Shock Absorber/Soft type

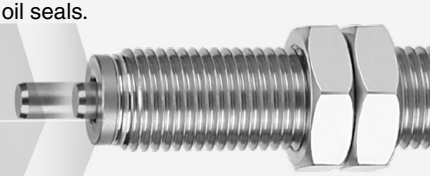
Series RJ

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.

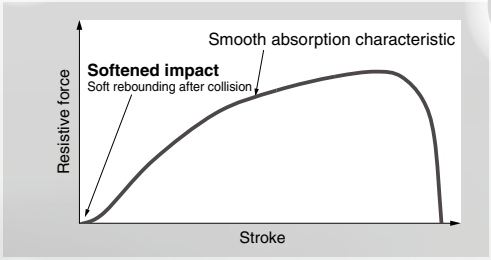


Maximum operating cycles

10 million cycles

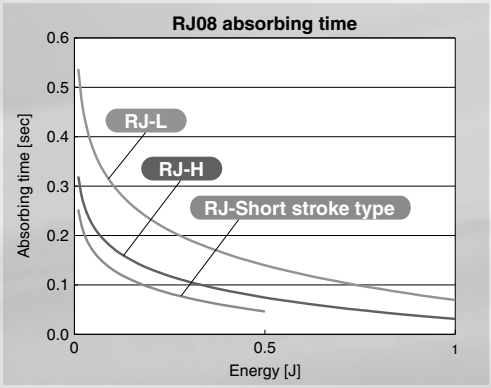
Stops transported objects softly

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



Rich variation

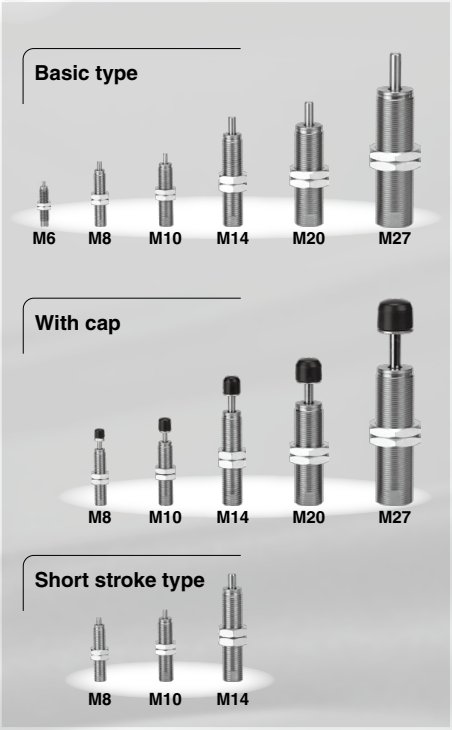
Short stroke type for improving takt time for short stroke actuators.



∗ 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.



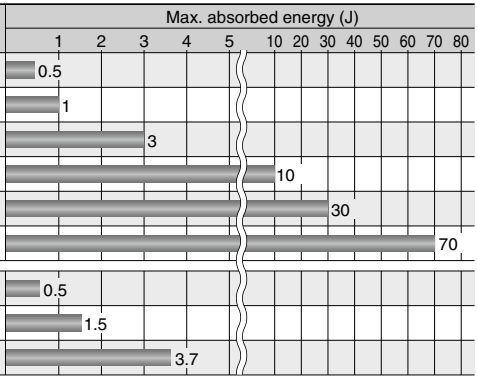
● Mounting interchangeable with the RB series.

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).

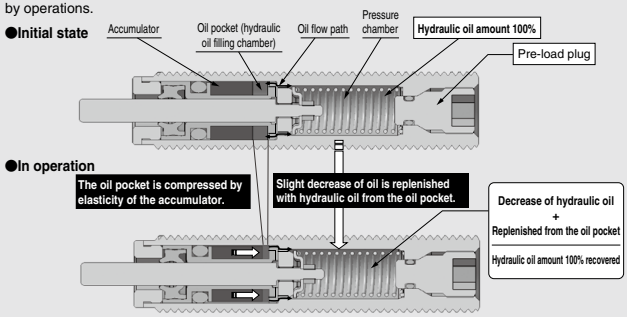
Max. Absorbed Energy

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

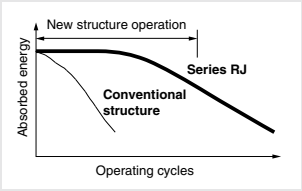


Pre-load mechanism working principle

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>

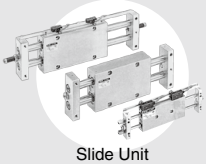
For details, refer to page 2056.

Mechanically Jointed Rodless Cylinder
Series MY1,2,3

Magnetically Coupled Rodless Cylinder
Series CY1

Guide Cylinder
Series MGG

Platform Cylinder
Series CXT



Slide Unit
Series CX2

Shock Absorbers Series Variations

●Shock Absorbers Series RJ/RB/RBL/RBQ

Series		Model ( ): With urethane cap ∗ Series RBQ ( ): With bumper	Max. absorbed energy (J)	Stroke absorption (mm)	Collision speed (m/s)	O.D. thread size	Option	Page
Series RJ **Soft type**	**Basic type**	**RJ0604**	0.5	4	0.05 to 1	M6 x 0.75	**Nut**	**P.1838**
		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		
Series RB	**Basic type**	**RB0604**	0.5	4	0.3 to 1	M6 x 0.75	**Stopper nut**	**P.1847 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		
Series RBL **Coolant resistant type**	**Basic type**	**RBL1006(C)**	3.92	6	0.05 to 5	M10 x 1.0	**Foot bracket** (Except RBQ)	**P.1858 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		
Series RBQ **Short type**	**Basic type**	**RBQ1604(C)**∗	1.96	4	0.05 to 3	M16 x 1.5		**P.1862 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
Series RJ
Model Selection 1

Model Selection Graph

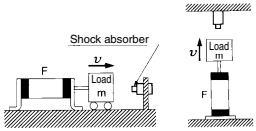
∗ The model selection graphs ① to ⑫ are at room temperature (20 to 25°C).

■ Type of Impact

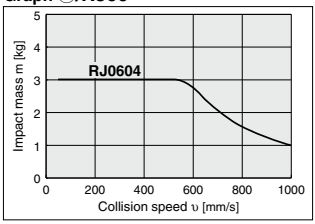
Free horizontal impact

Impact of air cylinder actuation (Horizontal/Upward)

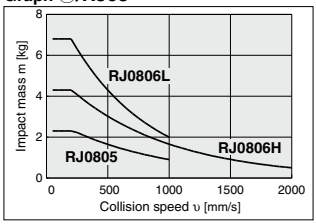
Check "Model Selection Step" 1 to 3 prior to use.



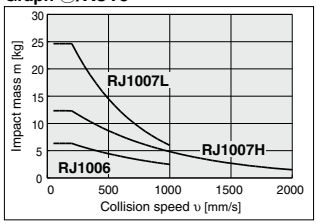
Graph ①/RJ06



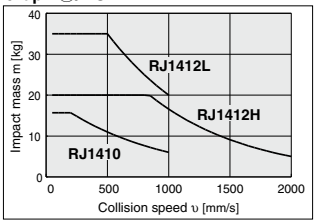
Graph ②/RJ08



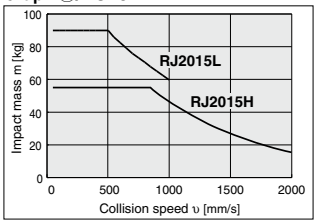
Graph ③/RJ10



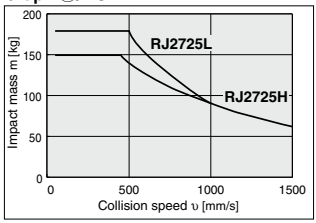
Graph ④/RJ14



Graph ⑤/RJ20



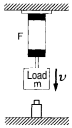
Graph ⑥/RJ27



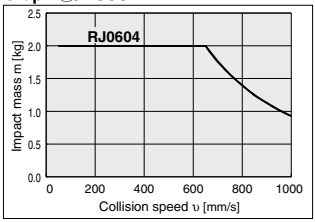
■ Type of Impact

Impact of air cylinder actuation (Downward)

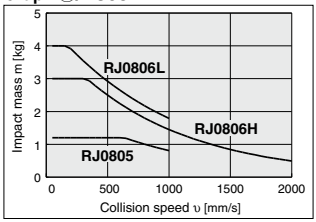
Check "Model Selection Step" 1 to 3 prior to use.



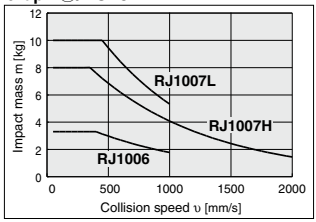
Graph ⑦/RJ06



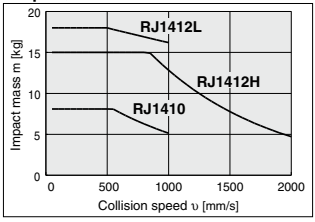
Graph ⑧/RJ08



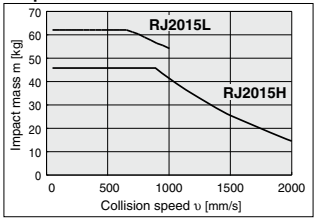
Graph ⑨/RJ10



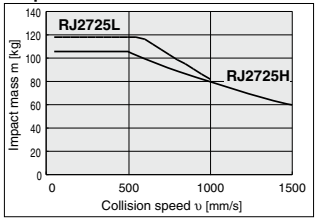
Graph ⑩/RJ14



Graph ⑪/RJ20



Graph ⑫/RJ27



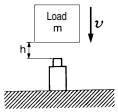
Model Selection Graph

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

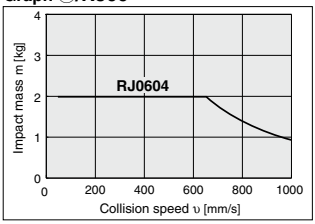
■ Type of Impact

Free fall impact

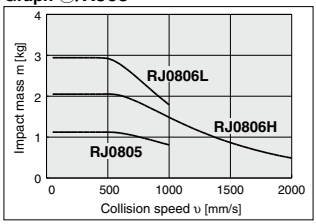
Check "Model Selection Step" 1 to 3 prior to use.



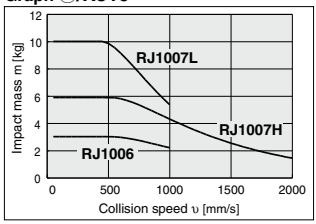
Graph ⑬/RJ06



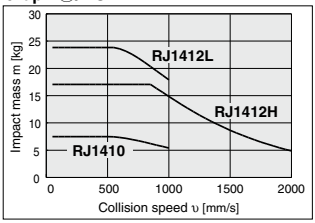
Graph ⑭/RJ08



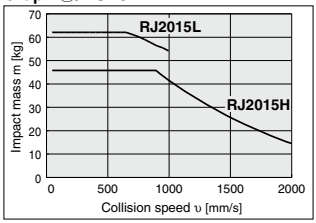
Graph ⑮/RJ10



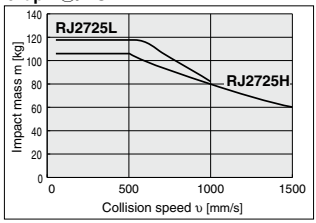
Graph ⑯/RJ14



Graph ⑰/RJ20



Graph ⑱/RJ27

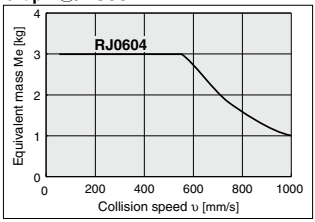


■ Type of Impact

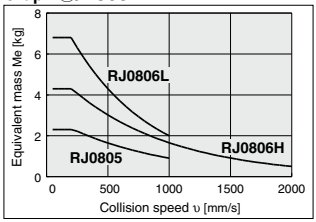
Others (such as thrust impact or swing impact other than air cylinder actuation)

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

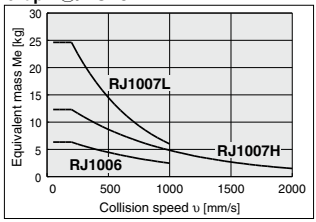
Graph ⑲/RJ06



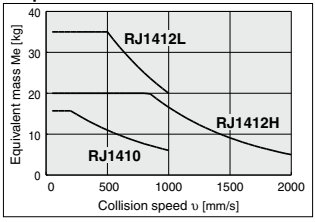
Graph ⑳/RJ08



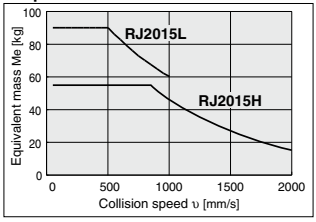
Graph ㉑/RJ10



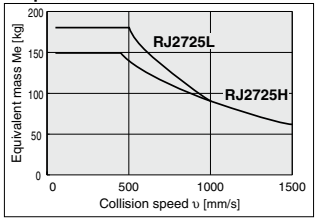
Graph ㉒/RJ14



Graph ㉓/RJ20



Graph ㉔/RJ27



Shock Absorber
Series RJ
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

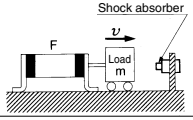
Calculate absorbed energy **E** to confirm it is not more than the maximum absorbed energy of the temporarily selected shock absorber.

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

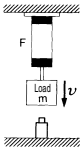
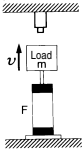
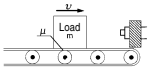
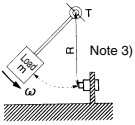
7 Selection of applicable model

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

	Impact of thrust of load (Horizontal) (Impact of thrust from sources other than air cylinder actuation)
1 Type of impact	
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 Me Note 2)	$\frac{2}{\upsilon^2} \cdot E$
2 Operating conditions	m= 5 kg υ= 0.5 m/s F= 150 N n= 30 cycle/min t= 25°C
3 Confirmation of specifications and precautions	● **Confirmation of specifications** υ ··· 0.5 < 1.0 (max.), 2.0 (max.) t ··· –10 (min.) < 25 < 60 (max.) F ··· 150 < 422 (max.) **YES**
4 Calculation of kinetic energy E_1	● **Kinetic energy E_1** Use **Formula** to calculate E_1 by using 5.0 for m and 0.5 for υ. **$E_1 \approx 0.63$ J**
5 Calculation of thrust energy E_2	● **Thrust energy E_2** Select the RJ1007L temporarily and obtain E_2 by using the formula. **$E_2 \approx 1.05$ J**
6 Calculation of equivalent mass Me	● **Equivalent mass Me** 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. **Me ≈ 13.4 kg**
7 Check adequacy of the selected model RJ1007.	● **Selection of applicable model** 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. **YES** ↓ **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** υ	υ	υ	υ	ω · **R**
Kinetic energy E_1	$\frac{1}{2}$ · **m** · υ²	$\frac{1}{2}$ · **m** · υ²	$\frac{1}{2}$ · **m** · υ²	$\frac{1}{2}$ · I · ω²
Thrust energy E_2	**F** · **S** + **m** · **g** · **S**	**F** · **S** – **m** · **g** · **S**	**m** · **g** · μ · **S**	**T** · $\frac{S}{R}$
Absorbed energy E	$E_1 + E_2$	$E_1 + E_2$	$E_1 + E_2$	$E_1 + E_2$
Note 2) **Equivalent mass Me**	$\frac{2}{υ^2}$ · **E**	$\frac{2}{υ^2}$ · **E**	$\frac{2}{υ^2}$ · **E**	$\frac{2}{υ^2}$ · **E**

Note 1) This is the momentary speed at which an object is impacting against a shock absorber. The collision speed is $υ = 2\overline{υ}$ when the speed (average speed $\overline{υ}$) 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, $E = \frac{1}{2}$·Me·υ²

Note 3) R: The distance between rotational center and impact point. Set R at the minimum installation radius (Caution 3. Rotating angle on page 1844) 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
υ	Collision speed	m/s
m	Impact mass	kg
Me	Equivalent mass	kg
ω	Angular speed	rad/s
μ	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
Series RJ

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.

Note) RJ0604: "Nil" or "N" only

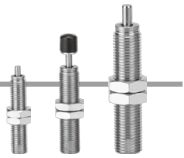
Specifications

Model		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
Series RJ

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	RJ0805	RJ1006	RJ1410
	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

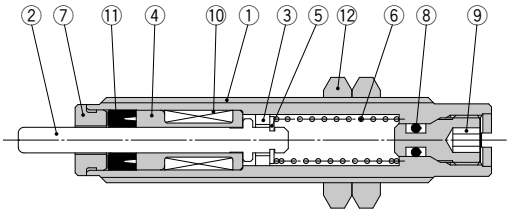
Applicable model

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

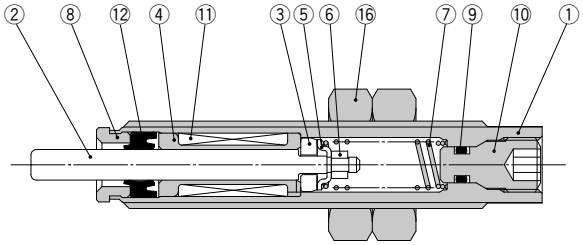
RJ0604

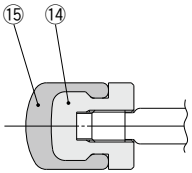


Component Parts

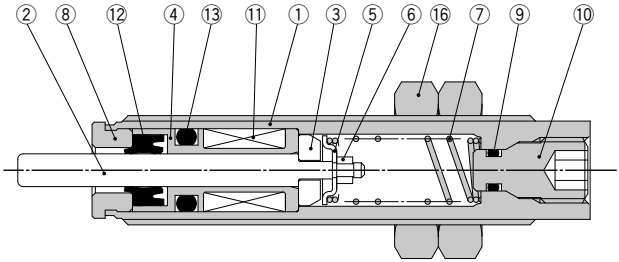
No.	Description	Material	Treatment
1	**Tube**	Special steel	Electroless nickel plating
2	**Piston rod**	Special steel	Electroless nickel plating
3	**Piston**	Stainless steel	
4	**Bearing**	Aluminum bearing alloy	
5	**Spring guide**	Tool steel	Phosphate film
6	**Return spring**	Steel wire	Zinc trivalent 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



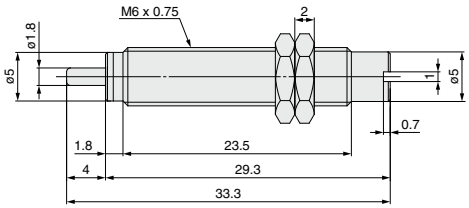
Component Parts

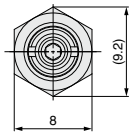
No.	Description	Material	Treatment
1	**Tube**	Special steel	Electroless nickel plating
2	**Piston rod**	Special steel	Electroless nickel plating
3	**Piston**	Stainless steel	
4	**Bearing**	Special bearing material	
5	**Spring guide**	Tool steel	Zinc trivalent chromating
6	**Lock ring**	Copper	
7	**Return 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 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
15	**Cap**	Urethane	
16	**Hexagon nut**	Carbon steel	Zinc trivalent chromating

Dimensions

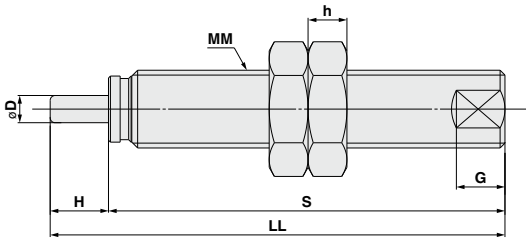
Basic type

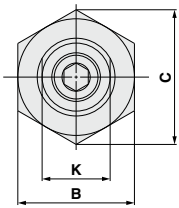
RJ0604



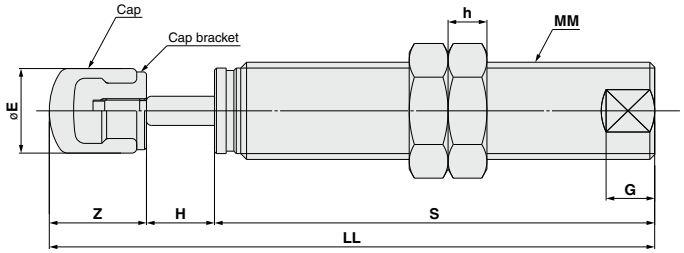


RJ08□□, 10□□, 14□□, 2015, 2725





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

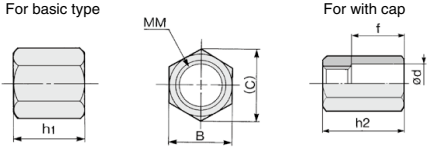
∗ The dimensions of H/L type are the same.

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

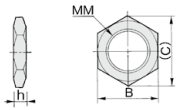
Stopper nut



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
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

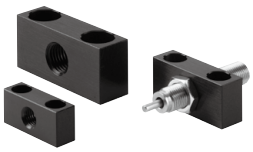
Hexagon Nut (2 pcs.are equipped as standard)



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

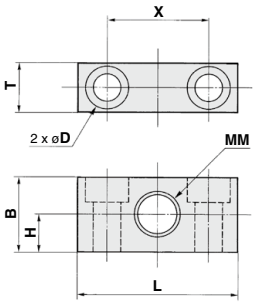
Foot Bracket for Shock Absorber



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

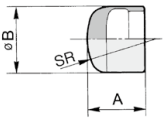
Dimensions



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

Series RJ
Specific Product Precautions 1

Be sure to read this before handling. Refer to front matter 39 for Safety Instructions, 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 1838 and 1839)

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.

Series RJ
Specific Product Precautions 2

Be sure to read this before handling. Refer to front matter 39 for Safety Instructions, 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.

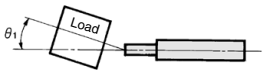
When a shock absorber is mounted on a cylinder, follow the torque values listed on each cylinder.

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 $\theta_1 \leq 3°$



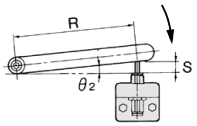
For with cap $\theta_1 \leq 1°$

⚠ 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)

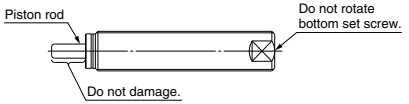
Model	S (Stroke)	θ2 (Allowable rotating angle)	R (Min. installation radius)	
			Basic type	With cap
RJ0604	4	3°	76	–
RJ0805	5		96	258
RJ0806	6		115	277
RJ1006	6		115	306
RJ1007	7		134	325
RJ1410	10		191	449
RJ1412	12		229	487
RJ2015	15		287	611
RJ2725	25		478	916

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. Refer to front matter 39 for Safety Instructions, pages 3 to 12 for Common Precautions.

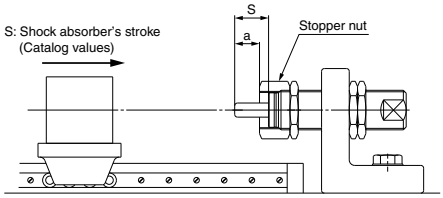
Mounting

⚠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.