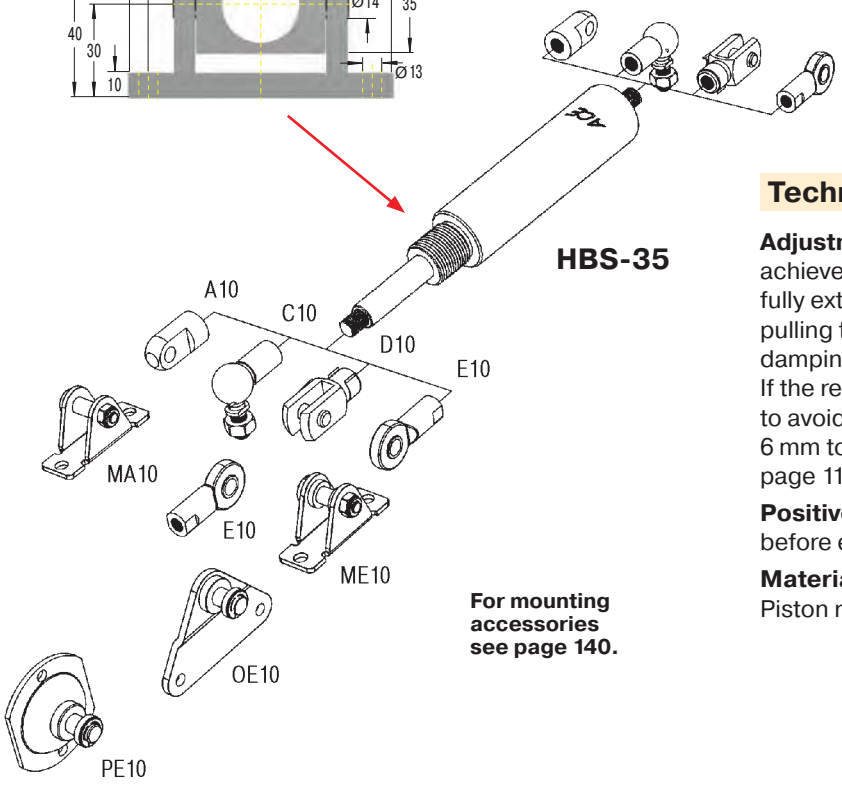


Rod Shroud no retrofit
Ø 40, L = Stroke + 50

MBS-35

Swivel Mounting Block





For mounting accessories see page 140.

Technical Data

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) postition. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. If the resistance increases noticeably, stop adjusting to avoid damage. The adjustment can add a max. of 6 mm to the L dim. shown (adjustment instruction see page 115).

Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction

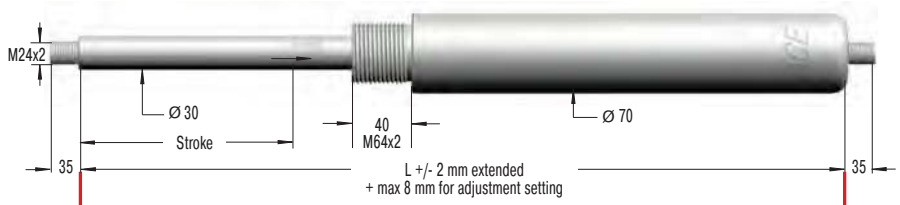
Material: Body and end fittings: zinc plated steel. Piston rod: hard chrome plated.

Hydraulic Dampers HBS-70

Adjustable (Compression and Extension Forces 2 000 N to 40 000 N) Without Free Travel

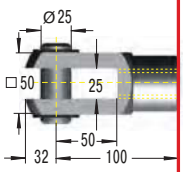
End Fitting | **Standard Dimensions** | **End Fitting**

B24

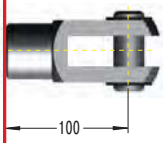


Stud Thread B24

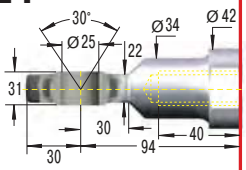
D24



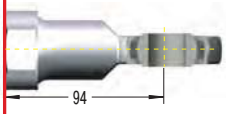
Clevis Fork D24



E24

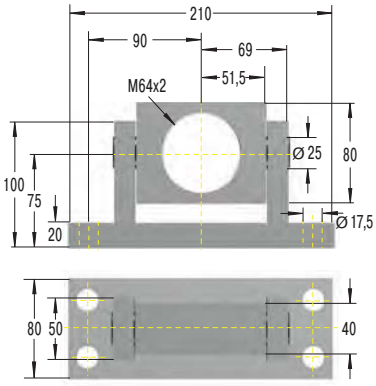


Swivel Eye E24



MBS-70

Swivel Mounting Block



Dimensions

Type	Stroke mm	L extended	[1] Max. Compression Force N	[1] Max. Compression Force with MBS N
HBS-70-100	100	561	40 000	40 000
HBS-70-200	200	861	40 000	40 000
HBS-70-300	300	1161	40 000	40 000
HBS-70-400	400	1461	30 300	40 000
HBS-70-500	500	1761	21 600	40 000
HBS-70-600	600	2 061	16 200	40 000
HBS-70-700	700	2 361	12 600	40 000
HBS-70-800	800	2 661	10 100	40 000

[1] Max. extension force for all stroke lengths 40 000 N.

Ordering Example **HBS-70-300-EE-N**

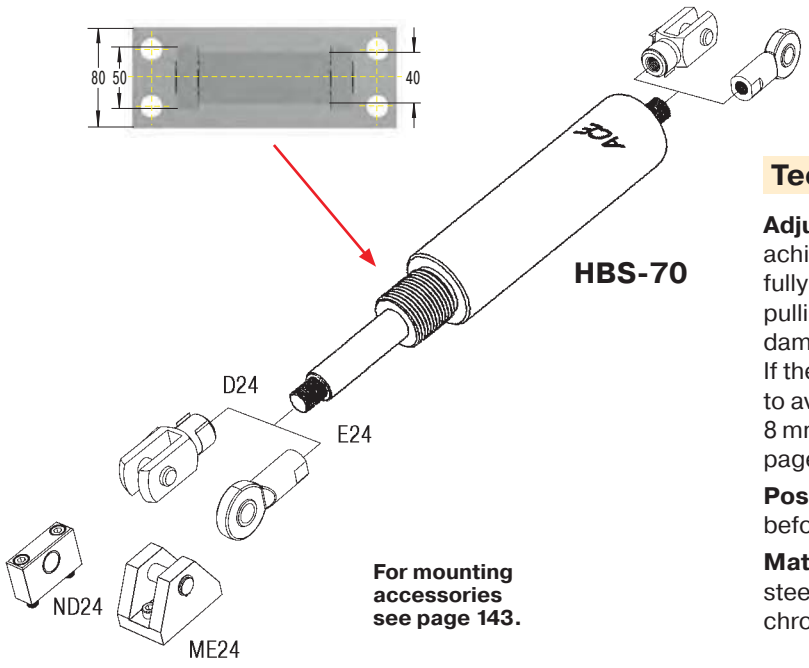
Type (Hydraulic Damper)
Body Ø (70 mm)
Stroke (300 mm)
Piston Rod End Fitting E24
Body End Fitting E24
Damping Direction (N = in stroke only)

Damping Options

P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite). For mounting accessories see page 143.

Rod Shroud W24-70
Ø 80, L = Stroke + 130



For mounting accessories see page 143.

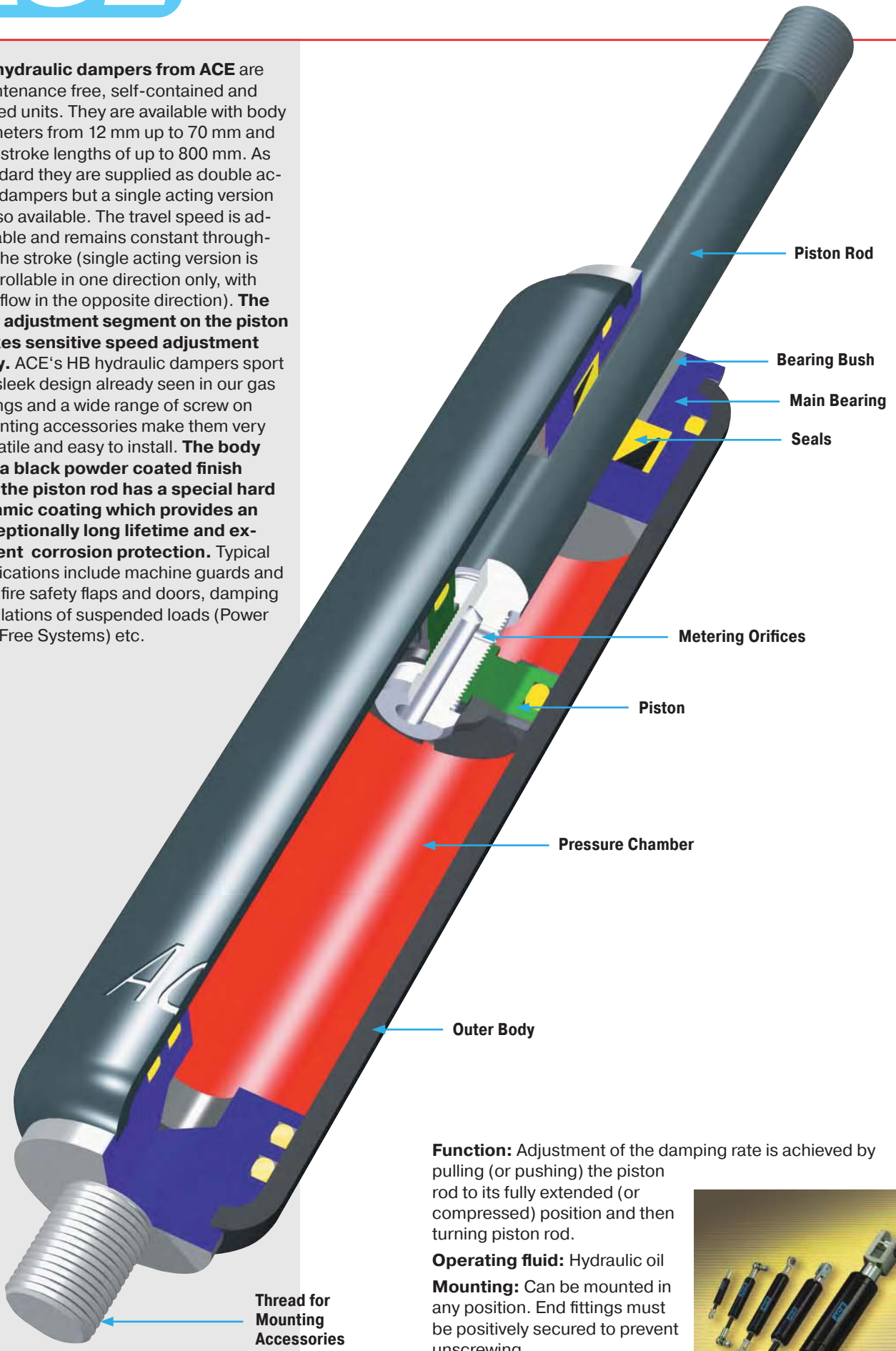
Technical Data

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. If the resistance increases noticeably, stop adjusting to avoid damage. The adjustment can add a max. of 8 mm to the L dim. shown (adjustment instruction see page 115).

Positive stop: Provide mechanical stops 5 to 6 mm before end of each stroke direction.

Material: Body: black powder coated or zinc plated steel. End fittings: zinc plated steel. Piston rod: hard chromed plated.

HB hydraulic dampers from ACE are maintenance free, self-contained and sealed units. They are available with body diameters from 12 mm up to 70 mm and with stroke lengths of up to 800 mm. As standard they are supplied as double acting dampers but a single acting version is also available. The travel speed is adjustable and remains constant throughout the stroke (single acting version is controllable in one direction only, with free flow in the opposite direction). **The new adjustment segment on the piston makes sensitive speed adjustment easy.** ACE's HB hydraulic dampers sport the sleek design already seen in our gas springs and a wide range of screw on mounting accessories make them very versatile and easy to install. **The body has a black powder coated finish and the piston rod has a special hard ceramic coating which provides an exceptionally long lifetime and excellent corrosion protection.** Typical applications include machine guards and lids, fire safety flaps and doors, damping oscillations of suspended loads (Power and Free Systems) etc.



Function: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position and then turning piston rod.

Operating fluid: Hydraulic oil

Mounting: Can be mounted in any position. End fittings must be positively secured to prevent unscrewing.

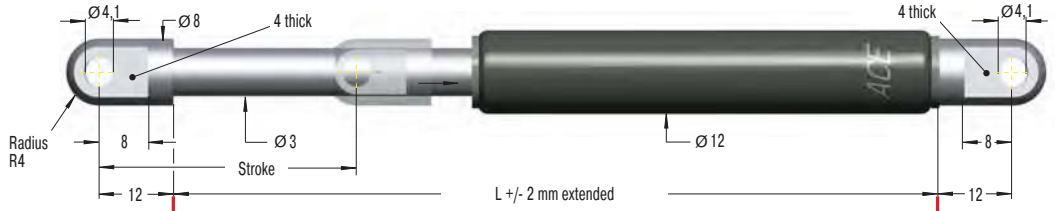
Operating temperature range: -20 °C to 80 °C

On request: Special lengths, alternative seals and end fittings.

108

End Fitting | **Standard Dimensions** | **End Fitting**

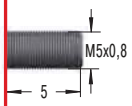
A3,5



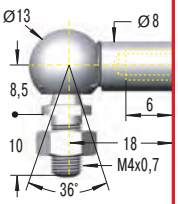
Eye A3,5-M5

B3,5

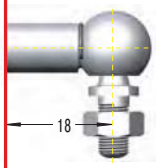
Stud Thread
B3,5-M5



C3,5



Angle Ball Joint
C3,5-M5

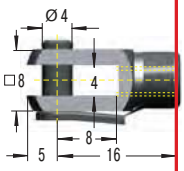


Dimensions

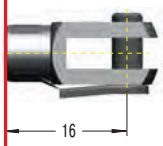
Type	Stroke mm	L extended	[1] Max. Compression Force N
HB-12-10	10	55	180
HB-12-20	20	75	180
HB-12-30	30	95	180
HB-12-40	40	115	180
HB-12-50	50	135	180
HB-12-60	60	155	180
HB-12-70	70	175	180
HB-12-80	80	195	150

[1] Max. extension force for all stroke lengths 180 N.

D3,5



Clevis Fork
D3,5-M5

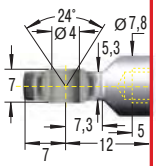


Ordering Example **HB-12-30-AC-M**

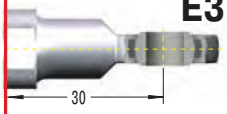
Type (Hydraulic Damper)
Body Ø (12 mm)
Stroke (30 mm)
Piston Rod End Fitting A3.5
Body End Fitting C3,5-M5
Damping Direction (M = out stroke only)

Damping Options
P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

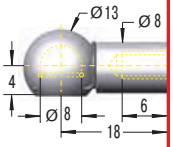
E3,5



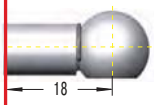
Swivel Eye
E3,5-M5



G3,5

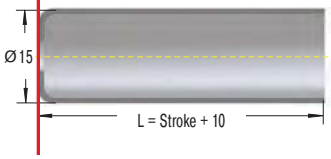


Ball Socket
G3,5-M5

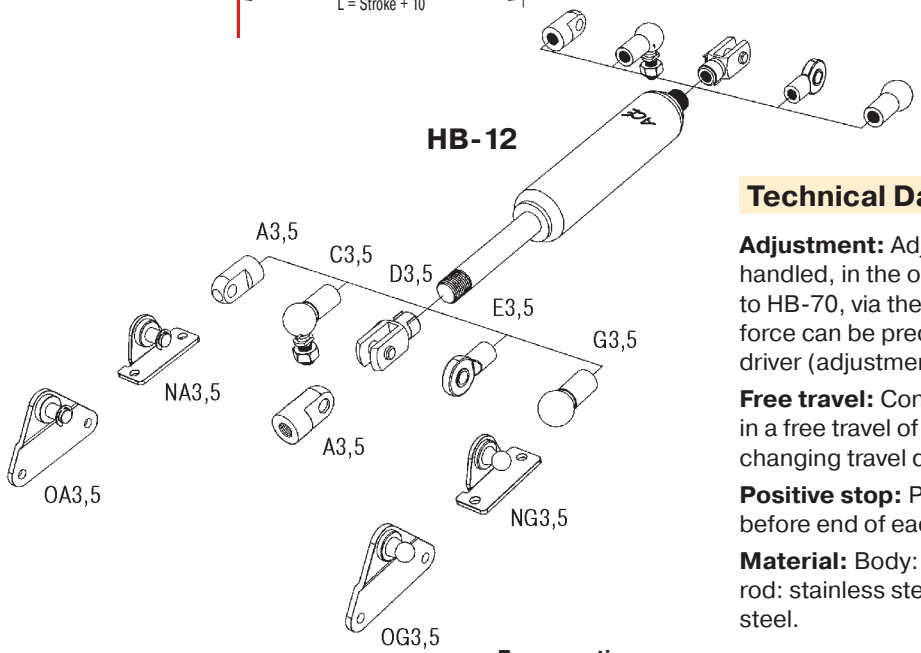


The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 141.

W3,5-12
Rod Shroud



HB-12



For mounting accessories see page 141.

Technical Data

Adjustment: Adjustment of the damping rate is handled, in the opposite way to the dampers HB-15 to HB-70, via the cylinder stud thread. The damping force can be precisely regulated by using a screw-driver (adjustment instruction see page 115).

Free travel: Construction of standard damper results in a free travel of approx. 21 % of total stroke when changing travel direction.

Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction.

Material: Body: black powder coated steel. Piston rod: stainless steel (1.4305). End fittings: zinc plated steel.

Hydraulic Dampers HB-15

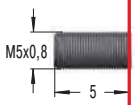
Adjustable (Compression and Extension Forces 20 N to 800 N)

End Fitting | **Standard Dimensions** | **End Fitting**

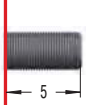
A5

Eye A5

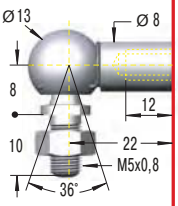
B5



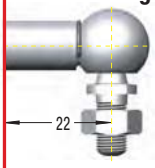
Stud Thread B5



C5



Angle Ball Joint C5
(Max. permitted force 500 N)

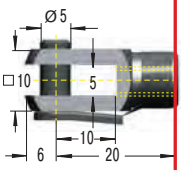


Dimensions

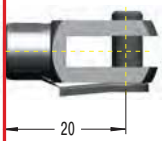
Type	Stroke mm	L extended	[1] Max. Compression Force N
HB-15-25	25	90	800
HB-15-50	50	140	800
HB-15-75	75	190	800
HB-15-100	100	240	350
HB-15-150	150	340	300

[1] Max. extension force for all stroke lengths 800 N.

D5



Clevis Fork D5



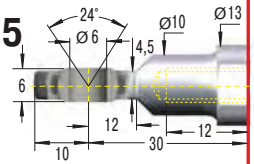
Ordering Example — HB-15-150-CC-M

Type (Hydraulic Damper)
Body Ø (15 mm)
Stroke (150 mm)
Piston Rod End Fitting C5
Body End Fitting C5
Damping Direction (M = out stroke only)

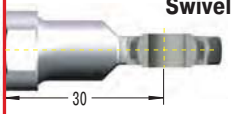
Damping Options
P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 141.

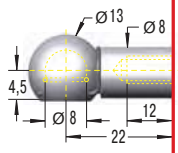
E5



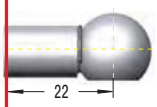
Swivel Eye E5



G5

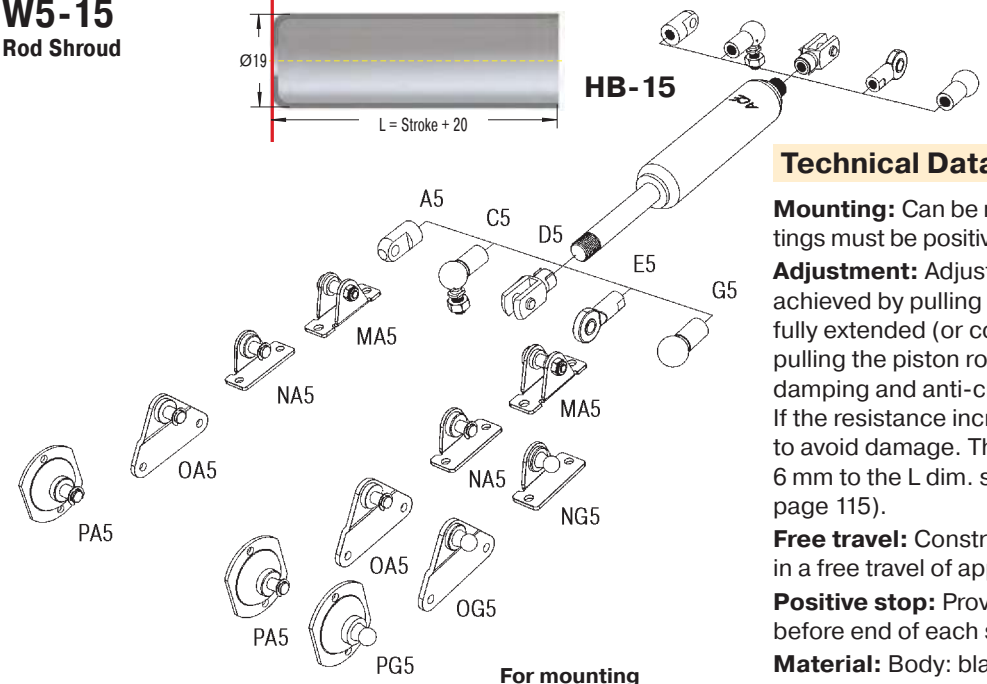


Ball Socket G5
(Max. permitted force 500 N)



W5-15
Rod Shroud

HB-15



For mounting accessories see page 141.

Technical Data

Mounting: Can be mounted in any position. End fittings must be positively secured to prevent unscrewing.

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. If the resistance increases noticeably, stop adjusting to avoid damage. The adjustment can add a max. of 6 mm to the L dim. shown (adjustment instruction see page 115).

Free travel: Construction of standard damper results in a free travel of approx. 20 % of stroke.

Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction.

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

Separator piston (-T): Available as a special option to remove free travel. Also provides extension force of max. 50 N. Dimension: L = 2.45 x stroke + 47 mm.

On request: Special lengths, alternative seals and end fittings.

110 ACE Stoßdämpfer GmbH · PO Box 1510 · D-40740 Langenfeld · Tel. +49-2173-9226-80 · Fax +49-2173-9226-89 · E-Mail: info@acecontrols-int.com

End Fitting

A8

B8

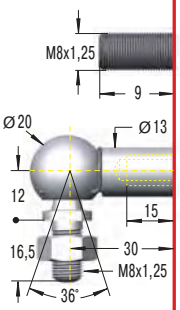
C8

D8

E8

G8

Standard Dimensions



Dimensions

Type	Stroke mm	L extended	[1] Max. Compression Force N
HB-22-50	50	150	1 800
HB-22-100	100	250	1 800
HB-22-150	150	350	1 800
HB-22-200	200	450	1 000
HB-22-250	250	550	1 000

[1] Max. extension force for all stroke lengths 1 800 N.

Ordering Example

HB-22-150-DD-M

Type (Hydraulic Damper)
Body Ø (22 mm)
Stroke (150 mm)
Piston Rod End Fitting D8
Body End Fitting D8
Damping Direction (M = out stroke only)

Damping Options

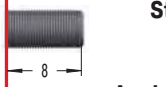
P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 142.

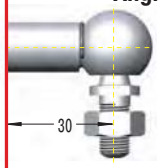
End Fitting

Eye A8

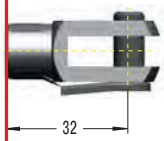
Stud Thread B8



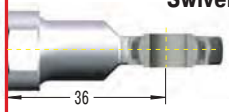
Angle Ball Joint C8
(Max. permitted force 1200 N)



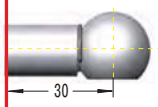
Clevis Fork D8



Swivel Eye E8

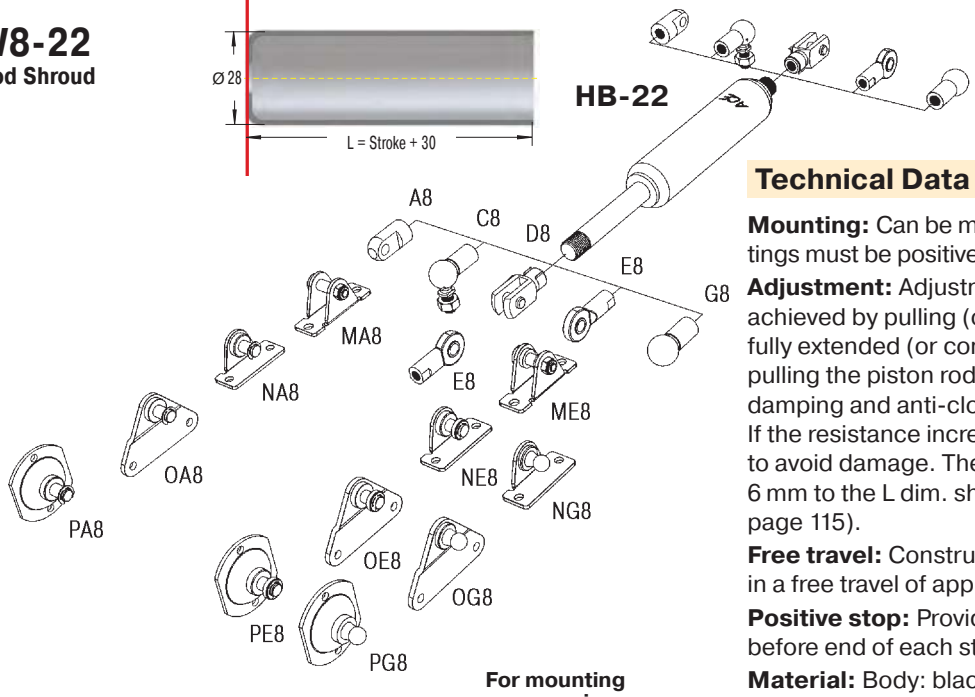


Ball Socket G8
(Max. permitted force 1200 N)



W8-22
Rod Shroud

HB-22



For mounting accessories see page 142.

Technical Data

Mounting: Can be mounted in any position. End fittings must be positively secured to prevent unscrewing.

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. If the resistance increases noticeably, stop adjusting to avoid damage. The adjustment can add a max. of 6 mm to the L dim. shown (adjustment instruction see page 115).

Free travel: Construction of standard damper results in a free travel of approx. 20 % of stroke.

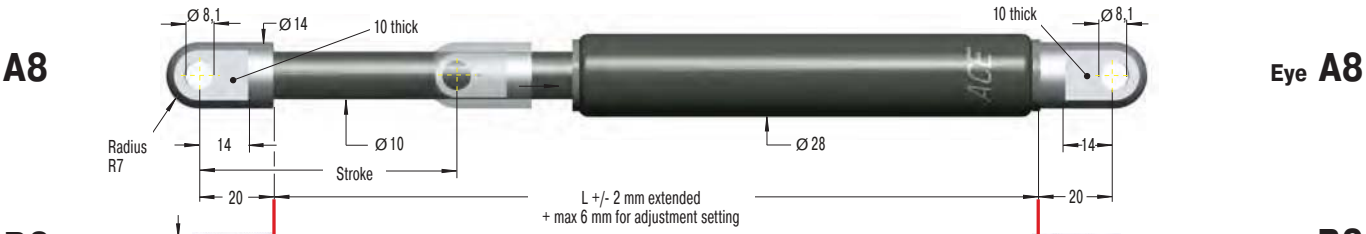
Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction.

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

Separator piston (-T): Available as a special option to remove free travel. Also provides extension force of max. 100 N. Dimension L = 2.38 x stroke + 55 mm.

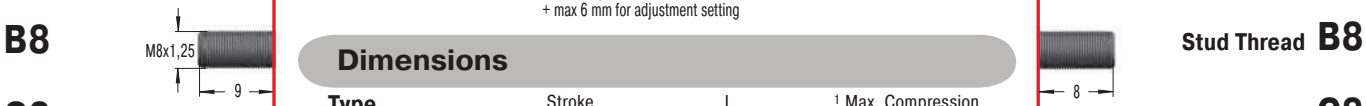
On request: Special lengths, alternative seals and end fittings.

End Fitting — Standard Dimensions — End Fitting

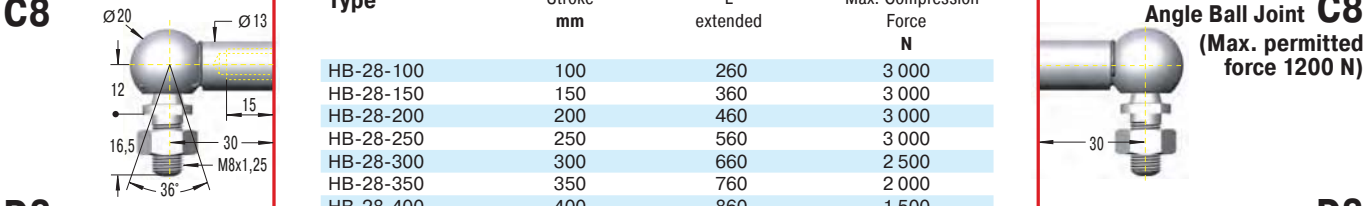


A8 — Eye **A8**

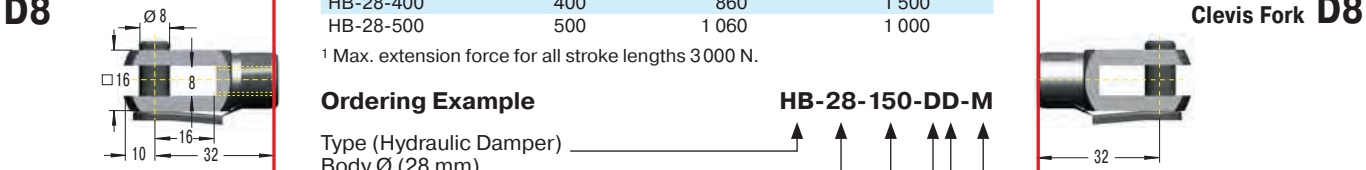
B8 — Stud Thread **B8**



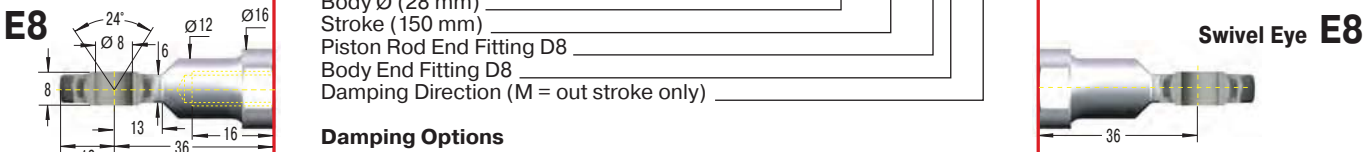
C8 — Angle Ball Joint **C8** (Max. permitted force 1200 N)



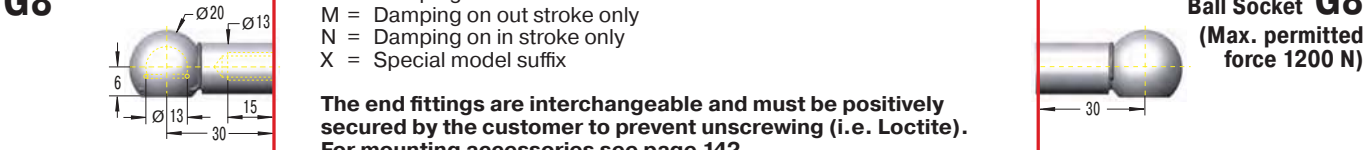
D8 — Clevis Fork **D8**



E8 — Swivel Eye **E8**



G8 — Ball Socket **G8** (Max. permitted force 1200 N)



Dimensions

Type	Stroke mm	L extended	[1] Max. Compression Force N
HB-28-100	100	260	3 000
HB-28-150	150	360	3 000
HB-28-200	200	460	3 000
HB-28-250	250	560	3 000
HB-28-300	300	660	2 500
HB-28-350	350	760	2 000
HB-28-400	400	860	1 500
HB-28-500	500	1 060	1 000

[1] Max. extension force for all stroke lengths 3 000 N.

Ordering Example — HB-28-150-DD-M

Type (Hydraulic Damper)
Body Ø (28 mm)
Stroke (150 mm)
Piston Rod End Fitting D8
Body End Fitting D8
Damping Direction (M = out stroke only)

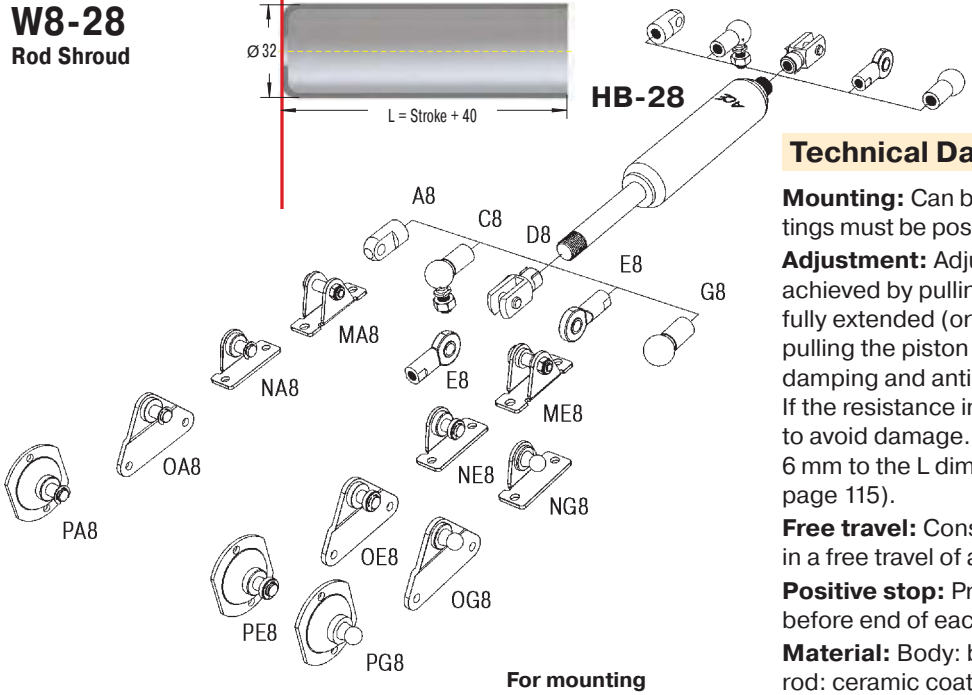
Damping Options

P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 142.

W8-28
Rod Shroud

HB-28



For mounting accessories see page 142.

Technical Data

Mounting: Can be mounted in any position. End fittings must be positively secured to prevent unscrewing.

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. If the resistance increases noticeably, stop adjusting to avoid damage. The adjustment can add a max. of 6 mm to the L dim. shown (adjustment instruction see page 115).

Free travel: Construction of standard damper results in a free travel of approx. 20 % of stroke.

Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction.

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

Separator piston (-T): Available as a special option to remove free travel. Also provides extension force of max. 50 N. Dimension L = 2.35 x stroke + 60 mm.

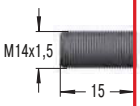
On request: Special lengths, alternative seals and end fittings.

End Fitting A14

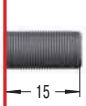
Standard Dimensions

End Fitting Eye A14

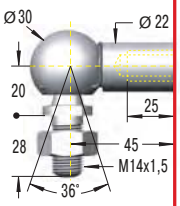
B14



Stud Thread B14

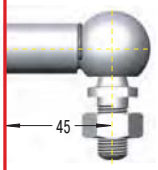


C14



Angle Ball Joint C14

(Max. permitted force 3200 N)

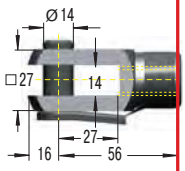


Dimensions

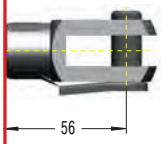
Type	Stroke mm	L extended	[1] Max. Compression Force N
HB-40-100	100	275	10 000
HB-40-150	150	375	10 000
HB-40-200	200	475	10 000
HB-40-300	300	675	10 000
HB-40-400	400	875	8 000
HB-40-500	500	1 075	6 000
HB-40-600	600	1 275	4 000
HB-40-700	700	1 475	3 000
HB-40-800	800	1 675	3 000

[1] Max. extension force for all stroke lengths 10 000 N.

D14



Clevis Fork D14



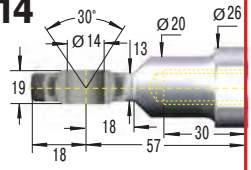
Ordering Example HB-40-300-EE-N

Type (Hydraulic Damper)
Body Ø (40 mm)
Stroke (300 mm)
Piston Rod End Fitting E14
Body End Fitting E14
Damping Direction (N = in stroke only)

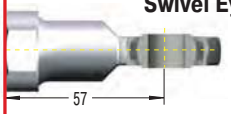
Damping Options

P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

E14

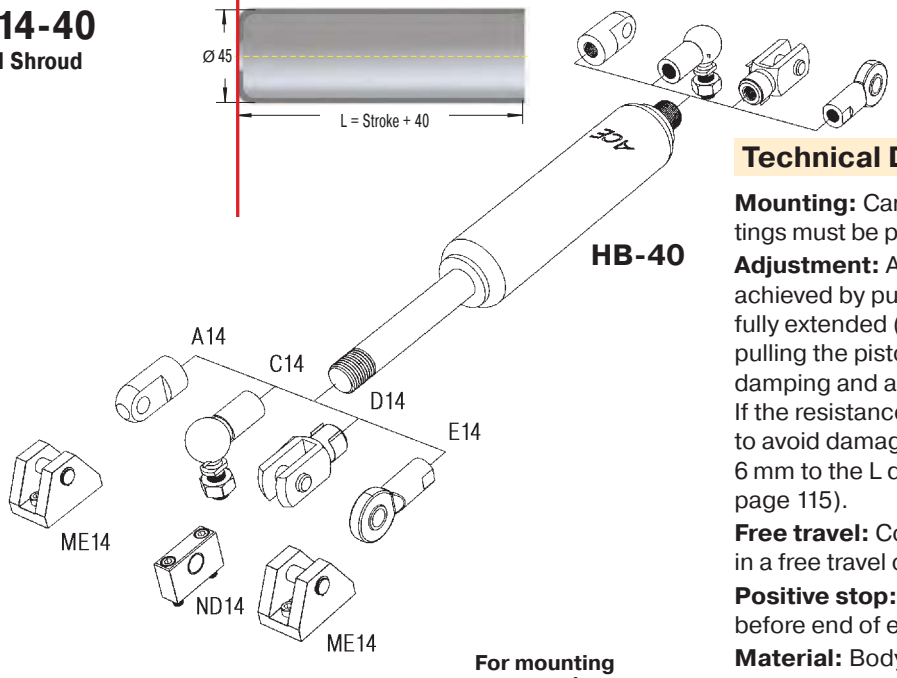


Swivel Eye E14



The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 143.

W14-40
Rod Shroud



For mounting accessories see page 143.

Technical Data

Mounting: Can be mounted in any position. End fittings must be positively secured to prevent unscrewing.

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. If the resistance increases noticeably, stop adjusting to avoid damage. The adjustment can add a max. of 6 mm to the L dim. shown (adjustment instruction see page 115).

Free travel: Construction of standard damper results in a free travel of approx. 20 % of stroke.

Positive stop: Provide mechanical stops 1 to 1.5 mm before end of each stroke direction.

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

Separator piston (-T): Available as a special option to remove free travel. Also provides extension force of max. 200 N. Dimension L = 2.32 x stroke + 82 mm.

On request: Special lengths, alternative seals and end fittings.

End Fitting — Standard Dimensions — End Fitting

B24

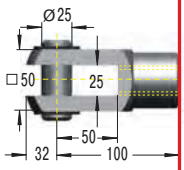
Stud Thread B24

Dimensions

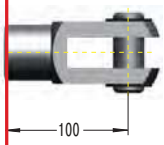
Type	Stroke mm	L extended	[1] Max. Compression Force N
HB-70-100	100	320	50 000
HB-70-200	200	520	50 000
HB-70-300	300	720	50 000
HB-70-400	400	920	30 300
HB-70-500	500	1 120	21 600
HB-70-600	600	1 320	16 200
HB-70-700	700	1 520	12 600
HB-70-800	800	1 720	10 100

[1] Max. extension force for all stroke lengths 50 000 N.

D24



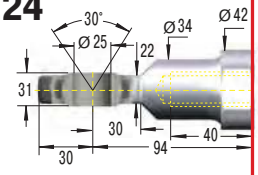
Clevis Fork D24



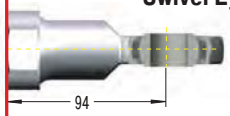
Ordering Example — HB-70-300-EE-N

Type (Hydraulic Damper)
Body Ø (70 mm)
Stroke (300 mm)
Piston Rod End Fitting E24
Body End Fitting E24
Damping Direction (N = in stroke only)

E24



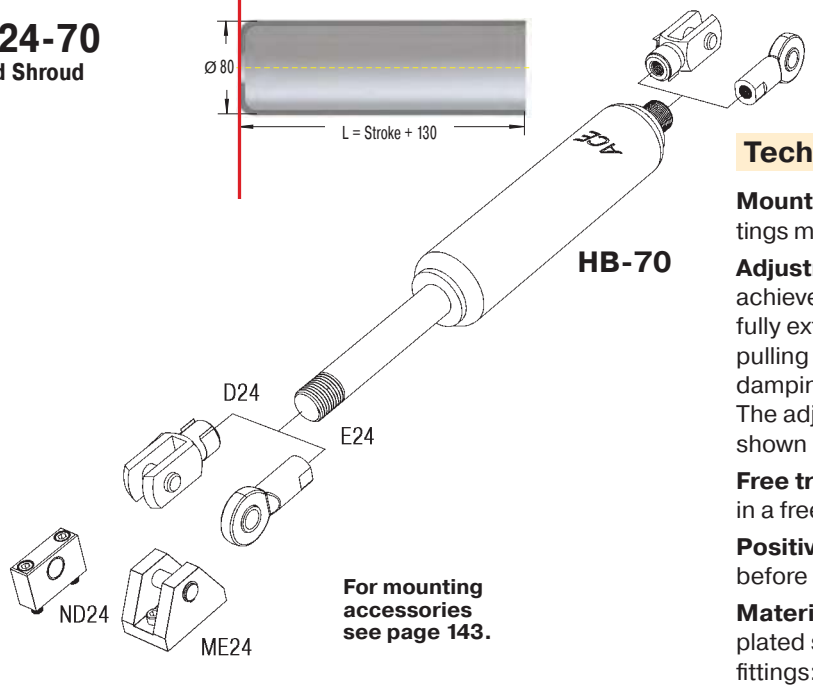
Swivel Eye E24



Damping Options
P = Damping in both directions
M = Damping on out stroke only
N = Damping on in stroke only
X = Special model suffix

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 143.

W24-70
Rod Shroud



For mounting accessories see page 143.

Technical Data

Mounting: Can be mounted in any position. End fittings must be positively secured to prevent unscrewing.

Adjustment: Adjustment of the damping rate is achieved by pulling (or pushing) the piston rod to its fully extended (or compressed) position. Whilst still pulling the piston rod turn it clockwise to increase damping and anti-clockwise to decrease damping. The adjustment can add a max. of 8 mm to the L dim. shown (adjustment instruction see page 115).

Free travel: Construction of standard damper results in a free travel of approx. 20 % of stroke.

Positive stop: Provide mechanical stops 5 to 6 mm before end of each stroke direction.

Material: Body: black powder coated steel or zinc plated steel. Piston rod: hard chrome plated. End fittings: zinc plated steel.

Separator piston (-T): Available as a special option to remove free travel. Also provides extension force of max. 250 N. Increases dimension L + 150 mm.

On request: Special lengths, alternative seals and end fittings.

Adjustment Instructions for HB-15 to HB-70 and HBS-28 to HBS-70

View in direction of arrow

Adjustment only possible when piston rod is **fully** extended or **fully** compressed.

soft damping

Rotate rod anti-clockwise ↺
higher velocity

strong damping

Rotate rod clockwise ↻
slower velocity

1. Hold outer body.
2. a) When piston rod is fully extended:
   Adjust damping by turning the piston rod as shown in the picture. Whilst rotating, pull the piston rod gently, to ensure the adjuster locates in the end cap.
   b) When the piston rod is fully compressed:
   Adjust the damping by turning the piston rod as shown in the picture. Whilst rotating, push the piston rod gently, to ensure the adjuster locates in the end cap.
3. When resistance is felt when rotating the piston rod, stop turning. You will be at the end of the adjustment.
   NOTE: Do not turn rotate piston rod too quickly as damage could occur.
4. Check the damping, if required repeat step 1 to 3.
5. On all versions with a separator piston (type “T”) adjustment is only possible when the piston rod is extended (adjustment 2a).

Adjustment Instructions for HB-12

Adjustment

Rotate rod anti-clockwise ↺
for higher velocity

Use screwdriver with size 0.6 x 2.5 mm

Rotate rod clockwise ↻
for slower velocity

Standard Dimensions TD-28

Ordering Example

TD-28-50-50

Type (Door Damper)
Body Ø (28 mm)
Stroke A (50 mm)
Stroke B (50 mm)

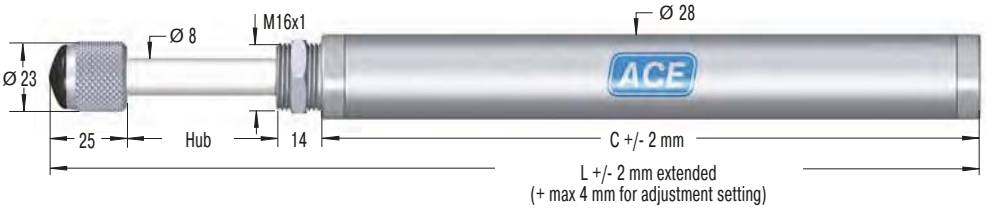
Return Type

F = automatic return with return spring
D = without return spring. When one piston is pushed in, the piston rod at the other end is pushed out (thus the damper must be impacted from alternate ends to sequence correctly).

Dimensions and Capacity Chart

Type	Stroke A mm	Stroke B mm	C	L max	Max. Impact Mass kg	Max. Damping Force Q N	Max. Energy Capacity W_3 Nm/Cycle	Max. Return Force N	Return Type	Adjustment
TD-28-50-50	50	50	220	402	150	1 550	75	30	F	Tooth Type
TD-28-70-70	70	70	260	482	200	1 500	70	30	F	Tooth Type
TD-28-100-100	100	100	220	502	250	1 500	80	40	F	Tooth Type
TD-28-120-120	120	120	208	410	250	3 800	165	0	D	Tooth Type

Standard Dimensions TDE-28



Ordering Example

TDE-28-50

Type (Door Damper)
Body Ø (28 mm)
Stroke (50 mm)

Dimensions and Capacity Chart

Type	Stroke mm	C	L max	Max. Impact Mass kg	Max. Damping Force Q N	Max. Energy Capacity W_3 Nm/Cycle	Max. Return Force N
TDE-28-50	50	130	221	4 000	2 400	80	30
TDE-28-70	70	158	269	5 600	2 400	112	30
TDE-28-100	100	193	333	8 000	2 400	160	30
TDE-28-120	120	214	373	7 000	2 400	190	40

Technical Data

ACE door dampers are single ended or double ended working adjustable hydraulic shock absorbers.

Application areas: Cushioning of elevator doors, automatic and sliding doors and similar applications.

Adjustment: Pull the piston rod fully out and turn the knurled rod end button. This allows the damping to be separately adjusted for each side. As a result of the adjustment mechanism the overall length L can be increased by up to 4 mm.

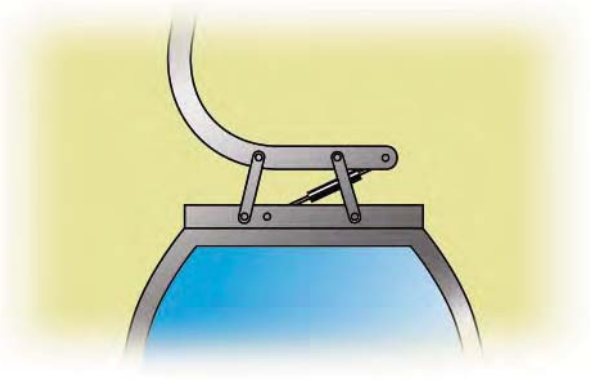
Operating temperature range: -20 °C to 80 °C

Impact velocity range v: 0.1 to 2 m/s

Strokes per minute: max. 10

Material: Piston rod: hard chrome plated steel. Cylinder body: zinc plated steel.

On request: With different deceleration characteristics, special stroke lengths, special seals etc.

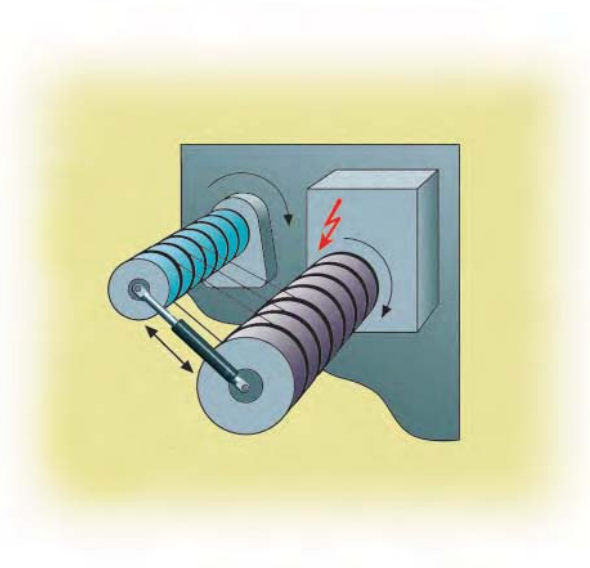


Swinging movements cushioned by hydraulic dampers

Passengers always feel the swinging movement involved when cable cars arrive at the ski station.

Maintenance free hydraulic dampers type **HB-40-300-EE-X-P** cushion these movements perfectly. Designers of the cable cars, connected by means of an articulated joint via a four-point frame and connection guide to the suspension rod, profit from the ability of the adjustable brakes to absorb compressive forces of up to 10 000 N on either side.

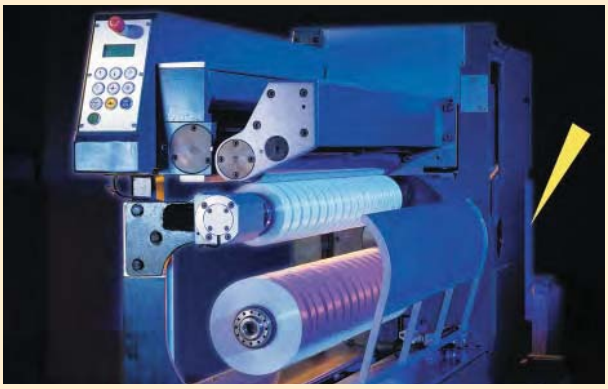
Hydraulic dampers for added convenience when operating cable cars



Precise unreeling

Hydraulic dampers bring the sled movement of this textile machine to a gentle stop.

At the turning point of 130 kg reeling spools, a sled should move up and down smoothly without causing a collision at the end of stroke position. The solution was provided by the hydraulic damper **DVC-32-100**. A self-contained sealed unit, ready to install and maintenance free these units are ideal for precise control of speeds in both directions of travel. The travel speed is maintained throughout the entire stroke and can be independently adjusted in each direction of travel. Thanks to their compact design and wide choice of mounting accessories, these dampers could be easily integrated into this machine.



Textile machine unreels threads even better

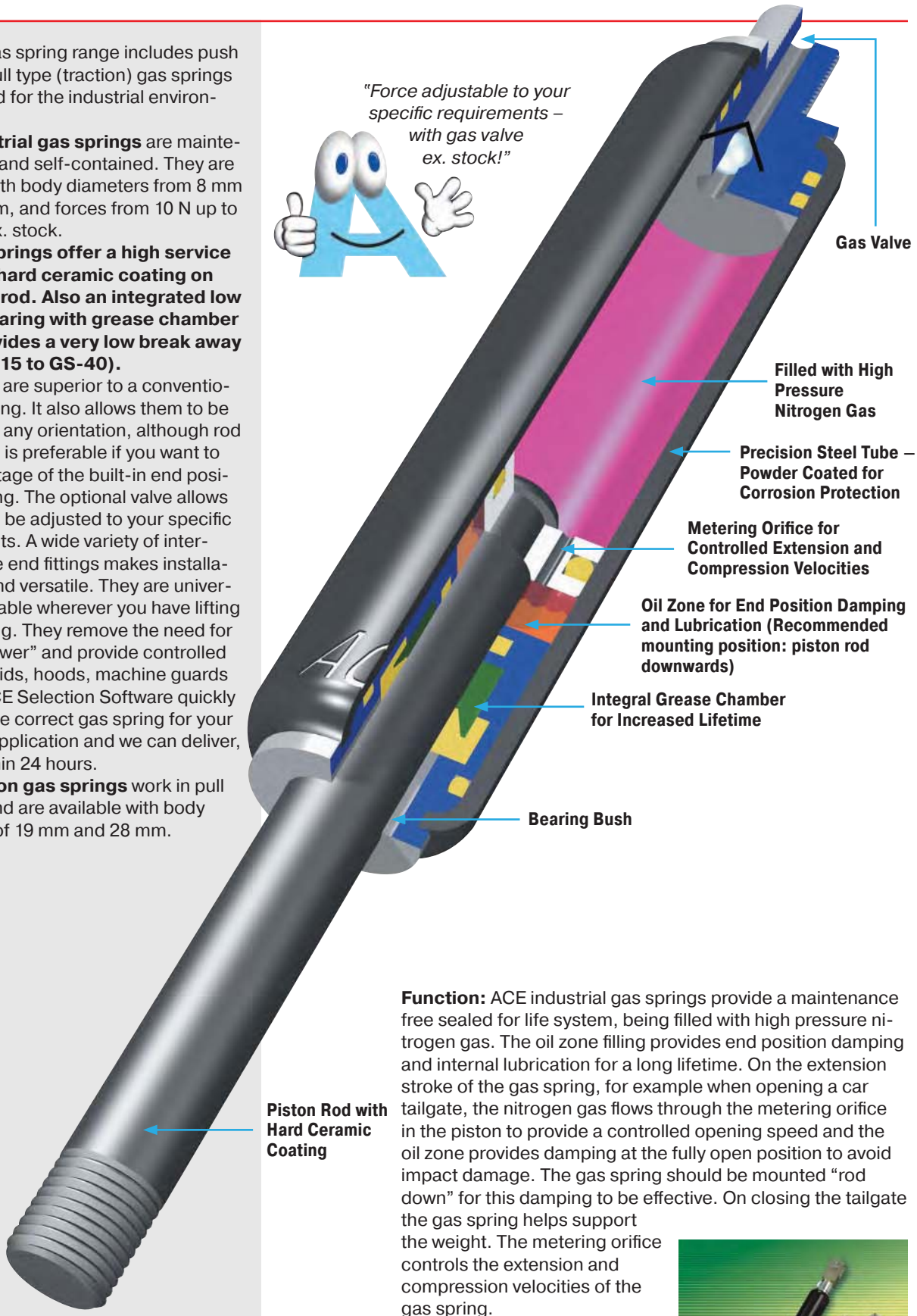
The ACE gas spring range includes push type and pull type (traction) gas springs all designed for the industrial environment.

ACE industrial gas springs are maintenance free and self-contained. They are available with body diameters from 8 mm up to 70 mm, and forces from 10 N up to 13 000 N ex. stock.

ACE gas springs offer a high service life with a hard ceramic coating on the piston rod. Also an integrated low friction bearing with grease chamber which provides a very low break away force (GS-15 to GS-40).

All of which are superior to a conventional gas spring. It also allows them to be mounted in any orientation, although rod downwards is preferable if you want to take advantage of the built-in end position damping. The optional valve allows the force to be adjusted to your specific requirements. A wide variety of interchangeable end fittings makes installation easy and versatile. They are universally applicable wherever you have lifting and lowering. They remove the need for "muscle power" and provide controlled motion for lids, hoods, machine guards etc. The ACE Selection Software quickly specifies the correct gas spring for your individual application and we can deliver, usually within 24 hours.

ACE traction gas springs work in pull direction and are available with body diameters of 19 mm and 28 mm.



Function: ACE industrial gas springs provide a maintenance free sealed for life system, being filled with high pressure nitrogen gas. The oil zone filling provides end position damping and internal lubrication for a long lifetime. On the extension stroke of the gas spring, for example when opening a car tailgate, the nitrogen gas flows through the metering orifice in the piston to provide a controlled opening speed and the oil zone provides damping at the fully open position to avoid impact damage. The gas spring should be mounted "rod down" for this damping to be effective. On closing the tailgate the gas spring helps support the weight. The metering orifice controls the extension and compression velocities of the gas spring.

Operating fluid: Nitrogen gas and oil (for end damping)

Mounting: In any position

Operating temperature range: -20 °C to 80 °C

On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.

118

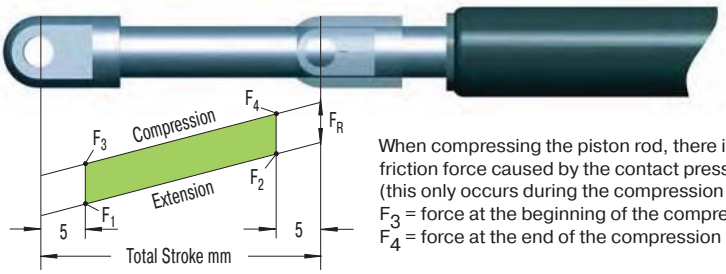
Issue 9.2007 Specifications subject to change

Gas springs are universally accepted, wherever you want **to push, pull, lift, lower, or position** covers, lids or other components by hand without using an external energy source.

ACE gas springs are individually filled to a predetermined pressure to suit a customer's requirement (extension Force F_1). The cross-sectional area of the piston rod and filling pressure determines the extension force F = p*A. During the compression of the piston rod, nitrogen flows through an orifice in the piston from the full bore side of the piston to the annulus. The nitrogen is compressed by the volume of the piston rod. As the piston rod is compressed the pressure increases, so increasing the reaction force (progression). The force depends on the proportional relationship between the piston rod and the inner tube diameter, which is approximately linear.

Gas Spring Force-Stroke Characteristics

Standard Gas Spring (Push Type)

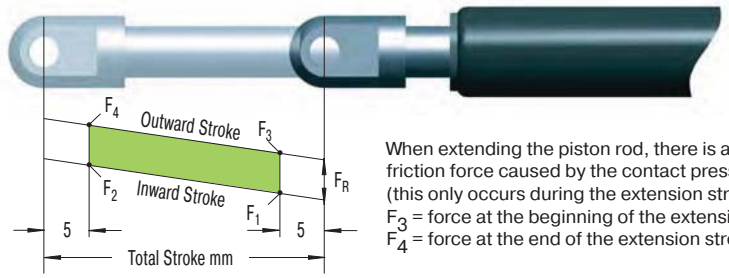


When compressing the piston rod, there is an additional friction force caused by the contact pressure of the seals (this only occurs during the compression stroke) F_R
F_3 = force at the beginning of the compression stroke
F_4 = force at the end of the compression stroke

Type	[1] Progression approx. %	[2] Friction F_R approx. in N
GS-8	28	10
GS-10	20	10
GS-12	25	20
GS-15	27	20
GS-19	36 - 42 [3]	30
GS-22	39 - 50 [3]	30
GS-28	60 - 95 [3]	40
GS-40	47 - 53 [3]	50
GS-70	25	50

F_1 = nominal force at 20 °C (this is the pressure figure normally used when specifying the gas spring)
F_2 = force in the complete compressed position

Traction Gas Spring (Pull Type)



When extending the piston rod, there is an additional friction force caused by the contact pressure of the seals (this only occurs during the extension stroke) F_R
F_3 = force at the beginning of the extension stroke
F_4 = force at the end of the extension stroke

Type	[1] Progression approx. %	[2] Friction F_R approx. in N
GZ-19	10	20 - 40
GZ-28	20	100 - 200

[1] **The Progression** (the slope of the force line in the diagrams above) is due to the reduction of the internal gas volume as the piston rod moves from its initial position to its fully stroked position. The approx. progression values given above for standard springs can be altered on request.
Effect of Temperature: The nominal F1 figure is given at 20 °C. An increase of 10 °C will increase force by 3.4 %.
Filling Tolerance on F1 Force: -20 N to +40 N or 5 % to 7 %

[2] Depending on the filling force.

[3] Depending on the stroke.

F_1 = nominal force at 20 °C (this is the pressure figure normally used when specifying the gas spring)
F_2 = force in the complete extended position

Service Life

Filling tolerance: -20 N to +40 N or 5 % to 7 %

Effect of temperature: An increase in temperature of each 10 °C will increase force by approx. 3.4 %.

Temperature range: -20 °C to +80 °C (special seals from -45 °C to 200 °C)

Mounting: The gas springs should ideally be installed with the **piston rod pointing downwards** to use the end damping during the extension stroke to smoothly decelerate the motion of the gas spring. Some ACE gas springs have a uniquely designed front bearing with an integrated grease chamber allowing the gas spring to be mounted and operated in any position if required.

When fitting the gas springs ensure that the stroke is fully extended (GZ type fully compressed), this makes assembly and disassembly much easier. **Support the moving mass/flap during assembly or disassembly to prevent accidents. To avoid twisting or side loading, it is recommended that ball joints or other pivoted mounting attachments are used.** The mounting attachments must always be securely tightened onto the threaded studs of the gas spring.

ACE gas springs are maintenance-free. DO NOT oil or grease the piston rod!

The piston rod must be protected from any hits, scratches or dirt and especially paint. Damage to the surface finish of the piston rod will destroy the sealing system and cause loss of pressure. The outer body must not be deformed or mechanically damaged.

ACE gas springs can be stored in any position. Experience has shown that long storage periods do not result in loss of pressure. However you may experience some "stiction" requiring a higher effort to move the gas spring for the first time after a long storage period.

Generally, ACE gas springs are tested to 70 000 to 100 000 complete strokes. This is equivalent to the seal lifetime (depending on model size) to a distance travelled of 2 km up to 10 km. During these tests the gas spring must not lose more than 5 % of its pressure. Depending upon the application and operating environment, the service life of these gas springs may be much longer. In practise 500 000 strokes or more have been achieved on some applications.

Lifetime for traction gas spring see pages 132 and 133.

Adjustment Instructions Valve

GS

GZ

Adjustment Instruction

1. Hold gas spring piston rod down.
2. Remove any fitting attached to the body end of the gas spring (GZ version the piston rod).
3. Insert adjuster knob on thread end on the cylinder body (on GZ version thread end on the piston rod). When resistance is felt, proceed slowly and with caution. This opens the valve and you can hear the nitrogen escaping and reducing pressure. Turn back the adjusting knob immediately, to avoid too much nitrogen being discharged.
4. After adjustment, remove the Adjuster knob, mount the end fittings and test the gas spring in your application. If necessary repeat the procedure.

If you use 2 gas springs in parallel, both gas springs should have the same force to avoid bending forces or side load on the application. If necessary return to ACE to refill both gas springs to the same (average) force. If too much nitrogen is discharged, the units can be returned to ACE for re-gassing.

Gas Spring Refilling Kit

The **ACE gas spring refilling kit** gives the ability to fill, or adjust pressure (or force) of a Gas Spring on site. You gain independence and flexibility. The refilling kit includes all the parts necessary to fill your ACE gas springs on site. Only the high pressure nitrogen bottle is not included in the kit.

Gas spring refilling kit with one filling bell.
Please indicate the thread size.

Ordering Example: gas spring refilling kit GS-19
additional filling bell GZ-19

"Independence and flexibility!"

Available filling bells

M3.5–8:	GS- 8
M3.5–10:	GS-10
M3.5–12:	GS-12
M5:	GS-15
M8:	GS-19
	GS-22
	GZ-19
M10:	GS-28
	GZ-28
M14:	GS-40

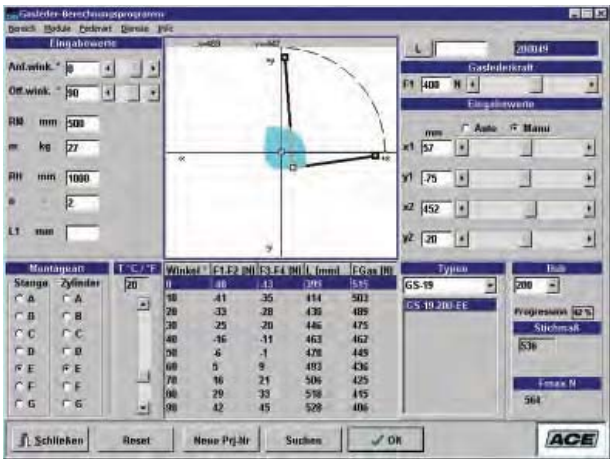
Calculation

To obtain the ideal selection to give the optimum operation for a gas spring it is important to identify the following points:

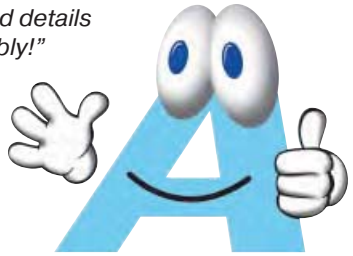
- gas spring size
- required gas spring stroke
- mounting points on flap and frame
- extended length of the gas spring
- required extension force
- hand forces throughout the complete movement on the flap

With our **free calculation service** you can eliminate the time-consuming calculation and fax us your details. Just complete the information shown on the calculation formulae page number 122. Please attach a sketch of your application (a simple hand sketch is sufficient) in side view. Our application engineers will determine the optimum mounting points and calculate the ideal situation to satisfy your requirements.

You will receive a quotation showing the opening and closing forces and our recommended mounting points to suit your application.



"Calculation offer with all required details for assembly!"



Safety Instructions

Gas springs are filled with pure nitrogen gas. Nitrogen is an inert gas that does not burn or explode and is not poisonous. Please note!: the internal pressure of gas springs can be up to 300 bar. Do not attempt to open or modify them.

ACE gas springs will operate in surrounding temperatures from -20 °C to +80 °C. We can equip our springs with special seals to withstand temperatures as low as -45 °C or as high as +200 °C. Gas springs should not be placed over heat or in open fire!

Disposal/Recycling:

Gas Springs consist mostly of metal and the metal could be recycled, but first the gas pressure must be removed. Please ask for our disposal recommendations which advise how to depressurize the gas springs and make them safe to recycle.

All gas springs are marked with the part number, the production date and a warning sign “Do not open high pressure”. We are not responsible for any damages of any kind that arises due to goods that are not marked accordingly.

Gas springs should be installed with the piston rod downwards. This position ensures best damping quality. Only ACE gas springs include an integrated grease chamber which allows for alternative mounting opportunities.

Gas springs should not be exposed to tilting or side load forces during operation or whilst static (this can cause bending of the piston rod or early wear).

Gas springs are maintenance free. Do not grease or oil the piston rod.

The piston rod must not be painted and should be protected against shocks, scratches and dirt. The cylinder should not be deformed as such damage would destroy the sealing system.

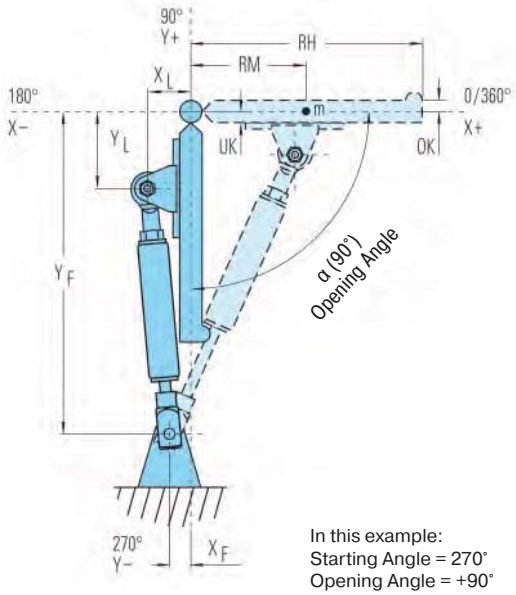
ACE gas springs can be stored in any position. Pressure lost through long storage is not to be expected. There are no known negative values, but there may be a sticking effect the first time you compress a spring. This may require a higher initial force to operate the gas spring for the first time (initial breakaway force).

The tolerance for the installation length is generally deemed to be ± 2 mm. If very high demands are placed on durability and stability, please avoid the combination of small diameter + long stroke + high force.

The filling tolerance is -20 N to 40 N or 5 % to 7 %.

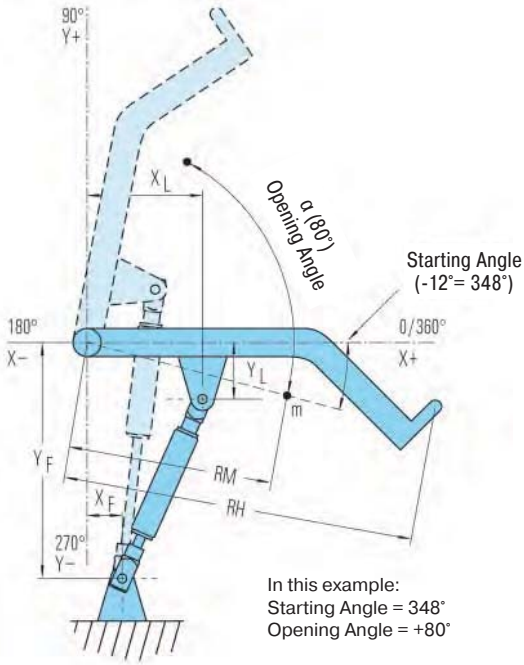
Issue 9.2007 Specifications subject to change

Case 1 (e.g. Flap)



In this example:
Starting Angle = 270°
Opening Angle = +90°

Case 2 (e.g. Hood)



In this example:
Starting Angle = 348°
Opening Angle = +80°

Push type ☐ **Pull type** ☐

Case 1 ☐ **Case 2** ☐ (with attached sketch only)

Input Date

Gas Spring Fixing points

The fixed point X_F and Y_F of the frame and the moving point X_L and Y_L of the flap are critical for the optimum operation.
Therefore please attach a sketch of your application on separate paper (a few lines with their dimensions are sufficient)!

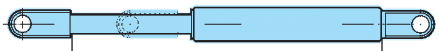
Moving mass	m	_____	kg
No. of gas springs in parallel	n	_____	pcs
Number of movements		_____	/day
Ambient temperature	T	_____	°C

(if not shown by the sketch)

Radius of centre of gravity	R_M	_____	mm
Radius of hand force	R_H	_____	mm
Starting angle (0° to 360°)		_____	°
Opening angle (–360° to +360°)	α	_____	°
(– = downwards, + = upwards)			
Dimensions of the flap: thickness		_____	mm

Distance between flap and pivot:
Upper side O_K = _____ mm, Lower side U_K = _____ mm

Desired Mounting Fittings

End Fitting		End Fitting
☐ A		☐ A
☐ B	Stud Thread	☐ B
☐ C	Angle Ball Joint	☐ C
☐ D	Clevis Fork	☐ D
☐ E	Swivel Eye	☐ E
☐ F	Inline Ball Joint	☐ F
☐ G	Ball Socket	☐ G

The end fittings are interchangeable.
e.g.: -CE C = Angle Ball Joint, E = Swivel Eye

Comments _____

Requirement per year _____

Machine type/reference _____

Sender

Co. _____ Dept. _____

Address _____ Name _____

_____ Telephone _____ Fax _____

Internet _____ E-Mail _____

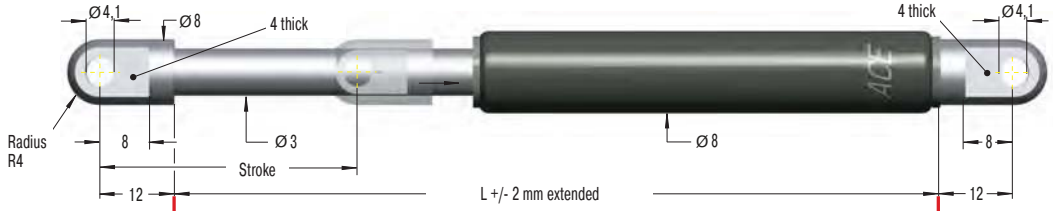
Please copy, complete and fax to ACE: Fax +49 - (0)2173 - 9226 - 89

Industrial Gas Springs GS-8 (Push Type)

Extension Forces 10 N to 100 N
(when Piston Rod Compressed up to 130 N)

End Fitting | **Standard Dimensions** | **End Fitting**

A3,5



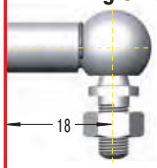
Eye A3,5

B3,5 — M3,5x0,6, 5

Stud Thread B3,5

C3,5 — Ø13, Ø8, 8,5, 6, 10, 18, M4x0,7, 36°

Angle Ball Joint C3,5



Dimensions

Type	Stroke mm	L extended
GS-8-20	20	72
GS-8-30	30	92
GS-8-40	40	112
GS-8-50	50	132
GS-8-60	60	152
GS-8-80	80	192

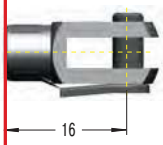
Ordering Example — **GS-8-30-AC-30**

Type (Push Type)
Body Ø (8 mm)
Stroke (30 mm)
Piston Rod End Fitting A3.5
Body End Fitting C3.5
Nominal Force F_1 30 N

The end fittings are interchangeable.
For mounting accessories see page 141.

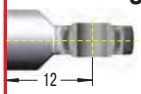
D3,5 — Ø4, □8, 4, 8, 5, 16

Clevis Fork D3,5



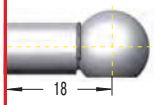
E3,5 — 24°, Ø4, Ø7,8, 5,3, 7, 7,3, 5, 12, 7

Swivel Eye E3,5

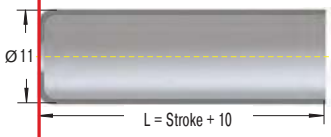


G3,5 — Ø13, Ø8, 4, Ø8, 6, 18

Ball Socket G3,5

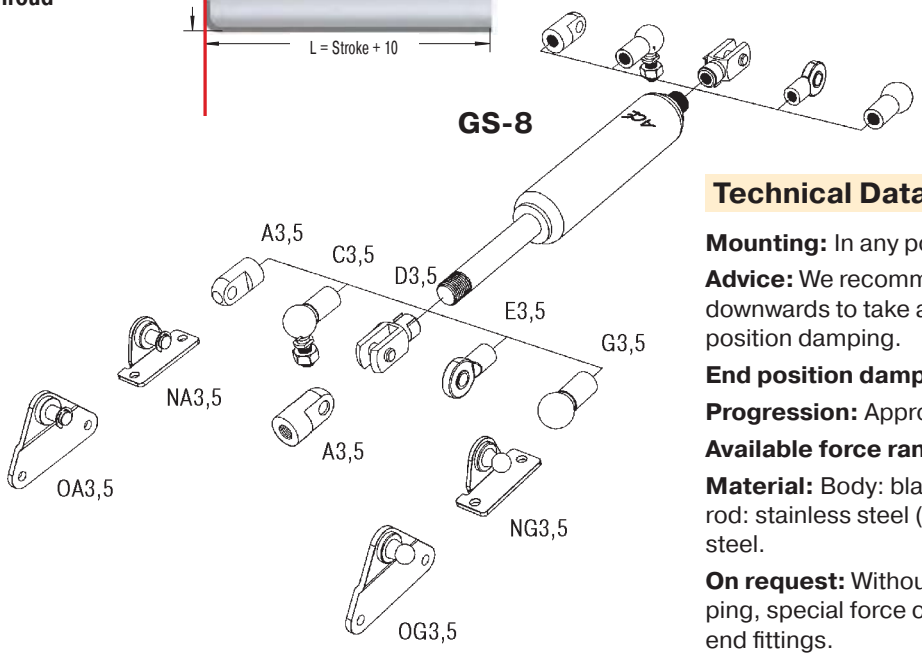


W3,5-8
Rod Shroud



Adjuster Knob U3,5
See page 120.

GS-8



For mounting accessories see page 141.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 5 mm

Progression: Approx. 28 %, F_2 max. 130 N

Available force range F_1 at 20 °C: 10 to 100 N

Material: Body: black powder coated steel. Piston rod: stainless steel (1.4305). End fittings: zinc plated steel.

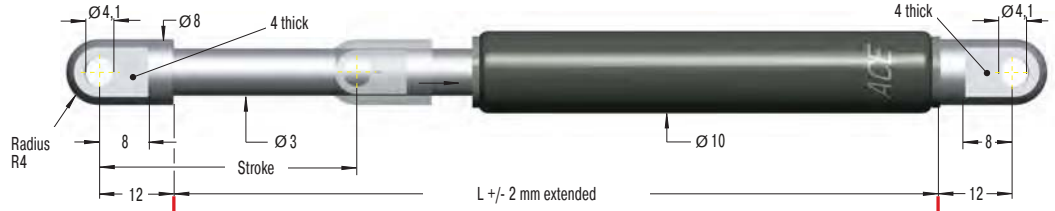
On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.

Industrial Gas Springs GS-10 (Push Type)

Extension Forces 10 N to 100 N
(when Piston Rod Compressed up to 120 N)

End Fitting | **Standard Dimensions** | **End Fitting**

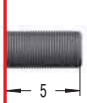
A3,5



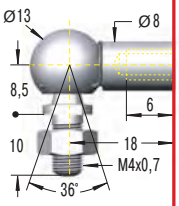
Eye A3,5

B3,5

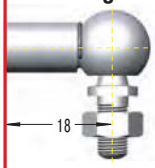
Stud Thread B3,5



C3,5



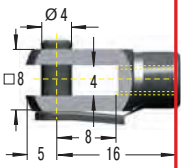
Angle Ball Joint C3,5



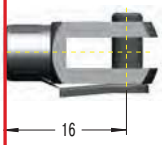
Dimensions

Type	Stroke mm	L extended
GS-10-20	20	72
GS-10-30	30	92
GS-10-40	40	112
GS-10-50	50	132
GS-10-60	60	152
GS-10-80	80	192

D3,5



Clevis Fork D3,5

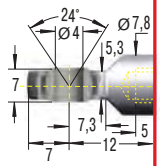


Ordering Example **GS-10-80-AC-60**

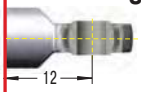
Type (Push Type)
Body Ø (10 mm)
Stroke (80 mm)
Piston Rod End Fitting A3.5
Body End Fitting C3.5
Nominal Force F_1 60 N

The end fittings are interchangeable.
For mounting accessories see page 141.

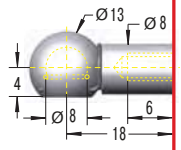
E3,5



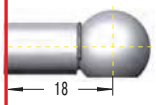
Swivel Eye E3,5



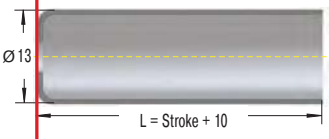
G3,5



Ball Socket G3,5

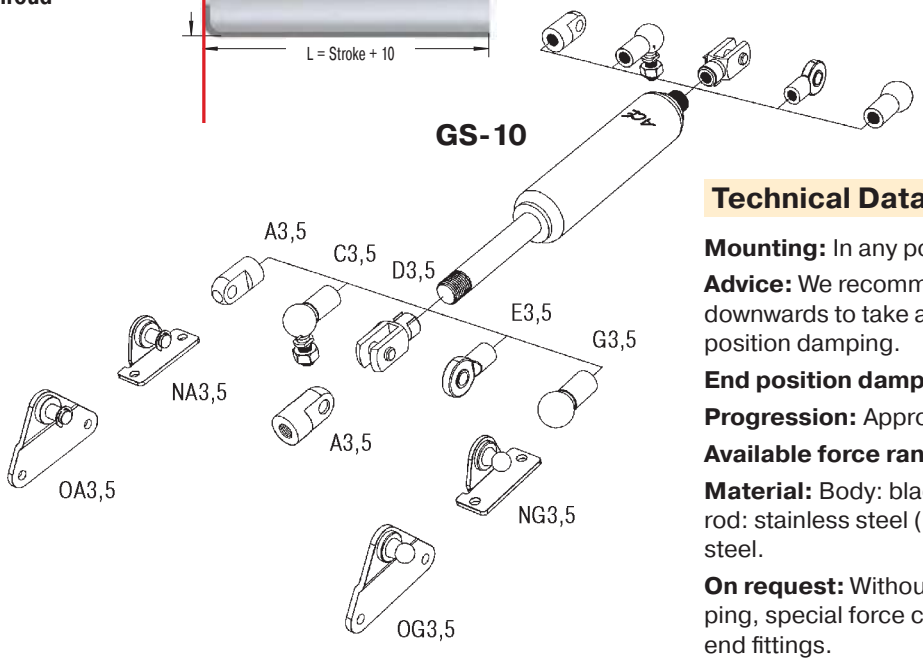


W3,5-10
Rod Shroud



Adjuster Knob U3,5
See page 120.

GS-10



For mounting accessories see page 141.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 5 mm

Progression: Approx. 20 %, F_2 max. 120 N

Available force range F_1 at 20 °C: 10 to 100 N

Material: Body: black powder coated steel. Piston rod: stainless steel (1.4305). End fittings: zinc plated steel.

On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.

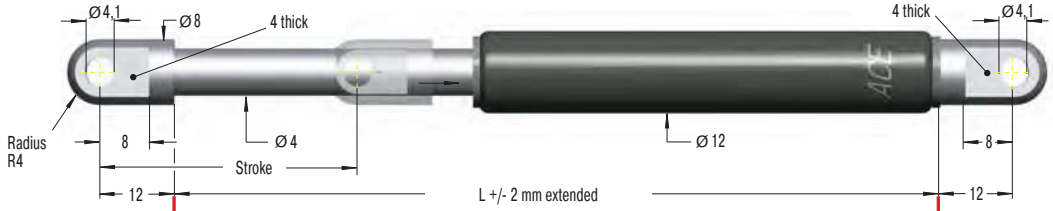
Issue 9.2007 Specifications subject to change

Industrial Gas Springs GS-12 (Push Type)

Extension Forces 10 N to 180 N
(when Piston Rod Compressed up to 225 N)

End Fitting | **Standard Dimensions** | **End Fitting**

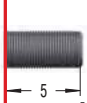
A3,5



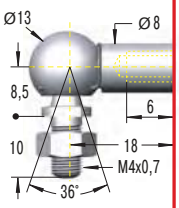
Eye A3,5

B3,5

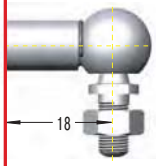
Stud Thread B3,5



C3,5



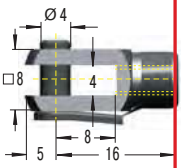
Angle Ball Joint C3,5



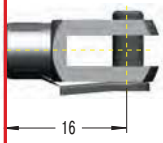
Dimensions

Type	Stroke mm	L extended	max. F1 N
GS-12-20	20	72	180
GS-12-30	30	92	180
GS-12-40	40	112	180
GS-12-50	50	132	180
GS-12-60	60	152	180
GS-12-80	80	192	150
GS-12-100	100	232	150
GS-12-120	120	272	120
GS-12-150	150	332	100

D3,5



Clevis Fork D3,5

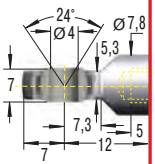


Ordering Example **GS-12-100-AA-30**

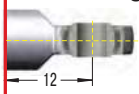
Type (Push Type)
Body Ø (12 mm)
Stroke (150mm)
Piston Rod End Fitting A3.5
Body End Fitting A3.5
Nominal Force F1 30 N

The end fittings are interchangeable.
For mounting accessories see page 141.

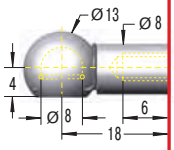
E3,5



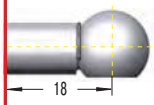
Swivel Eye E3,5



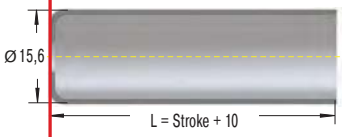
G3,5



Ball Socket G3,5

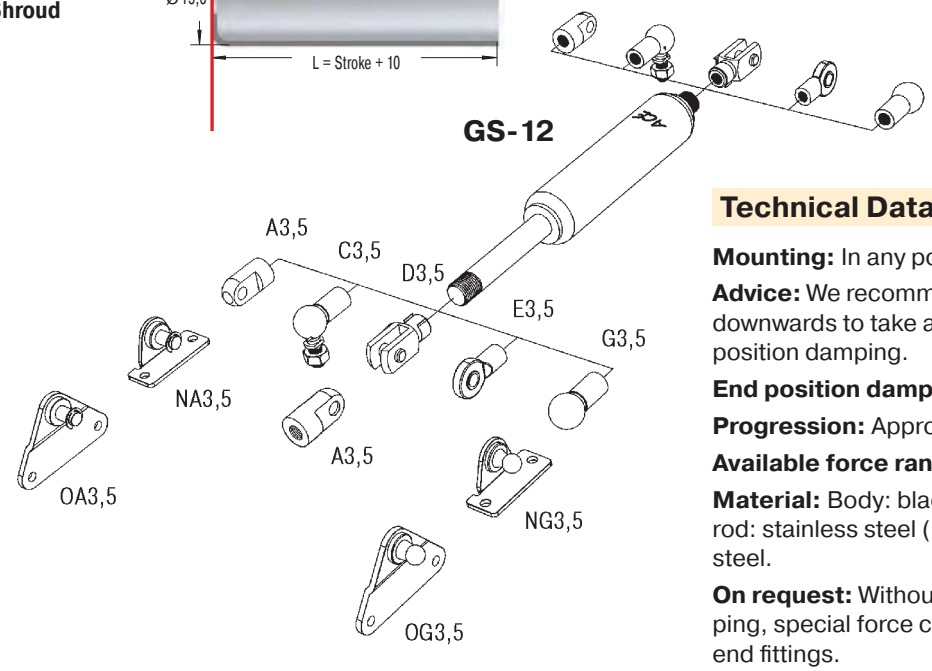


W3,5-12
Rod Shroud



Adjuster Knob U3,5
See page 120.

GS-12



For mounting accessories see page 141.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 10 mm

Progression: Approx. 25%, F2 max. 225 N

Available force range F1 at 20 °C: 10 to 180 N

Material: Body: black powder coated steel. Piston rod: stainless steel (1.4305). End fittings: zinc plated steel.

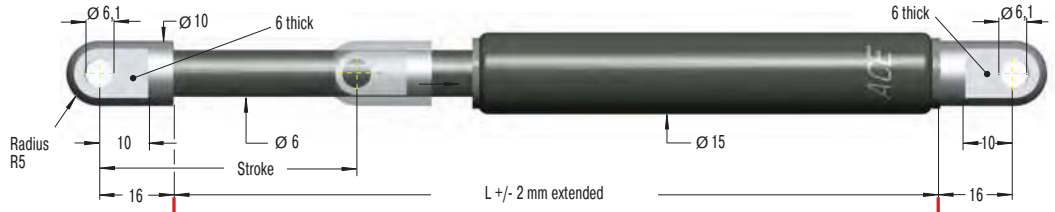
On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.

Industrial Gas Springs GS-15 (Push Type)

Extension Forces 20 N to 400 N
(when Piston Rod Compressed up to 500 N)

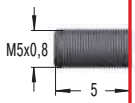
End Fitting | **Standard Dimensions** | **End Fitting**

A5



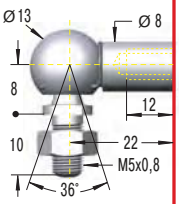
Eye A5

B5

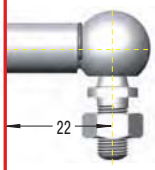


Stud Thread B5

C5



Angle Ball Joint C5
(Max. permitted force 500 N)



Dimensions

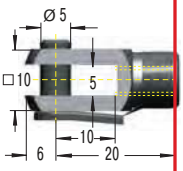
Type	Stroke mm	L extended
GS-15-20	20	67
GS-15-40	40	107
GS-15-50	50	127
GS-15-60	60	147
GS-15-80	80	187
GS-15-100	100	227
GS-15-120	120	267
GS-15-150	150	327

Ordering Example **GS-15-150-AC-150**

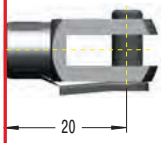
Type (Push Type)
Body Ø (15 mm)
Stroke (150 mm)
Piston Rod End Fitting A5
Body End Fitting C5
Nominal Force F1 150 N

The end fittings are interchangeable.
For mounting accessories see page 141.

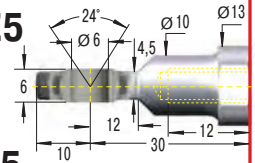
D5



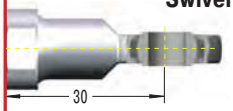
Clevis Fork D5



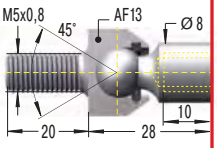
E5



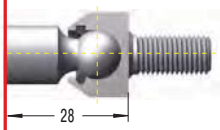
Swivel Eye E5



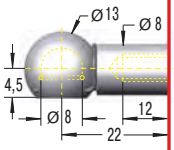
F5



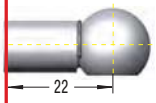
Inline Ball Joint F5



G5



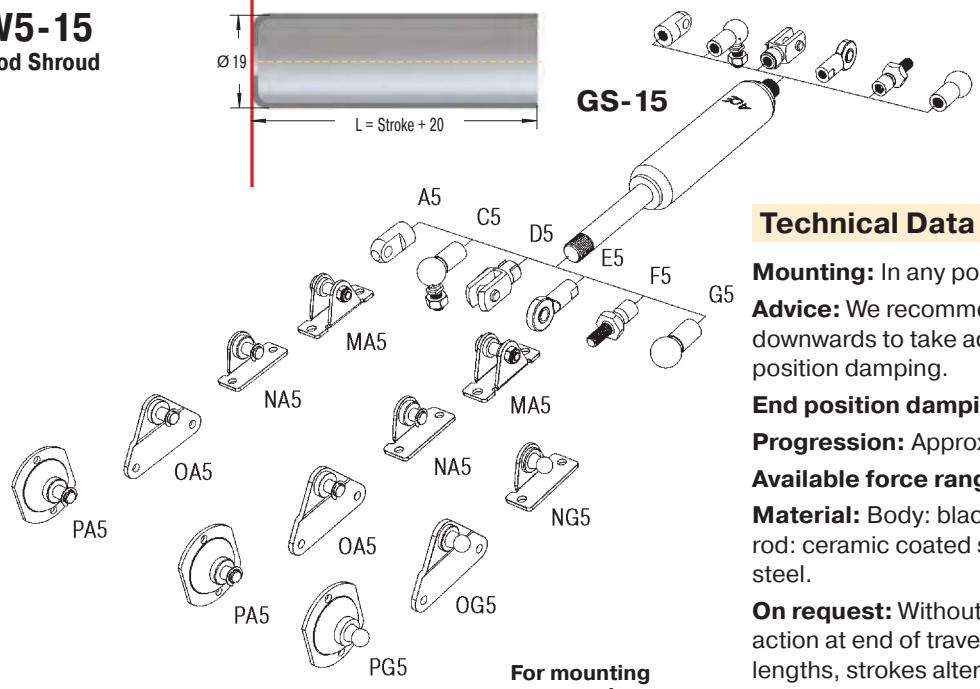
Ball Socket G5
(Max. permitted force 500 N)



W5-15
Rod Shroud

Adjuster Knob U5
See page 120.

GS-15



For mounting accessories see page 141.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 10 mm

Progression: Approx. 27 %, F2 max. 500 N

Available force range F1 at 20 °C: 20 to 400 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

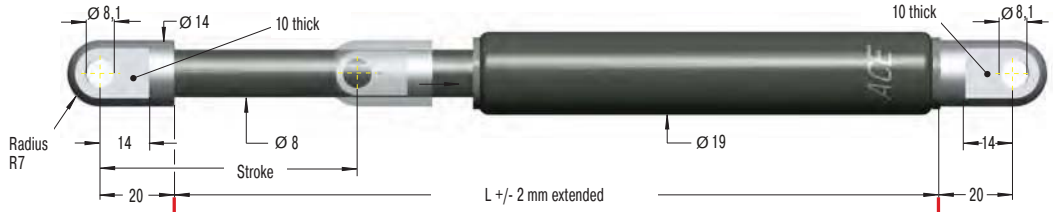
On request: Without damping, increased damping action at end of travel, special force curves, special lengths, strokes alternative end fittings, stainless steel (see pages 134 to 139).

Industrial Gas Springs GS-19 (Push Type)

Extension Forces 50 N to 700 N
(when Piston Rod Compressed up to 995 N)

End Fitting | **Standard Dimensions** | **End Fitting**

A8

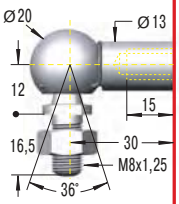


Eye A8

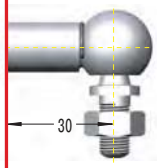
B8

Stud Thread B8

C8



Angle Ball Joint C8
(Max. permitted force 1200 N)



Dimensions

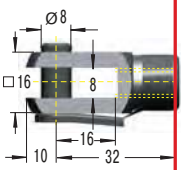
Type	Stroke mm	L extended
GS-19-50	50	164
GS-19-100	100	264
GS-19-150	150	364
GS-19-200	200	464
GS-19-250	250	564
GS-19-300	300	664

Ordering Example **GS-19-150-AC-600**

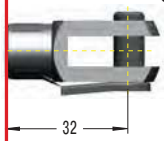
Type (Push Type)
Body Ø (19 mm)
Stroke (150 mm)
Piston Rod End Fitting A8
Body End Fitting C8
Nominal Force F_1 600 N

The end fittings are interchangeable.
For mounting accessories see page 142.

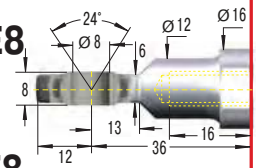
D8



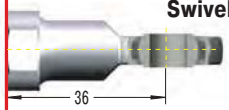
Clevis Fork D8



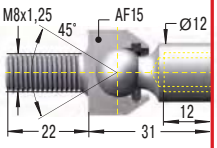
E8



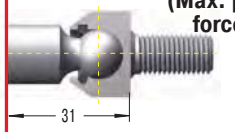
Swivel Eye E8



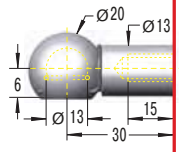
F8



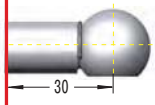
Inline Ball Joint F8
(Max. permitted force 1200 N)



G8

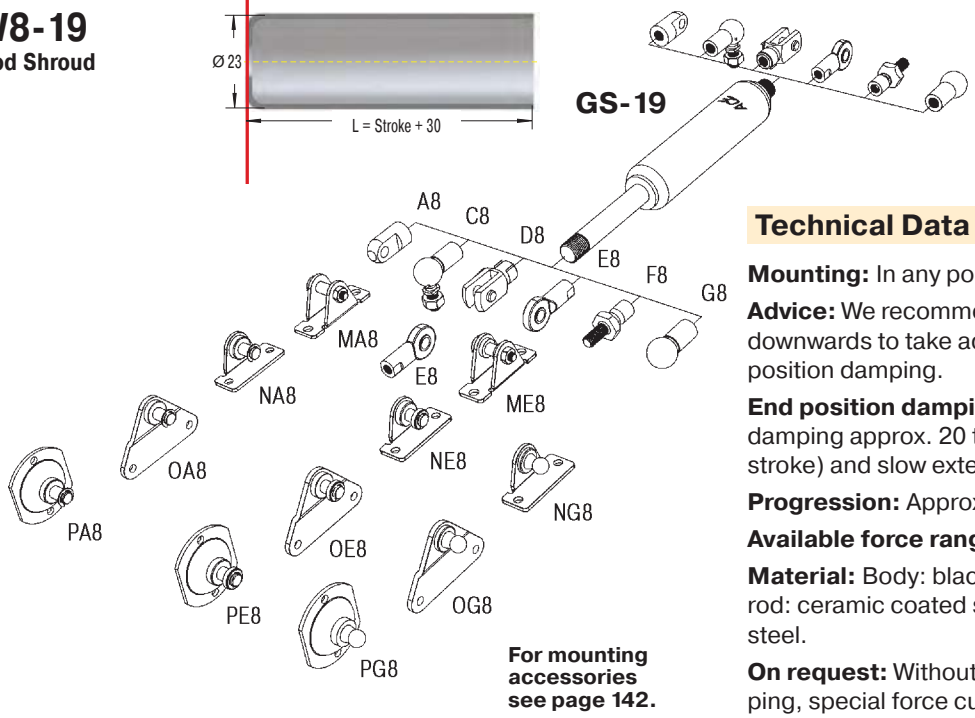


Ball Socket G8
(Max. permitted force 1200 N)



W8-19
Rod Shroud

GS-19



For mounting accessories see page 142.

Adjuster Knob U8
See page 120.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Strong end position damping approx. 20 to 60 mm (depending on the stroke) and slow extension speed.

Progression: Approx. 36-42 %, F_2 max. 995 N

Available force range F_1 at 20 °C: 50 to 700 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

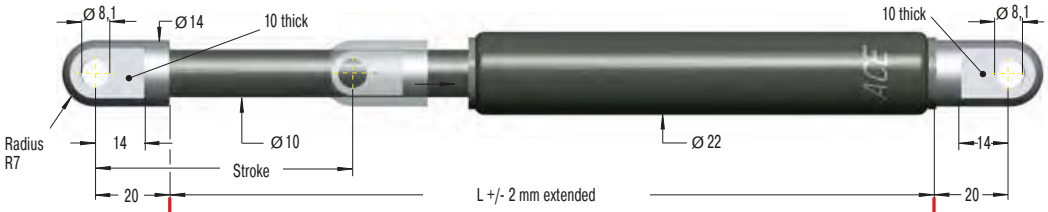
On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

Industrial Gas Springs GS-22 (Push Type)

Extension Forces 80 N to 1 300 N
(when Piston Rod Compressed up to 1 950 N)

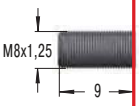
End Fitting | **Standard Dimensions** | **End Fitting**

A8



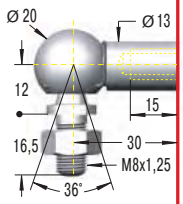
Eye A8

B8

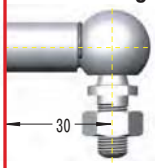


Stud Thread B8

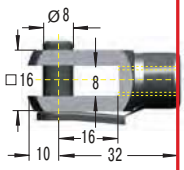
C8



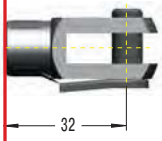
Angle Ball Joint C8
(Max. permitted force 1200 N)



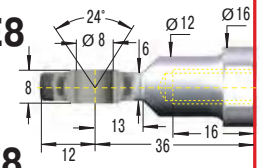
D8



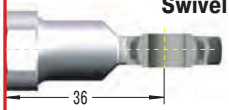
Clevis Fork D8



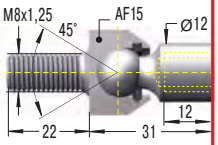
E8



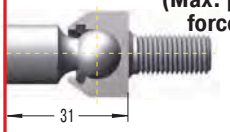
Swivel Eye E8



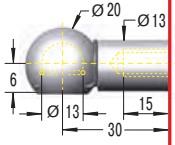
F8



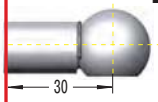
Inline Ball Joint F8
(Max. permitted force 1200 N)



G8



Ball Socket G8
(Max. permitted force 1200 N)



Dimensions

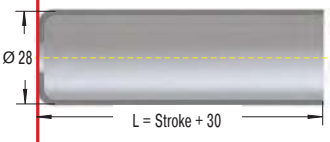
Type	Stroke mm	L extended
GS-22-50	50	164
GS-22-100	100	264
GS-22-150	150	364
GS-22-200	200	464
GS-22-250	250	564
GS-22-300	300	664
GS-22-350	350	764
GS-22-400	400	864
GS-22-450	450	964
GS-22-500	500	1 064
GS-22-550	550	1 164
GS-22-600	600	1 264
GS-22-650	650	1 364
GS-22-700	700	1 464

Ordering Example **GS-22-150-AE-800**

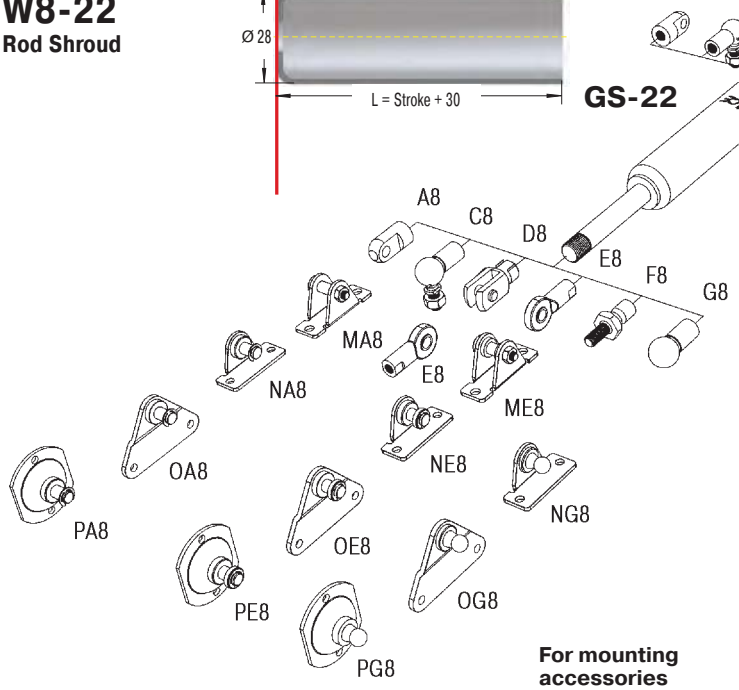
Type (Push Type)
Body Ø (22 mm)
Stroke (150 mm)
Piston Rod End Fitting A8
Body End Fitting E8
Nominal Force F_1 800 N

The end fittings are interchangeable.
For mounting accessories see page 142.

W8-22
Rod Shroud



GS-22



For mounting accessories see page 142.

Adjuster Knob U8
See page 120.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Strong end position damping approx. 20 to 70 mm (depending on the stroke) and slow extension speed.

Progression: approx. 39 to 50 %, F_2 max. 1 950 N

Available force range F_1 at 20 °C: 80 to 1 300 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

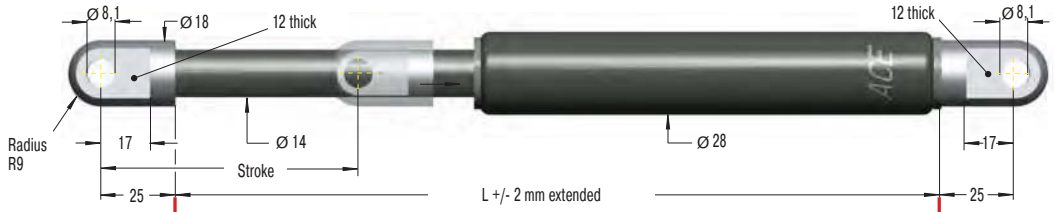
128 ACE Stoßdämpfer GmbH · PO Box 1510 · D-40740 Langenfeld · Tel. +49-2173-9226-80 · Fax +49-2173-9226-89 · E-Mail: info@acecontrols-int.com

Industrial Gas Springs GS-28 (Push Type)

Extension Forces 150 N to 2500 N
(when Piston Rod Compressed up to 4875 N)

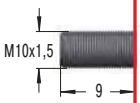
End Fitting | **Standard Dimensions** | **End Fitting**

A10



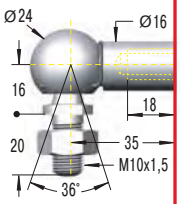
Eye A10

B10

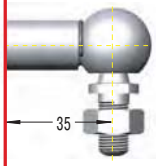


Stud Thread B10

C10



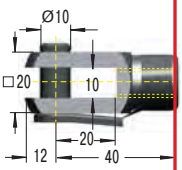
Angle Ball Joint C10
(Max. permitted force 1800 N)



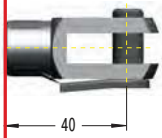
Dimensions

Type	Stroke mm	L extended
GS-28-100	100	262
GS-28-150	150	362
GS-28-200	200	462
GS-28-250	250	562
GS-28-300	300	662
GS-28-350	350	762
GS-28-400	400	862
GS-28-450	450	962
GS-28-500	500	1 062
GS-28-550	550	1 162
GS-28-600	600	1 262
GS-28-650	650	1 362
GS-28-700	700	1 462
GS-28-750	750	1 562

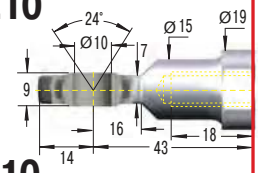
D10



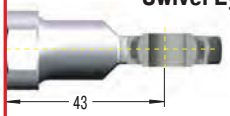
Clevis Fork D10



E10



Swivel Eye E10

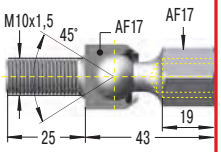


Ordering Example **GS-28-150-EE-1200**

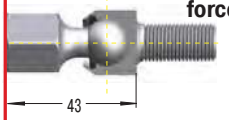
Type (Push Type)
Body Ø (28 mm)
Stroke (150 mm)
Piston Rod End Fitting E10
Body End Fitting E10
Nominal Force F1 1200 N

The end fittings are interchangeable.
For mounting accessories see page 142.

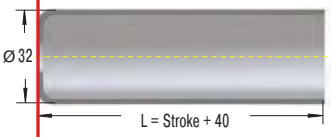
F10



Inline Ball Joint F10
(Max. permitted force 1800 N)

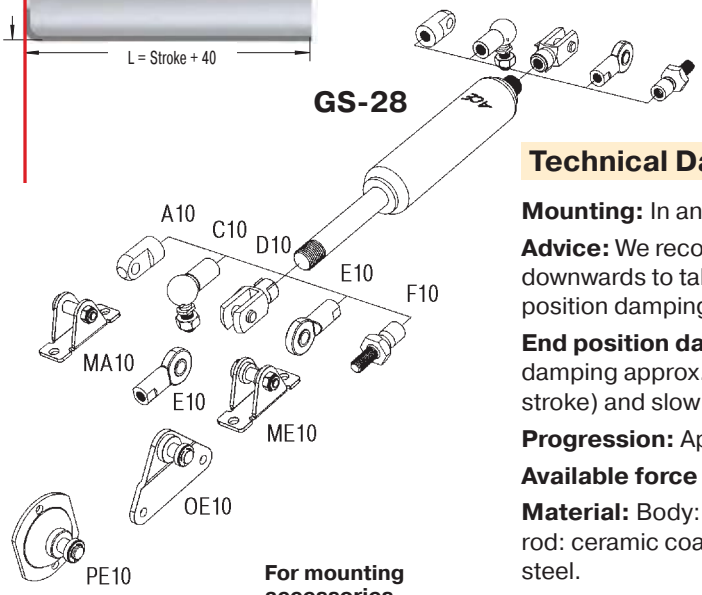


W10-28
Rod Shroud



Adjuster Knob U10
See page 120.

GS-28



For mounting accessories see page 142.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Strong end position damping approx. 30 to 70 mm (depending on the stroke) and slow extension speed.

Progression: Approx. 60 to 95 %, F2 max. 4875 N.

Available force range F1 at 20 °C: 150 to 2500 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

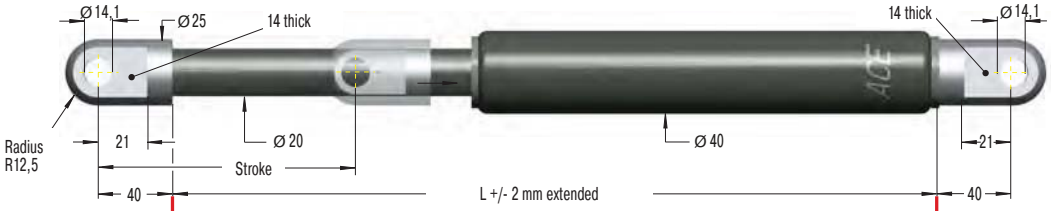
On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

Large Industrial Gas Springs GS-40 (Push Type)

Extension Forces 500 N to 5 000 N
(when Piston Rod Compressed up to 7650 N)

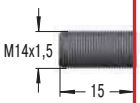
End Fitting | **Standard Dimensions** | **End Fitting**

A14



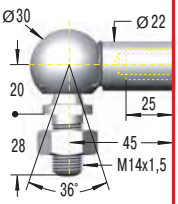
Eye A14

B14

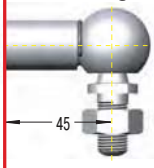


Stud Thread B14

C14



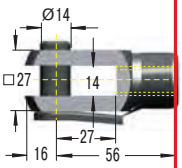
Angle Ball Joint C14
(Max. permitted force 3200 N)



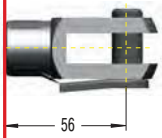
Dimensions

Type	Stroke mm	L extended
GS-40-100	100	317
GS-40-150	150	417
GS-40-200	200	517
GS-40-300	300	717
GS-40-400	400	917
GS-40-500	500	1 117
GS-40-600	600	1 317
GS-40-800	800	1 717
GS-40-1000	1 000	2 117

D14



Clevis Fork D14

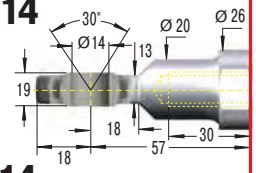


Ordering Example **GS-40-150-DD-3500**

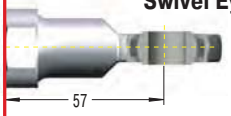
Type (Push Type)
Body Ø (40 mm)
Stroke (150 mm)
Piston Rod End Fitting D14
Body End Fitting D14
Nominal Force F1 3500 N

The end fittings are interchangeable.
For mounting accessories see page 143.

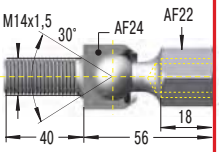
E14



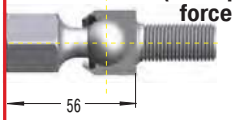
Swivel Eye E14



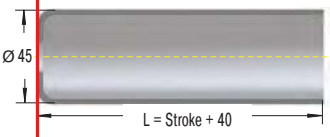
F14



Inline Ball Joint F14
(Max. permitted force 3200 N)

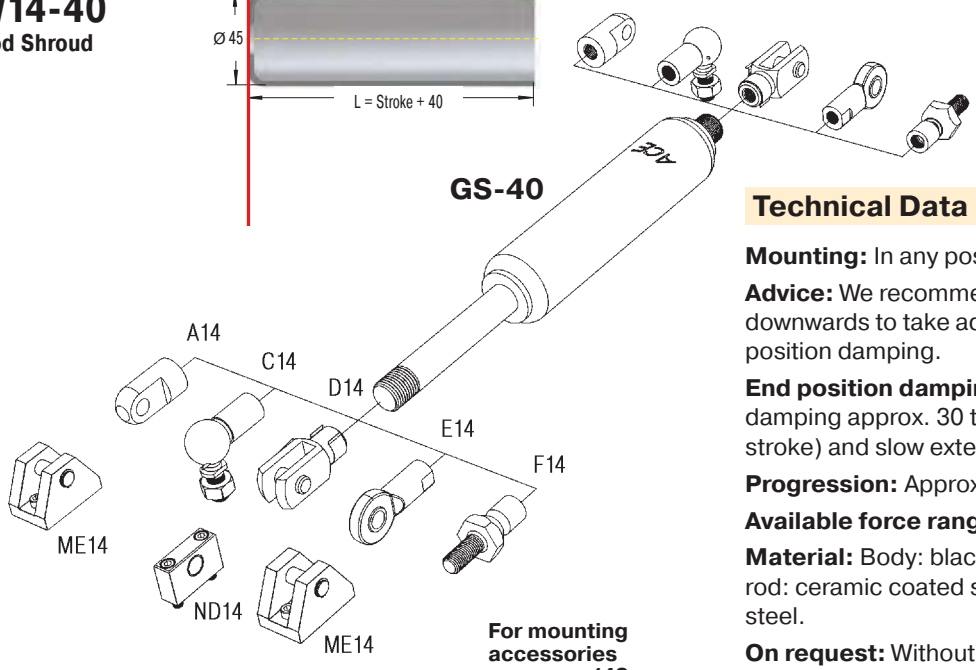


W14-40
Rod Shroud



Adjuster Knob U14
See page 120.

GS-40



For mounting accessories see page 143.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Strong end position damping approx. 30 to 70 mm (depending on the stroke) and slow extension speed.

Progression: Approx. 47 to 53 %, F2 max. 7650 N.

Available force range F1 at 20 °C: 500 to 5000 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

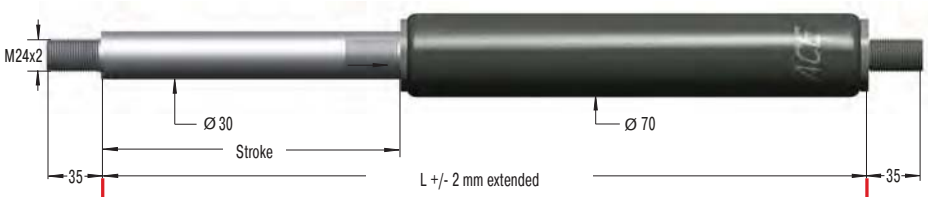
On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

Large Industrial Gas Springs GS-70 (Push Type)

Extension Forces 2000 N to 13000 N
(when Piston Rod Compressed up to 16250 N)

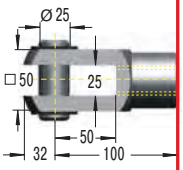
End Fitting | **Standard Dimensions** | **End Fitting**

B24

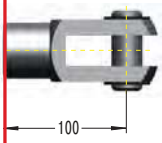


Stud Thread B24

D24



Clevis Fork D24



Dimensions

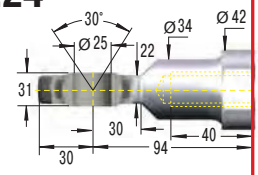
Type	Stroke mm	L extended
GS-70-100	100	320
GS-70-200	200	520
GS-70-300	300	720
GS-70-400	400	920
GS-70-500	500	1 120
GS-70-600	600	1 320
GS-70-700	700	1 520
GS-70-800	800	1 720

Ordering Example **GS-70-200-EE-8000**

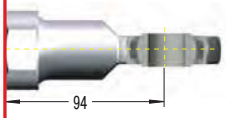
Type (Push Type)
Body Ø (70 mm)
Stroke (200 mm)
Piston Rod End Fitting E24
Body End Fitting E24
Nominal Force F1 8000 N

The end fittings are interchangeable.
For mounting accessories see page 143.
Standard gas spring with valve.

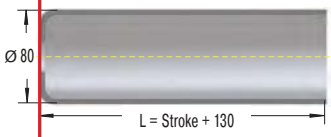
E24

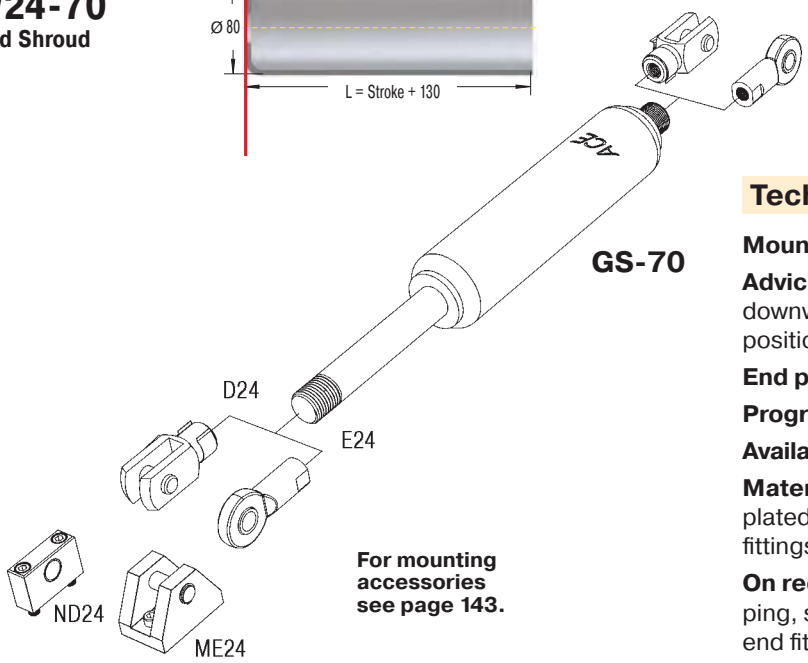


Swivel Eye E24



W24-70
Rod Shroud





For mounting accessories see page 143.

Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 10 mm

Progression: Approx. 25 %, F2 max. 16250 N

Available force range F1 at 20 °C: 2000 N to 13000 N

Material: Body: black powder coated steel or zinc plated steel. Piston rod: hard chrome plated. End fittings: zinc plated steel.

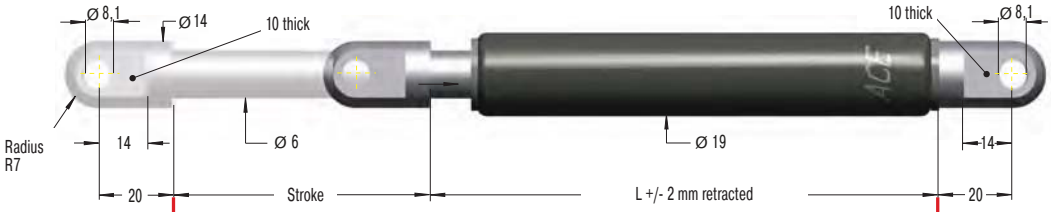
On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings, stainless steel.

Traction Gas Springs GZ-19 (Pull Type)

Traction (Pull) Forces 30 N to 300 N
(when Piston Rod Extended up to 330 N)

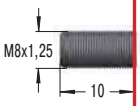
End Fitting | **Standard Dimensions** | **End Fitting**

A8



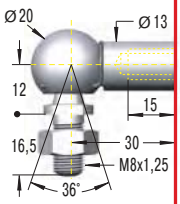
Eye A8

B8

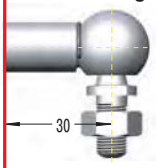


Stud Thread B8

C8



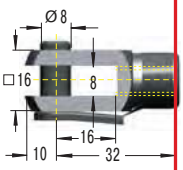
Angle Ball Joint C8
(Max. permitted force 1200 N)



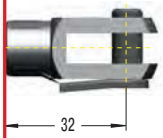
Dimensions

Type	Stroke mm	L retracted
GZ-19-30	30	112
GZ-19-50	50	132
GZ-19-100	100	182
GZ-19-150	150	232
GZ-19-200	200	282
GZ-19-250	250	332

D8



Clevis Fork D8

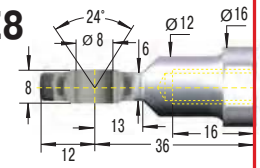


Ordering Example **GZ-19-150-AC-250**

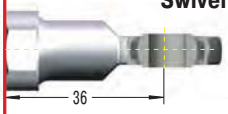
Type (Pull Type)
Body Ø (19 mm)
Stroke (150 mm)
Piston Rod End Fitting A8
Body End Fitting C8
Traction Force F1 250 N

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 142.

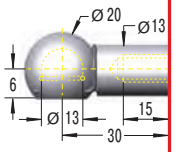
E8



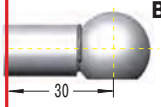
Swivel Eye E8



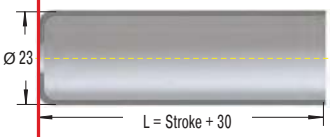
G8



Ball Socket G8
(Max. permitted force 1200 N)

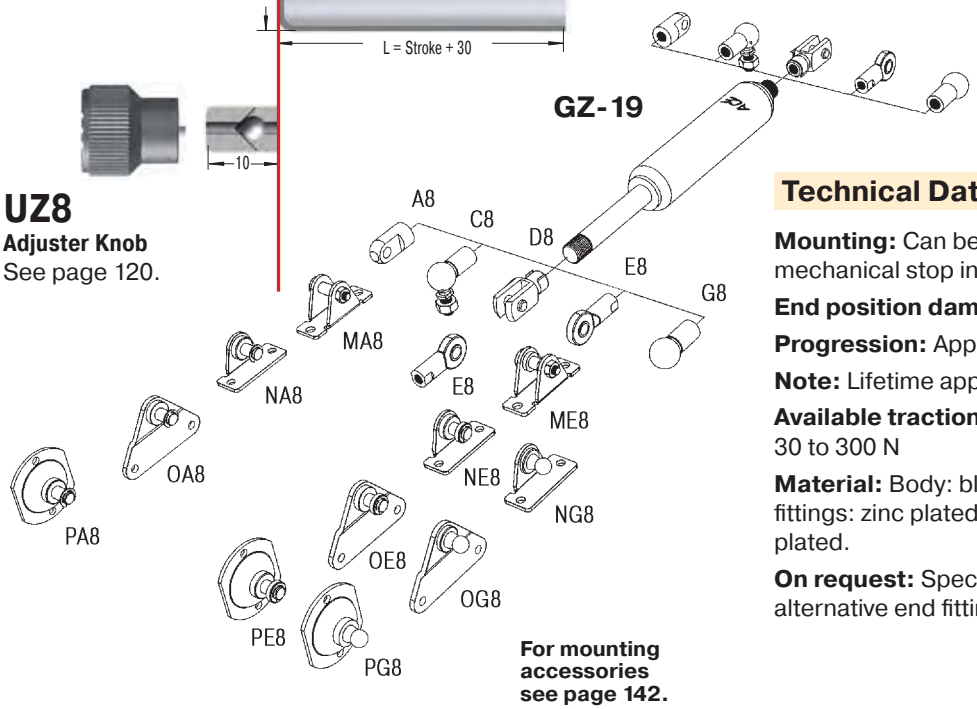


WZ8-19
Rod Shroud



UZ8
Adjuster Knob
See page 120.

GZ-19



For mounting accessories see page 142.

Technical Data

Mounting: Can be mounted in any position. Install mechanical stop in extended position.

End position damping length: Without damping

Progression: Approx. 10 %, F2 max. 330 N

Note: Lifetime approx. 2000 m

Available traction force range F1 at 20 °C:
30 to 300 N

Material: Body: black powder coated steel. End fittings: zinc plated steel. Piston rod: hard chrome plated.

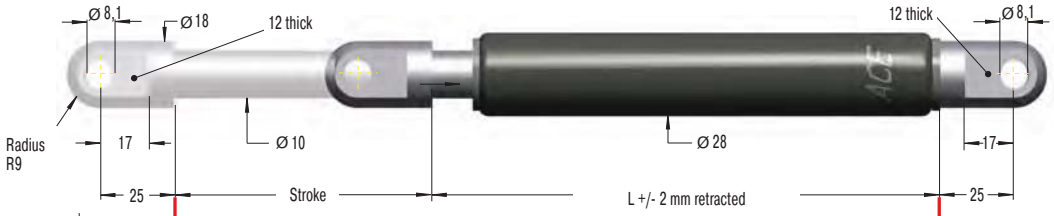
On request: Special force curves, special lengths, alternative end fittings, stainless steel.

Traction Gas Springs GZ-28 (Pull Type)

Traction (Pull) Forces 150 N to 1 200 N
(when Piston Rod Extended up to 1 440 N)

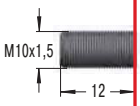
End Fitting | **Standard Dimensions** | **End Fitting**

A10



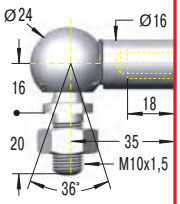
Eye A10

B10

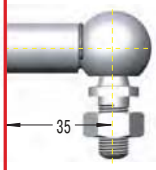


Stud Thread B10

C10



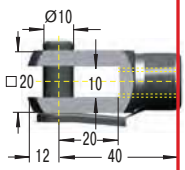
Angle Ball Joint C10
(Max. permitted force 1800 N)



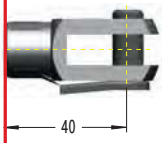
Dimensions

Type	Stroke mm	L retracted
GZ-28-30	30	130
GZ-28-50	50	150
GZ-28-100	100	200
GZ-28-150	150	250
GZ-28-200	200	300
GZ-28-250	250	350
GZ-28-300	300	400
GZ-28-350	350	450
GZ-28-400	400	500
GZ-28-450	450	550
GZ-28-500	500	600
GZ-28-550	550	650
GZ-28-600	600	700
GZ-28-650	650	750

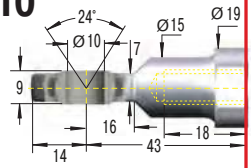
D10



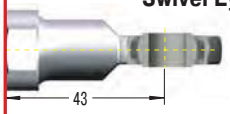
Clevis Fork D10



E10



Swivel Eye E10

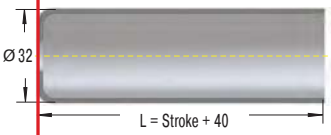


Ordering Example — GZ-28-150-EE-800

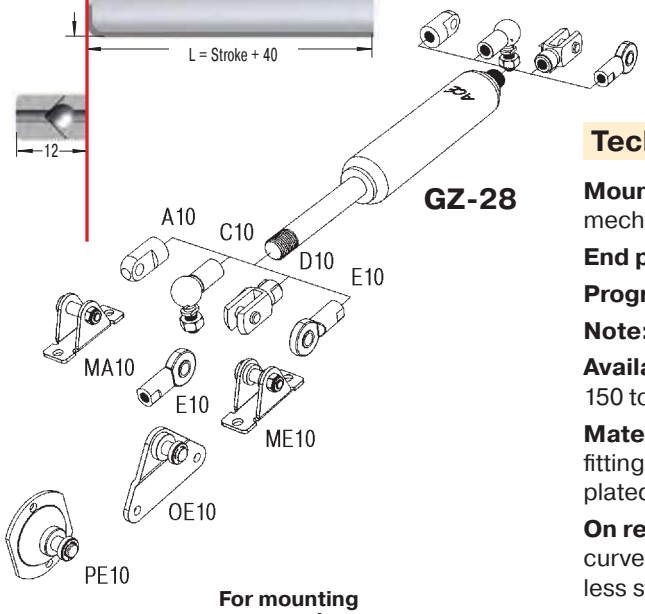
Type (Pull Type)
Body Ø (28 mm)
Stroke (150 mm)
Piston Rod End Fitting E10
Body End Fitting E10
Traction Force F1 800 N

The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite).
For mounting accessories see page 142.

WZ10-28
Rod Shroud



UZ10
Adjuster Knob
See page 120.



For mounting accessories see page 142.

Technical Data

Mounting: Can be mounted in any position. Install mechanical stop in extended position.

End position damping length: Without damping

Progression: Approx. 20 %, F2 max. 1 440 N.

Note: Lifetime approx. 2 000 m

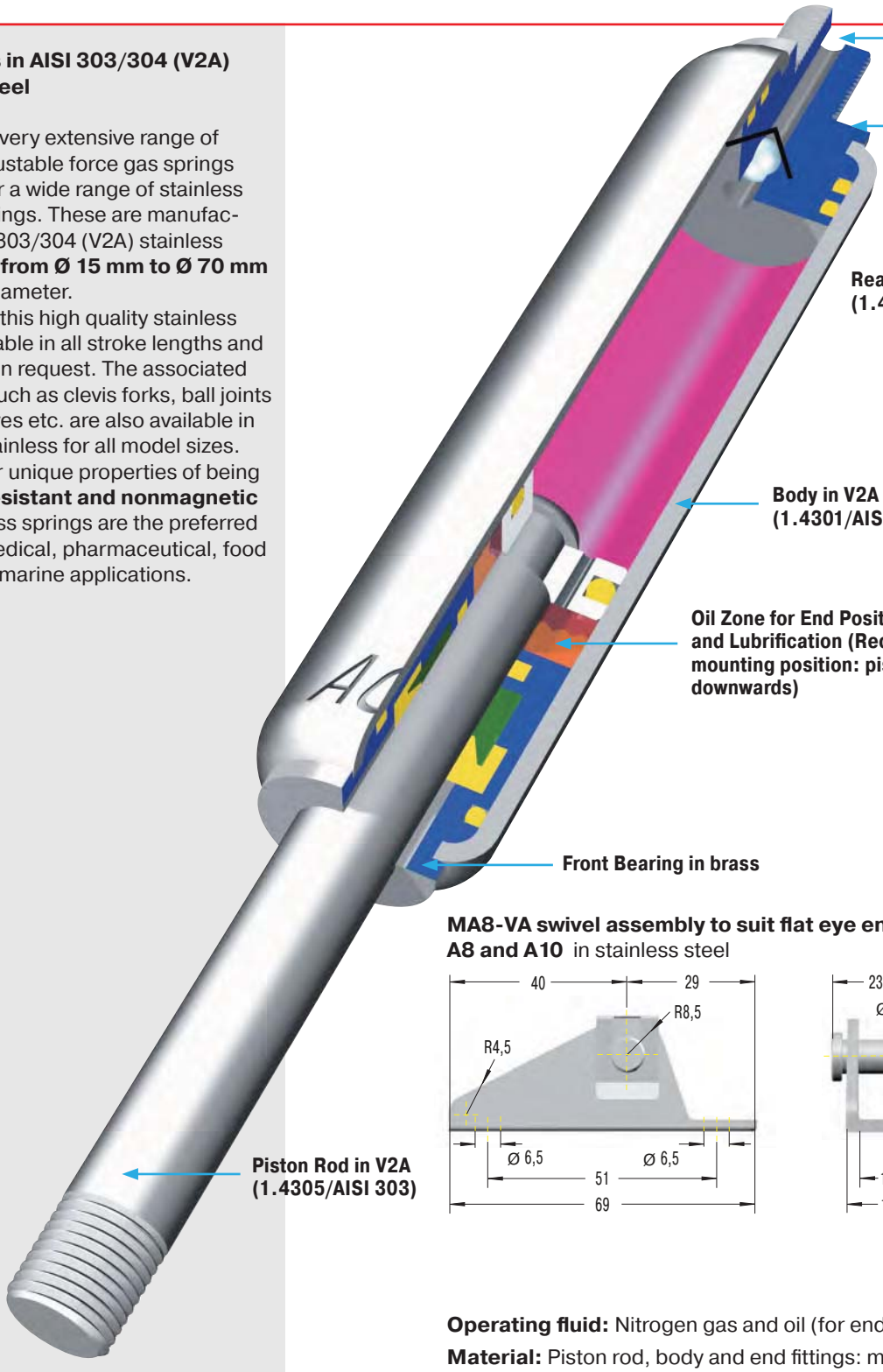
Available traction force range F1 at 20 °C: 150 to 1 200 N

Material: Body: black powder coated steel. End fittings: zinc plated steel. Piston rod: hard chrome plated.

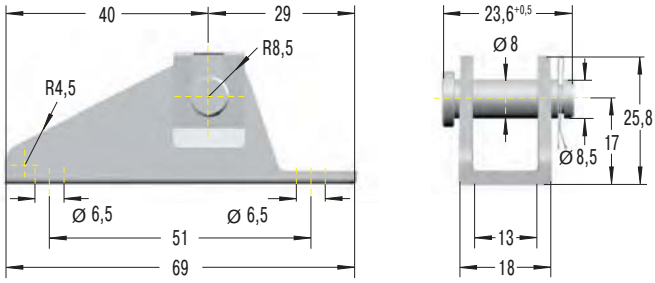
On request: Increased traction force, special force curves, special lengths, alternative end fittings, stainless steel.

Gas Springs in AISI 303/304 (V2A) Stainless Steel

As well as its very extensive range of standard adjustable force gas springs ACE can offer a wide range of stainless steel gas springs. These are manufactured in AISI 303/304 (V2A) stainless steel in sizes **from Ø 15 mm to Ø 70 mm** outer body diameter.
Furthermore this high quality stainless finish is available in all stroke lengths and force levels on request. The associated end fittings such as clevis forks, ball joints and swivel eyes etc. are also available in 304 (V2A) stainless for all model sizes.
Through their unique properties of being **corrosion resistant and nonmagnetic** these stainless springs are the preferred choice for medical, pharmaceutical, food industry and marine applications.



MA8-VA swivel assembly to suit flat eye end fittings A8 and A10 in stainless steel



Operating fluid: Nitrogen gas and oil (for end damping)

Material: Piston rod, body and end fittings: material 1.4301/1.4305.

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

Operating temperature range: -20 °C to 80 °C

On request: Without damping, increased end postition damping, special force curves, special lengths, alternative end fittings. Gas Springs and accessories: material 1.4404/1.4571 (V4A), AISI 316L/316Ti.

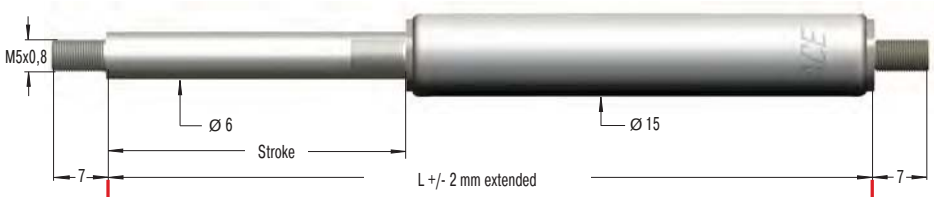
134

Industrial Gas Springs GS-15-VA (Push Type)

Extension Forces 40 N to 400 N
(when Piston Rod Compressed up to 490 N)

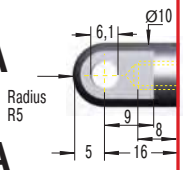
End Fitting | **Standard Dimensions** | **End Fitting**

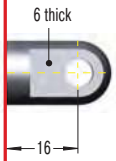
B5



Stud Thread B5

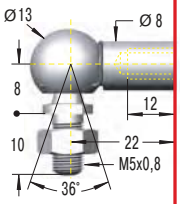
A5-VA

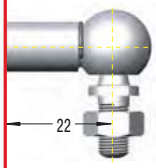




Eye A5-VA

C5-VA





Angle Ball Joint C5-VA
(Max. permitted force 430 N)

Dimensions

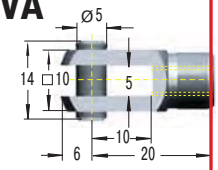
Type	Stroke mm	L extended
GS-15-20-VA	20	74
GS-15-40-VA	40	114
GS-15-50-VA	50	134
GS-15-60-VA	60	154
GS-15-80-VA	80	194
GS-15-100-VA	100	234
GS-15-120-VA	120	274
GS-15-150-VA	150	334

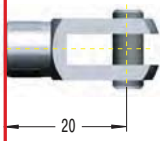
Ordering Example **GS-15-150-AC-150-VA**

Type (Push Type)
Body Ø (15 mm)
Stroke (150 mm)
Piston Rod End Fitting A5-VA
Body End Fitting C5-VA
Nominal Force F_1 150 N
Indicated by K.-No. on delivery

The end fittings are interchangeable.
Strokes also available up to 300 mm.

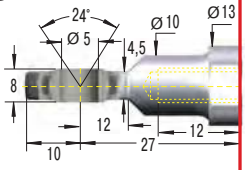
D5-VA

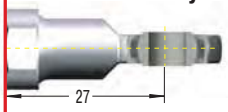




Clevis Fork D5-VA

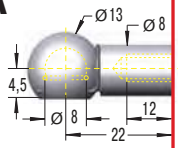
E8-VA

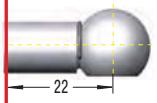




Swivel Eye E5-VA

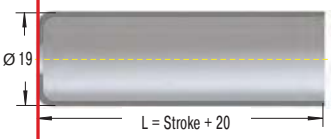
G5-VA



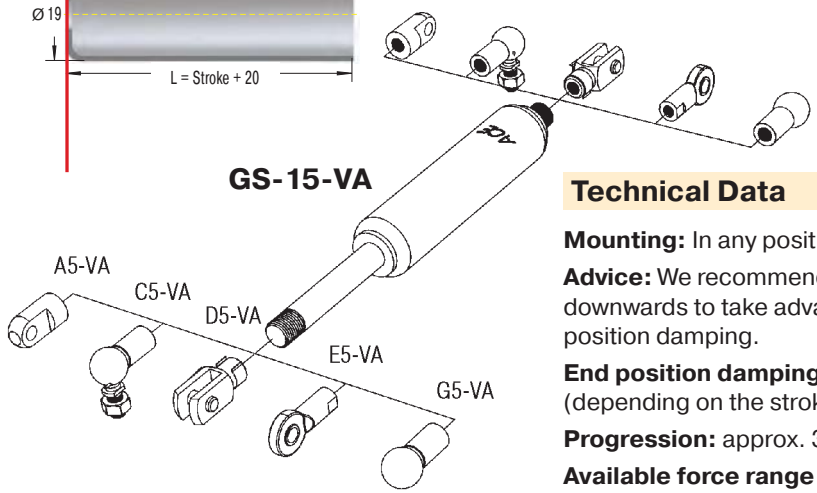


Ball Socket G5-VA

W5-15-VA
Rod Shroud



Adjuster Knob U5
See page 120.



Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 20 mm (depending on the stroke).

Progression: approx. 34 %, F_2 max. 490 N

Available force range F_1 at 20 °C: 40 to 400 N

Material: Piston rod, body and end fittings: material 1.4301/1.4305.

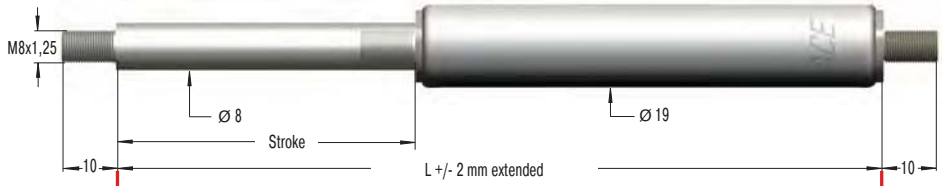
On request: Without damping, increased end position damping, special force curves, special lengths, alternative end fittings. Gas springs and accessories: material 1.4404/1.4571 (V4A).

Industrial Gas Springs GS-19-VA (Push Type)

Extension Forces 50 N to 700 N
(when Piston Rod Compressed up to 910 N)

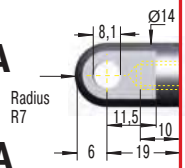
End Fitting | **Standard Dimensions** | **End Fitting**

B8

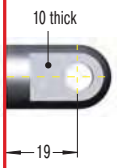


Stud Thread B8

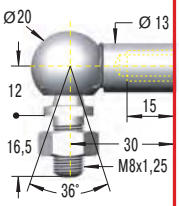
A8-VA



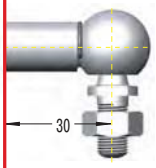
Eye A8-VA



C8-VA



Angle Ball Joint C8-VA
(Max. permitted force 1140 N)



Dimensions

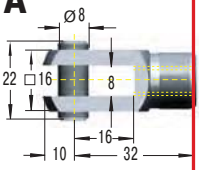
Type	Stroke mm	L extended
GS-19-50-VA	50	164
GS-19-100-VA	100	264
GS-19-150-VA	150	364
GS-19-200-VA	200	464
GS-19-250-VA	250	564
GS-19-300-VA	300	664

Ordering Example **GS-19-150-AC-600-VA**

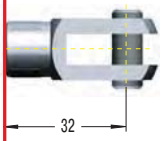
Type (Push Type)
Body Ø (19 mm)
Stroke (150 mm)
Piston Rod End Fitting A8-VA
Body End Fitting C8-VA
Nominal Force F_1 600 N
Indicated by K.-No. on delivery

The end fittings are interchangeable.
Strokes also available up to 500 mm.

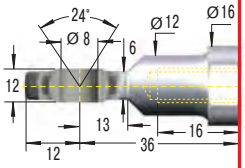
D8-VA



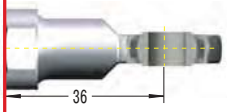
Clevis Fork D8-VA



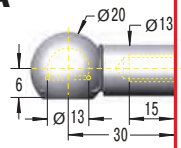
E8-VA



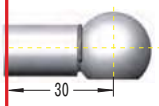
Swivel Eye E8-VA



G8-VA

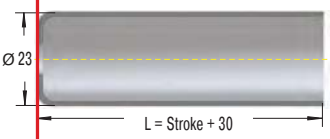


Ball Socket G8-VA

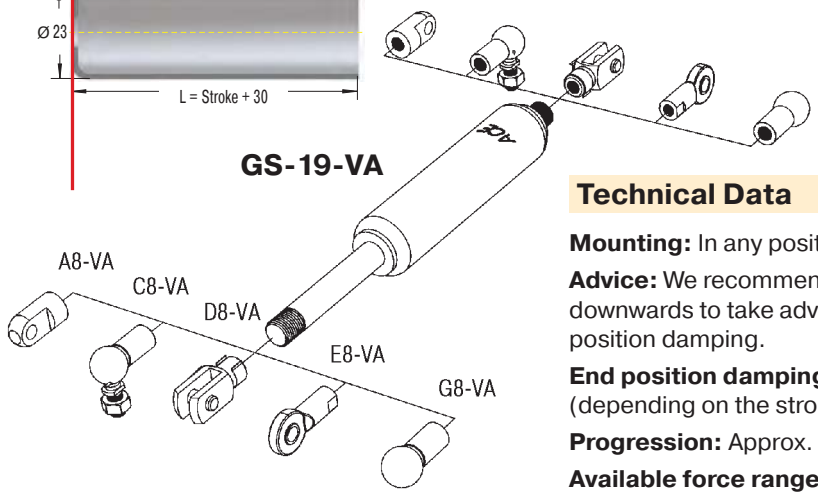


W8-19-VA

Rod Shroud



Adjuster Knob U8
See page 120.



Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 20 mm (depending on the stroke).

Progression: Approx. 33 %, F_2 max. 910 N

Available force range F_1 at 20 °C: 50 to 700 N

Material: Piston rod, body and end fittings: material 1.4301/1.4305.

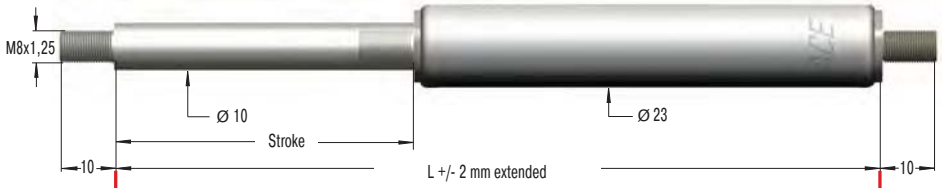
On request: Without damping, increased end position damping, lockable rod shroud, special force curves, special lengths, alternative end fittings. Gas springs and accessories: material 1.4404/1.4571 (V4A).

Industrial Gas Springs GS-22-VA (Push Type)

Extension Forces 100 N to 1 200 N
(when Piston Rod Compressed up to 1 560 N)

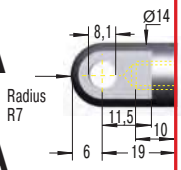
End Fitting | **Standard Dimensions** | **End Fitting**

B8

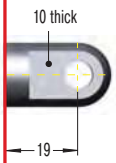


Stud Thread B8

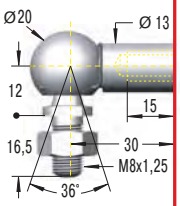
A8-VA



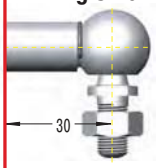
Eye A8-VA



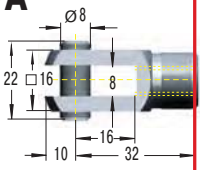
C8-VA



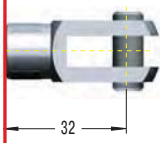
Angle Ball Joint C8-VA
(Max. permitted force 1140 N)



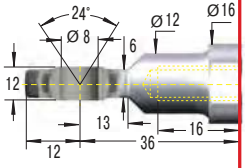
D8-VA



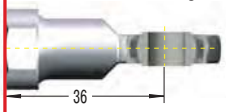
Clevis Fork D8-VA



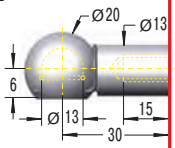
E8-VA



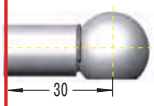
Swivel Eye E8-VA



G8-VA



Ball Socket G8-VA



W8-22-VA

Rod Shroud

Adjuster Knob U8
See page 120.

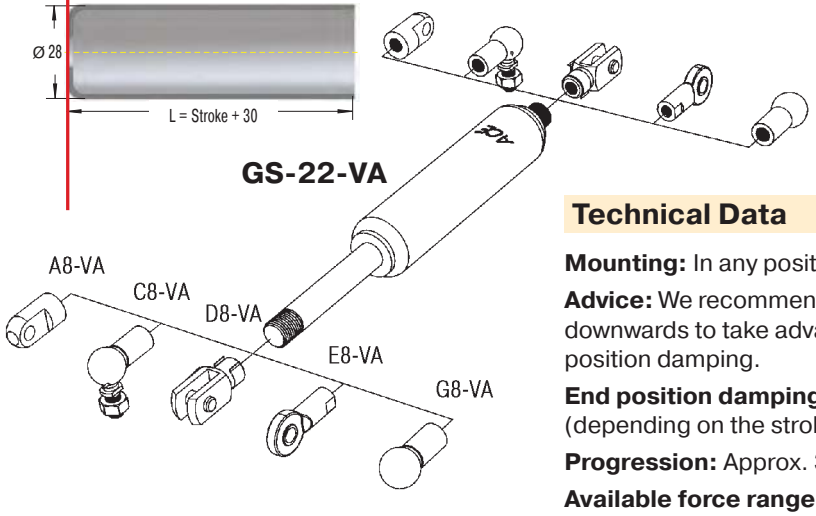
Dimensions

Type	Stroke mm	L extended
GS-22-50-VA	50	164
GS-22-100-VA	100	264
GS-22-150-VA	150	364
GS-22-200-VA	200	464
GS-22-250-VA	250	564
GS-22-300-VA	300	664
GS-22-350-VA	350	764
GS-22-400-VA	400	864
GS-22-450-VA	450	964
GS-22-500-VA	500	1 064
GS-22-550-VA	550	1 164
GS-22-600-VA	600	1 264
GS-22-650-VA	650	1 364
GS-22-700-VA	700	1 464

Ordering Example **GS-22-150-AE-800-VA**

Type (Push Type)
Body Ø (23 mm)
Stroke (150 mm)
Piston Rod End Fitting A8-VA
Body End Fitting E8-VA
Nominal Force F1 800 N
Indicated by K.-No. on delivery

The end fittings are interchangeable.



Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 20 mm (depending on the stroke).

Progression: Approx. 32 %, F2 max. 1560 N

Available force range F1 at 20 °C: 100 N to 1200 N

Material: Piston rod, body and end fittings: material 1.4301/1.4305.

On request: Without damping, increased end position damping, lockable rod shroud, special force curves, special lengths, alternative end fittings. Gas springs and accessories: material 1.4404/1.4571 (V4A).

ACE Stoßdämpfer GmbH · PO Box 1510 · D-40740 Langenfeld · Tel. +49-2173-9226-80 · Fax +49-2173-9226-89 · E-Mail: info@acecontrols-int.com

137

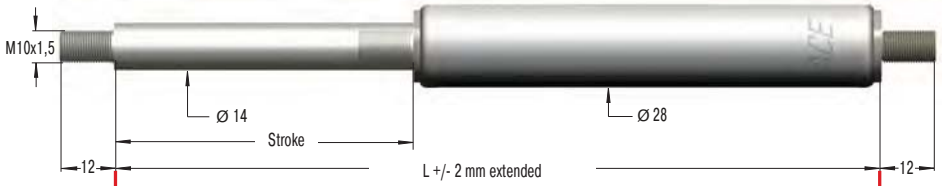
Industrial Gas Springs GS-28-VA (Push Type)

Extension Forces 150 N to 2 500 N
(when Piston Rod Compressed up to 3 800 N)

NEW

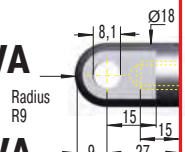
End Fitting | **Standard Dimensions** | **End Fitting**

B10

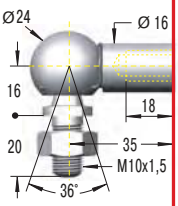


Stud Thread B10

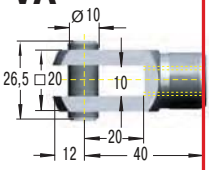
A10-VA



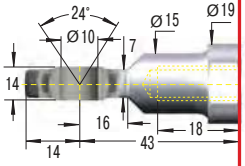
C10-VA



D10-VA



E10-VA



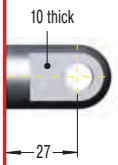
Dimensions

Type	Stroke mm	L extended
GS-28-100-VA	100	262
GS-28-150-VA	150	362
GS-28-200-VA	200	462
GS-28-250-VA	250	562
GS-28-300-VA	300	662
GS-28-350-VA	350	762
GS-28-400-VA	400	862
GS-28-450-VA	450	962
GS-28-500-VA	500	1 062
GS-28-550-VA	550	1 162
GS-28-600-VA	600	1 262
GS-28-650-VA	650	1 362

Ordering Example **GS-28-150-EE-1200-VA**

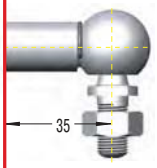
Type (Push Type)
Body Ø (28 mm)
Stroke (150 mm)
Piston Rod End Fitting E10-VA
Body End Fitting E10-VA
Nominal Force F_1 1200 N
Indicated by K.-No. on delivery

The end fittings are interchangeable.
Strokes also available up to 750 mm.

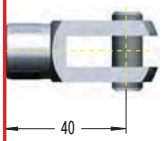


Eye A10-VA

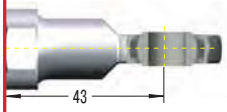
Angle Ball Joint C10-VA
(Max. permitted force 1750 N)



Clevis Fork D10-VA

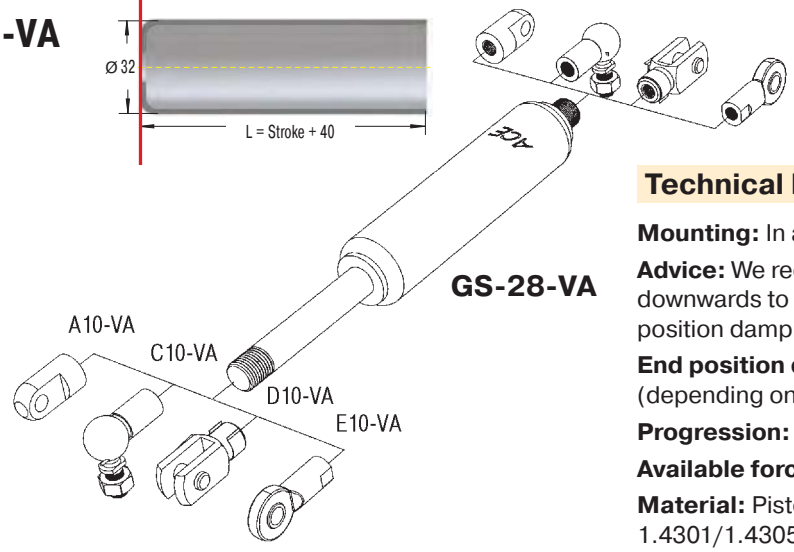


Swivel Eye E10-VA



Adjuster Knob U10-VA
See page 120.

W10-28-VA
Rod Shroud



Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 20 mm (depending on the stroke).

Progression: Approx. 52 %, F_2 max. 3 800 N

Available force range F_1 at 20 °C: 150 to 2500 N

Material: Piston rod, body and end fittings: material 1.4301/1.4305.

On request: Without damping, increased end position damping, special force curves, special lengths, alternative end fittings. Gas Springs and accessories: material 1.4404/1.4571 (V4A).

Large Industrial Gas Springs GS-40-VA (Push Type)

Extension Forces 500 N to 5000 N
(when Piston Rod Compressed up to 7000 N)

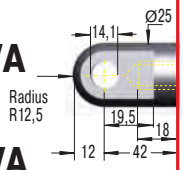
NEW

End Fitting | **Standard Dimensions** | **End Fitting**

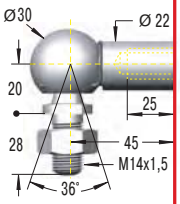
B14

Stud Thread B14

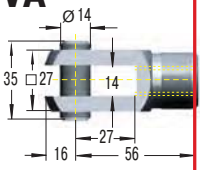
A14-VA



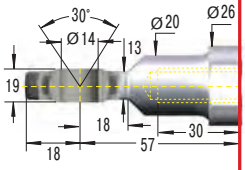
C14-VA



D14-VA



E14-VA



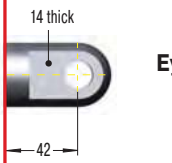
Dimensions

Type	Stroke mm	L extended
GS-40-100-VA	100	317
GS-40-150-VA	150	417
GS-40-200-VA	200	517
GS-40-300-VA	300	717
GS-40-400-VA	400	917
GS-40-500-VA	500	1 117
GS-40-600-VA	600	1 317

Ordering Example **GS-40-150-DD-3500-VA**

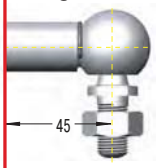
Type (Push Type)
Body Ø (40 mm)
Stroke (150 mm)
Piston Rod End Fitting D14-VA
Body End Fitting D14-VA
Nominal Force F_1 3500 N
Indicated by K.-No. on delivery

The end fittings are interchangeable.
Strokes also available up to 1000 mm.

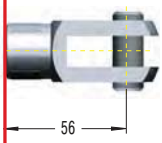


Eye A14-VA

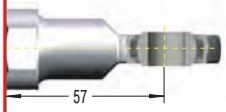
Angle Ball Joint C14-VA
(Max. permitted force 3200 N)



Clevis Fork D14-VA

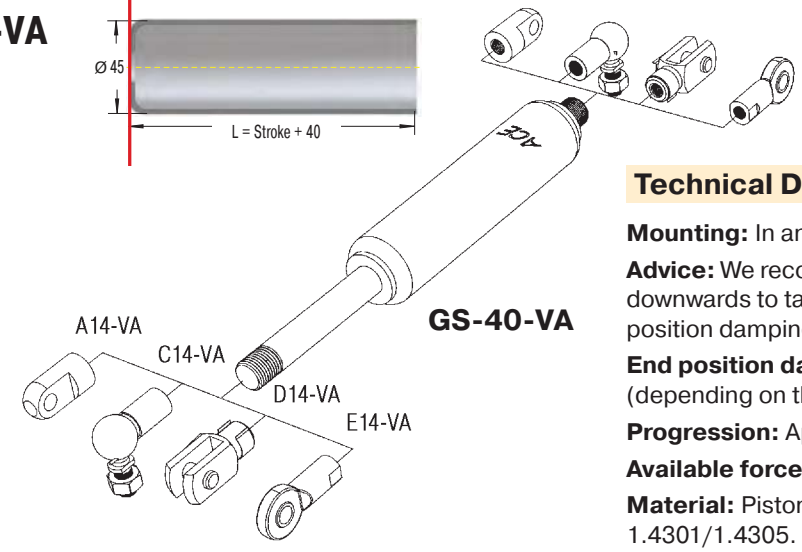


Swivel Eye E14-VA



Adjuster Knob U14-VA
See page 120.

W14-40-VA
Rod Shroud



Technical Data

Mounting: In any position

Advice: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 30 to 70 mm (depending on the stroke).

Progression: Approx. 40%, F_2 max. 7000 N

Available force range F_1 at 20 °C: 500 to 5000 N

Material: Piston rod, body and end fittings: material 1.4301/1.4305.

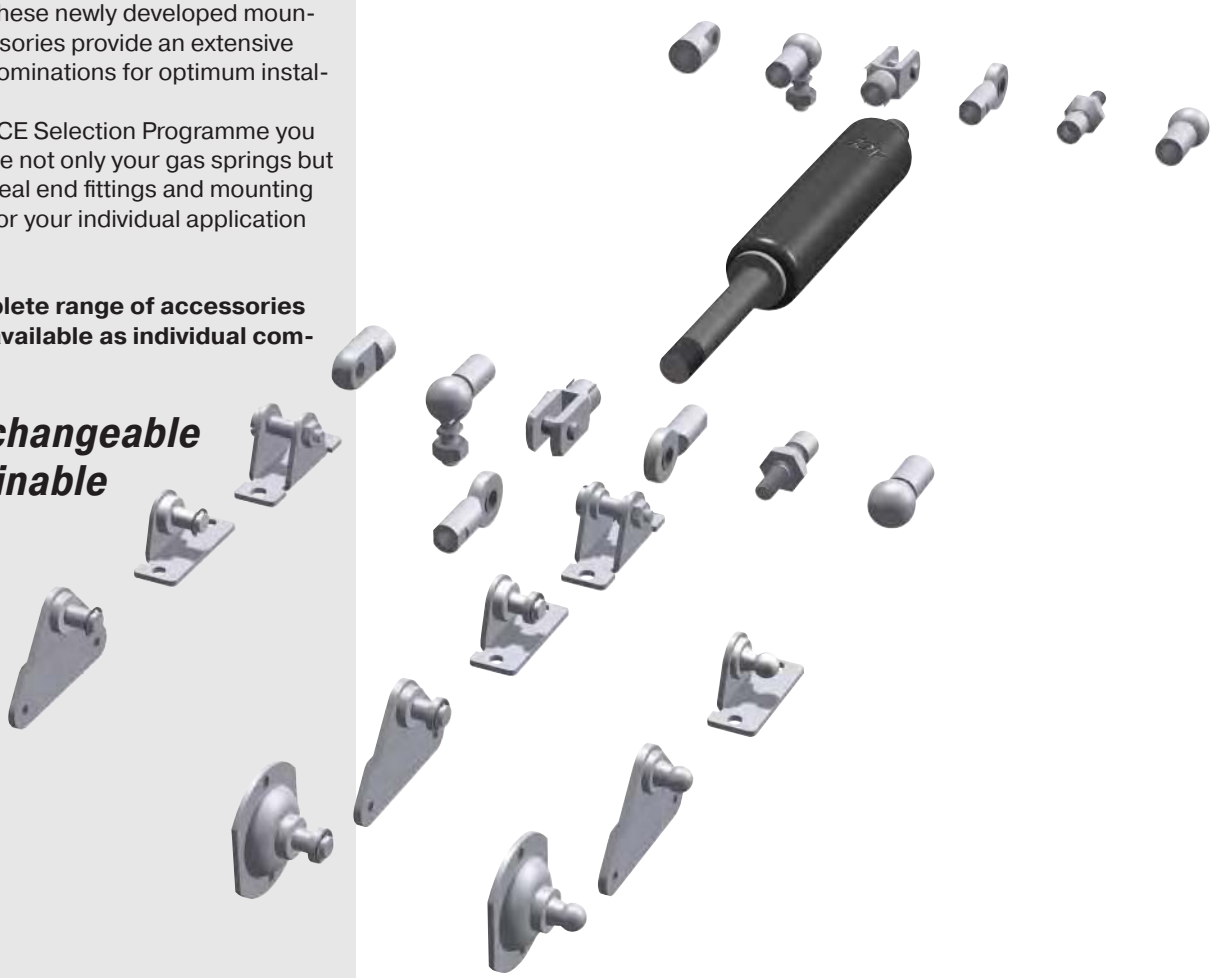
On request: Without damping, increased end position damping, special force curves, special lengths, alternative end fittings. Gas Springs and accessories: material 1.4404/1.4571 (V4A).

Just drill 4 holes – ACE does all the rest!

By taking advantage of the very extensive range of ACE end fittings and mounting brackets you can easily and simply install our gas springs and hydraulic dampers. You profit from the variety of DIN Standard end fittings such as swivel eyes, clevis forks, angle ball joints, inline ball joints, and complementary ball sockets. ACE also offers eye fittings made of wear resistant steel to meet the higher specification requirements found in industrial applications. With over 30 different types available these newly developed mounting accessories provide an extensive range of cominations for optimum installations.
With the ACE Selection Programme you can choose not only your gas springs but also the ideal end fittings and mounting brackets for your individual application example.

The complete range of accessories are also available as individual components.

Interchangeable Combinable

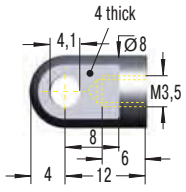


The wide range of mounting brackets available

140

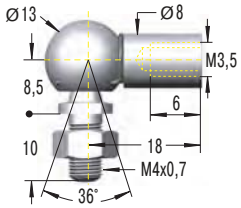
Accessories M3.5x0.6 GS-8, GS-10, GS-12, HB-12

A3.5 Eye



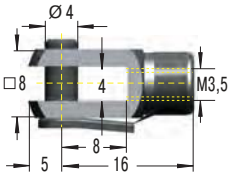
¹ max. force 225 N

C3.5 Angle Ball Joint DIN 71802



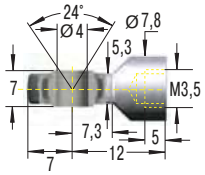
¹ max. force 225 N

D3,5 Clevis Fork DIN 71752



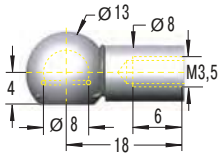
¹ max. force 225 N

E3,5 Swivel Eye DIN 648



¹ max. force 225 N

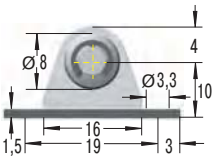
G3,5 Ball Socket DIN 71805



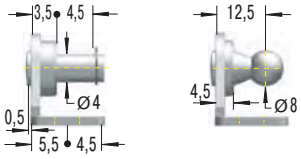
¹ max. force 225 N

¹ max. force 180 N

NA3.5

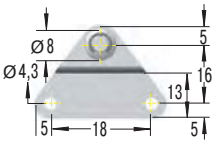


NG3.5

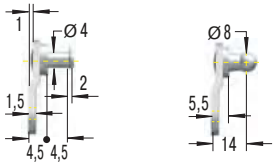


¹ max. force 180 N

OA3.5

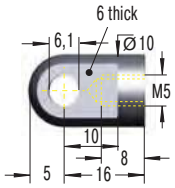


OG3.5



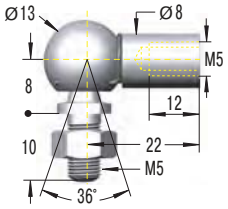
Accessories M5x0.8 GS-15, HB-15

A5 Eye



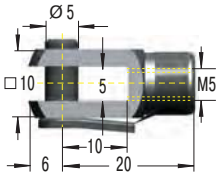
¹ max. force 800 N

C5 Angle Ball Joint DIN 71802



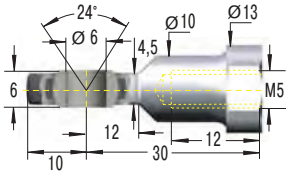
¹ max. force 500 N

D5 Clevis Fork DIN 71752



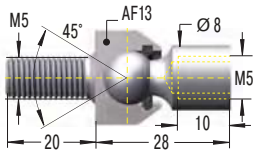
¹ max. force 800 N

E5 Swivel Eye DIN 648



¹ max. force 800 N

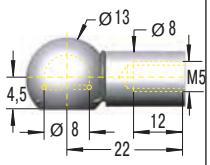
F5 Inline Ball Joint



Attention! Must only be used with compression loads.

¹ max. force 500 N

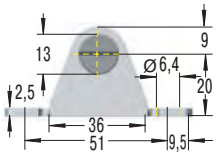
G5 Ball Socket DIN 71805



¹ max. force 500 N

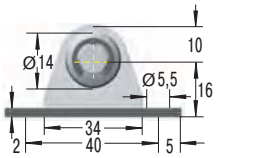
¹ max. force 500 N

MA5

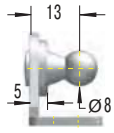


¹ max. force 500 N

NA5

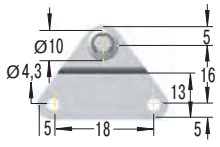


NG5

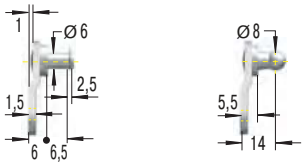


¹ max. force 180 N

OA5

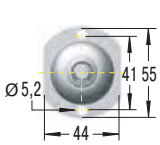


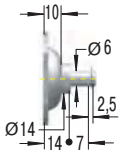
OG5



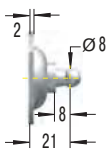
¹ max. force 500 N

PA5





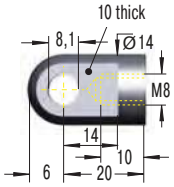
PG5



¹ Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.

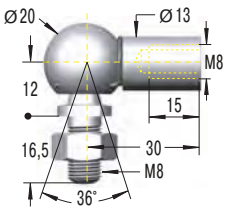
Accessories M8x1.25 GS-19, GS-22, GZ-19, HB-22, HB-28, HBS-28, DVC-32

A8 Eye



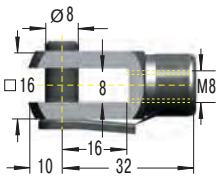
[1] max. force 3 000 N

C8 Angle Ball Joint DIN 71802



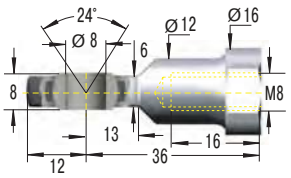
[1] max. force 1 200 N

D8 Clevis Fork DIN 71752



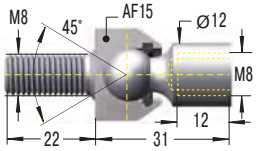
[1] max. force 3 000 N

E8 Swivel Eye DIN 648



[1] max. force 3 000 N

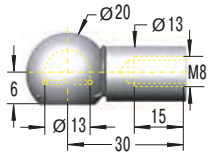
F8 Inline Ball Joint



Attention! Must only be used with compression loads.

[1] max. force 1 200 N

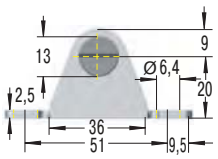
G8 Ball Socket DIN 71805

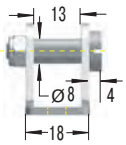


[1] max. force 1200 N

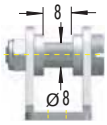
[1] max. force 1 800 N

MA8



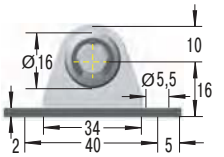


ME8

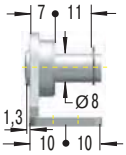


[1] max. force 1 200 N

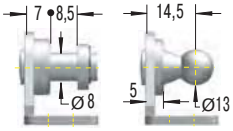
NA8



NE8

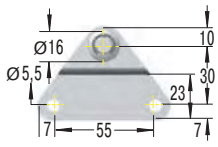


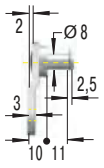
NG8



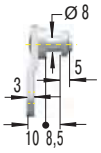
[1] max. force 1 200 N

OA8





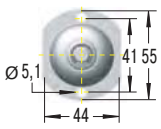
OE8



OG8

[1] max. force 1 200 N

PA8

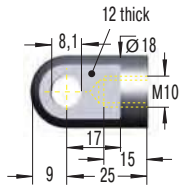


PE8

PG8

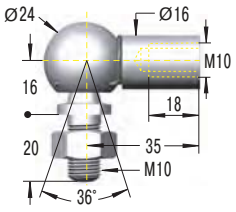
Accessories M10x1.5 GS-28, GZ-28, HBS-35

A10 Eye



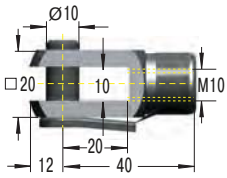
[1] max. force 10 000 N

C10 Angle Ball Joint DIN 71802



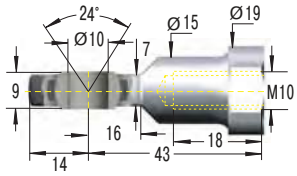
[1] max. force 1 800 N

D10 Clevis Fork DIN 71752



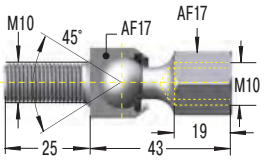
[1] max. force 10 000 N

E10 Swivel Eye DIN 648



[1] max. force 10 000 N

F10 Inline Ball Joint

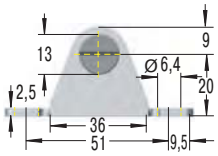


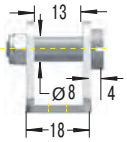
Attention! Must only be used with compression loads.

[1] max. force 1 800 N

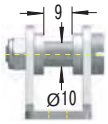
[1] max. force 1 800 N

MA10



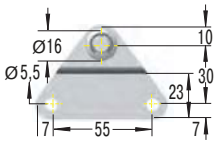


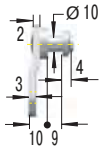
ME10



[1] max. force 1 200 N

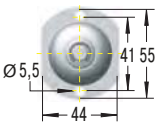
OE10





1 max. force 1 200 N

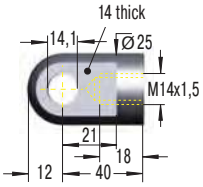
PE10



[1] Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.

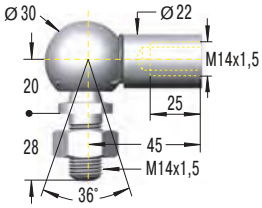
Accessories M14x1.5 GS-40, HB-40

A14 Eye



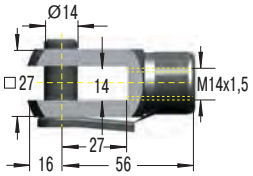
[1] max. force 10 000 N

C14 Angle Ball Joint DIN 71802



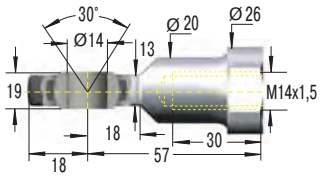
[1] max. force 3 200 N

D14 Clevis Fork DIN 71752



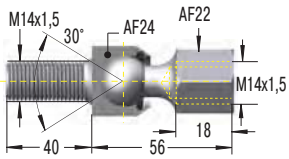
[1] max. force 10 000 N

E14 Swivel Eye DIN 648



[1] max. force 10 000 N

F14 Inline Ball Joint

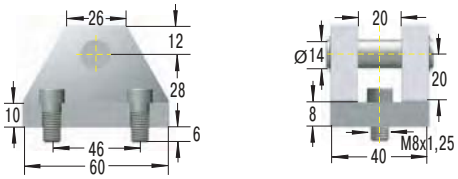


Attention! Must only be used with compression loads.

[1] max. force 3 200 N

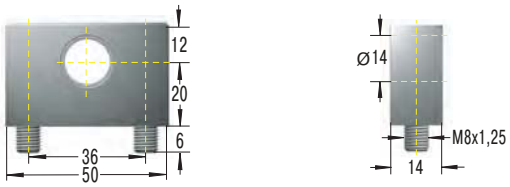
ME14

[1] max. force 10 000 N



ND14

[1] max. force 10 000 N

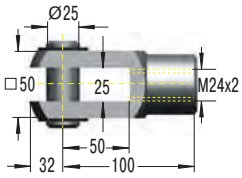


[1] Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.

Accessories M24x2 GS-70, HB-70, HBS-70

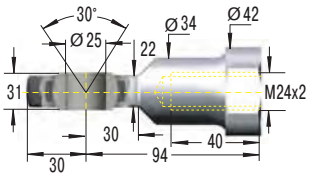
D24 Clevis Fork DIN 71752

[1] max. force 50 000 N



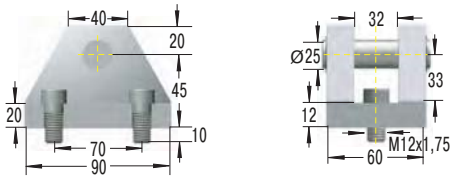
E24 Swivel Eye DIN 648

[1] max. force 50 000 N



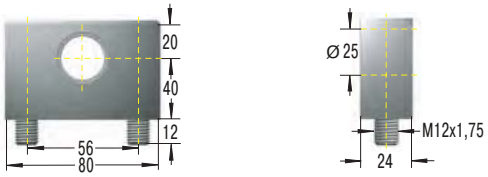
ME24

[1] max. force 50 000 N

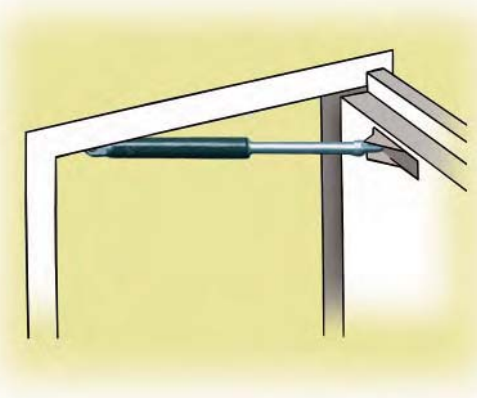


ND24

[1] max. force 50 000 N



[1] Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.



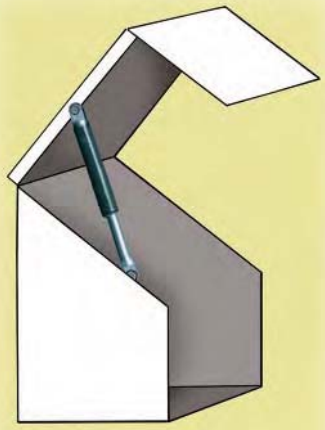
Doors open and close safely

ACE industrial gas springs make opening and closing doors of rescue helicopters easier.

The maintenance-free, sealed systems are installed in the access doors of helicopters of the type EC 135. There, they allow the crew to enter or exit the helicopter quickly, thus contributing to enhanced safety.

The **GS-19-300-CC** gas springs provide a defined retraction speed and secure engagement of the door lock. The integrated end position damper allows gentle closing of the door and saves wear and tear on the valuable, lightweight material.

Industrial gas springs: For safety entry and exit



Protection under the hood

ACE industrial gas springs prevent injuries during maintenance work on harvesting machines.

The blades of corn pickers are arranged under plastic hoods, which assure proper material flow within the machine. For maintenance purposes, the hoods, weighing about 7 kg, must be lifted up. To protect maintenance personnel from injury by falling hoods, they are kept in the open position by industrial gas springs of the type **GS-22-250-DD**.

Another advantage they offer is their stability under rough operating conditions due to their ceramic hardness structure on the piston rod and the powder-coated housing.

Enhanced protection: Industrial gas springs secure heavy hoods

Issue 9.2007 Specifications subject to change

FAX REQUEST

Company

Name

Department/Position

Street/PO Box

Postcode/City

Country

Telephone/Fax

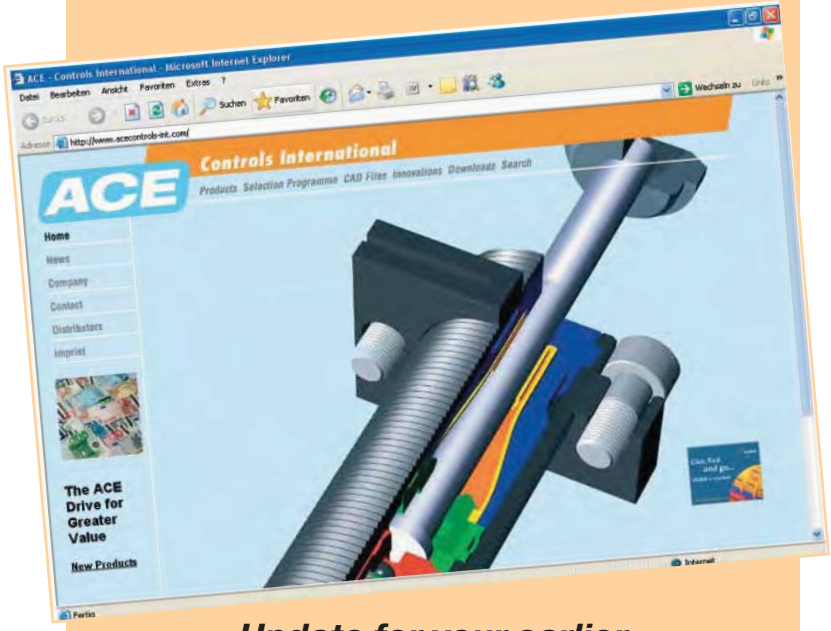
E-Mail

Internet

YES! We are interested in:

- ☐ further copy of the new ACE Catalogue.
- ☐ the new ACE CAD-Library with selection programme on CD-Rom. 2D- and 3D-version (standard formats).
- ☐ Training at our site.
- ☐ Technical assistance at our site.

Latest CAD-library and selection programme online

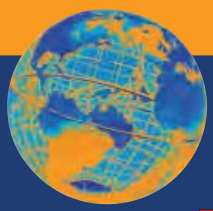


Update for your earlier version via internet! www.acecontrols-int.com

Fax to +49-2173-9226-89

Issue 9.2007 Specifications subject to change

ACE Worldwide



ARGENTINA
CAMOZZI NEUMATICA S.A.
Prof. Dr. Pedro Chutro 3048
1437 Buenos Aires, Argentina
Tel.: +54-11 49110816
Fax: +54-11 49124191

AUSTRALIA
IMI NORGREN LTD.
33 South Corporate Av.
Rowville, Victoria 3178, Australia
Tel.: +61-3 9213 0800
Fax: +61-3 9213 0898

AUSTRIA
ACE STOSSDÄMPFER GMBH
Herzogstraße 26-28, 40764 Langenfeld
Germany
Tel.: +49-2173-9226-70
Fax: +49-2173-9226-29
(Vertriebspartner auf Anfrage)

BELGIUM
ACE STOSSDÄMPFER GMBH
Herzogstraße 26-28, 40764 Langenfeld
Germany
Tel.: +49-2173-9226-70
Fax: +49-2173-9226-29
(Vertriebspartner auf Anfrage)

BRAZIL
OBR EQUIPAMENTOS
INDUSTRIAIS LTDA.
Rua Piratuba, 1573, Bom Retiro
Joinville-SC (South Brazil)
CEP 89.222-365, Brazil
Tel.: +55-0800 704 3698 / 47 3435 44 64
Fax: +55-47 3425 90 30

CANADA
COWPER LTD.
677 7th Avenue, Lachine, Quebec H8S 3A1
Tel.: +1-514-637-6746
Fax: +1-514-637-5055

CHILE
TAYLOR AUTOMATIZACION S. A.
A.V. Vicuna Mackenna, # 1589 Santiago
Chile
Tel.: +56-25 55 15 16
Fax: +56-25 44 19 65

CHINA
DANYAO TRADING CO. LTD.
No. 209, Lane 1181, Xiuyan Rd.
Nanhui District, Shanghai 201315
China
Tel.: +86-21-6819-8501
Fax: +86-21-6819-8503

IMI NORGREN LTD.
6th Floor, Benson Tower, 74 Hung To Road,
Kwun Tong, Kowloon, Hongkong
Tel.: +852-24 92 76 08
Fax: +852-24 92 76 78

UNIVERSE TECHNOLOGY LTD.
Flat E, 17/F., Mai On Ind. Bldg.
17 Kukng Yip St., Kwi Chung, Hongkong
Tel.: +852-26 19 00 13
Fax: +852-26 19 02 73

CROATIA AND BOSNIA
BIBUS ZAGREB D.O.O.
Anina 91, 10000 Zagreb, Croatia
Tel.: +385-1 3818 006
Fax: +385-1 3818 005

CZECH REPUBLIC
BIBUS S.R.O.
Videnska 125, 639 27 Brno, Czech Republic
Tel.: +420-547 125 300
Fax: +420-547 125 310

DENMARK
AVN PNEUMATIK A-S
Dalager 1, 2605 Broendby, Denmark
Tel.: +45-70 20 04 11
Fax: +45-43 24 55 00

FINLAND
NESTEPAINE OY
Makituvantie 11, 01510 Vantaa, Finland
Tel.: +358-20 765 165
Fax: +358-20 765 7666

FRANCE
BIBUS FRANCE
ZI du Chapotin, 69970 Chaponnay, France
Tel.: +33-4 78 96 80 00
Fax: +33-4 78 96 80 01

GREAT BRITAIN
ACE CONTROLS INTERNATIONAL
Belvedere Road, Newton-Le-Willows
Merseyside, WA12 0JJ, U.K.
Tel.: +44-19 25 22 71 71
Fax: +44-19 25 22 93 23

GREECE
PNEUMATEC
INDUSTRIAL AUTOMATION SYSTEMS
91 Spirou Patsi Street, Athens 11855, Greece
Tel.: +302-1 03412101 / 3413930
Fax: +302-1 03413930

HUNGARY
BIBUS KFT.
1103 Budapest, Ujhegyi ut 2, Hungary
Tel.: +36-1265 27 33
Fax: +36-1264 89 00

INDIA
MACO CORPORATION (INDIA)
PVT. LTD.
2/5 Sarat Bose Road, "Sukh Sagar" 7th Floor,
7A, Kolkata - 700020, Calcutta, India
Tel.: +91-33 24 75 83 71 / 85 00 / 24 54 32 81
Fax: +91-33 24 54 32 69

3D EQUIPMENT
319 Maheswari Chambers, 6-3-650 Somajiguda
Hyderabad 500 082, India
Tel.: +91-40 6666 8109
Fax: +91-40 6662 8727

IRELAND
IRISH PNEUMATIC SERVICES LTD.
Unit 2014, City West Business Campus
Saggart, Co. Dublin, Ireland
Tel.: +353-14 66 02 00
Fax: +353-14 66 01 58

ISRAEL
ILAN & GAVISH
AUTOMATION SERVICE LTD.
24, Shenkar Street, Qiryat-arie 49513
PO Box 10118, Petha-Tiqva 49001, Israel
Tel.: +972-39 22 18 24
Fax: +972-39 24 07 61

ITALY
R.T.I. S.R.L.
Via Chambery 93/107V, 10142 Torino, Italy
Tel.: +39-011-70 00 53 / 70 02 32
Fax: +39-011-70 01 41

JAPAN
ACE CONTROLS JAPAN L.L.C.
Room 31 Tanaka Bldg., 2-9-6 Kanda-Tacho
Chiyoda-Ku, Tokyo 101-0046, Japan
Tel.: +81-3 52 97 25 10
Fax: +81-3 52 97 25 17

KOREA
SEOWON CORPORATION
1001 Ilsan Technotown, 1141-1 Beksuk-Dong
Ilsandong-Gu, Goyang City
Gyunggi-Do, 410-722, South Korea
Tel.: +82-31 906 1100
Fax: +82-31 906 1101

LUXEMBOURG
ACE STOSSDÄMPFER GMBH
Herzogstraße 26-28, 40764 Langenfeld
Germany
Tel.: +49-2173-9226-70
Fax: +49-2173-9226-29
(Vertriebspartner auf Anfrage)

MALAYSIA
HOERBIGER-ORIGA SDN BHD
10 & 12, Lorong IKS Juru 3
Juru, 14100 Simpang Ampat
Penang, Malaysia
Tel.: +60-(0)4 508 1011
Fax: +60-(0)4 508 2122

MEXICO
KOPAR S.A. DE C.V.
Tomas Alva Edison 3116
Fraccionamiento Industrial
Monterrey, N.L. 64299 Mexico
Tel.: +52-81 1257-5000
Fax: +52-81 8331-4031

NETHERLANDS
ACE STOSSDÄMPFER GMBH
Herzogstraße 26-28, 40764 Langenfeld
Germany
Tel.: +49-2173-9226-70
Fax: +49-2173-9226-29
(Vertriebspartner auf Anfrage)

NEW ZEALAND
IMI NORGREN (N.Z.) LTD.
3-5 Walls Road, PO Box 12-893, Penrose
Auckland, New Zealand
Tel.: +64-95 79 01 89
Fax: +64-95 26 33 99

NORWAY
OILTECH AS.
Dynamitveien 23, Postboks 133
1401 Ski, Norway
Tel.: +47-64 91 11 80
Fax: +47-64 91 11 81

HYDNET AB
Turebergsvagen 5, 191 47 Sollentuna
Sweden
Tel.: +46-8 59 470 470
Fax: +46-8 59 470 479

PAKISTAN
J.J. HYDRAULICS &
PNEUMATICS
Hotel Metropole Bldg.
Room 127, 1st Floor
Club Road, Karachi, Pakistan 75520
Tel.: +92-2 15 66 10 63
Fax: +92-2 15 66 10 65

POLAND
BIBUS MENOS SP.Z.O.O.
ul. Tadeusza Wendy 7/9, 81-341 Gdynia
Poland
Tel.: +48-5 86 60 95 70
Fax: +48-5 86 61 71 32

PORTUGAL
AIRCONTROL S.A.
Paseo Sarroeta 4, 20014 San Sebastian
Spain
Tel.: +34-943 44 50 80
Fax: +34-943 44 51 53

PUERTO RICO
P & C COMPANY
PO Box 120, Canovanas
Puerto Rico 00729
Tel.: +1787-7 68 50 33
Fax: +1787-7 50 68 20

ROMANIA
BIBUS SES S.R.L.
Pestalozzi 22, 300155 Timisoara
Romania
Tel.: +40-256 200 500
Fax: +40-256 220 666

RUSSIA
BIBUS O.O.O.
Izmailovsky prospect 2, letter A
190005 St. Petersburg, Russia
Tel.: +7-812 251 62 71
Fax: +7-812 251 90 14

Lublinskaya street 42, office 500
109387 Moskow, Russia
Tel. +7-495 748 43 57
Fax +7-495 748 16 42

SINGAPORE
HOERBIGER-ORIGA PTE. LTD.
Block 5012 Ang Mo Kio Avenue 5#05-01
TECHplace II, Singapore 569876
Tel.: +65-64 83 29 59
Fax: +65-64 83 29 79

NORGREN PTE. LTD.
16 Tuas Street, Singapore 638453
Tel.: +65-68 62 18 11
Fax: +65-68 62 19 17

SLOVAKIA
BIBUS SK S.R.O.
Priemyselna 4, 94901 Nitra, Slovakia
Tel.: +421-37-741-2525
Fax: +421-37-651-6701

SLOVENIA
INOTEH D.O.O.
Ruska cesta 34, 2345 Bistrica ob Dravi
Slovenia
Tel.: +386-02 665 1131
Fax: +386-02 665 2081

SOUTH AFRICA
ISANDO PNEUMATICS (PTY) LTD.
1, Skietlood Street, Isando ext. 3
PO Box 441, Isando 1600, South Africa
Tel.: +27-11 974-5176
Fax: +27-11 974-6137

SPAIN
AIRCONTROL S. A.
Paseo Sarroeta 4, 20014 San Sebastian
Spain
Tel.: +34-943 44 50 80
Fax: +34-943 44 51 53

SWEDEN
HYDNET AB
Turebergsvagen 5, 191 47 Sollentuna
Sweden
Tel.: +46-8 59 470 470
Fax: +46-8 59 470 479

SWITZERLAND
BIBUS AG
Allmendstrasse 26, 8320 Fehraltorf
Switzerland
Tel.: +41-44-877 50 11
Fax: +41-44-877 58 51

TAIWAN
DANYAO TRADING CO. LTD.
7F, NO. 19, Chung-Cheng Road
Hsin-Chuang City, 242
Taipei County, Taiwan
Tel.: +886-2 22 76 82 00
Fax: +886-2 22 76 75 73

THAILAND
B-TAC AUTOMATION LTD. PART.
115 Soi Sukhumvit 62/1 Sukhumvit RD.
Bangjak Bangkok 10260
Thailand
Tel.: +66-2-332 5555
Fax: +66-2-332 9988

TURKEY
T.M.G. PNEUMATIC &
HYDRAULIC LTD.
Necatibey Cad No. 44/2
34420 Karakoy, Turkey
Tel.: +90-21 22 93 82 00
Fax: +90-21 22 49 88 34

UKRAINE
CENTRENERGOMASH
Pobeda avenue, 136-34
03115 Kyiv, Ukraine
Fax: +380-44 403-28-20
E-mail: centreenergo@ukr.net

USA
ACE CONTROLS
INTERNATIONAL INC.
PO Box 71, Farmington
Michigan 48024, USA
(and in all states)
Tel.: +1-248-476-0213
Fax: +1-248-476-2470

ООО "ЦЕНТРЭНЕРГОМАШ" Украина, 03115 г. Киев, пр-т Победы, 136 к. 34
тел/факс: +38(044) 403-28-20, e-mail: centreenergo@ukr.net, web: www.centrenergomash.com.ua