SHOCK ABSORBER

Series SA1E

Cat No SA1E - 01 - 01 - A

SHOCK ABSORBER - Stroke - 4, 6, 7, 10, 12, 15, 25 mm

Features

- ❑ Smooth and Quick deceleration characteristics
- ❑ Shock absorber resistance will be self-adjusted against the applied load
- ❑ Full threaded body design enhances heat dissipation & gives flexibility over fine adjustment
- ❑ High energy absorption characteristics & robust design gives longer life
- ❑ Higher usage frequency and smaller installation length

Applications

- ❑ Conveyor systems
- ❑ Factory automations
- ❑ Semi-Conductor Manufacturing
- ❑ Food processing equipment
- ❑ Metal Forming and Stamping equipment
- ❑ Medical Devices
- ❑ Automotive Manufacturing
- ❑ Glass forming equipment
- ❑ Pick & place robotics
- ❑ Material handling
- ❑ Packing machinery

Technical Specifications

Ambient Temperature	-10° to 80° C
Speed range	0.3 - 5.0 m/s
Reset time	≤ 0.3 Sec.
Material	Outer tube : Carbon Steel, Piston Rod : Carbon Steel (Hard Chrome plated), Seals : NBR

Performance Parameters

Stroke (mm)	Max. Nm/Cycle (Et)	Max. Nm/Hour (Etc)	Max. effective Mass Kg (Me)	Max. impact speed (v) m/s	Weight (g)	Ordering No (With Cap)	Ordering No (Without Cap)
4	0.5	720	3	0.3 - 1	4	SA1E004002XWC	SA1E004002YWC
6	3	7000	6	0.3 - 2.5	17	SA1E00603AXWC	SA1E00603AYWC
7	6	12400	12	0.3 - 3.5	28	SA1E007004XWC	SA1E007004YWC
10	12	22500	22	0.3 - 4	32	SA1E010005XWC	SA1E010005YWC
12	20	33000	40	0.3 - 5	70	SA1E01206AXWC	SA1E01206AYWC
15	59	38000	120	0.3 - 5	160	SA1E015008XWC	SA1E015008YWC
25	80	60000	180	0.3 - 5	295	SA1E025009XWC	SA1E025009YWC
25	147	72000	270	0.3 - 5	375	SA1E025010XWC	SA1E025010YWC

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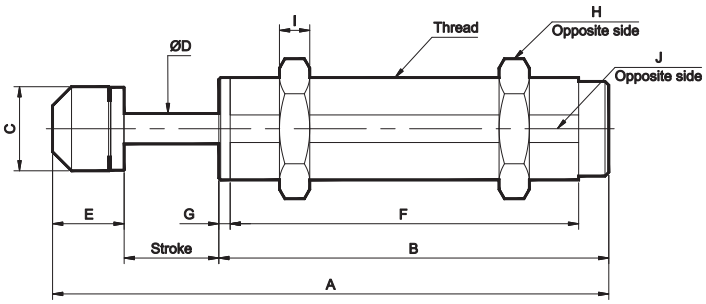
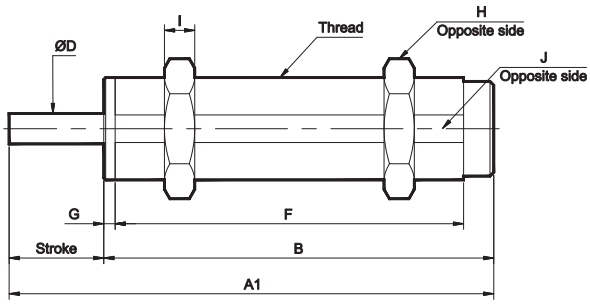


Shock Absorber with Cap



Shock Absorber without Cap

Stroke	Thread	A	A1	B	C	D	E	F	G	H	I	J
4	M6 x 0.75	36.5	32.5	28.5	4.5	1.8	4	22.5	1	8	3	-
6	M8 x 1.0	55.2	46.6	40.6	6.6	2.9	8.6	33.6	2	11	3	-
7	M10 x 1.0	62.6	54	47	8.6	3	8.6	39	3	12.7	3	-
10	M12 x 1.0	71.3	62.5	52.5	10.3	3	8.8	44	3	14	4	-
12	M14 x 1.5	90.2	79	67	12	4	11.2	58	4	19	5	12.1
15	M20 x 1.5	103.3	88	73	17.8	6	15.3	62	4	26	7	18
25	M25 x 1.5	136	117	92	22	8	19	82	-	32	9	23
25	M27 x 1.5	143	124	99	22	8	19	86	5	32	6	25

Shock Absorber recommendation chart for Air Cylinders

Cylinder I.D.	6	10	12	16	20	25	32	40	50	63	80
5 bar Cylinder propulsive force Kgf	1.4	3.9	5.7	10	15.7	24.5	40	62.8	98	155	251
SA1E004002XWC	●	●	●								
SA1E004002YWC											
SA1E00603AXWC		●	●	●							
SA1E00603AYWC											
SA1E007004XWC			●	●	●						
SA1E007004YWC											
SA1E010005XWC			●	●	●						
SA1E010005YWC											
SA1E01206AXWC			●	●	●						
SA1E01206AYWC											
SA1E015008XWC				●	●	●	●	●			
SA1E015008YWC											
SA1E025009XWC						●	●	●	●	●	●
SA1E025009YWC											
SA1E025010XWC						●	●	●	●	●	●
SA1E025010YWC											

SHOCK ABSORBER

Series SA1E

Cat No SA1E - 01 - 01 - A

Shock Absorber Selection

E_K	Kinetic energy	EK = mv2 / 2	(Nm)
E_D	Propelling energy	ED = F × S	(Nm)
E_T	Total energy per cycle	ET = EK + ED	(Nm)
E_{TC}	Total energy per hour	ETC = ET x C	(Nm/hr)
Me	Max. Effective mass	Me = (2ET) / V2	(kg)
m	Mass to slow down		(kg)
*v	Velocity or moving mass		(m/s)
$*v_D$	Impact velocity of shock absorber		(m/s)
Fm	Maximal impact force		(N)
F	Propelling force		(N)
C	Number of shocks per hour		(/hr)
d	Cylinder inner diameter		(mm)
S	Stroke		(m)
A	Width		(m)
B	Thickness		(m)

T	Driving torque	(Nm)
I	Moment of inertia	(kgm^2)
g	Gravitational acceleration	(m/s^2)
H	Height	(m)
HM	Arresting torque factor for motors (normally 2.5)	
P	Electric motor power	(W)
μ	Friction coefficient	
t	Deceleration time	(s)
ω	Angular velocity	(rad/s)
α	Slope tilting angle	(rad)
θ	Impact contact forwarding	(rad)
P	Actuation pressure	(bar)
R	Radius	(m)
Rs	Distance between shock absorber & rotational center	(m)

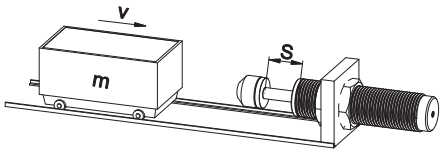
1. Horizontal Impact

Usage conditions

m = 2 Kg
v = 0.7 m/s
S = 0.004 m
C = 1000/hr

Formula and Calculation

$E_K = mv^2/2 = (2\times0.7^2)/2 = 0.5$ Nm
$E_T = E_K = 0.5$ Nm
$E_{TC} = E_T\times C = 0.5 \times 1000 = 500$ Nm/hr
$Me = (2E_T)/v^2 = (2\times0.5)/0.7^2 = 2$ Kg



From the calculation result based on formula, it is recommended that **SA1E004002XWC** can be used.

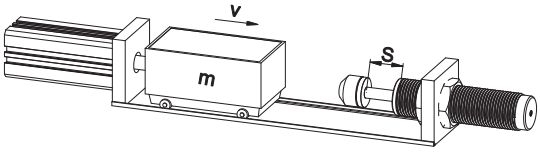
2. Horizontal Impact With Propulsive Force

Usage conditions

m = 2 Kg
v = 1.2 m/s
S = 0.006 m
P = 3 bar
D = 32 mm
C = 2000/hr

Formula and Calculation

$E_K = mv^2/2 = (2\times1.2^2)/2 = 1.44$ Nm
$E_D = F\times S = 0.0785Pd^2 \times S = 0.0785\times3\times32^2\times0.006 = 1.45$ Nm
$E_T = E_K+E_D = 1.44+1.45 = 2.89$ Nm
$E_{TC} = E_T\times C = 2.89\times2000 = 5780$ Nm/hr
$Me = 2E_T/v^2 = (2\times2.89)/1.2^2 = 4.01$ Kg



From the calculation result based on formula, it is recommended that **SA1E00603AXWC** can be used.

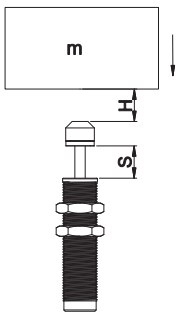
3. Free Fall Impact

Usage conditions

m = 10 Kg
H = 0.05 m
S = 0.007 m
C = 2000/hr

Formula and Calculation

$v = \sqrt{(2g.H)} = \sqrt{(2\times9.81\times0.05)} = 1$ m/s
$E_K = mv^2/2 = (10\times1^2)/2 = 5$ Nm
$E_D = F\times S = mg\times S = 10\times9.81\times0.007 = 0.7$ Nm
$E_T = E_K+E_D = 5+0.7 = 5.7$ Nm
$E_{TC} = E_T\times C = 5.7\times2000 = 11400$ Nm/hr
$Me = (2E_T)/v^2 = (2\times5.7)/1^2 = 11.4$ Kg



From the calculation result based on formula, it is recommended that **SA1E007004XWC** can be used.

SHOCK ABSORBER

Series SA1E

4. Free Fall With Propelling Force

Usage conditions

m = 8 Kg
S = 0.01 m
P = 4 bar
D = 40 mm
C = 1800/hr
v = 1.0 m/s

Formula and Calculation

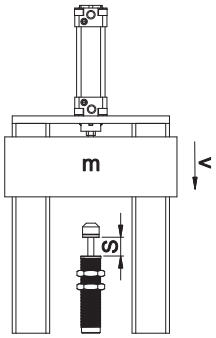
$E_K = mv^2 / 2 = (8 \times 1.0^2) / 2 = 4$ Nm

$E_D = F \times S = (mg + 0.0785Pd^2) \times S$
$= (8 \times 9.81 + 0.0785 \times 4 \times 40^2) \times 0.01 = 5.8$ Nm

$E_T = E_K + E_D = 4 + 5.8 = 9.8$ Nm

$E_{TC} = E_T \times C = 9.8 \times 1800 = 17640$ Nm/hr

$Me = (2E_T) / v^2 = (2 \times 9.8) / 1.0^2 = 19.6$ Kg



From the calculation result based on formula, it is recommended that **SA1E010005XWC** can be used.

5. Horizontal Impact With Motor Drive

Usage conditions

m = 5 Kg
v = 1.0 m/s
P = 0.5 kW
HM = 2.5
S = 0.012 m
C = 1500/hr

Formula and Calculation

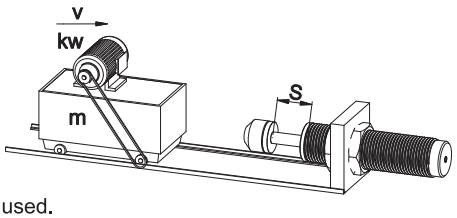
$E_K = mv^2 / 2 = (5 \times 1.0^2) / 2 = 2.5$ Nm

$E_D = F \times S = \{(P \times HM)/v\} \times S = \{(500 \times 2.5)/1.0\} \times 0.012 = 15$ Nm

$E_T = E_K + E_D = 2.5 + 15 = 17.5$ Nm

$E_{TC} = E_T \times C = 17.5 \times 1500 = 26250$ Nm/hr

$Me = (2E_T) / v^2 = (2 \times 17.5) / 1.0^2 = 35$ Kg



From the calculation result based on formula, it is recommended that **SA1E01206AXWC** can be used.

6. Tilted Impact

Usage conditions

m = 100 Kg
H = 0.1 m
S = 0.025 m
α = 30°
C = 600/hr

Formula and Calculation

$v = \sqrt{(2g.H)} = \sqrt{(2 \times 9.81 \times 0.1)} = 1.4$ m/s

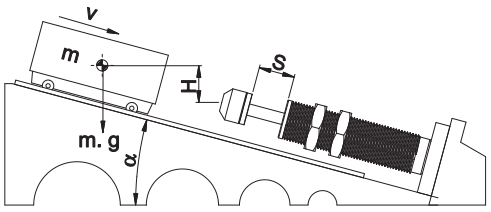
$E_K = mv^2 / 2 = (100 \times 1.4^2) / 2 = 98$ Nm

$E_D = F \times S = m \times g \times S \times \sin\alpha$
$= 100 \times 9.81 \times 0.025 \times \sin 30° = 12.26$ Nm

$E_T = E_K + E_D = 98 + 12.26 = 110.26$ Nm

$E_{TC} = E_T \times C = 110.26 \times 600 = 66156$ Nm/hr

$Me = (2E_T) / v^2 = (2 \times 110.26) / 1.4^2 = 112.5$ Kg



From the calculation result based on formula, it is recommended that **SA1E025010XWC** can be used.

7. Horizontal Rotational Door

Usage conditions

m = 100 Kg
ω = 2.0 rad/s
T = 20 Nm
R_S = 0.5 m
A = 1.0 m
B = 0.05 m
S = 0.025 m
C = 800/hr

Formula and Calculation

$I = (m(4A^2 + B^2)) / 12 = (100(4 \times 1.0^2 + 0.05^2)) / 12 = 33.35$ Kgm^2

$E_K = (I\omega^2) / 2 = (33.35 \times 2.0^2) / 2 = 66.7$ Nm

$\theta = S / R_S = 0.025 / 0.5 = 0.05$ rad

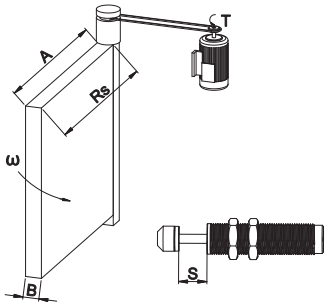
$E_D = T \times \theta = 20 \times 0.05 = 1$ Nm

$E_T = E_K + E_D = 66.7 + 1 = 67.7$ Nm

$E_{TC} = E_T \times C = 67.7 \times 800 = 54160$ Nm/hr

$v = \omega \times R_S = 2.0 \times 0.5 = 1$ m/s

$Me = (2E_T) / v^2 = (2 \times 67.7) / 1.0^2 = 135.4$ Kg

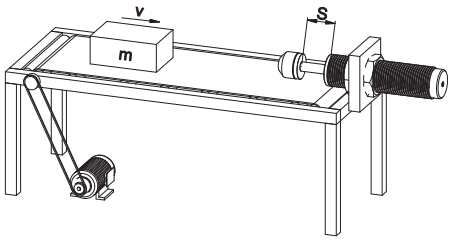


From the calculation result based on formula, it is recommended that **SA1E025009XWC** can be used.

SHOCK ABSORBER

Series SA1E

8. Horizontal Power Conveyor



Usage conditions

m = 200 Kg
v = 1.0 m/s
μ = 0.25
S = 0.025 m
C = 600/hr

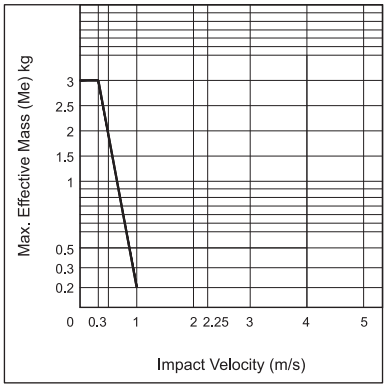
Formula and Calculation

$E_K = mv^2 / 2 = (200 \times 1.0^2) / 2 = 100$ Nm
$E_D = F \times S = m \times g \times \mu \times S = 200 \times 9.81 \times 0.25 \times 0.025 = 12.26$ Nm
$E_T = E_K + E_D = 100 + 12.26 = 112.26$ Nm
$E_{TC} = E_T \times C = 112.26 \times 600 = 67356$ Nm/hr
$Me = (2E_T) / v^2 = (2 \times 112.26) / 1.0^2 = 224.52$ Kg

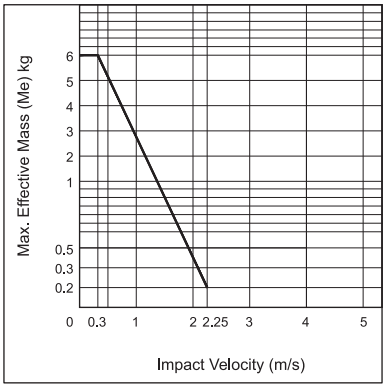
From the calculation result based on formula, it is recommended that **SA1E025010XWC** can be used

Flow Graph

SA1E004002XWC



SA1E00603AXWC



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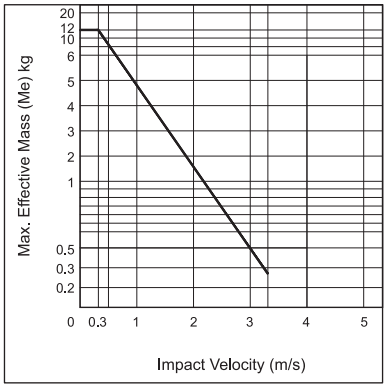

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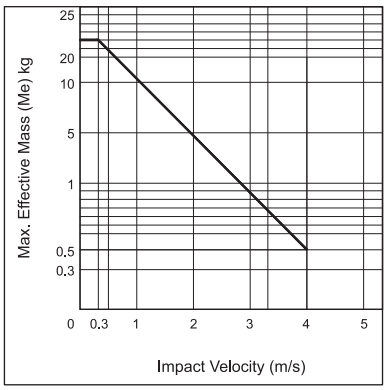

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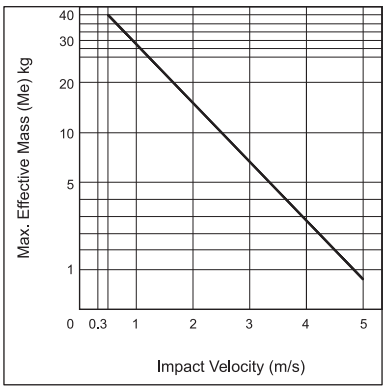
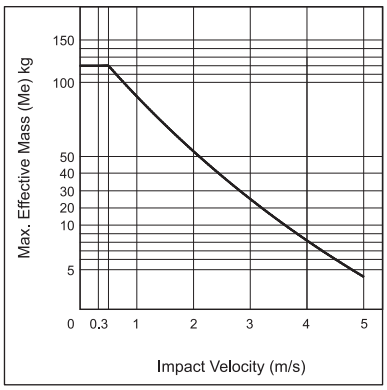


SA1E015008XWC



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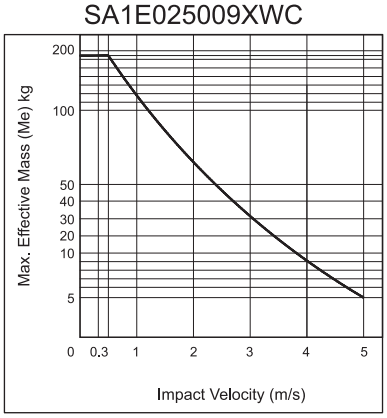

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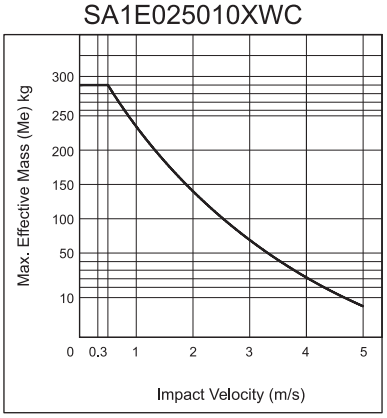

How to order

While ordering Shock Absorbers, mention the ordering number given in the corresponding table.

Subject to change