Basic type

With cap

Specifications

Model / Specifications		RB0604	RB0805	RB0806	RB1006	RB1007	RB1411	RB1412	RB2015	RB2725
	With cap	—	RBC0805	RBC0806	RBC1006	RBC1007	RBC1411	RBC1412	RBC2015	RBC2725
Max. energy absorption (J) Note)		0.5	0.98	2.94	3.92	5.88	14.7	19.6	58.8	147
Thread O.D. size		M6 x 0.75	M8 x 1.0		M10 x 1.0		M14 x 1.5		M20 x 1.5	M27 x 1.5
Stroke (mm)		4	5	6	6	7	11	12	15	25
Collision speed (m/s)		0.3 to 1.0	0.05 to 5.0							
Max. operating frequency (cycle/min)		80	80	80	70	70	45	45	25	10
Max. allowable thrust (N)		150	245	245	422	422	814	814	1961	2942
Ambient temperature range (°C)		–10 to 80 (No freezing)								
Spring force (N)	Extended	3.05	1.96	1.96	4.22	4.22	6.86	6.86	8.34	8.83
	Retracted	5.59	3.83	4.22	6.18	6.86	15.30	15.98	20.50	20.01
Weight (g)	Basic type	5.5	15	15	23	23	65	65	150	350
	With cap	—	16	16	25	25	70	70	165	400

Note) The maximum energy absorption, the maximum corresponding mass of impacting object and maximum operating frequency are measured at room temperature (20 to 25°C).

RB C 14 12 ☐

Shock absorber

Type

Nil	Basic type
C	With cap

O.D. thread size/Stroke

Symbol	O.D. thread size	Stroke	Symbol	O.D. thread size	Stroke
0604	6 mm	4 mm	1411	14 mm	11 mm
0805	8 mm	5 mm	1412	14 mm	12 mm
0806	8 mm	6 mm	2015	20 mm	15 mm
1006	10 mm	6 mm	2725	27 mm	25 mm
1007	10 mm	7 mm			

Note) RB0604: With cap type is not available.

Option

Symbol	Hex. nut	Stopper nut
Nil	2 pcs.	—
J	3 pcs.	—
N	—	—
S	2 pcs.	1 pc.
SJ	3 pcs.	1 pc.
SN	—	1 pc.

Replacement part no./Cap (Resin part only)

RBC 08 C

Applicable model

08	RBC0805, 0806	20	RBC2015
10	RBC1006, 1007	27	RBC2725
14	RBC1411, 1412		

Cap

Cap cannot be mounted for basic type. Please place an order with cap type from the beginning.

Model Selection

Model Selection Step

1. Type of impact

- ☐ Cylinder stroke at load (Horizontal)
- ☐ Cylinder stroke at load (Downward)
- ☐ Cylinder stroke at load (Upward)
- ☐ Conveyor stroke at load (Horizontal)
- ☐ Free horizontal impact
- ☐ Free dropping impact
- ☐ Rotating impact (With torque)

2. Enumeration of operating conditions

Symbol	Operating condition	Unit
m	Impacting object mass	kg
U	Collision speed	m / sec
h	Dropping height	m
W	Angle speed	rad/sec
R	Distance between axis of cylinder and impact point	m
d	Bore size	mm
p	Cylinder operating pressure	MPa
F	Thrust	N
T	Torque	N · m
n	Operation cycle	cycle / min
t	Ambient temperature	nC
M	Friction coefficient	—

3. Specifications and operational instructions

Ensure that the collision speed, thrust, operation cycle, the ambient temperature and atmosphere fall within the specifications.
Be aware of the min. installation radius in the case of rotating impacts.

4. Calculation of kinetic energy E1

Using the equation suitable for the classification of impact.

In the case of cylinder stroke at load and free horizontal impact, substitute respective figures for **Data A** in order to calculate **E1**.

5. Calculation of thrust energy E2

Select any shock absorber as a provisional model.

In the case of thrust energy of cylinder **E1**, substitute respective figures for **Data B** or **Data C**.

6. Calculation of corresponding mass of impacting object Me

Absorbed energy $E = E_1 + E_2$

Corresponding mass of impacting object $Me = \frac{2}{U^2} \cdot E$

Substitute both absorbed energy **E** and collision speed U for **Data A** in order to calculate the corresponding mass of the impacting object **Me**.

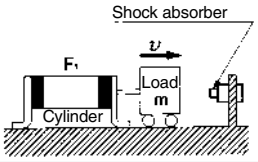
7. Selection of applicable model

Taking into consideration the corresponding mass of the impacting object **Me**, calculated using **Data D** and collision speed U, check provisional model compatibility with the condition of application. If this is satisfactory, then the said provisional 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 energy absorption, select a model that is one class smaller.

Selection Example

	Cylinder stroke at load (Horizontal)		
1. Type of impact			
Collision speed (1) U	U		
Kinetic energy E_1	$\frac{1}{2} \cdot m \cdot U^2$		
Thrust energy E_2	$F_1 \cdot S$		
Absorbed energy E	$E_1 + E_2$		
Corresponding (2) mass of impacting object Me	$\frac{2}{U^2} \cdot E$		
2. Operating conditions	**m** = 1 kg U = 0.5 m/s **d** = 10 mm **p** = 0.5 MPa **n** = 30 cycle/min **t** = 25 nC	**2. Operating conditions**	**m** = 50 kg U = 0.3 m/s **d** = 40 mm **p** = 0.5 MPa **n** = 20 cycle/min **t** = 25 nC
3. Specifications and operational instructions	# Confirmation of specifications U ··· 0.5 < 1.0 (max.) **t** ··· –10 (min.) < 25 < 80 (max.) **F** ··· **F1** ··· 39.3 < **YES**	**3. Specifications and operational instructions**	# Confirmation of specifications U ··· 0.3 < 5 (max.) **t** ··· –10 (min.) < 25 < 80 (max.) **F** ··· **F1** ···628 < 1961 (max.) **YES**
4. Calculation of kinetic energy E1	# Kinetic energy E1 Use **Formula** to calculate **E1**. Substitute 1.0 for **m** and 0.5 for U. **E1 0.125**	**4. Calculation of kinetic energy E1**	# Kinetic energy E1 Use **Formula** to calculate **E1**. Substitute 50 for **m** and 0.3 for U. **E1 2.3 J**
5. Calculation of thrust energy E2	# Thrust energy E2 Provisionally select a model RB0604 and make the use of **Data B** at left. According to **d** = 10, **E2** is obtained. **E2 0.157**	**5. Calculation of thrust energy E2**	# Thrust energy E2 Provisionally select a model RB2015 and make the use of **Data B**. According to **d** = 40, **E2** is obtained. **E2 9.4 J**
6. Calculation of corresponding mass of impacting object Me	# Corresponding mass of impacting object Me Use the **Formula** "Absorbed energy **E** = **E1** + **E2** = 0.282" to calculate **Me**. Substitute 0.282 for **E** and 0.5 for U. **Me 2.3**	**6. Calculation of corresponding mass of impacting object Me**	# Corresponding mass of impacting object Me Use the formula "Absorbed energy **E** = **E1** + **E2** = 2.3 + 9.4 = 11.7 J" to calculate **Me**. Substitute 11.7 J for **E** and 0.3 for U. **Me 260 kg**
7. Selection of RB0604	# Selection of RB0604 RB0604 satisfies **Me** = 2.3 < 3 kg (Max. corresponding mass of impacting object). Ultimately, it will result in an operating frequency of 30 < 80, without causing a problem. **YES**	**7. Selection of applicable model**	# Selection of applicable model According to **Data D**, the tentatively selected RB2015 satisfies **Me** = 260 kg < 400 kg at U = 0.3. Ultimately, it will result in an operating frequency of **n**···20 < 25, without causing a problem. **YES** **Select RB2015**

Data B

Thrust Energy of Cylinder F·S

(Operating pressure 0.5 MPa) (J)

Model		RB0604	RB: 0805	RB: 0806 RB: 1006	RB: 1007	RB: 1411	RB: 1412	RB: 2015	RB: 2725
Stroke absorption (mm)		4	5	6	7	11	12	15	25
Bore size d (mm)	6	0.057	0.071	0.085	0.099	0.156	0.170	0.212	0.353
	10	0.157	0.196	0.236	0.274	0.432	0.471	0.589	0.982
	15	0.353	0.442	0.530	0.619	0.972	1.06	1.33	2.21
	20	0.628	0.785	0.942	1.10	1.73	1.88	2.36	3.93
	25	0.981	1.23	1.47	1.72	2.70	2.95	3.68	6.14
	32	—	2.01	2.41	2.81	4.42	4.83	6.03	10.1
	40	—	3.14	3.77	4.40	6.91	7.54	9.42	15.7
	50	—	4.91	5.89	6.87	10.8	11.8	14.7	24.5
	63	—	7.79	9.35	10.9	17.1	18.7	23.4	39.0
	80	—	12.6	15.1	17.6	27.6	30.2	37.7	62.8
	100	—	19.6	23.6	27.5	43.2	47.1	58.9	98.2
	125	—	30.7	36.8	43.0	67.5	73.6	92.0	153
	140	—	38.5	46.2	53.9	84.7	92.4	115	192
	160	—	50.3	60.3	70.4	111	121	151	251
	180	—	63.6	76.3	89.1	140	153	191	318
	200	—	78.5	94.2	110	173	188	236	393
	250	—	123	147	172	270	295	368	614
	300	—	177	212	247	389	424	530	884

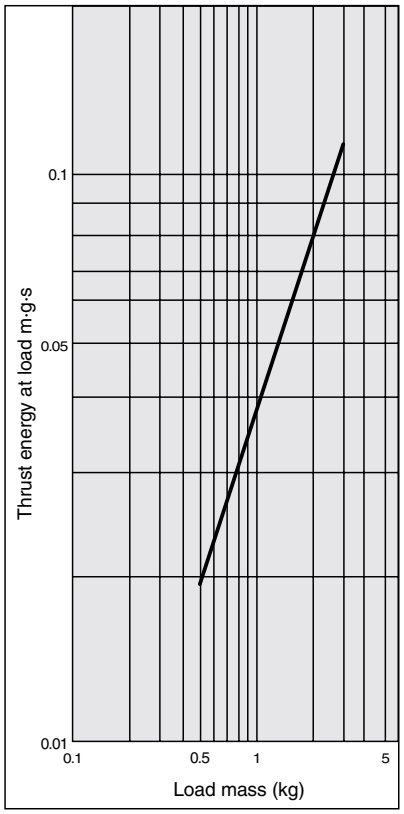
Operating pressure other than 0.5 MPa:
Multiply by the following coefficient.

Operating pressure (MPa)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Coefficient	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8

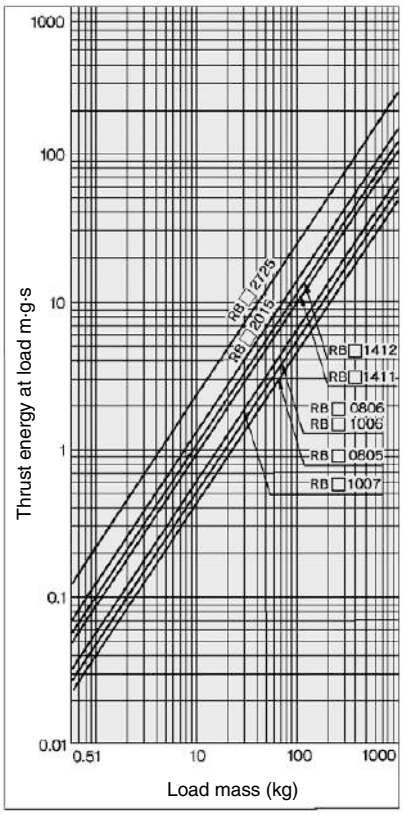
Data C

Thrust Energy at Load m·g·s

RB0604 :



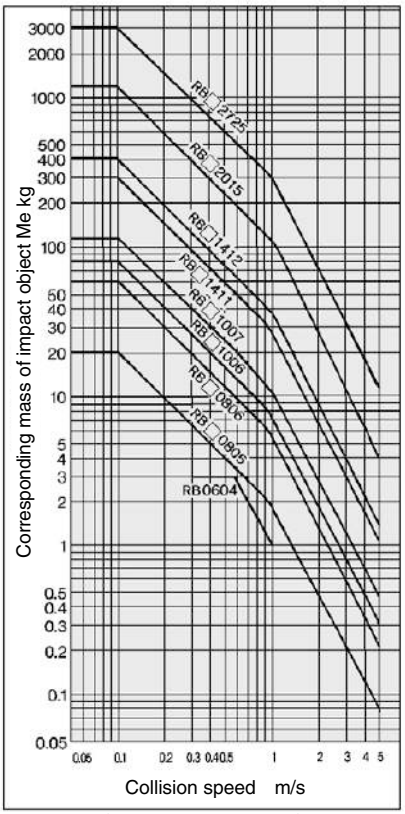
RB 0805 to 2725



Data D

Corresponding Mass of Impacting Object Me

U

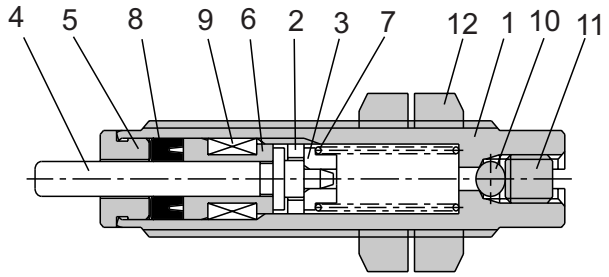


The graph of corresponding mass of impacting object: At room temperature (20 to 25nC)

Construction

RB0604

Extended



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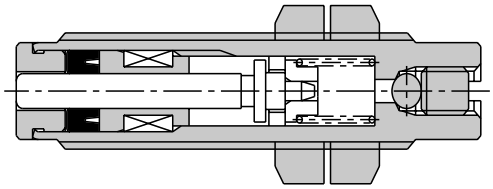
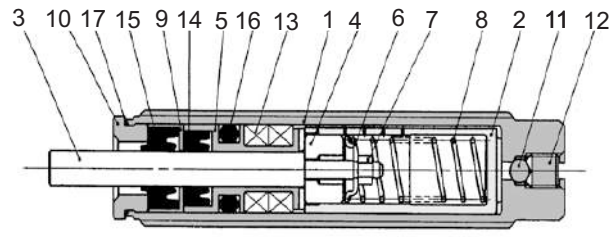


Component Parts

No.	Description	Material	Treatment
1	**Outer tube**	Free-cutting steel	Nitriding
2	**Piston**	Copper alloy	—
3	**Spring guide**	Stainless steel	—
4	**Piston rod**	Carbon steel	Nitriding
5	**Stopper**	Stainless steel	—
6	**Bearing**	Copper alloy	—
7	**Return spring**	Piano wire	Zinc trivalent chromated
8	**Rod seal**	NBR	—
9	**Accumulator**	NBR	Foam rubber
10	**Steel ball**	Bearing steel	—
11	**Hexagon socket head cap screw**	Special steel	Nickel plated
12	**Hexagon nut**	Carbon steel	Nickel plated

RB: 0805 to 2725

Extended



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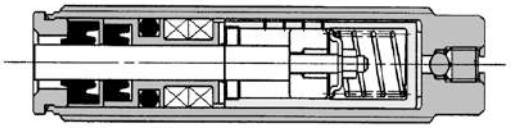
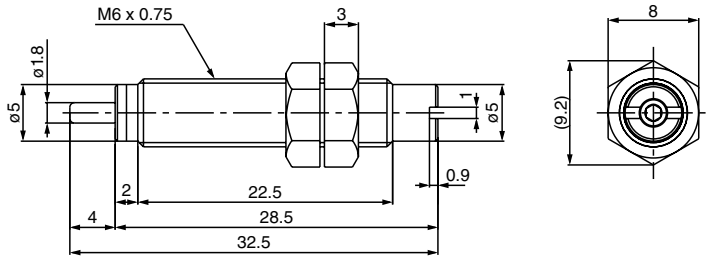


Component Parts

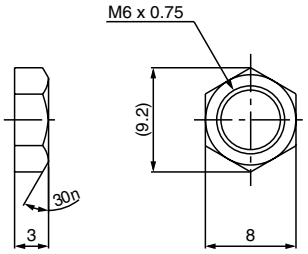
No.	Description	Material	Treatment
1	**Outer tube**	Rolled steel	Gray coated
2	**Inner tube**	Special steel	Heat treated
3	**Piston rod**	Special steel	Electroless nickel plated
4	**Piston**	Special steel	Heat treated
5	**Bearing**	Special bearing material	
6	**Spring guide**	Carbon steel	Zinc chromated
7	**Lock ring**	Copper	
8	**Return spring**	Piano wire	Zinc chromated
9	**Seal holder**	Copper alloy	
10	**Stopper**	Carbon steel	Zinc chromated
11	**Steel ball**	Bearing steel	
12	**Set screw**	Special steel	
13	**Accumulator**	NBR	Foam rubber
14	**Rod seal**	NBR	
15	**Scraper**	NBR	
16	**Gasket**	NBR	
17	**Gasket**	NBR	Only RB(C)2015, 2725

Dimensions

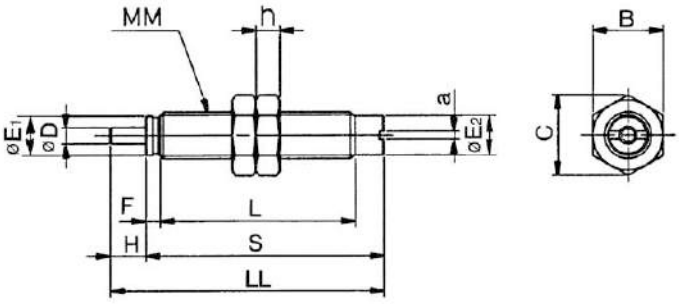
RB0604



Hexagon Nut
(2 pcs. standard equipment)

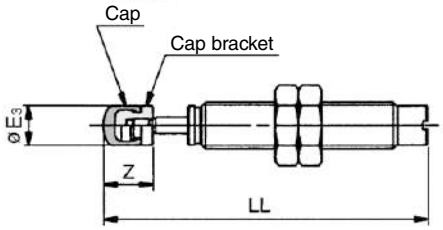


Basic type: RB0805, RB0806, RB1006, RB1007



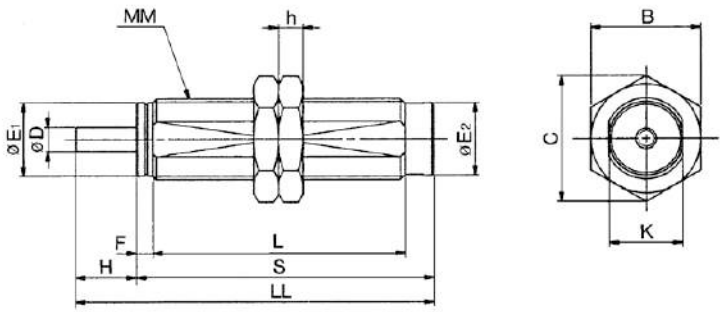
With cap: RBC0805, RBC0806 RBC1006, RBC1007

Other dimensions are the same as the basic type.



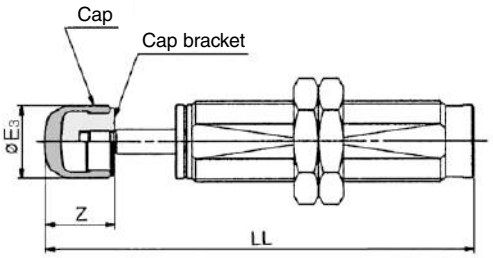
Model		Basic type dimensions										With cap			Hexagon nut		
Basic type	With cap	D	E_1	E_2	F	H	a	L	LL	MM	S	E_3	LL	Z	B	C	h
RB0805	**RBC0805**	2.8	6.8	6.6	2.4	5	1.4	33.4	45.8	M8 x 1.0	40.8	6.8	54.3	8.5	12	13.9	4
RB0806	**RBC0806**	2.8	6.8	6.6	2.4	6	1.4	33.4	46.8	M8 x 1.0	40.8	6.8	55.3	8.5	12	13.9	4
RB1006	**RBC1006**	3	8.8	8.6	2.7	6	1.4	39	52.7	M10 x 1.0	46.7	8.7	62.7	10	14	16.2	4
RB1007	**RBC1007**	3	8.8	8.6	2.7	7	1.4	39	53.7	M10 x 1.0	46.7	8.7	63.7	10	14	16.2	4

Basic type: RB1411, RB1412, RB2015, RB2725



With cap: RBC1411, RBC1412 RBC2015, RBC2725

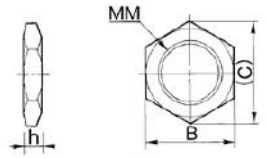
Other dimensions are the same as the basic type.



Model		Basic type dimensions										With cap			Hexagon nut		
Basic type	With cap	D	E_1	E_2	F	H	K	L	LL	MM	S	E_3	LL	Z	B	C	h
RB1411	**RBC1411**	5	12.2	12	3.5	11	12	58.8	78.3	M14 x 1.5	67.3	12	91.8	13.5	19	21.9	6
RB1412	**RBC1412**	5	12.2	12	3.5	12	12	58.8	79.3	M14 x 1.5	67.3	12	92.8	13.5	19	21.9	6
RB2015	**RBC2015**	6	18.2	18	4	15	18	62.2	88.2	M20 x 1.5	73.2	18	105.2	17	27	31.2	6
RB2725	**RBC2725**	8	25.2	25	5	25	25	86	124	M27 x 1.5	99	25	147	23	36	41.6	6

Hexagon Nut

(2 pcs. standard equipment)



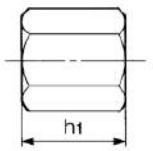
Material: Special steel
Treatment: Zinc trivalent chromated

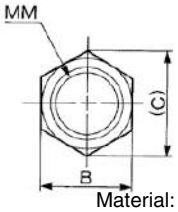
Part no.	Dimensions			
	MM	h	B	C
RB06J	M6 x 0.75	3	8	9.2
RB08J	M8 x 1.0	4	12	13.9
RB10J	M10 x 1.0	4	14	16.2
RB14J	M14 x 1.5	6	19	21.9
RB20J	M20 x 1.5	6	27	31.2
RB27J	M27 x 1.5	6	36	41.6

Option

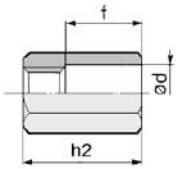
Stopper nut

For basic type





For cap type

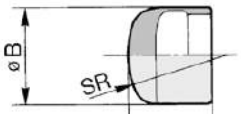


Material: Carbon steel
Treatment: Zinc trivalent chromated

Part no.		Dimensions						
Basic type	With cap	B	C	h1	h2	MM	d	f
RB06S	—	8	9.3	5	—	M6 x 0.75	—	—
RB08S	RBC08S	12	13.9	6.5	23	M8 x 1.0	9	15
RB10S	RBC10S	14	16.2	8	23	M10 x 1.0	11	15
RB14S	RBC14S	19	21.9	11	31	M14 x 1.5	15	20
RB20S	RBC20S	27	31.2	16	40	M20 x 1.5	23	25
RB27S	RBC27S	36	41.6	22	51	M27 x 1.5	32	33

Replacement Parts

Cap



These are the replacement part for the cap type. Not available for the basic type.

Material: Polyurethane

Part no.	Dimensions		
	A	B	SR
RBC08C	6.5	6.8	6
RBC10C	9	8.7	7.5
RBC14C	12.5	12	10
RBC20C	16	18	20
RBC27C	21	25	25

Foot Bracket for Shock Absorber

Available for the foot mounting bracket of the RB series.

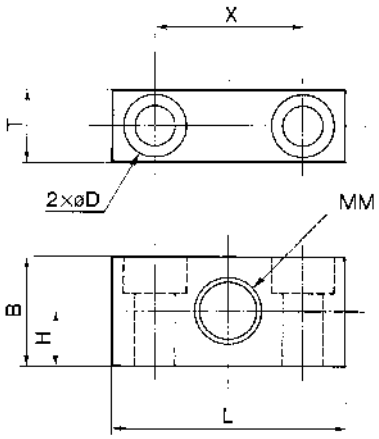
Part no.

Material: Aluminum alloy
Treatment: Black hard anodized

Part no.	Applicable absorber
RB08-X331	RB 0805, 0806
RB10-X331	RB: 1006, 1007
RB14-X331	RB: 1411, 1412
RB20-X331	RB: 2015
RB27-X331	RB: 2725

Order foot brackets separately. :

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

Operating Environment

⚠ Caution

5. Vibration

When vibrations are applied on impact objects, implement a secure guide on impact objects.

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 in the case workers might be getting close during the operation.

3. The rigidity of the mounting frame

The mounting frame must have sufficient rigidity.

Load on mounting plate can be calculated as follows.

$$\text{Load on mounting plate } N \quad 2\frac{E\ (\text{Absorbed energy} : J)}{S\ (\text{Stroke} : m)}$$

Depending on the impact conditions, a load applied to the mounting frame may exceed the calculated value.

When setting the rigidity of the mounting frame, the sufficient safety ration must be taken into account in the calculated value.

⚠ Caution

1. Tightening torque of mounting nut should be as follows.

When threading on a mounting frame in order to mount a shock absorber directly, prepared hole dimensions are referred to the table below.

For tightening torque of a nut for shock absorber, kindly abide by the table below.

If the tightening torque that is applied to the nut exceeds the value given below, the shock absorber itself could become damaged.

Model	RB0604	RB(C)0805 RB(C)0806	RB(C)1006 RB(C)1007	RB(C)1411 RB(C)1412
O.D. thread (mm)	M6 x 0.75	M8 x 1.0	M10 x 1.0	M14 x 1.5
Thread prepared bore (mm)	ø5.3 $^{+0.1}_{0}$	ø7.1 $^{+0.1}_{0}$	ø9.1 $^{+0.1}_{0}$	ø12.7 $^{+0.1}_{0}$
Tightening torque (N · m)	0.85	1.67	3.14	10.8

Model	RB(C)2015	RB(C)2725
O.D. thread (mm)	M20 x 1.5	M27 x 1.5
Thread prepared bore (mm)	ø18.7 $^{+0.1}_{0}$	ø25.7 $^{+0.1}_{0}$
Tightening torque (N · m)	23.5	62.8

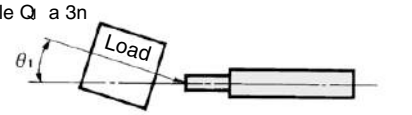
Mounting

⚠ Caution

2. Deviation of impact

The installation must be designed so that the impact body is perpendicular to the shock absorber's axial center. An angle of deviation that exceeds 3n will place an excessive load on the bearings, leading to oil leaks within a short period of operation.

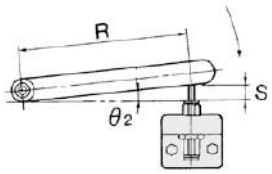
Allowable eccentric angle Q a 3n



With cap Q a 1n

3. Rotating angle

If rotating impacts are involved, the installation must be designed so that the direction in which the load is applied is perpendicular to the shock absorber's axial center. The allowable rotating angle until the stroke end must be Q < 3 n.



Allowable rotating eccentric angle Q a 3n

Installation Conditions for Rotating Impact (mm)

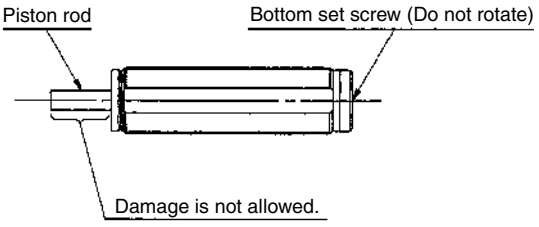
Model	S (Stroke)	Q (Allowable rotating angle)	R (Min. installation radius)	
			Basic type	With cap
RB0604	4	3n	76	—
RB:: 0805	5		96	258
RB:: 0806	6		115	277
RB:: 1006	6		115	306
RB:: 1007	7		134	325
RB:: 1411	11		210	468
RB:: 1412	12		229	487
RB:: 2015	15		287	611
RB:: 2725	25		478	916

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, which could lead to oil leakage and malfunction. Furthermore, damage to outside threaded portion of the outer tube could prevent the shock absorber from being mounted onto the frame, or its internal components could deform, leading to a malfunction.

5. Never turn the screw on the bottom of the body.

This is not an adjusting screw. Turning it could result in oil leakage.



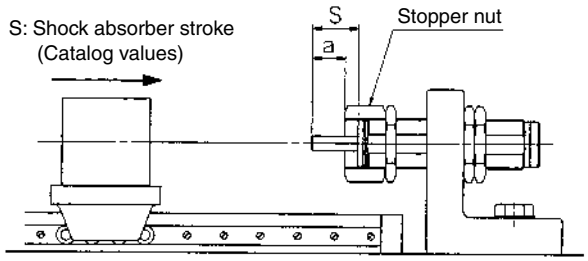
Mounting

⚠ Caution

6. Adjust the stopping time through the use of the stopper nut, as follows:

Control the stopping time of the impact object 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. Check the mounting nut is not loosen.

The shock absorber could become damaged if it is used in a loose state.

2. Pay attention to any abnormal impact sounds or vibrations.

If the impact sounds or vibrations have become abnormally high, the shock absorber may have reached the end of its service life. If this is the case, replace the shock absorber. If use is continued in this state, it could lead to equipment damage.

3. Confirm that abnormality, oil leakage, etc. in the outward surface.

When a large amount of oil is leaking, replace the product, because it is believed to be happening something wrong with it. If it keeps on using, it may cause to break the equipment which is mounted by this product.

4. Inspect the cap for any cracks or wear.

If the shock absorber comes with a cap, the cap could wear first. To prevent damage to the impact object, replace the cap often.

Storage

⚠ Caution

1. Piston rod position while stored

If a piston rod is stored as pushed in for a long period of time (over 30 days), absorption capacity may decrease.

Avoid storing like this for a long time.

Service Life and Replacement Period of Shock Absorber

⚠ Caution

1. Allowable operating cycle under the specifications set in this catalog is shown below.

1.2 million cycles	RB0604, RB08	
2 million cycles	RB10::	to RB2725
1 million cycles	RBA::::	, RBL::::

Note) Specified service life (suitable replacement period) is the value at room temperature (20 to 25nC). The period may vary depending on the temperature and other conditions. In some cases the absorber may need to be replaced before the allowable operating cycle above.