# SCK

## Shock absorber/adjustable

## Related products

### Overview

Impact force absorption with original mechanism. This adjustable shock absorber increases service life and production efficiency of facilities and equipment.
Compared to the NCK, the SCK shock absorber is the ideal buffering device for stopping a workpiece that moves or free-falls at high speeds.

### Features

Safely stops the movable object.
Production cycle is increased.
Life of machinery is extended.
Noise levels are reduced, improving the environment of mechanical facilities.
Mechanical failure can be prevented.

CONTENTS

Shock absorber

# SCK Series

● Max. energy absorption: 0.049 to 588J

RoHS CAD

## Specifications

| Item | | SCK | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Series | | 0.005 | 0.01 | 0.03 | 0.3 | 0.6 | 1.2 | 2.6 | 6.5 | 8 | 12 | 20 | 30 | 40 | 60 | 0.25 M | 0.5 M | 1.0 M |
| Type/Classification | | Spring return without adjuster | | | Spring return with adjuster | | | | | | | | | | | Spring return with adjuster (thread pitch: large) | | |
| Max. energy absorption | J | 0.049 | 0.098 | 0.294 | 2.94 | 5.88 | 11.8 | 25.5 | 63.7 | 78.4 | 118 | 196 | 294 | 392 | 588 | 3.43 | 11.8 | 74.5 |
| O.D. thread size | mm | M10x1.0 | M12x1.0 | M16x1.0 | M20x1.0 | | M25x1.5 | | M30x1.5 | | M40x1.5 | | | | M45x1.5 | M14x1.5 | M20x1.5 | M27x3.0 |
| Stroke | mm | 7 | 10 | | | | 15 | | 25 | | | 40 | 60 | 70 | | 10 | 15 | 30 |
| Max. absorbed energy per hour | kJ/hr | 0.135 | 0.27 | 0.98 | 8.1 | 10.8 | 21.6 | 39 | 78 | 86.4 | | 108 | 126 | 120 | 144 | 9.2 | 21.2 | 80.5 |
| Max. colliding speed | m/s | 1.0 | | | | 1.5 | 2.0 | | 2.5 | | 3.0 | | | | 4.0 | 1.0 | 2.0 | 2.5 |
| Max. operating frequency | Cycle/min. | 45 | | | | 30 | | 25 | 20 | 18 | 12 | 9 | 7 | 5 | 4 | 45 | 30 | 18 |
| Ambient temperature | °C | -10 (14°F) to 80 (176°F) | | | | | | | | | | | | | | | | |
| Max. load (resistance) | N | 39 | 59 | 147 | 540 | 1000 | 1400 | 3100 | 4600 | 5700 | 8600 | 9000 | | 10000 | 15000 | 630 | 1440 | 4560 |
| Return time | S | 0.3 or less | | | 0.4 or less | | | | 0.5 or less | | | 0.6 or less | | | | 0.4 or less | | 0.5 or less |
| Weight | kg | 0.02 | 0.04 | 0.07 | 0.2 | | 0.32 | | 0.63 | | 1.17 | 1.25 | 1.39 | 1.45 | 2.05 | 0.05 | 0.13 | 0.39 |
| Return spring force | When extended N | 1.2 | 2.0 | 5.9 | 5.9 | | 6.9 | | 12.0 | | 20.0 | | | | 29.0 | 3.9 | 5.5 | 7.6 |
| | When compressed N | 2.6 | 5.0 | 10.5 | 11.3 | | 17.2 | | 30.0 | | 39.0 | 51.0 | 68.0 | 75.0 | 84.0 | 8.4 | 11.5 | 21.0 |
| Copper and PTFE free specifications | | — | | | Standard | | | | | | | | | | | | | |

Note: Min. absorbed energy should be 1/5 of max. absorbed energy.

## How to order

**SCK - 00 - 0.3 - N1**

- Ⓐ Mounting
- Ⓑ Series
- Ⓒ Option

| Code | Description |
|---|---|
| **Ⓐ Mounting** | |
| **00** | Basic |
| **FA** | Flange |
| **Ⓑ Series (max. energy absorption)** | |
| **0.005** | 0.049 J |
| **0.01** | 0.098 J |
| **0.03** | 0.294 J |
| **0.3** | 2.94 J |
| **0.6** | 5.88 J |
| **1.2** | 11.8 J |
| **2.6** | 25.5 J |
| **6.5** | 63.7 J |
| **8** | 78.4 J |
| **12** | 118 J |
| **20** | 196 J |
| **30** | 294 J |
| **40** | 392 J |
| **60** | 588 J |
| **0.25 M** | 3.43 J |
| **0.5 M** | 11.8 J |
| **1.0 M** | 74.5 J |
| **Ⓒ Option** | |
| **Blank** | Standard |
| **N1** | With stop nut |

### Precautions for model No. selection

*1 : 3 hexagon nuts are provided for N1 specifications products.

[Example of model No.]

**SCK-00-0.3-N1**

Model: Shock absorber

- Ⓐ Mounting : Basic
- Ⓑ Series : Max. energy absorption 2.94 J
- Ⓒ Option : With stop nut

## How to order options

● Flange bracket (1 pc.)

**SCK - 0.01 - FA**

Ⓑ → Series

● Stop nut + hexagon nut (each 1 pc.)

**SCK - 0.01 - N1**

Ⓑ → Series

● Hexagon nut (1 pc.)

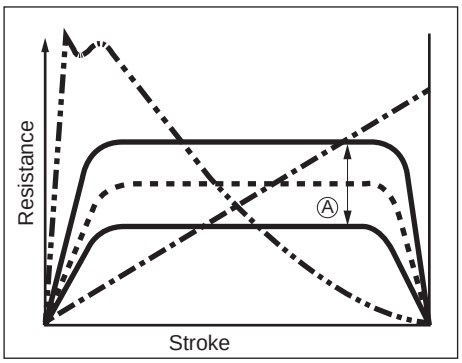
**SCK - 0.01 - NT**

Ⓑ → Series

## Shock absorber and other buffers

As shown at right:

- The spring accumulates energy and functions as spring return force at the stroke end.
- Cylinder cushion (single orifice connected to hydraulic cylinder) increases resistance sharply at collision and does not decelerate smoothly.
- Shock absorbers without adjuster have a preset level of energy that is absorbed and so working conditions are limited (SCK-00-0.03 or below).
- Shock absorbers with adjuster have roughly constant resistance throughout the stroke, uniformly decelerating the object's speed. The curve moves in parallel vertically when adjusted, and collision energy is absorbed appropriately.



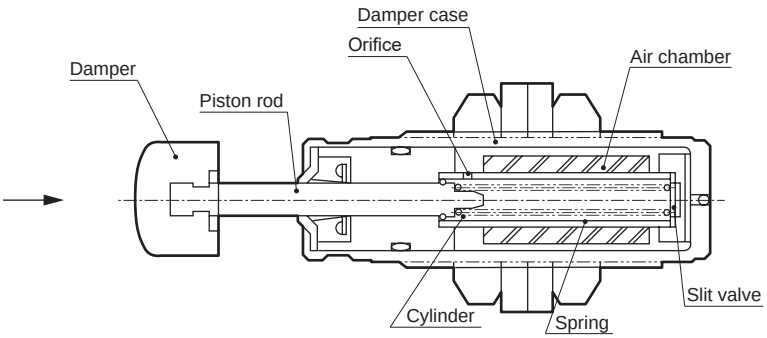

Spring
Cylinder cushion
Shock absorber without adjuster
Shock absorber
Ⓐ: The shock absorber is adjusted with the adjuster.

## Internal structure and operational explanation

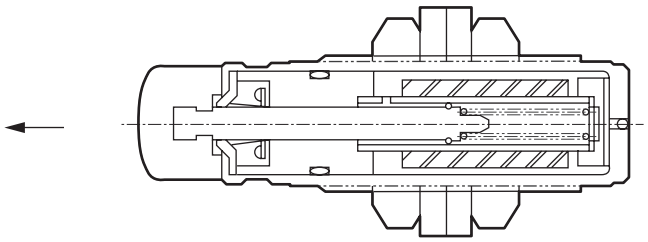
● SCK-00-0.005
00-0.01
00-0.03

**Cannot be disassembled**

Collision




Return



### Collision

Collision force applied to the damper pushes the piston rod and pressurizes oil in the cylinder. When the generated hydraulic pressure passes through the orifice and flows into the damper case, shock is absorbed.
Oil flowing into the damper case pressurizes the air chamber and decreases air chamber volume.
Note) With this product structure, internal pressure increases with workpiece speed during collision, generating resistance and absorbing energy. Resistance may thus appear low when pushed by hand, but the product is not defective.

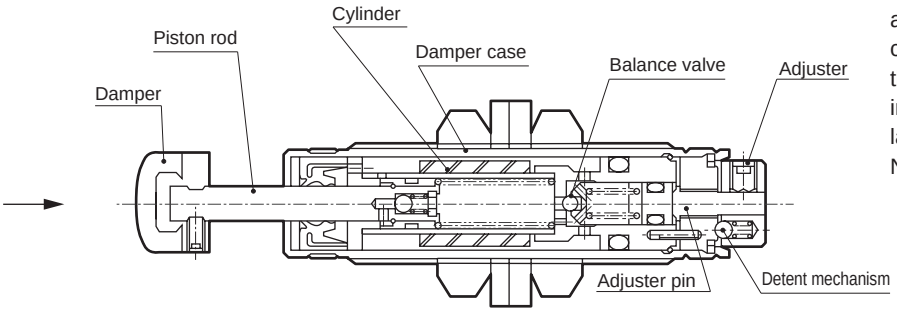
### Return

When the colliding workpiece is removed, the piston rod is pushed out by the internal spring. At the same time, the slit valve (check valve) is opened by pressure in the air chamber. Oil flows to the inner pipe and at completion, the slit valve closes.

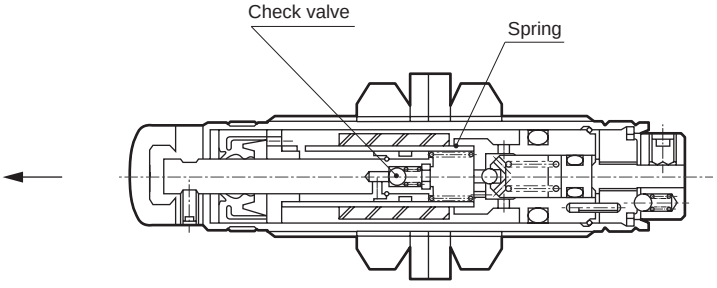
● SCK-00-0.3 to 60

**Cannot be disassembled**

Collision




Return




### Collision

Collision force applied to the damper pushes the piston via the piston rod and pressurizes oil in the cylinder. When the generated hydraulic pressure passes through the orifice and balance valve and flows into the damper case, shock is absorbed. When the adjuster is turned clockwise, the adjustable pin moves and the force of the balance valve spring increases. Oil flow is decreased and a larger colliding force can be withstood.
Note) With this product structure, internal pressure increases with workpiece speed during collision, generating resistance and absorbing energy. Resistance may thus appear low when pushed by hand, but the product is not defective.

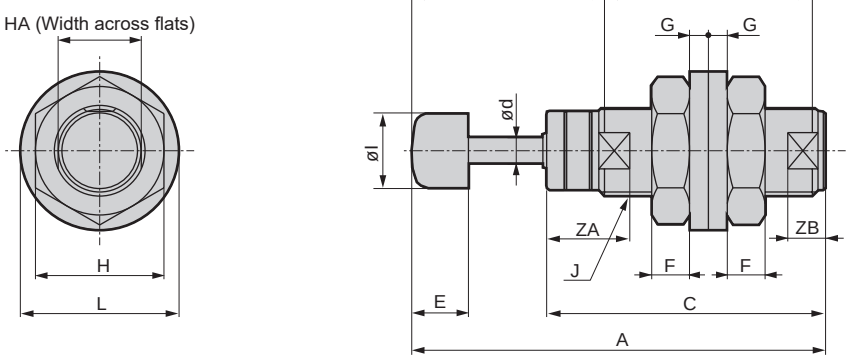
### Return

When the colliding workpiece is removed, the piston rod is pushed out by the internal spring. At the same time, the check valve is opened by pressure in the air chamber. Oil flows to the inner pipe and at completion, the check valve closes.

## Dimensions

● SCK-00-0.005
0.01
0.03

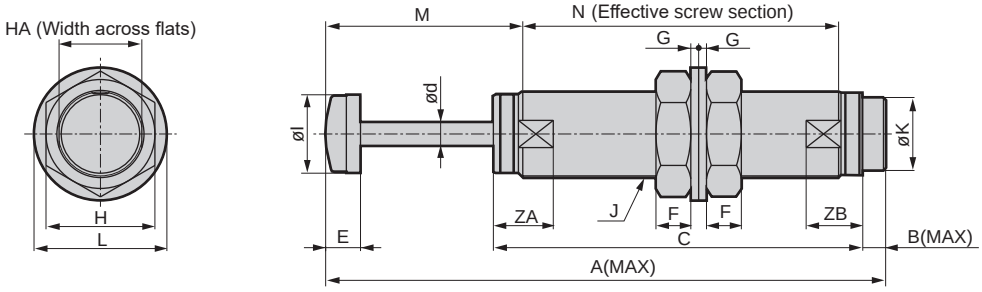
Basic (00)




| Code | Basic (00) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model No. | A | C | E | F | G | H | I | J | L | M | N | d | HA | ZA | ZB |
| SCK-00-0.005 | 41.5 | 27 | 7 | 4 | 2 | 14 | 8 | M10x1.0 | 18 | 21.3 | 18.5 | 3.0 | 9 | 9 | 4 |
| SCK-00-0.01 | 55 | 37 | 7.5 | 5 | 2.5 | 17 | 10 | M12x1.0 | 21 | 25.5 | 27.5 | 3.5 | 11 | 11 | 5 |
| SCK-00-0.03 | 70 | 49.5 | 10 | 6.5 | 2.5 | 22 | 14 | M16x1.0 | 27 | 28.3 | 39.5 | 4.0 | 15 | 12 | 6 |

● SCK-00-0.3 to 60, 0.25 M to 1.0 M
(Screw pitch large)

Basic (00)

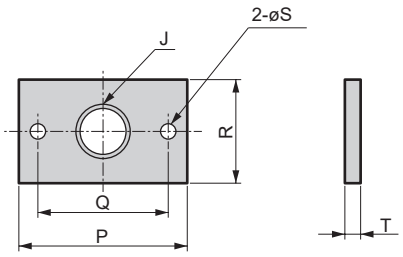



| Code | Basic (00) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model No. | A | B | C | E | F | G | H | I | J | K | L | M | N | d | HA | ZA | ZB |
| SCK-00-0.3 | 94.6 | 5.8 | 66.8 | 11 | 8 | 2.9 | 27 | 16 | M20x1.0 | 13.5 | 33 | 33.5 | 45.7 | 5 | 17 | 17.5 | 16 |
| SCK-00-0.6 | 94.6 | 5.8 | 66.8 | 11 | 8 | 2.9 | 27 | 16 | M20x1.0 | 13.5 | 33 | 33.5 | 45.7 | 5 | 17 | 17.5 | 16 |
| SCK-00-1.2 | 122.5 | 7.5 | 86 | 13 | 10 | 2.9 | 32 | 22 | M25x1.5 | 19.5 | 39 | 40.5 | 65.4 | 6 | 24 | 21 | 18 |
| SCK-00-2.6 | 122.5 | 7.5 | 86 | 13 | 10 | 2.9 | 32 | 22 | M25x1.5 | 19.5 | 39 | 40.5 | 65.4 | 6 | 24 | 21 | 18 |
| SCK-00-6.5 | 157.4 | 7.9 | 109.5 | 14 | 12 | 3.6 | 41 | 27 | M30x1.5 | 23.5 | 50 | 51.5 | 89.4 | 8 | 27 | 21.5 | 19.5 |
| SCK-00-8 | 157.4 | 7.9 | 109.5 | 14 | 12 | 3.6 | 41 | 27 | M30x1.5 | 23.5 | 50 | 51.5 | 89.4 | 8 | 27 | 21.5 | 19.5 |
| SCK-00-12 | 175.6 | 10.5 | 123.1 | 16 | 16 | 3.6 | 50 | 36 | M40x1.5 | 33.5 | 61 | 55.5 | 98.5 | 11 | 38 | 27.5 | 26 |
| SCK-00-20 | 205.6 | 10.5 | 138.1 | 16 | 16 | 3.6 | 50 | 36 | M40x1.5 | 33.5 | 61 | 70.5 | 113.5 | 11 | 38 | 27.5 | 26 |
| SCK-00-30 | 257.1 | 10.5 | 169.6 | 16 | 16 | 3.6 | 50 | 36 | M40x1.5 | 33.5 | 61 | 90.5 | 145 | 11 | 38 | 27.5 | 26 |
| SCK-00-40 | 277.1 | 10.5 | 179.6 | 16 | 16 | 3.6 | 50 | 36 | M40x1.5 | 33.5 | 61 | 100.5 | 155 | 11 | 38 | 27.5 | 26 |
| SCK-00-60 | 298.4 | 10.9 | 198.6 | 18 | 18 | 4.5 | 55 | 42 | M45x1.5 | 37.5 | 67 | 102.9 | 172.5 | 12.5 | 43.5 | 31.5 | 30 |
| SCK-00-0.25M | 96.6 | 6.5 | 69.1 | 10 | 5.5 | 2.5 | 19 | 12 | M14x1.5 | 10 | 24 | 26.1 | 53.5 | 4 | 12.4 | 10 | 15.5 |
| SCK-00-0.5M | 111.4 | 6.5 | 77.9 | 11 | 8 | 2.9 | 27 | 16 | M20x1.5 | 13.5 | 33 | 33 | 60.8 | 5 | 17 | 12 | 17.5 |
| SCK-00-1.0M | 161.6 | 7.7 | 109.9 | 13 | 10 | 2.9 | 32 | 22 | M27x3.0 | 19.5 | 39 | 50.5 | 90.3 | 6 | 24 | 15 | 22 |

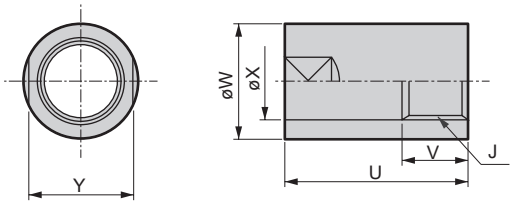
## Dimensions: Option (flange [mounting bracket]) CAD

● SCK-0.005-**
0.01
0.03

Flange (FA)

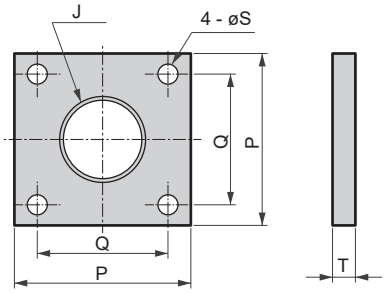



Stop nut (N1)

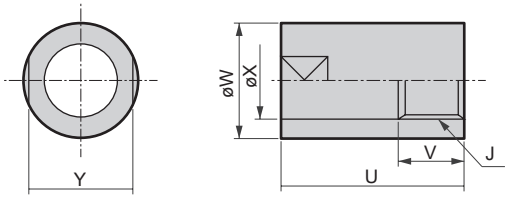



● SCK-0.3 to 60, 0.25M to 1.0M-**
(Screw pitch large)

Flange (FA)



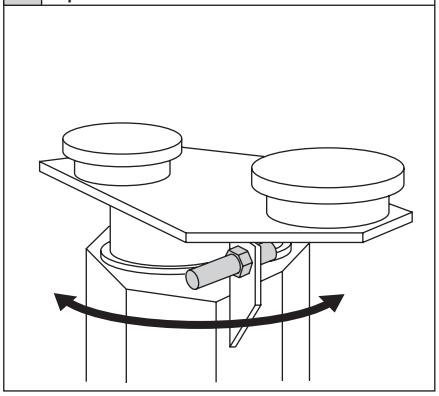

Stop nut (N1)




| Code | Flange (FA) | | | | | | Weight | Stop nut (N1) | | | | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model No. | J | P | Q | R | S | T | (g) | J | U | V | W | X | Y | (g) |
| SCK-0.005-** | M 10 x 1.0 | 42 | 30 | 20 | 5.5 | 2.3 | 14 | M 10 x 1.0 | 17 | 10 | 15 | 11 | 13 | 12 |
| SCK-0.01-** | M 12 x 1.0 | 46 | 34 | 20 | 5.5 | 3.6 | 22 | M 12 x 1.0 | 23 | 10 | 19 | 13 | 17 | 19 |
| SCK-0.03-** | M 16 x 1.0 | 52 | 40 | 32 | 5.5 | 4.5 | 51 | M 16 x 1.0 | 23 | 10 | 22 | 17 | 19 | 30 |
| SCK-0.3-** | M 20 x 1.0 | 52 | 38 | - | 6.5 | 6 | 107 | M 20 x 1.0 | 32.5 | 15 | 26 | 21 | 24 | 52 |
| SCK-0.6-** | M 20 x 1.0 | 52 | 38 | - | 6.5 | 6 | 107 | M 20 x 1.0 | 32.5 | 15 | 26 | 21 | 24 | 52 |
| SCK-1.2-** | M 25 x 1.5 | 52 | 38 | - | 6.5 | 6 | 100 | M 25 x 1.5 | 35 | 15 | 32 | 26 | 30 | 82 |
| SCK-2.6-** | M 25 x 1.5 | 52 | 38 | - | 6.5 | 6 | 100 | M 25 x 1.5 | 35 | 15 | 32 | 26 | 30 | 82 |
| SCK-6.5-** | M 30 x 1.5 | 66 | 48 | - | 8.5 | 6 | 163 | M 30 x 1.5 | 40 | 15 | 40 | 31 | 36 | 162 |
| SCK-8-** | M 30 x 1.5 | 66 | 48 | - | 8.5 | 6 | 163 | M 30 x 1.5 | 40 | 15 | 40 | 31 | 36 | 162 |
| SCK-12-** | M 40 x 1.5 | 84 | 64 | - | 10.5 | 9 | 390 | M 40 x 1.5 | 69.5 | 20 | 50 | 41 | 46 | 362 |
| SCK-20-** | M 40 x 1.5 | 84 | 64 | - | 10.5 | 9 | 390 | M 40 x 1.5 | 69.5 | 20 | 50 | 41 | 46 | 362 |
| SCK-30-** | M 40 x 1.5 | 84 | 64 | - | 10.5 | 9 | 390 | M 40 x 1.5 | 69.5 | 20 | 50 | 41 | 46 | 362 |
| SCK-40-** | M 40 x 1.5 | 84 | 64 | - | 10.5 | 9 | 390 | M 40 x 1.5 | 69.5 | 20 | 50 | 41 | 46 | 362 |
| SCK-60-** | M 45 x 1.5 | 84 | 64 | - | 10.5 | 9 | 390 | M 45 x 1.5 | 70 | 20 | 60 | 46 | 55 | 649 |
| SCK-0.25M-** | M 14 x 1.5 | 52 | 38 | - | 6.5 | 6 | 115 | M 14 x 1.5 | 26.5 | 10 | 20 | 15 | 17 | 30 |
| SCK-0.5M-** | M 20 x 1.5 | 52 | 38 | - | 6.5 | 6 | 108 | M 20 x 1.5 | 36.5 | 15 | 26 | 21 | 24 | 59 |
| SCK-1.0M-** | M 27 x 3.0 | 52 | 38 | - | 6.5 | 6 | 106 | M 27 x 3.0 | 45.5 | 15 | 35 | 28 | 32 | 134 |

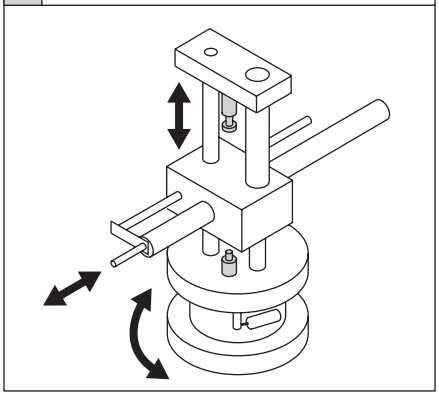
## Example of shock absorber

### 1 Special index table



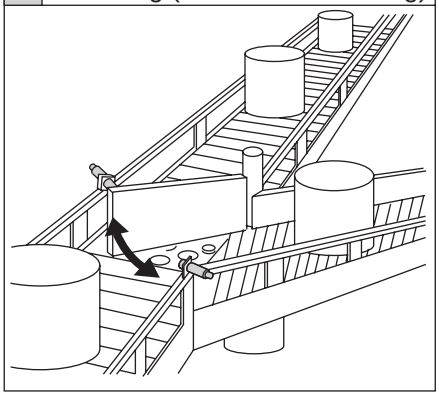
If used for special indexing tables such as wheel rim welding, etc., the index time can be reduced without damaging the machine.

### 2 Robot



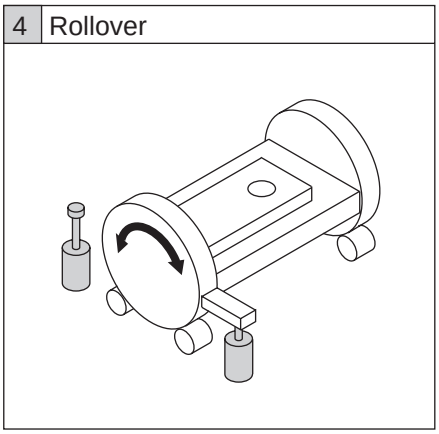
This absorbs the impact caused by the movement of various parts, and prevents damage to parts. Furthermore, production speed can be improved.

### 3 Switching (directional switching)



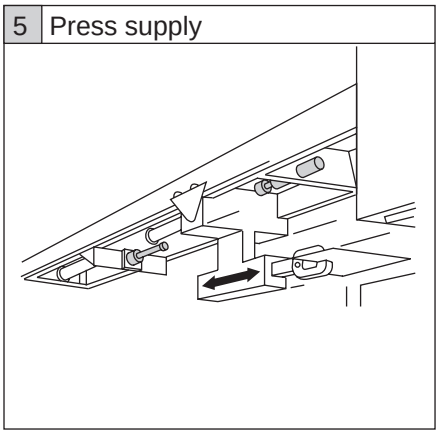
When used for defective parts inspection and sorting for shipping, this mechanism absorbs the gate bound impact and prevents damage to pneumatic cylinders, etc.

### 4 Rollover



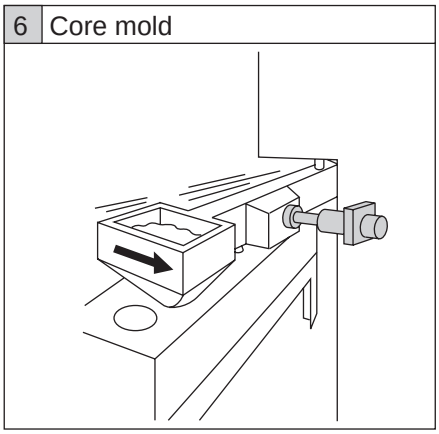
Can be used for automatic turn-over mechanism for parts after machining and welding, etc. Reduces wear and extends the service life of driving parts such as the drive, gears, pinion, etc.

### 5 Press supply



Can be used with feeding mechanisms for parts leading to press machine dies (molds, stamps). Without reducing the supply speed of pneumatic cylinders, etc., the deceleration effects suited for the parts can be attained.

### 6 Core mold



Can be used to stop the swing arm in the process that injects sand model material. This also increases cycles per unit time and supports increases in production.

# Selection guide

## Setting working conditions

Make the following conditions clear for shock absorber selection.
(1) Load weight (kg)
(2) Instantaneous colliding speed of impact with shock absorber(m/s)
(3) Thrust (kgf) if there is external pressure with load

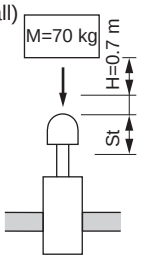
### Code

D = Cylinder diameter (mm)
E = Kinetic energy (J)
P = Operation pressure (MPa)
K = Radius of rotation (m) (distance of load center to center of rotation)
ω = Colliding angular speed (rad/s)
I = Moment of inertia (kg/m$^2$)
F = Thrust (N)
T = Torque (N·m)
V = Colliding speed (m/s)
H = Height (m)
St = Shock absorber stroke (m)
M = Weight of workpiece (kg)
g = Gravity acceleration 9.8 m/s$^2$

## Example of calculation

(1) Vertical falling motion (free fall)

$$E = \frac{1}{2}\cdot M\cdot V^2 + Mg\cdot St$$




Where weight (M) of workpiece is 70 kg and vertical fall is from 0.7 m (H), check if SCK-00-60 can be used.

Find the max. colliding speed under these conditions.

$V=\sqrt{2\cdot g\cdot H}=\sqrt{19.6 \times H}$

$V=\sqrt{19.6 \times 0.7}$ = 3.7 m/s < 4 m/s

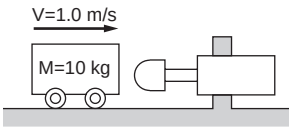
(SCK-00-60)

$E=\frac{1}{2}x70x3.7^2+70x9.8x0.07=527.2$

Absorbed energy of SCK-00-60 is larger according to colliding speed characteristics graph of absorbed energy on Graph 1. Therefore, energy can be absorbed by SCK-00-60.

(2) Horizontal motion (inertia motion)

$$E = \frac{1}{2}\cdot M\cdot V^2$$



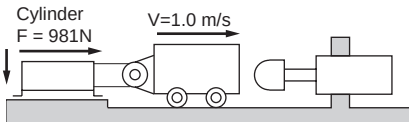

With workpiece weight (M) of 10 kg for colliding speed (V)
At 1.0m/s,

$E = \frac{1}{2} \times 10 \times (1.0)^2 = 5.0J$

SCK-00-1.2 can be used.

(3) Horizontal motion (for thrust)

$$E = \frac{1}{2}\cdot M\cdot V^2 + F\cdot St$$




If the workpiece calculated in (2) is moved by a ø50 mm pneumatic cylinder (D)with pneumatic pressure (P) of 0.5 MPa, pneumatic cylinder thrust is:

$F = \frac{\pi}{4} \times D^2 \times P = \frac{\pi}{4} \times 50^2 \times 0.5 = 981N$

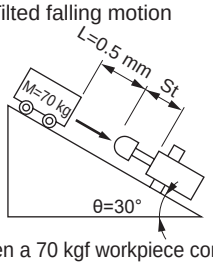
Check if SCK-00-6.5 can be used.$E=\frac{}{}$

$x10x(\frac{1}{2}1.0)^2+981x0.025$

≈29.5

Therefore, energy can be absorbed by SCK-00-6.5.
(Graph 1)

(4) Tilted falling motion




$E=(\frac{1}{2}MV^2)+$

$(Mg\cdot St\cdot \sin\theta)$

When a 70 kgf workpiece comes down a 30° slope, consider if the SCK-00-40 can be used. Find the max. colliding speed under the same conditions.

$V=\sqrt{19.6xH(H=0.5x\sin 30°)}$

$=\sqrt{19.6x0.5x\sin 30°}$

= 2.2 m/s < 3 m/s

$E=(\frac{1}{2}x70x2.2^2)+(70x9.8x0.07x\sin 30°)$

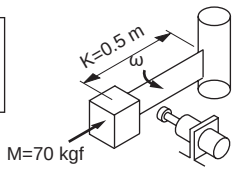
≈193.4 J

Therefore, energy can be absorbed by SCK-00-20.

(5) Horizontal rotary motion (inertia motion)

$I=WK^2$

$E=\frac{1\cdot\omega^2}{2}$




When a 70 kgf workpiece with a radius of rotation (K) 0.5 m and colliding angular speed of 1 rad/s is being operated, consider if the SCK-00-1.2 can be used.I =

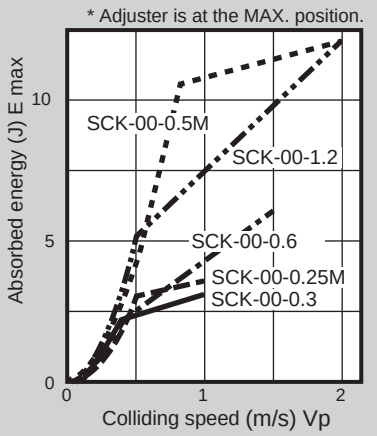
$70 \times (0.5)^2 = 17.5\ kg{\cdot}m^2$

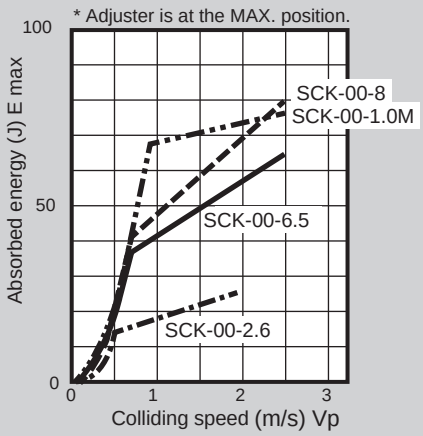
$E=\frac{(1)^2}{2}=\frac{17.5x(1)^2}{2}$

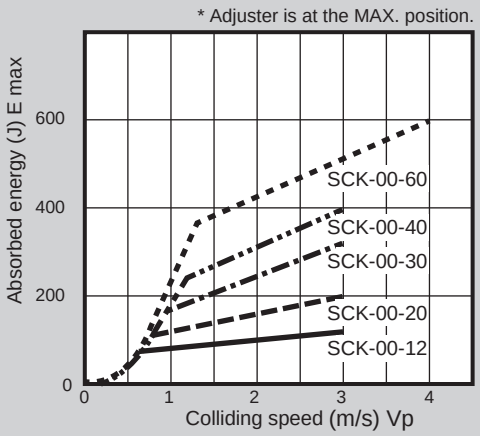
=8.8 J

Therefore, energy can be absorbed by SCK-00-1.2.

Vp·E max. characteristics (colliding speed/absorbed energy)




* Absorption energy drops at low speed.