Low Friction Cylinders
Series MQ

Metal Seal Type

Compact Low Friction Cylinder
Series MQQ

<table>
<thead>
<tr>
<th>Series</th>
<th>Bore Size (mm)</th>
<th>Operating Pressure Range (MPa)</th>
<th>Actuation Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQQT</td>
<td>10</td>
<td>0.005 to 0.5</td>
<td>0.3 to 300</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQQL</td>
<td>20</td>
<td>0.005 to 0.7</td>
<td>0.5 to 500</td>
</tr>
</tbody>
</table>
| Lateral Load Resisting Low Friction Cylinder
Series MQM

<table>
<thead>
<tr>
<th>Series</th>
<th>Bore Size (mm)</th>
<th>Operating Pressure Range (MPa)</th>
<th>Actuation Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOML</td>
<td>ø6</td>
<td>0.02 to 0.7</td>
<td>0.5 to 1000</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQMLH</td>
<td>20</td>
<td>0.01 to 0.7</td>
<td>5 to 3000</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Low Friction Cylinder (Single Acting)
Series MQP

<table>
<thead>
<tr>
<th>Series</th>
<th>Bore Size (mm)</th>
<th>Operating Pressure Range (MPa)</th>
<th>Thrust Control Standard (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQP</td>
<td>ø4</td>
<td>0.001 to 0.7</td>
<td>0.01 to 8</td>
</tr>
<tr>
<td></td>
<td>ø6</td>
<td>(Except for moving parts mass)</td>
<td>0.03 to 19</td>
</tr>
<tr>
<td></td>
<td>ø10</td>
<td></td>
<td>0.08 to 50</td>
</tr>
<tr>
<td></td>
<td>ø16</td>
<td></td>
<td>0.20 to 140</td>
</tr>
<tr>
<td></td>
<td>ø20</td>
<td></td>
<td>0.30 to 200</td>
</tr>
</tbody>
</table>
Low pressure actuation

Minimal sliding resistance allows low pressure actuation at 0.005 MPa.

- Contact SMC regarding vacuum applications.

Long service life

Long service life of 10,000 km or 100 million full cycles.

- Rod: Carbon steel (chrome plated)
  (Metal seal)
- Sleeve: Special stainless steel
  (Metal seal)
- Piston: Special stainless steel
  (Metal seal)

Metal seal structure with low sliding speed and an output control, which

Smooth, uniform speed actuation ranges as low as 0.3 mm/s.

Lateral load resistance increased by built-in ball bushing

- MQQT type made of fluoro resin.

Patented floating mechanism facilitates stable operating resistance without galling due to shaft slippage.

Low friction

Low sliding resistance and high stability allow force control as low as 0.05 N. (Based on cylinder Piston area x Pressure accuracy)
No increased sliding resistance after not operating for a long period of time.

Series Variation

Series MQQ
Compact low friction cylinders designed for low pressure, low speed, uniform speed or low friction applications

<table>
<thead>
<tr>
<th>Series</th>
<th>Bore size (mm)</th>
<th>Stroke (mm)</th>
<th>Operating pressure range (MPa)</th>
<th>Actuation speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQQT</td>
<td>10</td>
<td>15 30 45 60 75 100</td>
<td>0.005 to 0.5</td>
<td>0.3 to 300</td>
</tr>
<tr>
<td>Standard type</td>
<td>16</td>
<td>15 30 45 60 75 100</td>
<td>0.005 to 0.7</td>
<td>0.5 to 500</td>
</tr>
<tr>
<td>MQQ</td>
<td>20</td>
<td>15 30 45 60 75 100</td>
<td>0.005 to 0.7</td>
<td>0.5 to 500</td>
</tr>
<tr>
<td>MQQL</td>
<td>25</td>
<td>15 30 45 60 75 100</td>
<td>0.005 to 0.7</td>
<td>0.5 to 500</td>
</tr>
<tr>
<td>Lateral load resisting type (Built-in ball bushing)</td>
<td>30</td>
<td>15 30 45 60 75 100</td>
<td>0.005 to 0.7</td>
<td>0.5 to 500</td>
</tr>
<tr>
<td>MQML</td>
<td>40</td>
<td>15 30 45 60 75 100</td>
<td>0.005 to 0.7</td>
<td>0.5 to 500</td>
</tr>
</tbody>
</table>

Series MQM
Lateral load resisting low friction cylinders for low pressure, low speed, uniform speed, low friction high pressure, high speed and high speed response (high frequency) actuation

<table>
<thead>
<tr>
<th>Series</th>
<th>Bore size (mm)</th>
<th>Stroke (mm)</th>
<th>Operating pressure range (MPa)</th>
<th>Actuation speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQML</td>
<td>6 (standard only)</td>
<td>15 30 45 60 75 100</td>
<td>0.02 to 0.7 (ø10 to ø25: 0.005 to 0.2)</td>
<td>5 to 1000</td>
</tr>
<tr>
<td>Standard type</td>
<td>10</td>
<td>15 30 45 60 75 100</td>
<td>0.02 to 0.7 (ø10 to ø25: 0.005 to 0.2)</td>
<td>5 to 1000</td>
</tr>
<tr>
<td>MQMLH</td>
<td>16</td>
<td>15 30 45 60 75 100</td>
<td>0.02 to 0.7 (ø10 to ø25: 0.005 to 0.2)</td>
<td>5 to 1000</td>
</tr>
<tr>
<td>High speed/frequency</td>
<td>20</td>
<td>15 30 45 60 75 100</td>
<td>0.01 to 0.7</td>
<td>5 to 3000</td>
</tr>
<tr>
<td>MQML</td>
<td>25</td>
<td>15 30 45 60 75 100</td>
<td>0.01 to 0.7</td>
<td>5 to 3000</td>
</tr>
</tbody>
</table>
Recommended Circuit Examples

**Example 1)** Uniform & low speed actuation (no control of cylinder output)

- When using a solenoid valve, use a metal seal type (Series VQ, VQZ, SQ, etc.).

**Example 2)** Low speed with output control

- When performing control of cylinder output, do not create a restriction circuit using a speed controller, etc. Pressure inside the cylinder will drop and control will become impossible. Always control actuation by means of pressure control.

**Example 3)** High speed & high frequency actuation

- When using a solenoid valve, use a metal seal type (Series VQ, VQZ, SQ, etc.).

---

**High speed, High frequency actuation**

H type achieves speeds up to 3,000 mm/s (without fixed orifice), and continuous actuation up to 50 cycles per second. (MQML/□□□□□□□□□□)

*Refer to page 1191 for kinetic energy.*
Low Friction Cylinder
Series MQP
Fully covers a pressure force

No lurching
Even extremely small degree lurching such as 0.01 mm does not occur. A special air supply, such as for static bearings, is not required.

No piston
Sliding resistance is drastically decreased because the piston and the rod share the same shaft.

Special single acting/Piston retraction by external force
External force
For force control

Reduced thrust dispersion
Dispersion of piston diameter: 3 μm or less
Readjusting thrust is not necessary when the cylinder is replaced. Dispersion of thrust does not occur even more than one cylinder is connected to the same circuit, either. (Depends on the operation environment.)

Low friction and soft-touching
Possible to control the output in increments of 0.01 N. (Depends on the piston area of a cylinder x pressure accuracy) In addition, sliding resistance does not change after periods of non-operation.

High-precision linear control
Delicate and precise linear movement control is possible.

Series MQP
Low friction cylinder suitable for low friction, force control.

<table>
<thead>
<tr>
<th>Bore size [mm] (Pressure receiving diameter)</th>
<th>Stroke [mm]</th>
<th>Operating pressure range [MPa]</th>
<th>Mass of moving parts [g]</th>
<th>Thrust control standard [N]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø 4</td>
<td>10</td>
<td>0.001 to 0.7</td>
<td>4</td>
<td>0.01 to 8</td>
</tr>
<tr>
<td>ø 6</td>
<td></td>
<td>(Excluding the mass of moving parts)</td>
<td>8</td>
<td>0.03 to 19</td>
</tr>
<tr>
<td>ø10</td>
<td></td>
<td></td>
<td>24</td>
<td>0.08 to 50</td>
</tr>
<tr>
<td>ø16</td>
<td></td>
<td></td>
<td>62</td>
<td>0.20 to 140</td>
</tr>
<tr>
<td>ø20</td>
<td></td>
<td></td>
<td>103</td>
<td>0.30 to 200</td>
</tr>
</tbody>
</table>
Application Examples: For force control responding to a slight pressure fluctuation

**Control range of 0.01 N to 200 N**

**Application Examples**

1. **Inspection and mounting of an electronic component**
   - **Coil winding**
   - **High-precision linear control**
   - **Constant load**
   - **Coil spool**

   Using two MQP cylinders can improve the thrusting accuracy of an MQQ and/or MQM double acting metal cylinder. Additionally, equal strength of both extension and retracting thrust can be obtained.

**Recommended Circuit Examples**

1) **Normal operation**
   - **VQ100 series Direct operated (3 port solenoid valve)**
   - **Mist separator (0.01 μm or less)**
   - **Air filter (5 μm or less)**

2) **Soft-touch operation**
   - **Mist separator (0.3 μm or less)**

**Example 1)**
- **Normal operation**
- **Example 2)**
- **Soft-touch operation**

1) When using a solenoid valve, SMC recommends you use the VQ100 series in which the lubricant in the main valve will not flow out.
2) Do not use a speed controller in the circuit. If it is used, accurate thrust control may not be possible because the internal pressure of a cylinder will drop. Be sure to employ pressure control for control operations.

**Made to Order**
- Vacuum retraction cylinder
- Single acting, spring return type (Built-in springs)
- No exterior leakage (For clean rooms)
- Tubing with a maximum of ø40 (I.D.) is available.
Compact Low Friction Cylinder

Series MQQ

\(\phi 10, \phi 16, \phi 20, \phi 25, \phi 30, \phi 40\)

How to Order

**MQQ**

- **Type**
  - T: Standard type
  - L: Lateral load resisting type (Built-in ball bushing)
- **Mounting**
  - B: Through hole & Double end tapped (Standard)
  - L: Foot type
  - F: Rod side flange type
  - G: Head side flange type
  - D (Note): Double clevis type

**Bore size**
- 10 mm
- 16 mm
- 20 mm
- 25 mm
- 30 mm
- 40 mm

**Port thread type**
- Nil
- M thread
- Rc
- TN (NPT)
- TF (G)

- **Cylinder stroke**

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Standard stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10, 20, 30, 40</td>
</tr>
<tr>
<td>16</td>
<td>10, 20, 30, 40, 50, 60</td>
</tr>
<tr>
<td>20</td>
<td>10, 20, 30, 40, 50, 60</td>
</tr>
<tr>
<td>25</td>
<td>10, 20, 30, 40, 50, 75, 100</td>
</tr>
<tr>
<td>30</td>
<td>10, 20, 30, 40, 50, 75, 100</td>
</tr>
<tr>
<td>40</td>
<td>10, 20, 30, 40, 50, 75, 100</td>
</tr>
</tbody>
</table>

- **Action**
  - D: Double acting

- **Body option**
  - Nil: Standard (Rod end female thread)
  - M (Note): Rod end male thread

- **Foot**
  - Rod end thread adapter is attached.
  - A: Rod end thread adapter is shipped being assembled.

**Body option**

- Nil: Standard (Rod end female thread)
- M (Note): Rod end male thread

- **Mounting Bracket Part No.**

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Foot (Note 1)</th>
<th>Flange</th>
<th>Double clevis</th>
<th>Rod end thread adapter (with nut)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>CQS-L016</td>
<td>CQS-F016</td>
<td>CQS-D016</td>
<td>MQ10-M</td>
</tr>
<tr>
<td>16</td>
<td>CQS-L020</td>
<td>CQS-F020</td>
<td>CQS-D020</td>
<td>MQ16-M</td>
</tr>
<tr>
<td>20</td>
<td>CQS-L025</td>
<td>CQS-F025</td>
<td>CQS-D025</td>
<td>MQ20-M</td>
</tr>
<tr>
<td>25</td>
<td>MQ-L032</td>
<td>MQ-F032</td>
<td>MQ-D032</td>
<td>MQ25-M</td>
</tr>
<tr>
<td>30</td>
<td>MQ-L040</td>
<td>MQ-F040</td>
<td>MQ-D040</td>
<td>MQ29-M</td>
</tr>
<tr>
<td>40</td>
<td>CQ-L050</td>
<td>CQ-F050</td>
<td>MQ-D050</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** When ordering a foot bracket, order 2 pcs. for each cylinder.

**Note 2:** The following parts are included with a bracket respectively.
- Foot, Flange: Body mounting bolts
- Double clevis: Clevis pin, C type retaining ring for shaft, Body mounting bolts

* The MQQ series is not auto switch capable.
### Compact Low Friction Cylinder

#### Metal Seal Series MQQ

#### Specifications: Standard Type/MQQT

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>10</th>
<th>16</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal construction</td>
<td>Metal seal</td>
<td>Double acting, Single rod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.05 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>0.5 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum operating pressure</td>
<td>0.005 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambiant and fluid temperature</td>
<td>–10 to 80°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cushion</td>
<td>Rubber bumper (Standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubrication</td>
<td>Not required (Non-lube)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rod end thread</td>
<td>Female thread</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke length tolerance</td>
<td>–0.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston speed</td>
<td>0.3 to 300 mm/s (Refer to page 1190.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Specifications: Lateral Load Resisting Type/MQQL

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>10</th>
<th>16</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal construction</td>
<td>Metal seal</td>
<td>Double acting, Single rod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.05 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>0.7 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum operating pressure</td>
<td>0.005 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambiant and fluid temperature</td>
<td>–10 to 80°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cushion</td>
<td>Rubber bumper (Standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubrication</td>
<td>Not required (Non-lube)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rod end thread</td>
<td>Female thread</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke length tolerance</td>
<td>–0.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston speed</td>
<td>0.5 to 500 mm/s (Refer to page 1190.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Theoretical Output

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Rod size (mm)</th>
<th>Direction</th>
<th>Piston area (mm²)</th>
<th>Operating pressure (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>6</td>
<td>IN</td>
<td>50.3</td>
<td>0.1</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
<td>OUT</td>
<td>78.5</td>
<td>0.2</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
<td>IN</td>
<td>196.1</td>
<td>0.3</td>
</tr>
<tr>
<td>25</td>
<td>12</td>
<td>IN</td>
<td>377.8</td>
<td>0.4</td>
</tr>
<tr>
<td>30</td>
<td>16</td>
<td>OUT</td>
<td>490.9</td>
<td>0.5</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
<td>OUT</td>
<td>706.9</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN</td>
<td>1055.6</td>
<td>0.7</td>
</tr>
</tbody>
</table>

### Mass: Standard Type/MQQT

#### Unit: g

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Cylinder stroke (mm)</th>
<th>Mass (Standard Type/MQQT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>94</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
<td>166</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
<td>228</td>
</tr>
<tr>
<td>25</td>
<td>10</td>
<td>395</td>
</tr>
<tr>
<td>30</td>
<td>10</td>
<td>479</td>
</tr>
<tr>
<td>40</td>
<td>10</td>
<td>728</td>
</tr>
</tbody>
</table>

### Mass: Lateral Load Resisting Type/MQQL (Built-in Ball Bushing)

#### Unit: g

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Cylinder stroke (mm)</th>
<th>Mass (Lateral Load Resisting Type/MQQL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>148</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
<td>284</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
<td>383</td>
</tr>
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<td>25</td>
<td>10</td>
<td>552</td>
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<td>30</td>
<td>10</td>
<td>911</td>
</tr>
<tr>
<td>40</td>
<td>10</td>
<td>1337</td>
</tr>
</tbody>
</table>
**Series MQQ**

**Construction**

Standard type: MQQT

![Diagram of MQQT type]

Lateral load resisting type: MQQL (Built-in ball bushing)

![Diagram of MQQL type]

**Component Parts**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rod</td>
<td>Carbon steel</td>
<td>Hard chrome plated</td>
</tr>
<tr>
<td>2</td>
<td>Piston</td>
<td>Special stainless steel</td>
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<tr>
<td>3</td>
<td>Liner</td>
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<td>Sleeve</td>
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<td>Sleeve retainer</td>
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<td>6</td>
<td>Plate</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
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<td>O-ring</td>
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<td>Retaining ring</td>
<td>Carbon tool steel</td>
<td>Nickel plated</td>
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<tr>
<td>15</td>
<td>Bolt</td>
<td>Carbon tool steel</td>
<td>Nickel plated</td>
</tr>
<tr>
<td>16</td>
<td>Ball bushing</td>
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</table>
Mounting

Mounting bolts

a) Mounting type A (when using the mounting plate threads)

![Mounting type A diagram]

Note: Be sure to use a flat washer for the A type mounting.

b) Mounting type B (when using the cylinder tube threads)

![Mounting type B diagram]

Compatible Mounting Bolt Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Mounting type A</th>
<th>Mounting type B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mounting bolt size</td>
<td>C (mm)</td>
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<td>M3 x 0.5</td>
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<td>MQQTB16-D</td>
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<td>MQQTB20-D</td>
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<tr>
<td>MQQTB30-D</td>
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<td>MQQTB40-D</td>
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MQQL: (Built-in ball bushing)
Series MQQ

Dimensions

Standard type (Through hole & Double end tapped): MQQT B

\( \alpha 10, \alpha 16, \alpha 20 \)

\( 2 \times 4 \times \alpha OB \)

Depth of counterbore RB

\( 2 \times 4 \times \alpha OA \) effective depth RA

\( H \) effective thread depth C

\( 2 \times M5 \times 0.8 \)

\( \alpha 25, \alpha 30, \alpha 40 \)

\( 2 \times 4 \times \alpha OB \)

Depth of counterbore RB

\( 2 \times 4 \times \alpha OA \) effective depth RA

\( H \) effective thread depth C

Note) (): Rod end dimensions

With rod end male thread: MQQ□□□DM

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Stroke range (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D(ine)</th>
<th>E</th>
<th>F</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>OA</th>
<th>OB</th>
<th>P</th>
<th>Q</th>
<th>RA</th>
<th>RB</th>
<th>W</th>
<th>Y</th>
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<td>10 to 40</td>
<td>39.5</td>
<td>31.5</td>
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<td>6 (5.8)</td>
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<td>8</td>
<td>20</td>
<td>3.5</td>
<td>M4 x 0.7</td>
<td>6.5</td>
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<td>—</td>
<td>14.5</td>
<td>7</td>
<td>4</td>
<td>—</td>
</tr>
<tr>
<td>16</td>
<td>10 to 60</td>
<td>44</td>
<td>34</td>
<td>8</td>
<td>8 (7.8)</td>
<td>36</td>
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<td>M4 x 0.7</td>
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<td>—</td>
<td>18</td>
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<td>20</td>
<td>10 to 60</td>
<td>47.5</td>
<td>37.5</td>
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<td>10 (9.8)</td>
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<td>—</td>
<td>19.5</td>
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<tr>
<td>25</td>
<td>10 to 50, 75, 100</td>
<td>54</td>
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<td>12 (11.8)</td>
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<td>23</td>
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<td>7</td>
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<td>M8 x 1.25</td>
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<td>7</td>
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<tr>
<td>40</td>
<td>10 to 50, 75, 100</td>
<td>62</td>
<td>50</td>
<td>13</td>
<td>16 (15.8)</td>
<td>64</td>
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<td>M8 x 1.25</td>
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<td>14</td>
<td>8</td>
<td>71</td>
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</tbody>
</table>

Note) (): Rod end dimensions

With rod end male thread: MQQ□□□DM

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>L1</th>
<th>C1</th>
<th>H1</th>
<th>X</th>
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<tbody>
<tr>
<td>10</td>
<td>23.5</td>
<td>10.5</td>
<td>M5 x 0.8</td>
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<tr>
<td>16</td>
<td>26.5</td>
<td>11.5</td>
<td>M6 x 1.0</td>
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<td>20</td>
<td>28.5</td>
<td>13.5</td>
<td>M8 x 1.25</td>
<td>18.5</td>
</tr>
<tr>
<td>25</td>
<td>34.5</td>
<td>16.5</td>
<td>M10 x 1.25</td>
<td>22.5</td>
</tr>
<tr>
<td>30</td>
<td>40.5</td>
<td>22.5</td>
<td>M14 x 1.5</td>
<td>28.5</td>
</tr>
<tr>
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<td>40.5</td>
<td>22.5</td>
<td>M14 x 1.5</td>
<td>28.5</td>
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</tbody>
</table>

* Refer to page 1180 for details regarding the rod end thread adapter and the rod end nut.
Foot type: MQQTL
\(\varnothing 10, \varnothing 16, \varnothing 20\)

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Stroke range (mm)</th>
<th>A</th>
<th>B</th>
<th>L</th>
<th>LD</th>
<th>LG</th>
<th>LH</th>
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<td>10 to 40</td>
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<td>16</td>
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<td>6.6</td>
<td>4</td>
<td>24</td>
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<tr>
<td>20</td>
<td>10 to 60</td>
<td>54.7</td>
<td>37.5</td>
<td>10</td>
<td>6.6</td>
<td>4</td>
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</tr>
<tr>
<td>25</td>
<td>10 to 50,75,100</td>
<td>61.2</td>
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<td>6.6</td>
<td>4</td>
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<td>10 to 50,75,100</td>
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<td>33</td>
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<td>10 to 50,75,100</td>
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<td>5</td>
<td>39</td>
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</table>

Rod side flange type: MQQTF
\(\varnothing 10, \varnothing 16, \varnothing 20\)

<table>
<thead>
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<th>Bore size (mm)</th>
<th>Stroke range (mm)</th>
<th>A</th>
<th>B</th>
<th>L</th>
<th>FD</th>
<th>FT</th>
<th>FV</th>
<th>FX</th>
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<td>10 to 40</td>
<td>49.5</td>
<td>31.5</td>
<td>4.5</td>
<td>5.5</td>
<td>30</td>
<td>45</td>
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<tr>
<td>16</td>
<td>10 to 60</td>
<td>54</td>
<td>34</td>
<td>6.6</td>
<td>8</td>
<td>39</td>
<td>48</td>
<td></td>
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<tr>
<td>20</td>
<td>10 to 60</td>
<td>57.5</td>
<td>37.5</td>
<td>6.6</td>
<td>8</td>
<td>42</td>
<td>52</td>
<td></td>
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<tr>
<td>25</td>
<td>10 to 50,75,100</td>
<td>64</td>
<td>42</td>
<td>5.5</td>
<td>8</td>
<td>48</td>
<td>56</td>
<td></td>
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<tr>
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<td>10 to 50,75,100</td>
<td>70.5</td>
<td>48.5</td>
<td>5.5</td>
<td>8</td>
<td>54</td>
<td>62</td>
<td></td>
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<tr>
<td>40</td>
<td>10 to 50,75,100</td>
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<td>50</td>
<td>6.6</td>
<td>9</td>
<td>67</td>
<td>76</td>
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</table>

Head side flange type: MQQTG
\(\varnothing 10, \varnothing 16, \varnothing 20\)
\(\varnothing 25, \varnothing 30, \varnothing 40\)

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Stroke range (mm)</th>
<th>A</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10 to 40</td>
<td>45</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>10 to 60</td>
<td>52</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>10 to 60</td>
<td>55.5</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>10 to 50,75,100</td>
<td>62</td>
<td>12</td>
</tr>
<tr>
<td>30</td>
<td>10 to 50,75,100</td>
<td>68.5</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>10 to 50,75,100</td>
<td>70</td>
<td>12</td>
</tr>
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</table>

(Dimensions other than A and L are the same as the rod side flange type.)
Series MQQ

Dimensions

Lateral load resisting type (Through hole & Double end tapped): MQQLB
\( \phi 10, \phi 16, \phi 20 \)

\( \phi 25, \phi 30, \phi 40 \)

With rod end male thread: MQQ\( \Omega \)DM

---

### Table: Bore size and Stroke range (mm)

| Bore size (mm) | Stroke range (mm) | A | B | C | D | H | I | J | K | L | M | N | OA | OB | P | Q | RA | RB | W | Y |
| 10            | 10 to 40          | 69.5| 61.5| 6 | 6 (5.8) | 29 | 9 | M3 x 0.5 | 38 | --- | 5 | 8 | 20 | 3.5 | M4 x 0.7 | 6.5 | --- | --- | 39.5 | 7 | 4 | --- | 5 |
| 16            | 10 to 60          | 80.5| 70.5| 8 | 8 (7.8) | 36 | 11.5 | M4 x 0.7 | 47 | --- | 7 | 10 | 25.5 | 5.4 | M6 x 1.0 | 9 | --- | --- | 48.5 | 10 | 7 | --- | 5 |
| 20            | 10 to 60          | 89 | 79 | 9 | 10 (9.8) | 40 | 12 | M5 x 0.8 | 52 | --- | 8 | 10 | 28 | 5.4 | M6 x 1.0 | 9 | --- | --- | 55 | 10 | 7 | --- | 6 |
| 25            | 10 to 50, 75, 100 | 96.5| 84.5| 12 | 12 (11.8) | 45 | 13.5 | M6 x 1.0 | 60 | 4.5 | 10 | 12 | 34 | 5.5 | M8 x 1.0 | 9 | R1/8 | NPT 1/8 | G1/8 | 58 | 10 | 48.5 | 7 |
| 30            | 10 to 50, 75, 100 | 116| 104| 13 | 16 (15.8) | 52 | 17.5 | M8 x 1.25 | 69 | 5 | 14 | 12 | 40 | 5.5 | M8 x 1.0 | 9 | R1/8 | NPT 1/8 | G1/8 | 71 | 10 | 7 | 57 | 10 |
| 40            | 10 to 50, 75, 100 | 116| 104| 13 | 16 (15.8) | 64 | 17.5 | M8 x 1.25 | 86 | 7 | 14 | 12 | 50 | 6.6 | M8 x 1.25 | 11 | R1/8 | NPT 1/4 | G1/4 | 71 | 14 | 8 | 71 | 10 |

Note) (): Rod end dimensions

---

With rod end male thread: MQQ\( \Omega \)DM

### Table: Bore size (mm)

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>L1</th>
<th>C1</th>
<th>H1</th>
<th>X</th>
</tr>
</thead>
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<tr>
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<td>23.5</td>
<td>10.5</td>
<td>M5 x 0.8</td>
<td>15.5</td>
</tr>
<tr>
<td>16</td>
<td>26.5</td>
<td>11.5</td>
<td>M6 x 1.0</td>
<td>16.5</td>
</tr>
<tr>
<td>20</td>
<td>28.5</td>
<td>13.5</td>
<td>M8 x 1.25</td>
<td>18.5</td>
</tr>
<tr>
<td>25</td>
<td>34.5</td>
<td>16.5</td>
<td>M10 x 1.25</td>
<td>22.5</td>
</tr>
<tr>
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<td>40.5</td>
<td>22.5</td>
<td>M14 x 1.5</td>
<td>28.5</td>
</tr>
<tr>
<td>40</td>
<td>40.5</td>
<td>22.5</td>
<td>M14 x 1.5</td>
<td>28.5</td>
</tr>
</tbody>
</table>

* Refer to page 1180 for details regarding the rod end thread adapter and the rod end nut.
**Compact Low Friction Cylinder**  
**Metal Seal Series MQQ**

**Foot type: MQQLL**  
\( \varnothing 10, \varnothing 16, \varnothing 20 \)

**Bore size (mm)**  
<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Stroke range (mm)</th>
<th>A</th>
<th>B</th>
<th>L</th>
<th>LD</th>
<th>LG</th>
<th>LH</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10 to 40</td>
<td>74.3</td>
<td>61.5</td>
<td>8</td>
<td>4.5</td>
<td>2.8</td>
<td>19</td>
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<tr>
<td>16</td>
<td>10 to 60</td>
<td>87.7</td>
<td>70.5</td>
<td>10</td>
<td>6.6</td>
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<td>20</td>
<td>10 to 60</td>
<td>96.2</td>
<td>79</td>
<td>10</td>
<td>6.6</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>25</td>
<td>10 to 50,75,100</td>
<td>103.7</td>
<td>84.5</td>
<td>12</td>
<td>6.6</td>
<td>4</td>
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</tr>
<tr>
<td>30</td>
<td>10 to 50,75,100</td>
<td>123.2</td>
<td>104</td>
<td>12</td>
<td>6.6</td>
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<td>35</td>
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<tr>
<td>40</td>
<td>10 to 50,75,100</td>
<td>124.2</td>
<td>104</td>
<td>12</td>
<td>9</td>
<td>5</td>
<td>39</td>
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</table>

**Rod side flange type: MQQLF**  
\( \varnothing 25, \varnothing 30, \varnothing 40 \)

**Bore size (mm)**  
<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Stroke range (mm)</th>
<th>L</th>
<th>FT</th>
<th>A</th>
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<tbody>
<tr>
<td>10</td>
<td>10 to 40</td>
<td>79.5</td>
<td>61.5</td>
<td>4.5</td>
</tr>
<tr>
<td>16</td>
<td>10 to 60</td>
<td>90.5</td>
<td>70.5</td>
<td>6.6</td>
</tr>
<tr>
<td>20</td>
<td>10 to 60</td>
<td>99</td>
<td>79</td>
<td>6.6</td>
</tr>
<tr>
<td>25</td>
<td>10 to 50,75,100</td>
<td>106.5</td>
<td>84.5</td>
<td>5.5</td>
</tr>
<tr>
<td>30</td>
<td>10 to 50,75,100</td>
<td>126</td>
<td>104</td>
<td>5.5</td>
</tr>
<tr>
<td>40</td>
<td>10 to 50,75,100</td>
<td>128</td>
<td>104</td>
<td>6.6</td>
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</tbody>
</table>

**Head side flange type: MQQLG**  
\( \varnothing 10, \varnothing 16, \varnothing 20 \)

**Bore size (mm)**  
<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Stroke range (mm)</th>
<th>A</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10 to 40</td>
<td>75</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>10 to 60</td>
<td>88.5</td>
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</tr>
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<td>20</td>
<td>10 to 60</td>
<td>97</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>10 to 50,75,100</td>
<td>104.5</td>
<td>12</td>
</tr>
<tr>
<td>30</td>
<td>10 to 50,75,100</td>
<td>124</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>10 to 50,75,100</td>
<td>124</td>
<td>12</td>
</tr>
</tbody>
</table>

**Double clevis type: MQQLD**

**Bore size (mm)**  
<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>CX</th>
<th>CZ</th>
<th>L</th>
<th>RR</th>
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<tbody>
<tr>
<td>10</td>
<td>15</td>
<td>6.5</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>18</td>
<td>8</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>8</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>20</td>
<td>18</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>30</td>
<td>22</td>
<td>18</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>28</td>
<td>22</td>
<td>44</td>
<td>12</td>
</tr>
</tbody>
</table>
Series MQQ

Accessory Dimensions

Rod end thread adapter

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQ10-M</td>
<td>10</td>
<td>20.5</td>
<td>8</td>
<td>9.2</td>
<td>6</td>
<td>15.5</td>
<td>5</td>
</tr>
<tr>
<td>MQ16-M</td>
<td>16</td>
<td>22.5</td>
<td>8</td>
<td>9.2</td>
<td>8</td>
<td>16.5</td>
<td>6</td>
</tr>
<tr>
<td>MQ20-M</td>
<td>20</td>
<td>24.5</td>
<td>8</td>
<td>9.2</td>
<td>10</td>
<td>18.5</td>
<td>6</td>
</tr>
<tr>
<td>MQ25-M</td>
<td>25</td>
<td>33.5</td>
<td>10</td>
<td>11.5</td>
<td>12</td>
<td>22.5</td>
<td>11</td>
</tr>
<tr>
<td>MQ28-M</td>
<td>30, 40</td>
<td>40.5</td>
<td>14</td>
<td>16</td>
<td>16</td>
<td>28.5</td>
<td>12</td>
</tr>
</tbody>
</table>

Rod end nut

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>B</th>
<th>C</th>
<th>d</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTJ-015A</td>
<td>10</td>
<td>8</td>
<td>9.2</td>
<td>M5 x 0.8</td>
<td>4</td>
</tr>
<tr>
<td>NT-015A</td>
<td>16</td>
<td>10</td>
<td>11.5</td>
<td>M6 x 1.0</td>
<td>5</td>
</tr>
<tr>
<td>NT-02</td>
<td>20</td>
<td>13</td>
<td>15</td>
<td>M8 x 1.25</td>
<td>5</td>
</tr>
<tr>
<td>NT-03</td>
<td>25</td>
<td>17</td>
<td>19.6</td>
<td>M10 x 1.25</td>
<td>6</td>
</tr>
<tr>
<td>NT-04</td>
<td>30, 40</td>
<td>22</td>
<td>25.4</td>
<td>M14 x 1.5</td>
<td>8</td>
</tr>
</tbody>
</table>

Clevis pin

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>H</th>
<th>MM</th>
<th>NN</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQ10-M</td>
<td>10</td>
<td>10.5</td>
<td>M5 x 0.8</td>
<td>M3 x 0.5</td>
</tr>
<tr>
<td>MQ16-M</td>
<td>16</td>
<td>11.5</td>
<td>M6 x 1.0</td>
<td>M4 x 0.7</td>
</tr>
<tr>
<td>MQ20-M</td>
<td>20</td>
<td>13.5</td>
<td>M8 x 1.25</td>
<td>M5 x 0.8</td>
</tr>
<tr>
<td>MQ25-M</td>
<td>25</td>
<td>16.5</td>
<td>M10 x 1.25</td>
<td>M8 x 1.0</td>
</tr>
<tr>
<td>MQ28-M</td>
<td>30, 40</td>
<td>22.5</td>
<td>M14 x 1.5</td>
<td>M8 x 1.25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>Dd9</th>
<th>L</th>
<th>d</th>
<th>l</th>
<th>m</th>
<th>t</th>
<th>Applicable retaining ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-J015</td>
<td>10</td>
<td>5</td>
<td>16.6</td>
<td>4.8</td>
<td>12.2</td>
<td>1.5</td>
<td>0.7</td>
<td>C type 5 for shaft</td>
</tr>
<tr>
<td>IV-G02</td>
<td>16</td>
<td>8</td>
<td>21</td>
<td>7.6</td>
<td>16.2</td>
<td>1.5</td>
<td>0.9</td>
<td>C type 8 for shaft</td>
</tr>
<tr>
<td>IV-G03</td>
<td>20</td>
<td>10</td>
<td>25.6</td>
<td>9.6</td>
<td>20.2</td>
<td>1.55</td>
<td>1.15</td>
<td>C type 10 for shaft</td>
</tr>
<tr>
<td>IV-G04</td>
<td>25, 30</td>
<td>10</td>
<td>41.6</td>
<td>9.6</td>
<td>36.2</td>
<td>1.55</td>
<td>1.15</td>
<td>C type 10 for shaft</td>
</tr>
<tr>
<td>IV-G05</td>
<td>40</td>
<td>14</td>
<td>50.6</td>
<td>13.4</td>
<td>44.2</td>
<td>2.05</td>
<td>1.15</td>
<td>C type 14 for shaft</td>
</tr>
</tbody>
</table>
## Lateral Load Resisting Low Friction Cylinder

### Series MQM

**Metal Seal**

**How to Order**

### Lateral load resisting low friction specification

<table>
<thead>
<tr>
<th>Type</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Basic type</td>
</tr>
<tr>
<td>L</td>
<td>Foot type</td>
</tr>
<tr>
<td>F</td>
<td>Rod side flange type</td>
</tr>
<tr>
<td>G</td>
<td>Head side flange type (Except for ø6)</td>
</tr>
<tr>
<td>C</td>
<td>Single clevis type (Non-integrated type)</td>
</tr>
<tr>
<td>D</td>
<td>Double clevis type</td>
</tr>
</tbody>
</table>

**Note 1)** Bore size: 20, 25 mm only

- Mounting brackets are included when shipped, but unassembled. (Except for clevis type.)
- Note 2) ø6, ø10, ø16 .......... Integrated type
- ø20, ø25 .......... Non-integrated type

### Cylinder stroke

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Standard stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>15, 30, 45, 60</td>
</tr>
<tr>
<td>10</td>
<td>15, 30, 45, 60, 75, 100</td>
</tr>
<tr>
<td>16</td>
<td>15, 30, 45, 60, 75, 100</td>
</tr>
<tr>
<td>20</td>
<td>15, 30, 45, 60, 75, 100</td>
</tr>
<tr>
<td>25</td>
<td>15, 30, 45, 60, 75, 100</td>
</tr>
</tbody>
</table>

* Strokes are available in 1mm increments by installing spacers in standard stroke cylinders.

### Port thread type

<table>
<thead>
<tr>
<th>Function</th>
<th>Nil</th>
<th>Standard type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>D Double acting</td>
<td></td>
</tr>
<tr>
<td>Note 1)</td>
<td>Standard type</td>
<td></td>
</tr>
<tr>
<td>Note 2)</td>
<td>High speed/High frequency type (Without fixed orifice)</td>
<td></td>
</tr>
<tr>
<td>Note 3)</td>
<td>Standard type</td>
<td></td>
</tr>
</tbody>
</table>

### Mounting Style/Accessories

<table>
<thead>
<tr>
<th>Mounting bracket</th>
<th>Lateral load resisting low friction specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting nut</td>
<td>Note 1) Mounting nut is not included with the integral clevis, single clevis and double clevis types.</td>
</tr>
<tr>
<td>Rod end nut</td>
<td>Note 2) Pin and retaining ring are packed with the double clevis type.</td>
</tr>
<tr>
<td>Clevis pin</td>
<td>Note 3) T-bracket is applicable to the double clevis type (D).</td>
</tr>
<tr>
<td>T-bracket</td>
<td>With pin</td>
</tr>
</tbody>
</table>

### Mounting Bracket Part No.

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Foot</th>
<th>Flange</th>
<th>Single clevis</th>
<th>Double clevis (with pin)</th>
<th>T-bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>CJK-L016B</td>
<td>CJK-F016B</td>
<td>—</td>
<td>—</td>
<td>CJ-J016B</td>
</tr>
<tr>
<td>10</td>
<td>MQM-L010</td>
<td>CJK-F016B</td>
<td>—</td>
<td>—</td>
<td>CJ-J016B</td>
</tr>
<tr>
<td>16</td>
<td>MQM-L016</td>
<td>CLJ-F016B</td>
<td>—</td>
<td>—</td>
<td>CJ-J016B</td>
</tr>
<tr>
<td>20</td>
<td>CM-L020B</td>
<td>CM-F020B</td>
<td>CM-C020B</td>
<td>CM-D020B</td>
<td>—</td>
</tr>
<tr>
<td>25</td>
<td>CM-L032B</td>
<td>CM-F032B</td>
<td>CM-C032B</td>
<td>CM-D032B</td>
<td>—</td>
</tr>
</tbody>
</table>

**Note 1-1)** Bore size 6 mm:
- 1 foot bracket is included.
- When ordering foot brackets, order 1 piece per a cylinder unit.

**Note 1-2)** Bore size other than 6 mm (10, 16, 20 and 25 mm) (Same as Series CM):
- 2 foot brackets and 1 mounting nut (1 set) are used for a cylinder unit.
- When ordering foot brackets, order 2 pieces per a cylinder unit (shipped as a set).

**Note 2)** Clevis pin and retaining ring are included in package.

**Note 3)** T-bracket is applicable to the double clevis type (D).
### Series MQM

#### Specifications

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>6</th>
<th>10</th>
<th>16</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal construction</td>
<td>Metal seal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>Double acting, Single rod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.05 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>0.7 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum operating pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>-10 to 80°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cushion</td>
<td>Rubber bumper (Standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubrication Note 2)</td>
<td>Not required (Non-lube)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke length tolerance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total allowable leakage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Mass: Standard Type, High Speed/High Frequency Type

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Cylinder stroke (mm)</th>
<th>Unit: g</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>52.5</td>
<td>60.7</td>
</tr>
<tr>
<td>10</td>
<td>92.4</td>
<td>102.7</td>
</tr>
<tr>
<td>16</td>
<td>152.4</td>
<td>175.2</td>
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<tr>
<td>20</td>
<td>349.8</td>
<td>392.6</td>
</tr>
<tr>
<td>25</td>
<td>460.8</td>
<td>510.0</td>
</tr>
</tbody>
</table>

#### Theoretical Output

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Rod size (mm)</th>
<th>Direction</th>
<th>Piston area (mm²)</th>
<th>Operating pressure (MPa)</th>
<th>Unit: N</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>4</td>
<td>IN</td>
<td>15.7</td>
<td>1.6</td>
<td>3.2</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>OUT</td>
<td>28.3</td>
<td>2.8</td>
<td>5.7</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
<td>IN</td>
<td>66.0</td>
<td>6.6</td>
<td>13.2</td>
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<td>20</td>
<td>8</td>
<td>OUT</td>
<td>78.5</td>
<td>7.9</td>
<td>15.7</td>
</tr>
<tr>
<td>25</td>
<td>10</td>
<td>IN</td>
<td>181.4</td>
<td>18.1</td>
<td>36.3</td>
</tr>
<tr>
<td>20</td>
<td>8</td>
<td>OUT</td>
<td>201.1</td>
<td>20.1</td>
<td>40.2</td>
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<tr>
<td>25</td>
<td>10</td>
<td>IN</td>
<td>263.9</td>
<td>26.4</td>
<td>52.8</td>
</tr>
<tr>
<td>20</td>
<td>8</td>
<td>OUT</td>
<td>314.2</td>
<td>31.4</td>
<td>62.8</td>
</tr>
<tr>
<td>25</td>
<td>10</td>
<td>IN</td>
<td>412.3</td>
<td>41.2</td>
<td>82.5</td>
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<tr>
<td>20</td>
<td>8</td>
<td>OUT</td>
<td>490.9</td>
<td>49.1</td>
<td>98.2</td>
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Construction

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rod</td>
<td>Carbon steel</td>
<td>Hard chrome plated</td>
</tr>
<tr>
<td>2</td>
<td>Piston</td>
<td>Special stainless steel</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tube</td>
<td>Special stainless steel</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Head cover</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>5</td>
<td>Rod cover</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>6</td>
<td>Sleeve</td>
<td>Special stainless steel</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Seat</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bumper A</td>
<td>Polyurethane</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Bumper B</td>
<td>Polyurethane</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bumper C</td>
<td>Polyurethane</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Nut</td>
<td>Aluminum alloy</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Ball bushing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>O-ring</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Retaining ring</td>
<td>Carbon tool steel</td>
<td>Nickel plated</td>
</tr>
<tr>
<td>15</td>
<td>Rod end nut</td>
<td>Steel</td>
<td>Nickel plated</td>
</tr>
<tr>
<td>16</td>
<td>Mounting nut</td>
<td>Steel</td>
<td></td>
</tr>
</tbody>
</table>
Series MQM

Dimensions

Basic type: MQMLB

\( \phi 6 \)

Mounting nut

Rod end nut

2 \( \times \) M5 x 0.8

\( \phi 13 \)

16 + Stroke

30 + Stroke

\( \phi 10, \phi 16, \phi 20, \phi 25 \)

Mounting nut

Rod end nut

2 \( \times \) P

\( G1 \)

\( G2 \)

NN

Bore size (mm) | A | D | F | G1 | G2 | H | I | J | MM | N1 | N2 | NA | NN | P | S | ZZ
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 15 | 4 | 8 | 15 | 6 | 28 | 18.5 | 16 | M4 x 0.7 | 11 | 20 | 16 | M12 x 1 | M5 x 0.8 | — | — | 65 | 101
| 16 | 15 | 5 | 10 | 15 | 6 | 30 | 22 | 22 | M5 x 0.8 | 12 | 21 | 19.5 | M14 x 1 | M5 x 0.8 | — | — | 74 | 114
| 20 | 18 | 8 | 13 | 25 | 8.5 | 40.5 | 31.5 | 28.5 | M6 x 1.25 | 20.5 | 33 | 29 | M20 x 1.5 | Rc 1/8 | NPT 1/8 | G 1/8 | 97.5 | 151
| 25 | 18 | 10 | 13 | 30 | 8.5 | 44.5 | 34.5 | 32 | M10 x 1.25 | 20.5 | 38 | 32 | M26 x 1.5 | Rc 1/8 | NPT 1/8 | G 1/8 | 152.5 | 160

* Refer to page 1188 for details regarding the rod end nut and the mounting nut.
Lateral Load Resisting Low Friction Cylinder
Metal Seal *Series MQM*

**Dimensions**

**Foot type: MQMLL**

\[\varnothing 6\]

\[
\begin{array}{c}
2 \times \varnothing 5.5 \\
33 \\
42
\end{array}
\]

**\(\varnothing 10, \varnothing 16, \varnothing 20, \varnothing 25\)**

\[
\begin{array}{c}
4 \times \varnothing LC \\
LX \\
LZ
\end{array}
\]

**Bore size (mm)**

<table>
<thead>
<tr>
<th>Bore size</th>
<th>LC</th>
<th>LH</th>
<th>LS</th>
<th>LT</th>
<th>LX</th>
<th>LY</th>
<th>LZ</th>
<th>S</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>ZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5.5</td>
<td>14</td>
<td>83</td>
<td>2.3</td>
<td>33</td>
<td>25</td>
<td>42</td>
<td>65</td>
<td>6</td>
<td>9</td>
<td>19</td>
<td>108</td>
</tr>
<tr>
<td>16</td>
<td>5.5</td>
<td>18</td>
<td>92</td>
<td>2.3</td>
<td>42</td>
<td>30</td>
<td>54</td>
<td>74</td>
<td>6</td>
<td>9</td>
<td>21</td>
<td>119</td>
</tr>
<tr>
<td>20</td>
<td>6.8</td>
<td>23</td>
<td>107.5</td>
<td>3.2</td>
<td>40</td>
<td>40</td>
<td>55</td>
<td>97.5</td>
<td>8</td>
<td>20</td>
<td>20.5</td>
<td>166</td>
</tr>
<tr>
<td>25</td>
<td>6.8</td>
<td>28</td>
<td>140.5</td>
<td>3.2</td>
<td>47</td>
<td>55</td>
<td>102.5</td>
<td>8</td>
<td>20</td>
<td>24.5</td>
<td>175</td>
<td></td>
</tr>
</tbody>
</table>

**Rod side flange type: MQMLF**

\[\varnothing 6\]

\[
\begin{array}{c}
2 \times \varnothing 5.5 \\
33 \\
42
\end{array}
\]

**\(\varnothing 10, \varnothing 16, \varnothing 20, \varnothing 25\)**

**Bore size (mm)**

<table>
<thead>
<tr>
<th>Bore size</th>
<th>FC</th>
<th>FT</th>
<th>FX</th>
<th>FY</th>
<th>FZ</th>
<th>H</th>
<th>S</th>
<th>ZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>6.5</td>
<td>2.3</td>
<td>33</td>
<td>22</td>
<td>42</td>
<td>28</td>
<td>65</td>
<td>101</td>
</tr>
<tr>
<td>16</td>
<td>5.5</td>
<td>2.3</td>
<td>42</td>
<td>24</td>
<td>54</td>
<td>30</td>
<td>74</td>
<td>114</td>
</tr>
<tr>
<td>20</td>
<td>7</td>
<td>4</td>
<td>60</td>
<td>34</td>
<td>75</td>
<td>40.5</td>
<td>97.5</td>
<td>151</td>
</tr>
<tr>
<td>25</td>
<td>7</td>
<td>4</td>
<td>60</td>
<td>40</td>
<td>75</td>
<td>44.5</td>
<td>102.5</td>
<td>160</td>
</tr>
</tbody>
</table>
**Series MQM**

**Dimensions**

Head side flange type: MQMLG (Except for ø6)
ø10, ø16, ø20, ø25

Refer to the basic type on page 1184 for other dimensions.

![Diagram](image)

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>FC (mm)</th>
<th>FT (mm)</th>
<th>FX (mm)</th>
<th>FY (mm)</th>
<th>FZ (mm)</th>
<th>H (mm)</th>
<th>S (mm)</th>
<th>Z (mm)</th>
<th>ZZ (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5.5</td>
<td>2.3</td>
<td>35</td>
<td>22</td>
<td>28</td>
<td>65</td>
<td>95.3</td>
<td>101</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>5.5</td>
<td>2.3</td>
<td>35</td>
<td>22</td>
<td>28</td>
<td>65</td>
<td>95.3</td>
<td>101</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>7</td>
<td>4</td>
<td>60</td>
<td>34</td>
<td>40.5</td>
<td>97.5</td>
<td>142</td>
<td>151</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>7</td>
<td>4</td>
<td>60</td>
<td>34</td>
<td>40.5</td>
<td>97.5</td>
<td>142</td>
<td>151</td>
<td></td>
</tr>
</tbody>
</table>

Single clevis type: MQMLC (ø20 and ø25 only)
ø20, ø25 (Non-integrated type)

![Diagram](image)

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>CI (mm)</th>
<th>H (mm)</th>
<th>S (mm)</th>
<th>Z (mm)</th>
<th>ZZ (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>24</td>
<td>40.5</td>
<td>97.5</td>
<td>168</td>
<td>177</td>
</tr>
<tr>
<td>25</td>
<td>30</td>
<td>44.5</td>
<td>102.5</td>
<td>177</td>
<td>186</td>
</tr>
</tbody>
</table>
Lateral Load Resisting Low Friction Cylinder
Metal Seal Series MQM

Dimensions

Double clevis type: MQMLD
ø6, ø10, ø16 (Integrated type)

Refer to the basic type on page 1184 for other dimensions.

T-bracket: Order separately. Refer to page 1188 for details.

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>BB</th>
<th>CD</th>
<th>CX</th>
<th>GB</th>
<th>H</th>
<th>NB</th>
<th>R</th>
<th>S</th>
<th>U</th>
<th>Z</th>
<th>ZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>12</td>
<td>3.3</td>
<td>3.3</td>
<td>17.5</td>
<td>27.5</td>
<td>22</td>
<td>5</td>
<td>70.5</td>
<td>8</td>
<td>106</td>
<td>117</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>3.3</td>
<td>3.3</td>
<td>19</td>
<td>28</td>
<td>24</td>
<td>5</td>
<td>65</td>
<td>8</td>
<td>101</td>
<td>112</td>
</tr>
<tr>
<td>16</td>
<td>18</td>
<td>5</td>
<td>6.6</td>
<td>24</td>
<td>30</td>
<td>30</td>
<td>8</td>
<td>74</td>
<td>10</td>
<td>114</td>
<td>128</td>
</tr>
</tbody>
</table>

T-bracket Related Dimensions

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>TC</th>
<th>TH</th>
<th>TV</th>
<th>TW</th>
<th>TX</th>
<th>TY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CJ-T010B</td>
<td>6, 10</td>
<td>4.5</td>
<td>29</td>
<td>40</td>
<td>22</td>
<td>32</td>
<td>12</td>
</tr>
<tr>
<td>CJ-T016B</td>
<td>16</td>
<td>5.5</td>
<td>35</td>
<td>48</td>
<td>28</td>
<td>38</td>
<td>16</td>
</tr>
</tbody>
</table>

Note) Refer to page 1188 for details.

ø20, ø25 (Non-integrated type)

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>CI</th>
<th>H</th>
<th>S</th>
<th>Z</th>
<th>ZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>24</td>
<td>40.5</td>
<td>97.5</td>
<td>168</td>
<td>177</td>
</tr>
<tr>
<td>25</td>
<td>30</td>
<td>44.5</td>
<td>102.5</td>
<td>177</td>
<td>186</td>
</tr>
</tbody>
</table>
**Series MQM**

### Accessory Dimensions

#### Mounting nut

![Mounting nut diagram]

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>B</th>
<th>C</th>
<th>d</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNKJ-016B</td>
<td>6, 10</td>
<td>17</td>
<td>19.6</td>
<td>M12 x 1</td>
<td>4</td>
</tr>
<tr>
<td>SNLJ-016B</td>
<td>16</td>
<td>19</td>
<td>21.9</td>
<td>M14 x 1</td>
<td>5</td>
</tr>
<tr>
<td>SN-020B</td>
<td>20</td>
<td>26</td>
<td>30</td>
<td>M20 x 1.5</td>
<td>8</td>
</tr>
<tr>
<td>SN-032B</td>
<td>25</td>
<td>32</td>
<td>37</td>
<td>M26 x 1.5</td>
<td>8</td>
</tr>
</tbody>
</table>

**Material:** Carbon steel

#### Rod end nut

![Rod end nut diagram]

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTJ-010A</td>
<td>6, 10</td>
<td>7</td>
<td>8.1</td>
<td>M4 x 0.7</td>
<td>3.2</td>
</tr>
<tr>
<td>NTJ-015A</td>
<td>16</td>
<td>8</td>
<td>9.2</td>
<td>M5 x 0.8</td>
<td>4</td>
</tr>
<tr>
<td>NT-02</td>
<td>20</td>
<td>13</td>
<td>15</td>
<td>M8 x 1.25</td>
<td>5</td>
</tr>
<tr>
<td>NT-03</td>
<td>25</td>
<td>17</td>
<td>19.6</td>
<td>M10 x 1.25</td>
<td>6</td>
</tr>
</tbody>
</table>

**Material:** Carbon steel

#### T-bracket

![T-bracket diagram]

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>TC</th>
<th>TD</th>
<th>TH</th>
<th>TK</th>
<th>TN</th>
<th>TT</th>
<th>TU</th>
<th>TV</th>
<th>TW</th>
<th>TX</th>
<th>TY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CJ-T010B</td>
<td>6, 10</td>
<td>4.5</td>
<td>3.3</td>
<td>29</td>
<td>18</td>
<td>3.1</td>
<td>2</td>
<td>9</td>
<td>40</td>
<td>22</td>
<td>32</td>
<td>12</td>
</tr>
<tr>
<td>CJ-T016B</td>
<td>16</td>
<td>5.5</td>
<td>5</td>
<td>35</td>
<td>20</td>
<td>6.4</td>
<td>2.3</td>
<td>14</td>
<td>48</td>
<td>28</td>
<td>38</td>
<td>16</td>
</tr>
</tbody>
</table>

#### Clevis pin

![Clevis pin diagram]

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable bore size (mm)</th>
<th>d</th>
<th>D</th>
<th>l</th>
<th>L</th>
<th>m</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD-J010</td>
<td>6, 10</td>
<td>3</td>
<td>3.3</td>
<td>12.2</td>
<td>15.2</td>
<td>1.2</td>
<td>0.3</td>
</tr>
<tr>
<td>CD-Z015</td>
<td>16</td>
<td>4.8</td>
<td>5</td>
<td>18.3</td>
<td>22.7</td>
<td>1.5</td>
<td>0.7</td>
</tr>
<tr>
<td>CDP-1</td>
<td>20, 25</td>
<td>8.6</td>
<td>9</td>
<td>19.2</td>
<td>25</td>
<td>1.75</td>
<td>1.15</td>
</tr>
</tbody>
</table>

**Material:** Stainless steel

---

Material: Carbon steel

Material: Stainless steel
Series **MQQ/MQM**

**Specific Product Precautions 1**

Be sure to read before handling.

Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

---

### Caution

1. **Operation**
   - When mounting, thoroughly flush out the connector piping and be sure that dirt and chips, etc., do not get inside the cylinder.
   - Install an air filter with a filtration degree of 5 μm or less on the air supply. Furthermore, when controlling for low speed or controlled output, use clean air (atmospheric pressure dew point temperature of -10°C). Installation of a mist separator (filtration degree 0.3 μm or less) is also recommended.
   - Use a metal seal type when using solenoid valves for cylinder actuation. If a rubber seal type is used, there may be an increase in operating resistance due to grease sprayed from the main valve.
   - Operate so that the load applied to the piston rod is normally in the axial direction. In the event that a lateral load is unavoidable, do not exceed the range of the allowable lateral load at the rod end (refer to pages 1190 and 1191). (Use outside of the operating limits may cause an adverse effect on the life of the unit through problems such as looseness in the guide unit and a loss of precision.)
   - Take care not to scratch or gouge the sliding portion of the rod. This may cause malfunction or shorten the unit’s life.
   - When attaching a work piece to the end of the rod, move the rod to the fully retracted position and use the wrench flats at the end of the rod. Fasten the work piece without applying a large amount of torque to the rod.
   - Be certain to connect a load so that the rod axis is aligned with the load and its direction of movement. Especially when a cylinder rod is connected directly to a guide function (such as bearings, etc.) on the equipment side, the following is likely to occur. Either an offset load will occur and the sliding resistance will not be stable or galling will occur on the metal seal parts. Therefore, be sure to use a floating joint or a spherical joint.
   - When a piston rod is driven with a circuit from an external force such as force, control, tension control, etc., a stick-slip phenomenon will likely occur and sliding resistance will not be stable if the amount of displacement is 0.05 mm or less.
   - When it is used in locations where a constant vibration is applied, such as a polishing machine, etc., consult with us.

### Disassembly

1. The component parts of the metal seal cylinder are manufactured to precision tolerances, and therefore cannot be disassembled.

---

### Caution

1. **Operation**
   - When mounting, thoroughly flush out the connector piping and be sure that dirt and chips, etc., do not get inside the cylinder.
   - Install an air filter with a filtration degree of 5 μm or less on the air supply. Furthermore, when controlling for low speed or controlled output, use clean air (atmospheric pressure dew point temperature of -10°C). Installation of a mist separator (filtration degree 0.3 μm or less) is also recommended.
   - Use a metal seal type when using solenoid valves for cylinder actuation. If a rubber seal type is used, there may be an increase in operating resistance due to grease sprayed from the main valve.
   - Operate so that the load applied to the piston rod is normally in the axial direction. In the event that a lateral load is unavoidable, do not exceed the range of the allowable lateral load at the rod end (refer to pages 1190 and 1191). (Use outside of the operating limits may cause an adverse effect on the life of the unit through problems such as looseness in the guide unit and a loss of precision.)

---

### Caution

1. **Disassembly**
   - The component parts of the metal seal cylinder are manufactured to precision tolerances, and therefore cannot be disassembled.

---

### Lubrication

1. **Lubrication of non-lube type cylinder**
   - Do not apply lubrication when controlling for low speed or controlled output. If lubrication is applied, there may be changes in operating resistance due to factors such as the viscosity and surface tension of the oil. Also, use a metal seal type when using solenoid valves for cylinder actuation. If a rubber seal type is used, there may be an increase in operating resistance due to grease sprayed from the main valve.
   - Lubrication is also unnecessary for high speed actuation, but in the event that lubrication is applied, use turbine oil class 1 (with no additives) ISO VG32. (Do not use spindle oil or machine oil.)
Series **MQQ/MQM**

**Specific Product Precautions 2**

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

---

**Series MQQ**

![Diagram of MQQ Series](image)

**Caution**

**Operating Speed**

**Load Weight and Maximum Speed:** MQQT/MQQL

<table>
<thead>
<tr>
<th>Load mass W (N)</th>
<th>Maximum speed V (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

**Example:**

Driving a load of 15(N) using the MQQ/20 with a maximum speed of 167 (mm/sec)

**Lateral load resisting type:** MQQ

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Allowable kinetic energy (J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.006</td>
</tr>
<tr>
<td>16</td>
<td>0.010</td>
</tr>
<tr>
<td>20</td>
<td>0.022</td>
</tr>
<tr>
<td>25</td>
<td>0.044</td>
</tr>
<tr>
<td>30</td>
<td>0.080</td>
</tr>
<tr>
<td>40</td>
<td>0.160</td>
</tr>
</tbody>
</table>

Note 1) When a load is attached to the rod end, adjust the speed so that the maximum speed is no more than that shown in the graph for the corresponding load mass.

Note 2) The mass of cylinder's moving parts is included in the load mass. (See the graph on the right.)

---

**Allowable Lateral Load at Rod End**

**Standard Type:** MQQTB

![Graph of MQQTB](image)

**Lateral Load Resisting Type:** MQQLB/Built-in Ball Bushing

![Graph of MQQLB](image)

---

**Moving Parts Mass**

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>MQQT Moving parts mass (g)</th>
<th>MQQL Moving parts mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Mass = 8.9 + {3.1 x (stroke/10)}</td>
<td>Mass = 16.7 + {3.1 x (stroke/10)}</td>
</tr>
<tr>
<td>16</td>
<td>Mass = 23.9 + {4.0 x (stroke/10)}</td>
<td>Mass = 34.9 + {4.0 x (stroke/10)}</td>
</tr>
<tr>
<td>20</td>
<td>Mass = 34.8 + {6.0 x (stroke/10)}</td>
<td>Mass = 57.9 + {6.0 x (stroke/10)}</td>
</tr>
<tr>
<td>25</td>
<td>Mass = 66.5 + {9.8 x (stroke/10)}</td>
<td>Mass = 97.7 + {9.8 x (stroke/10)}</td>
</tr>
<tr>
<td>30</td>
<td>Mass = 116.6 + {15.8 x (stroke/10)}</td>
<td>Mass = 166.2 + {15.8 x (stroke/10)}</td>
</tr>
<tr>
<td>40</td>
<td>Mass = 190.2 + {24.8 x (stroke/10)}</td>
<td>Mass = 267.4 + {24.8 x (stroke/10)}</td>
</tr>
</tbody>
</table>

Note) For the rod side flange type, add 10 mm to the stroke length of the MQQ/L50482.

---

**Notes:**

1) The indicated allowable lateral load at the rod end is for the rod end female thread.

2) The allowable lateral load varies depending on the size of a load (the distance to the load's center of gravity). Please contact SMC for further details.
Series **MQQ/MQM**

**Specific Product Precautions 3**

*Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.*

### Series MQM

#### Caution

**Operating Speed**

**Load Mass and Maximum Speed: MQML/MQML\(\timesProject{H}\)**

Example)
Driving a load of 15(N) using the MQM16 with a maximum speed of 460 (mm/sec)

**Lateral load resisting type: MQML/MQML\(\timesProject{H}\)**

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Allowable kinetic energy (J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0.015</td>
</tr>
<tr>
<td>10</td>
<td>0.059</td>
</tr>
<tr>
<td>16</td>
<td>0.161</td>
</tr>
<tr>
<td>20</td>
<td>0.386</td>
</tr>
<tr>
<td>25</td>
<td>0.597</td>
</tr>
</tbody>
</table>

Note 1) When a load is attached to the rod end, adjust the speed so that the maximum speed is no more than that shown in the graph for the corresponding load mass.

Note 2) The mass of cylinder’s moving parts is included in the load mass. (See the graph on the right.)

**Allowable Lateral Load at Rod End**

**Maximum allowable lateral load  W (N)**

Note 1) The allowable lateral load varies depending on the size of a load (the distance to the load’s center of gravity). Please contact SMC for further details.
Low Friction Cylinder (Single Acting)

**Series MQP**

ø4, ø6, ø10, ø16, ø20

### How to Order

**MQ P 10-10 S**

- Single acting specification
- Bore size
  - 4 mm
  - 6 mm
  - 10 mm
  - 16 mm
  - 20 mm
- Cylinder stroke: 10 mm
- Action
  - S: Special single acting (Piston retraction by external force)

### Specifications

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>4</th>
<th>6</th>
<th>10</th>
<th>16</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal construction</td>
<td>Metal seal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>Special single acting (Piston retraction by external force)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.05 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>0.7 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum operating pressure (Note 1)</td>
<td>0.001 MPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>+5 to +80°C</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Lubrication (Note 2)</td>
<td>Not required (Non-lube)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Stroke length tolerance</td>
<td>±0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total allowable leakage</td>
<td>Supply pressure 0.1 MPa 100 cm³/min or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply pressure 0.3 MPa 500 cm³/min or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply pressure 0.5 MPa 1000 cm³/min or less</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Note 1) Excluding the mass of moving parts.
Note 2) Refer to precautions on page 1194 regarding lubrication.

### Moving Parts and Total Mass

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Moving parts mass</th>
<th>Total mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>55</td>
</tr>
<tr>
<td>10</td>
<td>24</td>
<td>96</td>
</tr>
<tr>
<td>16</td>
<td>62</td>
<td>161</td>
</tr>
<tr>
<td>20</td>
<td>103</td>
<td>239</td>
</tr>
</tbody>
</table>

### Theoretical Output

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Piston area (mm²)</th>
<th>Operating pressure (MPa) 0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>12.6</td>
<td>1.3</td>
<td>2.6</td>
<td>3.9</td>
<td>5.2</td>
<td>6.5</td>
<td>7.8</td>
<td>9.1</td>
</tr>
<tr>
<td>6</td>
<td>28.3</td>
<td>2.8</td>
<td>5.6</td>
<td>8.4</td>
<td>11.2</td>
<td>14.0</td>
<td>16.8</td>
<td>19.6</td>
</tr>
<tr>
<td>10</td>
<td>78.5</td>
<td>7.9</td>
<td>15.7</td>
<td>23.6</td>
<td>31.4</td>
<td>39.3</td>
<td>47.1</td>
<td>54.0</td>
</tr>
<tr>
<td>16</td>
<td>196.1</td>
<td>19.6</td>
<td>39.2</td>
<td>58.9</td>
<td>78.4</td>
<td>98.1</td>
<td>117.7</td>
<td>137.3</td>
</tr>
<tr>
<td>20</td>
<td>314.2</td>
<td>31.4</td>
<td>62.8</td>
<td>94.3</td>
<td>125.7</td>
<td>157.1</td>
<td>188.5</td>
<td>219.9</td>
</tr>
</tbody>
</table>

+ The MQP series is not auto switch capable.
Low Friction Cylinder (Single Acting)  
Metal Seal  
Series MQP

Construction

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Piston rod</td>
<td>Special stainless steel</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Liner</td>
<td>Special stainless steel</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cylinder tube</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>4</td>
<td>Bolt</td>
<td>Carbon tool steel</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bumper</td>
<td>Polycarbonate</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>O-ring</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Retaining ring</td>
<td>Carbon tool steel</td>
<td>Nickel plated</td>
</tr>
<tr>
<td>8</td>
<td>Plug</td>
<td>Carbon tool steel</td>
<td>Nickel plated</td>
</tr>
</tbody>
</table>

Dimensions

ø4, ø6

Ø10 depth of counterbore 1.5

90°

2 x ØA effective depth RA

2 x ØN through

ø10, ø16, ø20

2 x 4 x ØB

Depth of counterbore RB

2 x 4 x ØA effective depth RA

Bore size  

| Ø  | A   | B   | C   | D   | E   | F   | I   | L   | M   | N   | ØA | ØB | ØRA | ØRB |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|
| 4  | 41  | 38  | SR3 | 4   | —   | 9   | 22  | 3   | 16  | 3.2 | M3 x 0.5 | —   | 6   | —   |   |
| 6  | 41  | 38  | SR5 | 6   | —   | 9   | 24  | 3   | 18  | 3.2 | M3 x 0.5 | —   | 6   | —   |   |
| 10 | 46.5| 41.5| SR8 | 10  | 29  | 5.5 | 38  | 5   | 20  | 3.5 | M4 x 0.7 | 6.5 | 7   | 4   |   |
| 16 | 49  | 44  | SR12| 16  | 30  | 5.5 | 47  | 5   | 25.5| 5.4 | M6 x 1.0 | 9   | 10  | 7   |   |
| 20 | 52.5| 47.5| SR15| 20(19)| 52.5| 5.5 | 52  | 5   | 28  | 5.4 | M6 x 1.0 | 9   | 10  | 7   |   |

Note) (   ): Rod end dimensions
Series **MQP**
Specific Product Precautions
Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

### Operation

1. When mounting, thoroughly flush out the connector piping and be sure that dirt and chips, etc., do not get inside the cylinder.
2. Install an air filter with a nominal filtration degree of 5 μm or less on the air supply. Furthermore, when controlling for low speed or controlled output, use clean air (atmospheric pressure dew point temperature of –10°C or less). Installation of a mist separator (nominal filtration degree 0.3 μm or less) is also recommended.
3. Use a metal seal type when using solenoid valves for cylinder actuation. If a rubber seal type is used, there may be an increase in operating resistance due to grease sprayed from the main valve.
4. This cylinder cannot be used at the end of its stroke. Use it with an intermediate stroke of 10 mm.
5. The rod end should not come in direct contact with an equipment or workpiece. Also, make sure that the opposite side of the rod end is flat to make point-contact with the spherical surface of the rod end.

#### Disassembly

1. The component parts of the metal seal cylinder are manufactured to precision tolerances, and therefore cannot be disassembled.

#### Lubrication

1. **Lubrication of non-lube type cylinder**
   
   Do not apply lubrication when controlling for low speed or controlled output. If lubrication is applied, there may be changes in operating resistance due to factors such as the viscosity and surface tension of the oil. Also, use a metal seal type when using solenoid valves for cylinder actuation. If a rubber seal type is used, there may be an increase in operating resistance due to grease sprayed from the main valve.
   
   Lubrication is also unnecessary for high speed actuation, but in the event that lubrication is applied, use turbine oil class 1 (with no additives) ISO VG32. (Do not use spindle oil or machine oil.)