Miniature Shock Absorbers MC150 to MC600 – Self-Compensating

Operating Instruction

The listed type names are the corresponding standard types of the respective series of shock absorbers. Special types may display different type names.

Content

<table>
<thead>
<tr>
<th>General information</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety information</td>
<td>2</td>
</tr>
<tr>
<td>Purpose</td>
<td>2</td>
</tr>
<tr>
<td>Description and function</td>
<td>2</td>
</tr>
<tr>
<td>Calculation and dimensioning</td>
<td>2</td>
</tr>
<tr>
<td>Delivery and storage</td>
<td>2</td>
</tr>
<tr>
<td>Maintenance and care</td>
<td>2</td>
</tr>
<tr>
<td>Dismantling and disposal</td>
<td>2</td>
</tr>
<tr>
<td>Mounting Instructions</td>
<td>3 – 5</td>
</tr>
<tr>
<td>Warranty</td>
<td>6</td>
</tr>
<tr>
<td>Technical Data</td>
<td>6</td>
</tr>
<tr>
<td>Mounting Instructions for accessories</td>
<td>A – B</td>
</tr>
</tbody>
</table>
General information

This operating manual serves the purpose of fault-free use of the miniature shock absorber types listed on page 1, compliance is a prerequisite for fulfillment of any warranty claims. Please read the operating manual before use. Always comply with the limit values provided in the performance table (technical data). Please consider the prevailing environmental conditions and stipulations. Please pay attention to the regulations from the trade association, technical inspection association or the corresponding national, international and European regulations. Only install and commission in accordance with the assembly instructions.

Safety information

**WARNING**

- Additional security elements must be used if ACE miniature shock absorbers are to be used where failure of the product could lead to personal damage and/or damage to property.
- Free moving masses can lead to injuries due to crushing when installing the shock absorber. Protect moving masses against unintentional start-up with suitable safety precautions before installing the shock absorbers.

Purpose

ACE miniature shock absorbers are used anywhere where moving masses have to be stopped at a defined end position. The industrial shock absorbers are designed to take the force in an axial direction. Within the authorised load limits, the industrial shock absorbers also works as a mechanical stop.

Description and function

The ACE miniature shock absorbers MC150 bis MC600 are maintenance-free, ready-to-install, hydraulic elements with a number of throttle openings.

In the braking process, the moving mass drives the piston rod with kinetic energy, and possibly with additional drive energy, in an axial direction with the defined impact speed against the shock absorber. As an alternative, several shock absorbers can be used parallel. In the braking procedure used, the piston rod is pushed into the shock absorber. The hydraulic oil found in front of the piston is forced through all throttle bores at the same time. The number of effective throttle openings reduces proportional to the driven stroke. The run-in speed reduces.

The dynamic pressure in front of the piston corresponds with the counterforce applied by the shock absorber and remains almost constant throughout the whole stroke. A prerequisite for a constant delay is the correct calculation of the industrial shock absorber and therefore the correct selection of the right throttle bore pattern or the correct hardness level of the shock absorber.

The hardness graduations: M (soft), MH (midden), MH2 (hard) and MH3 (extra hard).

General Function

\[
F = \frac{P \cdot s}{t} = \frac{t \cdot P \cdot s}{v} = \frac{t \cdot s}{P \cdot v}
\]

Calculation and dimensioning

In order to guarantee the long life time of the shock absorber it must be correctly calculated and dimensioned. To do this the following parameters must be considered:

- moving mass [kg]
- impact velocity of moving mass onto the shock absorber [m/s]
- additional acting propelling force, motor power or propelling torque [N, kW, Nm]
- number of parallel acting shock absorbers [n]
- number of strokes or cycles per hour [1/h]
- effective weight moment [Nm/s, Nm/stroke, Nm/h, kW/h]
- maximum side load angle [°]

The correct dimensioning of shock absorbers can be made with the ACE online calculation program at www.ace-ace.com. Alternatively the filled out online form may be sent to us via E-Mail. Or call our free of charge calculation service: +49-(0)2173-9226-20.

**WARNING**

- The shock absorbers have to be dimensioned in such a way that the calculated values do not exceed the maximum values of the individual capacity chart (technical data):
  - \( W_4 [nm/h] \)
  - \( W_3 [nm/stroke] \)
  - effective weight moment max.
  - side load angle max.

To correctly calculate the shock absorber it must be the only active brake system in place. Additional deceleration systems, such as pneumatic cushioning, must be rendered ineffective and not allowed to interfere with the shock absorber deceleration.

Delivery and storage

- Please check the shock absorber for any damage upon delivery.
- The shock absorbers can suffer damage if allowed to fall. Please remove the shock absorbers carefully from the packaging.
- Shock absorbers can generally be stored in any position.
- Storage in the original packaging is recommended.
- Always store shock absorbers in a dry place to avoid oxidation.
- The maximum recommended storage time is three years.

Maintenance and care

Check the shock absorbers regularly for oil loss, piston rod return and external damages.

Shock absorbers are machine elements that are subjected to constant wear and tear. The absorbing effect reduces during the service life. When this is no longer sufficient, the shock absorbers must be replaced or exchanged.

Dismantling and disposal

Ensure that the shock absorbers are dealt with under consideration of environmental protection (problematic substance utilisation).

The MC miniature shock absorbers are filled in the standard version with silicone oil. You can request the corresponding data sheets for the respective type. Defensive absorbers can be sent to our services department to establish the cause of failure.
Installation information

Prior to installation and use, check if the identification number on the shock absorber or on the package corresponds to the number on the delivery sheet. Industrial shock absorbers are maintenance-free and ready-to-fit.

Operating temperature range: 0 °C to 66 °C

Mounting: In any position, but always so that the complete stroke can be used. The shock absorber is to be mounted so that the forces can be guided centrally via the piston rod. The maximum permissible side load of 4° should not be exceeded. An existing side load leads generally to a reduced lifetime. When exceeding the maximum permissible side load, a side load adaptor should be used.

Disposal of packaging

Dispose packaging in an environmentally safe manner. The recycling of packaging saves raw materials and lowers the amount of waste. The used packaging materials do not contain illegal substances.

WARNING

- Thermal effect: The values given in the capacity chart W and me (see operating and installation instructions or main catalogue) are valid for room temperature. Different values apply for higher temperatures.
- Moving masses can lead to injuries or bodily harm when installing the shock absorber. Secure moving masses against accidental movement.
- The shock absorbers may be unsuitable for the application and show insufficient damping performance. Check for proper suitability of shock absorber.
- When operating outside the allowed temperature range, the shock absorber may lose its functionality. Permissible temperature range must be adhered to. Do not paint the shock absorber due to heat radiation.
- Ambient fluids, gases and dirt particles may affect or damage the sealing system and lead to failure of the shock absorber. Piston rods and sealing systems must be protected against foreign substances.
- Damage to the piston rod surface may destroy the sealing system. Do not grease, oil, etc. the piston rod and protect it from dirt particles.
- The piston rod can be torn out of the shock absorber. Do not put tensile stress on the piston rod.
- The shock absorber can tear off upon impact. The mount must be calculated so that the maximum operating reaction forces can be accepted with sufficient safety. The maximum reaction forces given in the calculation report may deviate from the actual reaction forces since these are based on theoretical values.

Initial start-up

> After installation, start a test run on the moving mass initially with a reduced operating speed.

During the test run:

> Accelerate the load capacity step-by-step up to the subsequent operating speed. This can be taken from the calculation of your application. In the correct end position, the piston rod on the shock absorber reaches the end piece (fixed impact) without a hard impact.

Mounting Options

<table>
<thead>
<tr>
<th>Usage of the clamp mount MB</th>
<th>Usage of the rectangular flange RF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screwing in the shock absorbers into a tapped hole with an additional locknut</td>
<td>Mounting the shock absorbers in the through boring with two locknuts</td>
</tr>
<tr>
<td>Tightening torque: KM14 = 13-14 Nm</td>
<td>Tightening torque: KM14 = 13-14 Nm</td>
</tr>
<tr>
<td>Minimum thread depth: 1.5 x thread diameter</td>
<td>Minimum thread depth: 1.5 x thread diameter</td>
</tr>
</tbody>
</table>

Accessories

When using accessories and mounting elements, please consider the separate mounting instructions for accessories.

EU Marking

Starting with the production date September 2010 (Code IB or 10244) all shock absorbers are to be marked with an additional EU letter code in the identification number. The EU marking refers to the adherence to the required norms, laws, and guidelines of the EU. Only products marked with EU ensure the worldwide standard and the guarantee for liability.
Installation information

Prior to installation and use, check if the identification number on the shock absorber or on the package corresponds to the number on the delivery sheet. Industrial shock absorbers are maintenance-free and ready-to-fit.

Operating temperature range: 0 °C to 66 °C

Mounting: In any position, but always so that the complete stroke can be used. The shock absorber is to be mounted so that the forces can be guided centrally via the piston rod. The maximum permissible side load of 4° should not be exceeded. An existing side load leads generally to a reduced lifetime. When exceeding the maximum permissible side load, a side load adaptor should be used.

Disposal of packaging

Dispose packaging in an environmentally safe manner. The recycling of packaging saves raw materials and lowers the amount of waste. The used packaging materials do not contain illegal substances.

Initial start-up

> After installation, start a test run on the moving mass initially with a reduced operating speed. During the test run:
> Accelerate the load capacity step-by-step up to the subsequent operating speed. This can be taken from the calculation of your application. In the correct end position, the piston rod on the shock absorber reaches the end piece (fixed impact) without a hard impact.

WARNING

Thermal effect: The values given in the capacity chart $W$ and $m_{e}$ (see operating and installation instructions or main catalogue) are valid for room temperature. Different values apply for higher temperatures.

Moving masses can lead to injuries or bodily harm when installing the shock absorber. Secure moving masses against accidental movement.

The shock absorbers may be unsuitable for the application and show insufficient damping performance. Check for proper suitability of shock absorber.

When operating outside the allowed temperature range, the shock absorber may lose its functionality. Permissible temperature range must be adhered to. Do not paint the shock absorber due to heat radiation.

Ambient fluids, gases and dirt particles may affect or damage the sealing system and lead to failure of the shock absorber. Piston rods and sealing systems must be protected against foreign substances.

Damage to the piston rod surface may destroy the sealing system. Do not grease, oil, etc. the piston rod and protect it from dirt particles.

The piston rod can be torn out of the shock absorber. Do not put tensile stress on the piston rod.

The shock absorber can tear off upon impact. The mount must be calculated so that the maximum operating reaction forces can be accepted with sufficient safety. The maximum reaction forces given in the calculation report may deviate from the actual reaction forces since these are based on theoretical values.

Mounting Options

- **Usage of the clamp mount MB**
  - Screwing in the shock absorbers into a tapped hole with an additional locknut
  - Tightening torque: $KM20 = 27-30$ Nm

- **Usage of the rectangular flange RF**
  - Mounting the shock absorbers in the through boring with two locknuts
  - Minimum thread depth: $1.5 \times$ thread diameter
  - Tightening torque: $KM20 = 27-30$ Nm

Accessories

When using accessories and mounting elements, please consider the separate mounting instructions for accessories.

EU Marking

Starting with the production date September 2010 (Code IB or 10244) all shock absorbers are to be marked with an additional EU letter code in the identification number. The EU marking refers to the adherence to the required norms, laws, and guidelines of the EU. Only products marked with EU ensure the worldwide standard and the guarantee for liability.
Installation information
Prior to installation and use, check if the identification number
on the shock absorber or on the package corresponds to the
number on the delivery sheet. Industrial shock absorbers are
maintenance-free and ready-to-fit.

Operating temperature range: 0 °C to 66 °C
Mounting: In any position, but always so that the complete
stroke can be used. The shock absorber is to be mounted so that
the forces can be guided centrally via the piston rod.
The maximum permissible side load of 2° should not be exceeded.
An existing side load leads generally to a reduced lifetime. When
exceeding the maximum permissible side load, a side load
adaptor should be used.

Disposal of packaging
Dispose packaging in an environmentally safe manner. The
recycling of packaging saves raw materials and lowers the amount
of waste. The used packaging materials do not contain illegal
substances.

Initial start-up
> After installation, start a test run on the moving mass initially
with a reduced operating speed.
During the test run:
> Accelerate the load capacity step-by-step up to the subsequent
operating speed. This can be taken from the calculation of your
application. In the correct end position, the piston rod on the
shock absorber reaches the end piece (fixed impact) without a
hard impact.

WARNING
- Thermal effect: The values given in the capacity chart W,
and me (see operating and installation instructions or main
catalogue) are valid for room temperature. Different values
apply for higher temperatures.
- Moving masses can lead to injuries or bodily harm when
installing the shock absorber. Secure moving masses
against accidental movement.
- The shock absorbers may be unsuitable for the application
and show insufficient damping performance. Check for
proper suitability of shock absorber.
- When operating outside the allowed temperature range
the shock absorber may lose its functionality. Permissible
temperature range must be adhered to. Do not paint the
shock absorber due to heat radiation.
- Ambient fluids, gases and dirt particles may affect or
damage the sealing system and lead to failure of the
shock absorber. Piston rods and sealing systems must be
protected against foreign substances.
- Do not grease, oil, etc. the piston rod and protect it
from dirt particles.
- The shock absorber can tear off upon impact. The mount
must be calculated so that the maximum operating reaction
forces can be accepted with sufficient safety. The maximum
reaction forces given in the calculation report may deviate
from the actual reaction forces since these are based on
theoretical values.

Mounting Options

Usage of the clamp mount MB
- Screwing in the shock absorbers into a tapped hole with
an additional locknut
  - Tightening torque: KM25 = 60-66 Nm
  - Minimum thread depth: 1.5 x thread diameter

Usage of the rectangular flange RF
- Mounting the shock absorbers in the through boring with
two locknuts
  - Tightening torque: KM25 = 60-66 Nm

Accessories
When using accessories and mounting elements, please consider the separate mounting instructions for accessories.

EU Marking
Starting with the production date September 2010 (Code IB or 10244) all shock absorbers are to be marked with an additional EU
letter code in the identification number. The recycling of packaging saves raw materials and lowers the amount
of waste. The used packaging materials do not contain illegal
substances.
Operating Instruction

Warranty
All changes to the product generally lead to exclusion of warranty.

Obvious defects must be immediately notified in writing to the seller upon delivery, within one week at the latest, but always before processing or installation, otherwise enforcement of a warranty claim is excluded. Punctual despatch is sufficient to comply with the deadline.

The seller must be given the opportunity to check on the premises. In the case of an authorised complaint, the seller can choose between an improvement and replacement delivery. If subsequent fulfillment is not successful, the buyer can choose between reducing the payment (reduction) and reversing the contract (withdrawal). The buyer is not entitled to withdraw from the contract in the case of a negligible contract breach; especially negligible defects.

If the buyer chooses to withdraw from the contract due to a legal or material defect after failed subsequent fulfilment, he is not entitled to additional claims to replacement of damages due to a defect.

If the buyer chooses replacement of damages after failed subsequent fulfilment, the goods remain with the buyer where feasible. Replacement of damages is restricted to the difference between the purchase price and the value of the defective item. This does not apply if the seller has caused a fraudulent breach of the contract.

Only the product description from the seller is generally agreed with respect to the properties of the goods. Public statements, promotions or advertising by the manufacturer do not represent contractual properties of the goods. If the buyer receives a faulty set of assembly instructions, the seller is only obliged to supply a correct set of instructions and only if the fault in the assembly instructions oppose correct assembly.

The warranty period is two years and begins upon delivery. The exchange and return of customised production items is generally excluded. The factory conditions in the manufacturing plant, which can be viewed by the ordering party on the seller’s premises at any time, apply to parts not produced and processes by the seller. Construction and installation parts are supplied according to the most recent status.

Life expectancy
Industrial shock absorbers are machine elements that are generally subject to wear and tear. Expendable parts such as seals, pressure parts and pistons are excluded from the general warranty. The wear of the seals essentially depends on the environmental conditions, the respective application and the use parameters.

This type of industrial shock absorber with a lip seal sealing system can generally expect an average service life of three to five million load cycles. Unfavourable environmental and use conditions can considerably reduce the expected service life.

Capacity Chart

<table>
<thead>
<tr>
<th>Type</th>
<th>Max. Energy Capacity W,Nm/Cycle</th>
<th>Effective Weight me</th>
<th>Measuring Force N</th>
<th>Measuring Force N</th>
<th>Rod Reset Time s</th>
<th>Max. Side Load Angle °</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC150EUM</td>
<td>10 43000</td>
<td>0.9 10</td>
<td>3 8</td>
<td>0.4 4</td>
<td></td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td>MC150EUMH</td>
<td>10 43000</td>
<td>8.6 86</td>
<td>3 8</td>
<td>0.4 4</td>
<td></td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td>MC150EUMH2</td>
<td>10 43000</td>
<td>181 408</td>
<td>3 8</td>
<td>1 4</td>
<td></td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td>MC225EUM</td>
<td>41 45000</td>
<td>2.3 25</td>
<td>4 9</td>
<td>0.3 4</td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>MC225EUMH</td>
<td>41 45000</td>
<td>230 230</td>
<td>4 9</td>
<td>0.3 4</td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>MC225EUMH2</td>
<td>41 45000</td>
<td>189 910</td>
<td>4 9</td>
<td>0.3 4</td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>MC225EUMH3</td>
<td>41 45000</td>
<td>816 1814</td>
<td>4 9</td>
<td>0.3 4</td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>MC600EUM</td>
<td>136 68000</td>
<td>9 136</td>
<td>5 10</td>
<td>0.6 2</td>
<td></td>
<td></td>
<td>0.26</td>
</tr>
<tr>
<td>MC600EUMH</td>
<td>136 68000</td>
<td>113 1130</td>
<td>5 10</td>
<td>0.6 2</td>
<td></td>
<td></td>
<td>0.26</td>
</tr>
<tr>
<td>MC600EUMH2</td>
<td>136 68000</td>
<td>400 2300</td>
<td>5 10</td>
<td>0.6 2</td>
<td></td>
<td></td>
<td>0.26</td>
</tr>
<tr>
<td>MC600EUMH3</td>
<td>136 68000</td>
<td>5177 4538</td>
<td>5 10</td>
<td>0.6 2</td>
<td></td>
<td></td>
<td>0.26</td>
</tr>
</tbody>
</table>

¹For applications with higher side load angles please contact ACE.

Technical Data

Impact velocity range: 0.06 m/s to 6 m/s (Depending on the hardness range)
Piston Rod Seal: Rolling diaphragm seal EPDM ethylene-propylene
Operating fluid: Silicone oil (Silicone-free type available on request)
Piston Rod: Hardened, stainless steel
Locknut: Steel with black oxide finish
Shock absorber body: Steel nitride hardened steel
Tightening torque Locknut: MC150EUM: 13 – 14 Nm MC225EUM: 27 – 30 Nm MC600EUM: 60 – 66 Nm
Operating temperature range: 0 °C to 66 °C