SHOCK ABSORBERS SELECTION CRITERIA

FEATURES

- Maintenance free
- Consistent performance even with temperature variations
- Gradual, smooth response and shock absorption even in high speed applications

MODELS

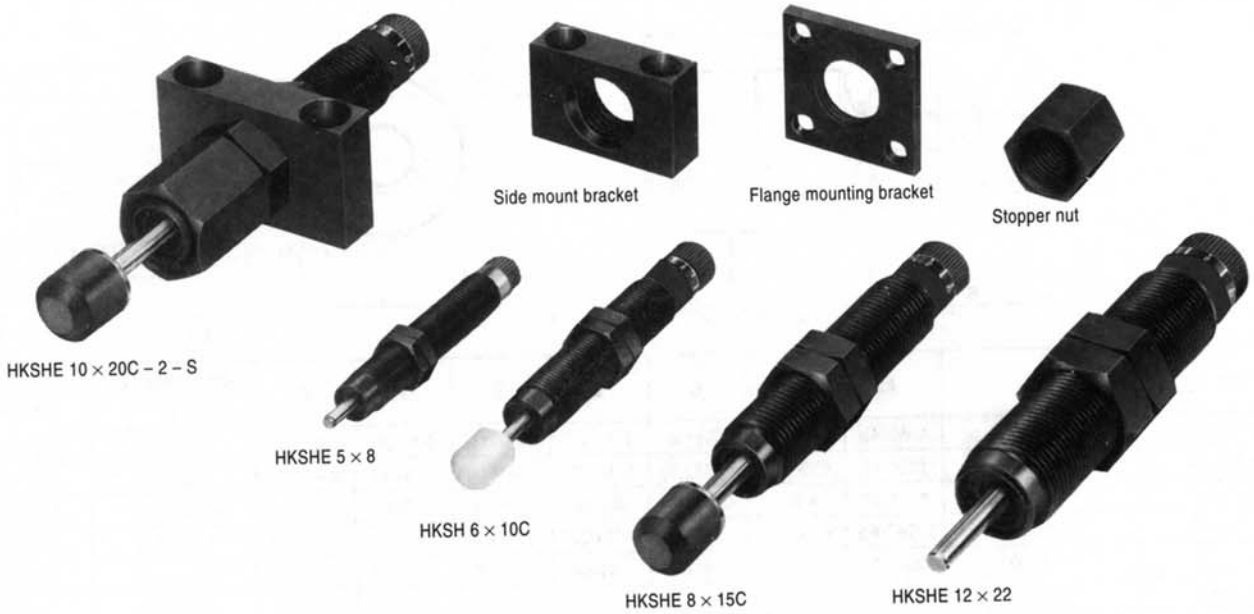
Adjustable Shock Absorbers

HKSH – Single Step Type

These models are recommended for low speed applications, where the impact velocity is a maximum of 1.5 feet (0.5 meters) per second. They have simple, single orifice operation and can be adjusted for varying loads. Use stopper nuts to stop the piston approximately 0.02 in. (0.5mm) prior to fully retracted stroke for optimum cycle life.

HKSHE SERIES – Double Step Type

These models are recommended for higher speed applications, where the impact velocity is a minimum of 1.0 foot (0.3m) per second. They have self-regulating, multi-orifice operation and can be adjusted for varying loads.

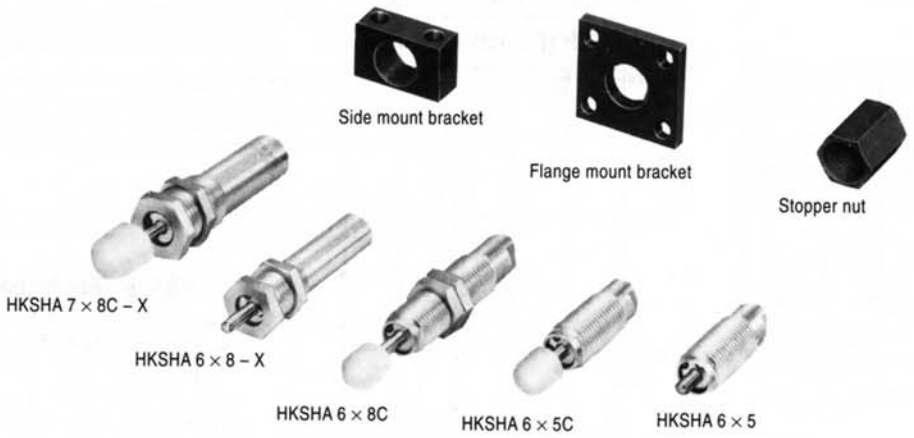


MODELS

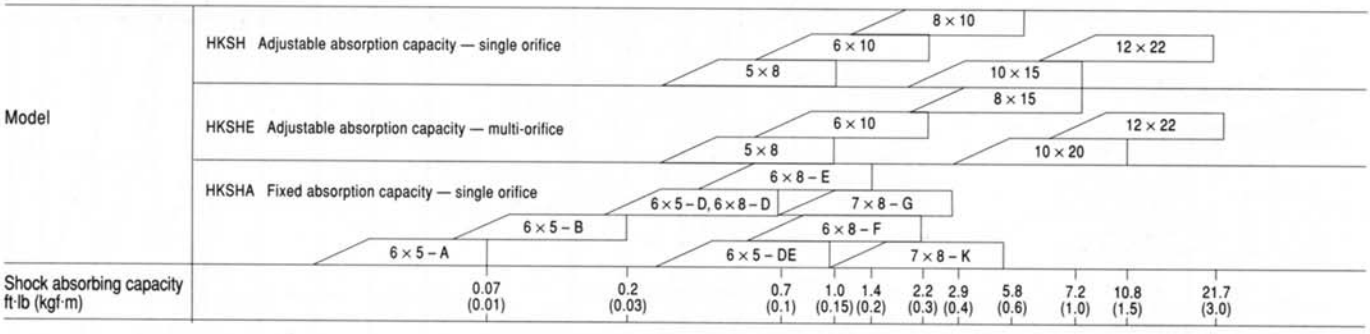
Fixed Shock Absorbers

HKSHA SERIES – Single Orifice Type

These compact, lightweight, low cost shock absorbers are ideal for OEM applications. Nose mounting saves space. HKSHA 6- models are similar to the HKSHE double step types mentioned above. HKSHA 7- models are similar to HKSH single step types. For HKSHA 6, use stopper nuts to stop piston approximately 0.02 in. (0.5mm) prior to fully retracted stroke for optimum cycle life. Use full stroke for optimum performance of HKSHA 7.



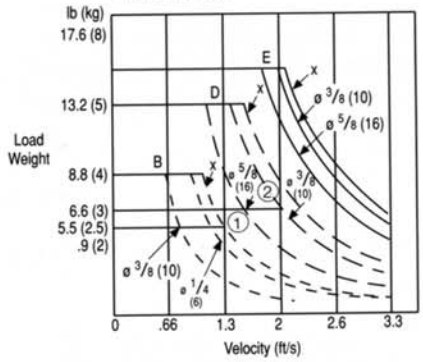
SELECTION CHART



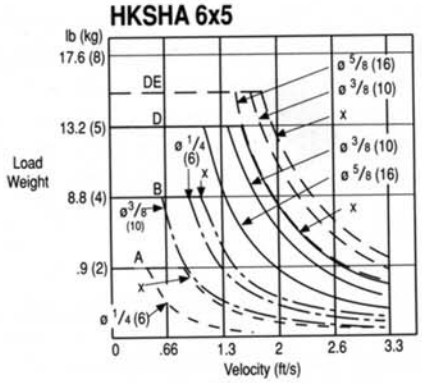
FIXED SHOCK ABSORBERS

x = no cylinder

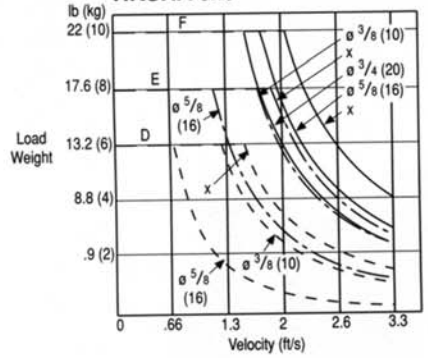
HKSHA 5x5



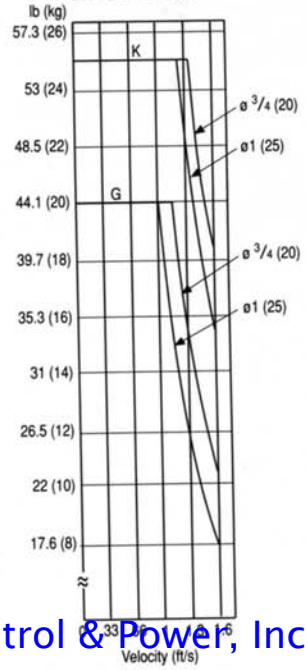
HKSHA 6x5



HKSHA 6x8

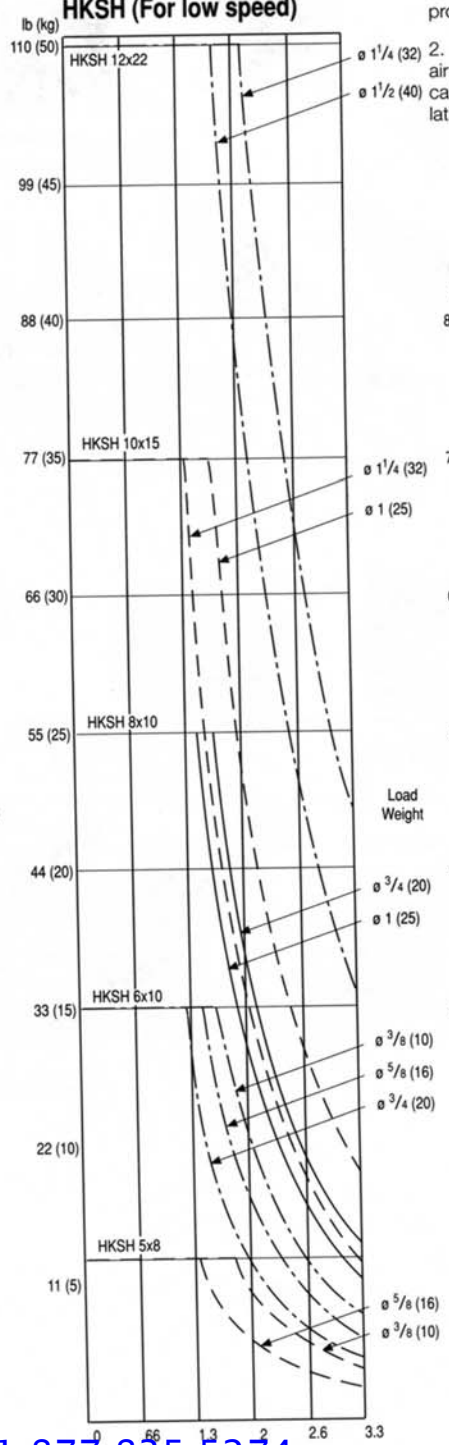


HKSHA 7x8

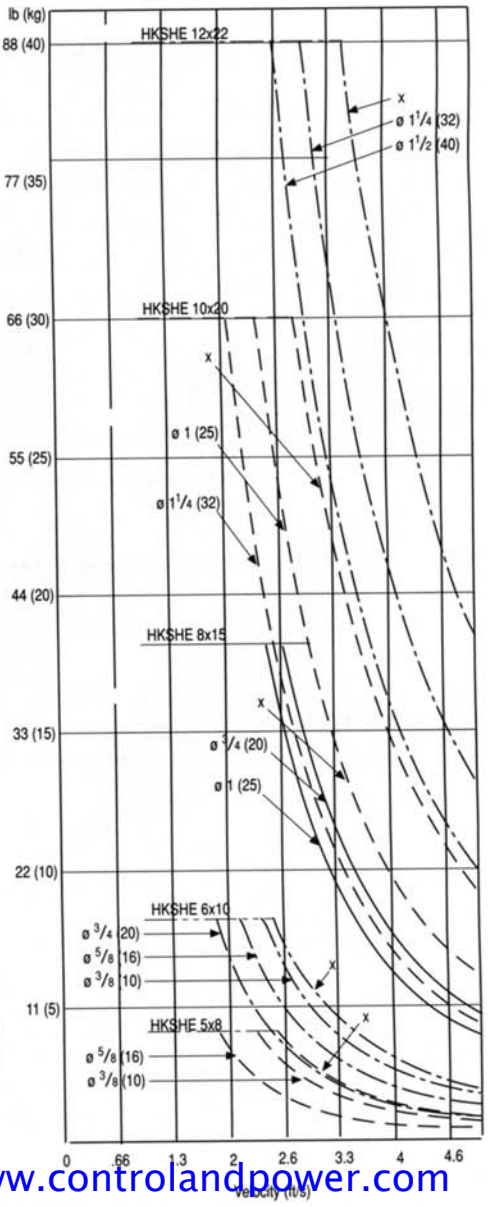


ADJUSTABLE SHOCK ABSORBERS

HKSH (For low speed)

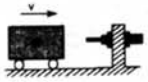


HKSHE (For higher speed)



HOW TO READ THE CHART

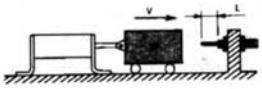
① Direct Horizontal Impact



W: Load weight 5.5 lbs.
V: Load velocity 1.3 ft/s

From the chart, select B type.

② Horizontal Impact Using Cylinder



W: Load weight 6.6 lbs.
V: Load velocity 2.0 ft/s
Cylinder 3/8 in.

From the chart, select D type.

NOTES

1. The chart indicates the best conditions for usage of the product with horizontal impact methods.
2. Calculation on the chart is based on the cylinder operating air pressure at 70 psig. If a pressure other than 70 psig is used, calculate the energy absorption using the appropriate calculation methods found in examples 1 - 6 on the following pages.

APPLICATION EXAMPLES

1. Fixed Speed Conveyor with Horizontal Impact

Impact by the loads on the conveyor operated with fixed speed.

Conveyor Velocity: V = 66 ft/min = 1.1 ft/s

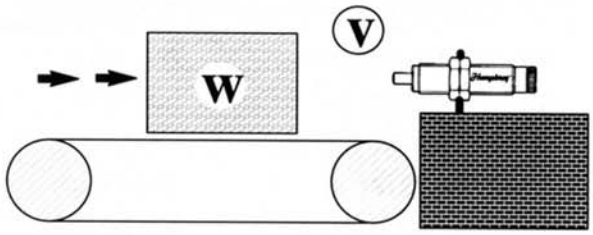
Load Weight: W = 22 lbs

Operating Cycle: 20 cycles/min

Kinetic Energy: $E_1: \frac{W \times V^2}{2g} = \frac{22 \text{ lbs} \times (1.1 \text{ ft/s})^2}{2 \times 32.2 \text{ ft/s}^2} = 0.4 \text{ ft-lbs}$

Select model by confirming that the operating cycles do not exceed 60/min and select HKSHA 6 × 5 D.

NOTE: In actuality, there is additional energy generated by friction between the load and conveyor. However, it is small compared with E_1 and was not considered.



Fixed speed conveyor with horizontal impact

2. Free Fall Conveyor with Direct Impact

Conveyor Length: L = 12 ft

Moving Time: t = 8 s

Load Weight: W = 26 lbs

Operating Cycle: 20 cycles/min

Starting from static point, the load travels 12 ft in 8 seconds before impacting the shock absorber.

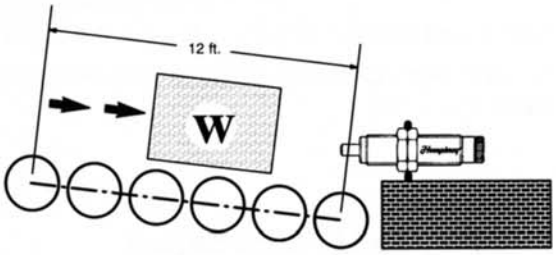
Load Average Velocity = L/t = 12 ft/8 s = 1.5 ft/s

Starting from 0, the speed at impact will be 2 times the average velocity.

Velocity at Impact: V = 2 × 1.5 ft/s = 3 ft/s

Kinetic Energy: $E_1: \frac{W \times V^2}{2g} = \frac{26 \text{ lbs} \times (3 \text{ ft/s})^2}{2 \times 32.2 \text{ ft/s}^2} = 3.6 \text{ ft-lbs}$

Confirm that operating cycles do not exceed 60/min and select HKSHE 8 × 15.

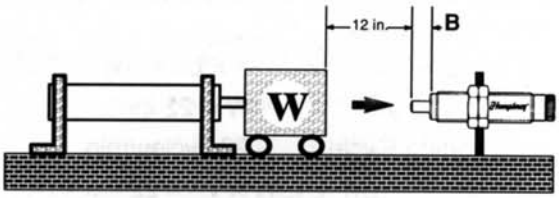


Free fall conveyor with direct impact

CODES		
W	Load weight	lbs
V	Load velocity at impact	ft/s
E	Total energy E_1: Kinetic energy E_2: Additional energy	ft-lbs ft-lbs ft-lbs
g	Acceleration due to gravity	32.2 ft/s^2
F	Cylinder thrust force $F = \pi/4 \times D^2 \times P^6$ D: Cylinder diameter P: Operating air pressure	lbs in psig (lb/in^2)
L_2	Shock absorber stroke	in
H	Height	in
T	Torque (Rotary)	ft-lbs
ω	Angular speed $\omega = 2\pi N/60$	rad/s
N	Rotating speed	rpm
R	Distance between rotation center and impact point	ft
B	Rotation angle $360° = 2\pi N/60$	
D	Cylinder diameter	in
t	Time	s

3. Horizontal Impact Using Cylinder

Cylinder Bore Diameter:	D = .75 in
Cylinder Stroke:	L = 12 in
Stroke Operating Time:	t = 0.6 s
Load Weight:	W = 10 lbs
Cylinder Air Pressure:	P = 60 psig
Operating Cycle:	40 cycles/min



Horizontal impact using cylinder

Cylinder Average Velocity = L/t = 12 in/0.6 s = 20 in/s

Considering cylinder start-up delay, the velocity at impact with the shock absorber should be approximately 1.5 times the average velocity.

Velocity at Impact: $V = 1.5 \times 20$ in/s = 30 in/s = 2.5 ft/s

Kinetic Energy: E_1: $\frac{W \times V^2}{2g} = \frac{10 \text{ lbs} \times (2.5 \text{ ft/s})^2}{2 \times 32.2 \text{ ft/s}^2} = 1.0$ ft-lbs

Cylinder Thrust Force: $F = \frac{\pi}{4} \times D^2P = \frac{\pi}{4} \times (0.75 \text{ in})^2 \times 60$ psig = 26.5 lbs

Thrust Force Energy: $E_2 = FL_2 = 26.5$ lbs $\times$ 0.39 in = 10.3 in-lbs = 0.9 ft-lbs

L_2 = Shock Absorber Stroke = 0.39 in

Total Load Energy: $E = E_1 + E_2$ = 1.0 ft-lbs + 0.9 ft-lbs = 1.9 ft-lbs

Confirm that operating cycles do not exceed 60/min and select HKSHE 6 × 10.

4. Free Fall Vertical Impact

Load Weight:	W = 22 lbs
Height :	H = 2 in
Operating Cycle:	60 cycles/min

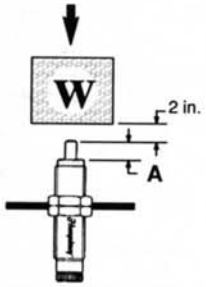
Kinetic Energy: $E_1 = WH = 22$ lb $\times$ 2 in = 44 in-lbs = 3.7 ft-lbs

Additional Energy: E_2: $WL_2 = 22$ lbs $\times$ 0.6 in = 13.2 in-lbs = 1.1 ft-lbs

L_2 = Shock Absorber Stroke = 0.6 in

Total Load Energy: $E = E_1 + E_2$ = 3.7 ft-lbs + 1.1 ft-lbs = 4.8 ft-lbs

Confirm that operating cycles do not exceed 60/min and select HKSHE 8 × 15.



Free fall vertical impact

CODES		
W	Load weight	lbs
V	Load velocity at impact	ft/s
E	Total energy E_1: Kinetic energy E_2: Additional energy	ft-lbs ft-lbs ft-lbs
g	Acceleration due to gravity	32.2 ft/s^2
F	Cylinder thrust force $F = \pi/4 \times D^2 \times P^6$ D: Cylinder diameter P: Operating air pressure	lbs in psig (lb/in^2)
L_2	Shock absorber stroke	in
H	Height	in
T	Torque (Rotary)	ft-lbs
ω	Angular speed $\omega = 2\pi N/60$	rad/s
N	Rotating speed	rpm
R	Distance between rotation center and impact point	ft
B	Rotation angle $360° = 2\pi N/60$	
D	Cylinder diameter	in
t	Time	s

5. Vertical Impact Using Cylinder

Cylinder Bore Diameter: D = 1.06 in
Cylinder Stroke: L = 16 in
Stroke Operating Time: t = 2 s
Load Weight: W = 17 lbs
Cylinder Air Pressure: P = 60 psig
Operating Cycle: 30 cycles/min

Cylinder Average Velocity = L/t = 16 in/2 s = 8 in/s

Considering required stroke time and longer strokes, the impact velocity should be approximately 1.2 times the average velocity.

Velocity at Impact:
V = 1.2 × Avg. Cyl. Velocity = 1.2 × 8 in/s = 9.6 in/s = 0.8 ft/s

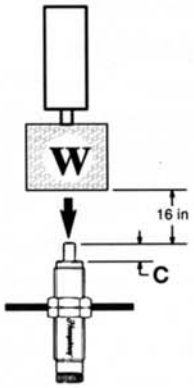
Kinetic Energy: E_1: $\frac{W \times V^2}{2g} = \frac{17 \text{ lbs} \times (0.8 \text{ ft/s})^2}{2 \times 32.2 \text{ ft/s}^2} = 0.17$ ft-lbs

Cylinder Thrust Force: $F = \frac{\pi}{4} \times D^2P = \frac{\pi}{4} \times (1.06 \text{ in})^2 \times 60 \text{ psig} = 53$ lbs

Thrust Force Energy:
$E_2 = (W + F)\, L_2 = (17 \text{ lbs} + 53 \text{ lbs}) \times 0.4 \text{ in} = 28 \text{ in-lbs} = 2.33$ ft-lbs
L_2 = Shock Absorber Stroke = 0.4 in

Total Load Energy: $E = E_1 + E_2 = 0.17$ ft-lbs + 2.33 ft-lbs = 2.5 ft-lbs

Confirm that operating cycles do not exceed 30/min and select HKSH 8 × 10.

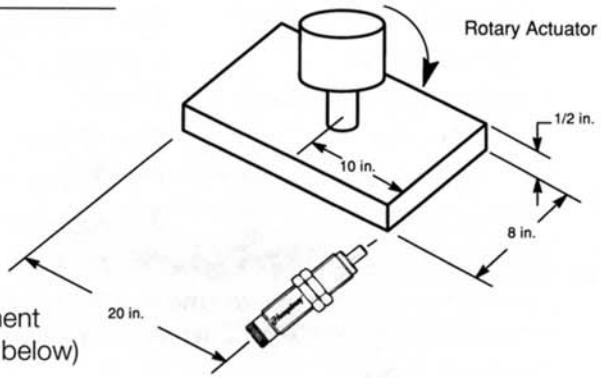


Vertical impact using cylinder

CODES		
W	Load weight	lbs
V	Load velocity at impact	ft/s
E	Total energy E_1: Kinetic energy E_2: Additional energy	ft-lbs ft-lbs ft-lbs
g	Acceleration due to gravity	32.2 ft/s^2
F	Cylinder thrust force $F = \pi/4 \times D^2 \times P^6$ D: Cylinder diameter P: Operating air pressure	lbs in psig (lb/in^2)
L_2	Shock absorber stroke	in
H	Height	in
T	Torque (Rotary)	ft-lbs
ω	Angular speed $\omega = 2\pi N/60$	rad/s
N	Rotating speed	rpm
R	Distance between rotation center and impact point	ft
B	Rotation angle $360° = 2\pi N/60$	
D	Cylinder diameter	in
t	Time	s

6. Load in Rotating Motion

Load Weight:	W = 22 lbs
Rotation Angle:	B = 90°
Rotary Actuator:	T = 3.6 ft-lbs
Distance: (Center to Impact Point)	R = 10 in
Operating Cycle:	30 cycles/min
Operating Time:	t = 1 s



Load in rotating motion

Load Inertia Moment: $I' = W/g \times (a^2 + b^2)$ (See Mass Moment of Inertia Chart below)

$a = 20 \text{ in}/12 = 1.67 \text{ ft}$

$b = 8 \text{ in}/12 = 0.67 \text{ ft}$

$$I' = \frac{W(a^2 + b^2)}{12g} = \frac{22 \text{ lbs} \times (1.67^2 + 0.67^2) \text{ ft}^2}{12 \times 32.2 \text{ ft/s}^2}$$

$$= 0.18 \text{ ft-lbs-s}^2$$

Average Angular Speed = B/t = (90°/s) (2π/360°) = π/2 rad/s

Starting from 0, impact velocity should be 2 times the average velocity.

Impact Velocity: $\omega = \pi/2 \times 2 = \pi$ rad/s

Kinetic Energy: E1: $\frac{I\omega^2}{2} = \frac{0.18 \text{ ft-lbs-s}^2 \times (\pi \text{ rad/s})^2}{2} = 0.89$ ft-lbs

Rotary Force Energy:

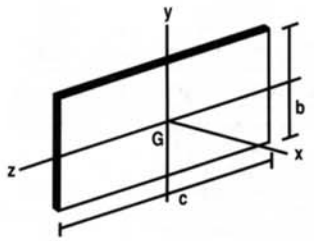
$$E_2 = \frac{TL_2}{R} = \frac{3.6 \text{ ft-lbs } (0.3/12) \text{ ft}}{(10/12) \text{ ft}} = 0.11 \text{ ft-lbs}$$

L_2 = Shock Absorber Stroke = 0.3 in

Total Energy: $E = E_1 + E_2 = 0.89 \text{ ft-lbs} + 0.11 \text{ ft-lbs} = 1.0 \text{ ft-lbs}$

Confirm that operating cycles do not exceed 60/min and select HKSHE 8 × 15.

NOTE: In this example the rotating axis and the center of gravity are the same. If the rotating center and the center of gravity are offset a distance from r', then I" = (I' + (W/g)) + r'^{2}. Calculate using I" in place of I' in the above formula.



Mass Moment of Inertia
$\frac{1}{12}$ × mass × $(b^2 + c^2)$ about the x-axis
$\frac{1}{12}$ × mass × c^2 about the y-axis
$\frac{1}{12}$ × mass × b^2 about the z-axis

CODES		
W	Load weight	lbs
V	Load velocity at impact	ft/s
E	Total energy E_1: Kinetic energy E_2: Additional energy	ft-lbs ft-lbs ft-lbs
g	Acceleration due to gravity	32.2 ft/s^2
F	Cylinder thrust force $F = \pi/4 \times D^2 \times P^6$ D: Cylinder diameter P: Operating air pressure	lbs in psig (lb/in^2)
L_2	Shock absorber stroke	in
H	Height	in
T	Torque (Rotary)	ft-lbs
ω	Angular speed $\omega = 2\pi N/60$	rad/s
N	Rotating speed	rpm
R	Distance between rotation center and impact point	ft
B	Rotation angle 360° = 2πN/60	
D	Cylinder diameter	in
t	Time	s

HUMPHREY SHOCK ABSORBERS – FLEXIBLE ABSORPTION CAPACITY

SPECIFICATIONS

Multi orifice type

Item	Model				
	HKSHE 5x8	HKSHE 6x10	HKSHE 8x15	HKSHE 10x20	HKSHE 12x22
Maximum absorption – ft·lb (kgf·m)	1.08 (0.15)	2.17 (0.3)	7.23 (1.0)	10.85 (1.5)	21.70 (3.0)
Absorption stroke – (mm)	(8)	(10)	(15)	(20)	(22)
Maximum speed impact – ft./sec. (m/s)	4.92 (1.5)				
Maximum repeatability – cycle/min.	60				
Spring return force – lb (kgf)	1.26 (0.57)	2.07 (0.94)	2.40 (1.09)	3.24 (1.47)	3.66 (1.66)
Angle variation	Less than 3°				
Temperature range – °F (°C)	32 ~ 140 (0 ~ 60)				

Single orifice type

Item	Model				
	HKSH 5x8	HKSH 6x10	HKSH 8x10	HKSH 10x15	HKSH 12x22
Maximum absorption – ft·lb (kgf·m)	1.08 (0.15)	2.17 (0.3)	4.34 (0.6)	7.23 (1.0)	18.08 (2.5)
Absorption stroke – (mm)	(8)	(10)	(10)	(15)	(22)
Maximum speed impact – ft./sec. (m/s)	3.28 (1.0)				
Maximum repeatability – cycle/min.	30				
Spring return force – lb (kgf)	1.26 (0.57)	2.07 (0.94)	3.53 (1.60)	3.73 (1.69)	8.33 (3.78)
Angle variation	Less than 3°				
Temperature range – °F (°C)	32 ~ 140 (0 ~ 60)				

WEIGHT oz. (gf)

Models	Items				
	Body weight	Added weight			
		Side mount bracket	Flange mount bracket	Stopper nuts	With cap
HKSHE 5x8, HKSH 5x8	0.9 (24)	0.5 (15)	0.6 (16)	0.3 (7)	0.04 (1)
HKSHE 6x10, HKSH 6x10	1.5 (43)	0.8 (22)	0.5 (15)	0.3 (8)	0.04 (1)
HKSH 8x10	3.2 (90)	2.4 (68)	1.0 (28)	0.7 (19)	0.07 (2)
HKSHE 8x15	3.6 (102)				0.14 (4)
HKSH 10x15	4.6 (130)	3.9 (110)	2.0 (57)	1.2 (34)	0.14 (4)
HKSHE 10x20	5.1 (144)				0.18 (5)
HKSHE 12x22	6.8 (192)	5.0 (140)	1.9 (54)	1.6 (46)	0.28 (8)
HKSH 12x22	7.1 (200)				0.21 (6)

ORDER EXAMPLE

HKSHE **8 × 15** □ – □ – □

Stopper nut
Blank — No nut
S — With nut

Mounting
Blank — Nose mount
2 — Side mount
3 — Flange mount

Rod End
Blank — No rod end cap
C — With cap

Shock Absorber Model

	Nominal Bore Size	Actual Bore Size × Stroke in. (mm)
HKSHE — Multi Orifice	3/16"	0.197 (5) ×0.315 (8)
	1/4"	0.236 (6) × 0.394 (10)
	5/16"	0.315 (8) × 0.591 (15)
	3/8"	0.394 (10) × 0.787 (20)
	1/2"	0.472 (12) × 0.866 (22)
HKSH — Single Orifice	3/16"	0.197 (5) × 0.315 (8)
	1/4"	0.236 (6) × 0.394 (10)
	5/16"	0.315 (8) × 0.394 (10)
	3/8"	0.394 (10) × 0.591 (15)
	1/2"	0.472 (12) × 0.866 (22)

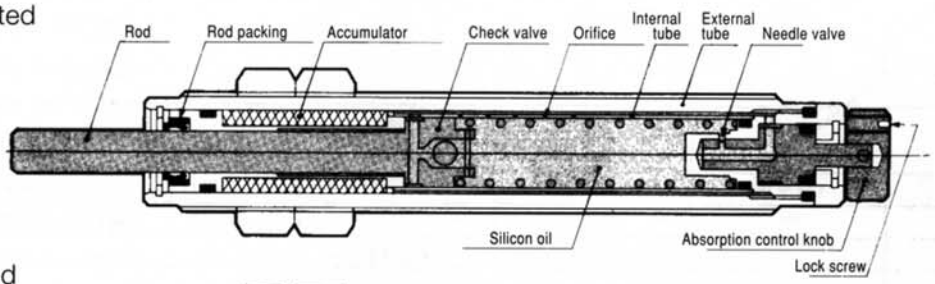
Nose mount shipped with two mounting nuts.

PART NAMES AND INTERNAL CONFIGURATION

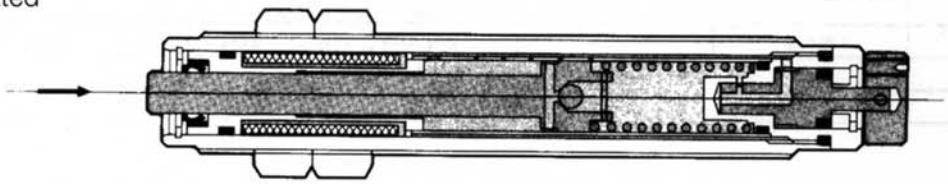
Multi orifice type

HKSHE

Inactivated



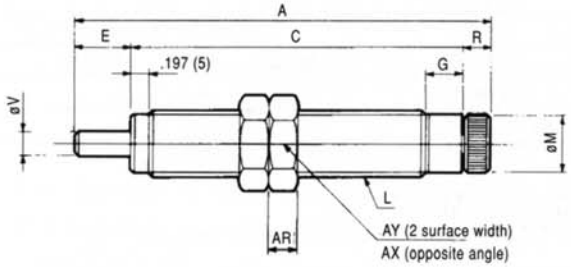
Activated



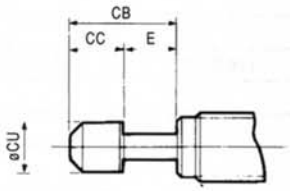
DIMENSIONS

Nose mount

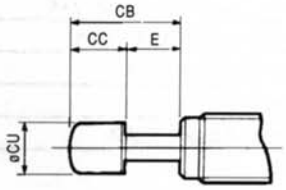
HKSHE□ × □, HKSH□ × □



HKSHE□ × □C



HKSH□ × □C



Models	Item – in. (mm)						
	A	C	E	G	L	M	R
HKSHE 5x8□, HKSH 5x8□NOTE	2.697 (68.5)	2.165 (55)	0.315 (8)	0.157 (4)	M10x1	0.354 (9)	0.217 (5.5)
HKSHE 6x10□, HKSH 6x10□NOTE	3.091 (78.5)	2.402 (61)	0.394 (10)	0.394 (10)	M12x1	0.433 (11)	0.295 (7.5)
HKSH 8x10□NOTE	3.642 (92.5)	2.953 (75)	0.394 (10)	0.394 (10)	M16x1.5	0.512 (13)	0.295 (7.5)
HKSHE 8x15□	4.016 (102)	3.130 (79.5)	0.591 (15)	0.394 (10)	M16x1.5	0.512 (13)	0.295 (7.5)
HKSH 10x15□NOTE	4.508 (114.5)	3.622 (92)	0.591 (15)	0.394 (10)	M18x1.5	0.591 (15)	0.295 (7.5)
HKSHE 10x20□	4.528 (115)	3.465 (88)	0.787 (20)	0.394 (10)	M18x1.5	0.591 (15)	0.276 (7)
HKSHE 12x22□	4.724 (120)	3.583 (91)	0.866 (22)	0.394 (10)	M20x1.5	0.669 (17)	0.276 (7)
HKSH 12x22□NOTE	5.807 (147.5)	4.646 (118)	0.866 (22)	0.394 (10)	M20x1.5	0.669 (17)	0.295 (7.5)

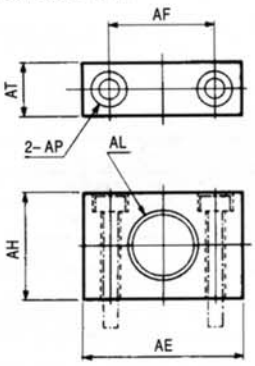
Models	Item – in. (mm)						
	V	AR	AX	AY	CB	CC	CU
HKSHE 5x8□, HKSH 5x8□NOTE	0.118 (3)	0.118 (3)	0.547 (13.9)	0.472 (12)	0.630 (16)	0.315 (8)	0.315 (8)
HKSHE 6x10□, HKSH 6x10□NOTE	0.118 (3)	0.157 (4)	0.638 (16.2)	0.551 (14)	0.787 (20)	0.394 (10)	0.394 (10)
HKSH 8x10□NOTE	0.197 (5)	0.276 (7)	0.862 (21.9)	0.748 (19)	0.984 (25)	0.591 (15)	0.472 (12)
HKSHE 8x15□	0.197 (5)	0.276 (7)	0.862 (21.9)	0.748 (19)	1.201 (30.5)	0.610 (15.5)	0.512 (13)
HKSH 10x15□NOTE	0.236 (6)	0.315 (8)	1.000 (25.4)	0.866 (22)	1.181 (30)	0.591 (15)	0.551 (14)
HKSHE 10x20□	0.197 (5)	0.315 (8)	1.000 (25.4)	0.866 (22)	1.398 (35.5)	0.610 (15.5)	0.591 (15)
HKSHE 12x22□	0.197 (5)	0.394 (10)	1.091 (27.7)	0.945 (24)	1.575 (40)	0.709 (18)	0.630 (16)
HKSH 12x22□NOTE	0.236 (6)	0.394 (10)	1.091 (27.7)	0.945 (24)	1.575 (40)	0.709 (18)	0.630 (16)

NOTE: Model HKSH is single orifice only.

MOUNTING BRACKET DIMENSIONS

Side mount bracket

Order code is 2

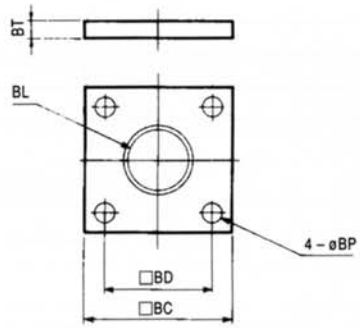


Model	Item – in. (mm)			
	AE	AF	AH	AL
HKSHE 5x8□, HKSH 5x8□	0.866 (22)	0.551 (14)	0.551 (14)	M10x1 counterbore: ø10.2, depth: 2
HKSHE 6x10□, HKSH 6x10□	0.984 (25)	0.630 (16)	0.709 (18)	M12x1 counterbore: ø12.2, depth: 2
HKSHE 8x15□, HKSH 8x10□	1.496 (38)	0.984 (25)	0.984 (25)	M16x1.5
HKSHE 10x20□, HKSH 10x15□	1.969 (50)	1.339 (34)	1.181 (30)	M18x1.5
HKSHE 12x22□, HKSH 12x22□	1.969 (50)	1.339 (34)	1.181 (30)	M20x1.5

Model	Item – in. (mm)	
	AP	AT
HKSHE 5x8□, HKSH 5x8□	ø3.4, counterbore: ø6.2, depth: 3.3	0.354 (9)
HKSHE 6x10□, HKSH 6x10□	ø3.4, counterbore: ø6.2, depth: 3.3	0.354 (9)
HKSHE 8x15□, HKSH 8x10□	ø4.5, counterbore: ø8.0, depth: 4.4	0.472 (12)
HKSHE 10x20□, HKSH 10x15□	ø6.5, counterbore: ø11, depth: 6.5	0.472 (12)
HKSHE 12x22□, HKSH 12x22□	ø9, counterbore: ø14, depth: 8.6	0.630 (16)

Flange mount bracket

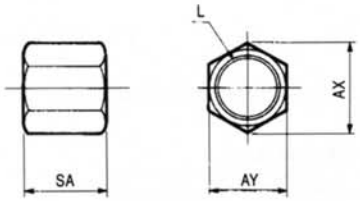
Order code is 3



Model	Item – in. (mm)				
	BC	BD	BL	BP	BT
HKSHE 5x8□, HKSH 5x8□	0.984 (25)	0.709 (18)	M10x1 counterbore: ø10.2, depth: 1.7	0.126 (3.2)	0.157 (4)
HKSHE 6x10□, HKSH 6x10□	0.984 (25)	0.709 (18)	M12x1 counterbore: ø12.2, depth: 1.7	0.126 (3.2)	0.157 (4)
HKSHE 8x15□, HKSH 8x10□	1.339 (34)	0.945 (24)	M16x1.5	0.177 (4.5)	0.157 (4)
HKSHE 10x20□, HKSH 10x15□	1.575 (40)	1.102 (28)	M18x1.5	0.256 (6.5)	0.236 (6)
HKSHE 12x22□, HKSH 12x22□	1.575 (40)	1.102 (28)	M20x1.5	0.256 (6.5)	0.236 (6)

Stopper nuts

Order code is S



Model	Item – in. (mm)			
	L	AX	AY	SA
HKSHE 5x8, HKSH 5x8	M10x1	0.547 (13.9)	0.472 (12)	0.669 (17)
HKSHE 5x8C, HKSH 5x8C				
HKSHE 6x10, HKSH 6x10	M12x1	0.638 (16.2)	0.551 (14)	0.669 (17)
HKSHE 6x10C, HKSH 6x10C				0.984 (25)
HKSHE 8x15, HKSH 8x10	M16x1.5	0.862 (21.9)	0.748 (19)	0.787 (20)
HKSHE 8x15C, HKSH 8x10C				1.260 (32)
HKSHE 10x20, HKSH 10x15	M18x1.5	1.000 (25.4)	0.866 (22)	0.984 (25)
HKSHE 10x20C, HKSH 10x15C				1.457 (37)
HKSHE 12x22, HKSH 12x22	M20x1.5	1.091 (27.7)	0.945 (24)	1.181 (30)
HKSHE 12x22C, HKSH 12x22C				1.772 (45)

HUMPHREY SHOCK ABSORBERS – FIXED ABSORPTION CAPACITY

SPECIFICATIONS

HKSHA Series

Item	Model			
	HKSHA 6x5□-A	HKSHA 6x5□-B	HKSHA 6x5□-D	HKSHA 6x5□-DE
Maximum absorption – ft·lb (kgf·m)	0.07 (0.01)	0.22 (0.03)	0.72 (0.10)	1.08 (0.15)
Absorption stroke – (mm)	(5)			
Maximum speed impact – ft./sec. (m/s)	3.28 (1.0)			
Maximum repeatability – cycle/min.	60			
Spring return force – lb (kgf)	0.90 (0.41)			
Angle variation	Less than 1°			
Temperature range – °F (°C)	32 ~ 140 (0 ~ 60)			

Item	Model				
	HKSHA 6x8□-D	HKSHA 6x8□-E	HKSHA 6x8□-F	HKSHA 7x8□-G	HKSHA 7x8□-K
Maximum absorption – ft·lb (kgf·m)	0.72 (0.1)	1.45 (0.2)	2.17 (0.3)	2.89 (0.4)	4.34 (0.6)
Absorption stroke – (mm)	(8)				
Maximum speed impact – ft./sec. (m/s)	3.28 (1.0)				
Maximum repeatability – cycle/min.	30				
Spring return force – lb (kgf)	1.46 (0.66)				
Angle variation	Less than 3°				
Temperature range – °F (°C)	32 ~ 140 (0 ~ 60)				

WEIGHT

oz. (gf)

Model	Body weight		Added weight			
	Nose mount	Insert mount	Side mount bracket	Flange mount bracket	Stopper nuts	With cap
HKSHA 6x5	0.4 (10)	–	0.5 (15)	0.6 (16)	0.3 (7)	0.04 (1)
HKSHA 6x8	0.7 (20)	0.7 (20)	0.5 (15)	0.6 (16)	0.3 (7)	0.04 (1)
HKSHA 7x8	1.0 (28)	1.0 (28)	0.8 (22)	0.5 (15)	0.3 (8)	0.04 (1)

ORDER EXAMPLE

HKSHA **6 × 8** □ – □ – □ – □ – □

Shock Absorber Model

Nominal Bore Size / **Actual Bore Size × Stroke in. (mm)**

- 1/4" — 0.236 (6) × 0.197 (5)
- 1/4" — 0.236 (6) × 0.315 (8)
- 5/16" — 0.276 (7) × 0.315 (8)

Rod end

Blank — No rod end cap
C — With cap

Mounting

Blank — Nose mount
X — Insert mount (not for HKSHA 6 × 5)

Absorption capacity ft·lb (kgf·m)

- **A** — 0.07 (0.01)
- **B** — 0.22 (0.03)
- **D** — 0.72 (0.1)
- **DE** — 1.08 (0.15)
- **D** — 0.72 (0.1)
- **E** — 1.45 (0.2)
- **F** — 2.17 (0.3)
- **G** — 2.89 (0.4)
- **K** — 4.34 (0.6)

Mounting bracket

Blank — No bracket
2 — Side mount
3 — Flange mount

Nose mount shipped with two mounting nuts.
Insert mount shipped with one mounting nut.

Stopper nut

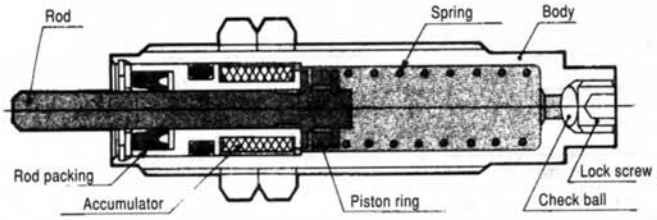
Blank — No nut
S — With nut

Cannot be used on insert mount.

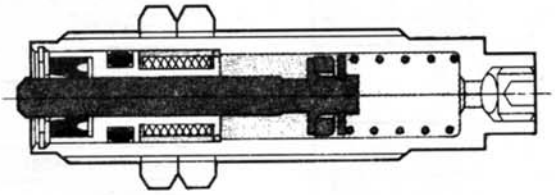
PART NAMES AND INTERNAL CONFIGURATION

Single orifice type

Inactivated



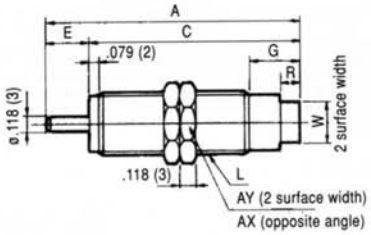
Activated



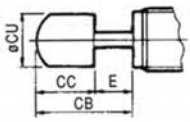
DIMENSIONS

Nose mount

HKSHA□ × □



HKSHA□ × □C

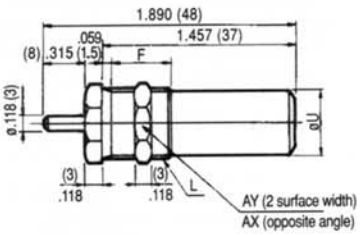


Models	Item – in. (mm)						
	A	C	E	G	L	R	W
HKSHA 6x5□	1.201 (30.5)	1.004 (25.5)	0.197 (5)	0.276 (7)	M10x1	0.138 (3.5)	0.236 (6)
HKSHA 6x8□	1.890 (48)	1.575 (40)	0.315 (8)	0.394 (10)	M10x1	0.157 (4)	0.236 (6)
HKSHA 7x8□	1.890 (48)	1.575 (40)	0.315 (8)	0.394 (10)	M12x1	0.157 (4)	0.315 (8)

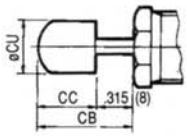
Models	Item – in. (mm)				
	AX	AY	CB	CC	CU
HKSHA 6x5□	0.547 (13.9)	0.472 (12)	0.512 (13)	0.315 (8)	0.315 (8)
HKSHA 6x8□	0.547 (13.9)	0.472 (12)	0.630 (16)	0.315 (8)	0.315 (8)
HKSHA 7x8□	0.638 (16.2)	0.551 (14)	0.709 (18)	0.394 (10)	0.394 (10)

Insert mount

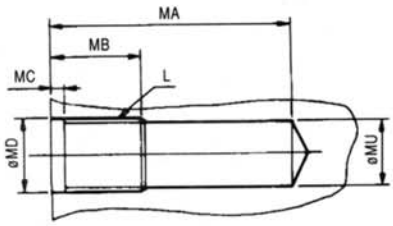
HKSHA□ × □ – X (Without cap)



HKSHA□ × □ – X (With cap)



Insert mount mounting hole



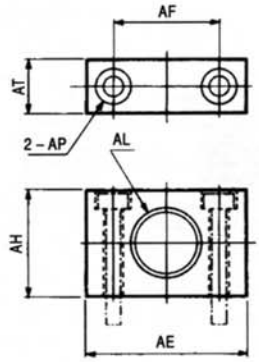
Models	Item – in. (mm)							
	F	L	U	AX	AY	CB	CC	CU
HKSHA 6x8□ -X	0.143 (10.5)	M10x1	0.335 (8.5)	0.547 (13.9)	0.472 (12)	0.630 (16)	0.315 (8)	0.315 (8)
HKSHA 7x8□ -X	0.492 (12.5)	M12x1	0.413 (10.5)	0.638 (16.2)	0.551 (14)	0.709 (18)	0.394 (10)	0.394 (10)

Models	Item – in. (mm)				
	MA	MB	MC	MD	MU
HKSHA 6x8□ -X	over 1.496 (38)	over 0.512 (13)	0.079 (2)	$0.394^{+0.020}_{+0.004}$ ($10^{+0.5}_{+0.1}$)	0.354 (9)
HKSHA 7x8□ -X	over 1.496 (38)	over 0.512 (13)	0.079 (2)	$0.472^{+0.020}_{+0.004}$ ($12^{+0.5}_{+0.1}$)	0.433 (11)

MOUNTING BRACKET DIMENSIONS

Side mount bracket

Order code is 2

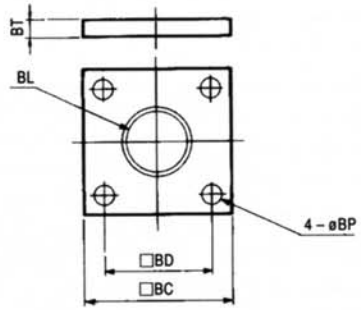


Model	Item – in. (mm)			
	AE	AF	AH	AL
HKSHA 6x5☐, HKSHA 6x8☐	0.866 (22)	0.551 (14)	0.551 (14)	M10x1 counterbore: ø10.2, depth: 2
HKSHA 7x8☐	0.984 (25)	0.630 (16)	0.709 (18)	M12x1 counterbore: ø12.2, depth: 2

Model	Item – in. (mm)	
	AP	AT
HKSHA 6x5☐, HKSHA 6x8☐	ø3.4, counterbore: ø6.2, depth: 3.3	0.354 (9)
HKSHA 7x8☐	ø3.4, counterbore: ø6.2, depth: 3.3	0.354 (9)

Flange mount bracket

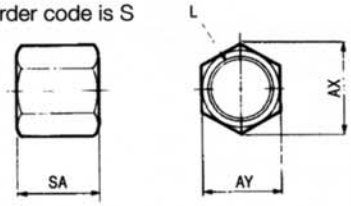
Order code is 3



Model	Item – in. (mm)				
	BC	BD	BL	BP	BT
HKSHA 6x5☐, HKSHA 6x8☐	0.984 (25)	0.709 (18)	M10x1 counterbore: ø10.2, depth: 1.7	0.126 (3.2)	0.157 (4)
HKSHA 7x8☐	0.984 (25)	0.709 (18)	M12x1 counterbore: ø12.2, depth: 1.7	0.126 (3.2)	0.157 (4)

Stopper nuts

Order code is S



Model	Item – in. (mm)			
	L	AX	AY	SA
HKSHA 6x5	M10x1	0.547 (13.9)	0.472 (12)	0.315 (8)
HKSHA 6x5C, HKSHA 6x8☐	M10x1	0.547 (13.9)	0.472 (12)	0.669 (17)
HKSHA 7x8☐	M12x1	0.638 (16.2)	0.551 (14)	0.669 (17)

INSTALLATION AND PRECAUTIONS

REGULATING SHOCK ABSORPTION CAPACITY

HKSHE SERIES/HKSH SERIES: FLEXIBLE ABSORPTION CAPACITY

1. Turn the shock-absorbing capacity adjusting knob so that the white mark on the knob is between 2 and 3.

2. When the shock is too great at end of stroke, turn adjusting knob toward 6. When the shock is mild and the rod stops before the preset stroke end, turn the adjusting knob toward 0.

3. After completing adjustment, set knob by tightening lock screw.

4. HKSHE Series is self-regulating (biggest shock absorbed at stroke end). Operate using full stroke.

HKSHA SERIES: FIXED ABSORPTION CAPACITY

Absorption capacity cannot be adjusted. Select model with desired absorption capacity. Refer Shock Absorber Selection Guide in this catalog.

INSTALLATION

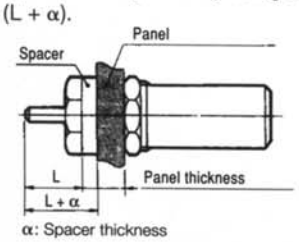
1. Install shock absorber so rod is horizontal or straight up. If shock absorber is mounted with rod facing down, operational life may be shortened.

2. Protect shock absorbers when used in contaminated conditions such as excessive dust or where exposed to water or oil particles. Penetration of this material may adversely affect operation.

INSTALLING HKSHA ☐ x ☐ ☐ -X

1. Adjustment of the rod tip position after installation of an insert type shock absorber is not required when referencing from the inside face of the hex head (dimension L).

The rod tip can be adjusted by using a spacer (L + α).



α: Spacer thickness

2. See Insert Mount Mounting Hole Dimension Chart in this catalog for mounting hole dimensions.

3. Refer to the following chart for maximum panel thickness when panel mounting.

in. (mm)

Shock absorber model	Maximum panel thickness
HKSHA 6x8 ☐ - X	0.315 (8)
HKSHA 7x8 ☐ - X	0.394 (10)

CAUTION

1. Avoid off-center loads on the shock absorber. Off-center loading may break or bend rod.

2. Do not attempt to increase the shock absorbing capacity by installing two or more shock absorbers in parallel. Use larger capacity shock absorber.

HKSHA SERIES: FIXED ABSORPTION CAPACITY

1. Do not use the end of the shock absorber as a stopper. Use stopper nut (Code -S) or external stopper (except Insert Mount).

2. When using stopper nut, adjust so that stopper nut protrudes at least .020 in. (0.5mm) HKSHE Series and .039 in. (1mm) – .059 (1.5mm) HKSH Series past the shock absorber body end face.

3. When the direction of impact varies, the direction must be below 1° of the rod axis for HKSHA 6x5☐ and below 3° of the rod axis for other models.

4. Do not loosen or remove lock screw at the end of the shock absorber. Oil will leak out and shock absorber will fail.