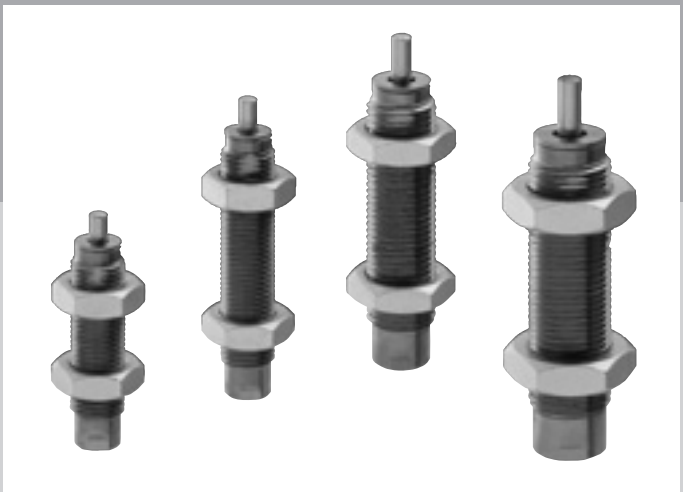
SKL

Shock absorber/fixed

Related products

Overview

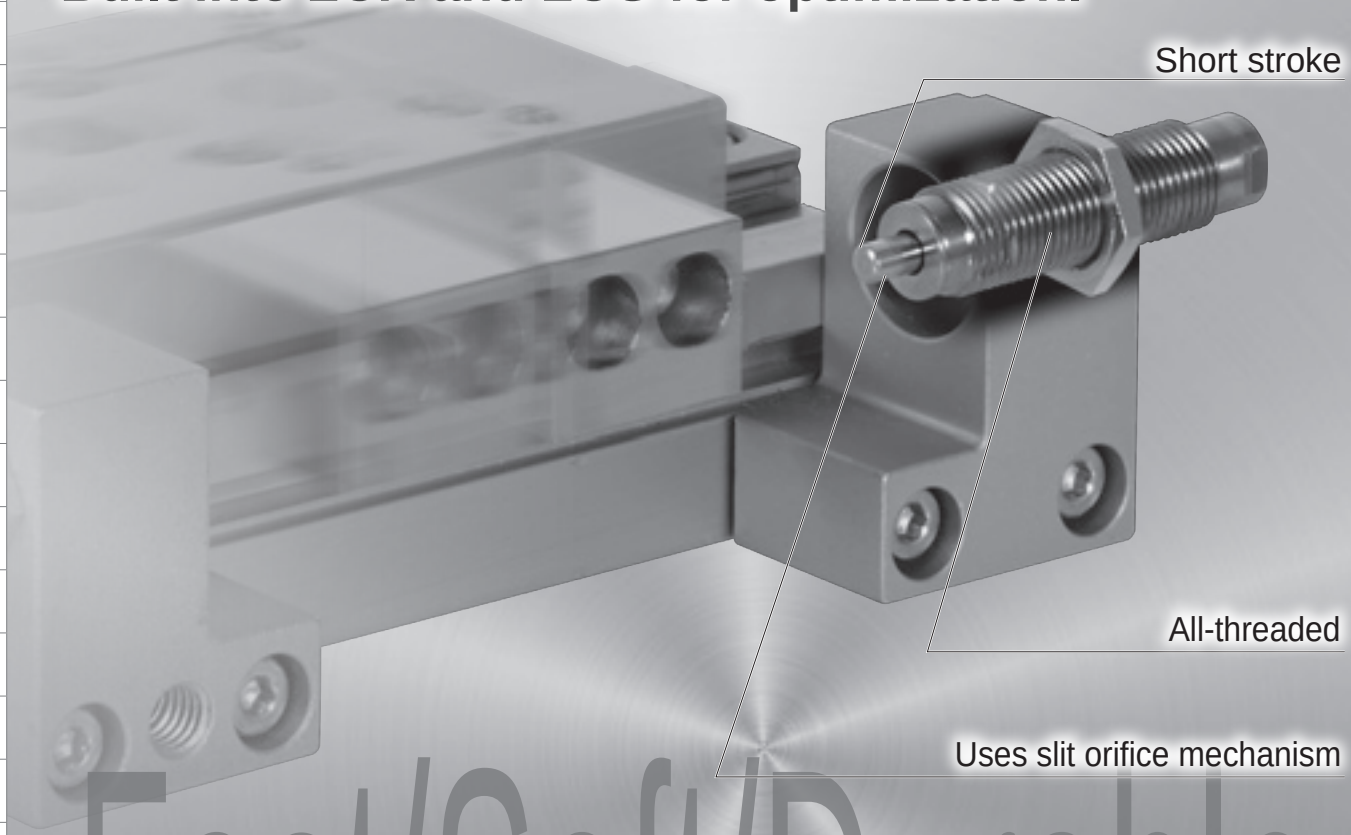
Maximization of the installation capacity with lower tact times, long service life.
A shock absorber that achieves smooth stoppage.



CONTENTS

Improves equipment tact time and contributes to increased productivity!

Linear slide cylinder
Built into LCR and LCG for optimization.



Fast/Soft/Durable

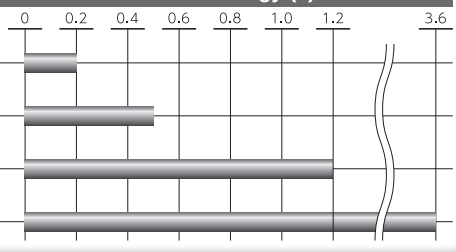
Shock absorber for linear slide cylinder

SKL Series

Model variations

Four types are available, matching the maximum absorbed energy suited to each linear slide cylinder.

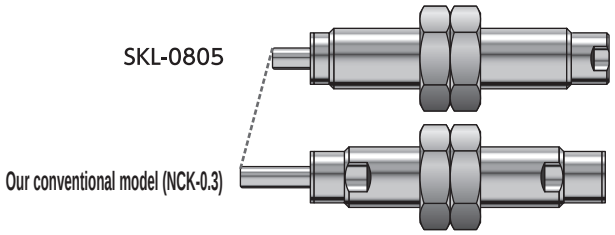
Model variations	Thread size	Stroke length (mm)	Absorbed energy (J)
SKL Series — SKL-0804	M8×0.75	3.5	
SKL Series — SKL-0805	M8×0.75	4.5	
SKL Series — SKL-1006	M10×1.0	6	
SKL Series — SKL-1208	M12×1.0	8	

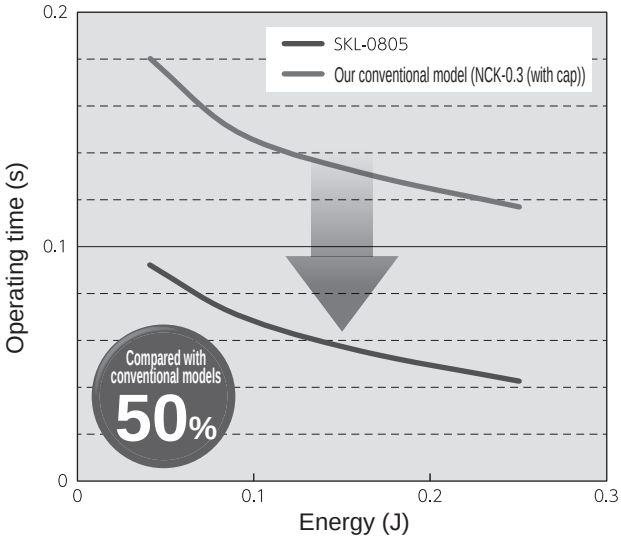


Fast tact

Short stroke dramatically reduces operating time

Compatible with low tact/high-accuracy linear slide cylinder. Reduces equipment operating time and contributes to increased productivity.



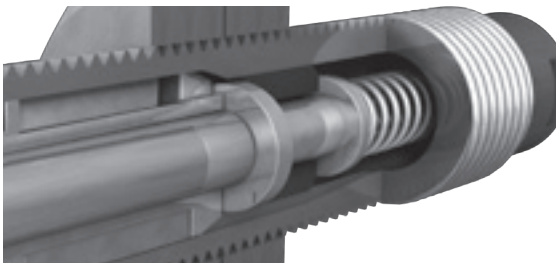


* Data are reference values at cylinder thrust 60 N, room temperature.
Operating time varies according to collision conditions.

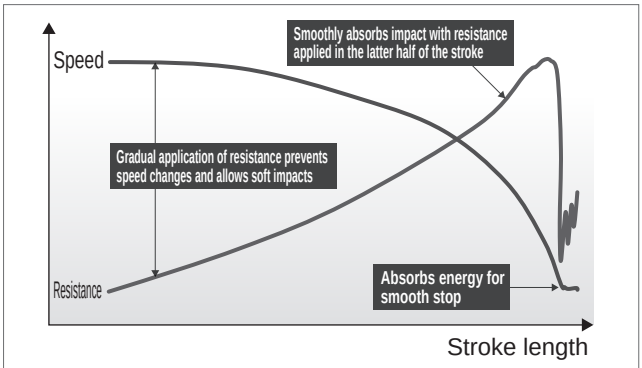
Soft stop extends service life

Slit orifice mechanism enables smooth impact absorption characteristics

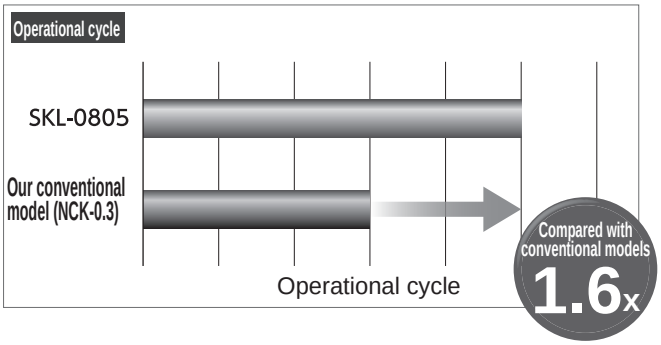
Uses a slit orifice mechanism in which the orifice surface area smoothly decreases as the piston moves. Realizes an ideal triangular waveform, gentle impacts with soft absorption characteristics.



Slit orifice mechanism realizes long service life
The well-regarded slit orifice mechanism has been retained and optimized through specialization for linear slide cylinders.



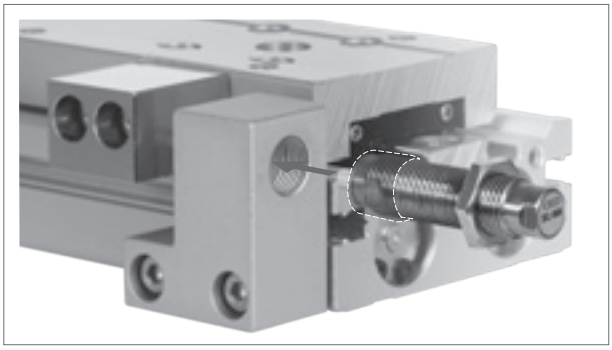
Gradual speed change enables soft stop

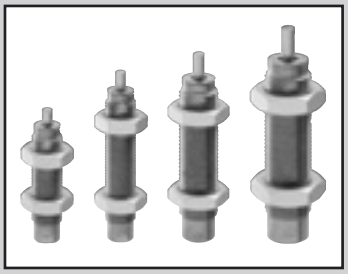


High maintainability

Easy capless mounting

Structure directly receives the slider with the body. Capless and mountable from rod side, allowing shock absorber replacement with the linear slide cylinder still installed.





Shock absorber

SKL Series

● Max. energy absorption: 0.2 to 3.6J

RoHS

Specifications

Item			SKL			
Model No.			SKL-0804	SKL-0805	SKL-1006	SKL-1208
Max. energy absorption		J	0.2	0.5	1.2	3.6
O.D. thread size		mm	M8x0.75		M10x1.0	M12x1.0
Stroke		mm	3.5	4.5	6	8
Max. absorbed energy per hour		kJ/hr	0.9	2.4	4.3	12.9
Max. colliding speed		m/s	1.0			
Max. operating frequency		Cycle/min.	80		60	
Ambient temperature		°C	-10 (14°F) to 60 (140°F)			
Max. allowable thrust		N	40	158	281	687
Max. load (rated resistance)		N	152	277	484	1064
Required mounting strength		N	456	831	1452	3192
Return time		s	0.3 or less			
Weight		g	9	12	20	40
Return	When extended	N	3.3	3.3	2.3	3.4
Spring force	When compressed	N	4.6	4.6	4.2	5.9

Note: The speed and absorption capacity of the shock absorber vary depending on the ambient temperature.
Values given in the above specifications are for room temperature.

How to order

SKL - 08 05

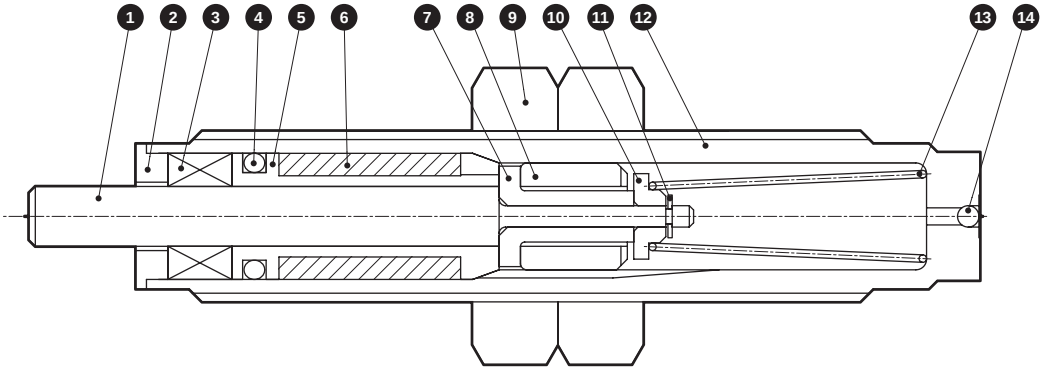
- SKL: Model No.
- 08: Ⓐ Thread size
- 05: Ⓑ Stroke

Code	Description
Ⓐ Thread size	
08	M8x0.75
10	M10x1.0
12	M12x1.0

Ⓑ Stroke (mm)

	Thread size	08	10	12
04	3.5 mm	●		
05	4.5 mm	●		
06	6 mm		●	
08	8 mm			●

Internal structure and parts list

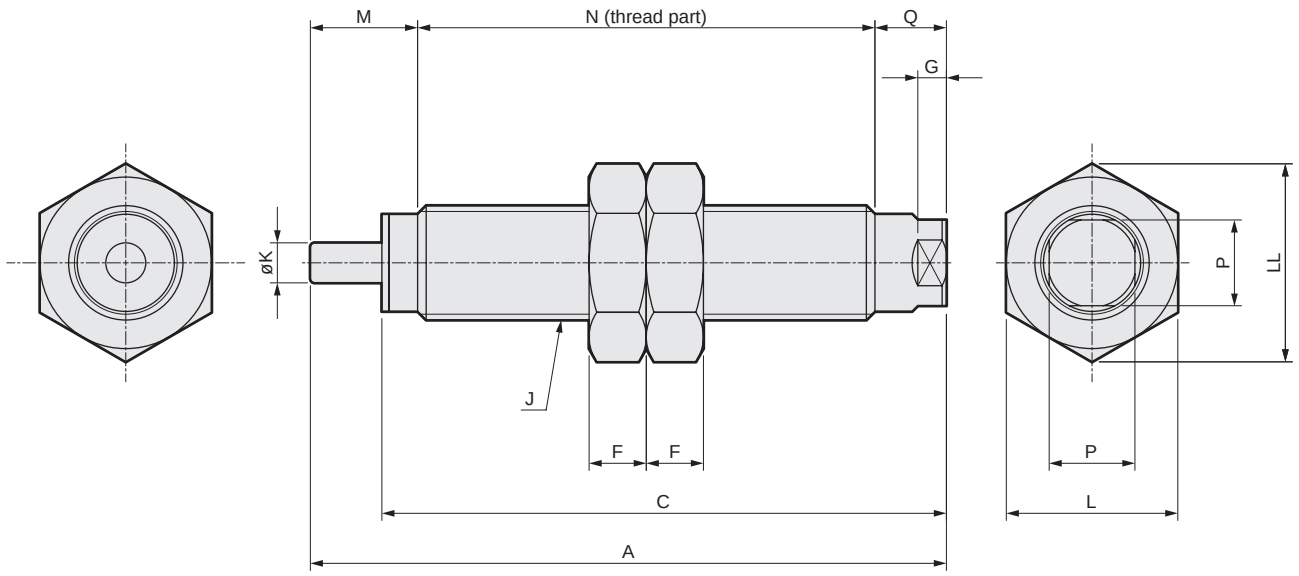


Cannot be disassembled

Parts list

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Piston rod	Steel	Industrial chrome plating	8	Piston	Cast iron	
2	Cover	Stainless steel		9	Hexagon nut	Steel	Zinc plated
3	Oil seal	Special nitrile rubber		10	Valve stopper	Steel	
4	O-ring	Nitrile rubber		11	E type snap ring	Stainless steel	
5	Rod guide	Aluminum alloy		12	Damper case	Steel	Nickel plating
6	Air chamber	Nitrile rubber		13	Spring	Piano wire	
7	Valve	Steel		14	Steel ball	Steel	

Dimensions



Model No.	A	C	F	G	J	K	L	LL	M	N	P	Q
SKL-0804	34.5	30.5	4	2	M8x0.75	2.8	12	13.9	6.5	23	6	5
SKL-0805	44.5	39.5	4	2	M8x0.75	2.8	12	13.9	7.5	32	6	5
SKL-1006	49	42.5	4	2	M10x1.0	3	14	16.2	9	34	8	6
SKL-1208	56	47.5	5	2	M12x1.0	3.5	17	19.6	12	37	10	7

Shock absorber selection guide

1 Clarify the colliding pattern of the device

- Horizontal motion
  - a. Simple horizontal collision
  - b. Collision with cylinder thrust
  - c. Collision with drive force of motor
- Vertical motion
  - d. Collision due to free fall
  - e. Collision with cylinder thrust (downward)
  - f. Collision with cylinder thrust (upward)
- Slope motion
  - g. Collision due to free sliding
  - h. Collision with cylinder thrust (downward)
  - i. Collision with cylinder thrust (upward)
- Oscillation/ rotation motion
  - j. Collision due to free oscillating fall
  - k. Colliding with torque of motor, etc., (oscillation)
  - l. Colliding with torque of motor, etc., (rotation)

Note: Refer to "Example of colliding pattern".

2 Make required conditions/descriptions clear to calculate energy

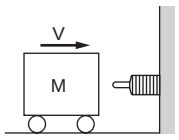
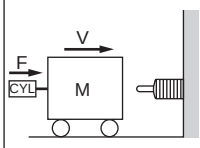
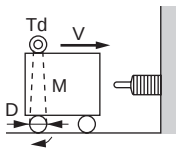
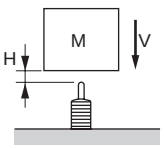
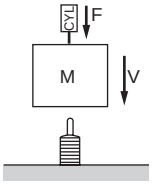
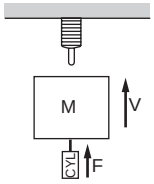
E = all absorbed energy (J)
E_1 = kinetic energy (J)
E_2 = thrust/self-weight energy (J)

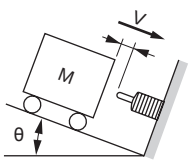
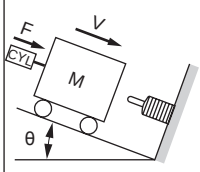
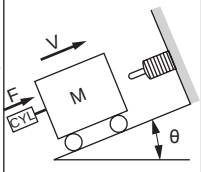
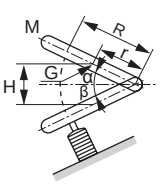
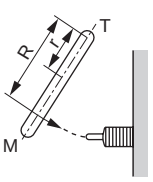
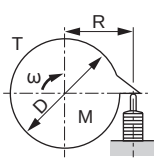
L = colliding object travel distance (m)
(Slope free fall)
R = distance from center of rotation to colliding point (m)
r = distance from center of rotation to center of gravity (m)
G = position of center of gravity

M = colliding weight (kg)
V = colliding speed (m/s)
S = SKL stroke (m)
F = pushing force (N)
g = gravity acceleration 9.8 m/s^2
ω = angular speed (rad/s)
J = moment of inertia (kg/m^2)
D = diameter (m)
N = number of rotations (rpm)
Me = equivalent weight (kg)

H = drop height (m)
T = torque (N·m)
Td = motor start torque (N·m)
K = reduction ratio
θ, α, β = tilt angle (deg)

3 Calculate actual energy in accordance with the sample figure for the colliding pattern

	Horizontal colliding			Vertical colliding		
	a. Simple horizontal collision	b. Pushing force of cylinder applies	c. Pushing force of motor applies	d. Free fall	e. Cylinder lower limit stopper	f. Cylinder upper limit stopper
Applications						
Kinetic energy E_1(J)	$\frac{1}{2}\cdot M\cdot V^2$	$\frac{1}{2}\cdot M\cdot V^2$	$\frac{1}{2}\cdot M\cdot V^2$	$\frac{1}{2}\cdot M\cdot V^2$	$\frac{1}{2}\cdot M\cdot V^2$	$\frac{1}{2}\cdot M\cdot V^2$
Thrust/self-weight energy E_2(J)	-------	F·S	$2\cdot\frac{K}{D}\cdot Td\cdot S$	M·g·S	(M·g+F)·S	(F-M·g)·S
All absorbed energy E (J)	$E = E_1$	$E = E_1+E_2$	$E = E_1+E_2$	$E = E_1+E_2$	$E = E_1+E_2$	$E = E_1+E_2$
Equivalent weight Me(kg)	Me = M	$Me = \frac{2\cdot E}{V^2}$	$Me = \frac{2\cdot E}{V^2}$	$Me = \frac{2\cdot E}{V^2}$ $(V=\sqrt{2\cdot g\cdot H})$	$Me = \frac{2\cdot E}{V^2}$	$Me = \frac{2\cdot E}{V^2}$

	Slope colliding			Oscillation colliding		Rotation colliding
	g. Free fall	h. Pushing force of cylinder applies	i. When thrust of cylinder is applied	j. Free fall	k. Torque of motor, etc., applies	L. Torque of motor, etc., applies
Applications						
Kinetic energy E_1(J)	$\frac{1}{2}\cdot M\cdot V^2$	$\frac{1}{2}\cdot M\cdot V^2$	$\frac{1}{2}\cdot M\cdot V^2$	M·g·H	$\frac{J\cdot\omega^2}{2}$ or $\frac{1}{2}\cdot M\cdot V^2$	$\frac{J\cdot\omega^2}{2}=\frac{M\cdot D^2\cdot\omega^2}{16}$
Thrust/self-weight energy E_2(J)	M·g·S·sinθ	(M·g·sinθ+F)·S	(F-M·g·sinθ)·S	$\frac{r}{R}\cdot M\cdot g\cdot S$	$\frac{T}{R}\cdot S$	$\frac{T}{R}\cdot S$
All absorbed energy E (J)	$E = E_1+E_2$	$E = E_1+E_2$	$E = E_1+E_2$	$E = E_1+E_2$	$E = E_1+E_2$	$E = E_1+E_2$
Equivalent weight Me(kg)	$Me = \frac{2\cdot E}{V^2}$ $(V=\sqrt{2\cdot g\cdot L\cdot\sin\theta})$	$Me = \frac{2\cdot E}{V^2}$	$Me = \frac{2\cdot E}{V^2}$	$Me = \frac{2\cdot E}{V^2}$ $(V=\frac{R}{r}\sqrt{\frac{3\cdot g\cdot H}{2}})$	$Me = \frac{2\cdot E}{V^2}$ $(V=\omega\cdot R)$	$Me = \frac{2\cdot E}{V^2}$ $(V=\omega\cdot R,\ \omega=\frac{2\pi\cdot N}{60})$

● Explanation of code
E = all absorbed energy J
E_1 = kinetic energy J
E_2 = thrust/self-weight energy J

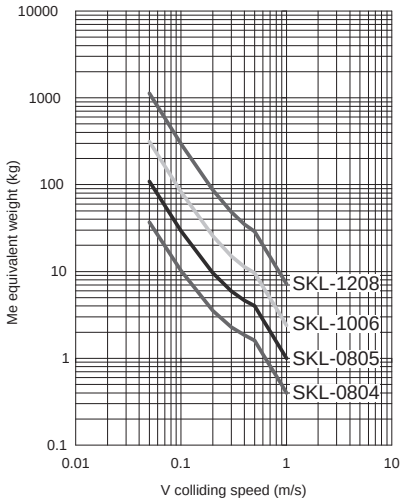
a. Kinetic energy..... Calculate the E_1 value according to "Example of colliding pattern".
b. Thrust/self-weight energy ..... Calculate the value of E_2 according to "Example of colliding pattern". For S (stroke of SKL) in the formula, select a model whose max. absorbed energy exceeds E_1, and use S for that model No.
c. Total absorbed energy..... If after that the calculation result exceeds Emax (max. energy absorption), select one size larger SKL than the previously selected model No., and recalculate. If calculated E is lower than Emax selected model No., the selection is acceptable.

4 Confirm the equivalent weight

a. Calculate value of Me according to "Example of colliding pattern".
b. Usable if Me is within Me range of selected model (calculated value of Me < specified value of Me) according to calculation of Me (catalog value) and "a" for model No. selected at 3.
c. When exceeding the Me range of the selected model at b, select an SKL one size larger, and check conditions in the same manner.

Note: Equivalent mass corresponds to weight of workpiece, even for body moving with thrust, etc., if it is assumed that all of them are kinetic energy only. This allows the load to be controlled at very low speed conditions.

Equivalent weight graph



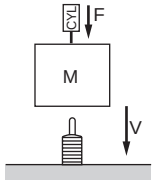
5 Confirm shock absorber specifications range

a. Max. repeating cycle	[cycle/min.]	c. Ambient temperature	[°C]
b. Max. colliding speed	[m/s]	d. Return time	[s]

Note: Value of allowable energy absorption may vary depending on colliding speed.

Example of selection

1 Clarify the colliding pattern of the device

Applications	Vertical colliding
	e. Cylinder lower limit stopper
	
Kinetic energy E_1(J)	$E_1 = \frac{1}{2}\cdot M\cdot V^2$
Thrust/self-weight energy E_2(J)	$E_2 = (Mg + F)\cdot S$
All absorbed energy E (J)	$E = E_1 + E_2$
Equivalent weight Me (kg)	$Me = \frac{2\cdot E}{V^2}$

2 Make required conditions/descriptions clear to calculate energy

(Example)

Colliding object weight:	M=1.0 kg
Colliding speed:	V=0.5 m/s
Pushing force:	F=70 N
Frequency:	30 cycle/min.
Ambient temperature:	23°C
Return time:	2s (time up to re-collision)

3 Calculate actual energy in accordance with the sample figure for the colliding pattern.

Calculate E_1

$E_1 = \frac{1}{2}\cdot MV^2 = \frac{1}{2} \times 1 \times 0.5^2 = 0.13$ (J)

Tentatively select SKL-0804 from E_1, then calculate E_2

$E_2 = (Mg + F)\cdot S = (1 \times 9.8 + 70) \times 0.0035 = 0.28$(J)

As it exceeds the allowable absorbed energy of SKL-0804, recalculate with the one size larger SKL-0805

$E_2 = (Mg + F)\cdot S = (1 \times 9.8 + 70) \times 0.0045 = 0.36$(J)

$E = E_1 + E_2 = 0.13 + 0.36 = 0.49$(J)

Acceptable as it is less than the allowable absorbed energy of SKL-0805

4 Confirm the equivalent weight

$Me = \frac{2E}{V^2} = \frac{2x0.49}{0.5^2} = 3.92$(kg)

As it is less than the allowable value of SKL-0805, select OK SKL-0805