Shock Absorber
Soft type

- **Stops transported objects softly**
  Unique mechanism to achieve a variable sectional area of the fluid channel proportional to the stroke
  [Image: Smooth absorption with a spiral groove structure]

- **30% reduced absorption time**
  (compared with SMC RB series)
  Shortened takt time of short stroke actuators, such as air slide tables and rotary tables

Suitable for softly stopping light objects or objects transferred at low speeds

- Mounting interchangeable with the RB series.
- Variation available according to the operating speed.
  Selectable from two types of collision speed range for each size
  - **L type**: 0.05 to 1 m/s
  - **H type**: 0.05 to 2 m/s

**Series RJ**

**RJ-L type**
- RJ1412(M14)
- RJ1007(M10)
- RJ0806(M8)

**RJ-H type**
- RJ1412(M14)
- RJ1007(M10)
- RJ0806(M8)

**RB1**
- 0.7 1
- 0.75

**Time**
- Reaction force

**RJ**

PAT.PEND

<table>
<thead>
<tr>
<th>Impacting material mass (kg)</th>
<th>Series RB</th>
<th>RJ-L type</th>
<th>RJ-H type</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Collision speed (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

**CAT.E20-200A**
Shock Absorber
Series RJ
Model Selection 1

Model Selection Graph

Type of Impact
Free fall impact
Impact of air cylinder actuation (Horizontal/Upward)
Check the procedure “Model Selection Step” from 1 to 9 prior to use.

Graph 1/RJ0806

Graph 2/RJ1007

Graph 3/RJ1412

Type of Impact
Free fall impact
Impact of air cylinder actuation (Horizontal/Upward)
Check the procedure “Model Selection Step” from 1 to 9 prior to use.

Graph 4/RJ0806

Graph 5/RJ1007

Graph 6/RJ1412

The model selection graphs 1 to 9 are at room temperature (20 to 25°C).
Model Selection Graph

Type of Impact

Others (such as thrust impact or swing impact other than air cylinder actuation)

Check the procedure "Model Selection Step" from ① to ⑧ to calculate equivalent mass Me prior to use.

Graph ⑦/RJ0806

Graph ⑧/RJ1007

Graph ⑨/RJ1412

The model selection graphs ① to ⑨ are at room temperature (20 to 25°C).
Use Formula "Absorbed energy $E = E_1 + E_2 = 0.63 + 1.05 = 1.68 \text{ J}\) to calculate $Me$ by using $E$ and $0.5$ for $\upsilon$. Select the RJ1007L temporarily and obtain $E_2$ by using the formula.

$$E_2 = 1.05 \text{ J}$$

Calculate equivalent mass $Me$ by using "Model Selection Graph" to check if the temporarily selected model is compatible with the condition of application. If satisfactory, then the temporarily selected model will be the applicable one.

$$Me = 13.4 \text{ kg}$$

According to Graph 6, the temporarily selected RJ1007L satisfies $Me = 13.4 \text{ kg} < 14.5 \text{ kg}$, resulting in an operating frequency of $n = 30 < 70$, without causing a problem.

Select the RJ1007L.

In order for the shock absorbers to operate accurately for long hours, it is necessary to select a model that is well-suited to your operating conditions. If the impact energy is smaller than 5% of the maximum absorbed energy, select a model that is one class smaller.

### Model Selection

**Model Selection Step**

1. **Type of impact**
   - Impact of thrust of load (Horizontal)
   - Impact of thrust of load (Downward)
   - Impact of thrust of load (Upward)
   - Free horizontal impact (Impact of inertial force)
   - Free fall impact
   - Swing impact (With torque)

2. **Operating conditions**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Operating conditions</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$m$</td>
<td>Impacting material mass</td>
<td>kg</td>
</tr>
<tr>
<td>$\upsilon$</td>
<td>Collision speed</td>
<td>m/sec</td>
</tr>
<tr>
<td>$h$</td>
<td>Dropping height</td>
<td>m</td>
</tr>
<tr>
<td>$\omega$</td>
<td>Angle speed</td>
<td>rad/sec</td>
</tr>
<tr>
<td>$r$</td>
<td>Distance between rotational center and impact point</td>
<td>m</td>
</tr>
<tr>
<td>$F$</td>
<td>Thrust</td>
<td>N</td>
</tr>
<tr>
<td>$T$</td>
<td>Torque</td>
<td>N·m</td>
</tr>
<tr>
<td>$n$</td>
<td>Operating frequency</td>
<td>cycle/min</td>
</tr>
<tr>
<td>$t$</td>
<td>Ambient temperature</td>
<td>°C</td>
</tr>
<tr>
<td>$\mu$</td>
<td>Friction coefficient</td>
<td>—</td>
</tr>
</tbody>
</table>

3. **Confirmation of specifications and precautions**
   - Ensure the collision speed, thrust, operating frequency, ambient temperature and atmosphere fall within the specifications.
   - Be aware of the minimum installation radius in the case of swing impacts.

4. **Calculation of kinetic energy $E_1$**
   - Calculate kinetic energy $E_1$ by using the formula according to the impact type.

5. **Calculation of thrust energy $E_2$**
   - Calculate thrust energy $E_2$ by selecting a model temporarily.

6. **Calculation of equivalent mass $Me$**
   - Calculate absorbed energy $E$ to confirm it is not more than the maximum absorbed energy of the temporarily selected shock absorber.
   - Equivalent mass $Me = \frac{2}{\upsilon^2} \cdot E$

7. **Selection of applicable model**
   - Substitute the obtained equivalent mass $Me$, and the collision speed $\upsilon$ using "Model Selection Graph" to check if the temporarily selected model is compatible with the condition of application. If satisfactory, then the temporarily selected model will be the applicable one.

### Caution on Selection

In order for the shock absorbers to operate accurately for long hours, it is necessary to select a model that is well-suited to your operating conditions. If the impact energy is smaller than 5% of the maximum absorbed energy, select a model that is one class smaller.
## Type of Impact

<table>
<thead>
<tr>
<th>Type of impact</th>
<th>Impact of thrust of load (Downward) (Impact of thrust from sources other than air cylinder actuation)</th>
<th>Impact of thrust of load (Upward) (Impact of thrust from sources other than air cylinder actuation)</th>
<th>Load on conveyor (Horizontal)</th>
<th>Free fall impact</th>
<th>Swing impact (With torque)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collision speed $\nu$</td>
<td>$\frac{1}{2} \cdot m \cdot \nu^2$</td>
<td>$\frac{1}{2} \cdot m \cdot \nu^2$</td>
<td>$\frac{1}{2} \cdot m \cdot \nu^2$</td>
<td>$m \cdot g \cdot h$</td>
<td>$\frac{1}{2} \cdot I \cdot \omega^2$</td>
</tr>
<tr>
<td>Kinetic energy $E_1$</td>
<td>$F \cdot S + m \cdot g \cdot S$</td>
<td>$F \cdot S - m \cdot g \cdot S$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
</tr>
<tr>
<td>Thrust energy $E_2$</td>
<td>$m \cdot g \cdot \mu \cdot S$</td>
<td>$m \cdot g \cdot S$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
</tr>
<tr>
<td>Absorbed energy $E$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
<td>$E_1 + E_2$</td>
</tr>
<tr>
<td>Equivalent mass $Me$</td>
<td>$\frac{2}{\nu^2} \cdot E$</td>
<td>$\frac{2}{\nu^2} \cdot E$</td>
<td>$\frac{2}{\nu^2} \cdot E$</td>
<td>$\frac{2}{\nu^2} \cdot E$</td>
<td>$\frac{2}{\nu^2} \cdot E$</td>
</tr>
</tbody>
</table>

Note 1) This is the momentary speed at which an object is impacting against a shock absorber.

Note 2) This is the theoretical mass, which is converted into the mass of the impacting material under no thrust collision conditions. Hence, $E = \frac{1}{2} \cdot Me \cdot \nu^2$.

### Symbol

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Specifications</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E$</td>
<td>Absorbed energy</td>
<td>J</td>
</tr>
<tr>
<td>$E_1$</td>
<td>Kinetic energy</td>
<td>J</td>
</tr>
<tr>
<td>$E_2$</td>
<td>Thrust energy</td>
<td>J</td>
</tr>
<tr>
<td>$F$</td>
<td>Thrust</td>
<td>N</td>
</tr>
<tr>
<td>$g$</td>
<td>Gravitational acceleration (9.8)</td>
<td>m/s²</td>
</tr>
<tr>
<td>$h$</td>
<td>Dropping height</td>
<td>m</td>
</tr>
<tr>
<td>$I$</td>
<td>Moment of inertia around the center of gravity</td>
<td>kg·m²</td>
</tr>
<tr>
<td>$n$</td>
<td>Operating frequency</td>
<td>cycle/min</td>
</tr>
<tr>
<td>$R$</td>
<td>Distance between rotational center and impact point</td>
<td>m</td>
</tr>
<tr>
<td>$S$</td>
<td>Shock absorber's stroke</td>
<td>m</td>
</tr>
<tr>
<td>$T$</td>
<td>Torque</td>
<td>N·m</td>
</tr>
<tr>
<td>$t$</td>
<td>Ambient temperature</td>
<td>°C</td>
</tr>
<tr>
<td>$\nu$</td>
<td>Collision speed</td>
<td>m/s</td>
</tr>
<tr>
<td>$\mu$</td>
<td>Impacting material mass</td>
<td>kg</td>
</tr>
<tr>
<td>$Me$</td>
<td>Equivalent mass</td>
<td>kg</td>
</tr>
<tr>
<td>$\omega$</td>
<td>Angle speed</td>
<td>rad/s</td>
</tr>
<tr>
<td>$\mu$</td>
<td>Friction coefficient</td>
<td>—</td>
</tr>
</tbody>
</table>

Note 3) For the formula for moment of inertia $I$ (kg·m²), refer to the rotary actuator’s catalog.
Shock Absorber

Series RJ

How to Order

RJ 0806 H

Shock absorber

Size

<table>
<thead>
<tr>
<th>Symbol</th>
<th>O.D. thread</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>0806</td>
<td>8 mm</td>
<td>6 mm</td>
</tr>
<tr>
<td>1007</td>
<td>10 mm</td>
<td>7 mm</td>
</tr>
<tr>
<td>1412</td>
<td>14 mm</td>
<td>12 mm</td>
</tr>
</tbody>
</table>

Option

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Hexagon nut</th>
<th>Stopper nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>2 pcs.</td>
<td>—</td>
</tr>
<tr>
<td>J</td>
<td>3 pcs.</td>
<td>—</td>
</tr>
<tr>
<td>N</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>S</td>
<td>2 pcs.</td>
<td>1 pc.</td>
</tr>
<tr>
<td>SJ</td>
<td>3 pcs.</td>
<td>1 pc.</td>
</tr>
<tr>
<td>SN</td>
<td>—</td>
<td>1 pc.</td>
</tr>
</tbody>
</table>

Collision speed range

| H     | 0.05 to 2 m/s |
| L     | 0.05 to 1 m/s |

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>RJ0806</th>
<th>RJ1007</th>
<th>RJ1412</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>Max. absorbed energy (J) (Note)</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>O.D. thread size (mm)</td>
<td>8</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Stroke (mm)</td>
<td>6</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Collision speed (m/s)</td>
<td>0.05 to 2</td>
<td>0.05 to 1</td>
<td>0.05 to 2</td>
</tr>
<tr>
<td>Max. operating frequency (cycle/min) (Note)</td>
<td>80</td>
<td>70</td>
<td>45</td>
</tr>
<tr>
<td>Spring force (N)</td>
<td>Extended</td>
<td>2.8</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Retracted</td>
<td>5.4</td>
<td>8.4</td>
</tr>
<tr>
<td>Max. allowable thrust (N)</td>
<td>245</td>
<td>422</td>
<td>814</td>
</tr>
<tr>
<td>Ambient temperature (°C)</td>
<td>–10 to 60 (No freezing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (g)</td>
<td>15</td>
<td>23</td>
<td>65</td>
</tr>
</tbody>
</table>

Note) Max. absorbed energy and max. operating frequency values are at room temperature (20 to 25°C).
Construction

RJ0806

RJ1007, 1412

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tube</td>
<td>Special steel</td>
<td>Electroless nickel plated</td>
</tr>
<tr>
<td>2</td>
<td>Piston rod</td>
<td>Special steel</td>
<td>Electroless nickel plated</td>
</tr>
<tr>
<td>3</td>
<td>Piston</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bearing</td>
<td>Special bearing material</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spring guide</td>
<td>Tool steel</td>
<td>Zinc chromated</td>
</tr>
<tr>
<td>6</td>
<td>Lock ring</td>
<td>Copper</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Return spring</td>
<td>Steel wire</td>
<td>Zinc chromated</td>
</tr>
<tr>
<td>8</td>
<td>Stopper</td>
<td>Structural steel</td>
<td>Electroless nickel plated</td>
</tr>
<tr>
<td>9</td>
<td>O-ring</td>
<td>Synthetic rubber</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Plug</td>
<td>—</td>
<td>Electroless nickel plated</td>
</tr>
<tr>
<td>11</td>
<td>Accumulator</td>
<td>Synthetic rubber</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Rod seal</td>
<td>Synthetic rubber</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>O-ring</td>
<td>Synthetic rubber</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
<th>Hexagon nut</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D</td>
<td>H</td>
</tr>
<tr>
<td>RJ0806</td>
<td>2.8</td>
<td>6</td>
</tr>
<tr>
<td>RJ1007</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>RJ1412</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

*The dimensions of H- and L-type are the same.

Option

Basic type stopper nut

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic type</td>
<td>B</td>
</tr>
<tr>
<td>RB08S</td>
<td>12</td>
</tr>
<tr>
<td>RB10S</td>
<td>14</td>
</tr>
<tr>
<td>RB14S</td>
<td>19</td>
</tr>
</tbody>
</table>
Foot Bracket for Shock Absorber

Foot mounting bracket is available for the RJ series.

### Part No.

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Applicable absorber</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB08-X331</td>
<td>RJ0806</td>
</tr>
<tr>
<td>RB10-X331</td>
<td>RJ1007</td>
</tr>
<tr>
<td>RB14-X331</td>
<td>RJ1412</td>
</tr>
</tbody>
</table>

* Order the foot bracket separately.

### Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>D</th>
<th>H</th>
<th>L</th>
<th>MM</th>
<th>T</th>
<th>X</th>
<th>Mounting bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB08-X331</td>
<td>15</td>
<td>4.5 drill, 8 counterbore depth 4.4</td>
<td>7.5</td>
<td>32</td>
<td>M8 x 1.0</td>
<td>10</td>
<td>20</td>
<td>M4</td>
</tr>
<tr>
<td>RB10-X331</td>
<td>19</td>
<td>5.5 drill, 9.5 counterbore depth 5.4</td>
<td>9.5</td>
<td>40</td>
<td>M10 x 1.0</td>
<td>12</td>
<td>25</td>
<td>M5</td>
</tr>
<tr>
<td>RB14-X331</td>
<td>25</td>
<td>9 drill, 14 counterbore depth 8.6</td>
<td>12.5</td>
<td>54</td>
<td>M14 x 1.5</td>
<td>16</td>
<td>34</td>
<td>M8</td>
</tr>
</tbody>
</table>
Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC), Japan Industrial Standards (JIS) and other safety regulations.

1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
   ISO 4413: Hydraulic fluid power – General rules relating to systems.
   IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
   JIS B 8370: General rules for pneumatic equipment.
   JIS B 8361: General rules for hydraulic equipment.
   JIS B 9960-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
   etc.

2) Labor Safety and Sanitation Law, etc.

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications. Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment. The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
   1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
   2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
   3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.
   1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
   2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
   3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
   4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.
**Safety Instructions**

---

**Caution**

The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

---

**Limited Warranty and Disclaimer/Compliance Requirements**

The product used is subject to the following “Limited Warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

**Limited Warranty and Disclaimer**

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.\(^3\)
   - Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   - This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.
   - \(^3\) Vacuum pads are excluded from this 1 year warranty.
     - A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
     - Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

---

**Compliance Requirements**

When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).
Series RJ
Specific Product Precautions 1

Be sure to read this before handling. Refer to back pages 1 and 2 for Safety Instructions, “Precautions for Handling Pneumatic Devices” (M-03-E3A) for Common Precautions.

⚠️ Danger

1. Absorbed energy
   Select a model so that the aggregated energy of an impacting material should not exceed the maximum absorbed energy. Otherwise, it could cause changes in properties or result in damaging the shock absorber.

2. Equivalent mass
   Select a model so that the equivalent mass should not exceed the allowable range. Otherwise, pulsation could occur in buffer capacity and deceleration force, thus making it difficult to absorb shock smoothly.

3. Collision speed
   Use the product within the specified collision speed range. Otherwise, it could cause the changes in buffer characteristics or result in damaging the shock absorber.

⚠️ Warning

1. Static load
   Design the system so that any other forces than the buffer capacity or impacts should not be applied to the piston rod which is stopped at the retracted state.

⚠️ Caution

1. Maximum operating frequency
   Design the system in the conditions under which it is not used at the frequency exceeding the specified maximum operating frequency.

2. Stroke
   The specified maximum absorbed energy cannot be exerted unless the full stroke is used.

3. Work surface of an impacting material
   The contact surface of an impacting material with which the piston rod comes into contact must be highly rigid.

4. Be aware of the backlash of the impacting material.
   When used in a conveyor line, the object may be pushed back by the built-in spring force after energy is absorbed. For backlash, refer to the spring force in the specifications (page 5).

5. Selection of size
   As the number of operation proceeds, the maximum absorbed energy of shock absorbers will be decreased by the reasons such as abrasion, or deterioration, etc. of the internal working fluid. Taking this into consideration, selecting a size which is 20 to 40% affordable against the amount of absorbed energy is recommended.

6. Reaction force
   In general, the values of reaction force (reactive force generated during operation) generated by the operating speed will vary in oil hydraulic shock absorber. The RJ series can adapt to such this fast/slow speed and can absorb shock smoothly in a wide range of speed.

   But, take note the stroke time could be long, and the motion would not be smooth, etc., depending on the operating conditions. If this would be a problem, we recommend the stroke amount should be restricted by using our optional component “stopper nut”, etc.

⚠️ Danger

1. Operation in an environment which requires explosion-proof
   - When mounting in places where static electricity is accumulated, implement a distribution of electrical energy by grounding.
   - Do not use the materials for buffer face which might cause to spark by collision.

⚠️ Warning

1. Pressure
   Do not use the product in the vacuum state which is substantially different from the atmospheric pressure (above sea level) and in the atmosphere under being pressurized.

2. Using inside a clean room
   Do not use the product in a clean room, as it could contaminate the clean room.

⚠️ Caution

1. Temperature range
   Do not use the product, exceeding the specified allowable temperature range. Seal could be softened or hardened or worn out, or leading to working fluid leak, deterioration, or buffer characteristic changes.

2. Deterioration by atmosphere
   Do not use the product in the presence of salt damage, sulfuric acid gas which makes the metal corroded, or solvent which makes the seal deteriorated.

3. Deterioration by ozone
   Do not use the product under the direct sunlight on the beach, or by the mercury lamp, or the ozone generator, because the rubber material will be deteriorated by ozone.

4. Cutting oil, water, blown dust
   Do not use the product under the condition where the liquid such as cutting oil, water, solvent, etc. is exposed either directly or in atomized form to the piston rod, or where blown dust could be adhered around the piston rod. This could cause malfunction.

5. Vibration
   When vibrations are applied on an impacting material, implement a secure guide on the impacting material.
Warning

1. Before performing installation, removal, or stroke adjustment, make sure to cut the power supply to the equipment and verify that the equipment has stopped.

2. Installation of protective cover
   We recommend the protective cover should be installed for fear that workers might be getting close during the operation.

3. Strength of mounting frame
   The mounting frame needs to have sufficient strength. When deciding the strength of the mounting frame, consider the force applied to the mounting frame at the upper limit of operating conditions shown in the below table, and allow a sufficient safety factor.

<table>
<thead>
<tr>
<th>Model</th>
<th>Load on mounting frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJ0806</td>
<td>630 N</td>
</tr>
<tr>
<td>RJ1007</td>
<td>1600 N</td>
</tr>
<tr>
<td>RJ1412</td>
<td>2000 N</td>
</tr>
</tbody>
</table>

Note) Load on mounting frame is at room temperature (20 to 25°C).

Caution

1. Tightening torque and mounting thread
   When threading on the mounting frame in order to mount a shock absorber directly, refer to the below prepared hole dimensions. Observe the below tightening torque of a nut for shock absorber.
   If the tightening torque exceeds the below value, the shock absorber could be damaged.

<table>
<thead>
<tr>
<th>Model</th>
<th>RJ0806</th>
<th>RJ1007</th>
<th>RJ1412</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread dimensions (mm)</td>
<td>M8 x 1.0</td>
<td>M10 x 1.0</td>
<td>M14 x 1.5</td>
</tr>
<tr>
<td>Thread prepared hole dia. (mm)</td>
<td>ø7.1 ± 0.1</td>
<td>ø9.1 ± 0.1</td>
<td>ø12.7 ± 0.1</td>
</tr>
<tr>
<td>Nut tightening torque (N·m)</td>
<td>1.67</td>
<td>3.14</td>
<td>10.8</td>
</tr>
</tbody>
</table>

2. Deviation of impact
   Mount the shock absorber so that the point of contact of an impacting material must be within the allowable eccentric angle range. If the eccentric angle exceed 3°, an excessive load could be placed on the bearings, resulting in oil leak in a short time.

| Allowable eccentric angle θ₁ < 3° |

3. Rotating angle
   If swing impacts are involved, the installation must be designed so that the direction in which a load is applied should be perpendicular to the shock absorber’s axial center.
   The allowable rotating eccentric angle to the stroke end must be θ₂ < 3°.

| Allowable rotating eccentric angle θ₂ < 3° |

4. Do not scratch the sliding portion of the piston rod or the outside threads of the outer tube.
   Failure to observe this precaution could scratch or gouge the sliding potion of the piston rod, or damage the seals, resulting in oil leak or malfunction. Furthermore, damage to outside threaded portion of the outer tube could prevent the shock absorber from being mounted onto the frame, or result in malfunction by internal component parts deformation.

5. Never turn the screw on the bottom of the body.
   This is not an adjusting screw. Otherwise, oil leak could occur.

6. Adjust the stopping time by using a stopper nut.
   Control the stopping time of the impacting material by turning the stopper nut in or out (thus changing length “a”). After establishing the stopper nut position, use a hexagon nut to secure the stopper nut in place.
Maintenance

⚠️ Caution

1. **Confirm that the mounting nut is not loosen.**
   The shock absorber could be damaged if used in a loosen state.

2. **Pay attention to any abnormal impact sounds or vibrations.**
   If impact sounds or vibrations become abnormally high, the shock absorber may reach the end of its service life. Replace the shock absorber. If using continuously in such a state, equipment could be damaged.

3. **Confirm that there is no oil leak on the outer surface.**
   When a large amount of oil is leaking, replace the product, because it is believed to be happening something wrong with it. If using continuously in such a state, equipment could be damaged.

Storage

⚠️ Caution

1. **Position of the piston rod during storage**
   If the product is stored for an extended period (30 days or more) with the piston rod pushed, the absorption capacity could decrease. Avoid this kind of storage condition.

Life and Replacement Period of Product

⚠️ Caution

1. **As a guide, the maximum operating life of the product (number of cycles) when operated within the specifications is as follows.**
   3 million cycles RJ0806, 1007, 1412
   
   Note) This value (adequate replacement period) is at room temperature (20 to 25°C). The life can depend on conditions such as temperature so the product may need to be replaced before the above number of cycles is reached.
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Safety Instructions
Be sure to read “Precautions for Handling Pneumatic Devices” (M-03-E3A) before using.

SMC Corporation
Akihabara UDX 15F,
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: 03-5207-8249  Fax: 03-5298-5362
URL http://www.smcworld.com
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