# Shock Absorber/Soft type

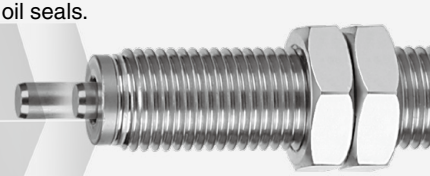
## *RJ* Series

### M6, M8, M10, M14, M20, M27

RoHS

## Improved durability

Long-term continuous operation has been realized by employing the pre-load mechanism, newly-developed oil seals.

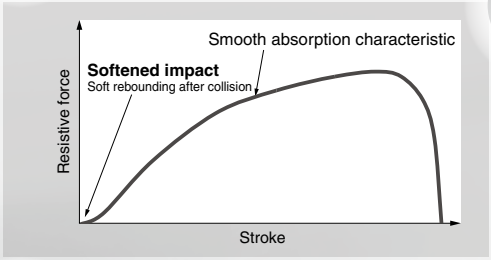


## Maximum operating cycles

# 10 million cycles

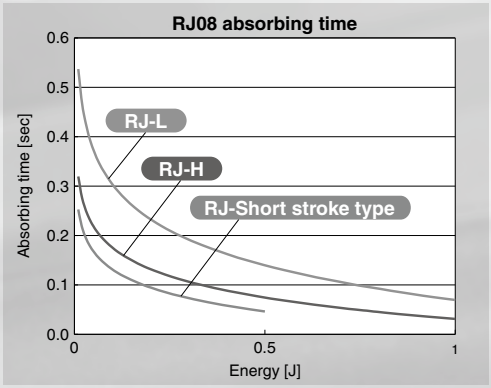
## Stops transported objects softly

A smooth absorption characteristic is achieved by adopting the unique orifice mechanism to ease the impacts on conveyed objects.




## Rich variation

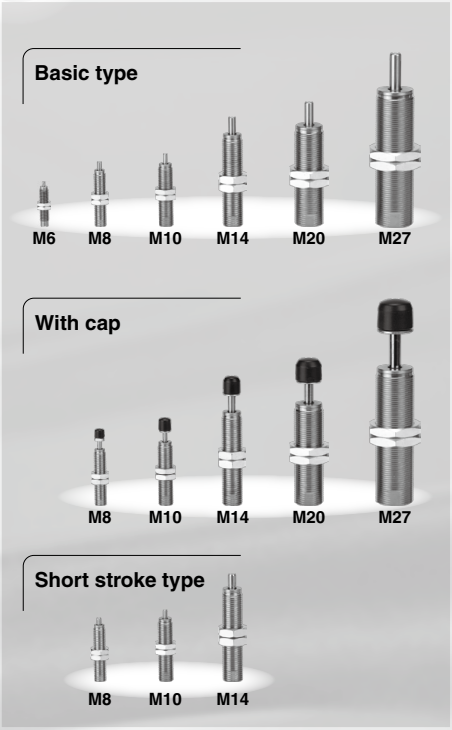
Short stroke type for improving takt time for short stroke actuators.




∗ Reference values when cylinder thrust is 157 N.
Absorbing time varies depending on cylinder collision conditions.

## Lineup M6 – M27

A wider range of usage is possible.




● Mounting interchangeable with the RB series.

RJ
RB
D-□
-X□

# Two types of absorbed energy are available as standard. Selectable in accordance with impact mass and collision speed

**Soft type and short stroke type are available as standard so as to be selectable according to usage conditions (impact mass, collision speed).**

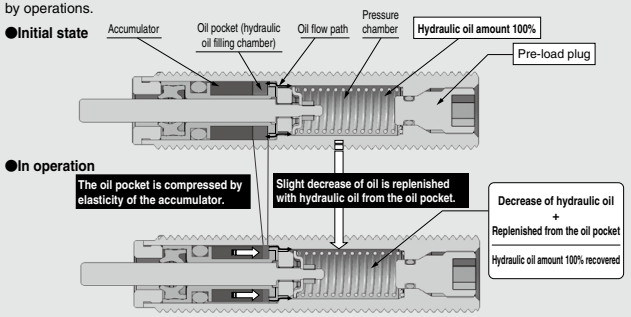
## Max. Absorbed Energy

| Model | | Collision speed (m/s) | Max. absorbed energy (J) |
|---|---|---|---|
| **Soft type**  | **RJ0604** | 0.05 to 1 | 0.5 |
| | **RJ0806H/L** | H : 0.05 to 2/L : 0.05 to 1 | 1 |
| | **RJ1007H/L** | H : 0.05 to 2/L : 0.05 to 1 | 3 |
| | **RJ1412H/L** | H : 0.05 to 2/L : 0.05 to 1 | 10 |
| | **RJ2015H/L** | H : 0.05 to 2/L : 0.05 to 1 | 30 |
| | **RJ2725H/L** | H : 0.05 to 1.5/L : 0.05 to 1 | 70 |
| **Short stroke type**  | **RJ0805** | 0.05 to 1 | 0.5 |
| | **RJ1006** | 0.05 to 1 | 1.5 |
| | **RJ1410** | 0.05 to 1 | 3.7 |

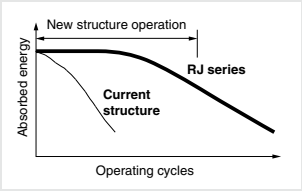


## Pre-load mechanism working principle

Hydraulic oil in the oil pocket is suppled into the pressure chamber by elasticity of the accumulator to replenish the slight decrease of oil caused by operations.

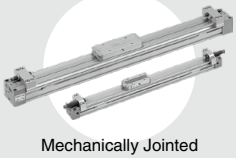



**Transition of absorbed energy**




## Cylinders with RJ series <Made-to-Order (-XB22) applicable products>

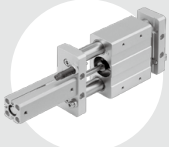
For details, refer to page 1118.



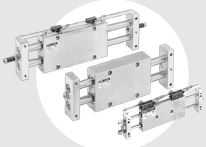
Mechanically Jointed Rodless Cylinder
**MY1,2,3 series**

Magnetically Coupled Rodless Cylinder
**CY1 series**

Guide Cylinder
**MGG series**



Platform Cylinder
**CXT series**



Slide Unit
**CX2 series**

# Shock Absorbers Series Variations

## ●Shock Absorbers RJ/RB/RBL/RBQ series

| Series | | Model<br>( ): With urethane cap<br>* RBQ series ( ): With bumper | Max. absorbed energy (J) | Stroke absorption (mm) | Collision speed (m/s) | O.D. thread size | Option | Page |
|---|---|---|---|---|---|---|---|---|
| **RJ series**<br>**Soft type** | **Basic type** | **RJ0604** | 0.5 | 4 | 0.05 to 1 | M6 x 0.75 | **Nut** | **P.886 to** |
| | | **RJ0806H(U)** | 1 | 6 | 0.05 to 2 | M8 x 1.0 | | |
| | | **RJ0806L(U)** | | | 0.05 to 1 | | | |
| | | **RJ1007H(U)** | 3 | 7 | 0.05 to 2 | M10 x 1.0 | | |
| | | **RJ1007L(U)** | | | 0.05 to 1 | | | |
| | | **RJ1412H(U)** | 10 | 12 | 0.05 to 2 | M14 x 1.5 | | |
| | | **RJ1412L(U)** | | | 0.05 to 1 | | | |
| | | **RJ2015H(U)** | 30 | 15 | 0.05 to 2 | M20 x 1.5 | | |
| | | **RJ2015L(U)** | | | 0.05 to 1 | | | |
| | | **RJ2725H(U)** | 70 | 25 | 0.05 to 1.5 | M27 x 1.5 | | |
| | | **RJ2725L(U)** | | | 0.05 to 1 | | | |
| | **Short stroke type** | **RJ0805(U)** | 0.5 | 5 | 0.05 to 1 | M8 x 1.0 | | |
| | | **RJ1006(U)** | 1.5 | 6 | | M10 x 1.0 | | |
| | | **RJ1410(U)** | 3.7 | 10 | | M14 x 1.5 | | |
| **RB series** | **Basic type** | **RB0604** | 0.5 | 4 | 0.3 to 1 | M6 x 0.75 | **Stopper nut** | **P.895 to** |
| | | **RB0805(C)** | 0.98 | 5 | 0.05 to 5 | M8 x 1.0 | | |
| | | **RB0806(C)** | 2.94 | 6 | | | | |
| | | **RB1006(C)** | 3.92 | 6 | | M10 x 1.0 | | |
| | | **RB1007(C)** | 5.88 | 7 | | | | |
| | | **RB1411(C)** | 14.7 | 11 | | M14 x 1.5 | | |
| | | **RB1412(C)** | 19.6 | 12 | | | | |
| | | **RB2015(C)** | 58.8 | 15 | | M20 x 1.5 | | |
| | | **RB2725(C)** | 147 | 25 | | M27 x 1.5 | | |
| **RBL series**<br>**Coolant resistant type** | **Basic type** | **RBL1006(C)** | 3.92 | 6 | 0.05 to 5 | M10 x 1.0 | **Foot bracket**<br>(Except RBQ) | **P.906 to** |
| | | **RBL1007(C)** | 5.88 | 7 | | | | |
| | | **RBL1411(C)** | 14.7 | 11 | | M14 x 1.5 | | |
| | | **RBL1412(C)** | 19.6 | 12 | | | | |
| | | **RBL2015(C)** | 58.8 | 15 | | M20 x 1.5 | | |
| | | **RBL2725(C)** | 147 | 25 | | M27 x 1.5 | | |
| **RBQ series**<br>**Short type** | **Basic type** | **RBQ1604(C)*** | 1.96 | 4 | 0.05 to 3 | M16 x 1.5 | | **P.910 to** |
| | | **RBQ2007(C)*** | 11.8 | 7 | | M20 x 1.5 | | |
| | | **RBQ2508(C)*** | 19.6 | 8 | | M25 x 1.5 | | |
| | | **RBQ3009(C)*** | 33.3 | 8.5 | | M30 x 1.5 | | |
| | | **RBQ3213(C)*** | 49 | 13 | | M32 x 1.5 | | |

# Shock Absorber
# *RJ Series*
# Model Selection 1

## Model Selection Graph

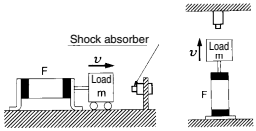
∗ The model selection graphs ① to ⑫ are at room temperature (20 to 25°C).

### ■ Type of Impact

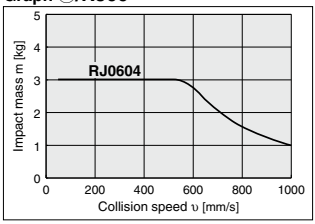
**Free horizontal impact**

**Impact of air cylinder actuation (Horizontal/Upward)**

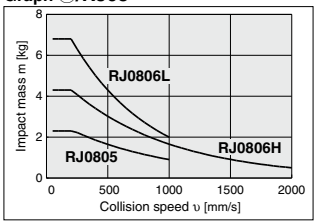
Check "Model Selection Step" 1 to 3 prior to use.



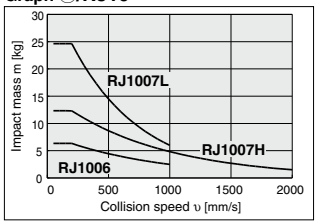

**Graph ①/RJ06**



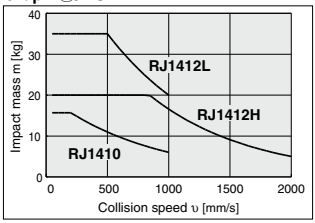

**Graph ②/RJ08**



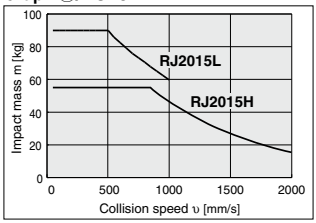

**Graph ③/RJ10**



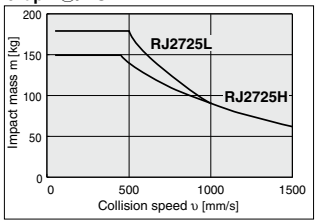

**Graph ④/RJ14**




**Graph ⑤/RJ20**



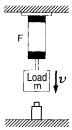

**Graph ⑥/RJ27**



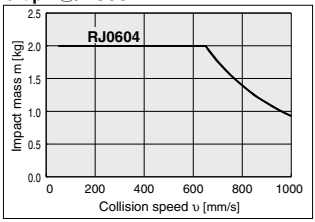

### ■ Type of Impact

**Impact of air cylinder actuation (Downward)**

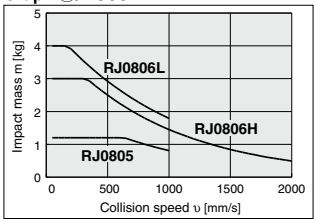
Check "Model Selection Step" 1 to 3 prior to use.



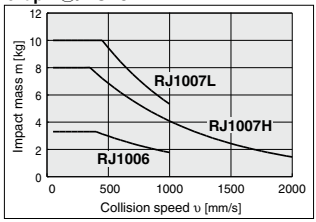

**Graph ⑦/RJ06**



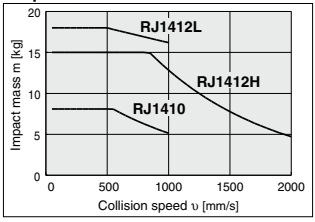

**Graph ⑧/RJ08**



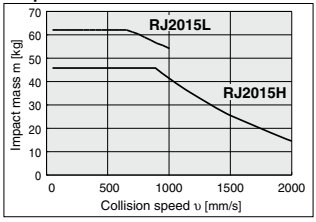

**Graph ⑨/RJ10**



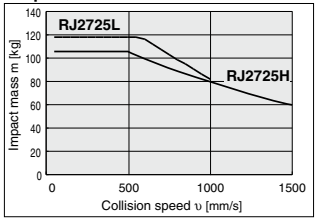

**Graph ⑩/RJ14**




**Graph ⑪/RJ20**




**Graph ⑫/RJ27**



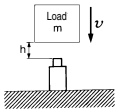
## Model Selection Graph

∗ The model selection graphs ⑬ to ㉔ are at room temperature (20 to 25°C).

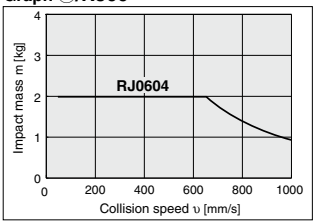
### ■ Type of Impact

**Free fall impact**

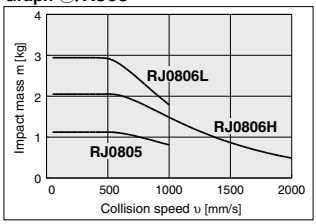
Check "Model Selection Step" 1 to 3 prior to use.



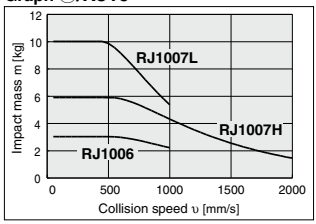

**Graph ⑬/RJ06**



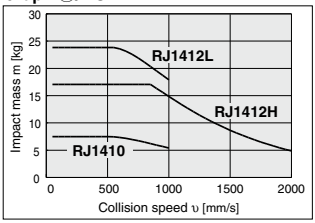

**Graph ⑭/RJ08**



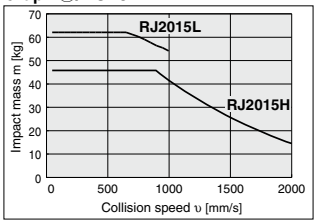

**Graph ⑮/RJ10**



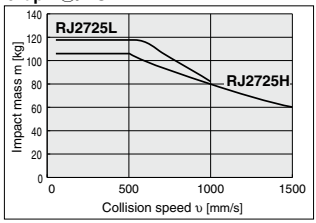

**Graph ⑯/RJ14**




**Graph ⑰/RJ20**




**Graph ⑱/RJ27**

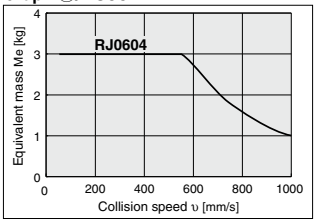



### ■ Type of Impact

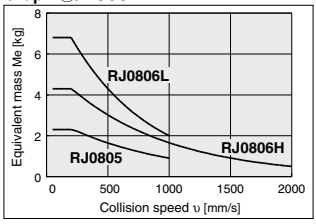
**Others (such as thrust impact or swing impact other than air cylinder actuation)**

Calculate equivalent mass Me from "Model Selection Step" 1 to 7 prior to use.

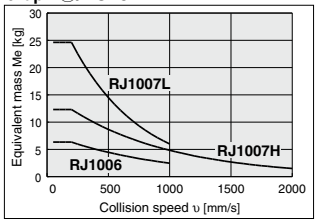
**Graph ⑲/RJ06**



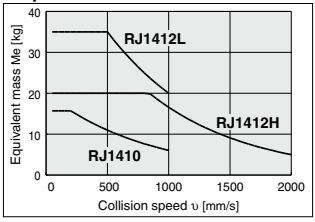

**Graph ⑳/RJ08**



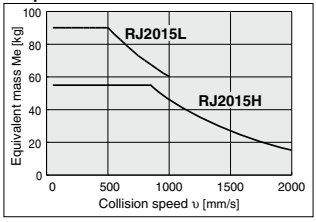

**Graph ㉑/RJ10**



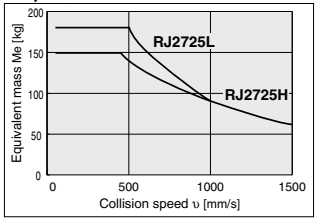

**Graph ㉒/RJ14**




**Graph ㉓/RJ20**




**Graph ㉔/RJ27**



# Shock Absorber
# *RJ Series*
# Model Selection 2

## 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**

| Symbol | Operating conditions | Unit |
|---|---|---|
| m | Impact mass | kg |
| υ | Collision speed | m/s |
| h | Dropping height | m |
| ω | Angular speed | rad/s |
| r | Distance between rotational center and impact point | m |
| F | Thrust | N |
| T | Torque | N·m |
| n | Operating frequency | cycle/min |
| t | Ambient temperature | °C |
| μ | Friction coefficient | — |

**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**

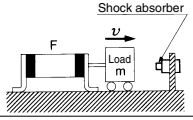
Calculate absorbed energy **E** to confirm it is not more than the maximum absorbed energy of the temporarily selected shock absorber.

Equivalent mass $Me = \frac{2}{\upsilon^2} \cdot E$

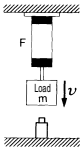
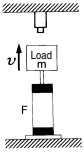
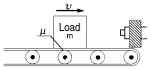
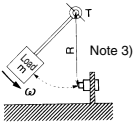
**7 Selection of applicable model**

Substitute the obtained equivalent mass Me, and the collision speed υ by using "Model Selection Graph" ⑲ to ㉔ 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.

### Example of Selection

| | |
|---|---|
| **1 Type of impact** | **Impact of thrust of load (Horizontal) (Impact of thrust from sources other than air cylinder actuation)**   |
| **Collision speed** Note 1) **υ** | **υ** |
| **Kinetic energy $E_1$** | $\frac{1}{2} \cdot m \cdot \upsilon^2$ |
| **Thrust energy $E_2$** | **F · S** |
| **Absorbed energy E** | **$E_1 + E_2$** |
| **Equivalent mass** Note 2) **Me** | $\frac{2}{\upsilon^2} \cdot E$ |
| **2 Operating conditions** | m= 5 kg<br>υ= 0.5 m/s<br>F= 150 N<br>n= 30 cycle/min<br>t= 25°C |
| **3 Confirmation of specifications and precautions** | ● **Confirmation of specifications**<br>υ ··· 0.5 < 1.0 (max.), 2.0 (max.)<br>t ··· –10 (min.) < 25 < 60 (max.)<br>F ··· 150 < 422 (max.)<br>**YES** |
| **4 Calculation of kinetic energy $E_1$** | ● **Kinetic energy $E_1$**<br>Use **Formula** to calculate $E_1$ by using 5.0 for m and 0.5 for υ.<br>**$E_1 \approx 0.63$ J** |
| **5 Calculation of thrust energy $E_2$** | ● **Thrust energy $E_2$**<br>Select the RJ1007L temporarily and obtain $E_2$ by using the formula.<br>**$E_2 \approx 1.05$ J** |
| **6 Calculation of equivalent mass Me** | ● **Equivalent mass Me**<br>Use **Formula** "Absorbed energy **E** = **$E_1$** + **$E_2$** = 0.63 + 1.05 = 1.68 J" to calculate **Me** by using **E** and **0.5** for υ.<br>**Me ≈ 13.4 kg** |
| **7 Check adequacy of the selected model RJ1007.** | ● **Selection of applicable model**<br>According to Graph ㉑, the temporarily selected RJ1007L satisfies Me = 13.4 kg < 14.5 kg, resulting in an operating frequency of n = 30 < 70, without causing a problem.<br>**YES**<br>↓<br>**Select the RJ1007L.** |

## 1 Type of Impact

| Type of impact | Impact of thrust of load (Downward) (Impact of thrust from sources other than air cylinder actuation) | Impact of thrust of load (Upward) (Impact of thrust from sources other than air cylinder actuation) | Load on conveyor (Horizontal) | Swing impact (With torque) |
|---|---|---|---|---|
| |  |  |  |  |
| Note 1) **Collision speed** $\upsilon$ | $\upsilon$ | $\upsilon$ | $\upsilon$ | $\omega \cdot R$ |
| **Kinetic energy** $E_1$ | $\frac{1}{2} \cdot m \cdot \upsilon^2$ | $\frac{1}{2} \cdot m \cdot \upsilon^2$ | $\frac{1}{2} \cdot m \cdot \upsilon^2$ | $\frac{1}{2} \cdot I \cdot \omega^2$ |
| **Thrust energy** $E_2$ | $F \cdot S + m \cdot g \cdot S$ | $F \cdot S - m \cdot g \cdot S$ | $m \cdot g \cdot \mu \cdot S$ | $T \cdot \frac{S}{R}$ |
| **Absorbed energy** E | $E_1 + E_2$ | $E_1 + E_2$ | $E_1 + E_2$ | $E_1 + E_2$ |
| Note 2) **Equivalent mass** Me | $\frac{2}{\upsilon^2} \cdot E$ | $\frac{2}{\upsilon^2} \cdot E$ | $\frac{2}{\upsilon^2} \cdot E$ | $\frac{2}{\upsilon^2} \cdot E$ |

Note 1) This is the momentary speed at which an object is impacting against a shock absorber. The collision speed is $\upsilon = 2\overline{\upsilon}$ when the speed (average speed $\overline{\upsilon}$) is calculated from the air cylinder's stroke time.

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

Note 3) R: The distance between rotational center and impact point. Set R at the minimum installation radius (Caution 3. Rotating angle on page 892) or higher.

**<Symbol>**

| Symbol | Specifications | Unit |
|---|---|---|
| E | Absorbed energy | J |
| $E_1$ | Kinetic energy | J |
| $E_2$ | Thrust energy | J |
| F | Thrust | N |
| g | Gravitational acceleration (9.8) | m/s² |
| h | Dropping height | m |
| I Note 4) | Moment of inertia around the center of gravity | kg·m² |
| n | Operating frequency | cycle/min |
| R | Distance between rotational center and impact point | m |
| S | Shock absorber's stroke | m |
| T | Torque | N·m |
| t | Ambient temperature | °C |
| $\upsilon$ | Collision speed | m/s |
| m | Impact mass | kg |
| Me | Equivalent mass | kg |
| $\omega$ | Angular speed | rad/s |
| $\mu$ | Friction coefficient | — |

Note 4) For the formula for moment of inertia I (kg·m²), refer to the rotary actuator's catalog.

### 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. Use the RJ20 and 27 under the conditions mentioned below.
RJ20: Cylinder bore size ø32 or higher or thrust 240 N or higher
RJ27: Cylinder bore size ø40 or higher or thrust 380 N or higher

# Shock Absorber
# *RJ Series*

RoHS

## How to Order

**RJ 0604 □**

**RJ 0806 H U □**

**Shock absorber/soft type**

**O.D. thread size/Stroke**

| Symbol | O.D. thread size | Stroke |
|---|---|---|
| **0604** | 6 mm | 4 mm |
| **0806** | 8 mm | 6 mm |
| **1007** | 10 mm | 7 mm |
| **1412** | 14 mm | 12 mm |
| **2015** | 20 mm | 15 mm |
| **2725** | 27 mm | 25 mm |

**Collision speed range**

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

**With cap**

| | |
|---|---|
| **Nil** | Basic type |
| **U** | With urethane cap |

**Option**

| Symbol | Hexagon nut | Stopper nut |
|---|---|---|
| **Nil** | 2 pcs. | — |
| **J** | 3 pcs. | — |
| **N** | — | — |
| **S** | 2 pcs. | 1 pc. |
| **SJ** | 3 pcs. | 1 pc. |
| **SN** | — | 1 pc. |

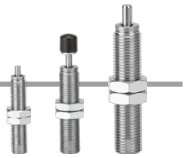
## Specifications

| Model | Basic type | RJ0604 | RJ0806 | | RJ1007 | | RJ1412 | | RJ2015 | | RJ2725 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | With cap | — | RJ0806□U | | RJ1007□U | | RJ1412□U | | RJ2015□U | | RJ2725□U | |
| | Collision speed range | — | H | L | H | L | H | L | H | L | H | L |
| Max. absorbed energy (J) Note) | | 0.5 | 1 | | 3 | | 10 | | 30 | | 70 | |
| O.D. thread size (mm) | | 6 x 0.75 | 8 x 1 | | 10 x 1 | | 14 x 1.5 | | 20 x 1.5 | | 27 x 1.5 | |
| Stroke (mm) | | 4 | 6 | | 7 | | 12 | | 15 | | 25 | |
| Collision speed (m/s) | | 0.05 to 1 | 0.05 to 2 | 0.05 to 1 | 0.05 to 2 | 0.05 to 1 | 0.05 to 2 | 0.05 to 1 | 0.05 to 2 | 0.05 to 1 | 0.05 to 1.5 | 0.05 to 1 |
| Max. operating frequency (cycle/min) Note) | | 80 | 80 | | 70 | | 45 | | 25 | | 10 | |
| Spring force (N) | Extended | 1.3 | 2.8 | | 5.4 | | 6.4 | | 14.1 | | 14.7 | |
| | Compressed | 3.9 | 5.4 | | 8.4 | | 17.4 | | 29.1 | | 34.4 | |
| Max. allowable thrust (N) | | 150 | 245 | | 422 | | 814 | | 1961 | | 2942 | |
| Ambient temperature (°C) | | –10 to 60 (No freezing) | | | | | | | | | | |
| Weight (g) | Basic type | 5.5 | 15 | | 23 | | 65 | | 120 | | 300 | |
| | With cap | — | 16 | | 25 | | 70 | | 135 | | 350 | |

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

# Shock Absorber
# *RJ Series*

RoHS



## How to Order

**Short stroke type** **RJ** **0805** **U** ☐

**Shock absorber/soft type**

**O.D. thread size/Stroke**

| Symbol | O.D. thread size | Stroke |
|---|---|---|
| **0805** | 8 mm | 5 mm |
| **1006** | 10 mm | 6 mm |
| **1410** | 14 mm | 10 mm |

**Option**

| Symbol | Hexagon nut | Stopper nut |
|---|---|---|
| **Nil** | 2 pcs. | — |
| **J** | 3 pcs. | — |
| **N** | — | — |
| **S** | 2 pcs. | 1 pc. |
| **SJ** | 3 pcs. | 1 pc. |
| **SN** | — | 1 pc. |

**With cap**

| | |
|---|---|
| **Nil** | Basic type |
| **U** | With urethane cap |

## Specifications

| Model | | RJ0805 | RJ1006 | RJ1410 |
|---|---|---|---|---|
| | Basic type / With cap | RJ0805U | RJ1006U | RJ1410U |
| Max. absorbed energy (J) Note) | | 0.5 | 1.5 | 3.7 |
| O.D. thread size (mm) | | 8 x 1 | 10 x 1 | 14 x 1.5 |
| Stroke (mm) | | 5 | 6 | 10 |
| Collision speed (m/s) | | 0.05 to 1 | | |
| Max. operating frequency (cycle/min) Note) | | 80 | 70 | 45 |
| Spring force (N) | Extended | 2.8 | 5.4 | 6.4 |
| | Compressed | 4.9 | 8.0 | 14.6 |
| Max. allowable thrust (N) | | 245 | 422 | 814 |
| Ambient temperature (°C) | | −10 to 60 (No freezing) | | |
| Weight (g) | Basic type | 15 | 23 | 65 |
| | With cap | 16 | 25 | 70 |

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

## Replacement Parts No./Cap (Resin part only)

**RBC** **08** **C**

**Cap**

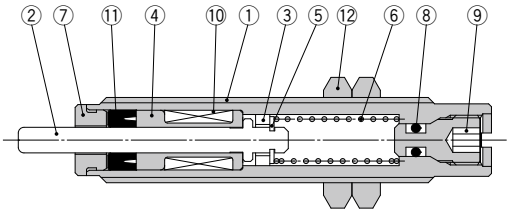
**Applicable model**

| | |
|---|---|
| **08** | RJ0805U, 0806☐U |
| **10** | RJ1006U, 1007☐U |
| **14** | RJ1410U, 1412☐U |
| **20** | RJ2015☐U |
| **27** | RJ2725☐U |

Caps cannot be mounted on basic type. Please specify a type with cap when ordering.

## Construction

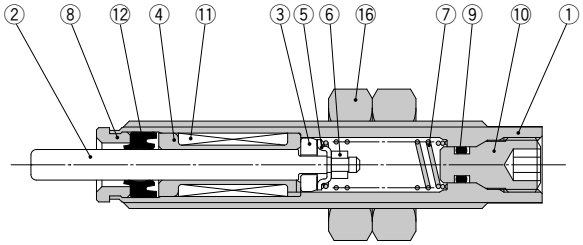
### RJ0604

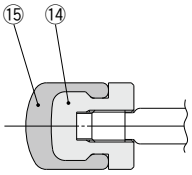



**Component Parts**

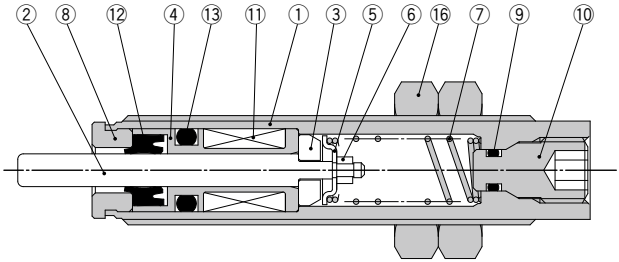
| No. | Description | Material | Treatment |
|---|---|---|---|
| 1 | **Tube** | Special steel | Electroless nickel plating |
| 2 | **Piston rod** | Special steel | Electroless nickel plating |
| 3 | **Piston** | Stainless steel | |
| 4 | **Bearing** | Aluminum bearing alloy | |
| 5 | **Spring guide** | Tool steel | Phosphate film |
| 6 | **Return spring** | Steel wire | Zinc trivalent chromating |
| 7 | **Stopper** | Stainless steel | |
| 8 | **O-ring** | Synthetic rubber | |
| 9 | **Plug** | Special steel | Electroless nickel plating |
| 10 | **Accumulator** | Synthetic rubber | |
| 11 | **Rod seal** | Synthetic rubber | |
| 12 | **Hexagon nut** | Carbon steel | Zinc trivalent chromating |

### RJ08□□




### RJ10□□, 14□□, 2015, 2725



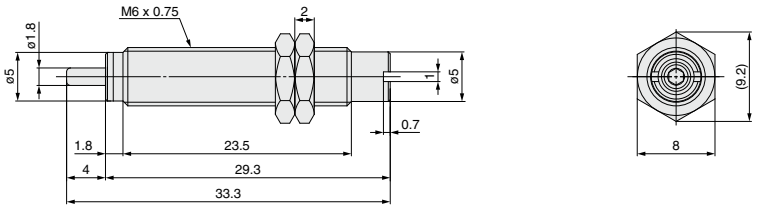

**Component Parts**

| No. | Description | Material | Treatment |
|---|---|---|---|
| 1 | **Tube** | Special steel | Electroless nickel plating |
| 2 | **Piston rod** | Special steel | Electroless nickel plating |
| 3 | **Piston** | Stainless steel | |
| 4 | **Bearing** | Special bearing material | |
| 5 | **Spring guide** | Tool steel | Zinc trivalent chromating |
| 6 | **Lock ring** | Copper | |
| 7 | **Return spring** | Steel wire | Zinc trivalent chromating |
| 8 | **Stopper** | Structural steel | Electroless nickel plating |
| 9 | **O-ring** | Synthetic rubber | |
| 10 | **Plug** | Special steel | H: Electroless nickel plating<br>L: Black electroless nickel plating |
| 11 | **Accumulator** | Synthetic rubber | |
| 12 | **Rod seal** | Synthetic rubber | |
| 13 | **O-ring** | Synthetic rubber | |
| 14 | **Cap bracket** | Structural steel | Zinc trivalent chromating<br>(RJ08□□: Electroless nickel plating) |
| 15 | **Cap** | Urethane | |
| 16 | **Hexagon nut** | Carbon steel | Zinc trivalent chromating |

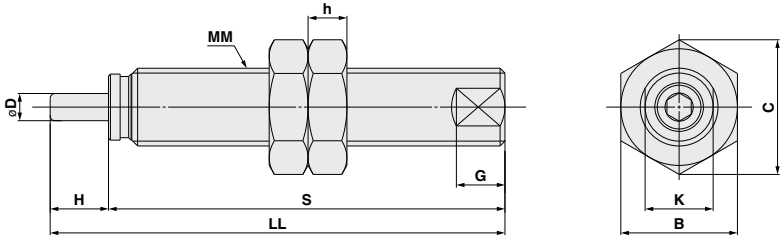
## Dimensions

**Basic type**

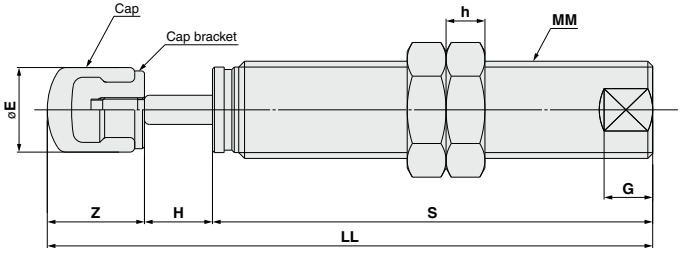
**RJ0604**




**RJ08□□, 10□□, 14□□, 2015, 2725**




**With cap**




**Basic type**

| Model | | Dimensions | | | | | | | Hexagon nut | | | With cap | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D | H | LL | MM | S | G | K | B | C | h | E | LL | Z |
| RJ0806□ | RJ0806□U | 2.8 | 6 | 46.8 | M8 x 1.0 | 40.8 | 5 | 7 | 12 | 13.9 | 4 | 6.8 | 55.3 | 8.5 |
| RJ1007□ | RJ1007□U | 3 | 7 | 52.3 | M10 x 1.0 | 45.3 | 7 | 9 | 14 | 16.2 | 4 | 8.7 | 62.3 | 10 |
| RJ1412□ | RJ1412□U | 5 | 12 | 79.1 | M14 x 1.5 | 67.1 | 8 | 12 | 19 | 21.9 | 6 | 12 | 92.6 | 13.5 |
| RJ2015□ | RJ2015□U | 6 | 15 | 88.2 | M20 x 1.5 | 73.2 | 10 | 17 | 27 | 31.2 | 6 | 18 | 105.2 | 17 |
| RJ2725□ | RJ2725□U | 8 | 25 | 124 | M27 x 1.5 | 99 | 12 | 24 | 36 | 41.6 | 6 | 25 | 147 | 23 |

∗ The dimensions of H/L type are the same.

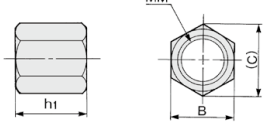
**Short stroke type**

| Model | | Dimensions | | | | | | | Hexagon nut | | | With cap | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D | H | LL | MM | S | G | K | B | C | h | E | LL | Z |
| RJ0805 | RJ0805U | 2.8 | 5 | 45.8 | M8 x 1.0 | 40.8 | 5 | 7 | 12 | 13.9 | 4 | 6.8 | 54.3 | 8.5 |
| RJ1006 | RJ1006U | 3 | 6 | 51.3 | M10 x 1.0 | 45.3 | 7 | 9 | 14 | 16.2 | 4 | 8.7 | 61.3 | 10 |
| RJ1410 | RJ1410U | 5 | 10 | 77.1 | M14 x 1.5 | 67.1 | 8 | 12 | 19 | 21.9 | 6 | 12 | 90.6 | 13.5 |

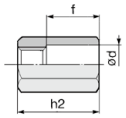
## Option

**Stopper nut**

For basic type



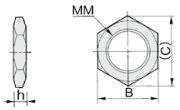

For with cap




Material: Carbon steel Treatment: Zinc trivalent chromating

| Part no. | | Applicable absorber | Dimensions | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| For basic type | For with cap | | B | C | h1 | h2 | MM | d | f |
| **RB06S** | — | RJ06□□ | 8 | 9.3 | 5 | — | M6 x 0.75 | — | — |
| **RB08S** | **RBC08S** | RJ08□□ | 12 | 13.9 | 6.5 | 23 | M8 x 1.0 | 9 | 15 |
| **RB10S** | **RBC10S** | RJ10□□ | 14 | 16.2 | 8 | 23 | M10 x 1.0 | 11 | 15 |
| **RB14S** | **RBC14S** | RJ14□□ | 19 | 21.9 | 11 | 31 | M14 x 1.5 | 15 | 20 |
| **RB20S** | **RBC20S** | RJ2015 | 27 | 31.2 | 16 | 40 | M20 x 1.5 | 23 | 25 |
| **RB27S** | **RBC27S** | RJ2725 | 36 | 41.6 | 22 | 51 | M27 x 1.5 | 32 | 33 |

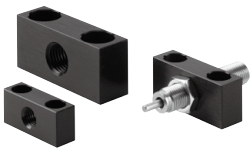
## Hexagon Nut (2 pcs.are equipped as standard)




Material: Special steel Treatment: Zinc trivalent chromating

| Part no. | Dimensions | | | |
|---|---|---|---|---|
| | MM | h | B | C |
| **RJ06J** | M6 x 0.75 | 2 | 8 | 9.2 |
| **RB08J** | M8 x 1.0 | 4 | 12 | 13.9 |
| **RB10J** | M10 x 1.0 | 4 | 14 | 16.2 |
| **RB14J** | M14 x 1.5 | 6 | 19 | 21.9 |
| **RB20J** | M20 x 1.5 | 6 | 27 | 31.2 |
| **RB27J** | M27 x 1.5 | 6 | 36 | 41.6 |

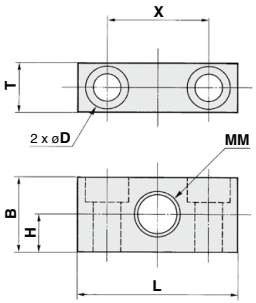
## Foot Bracket for Shock Absorber



Material: Aluminum alloy
Treatment: Black hard anodized

| Part no. | Applicable absorber |
|---|---|
| **RB08-X331** | RJ08□□ |
| **RB10-X331** | RJ10□□ |
| **RB14-X331** | RJ14□□ |
| **RB20-X331** | RJ2015 |
| **RB27-X331** | RJ2725 |

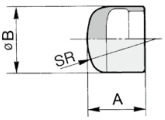
## Dimensions




| Part no. | B | D | H | L | MM | T | X | Mounting bolt |
|---|---|---|---|---|---|---|---|---|
| **RB08-X331** | 15 | 4.5 drill, 8 counterbore depth 4.4 | 7.5 | 32 | M8 x 1.0 | 10 | 20 | M4 |
| **RB10-X331** | 19 | 5.5 drill, 9.5 counterbore depth 5.4 | 9.5 | 40 | M10 x 1.0 | 12 | 25 | M5 |
| **RB14-X331** | 25 | 9 drill, 14 counterbore depth 8.6 | 12.5 | 54 | M14 x 1.5 | 16 | 34 | M8 |
| **RB20-X331** | 38 | 11 drill, 17.5 counterbore depth 10.8 | 19 | 70 | M20 x 1.5 | 22 | 44 | M10 |
| **RB27-X331** | 50 | 13.5 drill, 20 counterbore depth 13 | 25 | 80 | M27 x 1.5 | 34 | 52 | M12 |

## Replacement Parts

**Cap**




* Replacement parts for a type with cap. Cannot be mounted on basic type.

Material: Polyurethane

| Part no. | Applicable absorber | Dimensions | | |
|---|---|---|---|---|
| | | A | B | SR |
| **RBC08C** | RJ08□□U | 6.5 | 6.8 | 6 |
| **RBC10C** | RJ10□□U | 9 | 8.7 | 7.5 |
| **RBC14C** | RJ14□□U | 12.5 | 12 | 10 |
| **RBC20C** | RJ2015U | 16 | 18 | 20 |
| **RBC27C** | RJ2725U | 21 | 25 | 25 |

# *RJ Series*
# Specific Product Precautions 1

**Be sure to read this before handling the products. Refer to back page 50 for Safety Instructions and pages 3 to 12 for Common Precautions.**

## Selection

### ⚠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 (hardness of HRC35 or more). A high surface compression load is applied to the contact surface of the impacting material with which the piston rod comes into contact.

**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. (Pages 886 and 887)

**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 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. Resisitive force characteristics**

In general, the values of resisitive force (resisitive force generated during the 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.

### ⚠Caution

**7. Parallel usage**

When using multiple shock absorbers in parallel, energy will not be divided evenly because of differences in product dimensions and devices. For this reason, select the following options.

E= Ea/N/0.6

E: Energy used per shock absorber

Ea: All energies

N: The number of shock absorbers used in parallel

## Operating Environment

### ⚠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 materials for the buffer surface 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, sulfurous 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 a malfunction.

**5. Vibration**

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

# *RJ Series*
# Specific Product Precautions 2

**Be sure to read this before handling the products. Refer to back page 50 for Safety Instructions and pages 3 to 12 for Common Precautions.**

## Mounting

## ⚠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 load applied to the mounting frame at the upper limit of operating conditions shown in the table below, and allow a sufficient safety factor.

| Model | Load on mounting frame |
|---|---|
| **RJ0604** | 450 N |
| **RJ0805** | 380 N |
| **RJ0806** | 630 N |
| **RJ1006** | 900 N |
| **RJ1007** | 1600 N |
| **RJ1410** | 1700 N |
| **RJ1412** | 2000 N |
| **RJ2015** | 6000 N |
| **RJ2725** | 8500 N |

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 prepared hole dimensions below. Observe the below tightening torque of a nut for shock absorber.

If the tightening torque exceeds the value below, the shock absorber could be damaged.

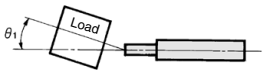
When a shock absorber is mounted on a cylinder, follow the torque values listed on each cylinder.

| Model | **RJ0604** | **RJ08□□** | **RJ10□□** | **RJ14□□** | **RJ2015** | **RJ2725** |
|---|---|---|---|---|---|---|
| Thread dimensions (mm) | M6 x 0.75 | M8 x 1.0 | M10 x 1.0 | M14 x 1.5 | M20 x 1.5 | M27 x 1.5 |
| Thread prepared hole dia. (mm) | $\phi 5.3^{+0.1}_{0}$ | $\phi 7.1^{+0.1}_{0}$ | $\phi 9.1^{+0.1}_{0}$ | $\phi 12.7^{+0.1}_{0}$ | $\phi 18.7^{+0.1}_{0}$ | $\phi 25.7^{+0.1}_{0}$ |
| Nut tightening torque (N·m) | 0.85 | 1.67 | 3.14 | 10.8 | 23.5 | 62.8 |

**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 is exceed 3°, an excessive load could be placed on the bearings, resulting in oil leak in a short time.

Allowable eccentric angle $\theta_1 \leq 3°$



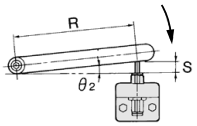

For with cap $\theta_1 \leq 1°$

## ⚠Caution

**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 rotating eccentric angle to the stroke end must be $\theta_2 \leq 3°$.




Allowable rotating eccentric angle $\theta_2 \leq 3°$

**Installation Requirement for Swing Impacts** (mm)

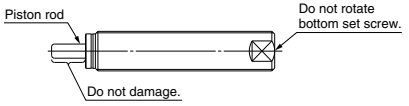
| Model | **S** (Stroke) | $\theta_2$ (Allowable rotating angle) | **R** (Min. installation radius) | |
|---|---|---|---|---|
| | | | Basic type | With cap |
| **RJ0604** | 4 | 3° | 76 | – |
| **RJ0805** | 5 | | 96 | 258 |
| **RJ0806** | 6 | | 115 | 277 |
| **RJ1006** | 6 | | 115 | 306 |
| **RJ1007** | 7 | | 134 | 325 |
| **RJ1410** | 10 | | 191 | 449 |
| **RJ1412** | 12 | | 229 | 487 |
| **RJ2015** | 15 | | 287 | 611 |
| **RJ2725** | 25 | | 478 | 916 |

**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 a 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.



# Specific Product Precautions 3

**Be sure to read this before handling the products. Refer to back page 50 for Safety Instructions and pages 3 to 12 for Common Precautions.**

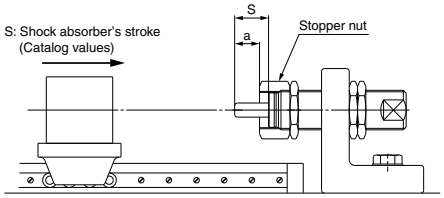
## Mounting

### ⚠Warning

**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.

Capacity of shock absorbers deteriorate in accordance with usage. When crashing sounds or vibrations are generated during the operation, adjust the stopper nut and make the effective stroke (a) longer, or give the stroke enough leeway beforehand.




## 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.

**4. Check for cracks and wear in caps.**

For shock absorbers with caps, the caps will wear out first. Replace caps early to prevent damage to colliding objects.

## 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.

## Shock Absorber Replacement Period

### ⚠Caution

**1. The cylinder, eguipment and/or workpieces might be destroyed if the table collides the end of the stroke without being buffered properly by the shock absorber.**

**Check the conditions periodically and adjust or replace the shock absorber, if necessary. About 3 million cycles are possible within the catalog usage range (model selection graph range), so check the condition after 1.5 million cycles for the RJ06 (room temperature: 20 to 25°C). Maximum operating cycles of 10 million is confirmed under our in-house conditions (room temperature: 20 to 25°C, impact load factor 50%, linear cylinder collision), so by making a size selection with much leeway, long operational life will be possible.**