Damping Technology

ACE: Your partner for industrial shock absorbers, gas springs and vibration control

Main Catalog 2018
North America
Complete Product Range
Data Sheets & Catalogs
CAD Database
Free Calculation Programs
Distributors
Services
News
etc.

www.acecontrols.com
Dear customer,

You have made the right decision.

You will find over 280 pages of comprehensive information on the application fields of automation control (single direction of movement, i.e. deceleration), motion control (bidirectional movement, i.e. gas springs and dampers), vibration control and safety products. Each section is marked with a different color. This integrated concept is reflected in all documentation and on our www.acecontrols.com website. We also offer an ACE YouTube channel, extensive CAD library and calculation aids.

Innovations can as usual be found in the table of contents and on the individual catalogue pages.

ACE products assist you in making your production and processes faster, more efficient, quieter, easier, safer and more sustainable – underpinned by ACE product quality and our 5-star service.

Yours,
Jürgen Roland (Managing Director)

Free Application & Engineering Support
Tell us about your requirements and take advantage of our more than 50 years of expert knowledge in damping technology. Our specialists in engineering discuss your requirements with you and demonstrate our capabilities. Take advantage of our service hotline:

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Our regional managers are genuine product specialists. They will visit you onsite and work out customized solutions for you.

ACE service support and products are available in more than 40 countries worldwide.

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With our user-friendly calculation program, you can select the right product – online or via download. The CAD data is available in all standard formats in 2D and 3D.

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Our specialist engineers create detailed technical solutions for you including assembly suggestions and details on machine loads, brake time and workload etc.
Automation Control

Motion Control

Vibration Control

Safety Products

Certified Quality

ACE products are exclusively manufactured from high quality and environmentally friendly materials. With constant quality monitoring and performance testing, we guarantee the highest quality products.

ACE pursues continual improvement throughout the production process in order to reduce material and energy consumption, the production of damaging substances and works to recycle or dispose of end products as gently as possible.

It is important to us to keep the strain on the environment as low as possible and simultaneously improve our services.

With ongoing optimization of our products, we strive to provide our customers with well designed products which are smaller, more effective and energy saving.
Our Total Product Range

Automation Control Equipment

Miniature Shock Absorbers, Industrial Shock Absorbers, Heavy Industrial Shock Absorbers, Profile Dampers, Damping Pads

Industrial Gas Springs (push type), Industrial Gas Springs (pull type), Hydraulic Dampers, Hydraulic Feed Controls, Rotary Dampers

Rubber-Metal Isolators, Vibration-Isolating Pads, Low Frequency Pneumatic Leveling Mounts

Safety Shock Absorbers, Safety Dampers, Clamping Elements

We are your Specialists for Industrial Damping Technology

ACE is the world’s globally recognized specialist in the field of industrial damping technology – with agencies in 45 countries on all continents. ACE was founded in Farmington Hills, Michigan in 1962.

ACE customers benefit from sophisticated solutions, valuable innovations and exemplary service around the topic of damping technology. Through close cooperation with leading engineering companies, ACE has established itself as a pioneer in the field of technical progress in damping technology.

This catalog is our attempt to provide a comprehensive service, including all the information you need to find solutions to your damping technology and vibration isolation challenges.

ACE develops, produces and sells a wide range of damping products. It comprises industrial and safety shock absorbers, profile dampers, rotary dampers, industrial gas springs, hydraulic dampers, vibration isolators, air springs and hydraulic feed controls.

Our advanced products are designed and engineered to help forward-thinking companies quickly, gently and precisely slow down moving masses or to isolate harmful vibrations.
# ACE Product Variety

Concentrated knowledge on more than 280 pages

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Automation Control

Miniature Shock Absorbers, Industrial Shock Absorbers
Heavy Industrial Shock Absorbers, Profile Dampers
Damping Pads
Optimum Customization
Tailor-made solutions for any application

ACE universal damping solutions convert kinetic energy into heat. This makes machines faster, quieter, more durable, lighter and therefore more competitive and profitable.

Here you will find the perfect selection of machine elements, which turn damaging forces into harmless heat. These solutions from ACE smoothly decelerate moving loads. This involves the lowest possible stress on machines, which makes the damping products from ACE so valuable.
Industrial Shock Absorbers

Standard-setting damping solutions

The name says it all. ACE is considered the technology and market leader worldwide for small, medium-sized and heavy industrial shock absorbers is a result of the successful blend of quality, performance and the durability of the solutions.

ACE provides the right shock absorber for every industrial application. Over 200 different models are available, from the smallest model with a 4 mm stroke up to the biggest with 406 mm.

Whether self-compensating or adjustable, with ACE dampers between 0.68 Nm/cycle and 126,500 Nm/cycle can be absorbed and effective weights between 500 g and 204 t can be decelerated with great precision.

In addition, ACE damping solutions impress with knowledgeable consulting, exemplary service and ideal matching accessories.
Comparison of Different Damping Elements

When it comes to slowing down moving masses with constant damping force through the stroke, the industrial shock absorber is the right choice. A comparison demonstrates the differences of the damping elements.

**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.

**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.

**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.

**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.

![Comparison of Different Damping Elements](image)

The comparison shows the differences of the damping in a direct comparison of stopping force to stopping stroke.

**Function of the Pressure Chamber**

If a moving mass hits the industrial shock absorber, the piston puts the oil in the pressure chamber into motion. The oil is pressed through the metering orifices, which converts the discharged energy into heat. The metering orifices are arranged on the stroke so that the mass is dulled with a constant damping force. The hydraulic pressure is maintained throughout the entire braking process nearly constant.

![Function of the Pressure Chamber](image)

*The load velocity reduces continually 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.

\[ F = \text{force (N)}, \ p = \text{internal pressure (bar)} \]
\[ s = \text{stroke (m)}, \ t = \text{deceleration time (s)}, \ v = \text{velocity (m/s)} \]
Calculation Data for the Design of Industrial Shock Absorbers

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

1. **Weight to be decelerated** (weight) \( W \) [kg]
2. **Impact velocity at shock absorber** \( v_0 \) [m/s]
3. **Propelling force** \( F \) [N]
4. **Cycles per hour** \( c \) [/hr]
5. **Number of absorbers in parallel** \( n \)

**Key to symbols used**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
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<tbody>
<tr>
<td>( E_1 )</td>
<td>Kinetic energy per cycle [Nm]</td>
</tr>
<tr>
<td>( E_2 )</td>
<td>Propelling force energy per cycle [Nm]</td>
</tr>
<tr>
<td>( E_3 )</td>
<td>Total energy per cycle ( (E_1 + E_2) ) [Nm]</td>
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<tr>
<td>( E_4 )</td>
<td>Total energy per hour ( (E_3 \cdot c) ) [Nm/hr]</td>
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<tr>
<td>( W_0 )</td>
<td>Effective weight [kg]</td>
</tr>
<tr>
<td>( W )</td>
<td>Weight to be decelerated [kg]</td>
</tr>
<tr>
<td>( n )</td>
<td>Number of shock absorbers (in parallel)</td>
</tr>
<tr>
<td>( v )</td>
<td>Velocity at impact [m/s]</td>
</tr>
<tr>
<td>( v_0 )</td>
<td>Impact velocity at shock absorber [m/s]</td>
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<tr>
<td>( \omega )</td>
<td>Angular velocity at impact [rad/s]</td>
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<td>( F )</td>
<td>Propelling force [N]</td>
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<tr>
<td>( c )</td>
<td>Cycles per hour [1/hr]</td>
</tr>
<tr>
<td>( P )</td>
<td>Motor power [kW]</td>
</tr>
<tr>
<td>( 3 , ST )</td>
<td>Tall torque factor (normally 2.5) 1 to 3</td>
</tr>
<tr>
<td>( T )</td>
<td>Propelling torque [Nm]</td>
</tr>
<tr>
<td>( I )</td>
<td>Moment of Inertia [kgm(^2)]</td>
</tr>
<tr>
<td>( g )</td>
<td>Acceleration due to gravity = 9.81 m/s(^2)</td>
</tr>
<tr>
<td>( H )</td>
<td>Drop height excl. shock absorber stroke [m]</td>
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<tr>
<td>( s )</td>
<td>Shock absorber stroke [m]</td>
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<tr>
<td>( L/R/r )</td>
<td>Radius [m]</td>
</tr>
<tr>
<td>( Q )</td>
<td>Reaction force [N]</td>
</tr>
<tr>
<td>( \mu )</td>
<td>Coefficient of friction</td>
</tr>
<tr>
<td>( t )</td>
<td>Deceleration time [s]</td>
</tr>
<tr>
<td>( a )</td>
<td>Deceleration [m/s(^2)]</td>
</tr>
<tr>
<td>( \alpha )</td>
<td>Side load angle [°]</td>
</tr>
<tr>
<td>( \beta )</td>
<td>Angle of incline [°]</td>
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</tbody>
</table>

¹ All mentioned values of \( E_4 \) in the capacity charts are only valid for room temperature. There are reduced values at higher temperature ranges.

² \( v \) or \( v_0 \) 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 \( (E_3), (E_4), (W_0) \) and the desired shock absorber stroke (s).

**Note:**

When using several shock absorbers in parallel, the values \( (E_3), (E_4) \) and \( (W_0) \) are divided according to the number of units used.

\[
Q = \frac{1.5 \cdot E_3}{s}
\]

\[
t = \frac{2.6 \cdot s}{v_0}
\]

\[
a = \frac{0.75 \cdot v_0^2}{s}
\]

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

#### Industrial Shock Absorbers

**Application**

1. **Weight without propelling force**

   - **Formula**
     
     \[
     E_1 = W \cdot v^2 \cdot 0.5 \\
     E_2 = 0 \\
     E_3 = E_1 + E_2 \\
     E_4 = E_3 \cdot c \\
     v_D = v \\
     W = 100 \text{ kg} \\
     v = 1.5 \text{ m/s} \\
     c = 500 \text{ /hr} \\
     s = 0.050 \text{ m} (\text{chosen}) \\
     \]

   - **Example**

     \[
     E_1 = 100 \cdot 1.5^2 \cdot 0.5 = 113 \text{ Nm} \\
     E_2 = 0 \\
     E_3 = 113 + 0 = 113 \text{ Nm} \\
     E_4 = 113 \cdot 500 = 56500 \text{ Nm/hr} \\
     W = 100 \text{ kg} \\
     \]

     Chosen from capacity chart: Model MC3550-2 self-compensating

2. **Weight with propelling force**

   - **Formula**

     \[
     E_1 = W \cdot v^2 \cdot 0.5 \\
     E_2 = F \cdot s \\
     E_3 = E_1 + E_2 \\
     E_4 = E_3 \cdot c \\
     v_D = v \\
     W = 800 \text{ kg} \\
     v = 1.2 \text{ m/s} \\
     F = 1000 \\text{N} \\
     c = 2.5 \text{ /hr} \\
     s = 0.100 \text{ m} (\text{chosen}) \\
     \]

   - **Example**

     \[
     E_1 = 800 \cdot 1.2^2 \cdot 0.5 = 576 \text{ Nm} \\
     E_2 = 1000 \cdot 2.5 \cdot 0.1 \cdot 1.2 = 834 \text{ Nm} \\
     E_3 = 800 + 834 = 1634 \text{ Nm} \\
     E_4 = 1634 \cdot 100 = 163400 \text{ Nm/hr} \\
     W = 2 \cdot 1634 = 3268 \text{ kg} \\
     \]

     Chosen from capacity chart: Model MC64600-2 self-compensating

   - **Note:** Do not forget to include the rotational energy of motor, coupling and gearbox into calculation for $E_2$.

3. **Weight with motor drive**

   - **Formula**

     \[
     E_1 = W \cdot v^2 \cdot 0.5 \\
     E_2 = 1000 \cdot P \cdot ST \cdot s \cdot v \\
     E_3 = E_1 + E_2 \\
     E_4 = E_3 \cdot c \\
     v_D = v \\
     W = 250 \text{ kg} \\
     v = 1.5 \text{ m/s} \\
     P = 4 \text{ kW} \\
     c = 100 \text{ /hr} \\
     s = 0.050 \text{ m} (\text{chosen}) \\
     \]

   - **Example**

     \[
     E_1 = 250 \cdot 1.5^2 \cdot 0.5 = 281 \text{ Nm} \\
     E_2 = 250 \cdot 9.81 \cdot 0.05 = 25 \text{ Nm} \\
     E_3 = 281 + 25 = 306 \text{ Nm} \\
     E_4 = 306 \cdot 180 = 55080 \text{ Nm/hr} \\
     W = 2 \cdot 306 = 612 \text{ kg} \\
     \]

     Chosen from capacity chart: Model MC4550-2 self-compensating

4. **Weight on driven rollers**

   - **Formula**

     \[
     E_1 = W \cdot v^2 \cdot 0.5 \\
     E_2 = W \cdot g \cdot s \cdot \mu \\
     E_3 = E_1 + E_2 \\
     E_4 = E_3 \cdot c \\
     v_D = v \\
     W = 30 \text{ kg} \\
     H = 0.5 \text{ m} \\
     c = 400 \text{ /hr} \\
     s = 0.050 \text{ m} (\text{chosen}) \\
     \]

   - **Example**

     \[
     E_1 = 30 \cdot 0.5 \cdot 9.81 = 147 \text{ Nm} \\
     E_2 = 30 \cdot 9.81 \cdot 0.05 = 15 \text{ Nm} \\
     E_3 = 147 + 15 = 162 \text{ Nm} \\
     E_4 = 162 \cdot 600 = 97200 \text{ Nm/hr} \\
     W = 2 \cdot 162 = 324 \text{ kg} \\
     \]

     Chosen from capacity chart: Model MC3550-1 self-compensating

   - **Note:** Do not forget to include the rotational energy of motor, coupling and gearbox into calculation for $E_2$.

5. **Swinging weight with propelling force**

   - **Formula**

     \[
     E_1 = W \cdot v^2 \cdot 0.5 - \frac{1}{2} \cdot I \cdot \omega^2 \\
     E_2 = T \cdot s \\
     E_3 = E_1 + E_2 \\
     E_4 = E_3 \cdot c \\
     v_D = v \cdot R \cdot \omega \\
     W = 20 \text{ kg} \\
     v = 1 \text{ m/s} \\
     T = 10 \text{ Nm} \\
     R = 0.5 \text{ m} \\
     L = 0.8 \text{ m} \\
     c = 100 \text{ /hr} \\
     s = 0.010 \text{ m} (\text{chosen}) \\
     \]

   - **Example**

     \[
     E_1 = 20 \cdot 1^2 \cdot 0.5 = 10 \text{ Nm} \\
     E_2 = 10 \cdot 0.012 \cdot 0.5 = 1.7 \text{ Nm} \\
     E_3 = 10 + 1.7 = 11.7 \text{ Nm} \\
     E_4 = 117 \cdot 100 = 11700 \text{ Nm/hr} \\
     \]

     Chosen from capacity chart: Model MC150H self-compensating

     Check the side load angle, $\tan \alpha = \frac{s}{R}$, with regard to "Max. Side Load Angle" in the capacity chart (see example 6.2)

6. **Free falling weight**

   - **Formula**

     \[
     E_1 = W \cdot g \cdot H \\
     E_2 = W \cdot g \cdot s \\
     E_3 = E_1 + E_2 \\
     E_4 = E_3 \cdot c \\
     v_D = \sqrt{2 \cdot g \cdot H} \\
     W = 30 \text{ kg} \\
     H = 0.5 \text{ m} \\
     c = 400 \text{ /hr} \\
     s = 0.050 \text{ m} (\text{chosen}) \\
     \]

   - **Example**

     \[
     E_1 = 30 \cdot 0.5 \cdot 9.81 = 147 \text{ Nm} \\
     E_2 = 30 \cdot 9.81 \cdot 0.05 = 15 \text{ Nm} \\
     E_3 = 147 + 15 = 162 \text{ Nm} \\
     E_4 = 162 \cdot 600 = 97200 \text{ Nm/hr} \\
     \]

     Chosen from capacity chart: Model MC3550-1 self-compensating

   - **Note:** Do not forget to include the rotational energy of motor, coupling and gearbox into calculation for $E_2$. 

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**Issue 04.2018 – Specifications subject to change**

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### Formulas and Calculations

**Industrial Shock Absorbers**

#### Application

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<th>Formula</th>
<th>Example</th>
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</thead>
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<tr>
<td>6.1 Weight rolling/sliding down incline</td>
<td>$E_1 = W \cdot g \cdot H = W \cdot v_D^2 \cdot 0.5$</td>
<td>$W = 500 \text{ kg}$</td>
</tr>
<tr>
<td></td>
<td>$E_2 = W \cdot g \cdot \sin \beta \cdot s$</td>
<td>$H = 0.1 \text{ m}$</td>
</tr>
<tr>
<td></td>
<td>$E_3 = E_1 + E_2$</td>
<td>$c = 200 \text{ /hr}$</td>
</tr>
<tr>
<td></td>
<td>$E_4 = E_3 \cdot c$</td>
<td>$\theta = 10 \text{ °C}$</td>
</tr>
<tr>
<td></td>
<td>$v_D = \sqrt{2 \cdot g \cdot H}$</td>
<td>$E_1 = 500 \cdot 9.81 \cdot 0.1 = 490.5 \text{ Nm}$</td>
</tr>
<tr>
<td></td>
<td>$W = 500 \text{ kg}$</td>
<td>$E_2 = 50 \cdot 9.81 \cdot \sin(10) \cdot 0.075 = 63.9 \text{ Nm}$</td>
</tr>
<tr>
<td></td>
<td>$E_3 = E_1 + E_2$</td>
<td>$E_3 = 490.5 + 63.9 = 554.4 \text{ Nm}$</td>
</tr>
<tr>
<td></td>
<td>$E_4 = E_3 \cdot c$</td>
<td>$E_4 = 554.4 \cdot 200 = 11880.0 \text{ Nm/hr}$</td>
</tr>
<tr>
<td></td>
<td>$v_D = \sqrt{2 \cdot g \cdot H}$</td>
<td>$\text{Chosen from capacity chart:}$</td>
</tr>
<tr>
<td></td>
<td>$E_1 = 500 \cdot 9.81 \cdot 0.1$</td>
<td>$\text{Model MC4575-2 self-compensating}$</td>
</tr>
</tbody>
</table>

| 6.1a propelling force up incline | $E_1 = (F - W \cdot g \cdot \sin \beta) \cdot s$ | $F = 7000 \text{ N}$ |
| 6.1b propelling force down incline | $E_2 = (F + W \cdot g \cdot \sin \beta) \cdot s$ | $F = 4200 \text{ Nm}$ |

| 6.2 Weight free falling about a pivot point | $E_1 = W \cdot g \cdot H$ | $W = 50 \text{ kg}$ |
|                                              | $E_2 = 0$ | $H = 1 \text{ m}$ |
|                                              | $E_3 = E_1 + E_2$ | $c = 50 \text{ /hr}$ |
|                                              | $E_4 = E_3 \cdot c$ | $E_4 = 490.5 \cdot 50 = 24525.0 \text{ Nm/hr}$ |
|                                              | $v_D = \sqrt{2 \cdot g \cdot H \cdot R}$ | $\text{Chosen from capacity chart:}$ |
|                                              | $W = 50 \text{ kg}$ | $\text{Model MC600 self-compensating}$ |

| 7 Rotary index table with propelling torque | $E_1 = W \cdot v^2 \cdot 0.25 \cdot 0.5 \cdot 1 \cdot \omega^2$ | $W = 1000 \text{ kg}$ |
|                                            | $E_2 = \frac{T \cdot s}{R}$ | $v = 1.1 \text{ m/s}$ |
|                                            | $E_3 = E_1 + E_2$ | $T = 300 \text{ Nm}$ |
|                                            | $E_4 = E_3 \cdot c$ | $s = 0.025 \text{ m (chosen)}$ |
|                                            | $v_D = \frac{v \cdot R}{L}$ | $E_3 = 37 \cdot 1200 = 44400 \text{ Nm/hr}$ |
|                                            | $E_1 = 1000 \cdot 1.1^2 \cdot 0.25$ | $E_2 = 300 \cdot 0.025 \cdot 0.8$ |
|                                            | $E_2 = 300 \cdot 0.025 \cdot 0.8$ | $E_3 = 28 + 9$ |
|                                            | $E_3 = 28 + 9$ | $E_4 = 37 \cdot 1200 = 36600 \text{ Nm/hr}$ |
|                                            | $E_4 = 37 \cdot 1200$ | $v_D = 1.1 \cdot 0.8 \cdot 1.25 = 0.8 \text{ m/s}$ |
|                                            | $v_D = 1.1 \cdot 0.8 \cdot 1.25$ | $\text{We} = 2 \cdot 366 \cdot 0.7^2 = 1149 \text{ kg}$ |

| 8 Swinging arm with propelling torque (uniform weight distribution) | $E_1 = W \cdot v^2 \cdot 0.17 \cdot 0.5 \cdot 1 \cdot \omega^2$ | $W = 1000 \text{ kg}$ |
|                                                              | $E_2 = \frac{T \cdot s}{R}$ | $v = 1 \text{ rad/s}$ |
|                                                              | $E_3 = E_1 + E_2$ | $T = 300 \text{ Nm}$ |
|                                                              | $E_4 = E_3 \cdot c$ | $s = 0.025 \text{ m (chosen)}$ |
|                                                              | $v_D = \frac{v \cdot R}{L}$ | $E_3 = 37 \cdot 1200 = 44400 \text{ Nm/hr}$ |
|                                                              | $W = 1000 \text{ kg}$ | $E_1 = 0.5 \cdot 56 \cdot 1^2$ |
|                                                              | $E_2 = 300 \cdot 0.025 \cdot 0.8$ | $E_2 = 28 + 9$ |
|                                                              | $E_3 = 28 + 9$ | $E_4 = 37 \cdot 1200 = 36600 \text{ Nm/hr}$ |
|                                                              | $E_4 = 37 \cdot 1200$ | $v_D = 1.1 \cdot 0.8 \cdot 1.25 = 0.8 \text{ m/s}$ |
|                                                              | $v_D = 1.1 \cdot 0.8 \cdot 1.25$ | $\text{We} = 2 \cdot 37 \cdot 0.8^2 = 116 \text{ kg}$ |

| 9 Swinging arm with propelling force (uniform weight distribution) | $E_1 = W \cdot v^2 \cdot 0.17 \cdot 0.5 \cdot 1 \cdot \omega^2$ | $W = 1000 \text{ kg}$ |
|                                                              | $E_2 = \frac{F \cdot r \cdot s}{R}$ | $v = 2 \text{ m/s}$ |
|                                                              | $E_3 = E_1 + E_2$ | $F = 7000 \text{ N}$ |
|                                                              | $E_4 = E_3 \cdot c$ | $T = 4200 \text{ Nm}$ |
|                                                              | $v_D = \frac{v \cdot R}{L}$ | $s = 0.050 \text{ m (chosen)}$ |
|                                                              | $W = 1000 \text{ kg}$ | $E_3 = 943 \cdot 900$ |
|                                                              | $E_2 = 2 \cdot 0.8 \cdot 1.2$ | $E_4 = 943 \cdot 900 = 848700 \text{ Nm/hr}$ |
|                                                              | $E_3 = 2 \cdot 943 \cdot 1.33^2$ | $v_D = 2 \cdot 0.8 \cdot 1.2 = 1.33 \text{ m/s}$ |
|                                                              | $E_4 = 2 \cdot 943 \cdot 1.33^2$ | $\text{We} = 2 \cdot 943 \cdot 1.33^2 = 1066 \text{ kg}$ |

| 10 Weight lowered at controlled speed | $E_1 = W \cdot v^2 \cdot 0.5$ | $W = 6000 \text{ kg}$ |
|                                      | $E_2 = W \cdot g \cdot s$ | $v = 1.5 \text{ m/s}$ |
|                                      | $E_3 = E_1 + E_2$ | $s = 0.305 \text{ m (chosen)}$ |
|                                      | $E_4 = E_3 \cdot c$ | $c = 60 \text{ /hr}$ |
|                                      | $v_D = \frac{v \cdot R}{L}$ | $E_3 = 6750 \cdot 17952 = 17952 \text{ Nm}$ |
|                                      | $E_4 = 6750 \cdot 17952$ | $E_4 = 24702 \cdot 60 = 1482120 \text{ Nm/hr}$ |
|                                      | $E_1 = 6000 \cdot 1.5^2 \cdot 0.5$ | $E_4 = 24702 \cdot 60 = 1482120 \text{ Nm/hr}$ |
|                                      | $E_2 = 6000 \cdot 9.81 \cdot 0.305$ | $\text{We} = 2 \cdot 24702 \cdot 1.5^2 = 21957 \text{ kg}$ |

Chosen from capacity chart:

- **Model CA2x2-1 self-compensating**
- **Model CA3x12-2 self-compensating**
- **Model MC500 self-compensating**
- **Model MC600 self-compensating**
- **Model MC4550-3 self-compensating**
- **Model MC4550-1 self-compensating**
- **Model MC4575-2 self-compensating**
- **Model MC4550-2 self-compensating**
**Effective Weight (We)**

The effective weight (We) 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).

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<th>Application</th>
<th>Example</th>
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<td>We = W</td>
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<td>v₀ = v = 2 m/s</td>
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<tr>
<td>E₁ = E₃ = 200 Nm</td>
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<tr>
<td>We = 2 · 200</td>
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<td>4</td>
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<tr>
<td>100 kg</td>
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| B Weight with propelling force | We = 2 · E₃  |
| We = 100 kg  |  |
| F = 2000 N  |  |
| v₀ = v = 2 m/s  |  |
| s = 0.1 m  |  |
| E₁ = 200 Nm  |  |
| E₂ = 200 Nm  |  |
| E₃ = 400 Nm  |  |
| We = 2 · 400  |  |
| 4            |  |
| 200 kg       |  |

| C Weight without propelling force direct against shock absorber | We = W  |
| We = 20 kg  |  |
| v₀ = v = 2 m/s  |  |
| s = 0.1 m  |  |
| E₁ = E₃ = 40 Nm  |  |
| We = 2 · 40  |  |
| 2²           |  |
| 20 kg        |  |

| D Weight without propelling force with mechanical advantage | We = 2 · E₃  |
| We = 20 kg  |  |
| v = 2 m/s  |  |
| v₀ = 0.5 m/s  |  |
| s = 0.1 m  |  |
| E₁ = E₃ = 40 Nm  |  |
| We = 2 · 40  |  |
| 0.5²         |  |
| 320 kg       |  |
## Industrial Shock Absorbers

### Self-Compensating Shock Absorbers

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<tr>
<th>TYPES</th>
<th>Stroke mm</th>
<th>Energy capacity Nm/cycle</th>
<th>We min. kg</th>
<th>We max. kg</th>
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**Issue 04.2018 – Specifications subject to change**

ACE Controls Inc. - 23425 Industrial Park Dr. Farmington - US-48335 Michigan - T +1 800-521-3320 - F +1 248-476-2470 - shocks@acecontrols.com - www.acecontrols.com
### Self-Compensating Shock Absorbers

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<th>Stroke mm</th>
<th>Energy capacity Nm/cycle</th>
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### Shock Absorbers Soft Contact and Self-Compensating

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<th>Energy capacity Nm/cycle</th>
<th>Effective Weight Soft-Contact We min. kg</th>
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Miniature Shock Absorbers

Tuning for almost any design

Miniature shock absorbers from ACE are tried-and-tested quality products used in millions of industrial designs throughout the world. They optimize machines in an equally reliable and effective way by decelerating loads quickly and without recoil.

The compact, maintenance-free, hydraulic machine elements can be easily and quickly integrated in any design and certain models can be directly integrated in pneumatic cylinders. They reduce the load and increase the efficiency for handling devices, rotary and pivoting actuators, linear cylinders and many other industrial applications. ACE ensures a long service life with innovative sealing techniques, shock absorber and inner pressure chambers fully machined from solid high tensile alloy steel.

Easy, inexpensive construction
Large variety of models for every purpose
Less stress on the machine
Reduced operating costs
Maintenance-free
Miniature Shock Absorbers

**MC5 to MC75**
Self-Compensating
**Shock absorbers in miniature format**
Miniature slides, Pneumatic cylinders, Handling modules, Copiers

**Page 18**

**MC150 to MC600**
Self-Compensating, Rolling Diaphragm Technology
**Exceptionally high endurance and with the lowest resetting force**
Linear slides, Pneumatic cylinders, Swivel units, Handling modules

**Page 20**

**MC150-V4A to MC600-V4A**
Self-Compensating, Stainless Steel, Rolling Diaphragm Technology
**Exceptionally high endurance with stainless steel corrosion protection**
Clean room areas, Pharmaceutical industry, Medical technology, Food industry

**Page 22**

**PMCN150 to PMCN600**
Self-Compensating, Rolling Diaphragm Technology, TPU Bellow
**Reliable protection from fluids and particulate**
Finishing and processing centers, Clean room areas, Pharmaceutical industry

**Page 24**

**PMCN150-V4A to PMCN600-V4A**
Self-Compensating, Rolling Diaphragm Technology, TPU Bellow
**Optimum corrosion protection**
Finishing and processing centers, Clean room areas, Pharmaceutical industry

**Page 26**

**SC190 to SC925**
Self-Compensating, Soft-Contact
**Long stroke and soft impact**
Linear slides, Pneumatic cylinders, Handling modules, Machines and plants

**Page 28**

**SC²25 to SC²190**
Self-Compensating, Piston Tube Technology
**Piston tube design for maximum energy absorption**
Linear slides, Pneumatic cylinders, Swivel units, Handling modules

**Page 30**

**SC²300 to SC²650**
Self-Compensating, Piston Tube Technology
**Piston tube design for maximum energy absorption**
Turntables, Swivel units, Robot arms, Linear slides, Pneumatic

**Page 32**

**SC25-HC to SC650-HC**
Self-Compensating
**Miniature self compensating shocks for high-speed applications**
Linear slides, Tool machines, Handling modules, Production plants

**Page 34**

**MA30 to MA900**
Adjustable
**Stepless adjustment**
Linear slides, Pneumatic cylinders, Swivel units, Handling modules

**Page 36**

**3/8x1**
Adjustable
**Miniature adjustable shock delivers convenience**
Linear slides, Transport industry, Tool machines, Handling modules

**Page 38**
**MC5 to MC75**

Shock absorbers in miniature format

Self-Compensating

Energy capacity 0.68 Nm/Cycle to 9 Nm/Cycle

Stroke 4 mm to 10 mm

Ideal for compact, efficient designs: The miniature size of the product family MC5 to MC75 delivers very short overall lengths and low return forces.

The outer body of each shock, produced from one solid piece, is filled with temperature stable oil, offers a continuous outer body thread including a supplied lock nut and also has an integrated positive stop. These maintenance-free hydraulic machine elements from ACE are ready for immediate installation. A wide range of energy absorption and effective weight are further benefits in these compact units. Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These self-compensating miniature shock absorbers are perfectly suited to use in applications such as rotary actuators, automation, light industrial manufacturing, material handling and packaging equipment, medical, electronics and robotics.

### Technical Data

- **Energy capacity:** 0.68 Nm/Cycle to 9 Nm/Cycle
- **Impact velocity range:** 0.15 m/s to 4 m/s
- **Operating temperature range:** -10 °C to 66 °C
- **Mounting:** In any position
- **Positive stop:** Integrated
- **Material:** Outer body, Accessories: Steel corrosion-resistant coating; Piston rod: Hardened stainless steel; Rod end button: Steel, MC25 and MC75: Elastomer Insert; Locknut: Steel, MCS and MC9: Aluminium
- **Damping medium:** Oil, temperature stable
- **Application field:** Miniature slides, Pneumatic cylinders, Handling modules, Copiers, Measuring tables, Machines and plants, Locking systems
- **Note:** If precise end position data is required consider use of a stop collar.
- **Safety information:** External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.
- **On request:** Increased corrosion protection. Special finishes. Models without rod end button also available on request.

Issue 04.2018 – Specifications subject to change

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Miniature Shock Absorbers MC5 to MC75

**MC5M**

Standard version without button for MC5, MC9 and MC10

**MC9M**

Standard version without button for MC5, MC9 and MC10

**MC30M**

Product available for UNF and metric thread (for metric add suffix -M from part number)

**MC10M**

Product available for UNF and metric thread (for metric add suffix -M from part number)

**MC25**

Product available for UNF and metric thread (for metric add suffix -M from part number)

**MC75**

Product available for UNF and metric thread (for metric add suffix -M from part number)

**Performance**

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<tr>
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<th>E&lt;sub&gt;2&lt;/sub&gt; Nm/h</th>
<th>We min. kg</th>
<th>We max. kg</th>
<th>Return Force min. N</th>
<th>Return Force max. N</th>
<th>Return Time s</th>
<th>Side Load Angle Max. °</th>
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</table>

1 For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.
MC150 to MC600

Exceptionally high endurance and with the lowest resetting force

Self-Compensating, Rolling Diaphragm Technology

Energy capacity 20 Nm/Cycle to 136 Nm/Cycle
Stroke 12 mm to 25 mm

Tried-and-tested and durable: With a hermetically sealed rolling diaphragm in each absorber, the MC150 to MC600 product family is suitable for an exceptionally high lifetime of use with up to 25 million cycles. The rolling diaphragm technology perfected by ACE ensures complete separation of the damping fluid from the surrounding air. This makes it possible for direct installation in a pressure chamber to provide end stop damping in pneumatic cylinders up to approximately 7 bar (100 psi).

The rolling diaphragm delivers very low return forces for these maintenance-free, ready-to-install absorbers. An integrated positive stop and progressive energy capacities, with a wide range of effective weight, make these miniature shock absorbers a winner. Furthermore, the use of a side load adapter allows impact angles of up to 25°. Stainless steel options are available for greater environmental compatibility. Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These self-compensating miniature shock absorbers are capable of universal mounting even inside a cylinder. These shocks are ideal for use in multitude of applications including material handling equipment, packaging equipment, medium robotics and machine tools.

Technical Data

**Energy capacity:** 20 Nm/Cycle to 136 Nm/Cycle

**Impact velocity range:** 0.06 m/s to 6 m/s.

**Other speeds on request.**

**Operating temperature range:** 0 °C to 66 °C

**Mounting:** In any position

**Positive stop:** Integrated

**Material:** Outer body, Accessories: Steel corrosion-resistant coating; Main bearing: Plastic; Piston rod: Hardened stainless steel (1.4125, AISI 440C); Rolling diaphragm: EPDM

**Damping medium:** Oil, temperature stable

**Application field:** Linear slides, Pneumatic cylinders, Swivel units, Handling modules, Machines and plants, Finishing and processing centers, Measuring tables, Tool machines, Locking systems

**Note:** If precise end position data is required consider use of a stop collar.

**Safety information:** External materials in the surrounding area can attack the rolling seal and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Suitable for use in pressure chambers up to 7 bar.

**On request:** Increased corrosion protection. Special threads or other special options.
### Performance

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<th>TYPES</th>
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<th>(E_2) Nm/h</th>
<th>(N_1)</th>
<th>(N_2)</th>
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<th>Return Force (N) max.</th>
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<th>(^\circ) Side Load Angle max.</th>
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</tbody>
</table>

1. For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.
MC150-V4A to MC600-V4A

Exceptionally high endurance with stainless steel corrosion protection

Self-Compensating, Stainless Steel, Rolling Diaphragm Technology

Energy capacity 20 Nm/Cycle to 136 Nm/Cycle

Stroke 12 mm to 25 mm

Brilliant in every respect: These high performance stainless steel miniature shock absorbers are based on the MC150 to MC600 product family and its proven damping technology. This means that these special absorbers offer all of the benefits of the standard units such as the ACE rolling diaphragm technology which delivers maximum service life and direct installation in a pressure chamber with up to approx. 100 psi (7 bar).

Thanks to perfectly progressive maximum energy absorption and effective weight potential, their use is augmented even further by the stainless steel outer body and a complete range of stainless accessories (AISI 316L). Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These self-compensating miniature stainless steel shock absorbers are used in medical and electro-technology, as well as marine, packaging, and chemical applications. Shocks can be filled with food-grade oil for food processing applications.

Technical Data

Energy capacity: 20 Nm/Cycle to 136 Nm/Cycle

Impact velocity range: 0.06 m/s to 6 m/s.

Other speeds on request.

Operating temperature range: 0 °C to 66 °C

Mounting: In any position

Positive stop: Integrated

Material: Outer body, Locknut, Accessories: Stainless steel (1.4404, AISI 316L); Main bearing: Plastic; Piston rod: Hardened stainless steel (1.4125, AISI 440C); Rolling diaphragm: EPDM

Damping medium: Oil, temperature stable

Application field: Clean room areas, Pharmaceutical industry, Medical technology, Food industry, Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Finishing and processing centers, Measuring tables

Note: If precise end position data is required consider use of a stop collar.

Safety information: External materials in the surrounding area can attack the rolling seal and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Suitable for use in pressure chambers up to 7 bar.

On request: Special oil with food approval. Special threads or other special options available on request.
### Miniature Shock Absorbers MC150-V4A to MC600-V4A

**Self-Compensating, Stainless Steel, Rolling Diaphragm Technology**

#### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
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<th>E&lt;sub&gt;r&lt;/sub&gt; Nm/h</th>
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<th>We max. kg</th>
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1 For applications with higher side load angles please contact ACE.
PMCN150 to PMCN600

Reliable protection from fluids and particulate

Self-Compensating, Rolling Diaphragm Technology, TPU Bellow

Energy capacity 20 Nm/Cycle to 136 Nm/Cycle
Stroke 12 mm to 25 mm

Hermetically sealed: The shock absorbers from the ACE Protection family PMCN have a compact, perfectly sealed cap as a special feature.

This protection bellows, made of TPU (thermoplastic polyurethane), safely encapsulates the proven ACE rolling diaphragm from the outside environment. Aggressive cutting, lubricating and cleaning agents don’t stand a chance and the function of the maintenance-free, ready-to-install shock absorber is retained. They are also available in full stainless steel.

The PMCN range is a good alternative to the SP type air bleed collar if no compressed air is available on the machine or system.

Reliable protection against aggressive environments including fluids and abrasives, these self-compensating miniature shock absorbers are the first choice where conventional dampers wear out too quickly. Use them in harsh environments where cutting, cooling or cleaning agents can attack.

Technical Data

Energy capacity: 20 Nm/Cycle to 136 Nm/Cycle
Impact velocity range: 0.06 m/s to 6 m/s
Other speeds on request.
Operating temperature range: 0 °C to 66 °C
Mounting: In any position
Positive stop: Integrated
Material: Outer body: Steel corrosion-resistant coating; Main bearing: Plastic; Piston rod: Hardened stainless steel (1.4125, AISI 440C); Bellows: TPU, steel insert: Stainless steel (1.4404/1.4571, AISI 316L/316Ti); Rolling diaphragm: EPDM
Damping medium: Oil, temperature stable
Application field: Finishing and processing centers, Clean room areas, Pharmaceutical industry, Medical technology, Food industry, Linear slides, Pneumatic cylinders, Machines and plants
Note: Final preliminary test must be done on the application.
Safety information: Do not paint the shock absorbers due to heat emission.
On request: Special accessories available on request.
Performance

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Additional accessories, mounting, installation ... starting on page 40.
**Technical Data**

**Energy capacity:** 20 Nm/Cycle to 136 Nm/Cycle

**Impact velocity range:** 0.06 m/s to 6 m/s.

**Operating temperature range:** 0 °C to 66 °C

**Mounting:** In any position

**Positive stop:** Integrated

**Material:** Outer body: Stainless steel (1.4404, AISI 316L); Main bearing: Plastic; Piston rod: Hardened stainless steel (1.4125, AISI 440C); Bellow: TPU, steel insert: Stainless steel (1.4404/1.4571, AISI 316L/316Ti); Rolling diaphragm: EPDM

**Damping medium:** Oil, temperature stable

**Application field:** Finishing and processing centers, Clean room areas, Pharmaceutical industry, Medical technology, Food industry, Machines and plants

**Note:** Final preliminary test must be done on the application.

**Safety information:** Do not paint the shock absorbers due to heat emission.

**On request:** Special accessories available on request.
Performance

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<th>Effective Weight</th>
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<th>Return Force</th>
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SC190 to SC925
Long stroke and soft impact

Self-Compensating, Soft-Contact
Energy capacity 25 Nm/Cycle to 110 Nm/Cycle
Stroke 16 mm to 40 mm

Ideal for soft damping: the SC found in the model code from the ACE product family SC190 to SC925 stands for ‘soft contact’. These miniature shock absorbers manufactured from one solid piece are designed in such a way that they can be setup with a linear or a progressive braking curve. The soft damping character is thanks to the special, long strokes which produce smooth deceleration and low reaction forces.

These maintenance-free, ready-to-install hydraulic machine elements are equipped with an integrated positive stop. The use of side load adapter allows impact angles of up to 25°. Thanks to the designed overlapping effective weight ranges, these dampers cover an effective load range of 1 kg to 2,000 kg!

Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These miniature self-compensating shock absorbers from the SC190 to SC925 product family are used in industrial, automation and machine engineering and primarily in the areas of handling and automation.

Technical Data

Energy capacity: 25 Nm/Cycle to 110 Nm/Cycle
Impact velocity range: 0.15 m/s to 3.66 m/s. Other speeds on request.
Operating temperature range: 0 °C to 66 °C
Mounting: In any position
Positive stop: Integrated
Material: Outer body, Accessories: Steel corrosion-resistant coating; Piston rod: Hardened stainless steel
Damping medium: Oil, temperature stable

Application field: Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Finishing and processing centers, Measuring tables, Tool machines
Note: If precise end position data is required consider use of a stop collar.
Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

On request: Nickel-plated or weartec finish (seawater resistant) or other special finishes available to special order. Models without rod end button.
**Miniature Shock Absorbers SC190 to SC925**

**Self-Compensating, Soft-Contact**

### Issue 04.2018 – Specifications subject to change

**ACE Controls Inc.**  
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US-48335 Michigan  
T +1 800-521-3320  
F +1 248-476-2470  
shocks@acecontrols.com  
www.acecontrols.com

For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.

**SC925; 0 to 4**

Product available for UNF and metric thread (for metric add suffix -M from part number)  
M14x1 and M16x1 also available to special order

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**SC650; 0 to 4**

Product available for UNF and metric thread (for metric add suffix -M from part number)  
M22x1.5 also available to special order

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**SC300; 0 to 4**

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M22x1.5 also available to special order

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**SC925; 0 to 4**

Product available for UNF and metric thread (for metric add suffix -M from part number)  
M22x1.5 also available to special order

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E&lt;sub&gt;max&lt;/sub&gt;</th>
<th>E&lt;sub&gt;min&lt;/sub&gt;</th>
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**Performance**

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</table>

Additional accessories, mounting, installation… starting on page 40.

1 For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.
SC²25 to SC²190
Piston tube design for maximum energy absorption

Self-Compensating, Piston Tube Technology
Energy capacity 10 Nm/Cycle to 31 Nm/Cycle
Stroke 8 mm to 12 mm

Soft damping, but enormous capacity: The range of ‘soft contact’ absorbers SC²25 to SC²190 extends from thread size M10 to M14 and covers effective weight ranges of 1 kg to 1,550 kg (2.2 to 3,400 lbs). All models are characterised by high energy absorption and they also unite the piston tube technology with the diaphragm seal perfected by ACE. This enables direct installation as end position damping in pneumatic cylinders at 5 to 7 bar (72 to 102 psi) or applications where deceleration needs to take place close to the pivot point.

They are maintenance-free, have an integrated positive stop and are mountable in any position. The option of a side load adapter allows impact angles of up to 25°. They offer soft contact deceleration where initial impact reaction forces are very low, with the advantages of self-compensation to react to changing energy conditions, without adjustment.

Thanks to their robust design and their durability, these miniature shock absorbers can be used for a wide range of applications. Designers mainly use them for pick and place systems, pneumatic rotary modules and in automation applications.

Technical Data

Energy capacity: 10 Nm/Cycle to 31 Nm/Cycle
Impact velocity range: 0.1 m/s to 5.7 m/s. Other speeds on request.
Operating temperature range: 0 °C to 66 °C
Mounting: In any position
Positive stop: Integrated
Material: Outer body, Accessories: Steel corrosion-resistant coating; Piston rod: Hardened stainless steel; Rolling diaphragm: SC²190: EPDM; Stretch diaphragm: SC²25 and SC²75: Nitrile
Damping medium: Oil, temperature stable

Application field: Linear slides, Pneumatic cylinders, Swivel units, Handling modules,
Machines and plants, Finishing and processing centers, Measuring tables, Tool machines,
Locking systems

Note: If precise end position data is required consider use of a stop collar.

Safety information: External materials in the surrounding area can attack the rolling and stretch seals and lead to a shorter service life. Please contact ACE for appropriate solution suggestions.

On request: Increased corrosion protection. Special finishes.
### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>M</th>
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<tbody>
<tr>
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<td>E4 Nm/h</td>
<td>N min.</td>
<td>N max.</td>
<td>s</td>
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</tbody>
</table>

1 For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.
SC²300 to SC²650

Piston tube design for maximum energy absorption

Self-Compensating, Piston Tube Technology

Energy capacity 73 Nm/Cycle to 210 Nm/Cycle
Stroke 15 mm to 23 mm

Added safety with accumulator technology:
The larger ‘soft contact’ models from the SC²300 to SC²650 are available with up to three times the energy absorption compared to similar sizes of standard shock absorbers SC190 to SC925, due to the ACE piston tube specialty. Furthermore, the membrane accumulator serves as a compensation element for the oil displaced in the shock absorber and replaces the standard use of absorber materials. This increases process safety even further.

The shock absorbers, which are perfect for rotary actuators for example, are available in progressively stepped effective weight ranges with an integrated positive stop. They are maintenance-free and ready for direct installation. The side load adapter option allows impact angles of up to 25°. They offer soft contact deceleration where initial impact reaction forces are very low, with the advantages of self-compensation to react to changing energy conditions, without adjustment.

These miniature shock absorbers offer high performance levels with a long service life and are particularly popular for handling, mounting very close to pivots and automation tasks.

Technical Data

Energy capacity: 73 Nm/Cycle to 210 Nm/Cycle
Impact velocity range: 0.09 m/s to 3.66 m/s. Other speeds on request.
Operating temperature range: 0 °C to 66 °C
Mounting: In any position
Positive stop: Integrated
Material: Outer body: Steel corrosion-resistant coating; Piston rod: Hardened stainless steel; Accessories: Hardened steel and corrosion-resistant coating
Damping medium: Oil, temperature stable

Application field: Turntables, Swivel units, Robot arms, Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Finishing and processing centers, Tool machines

Note: If precise end position data is required consider use of a stop collar.
On request: Increased corrosion protection. Special finishes.
### Performance

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<tr>
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<th>$E_s$ Nm/h</th>
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<th>Return Time</th>
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<th>Weight</th>
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<tr>
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</tbody>
</table>

1 For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.

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**Micro Shock Absorbers SC2300 to SC2650**

Self-Compensating, Piston Tube Technology

**SC300; 5 to 9**

**SC650; 5 to 9**
Technical Data

Energy capacity: 2.25 Nm/Cycle to 136 Nm/Cycle
Impact velocity range: 0.03 m/s to 4.5 m/s.
Operating temperature range: 0 °C to 66 °C
Mounting: In any position
Positive stop: Integrated
Material: Outer body: Steel corrosion-resistant coating; Main bearing: Brass; Piston rod: Steel hardened; Locknut, Accessories: Steel; Rolling diaphragm: Rubber (EPDM); Stretch diaphragm: Rubber (nitrile)
Damping medium: SF 96-500 and others

Application field: Linear slides, Tool machines, Handling modules, Production plants

Note: If precise end position is required, consider use of the optional stop collar.

Safety information: External materials in the surrounding area can attack the accumulator and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Suitable for use in pressure chambers up to 102 psi.

On request: Food grade oils, special threads available on request.
### Performance

<table>
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<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return</th>
<th>Return</th>
<th>Return Time</th>
<th>Side Load Angle max.</th>
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<th>Weight</th>
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</tbody>
</table>

\(^1\) For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.
MA30 to MA900
Stepless adjustment

Adjustable
Energy capacity 3.5 Nm/Cycle to 100 Nm/Cycle
Stroke 8 mm to 40 mm

The miniature shock absorbers from the MA30 to MA900 product family can be adjusted and precisely adapted to your requirements. For example, the MA150 displays the rolling diaphragm technology from the MC150 to MC600 family and offers all of the advantages of this technology, such as use in pressure chambers. Thanks to long strokes (including 40 mm on the MA900) lower reaction forces result, which provide a soft damping characteristic.

All variations of these units are maintenance-free, ready-to-install machine elements and have an integrated positive stop. They provide the best service where application data changes, where the calculation parameters are not clear or where maximum flexibility in the possible usage is required.

These adjustable miniature shock absorbers from ACE can be used to precisely meet the customer’s application needs and are therefore found everywhere in industrial, automation and machine engineering and many other applications.

Technical Data

Energy capacity: 3.5 Nm/Cycle to 100 Nm/Cycle
Impact velocity range: 0.15 m/s to 4.5 m/s.
Operating temperature range: 0 °C to 66 °C
Mounting: In any position
Positive stop: Integrated
Adjustment: Hard impact at the start of stroke, adjust the ring towards 9 or PLUS. Hard impact at the end of stroke, adjust the ring towards 0 or MINUS.

Material: Outer body, Accessories: Steel corrosion-resistant coating; Piston rod: Hardened stainless steel
Damping medium: Oil, temperature stable
Application field: Linear slides, Pneumatic cylinders, Swivel units, Handling modules, Machines and plants, Finishing and processing centers, Automatic machinery, Tool machines, Locking systems

Note: If precise end position data is required consider use of a stop collar. Shock absorber is preset at delivery in a neutral position between hard and soft.

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

On request: Nickel-plated or other special options available to special order. Models without rod end button.
Miniature Shock Absorbers MA30 to MA900

Adjustable

**MA30M**
- **Adjustment Screw**
- **Adjustable**
- **4.1**
- **M**
- **AF10**
- **2.5**
- **Stroke**
- **12.1**
- **Ø 2.5**
- **13.1**
- **Ø 6.4**

**MA50M**
- **Adjustment Screw**
- **Adjustable**
- **5.1**
- **M**
- **AF12**
- **2.5**
- **Stroke**
- **18.2**
- **Ø 3.2**
- **19.2**
- **Ø 7.7**

**MA150**
- **Adjustment Screw**
- **Adjustable**
- **7.1**
- **M**
- **AF12**
- **2.5**
- **Stroke**
- **22.3**
- **Ø 6.8**
- **23.3**
- **Ø 12.7**

**MA225**
- **Adjustment Knob**
- **Adjustable**
- **8.5**
- **M**
- **AF16**
- **2.5**
- **Stroke**
- **38.5**

**MA30M**
- **Adjustment Screw**
- **Adjustable**
- **10.6 (137.0)**
- **M**
- **AF23**
- **2.5**
- **Stroke**
- **38.3 (50.9)**

**MA600 / MA900**
- **Adjustment Knob**
- **Adjustable**
- **17.5**
- **M**
- **AF23**
- **2.5**
- **Stroke**
- **38.3 (50.9)**

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
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<tr>
<td>MA225</td>
<td>25 (45,000)</td>
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<tr>
<td>MA600</td>
<td>68 (68,000)</td>
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<tr>
<td>MA900</td>
<td>100 (90,000)</td>
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Additional accessories, mounting, installation... starting on page 40.
3/8x1
Miniature adjustable shock delivers convenience

Adjustable
Energy capacity 68 Nm/Cycle
Stroke 25 mm

ACE Controls 3/8x1* (9.53 mm x 25 mm) bore adjustable miniature shock absorber offers high energy capacity and a wide effective weight range for handling a variety of applications. A unique feature of the multi-orifice 3/8x1* bore is the optional rear slot adjuster. Adjustment can be made by turning the front adjuster to the preferred setting, or by turning the rear slot adjuster if desired.

Available with side or rear adjustment, these 1“ bore shock absorbers provide performance and convenience in one reliable package. Applications include: Slides, material handling equipment, robotics, machine tools, pick and place systems, packaging equipment and more.

Technical Data

Energy capacity: 68 Nm/Cycle
Impact velocity range: 0.5 m/s to 4.6 m/s
Operating temperature range: -12 °C to 66 °C
Mounting: In any position. Clevis mounting available (NA 3/8x1)
Adjustment: Adjustment can be made by turning the front adjuster to the preferred setting, or by turning the rear slot adjuster if desired.

Material: Outer body, Accessories: Steel corrosion-resistant coating; Main bearing, Rod end button: Steel hardened; Piston rod: Steel hardened and chrome plated; Return spring: Steel; Locknut: Zinc plated steel
Damping medium: American 46
Application field: Linear slides, Transport industry, Tool machines, Handling modules, Production plants
Note: Maximum side load depends on application. For additional information contact ACE Controls’ Applications Department. Lock nut included with each shock absorber.

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

On request: Increased corrosion protection. Special finishes. Models without rod end button also available on request.
## Miniature Shock Absorbers 3/8x1

### AS3/8x1

![AS3/8x1 Diagram]

- Wrench Flats: 22
- Rear Adjuster Optional
- Poly Pad Optional (Part #250-0767)

### NA3/8x1

![NA3/8x1 Diagram]

- 29 Hex: 5

### 250-0402 Mounting Block

![Mounting Block Diagram]

- 1-12 UNF C Bore x 11 Deep
- #10-32 Soc. Hd. Screw Thru 4 Holes

### Performance

<table>
<thead>
<tr>
<th>Types</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
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<td>Eₜ (Nm/cycle)</td>
<td>We min. (kg)</td>
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<tr>
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<td>68</td>
<td>4.54</td>
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<table>
<thead>
<tr>
<th>Types</th>
<th>Energy Capacity (Nm/h)</th>
<th>We max. (kg)</th>
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<table>
<thead>
<tr>
<th>Types</th>
<th>Return Force (min, N)</th>
<th>Return Force (max, N)</th>
<th>Return Time (s)</th>
<th>Side Load Angle max.</th>
<th>M</th>
<th>Weight (kg)</th>
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1 For applications with higher side load angles consider using the side load adaptor, pages 44 to 49.

Additional accessories, mounting, installation ... starting on page 40.
## Miniature Shock Absorber Accessories M5 to M25

### Selection Chart

<table>
<thead>
<tr>
<th>Shock Absorber Type</th>
<th>¹ Locknut</th>
<th>² Stop Collar</th>
<th>Mounting Block</th>
<th>³ Side Load Adaptor</th>
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</table>

¹ Additional special options: Locknut 250-0232 for the MC10ME (extra fine thread), locknut 250-0232 for the MA/MC150E (extra fine thread), locknut 250-0239 for the MC600ML (extra fine thread).

² Additional special options: Stop Collar 250-0263 for the MC600ML (extra fine thread).

³ Only mountable on units without button. Remove the button from the shock absorber, if there’s one fitted!

The following side load adaptors fit -880 model shock absorbers: 250-0080, 0081, 0082, 0141, 0145, 0562, 0562, 0760, 0762 and 0763.

**Dimensions can be found on the corresponding accessories pages.**
# Miniature Shock Absorber Accessories M5 to M25

## Selection Chart

<table>
<thead>
<tr>
<th>Shock Absorber Type</th>
<th>Steel Shroud</th>
<th>Steel Button</th>
<th>Steel/Urethane Button</th>
<th>Nylon Button</th>
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Issue 04.2018 – Specifications subject to change
## Selection Chart

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1 Only mountable on units without button. Remove the button from the shock absorber, if there’s one fitted!

The following side load adaptors fit -880 model shock absorbers: 250 -0080, -0081, -0082, -0141, -0145, -0562, -0760, -0762 and -0763.

Dimensions can be found on the corresponding accessories pages.
<table>
<thead>
<tr>
<th>Thread 3/8-32 UNF</th>
<th>Steel Shroud</th>
<th>Steel Button</th>
<th>Steel/Urethane Button</th>
<th>Nylon Button</th>
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</table>
Miniature Shock Absorber Accessories M5 to M25

Selection Chart See Pages 40 to 41

**M5x0.5**

- **0801-001**
  - Locknut
  - M5x0.5
  - AFB

**M6x0.5**

- **250-0716**
  - Locknut
  - M6x0.5
  - AFB

**M8x1**

- **250-0482**
  - Locknut
  - M8x1
  - AF10

- **250-0362**
  - Locknut
  - M8x0.75
  - AF11

- **250-0141**
  - Side Load Adaptor
  - M8x1
  - AF9

- **250-0146**
  - Side Load Adaptor
  - M8x1
  - AF10

- **250-0832**
  - Steel Shroud
  - Ø 2.6

- **250-0833**
  - Steel Shroud
  - Ø 2

- **250-0764**
  - Steel/Urethane Button
  - Ø 2

**M10x1**

- **250-0315**
  - Locknut
  - M10x1
  - AF12

- **250-0408**
  - Stop Collar
  - M10x1
  - 12.5

- **250-0307**
  - Mounting Block
  - M10x1
  - 12

- **250-0562**
  - Side Load Adaptor
  - M10x1
  - 12

- **250-0834**
  - Steel Shroud
  - Ø 3.2

- **250-0835**
  - Steel Shroud
  - Ø 3.2

- **250-0124**
  - Steel Button
  - Ø 8.8

- **250-0175**
  - Steel Button
  - Ø 9

- **250-0094**
  - Steel/Urethane Button
  - Ø 9

Mounting, installation, ... see pages 50 to 51.
Miniature Shock Absorber Accessories M5 to M25

Selection Chart See Pages 40 to 41

Mounting, installation, ... see pages 50 to 51.

M12x1

250-0317 Locknut

250-0409 Stop Collar

250-0309 Mounting Block

250-0145 Side Load Adaptor

M14x1

250-0760 Side Load Adaptor

250-0836 Steel Shroud

250-0837 Steel Shroud

250-0174 Steel Button

250-0232 Locknut

250-0233 Locknut

250-0243 Stop Collar

250-0272 Stop Collar

250-0255 Mounting Block

250-0352 Mounting Block

250-0080 Side Load Adaptor

250-0558 Side Load Adaptor

250-0733 Steel Shroud

250-0785 Steel Shroud

250-0111 Steel Button

250-0095 Steel/Urethane Button

250-0096 Steel/Urethane Button

250-0753 Nylon Button

Issue 04.2018 – Specifications subject to change

Miniature Shock Absorber Accessories M5 to M25

Selection Chart See Pages 40 to 41

### M20x1.5

#### 250-0207
Locknut

#### 250-0442
Locknut

#### 250-0253
Stop Collar

#### 250-0410
Stop Collar

#### 250-0353
Mounting Block

#### 250-0434
Mounting Block

#### 250-0081
Side Load Adaptor

#### 250-0559
Side Load Adaptor

#### 250-0170
Steel Shroud

#### 250-0734
Steel Shroud

#### 250-0112
Steel Button

#### 250-0097
Steel/Urethane Button

#### 250-0098
Steel/Urethane Button

#### 250-0105
Steel/Urethane Button

#### 250-0754
Nylon Button

Mounting, installation, ... see pages 50 to 51.

Issue 04.2018 – Specifications subject to change

Miniature Shock Absorber Accessories M5 to M25

Selection Chart See Pages 40 to 41

M25x1.5

<table>
<thead>
<tr>
<th>Part Number</th>
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<th>Specifications</th>
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<td>250-0755</td>
<td>Nylon Button</td>
<td>M25x1.5</td>
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</table>

Mounting, installation, ... see pages 50 to 51.
Selection Chart See Pages 42 to 43

3/8-32 UNF

- **250-0404** Locknut
- **250-0406** Stop Collar
- **250-0306** Mounting Block
- **250-0834** Steel Shroud

1/2-20 UNF

- **250-0405** Locknut
- **250-0407** Stop Collar
- **250-0308** Mounting Block
- **250-0762** Side Load Adaptor

9/16-18 UNF

- **250-0231** Locknut
- **250-0271** Stop Collar
- **250-0318** Mounting Block
- **250-0554** Side Load Adaptor

- **250-0733** Steel Shroud
- **250-0785** Steel Shroud
- **250-0111** Steel Button
- **250-0095** Steel/Urethane Button

- **250-0096** Steel/Urethane Button
- **250-0753** Nylon Button

Mounting, installation, ... see pages 50 to 51.
Miniature Shock Absorber Accessories 3/8-32 UNF to 1-12 UNF

Selection Chart See Pages 42 to 43

3/4-16 UNF

250-0399
Locknut

250-0403
Stop Collar

250-0401
Mounting Block

250-0561
Side Load Adaptor

250-0170
Steel Shroud

250-0734
Steel Shroud

250-0112
Steel Button

250-0097
Steel/Urethane Button

250-0098
Steel/Urethane Button

250-0105
Steel/Urethane Button

250-0754
Nylon Button

1-12 UNF

250-0402
Mounting Block

250-0763
Side Load Adaptor

250-0171
Steel Shroud

250-0765
Steel Shroud

10721-000
Steel Button

250-0099
Steel/Urethane Button

250-0100
Steel/Urethane Button

250-0755
Nylon Button

Mounting, installation, ... see pages 50 to 51.
**Stop Collar**
All ACE miniature shock absorbers have an integrated positive stop. An optional stop collar can be added if desired to give fine adjustment of final stopping position.

**Mounting Block**
This versatile block can be mounted to a horizontal or vertical surface. The shock is screwed into the center threaded hole and secured with a locknut.

**Mounting information**
- Mounting block only. Bolts supplied separately.
- Delivery
  - One locknut is included with each shock.

**Steel Shroud**
Grinding beads, sand, welding splatter, paints, 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.

**Ordering information**
The steel shroud can only be installed onto a shock absorber without rod end button.
- For part number MA, MC, SC please order with "-880" suffix. Part numbers MA150, MC150 to MC600 and SC25 to SC190 5-7 are supplied without a button.
- **Safety information**
  - When installing don’t forget to allow operating space for the shroud to move as the shock absorber is cycled.

**Steel Button**
The buttons are made of an oxidized steel, and offer durability beyond nylon or urethane options. They fit easily onto the piston rod of the corresponding shock absorber. Steel buttons are included on most MA and SC models. Options are available all other models that do not include the standard steel button.

**Mounting information**
Depending on the model, these buttons may be additionally secured with an O-Ring and LOCTITE.

**Steel/Urethane Button**
These impact buttons made of urethane offer all advantages of the nylon button in terms of reducing noise and wear. They fit easily onto the piston rod of the corresponding shock absorber. The impact buttons must additionally be secured with LOCTITE.

**Ordering information**
New orders can include this button already installed by adding -BP to the part number.
- Please refer to the accessories table on pages 40 to 43 to see which shock absorber types the steel urethane buttons are available for.
Nylon Button

While the use of industrial shock absorbers provides a considerable reduction in noise levels, adding impact buttons made of glass fiber reinforced nylon reduces noise levels even further. Additionally, use of a nylon button drastically reduces wear to the impact surface. These nylon buttons are available for the MA150 and the MC150 to MC600 shock absorber series.

Mounting information

The buttons are fitted by pressing onto the piston rod. We recommend to additionally fix the nylon button with LOCTITE.

Side Load Adaptor

Rotating impact motion causes high side load forces on the piston rod. This increases bearing wear and possibly results in rod breakage or bending. 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 side load adaptor provides long lasting solution.

Ordering information

The side load adaptor can only be installed onto a shock absorber without rod end button.

Material

Threaded body and plunger: Hardened high tensile steel, hardened 610 HV1

Mounting information

Secure the side load adaptor with LOCTITE or locknut on the shock absorber. 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.

Safety information

Maximum angle:
250-0141, 250-0145, 250-0146, 250-0562, 250-0762 = 12.5°
250-0554, 250-0561, 250-0763 = 25°

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.

Formulae:

\[ \alpha = \tan^{-1} \left( \frac{s}{R_s} \right) \]

\[ R_{s_{\text{min}}} = \frac{s}{\tan \alpha} \]

Example:

\[ s = 0.025 \text{ m} \quad \alpha_{\text{max}} = 25° \text{ (adapter 250-0763)} \]

\[ R_s = 0.1 \text{ m} \]

\[ \alpha = \tan^{-1} \left( \frac{0.025}{0.1} \right) \quad R_{s_{\text{min}}} = \frac{0.025}{\tan 25°} \]

\[ \alpha = 14.04° \quad R_{s_{\text{min}}} = 0.054 \text{ m} \]

\[ \alpha = \text{side load angle °} \quad R_s = \text{mounting radius m} \]

\[ \alpha_{\text{max}} = \text{max. angle °} \quad R_{s_{\text{min}}} = \text{min. possible} \]

\[ s = \text{absorber stroke m} \quad \text{R}_s = \text{mounting radius m} \]
Application Examples

MC25
Constant deceleration 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 MC25H-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.

MC225
Obstacle end positions secured
In the case of driving safety training, swinging flags are used to simulate the sudden appearance of obstacles. If the driver reacts too slowly, the flags are swung just as quickly away to avoid damage to the vehicle. In order to protect the end positions of this safety system during to and fro motion, ACE miniature shock absorbers of the type MC225H2 are installed. They come with a special side load adapter for use in this situation. Among other things, this improves the ability of the shock absorber to absorb lateral forces during to and fro motion.
ACE miniature shock absorbers optimize production with minimum expenditure. The cycle rate for an assembly line producing electronic components was increased to 3,600 units/hr. Miniature shock absorbers type SC190-1 decelerate the rapid transfer movements on the production line and using soft damping methods optimize 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.

SC190
Soft end-of-travel damping on rotary movements
Industrial Shock Absorbers
Absorbers suited for all loads

ACE industrial shock absorbers work hard. Their application means moving loads are evenly decelerated over the full stroke. The result: the lowest braking force and shortest braking time. The MAGNUM series from ACE is viewed as the reference standard for medium-sized damping technology.

Many innovations such as diaphragm accumulators, long life seals, hardened inner pressure chambers and make a decisive contribution towards extension of the service life. This means that the effective load range can be increased considerably, providing users with more scope with respect to the absorber size and greater utilization of the machine’s output. ACE offers a wide range of matching accessories for all absorber series. This eliminates internal production of assembly parts which involves high costs and loss of time.
Industrial Shock Absorbers

MC33 to MC64
Self-Compensating
High energy absorption and robust design
Linear slides, Swivel units, Turntables, Portal systems

MC33-V4A to MC64-V4A
Self-Compensating, Stainless Steel
Optimum corrosion protection
Linear slides, Swivel units, Turntables, Food industry

MC33-HT to MC64-HT
Self-Compensating
Extreme temperature and high cycle applications
Linear slides, Swivel units, Turntables, Machines and plants

MC33-LT to MC64-LT
Self-Compensating
Extreme temperature and high cycle applications
Linear slides, Swivel units, Turntables, Machines and plants

SC33 to SC45
Self-Compensating, Piston Tube Technology
Piston tube design for maximum energy absorption
Turntables, Swivel units, Robot arms, Linear slides

MA/ML33 to MA/ML64
Adjustable
High energy absorption and progressive adjustment
Linear slides, Swivel units, Portal systems

SASL1 1/8
Adjustable
Low velocity and high effective weight range
Linear slides, Pneumatic cylinders, Swivel units, Handling modules

SALD1/2 to SALD1 1/8
Adjustable
High energy absorption and a wide effective weight range
Linear slides, Pneumatic cylinders, Swivel units, Handling modules

SALDN3/4
Adjustable
High energy absorption and a wide effective weight range
Linear slides, Pneumatic cylinders, Swivel units, Handling modules
MC33 to MC64
High energy absorption and robust design

Self-Compensating
Energy capacity 170 Nm/Cycle to 5,650 Nm/Cycle
Stroke 23.1 mm to 150 mm

The latest damper technology: The combination of the latest sealing technology, annealed guide bearing and integrated positive stop make these self-compensating shock absorbers from ACE’S MAGNUM range so successful. After all, users benefit from the longer service life of the products, even in the most difficult environments. A continuous outer thread and extensive accessories make their contribution to the success story of the MC33 to MC64.

High energy absorption in a compact design and a wide damping range lead to huge advantages in practice. Alongside generally more compact designs, these small yet very powerful absorbers enable full use of the machine’s performance. Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These self-compensating industrial shock absorbers are used in all areas of industrial automation and machine engineering, especially in automation and for gantries.

Technical Data

Energy capacity: 170 Nm/Cycle to 5,650 Nm/Cycle
Impact velocity range: 0.15 m/s to 5 m/s. Other speeds on request.
Operating temperature range: -12 °C to +66 °C. Other temperatures on request.
Mounting: In any position
Positive stop: Integrated
Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel; Accessories: Steel with black oxide finish or nitride hardened

Damping medium: Automatic Transmission Fluid (ATF)
Application field: Linear slides, Swivel units, Turntables, Portal systems, Machines and plants, Tool machines, Machining centers, Z-axes, Impact panels, Handling modules
Note: A noise reduction of 3 dB to 7 dB is possible when using the special impact button. For emergency use only applications and for continuous use (with additional cooling) it is sometimes possible to exceed the published max. capacity ratings. In this case, please consult ACE.

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.
On request: Special oils, nickel-plated, increased corrosion protection, mounting inside air cylinders or other special options are available on request.
Industrial Shock Absorbers MC33

Self-Compensating

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

Model Type Prefix

Standard Models
MC: Self-Contained with return spring, self-compensating

Special Models
MCA: Air/Oil return without return spring. Use only with external air/oil tank.
MCS: Air/Oil return with return spring. Use only with external air/oil tank.
MCN: Self-Contained without return spring

Ordering Example

MC3325M-1
Self-Compensating 33 for 1-1/4-12 UNF or M33 threads
Stroke 0.98” (25 mm)
Metric Thread (omitted when using thread UNF 1 1/4-12)
Effective Weight Range Version

Dimensions

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<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
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<th>d2</th>
<th>L2</th>
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Performance

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<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
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<td>$E_2$, Nm/h</td>
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<td>MC3325-4</td>
<td>170</td>
<td>124,000</td>
</tr>
<tr>
<td>MC3350-0</td>
<td>330</td>
<td>85,000</td>
</tr>
<tr>
<td>MC3350-1</td>
<td>330</td>
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</tr>
<tr>
<td>MC3350-2</td>
<td>330</td>
<td>135,000</td>
</tr>
<tr>
<td>MC3350-3</td>
<td>330</td>
<td>135,000</td>
</tr>
<tr>
<td>MC3350-4</td>
<td>330</td>
<td>135,000</td>
</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2 The effective weight range limits can be raised or lowered to special order.
3 For applications with higher side load angles please contact ACE.


Issue 04.2018 – Specifications subject to change
Industrial Shock Absorbers MC45

Self-Compensating

MC45

Product available for UNF and metric thread (for metric add suffix -M from part number)

250-0024
Rectangular Flange

250-0299
Rectangular Flange

250-0297
Locking Ring

250-0023
Square Flange

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

Model Type Prefix

Standard Models
MC: Self-Contained with return spring, self-compensating

Special Models
MCA: Air/Oil return without return spring. Use only with external air/oil tank.
MC: Air/Oil return with return spring. Use only with external air/oil tank.
MCN: Self-Contained without return spring

Performance

Ordering Example
MC4525M-1

Dimensions

Types
Stroke mm
A max. mm
d1 mm
d2 mm
L2 mm
M

MC4525
23.1
145
42
35
95
1-3/4-12 UNF / M45x1.5

MC4550
48.5
195
42
35
120
1-3/4-12 UNF / M45x1.5

MC4575
73.9
246
42
35
145
1-3/4-12 UNF / M45x1.5

For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.

The effective weight range limits can be raised or lowered to special order.

For applications with higher side load angles please contact ACE.

Performance

Max. Energy Capacity

Effective Weight

Return Force
Return Force
Return Time
Side Load Angle

Types

1 E1 Nm/cycle
E2 Nm/h
E3 with Air/Oil Tank Nm/h
E4 with Oil Recirculation Nm/h
We min (kg)
We max (kg)
Hardness

Return Force min. N
Return Force max. N
Return Time s

MC4525-0
370
107,000
158,000
192,000
50
20
0.03
1.3

MC4525-1
370
107,000
158,000
192,000
50
35
0.03
1.3

MC4525-2
370
107,000
158,000
192,000
50
70
0.03
1.3

MC4525-3
370
107,000
158,000
192,000
50
200
0.03
1.3

MC4525-4
370
107,000
158,000
192,000
50
800
0.03
1.3

MC4550-0
740
112,000
192,000
248,000
45
180
-1

MC4550-1
740
112,000
192,000
248,000
45
180
-1

MC4550-2
740
112,000
192,000
248,000
45
180
-1

MC4550-3
740
112,000
192,000
248,000
45
180
-1

MC4550-4
740
112,000
192,000
248,000
45
180
-1

MC4575-0
1,130
146,000
225,000
282,000
250
10,600
-4

MC4575-1
1,130
146,000
225,000
282,000
250
10,600
-4

MC4575-2
1,130
146,000
225,000
282,000
250
10,600
-4

MC4575-3
1,130
146,000
225,000
282,000
250
10,600
-4

MC4575-4
1,130
146,000
225,000
282,000
250
10,600
-4

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Issue 04.2018 – Specifications subject to change

ACE Controls Inc. 23425 Industrial Park Dr. Farmington US-48335 Michigan T +1 800-521-3320 F +1 248-476-2470 shocks@acecontrols.com www.acecontrols.com
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

**Model Type Prefix**

**Standard Models**
- MC: Self-Contained with return spring, self-compensating

**Special Models**
- MCA: Air/Oil return without return spring. Use only with external air/oil tank.
- MCS: Air/Oil return with return spring. Use only with external air/oil tank.
- MCN: Self-Contained without return spring

**Ordering Example**

MC6450M-1
- 64 for 2-1/2-12 UNF or M64 threads
- Stroke 0.97" (50 mm)
- Metric Thread (omitted when using thread UNF 2-1/2-12)
- Effective Weight Range Version

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC6450</td>
<td>48.6</td>
<td>225</td>
<td>60</td>
<td>48</td>
<td>140</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
<tr>
<td>MC64100</td>
<td>99.4</td>
<td>326</td>
<td>60</td>
<td>48</td>
<td>191</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
<tr>
<td>MC64150</td>
<td>150</td>
<td>450</td>
<td>60</td>
<td>48</td>
<td>241</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
</tbody>
</table>

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E1 Nm/cycle</td>
<td>E2 Nm/h</td>
<td>E3 with Air/Oil Tank Nm/h</td>
<td>E4 with Oil Recirculation Nm/h</td>
<td>We min. kg</td>
<td>We max. kg</td>
<td>Hardness</td>
</tr>
<tr>
<td>MC6450-0</td>
<td>1,870</td>
<td>146,000</td>
<td>293,000</td>
<td>384,000</td>
<td>35</td>
<td>140</td>
<td>0</td>
</tr>
<tr>
<td>MC6450-1</td>
<td>1,870</td>
<td>146,000</td>
<td>293,000</td>
<td>384,000</td>
<td>140</td>
<td>540</td>
<td>-1</td>
</tr>
<tr>
<td>MC6450-2</td>
<td>1,870</td>
<td>146,000</td>
<td>293,000</td>
<td>384,000</td>
<td>460</td>
<td>1,850</td>
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<tr>
<td>MC6450-3</td>
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<td>293,000</td>
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<td>1,600</td>
<td>6,300</td>
<td>-3</td>
</tr>
<tr>
<td>MC6450-4</td>
<td>1,870</td>
<td>146,000</td>
<td>293,000</td>
<td>384,000</td>
<td>5,300</td>
<td>21,200</td>
<td>-4</td>
</tr>
<tr>
<td>MC6450-1-0</td>
<td>3,730</td>
<td>192,000</td>
<td>384,000</td>
<td>497,000</td>
<td>70</td>
<td>290</td>
<td>0</td>
</tr>
<tr>
<td>MC6450-1-1</td>
<td>3,730</td>
<td>192,000</td>
<td>384,000</td>
<td>497,000</td>
<td>270</td>
<td>1,100</td>
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<tr>
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<td>384,000</td>
<td>497,000</td>
<td>930</td>
<td>3,700</td>
<td>-2</td>
</tr>
<tr>
<td>MC64100-1</td>
<td>3,730</td>
<td>192,000</td>
<td>384,000</td>
<td>497,000</td>
<td>3,150</td>
<td>12,600</td>
<td>-3</td>
</tr>
<tr>
<td>MC64100-2</td>
<td>3,730</td>
<td>192,000</td>
<td>384,000</td>
<td>497,000</td>
<td>10,600</td>
<td>42,500</td>
<td>-4</td>
</tr>
<tr>
<td>MC64100-3</td>
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<td>365</td>
<td>0.48</td>
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<tr>
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<td>497,000</td>
<td>35</td>
<td>1,390</td>
<td>5,600</td>
</tr>
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<td>MC64150-0</td>
<td>5,650</td>
<td>248,000</td>
<td>497,000</td>
<td>644,000</td>
<td>140</td>
<td>1,640</td>
<td>-1</td>
</tr>
<tr>
<td>MC64150-1</td>
<td>5,650</td>
<td>248,000</td>
<td>497,000</td>
<td>644,000</td>
<td>1,390</td>
<td>5,600</td>
<td>-2</td>
</tr>
<tr>
<td>MC64150-2</td>
<td>5,650</td>
<td>248,000</td>
<td>497,000</td>
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<td>4,700</td>
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<td>644,000</td>
<td>16,000</td>
<td>63,700</td>
<td>-4</td>
</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2 The effective weight range limits can be raised or lowered to special order.
3 For applications with higher side load angles please contact ACE.

Products for UNF and metric thread available.
MC33-V4A to MC64-V4A

Optimum corrosion protection

Self-Compensating, Stainless Steel
Energy capacity 170 Nm/Cycle to 3,730 Nm/Cycle
Stroke 23.1 mm to 99.4 mm

The latest damper technology in stainless steel: The self-compensating industrial shock absorbers MC33 to MC64 from the tried-and-tested and popular MAGNUM range is also available with all outer components made from stainless steel, material AISI 316L (except piston rod). They are filled in the factory with special oil, which meets the permit conditions (NSF-H1) for the food industry.

Just like the standard product family, the MAGNUM stainless steel models are distinguished by their robust, modern sealing technology, high energy absorption in a compact design, integrated positive stop and a wide damping range. Equipped with a PUR head, they are available in thread sizes M33x1.5 to M64x2 with damping strokes up to 100 mm. Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These self-compensating industrial shock absorbers made of stainless steel from ACE are mainly used in the food, medical, electronics and offshore industries, but also in many other markets.

Technical Data

- **Energy capacity**: 170 Nm/Cycle to 3,730 Nm/Cycle
- **Impact velocity range**: 0.15 m/s to 5 m/s. Other speeds on request.
- **Operating temperature range**: -12 °C to +66 °C. Other temperatures on request.
- **Mounting**: In any position
- **Positive stop**: Integrated
- **Material**: Outer body, Main bearing, Accessories, Locking ring: Stainless steel (1.4404, AISI 316L); Piston rod: Hard chrome plated steel; Rod end button: Stainless steel (1.4404, AISI 316L) with elastomer insert; Return spring: Stainless steel
- **Damping medium**: Special oil NSF-H1 approved
- **Application field**: Linear slides, Swivel units, Turntables, Food industry, Medical technology, Portal systems, Machines and plants, Tool machines, Machining centers, Z-axes
- **Note**: Impact button for noise reduction included. For emergency use only applications and for continuous use (with additional cooling) it is sometimes possible to exceed the published max. capacity ratings. In this case, please consult ACE.
- **Safety information**: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.
- **On request**: Special oils, other special options and special accessories are available on request.
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

### Model Type Prefix

**Standard Models**
- MC: Self-Contained with return spring, self-compensating

**Special Models**
- MCA: Air/Oil return without return spring. Use only with external air/oil tank.
- MCS: Air/Oil return with return spring. Use only with external air/oil tank.
- MCN: Self-Contained without return spring

### Ordering Example

**MC3325M-2-V4A**
- Self-Compensating
- Thread Size M33
- Stroke 0.98” (25 mm)
- Effective Weight Range Version
- Stainless Steel 1.4404/AISI 316L

### Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L1</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC3325M-V4A</td>
<td>23.2</td>
<td>151.2</td>
<td>30</td>
<td>29.2</td>
<td>13.2</td>
<td>83</td>
<td>M33x1.5</td>
</tr>
<tr>
<td>MC3350M-V4A</td>
<td>48.6</td>
<td>202.2</td>
<td>30</td>
<td>29.2</td>
<td>13.2</td>
<td>108</td>
<td>M33x1.5</td>
</tr>
</tbody>
</table>

### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E_1$ Nm/cycle</td>
<td>$E_2$ Nm/h</td>
<td>1 We min. kg</td>
<td>1 We max. kg</td>
<td>Hardness</td>
<td>min. N</td>
<td>max. N</td>
</tr>
<tr>
<td>MC3325M-0-V4A</td>
<td>170</td>
<td>75,000</td>
<td>3</td>
<td>11</td>
<td>-0</td>
<td>45</td>
<td>90</td>
</tr>
<tr>
<td>MC3325M-1-V4A</td>
<td>170</td>
<td>75,000</td>
<td>9</td>
<td>40</td>
<td>-1</td>
<td>45</td>
<td>90</td>
</tr>
<tr>
<td>MC3325M-2-V4A</td>
<td>170</td>
<td>75,000</td>
<td>30</td>
<td>120</td>
<td>-2</td>
<td>45</td>
<td>90</td>
</tr>
<tr>
<td>MC3325M-3-V4A</td>
<td>170</td>
<td>75,000</td>
<td>100</td>
<td>420</td>
<td>-3</td>
<td>45</td>
<td>90</td>
</tr>
<tr>
<td>MC3325M-4-V4A</td>
<td>170</td>
<td>75,000</td>
<td>350</td>
<td>1,420</td>
<td>-4</td>
<td>45</td>
<td>90</td>
</tr>
<tr>
<td>MC3350M-0-V4A</td>
<td>330</td>
<td>85,000</td>
<td>5</td>
<td>22</td>
<td>-0</td>
<td>45</td>
<td>135</td>
</tr>
<tr>
<td>MC3350M-1-V4A</td>
<td>330</td>
<td>85,000</td>
<td>18</td>
<td>70</td>
<td>-1</td>
<td>45</td>
<td>135</td>
</tr>
<tr>
<td>MC3350M-2-V4A</td>
<td>330</td>
<td>85,000</td>
<td>18</td>
<td>70</td>
<td>-1</td>
<td>45</td>
<td>135</td>
</tr>
<tr>
<td>MC3350M-3-V4A</td>
<td>330</td>
<td>85,000</td>
<td>18</td>
<td>70</td>
<td>-1</td>
<td>45</td>
<td>135</td>
</tr>
<tr>
<td>MC3350M-4-V4A</td>
<td>330</td>
<td>85,000</td>
<td>240</td>
<td>840</td>
<td>-3</td>
<td>45</td>
<td>135</td>
</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.

2 For applications with higher side load angles please contact ACE.
**Industrial Shock Absorbers MC45M-V4A**

**Self-Compensating, Stainless Steel**

**MC45M-V4A**

![Diagram of MC45M-V4A shock absorber](image)

**The calculation and selection of the most suitable damper should be carried out or be approved by ACE.**

**Model Type Prefix**

**Standard Models**
- MC: Self-Contained with return spring, self-compensating

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- MCS: Air/Oil return with return spring. Use only with external air/oil tank.
- MCN: Self-Contained without return spring

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>A max (mm)</th>
<th>d1 (mm)</th>
<th>d2 (mm)</th>
<th>L1 (mm)</th>
<th>L2 (mm)</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC4525M-V4A</td>
<td>23.1</td>
<td>164.5</td>
<td>42</td>
<td>42</td>
<td>19.4</td>
<td>95</td>
<td>M45x1.5</td>
</tr>
<tr>
<td>MC4550M-V4A</td>
<td>48.5</td>
<td>214.4</td>
<td>42</td>
<td>42</td>
<td>19.4</td>
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<td>M45x1.5</td>
</tr>
<tr>
<td>MC4575M-V4A</td>
<td>73.9</td>
<td>265.4</td>
<td>42</td>
<td>42</td>
<td>19.4</td>
<td>145</td>
<td>M45x1.5</td>
</tr>
</tbody>
</table>

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E_1$ Nm/cycle</td>
<td>$E_2$ Nm/h</td>
<td>N min.</td>
<td>N max.</td>
<td>Return Time s</td>
<td>kg</td>
</tr>
<tr>
<td>MC4525M-0-V4A</td>
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<td>7</td>
<td>27</td>
<td>0.03</td>
<td>4</td>
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<tr>
<td>MC4525M-1-V4A</td>
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<td>107,000</td>
<td>20</td>
<td>90</td>
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<td>4</td>
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<tr>
<td>MC4525M-2-V4A</td>
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<td>107,000</td>
<td>80</td>
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</tr>
<tr>
<td>MC4525M-3-V4A</td>
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<td>107,000</td>
<td>260</td>
<td>1,050</td>
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<td>4</td>
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<tr>
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<td>4</td>
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<td>13</td>
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<td>0.08</td>
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<tr>
<td>MC4550M-1-V4A</td>
<td>740</td>
<td>112,000</td>
<td>45</td>
<td>180</td>
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<td>7,100</td>
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<tr>
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<td>80</td>
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<tr>
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<td>1,130</td>
<td>146,000</td>
<td>70</td>
<td>270</td>
<td>0.03</td>
<td>2</td>
</tr>
<tr>
<td>MC4575M-2-V4A</td>
<td>1,130</td>
<td>146,000</td>
<td>230</td>
<td>930</td>
<td>0.03</td>
<td>2</td>
</tr>
<tr>
<td>MC4575M-3-V4A</td>
<td>1,130</td>
<td>146,000</td>
<td>790</td>
<td>3,140</td>
<td>0.03</td>
<td>2</td>
</tr>
<tr>
<td>MC4575M-4-V4A</td>
<td>1,130</td>
<td>146,000</td>
<td>2,650</td>
<td>10,680</td>
<td>0.03</td>
<td>2</td>
</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.

2 For applications with higher side load angles please contact ACE.

---

**Ordering Example**

Self-Compensating
- Thread Size M45
- Stroke 0.98" (25 mm)
- Effective Weight Range Version
- Stainless Steel 1.4404/AISI 316L

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke a</th>
<th>A max. b</th>
<th>d1</th>
<th>d2</th>
<th>L1</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC4525M-V4A</td>
<td>250-0049</td>
<td>9.5</td>
<td>55.6</td>
<td></td>
<td></td>
<td></td>
<td>M45x1.5</td>
</tr>
</tbody>
</table>

---

**Issue 04.2018 – Specifications subject to change**

**Model Type Prefix**

**Standard Models**
MC: Self-Contained with return spring, self-compensating

**Special Models**
MCA: Air/Oil return without return spring. Use only with external air/oil tank.
MCS: Air/Oil return with return spring. Use only with external air/oil tank.
MCN: Self-Contained without return spring

**Ordering Example**
Self-Compensating
Thread Size M64
Stroke 0.97" (50 mm)
Effective Weight Range Version
Stainless Steel 1.4404/AISI 316L

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>A max (mm)</th>
<th>d1 (mm)</th>
<th>d2 (mm)</th>
<th>L1 (mm)</th>
<th>L2 (mm)</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC6450M-V4A</td>
<td>48.6</td>
<td>244.1</td>
<td>60</td>
<td>60</td>
<td>19.1</td>
<td>140</td>
<td>M64x2</td>
</tr>
<tr>
<td>MC64100M-V4A</td>
<td>99.4</td>
<td>345.1</td>
<td>60</td>
<td>60</td>
<td>19.1</td>
<td>191</td>
<td>M64x2</td>
</tr>
</tbody>
</table>

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E1 Nm/cycle</th>
<th>E2 Nm/h</th>
<th>1 We min.</th>
<th>1 We max.</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC6450M-0-V4A</td>
<td>1,870</td>
<td>146,000</td>
<td>35</td>
<td>140</td>
<td>-0</td>
</tr>
<tr>
<td>MC6450M-1-V4A</td>
<td>1,870</td>
<td>146,000</td>
<td>140</td>
<td>540</td>
<td>-1</td>
</tr>
<tr>
<td>MC6450M-2-V4A</td>
<td>1,870</td>
<td>146,000</td>
<td>480</td>
<td>1,850</td>
<td>-2</td>
</tr>
<tr>
<td>MC6450M-3-V4A</td>
<td>1,870</td>
<td>146,000</td>
<td>1,600</td>
<td>6,300</td>
<td>-3</td>
</tr>
<tr>
<td>MC6450M-4-V4A</td>
<td>1,870</td>
<td>146,000</td>
<td>5,300</td>
<td>21,200</td>
<td>-4</td>
</tr>
<tr>
<td>MC64100M-0-V4A</td>
<td>3,730</td>
<td>192,000</td>
<td>70</td>
<td>280</td>
<td>-0</td>
</tr>
<tr>
<td>MC64100M-1-V4A</td>
<td>3,730</td>
<td>192,000</td>
<td>270</td>
<td>1,100</td>
<td>-1</td>
</tr>
<tr>
<td>MC64100M-2-V4A</td>
<td>3,730</td>
<td>192,000</td>
<td>930</td>
<td>3,700</td>
<td>-2</td>
</tr>
<tr>
<td>MC64100M-3-V4A</td>
<td>3,730</td>
<td>192,000</td>
<td>3,150</td>
<td>12,600</td>
<td>-3</td>
</tr>
<tr>
<td>MC64100M-4-V4A</td>
<td>3,730</td>
<td>192,000</td>
<td>10,600</td>
<td>42,500</td>
<td>-4</td>
</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2 For applications with higher side load angles please contact ACE.
MC33-HT to MC64-HT

Extreme temperature and high cycle applications

Self-Compensating

Energy capacity 170 Nm/Cycle to 3,730 Nm/Cycle
Stroke 23.1 mm to 99.4 mm

Greater application range: just like all MAGNUM types from the product family MC33 to MC64, the HT (high temperature) industrial shock absorbers are also made from one solid piece. They use special seals and fluids. This means that these versions can even be used at extreme temperatures of 0 °C to 150 °C in order to safely and reliably damp masses and absorb 100% of the kinetic energy.

These ready-to-install machine elements are recommended even under the most unfavorable conditions. Additional benefits are their robust, innovative sealing technology, high energy absorption in a compact design, fixed positive stop and a wide damping range.

Self-compensating shock absorbers react to changing energy conditions, without adjustment.

Designed for use in extreme temperature ranges, these self-compensating industrial shock absorbers are suitable almost anywhere in plant, industrial, automation and machine engineering.

Technical Data

Energy capacity: 170 Nm/Cycle to 3,730 Nm/Cycle
Impact velocity range: 0.15 m/s to 5 m/s. Other speeds on request.
Operating temperature range: 0 °C to 150 °C
Mounting: In any position
Positive stop: Integrated
Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel; Accessories: Steel with black oxide finish or nitride hardened

Damping medium: Synthetic high temperature oil
Application field: Linear slides, Swivel units, Turntables, Machines and plants, Tool machines, Machining centers, Z-axes

Note: A noise reduction of 3 dB to 7 dB is possible when using the special impact button.

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

On request: Nickel-plated, increased corrosion protection, mounting inside air cylinders or other special options are available on request. Adjustable HT and LT shock absorbers.

Issue 04.2018 - Specifications subject to change
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Complete details required when ordering

Load to be decelerated: m (kg)
Impact velocity: v (m/s)
Propelling force: F (N)
Operating cycles per hour: c (/hr)
Number of absorbers in parallel: n
Ambient temperature: °C

Ordering Example

Self-Compensating
33 for 1-1/4-12 UNF or M33 threads
Stroke 1.97" (50 mm)
Metric Thread
(omitted when using thread UNF 1-1/4-12)
Effective Weight Range Version
HT = Version for High Temperature Use

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC3325-HT</td>
<td>23.2</td>
<td>198</td>
<td>30</td>
<td>25</td>
<td>83</td>
<td>1-1/4-12 UNF / M33x1.5</td>
</tr>
<tr>
<td>MC3350-HT</td>
<td>48.6</td>
<td>189</td>
<td>30</td>
<td>25</td>
<td>108</td>
<td>1-1/4-12 UNF / M33x1.5</td>
</tr>
</tbody>
</table>

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E_1$ at 20 °C Nm/h</td>
<td>$E_1$ at 100 °C Nm/h</td>
<td>$E_2$ We min. kg</td>
<td>$E_2$ We max. kg</td>
</tr>
<tr>
<td>MC3325-0-HT</td>
<td>170</td>
<td>215,000</td>
<td>82,000</td>
<td>3</td>
</tr>
<tr>
<td>MC3325-1-HT</td>
<td>170</td>
<td>215,000</td>
<td>82,000</td>
<td>9</td>
</tr>
<tr>
<td>MC3325-2-HT</td>
<td>170</td>
<td>215,000</td>
<td>82,000</td>
<td>30</td>
</tr>
<tr>
<td>MC3325-3-HT</td>
<td>170</td>
<td>215,000</td>
<td>82,000</td>
<td>100</td>
</tr>
<tr>
<td>MC3325-4-HT</td>
<td>170</td>
<td>215,000</td>
<td>82,000</td>
<td>350</td>
</tr>
<tr>
<td>MC3350-0-HT</td>
<td>330</td>
<td>244,000</td>
<td>93,000</td>
<td>5</td>
</tr>
<tr>
<td>MC3350-1-HT</td>
<td>330</td>
<td>244,000</td>
<td>93,000</td>
<td>18</td>
</tr>
<tr>
<td>MC3350-2-HT</td>
<td>330</td>
<td>244,000</td>
<td>93,000</td>
<td>60</td>
</tr>
<tr>
<td>MC3350-3-HT</td>
<td>330</td>
<td>244,000</td>
<td>93,000</td>
<td>240</td>
</tr>
<tr>
<td>MC3350-4-HT</td>
<td>330</td>
<td>244,000</td>
<td>93,000</td>
<td>710</td>
</tr>
</tbody>
</table>

1 The effective weight range limits can be raised or lowered to special order.
2 For applications with higher side load angles please contact ACE.

ACE Controls Inc. - 23425 Industrial Park Dr. Farmington - US-48335 Michigan - T +1 800-521-3320 - F +1 248-476-2470 - shocks@acecontrols.com - www.acecontrols.com
Industrial Shock Absorbers MC45-HT

**Self-Compensating**

**MC45-HT**

Product available for UNF and metric thread (for metric add suffix -M from part number)

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

Complete details required when ordering

- Load to be decelerated: m (kg)
- Impact velocity: v (m/s)
- Propelling force: F (N)
- Operating cycles per hour: c (/hr)
- Number of absorbers in parallel: n
- Ambient temperature: °C

**Ordering Example MC4525M-2-HT**

- Self-Compensating
- 45 for 1-3/4-12 UNF or M45 threads
- Stroke 0.91" (25 mm)
- Metric Thread
- (omitted when using thread UNF 1-3/4-12)
- Effective Weight Range Version
- HT = Version for High Temperature Use

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC4525-HT</td>
<td>23.1</td>
<td>151</td>
<td>42</td>
<td>35</td>
<td>95</td>
<td>1-3/4-12 UNF / M45x1.5</td>
</tr>
<tr>
<td>MC4550-HT</td>
<td>48.5</td>
<td>195</td>
<td>42</td>
<td>35</td>
<td>120</td>
<td>1-3/4-12 UNF / M45x1.5</td>
</tr>
</tbody>
</table>

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E_e Nm/cycle</td>
<td>E_e at 20 °C Nm/h</td>
</tr>
<tr>
<td>MC4525-0-HT</td>
<td>370</td>
<td>307,000</td>
</tr>
<tr>
<td>MC4525-1-HT</td>
<td>370</td>
<td>307,000</td>
</tr>
<tr>
<td>MC4525-2-HT</td>
<td>370</td>
<td>307,000</td>
</tr>
<tr>
<td>MC4525-3-HT</td>
<td>370</td>
<td>307,000</td>
</tr>
<tr>
<td>MC4525-4-HT</td>
<td>370</td>
<td>307,000</td>
</tr>
<tr>
<td>MC4550-0-HT</td>
<td>740</td>
<td>321,000</td>
</tr>
<tr>
<td>MC4550-1-HT</td>
<td>740</td>
<td>321,000</td>
</tr>
<tr>
<td>MC4550-2-HT</td>
<td>740</td>
<td>321,000</td>
</tr>
<tr>
<td>MC4550-3-HT</td>
<td>740</td>
<td>321,000</td>
</tr>
<tr>
<td>MC4550-4-HT</td>
<td>740</td>
<td>321,000</td>
</tr>
</tbody>
</table>

1. The effective weight range limits can be raised or lowered to special order.
2. For applications with higher side load angles please contact ACE.
**Industrial Shock Absorbers MC64-HT**

**MC64-HT**

![Diagram of MC64-HT Shock Absorber](Image)

Product available for UNF and metric thread (for metric suffix -M from part number)

**250-0042**

Locking Ring

2-1/2-12 UNF

**250-0028**

Square Flange

10.5

**250-0310**

Locking Ring

M64x2

**250-0302**

Square Flange

10.5

---

**The calculation and selection of the most suitable damper should be carried out or be approved by ACE.**

---

**Complete details required when ordering**

- Load to be decelerated: m (kg)
- Impact velocity: v (m/s)
- Propelling force: F (N)
- Operating cycles per hour: c (/hr)
- Number of absorbers in parallel: n
- Ambient temperature: °C

**Ordering Example**

Self-Compensating

64 for 2-1/2-12 UNF or M64 threads

Stroke 1.91" (50 mm)

Metric Thread

(omitted when using thread UNF 2-1/2-12)

Effective Weight Range Version

HT = Version for High Temperature Use

---

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC6450-HT</td>
<td>48.6</td>
<td>225</td>
<td>60</td>
<td>48</td>
<td>140</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
<tr>
<td>MC64100-HT</td>
<td>99.4</td>
<td>326</td>
<td>60</td>
<td>48</td>
<td>191</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
</tbody>
</table>

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E&lt;sub&gt;i&lt;/sub&gt; Nm/cycle</td>
<td>E&lt;sub&gt;1&lt;/sub&gt; at 20 °C Nm/h</td>
</tr>
<tr>
<td>MC6450-0-HT</td>
<td>1,870</td>
<td>419,000</td>
</tr>
<tr>
<td>MC6450-1-HT</td>
<td>1,870</td>
<td>419,000</td>
</tr>
<tr>
<td>MC6450-2-HT</td>
<td>1,870</td>
<td>419,000</td>
</tr>
<tr>
<td>MC6450-3-HT</td>
<td>1,870</td>
<td>419,000</td>
</tr>
<tr>
<td>MC6450-4-HT</td>
<td>1,870</td>
<td>419,000</td>
</tr>
<tr>
<td>MC64100-0-HT</td>
<td>3,730</td>
<td>550,000</td>
</tr>
<tr>
<td>MC64100-1-HT</td>
<td>3,730</td>
<td>550,000</td>
</tr>
<tr>
<td>MC64100-2-HT</td>
<td>3,730</td>
<td>550,000</td>
</tr>
<tr>
<td>MC64100-3-HT</td>
<td>3,730</td>
<td>550,000</td>
</tr>
<tr>
<td>MC64100-4-HT</td>
<td>3,730</td>
<td>550,000</td>
</tr>
</tbody>
</table>

1. The effective weight range limits can be raised or lowered to special order.
2. For applications with higher side load angles please contact ACE.

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MC33-LT to MC64-LT

Extreme temperature and high cycle applications

Self-Compensating

Energy capacity 170 Nm/Cycle to 5,650 Nm/Cycle
Stroke 23.1 mm to 150 mm

Greater application range: just like all MAGNUM types from the product family MC33 to MC64, the LT (low temperature) industrial shock absorbers are also made from one solid piece. They use special seals and fluids. This means that these versions can even be used at extreme temperatures of -50 °C to 66 °C in order to safely and reliably damp masses and absorb 100 % of the kinetic energy.

These ready-to-install machine elements are recommended even under the most unfavorable conditions. Additional benefits are their robust, innovative sealing technology, high energy absorption in a compact design, fixed positive stop and a wide damping range.

Self-compensating shock absorbers react to changing energy conditions, without adjustment.

Designed for use in extreme temperature ranges, these self-compensating industrial shock absorbers are suitable almost anywhere in plant, industrial, automation and machine engineering.

Technical Data

Energy capacity: 170 Nm/Cycle to 5,650 Nm/Cycle
Impact velocity range: 0.15 m/s to 5 m/s. Other speeds on request.
Operating temperature range: -50 °C to +66 °C
Mounting: In any position
Positive stop: Integrated
Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel; Accessories: Steel with black oxide finish or nitride hardened

Damping medium: Low temperature hydraulic oil
Application field: Linear slides, Swivel units, Turntables, Machines and plants, Tool machines, Machining centers, Z-axes

Note: A noise reduction of 3 dB to 7 dB is possible when using the special impact button.
Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

On request: Nickel-plated, increased corrosion protection, mounting inside air cylinders or other special options are available on request. Adjustable HT and LT shock absorbers.

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

Complete details required when ordering
Load to be decelerated: m (kg)
Impact velocity: v (m/s)
Propelling force: F (N)
Operating cycles per hour: c (/hr)
Number of absorbers in parallel: n
Ambient temperature: °C

Ordering Example
Self-Compensating 33 for 1-1/4-12 UNF or M33 threads Stroke 0.91" (25 mm) Metric Thread (omitted when using thread UNF 1-1/4-12) Effective Weight Range Version LT = Version for High Temperature Use

Dimensions
<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC3325-LT</td>
<td>23.2</td>
<td>138</td>
<td>30</td>
<td>25</td>
<td>83</td>
<td>1-1/4-12 UNF / M33x1.5</td>
</tr>
<tr>
<td>MC3350-LT</td>
<td>48.6</td>
<td>189</td>
<td>30</td>
<td>25</td>
<td>108</td>
<td>1-1/4-12 UNF / M33x1.5</td>
</tr>
</tbody>
</table>

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E&lt;sub&gt;s&lt;/sub&gt; Nm/cycle</td>
<td>E&lt;sub&gt;h&lt;/sub&gt; Nm/h</td>
</tr>
<tr>
<td>MC3325-0-LT</td>
<td>170</td>
<td>75,000</td>
</tr>
<tr>
<td>MC3325-1-LT</td>
<td>170</td>
<td>75,000</td>
</tr>
<tr>
<td>MC3325-2-LT</td>
<td>170</td>
<td>75,000</td>
</tr>
<tr>
<td>MC3325-3-LT</td>
<td>170</td>
<td>75,000</td>
</tr>
<tr>
<td>MC3325-4-LT</td>
<td>170</td>
<td>75,000</td>
</tr>
<tr>
<td>MC3350-0-LT</td>
<td>300</td>
<td>85,000</td>
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<tr>
<td>MC3350-1-LT</td>
<td>300</td>
<td>85,000</td>
</tr>
<tr>
<td>MC3350-2-LT</td>
<td>300</td>
<td>85,000</td>
</tr>
<tr>
<td>MC3350-3-LT</td>
<td>300</td>
<td>85,000</td>
</tr>
<tr>
<td>MC3350-4-LT</td>
<td>300</td>
<td>85,000</td>
</tr>
</tbody>
</table>

¹ The effective weight range limits can be raised or lowered to special order.
² at -50 °C
³ For applications with higher side load angles please contact ACE.
Industrial Shock Absorbers MC45-LT

Self-Compensating

MC45-LT

Positive Stop

Ød1

L2

A max.

Stroke

250-0041

Locking Ring

1-3/4-12 UNF

250-0023

Square Flange

8.5

41

57

1-3/4-12 UNF

8.5

41

57

1-3/4-12 UNF

Product available for UNF and metric thread (for metric add suffix -M from part number)

250-0024

Rectangular Flange

250-0299

Rectangular Flange

250-0297

Locking Ring

M45x1.5

250-0298

Square Flange

8.5

41

57

M45x1.5

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

Ordering Example

MC45SM-3-LT

45 for 1-3/4-12 UNF or M45 threads

Stoke 0.91" (25 mm)

Effective Weight Range Version

LT = Version for High Temperature Use

Complete details required when ordering

- Load to be decelerated: m (kg)
- Impact velocity: v (m/s)
- Propelling force: F (N)
- Operating cycles per hour: c (hr)
- Number of absorbers in parallel: n
- Ambient temperature: °C

Ordering Example

MC4525M-3-LT

45 for 1-3/4-12 UNF or M45 threads

Stroke 0.91" (25 mm)

Effective Weight Range Version

LT = Version for High Temperature Use

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC4525-LT</td>
<td>23.1</td>
<td>151</td>
<td>42</td>
<td>35</td>
<td>95</td>
<td>1-3/4-12 UNF</td>
</tr>
<tr>
<td>MC4550-LT</td>
<td>48.5</td>
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<td>35</td>
<td>120</td>
<td>1-3/4-12 UNF</td>
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<tr>
<td>MC4575-LT</td>
<td>73.9</td>
<td>246</td>
<td>42</td>
<td>35</td>
<td>145</td>
<td>1-3/4-12 UNF</td>
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Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Time</th>
<th>Side Load Angle max.</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 Nm/cycle</td>
<td>E2 Nm/h</td>
<td>1 We min</td>
<td>2 We max</td>
<td>Hardness</td>
<td>s</td>
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<td>MC4575-2-LT</td>
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<td>10,600</td>
<td>-4</td>
</tr>
</tbody>
</table>

1 The effective weight range limits can be raised or lowered to special order.
2 at -50 °C
3 For applications with higher side load angles please contact ACE.
# Industrial Shock Absorbers MC64-LT

## MC64-LT

Product available for UNF and metric thread (for metric add suffix -M from part number) 150 mm stroke model does not include stop collar. Positive stop is provided by the rod button (Ø 60 mm) and a stop block.

## The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

### Complete details required when ordering

- Load to be decelerated: m (kg)
- Impact velocity: v (m/s)
- Propelling force: F (N)
- Operating cycles per hour: c (/hr)
- Number of absorbers in parallel: n
- Ambient temperature: °C
- Effective Weight Range Version
- LT = Version for High Temperature Use

### Ordering Example

<table>
<thead>
<tr>
<th>MC6450-0-LT</th>
<th>1,870</th>
<th>146,000</th>
<th>35</th>
<th>140</th>
<th>-0</th>
<th>0.24</th>
<th>4</th>
<th>2.90</th>
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<td>0.68</td>
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<td>3.70</td>
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### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC6450-0-LT</td>
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<td>146,000</td>
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<tr>
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<td>MC64150-4-LT</td>
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<td>248,000</td>
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</table>

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<thead>
<tr>
<th>TYPES</th>
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<tbody>
<tr>
<td>MC6450-0-LT</td>
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<td>146,000</td>
</tr>
<tr>
<td>MC6450-1-LT</td>
<td>1,870</td>
<td>146,000</td>
</tr>
<tr>
<td>MC6450-2-LT</td>
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<td>146,000</td>
</tr>
<tr>
<td>MC6450-3-LT</td>
<td>1,870</td>
<td>146,000</td>
</tr>
<tr>
<td>MC6450-4-LT</td>
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<td>146,000</td>
</tr>
<tr>
<td>MC64100-0-LT</td>
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<tr>
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<td>248,000</td>
</tr>
</tbody>
</table>

1. The effective weight range limits can be raised or lowered to special order.
2. at -50 °C
3. For applications with higher side load angles please contact ACE.

---

Issue 04.2018 – Specifications subject to change

**SC33 to SC45**

**Piston tube design for maximum energy absorption**

**Self-Compensating, Piston Tube Technology**

**Energy capacity** 155 Nm/Cycle to 680 Nm/Cycle  
**Stroke** 23.1 mm to 48.6 mm

True performers: The SC33 to SC45 absorber models are strong and durable by combining the proven sealing technology from the MAGNUM range including membrane accumulator with the well-known piston tube technology from the SC² family. We increase the oil volume to ensure the maximum effective weights. Short stroke lengths of 25 mm to 50 mm (.98 in to 1.96 in) deliver shorter braking times in combination with high energy absorption.

These dampers safely and reliably decelerate rotary movements without unwanted recoil effects. Installation close to the pivot point is possible. ACE’s generation of piston tube manage low impact speeds with ease. Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These self-compensating industrial shock absorbers can be relied on in industrial, automation and machine engineering. They are used in pivot units, rotary tables, robot arms or integrated wherever decleration is needed.

---

**Technical Data**

**Energy capacity:** 155 Nm/Cycle to 680 Nm/Cycle  
**Impact velocity range:** 0.02 m/s to 0.46 m/s. Other speeds on request.  
**Operating temperature range:** -12 °C to +66 °C. Other temperatures on request.  
**Mounting:** In any position  
**Positive stop:** Integrated  
**Material:** Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Accessories: Steel with black oxide finish or nitride hardened  
**Damping medium:** Low temperature hydraulic oil  
**Application field:** Turntables, Swivel units, Robot arms, Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Finishing and processing centers  
**Note:** A noise reduction of 3 dB to 7 dB is possible when using the special impact button.  
**Safety information:** External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.  
**On request:** Special oils, mounting inside air cylinders or other special options are available on request.
Industrial Shock Absorbers SC33
Self-Compensating, Piston Tube Technology

**SC33**

Product available for UNF and metric thread (for metric add suffix -M from part number)

---

**250-0038**
- Locking Ring
- 1-1/4-12 UNF

**250-0016**
- Rectangular Flange
- 5.5

**250-0292**
- Locking Ring
- M33x1.5

**250-0293**
- Rectangular Flange
- 7

---

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

**Ordering Example**

**SC3325M-5**
- Self-Compensating
- 33 for 1-1/4-12 UNF or M33 threads
- Stroke 0.98" (25 mm)
- Metric Thread
- (omitted when using thread UNF 1 1/4-12)
- Effective Weight Range Version

---

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
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<tbody>
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<td>25</td>
<td>173</td>
<td>1-1/4-12 UNF / M33x1.5</td>
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</table>

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**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E_1$ Nm/cycle</td>
<td>$E_2$ Nm/h</td>
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</table>

1 The effective weight range limits can be raised or lowered to special order.

2 For applications with higher side load angles please contact ACE.
Industrial Shock Absorbers SC45
Self-Compensating, Piston Tube Technology

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

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
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<td>$E_s$ Nm/min</td>
<td>$N$ min.</td>
<td>$N$ max.</td>
<td>$s$</td>
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<td>104</td>
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<td>4</td>
</tr>
<tr>
<td>SC4525-6</td>
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<td>107,000</td>
<td>67</td>
<td>104</td>
<td>0.8</td>
<td>1.13</td>
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<tr>
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<td>107,000</td>
<td>67</td>
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<td>242</td>
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<tr>
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<td>112,000</td>
<td>47</td>
<td>242</td>
<td>1.0</td>
<td>1.90</td>
</tr>
</tbody>
</table>

1 The effective weight range limits can be raised or lowered to special order.
2 For applications with higher side load angles please contact ACE.

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
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<tr>
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<td>35</td>
<td>139</td>
<td>1-3/4-12 UNF / M45x1.5</td>
</tr>
<tr>
<td>SC4550</td>
<td>48.5</td>
<td>265</td>
<td>42</td>
<td>35</td>
<td>190</td>
<td>1-3/4-12 UNF / M45x1.5</td>
</tr>
</tbody>
</table>

Ordering Example

SC4525M-5
Self-Compensating
45 for 1 3/4-12 UNF or M45 threads
Stroke 0.98" (25 mm)
Metric Thread
(omitted when using thread UNF 1 3/4-12)
Effective Weight Range Version
Locate and Eliminate Disturbing Vibration

Vibration isolation

- Free App for iPhone
- Precise 3-axis measurement system
- Simple, understandable menu
- Immediate product recommendations

www.vibrochecker.com
MA/ML33 to MA/ML64
High energy absorption and progressive adjustment

Adjustable

Energy capacity 170 Nm/Cycle to 6,780 Nm/Cycle
Stroke 23.1 mm to 150 mm

Adjustable and unique: These industrial shock absorbers from ACE, which can be precisely adjusted both at the front and rear, also contribute towards the success of the MAGNUM range. Equipped with excellent sealing technology, an annealed guide bearing and integrated positive stop, they are robust and durable.

These dampers absorb 50 % more energy than their predecessors but are built even more compactly. The larger range of effective loads also opens up options in design and assembly. This makes the ML range especially suitable for effective weights of 300 kg to 500,000 kg (661 lbs. to 1,102,311 lbs.). These shocks are the best option wherever application data changes and flexibility is required.

These adjustable industrial shock absorbers are used in all areas of industrial, automation and machine engineering, for gantries and integrated in linear carriages or pivoting units.

Technical Data

Energy capacity: 170 Nm/Cycle to 6,780 Nm/Cycle
Impact velocity range: MA: 0.15 m/s to 5 m/s. ML: 0.02 m/s to 0.46 m/s. Other speeds on request.
Operating temperature range: -12 °C to +66 °C. Other temperatures on request.
Mounting: In any position
Positive stop: Integrated
Adjustment: Hard impact at the start of stroke, adjust the ring towards 9 or PLUS. Hard impact at the end of stroke, adjust the ring towards 0 or MINUS.

Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel; Accessories: Steel with black oxide finish or nitride hardened
Damping medium: Automatic Transmission Fluid (ATF)
Application field: Linear slides, Swivel units, Turntables, Portal systems, Machines and plants, Tool machines, Machining centers, Z-axes, Impact panels, Handling modules

Note: A noise reduction of 3 dB to 7 dB is possible when using the special impact button. For emergency use only applications and for continuous use (with additional cooling) it is sometimes possible to exceed the published max. capacity ratings. In this case, please consult ACE.

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

On request: Special oils, nickel-plated, increased corrosion protection, mounting inside air cylinders or other special options are available on request.
Industrial Shock Absorbers MA/ML33

Adjustable

MA/ML33

Adjuster Ring
Positive Stop

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

Model Type Prefix

Standard Models
MA: Self-Contained with return spring, adjustable
ML: Self-Contained with return spring, adjustable, for lower impact velocity

Special Models
MAA, MLA: Air/Oil return without return spring. Use only with external air/oil tank.
MAS, MLS: Air/Oil Return with return spring. Use only with external air/oil tank.
MAN, MLN: Self-Contained without return spring

Ordering Example
MA/ML3325M
Adjustable
33 for 1-1/4-12 UNF or M33 threads
Stroke 0.98" (25 mm)
Metric Thread
(omitted when using thread UNF 1 1/4-12)

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA3325</td>
<td>23.2</td>
<td>138</td>
<td>30</td>
<td>25</td>
<td>83</td>
<td>1-1/4-12 UNF / M33x1.5</td>
</tr>
<tr>
<td>ML3325</td>
<td>23.2</td>
<td>138</td>
<td>30</td>
<td>25</td>
<td>83</td>
<td>1-1/4-12 UNF / M33x1.5</td>
</tr>
<tr>
<td>MA3350</td>
<td>48.6</td>
<td>189</td>
<td>30</td>
<td>25</td>
<td>108</td>
<td>1-1/4-12 UNF / M33x1.5</td>
</tr>
<tr>
<td>ML3350</td>
<td>48.6</td>
<td>189</td>
<td>30</td>
<td>25</td>
<td>108</td>
<td>1-1/4-12 UNF / M33x1.5</td>
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Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E1 E2 E3</th>
<th>E4</th>
<th>E5</th>
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<tr>
<td>MA3325</td>
<td>770</td>
<td>75,000</td>
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<tr>
<td>ML3325</td>
<td>170</td>
<td>75,000</td>
<td>124,000</td>
</tr>
<tr>
<td>MA3350</td>
<td>340</td>
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<tr>
<td>ML3350</td>
<td>340</td>
<td>85,000</td>
<td>135,000</td>
</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2 The effective weight range limits can be raised or lowered to special order.
3 For applications with higher side load angles please contact ACE.
Industrial Shock Absorbers MA/ML45

Adjustable

MA/ML45

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

Model Type Prefix

Standard Models

MA: Self-Contained with return spring, adjustable

ML: Self-Contained with return spring, adjustable, for lower impact velocity

Special Models

MAA, MLA: Air/Oil return without return spring. Use only with external air/oil tank.

MAS, MLS: Air/Oil Return with return spring. Use only with external air/oil tank.

MAN, MLN: Self-Contained without return spring

Ordering Example

Adjustable

45 for 1-3/4-12 UNF or M45 threads

Stroke 0.98” (25 mm)

Metric Thread

(omitted when using thread UNF 1-3/4-12)

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA4525</td>
<td>23.1</td>
<td>145</td>
<td>42</td>
<td>35</td>
<td>85</td>
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<td>ML4525</td>
<td>23.1</td>
<td>145</td>
<td>42</td>
<td>35</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>MA4550</td>
<td>48.5</td>
<td>195</td>
<td>42</td>
<td>35</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>ML4550</td>
<td>48.5</td>
<td>195</td>
<td>42</td>
<td>35</td>
<td>120</td>
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<tr>
<td>MA4575</td>
<td>73.9</td>
<td>246</td>
<td>42</td>
<td>35</td>
<td>145</td>
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</tbody>
</table>

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E&lt;sub&gt;1&lt;/sub&gt; Nm/cycle</td>
<td>E&lt;sub&gt;2&lt;/sub&gt; Nm/h</td>
<td>E&lt;sub&gt;3&lt;/sub&gt; Nm/h</td>
<td>E&lt;sub&gt;4&lt;/sub&gt; Nm/h</td>
<td>We min. kg</td>
<td>We max. kg</td>
<td>min. N</td>
</tr>
<tr>
<td>MA4525</td>
<td>425</td>
<td>107,000</td>
<td>158,000</td>
<td>192,000</td>
<td>40</td>
<td>10,000</td>
<td>70</td>
</tr>
<tr>
<td>ML4525</td>
<td>425</td>
<td>107,000</td>
<td>158,000</td>
<td>192,000</td>
<td>3,000</td>
<td>110,000</td>
<td>70</td>
</tr>
<tr>
<td>MA4550</td>
<td>850</td>
<td>112,000</td>
<td>192,000</td>
<td>248,000</td>
<td>70</td>
<td>14,500</td>
<td>70</td>
</tr>
<tr>
<td>ML4550</td>
<td>850</td>
<td>112,000</td>
<td>192,000</td>
<td>248,000</td>
<td>5,000</td>
<td>180,000</td>
<td>70</td>
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<tr>
<td>MA4575</td>
<td>1,300</td>
<td>146,000</td>
<td>225,000</td>
<td>282,000</td>
<td>70</td>
<td>15,000</td>
<td>50</td>
</tr>
</tbody>
</table>

1. For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2. The effective weight range limits can be raised or lowered to special order.

ACE Controls Inc. - 23425 Industrial Park Dr. Farmington - US-48335 Michigan - T +1 800-521-3320 - F +1 248-476-2470 - shocks@acecontrols.com - www.acecontrols.com

Issue 04.2018 – Specifications subject to change
MA/ML64

Adjustable

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

Model Type Prefix

Standard Models
MA: Self-Contained with return spring, adjustable
ML: Self-Contained with return spring, adjustable, for lower impact velocity

Special Models
MAA, MLA: Air/Oil return without return spring. Use only with external air/oil tank.
MAS, MLS: Air/Oil Return with return spring. Use only with external air/oil tank.
MAN, MLN: Self-Contained without return spring

Ordering Example

MA/ML6450M
Adjustable
64 for 2-1/2-12 UNF or M64 threads
Stroke 1.97” (50 mm)
Metric Thread
(omitted when using thread UNF 2-1/2-12)

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>d1</th>
<th>d2</th>
<th>L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML6425</td>
<td>23.2</td>
<td>174</td>
<td>60</td>
<td>48</td>
<td>114</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
<tr>
<td>MA6450</td>
<td>48.6</td>
<td>225</td>
<td>60</td>
<td>48</td>
<td>140</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
<tr>
<td>ML6450</td>
<td>48.6</td>
<td>225</td>
<td>60</td>
<td>48</td>
<td>140</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
<tr>
<td>MA64100</td>
<td>99.4</td>
<td>326</td>
<td>60</td>
<td>48</td>
<td>191</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
<tr>
<td>MA64150</td>
<td>150</td>
<td>450</td>
<td>60</td>
<td>48</td>
<td>241</td>
<td>2-1/2-12 UNF / M64x2</td>
</tr>
</tbody>
</table>

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E_min  Nm/cycle</th>
<th>E_max Nm/h</th>
<th>E_w with Air/Oil Tank Nm/h</th>
<th>E_w with Oil Recirculation Nm/h</th>
<th>We min. kg</th>
<th>We max. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML6425</td>
<td>1,135</td>
<td>124,000</td>
<td>248,000</td>
<td>332,000</td>
<td>7,000</td>
<td>300,000</td>
</tr>
<tr>
<td>MA6450</td>
<td>2,275</td>
<td>146,000</td>
<td>293,000</td>
<td>384,000</td>
<td>220</td>
<td>50,000</td>
</tr>
<tr>
<td>ML6450</td>
<td>2,275</td>
<td>146,000</td>
<td>293,000</td>
<td>384,000</td>
<td>11,000</td>
<td>500,000</td>
</tr>
<tr>
<td>MA64100</td>
<td>4,520</td>
<td>192,000</td>
<td>384,000</td>
<td>497,000</td>
<td>270</td>
<td>52,000</td>
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<tr>
<td>MA64150</td>
<td>6,780</td>
<td>248,000</td>
<td>497,000</td>
<td>644,000</td>
<td>330</td>
<td>80,000</td>
</tr>
</tbody>
</table>

1. For emergency use only. Applications are sometimes possible to exceed the above ratings. Please consult ACE for further details.

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Return Force min.</th>
<th>Return Force max.</th>
<th>Return Time</th>
<th>Side Load Angle max.</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML6425</td>
<td>120</td>
<td>155</td>
<td>0.06</td>
<td>5</td>
<td>2.50</td>
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<tr>
<td>MA6450</td>
<td>90</td>
<td>155</td>
<td>0.12</td>
<td>4</td>
<td>2.90</td>
</tr>
<tr>
<td>ML6450</td>
<td>11,000</td>
<td>500,000</td>
<td>0.12</td>
<td>4</td>
<td>2.90</td>
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<tr>
<td>MA64100</td>
<td>270</td>
<td>270</td>
<td>0.34</td>
<td>3</td>
<td>3.70</td>
</tr>
<tr>
<td>MA64150</td>
<td>75</td>
<td>365</td>
<td>0.48</td>
<td>2</td>
<td>5.10</td>
</tr>
</tbody>
</table>

1. For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2. The effective weight range limits can be raised or lowered to special order.
3. For applications with higher side load angles please contact ACE.
SASL1 1/8
Low velocity and high effective weight range

Adjustable
Energy capacity 900 Nm/Cycle to 1,800 Nm/Cycle
Stroke 25 mm to 51 mm

Designed for low velocity, high propelling force applications, SASL shock absorbers are a fixed flange product with a built-in square mount.

SASL industrial shock absorbers can be adjusted and precisely adapted to your requirements; they feature an integrated positive stop and are designed to handle effective weights from 1,800 to 5,400 Nm per cycle.

These adjustable shock absorbers are ideal for all areas of industrial automation and machine engineering applications. They are used in linear slides, tool machines, swivel units or wherever deceleration is needed.

Technical Data

Energy capacity: 900 Nm/Cycle to 1,800 Nm/Cycle
Impact velocity range: 0.08 m/s to 0.61 m/s
Operating temperature range: -12 °C to +66 °C
Positive stop: Integrated
Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel
Damping medium: Automatic Transmission Fluid (ATF)

Application field: Linear slides, Pneumatic cylinders, Swivel units, Handling modules, Machines and plants, Finishing and processing centers, Measuring tables, Tool machines, Machining centers, Locking systems

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.
SASL 1 1/8-R Rear Flange

Adjustable

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

Model Type Prefix
SASL: Internal accumulator, spring return
ASLA: Internal accumulator, mechanical return
ASLS: External accumulator, spring return
ASL: External accumulator, air or mechanical return

Ordering Example
Adjustable SASL1/8x1-R
Bore 1 1/8” (28.5 mm)
Stroke 1” (25 mm)
Rear Flange

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SASL1/8X1-R</td>
<td>23</td>
<td>175</td>
<td>100</td>
</tr>
<tr>
<td>SASL1/8X2-R</td>
<td>48.5</td>
<td>225</td>
<td>124</td>
</tr>
</tbody>
</table>

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E_1$ Nm/cycle</td>
<td>$E_2$ Nm/h</td>
<td>$E_3$ Nm/h</td>
</tr>
<tr>
<td>SASL1/8X1-R</td>
<td>900</td>
<td>142,000</td>
<td>282,000</td>
</tr>
<tr>
<td>SASL1/8X2-R</td>
<td>1,800</td>
<td>170,000</td>
<td>340,000</td>
</tr>
</tbody>
</table>

¹ The effective weight range limits can be raised or lowered to special order.
SALD1/2 to SALD1 1/8

High energy absorption and a wide effective weight range

Adjustable

Energy capacity 153 Nm/Cycle to 5,400 Nm/Cycle
Stroke 25 mm to 152 mm

Ideal for high-speed moving machines, industrial shock absorbers of the SALD product family feature a built-in external positive stop which prevents damage from bottoming out and a positive work-positioning point.

High energy absorption and a wide damping range lead to huge advantages in practice. Alongside generally more compact designs, these small yet very powerful shock absorbers enable full use of the machine’s performance.

These adjustable shock absorbers can be adjusted and precisely adapted to your requirements, making them suitable for a variety of applications in industrial automation and machine engineering applications, especially in automation and gantries.

Technical Data

Energy capacity: 153 Nm/Cycle to 5,400 Nm/Cycle
Impact velocity range: 0.3 m/s to 4.6 m/s
Operating temperature range: -12 °C to +66 °C
Mounting: In any position
Positive stop: External
Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel
Damping medium: Automatic Transmission Fluid (ATF)

Application field: Linear slides, Pneumatic cylinders, Swivel units, Handling modules, Machines and plants, Finishing and processing centers, Measuring tables, Tool machines, Machining centers, Locking systems

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.
Industrial Shock Absorbers SALD1/2-P Primary

Adjustable

**SALD1/2-P Primary**

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

**Model Type Prefix**
- SALD: Internal accumulator, spring return
- ALDA: Internal accumulator, mechanical return
- ALDS: External accumulator, spring return
- ALD: External accumulator, air or mechanical return

**Ordering Example**

```
SALD1/2x1-P
Adjustable
Bore 1/2" (12.7 mm)
Stroke 1" (25 mm)
Primary
```

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E_1$ Nm/revolution</td>
<td>$E_2$ Nm/h</td>
</tr>
<tr>
<td>SALD1/2X1-P</td>
<td>103</td>
<td>85,000</td>
</tr>
<tr>
<td>SALD1/2X2-P</td>
<td>305</td>
<td>98,000</td>
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</table>

1 The effective weight range limits can be raised or lowered to special order.

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>SALD1/2X1-P</td>
<td>23.2</td>
<td>138</td>
<td>82</td>
</tr>
<tr>
<td>SALD1/2X2-P</td>
<td>48.5</td>
<td>189</td>
<td>102</td>
</tr>
</tbody>
</table>

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Issue 04.2018 – Specifications subject to change

Industrial Shock Absorbers SALD3/4-P Primary

Adjustable

**SALD3/4-P Primary**

![Image of SALD3/4-P Primary shock absorber]

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

### Model Type Prefix

- **SALD**: Internal accumulator, spring return
- **ALDA**: Internal accumulator, mechanical return
- **ALDS**: External accumulator, spring return
- **ALD**: External accumulator, air or mechanical return

### Ordering Example

- **SALD3/4x1-P**
  - Adjustable
  - Bore 3/4” (19 mm)
  - Stroke 1” (25 mm)
  - Primary

### Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALD3/4X1-P</td>
<td>23.2</td>
<td>151</td>
<td>101</td>
</tr>
<tr>
<td>SALD3/4X2-P</td>
<td>48.5</td>
<td>202</td>
<td>126</td>
</tr>
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<td>SALD3/4X3-P</td>
<td>74</td>
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### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E&lt;sub&gt;i&lt;/sub&gt;</td>
<td>E&lt;sub&gt;j&lt;/sub&gt;</td>
<td>E&lt;sub&gt;j&lt;/sub&gt; with Air/Oil Tank</td>
</tr>
<tr>
<td>SALD3/4X1-P</td>
<td>340</td>
<td>125,000</td>
<td>181,000</td>
</tr>
<tr>
<td>SALD3/4X2-P</td>
<td>680</td>
<td>147,000</td>
<td>225,000</td>
</tr>
<tr>
<td>SALD3/4X3-P</td>
<td>1,000</td>
<td>181,000</td>
<td>2,700,000</td>
</tr>
</tbody>
</table>

¹ The effective weight range limits can be raised or lowered to special order.
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Model Type Prefix
SALD: Internal accumulator, spring return
ALDA: Internal accumulator, mechanical return
ALDS: External accumulator, spring return
ALD: External accumulator, air or mechanical return

Ordering Example
SALD3/4x1-P Adjustable
Bore 1 1/8" (28.5 mm)
Stroke 1" (25 mm)
Primary

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALD1/8X2-P</td>
<td>48.5</td>
<td>226</td>
<td>140</td>
</tr>
<tr>
<td>SALD1/8X4-P</td>
<td>99</td>
<td>327</td>
<td>190</td>
</tr>
<tr>
<td>SALD1/8X6-P</td>
<td>150</td>
<td>451</td>
<td>241</td>
</tr>
</tbody>
</table>

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E3</th>
<th>E4</th>
<th>E4 with Air/Oil Tank</th>
<th>E3</th>
<th>E4</th>
<th>E4 with Air/Oil Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nm/cycle</td>
<td>Nm/h</td>
<td>Nm/h</td>
<td>Nm/h</td>
<td>1 We min.</td>
<td>1 We max.</td>
</tr>
<tr>
<td>SALD1/8X2-P</td>
<td>1,800</td>
<td>170,000</td>
<td>340,000</td>
<td>54</td>
<td>22,700</td>
<td>3.97</td>
</tr>
<tr>
<td>SALD1/8X4-P</td>
<td>5,600</td>
<td>225,000</td>
<td>452,000</td>
<td>72.5</td>
<td>45,000</td>
<td>5.22</td>
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<tr>
<td>SALD1/8X6-P</td>
<td>5,400</td>
<td>280,000</td>
<td>565,000</td>
<td>91</td>
<td>68,000</td>
<td>7.04</td>
</tr>
</tbody>
</table>

1 The effective weight range limits can be raised or lowered to special order.
SALDN3/4

High energy absorption and a wide effective weight range

Adjustable

Energy capacity 390 Nm/Cycle to 1,200 Nm/Cycle
Stroke 25 mm to 76 mm

SALDN industrial shock absorbers offer high performance levels and a long service life, even in the most difficult environments. These shock absorbers feature an integrated positive stop and are designed to handle effective weights from 390 to 1,200 Nm per cycle.

High energy absorption in a compact design and a wide damping range lead to huge advantages in practice. Alongside generally more compact designs, these small yet very powerful shock absorbers enable full use of the machine’s performance.

These adjustable shock absorbers can be adjusted and precisely adapted to your requirements, making them suitable for a variety of applications in industrial automation and machine engineering applications, especially in automation and gantries.

Technical Data

Energy capacity: 390 Nm/Cycle to 1,200 Nm/Cycle
Impact velocity range: 0.1 m/s to 5 m/s
Operating temperature range: -12 °C to +66 °C
Mounting: In any position
Positive stop: Integrated
Adjustment: Rear of shock
Damping medium: Automatic Transmission Fluid (ATF)
Application field: Linear slides, Pneumatic cylinders, Swivel units, Handling modules, Machines and plants, Finishing and processing centers, Measuring tables, Tool machines, Machining centers, Locking systems

Note: ACE recommends selecting a model with 20% more capacity than your calculations indicate necessary. This extra capacity allows for changes in weight, velocity or cycle rates in the future.

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

On request: Special oils, nickel-plated, increased corrosion protection, mounting inside air cylinders, additional impact velocity ranges or other special options are available on request.
Industrial Shock Absorbers SALDN3/4-RF Front Flange

**SALDN3/4-RF Front Flange**

Adjustable

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

**Model Type Prefix**

- **SALDN**: Internal accumulator, spring return
- **ALDAN**: Internal accumulator, mechanical return
- **ALDSN**: External accumulator, spring return
- **ALDN**: External accumulator, air or mechanical return

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALDN3/4X1-RF</td>
<td>25</td>
<td>145</td>
<td>82</td>
</tr>
<tr>
<td>SALDN3/4X2-RF</td>
<td>50</td>
<td>195</td>
<td>107</td>
</tr>
<tr>
<td>SALDN3/4X3-RF</td>
<td>75</td>
<td>246</td>
<td>133</td>
</tr>
</tbody>
</table>

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E₁ Nm/cycle</td>
<td>E₂ Nm/h</td>
<td>E₃ Nm/h</td>
<td>Tank Nm/h</td>
<td>Return Force min.</td>
<td>Return Force max.</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>---------</td>
<td>--------</td>
<td>-----------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>SALDN3/4X1-RF</td>
<td>390</td>
<td>107,000</td>
<td>158,000</td>
<td>45</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>SALDN3/4X2-RF</td>
<td>780</td>
<td>113,000</td>
<td>189,000</td>
<td>72.6</td>
<td>7</td>
<td>14.5</td>
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<tr>
<td>SALDN3/4X3-RF</td>
<td>1,200</td>
<td>147,000</td>
<td>226,000</td>
<td>115</td>
<td>5</td>
<td>18.25</td>
</tr>
</tbody>
</table>

1 The effective weight range limits can be raised or lowered to special order.

Ordering Example

SALDN3/4x1-RF

Adjustable

Bore 3/4” (19 mm)

Stroke 1” (25 mm)

Series (RF = Front Flange)
Industrial Shock Absorbers SALDN3/4-RR Rear Flange

Adjustable

**SALDN3/4-RR Rear Flange**

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

**Model Type Prefix**

SALDN: Internal accumulator, spring return  
ALDAN: Internal accumulator, mechanical return  
ALDSN: External accumulator, spring return  
ALDN: External accumulator, air or mechanical return

**Ordering Example**

<table>
<thead>
<tr>
<th>SALDN3/4x1-RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustable</td>
</tr>
<tr>
<td>Bore 3/4” (19 mm)</td>
</tr>
<tr>
<td>Stroke 1” (25 mm)</td>
</tr>
<tr>
<td>Series (RR = Rear Flange)</td>
</tr>
</tbody>
</table>

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALDN3/4X1-RR</td>
<td>25</td>
<td>145</td>
<td>82</td>
</tr>
<tr>
<td>SALDN3/4X2-RR</td>
<td>50</td>
<td>195</td>
<td>107</td>
</tr>
<tr>
<td>SALDN3/4X3-RR</td>
<td>75</td>
<td>246</td>
<td>133</td>
</tr>
</tbody>
</table>

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$E_1$ Nm/cycle</td>
<td>$E_2$ Nm/h</td>
<td>$E_3$ with Air/Oil Nm/h</td>
<td>Return Force min. N</td>
<td>Return Force max. N</td>
<td>Return Time s</td>
<td>max. °</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------</td>
<td>-------------</td>
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<td>-------------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>SALDN3/4X1-RR</td>
<td>390</td>
<td>167,000</td>
<td>158,000</td>
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<td>10</td>
<td>0.03</td>
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<tr>
<td>SALDN3/4X2-RR</td>
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<td>190,000</td>
<td>7</td>
<td>14.5</td>
<td>0.08</td>
<td>3</td>
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<tr>
<td>SALDN3/4X3-RR</td>
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<td>226,000</td>
<td>5</td>
<td>18.25</td>
<td>0.11</td>
<td>2</td>
</tr>
</tbody>
</table>

1 The effective weight range limits can be raised or lowered to special order.
High Performance for PET Stretch Blow Machines

PET 20 and PET 27

20 million cycles – up to 107 °C – aluminium outer body hardened pressure chamber – corrosion protection

= extended service life – low-wear – faster reduced downtime – improved system performance increased production volume – high cost efficiency

For all information see our Website www.acecontrols.com
Industrial Shock Absorber Accessories M33 to M64

M33x1.5

250-0294  Side Foot Mounting Kit

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC, MA, ML3325</td>
<td>95.3</td>
<td>49.3</td>
</tr>
<tr>
<td>MC, MA, ML3350</td>
<td>120.7</td>
<td>74.7</td>
</tr>
<tr>
<td>SC3325</td>
<td>134.9</td>
<td>49.3</td>
</tr>
<tr>
<td>SC3350</td>
<td>185.7</td>
<td>74.7</td>
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<tr>
<td>SC3350-25</td>
<td>95.3</td>
<td>49.3</td>
</tr>
<tr>
<td>SC3350-50</td>
<td>120.7</td>
<td>74.7</td>
</tr>
</tbody>
</table>

250-0294 = 1 locknut, 2 flanges, 2 bars, 4 screws M6x40, DIN 912
Torque max.: 11 Nm
Clamping torque: 90 Nm
Bolts to mount assembled shock & mount not included.

250-0323  Clevis Mount Assembly

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1 max</th>
<th>L2 max</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC, MA, ML3325</td>
<td>167.13</td>
<td>34.54</td>
<td>67.05</td>
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<tr>
<td>MC, MA, ML3350</td>
<td>217.93</td>
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<td>92.46</td>
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<tr>
<td>SC3325</td>
<td>200.76</td>
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<td>67.31</td>
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<tr>
<td>SC3350</td>
<td>281.96</td>
<td>60.20</td>
<td>92.71</td>
</tr>
</tbody>
</table>

Use positive stop at both ends of travel.

250-0292  Locking Ring

250-0091  Poly Button

250-0293  Rectangular Flange

250-0130  Steel Shroud

250-0730  Steel Shroud

250-0427  Stop Bar

250-0071  Flanged Stop Collar

Mounting, installation, ... see page 96.
M45x1.5

**250-0300**
Side Foot Mounting Kit

250-0300 = 1 locknut, 2 flanges, 2 bars, 4 screws M8x50, DIN 912
Torque max.: 27 Nm
Clamping torque: 350 Nm
Bolts to mount assembled shock & mount not included.

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1 (mm)</th>
<th>L2 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC, MA, ML4525</td>
<td>89.9</td>
<td>49.3</td>
</tr>
<tr>
<td>MC, MA, ML4550</td>
<td>111.8</td>
<td>77.7</td>
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<tr>
<td>MC, MA4575</td>
<td>136.6</td>
<td>103.1</td>
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<tr>
<td>SC4525</td>
<td>129.5</td>
<td>53.9</td>
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<tr>
<td>SC4550</td>
<td>180.3</td>
<td>78.5</td>
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<tr>
<td>SC545-25</td>
<td>88.3</td>
<td>49.3</td>
</tr>
<tr>
<td>SC545-50</td>
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<td>77.7</td>
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<tr>
<td>SC545-75</td>
<td>136.6</td>
<td>103.1</td>
</tr>
</tbody>
</table>

**250-0325**
Clevis Mount Assembly

Use positive stop at both ends of travel.

**Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1 max. (mm)</th>
<th>L2 max. (mm)</th>
<th>L3 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC, MA, ML4525</td>
<td>38.35</td>
<td>29.49</td>
<td>9.39</td>
</tr>
<tr>
<td>MC, MA, ML4550</td>
<td>63.75</td>
<td>52.00</td>
<td>39.00</td>
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<td>MC, MA4575</td>
<td>89.15</td>
<td>78.67</td>
<td>59.67</td>
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<tr>
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<td>38.35</td>
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<td>9.39</td>
</tr>
<tr>
<td>SC4550</td>
<td>63.75</td>
<td>52.00</td>
<td>39.00</td>
</tr>
<tr>
<td>SC545-25</td>
<td>89.15</td>
<td>78.67</td>
<td>59.67</td>
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<tr>
<td>SC545-50</td>
<td>113.85</td>
<td>103.10</td>
<td>83.10</td>
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<tr>
<td>SC545-75</td>
<td>136.6</td>
<td>103.1</td>
<td>83.10</td>
</tr>
</tbody>
</table>

**250-0297**
Locking Ring

**250-0092**
Poly Button

A max. see shock absorber dims.
Supplied ready mounted onto the shock absorber.

**250-0298**
Square Flange

**250-0299**
Rectangular Flange

**250-0778**
Steel Shroud

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

**250-0731**
Steel Shroud

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

**250-0639**
Stop Bar

**250-0073**
Flanged Stop Collar

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

Mounting, installation, ... see page 96.
**Industrial Shock Absorber Accessories M33 to M64**

### M64x2

**250-0304**
Side Foot Mounting Kit

![Diagram](image_url)

- Dimensions
  - **Types**
  - ML6425: 101.6 x 64.5
  - MC, MA, ML6450: 127.0 x 89.9
  - MC, MA64100: 177.8 x 140.7
  - MC, MA64150: 228.6 x 213.9

- Torque max.: 50 Nm
- Clamping torque: 350 Nm
- Bolts to mount assembled shock & mount not included.

**250-0626**
Clevis Mount Assembly

![Diagram](image_url)

- Dimensions
  - **Types**
  - ML6425: 257.1 x 84.1 x 120.7
  - MC, MA, ML6450: 307.9 x 134.9 x 171.5
  - MC, MA64100: 350.1 x 204.7 x 241.3
  - MC, MA64150: 409.5 x 250.1 x 291.1

- Use positive stop at both ends of travel.

**250-0301**
Locking Ring

![Diagram](image_url)

**250-0093**
Poly Button

![Diagram](image_url)

**250-0302**
Square Flange

![Diagram](image_url)

**250-0787**
Steel Shroud

![Diagram](image_url)

- **Types**
  - MC, MA, ML6450: 59.7 x 120.7
  - MC, MA64100: 134.9 x 171.5
  - MC, MA64150: 204.7 x 241.3

- **A max 236**
- **Total installation length of the shock absorber inc. steel shroud**

**250-0640**
Stop Bar

![Diagram](image_url)

- **For MC/MA/ML6425M to 64100M models**

**250-0641**
Stop Bar

![Diagram](image_url)

- **For MC/MA/ML64150M model**

**250-0077**
Flanged Stop Collar

![Diagram](image_url)

- **For MC/MA/ML64150M model**

**250-0075**
Flanged Stop Collar

![Diagram](image_url)

- **For MC/MA/ML6425M to 64100M models**

Mounting, installation, ... see page 96.

---

ACE Controls Inc. - 23425 Industrial Park Dr. Farmington - US-48335 Michigan - T +1 800-521-3320 - F +1 248-476-2470 - shocks@acecontrols.com - www.acecontrols.com

Issue 04.2018 – Specifications subject to change
1-1/4-12 UNF

250-0015
Side Foot Mounting Kit

250-0015 = 1 locknut, 2 flanges, 2 bars, 4 screws 1-1/4-12 UNF, DIN 912
Torque max.: 11 Nm
Clamping torque: 90 Nm
Bolts to mount assembled shock & mount not included.

250-0225
Clevis Mount Assembly

Use positive stop at both ends of travel.

250-0038
Locking Ring

250-0091
Poly Button

250-0016
Rectangular Flange

250-0130
Steel Shroud

250-0730
Steel Shroud

250-0426
Stop Bar

250-0070
Flanged Stop Collar

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1 (mm)</th>
<th>L2 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC, MA, ML3325</td>
<td>95.3</td>
<td>49.3</td>
</tr>
<tr>
<td>MC, MA, ML3350</td>
<td>120.7</td>
<td>74.7</td>
</tr>
<tr>
<td>SC3325</td>
<td>134.9</td>
<td>49.3</td>
</tr>
<tr>
<td>SC3350</td>
<td>185.7</td>
<td>74.7</td>
</tr>
<tr>
<td>SC333-25</td>
<td>95.3</td>
<td>49.3</td>
</tr>
<tr>
<td>SC333-50</td>
<td>120.7</td>
<td>74.7</td>
</tr>
</tbody>
</table>

Dimensions for MC, MA, ML in []

Supplied ready mounted onto the shock absorber.

a Total installation length of the shock absorber inc. steel shroud

Mounting, installation, ... see page 96.
### 1-3/4-12 UNF

**250-0025**
Side Foot Mounting Kit

250-0025 = 1 locknut, 2 flanges, 2 bars, 4 screws 1-3/4-12 UNF, DIN 912
Torque max.: 27 Nm
Clamping torque: 350 Nm
Bolts to mount assembled shock & mount not included.

**250-0324**
Clevis Mount Assembly

Use positive stop at both ends of travel.

**250-0041**
Locking Ring

**250-0092**
Poly Button

**250-0023**
Square Flange

**250-0024**
Rectangular Flange

**250-0778**
Steel Shroud

**250-0731**
Steel Shroud

**250-0428**
Stop Bar

**250-0072**
Flanged Stop Collar

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

2 Total installation length of the shock absorber inc. steel shroud
2-1/2-12 UNF

250-0030
Side Foot Mounting Kit

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1 (mm)</th>
<th>L2 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML6425</td>
<td>101.6</td>
<td>64.5</td>
</tr>
<tr>
<td>MC, MA, ML6450</td>
<td>127.0</td>
<td>89.9</td>
</tr>
<tr>
<td>MC, MA64100</td>
<td>177.8</td>
<td>140.7</td>
</tr>
<tr>
<td>MC, MA64150</td>
<td>228.6</td>
<td>213.9</td>
</tr>
<tr>
<td>SCS64-50</td>
<td>127.0</td>
<td>89.9</td>
</tr>
<tr>
<td>SCS64-100</td>
<td>177.8</td>
<td>140.7</td>
</tr>
<tr>
<td>SCS64-150</td>
<td>228.6</td>
<td>213.9</td>
</tr>
</tbody>
</table>

250-0030 = 1 locknut, 2 flanges, 2 bars, 4 screws 2-1/2-12 UNF, DIN 912
Torque max.: 50 Nm
Clamping torque: 50 Nm
Bolts to mount assembled shock & mount not included.

250-0625
Clevis Mount Assembly

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1 max. (mm)</th>
<th>L2 max. (mm)</th>
<th>L3 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML6425</td>
<td>257.10</td>
<td>193.70</td>
<td>95.50</td>
</tr>
<tr>
<td>MC, MA, ML6450</td>
<td>307.90</td>
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<td>214.30</td>
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</table>

Use positive stop at both ends of travel.

250-0042
Locking Ring

250-0093
Poly Button

250-0028
Square Flange

250-0787
Steel Shroud

250-0839
Steel Shroud

250-0430
Stop Bar

250-0432
Stop Bar

250-0074
Flanged Stop Collar

250-0076
Flanged Stop Collar

Mounting, installation, ... see page 96.
Steel Shroud
For industrial shock absorbers with a 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 information**
To mount the steel shroud it’s necessary to remove the rod end button of the shock absorber.

**Safety information**
When installing don’t forget to allow operating space for the shroud to move as the shock absorber is cycled.

Flanged Stop Collar
Flanged stop collars provide industrial shock absorbers with a secure front mount and a positive mechanical stop. No specific mounting panel thickness is required.

**Material**
Hardened high tensile steel

Stop Bar
Stop bars are used in pairs and come two per package for assembly.
Hard metric stop bars are available upon request.

**Material**
Hardened high tensile steel
Application Examples

MC33

Quick, gentle positioning

ACE industrial shock absorbers optimize portals for machine loading and increase productivity. This device is driven by piston rodless pneumatic cylinders where 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 MC3350-1-S model 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.

MC45

MAGNUM protection of carriage construction

Serving a similar purpose, several ACE dampers are installed in Jada, the triple-axis, free-moving badminton robot. In order for the badminton robot to be capable of playing, it must be able to change direction in the shortest time possible. Jada is designed therefore to brake at a maximum of 30 m/s². For this task, linear modules are limited by the use of industrial shock absorbers of the type MC4575-0. Miniature shock absorbers and profile dampers are also installed at the location of the „racket hand“. In all cases, the modern ACE machine elements serve to protect the end positions of the construction.
**MC64-VA**

**MAGNUM damper for safety under water**

A pipeline from the rig to the well head that is as flexible as possible is considered to be a quick-disconnect connection in an emergency. Nevertheless, this connection made at the oil source on the sea floor is an Achilles heel. If the connection snaps or if it cannot be separated quickly enough during hazards such as storms, unpredictable, often serious consequences can hardly be prevented. With the so-called XR connector, the safety at this critical point is significantly increased. In the innovative design 10 industrial shock absorbers per connection from the MAGNUM series from ACE master this important task.

---

**MC64M**

**Emergency exits made safer with MAGNUM shock absorbers**

MAGNUM 64150 industrial shock absorbers are integrated into the overall safety design for the Amsterdam metro system. In contrast to previous solutions, ACE shocks ensure rapid opening and stopping for a five-ton barrier located at the end of an emergency escape route. In this application, over 5,100 Nm of energy are able to be absorbed per stroke. Through installing shock absorbers in end positions of the design, over 63,700 kg of effective weight are able to be absorbed. ACE provided an excellent solution, even with an impact speed of approximately 1.8 meters per second and the barrier exit grille at an unusual impact angle.
MA/ML33

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, ML3325 industrial shock absorbers are used as braking elements. Should the telescope inadvertently overshoot the permissible swivel range, they will safely damp the travel of the valuable telescope.

MA/ML64

MAGNUM helps in the fight against people not buckling up

The Central-Hessian police department has developed an accident simulator with the help of ACE Stoßdämpfer GmbH aimed at significantly increasing the number of road traffic seatbelt wearers. The mobile simulator demonstrates strikingly that the smallest impact velocities lead to enormous forces, even when wearing seat belts, and can cause serious injuries when not. Adjustable MAGNUM type MA64150 dampers are installed to protect the simulator passengers and the end points of the construction at various speeds and moving masses. These are the largest adjustable dampers of the ACE product range; stronger special constructions are possible at any time.
Heavy Industrial Shock Absorbers

Effective shock absorption for heavy loads

The heavy industrial shock absorbers from ACE top off the company’s offerings in damping technology. This ACE category gives Designers a choice between self-compensating and adjustable machine elements.

Whichever design is chosen, this type of shock absorber impresses with its robustness and operational readiness wherever heavy loads need to be reliably stopped on-the-spot and at a precise point.

The CA4 models can absorb up to 126,500 Nm of energy. The series of heavy duty, self-compensating “CA” types are equally suitable for use as an emergency stop as are the adjustable types with the designations “A”. The range of effective loads covered is increased considerably for this purpose.
Heavy Industrial Shock Absorbers

CA2 to CA4
Self-Compensating
Deceleration of heavy loads
Portal systems, Machines and plants, Conveyor systems, Crane systems

A1 1/2 to A3
Adjustable
Deceleration of heavy loads and progressive adjustment
Portal systems, Machines and plants, Conveyor systems, Crane systems

Rugged and powerful
Gently stops heavy loads with high precision
Also ideal for emergency stop utilization
Safe, reliable production
Maintenance-free and ready-to-install
Special versions available
CA2 to CA4
Deceleration of heavy loads

Self-Compensating
Energy capacity 3,600 Nm/Cycle to 126,500 Nm/Cycle
Stroke 50 mm to 406 mm

Powerful: The weight of these high capacity absorbers are between 12.8 and 146 kg (28.2 lbs and 322 lbs.). They complement ACE’s product range of self-compensating shock absorbers. All models from this product family are designed for applications where robustness and large energy absorption are important.

ACE uses our proprietary custom calculation program to design each shock absorber for the specific customer application. Customization helps reduce the risk of crashes and incorrect product sizing. The CA models can absorb up to 126,500 Nm (1,119,620 in-lbs) of energy and can be used in the area of effective weights between 700 kg and 326,000 kg (1,543 lbs and 718,707 lbs.). The combination of being extremely solid, absorbing high levels of energy and having a large damping range makes them invaluable. Self-compensating shock absorbers react to changing energy conditions, without adjustment.

These heavy duty self-compensating industrial shock absorbers are primarily used in heavy mechanical engineering e.g. on lift bridges and steel structures or for damping sluice systems.

Technical Data

| Energy capacity: 3,600 Nm/Cycle to 126,500 Nm/Cycle |
| Impact velocity range: 0.3 m/s to 5 m/s. Other speeds on request. |
| Operating temperature range: -12 °C to +66 °C. Other temperatures on request. |
| Mounting: In any position |
| Positive stop: External positive stops 2.5 mm to 3 mm before the end of stroke provided by the customer. |
| Material: Outer body: Steel corrosion-resistant coating; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated steel |
| Damping medium: Automatic Transmission Fluid (ATF) |
| Application field: Portal systems, Machines and plants, Conveyor systems, Crane systems, Loading and lifting equipment, Shelf storage systems, Heavy load applications, Swivel units |
| Note: For emergency use only applications and for continuous use it is possible to exceed the published max. capacity ratings. In this case, please consult ACE. |
| Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission. |
| On request: Special oils, nickel-plated, increased corrosion protection or other special options are available on request. |

ACE Controls Inc. · 23425 Industrial Park Dr. Farmington · US-48335 Michigan · T +1 800-521-3320 · F +1 248-476-2470 · shocks@acecontrols.com · www.acecontrols.com
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

### Dimensions

<table>
<thead>
<tr>
<th></th>
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### Performance

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</thead>
<tbody>
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<td>( E_2 ) Nm/h</td>
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1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2 Figures for oil recirculation systems on request.
3 The effective weight range limits can be raised or lowered to special order.

### Model Type Prefix

- **Standard Models**
  - CA: Self-contained with return spring, self-compensating

- **Special Models**
  - CAA: Air/Oil return without return spring. Use only with external air/oil tank.
  - CNA: Self-Contained without return spring
  - CSA: Air/Oil return with return spring. Use only with external air/oil tank.

### Ordering Example

- **CA2x4F-3**
  - Self-Compensating
  - Bore Size \( \phi 2" \)
  - Stroke Length 4" (102 mm)
  - Front Flange Mounting
  - Effective Weight Range Version
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

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<td>432</td>
<td>447</td>
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</table>

CA3x5-3F:
- Self-Compensating
- Bore Size Ø 3"
- Stroke Length 5" = 127 mm
- Effective Weight Range Version
- Front Flange Mounting

### Dimensions

**Model Type Prefix**

**Standard Models**
- CA: Self-contained with return spring, self-compensating

**Special Models**
- CAA: Air/Oil return without return spring. Use only with external air/oil tank.
- CNA: Self-Contained without return spring
- CSA: Air/Oil return with return spring. Use only with external air/oil tank.

### Performance

<table>
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<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
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<td>( E_2 ) with Air/Oil</td>
<td>( E_3 )</td>
<td>( E_4 )</td>
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<td>326,000</td>
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</table>

1. For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2. Figures for all recirculation systems on request.
3. The effective weight range limits can be raised or lowered to special order.
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

**Model Type Prefix**

**Standard Models**
CA: Self-contained with return spring, self-compensating

**Special Models**
CAA: Air/Oil return without return spring. Use only with external air/oil tank.
CNA: Self-Contained without return spring
CSA: Air/Oil return with return spring. Use only with external air/oil tank.

**Dimensions**

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<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>B max.</th>
<th>C max.</th>
<th>D max.</th>
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<td>291</td>
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<td>63.5</td>
<td>127</td>
<td>698</td>
<td>585</td>
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**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
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</thead>
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</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2 The effective weight range limits can be raised or lowered to special order.

**Ordering Example**
CA4x8R-5
Self-Compensating
Bore Size ø 4”
Stroke Length 8” (203 mm)
Rear Flange Mounting
Effective Weight Range Version

1-1/2”-11 NPT

ACE Controls Inc. - 23425 Industrial Park Dr. Farmington - US-4835 Michigan - T +1 800-521-3320 - F +1 248-476-2470 - shocks@acecontrols.com - www.acecontrols.com
### A1 1/2 to A3

**Deceleration of heavy loads and progressive adjustment**

**Adjustable**

**Energy capacity 2,350 Nm/Cycle to 44,000 Nm/Cycle**

**Stroke 50 mm to 305 mm**

Strong and adjustable: Also in ACE’s range of units are heavy duty industrial shock absorbers, which can be adjusted. The models from the A1 1/2 to A3 range, which weigh between 7.55 kg and 48 kg, are extremely robust, ready-to-install hydraulic machine elements with impressively high energy absorption levels and a wide range of damping rates.

Their special aspect is the flexibility, as all the absorbers can be adjusted using a socket on the absorber base and be perfectly adapted to the required data. The A models cover a range of effective loads from 0.3 kg to 204,000 kg and can absorb up to 44,000 Nm energy.

These heavy duty, adjustable ACE industrial shock absorbers are the first choice in heavy duty applications and generally in heavy mechanical engineering when the usage data has not been exactly determined.

### Technical Data

**Energy capacity:** 2,350 Nm/Cycle to 44,000 Nm/Cycle

**Impact velocity range:** 0.1 m/s to 5 m/s. Other speeds on request.

**Operating temperature range:** -12 °C to +66 °C. Other temperatures on request.

**Mounting:** In any position

**Positive stop:** External positive stops 2.5 mm to 3 mm before the end of stroke provided by the customer.

**Adjustment:** Hard impact at the start of stroke, adjust the ring towards 9. Hard impact at the end of stroke, adjust the ring towards 0.

**Material:** Outer body: Steel corrosion-resistant coating; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated steel

**Damping medium:** Automatic Transmission Fluid (ATF)

**Application field:** Portal systems, Machines and plants, Conveyor systems, Crane systems, Loading and lifting equipment, Impact panels, Heavy load applications, Swivel units, Shelf storage systems

**Note:** For emergency use only applications and for continuous use it is possible to exceed the published max. capacity ratings. In this case, please consult ACE.

**Safety information:** External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions. Do not paint the shock absorbers due to heat emission.

**On request:** Special oils, nickel-plated, increased corrosion protection or other special options are available on request.
## Model Type Prefix

**Standard Models**
- A: Self-contained with return spring, adjustable

**Special Models**
- 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

<table>
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<tr>
<th>TYPES</th>
<th>Stroke</th>
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<th>L max.</th>
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<th>L2</th>
<th>L3</th>
<th>L4</th>
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<tbody>
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### Performance

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<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
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<td>0.40</td>
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</tbody>
</table>

1. For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2. Figures for oil recirculation systems on request.
3. The effective weight range limits can be raised or lowered to special order.
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

### Dimensions

<table>
<thead>
<tr>
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### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
</tr>
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<tr>
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<td>E₂</td>
<td>min.</td>
<td>max.</td>
<td>s</td>
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</tbody>
</table>

1. For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.
2. Figures for oil recirculation systems on request.
3. The effective weight range limits can be raised or lowered to special order.

### Ordering Example

Adjustable
Bore Size Ø 2”
Stroke Length 6” = 152 mm
Rear Flange Mounting

---

**Model Type Prefix**

**Standard Models**
A: Self-contained with return spring, adjustable

**Special Models**
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.

---

**A2-F Front Flange**

---

**A2-C Clevis Mount**

---

**A2-R Rear Flange**

---

**A2-S 2" Bore Foot Mount**
The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

### Model Type Prefix

**Standard Models**

A: Self-contained with return spring, adjustable

**Special Models**

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.

### Ordering Example

A3x8R

Adjustable __________

Bore Size ø 3”

Stroke Length 8” (203 mm)

Rear Flange Mounting __________

### Dimensions

<table>
<thead>
<tr>
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<td>211</td>
<td>254</td>
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<td>203</td>
<td>641</td>
<td>286</td>
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<td>300</td>
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<td>A3X12</td>
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<td>890</td>
<td>434</td>
<td>432</td>
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### Performance

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<th>Max. Energy Capacity</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Time</th>
<th>Side Load Angle</th>
<th>Weight</th>
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<tbody>
<tr>
<td>A3X5</td>
<td>15,800 2,260,000 2,800,000</td>
<td>480 154,000</td>
<td>270 710 0.6 3 32.7</td>
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<td>28,200 3,600,000 4,520,000</td>
<td>540 181,500</td>
<td>280 740 0.8 3 38.5</td>
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<td>A3X12</td>
<td>44,000 5,400,000 6,780,000</td>
<td>610 204,000</td>
<td>270 730 1.2 3 48.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 For emergency use only applications it is sometimes possible to exceed the above ratings. Please consult ACE for further details.

2 Figures for oil recirculation systems on request.

3 The effective weight range limits can be raised or lowered to special order.
**Air/Oil Tanks**

for industrial shock absorbers

For high cycle rates and extreme temperatures with limited mounting space

Shock absorbers convert the introduced energy into heat. The more frequently a shock absorber is stressed per hour, the hotter the oil volume becomes over time. If the requirements placed on the impact frequency of a shock absorber are especially high, use of an air-oil tank is the solution.

Thanks to increased oil volume and resulting heat dissipation, the upper limit of the possible hourly energy capacity of the shock absorber increases significantly.

In addition, the air-oil tank provides an opportunity for controlled piston return if no permanent return force through an integrated spring in the shock absorber is desired.

---

**Air/Oil Tanks AO**

**AO1**
Oil capacity 20 cm³
Material: Aluminium caps

**AO3**
Oil capacity 370 cm³
Material: Steel

**AO6**
Oil capacity 2,600 cm³
Material: Steel

---

**Technical Data**

- **Operating pressure:** Max. 8 bar (116 psi)
- **Operating temperature range:** 80 °C
- **Damping medium:** ATF-Oil 42 cSt at 40 °C
  
Mount air/oil tank higher than shock absorber. Bleed all air from system before operating.

- **Safety instructions:** Exhaust tank before carrying out service. Check valve holds pressure!
- **Suggested air/oil tanks in accordance with E4 ratings**
Connection Examples

1. Check valve – CV – Pipe as short as possible, Max. pressure 8 bar (116 psi)
   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.
   Return force can be adjusted by pressure regulator. Ensure safe minimum pressure to return shock absorber.

3. Pressure regulator
   Pipe as short as possible
   Special unit necessary

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.

Selection Chart Air/Oil Tanks

<table>
<thead>
<tr>
<th>Shock Absorber Type</th>
<th>With Tank Example 1 to 4</th>
<th>With Recirc. Circuits Example 5 to 6</th>
<th>Min. Conn. Pipe Ø</th>
<th>Thread Sizes for Connection to Air/Oil Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA, MAA, MLA33...</td>
<td>Tank Check Valve</td>
<td>Tank Check Valve</td>
<td>mm</td>
<td>Thread Bottom 1/8-27 NPTF inside</td>
</tr>
<tr>
<td>MCA, MAA, MLA45...</td>
<td>AO1 CV1/8</td>
<td>AO3 CV1/4</td>
<td>4</td>
<td>1/8-27 NPTF inside</td>
</tr>
<tr>
<td>MCA, MAA, MLA45...</td>
<td>AO1 CV1/8</td>
<td>AO3 CV1/4</td>
<td>6</td>
<td>1/8-27 NPTF inside</td>
</tr>
<tr>
<td>CAA, AA2...</td>
<td>AO3 CV1/4</td>
<td>AO6 CV3/4</td>
<td>8</td>
<td>1/4-18 NPTF inside</td>
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<tr>
<td>CAA, AA3...</td>
<td>AO6 CV3/4</td>
<td>AO82 CV3/4</td>
<td>15</td>
<td>–</td>
</tr>
<tr>
<td>CAA, AA4...</td>
<td>AO82 CV3/4</td>
<td>AO82 CV3/4</td>
<td>19</td>
<td>–</td>
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<tr>
<td>A082 and connection accessories: Details on request</td>
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<td></td>
<td>38</td>
<td>–</td>
</tr>
</tbody>
</table>

Check Valves CV

Through an oil circuit fresh oil is drawn in from the industrial shock absorber and warm oil is pumped off (see example 5). To obtain this function, ACE offers suitable check valves of the CV series.

Technical Data

Operating pressure: 20 bar (290 psi)
Operating temperature range: 95 °C
Suitable for: Oil, air, water
Material: Aluminium

Check Valves – Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C</th>
</tr>
</thead>
<tbody>
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<td>19</td>
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<tr>
<td>CV1/4</td>
<td>29</td>
<td>33</td>
<td>1/4-18 NPT</td>
</tr>
<tr>
<td>CV3/8</td>
<td>29</td>
<td>33</td>
<td>3/8-18 NPT</td>
</tr>
<tr>
<td>CV1/2</td>
<td>41</td>
<td>40</td>
<td>1/2-14 NPT</td>
</tr>
<tr>
<td>CV3/4</td>
<td>48</td>
<td>59</td>
<td>3/4-14 NPT</td>
</tr>
</tbody>
</table>
Profile Dampers

The low cost alternative for continuous duty

The exceedingly successful TUBUS series from ACE is a perfect alternative, when masses don’t need to be decelerated to an exact point. Available in more than 140 different versions, the profile dampers are used to slow down masses, particularly under extreme conditions.

They are also recommended for use if there is little installation space available. Manufactured in co-polyester elastomer, the highly resistant absorbers provide the best benefits in areas where other materials fail or where a similarly high service life of up to 1 million load changes cannot be achieved. They are affordable, compact and light and absorb the energy with different damping characteristics depending on the design.

Competitive price/performance ratio
Reliable in extreme situations
Highly resistant material
Compact and lightweight design
Easy to mount
Long service life
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 excellent damping characteristics are achieved as a result of the special elastomer material and the worldwide unique 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. An advantage over other damping elements is TUBUS’ 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.

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

**Product family TA**
Degressive characteristic with max. energy absorption with min. stroke.
Energy absorption: 58 % to 73 %

**Product family TS**
Almost linear characteristic with low reaction force over a short operating stroke.
Energy absorption: 35 % to 64 %

**Product family TR/TR-L/TR-H**
Progressive characteristic with gradually increasing reaction force over a long stroke.
- Energy absorption TR: 25 % to 45 %
- Energy absorption TR-L: 26 % to 41 %
- Energy absorption TR-H: 39 % to 62 %

**Product family TR-HD**
Progressive characteristic with high energy absorption with a short stroke.
Energy absorption: 43 % to 72 %

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**Comparison of Damping Characteristics**

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Progressive characteristic with high energy absorption with a short stroke.
Energy absorption: 43 % to 72 %

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

#### Capacity Chart

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Type: Emergency Stop</th>
<th>Stroke max.</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
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<td>E₁ 2.0, E₂ 3.0</td>
<td></td>
<td>5</td>
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<td>TA17-7</td>
<td>E₁ 6.0, E₂ 9.0</td>
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<td>117</td>
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<td>TA21-9</td>
<td>E₁ 10.0, E₂ 16.0</td>
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<td>TA22-10</td>
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<td>E₁ 170.0, E₂ 223.0</td>
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<td>E₁ 242.0, E₂ 302.0</td>
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<td>TA90-40</td>
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<td>E₁ 2,014.0, E₂ 2,951.0</td>
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</table>

### TUBUS TA, TS, TR, TR-H, TR-HD

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Max. Energy Capacity</th>
<th>Type: Emergency Stop</th>
<th>Stroke max.</th>
<th>Page</th>
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<tbody>
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<td>E₁ 7.2, E₂ 10.9</td>
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<td>TR63-43L</td>
<td>E₁ 21.9, E₂ 32.0</td>
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<td>E₁ 204.0, E₂ 286.0</td>
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<tr>
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<td>125</td>
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<tr>
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1. **Max. energy capacity per cycle for continuous use.**
Profile Dampers

**TUBUS TA**
Axial Damping
*Compact size and strong force absorption*
Linear slides, Pneumatic cylinders, Handling modules, Machines and plants

**TUBUS TS**
Axial Soft Damping
*Compact size and smooth deceleration*
Linear slides, Pneumatic cylinders, Handling modules, Machines and plants

**TUBUS TR**
Radial Damping
*Compact size and soft deceleration*
Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders

**TUBUS TR-H**
Radial Damping, Hard Version
*Compact size with soft deceleration and high energy absorption*
Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders

**TUBUS TR-L**
Radial Damping, Long Version
*Powerhouse in long body length*
Offshore industry, Agricultural machinery, Impact panels, Conveyor systems

**TUBUS TR-HD**
Radial Damping, Heavy Duty Version
*Compact powerhouse in solid material*
Offshore industry, Agricultural machinery, Impact panels, Conveyor systems
TUBUS TA
Compact size and strong force absorption

Axial Damping
Energy capacity 2 Nm/Cycle to 2,951 Nm/Cycle
Maximum stroke 5 mm to 48 mm

Very efficient energy guzzlers: The TA profile dampers from the ACE TUBUS-Series are maintenance-free and ready to install. They’re made of co-polyester elastomer; a material that only heats up slightly and ensures consistent damping. The TA models absorbs most of the energy at the start of the stroke.

The TA family has been specially developed for maximum energy absorption within a range of 2 Nm to 2,951 Nm (18 in-lbs to 26,119 in-lbs.). These dampers have a minimum height is thanks to the space-saving shape, with Ø 12 mm to Ø 116 mm (Ø 0.47" to Ø 4.57"). The dampers can be very easily and quickly installed with the provided special screw.

These compact, cost-effective dampers are ideal as end position dampers in linear axes, in toolmaking and tool machines, in hydraulic and pneumatic equipment, handling equipment and other applications.

Technical Data

Energy capacity: 2 Nm/Cycle to 2,951 Nm/Cycle
Energy absorption: 58 % to 73 %
Dynamic force range: 870 N to 90,000 N
Operating temperature range: -40 °C to 90 °C
Construction size: 12 mm to 116 mm
Mounting: In any position
Material hardness rating: Shore 55D
Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.
Impact velocity range: Max. 5 m/s
Torque max.:
M3: 1 Nm
M4: 1.7 Nm
M5: 2.3 Nm
M6: 6 Nm
M8: 20 Nm
M12: 50 Nm
M16: 120 Nm

Application field: Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Swivel units, Electro-mechanical drives, Hydraulic devices, Conveyor systems, Crane systems

Note: Suitable for emergency stop applications and for continous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.
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 ($v > 0.5 \text{ m/s}$) and static ($v \leq 0.5 \text{ m/s}$) characteristics of all types are available on request.

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

### Performance and Dimensions

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<th>TYPES</th>
<th>$E_0$ Nm/cycle</th>
<th>$E_1$ Nm/cycle</th>
<th>Stroke max. mm</th>
<th>A mm</th>
<th>$d_1$ mm</th>
<th>$d_2$ mm</th>
<th>$d_3$ mm</th>
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1. Max. energy capacity per cycle for continuous use.

**Ordering Example**

**TA37-16**

TUBUS Axial
Outer-Ø 1.46” (37 mm)
Stroke 0.63” (16 mm)
TUBUS TS
Compact size and smooth deceleration

Axial Soft Damping
Energy capacity 2 Nm/Cycle to 966 Nm/Cycle
Maximum stroke 7 mm to 56 mm

Energy absorption in a compact and uniform way: The TS (TUBUS soft) profile dampers are also manufactured from co-polyester elastomer. Due to the almost linear damping characteristic curve, the maintenance-free, ready-to-install components softly absorb the energy with minimum strain on the machine. Consistent damping is helped by the low temperature increase of the material during operation.

The TS product family impresses with maximum energy absorption within a range of 2 Nm to 966 Nm within a minimum height. The space-saving design has been implemented from Ø 14 mm to Ø 107 mm. The special screw supplied is used to simply and quickly fix the profile dampers in place.

Suitable for emergency stop and permanent applications, the cost-effective, durable TUBUS TS can be used as end position dampers in linear axes, in toolmaking and tool machines and in hydraulic, pneumatic and handling equipment.

Technical Data

Energy capacity: 2 Nm/Cycle to 966 Nm/Cycle
Energy absorption: 35 % to 64 %
Dynamic force range: 533 N to 23,500 N
Operating temperature range: -40 °C to 90 °C
Construction size: 14 mm to 107 mm
Mounting: In any position
Material hardness rating: Shore 40D
Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.
Impact velocity range: Max. 5 m/s
Torque max.: M4: 1.7 Nm
M5: 2.3 Nm
M6: 6 Nm
M12: 50 Nm
M16: 120 Nm

Application field: Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Swivel units, Electro-mechanical drives, Crane systems, Conveyor systems

Note: Suitable for emergency stop applications and for continuous use. For applications with preloading and increased temperatures please consult ACE.
Safety information: Mounting screw should additionally be secured with Loctite.
On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.
Profile Dampers TS
Axial Soft Damping

Characteristics

Type TS44-23
Energy-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 calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example
TUBUS Axial Soft
Outer-∅ 1.73" (44 mm)
Stroke 0.91" (23 mm)

Performance and Dimensions

<table>
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<th>TYPES</th>
<th>1 E₀ Nm/cycle</th>
<th>2 E₀ Nm/cycle</th>
<th>Stroke max. mm</th>
<th>A mm</th>
<th>d₁ mm</th>
<th>d₂ mm</th>
<th>d₃ mm</th>
<th>Iₘ₄ mm</th>
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1 Max. energy capacity per cycle for continuous use.

Issue 04.2018 – Specifications subject to change
Profile Dampers

TUBUS TR
Compact size and soft deceleration

Radial Damping
Energy capacity 1.2 Nm/Cycle to 146 Nm/Cycle
Maximum stroke 17 mm to 60 mm

For long, soft braking action: The TUBUS TR models deliver linear damping forces. These maintenance-free, ready-to-install elements are made of co-polyester elastomer, which only heats up slightly during operation and therefore provides consistent damping.

The radial loading enables a very long and soft deceleration with progressive energy reduction at the end of the stroke. The TR product family has been specially designed for maximum stroke with a minimum height, producing an energy absorption per stroke extending from 1.2 Nm to 146 Nm. The dampers are available in compact formats of Ø 29 mm to Ø 100 mm and are supplied with a special screw for simple, quick assembly.

The TUBUS TR products are suitable as end position dampers in linear axes, in toolmaking and tool machines, in hydraulic and pneumatic equipment, handling equipment and other applications.

Technical Data

- Energy capacity: 1.2 Nm/Cycle to 146 Nm/Cycle
- Energy absorption: 25 % to 45 %
- Dynamic force range: 218 N to 7,500 N
- Operating temperature range: -40 °C to 90 °C
- Construction size: 29 mm to 100 mm
- Mounting: In any position
- Material hardness rating: Shore 40D
- Material: Profile body: Co-Polyester Elastomer

- Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.
- Impact velocity range: Max. 5 m/s
- Torque max.: M5: 3 Nm M6: 6 Nm M8: 20 Nm

Application field: Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Stacking units, Electro-mechanical drives, Conveyor systems, Dock constructions for shipbuilding

Note: Suitable for emergency stop applications and for continuous use. For applications with preloading and increased temperatures please consult ACE.

Safety information: Mounting screw should additionally be secured with Loctite.

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

Type TR93-57
Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)

Type TR93-57
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 ≤ 0.5 m/s) characteristics of all types are available on request.

Performance and Dimensions

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

Ordering Example
TR93-57
TUBUS Radial
Outer-Ø 3.66” (93 mm)
Stroke 2.24” (57 mm)

<table>
<thead>
<tr>
<th>TYPES</th>
<th>$E_a$ Nm/cycle</th>
<th>$E_b$ Nm/cycle</th>
<th>Stroke max. mm</th>
<th>A mm</th>
<th>B mm</th>
<th>C mm</th>
<th>D mm</th>
<th>$L_w$ mm</th>
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1 Max. energy capacity per cycle for continuous use.
TUBUS TR-H

Compact size with soft deceleration and high energy absorption

Radial Damping, Hard Version
Energy capacity 2.7 Nm/Cycle to 427 Nm/Cycle
Maximum stroke 15 mm to 56 mm

Harder mixture of materials for higher energy absorption: The maintenance-free and ready-to-install TR-H profile dampers, are stressed radially in the same way as the basic TR model. With almost the same dimensions, they also decelerate with a very long and soft action. The harder co-polyester elastomer mixture leads to significantly high energy absorption of 2.7 Nm to 427 Nm (3.9 in-lbs to 3,779 in-lbs) in these models. The supplied special screw makes them easy to mount.

The TR-H product family is space-saving with dimensions of Ø 30 mm to Ø 102 mm (Ø 1.18” to Ø 4.02”). It complements the TUBUS range between the progressive TR and almost linear TS models. Users are therefore provided with a full range of deceleration curves within the ACE TUBUS family.

The TUBUS TR-H products are suitable end position dampers in linear axes, in toolmaking and tool machines and in hydraulic, pneumatic and handling equipment as well as other applications.

Technical Data

Energy capacity: 2.7 Nm/Cycle to 427 Nm/Cycle
Energy absorption: 39 % to 62 %
Dynamic force range: 550 N to 21,200 N
Operating temperature range: -40 °C to 90 °C
Construction size: 30 mm to 102 mm
Mounting: In any position
Material hardness rating: Shore 55D
Material: Profile body: Co-Polyester Elastomer

Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.
Impact velocity range: Max. 5 m/s
Torque max.: M5: 3 Nm
M6: 6 Nm
M8: 20 Nm

Application field: Furniture industry, Sports equipment, Linear slides, Pneumatic cylinders, Handling modules, Machines and plants, Stacking units, Electro-mechanical drives, Conveyor systems, Dock constructions for shipbuilding

Note: Suitable for emergency stop applications and for continuous use. For applications with preloading and increased temperatures please consult ACE.
Safety information: Mounting screw should additionally be secured with Loctite.
On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.
Characteristics

Type TR95-50H
Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)

Type TR95-50H
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 25 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 calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Ordering Example
TUBUS Radial
Outer-d 3.74" (95 mm)
Stroke 1.97" (50 mm)
Hard Version

Performance and Dimensions

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<th>( E_{\text{p}} ) Nm/cycle</th>
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</table>

1 Max. energy capacity per cycle for continuous use.

1 E_r: Emergency Stop

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Issue 04.2018 – Specifications subject to change
Especially for applications with long and soft deceleration: The radial tube dampers TR-L from the ACE TUBUS-Series are maintenance-free, ready-to-install elements made of co-polyester elastomer.

Their radial load offers designers a very long and soft deceleration with a progressive reduction in energy at the end of the stroke. The TR-L range has been specially developed for a maximum stroke with a minimum height and a range of 7.2 Nm to 10,780 Nm. The absorption capacity is dependent on the length of the selected tube damper. These models are available in sizes between Ø 29 mm and Ø 188 mm.

The TUBUS TR-L is used where impact or collision protection is necessary along a straight line e.g. on shovels in mining equipment, loading and lifting devices, dock systems in shipbuilding or luggage and transport belts.

Technical Data

Energy capacity: 7.2 Nm/Cycle to 10,780 Nm/Cycle
Energy absorption: 26 % to 41 %
Dynamic force range: 1,312 N to 217,700 N
Operating temperature range: -40 °C to 90 °C
Construction size: 29 mm to 188 mm
Mounting: In any position
Material hardness rating: Shore 55D
Material: Profile body: Co-Polyester Elastomer
Environment: Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.
Impact velocity range: Max. 5 m/s
Torque max.: M5: 3 Nm
M8: 20 Nm
M16: 40 Nm (DIN912)
M16: 120 Nm (shouldered screw)
Application field: Offshore industry, Agricultural machinery, Impact panels, Conveyor systems, Stacking units, Shipbuilding, Shovels or articulated joints for construction machinery, Transport roads, Loading and lifting equipment

Note: Suitable for emergency stop applications and for continuos use. For applications with preloading and increased temperatures please consult ACE.
Safety information: Mounting screw should additionally be secured with Loctite.
On request: Special strokes, -characteristics, -spring rates, -sizes and -materials.
### Performance and Dimensions

<table>
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<tr>
<th>TYPES</th>
<th>$E_1$ Nm/cycle</th>
<th>$E_2$ Nm/cycle</th>
<th>Stroke max. (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>$L_2$ (mm)</th>
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</table>

1. Max. energy capacity per cycle for continuous use.

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**TR-L**

Profile Dampers TR-L
Radial Damping, Long Version

Ordering Example TR66-40L-2

TUBUS Radial
Outer-d 2.60" (66 mm)
Stroke 1.57" (40 mm)
Long Version
Length 2 = 12.01" (305 mm)

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

Issue 04.2018 – Specifications subject to change

ACE Controls Inc.  23425 Industrial Park Dr. Farmington  US-48335 Michigan  T +1 800-521-3320  F +1 248-476-2470  shocks@acecontrols.com  www.acecontrols.com
# TUBUS TR-HD

**Compact powerhouse in solid material**

**Radial Damping, Heavy Duty Version**

**Energy capacity** 405 Nm/Cycle to 11,840 Nm/Cycle

**Maximum stroke** 12 mm to 44 mm

Impact and collision protection: The TR-HD profile dampers are stressed in the same way as the basic model TR but offer a higher force and energy absorption with a shorter damping distance thanks to the solid design. Different damping characteristic curves can be achieved with two different co-polyester elastomer hardness levels. The slightly oval (bi-concave) shape also ensures a softer force intake.

This product family absorbs a lot of energy despite the low height: a range of 405 Nm to 11,840 Nm is progressively covered by strokes of 12 mm to 44 mm. Delivered with two included screws, the damper can be easily and quickly installed both horizontally or vertically. The drill hole distance can be adapted if required.

These dampers are used in agricultural technology and on shovels or break joints on construction machines as well as on loading and lifting or similar equipment.

## Technical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td><strong>Energy capacity</strong></td>
<td>405 Nm/Cycle to 11,840 Nm/Cycle</td>
</tr>
<tr>
<td><strong>Energy absorption</strong></td>
<td>43 % to 72 %</td>
</tr>
<tr>
<td><strong>Dynamic force range</strong></td>
<td>78.800 N to 812.900 N</td>
</tr>
<tr>
<td><strong>Operating temperature range</strong></td>
<td>-40 °C to 90 °C</td>
</tr>
<tr>
<td><strong>Construction size</strong></td>
<td>42 mm to 117 mm</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>In any position</td>
</tr>
<tr>
<td><strong>Material hardness rating</strong></td>
<td>Shore 40D, Shore 55D</td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td>Profile body: Co-Polyester Elastomer</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>Resistant to microbes, seawater or chemical attack. Excellent UV and ozone resistance. Material does not absorb water or swell.</td>
</tr>
<tr>
<td><strong>Impact velocity range</strong></td>
<td>Max. 5 m/s</td>
</tr>
<tr>
<td><strong>Torque max.:</strong></td>
<td>M10: 7 Nm</td>
</tr>
<tr>
<td></td>
<td>M12: 12 Nm</td>
</tr>
<tr>
<td><strong>Application field</strong></td>
<td>Offshore industry, Agricultural machinery, Impact panels, Conveyor systems, Stacking units, Shipbuilding, Shovels or articulated joints for construction machinery, Transport roads, Loading and lifting equipment</td>
</tr>
</tbody>
</table>

**Note:** Suitable for emergency stop applications and for continuous use. For applications with preloading and increased temperatures please consult ACE.

**Safety information:** Mounting screw should additionally be secured with Loctite.

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

**TUBUS TR-HD**

**Force-Stroke Characteristics (static)**

![Graph showing force-stroke characteristics](image)

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

**Ordering Example**

TUBUS Radial

Outer-Ø 2.48” (63 mm)

Stroke 0.94” (24 mm)

Heavy Duty Version

---

### Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E₂₁</th>
<th>E₂₂</th>
<th>F max. static</th>
<th>Stroke max.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Lₘ</th>
<th>M</th>
<th>Weight</th>
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</thead>
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<tr>
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<td>289,300</td>
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<td>79</td>
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<td>64</td>
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<td>93</td>
<td>115</td>
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<td>575,200</td>
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<td>129</td>
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<td>21</td>
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<td>3,949</td>
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<td>82</td>
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<td>22</td>
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<td>1.050</td>
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<td>102</td>
<td>1.000</td>
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<td>639,100</td>
<td>30</td>
<td>66</td>
<td>166</td>
<td>117</td>
<td>143</td>
<td>102</td>
<td>25</td>
<td>102</td>
<td>1.080</td>
</tr>
</tbody>
</table>

1 Max. energy capacity per cycle for continuous use.
**Application Examples**

**TUBUS TA**

**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 TA98-40 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 73 % of the impact energy.

**TUBUS TS**

**Safe braking of maintenance boats**

The maintenance of wind turbines in open seas has long resulted in damage to maintenance boats. Because of impact velocity and swell, an increase in the boat’s mass of up to 20 percent must be taken into account when landing on a rigid mooring structure. It is only since the landing operation has been carried out with the aid of the ACE company’s TUBUS series that cable repair and maintenance work on wind turbines has been made safe for both personnel and equipment. TUBUS of the type TS84-43 are seawater resistant and can withstand ambient temperatures from -40 °C to +90 °C.

Seawater-resistant, robust TUBUS profile dampers made of co-polyester elastomer allow boats and crew to dock safely

Wals Diving and Marine Service, 1970AC Ijmuiden, Netherlands
TUBUS TS
Protection of drive used in space treadmill

When training in zero gravity, a harness with bungee cords is used to ensure that trainees do not become disengaged. Three ACE profile dampers with a linear-working facility are utilized in this case. One so-called TUBUS is positioned in the pneumatic cylinder, while the other two are put in place in the rest of the system. All the dampers have the task of protecting the system if the treadmill drive belts become damaged. Otherwise, the cylinder would reach a very high speed and become seriously damaged at the end of the stroke.

TUBUS TR
Gentle damping for electric scooters

TUBUS profile dampers make driving an e-scooter a real experience. The footboard of an electric scooter should be dampened to enable the driver to experience a comfortable ride even over potholes and other bumpy surfaces. Ideally, the characteristic line should be furnished with a soft increase in force over a long stroke. The elegant look of the scooter as well as the folding mechanism designed to save space have not allowed the use of feasible damper solutions up to now. Inferior alternatives such as rubber dampers made of polyurethane or simple steel springs could not be considered from the start. The TUBUS profile damper TRS2-32H offered the perfect solution with its compact construction design paired with progressive damping action.
Special Profile Dampers
Cost-effective damping for your pressing tools

ACE provides TUBUS profile dampers in many variations. Special solutions for presses can now be cost-effectively achieved with down holder dampers, damping plugs, lift dampers and press dampers from ACE.

They replace the PU-springs previously used in the automotive industry. It was no longer possible for them to fulfill the required tasks due to the higher return stroke speeds in modern pressing tools. Made of co-polyester elastomers, the TUBUS special takes care of the protection of mounting bolts and insert bolts much more reliably. On the one hand they protect a so-called down holders during the return stroke after the forming of sheet metal parts, and on the other they function as protection for hoisting lifters.

- High reliability
- Long service life
- High power and energy absorption
- Efficient working through higher cycle rates
- Extreme abrasion hardness and sheer strength
- Noise reduction
TUBUS Special Profile Dampers
A wide range of solutions for your tools

Small but effective: These versatile, custom-manufactured components make all the difference during sheet metal forming in the automotive and tool industries thanks to long service lives and high power absorption.

TUBUS Down Holder Dampers
The innovation as a substitute for overburdened PU springs
The axial-functioning elements are ideal for different diameters of mounting bolts from M10 to M30 in the press tools. They increase clock rates, service lives and reliability during increased cushioning strokes there.

TUBUS Lift Dampers
The brother of the down holder damper
Used in the end position damping in ProgDie presses, they sit on the mounting bolts of the spring-loaded belt guide rails or hoisting lifters in the bottom part of the tool of the follow-on composite tool, protect it and accelerate production.

TUBUS Damping Plugs
A special kind of emergency plug
These side-mounted, radial damping elements also protect the mounting bolts and insert bolts during the opening of the pressing tools. They are available in four different sizes and are used in large tools.

TUBUS Press Dampers
When a side effect (nearly) becomes the main thing
All TUBUS specials additionally reduce noise. In press dampers, used particularly in eccentric presses by manufacturers of large household appliances, this is however the main task. Screwed into a hole pocket, they also effectively protect the tools.
Damping Pads
Customized damping technology

With damping pads from the SLAB series, ACE provides solutions to effectively slow down loads impacting large and small surfaces. This means that these products are found in a wide range of damping technologies from ACE where oscillation begins or where damaging impacts in construction designs need to be slowed over a large surface.

The ACE SLAB pads, available to choose in any size, absorb static loads from 3 to 30 N/cm² and can be either cut to size according to each requirement or designed as a molded part. Simply use an adhesive to install. The standard plate heights are between 12.5 and 25 mm. Many different coatings clear the way for numerous applications and not least because they can be used in a temperature range from -5 °C to 50 °C.
Individual Pad Cutting
SLAB pads pre-assembled for each project

Whether pads, cuts or drawing parts, stocked SLAB pads in combination with our freely programmable cutting machine ensure maximum flexibility with excellent delivery speed.

Fast, flexible and adapted to your conditions.

- Can be integrated quickly and cost-effectively
- Immense inner damping
- Pad thicknesses up to 80 mm on request
- Can be assembled with CNC cutting machines
- Patented formula

Ask for special solutions!!!
Technical Data

**Energy capacity:** 3.1 Nm/Cycle to 210 Nm/Cycle

**Energy absorption in pad format**

**Connectable and Combinable**

**Energy capacity 3.1 Nm/Cycle to 210 Nm/Cycle**

**Stroke 6.5 mm to 12.5 mm**

Tailor made damping material in pad format:
SLAB damping pads are made of a viscoelastic PUR-material. They absorb impact loads extremely effectively and are also suitable for insulating or damping vibration.

The pads of the product family SL-030 to SL-300 are quickly adapted to the relevant type of application. This is in part achieved through the configuration of the calculating tool or directly by the ACE specialist engineers. Furthermore, this is possible because the standard material can be cut exactly and quickly to any customer requirement with our new cutting system. It is also possible to obtain a sample to find an optimum solution.

The SLAB damping pads are proven impact or collision protection. They are used on luggage and transport belts, conveyor systems, pneumatic, electromechanical and hydraulic drives as well as on linear carriages.

---

**Technical Data**

- **Energy capacity:** 3.1 Nm/Cycle to 210 Nm/Cycle
- **Standard density:**
  - SL-030 = approx. 220 kg/m³
  - SL-100 = approx. 440 kg/m³
  - SL-300 = approx. 680 kg/m³
- **Standard colour:** Green
- **Dimensions:**
  - Widths: up to 1,500 mm
  - Lengths: up to 5,000 mm
  - Thicknesses: 12.5 mm and 25 mm
- **Environment:** Resistant against ozone and UV radiation. Chemical resistancy on request.
- **Operating temperature range:** -5 °C to 50 °C
- **Material:** Profile body: Mixed cellular PUR-Elastomer (polyurethane)
- **Application field:** Linear slides, Handling modules, Luggage and transport belts, Impact panels, Pipeline insulation, Foundation mounting, Conveyor technology, Electronic systems and controls, Medical technology, Buildings
- **Note:** Possibilities for cutting: Water jet cutting, stamping, splitting, sawing and drilling
- **Safety information:** Fire rating: B2, normally flammable, according to DIN 4102
- **On request:** Special versions with further dimensions such as thicknesses, colours, shapes and drawing parts e.g. curves. Different wear layers.
Characteristics

Type SL-030-12
Force-Stroke Characteristic (dynamic)
Stroke Utilization 6.5 mm

The chosen damping plate should be tested by the customer on the specific application.

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>$E$, max. Nm/cycle</th>
<th>Stroke A (mm)</th>
<th>Stroke B (mm)</th>
<th>Stroke C (mm)</th>
<th>Area $A$ (mm$^2$)</th>
<th>Standard density $B$ (kg/m$^3$)</th>
<th>Return Time $C$ (s)</th>
<th>Weight $D$ (kg)</th>
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</thead>
<tbody>
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<td>50.0</td>
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<td>200</td>
<td>0.013</td>
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<td>12.5</td>
<td>10,000</td>
<td>200</td>
<td>0.025</td>
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</table>

1 Maximum energy absorption in terms of area graded pad sizes as a reference for the correct selection of material and pad size. The energy absorption depends on the individual impact surface and stroke utilization.
Damping Pads SL-030-25

Connectable and Combinable

SL-030-25

Characteristics
Type SL-030-25
Force-Stroke Characteristic (dynamic)
Stroke Utilization 12.5 mm

Load data
Dynamic load, impact velocity: approx. 1 m/s

The chosen damping plate should be tested by the customer on the specific application.

Ordering Example
ACE-SLAB
Material Type
Material Thickness 0.98" (25 mm)
Customers Specific Dimension/Shape (D-Number is assigned by ACE)

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E&lt;sub&gt;max&lt;/sub&gt; (Nm/cycle)</th>
<th>Stroke (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>Area (mm²)</th>
<th>Standard density (kg/m³)</th>
<th>Return Time (s)</th>
<th>Weight (kg)</th>
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<td>200</td>
<td>5</td>
<td>0.050</td>
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</table>

1 Maximum energy absorption in terms of area graded pad sizes as a reference for the correct selection of material and pad size. The energy absorption depends on the individual impact surface and stroke utilization.
Damping Pads SL-100-12

Connectable and Combinable

SL-100-12

Characteristics

Type SL-100-12

Force-Stroke Characteristic (dynamic)

Stroke Utilization 6.5 mm

Force (kN) vs. Stroke (mm)

Load data

Dynamic load, impact velocity: approx. 1 m/s

The chosen damping plate should be tested by the customer on the specific application.

Ordering Example

ACE-SLAB

Material Type

Material Thickness 0.49" (12.5 mm)

Customers Specific Dimension/Shape
(D-Number is assigned by ACE)

Performance and Dimensions

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<th>TYPES</th>
<th>E, max. Nm/cycle</th>
<th>Stroke (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>Area (mm²)</th>
<th>Standard density kg/m²</th>
<th>Return Time (s)</th>
<th>Weight (kg)</th>
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</table>

1 Maximum energy absorption in terms of area graded pad sizes as a reference for the correct selection of material and pad size. The energy absorption depends on the individual impact surface and stroke utilization.
### Characteristics

**Type SL-100-25**  
**Force-Stroke Characteristic (dynamic)**  
**Stroke Utilization 12.5 mm**

![Graph showing the force-stroke characteristic for different materials (MP1, MP2, MP3).]

**Load data**  
Dynamic load, impact velocity: approx. 1 m/s

The chosen damping plate should be tested by the customer on the specific application.

### Performance and Dimensions

| ORDERING EXAMPLE SL-100-25-Dxxxx | ACE-SLAB | Material Type | Material Thickness 0.98” (25 mm) | Customers Specific Dimension/Shape (D-Number is assigned by ACE) |
|---------------------------------|----------|---------------|---------------------------------|-----------------------------------------------------------------
| SL-100-25-D-MP1                 |          |               |                                 |                                                                  |
| SL-100-25-D-MP2                 |          |               |                                 |                                                                  |
| SL-100-25-D-MP3                 |          |               |                                 |                                                                  |

### Load data

<table>
<thead>
<tr>
<th>Area (mm²)</th>
<th>Load data</th>
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</thead>
<tbody>
<tr>
<td>10,000 mm²</td>
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</tr>
<tr>
<td>5,000 mm²</td>
<td></td>
</tr>
<tr>
<td>2,500 mm²</td>
<td></td>
</tr>
</tbody>
</table>

1 Maximum energy absorption in terms of area graded pad sizes as a reference for the correct selection of material and pad size. The energy absorption depends on the individual impact surface and stroke utilization.
**Characteristics**

**Type SL-300-12**  
Force-Stroke Characteristic (dynamic)  
Stroke Utilization 6.5 mm

<table>
<thead>
<tr>
<th>Force (kN)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.0</td>
<td>0.5</td>
</tr>
<tr>
<td>10.0</td>
<td>1.0</td>
</tr>
<tr>
<td>15.0</td>
<td>1.5</td>
</tr>
<tr>
<td>20.0</td>
<td>2.0</td>
</tr>
<tr>
<td>25.0</td>
<td>2.5</td>
</tr>
<tr>
<td>30.0</td>
<td>3.0</td>
</tr>
<tr>
<td>35.0</td>
<td>3.5</td>
</tr>
<tr>
<td>40.0</td>
<td>4.0</td>
</tr>
<tr>
<td>45.0</td>
<td>4.5</td>
</tr>
</tbody>
</table>

**Load data**  
Dynamic load, impact velocity: approx. 1 m/s

The chosen damping plate should be tested by the customer on the specific application.

**Ordering Example**  
ACE-SLAB  
Material Type  
Material Thickness 0.49" (12.5 mm)  
Customers Specific Dimension/Shape  (D-Number is assigned by ACE)

**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E, max. (Nm/cycle)</th>
<th>Stroke A (mm)</th>
<th>Stroke B (mm)</th>
<th>Stroke C (mm)</th>
<th>Area (mm²)</th>
<th>Standard density (kg/m³)</th>
<th>Return Time (s)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL-300-12-D-MP1</td>
<td>38.0</td>
<td>6.5</td>
<td>50.0</td>
<td>50.0</td>
<td>12.5</td>
<td>2,500</td>
<td>3</td>
<td>0.021</td>
</tr>
<tr>
<td>SL-300-12-D-MP2</td>
<td>65.0</td>
<td>6.5</td>
<td>70.7</td>
<td>70.7</td>
<td>12.5</td>
<td>5,000</td>
<td>3</td>
<td>0.043</td>
</tr>
<tr>
<td>SL-300-12-D-MP3</td>
<td>121.0</td>
<td>6.5</td>
<td>100.0</td>
<td>100.0</td>
<td>12.5</td>
<td>10,000</td>
<td>3</td>
<td>0.085</td>
</tr>
</tbody>
</table>

1 Maximum energy absorption in terms of area graded pad sizes as a reference for the correct selection of material and pad size. The energy absorption depends on the individual impact surface and stroke utilization.
Damping Pads SL-300-25

Connectable and Combinable

SL-300-25

Characteristics

Type SL-300-25
Force-Stroke Characteristic (dynamic)
Stroke Utilization 12.5 mm

The chosen damping plate should be tested by the customer on the specific application.

Ordering Example
ACE-SLAB
Material Type ______
Material Thickness 0.98" (25 mm)
Customers Specific Dimension/Shape
(D-Number is assigned by ACE)

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>( E_{\text{max}} )</th>
<th>( \text{Stroke} )</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Area</th>
<th>Standard density</th>
<th>Return Time</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL-300-25-D-MP1</td>
<td>59.0</td>
<td>12.5</td>
<td>50.0</td>
<td>50.0</td>
<td>25.0</td>
<td>2,500</td>
<td>680</td>
<td>4</td>
<td>0.043</td>
</tr>
<tr>
<td>SL-300-25-D-MP2</td>
<td>101.0</td>
<td>12.5</td>
<td>70.7</td>
<td>70.7</td>
<td>25.0</td>
<td>5,000</td>
<td>680</td>
<td>4</td>
<td>0.085</td>
</tr>
<tr>
<td>SL-300-25-D-MP3</td>
<td>210.0</td>
<td>12.5</td>
<td>100.0</td>
<td>100.0</td>
<td>25.0</td>
<td>10,000</td>
<td>680</td>
<td>4</td>
<td>0.170</td>
</tr>
</tbody>
</table>

1 Maximum energy absorption in terms of area graded pad sizes as a reference for the correct selection of material and pad size. The energy absorption depends on the individual impact surface and stroke utilization.
Bonding of Polyurethane (PUR) Elastomers

Cellular and compact parts of polyurethane (PUR) elastomers SLAB damping pads can be bonded according to the following recommendations. If treatment instructions are followed, the strengths of the bonded joint can be equivalent to the elastomer material itself.

1. General Information

To achieve the required bonding strength it is necessary to ensure the correct adhesive is chosen for each individual application.

Contact bonding material
Thin adhesive film, with little filling of the gaps. Correcting or moving of the areas covered with bonding material is no longer possible after the first contact is made (contact effect).

Once a bonding is separated, the bonding process must be renewed. Please note that creases, ripples or blisters cannot be straightened once the contact is made.

Hardening bonding material
(As thin as possible) the film of glue fills the joint. The gluing can be done after the edges are brought together.

2. Preparation

The preparation of bonding surfaces is of significant importance for the bonding strength. The surfaces must be adapted to each other and available in plain, clean form.

Careful removal of
Adhesive remnants, oil, fat, separating agents, dirt, dust, scales, molding layers, protective coating, finish, paint, sweat etc.

Mechanical support
Stripping, brushing, scraping, grinding, sandblasting.

Chemical support
Degreasing (washing off with grease remover), etching, priming; pay attention to chemical resistancy on the following page!

In general, SLAB damping pads in sheet form can be bonded without pretreatment. Molded parts, with or without special skin, have to be cleaned from left-over separating agents, if necessary by grinding. When bonding with other materials like plastic, wood, metal or concrete, mechanical and/or chemical additives have to be used.

The adhesive has to be prepared according to the formula, observing the manufacturer’s recommendations. The adhesive film is also to be carefully applied pursuant to these details. (Tools: brush, spatula, adhesive spreader, airless spray gun).

Contact bonding material
Apply the non-gap-filling adhesive film to both bonding surfaces – the thinner, the better. To close the pores of low density materials, two layers may be necessary.

Hardening bonding material
Apply evenly. Possible irregularities can be compensated by the film thickness.

3. Bonding

When using contact bonding material, the flash off time has to be kept in mind. Especially, with systems containing water instead of usual solvents, the adhesive film must be as dry as possible in order to pass the “finger test” – no marks appear when touching the adhesive surface.

When using hardening bonding material, the parts have to be joined immediately after applying the bonding material.

4. Pressing

Contact bonding material  Contact pressure up to 0.5 N/mm²
Hardening bonding material  Fix firmly

It is important to carefully follow the manufacturer’s instructions with regard to processing temperature, hardening time and earliest possible loading.

5. Selection of Approved Bonding Materials

Because of the variety of materials that can be bonded together as well as numerous suitable bonding materials, we refer you to a worldwide leading producer of bonding and sealing materials.

Sika U.S.
Sika Corporation
201 Polito Avenue
Lyndhurst, NJ 07071
T +1 (800) 933-SIKA (7452)
www.usa.sika.com
# Chemical Resistance

**Test (following DIN 53428)**

Exposure time of the medium: 6 weeks at room temperature, but for concentrated acids and bases as well as solvents: 7 days at room temperature

**Evaluation Criteria**

Changing of tensile strength and elongation of break (dry samples), change in volume

**Evaluation Standard**

<table>
<thead>
<tr>
<th>1 Excellent resistance</th>
<th>change in characteristics &lt; 10 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Good resistance</td>
<td>change in characteristics between 10 % and 20 %</td>
</tr>
<tr>
<td>3 Conditional resistance</td>
<td>change in characteristics partly above 20 %</td>
</tr>
<tr>
<td>4 Not resistant</td>
<td>change in characteristics all above 20 %</td>
</tr>
</tbody>
</table>

All information is based on our current knowledge and experiences. We reserve the rights for changes towards product refinement.

## Water/Watery Solutions

<table>
<thead>
<tr>
<th>SL-030 to SL-300</th>
<th>Water/Watery Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Water</td>
<td></td>
</tr>
<tr>
<td>1 Iron (III) chloride 10 %</td>
<td></td>
</tr>
<tr>
<td>1 Sodium carbonate</td>
<td></td>
</tr>
<tr>
<td>1 Sodium chlorate 10 %</td>
<td></td>
</tr>
<tr>
<td>1 Sodium chloride 10 %</td>
<td></td>
</tr>
<tr>
<td>1 Sodium nitrate 10 %</td>
<td></td>
</tr>
<tr>
<td>1 Tensides (div.)</td>
<td></td>
</tr>
<tr>
<td>1 Hydrogen peroxide 2 %</td>
<td></td>
</tr>
<tr>
<td>1 Laitance</td>
<td></td>
</tr>
</tbody>
</table>

## Solvents

<table>
<thead>
<tr>
<th>SL-030 to SL-300</th>
<th>Solvents</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Acetone</td>
<td></td>
</tr>
<tr>
<td>2 Diesel/Fuel oil</td>
<td></td>
</tr>
<tr>
<td>3 Carburetor fuel/Benzine</td>
<td></td>
</tr>
<tr>
<td>1 Glycerin</td>
<td></td>
</tr>
<tr>
<td>1 Glycols</td>
<td></td>
</tr>
<tr>
<td>1 Cleaning solvents/Hexane</td>
<td></td>
</tr>
<tr>
<td>1 Methanol</td>
<td></td>
</tr>
<tr>
<td>4 Aromatic hydrocarbons</td>
<td></td>
</tr>
</tbody>
</table>

## Other Factors

| 1 Hydrolysis * | |
| 1 Ozone        | |
| 1 UV radiation and weathering | |
| 1 Biological resistance | |

* 28 days, 70 °C, 95 % relative humidity

## Oils and Greases

<table>
<thead>
<tr>
<th>SL-030 to SL-300</th>
<th>Oils and Greases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ASTM Oil No. 1</td>
<td></td>
</tr>
<tr>
<td>1 ASTM Oil No. 3</td>
<td></td>
</tr>
<tr>
<td>2 Laitance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydrostatic oils</td>
</tr>
<tr>
<td></td>
<td>depends on consistency/additives</td>
</tr>
<tr>
<td>1 Motor oil</td>
<td></td>
</tr>
<tr>
<td>1 Formwork oil</td>
<td></td>
</tr>
<tr>
<td>1 High performance grease</td>
<td></td>
</tr>
<tr>
<td>1-2 Railroad switch lubricant</td>
<td></td>
</tr>
</tbody>
</table>

## Acids and Bases

<table>
<thead>
<tr>
<th>SL-030 to SL-300</th>
<th>Acids and Bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Formic acid 5 %</td>
<td></td>
</tr>
<tr>
<td>2 Acetic acid 5 %</td>
<td></td>
</tr>
<tr>
<td>1 Phosphoric acid 5 %</td>
<td></td>
</tr>
<tr>
<td>4 Nitric acid 5 %</td>
<td></td>
</tr>
<tr>
<td>1 Hydrochloric acid 5 %</td>
<td></td>
</tr>
<tr>
<td>1 Sulphuric acid 5 %</td>
<td></td>
</tr>
<tr>
<td>1 Ammonia solution 5 %</td>
<td></td>
</tr>
<tr>
<td>1 Caustic potash solution 5 %</td>
<td></td>
</tr>
<tr>
<td>1 Caustic soda solution 5 %</td>
<td></td>
</tr>
</tbody>
</table>

---

**Technical Information**

**Chemical Resistance**

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</tr>
<tr>
<td>3 Conditional resistance</td>
<td>change in characteristics partly above 20 %</td>
</tr>
<tr>
<td>4 Not resistant</td>
<td>change in characteristics all above 20 %</td>
</tr>
</tbody>
</table>

All information is based on our current knowledge and experiences. We reserve the rights for changes towards product refinement.
## Shock Absorption Samples (Sold Separately)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL-030-12-D-MP1</td>
<td>Sample Kit</td>
<td>50 mm x 50 mm / 70.7 mm x 70.7 mm / 100 mm x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>SL-030-25-D-MP1</td>
<td>Sample Kit</td>
<td>50 mm x 50 mm / 70.7 mm x 70.7 mm / 100 mm x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>SL-100-12-D-MP1</td>
<td>Sample Kit</td>
<td>50 mm x 50 mm / 70.7 mm x 70.7 mm / 100 mm x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>SL-100-25-D-MP1</td>
<td>Sample Kit</td>
<td>50 mm x 50 mm / 70.7 mm x 70.7 mm / 100 mm x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>SL-300-12-D-MP1</td>
<td>Sample Kit</td>
<td>50 mm x 50 mm / 70.7 mm x 70.7 mm / 100 mm x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>SL-300-25-D-MP1</td>
<td>Sample Kit</td>
<td>50 mm x 50 mm / 70.7 mm x 70.7 mm / 100 mm x 100 mm x 12.5 mm</td>
</tr>
</tbody>
</table>

### Additional Information
- 50 mm, 70.7 mm, 100 mm kits include 1 sample each of the MP1, MP2 and MP3.
- 220 mm x 150 mm x 12.5 mm & 25 mm kits include 1 sample each of the 12 and 25 MP4.
- * Has a layer for wear protection & adhesive on one side

## Sample Kits

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>250-0800</td>
<td>SL-030-12 Sample Kit</td>
<td>50 x 50 mm / 70.7 x 70.7 mm / 100 x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>250-0801</td>
<td>SL-030-25 Sample Kit</td>
<td>50 x 50 mm / 70.7 x 70.7 mm / 100 x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>250-0802</td>
<td>SL-100-12 Sample Kit</td>
<td>50 x 50 mm / 70.7 x 70.7 mm / 100 x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>250-0803</td>
<td>SL-100-25 Sample Kit</td>
<td>50 x 50 mm / 70.7 x 70.7 mm / 100 x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>250-0804</td>
<td>SL-300-12 Sample Kit</td>
<td>50 x 50 mm / 70.7 x 70.7 mm / 100 x 100 mm x 12.5 mm</td>
</tr>
<tr>
<td>250-0805</td>
<td>SL-300-25 Sample Kit</td>
<td>50 x 50 mm / 70.7 x 70.7 mm / 100 x 100 mm x 12.5 mm</td>
</tr>
</tbody>
</table>

## Vibration Isolation Samples (Sold Separately)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL-170-12-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-170-25-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-210-12-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-210-25-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-275-12-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-275-25-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-450-12-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-450-25-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-600-12-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-600-25-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-720-12-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
<tr>
<td>SL-720-25-F-MP4</td>
<td></td>
<td>220 mm x 150 mm</td>
</tr>
</tbody>
</table>

### Additional Information
- 50 x 50 mm, 70.7 x 70.7 mm, 100 x 100 mm kits include 1 sample each of the MP1, MP2 and MP3.
- 220 mm x 150 mm x 12.5 mm & 25 mm kits include 1 sample each of the 12 and 25 MP4.
- * Has a layer for wear protection & adhesive on one side

---

ACE Controls Inc.  ·  23425 Industrial Park Dr. Farmington  ·  US-48335 Michigan  ·  T +1 800-521-3320  ·  F +1 248-476-2470  ·  shocks@acecontrols.com  ·  www.acecontrols.com
Application Examples

SL-030, TA
Damping combination SLAB and TUBUS

SLAB-TUBUS-Combination ensures fast luggage transport. Airports endeavour to shorten air passengers’ waiting times as much as possible. This aim is met with a solution especially developed for luggage transport systems and has solved previous damping issue. Transport carriers with a weight of up to 120 kg can now be moved at the desired conveyor belt speeds. A SLAB-combination of the material SL-030-12(25)-Dxxxx together with two TA40-16 type TUBUS profile dampers are used here.

SL-030
Noise reduction

ACE-SLAB damping pads protect man and machine. At the beginning of the construction phase of a modern processing centre at the end position, a 25 kg cable channel collided with force against the housing and produced a deafening noise and mechanical strain on the energy chain. A reliable solution for compliance with the operational parameters was realized with the SL-030-25-Dxxxx type ACE-SLAB damping pads even before the milling machine was finished.
SL-030
Impact reduction in ring form
ACE-SLAB damping pads make tyre transport safer. Developed for absorbing the impact of forces, the ACE-SLAB damping pads SL-030-121-Dxxxx applied in this tyre testing system are ideal for protecting the sliding parts of the machine during quality tests. The individual customisation of the ring form of the centre arm and simple integration into the equipment also support the decision for applying these innovative absorber elements.

SL-030
Impact protection for large areas
ACE-SLAB damping pads offer impact protection for wooden battens. To protect wooden battens with differing weights and impact speeds of approx. 2 m/s, the SLAB-material SL-030-12-Dxxxx was screwed across the whole surface between two steel sheets in this application. This creates an even damping effect over the whole impact area, which protects the impact surfaces of the battens from an excessive impact load. The minimisation of recoil as well as reduction of noise are further positive side effects of this construction.
Motion Control

Gas Springs – Push Type, Gas Springs – Pull Type
Hydraulic Dampers, Hydraulic Feed Controls
Rotary Dampers
Custom Control of Hand Forces
Customized to suit your applications

The ACE products in this segment enhance the quality of any type of movement. Anyone who wants to raise or lower loads, regulate the feed of an object to the precise millimeter or gently decelerate rotating or linear movements will find the right solution here.

ACE delivers industry leading quality. Our innovative solutions correspond with stringent requirements for ergonomics and individuality, including custom pressurized gas springs.
Industrial Gas Springs – Push Type
The smart way to lift and lower

Anyone who wants to lift or lower loads with control and without excessive strength relies on the industrial gas springs from ACE. These maintenance-free, ready-to-install machine elements, which are available from stock, support sheer muscle power, reliably open and hold.

Available with body diameters of 8 to 70 mm (0.31" to 2.76") and forces from 0 to 13,000 N (2 to 2,925 lbs.), ACE push type gas springs offer a huge variety and maximum service life. The first is achieved thanks to the number of available connections and fittings for simple attachment and the latter with high quality design and materials. Whether they are made of steel or stainless steel, these components make any work easier and are also visually appealing.
Function of a Gas Spring – Push Type

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.

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.

Calculation Principles

**Force-Stroke Characteristics of Gas Spring (Push Type)**

$F_1 =$ 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

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**):

- $F_3 =$ force at the beginning of the compression stroke
- $F_4 =$ force at the end of the compression stroke

<table>
<thead>
<tr>
<th>Gas Springs (Push Type)</th>
<th>Progression approx. %</th>
<th>Friction $F_3$ approx. in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-8</td>
<td>29 - 33</td>
<td>10</td>
</tr>
<tr>
<td>GS-10</td>
<td>13 - 16</td>
<td>10</td>
</tr>
<tr>
<td>GS-12</td>
<td>20 - 35</td>
<td>20</td>
</tr>
<tr>
<td>GS-15</td>
<td>30 - 45</td>
<td>20</td>
</tr>
<tr>
<td>GS-19</td>
<td>24 - 35</td>
<td>30</td>
</tr>
<tr>
<td>GS-22</td>
<td>30 - 40</td>
<td>30</td>
</tr>
<tr>
<td>GS-28</td>
<td>63 - 76</td>
<td>40</td>
</tr>
<tr>
<td>GS-40</td>
<td>38 - 50</td>
<td>50</td>
</tr>
<tr>
<td>GS-70</td>
<td>25</td>
<td>50</td>
</tr>
</tbody>
</table>

1 Depending on the filling force
2 Depending on the stroke

**Progression:** (the slope of the force line in the diagram 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 $F_1$ figure is given at 20 °C. An increase of 10 °C will increase force by 3.4 %.

**Filling tolerances:** -20 N to +40 N or 5 % to 7 %. Depending on size and extension force the tolerances can differ.

Industrial Gas Springs – Push Type

**GS-8 to GS-70**

Valve Technology

*Individual stroke length and extension forces*

Hoods, Shutters, Machine housing, Conveyor systems

Page 150

**GS-8-V4A to GS-40-VA**

Valve Technology, Stainless Steel

*With food grade oil according to FDA approval*

Hoods, Shutters, Machine housing, Conveyor systems

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**GST-40 Tandem**

Valve Technology

*Optimized dual force for heavy flaps and wide angle applications*

Hoods, Shutters, Machine housing, Conveyor systems

Page 170
GS-8 to GS-70

Individual stroke length and extension forces

Valve Technology
Extension force 10 N to 13,000 N
Stroke 20 mm to 1,000 mm

Universal and tailor made: ACE industrial gas springs offer perfect support of muscle power with forces from 10 to 13,000 N (2 to 2,923 lbs.) with body diameter of 8 to 70 mm (0.31" to 2.76"). These durable and sealed systems are ready for installation, maintenance-free and filled with pressurized nitrogen gas.

They are filled according to individual customer pressure requirements and may be adjusted later by use of a built-in valve. ACE provides free calculation support and designs the gas springs with mounting points specifically for the particular application. A variety of accessories makes assembly even easier and allows universal application of the gas springs.

ACE industrial gas push type springs are used on covers, lids, or other components. They are used in industrial applications, automation and machine building, medical technology as well as in the electronics, automobile and furniture industries.

Technical Data

Extension force: 10 N to 13,000 N
Piston rod diameter: Ø 3 mm to Ø 30 mm
Progression: Approx. 13 % to 76 % (depending on size and stroke)
Lifetime: Approx. 10,000 m
Operating temperature range: -20 °C to 80 °C
Material: Outer body: Coated steel; Piston rod: Steel or stainless steel with wear-resistant coating; End fittings: Zinc plated steel
Operating fluid: Nitrogen gas and oil
Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

End position damping length: Approx. 5 mm to 70 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Application field: Hoods, Shutters, Machine housing, Conveyor systems, Control boxes, Furniture industry, Jacking applications, Assembly stations, Vehicle technology, Folding elements
Note: Increased break-away force if unit has not moved for some time.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

Safety information: Gas springs (push type) should not be installed under pre-tension.

On request: Special oils and other special options. Alternative accessories. Different end position damping and extension speed.

Issue 04.2018 – Specifications subject to change
**Industrial Gas Springs – Push Type GS-8**

Valve Technology, Extension force 10 N to 100 N (compressed up to 133 N)

**End Fitting**

**A3.5**

**Standard Dimensions**

**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke mm</th>
<th>L extended mm</th>
<th>Extension force max. N</th>
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<td>152</td>
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<td>GS-8-80</td>
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</table>

**Ordering Example**

GS-8-30-AC-30

Type (Push Type)

- Body 0.31" (8 mm)
- Stroke 1.18" (30 mm)
- Piston Rod End Fitting A3.5
- Body End Fitting C3.5

Nominal Force F1 7 lbs (30 N)

**Mounting accessories see from page 212.**

**Technical Data**

- **Extension force**: 10 N to 100 N (compressed up to 133 N)
- **Progression**: Approx. 29 % to 33 %
- **Operating temperature range**: -20 °C to 80 °C
- **Material**: Outer body: Coated steel; Piston rod: Stainless steel (1.4301/1.4305, AISI 304/303); End fittings: Zinc plated steel
- **Mounting**: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- **End position damping length**: approx. 5 mm (depending on the stroke)
- **Positive stop**: External positive stop at the end of stroke provided by the customer.
- **Note**: Increased break-away force if unit has not moved for some time.
- **End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
- **Safety information**: Gas springs (push type) should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-10

Valve Technology, Extension force 10 N to 100 N (compressed up to 116 N)

**End Fitting**

**A3.5**

**B3.5**

**C3.5**

**D3.5**

**E3.5**

**G3.5**

**Rod Shroud W3.5-10**

**Standard Dimensions**

**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>L extended</th>
<th>Extension force max.</th>
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<td>GS-10-50</td>
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<td>GS-10-60</td>
<td>60</td>
<td>152</td>
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<tr>
<td>GS-10-80</td>
<td>80</td>
<td>192</td>
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</table>

**Ordering Example**

Type (Push Type)
Body 0.39” (10 mm)
Stroke 3.15” (80 mm)
Piston Rod End Fitting A3.5
Body End Fitting C3.5
Nominal Force F1 13 lbs (60 N)

**Mounting accessories see from page 212.**

**Technical Data**

**Extension force:** 10 N to 100 N (compressed up to 116 N)
**Progression:** Approx. 13 % to 16 %
**Operating temperature range:** -20 °C to 80 °C
**Material:** Outer body: Coated steel; Piston rod: Stainless steel (1.4301/1.4305, AISI 304/303); End fittings: Zinc plated steel
**Mounting:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
**End position damping length:** approx. 5 mm (depending on the stroke)
**Positive stop:** External positive stop at the end of stroke provided by the customer.
**Note:** Increased break-away force if unit has not moved for some time.
**End fittings:** They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
**Safety information:** Gas springs (push type) should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-12

Valve Technology, Extension force 15 N to 180 N (compressed up to 243 N)

End Fitting

A3.5

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Extension force max. (N)</th>
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<td>GS-12-120</td>
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<tr>
<td>GS-12-150</td>
<td>150</td>
<td>332</td>
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</tr>
</tbody>
</table>

Ordering Example

GS-12-100-AA-30

Type (Push Type)
Body 0.47” (12 mm)
Stroke 3.94” (100 mm)
Piston Rod End Fitting A3.5
Body End Fitting A3.5
Nominal Force F, 7 lbs (30 N)

Mounting accessories see from page 212.

End Fitting

Eye A3.5 max. force 370 N

Stud Thread B3.5 max. force 370 N

Angle Ball Joint C3.5 max. force 370 N

Clevis Fork D3.5 max. force 370 N

Swivel Eye E3.5 max. force 370 N

Ball Socket G3.5 max. force 370 N

Rod Shroud W3.5-12

L = Stroke + 10

Technical Data

Extension force: 15 N to 180 N (compressed up to 243 N)
Progression: Approx. 20 % to 35 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body: Coated steel; Piston rod: Stainless steel (1.4301/1.4305, AISI 304/303); End fittings: Zinc plated steel
Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 10 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Increased break-away force if unit has not moved for some time.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas springs (push type) should not be installed under pre-tension.

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Issue 04.2018 – Specifications subject to change
Industrial Gas Springs – Push Type GS-15

Valve Technology, Extension force 40 N to 400 N (compressed up to 560 N)

End Fitting

Standard Dimensions

End Fitting

Eye A5
max. force 800 N

Stud Thread B5
max. force 500 N

Angle Ball Joint C5
max. force 500 N

Clevis Fork D5
max. force 800 N

Swivel Eye E5
max. force 800 N

Inline Ball Joint F5
max. force 500 N

Ball Socket G5
max. force 500 N

Mounting accessories see from page 212.

Adjuster Knob DE-GAS-5
See page 191.

Technical Data

Extension force: 40 N to 400 N (compressed up to 560 N)
Progression: Approx. 30 % to 40 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 10 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Increased break-away force if unit has not moved for some time.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas springs (push type) should not be installed under pre-tension.
Valve Technology, Extension force 50 N to 700 N (compressed up to 560 N)

### Technical Data

**Extension force:** 50 N to 700 N (compressed up to 560 N)

**Progression:** Approx. 24 % to 35 %

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

**Material:** Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel

**Mounting:** In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** approx. 20 mm to 60 mm (depending on the stroke)

**Positive stop:** External positive stop at the end of stroke provided by the customer.

**Note:** Integrated grease chamber reduces friction and wear and optimizes lubrication.

**End fittings:** They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

**Safety information:** Gas springs (push type) should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-22

Valve Technology, Extension force 80 N to 1,300 N (compressed up to 1,820 N)

End Fitting

A8

B8

C8

D8

E8

F8

G8

Rod Shroud W8-22

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
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<th>Extension force max.</th>
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<td>GS-22-150</td>
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<td>GS-22-200</td>
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<td>GS-22-400</td>
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<td>GS-22-450</td>
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<td>GS-22-700</td>
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</table>

Ordering Example

GS-22-150-AE-800

Technical Data

Extension force: 80 N to 1,300 N (compressed up to 1,820 N)
Progression: Approx. 30 % to 40 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
Mounting: In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 20 mm to 70 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Integrated grease chamber reduces friction and wear and optimizes lubrication.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas springs (push type) should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-28

Valve Technology, Extension force 150 N to 2,500 N (compressed up to 4,400 N)

**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke mm</th>
<th>L extended mm</th>
<th>Extension force max. N</th>
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<td>GS-28-100</td>
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</table>

**End Fitting**

- A10
- B10
- C10
- D10
- E10
- F10

**Eye A10**
- Max. force 10,000 N

**Stud Thread B10**
- Max. force 1,800 N

**Angle Ball Joint C10**
- Max. force 10,000 N

**Clevis Fork D10**
- Max. force 10,000 N

**Swivel Eye E10**
- Max. force 10,000 N

**Inline Ball Joint F10**
- Max. force 1,800 N

**Ordering Example**
GS-28-150-EE-1200
- Type (Push Type)
- Body 1.1” (28 mm)
- Stroke 5.91” (150 mm)
- Piston Rod End Fitting E10
- Body End Fitting E10
- Nominal Force F1 270 lbs (1,200 N)

**Technical Data**

- **Extension force**: 150 N to 2,500 N (compressed up to 4,400 N)
- **Progression**: Approx. 63 % to 76 %
- **Operating temperature range**: -20 °C to 80 °C
- **Material**: Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
- **Mounting**: In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- **End position damping length**: approx. 30 mm to 70 mm (depending on the stroke)
- **Positive stop**: External positive stop at the end of stroke provided by the customer.
- **Note**: Integrated grease chamber reduces friction and wear and optimizes lubrication.
- **End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
- **Safety information**: Gas springs (push type) should not be installed under pre-tension.

Mounting accessories see from page 212.

Adjuster Knob DE-GAS-10
See page 191.
Industrial Gas Springs – Push Type GS-40

Valve Technology, Extension force 500 N to 5,000 N (compressed up to 7,500 N)

End Fitting

A14

B14

C14

D14

E14

F14

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>L extended</th>
<th>Extension force max.</th>
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<tr>
<td>GS-40-1000</td>
<td>1,000</td>
<td>2,117</td>
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</table>

Ordering Example

Type (Push Type) Body 1.57” (40 mm) Stroke 5.91” (150 mm) Piston Rod End Fitting D14 Body End Fitting D14 Nominal Force F 787 lbs (3,500 N)

Mounting accessories see from page 212.

Technical Data

Extension force: 500 N to 5,000 N (compressed up to 7,500 N)
Progression: Approx. 38 % to 50 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
Mounting: In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 30 mm to 70 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Integrated grease chamber reduces friction and wear and optimizes lubrication.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas springs (push type) should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-70

Valve Technology, Extension force 2,000 N to 13,000 N (compressed up to 16,250 N)

End Fitting

Standard Dimensions

End Fitting

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Extension force max. (N)</th>
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</thead>
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<td>13,000</td>
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<td>GS-70-800</td>
<td>800</td>
<td>1,720</td>
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</table>

Ordering Example

Type (Push Type)
Body 2.76” (70 mm)
Stroke 7.87” (200 mm)
Piston Rod End Fitting E24
Body End Fitting E24
Nominal Force F, 1,798 lbs (8,000 N)

Mounting accessories see from page 212.

Technical Data

Extension force: 2,000 N to 13,000 N (compressed up to 16,250 N)
Progression: Approx. 25 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body: Coated steel; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel
Mounting: In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 10 mm to 20 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Increased break-away force if unit has not moved for some time.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas springs (push type) should not be installed under pre-tension.
GS-8-V4A to GS-40-VA
With food grade oil for FDA compliance

Valve Technology, Stainless Steel
Extension force 10 N to 5,000 N
Stroke 20 mm to 700 mm

Protection against corrosion and superior visual appearance for even more sophisticated requirements: Based on ACE’s industrial gas springs GS-8 to 40 made of steel, these models combine all advantages of stainless steel: they look great and are rust free. They are filled with food-grade oil as standard, which conforms to the requirements of FDA 21 CFR 178.3570.

These ACE gas springs not only look good, they are also available in various stroke lengths and extension forces. A comprehensive range of accessories in stainless steel guarantees easy assembly and a broad range of uses.

ACE stainless steel industrial gas springs are used in the automotive sector, in industrial applications, automation and machine building and medical clean room technology as well as in the food, electronics and shipbuilding industries.

Technical Data

Extension force: 10 N to 5,000 N
Piston rod diameter: Ø 3 mm to Ø 20 mm
Progression: Approx. 13 % to 59 % (depending on size and stroke)
Lifetime: Approx. 10,000 m
Operating temperature range: -20 °C to 80 °C
Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303 and 1.4404/1.4571, AISI 316L/316Ti)
Operating fluid: Nitrogen gas and HLP oil according to DIN 51524, part 2

Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: Approx. 5 mm to 30 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Application field: Hoods, Shutters, Machine housing, Conveyor systems, Control boxes, Furniture industry, Shipbuilding, Food industry, Pharmaceutical industry, Folding elements

Note: Special oil according to FDA 21 CFR 178.3570 of the food industry

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

Safety information: Gas pressure springs should not be installed under pre-tension.

On request: Special oils and other special options. Alternative accessories. Different end position damping and extension speed. Other gas springs material 1.4404/1.4571, AISI 316L/316Ti (V4A) available on request.
Industrial Gas Springs – Push Type GS-8-V4A

Valve Technology, Stainless Steel, Extension force 10 N to 100 N (compressed up to 131 N)

Technical Data

Extension force: 10 N to 100 N (compressed up to 131 N)
Progression: Approx. 28 % to 31 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body, Piston rod, End fittings: Stainless steel (1.4404/1.4571, AISI 316L/316Ti)
Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 5 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Special oil according to FDA 21 CFR 178.3570 of the food industry
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas pressure springs should not be installed under pre-tension.

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Extension force max. (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-8-20-V4A</td>
<td>20</td>
<td>72</td>
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<td>GS-8-30-V4A</td>
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<tr>
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<tr>
<td>GS-8-80-V4A</td>
<td>80</td>
<td>192</td>
<td>100</td>
</tr>
</tbody>
</table>

Ordering Example

Type (Push Type)
Body 0.31" (8 mm)
Stroke 1.18” (30 mm)
Piston Rod End Fitting A3.5-V4A
End Body End Fitting C3.5-V4A
Nominal Force F1 7 lbs (30 N)
Material (1.4404/1.4571, AISI 316L/316Ti, V4A)

Mounting accessories see from page 220.
Industrial Gas Springs – Push Type GS-10-V4A

Valve Technology, Stainless Steel, Extension force 10 N to 100 N (compressed up to 116 N)

End Fitting

<table>
<thead>
<tr>
<th>B3.5</th>
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<tbody>
<tr>
<td>Ø 3</td>
</tr>
<tr>
<td>Stroke</td>
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<tr>
<td>L +/- 2 mm extended</td>
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<tr>
<td>Ø 10</td>
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Standard Dimensions

Performance and Dimensions

**Types**

- GS-10-20-V4A
- GS-10-30-V4A
- GS-10-40-V4A
- GS-10-50-V4A
- GS-10-60-V4A
- GS-10-80-V4A

- **Stroke**: mm
- **Extended**: mm
- **Extension force max.**: N

Ordering Example

- Type (Push Type)
- Body 0.39” (10 mm)
- Stroke 1.18” (30 mm)
- Piston Rod End Fitting A3.5-V4A
- Body End Fitting C3.5-V4A
- Nominal Force F, 7 lbs (30 N)
- Material (1.4404/1.4571, AISI 316L/316Ti, V4A)

Mounting accessories see from page 220.

Technical Data

- **Extension force**: 10 N to 100 N (compressed up to 116 N)
- **Progression**: Approx. 13 % to 16 %
- **Operating temperature range**: -20 °C to 80 °C
- **Material**: Outer body, Piston rod, End fittings: Stainless steel (1.4404/1.4571, AISI 316L/316Ti)

Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length**: approx. 5 mm (depending on the stroke)

**Positive stop**: External positive stop at the end of stroke provided by the customer.

**Note**: Special oil according to FDA 21 CFR 178.3570 of the food industry

**End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

**Safety information**: Gas pressure springs should not be installed under pre-tension.
Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Extension force max. (N)</th>
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</thead>
<tbody>
<tr>
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<td>GS-12-130-V4A</td>
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<tr>
<td>GS-12-140-V4A</td>
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<td>312</td>
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<tr>
<td>GS-12-150-V4A</td>
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<td>332</td>
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<tr>
<td>GS-12-160-V4A</td>
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<td>352</td>
<td>100</td>
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</table>

Ordering Example
Type (Push Type)  GS-12-100-AA-30-V4A
Body 0.47” (12 mm) Stroke 3.94” (100 mm)
Piston Rod End Fitting A3.5-V4A
Body End Fitting A3.5-V4A
Nominal Force F1, 7 lbs (30 N)
Material: (1.4404/1.4571, AISI 316L/316Ti, V4A)

Mounting accessories see from page 220.

Technical Data

Extension force: 15 N to 180 N (compressed up to 225 N)
Progression: Approx. 20 % to 25 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body, Piston rod, End fittings: Stainless steel (1.4404/1.4571, AISI 316L/316Ti)
Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 10 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Special oil according to FDA 21 CFR 178.3570 of the food industry
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas pressure springs should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-15-VA

Valve Technology, Stainless Steel, Extension force 40 N to 400 N (compressed up to 612 N)

### End Fitting

<table>
<thead>
<tr>
<th>Type</th>
<th>Stroke (mm)</th>
<th>Extension force max. (N)</th>
</tr>
</thead>
<tbody>
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<td>GS-15-40-VA</td>
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</tr>
<tr>
<td>GS-15-50-VA</td>
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<td>GS-15-60-VA</td>
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<td>400</td>
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<tr>
<td>GS-15-80-VA</td>
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<td>400</td>
</tr>
<tr>
<td>GS-15-100-VA</td>
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<td>400</td>
</tr>
<tr>
<td>GS-15-120-VA</td>
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</tr>
<tr>
<td>GS-15-150-VA</td>
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<td>400</td>
</tr>
</tbody>
</table>

### Standard Dimensions

- **B5**
- **A5-VA**
- **C5-VA**
- **D5-VA**
- **E5-VA**
- **G5-VA**
- **Rod Shroud W5-15-VA**

### Performance and Dimensions

- **Types**
  - GS-15-20-VA
  - GS-15-40-VA
  - GS-15-50-VA
  - GS-15-60-VA
  - GS-15-80-VA
  - GS-15-100-VA
  - GS-15-120-VA
  - GS-15-150-VA

- **Stroke**
- **Extension force max.**

### Ordering Example

**GS-15-150-AC-150-VA**

- Type (Push Type)
- Body 0.61” (15.6 mm)
- Stroke 5.91” (150 mm)
- Piston Rod End Fitting A5-VA
- Body End Fitting C5-VA
- Nominal Force F1 34 lbs (150 N)
- Material (1.4301/1.4305, AISI 304/303, VA)

### Technical Data

- **Extension force**: 40 N to 400 N (compressed up to 612 N)
- **Progression**: Approx. 30 % to 53 %
- **Operating temperature range**: -20 °C to 80 °C
- **Material**: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)
- **Mounting**: 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)
- **Positive stop**: External positive stop at the end of stroke provided by the customer.
- **Note**: Special oil according to FDA 21 CFR 178.3570 of the food industry
- **End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
- **Safety information**: Gas pressure springs should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-19-VA

Valve Technology, Stainless Steel, Extension force 50 N to 700 N (compressed up to 924 N)

End Fitting

Standard Dimensions

End Fitting

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>L extended</th>
<th>Extension force max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-19-50-VA</td>
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<tr>
<td>GS-19-100-VA</td>
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<td>264</td>
<td>700</td>
</tr>
<tr>
<td>GS-19-150-VA</td>
<td>150</td>
<td>364</td>
<td>700</td>
</tr>
<tr>
<td>GS-19-200-VA</td>
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<td>464</td>
<td>700</td>
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<tr>
<td>GS-19-250-VA</td>
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<tr>
<td>GS-19-300-VA</td>
<td>300</td>
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<td>450</td>
</tr>
</tbody>
</table>

Ordering Example

Type (Push Type)
Body 0.75" (19 mm)
Stroke 5.91" (150 mm)
Piston Rod End Fitting A8-VA
Body End Fitting C8-VA
Nominal Force F1 135 lbs (600 N)
Material (1.4301/1.4305, AISI 304/303, VA)

Mounting accessories see from page 220.

Adjuster Knob DE-GAS-8 See page 191.

Technical Data

Extension force: 50 N to 700 N (compressed up to 924 N)
Progression: Approx. 28 % to 32 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)

Mounting: 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)

Positive stop: External positive stop at the end of stroke provided by the customer.

Note: Special oil according to FDA 21 CFR 178.3570 of the food industry

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

Safety information: Gas pressure springs should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-22-VA

Valve Technology, Stainless Steel, Extension force 100 N to 1,200 N (compressed up to 1,596 N)

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Extension force max. (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS-22-50-VA</td>
<td>50</td>
<td>164</td>
<td>1,200</td>
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<td>GS-22-100-VA</td>
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<td>GS-22-300-VA</td>
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</table>

Ordering Example

Type (Push Type) GS-22-150-AE-800-VA

Body 0.91" (23 mm) Stroke 5.91" (150 mm) Piston Rod End Fitting A8-VA

Body End Fitting E8-VA

Nominal Force F

Material (1.4301/1.4305, AISI 304/303, VA)

Mounting accessories see from page 220.

Technical Data

Extension force: 100 N to 1,200 N (compressed up to 1,596 N)
Progression: Approx. 29 % to 33 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)
Mounting: 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)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Special oil according to FDA 21 CFR 178.3570 of the food industry
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Safety information: Gas pressure springs should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-28-VA

Valve Technology, Stainless Steel, Extension force 150 N to 2,500 N (compressed up to 3,975 N)

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Extension force max. (N)</th>
</tr>
</thead>
<tbody>
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</table>

Ordering Example

Type (Push Type) Body 1.1" (28 mm) Stroke 5.91" (150 mm) Piston Rod End Fitting E10-VA

End position damping length: approx. 20 mm (depending on the stroke)

Positive stop: External positive stop at the end of stroke provided by the customer.

Note: Special oil according to FDA 21 CFR 178.3570 of the food industry

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

Safety information: Gas pressure springs should not be installed under pre-tension.
Industrial Gas Springs – Push Type GS-40-VA

Valve Technology, Stainless Steel, Extension force 500 N to 5,000 N (compressed up to 7,100 N)

End Fitting

Standard Dimensions

End Fitting

Performance and Dimensions

Types | Stroke | L extended | Extension force max.
-----|-------|-----------|---------------------
GS-40-100-VA | 100 mm | 317 mm | 5,000 N
GS-40-150-VA | 150 mm | 417 mm | 5,000 N
GS-40-200-VA | 200 mm | 517 mm | 5,000 N
GS-40-300-VA | 300 mm | 717 mm | 5,000 N
GS-40-400-VA | 400 mm | 917 mm | 5,000 N
GS-40-500-VA | 500 mm | 1,117 mm | 4,150 N
GS-40-600-VA | 600 mm | 1,317 mm | 4,150 N

Ordering Example

Type (Push Type) GS-40-150-DD-3500-VA

Body 1.57" (40 mm)
Stroke 5.91" (150 mm)
Piston Rod End Fitting D14-VA
Body End Fitting D14-VA
Nominal Force F = 1787 lbs (3,500 N)
Material (1.4301/1.4305, AISI 304/303, VA)

Mounting accessories see from page 220.

Technical Data

Extension force: 500 N to 5,000 N (compressed up to 7.100 N)
Progression: Approx. 34 % to 42 %
Operating temperature range: -20 °C to 80 °C
Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)
Mounting: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
End position damping length: approx. 30 mm (depending on the stroke)
Positive stop: External positive stop at the end of stroke provided by the customer.
Note: Special oil according to FDA 21 CFR 178.3570 of the food industry
End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.
Safety information: Gas pressure springs should not be installed under pre-tension.

Issue 04.2018 – Specifications subject to change

### Stainless Steel Gas Springs (Push Type), V4A

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke mm</th>
<th>L extended mm</th>
<th>Dimensions see Page</th>
</tr>
</thead>
<tbody>
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### Stainless Steel Accessories, V4A

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<th>TYPES</th>
<th>Dimensions see Page</th>
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<tbody>
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<td>C5-V4A</td>
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<tr>
<td>E14-V4A</td>
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</table>
GST-40 Tandem
Optimized dual force for heavy flaps and wide angle applications

Valve Technology
Extension force 300 N to 5,000 N
Stroke 50 mm to 400 mm

Cover two differing force ranges: Tandem gas springs by ACE are maintenance-free and ready-to-install. Two pressure tubes deliver different extension forces and progression curves. With this type of gas spring you cover the different force ranges between the start and end of an application. ACE provides free specification support to deliver a gas spring that meets your specific application needs. We manufacture and adjusted precisely to the required dynamics of the application.

A comprehensive range of accessories guarantees easy assembly and a broad range of uses, are specifically suitable for heavy loads with large opening angle. Stainless steel versions are available to meet environmental or appearance requirements.

Tandem push type gas springs from ACE are used in industrial applications such as in automation and machine building, in the automobile, electronics and furniture industries, but also in medical technology as well as for service hatches.

Technical Data

Extension force: 300 N to 5,000 N
Piston rod diameter: Ø 20 mm
Progression: According to calculation relating to your application.
Lifetime: Approx. 10,000 m
Operating temperature range: -20 °C to 80 °C
Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating
Operating fluid: Nitrogen gas and oil
Mounting: In any position. Please adopt the mounting points determined by ACE.

End position damping length: Application-specific end position damping and extension speed.
Positive stop: External positive stop at the end of stroke provided by the customer.
Application field: Hoods, Shutters, Machine housing, Conveyor systems, Folding elements, Loading and lifting equipment
Note: These gas springs are tailored to the relevant application and are therefore not available ex stock.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

On request: Special oils and other special options. Alternative accessories. Material 1.4301/1.4305, AISI 304/303 (V2A) and 1.4404/1.4571, AISI 316L/316Ti (V4A).
### Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke A (mm)</th>
<th>Stroke B (mm)</th>
<th>L extended (mm)</th>
<th>Extension force max. (N)</th>
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<tbody>
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<td>150</td>
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<td>1,125</td>
<td>5,000</td>
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</tbody>
</table>

### Ordering Example

**Type (Tandem Gas Spring)**
- Body: 1.57" (40 mm)
- Stroke A: 1.97" (50 mm)
- Stroke B: 5.91" (150 mm)
- Body A End Fitting: A14
- Body B End Fitting: D14
- Nominal Force Body A: 202 lbs (900 N)
- Nominal Force Body B: 562 lbs (2,500 N)

**GST-40-50-150-AD-900N-2500N**

**Mounting accessories see from page 220.**

### Technical Data

- **Extension force**: 300 N to 5,000 N
- **Progression**: According to calculation relating to your application.
- **Operating temperature range**: -20 °C to 80 °C
- **Material**: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating
- **Mounting**: In any position. Please adopt the mounting points determined by ACE.
- **End position damping length**: Application-specific end position damping and extension speed.
- **Positive stop**: External positive stop at the end of stroke provided by the customer.
- **Note**: These gas springs are tailored to the relevant application and are therefore not available ex stock.
- **End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Application Examples

**GS-12**

Safe opening and closing

ACE industrial gas springs (push type) protect samples in an incubator, which is used for chemical and biochemical applications. The plexiglass hood, under which may be found valuable laboratory goods, is securely held open by two maintenance-free, ready-to-install ACE industrial gas springs (push type) of the type GS-12-60-AA-X. With an end-position damping of 5 mm and an extension force of 10 to 180 N, they help to handle the forces generated. The hood is always easily opened and remains in this position. It also remains securely shut when the incubator is in operation.

![Image of GS-12 industrial gas spring](image)

**GS-19**

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.

![Image of GS-19 industrial gas spring](image)

Very small ACE industrial gas springs (push type) enable careful opening and closing movements of a mini-incubator hood, under which may be found laboratory products

GFL Gesellschaft für Labortechnik mbH, 30938 Burgwedel, Germany

![Image of mini-incubator hood](image)

Industrial gas springs: For safe entry and exit

![Image of rescue helicopter](image)
GS-22-VA

**Made-to-measure stainless steel gas springs**

A special hygiene and toilet chair, designed for children and young people with disabilities, must be firmly lockable in the sit and tilt positions. The practical aid thereby provided for relatives and carers can be attributed to two lockable ACE industrial gas springs (push type) which were especially developed and manufactured for this application and operate on the basis of the so-called tilt-in-space function. This allows the chair to be tilted forwards and backwards and provides significantly more convenience for users and patients. In order to meet all hygiene requirements, the gas springs are constructed in stainless steel.

With inclination angles of 15 degrees to the front and rear, the ACE stainless steel gas springs facilitate the work of nurses

Rifton Equipment, Rifton, New York 12471, USA

---

GST-40

**Tandemly-operated large flaps securely under control**

Underground distribution systems are visually advantageous. To facilitate their servicing, the heavy covers of the often large supply systems are brought back to the surface with the help of ACE industrial tandem gas springs (push type). This is quite easily achieved thanks to the use of two pressure pipes, the result of which is two different force ranges. This means fitters must not endure laborious bending and a downward passage into the system of channels. In addition to these advantages, the springs benefit from their long service life and their capacity to be used, as stainless steel variants, in even the most hygienically-sensitive areas.

ACE industrial tandem gas springs (push type) enable easy maintenance of supply boxes by making the heavy flaps easier to operate

Langmatz GmbH, 82467 Garmisch-Partenkirchen, Germany
Industrial Gas Springs – Pull Type

Alternatives for tight spaces and mounting requirements

If ACE gas push type springs cannot be used due to a lack of space, ACE’s industrial gas pull type springs come into their own. These compact assistants with body diameters of 15 to 40 mm (0.59” to 1.57”) are effective in the direction of traction and work in the opposite way to the principle of gas push type springs.

This means that the gas pressure in the cylinder draws the piston rod in and, when closing a flap for example, supports the manual force required for a controlled motion. ACE’s gas pull type springs are also self-contained, maintenance-free machine elements and equipped with a standard valve to individually regulate the gas pressure, whereby they cover forces between 30 and 5,000 N (7 to 1125 lb). The ability to mount in any orientation and position along with an extensive range of DIN standardized accessories enable universal use.
Function of a Gas Spring – Pull Type

Gas pull type springs work based on the reverse principle of a gas push type spring. They are also individually filled according to customer request to a certain pressure (extension force $F_1$). However, the piston rod here is pulled inwards by the gas pressure in the cylinder. The higher the pressure, the greater the traction force.

The piston ring surface between the piston rod and the inner tube is decisive for the function. When the piston rod pulls out, the nitrogen from the piston is compressed in the inner tube. The force increase (progression) of the gas spring is due to the rising pressure. The force increase is almost linear.

Calculation Principles

**Force-Stroke Characteristics of Traction Gas Spring (Pull Type)**

![Diagram of gas spring forces](image)

- $F_1 =$ 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
- $F_3 =$ force at the beginning of the extension stroke
- $F_4 =$ force at the end of the extension stroke

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):

**Gas Springs (Pull Type)***

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Progression approx. %</th>
<th>1 Friction $F_1$ approx. in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>GZ-15</td>
<td>12 - 22 $^1$</td>
<td>55 - 140</td>
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<tr>
<td>GZ-19</td>
<td>21 - 28 $^1$</td>
<td>20 - 40</td>
</tr>
<tr>
<td>GZ-28</td>
<td>28 - 30 $^2$</td>
<td>100 - 200</td>
</tr>
<tr>
<td>GZ-40</td>
<td>43 - 45 $^2$</td>
<td></td>
</tr>
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</table>

$^1$ Depending on the filling force
$^2$ Depending on the stroke

**Progression:** (the slope of the force line in the diagram 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 $F_1$ figure is given at 20 °C. An increase of 10 °C will increase force by 3.4 %.

**Filling Tolerances:** -20 N to +40 N or 5 % to 7 %. Depending on size and extension force the tolerances can differ.

Industrial Gas Springs – Pull Type

**GZ-15 to GZ-40**

Valve Technology

**Very low progression rate**

Hoods, Shutters, Machine housing, Conveyor systems

Page 176

**GZ-15-V4A to GZ-40-VA**

Valve Technology, Stainless Steel

**Very low progression rate with FDA approval**

Hoods, Shutters, Machine housing, Conveyor systems

Page 182
GZ-15 to GZ-40
Very low progression rate

Valve Technology
Traction force 40 N to 5,000 N
Stroke 20 mm to 650 mm

The solution to a lack of space: If standard push type gas springs cannot be used due to a lack of space, ACE’s industrial pull type gas springs are the solution. They work in the opposite way of standard push type gas springs. The piston rod is retracted when the cylinder is unloaded. The gas pressure in the cylinder draws the piston rod in.

ACE pull type gas springs offer the maximum service life thanks to the solid chrome-plated piston rod and an integrated sliding bearing. The maintenance-free and ready-to-install products are available in body diameters of 15 mm to 40 mm (0.59” to 1.57”) as well as forces from 40 N to 5,000 N (8.99 lbs to 1,124 lbs.) and are available from stock with valve and a large selection of accessories. The traction force can be fine-tuned using the adjustment valve.

Gas traction springs from ACE are used in industrial applications, especially in mechanical engineering and in medical technology as well as in the electronics and furniture industries.

Technical Data

Traction force: 40 N to 5,000 N
Piston rod diameter: Ø 4 mm to Ø 28 mm
Progression: Approx. 12 % to 45 %
Lifetime: Approx. 2,000 m
Operating temperature range: -20 °C to 80 °C
Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel or stainless steel with wear-resistant coating
Operating fluid: Nitrogen gas
Mounting: With piston rod upwards.
End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop at the end of stroke provided by the customer.
Application field: Hoods, Shutters, Machine housing, Conveyor systems, Control boxes, Furniture industry, Shipbuilding, Assembly stations, Vehicle technology, Folding elements
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
On request: Special oils and other special options. Alternative accessories. Traction gas springs with end position damping also available on request.
Industrial Gas Springs – Pull Type GZ-15

Valve Technology, Traction force 50 N to 150 N (extended up to 183 N)

End Fitting A3.5

Standard Dimensions

Performance and Dimensions

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<tr>
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<th>Stroke</th>
<th>L retracted</th>
<th>Traction force max.</th>
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</table>

Ordering Example

GZ-15-150-AC-V-150

Type (Pull Type)
Body 0.61" (15.6 mm)
Stroke 5.91" (150 mm)
Piston Rod End Fitting A3.5
Body End Fitting C3.5
Adjustable (V)
Traction Force F, 34 lbs (150 N)

Mounting accessories see from page 212.

End Fitting Eye A3.5

max. force 370 N

End Fitting Stud Thread B3.5

Angle Ball Joint C3.5

max. force 370 N

End Fitting Clevis Fork D3.5

max. force 370 N

End Fitting Swivel Eye E3.5

max. force 370 N

End Fitting Ball Socket G3.5

max. force 370 N

End Fitting Adjuster Knob DE-GAS-3.5

See page 191.

GZ-15

Technical Data

Traction force: 50 N to 150 N (extended up to 183 N)
Progression: Approx. 12 % to 22 %
Lifetime: Approx. 2,000 m
Operating temperature range: -20 °C to 80 °C
Material: Outer body, End fittings: Zinc plated steel; Piston rod: Stainless steel (1.4301/1.4305, AISI 304/303)
Mounting: With piston rod upwards.
End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).
Positive stop: External positive stop at the end of stroke provided by the customer.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Industrial Gas Springs – Pull Type GZ-19

Valve Technology, Traction force 40 N to 350 N (extended up to 448 N)

End Fitting

A8

B8

C8

D8

E8

G8

Rod Shroud

W8-19

Adjuster Knob

DE-GAS-8

See page 191.

Performance and Dimensions

TYPES

<table>
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<tr>
<th>Stroke (mm)</th>
<th>L retracted (mm)</th>
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</table>

Ordering Example

Type (Pull Type) GZ-19-150-AC-V-250

Body 0.75” (19 mm)

Stroke 5.91” (150 mm)

Piston Rod End Fitting A8

Body End Fitting C8

Adjustable (V)

Traction Force F, 56 lbs (250 N)

Mounting accessories see from page 212.

Technical Data

Traction force: 40 N to 350 N (extended up to 448 N)

Progression: Approx. 21 % to 28 %

Lifetime: Approx. 2,000 m

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

Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop at the end of stroke provided by the customer.

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Industrial Gas Springs – Pull Type GZ-28

Valve Technology, Traction force 150 N to 1,200 N (extended up to 1,560 N)

End Fitting

A10

B10

C10

D10

E10

Rod Shroud

W10-28

Adjuster Knob

DE-GAS-10

See page 191.

Performance and Dimensions

<table>
<thead>
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Ordering Example

GZ-28-150-EE-V-800

Type (Pull Type)
Body 1.10” (28 mm)
Stroke 5.91” (150 mm)
Piston Rod End Fitting E10
Body End Fitting E10
Adjustable (V)
Traction Force F1 180 lbs (800 N)

Mounting accessories see from page 212.

Technical Data

Traction force: 150 N to 1,200 N (extended up to 1,560 N)
Progression: Approx. 28 % to 30 %
Lifetime: Approx. 2,000 m
Operating temperature range: -20 °C to 80 °C
Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating
Mounting: With piston rod upwards.
End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).
Positive stop: External positive stop at the end of stroke provided by the customer.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Industrial Gas Springs – Pull Type GZ-40

Valve Technology, Traction force 500 N to 5,000 N (extended up to 7,250 N)

**End Fitting**

**Standard Dimensions**

**Performance and Dimensions**

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<tr>
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<th>Stroke</th>
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<th>Traction force max.</th>
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**Ordering Example**

Type (Pull Type)

Body 1.57" (40 mm)

Stroke 5.91" (150 mm)

Piston Rod End Fitting E14

Body End Fitting E14 Adjustable (V)

Traction Force F, 180 lbs (800 N)

**End position damping length**: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

**Positive stop**: External positive stop at the end of stroke provided by the customer.

**End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

**Technical Data**

- **Traction force**: 500 N to 5,000 N (extended up to 7,250 N)
- **Progression**: Approx. 43 % to 45 %
- **Lifetime**: Approx. 2,000 m
- **Operating temperature range**: -20 °C to 80 °C
- **Material**: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating
- **Mounting**: With piston rod upwards.

Mounting accessories see from page 212.
ACE Easy Sizing

Just a few simple steps to your perfect ACE Gas Spring

1. Select the position of flap and pivot point.
2. Specify your application within our 3D-simulator.
3. Calculate your ACE Gas Springs.
4. Add mounting accessories.
5. Send an order request.

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Sometimes your problems are more complicated than an online tool can solve. ACE application engineers have the skills, knowledge and training to deliver a solution.

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Calculations
GZ-15-V4A to GZ-40-VA

Very low progression rate with FDA approval

Valve Technology, Stainless Steel
Traction force 40 N to 5,000 N
Stroke 20 mm to 600 mm

Brilliant performance when things become tight: For specific use in tough surroundings or small spaces, the broad spectrum of ACE stainless steel industrial pull type gas springs come in body diameters from 15 to 40 mm (0.59” to 1.57”). These units supplement the comprehensive program of the ACE industrial pull type gas springs with valves.

This high quality design is rust free and is more robust against environmental impact compared with standard gas pull type springs. These stainless steel gas springs are also visually appealing, very durable and available, upon request, in many stroke lengths and traction forces. A comprehensive range of accessories in stainless steel guarantees easy assembly and a broad range of uses.

ACE industrial push type springs made of stainless steel are used in industries such as the chemical and food industry, in automobiles, plant engineering and shipbuilding and also in medical, military, environmental and water supply technology.

Technical Data

| Traction force: | 40 N to 5,000 N |
| Psocket rod diameter: | Ø 4 mm to Ø 28 mm |
| Progression: | Approx. 11 % to 45 % |
| Lifetime: | Approx. 2,000 m |
| Operating temperature range: | -20 °C to 80 °C |
| Material: | Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303 and 1.4404/1.4571, AISI 316L/316Ti) |
| Operating fluid: | Nitrogen gas |
| Mounting: | With piston rod upwards. |
| End position damping length: | Without damping. For end position damping use damping material (e.g. TUBUS or SLAB). |

Positive stop: External positive stop in the pulling direction provided by the customer.

Application field: Hoods, Shutters, Machine housing, Conveyor systems, Control boxes, Furniture industry, Shipbuilding, Food industry, Pharmaceutical industry, Folding elements

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

On request: Special oils and other special options. Alternative accessories. Traction gas springs with end position damping also available on request. Other traction gas springs material 1.4404/1.4571, AISI 316L/316Ti (V4A) available on request.
Industrial Gas Springs – Pull Type GZ-15-V4A

Valve Technology, Stainless Steel, Traction force 50 N to 150 N (extended up to 182 N)

**End Fitting**

- **B3.5**
- **A3.5-V4A**
- **C3.5-V4A**
- **D3.5-V4A**
- **G3.5-V4A**

**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>L retracted (mm)</th>
<th>Traction force max. (N)</th>
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</tbody>
</table>

**Ordering Example**

GZ-15-150-AC-V-150-V4A

- Type (Pull Type)
- Body 0.61” (15.6 mm)
- Stroke 5.91” (150 mm)
- Piston Rod End Fitting A3.5-V4A
- Body End Fitting C3.5-V4A
- Adjustable (V)
- Traction Force F: 34 lbs (150 N)
- Material (1.4404/1.4571, AISI 316L/316Ti, V4A)

**Mounting accessories see from page 220.**

**Technical Data**

- **Traction force:** 50 N to 150 N (extended up to 182 N)
- **Progression:** Approx. 11 % to 21 %
- **Lifetime:** Approx. 2,000 m
- **Operating temperature range:** -20 °C to 80 °C
- **Material:** Outer body, Piston rod, End fittings: Stainless steel (1.4404/1.4571, AISI 316L/316Ti)
- **Mounting:** With piston rod upwards.
- **End position damping length:** Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).
- **Positive stop:** External positive stop in the pulling direction provided by the customer.
- **End fittings:** They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Industrial Gas Springs – Pull Type GZ-19-VA

Valve Technology, Stainless Steel, Traction force 40 N to 350 N (extended up to 448 N)

### Technical Data

- **Traction force:** 40 N to 350 N (extended up to 448 N)
- **Progression:** Approx. 23 % to 28 %
- **Lifetime:** Approx. 2,000 m
- **Operating temperature range:** -20 °C to 80 °C
- **Material:** Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)
- **Mounting:** With piston rod upwards.
- **End position damping length:** Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).
- **Positive stop:** External positive stop in the pulling direction provided by the customer.
- **End fittings:** They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

### Performance and Dimensions

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<th>TYPES</th>
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<td>GZ-19-250-VA</td>
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</tbody>
</table>

### Ordering Example

**GZ-19-150-AC-V-150-VA**

- **Type (Pull Type):**
- **Body:** 0.75” (19 mm)
- **Stroke:** 5.91” (150 mm)
- **Piston Rod End Fitting:** A8-VA
- **Body End Fitting:** C8-VA
- **Adjustable (V):**
- **Traction Force F:** 34 lbs (150 N)
- **Material:** (1.4301/1.4305, AISI 304/303, VA)

### Mounting accessories see from page 220.
## Technical Data

- **Traction force:** 150 N to 1,200 N (extended up to 1,560 N)
- **Progression:** Approx. 29 % to 30 %
- **Lifetime:** Approx. 2,000 m
- **Operating temperature range:** -20 °C to 80 °C
- **Material:** Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)
- **Mounting:** With piston rod upwards.
- **End position damping length:** Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).
- **Positive stop:** External positive stop in the pulling direction provided by the customer.
- **End fittings:** They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

## Performance and Dimensions

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<td>GZ-28-600-VA</td>
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## Ordering Example

- **Type (Pull Type)**
- **Body 1.10” (28 mm)**
- **Stroke 5.91” (150 mm)**
- **Piston Rod End Fitting E10-VA**
- **Body End Fitting E10-VA**
- **Adjustable (V)**
- **Traction Force F1 180 lbs (800 N)**
- **Material (1.4301/1.4305, AISI 304/303, VA)**

**GZ-28-150-EE-V-800-VA**

Mounting accessories see from page 220.
Industrial Gas Springs – Pull Type GZ-40-VA
Valve Technology, Stainless Steel, Traction force 500 N to 5,000 N (extended up to 7,250 N)

End Fitting

Standard Dimensions

End Fitting

Performance and Dimensions

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<th>TYPES</th>
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Ordering Example

GZ-40-150-EE-V-800-VA

- Type (Pull Type)
- Body: 1.57” (40 mm)
- Stroke: 5.91” (150 mm)
- Piston Rod End Fitting: E14-VA
- Body End Fitting: E14-VA
- Adjustable (V)
- Traction Force: F1 180 lbs (800 N)
- Material: (1.4301/1.4305, AISI 304/303, VA)

Mounting accessories see from page 220.

Technical Data

- Traction force: 500 N to 5,000 N (extended up to 7,250 N)
- Progression: Approx. 43 % to 45 %
- Lifetime: Approx. 2,000 m
- Operating temperature range: -20 °C to 80 °C
- Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)
- Mounting: With piston rod upwards.
- End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).
- Positive stop: External positive stop in the pulling direction provided by the customer.
- End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
### Stainless Steel Gas Springs (Pull Type), V4A

<table>
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<tr>
<td>GZ-40-250-V4A</td>
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<tr>
<td>GZ-40-600-V4A</td>
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### Stainless Steel Accessories, V4A

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Dimensions see Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A5-V4A</td>
<td>222</td>
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<tr>
<td>C5-V4A</td>
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<td>D14-V4A</td>
<td>225</td>
</tr>
<tr>
<td>E14-V4A</td>
<td>225</td>
</tr>
</tbody>
</table>
We’ll Size Industrial Gas Springs for You
And we’ll provide all necessary information for installation

To obtain the optimum operation with minimal hand force, gas spring must be properly sized and the mounting points have to be optimally placed.

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 send us your details by fax or e-mail. Just complete the information shown on the following page. Please attach a sketch of your application (a simple hand sketch is sufficient) in side view. Our application engineers will determine the optimum gas springs and 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.
Input Data

Gas Spring Push type ☐ Gas Spring Pull type ☐

Gas spring fixing points
The fixed point of the frame and the moving point of the flap are critical for the optimum operation.

Please attach a sketch of your application!
(A few lines with dimensions are sufficient)

Moving mass* m ________ kg
Number of gas springs in parallel* n ________ pcs
Number of movements* ________ /day
Ambient temperature T ________ °C

If not shown by the sketch:
Radius of center of gravity RM ________ mm
Radius of hand force RH ________ mm
Starting angle αM ________ °
Opening angle α ________ °

* Compulsory information

Desired Mounting Fittings

End Fitting

End Fitting

A

B Stud Thread

C Angle Ball Joint

D Clevis Fork

E Swivel Eye

F Inline Ball Joint

G Ball Socket

The end fittings are interchangeable
e.g. -CE: C = Angle Ball Joint, E = Swivel Eye

Please send us a sketch with dimensions of your application!
Without this sketch we won’t be able to calculate.

Comments

Requirement per year
Machine type / reference

Sender

Company
Address
ZIP / City
Website

Dept.
Name
Telephone
E-Mail

Please complete and fax or email to: (248) 476-2470 or applications@acecontrols.com
Mounting and Safety Instructions

Filling
Gas springs are filled with pure nitrogen gas. Nitrogen is an inert gas that does not burn or explode and is not poisonous. The internal pressure of gas springs can be up to 300 bar (4,350 psi). Do not attempt to open or modify them!

Gas springs are maintenance-free!
ACE gas springs will operate in ambient 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!
ACE gas springs can be stored in any position. Pressure lost through long storage is not to be expected. There are no known negative effects of long-term storage, 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).

Mounting
Gas springs should be installed with the piston rod downwards. This position ensures best damping quality. ACE gas springs include an integrated grease chamber which allows for alternative mounting opportunities.
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 %. Depending on size and extension force the tolerances can differ.

Life Time
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 10 km (lifetime of traction gas springs approx. 2 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 practice 500,000 strokes or more have been achieved on some applications.

Disposal/Recycling
Please ask for our disposal recommendations.

Warnings and Liability
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.
Valve Actuation with ACE DE-GAS

Simple, safe and reliable

De-gassing for controlled force reduction on valve gas springs
The reduction is made by screwing the DE-Gas on the male screwed end of the gas spring. The drain process is possible through light actuation of the push button. If too much nitrogen is discharged, the gas spring can be refilled by ACE.

Adjustment
1. Hold gas spring valve up.
2. Insert DE-GAS adjuster knob on thread of the valve.
3. Press the DE-GAS adjuster knob with light hand force until you can hear the nitrogen escaping. Press only briefly to avoid too much nitrogen being discharged.
4. After adjustment, remove the DE-GAS 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.

You can also visit our Youtube channel at www.youtube.com/user/acecontrolsglobal
Here, among other things you will find an ACETips video on the topic of DE-GAS!

Gas Spring Refilling Kit

Flexible and easy to use

The ACE gas spring refilling kit offers you the opportunity to fill gas springs on location or adapt them individually. The refilling kit is equipped with all the parts you need to fill gas springs. Very precise filling of the gas springs is possible using the digital manometer. The table for determining the filling pressure of the gas springs is included with the case. The only thing missing from the delivery is the nitrogen.

The refilling kit contains all filling bells and adjuster knobs for the current ACE gas spring range.
Gas springs filled with the refilling kit must be measured on a calibrated measurement system by ACE for repeat production.

The refilling kit suits 200 bar nitrogen bottles with a thread of W24.32x1/14”. Other connections are available upon request.

Part number: GS-FK-C
Hydraulic Dampers

Multi-talent in speed control

The hydraulic dampers are similar in appearance to the ACE industrial gas springs but are adjusted in the end position and work differently to the DVC family with individual speed adjusters for the push and pull direction. This provide users with the maximum flexibility.

Whether used as drive compensation or safety elements, the retraction and extension speed of these ACE solutions can always be precisely set. This means that the speed of movement can be controlled, synchronisation regulated in both directions and pivoting loads can be compensated. Depending on the model, the push and pull forces are between 30 N and 40,000 N. These maintenance-free, ready-to-install products are available in body diameters of 12 mm to 70 mm and in stroke lengths up to 800 mm.
Hydraulic Dampers

**DVC-32 and DVC-2 to DVC-6**
Adjustable, Without Free Travel
**Multi-directional speed adjustment**
Cylinder speed controls, Absorption control, Finishing and processing centres

**HBD-15 to HBD-40**
Adjustable
**Motion Control at the highest level**
Finishing and processing centres, Machine housing, Hoods, Shutters

**HB-12 to HB-70**
Adjustable
**Linear motion control**
Conveyor systems, Transport systems, Furniture industry, Locking systems

- Constant speed rates
- Sensitive adjustment
- High quality and long lifetime
- Easy to mount
DVC-32 and DVC-2 to DVC-6

Multi-directional speed adjustment

Adjustable, Without Free Travel

Compression and extension force 42 N to 2,000 N

Stroke 50 mm to 150 mm

Separately regulated in any stroke position:
The hydraulic dampers of the product family DVC-32 and DVC-2 to DVC-6 are the first dampers to provide precise, independent, external adjustment of in-and-out speeds. With their individual adjustments for the push and pull direction as well as the bi-directional action, these are suitable as safety or control elements.

The great number of mounting accessories makes assembly of these ACE hydraulic dampers easier and allows these maintenance-free, ready-to-install and self-contained systems universally applicable. Qualitatively high grade, and at the same time simple to use; one of their uses is to absorb swinging loads.

These velocity controllers are used in the automotive sector, automation and machine building as well as in the electronics industry.

Technical Data

Compression and extension force: 42 N to 2,000 N

Outer body diameter: Ø 32 mm

Piston rod diameter: Ø 8 mm

Lifetime: Approx. 10,000 m

Operating temperature range: 0 °C to 65 °C

Adjustment: Steplessly adjustable

Positive stop: External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.

Damping medium: Automatic Transmission Fluid (ATF)

Material: Outer body: Coated aluminium; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel

Mounting: In any position

Application field: Cylinder speed controls, Absorption control, Finishing and processing centres

Note: Increased break-away force if unit has not moved for some time. Damping force can be adjusted after installation.

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

On request: Special oils and other special options. Alternative accessories available on request.
Hydraulic Dampers DVC-32 and DVC-2 to DVC-6

Adjustable, Without Free Travel, Compression and extension force 42 N to 2,000 N

End Fitting

A8

B8

C8

D8

E8

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>L extended</th>
<th>Compression force max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVC-32-50</td>
<td>50</td>
<td>240</td>
<td>2,000</td>
</tr>
<tr>
<td>DVC-32-100</td>
<td>100</td>
<td>440</td>
<td>2,000</td>
</tr>
<tr>
<td>DVC-32-150</td>
<td>150</td>
<td>640</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Max. extension force for all stroke lengths 2,000 N.

Ordering Example

DVC-32-50-DD-DD-CCO

Type (Hydraulic Damper)
Body ø 1.26” (32 mm) omitted at DVC-2 to DVC-6
Stroke 2” (50 mm)
Piston Rod End Fitting D8
Body End Fitting D8
Velocity Controls (Omit prefix for controlled, both directions)

Model Type Prefix

- : Controlled, both directions
CCO: Controlled, compression only
CTO: Controlled, tension only

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

Mounting accessories see from page 212.

DVC-2 to DVC-6

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>A max.</th>
<th>B</th>
<th>Compression force max.</th>
<th>Traction force max.</th>
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<tbody>
<tr>
<td>DVC-2</td>
<td>50</td>
<td>260</td>
<td>75.4</td>
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<td>DVC-4</td>
<td>100</td>
<td>351</td>
<td>125</td>
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<td>2,000</td>
</tr>
<tr>
<td>DVC-6</td>
<td>150</td>
<td>452</td>
<td>176</td>
<td>2,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>
**Technical Data**

**Compression and extension force:** 36 N to 10,000 N  
**Outer body diameter:** Ø 15 mm to Ø 40 mm  
**Piston rod diameter:** Ø 6 mm to Ø 14 mm  
**Lifetime:** Approx. 10,000 m  
**Free travel:** These units have no free travel and are ideal for applications that require this level of performance.  
**Operating temperature range:** -20 °C to 80 °C  
**Adjustment:** Pull the piston rod out to its fully extended position. While pulling on the rod, turn it clockwise or counter-clockwise until the desired damping is achieved. The adjustment is multi-turn and correct damping may require several trial and error adjustments. A built-in antilock guard allows adjustments to be made at any damping rate without unit lock up.  
**Positive stop:** External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.  
**Damping medium:** Petroleum oil  
**Material:** Outer body: Black anodized aluminium; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel  
**Mounting:** In any position  
**Application field:** Finishing and processing centers, Machine housing, Hoods, Shutters, Fire safety doors, Medical technology, Conveyor systems, Swivel units, Tool machines, Lift doors  
**Note:** Increased break-away force if unit has not moved for some time.  
**End fittings:** They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.  
**Safety information:** Mechanical Stop required 1 mm to 1.5 mm before end of stroke.  
**On request:** Special oils, damping characteristics, and stroke lengths. Alternative accessories available on request.
Hydraulic Dampers HBD-15

Adjustable, Compression and extension force 36 N to 800 N

Technical Data

Compression and extension force: 36 N to 800 N

Free travel: These units have no free travel and are ideal for applications that require this level of performance.

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

Adjustment: Pull the piston rod out to its fully extended position. While pulling on the rod, turn it clockwise or counter-clockwise until the desired damping is achieved. The adjustment is multi-turn and correct damping may require several trial and error adjustments. A built-in antilock guard allows adjustments to be made at any damping rate without unit lock up.

Material: Outer body: Black anodized aluminium; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel

Mounting: In any position

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

Safety information: Mechanical Stop required 1 mm to 1.5 mm before end of stroke.
Hydraulic Dampers HBD-22

Adjustable, Compression and extension force 50 N to 1,800 N

**End Fitting**

<table>
<thead>
<tr>
<th>A8</th>
<th>B8</th>
<th>C8</th>
<th>D8</th>
<th>E8</th>
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</thead>
<tbody>
<tr>
<td>R7</td>
<td>8</td>
<td>10</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
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<tr>
<td>16</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>

**Standard Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke mm</th>
<th>L extended mm</th>
<th>↑ Compression force max. N</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBD-22-50</td>
<td>50</td>
<td>238</td>
<td>1,800</td>
</tr>
<tr>
<td>HBD-22-100</td>
<td>100</td>
<td>385</td>
<td>1,800</td>
</tr>
<tr>
<td>HBD-22-150</td>
<td>150</td>
<td>525</td>
<td>1,800</td>
</tr>
<tr>
<td>HBD-22-200</td>
<td>200</td>
<td>685</td>
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<tr>
<td>HBD-22-250</td>
<td>250</td>
<td>835</td>
<td>800</td>
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<td>HBD-22-300</td>
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<td>985</td>
<td>600</td>
</tr>
<tr>
<td>HBD-22-350</td>
<td>350</td>
<td>1,135</td>
<td>400</td>
</tr>
<tr>
<td>HBD-22-400</td>
<td>400</td>
<td>1,285</td>
<td>400</td>
</tr>
</tbody>
</table>

* ↑ Max. extension force for all stroke lengths 1,800 N.

**Ordering Example**

HBD-22-150-AA-P

Type (Hydraulic Damper) Body 0.87" (22 mm)
Stroke 5.90" (150 mm)
Piston Rod End Fitting A8
Body End Fitting A8
Damping Direction (P = in both directions)

**Model Type Prefix**

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

Mounting accessories see from page 212.

**Technical Data**

**Compression and extension force**: 50 N to 1,800 N

**Free travel**: These units have no free travel and are ideal for applications that require this level of performance.

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

**Adjustment**: Pull the piston rod out to its fully extended position. While pulling on the rod, turn it clockwise or counter-clockwise until the desired damping is achieved. The adjustment is multi-turn and correct damping may require several trial and error adjustments. A built-in antilock guard allows adjustments to be made at any damping rate without unit lock up.

**Material**: Outer body: Black anodized aluminium; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel

**Mounting**: In any position

**End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

**Safety information**: Mechanical Stop required 1 mm to 1.5 mm before end of stroke.
Hydraulic Dampers HBD-28

Adjustable, Compression and extension force 70 N to 3,000 N

**Technical Data**

**Compression and extension force:** 70 N to 3,000 N

**Free travel:** These units have no free travel and are ideal for applications that require this level of performance.

**Operating temperature range:** -4 °F to 176 °F

**Adjustment:** Pull the piston rod out to its fully extended position. While pulling on the rod, turn it clockwise or counter-clockwise until the desired damping is achieved. The adjustment is multi-turn and correct damping may require several trial and error adjustments. A built-in antilock guard allows adjustments to be made at any damping rate without unit lock up.

**Material:** Outer body: Black anodized aluminium; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel

**Mounting:** In any position

**End fittings:** They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.

**Safety information:** Mechanical Stop required 1 mm to 1.5 mm before end of stroke.

---

**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Compression force max. (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBD-28-50</td>
<td>50</td>
<td>250</td>
<td>3,000</td>
</tr>
<tr>
<td>HBD-28-100</td>
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<td>HBD-28-200</td>
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<td>HBD-28-250</td>
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<tr>
<td>HBD-28-300</td>
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<td>1,000</td>
<td>2,500</td>
</tr>
<tr>
<td>HBD-28-350</td>
<td>350</td>
<td>1,150</td>
<td>2,000</td>
</tr>
<tr>
<td>HBD-28-400</td>
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</tr>
<tr>
<td>HBD-28-500</td>
<td>500</td>
<td>1,600</td>
<td>1,000</td>
</tr>
</tbody>
</table>

1. Max. extension force for all stroke lengths 3,000 N.

---

**Model Type Prefix**

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

**Mounting accessories see from page 212.**
Hydraulic Dampers HBD-40

Adjustable, Compression and extension force 80 N to 10,000 N

### End Fitting

<table>
<thead>
<tr>
<th>A14</th>
<th>B14</th>
<th>C14</th>
<th>D14</th>
<th>E14</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

### Standard Dimensions

<table>
<thead>
<tr>
<th>Performance and Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPES</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>HBD-40-100</td>
</tr>
<tr>
<td>HBD-40-150</td>
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<tr>
<td>HBD-40-200</td>
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<td>HBD-40-400</td>
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<tr>
<td>HBD-40-500</td>
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<tr>
<td>HBD-40-600</td>
</tr>
<tr>
<td>HBD-40-700</td>
</tr>
<tr>
<td>HBD-40-800</td>
</tr>
</tbody>
</table>

*Max. extension force for all stroke lengths 10,000 N.*

### Model Type Prefix

- **P**: Damping in both directions
- **N**: Damping on in stroke only
- **M**: Damping on out stroke only
- **X**: Special model suffix

### Mounting accessories see from page 212.

### Technical Data

- **Compression and extension force**: 80 N to 10,000 N
- **Free travel**: These units have no free travel and are ideal for applications that require this level of performance.
- **Operating temperature range**: -20 °C to 80 °C
- **Adjustment**: Pull the piston rod out to its fully extended position. While pulling on the rod, turn it clockwise or counter-clockwise until the desired damping is achieved. The adjustment is multi-turn and correct damping may require several trial and error adjustments. A built-in antilock guard allows adjustments to be made at any damping rate without unit lock up.
- **Material**: Outer body: Black anodized aluminium; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel
- **Mounting**: In any position
- **End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
- **Safety information**: Mechanical Stop required 1 mm to 1.5 mm before end of stroke.
Dream it
We. Love. Challenges.

Ok, pure gold or fur-covered are not realistic options. But if you need a perfect solution for your individual needs, ACE has the tools and expertise to make it happen.

Call our experts
+1 800-521-3220 or go to www.acecontrols.com
**HB-12 to HB-70**

*Linear motion control*

**Adjustable**

Compression and extension force 20 N to 50,000 N  
Stroke 10 mm to 800 mm

High quality and long service life: The hydraulic dampers of the product family HB can also be used as single or double acting brake. Its coated body and piston rods with wear-resistant surface treatment are features of high quality and long service life.

The maintenance free, ready-to-install and closed systems provide a constant feed rate and are adjustable. The control segment on the piston makes adjustment at the end position child’s play. Thanks to a broad selection of end fittings the assembly is easy to mount, so that the damper can be universally deployed for damping swinging masses, such as in power or free conveyors.

On automotive, automation and machine building, medical technology or the electronics and furniture industry, these machine elements are found in a number of different areas.

**Technical Data**

- **Compression and extension force:** 20 N to 50,000 N  
- **Outer body diameter:** Φ 12 mm to Φ 70 mm  
- **Piston rod diameter:** Φ 4 mm to Φ 30 mm  
- **Lifetime:** Approx. 10,000 m  
- **Free travel:** Construction of the damper results in a free travel of approx. 20% of stroke.  
- **Separator piston:** Available as a special option without free travel achieved by separator piston and nitrogen accumulator.  
- **Operating temperature range:** -20 °C to 80 °C  
- **Adjustment:** Achieved by turning the piston rod in its fully extended or fully compressed position.  
- **Positive stop:** External positive stops 1 mm to 6 mm before the end of stroke provided by the customer.  
- **Damping medium:** Hydraulic oil  
- **Material:** Outer body: Coated steel; Piston rod: Steel or stainless steel with wear-resistant coating; End fittings: Zinc plated steel  
- **Mounting:** In any position  
- **Application field:** Conveyor systems, Transport systems, Furniture industry, Locking systems, Sports equipment  

**Note:** Increased break-away force if unit has not moved for some time.

**End fittings:** They are interchangeabe and if necessary must be positively secured by the customer to prevent unscrewing.  
**On request:** Special oils and other special options. Alternative accessories available on request.

---

ACE Controls Inc.  
23425 Industrial Park Dr. Farmington  
US-48335 Michigan  
T +1 800-521-3320  
F +1 248-476-2470  
shocks@acecontrols.com  
www.acecontrols.com
Hydraulic Dampers HB-12

Adjustable, Compression and extension force 20 N to 180 N

End Fitting

A3.5

Standard Dimensions

B3.5

C3.5

D3.5

E3.5

G3.5

Rod Shroud

W3.5-12

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke mm</th>
<th>L extended mm</th>
<th>Compression force max. N</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB-12-10</td>
<td>10</td>
<td>55</td>
<td>180</td>
</tr>
<tr>
<td>HB-12-20</td>
<td>20</td>
<td>75</td>
<td>180</td>
</tr>
<tr>
<td>HB-12-30</td>
<td>30</td>
<td>95</td>
<td>180</td>
</tr>
<tr>
<td>HB-12-40</td>
<td>40</td>
<td>115</td>
<td>180</td>
</tr>
<tr>
<td>HB-12-50</td>
<td>50</td>
<td>135</td>
<td>180</td>
</tr>
<tr>
<td>HB-12-60</td>
<td>60</td>
<td>155</td>
<td>180</td>
</tr>
<tr>
<td>HB-12-70</td>
<td>70</td>
<td>175</td>
<td>180</td>
</tr>
<tr>
<td>HB-12-80</td>
<td>80</td>
<td>195</td>
<td>150</td>
</tr>
</tbody>
</table>

1 Max. extension force for all stroke lengths 180 N.

Ordering Example

Type (Hydraulic Damper)  Body 0.47” (12 mm)  Stroke 1.18” (30 mm)  Piston Rod End Fitting A3.5  Body End Fitting C3.5  Damping Direction (M = out stroke only)

HB-12-30-AC-M

Model Type Prefix

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

Mounting accessories see from page 212.

Technical Data

Compression and extension force: 20 N to 180 N

Free travel: Construction of the damper results in a free travel of approx. 21% of stroke.

Separator piston: Available as a special option without free travel achieved by separator piston and nitrogen accumulator.

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

Adjustment: Achieved by turning the piston rod in its fully extended or fully compressed position.

Clockwise rotation = increase of the damping
Anti-clockwise rotation = decrease of the damping

Damping force adjustable before installation. Adjustment can add a max. of 6 mm to the L dimension.

Positive stop: External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.

Material: Outer body: Coated steel; Piston rod: Stainless steel (1.4301/1.4305, AISI 304/303); End fittings: Zinc plated steel

Mounting: In any position

Note: Increased break-away force if unit has not moved for some time.

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Hydraulic Dampers HB-15

Adjustable, Compression and extension force 20 N to 800 N

End Fitting

<table>
<thead>
<tr>
<th>Standard Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stroke</strong></td>
</tr>
<tr>
<td><strong>L extended</strong></td>
</tr>
<tr>
<td><strong>Compression force max.</strong></td>
</tr>
<tr>
<td>TYPES</td>
</tr>
<tr>
<td>Stroke (mm)</td>
</tr>
<tr>
<td>HB-15-25</td>
</tr>
<tr>
<td>HB-15-50</td>
</tr>
<tr>
<td>HB-15-75</td>
</tr>
<tr>
<td>HB-15-100</td>
</tr>
<tr>
<td>HB-15-150</td>
</tr>
</tbody>
</table>

* Max. extension force for all stroke lengths 800 N.

**Ordering Example**

Type (Hydraulic Damper)
Body 0.59" (15 mm)
Stroke 5.91" (150 mm)
Piston Rod End Fitting A5
Body End Fitting A5
Damping Direction (P = in both directions)

**Model Type Prefix**

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

**Mounting accessories see from page 212.**

**Technical Data**

Compression and extension force: 20 N to 800 N

Free travel: Construction of the damper results in a free travel of approx. 20 % of stroke.

Separator piston: Available as a special option without free travel achieved by separator piston and nitrogen accumulator.

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

Adjustment: Achieved by turning the piston rod in its fully extended or fully compressed position.

Clockwise rotation = increase of the damping
Anti-clockwise rotation = decrease of the damping

Damping force adjustable before installation. Adjustment can add a max. of 6 mm to the L dimension.

Positive stop: External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.

Material: Outer body: Black anodized aluminium; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel

Mounting: In any position

Note: Increased break-away force if unit has not moved for some time.

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Hydraulic Dampers HB-22
Adjustable, Compression and extension force 30 N to 1,800 N

**End Fitting**

**Standard Dimensions**

<table>
<thead>
<tr>
<th>Types</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Compression force max. (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB-22-50</td>
<td>50</td>
<td>150</td>
<td>1,800</td>
</tr>
<tr>
<td>HB-22-100</td>
<td>100</td>
<td>250</td>
<td>1,800</td>
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<tr>
<td>HB-22-150</td>
<td>150</td>
<td>350</td>
<td>1,800</td>
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<tr>
<td>HB-22-200</td>
<td>200</td>
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<tr>
<td>HB-22-250</td>
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<td>HB-22-300</td>
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<td>650</td>
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<tr>
<td>HB-22-350</td>
<td>350</td>
<td>750</td>
<td>400</td>
</tr>
<tr>
<td>HB-22-400</td>
<td>400</td>
<td>850</td>
<td>400</td>
</tr>
</tbody>
</table>

Max. extension force for all stroke lengths 1,800 N.

**Performance and Dimensions**

- **Ordering Example**: HB-22-150-AA-P
  - Type (Hydraulic Damper): Body 0.87" (22 mm)
  - Stroke 5.90" (150 mm)
  - Piston Rod End Fitting A8
  - Body End Fitting A8

**Model Type Prefix**
- P: Damping in both directions
- N: Damping on in stroke only
- M: Damping on out stroke only
- X: Special model suffix

**Mounting accessories see from page 212.**

**Technical Data**

- **Compression and extension force**: 30 N to 1,800 N
- **Free travel**: Construction of the damper results in a free travel of approx. 20% of stroke.
- **Separator piston**: Available as a special option without free travel achieved by separator piston and nitrogen accumulator.
- **Operating temperature range**: -20 °C to 80 °C
- **Adjustment**: Achieved by turning the piston rod in its fully extended or fully compressed position.
  - Clockwise rotation = increase of the damping
  - Anti-clockwise rotation = decrease of the damping
  - Damping force adjustable before installation. Adjustment can add a max. of 6 mm to the L dimension.
- **Positive stop**: External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.
- **Material**: Outer body: Black anodized aluminium; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
- **Mounting**: In any position
- **Note**: Increased break-away force if unit has not moved for some time.
- **End fittings**: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Hydraulic Dampers HB-28

Adjustable, Compression and extension force 30 N to 3,000 N

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>L extended</th>
<th>¹ Compression force max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB-28-50</td>
<td>50</td>
<td>160</td>
<td>3,000</td>
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<tr>
<td>HB-28-100</td>
<td>100</td>
<td>260</td>
<td>3,000</td>
</tr>
<tr>
<td>HB-28-150</td>
<td>150</td>
<td>360</td>
<td>3,000</td>
</tr>
<tr>
<td>HB-28-200</td>
<td>200</td>
<td>460</td>
<td>3,000</td>
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<tr>
<td>HB-28-250</td>
<td>250</td>
<td>560</td>
<td>3,000</td>
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<tr>
<td>HB-28-300</td>
<td>300</td>
<td>660</td>
<td>2,500</td>
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<tr>
<td>HB-28-350</td>
<td>350</td>
<td>760</td>
<td>2,000</td>
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<tr>
<td>HB-28-400</td>
<td>400</td>
<td>860</td>
<td>1,500</td>
</tr>
<tr>
<td>HB-28-500</td>
<td>500</td>
<td>1,060</td>
<td>1,000</td>
</tr>
</tbody>
</table>

¹ Max. extension force for all stroke lengths 3,000 N.

Ordering Example

Type (Hydraulic Damper)  
Body 1.10" (28 mm)  
Stroke 5.91" (150 mm)  
Piston Rod End Fitting A8  
Body End Fitting A8  
Damping Direction (P = in both directions)

Model Type Prefix

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

Mounting accessories see from page 212.

Technical Data

Compression and extension force: 30 N to 3,000 N

Free travel: Construction of the damper results in a free travel of approx. 20 % of stroke.

Separator piston: Available as a special option without free travel achieved by separator piston and nitrogen accumulator.

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

Adjustment: Achieved by turning the piston rod in its fully extended or fully compressed position.  
Clockwise rotation = increase of the damping  
Anti-clockwise rotation = decrease of the damping  
Damping force adjustable before installation. Adjustment can add a max. of 6 mm to the L dimension.

Positive stop: External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.

Material: Outer body: Black anodized aluminium; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel

Mounting: In any position

Note: Increased break-away force if unit has not moved for some time.

End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Hydraulic Dampers HB-40

Adjustable, Compression and extension force 30 N to 10,000 N

End Fitting

- A14
- B14
- C14
- D14
- E14

Standard Dimensions

<table>
<thead>
<tr>
<th>Types</th>
<th>Stroke (mm)</th>
<th>L extended (mm)</th>
<th>Compression force max. (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB-40-100</td>
<td>100</td>
<td>275</td>
<td>10,000</td>
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<tr>
<td>HB-40-150</td>
<td>150</td>
<td>375</td>
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<tr>
<td>HB-40-200</td>
<td>200</td>
<td>475</td>
<td>10,000</td>
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<tr>
<td>HB-40-300</td>
<td>300</td>
<td>675</td>
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<tr>
<td>HB-40-400</td>
<td>400</td>
<td>875</td>
<td>8,000</td>
</tr>
<tr>
<td>HB-40-500</td>
<td>500</td>
<td>1,075</td>
<td>6,000</td>
</tr>
<tr>
<td>HB-40-600</td>
<td>600</td>
<td>1,275</td>
<td>4,000</td>
</tr>
<tr>
<td>HB-40-700</td>
<td>700</td>
<td>1,475</td>
<td>3,000</td>
</tr>
<tr>
<td>HB-40-800</td>
<td>800</td>
<td>1,675</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Note: Maximum extension force for all stroke lengths 10,000 N.

Model Type Prefix

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

Mounting accessories see from page 212.

Technical Data

- Compression and extension force: 30 N to 10,000 N
- Free travel: Construction of the damper results in a free travel of approx. 20% of stroke.
- Separator piston: Available as a special option without free travel achieved by separator piston and nitrogen accumulator.
- Operating temperature range: -20 °C to 80 °C
- Adjustment: Achieved by turning the piston rod in its fully extended or fully compressed position. Clockwise rotation = increase of the damping Anti-clockwise rotation = decrease of the damping Damping force adjustable before installation. Adjustment can add a max. of 6 mm to the L dimension.
- Positive stop: External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.
- Material: Outer body: Black anodized aluminium; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
- Mounting: In any position
- Note: Increased break-away force if unit has not moved for some time.
- End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
Hydraulic Dampers HB-70
Adjustable, Compression and extension force 2,000 N to 50,000 N

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke</th>
<th>L extended</th>
<th>Compression force max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB-70-100</td>
<td>111</td>
<td>331</td>
<td>50,000</td>
</tr>
<tr>
<td>HB-70-200</td>
<td>211</td>
<td>531</td>
<td>50,000</td>
</tr>
<tr>
<td>HB-70-300</td>
<td>311</td>
<td>731</td>
<td>50,000</td>
</tr>
<tr>
<td>HB-70-400</td>
<td>411</td>
<td>931</td>
<td>30,300</td>
</tr>
<tr>
<td>HB-70-500</td>
<td>511</td>
<td>1,131</td>
<td>21,600</td>
</tr>
<tr>
<td>HB-70-600</td>
<td>611</td>
<td>1,331</td>
<td>16,200</td>
</tr>
<tr>
<td>HB-70-700</td>
<td>711</td>
<td>1,531</td>
<td>12,600</td>
</tr>
<tr>
<td>HB-70-800</td>
<td>811</td>
<td>1,731</td>
<td>10,100</td>
</tr>
</tbody>
</table>

Ordering Example
Type (Hydraulic Damper) Body 2.76" (70 mm) Stroke 11.81" (300 mm) Piston Rod End Fitting E24 Body End Fitting E24 Damping Direction (N = in stroke only)

Model Type Prefix
P: Damping in both directions
N: Damping on in stroke only
M: Damping on out stroke only
X: Special model suffix

Mounting accessories see from page 212.

Technical Data

Compression and extension force: 2,000 N to 50,000 N
Free travel: Construction of the damper results in a free travel of approx. 20% of stroke.
Separator piston: Available as a special option without free travel achieved by separator piston and nitrogen accumulator.
Operating temperature range: -20 °C to 80 °C
Adjustment: Achieved by turning the piston rod in its fully extended or fully compressed position.
Clockwise rotation = increase of the damping
Anti-clockwise rotation = decrease of the damping
Damping force adjustable before installation. The adjustment can add a max. of 5 mm to the L dimension.
Positive stop: External positive stops 5 mm to 6 mm before the end of stroke provided by the customer.
Material: Outer body: Coated steel; Piston rod: Hard chrome platted steel; End fittings: Zinc plated steel
Mounting: In any position
Note: Increased break-away force if unit has not moved for some time.
End fittings: They are interchangeable and if necessary must be positively secured by the customer to prevent unscrewing.
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► Extensive CAD component libraries
► ACE-YouTube channel with video tips
► VibroChecker – free award-winning iPhone App

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Application Examples

DVC-32
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

HB-15
Operating speed of flaps top-regulated

In the past, operators of used-clothes containers could sustain injury because the flaps closed relatively quickly and uncontrollably. Various hydraulic dampers of the type HB-15, which are designed specifically for the type of container, regulate the synchronization of the flap in both directions and thereby serve to regulate the operating speed. To accommodate a range of requirements and to provide optimal protection against theft, different types with different strokes are mounted on flaps without damping, on large flaps with damping and on rotor flaps with damping.

Hydraulic dampers prevent fingers becoming trapped in used-clothes containers as they ensure more gentle opening and closing movements

MCB Milieu & Techniek BV, 4704 SE Roosendaal, Netherlands
HB-40
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 dampers to absorb compressive forces of up to 10,000 N on either side.
Mounting Accessories
for steel gas springs and hydraulic dampers

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 included 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 mounting accessories provide an extensive range of combinations for optimum installations.

With the ACE selection program you can choose not only your ACE 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.

Infinite Combinations!
Steel Accessories for Gas Springs and Hydraulic Dampers

M3.5x0.6 (for GS-8, GS-10, GS-12, GZ-15, HB-12)

C3.5 Angle Ball Joint DIN 71802

E3.5 Swivel Eye DIN 648

A3.5 Eye

D3.5 Clevis Fork DIN 71752

NA3.5 Angle Bracket

OA3.5 Side Bracket

G3.5 Ball Socket DIN 71605

NG3.5 Angle Bracket

OG3.5 Side Bracket

Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
<th>Code</th>
<th>Dimensions</th>
<th>Force Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5</td>
<td>Angle Ball Joint</td>
<td>DIN 71802</td>
<td>8x6x13</td>
<td>500 N</td>
</tr>
<tr>
<td>D5</td>
<td>Clevis Fork</td>
<td>DIN 71752</td>
<td>6x10x20</td>
<td>800 N</td>
</tr>
<tr>
<td>F5</td>
<td>Inline Ball Joint</td>
<td></td>
<td>5x6x10</td>
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<tr>
<td>A5</td>
<td>Eye</td>
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<td>MA5</td>
<td>Bearing Shoe</td>
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<td>500 N</td>
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<td>Angle Bracket</td>
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<td>DIN 648</td>
<td>6x5x10</td>
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<tr>
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<td>NG5</td>
<td>Angle Bracket</td>
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<td>400 N</td>
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</tr>
<tr>
<td>PG5</td>
<td>Round Bracket</td>
<td></td>
<td>8x6x20</td>
<td>500 N</td>
</tr>
</tbody>
</table>

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
**M8x1.25**


<table>
<thead>
<tr>
<th>C8</th>
<th>Angle Ball Joint</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
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</thead>
</table>

<table>
<thead>
<tr>
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<th>Bearing Shoe</th>
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<tbody>
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<table>
<thead>
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<table>
<thead>
<tr>
<th>R8</th>
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<tbody>
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<table>
<thead>
<tr>
<th>D8</th>
<th>Side Bracket</th>
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<table>
<thead>
<tr>
<th>E8</th>
<th>Swivel Eye</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DIN 648</td>
</tr>
</tbody>
</table>

1 max. force 1,200 N

Attention! Must only be used with compression loads!

1 max. force 1,800 N

1 max. force 1,200 N

1 max. force 1,200 N

1 max. force 3,000 N

1 max. force 3,000 N

1 max. force 1,200 N

1 max. force 1,200 N

Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
Steel Accessories for Gas Springs and Hydraulic Dampers

**M8x1.25** (for GS-19, GS-22, GZ-19, HBD-22, HBD-28, HB-22, HB-28, DVC-32)

**E8**
Swivel Eye
DIN 648

1 max. force 3,000 N

**G8**
Ball Socket
DIN 71805

1 max. force 1,200 N

**ME8**
Bearing Shoe
1 max. force 1,800 N

**NE8**
Angle Bracket
1 max. force 1,000 N

**OE8**
Side Bracket
1 max. force 1,200 N

**PE8**
Round Bracket
1 max. force 1,200 N

**NG8**
Angle Bracket
1 max. force 1,000 N

**OG8**
Side Bracket
1 max. force 1,200 N

**PG8**
Round Bracket
1 max. force 1,200 N

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
Steel Accessories for Gas Springs and Hydraulic Dampers

**M10x1.5** (for GS-28, GZ-28, HBD-50)

### C10 Angle Ball Joint
DIN 71802

- Ø24
- 16
- 20
- 35

1 max. force 1,800 N

### A10 Eye

- Ø18
- 12 thick
- 25

1 max. force 10,000 N

### D10 Clevis Fork
DIN 71752

- Ø10
- 12
- 40

1 max. force 10,000 N

### E10 Swivel Eye
DIN 648

- Ø15
- 14
- 6.5

1 max. force 1,800 N

### ME10 Bearing Shoe

- Ø6.5
- 2.5
- 3

1 max. force 1,200 N

### OE10 Side Bracket

- Ø5.1
- 20
- 3

1 max. force 1,200 N

### PE10 Round Bracket

- Ø5.3
- 41
- 55

1 max. force 1,200 N

---

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.


**M14x1.5**

(for GS-40, GST-40, GZ-40, HBD-40, HB-40)

**C14**
Angle Ball Joint
DIN 71802

![Diagram](image1)

1 max. force 3,200 N

**F14**
Inline Ball Joint

![Diagram](image2)

1 max. force 3,200 N
Attention! Must only be used with compression loads!

**A14**
Eye

![Diagram](image3)

1 max. force 10,000 N

**ME14**
Bearing Shoe

![Diagram](image4)

1 max. force 10,000 N

**D14**
Clevis Fork
DIN 71752

![Diagram](image5)

1 max. force 10,000 N

**ND14**
Mounting Flange

![Diagram](image6)

1 max. force 10,000 N

**E14**
Swivel Eye
DIN 648

![Diagram](image7)

1 max. force 10,000 N

**ME14**
Bearing Shoe

![Diagram](image8)

1 max. force 10,000 N

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
## M24x2 (for GS-70, HB-70)

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Dimensions</th>
<th>Notes</th>
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<td>DIN 71752</td>
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<td>Ø25</td>
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<td></td>
<td></td>
<td>Ø25</td>
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<tr>
<td><strong>E24</strong></td>
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<td>1 max. force 50,000 N</td>
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</table>

1Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
Mounting Accessories
for stainless steel gas springs and hydraulic dampers

For our gas springs and hydraulic dampers made of stainless steel we also offer a flexible product range of DIN standardized end fittings and mounting brackets. These eyes, swivel eyes, clevis forks, angle ball joints, ball sockets, inline ball joints and mounting brackets are also made of sturdy stainless steel and can be easily combined.

The high-quality stainless steel accessories are rustproof and weakly magnetic. Just as with the corresponding stainless steel gas springs and hydraulic dampers, they are preferred in the food, electronics and ship building industries along with medical and cleanroom technology.

All ACE stainless steel gas springs and the appropriate mounting accessories are individually designed for each application with the ACE calculation program.

The entire range of stainless steel accessories is also available separately.
Stainless Steel Accessories for Gas Springs and Hydraulic Dampers

M3.5x0.6
(for GS-8-V4A, GS-10-V4A, GS-12-V4A, GZ-15-V4A)

**C3.5-V4A**
Angle Ball Joint

- Ø13
- Ø8
- Ø6
- Ø4

1 max. force 370 N

**A3.5-V4A**
Eye

- 4 thick
- Radius
- R4

1 max. force 370 N

**D3.5-V4A**
Clevis Fork

- Ø4
- Ø3
- Ø2

1 max. force 370 N

**G3.5-V4A**
Ball Socket

- Ø13
- Ø8
- Ø6
- Ø4

1 max. force 370 N

**NA3.5-V4A**
Angle Bracket

- Ø3.4
- Ø2.5
- Ø1.5

1 max. force 180 N

**OA3.5-V4A**
Side Bracket

- Ø4
- Ø3.5
- Ø2.5

1 max. force 180 N

**NG3.5-V4A**
Angle Bracket

- Ø8
- Ø5.5
- Ø4

1 max. force 180 N

**OG3.5-V4A**
Side Bracket

- Ø8
- Ø3.5
- Ø1.5

1 max. force 180 N

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
Stainless Steel Accessories for Gas Springs and Hydraulic Dampers

M5x0.8 (for GS-15-VA)

C5-VA
Angle Ball Joint

D5-VA
Clevis Fork

E5-VA
Swivel Eye

A5-VA
Eye

MA5-V4A
Bearing Shoe

NA5-V4A
Angle Bracket

OA5-V4A
Side Bracket

PA5-V4A
Round Bracket

G5-VA
Ball Socket

NG5-V4A
Angle Bracket

OG5-V4A
Side Bracket

PG5-V4A
Round Bracket

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
### Stainless Steel Accessories for Gas Springs and Hydraulic Dampers

#### M8x1.25 (for GS-19-VA, GS-22-VA, GZ-19-VA)

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| **C8-VA** Angle Ball Joint | ![Diagram](image1.png)  
 max. force 1,140 N |
| **D8-VA** Clevis Fork       | ![Diagram](image2.png)  
 max. force 1,560 N |
| **A8-VA** Eye              | ![Diagram](image3.png)  
 max. force 1,560 N |
| **MA8-V4A** Bearing Shoe   | ![Diagram](image4.png)  
 max. force 1,800 N |
| **NA8-V4A** Angle Bracket  | ![Diagram](image5.png)  
 max. force 1,000 N |
| **OA8-V4A** Side Bracket   | ![Diagram](image6.png)  
 max. force 1,200 N |
| **PA8-V4A** Round Bracket  | ![Diagram](image7.png)  
 max. force 1,200 N |
| **E8-VA** Swivel Eye       | ![Diagram](image8.png)  
 max. force 1,560 N |
| **MA8-V4A** Bearing Shoe   | ![Diagram](image9.png)  
 max. force 1,800 N |

---

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
Stainless Steel Accessories for Gas Springs and Hydraulic Dampers

**M8x1.25** (for GS-19-VA, GS-22-VA, GZ-19-VA)

- **G8-VA** Ball Socket
  - [Image]
  - 1 max. force 1,140 N

- **NG8-V4A** Angle Bracket
  - [Image]
  - 1 max. force 1,200 N

- **OG8-V4A** Side Bracket
  - [Image]
  - 1 max. force 1,200 N

- **PG8-V4A** Round Bracket
  - [Image]
  - 1 max. force 1,200 N

**M10x1.5** (for GS-28-VA, GZ-28-VA)

- **C10-VA** Angle Ball Joint
  - [Image]
  - 1 max. force 1,750 N

- **D10-VA** Clevis Fork
  - [Image]
  - 1 max. force 3,800 N

- **E10-VA** Swivel Eye
  - [Image]
  - 1 max. force 3,800 N

- **A10-VA** Eye
  - [Image]
  - 1 max. force 3,800 N

- **MA10-V4A** Bearing Shoe
  - [Image]
  - 1 max. force 1,800 N

---

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
Stainless Steel Accessories for Gas Springs and Hydraulic Dampers

M14x1.5 (for GS-40-VA, GZ-40-VA)

C14-VA
Angle Ball Joint

A14-VA
Eye

D14-VA
Clevis Fork

E14-VA
Swivel Eye

ME14-VA
Bearing Shoe

ME14-VA
Bearing Shoe

ND14-VA
Mounting Flange

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.
Hydraulic Feed Controls
Regulate feed rates in the best way

ACE Hydraulic feed controls are recommended as the perfect solution when sawing, cutting, drilling and in order to prevent the stick-slip effect on pneumatic cylinders. They can be precisely adjusted and provide speeds from 12 mm/min. (1/2”/min.) with a very low feed force or up to 38 m/min. (1.5”/min.) with a high feed rate.

These maintenance-free, ready-to-install hydraulic feed controls are self-contained hydraulic elements regulated by a precision throttle. The feed rate is set from the outside by turning the setting adjuster. The tried-and-tested rolling diaphragms used in many ACE shock absorbers also serve as a dynamic sealing element for a hermetic seal as well as volume compensation for the piston rod and provide the resetting of the piston when the force is removed.
Hydraulic Feed Controls

**VC25**  
Adjustable  
*For precision adjustment of feed rates*  
Handling modules, Linear slides, Automatic machinery,  
Conveyor equipment

**MA, MVC**  
Adjustable  
*Designed for applications with low precision requirements*  
Handling modules, Linear slides, Automatic machinery,  
Conveyor equipment

- Shorter processing times
- Different feed rates
- Adjustment segment at the lower end of the feed control
- Most accurate calibrations
- Available immediately
- Easy to mount
VC25

For precision adjustment of feed rates

Adjustable

Compression force 30 N to 3,500 N
Stroke 15 mm to 125 mm

Precise adjustment for any type of application: Hydraulic feed controls of the product family VC are ideally suited for the precise tuning of constant feed rates. The thread of the outer body of this closed hydraulic element allows simple assembly. Designs with a smooth body can also be supplied.

As the hydraulic oil is forced out through the throttle opening, a constant feed rate is achieved on the stroke. In the models up to 55 mm (2.17”) stroke, the tried and tested rolling diaphragm, known from ACE shock absorbers, serves as a dynamic seal, as volume compensation of the piston rod and as a reset element.

Precision hydraulic feed controls of the product family VC are used in automotive and industrial applications as well as in mechanical engineering and the electronics industry.

Technical Data

**Compression force:** 30 N to 3,500 N  
**Execution:** F = Ø 23.8 mm without thread  
FT = M25x1.5 threaded body  
**Piston rod diameter:** Ø 8 mm  
**Feed rate/Compression force:**  
Min. 0.013 m/min. at 400 N; Max. 38 m/min. at 3,500 N  
**Impact velocity range:** 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 75 mm to 125 mm stroke. Where higher energies occur use a shock absorber for the initial impact. Avoid high impact velocities.  
**Adjustment:** Infinitely adjustable

**Positive stop:** External positive stops 1 mm to 1.5 mm before the end of stroke provided by the customer.  
**Damping medium:** Oil, temperature stable  
**Material:** Outer body: Black anodized aluminium; Piston rod: Hard chrome plated steel; Accessories: Steel with black oxide finish or nitride hardened  
**Mounting:** In any position  
**Operating temperature range:** 0 °C to 60 °C  
**Application field:** Handling modules, Linear slides, Automatic machinery, Conveyor equipment, Absorption control

**Note:** Nylon button can be fitted onto piston rod. Unit may be mounted in any position.  
**Safety information:** Do not rotate piston rod, if excessive rotation force is applied rolling seal may rupture. External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions.  
**On request:** Special oil and other special options available on request.
Hydraulic Feed Controls VC25FT

Adjustable

VC25FT

VC25F

SP25
Air Bleed Collar

250-0044
Mounting Block

For VC2515FT to VC2555FT reduction of the stroke 6.4 mm

SP25
Air Bleed Collar

250-0044
Mounting Block

For VC2515FT to VC2555FT reduction of the stroke 6.4 mm

Additional accessories, mounting, installation ... see from page 47.

Complete details required when ordering

Load to be decelerated: m (kg)
Impact velocity: v (m/s)
Propelling force: F (N)
Operating cycles per hour: c (/hr)
Number of absorbers in parallel: n
Ambient temperature: °C

Ordering Example

Type (Feed Control)
25 for Thread Size M25
Stroke 2.16" (55 mm)
FT = with thread M25x1.5
F = without thread, plain body (Ø 0.94" / 23.8 mm)

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Stroke (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>Compression force min. (N)</th>
<th>Compression force max. (N)</th>
<th>Return Force min. (N)</th>
<th>Return Force max. (N)</th>
<th>Return Time (s)</th>
<th>Side Load Angle (°)</th>
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</table>

Suffix FT: M25x1.5 threaded body.
Suffix F: plain body 23.8 mm dia. (without thread), with optional clamp type mounting block.

Operating range VC

Accessories with Mounting Example

Mounting with clamp mount

Installed with air bleed collar SP25 (part no. 10783-000)
MA, MVC

Designed for applications with low precision requirements

Adjustable
Compression force 8 N to 3,500 N
Stroke 7 mm to 40 mm

Many application options: the hydraulic feed controls in models MA and MVC are similar to that of the VC model. However, these hydraulic controls have been designed for applications that require less precision.

There are also plenty of accessories for the MA and MVC models. All products are ready-to-install, maintenance-free, stable in temperature and avoid stick-slip effect. Speeds from 0.47"/min. (12 mm/min.) can be driven at a low thrust force using the adjustment screw on the base of the hydraulic control.

Hydraulic feed controls with the designations MA and MVC are especially used in handling modules or linear carriages and also for applications with changing usage data.

| PERFORMANCE AND DIMENSIONS | TYPES | Stroke (mm) | Compression force min. (N) | Compression force max. (N) | Return Force min. (N) | Return Force max. (N) | Return Time (s) | 1 Side Load Angle max. ° | M | Weight (kg)
<table>
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<td>0.95</td>
<td>2</td>
<td>1-12 UNF / M25x1.5</td>
<td></td>
<td>0.414</td>
</tr>
</tbody>
</table>

1 For applications with higher side load angles consider using the side load adaptor, pages 44 to 51.

Technical Data

Compression force: 8 N to 3,500 N
Execution: Thread M8 to M25
Impact velocity range: 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. Avoid high impact velocities.
Adjustment: Hard impact at the start of stroke, turn towards 0 or PLUS. Hard impact at the end of stroke, turn towards 0 or MINUS.
Positive stop: Integrated

Damping medium: Oil, temperature stable
Material: Outer body: Nitride hardened steel; Piston rod: Steel with black oxide finish or nitride hardened
Mounting: In any position
Operating temperature range: 0 °C to 66 °C
Application field: Handling modules, Linear slides, Automatic machinery, Conveyor equipment, Absorption control
Note: Damper is preset at delivery in a neutral position between hard and soft.

Safety information: External materials in the surrounding area can attack the seal components and lead to a shorter service life. Please contact ACE for appropriate solution suggestions.

On request: Nickel-plated, weartec finish (seawater resistant) or other special options available on request.
Products for UNF and metric thread available

MA30M
Adjustment Screw

MA50M
Adjustment Screw

MA35
Adjustment Screw

MA150
Adjustment Screw

MVC225
Adjustment Knob

MVC600
Adjustment Knob

MVC900
Adjustment Knob

250-0307
Mounting Block

250-0308
Mounting Block

250-0309
Mounting Block

250-0318
Mounting Block

250-0352
Mounting Block

250-0401
Mounting Block

250-0402
Mounting Block

250-0044
Mounting Block

Additional accessories, mounting, installation ... see from page 44.
Rotary Dampers
Small dampers refine your design

ACE rotary dampers mainly provide an invisible yet valuable service as a maintenance-free machine element to allow controlled deceleration of rotary or linear movements.

They are often necessary to make careful opening and closing of small lids, compartments and drawers possible and they protect sensitive components while increasing the quality and value of products. They are easy to integrate. The harmoniously gentle movements of these little decelerators can be achieved with continual rotation or with limited pivoting angles. They slow down left, right or double sided rotation. Suitable for almost any application and currently also available in adjustable variations, they provide braking torques of 0.05 Ncm to 40 Nm.

Partial Rotation Angle, Adjustable
e.g. FYT-H1 and FYN-H1

General Function
Rotary dampers operate on the principle of fluid damping. The damping moment is determined by the viscosity of the fluid and the dimensioning of the throttle gap or throttle orifices.

Sealing Ring
Damping Vane
Fluid
Rotary Dampers with Continuous Rotation

Rotate for the plus in quality: For smooth, quiet movements of small hoods, flaps and fans these continuously rotating rotary dampers from ACE decelerate either right, left or two-sided rotation right in the pivot point or linear through a gear and gear rack. The harmoniously gentle process protects components and increases the quality and value of products. The maintenance-free, ready-to-install ACE rotary dampers are filled with an inert fluid, usually silicone oil. The viscosity of the fluid and the sizing of the throttling gap determine the damping torque. The FFD series is the only exception: These fluid-free rotary dampers operate according to the principle of friction.

The continuously rotating rotary dampers with the designations FRT, FRN, FFD, FDT and FDN are used in household and medical devices as well as in the automotive, electronics and furniture industries.

Rotary Dampers with Partial Rotation Angle

For controlled and gentle deceleration: The damping direction of this rotary damper, which is available with adjustable damping torque, can be right, left or two-sided rotation. They can be installed directly in the pivot point of a construction and achieve uniform, quiet movements, which increases quality and value and protects sensitive components. The products are maintenance-free, ready-to-install and filled with an inert fluid, usually silicone oil. A rotor movement presses the fluid from one chamber into the other. The damping torque is determined by the viscosity of the fluid and the sizing of the throttling gap the throttle holes. During each reversal of movement, depending on the frame size a certain return damping torque develops.

These solutions are used in the automotive sector, in many industrial applications, in the electronics and furniture industries as well as in medical devices.

High protection of sensitive components
Various designs for every application
Maintenance-free and ready-to-install

Partial Rotation Angle

e.g. FYN-N1

Continuous Rotation

e.g. FRT-E2

[Diagram showing rotary dampers with labels for End Cap, Sealing Ring, Rotor, Cover, Sealing Ring]
Rotary Dampers

Continuous rotation

FRT-E2
Continuous Rotation
Small and lightweight for finest braking

Page 236

FRT-G2
Continuous Rotation
Small and lightweight for finest braking

Page 237

FRT-C2 and FRN-C2
Continuous Rotation
Flexible and cost efficient use

Page 238

FRT-D2 and FRN-D2
Continuous Rotation
Flexible and cost efficient use

Page 239

FRT-F2/K2 and FRN-F2/K2
Continuous Rotation
For a long service life

Page 240

FFD
Continuous Rotation
Precise braking without oil

Page 241

FDT
Continuous Rotation
The flat disc brake for two-sided damping

Page 242

FDN
Continuous Rotation
The flat disc brake for one direction of rotation

Page 243
Rotary Dampers

Partial rotation angle

**FYN-P1**
Partial Rotation Angle  
Small diameter, large damping torques

**FYN-N1**
Partial Rotation Angle  
Small diameter, large damping torques

**FYN-U1**
Partial Rotation Angle  
Small, strong and very robust

**FYN-S1**
Partial Rotation Angle  
The flat damper for constant component protection

Partial rotation angle, adjustable

**FYT-H1 and FYN-H1**
Partial Rotation Angle, Adjustable  
Specifically adjustable, strong braking force

**FYT-LA3 and FYN-LA3**
Partial Rotation Angle, Adjustable  
Adjustable high performance
FRT-E2
Small and lightweight for finest braking

Continuous Rotation
Damping torque 0.1 Ncm to 0.4 Ncm

The damping direction of the smallest ACE FRT-E2 rotary dampers with plastic body is rotating on both sides. They can brake directly in the pivot point or linear through a gear and gear rack. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 10 mm
Rotational speed max.: 50 rpm
Lifetime: 50,000 cycles (1 cycle = 360° left-hand, 360° right-hand). Even after this time, the dampers still produce over approx. 80% of their original damping moment. The service life may be significantly higher or lower, depending on the application.
Operating temperature range: 0 °C to 50 °C
Pressure angle: 20°
Material: Outer body, Shaft, Gear: Plastic
Mounting: In any position
Tooth: Involute gearing
P.C.D.: 6 mm
No. of teeth: 10
Module: 0.6
Mounting information: No axial or radial forces may be induced via the shaft.
Safety information: Do not use rotary dampers as supports. Provide an external guide or support.
On request: Special designs available on request. Toothed plastic racks (modules 0.5 to 1.0) are available for the rotary dampers with pinions.

Characteristics

At 23 °C ambient temperature

At 20 rpm rotational speed

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque Ncm</th>
<th>Damping direction</th>
<th>Gear</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRT-E2-100</td>
<td>0.10 +/- 0.05</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00032</td>
</tr>
<tr>
<td>FRT-E2-200</td>
<td>0.20 +/- 0.07</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00032</td>
</tr>
<tr>
<td>FRT-E2-300</td>
<td>0.30 +/- 0.08</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00032</td>
</tr>
<tr>
<td>FRT-E2-400</td>
<td>0.40 +/- 0.10</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00032</td>
</tr>
<tr>
<td>FRT-E2-100-G1</td>
<td>0.10 +/- 0.05</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00041</td>
</tr>
<tr>
<td>FRT-E2-200-G1</td>
<td>0.20 +/- 0.07</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00041</td>
</tr>
<tr>
<td>FRT-E2-300-G1</td>
<td>0.30 +/- 0.08</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00041</td>
</tr>
<tr>
<td>FRT-E2-400-G1</td>
<td>0.40 +/- 0.10</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00041</td>
</tr>
</tbody>
</table>

¹ The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.
FRT-G2
Small and lightweight for finest braking

Continuous Rotation
Damping torque 0.2 Ncm to 1 Ncm

The damping direction of the ACE FRT-G2 product family with plastic body is rotating on both sides. The small rotary dampers can brake directly in the pivot point or linear through a gear and gear rack. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 15 mm
Rotational speed max.: 50 rpm
Lifetime: 50,000 cycles (1 cycle = 360° left-hand, 360° right-hand). Even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.
Operating temperature range: 0 °C to 50 °C
Pressure angle: 20°
Material: Outer body, Shaft, Gear: Plastic
Mounting: In any position
Tooth: Involute gearing
P.C.D.: 7 mm
No. of teeth: 14
Module: 0.5
Mounting information: No axial or radial forces may be induced via the shaft.
Safety information: Do not use rotary dampers as supports. Provide an external guide or support.
On request: Special designs available on request. Toothed plastic racks (modules 0.5 to 1.0) are available for the rotary dampers with pinions.

Characteristics

At 23 °C ambient temperature

At 20 rpm rotational speed

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque Ncm</th>
<th>Damping direction</th>
<th>Gear</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRT-G2-200</td>
<td>0.20 +/- 0.07</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00060</td>
</tr>
<tr>
<td>FRT-G2-300</td>
<td>0.30 +/- 0.08</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00060</td>
</tr>
<tr>
<td>FRT-G2-450</td>
<td>0.45 +/- 0.10</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00060</td>
</tr>
<tr>
<td>FRT-G2-600</td>
<td>0.60 +/- 0.12</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00060</td>
</tr>
<tr>
<td>FRT-G2-101</td>
<td>1.00 +/- 0.20</td>
<td>bidirectional</td>
<td>without</td>
<td>0.00080</td>
</tr>
<tr>
<td>FRT-G2-200-G1</td>
<td>0.20 +/- 0.07</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00080</td>
</tr>
<tr>
<td>FRT-G2-300-G1</td>
<td>0.30 +/- 0.08</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00080</td>
</tr>
<tr>
<td>FRT-G2-450-G1</td>
<td>0.45 +/- 0.10</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00080</td>
</tr>
<tr>
<td>FRT-G2-600-G1</td>
<td>0.60 +/- 0.12</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00080</td>
</tr>
<tr>
<td>FRT-G2-101-G1</td>
<td>1.00 +/- 0.20</td>
<td>bidirectional</td>
<td>with</td>
<td>0.00080</td>
</tr>
</tbody>
</table>

1 The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.
**FRT-C2 and FRN-C2**

Flexible and cost efficient use

**Continuous Rotation**

**Damping torque** 2 Ncm to 3 Ncm

The damping direction of the simple FRT-C2 and FRN-C2 is either right, left or two-sided rotation. These ACE rotary dampers with plastic body can decelerate directly in the pivot point or linear through a gear and gear rack. ACE rotary dampers are maintenance-free and ready-to-install.

### Technical Data

- **Construction size:** Ø 15 mm
- **Rotational speed max.:** 50 rpm
- **Lifetime:** 50,000 cycles (1 cycle = 360° left-hand, 360° right-hand).
- **Operating temperature range:** 0 °C to 50 °C
- **Pressure angle:** 20°
- **Material:** Outer body, Gear: Plastic; Shaft: Plastic, steel
- **Mounting:** In any position
- **Tooth:** Involute gearing
- **P.C.D.:** 8.8 mm
- **No. of teeth:** 11
- **Module:** 0.8
- **Mounting information:** No axial or radial forces may be induced via the shaft.
- **Safety information:** Do not use rotary dampers as supports. Provide an external guide or support.
- **On request:** Special designs available on request. Toothed plastic racks (modules 0.5 to 1.0) are available for the rotary dampers with pinions.

### Characteristics

**At 23 °C ambient temperature**

<table>
<thead>
<tr>
<th>Ncm</th>
<th>rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>5</td>
</tr>
<tr>
<td>201</td>
<td>3</td>
</tr>
</tbody>
</table>

**At 20 rpm rotational speed**

<table>
<thead>
<tr>
<th>Ncm</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>50</td>
</tr>
<tr>
<td>201</td>
<td>50</td>
</tr>
</tbody>
</table>

### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque</th>
<th>Damping direction</th>
<th>Gear</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRT-C2-201</td>
<td>2 +/- 0.6</td>
<td>bidirectional</td>
<td>without</td>
<td>0.002</td>
</tr>
<tr>
<td>FRT-C2-301</td>
<td>3 +/- 0.8</td>
<td>bidirectional</td>
<td>without</td>
<td>0.002</td>
</tr>
<tr>
<td>FRT-C2-201-G1</td>
<td>2 +/- 0.6</td>
<td>bidirectional</td>
<td>with</td>
<td>0.002</td>
</tr>
<tr>
<td>FRT-C2-301-G1</td>
<td>3 +/- 0.8</td>
<td>bidirectional</td>
<td>with</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-R201</td>
<td>2 +/- 0.6</td>
<td>right</td>
<td>without</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-R301</td>
<td>3 +/- 0.8</td>
<td>right</td>
<td>without</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-R201-G1</td>
<td>2 +/- 0.6</td>
<td>right</td>
<td>with</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-R301-G1</td>
<td>3 +/- 0.8</td>
<td>right</td>
<td>with</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-L201</td>
<td>2 +/- 0.6</td>
<td>left</td>
<td>without</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-L301</td>
<td>3 +/- 0.8</td>
<td>left</td>
<td>without</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-L201-G1</td>
<td>2 +/- 0.6</td>
<td>left</td>
<td>with</td>
<td>0.002</td>
</tr>
<tr>
<td>FRN-C2-L301-G1</td>
<td>3 +/- 0.8</td>
<td>left</td>
<td>with</td>
<td>0.002</td>
</tr>
</tbody>
</table>

1 The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.
FRT-D2 and FRN-D2

Flexible and cost efficient use

Continuous Rotation
Damping torque 5 Ncm to 15 Ncm

The damping direction of the ACE FRT-D2 and FRN-D2 rotary dampers with plastic body is either the right, left or two-sided rotation. They can decelerate directly in the pivot point or linear through a gear and gear rack. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

**Construction size:** Ø 25 mm
**Rotational speed max.:** 50 rpm
**Lifetime:** 50,000 cycles (1 cycle = 360° left-hand, 360° right-hand).
Even after this time, the dampers still produce over approx. 80% of their original damping moment. The service life may be significantly higher or lower, depending on the application.
**Operating temperature range:** 0 °C to 50 °C
**Pressure angle:** 20°
**Material:** Outer body, Gear: Plastic; Shaft: Plastic, steel
**Mounting:** In any position
**Tooth:** Involute gearing (addendum modification coefficient: +0.375)
**P.C.D.:** 12 mm
**No. of teeth:** 12
**Module:** 1

**Mounting information:** No axial or radial forces may be induced via the shaft.

**Safety information:** Do not use rotary dampers as supports. Provide an external guide or support.

**On request:** Special designs available on request. Toothed plastic racks (modules 0.5 to 1.0) are available for the rotary dampers with pinions.

### Characteristics

**At 23 °C ambient temperature**

<table>
<thead>
<tr>
<th>Ncm</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**At 20 rpm rotational speed**

<table>
<thead>
<tr>
<th>Ncm</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque</th>
<th>Damping direction</th>
<th>Gear</th>
<th>Weight</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRT-D2-102</td>
<td>10 +/- 2</td>
<td>bidirectional</td>
<td>without</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>FRT-D2-152</td>
<td>15 +/- 3</td>
<td>bidirectional</td>
<td>without</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>FRT-D2-501</td>
<td>5 +/- 1</td>
<td>bidirectional</td>
<td>without</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>FRT-D2-102-G1</td>
<td>10 +/- 2</td>
<td>bidirectional</td>
<td>with</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>FRT-D2-152-G1</td>
<td>15 +/- 3</td>
<td>bidirectional</td>
<td>with</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>FRT-D2-501-G1</td>
<td>5 +/- 1</td>
<td>bidirectional</td>
<td>with</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-R102</td>
<td>10 +/- 2</td>
<td>right</td>
<td>without</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-R152</td>
<td>15 +/- 3</td>
<td>right</td>
<td>without</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-R501</td>
<td>5 +/- 1</td>
<td>right</td>
<td>without</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-R102-G1</td>
<td>10 +/- 2</td>
<td>right</td>
<td>with</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-R152-G1</td>
<td>15 +/- 3</td>
<td>right</td>
<td>with</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-R501-G1</td>
<td>5 +/- 1</td>
<td>right</td>
<td>with</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-L102</td>
<td>10 +/- 2</td>
<td>left</td>
<td>without</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-L152</td>
<td>15 +/- 3</td>
<td>left</td>
<td>without</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>FRN-D2-L501</td>
<td>5 +/- 1</td>
<td>left</td>
<td>without</td>
<td>0.012</td>
<td></td>
</tr>
</tbody>
</table>

1 The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.
FRT-F2/K2 and FRN-F2/K2
For a long service life

Continuous Rotation
Damping torque 200 Ncm to 400 Ncm

The damping direction of FRT F2/K2 and FRN-F2/K2 is either the right, left or two-sided rotation. With a damping torque of up to 400 Ncm, this product family can even handle heavy components. These ACE rotary dampers can decelerate directly in the pivot point or linear through a gear and gear rack. They are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 40 mm
Rotational speed max.: 50 rpm
Lifetime: 50,000 cycles (1 cycle = 360° left-hand, 360° right-hand).
Even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.
Operating temperature range: 30 °C to 50 °C
Material: Outer body: Plastic; Shaft: Steel
Mounting: In any position
Mounting information: No axial or radial forces may be induced via the shaft.
Safety information: Do not use rotary dampers as supports. Provide an external guide or support.
On request: Special designs available on request.

Characteristics

At 23 °C ambient temperature

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>1 Damping torque Ncm</th>
<th>Damping direction</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRT-K2-502</td>
<td>50 +/- 10</td>
<td>bidirectional</td>
<td>0.080</td>
</tr>
<tr>
<td>FRT-K2-103</td>
<td>100 +/- 20</td>
<td>bidirectional</td>
<td>0.080</td>
</tr>
<tr>
<td>FRT-F2-203</td>
<td>200 +/- 40</td>
<td>bidirectional</td>
<td>0.115</td>
</tr>
<tr>
<td>FRT-F2-303</td>
<td>300 +/- 80</td>
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<td>0.115</td>
</tr>
<tr>
<td>FRT-F2-403</td>
<td>400 +/- 100</td>
<td>bidirectional</td>
<td>0.115</td>
</tr>
<tr>
<td>FRN-K2-R502</td>
<td>50 +/- 10</td>
<td>right</td>
<td>0.057</td>
</tr>
<tr>
<td>FRN-K2-R103</td>
<td>100 +/- 20</td>
<td>right</td>
<td>0.057</td>
</tr>
<tr>
<td>FRN-F2-R203</td>
<td>200 +/- 40</td>
<td>right</td>
<td>0.090</td>
</tr>
<tr>
<td>FRN-K2-L502</td>
<td>50 +/- 10</td>
<td>left</td>
<td>0.057</td>
</tr>
<tr>
<td>FRN-K2-L103</td>
<td>100 +/- 20</td>
<td>left</td>
<td>0.057</td>
</tr>
<tr>
<td>FRN-F2-L203</td>
<td>200 +/- 40</td>
<td>left</td>
<td>0.090</td>
</tr>
</tbody>
</table>

1 The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.
**FFD**

Precise braking without oil

**Continuous Rotation**

**Damping torque 0.1 Nm to 3 Nm**

In comparison to other rotary dampers, the ACE FFD product family does not need any fluid to generate the damping torque, but rather works on the principle of friction. That means temperature or speed changes have virtually no influence on the damping torque. The FFD is available in two different body variants and two types of bearings. ACE rotary dampers are maintenance-free and ready-to-install.

**Technical Data**

**Construction size:** Ø 25 mm to 30 mm

**Rotational speed max.:** 30 rpm

**Lifetime:** 30,000 cycles (1 cycle = 360° left-hand, 360° right-hand). Even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.

**Operating temperature range:** -10 °C to 60 °C

**Material:** Outer body: Plastic

**Mounting:** In any position

**Information to the shaft:** Ø +0 / -0.03

**Hardness:** > HRC55, surface smoothness R<sub>s</sub> < 1 µm

**Mounting information:** Turn the shaft in the opposite direction to the brake direction to avoid damaging the freewheel mount. No axial or radial forces may be induced via the shaft.

**Safety information:** Do not use rotary dampers as supports. Provide an external guide or support.

**On request:** Special designs available on request.

---

**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque</th>
<th>Damping direction</th>
<th>Model</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>F (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>I (mm)</th>
<th>J (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFD-25SS</td>
<td>0.1/0.5/1.0</td>
<td>right or left</td>
<td>SS</td>
<td>25</td>
<td>6</td>
<td>13</td>
<td>3</td>
<td>42</td>
<td>34</td>
<td>21</td>
<td>6.2</td>
<td>16</td>
<td>4</td>
<td>0.012</td>
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<tr>
<td>FFD-28SS</td>
<td>0.1/0.5/1.0</td>
<td>right or left</td>
<td>SS</td>
<td>28</td>
<td>8</td>
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<td>3</td>
<td>44</td>
<td>36</td>
<td>24</td>
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<td>16</td>
<td>4</td>
<td>0.014</td>
</tr>
<tr>
<td>FFD-30SS</td>
<td>0.1/0.5/1.0/1.5</td>
<td>right or left</td>
<td>SS</td>
<td>30</td>
<td>10</td>
<td>13</td>
<td>3</td>
<td>46</td>
<td>38</td>
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<td>16</td>
<td>4</td>
<td>0.016</td>
</tr>
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<td>right or left</td>
<td>FS</td>
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<td>34</td>
<td>21</td>
<td>6.2</td>
<td>16</td>
<td>4</td>
<td>0.013</td>
</tr>
<tr>
<td>FFD-28FS</td>
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<td>right or left</td>
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<td>36</td>
<td>24</td>
<td>8.2</td>
<td>16</td>
<td>4</td>
<td>0.014</td>
</tr>
<tr>
<td>FFD-30FS</td>
<td>0.1/0.5/1.0/1.5</td>
<td>right or left</td>
<td>FS</td>
<td>30</td>
<td>10</td>
<td>13</td>
<td>3</td>
<td>46</td>
<td>38</td>
<td>26</td>
<td>10.2</td>
<td>16</td>
<td>4</td>
<td>0.017</td>
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<tr>
<td>FFD-25SW</td>
<td>1.0/1.5/2.0</td>
<td>right or left</td>
<td>SW</td>
<td>25</td>
<td>6</td>
<td>19</td>
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<td>42</td>
<td>34</td>
<td>21</td>
<td>6.2</td>
<td>22</td>
<td>4</td>
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<td>1.0/1.5/2.0</td>
<td>right or left</td>
<td>SW</td>
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<td>36</td>
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<td>right or left</td>
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<td>10</td>
<td>19</td>
<td>3</td>
<td>46</td>
<td>38</td>
<td>26</td>
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<td>right or left</td>
<td>FW</td>
<td>25</td>
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<td>34</td>
<td>21</td>
<td>6.2</td>
<td>22</td>
<td>4</td>
<td>0.024</td>
</tr>
<tr>
<td>FFD-28FW</td>
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<td>right or left</td>
<td>FW</td>
<td>28</td>
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<td>36</td>
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<td>22</td>
<td>4</td>
<td>0.027</td>
</tr>
<tr>
<td>FFD-30FW</td>
<td>1.5/2.0/2.5/3.0</td>
<td>right or left</td>
<td>FW</td>
<td>30</td>
<td>10</td>
<td>19</td>
<td>3</td>
<td>46</td>
<td>38</td>
<td>26</td>
<td>10.2</td>
<td>22</td>
<td>4</td>
<td>0.031</td>
</tr>
</tbody>
</table>

1 The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.

**Ordering Example**

<table>
<thead>
<tr>
<th>Friction Damper</th>
<th>Body Ø</th>
<th>Mounting Style (flange = F, standard = S)</th>
<th>Model (standard = S, high = W)</th>
<th>Damping Direction (right = R, left = L)</th>
<th>Damping Torque see chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFD-25-FS-L-102</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Complete details required when ordering**

- **Damping torque 102** = 0.1 Nm
- **Damping torque 502** = 0.5 Nm
- **Damping torque 103** = 1.0 Nm
- **Damping torque 153** = 1.5 Nm
- **Damping torque 203** = 2.0 Nm
- **Damping torque 253** = 2.5 Nm
- **Damping torque 303** = 3.0 Nm

**Note dimension C.**

**Model Type Prefix**

- **FS** = Mounting Style with Flange, Model standard
- **FW** = Mounting Style with Flange, Model high
- **SS** = Mounting Style Standard, Model standard
- **SW** = Mounting Style Standard, Model high

Combinations with W for higher damping torque.
FDT
The flat disc brake for two-sided damping

Continuous Rotation
Damping torque 2 Nm to 8.7 Nm

The damping direction of the flat constructive ACE rotary damper FDT with robust steel body is two-sided rotation. It can brake directly in the pivot point of the square receptacle. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 47 mm to 70 mm  
Rotational speed max.: 50 rpm  
Lifetime: 50,000 cycles (1 cycle = 360° left-hand, 360° right-hand). Even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.  
Operating temperature range: -10 °C to 50 °C  
Material: Outer body: Steel; Output shaft sleeve: Nylon  
Mounting: In any position  
Mounting information: No axial or radial forces may be induced via the shaft.  
Safety information: Do not use rotary dampers as supports. Provide an external guide or support.  
On request: Special designs available on request.

Characteristics

At 23 °C ambient temperature

At 20 rpm rotational speed

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque</th>
<th>Damping direction</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>R</th>
<th>J</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDT-47</td>
<td>2.0 +/- 0.3</td>
<td>bidirectional</td>
<td>65</td>
<td>56</td>
<td>8</td>
<td>4.5</td>
<td>47</td>
<td>42.8</td>
<td>1.6</td>
<td>10.3</td>
<td>4.5</td>
<td>10</td>
<td>0.050</td>
</tr>
<tr>
<td>FDT-57</td>
<td>4.7 +/- 0.5</td>
<td>bidirectional</td>
<td>79</td>
<td>68</td>
<td>10</td>
<td>5.5</td>
<td>57</td>
<td>52.4</td>
<td>1.6</td>
<td>11.2</td>
<td>5.5</td>
<td>13</td>
<td>0.075</td>
</tr>
<tr>
<td>FDT-63</td>
<td>6.7 +/- 0.7</td>
<td>bidirectional</td>
<td>89</td>
<td>76</td>
<td>12.5</td>
<td>6.5</td>
<td>63</td>
<td>58.6</td>
<td>1.6</td>
<td>11.3</td>
<td>6.5</td>
<td>17</td>
<td>0.095</td>
</tr>
<tr>
<td>FDT-70</td>
<td>8.7 +/- 0.8</td>
<td>bidirectional</td>
<td>95</td>
<td>82</td>
<td>12.5</td>
<td>6.5</td>
<td>70</td>
<td>65.4</td>
<td>1.6</td>
<td>11.3</td>
<td>6.5</td>
<td>17</td>
<td>0.110</td>
</tr>
</tbody>
</table>

1 The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.
The damping direction of the flat, strong FDN rotary dampers with steel body can be either right or left rotation. They can brake directly in the pivot point. ACE rotary dampers are maintenance-free and ready-to-install.

**Technical Data**

**Construction size:** Ø 47 mm to 70 mm  
**Rotational speed max.:** 50 rpm  
**Lifetime:** 50,000 cycles (1 cycle = 360° left-hand, 360° right-hand). Even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.  
**Operating temperature range:** -10 °C to 50 °C  
**Material:** Outer body: Steel; Output shaft sleeve: nylon with metal freewheel  
**Mounting:** In any position  
**Information to the shaft:**  
FDN-47: Ø 6 +/- 0 / -0.03  
FDN-57 to FDN-70: Ø 10 +0 / -0.03  
**Hardness > HRC55, surface smoothness R<sub>z</sub> < 1µm**  
**Mounting information:** Turn the shaft in the opposite direction to the brake direction to avoid damaging the freewheel mount. No axial or radial forces may be induced via the shaft.  
**Safety information:** Do not use rotary dampers as supports. Provide an external guide or support.  
**On request:** Special designs available on request.

---

**Characteristics**

**At 23 °C ambient temperature**

<table>
<thead>
<tr>
<th>Nm</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**At 20 rpm rotational speed**

<table>
<thead>
<tr>
<th>Nm</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Performance and Dimensions**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque</th>
<th>Damping direction</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>R</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDN-47-R</td>
<td>2.0 +/- 0.3</td>
<td>right</td>
<td>65</td>
<td>56</td>
<td>6</td>
<td>4.5</td>
<td>47</td>
<td>42.8</td>
<td>1.6</td>
<td>10.3</td>
<td>4.5</td>
<td>0.054</td>
</tr>
<tr>
<td>FDN-57-R</td>
<td>5.5 +/- 0.3</td>
<td>right</td>
<td>79</td>
<td>68</td>
<td>10</td>
<td>5.5</td>
<td>57</td>
<td>52.4</td>
<td>1.6</td>
<td>14</td>
<td>5.5</td>
<td>0.095</td>
</tr>
<tr>
<td>FDN-63-R</td>
<td>8.5 +/- 0.8</td>
<td>right</td>
<td>89</td>
<td>76</td>
<td>10</td>
<td>6.5</td>
<td>63</td>
<td>58.6</td>
<td>1.6</td>
<td>13.9</td>
<td>6.5</td>
<td>0.115</td>
</tr>
<tr>
<td>FDN-70-R</td>
<td>11.0 +/- 1.0</td>
<td>right</td>
<td>95</td>
<td>82</td>
<td>10</td>
<td>6.5</td>
<td>70</td>
<td>65.4</td>
<td>1.6</td>
<td>13</td>
<td>6.5</td>
<td>0.135</td>
</tr>
<tr>
<td>FDN-47-L</td>
<td>2.0 +/- 0.3</td>
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<td>65</td>
<td>56</td>
<td>6</td>
<td>4.5</td>
<td>47</td>
<td>42.8</td>
<td>1.6</td>
<td>10.3</td>
<td>4.5</td>
<td>0.054</td>
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<tr>
<td>FDN-57-L</td>
<td>5.5 +/- 0.3</td>
<td>left</td>
<td>79</td>
<td>68</td>
<td>10</td>
<td>5.5</td>
<td>57</td>
<td>52.4</td>
<td>1.6</td>
<td>14</td>
<td>5.5</td>
<td>0.095</td>
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<tr>
<td>FDN-63-L</td>
<td>8.5 +/- 0.8</td>
<td>left</td>
<td>89</td>
<td>76</td>
<td>10</td>
<td>6.5</td>
<td>63</td>
<td>58.6</td>
<td>1.6</td>
<td>13.9</td>
<td>6.5</td>
<td>0.115</td>
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<tr>
<td>FDN-70-L</td>
<td>11.0 +/- 1.0</td>
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<td>95</td>
<td>82</td>
<td>10</td>
<td>6.5</td>
<td>70</td>
<td>65.4</td>
<td>1.6</td>
<td>13</td>
<td>6.5</td>
<td>0.135</td>
</tr>
</tbody>
</table>

1 The indicated damping torque refers to a rotational speed of 20 rpm and an ambient temperature of 23 °C.
**FYN-P1**

Small diameter, large damping torques

Partial Rotation Angle

Damping torque 100 Ncm to 180 Ncm

The damping direction of the rotary damper FYN-P1 can be either right or left rotation. The dampers can be directly mounted in the pivot point. During each reverse movement of the unilateral decelerating versions there is a certain return damping torque that depends on the size. Differentiation of the damping direction through the coloured shaft. ACE rotary dampers are maintenance-free and ready-to-install.

**Technical Data**

- **Construction size:** Ø 18.5 mm
- **Lifetime:** 50,000 cycles, even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.
- **Operating temperature range:** -5 °C to 50 °C
- **Material:** Outer body, Shaft: Plastic
- **Mounting:** In any position
- **Rotation angle max.:** 115°

**Note:** Damping direction: Right hand damping = damping action in clockwise direction (when looking onto the output shaft or output shaft sleeve, depending on the damper type). A play of approx. 5° can occur at the beginning of movement.

**Mounting information:** No axial or radial forces may be induced via the shaft.

**Safety information:** Do not use rotary dampers as supports. Provide an external guide or support.

**On request:** Special designs available on request.

**Performance**

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque</th>
<th>Return Damping Torque</th>
<th>Damping direction</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>FYN-P1-R103</td>
<td>100</td>
<td>30</td>
<td>right</td>
<td>0.011</td>
</tr>
<tr>
<td>FYN-P1-R153</td>
<td>150</td>
<td>50</td>
<td>right</td>
<td>0.011</td>
</tr>
<tr>
<td>FYN-P1-R183</td>
<td>180</td>
<td>80</td>
<td>right</td>
<td>0.011</td>
</tr>
<tr>
<td>FYN-P1-L103</td>
<td>100</td>
<td>30</td>
<td>left</td>
<td>0.011</td>
</tr>
<tr>
<td>FYN-P1-L153</td>
<td>150</td>
<td>50</td>
<td>left</td>
<td>0.011</td>
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<tr>
<td>FYN-P1-L183</td>
<td>180</td>
<td>80</td>
<td>left</td>
<td>0.011</td>
</tr>
</tbody>
</table>
FYN-N1
Small diameter, large damping torques

Partial Rotation Angle
Damping torque 100 Ncm to 300 Ncm

The damping direction of the rotary damper FYN-N1 can be either right or left rotation. The dampers can be directly mounted in the pivot point. During each reverse movement of the unilateral decelerating versions there is a certain return damping torque that depends on the size. Differentiation of the damping direction through coloured end cap. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 20 mm
Lifetime: 50,000 cycles, even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.
Operating temperature range: -5 °C to 50 °C
Material: Outer body, Shaft: Plastic
Mounting: In any position
Rotation angle max.: 110°

Note: Damping direction: Right hand damping = damping action in clockwise direction (when looking onto the output shaft or output shaft sleeve, depending on the damper type). A play of approx. 5° can occur at the beginning of movement.

Mounting information: No axial or radial forces may be induced via the shaft.
Safety information: Do not use rotary dampers as supports. Provide an external guide or support.
On request: Special designs available on request.

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque Ncm</th>
<th>Return Damping Torque Ncm</th>
<th>Damping direction</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>FYN-N1-R103</td>
<td>100</td>
<td>20</td>
<td>right</td>
<td>0.012</td>
</tr>
<tr>
<td>FYN-N1-R203</td>
<td>200</td>
<td>40</td>
<td>right</td>
<td>0.012</td>
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<td>80</td>
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</table>
**FYN-U1**
Small, strong and very robust

**Partial Rotation Angle**
**Damping torque 200 Ncm to 300 Ncm**

The damping direction of the rotary damper FYN-U1 can be either right or left rotation. The dampers can be directly mounted in the pivot point. The body is made of especially robust die-cast zinc. During each reverse movement of the unilateral decelerating versions there is a certain return damping torque that depends on the size. ACE rotary dampers are maintenance-free and ready-to-install.

**Technical Data**

*Construction size:* Ø 16 mm

*Lifetime:* 50,000 cycles, even after this time, the dampers still produce over approx. 80% of their original damping moment. The service life may be significantly higher or lower, depending on the application.

*Operating temperature range:* -5 °C to 50 °C

*Material:* Outer body, Shaft: Zinc die-cast

*Mounting:* In any position

*Rotation angle max.:* 115°

*Note:* Damping direction: Right hand damping = damping action in clockwise direction (when looking onto the output shaft or output shaft sleeve, depending on the damper type). A play of approx. 5° can occur at the beginning of movement.

*Mounting information:* No axial or radial forces may be induced via the shaft.

*Safety information:* Do not use rotary dampers as supports. Provide an external guide or support.

*On request:* Special designs available on request.

---

**Performance**

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<th>TYPES</th>
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FYN-S1
The flat damper for constant component protection

Partial Rotation Angle
Damping torque 5 Nm to 10 Nm

The self-compensating FYN-S1 rotary damper with zinc die-cast body provides a constant sequence of movement for different masses. The damping direction can be either right or left rotation. During each reverse movement of the unilateral decelerating versions there is a certain return damping torque that depends on the size. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 60 mm
Lifetime: 50,000 cycles, even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.
Operating temperature range: -5 °C to 50 °C
Material: Outer body: Zinc die-cast; Output shaft sleeve: Plastic
Mounting: In any position
Rotation angle max.: 130°
Note: Damping direction: Right hand damping = damping action in clockwise direction (when looking onto the output shaft or output shaft sleeve, depending on the damper type). A play of approx. 5° can occur at the beginning of movement.
Mounting information: No axial or radial forces may be induced via the shaft.
Safety information: Do not use rotary dampers as supports. Provide an external guide or support.
On request: Special designs available on request.

Performance

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Damping torque Nm</th>
<th>Return Damping Torque Nm</th>
<th>Damping direction</th>
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FYT-H1 and FYN-H1

Specifically adjustable, strong braking force

Partial Rotation Angle, Adjustable
Damping torque 2 Nm to 10 Nm

The damping direction of the adjustable FYT-H1 and FYT-H1 can be right, left or two-sided rotation. During each reverse movement of the unilateral decelerating versions there is a certain return damping torque that depends on the size. The brakes have a particularly robust zinc die-cast body and shafts made of steel. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 45 mm
Lifetime: 50,000 cycles, even after this time, the dampers still produce over approx. 80 % of their original damping moment. The service life may be significantly higher or lower, depending on the application.
Operating temperature range: -5 °C to 50 °C
Material: Outer body: Zinc die-cast; Shaft: Steel
Mounting: In any position
Rotation angle max.: 105°
Maximum side load: 50 N
Note: Damping direction: Right hand damping = damping action in clockwise direction (when looking onto the output shaft or output shaft sleeve, depending on the damper type). A play of approx. 5° can occur at the beginning of movement.
Safety information: Do not use rotary dampers as supports. Provide an external guide or support.
On request: Special designs available on request.

Performance

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<th>TYPES</th>
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FYT-LA3 and FYN-LA3
Adjustable high performance

Partial Rotation Angle, Adjustable
Damping torque 4 Nm to 40 Nm

The damping direction of this adjustable high-performance rotary damper can be right, left or two-sided rotation. During each reverse movement of the unilateral decelerating versions there is a certain return damping torque that depends on the size. The brakes have a particularly robust zinc die-cast body and shafts made of steel. ACE rotary dampers are maintenance-free and ready-to-install.

Technical Data

Construction size: Ø 80 mm
Lifetime: 50,000 cycles, even after this time, the dampers still produce over approx. 80% of their original damping moment. The service life may be significantly higher or lower, depending on the application.
Operating temperature range: -5 °C to 50 °C
Material: Outer body: Zinc die-cast; Shaft: Steel
Mounting: In any position
Rotation angle max.: 210°
Maximum side load: 200 N

Note: Damping direction: Right hand damping = damping action in clockwise direction (when looking onto the output shaft or output shaft sleeve, depending on the damper type). A play of approx. 5° can occur at the beginning of movement.

Safety information: Do not use rotary dampers as supports. Provide an external guide or support.

On request: Special designs available on request.

Performance

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<tr>
<th>TYPES</th>
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**Calculation Example**

**Damping of a Lid**

To select an appropriate rotary damper for the adjacent calculation example, the length and the weight or the center of gravity of the flap have to be known. After determining the value of the max. torque at an unfavorable angle of the flap, select the appropriate damper.

**Calculation Steps**

1. Calculate max. torque damper will be exposed to (with example shown on the left max. torque is at $\alpha = 0^\circ$).
2. Decide upon rotation speed desired.
3. Choose a rotary damper 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.

**Closing Torque**

\[
M = \frac{L}{2} \cdot m \cdot g \cdot \cos \alpha
\]

- $m$: Mass of a lid [kg] (1 kg = 9.81 N)
- $L$: Length of lid from pivot [cm]
- $n$: Rotation speed [r.p.m.]

**Special Accessories**

**Toothed Racks for Rotary Dampers with Gear**

Rotary dampers with gears are available in four standard modules which can be optionally supplied with plastic toothed racks as accessories.

**Delivery Notes**

**Delivery form:** Toothed plastic racks with modules 0.5 to 1.0 availables ex stock

**On request:** Toothed metal racks

**Dimensions**

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<td>500</td>
<td>10</td>
<td>10</td>
<td>rigid, milled</td>
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</table>

**Damping Direction**

right hand damping = damping action in clockwise direction

*(when looking onto the output shaft)*

**Mounting Information**

The rotary axis, square receptacles or free-wheel receptacles are not designed for lateral loads. An external guide or bearing support is fundamentally recommended.

**Issue 04.2018 – Specifications subject to change**
Application Examples

FDT
Finger protection when cutting bread

To exclude the possibility of injury when using bread slicing machines on self-service counters, the automatic bread slicing process does not start until the flap of the modern machine is closed. To simplify the operation and to thereby increase acceptance of the self-slicing principle among users, two-way rotary dampers of the type FDT-57 ensure smooth opening and closing of the door. Even when rotary dampers must act only in one direction, ACE has appropriate variants readily available.

FDN-R
Invisible protection for cooker hoods

For ergonomic handling, modern cooker hoods can be driven by a motor into an up position and then down again. When driven downwards, an AC load can result in a total loss through current being fed back into the voltage source. One of the tasks of the ACE rotary dampers type FDN-63-R is to prevent this. The modern machine elements are also built to provide protection against motor failure. Sliding the hood down too quickly could lead to further costly damage to the hood and the ceiling console and even cause personal injury.

Daub Bakery Machinery BV, 5050 AB Goirle, Netherlands

berbel Ablufttechnik GmbH, 48432 Rheine, Germany
Vibration Control

Vibration-Isolating Pads, Rubber-Metal Isolators
Low Frequency Pneumatic Leveling Mounts
Isolate Unwanted Vibrations Effectively

Unique variety

This product group from ACE includes innovative solutions to provide customers with the best assistance in insulation technology and vibration isolation. These machine elements are also distinguished by their light design and exemplary variety.

The product range extends from extremely low frequency isolating pneumatic leveling mounts through to ready-to-install rubber-metal isolators and insulation plates. With this portfolio, ACE is capable of offering you customized vibration isolation for almost any application.
Vibration Isolation

Noise reduction and vibration isolation are becoming more and more important in our daily lives. This applies in particular to the workplace and the environments around production companies.

Preventing noise emissions or harmful vibrations is not only a necessity required by noise protection and occupational health and safety legislation; their sources must also be localized by means of targeted analysis in order to develop suitable improvement measures for achieving increased production quality. A second by-product of vibrations are their effects on the surrounding production environment and any measuring and testing facilities that may be in use.

Advantages

- improved working conditions for people and the environment
- more accurate production tolerances and increased product quality
- competitive and cost advantages thanks to lower reject rate in production
- increased production speed thanks to increased maximum machine dynamics
- longer tool and machine life thanks to lower stress
- faster and more accurate measuring results

For detailed information, see our ACEolator catalog
Rubber-Metal Isolators
Ready-to-install isolators for quick selection

Rubber-metal isolators and machine feet are supplied ready-to-install and are used in a large variety of vibration isolation applications. Common applications are engines, compressors, transfer systems, machines, fans and blowers.

**LEV**
Leveling Mounts (height-adjustable machine feet)
Secure, adjustable stabilization for all types of machines, transfer systems, assembly stations, etc.

**CM**
Cup Mounts (cup elements)
For isolating machinery and equipment. Fail-safe isolators for all axes in any installation position. Application examples: compressors, off-road vehicles, engines, fans, etc.

**COM**
Compression Mounts (pre-tensioned high-performance bearing surface)
Vertically acting isolators for machinery and equipment. Applications include: blowers, compressors, motors, generators, presses, etc.

**AAM**
All Attitude Mounts (vibration-isolating fasteners)
Maintenance free isolators for decoupling parts and components in electronics, aerospace, the military, medicine, transfer systems, etc.

**SFM**
Stable Flex Mounts (stable machine feet)
Extremely rugged and maintenance-free isolators, e.g. for marine applications, for diesel generators, in power generation or in off-road vehicles.

**BM**
Bubble Mounts (low-frequency vibration isolators)
For protecting small devices and electronic components, e.g. in medical technology, aerospace, electronic systems or computers.

**UMO**
Universal Mounts (universal connection isolators)
Maintenance-free connection isolators which can be implemented both radially and axially. Application examples: conveying systems, machinery and equipment, off-road, oil and gas industry, control systems, etc.

**FL**
Flex Locs (quick fastening elements)
Simple, efficient components with versatile applications as isolating fasteners for decoupling structure-borne sound in enclosures, housings, equipment and machinery. For application in mechanical engineering, in buildings, vehicles, or navigation.
Vibration Control

Overview and Application Areas of Product Families

Vibration-Isolating Pads
Customized insulation technology through cutting and combining

A wide range of applications such as machine foundations, supports, decoupling elements, pipelines and subsequently protected machines require tailor-made solutions. Here with its product range of vibration insulating pads ACE offers comprehensive possibilities for insulation. The products are manufactured and supplied either as standard pads or as drawing parts according to customer request.

SLAB
Universal Damping Pads
For application on foundations for plants and machines, compressors, in pump stations, generators, for insulations, measuring tables, buildings, etc.

CEL
Low-Frequency Damping Pads
For use in foundations, buildings, transport routes, bridges, stairs, test benches, pump stations, generators, compressors, machines, etc.

PAD
Rugged Fiber and Elastomer Pads
For isolating and protecting foundations, such as presses, plants, machines, as well as for use in pump stations, crane runways, bridges and heavy-duty applications

Application overview

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<th>Foundations</th>
<th>Control units Electrical systems</th>
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## Low Frequency Pneumatic Leveling Mounts

**Highly efficient insulation – it can hardly get any better**

Everywhere perfect isolation of measuring tables, test equipment and high-performance machines are important, the low frequency pneumatic leveling mounts PLM and PAL are a good choice. On request a detailed system analysis will be carried out at the customer and the perfect solution will be developed.

**PLM**

Pneumatic Air Spring Elements
For an efficient isolation of measuring equipment, high-speed presses and machines.

**PAL-3 to PAL-9**

Small Size Air Spring Elements
The perfect leveling and isolation system for smaller constructions that require precision and flexibility. Available in the system with many accessories.

**PAL-18 to PAL-1000**

Big Air Spring Elements with Automatic Level Controls
Isolation against disruptive vibrations and level-adjustment for test and measuring equipment. Isolating at extremely low-frequencies, these components are used in the automotive industry and in aerospace engineering.

More information about vibration control can be found in our special catalog and on our website [www.acecontrols.com / Downloads](http://www.acecontrols.com / Downloads)

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<th>Type</th>
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</tr>
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<td>PAL</td>
</tr>
</tbody>
</table>
Safety Products

Safety Shock Absorbers, Safety Dampers
Clamping Elements
Highest Protection under any Circumstances
For any budget and all requirements

Safely slowing down damaging forces from moving loads or Emergency braking are united in this product group from ACE. Although the safety shock absorbers, profile dampers and clamping elements differ so much in design, every single ACE component provides the best protection for your machine.

They demonstrate their main advantages in emergency stop situations and, based on the protection they provide, are very cost-effective. Furthermore, they can all be easily integrated in the existing construction designs and largely work independent of energy supplies.
Safety Shock Absorbers

Perfect protection for the worst case scenario

As an alternative to the standard shock absorber, Safety shock absorbers are the tried and tested low cost method of preventing those occasional emergency stops. Designed for occasional use, they primarily serve as reliable, effective protection in emergency stop situations.

The maintenance-free and ready-to-install machine elements are characterized in every respect by the well-known high ACE quality and maximum energy absorption of up to 480,000 Nm/Cycle. This means, in the product-family SCS33 up to SCS64 a service life of up to 1,000 full load emergency cycles is achieved.

Safety shock absorbers from ACE are available in a large choice with strokes of 23 mm to 1,200 mm, and the arrangement of orifice pattern can be calculated and produced specifically to the customer's requirements and depending on the application.
Safety Shock Absorbers

SCS33 to SCS64
Self-Compensating or Optimized Characteristic
**Industry design with high energy absorption**
Finishing and processing centres, Conveyor systems, Portal systems, Test stations

SCS38 to SCS63
High Rack Damper, Optimized Characteristic
**Low reaction forces with long strokes**
Shelf storage systems, Heavy load applications, Conveyor systems, Conveyor systems

CB63 to CB160
Crane Installations, Optimized Characteristic
**High resetting forces with gas pressure accumulator**
Heavy load applications, Heavy load applications, Conveyor systems, Portal systems

EB63 to EB160
Crane Installations, Optimized Characteristic
**Low return force with spring assembly**
Heavy load applications, Heavy load applications, Conveyor systems, Portal systems

Top machine protection
Latest damping technology
Attractive cost-benefit ratio
Maximum strokes
Wide application spectrum
Robust design
SCS33 to SCS64

Industry design with high energy absorption

Self-Compensating or Optimized Characteristic

Energy capacity 310 Nm/Cycle to 18,000 Nm/Cycle

Stroke 23.1 mm to 150 mm

Effective emergency stop: the ACE safety shock absorbers from the SCSS3 to SCS64 product family are based on the innovative technology of the successful MAGNUM range shock absorbers. They are also maintenance-free and ready-to-install.

ACE uses our proprietary custom calculation program to design each shock absorber for the specific customer application. Customization helps reduce the risk of crashes and incorrect product sizing. Due to the optimized characteristic curve for the respective application, the energy absorption of these hydraulic machine elements can be increased to more than twice the level of the MAGNUM model of ACE industrial shock absorber per stroke. Users benefit from a service life of up to 1,000 full load emergency cycles with a very good price-performance ratio. Their compact design in sizes M33x1.5 to M64x2 makes them easy to integrate into current applications.

These slimline, high-performance safety shock absorbers are only designed for emergency stop situations. They can be used for a number of tasks in gantries and conveyor systems, processing centres or assembly machines.

Technical Data

Energy capacity: 310 Nm/Cycle to 18,000 Nm/Cycle

Impact velocity range: 0.02 m/s to 5 m/s.
Other speeds on request.

Operating temperature range: -12 °C to 66 °C. Other temperatures on request.

Mounting: In any position

Positive stop: Integrated

Material: Outer body: Nitride hardened steel; Piston rod: Hard chrome plated steel; Rod end button: Hardened steel and corrosion-resistant coating; Return spring: Zinc plated or plastic-coated steel; Accessories: Steel corrosion-resistant coating

Damping medium: Automatic Transmission Fluid (ATF)

Application field: Finishing and processing centers, Conveyor systems, Portal systems, Test stations, Machines and plants, Swivel units, Cranes

Note: 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.

On request: Special oils, special flanges etc.
SCS33

Positive Stop

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

Accessories

<table>
<thead>
<tr>
<th>250-0292</th>
<th>250-0293</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locking Ring</td>
<td>Rectangular Flange</td>
</tr>
</tbody>
</table>

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>L1 mm</th>
<th>L2 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC, MA, ML3325</td>
<td>95.3</td>
<td>49.3</td>
</tr>
<tr>
<td>MC, MA, ML3350</td>
<td>120.7</td>
<td>74.7</td>
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<tr>
<td>SCS325</td>
<td>134.9</td>
<td>49.3</td>
</tr>
<tr>
<td>SCS350</td>
<td>185.7</td>
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<td>SCS33-25</td>
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<td>49.3</td>
</tr>
<tr>
<td>SCS33-50</td>
<td>120.7</td>
<td>74.7</td>
</tr>
</tbody>
</table>

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n
or technical data according to formula and calculations on page 275.

Ordering Example

SCS33-50-1xxxx
Safety Shock Absorber
Thread Size M33
Max. Stroke without Positive Stop 1.97" (50 mm)
Identification No. assigned by ACE
Please indicate identification no. in case of replacement order

Please contact the factory for complete part number.

Performance and Dimensions

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E₁ Self-compensating</td>
<td>E₂ Optimised</td>
<td>min.</td>
<td>max.</td>
<td>mm</td>
<td>mm</td>
<td>max.</td>
</tr>
<tr>
<td></td>
<td>Nm/cycle</td>
<td>Nm/cycle</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>kg</td>
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<tr>
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<td>950</td>
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<td>135</td>
<td>48.6</td>
<td>2</td>
<td>0.63</td>
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</table>

1 The values are reduced by 20 % at max. side load angle.
Safety Shock Absorbers SCS45

Self-Compensating or Optimized Characteristic

SCS45

Positive Stop

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

Accessories

250-0297
Locking Ring

250-0298
Square Flange

250-0299
Rectangular Flange

250-0300
Side Foot Mounting Kit

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n

or technical data according to formula and calculations on page 275.

Ordering Example

Safety Shock Absorber

Max. Stroke without Positive Stop 1.97” (50 mm)

Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

Please contact the factory for complete part number.

Performance and Dimensions

Max. Energy Capacity

<table>
<thead>
<tr>
<th>TYPES</th>
<th>E₀ Self-compensating</th>
<th>E₂ Optimised</th>
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<tr>
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<td>Nm/cycle</td>
<td>Nm/cycle</td>
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<tr>
<td>SCS45-75</td>
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Return Force

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<th></th>
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<tbody>
<tr>
<td>N</td>
<td>N</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>°</td>
<td>kg</td>
</tr>
<tr>
<td>70</td>
<td>100</td>
<td>23.1</td>
<td>145</td>
<td>95</td>
<td>3</td>
<td>1.14</td>
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<td>70</td>
<td>145</td>
<td>48.5</td>
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<td>120</td>
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<td>1.36</td>
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<td>50</td>
<td>180</td>
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<td>145</td>
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<td>1.59</td>
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1 The values are reduced by 20 % at max. side load angle.

Dimensions

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<tr>
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<th>L₂</th>
</tr>
</thead>
<tbody>
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<td>MC, MA, ML4550</td>
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</tr>
<tr>
<td>MC, MA4575</td>
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<tr>
<td>SC4525</td>
<td>129.5</td>
<td>53.9</td>
</tr>
<tr>
<td>SC4550</td>
<td>180.3</td>
<td>78.5</td>
</tr>
<tr>
<td>SCS45-25</td>
<td>88.9</td>
<td>49.3</td>
</tr>
<tr>
<td>SCS45-50</td>
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<td>77.7</td>
</tr>
<tr>
<td>SCS45-75</td>
<td>136.6</td>
<td>103.1</td>
</tr>
</tbody>
</table>

250-0300 = 1 locknut, 2 flanges, 2 bars, 4 screws M8x50, DIN 912
Torque max.: 27 Nm
Clamping torque: 350 Nm
Bolts to mount assembled shock & mount not included.

Issue 04.2018 – Specifications subject to change

ACE Controls Inc. · 23425 Industrial Park Dr. Farmington · US-48335 Michigan · T +1 800-521-3320 · F +1 248-476-2470 · shocks@acecontrols.com · www.acecontrols.com
SCS64

Positive Stop

150 mm stroke model does not include stop collar.
Positive stop is provided by the rod button (Ø 60 mm) and a stop block.

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

Accessories

250-0301
Locking Ring

250-0302
Square Flange

250-0304
Side Foot Mounting Kit

Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
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<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML6425</td>
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<td>64.5</td>
</tr>
<tr>
<td>MC, MA, ML6450</td>
<td>127.0</td>
<td>89.9</td>
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<tr>
<td>MC, MA64100</td>
<td>177.8</td>
<td>140.7</td>
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<tr>
<td>MC, MA64150</td>
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<td>SCS64-100</td>
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<td>140.7</td>
</tr>
<tr>
<td>SCS64-150</td>
<td>228.6</td>
<td>213.9</td>
</tr>
</tbody>
</table>

Ordering Example

SCS64-50-1xxxx

Safety Shock Absorber
Thread Size M64

Max. Stroke without Positive Stop 1.97” (50 mm)

Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

Please contact the factory for complete part number.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n

or technical data according to formula and calculations on page 275.

Performance and Dimensions

<table>
<thead>
<tr>
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</thead>
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<tr>
<td></td>
<td>E_s Self-compensating</td>
<td>min. N</td>
<td>max. N</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>max. °</td>
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<tr>
<td>SCS64-50</td>
<td>3,400</td>
<td>99</td>
<td>155</td>
<td>48.6</td>
<td>225</td>
<td>140</td>
<td>3</td>
</tr>
<tr>
<td>SCS64-100</td>
<td>6,800</td>
<td>105</td>
<td>270</td>
<td>99.4</td>
<td>326</td>
<td>131</td>
<td>2</td>
</tr>
<tr>
<td>SCS64-150</td>
<td>10,200</td>
<td>75</td>
<td>365</td>
<td>150.0</td>
<td>450</td>
<td>241</td>
<td>1</td>
</tr>
</tbody>
</table>

1 The values are reduced by 20 % at max. side load angle.
**SCS38 to SCS63**

Low reaction forces with long strokes

**High Rack Damper, Optimized Characteristic**

Energy capacity 3,600 Nm/Cycle to 216,000 Nm/Cycle

Stroke 50 mm to 1,200 mm

Slim with a long stroke: safety shock absorbers from the SCS38 to SCS63 product family are designed for emergency-stop applications. Strokes of up to 1,200 mm (47.24") are possible with these maintenance-free and ready-to-install dampers. Low reaction forces result due to the large strokes.

ACE uses our proprietary custom calculation program to design each shock absorber for the specific customer application. Customization helps reduce the risk of crashes and incorrect product sizing. The characteristic curve or damping characteristics of all safety shock absorbers from ACE are individually designed to the specific customer application. The metering orifices for the applications are specially calculated and produced. These tailor-made machine elements are the ideal protection because they are less expensive than industrial shock absorbers and are effective with up to 1,000 possible full load emergency stops.

Anyone who wants to reliably protect the end positions of rack operating equipment, conveyor and crane systems, heavy duty applications and test benches chooses these safety shock absorbers from ACE.

---

**Technical Data**

- **Energy capacity**: 3,600 Nm/Cycle to 216,000 Nm/Cycle
- **Impact velocity range**: 0.5 m/s to 4.6 m/s.
- **Reacting force**: At max. capacity rating = 80 kN to 210 kN
- **Operating temperature range**: -20 °C to 60 °C. Other temperatures on request.
- **Mounting**: In any position
- **Positive stop**: Integrated
- **Material**: Outer body, Rod end button: Steel corrosion-resistant coating; Piston rod: Hard chrome plated steel
- **Damping medium**: Automatic Transmission Fluid (ATF)
- **Filling pressure**: Approx. 2 bar. Rod return by integrated nitrogen accumulator.
- **Application field**: Shelf storage systems, Heavy load applications, Conveyor systems, Portal systems, Test stations
- **Note**: 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.

**On request**: Special oils, special flanges, additional corrosion protection etc. Integrated rod sensor for indicating the complete extension of the piston rod. Type normally closed or normally open, option PNP or NPN switch.
Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Energy capacity Nm/cycle</th>
<th>Return Force min. N</th>
<th>Return Force max. N</th>
<th>Stroke A max. mm</th>
<th>B mm</th>
<th>D mm</th>
<th>E max. mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCS38-50</td>
<td>3,600</td>
<td>600</td>
<td>700</td>
<td>50</td>
<td>270</td>
<td>205</td>
<td>175</td>
</tr>
<tr>
<td>SCS38-100</td>
<td>7,200</td>
<td>600</td>
<td>700</td>
<td>100</td>
<td>370</td>
<td>255</td>
<td>225</td>
</tr>
<tr>
<td>SCS38-150</td>
<td>10,800</td>
<td>600</td>
<td>700</td>
<td>150</td>
<td>470</td>
<td>305</td>
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<td>SCS38-200</td>
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<td>700</td>
<td>200</td>
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<td>375</td>
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<tr>
<td>SCS38-250</td>
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<td>700</td>
<td>250</td>
<td>670</td>
<td>405</td>
<td>375</td>
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<tr>
<td>SCS38-300</td>
<td>21,600</td>
<td>600</td>
<td>700</td>
<td>300</td>
<td>785</td>
<td>470</td>
<td>440</td>
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<tr>
<td>SCS38-350</td>
<td>25,200</td>
<td>600</td>
<td>700</td>
<td>350</td>
<td>885</td>
<td>520</td>
<td>490</td>
</tr>
<tr>
<td>SCS38-400</td>
<td>28,800</td>
<td>600</td>
<td>700</td>
<td>400</td>
<td>1,000</td>
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<td>555</td>
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<td>SCS38-500</td>
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<td>670</td>
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<td>700</td>
<td>600</td>
<td>1,430</td>
<td>815</td>
<td>785</td>
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<td>SCS38-700</td>
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<td>800</td>
<td>1,860</td>
<td>1,045</td>
<td>1,015</td>
</tr>
</tbody>
</table>

The values are reduced by 20% at max. side load angle.

Technical Data

Impact velocity range: 0.90 m/s to 4.6 m/s

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n
or technical data according to formula and calculations on page 275.

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

Ordering Example

Safety Shock Absorber
Bore Size Ø 1.50” (38 mm)
Stroke 15.75” (400 mm)
Mounting Style: Front Flange
SCS38-F
Identification No. assigned by ACE
Please indicate identification no. in case of replacement order

Please contact the factory for complete part number.
Technical Data

Impact velocity range: 0.61 m/s to 4.6 m/s

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n

or technical data according to formula and calculations on page 275.

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

Ordering Example
Safety Shock Absorber
Bore Size \( \phi \) 1.97” (50 mm)
Stroke 15.75” (400 mm)
Mounting Style: Front Flange
Identification No. assigned by ACE
Please indicate identification no. in case of replacement order

Please contact the factory for complete part number.

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Energy capacity Nm/cycle</th>
<th>Return Force min. N</th>
<th>Return Force max. N</th>
<th>Stroke A max. mm</th>
<th>B mm</th>
<th>D mm</th>
<th>E max. mm</th>
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<tbody>
<tr>
<td>SCS50-100</td>
<td>14,000</td>
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<td>1,200</td>
<td>100</td>
<td>390</td>
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<td>1,200</td>
<td>150</td>
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<td>200</td>
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<td>1,200</td>
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<td>1,060</td>
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<td>2,310</td>
<td>1,290</td>
<td>1,255</td>
</tr>
</tbody>
</table>

1 The values are reduced by 20 % at max. side load angle.
### Technical Data

**Impact velocity range:** 0.50 m/s to 4.6 m/s

**Complete details required when ordering**

- Moving load: m (kg)
- Impact velocity range: v (m/s) max.
- Creep speed: vs (m/s)
- Motor power: P (kW)
- Stall torque factor: ST (normal, 2.5)
- Number of absorbers in parallel: n

or technical data according to formula and calculations on page 275.

### Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Energy capacity Nm/cycle</th>
<th>Return Force N</th>
<th>Return Force N</th>
<th>Stroke mm</th>
<th>A max. mm</th>
<th>B mm</th>
<th>D mm</th>
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<th>R</th>
<th>F and R</th>
<th>S</th>
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</tbody>
</table>

1 The values are reduced by 20 % at max. side load angle.

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

**Ordering Example**

- Safety Shock Absorber
- Bore Size: ø 2.48” (63 mm)
- Stroke: 15.75” (400 mm)
- Mounting Style: Front Flange

Please indicate identification no. assigned by ACE in case of replacement order.

Please contact the factory for complete part number.
CB63 to CB160

High resetting forces with gas pressure accumulator

Crane Installations, Optimized Characteristic
Energy capacity 16,000 Nm/Cycle to 480,000 Nm/Cycle
Stroke 100 mm to 800 mm

Robust powerhouse: the CB63 to CB160 product family with internal system seals are used in heavy duty areas for emergency stop. Even dirt or scratches to the piston rod do not lead to a leakage or failure. Compressed gas accumulators allow return forces of up to 100 kN (22,481 lb.) in the CB models, which can make applications in multiple bridge crane systems safer, for example. The absorber body and the robust, large-sized piston rod bearing are also designed for heavy duty operations.

ACE uses our proprietary custom calculation program to design each shock absorber for the specific customer application. Customization helps reduce the risk of crashes and incorrect product sizing. Just like all ACE safety shock absorbers, the characteristic curve or damping characteristics of each individual CB unit is individually designed to the customer application.

Whether its crane systems or machines in heavy duty applications e.g. in the metal industry or in mining, these powerful safety shock absorbers reliably protect construction designs against expensive failure.

Technical Data

- **Energy capacity**: 16,000 Nm/Cycle to 480,000 Nm/Cycle
- **Impact velocity range**: 0.5 m/s to 4.6 m/s. Other speeds on request.
- **Reacting force**: At max. capacity rating = 187 kN to 700 kN
- **Operating temperature range**: -12 °C to 66 °C. Other temperatures on request.
- **Mounting**: In any position
- **Positive stop**: Integrated
- **Material**: Outer body, Rod end button: Steel corrosion-resistant coating; Piston tube: Hard chrome plated steel
- **Damping medium**: Automatic Transmission Fluid (ATF)
- **Filling pressure**: Approx. 5.6 bar to 5.9 bar. Rod return by integrated nitrogen accumulator.
- **Application field**: Heavy load applications, Heavy load applications, Conveyor systems, Portal systems
- **Note**: 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.
- **On request**: Special oils, special flanges, additional corrosion protection etc.
Safety Shock Absorbers CB63 to CB160

Crane Installations, Optimized Characteristic

**CB63-F Front Flange**

Reacting force: at max. capacity rating = 187 kN max.

**CB100-F Front Flange**

Reacting force: at max. capacity rating = 467 kN max.

**CB160-F Front Flange**

Reacting force: at max. capacity rating = 700 kN max.

**CB63-R Rear Flange**

Reacting force: at max. capacity rating = 187 kN max.

**CB100-R Rear Flange**

Reacting force: at max. capacity rating = 467 kN max.

**CB160-R Rear Flange**

Reacting force: at max. capacity rating = 700 kN max.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
( Alternatively: Propelling force F (N))
Number of absorbers in parallel: n

or technical data according to formula and calculations on page 275.

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

Ordering Example

CB63-400-F-X

Safety Shock Absorber
Bore Size 2.48" (63 mm)
Stroke 15.75" (400 mm)
Mounting Style: Front Flange

Identification No. assigned by ACE
Please indicate identification no. in case of replacement order

Please contact the factory for complete part number.

### Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Ei Nm/cycle</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Side Load Angle max.</th>
<th>Weight kg</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>We min. kg</td>
<td>We max. kg</td>
<td>N</td>
<td>Stroke mm</td>
<td>A max. mm</td>
</tr>
<tr>
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<td>16,000</td>
<td>1,510</td>
<td>128,000</td>
<td>1,700</td>
<td>200</td>
<td>700</td>
</tr>
<tr>
<td>CB63-200</td>
<td>32,000</td>
<td>3,020</td>
<td>256,000</td>
<td>1,700</td>
<td>300</td>
<td>980</td>
</tr>
<tr>
<td>CB63-300</td>
<td>48,000</td>
<td>4,540</td>
<td>384,000</td>
<td>1,700</td>
<td>400</td>
<td>1,260</td>
</tr>
<tr>
<td>CB63-400</td>
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<td>6,050</td>
<td>512,000</td>
<td>1,700</td>
<td>500</td>
<td>1,540</td>
</tr>
<tr>
<td>CB63-500</td>
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<td>7,560</td>
<td>640,000</td>
<td>1,700</td>
<td>600</td>
<td>1,820</td>
</tr>
<tr>
<td>CB100-200</td>
<td>80,000</td>
<td>7,560</td>
<td>640,000</td>
<td>4,500</td>
<td>200</td>
<td>735</td>
</tr>
<tr>
<td>CB100-300</td>
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<td>300</td>
<td>1,005</td>
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<tr>
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<td>4,500</td>
<td>400</td>
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<tr>
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<td>4,500</td>
<td>500</td>
<td>1,545</td>
</tr>
<tr>
<td>CB100-600</td>
<td>240,000</td>
<td>22,680</td>
<td>1,920,000</td>
<td>4,500</td>
<td>600</td>
<td>1,815</td>
</tr>
<tr>
<td>CB160-400</td>
<td>240,000</td>
<td>22,700</td>
<td>1,920,000</td>
<td>11,000</td>
<td>400</td>
<td>1,400</td>
</tr>
<tr>
<td>CB160-600</td>
<td>360,000</td>
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<td>600</td>
<td>2,000</td>
</tr>
<tr>
<td>CB160-800</td>
<td>480,000</td>
<td>45,400</td>
<td>3,840,000</td>
<td>11,000</td>
<td>800</td>
<td>2,600</td>
</tr>
</tbody>
</table>

1 The values are reduced by 20 % at max. side load angle.

EB63 to EB160
Low return force with spring assembly

Crane Installations, Optimized Characteristic
Energy capacity 16,000 Nm/Cycle to 480,000 Nm/Cycle
Stroke 100 mm to 800 mm

Reduced return forces: the ACE safety shock absorbers from the EB-Family offer internal system seals, large sized piston rod bearings and the maximum energy absorption for emergency stop applications. However, an integrated spring package in the robust shock absorber body makes sure that the return forces are reduced to a fraction of those in the CB-Family.

The damping characteristics of the maintenance-free and ready-to-install EB models is individually designed specific to the customer application, just like all ACE safety shock absorbers.

These safety shock absorbers reliably perform their services in crane systems and in numerous heavy duty applications, even if the power fails, because these hydraulic machine elements are independent braking systems.

Technical Data

<table>
<thead>
<tr>
<th>Energy capacity:</th>
<th>16,000 Nm/Cycle to 480,000 Nm/Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact velocity range:</td>
<td>0.5 m/s to 4.6 m/s. Other speeds on request.</td>
</tr>
<tr>
<td>Reacting force:</td>
<td>At max. capacity rating = 187 kN to 700 kN</td>
</tr>
<tr>
<td>Operating temperature range:</td>
<td>-12 °C to 66 °C. Other temperatures on request.</td>
</tr>
<tr>
<td>Mounting:</td>
<td>In any position</td>
</tr>
<tr>
<td>Positive stop:</td>
<td>Integrated</td>
</tr>
<tr>
<td>Material:</td>
<td>Outer body, Rod end button: Steel corrosion-resistant coating; Piston tube: Hard chrome plated steel</td>
</tr>
<tr>
<td>Damping medium:</td>
<td>Automatic Transmission Fluid (ATF)</td>
</tr>
<tr>
<td>Filling pressure:</td>
<td>Approx. 0.55 bar to 1.1 bar. Rod return by integrated nitrogen accumulator combined with additional return spring.</td>
</tr>
<tr>
<td>Application field:</td>
<td>Heavy load applications, Conveyor systems, Portal systems</td>
</tr>
<tr>
<td>Note:</td>
<td>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.</td>
</tr>
<tr>
<td>On request:</td>
<td>Special oils, special flanges, additional corrosion protection etc.</td>
</tr>
</tbody>
</table>
Safety Shock Absorbers EB63 to EB160

Crane Installations, Optimized Characteristic

EB63-F Front Flange

Reacting force: at max. capacity rating = 187 kN max.

EB63-R Rear Flange

Reacting force: at max. capacity rating = 187 kN max.

EB100-F Front Flange

Reacting force: at max. capacity rating = 467 kN max.

EB100-R Rear Flange

Reacting force: at max. capacity rating = 467 kN max.

EB160-F Front Flange

Reacting force: at max. capacity rating = 700 kN max.

EB160-R Rear Flange

Reacting force: at max. capacity rating = 700 kN max.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
(Alternatively: Propelling force F (N))
Number of absorbers in parallel: n

or technical data according to formula and calculations on page 275.

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

Ordering Example

EB63-400-F-X

Safety Shock Absorber
Bore Size 2.48” (63 mm)
Stroke 15.75” (400 mm)
Mounting Style: Front Flange
Identification No. assigned by ACE
Please indicate identification no. in case of replacement order

Please contact the factory for complete part number.

Performance and Dimensions

<table>
<thead>
<tr>
<th>TYPES</th>
<th>Eᵢ</th>
<th>Effective Weight</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Force</th>
<th>Return Force</th>
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<tbody>
<tr>
<td></td>
<td>Nm/cycle</td>
<td>We min.</td>
<td>kg</td>
<td>We max.</td>
<td>kg</td>
<td>N</td>
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<td>1,510</td>
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<td>700</td>
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<tr>
<td>EB63-200</td>
<td>32,000</td>
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<td>256,000</td>
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<td>EB63-300</td>
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<td>600</td>
</tr>
</tbody>
</table>

1 The values are reduced by 20 % at max. side load angle.
Permitted Use
ACE safety shock absorbers are machine elements to brake moving masses in a defined end position in emergency stop situations for axial forces. The safety shock absorbers are not designed for regular operational usage.

Calculation of safety shock absorbers
The calculation of safety shock absorbers should generally be performed or checked by ACE.

Deceleration Properties
The orifice sizing and drill pattern in the pressure chamber are individually designed for each safety shock absorber. The respective absorption characteristic is optimized corresponding to the maximum mass that occurs in the emergency stop and the impact speed. Correspondingly, each safety shock absorber is given an individual identification number.

Model Code
For types SCS33 to 64, the individual five-digit identification numbers can be taken from the last digits of the shock absorber model code shown on the label. Example: SCS3-G-XXXXX. For type series SCS38 to SCS63, CB63 to CB160 and EB63 to EB160, the identification number is a five digit number. Example: SCS38-400-F-XXXXX. In addition to the model code, the label also shows the authorized maximum impact velocity and maximum authorised impact mass for the unit. The factory assigns these identification numbers. Please contact the factory for complete part number.

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

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 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 stop as a stroke limiter. The stroke of the safety absorber is limited by the stop of the impact head on the shock absorber. For types SCS33 to SCS64, the fixed stop point is achieved with the integrated 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.

Detailed information on the above listed points can be taken from the corresponding operating and assembly instructions.
Calculation Data for the Design of Safety Shock Absorbers

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 four parameters:

1. Weight to be decelerated \( W \) [kg]
2. Impact velocity at shock absorber \( v \) [m/s]
3. Propelling force \( F \) [N]
4. Number of absorbers in parallel \( n \)

Key to symbols used

- \( E_1 \) Kinetic energy per cycle \( \text{Nm} \)
- \( E_2 \) Propelling force energy per cycle \( \text{Nm} \)
- \( E_3 \) Total energy per cycle \( (E_1 + E_2) \) \( \text{Nm} \)
- \( E_4 \) Total energy per hour \( (E_3 \cdot x) \) \( \text{Nm/hr} \)
- \( W \) Weight to be decelerated \( \text{kg} \)
- \( E \) Effective weight \( \text{kg} \)
- \( n \) Number of shock absorbers (in parallel)
- \( F \) Propelling force \( \text{N} \)
- \( v \) Velocity at impact \( \text{m/s} \)
- \( S \) Shock absorber stroke \( \text{m} \)
- \( T \) Deceleration time \( \text{s} \)
- \( Q \) Reaction force \( \text{N} \)
- \( t \) Deceleration \( \text{s} \)
- \( a \) Acceleration \( \text{m/s}^2 \)

Note: When using several shock absorbers in parallel, the values \( E_3 \), \( E_4 \) and \( W \) are divided according to the number of units used.

\(^1\) All mentioned values of \( E_4 \) in the capacity charts are only valid for room temperature. There are reduced values at higher temperature ranges.

\(^2\) \( v \) or \( v_s \) 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.

In all the following examples the choice of shock absorbers made from the capacity chart is based upon the values of \( (E_3) \), \( (E_4) \), \( (W) \) and the desired shock absorber stroke \( (s) \).

Application Formula Example

19 Wagon against 2 shock absorbers

\[ E_1 = W \cdot v^2 \cdot 0.5 \]
\[ E_2 = F \cdot s \]
\[ E_3 = E_1 + E_2 \]
\[ v_s = v \cdot 0.5 \]

\( E_1 = 5000 \cdot 2^2 \cdot 0.25 = 5000 \text{ Nm} \)
\( E_2 = 3500 \cdot 0.10 = 350 \text{ Nm} \)
\( E_3 = 5000 + 350 = 5350 \text{ Nm} \)
\( v = 2 \text{ m/s} \)

Chosen from capacity chart:
Model SCS38-100 self-compensating

20 Wagon against wagon

\[ E_1 = W_1 \cdot W_2 \cdot (v_1 + v_2)^2 \cdot 0.25 \]
\[ E_2 = F \cdot s \]
\[ E_3 = E_1 + E_2 \]
\[ v_s = v_1 + v_2 \]

\( E_1 = 7000 \cdot 10000 \cdot (1.2 + 0.5)^2 \cdot 0.25 = 2975 \text{ Nm} \)
\( E_2 = 5000 \cdot 0.10 = 500 \text{ Nm} \)
\( E_3 = 5950 + 500 = 6450 \text{ Nm} \)
\( v = 1.2 + 0.5 \text{ m/s} \)

Chosen from capacity chart:
Model SCS50-100 self-compensating

21 Wagon against wagon

\[ E_1 = W_1 \cdot W_2 \cdot (v_1 + v_2)^2 \cdot 0.25 \]
\[ E_2 = F \cdot s \]
\[ E_3 = E_1 + E_2 \]
\[ v_s = v_1 + v_2 \]

\( E_1 = 7000 \cdot 10000 \cdot (1.2 + 0.5)^2 \cdot 0.25 = 2975 \text{ Nm} \)
\( E_2 = 5000 \cdot 0.10 = 500 \text{ Nm} \)
\( E_3 = 2975 + 510 = 3475 \text{ Nm} \)

Chosen from capacity chart:
Model SCS38-100 self-compensating
**Application Examples**

**SCS45**

**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 SCS45-50EU. If the turntables malfunction the safety shock absorbers decelerate the loads before expensive damage can occur to the granite measuring tables.

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**SCS33, SCS45**

**High-level protection of linear modules**

Safety shock absorbers produced by ACE are installed in the top linear system models of one of the most prestigious companies in the field of drive and control technology. Their job: to protect the z-axis from damage caused by uncontrolled movements. Various safety dampers are used for different load ranges. Tests have shown that, in the worst case, a collision speed of up to 5 m/s might occur. To be on the safe side, the interpretations were based in all cases on a slightly higher value.

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For protecting equipment and modules such as these, the SCS series from ACE is the ideal solution in the emergency stop sector

Roth GmbH & Co. KG, 90411 Nürnberg, Germany
and Bosch Rexroth AG, 97816 Lohr am Main, Germany
SCS38
Safe driving in end positions with ACE

The aim was to protect a driving simulation capsule on two of its eight axes. The demands placed on a potential emergency stopper were high because it was clear that its failure would lead to massive damage to the complete construction as well as to the capsule. Even the possibility of damage to the health of the test personnel could not be ruled out and was taken into consideration in a diverse range of mass-speed combinations. Two ACE safety shock absorbers now safely contain destructive forces, e.g. during power outages, and eliminate high risks.
Safety Dampers
Top for emergency stopping

The extremely successful TUBUS series from ACE is suitable for emergency stopping, as overrun protection or as end stop dampers. Available in different variations for heavy duty or crane installations, these profile dampers are perfect when loads do not need to be instantly decelerated or when working under extreme conditions.

Manufactured in co-polyester elastomer, the highly resistant absorbers provide high force and energy absorption in areas where other materials fail or where a similarly high service life of up to 1 million load changes cannot be achieved. They are cost-effective and distinguished by the small, light design. With energy absorption within a range of 450 and 17,810 Nm, they can be considered as an alternative to hydraulic end position damping.
Safety Dampers

TUBUS TC and TC-S
Crane Installations
Compact powerhouse
Crane systems, Loading and lifting equipment, Hydraulic devices, Electro-mechanical drives

Extremely durable
Highly resistant co-polyester elastomers
Lightweight designs
Cost-effective use
Heavy-duty versions available
For even more protection: the profile dampers from the TC range of the ACE TUBUS-Series can also be used as safety dampers. These maintenance-free, ready-to-install damping elements made of co-polyester elastomer have been specially developed for use in crane systems and meet the international industry standards for OSHA and CMAA. The TC-S design employs a unique dual concept to achieve the spring rate required for crane systems.

Whether TC-S or TC, this range of models represents a cost-effective solution with high energy absorption for energy management systems. The very small and light design of Ø 64 mm to Ø 176 mm (Ø 2.52” to Ø 6.93”) progressively covers energy absorption within a range of 450 Nm to 17,810 Nm (3,983 in-lbs to 157,632 in-lbs).

The profile dampers from the TC range protect cranes, loading and lifting equipment, hydraulic units and much more.

**Technical Data**

- **Energy capacity:** 630 Nm/Cycle to 17,810 Nm/Cycle
- **Energy absorption:** 31% to 64%
- **Dynamic force range:** 80,000 N to 978,000 N
- **Operating temperature range:** -40 °C to 90 °C
- **Construction size:** 64 mm to 176 mm
- **Material hardness rating:** Shore 55D
- **Material:** Profile body: Co-Polyester Elastomer
- **Mounting:** In any position

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

**Impact velocity range:** Max. 5 m/s

**Torque max.**:
- M12: 50 Nm
- M16: 40 Nm (DIN912)
- M16: 120 Nm (shouldered screw)

**Application field:** Crane systems, Loading and lifting equipment, Hydraulic devices, Electro-mechanical drives

**Note:** Suitable for emergency stop applications and for continuous use. For applications with preloading and increased temperatures please consult ACE.

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

Characteristics

Type TC90-49
Energy-Stroke Characteristic (dynamic)
(with impact velocity over 0.5 m/s)

Type TC90-49
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.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.
Clamping Elements

On-the-spot clamping and stopping in emergencies and other situations

Clamping elements from the LOCKED series also serve the purpose of safety. These ACE products clamp and decelerate loads and are suitable for perfectly controlled holding, both linear and rotary, in all processes.

Alongside ACE LOCKED solutions for conventional rail, rod or rotation clamping, special clamps with safety function for Z-axes, which reliably help secure axes with a gravitational load, are available in the LOCKED LZ-P series. The latter solution is available for both pneumatic operation and as an electric version. Whether Z-axes, linear guide, rod or rotation clamping, the choice is (typical of ACE) as large as the performance capacity of the products, which are compatible with the solutions of all standard manufacturers.
LOCKED by ACE. After all, safe is safe.

- Increased process reliability
- Available as clamping and emergency stop brakes
- Very short stop distances
- Very high clamping forces
- Compact designs
- Ideal for all standard sizes
Safe deceleration of a mass that is traversed with the help of a rail and guide rail and track carriage combination must be complied with and not only for safety reasons; reliable clamps in the production processes are also becoming increasingly important.

Both features can be taken care of by the clamping elements from ACE. All clamping elements work with the patented spring steel plate system. This system achieves braking and clamping forces of up to 10,000 N. The clamping elements are always individually adapted to the used linear guide. They are available for all rail sizes and profiles for all renowned manufacturers.

### Function of clamping elements LOCKED PL/SL/PLK/SLK

All process and safety clamps work with the reinforced spring steel plate system. Compressed air is introduced between the two spring plates, which are connected with a surrounding rubber coating. If pressure is applied, the clamping element can freely move; if the clamping element is vented clamping to the guide rail follows.

**Released**

The chamber filled with compressed air between the spring steel plates relaxes and thus releases the clamping/brake pads from the rail. The clamping element is now free to move.

**Engaged**

The clamping force of the mechanically pre-stressed spring steel plates is transferred to the clamping/brake pads as holding force. The clamping element is clamped on the guide rail.

### Slot dimensions between braking and clamping linings and linear guide rail

The internal dimension “I” between the linings of every LOCKED rail clamping is ground to an exact value.

This is always 0.01 to 0.03 mm greater than the upper limit J max. of the respective linear guide rail (see drawing), resulting from the manufacturer’s directives.

The maximum holding force results at J max. and, in the most unfavorable case, holding force losses up to 30 % can occur (see table).

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<th>Air Gap</th>
<th>Loss in Holding Force %</th>
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<tr>
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</table>

### Different brake pads for PL/PLK and for SL/SLK

The process clamps and safety clamps are available completely identical in their structure. They differ only in the clamping and brake pads material.

#### Position Clamping

The types of the LOCKED series PL and PLK are designed for clamping directly on the linear guide. The clamping linings are produced from tool steel and offer 100 % clamping force, even in the case of lubricated rails.

#### Position Clamping and Emergency Stop Braking

With the typical SL, SLK, low-wear sinter graphite linings are employed. These enable both a position clamping, as well as emergency stop braking on the linear guide. In case of lubricated rails, a stopping force of 60 % of the nominal stopping force should be considered.
Clamping Elements

Rod Clamping

The modular solution for exact holding at certain positions

Safe and reliable stopping at a position or an operating state is an important part of many production processes. This task can be performed by the clamping elements from ACE. If clamping on a rod is required, the clamping elements of the PN and PRK families are the right choice.

Thanks to the patented spring steel plate system the rod clamps transfer clamping forces of up to 36,000 N directly to the (piston) rod.

The PN and PRK rod clamps can absorb both axial and rotary forces.

Function of clamping elements LOCKED PN and PRK

Consisting of a deck plate, one to four clamping units and a base plate, all rod clamps work with the reinforced spring steel plate system.

Through that, both axial and rotary forces can be absorbed.

Released

The membrane filled with compressed air relaxes the spring steel plate system and releases the clamping sleeve.

Engaged

The clamping force of the mechanically pre-stressed spring steel plates system is transferred as a holding force into the clamping sleeve. The rod or shaft is engaged.

Intelligent component system solution

By connecting up to four clamping units between the base and deck plates, it is possible to easily increase the clamping force.

Component tolerances for LOCKED PN and PRK

Design-related, the addition of the individual component tolerances leads to an elastic axial tolerance allowance. This axial tolerance allowance can be up to 500 µm in the clamped status, according to implementation!

The axis SHAFT/ROD must be machined with at least h9-fit (or better) above h5. Deviations from the prescribed tolerance can lead to reduction of the stopping force, or functional failure.
Reliable holding and securing against a rotation of a position are important elements in many production processes. This task can be performed by means of the clamping elements of the Locked R family. The rotational clamps can, thanks to the patented spring steel plate system, transfer holding torques of up to 4,680 Nm to the shaft. The spring accumulator can immediately clamp the axis during a power failure.

Rotational Clamping

The reliable protection against twisting

Reliable holding and securing against a rotation of a position are important elements in many production processes. This task can be performed by means of the clamping elements of the Locked R family. The rotational clamps can, thanks to the patented spring steel plate system, transfer holding torques of up to 4,680 Nm to the shaft. The spring accumulator can immediately clamp the axis during a power failure.

Function of clamping elements LOCKED R

The reinforced spring steel plate system transfers holding torques in the shortest possible time.

Released
The membrane filled with compressed air relaxes the spring steel plate system and releases the clamping ring. The shaft is free to move.

Engaged
The clamping force of the membrane/spring steel plates systems is transferred to the holding force of the clamping ring. The shaft is clamped.

Function of clamping elements LOCKED R-Z with additional air

If higher holding torques are required, the rotational clamps with an additional air function are used.

With the same size, significantly higher holding torques are achieved.

Engaged with additional air
By filling the outer membrane chamber with additional compressed air (4 or 6 bar), there is the possibility to increase the clamping force. The clamping element is engaged in this condition.
Clamping Elements

**LOCKED PL**
Process Clamping for Rail Systems
*High clamping power for all rail profiles*
tool machines, transport systems, feeder installations, positioning tables

**LOCKED PLK**
Process Clamping for Rail Systems, Compact
*High clamping power for all compact design rail profiles*
tool machines, transport systems, feeder installations, positioning tables

**LOCKED SL**
Safety Clamping for Rail Systems
*Combined clamping and braking*
tool machines, transport systems, feeder installations, positioning tables

**LOCKED SLK**
Safety Clamping for Rail Systems, Compact
*Combined compact design clamping and braking*
tool machines, transport systems, feeder installations, positioning tables

**LOCKED LZ-P**
Rail Clamping for Z-Axes
*Certified safety clamping*
Z-axes, vertical conveyor systems, jacking applications

**LOCKED PN**
Pneumatic Rod Clamping
*Rod clamping with maximum clamping force*
jacking systems, light presses, punching/stamping machines, stacking units

**LOCKED PRK**
Pneumatic Rod Clamping, Compact
*Rod clamping with maximum clamping force in a compact size*
jacking systems, light presses, punching/stamping machines, stacking units

**LOCKED R**
Pneumatic Rotational Clamping
*Strong holding force on the shaft*
drive shafts, torque motors, conveyor systems
Application Examples

**SL**

**Special LOCKED SL elements for emergency stops**

In order to secure the processing position of a special lathe in both the horizontal and the vertical axis, ACE LOCKED elements of the type SL35-1-6B are installed. They have the further advantage of preventing slippage through the vertical axis in the case of a malfunction. The products used in the SL-series not only have the correct track width and offer very high process clamping forces of up to 10,000 N, but can also apply the same force as an emergency-stop braking function. This is due to the specially integrated brake linings made of low-wear sintered metal.

**SLK**

**Secure rail clamping**

ACE clamping elements secure machines in the tyre industry. The goods accumulator/compensator of a material dispenser carries meandering, coiled, highly tear resistant material strips, which are fed at high speed to a tyre-manufacturing machine. To prevent damaging the machine, innovative type SLK25-1-6B clamping elements are employed.

ACE clamping and safety elements maintain a rock-solid hold on the axes in special lathes and secure the predetermined positions both horizontally and vertically

RASOMA Werkzeugmaschinen GmbH, 04720 Döbeln, Germany
PN

Clamping elements as a variable stop

ACE clamping elements are inserted, as a variable stop, during a joining process for the production of drilling tools. They meet the requirements for a precise positioning of the workpiece head and an adaptation of the length tolerance of up to 3 mm, ideally. ACE was awarded the contract because the clamping element is attached on a bar and its PN LOCKED series is specifically designed for this purpose. For clamping on linear guides, rails, axles and shafts, ACE offers a great range of high-performance models.

PN

Secure rod clamping

Pneumatic rod clamping allows hydraulic presses to be used for any application. With the help of hydraulic presses, cut ceramic parts are manufactured during the week. So that the rods of the upper and lower stamping plate do not sag when the press is at a standstill over the weekend or during holidays and therefore have to be setup again on the next working day, PN80-25-2-6B type rod clamps are used.
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<td>Baltimore</td>
<td>Airoyal Co., Inc.</td>
<td>(888) 247-6645</td>
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<td>Pearse-Bertram, LLC</td>
<td>(800) 677-1911</td>
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<td>Kinepower (KinFac Corp)</td>
<td>(508) 754-6901</td>
<td><a href="http://www.kinepower.com">www.kinepower.com</a></td>
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<td>Hartfleth Automation</td>
<td>(952) 974-2500</td>
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<td>Massachusetts</td>
<td>Worcester</td>
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<td></td>
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<td>Minuteman Controls</td>
<td>(781) 245-9550</td>
<td><a href="http://www.maseas.com">www.maseas.com</a></td>
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<td>Michigan</td>
<td>Grand Rapids</td>
<td>Bond Fluidine</td>
<td>(616) 942-1060</td>
<td><a href="http://www.bondfluidine.com">www.bondfluidine.com</a></td>
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<td></td>
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<td>Farmington Hills</td>
<td>(248) 477-2122</td>
<td><a href="http://www.exoticautomation.com">www.exoticautomation.com</a></td>
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<td>Hudsonville</td>
<td>(530) 578-5700</td>
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<td>Flint</td>
<td>(810) 232-9350</td>
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<td>Minnesota</td>
<td>Eagan</td>
<td>John Henry Foster</td>
<td>(651) 452-8452</td>
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<td>Eden Prairie</td>
<td>(800) 288-8628</td>
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<td>Mississippi</td>
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<td>Memphis, TN</td>
<td>(630) 466-1900</td>
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<td>(503) 326-5900</td>
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<td>(913) 677-3151</td>
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<td>Montana</td>
<td>Spokane Valley, WA</td>
<td>SunSource - Warden Fluid Dynamics</td>
<td>(800) 234-8265</td>
<td><a href="http://www.sun-source.com">www.sun-source.com</a></td>
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<td>Nebraska</td>
<td>Omaha</td>
<td>Skarda Equipment Co., Inc.</td>
<td>(402) 422-0430</td>
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<td>Nevada</td>
<td>Campbell, CA</td>
<td>Clayton Controls Inc.</td>
<td>(800) 341-4445</td>
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<td>Clayton Controls Inc. - HQ</td>
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<td>Nor-Cal Controls Inc.</td>
<td>(800) 233-2013</td>
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<td>Los Angeles</td>
<td>(714) 996-9417</td>
<td><a href="http://www.proutilcon.com">www.proutilcon.com</a></td>
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<td>(858) 748-2237</td>
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<td>New Hampshire</td>
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<td>Broomall, PA</td>
<td>Rankin Automation</td>
<td>(610) 544-6800</td>
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<td>York, PA</td>
<td>RG Group</td>
<td>(717) 849-0320</td>
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<td>(716) 587-7459</td>
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<td>North Carolina</td>
<td>Concord</td>
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<td></td>
<td>Eden Prairie, MN</td>
<td>Braas Co.</td>
<td>(800) 288-6628</td>
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<td>Ohio</td>
<td>Westlake</td>
<td>Neff Engineering</td>
<td>(440) 835-7010</td>
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<td>West Chester</td>
<td>Henry M. Wood</td>
<td>(513) 755-4080</td>
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<td>Rochester</td>
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<td>Fairfield</td>
<td>JW Technologies</td>
<td>(513) 769-9611</td>
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<td>Oklahoma</td>
<td>Allen, TX</td>
<td>Shepherd Controls</td>
<td>(972) 727-7300</td>
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<td>Southwestern</td>
<td>Hydraulics</td>
<td>(713) 683-1951</td>
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<td>Oregon</td>
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<td>Northwest Automation Products</td>
<td>(503) 620-5670</td>
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<td>Vancouver, WA</td>
<td>SunSource - Warden Fluid Dynamics</td>
<td>(800) 444-4946</td>
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<td>(724) 952-5666</td>
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<td>Rhode Island</td>
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<td>Tennessee</td>
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<td>Centro Inc.</td>
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<td>Knoxville</td>
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<td>(603) 525-0363</td>
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<td>Texas</td>
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<td>Tech Automation Solutions</td>
<td>(915) 599-3022</td>
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<td>Virginia</td>
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<td>Wisconsin</td>
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<td>(262) 834-6300</td>
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<td>Wyoming</td>
<td>Englewood, CO</td>
<td>AAP Automation</td>
<td>(303) 778-0800</td>
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**CANADA**

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<tr>
<td>Alberta &amp;</td>
<td>Edmonton</td>
<td>Peerless Engineering</td>
<td>(780) 439-3322</td>
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<td>Northwest Territories</td>
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<td>British Columbia &amp;</td>
<td>Burnaby</td>
<td>Peerless Engineering - HQ</td>
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<td>Yukon Territory</td>
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<td>(250) 563-2130</td>
<td><a href="http://www.peerlessengineering.com">www.peerlessengineering.com</a></td>
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<td>Lachine, Quebec</td>
<td>Cowper Incorporated</td>
<td>(888) 506-1111</td>
<td><a href="http://www.cowper.ca">www.cowper.ca</a></td>
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<td>ASCO</td>
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<td><a href="http://www.ascocan/en-ca">www.ascocan/en-ca</a></td>
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<td>Saskatchewan</td>
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