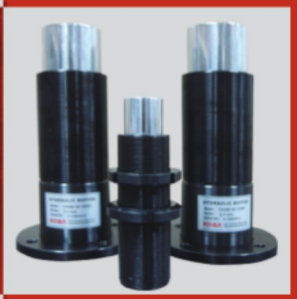
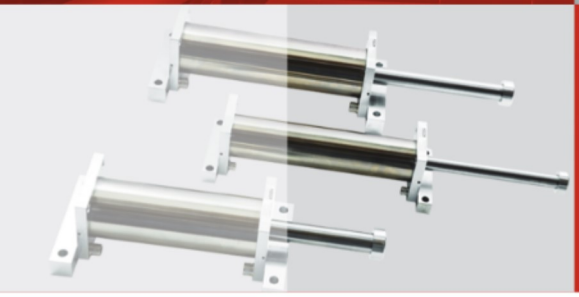
# Hydraulic
# Shock Absorber
# Buffer

Softly
Safely
Smoothly





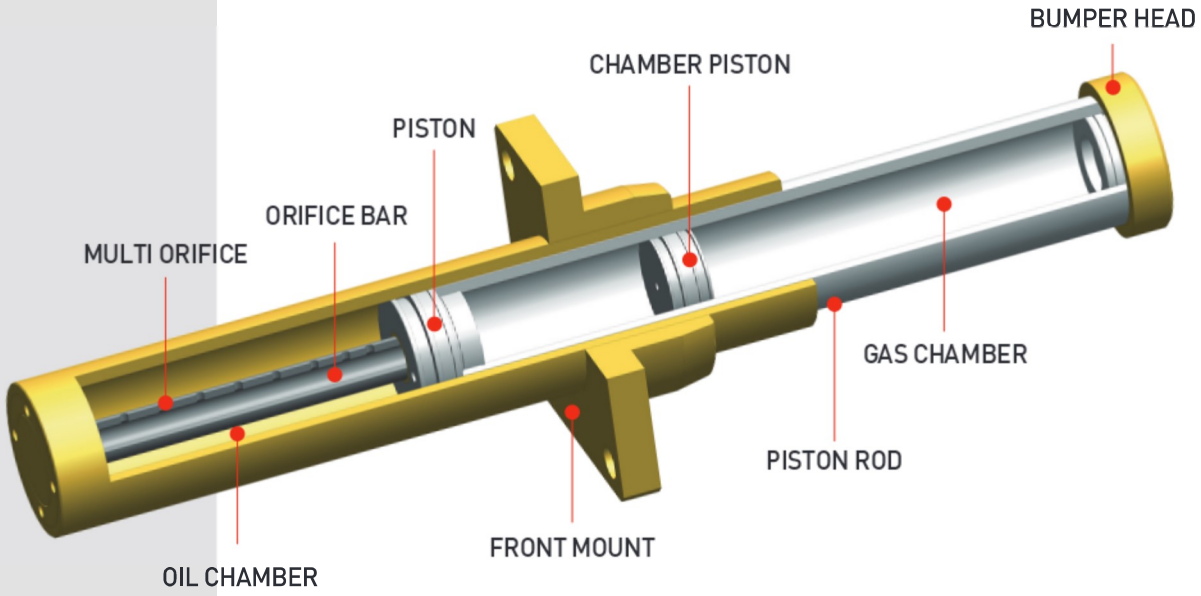
KOBA
Best Energy Absorption
www.kobapage.com

# KHG Series
## Hydraulic Buffer

KOBA
Best Energy Absorption

*KHG Series for heavy industries*

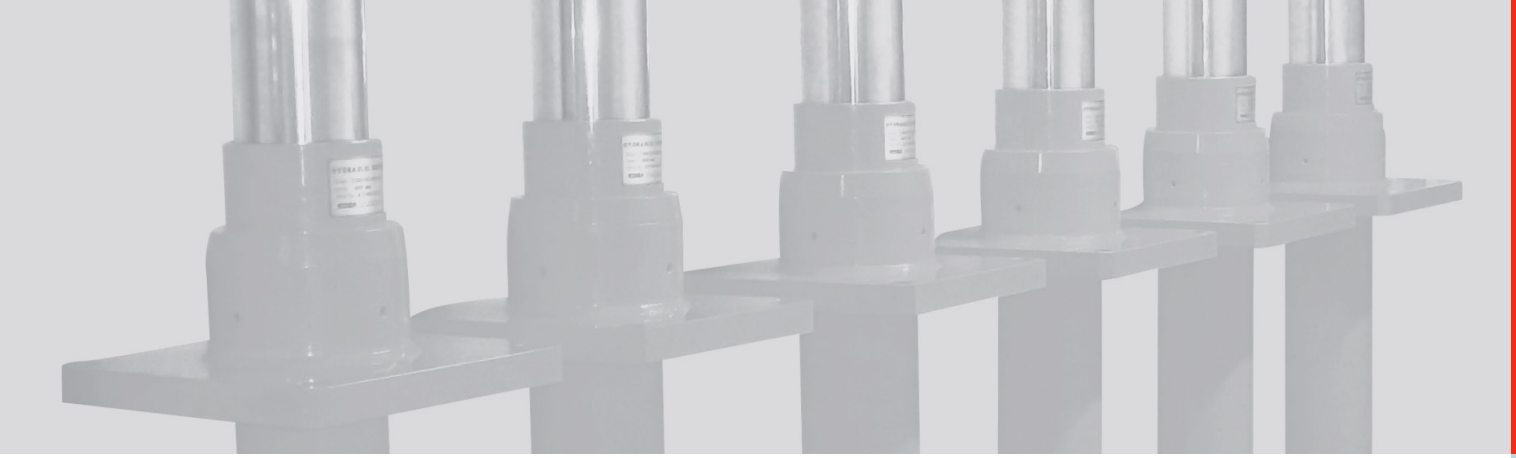
*When the moving load is collided to bumper head, the piston rod enters inner tube according to stroke and check valve is closed with the oil chamber compressed. The oil in chamber is absorbed the impact force by discharging through multiple orifice. Also piston rod inside body makes the oil push chamber piston to compress gas chamber according to stroke so the oil mutually interacts with nitrogen gas to absorb shock efficiently and smoothly. After absorption of impact force, compressed gas chamber deliver the force to oil chamber and the check valve open so the piston rod is return.*



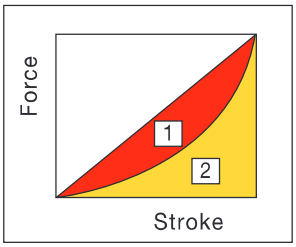

## Characteristic

KHG buffer safely protect heavy machinery and equipment during transfer of heavy loads. The high-capcity buffer are individually designed to decelerate moving loads under various conditions in compliance with industry mandated standards.

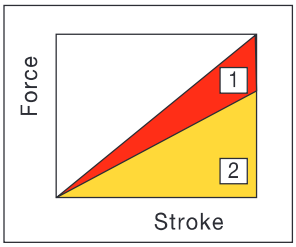
- Compact design for low installation space with highest energy absorption capcity up to 500 kNm
- Double damping technology : Oil + Nitrogen Gas
- Temperature range (-10~80℃), Special (-30~100℃)
- Return of piston rod : internal Nitrogen Gas chamber
- Piston Rod : Hard Chrome( over 25㎛)
- Body : Epoxy Paint Coatings
- Aplication : harbour cranes, rail industry, emergency stop heavy mass



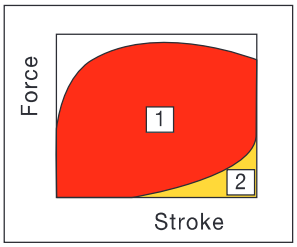
## Comparision Damping




Rubber Damping
1. Low damping
2. High spring



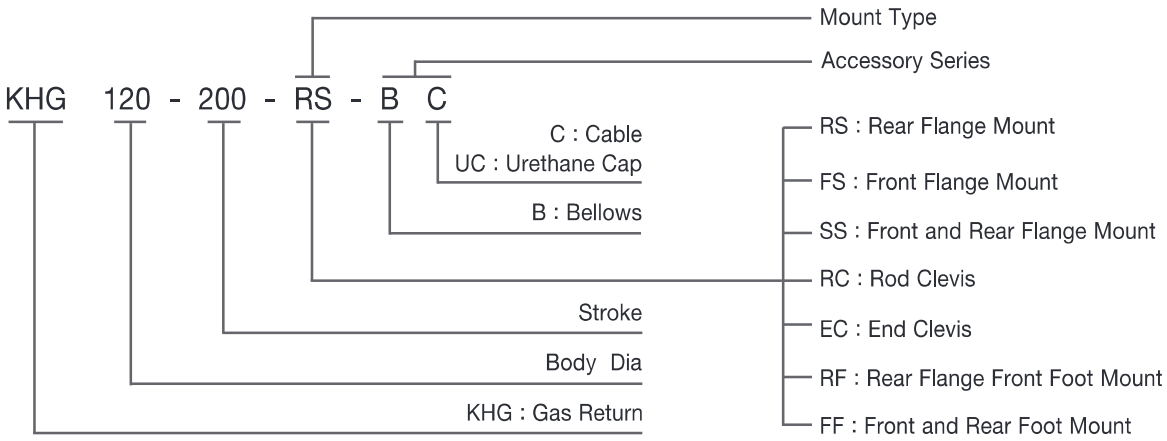

Spring Damping
1. Low damping
2. High spring




Hydraulic Buffer
1. Maximum damping
2. Low gas spring

absorption
force

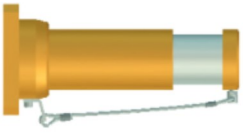
## KHG Series Ordering Information



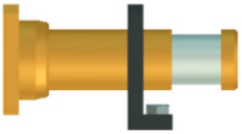

## Accessory

Bellows Cover

Clevis Mounting



Front & Rear Safety Cable



Rear Mount + Front Foot Mount

## Special Order

- Temperature : -30~100℃
- Special Coatings
- Body Chrome Plating
- Stainless Steel
- Special Head

## Formulae for selection model of Shock Absorber

### 1. Symbols

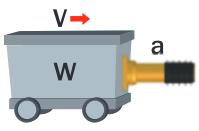
| Symbol | Unit | Description |
|---|---|---|
| $E_K$ | kJ | Kinetic Energy |
| $E_W$ | kJ | Work Energy |
| $E_T$ | kJ | Total Energy |
| $E_TC$ | kJ/h | Total Energy Absorbed Per Hour |
| $F_S$ | kN | Maximum Buffer Force |
| V | m/s | Impact Velocity |
| $V_E$ | m/s | Effective Velocity |
| S | m | Buffer Stroke |
| $S_D$ | $m/s^2$ | Deceleration |
| C | Cycle/h | Cycle Per Hour |
| H | m | Drop Height |
| p | bar | Operation Pressure |
| P | kW | Motor Power |
| g | $m/s^2(9.8m/s^2)$ | Accelleration |
| n | - | Min. Efficiency |

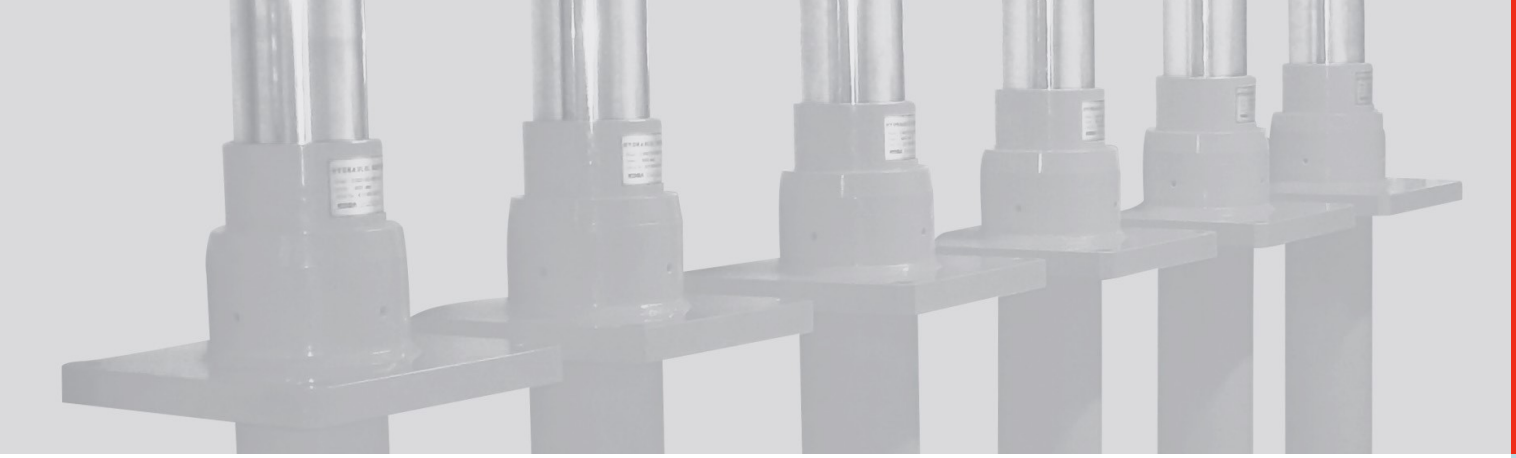
▪ 1kgf = 9.81N , 1Nm = 1J , 1MPa = 10bar = 10.2kg/$cm^2$ , 1g = 9.8m/$s^2$

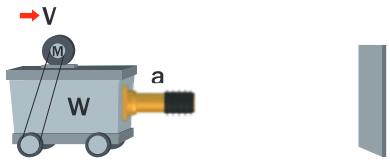
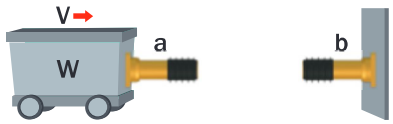
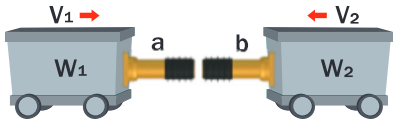
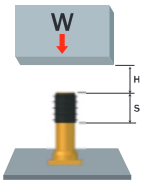
### 2. Formula

$$E_K = \frac{W \cdot V^2}{2} \quad E_TC = E_T \cdot C \quad E_T = E_K + E_W \quad E_W = F \times S \quad F_M = \frac{E_K}{S \cdot 0.8} \quad S_D = \frac{V_E^2}{2 \cdot S \cdot 0.8} \quad S \geq \frac{V^2}{2 \cdot S_D \cdot 0.8}$$

### 3. Calculation examples

| Moving Weight | Example | Buffer Model | |
|---|---|---|---|
| a) V=0.6m/s W=80 ton   | $E_K = \frac{W \cdot V^2}{2} = \frac{80 \times 0.6^2}{2} = 14.4kJ$<br>$E_T = E_K$<br>$F_S = \frac{E_T}{S \cdot 0.8} = \frac{14.4}{0.15 \times 0.8} = 120kN$<br>$V_E = 0$<br>$S_D = \frac{V^2}{2 \cdot S \cdot 0.8} = \frac{0.6^2}{2 \times 0.15 \times 0.8} = 1.5m/s^2$<br>$S = \frac{V^2}{2 \cdot S_D \cdot 0.8} = \frac{0.6^2}{2 \times 1.5 \times 0.8} = 0.15m = 150mm$ | pre-selected | KHG85-150<br>Stroke : 150 |
| | | final selection | KHG85-150 |

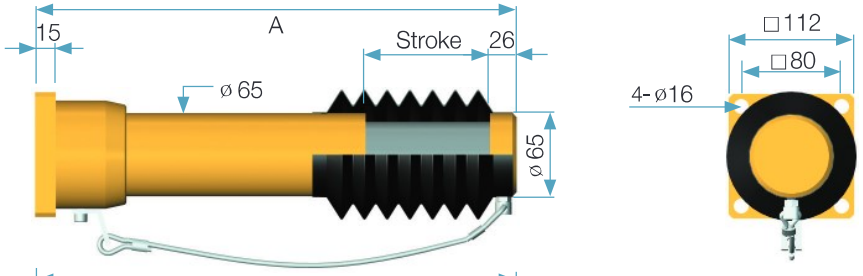


| Moving Weight | Example | Buffer Model | |
|---|---|---|---|
| b)<br>V =1.2m/s<br>W=200 ton<br>P =20kW<br>  | $E_K = \frac{W \cdot V^2}{2} = \frac{200 \times 1.2^2}{2} = 144kJ$<br>$F = \frac{2.5 \cdot P}{V} = \frac{2.5 \times 20}{1.2} = 41.7kN$<br>$E_W = F \cdot S = 41.7 \times 0.3 = 12.5kJ$<br>$E_T = E_K + E_W = 144 + 12.5 = 156.5kJ$<br>$F_S = \frac{E_T}{S \cdot 0.8} = \frac{156.5}{0.3 \times 0.8} = 652kN$ | pre-selected | KHG140-300<br>Stroke : 300 |
| | | final selection | KHG140-300 |
| c)<br>V =1.8m/s<br>W=150 ton<br>  | $E_K = \frac{0.5 \cdot W \cdot V^2}{2} = \frac{0.5 \cdot 150 \cdot 1.8^2}{2} = 121.5kJ$<br>$E_T = E_K$<br>$F_S = \frac{E_T}{S \cdot 0.8} = \frac{121.5}{0.4 \times 0.8} = 379.69\,kN$<br>$V_E = \frac{V}{2} = \frac{1.8}{2} = 0.9m/s$<br>$S_D = \frac{V_E^2}{2 \cdot S \cdot 0.8} = \frac{0.9^2}{2 \times 0.4 \times 0.8} = 1.27m/s^2$ | pre-selected | KHG130-400<br>Stroke : 400 |
| | | final selection | KHG130-400 |
| d)<br>$V_1$=1.0m/s<br>$W_1$=180 ton<br>$V_2$=0.6m/s<br>$W_2$=250 ton<br>  | $E_K = \frac{W_1 \cdot W_2(V_1 + V_2^2)}{2(W_1 + W_2)} = \frac{180 \times 250(0.1 + 0.6)^2}{2(180 + 250)} = 133.95kJ$<br>$E_T = E_K$<br>$F_S = \frac{E_T}{S \cdot 0.8} = \frac{133.95}{0.5 \times 0.8} = 334.88\,kN$<br>$V_E = V_1 + V_2 = 1.0 + 0.6 = 1.6m/s$<br>$S_D = \frac{V_E^2}{2 \cdot S \cdot 0.8} = \frac{1.6^2}{2 \times 0.5 \times 0.8} = 3.2m/s^2$ | pre-selected | KHG120-500<br>Stroke : 500 |
| | | final selection | KHG120-500 |
| e)<br>$V_1$=1m/s<br>$W_1$=220 ton<br>$V_2$=0.7m/s<br>$W_2$=260 ton<br>  | $E_K = \frac{W_1 \cdot W_2(V_1 + V_2)^2}{4(W_1 + W_2)} = \frac{220 \times 260(1 + 0.7)^2}{4(220 + 260)} = 86kJ$<br>$E_T = E_K$<br>$F_S = \frac{E_T}{S \cdot 0.8} = \frac{86}{0.25 \times 0.8} = 430.49\,kN$<br>$V_E = \frac{V_1 + V_2}{2} = \frac{1 + 0.7}{2} = 0.85m/s$<br>$S_D = \frac{V_E^2}{2 \cdot S \cdot 0.8} = \frac{0.85^2}{2 \times 0.25 \times 0.8} = 1.806m/s^2$ | pre-selected | KHG120-250<br>Stroke : 250 |
| | | final selection | KHG120-250 |
| f)<br>W=2.5 ton<br>H =0.4m<br>  | $E_K = g \cdot W \cdot H = 9.81 \times 2.5 \times 0.4 = 9.81kJ$<br>$E_W = W \cdot g \cdot S = 2.5 \times 9.81 \times 0.15 = 3.67kJ$<br>$E_T = E_K + E_W = 9.81 + 3.67 = 13.48kJ$<br>$V = \sqrt{2 \cdot g \cdot H} = \sqrt{2 \times 9.81 \times 0.4} = 2.8m/s$<br>$F_S = \frac{E_T}{S \cdot 0.8} = \frac{13.48}{0.15 \times 0.8} = 112.33kN$ | pre-selected | KHG85-150<br>Stroke : 150 |
| | | final selection | KHG85-150 |

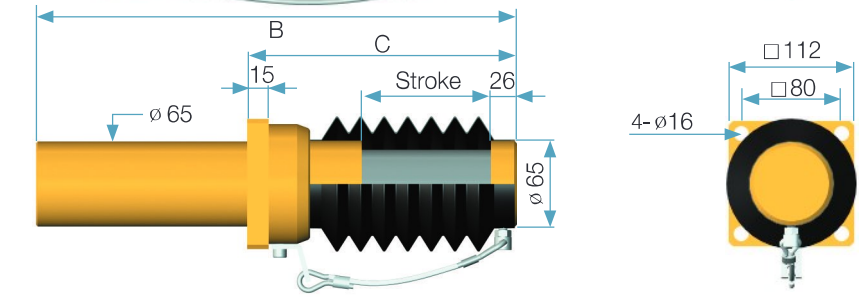
## KHG 65 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG65-25 | 25 | 2 | 100 | 100 | | 3.2 | 3.5 | 3.5 | 6 |
| -50 | 50 | 4 | 200 | 100 | | 4.7 | 3.5 | 3.5 | 7 |
| -75 | 75 | 6 | 300 | 100 | | 5.3 | 3 | 3 | 8 |
| -100 | 100 | 8 | 400 | 100 | 1.0 | 6.6 | 3 | 3 | 9 |
| -125 | 125 | 10 | 500 | 100 | | 6.6 | 2.5 | 2.5 | 10 |
| -150 | 150 | 12 | 600 | 100 | | 6.6 | 2 | 2 | 11 |
| -200 | 200 | 16 | 800 | 100 | | 9.0 | 2 | 2 | 12 |

Rear Mount

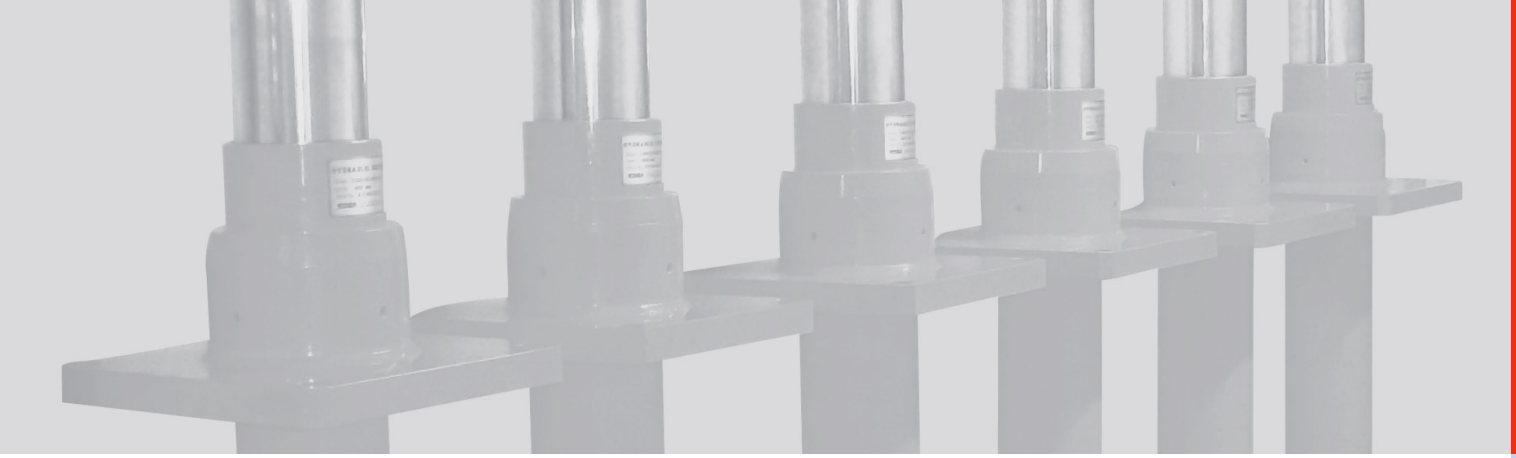



Front Mount




## Dimensions (unit : mm)

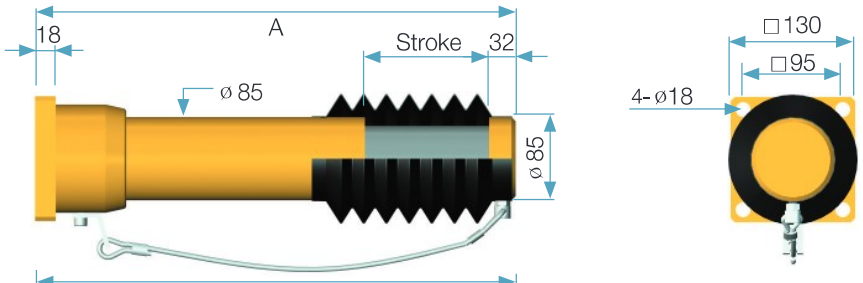
| Model | Stroke (mm) S | Rear Type A | Front Type B | Front Type C | Mounting Bolt Size |
|---|---|---|---|---|---|
| KHG65-25 | 25 | 262 | 250 | 126 | |
| -50 | 50 | 312 | 300 | 151 | |
| -75 | 75 | 372 | 360 | 176 | |
| -100 | 100 | 432 | 420 | 231 | 14 |
| -125 | 125 | 497 | 485 | 256 | |
| -150 | 150 | 552 | 540 | 281 | |
| -200 | 200 | 682 | 670 | 371 | |



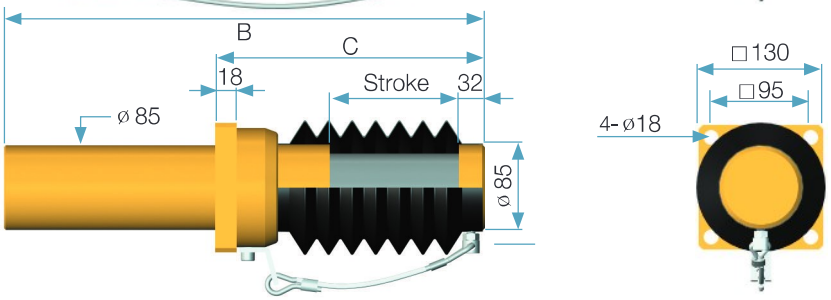
## KHG 85 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG85-50 | 50 | 8 | 600 | 200 | 1.5 | 10 | 4 | 3.5 | 12 |
| -100 | 100 | 16 | 1,200 | 200 | | 13 | 3 | 3 | 15 |
| -150 | 150 | 24 | 1,800 | 200 | | 17 | 2 | 2 | 18 |
| -200 | 200 | 32 | 2,400 | 200 | | 19 | 1.8 | 1.5 | 20 |
| -250 | 250 | 40 | 2,850 | 200 | | 20 | 1.5 | 1.2 | 22 |

Rear Mount




Front Mount



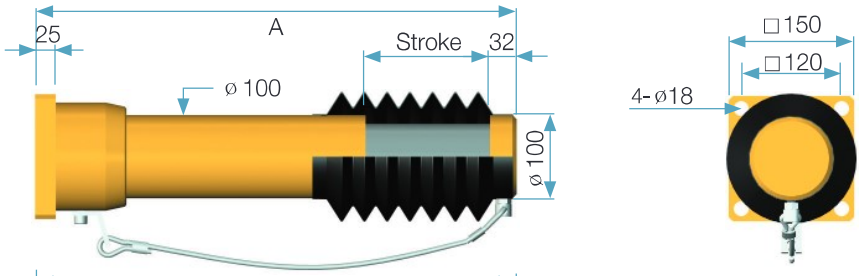

## Dimensions (unit : mm)

| Model | Stroke (mm) S | Rear Type | Front Type | | Mounting Bolt Size |
|---|---|---|---|---|---|
| | | A | B | C | |
| KHG85-50 | 50 | 323 | 310 | 183 | 16 |
| -100 | 100 | 463 | 450 | 242 | |
| -150 | 150 | 603 | 590 | 305 | |
| -200 | 200 | 743 | 730 | 367 | |
| -250 | 250 | 883 | 870 | 430 | |

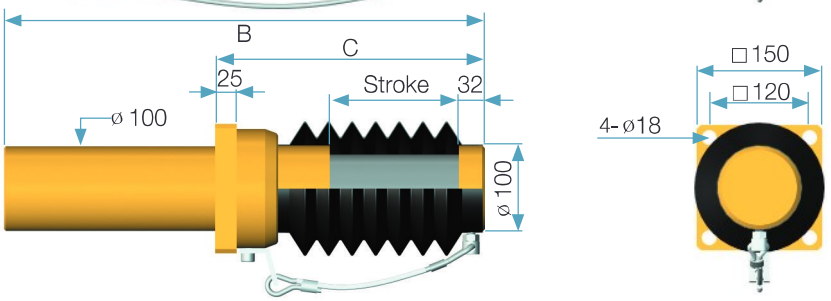
## KHG 100 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG100-50 | 50 | 11 | 750 | 280 | 2.4 | 16 | 5 | 4 | 17 |
| -80 | 80 | 18 | 1,200 | 280 | | 16 | 4.5 | 4 | 20 |
| -100 | 100 | 23 | 1,600 | 280 | | 16 | 5 | 4 | 25 |
| -120 | 120 | 27 | 1,800 | 280 | | 20 | 4.5 | 3.5 | 27 |
| -150 | 150 | 34 | 2,300 | 280 | | 20 | 4.5 | 3.5 | 28 |
| -200 | 200 | 46 | 3,100 | 280 | | 20 | 4 | 3 | 34 |
| -250 | 250 | 58 | 3,600 | 280 | | 25 | 3.5 | 2.5 | 39 |
| -300 | 300 | 69 | 4,200 | 280 | | 25 | 3 | 2 | 43 |
| -400 | 400 | 90 | 5,400 | 280 | | 25 | 2.5 | 2 | 49 |
| -500 | 500 | 110 | 6,600 | 275 | | 25 | 2.5 | 2 | 55 |
| -600 | 600 | 125 | 7,200 | 260 | | 25 | 2 | 1.5 | 62 |
| -800 | 800 | 140 | 7,900 | 210 | | 25 | 2 | 1.5 | 73 |

Rear Mount

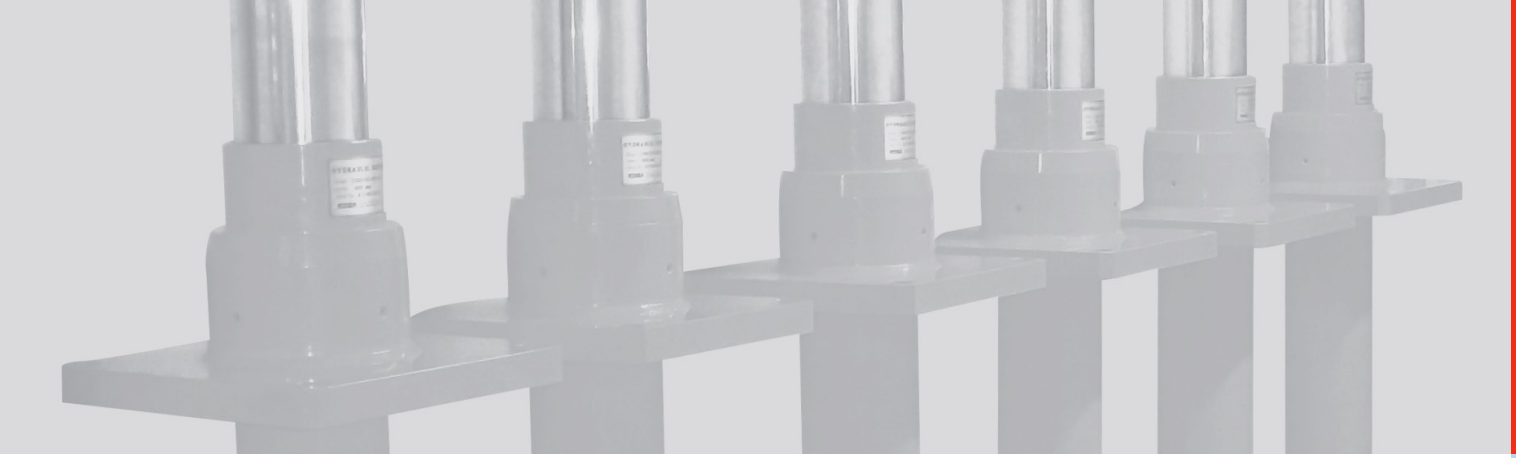



Front Mount




## Dimensions (unit : mm)

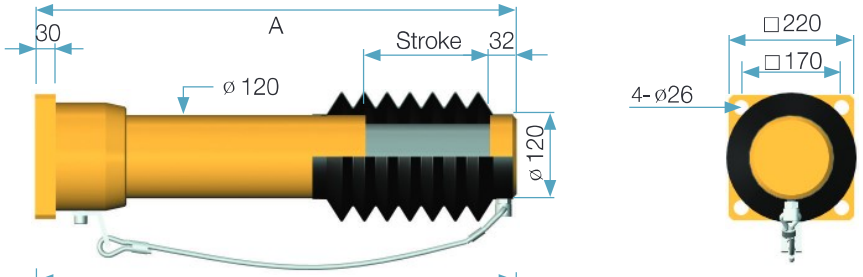
| Model | Stroke (mm) S | Rear Type | Front Type | | Mounting Bolt Size |
|---|---|---|---|---|---|
| | | A | B | C | |
| KHG100-50 | 50 | 332 | 312 | 175 | 16 |
| -80 | 80 | 423 | 403 | 215 | |
| -100 | 100 | 450 | 430 | 252 | |
| -120 | 120 | 529 | 509 | 270 | |
| -150 | 150 | 580 | 560 | 315 | |
| -200 | 200 | 720 | 700 | 377 | |
| -250 | 250 | 865 | 845 | 440 | |
| -300 | 300 | 1,010 | 990 | 502 | |
| -400 | 400 | 1,349 | 1,329 | 645 | |
| -500 | 500 | - | 1,616 | 890 | |
| -600 | 600 | - | 1,888 | 1,010 | |
| -800 | 800 | - | 2,426 | 1,345 | |



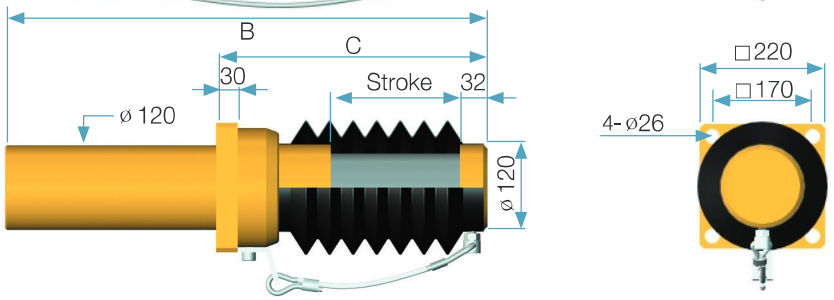
## KHG 120 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG120-100 | 100 | 45 | 2,900 | 570 | 3.5 | 38 | 4 | 4.5 | 41 |
| -150 | 150 | 70 | 4,400 | 570 | | 38 | 4 | 3.5 | 48 |
| -200 | 200 | 92 | 5,800 | 570 | | 38 | 3.5 | 3.5 | 58 |
| -250 | 250 | 114 | 7,200 | 570 | | 40 | 3 | 3 | 65 |
| -300 | 300 | 130 | 8,500 | 450 | | 40 | 3 | 2.5 | 72 |
| -400 | 400 | 160 | 10,000 | 450 | | 40 | 2.5 | 2 | 78 |
| -500 | 500 | 180 | 11,500 | 450 | | 40 | 2 | 1.5 | 86 |
| -600 | 600 | 200 | 12,800 | 450 | | 40 | 2 | 1.5 | 95 |
| -800 | 800 | 240 | 13,600 | 375 | | 40 | 2 | 1.3 | 112 |
| -1000 | 1,000 | 280 | 14,500 | 350 | | 40 | 2 | 1.3 | 118 |

Rear Mount




Front Mount



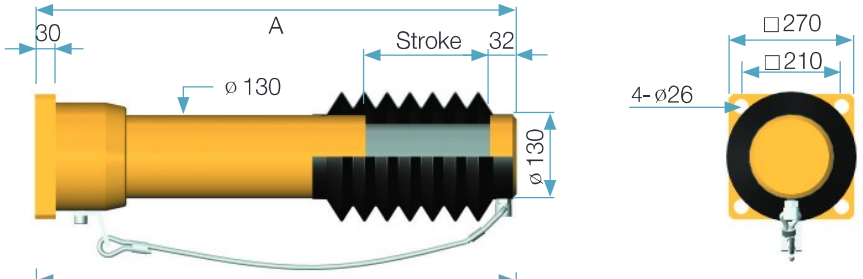

## Dimensions (unit : mm)

| Model | Stroke (mm) S | Rear Type | Front Type | | Mounting Bolt Size |
|---|---|---|---|---|---|
| | | A | B | C | |
| KHG120-100 | 100 | 470 | 450 | 277 | 24 |
| -150 | 150 | 610 | 590 | 340 | |
| -200 | 200 | 760 | 740 | 402 | |
| -250 | 250 | 900 | 880 | 465 | |
| -300 | 300 | 1,050 | 1,030 | 527 | |
| -400 | 400 | 1,340 | 1,320 | 680 | |
| -500 | 500 | 1,620 | 1,600 | 815 | |
| -600 | 600 | 1,920 | 1,900 | 950 | |
| -800 | 800 | - | 2,400 | 1,290 | |
| -1000 | 1,000 | - | 2,960 | 1,360 | |

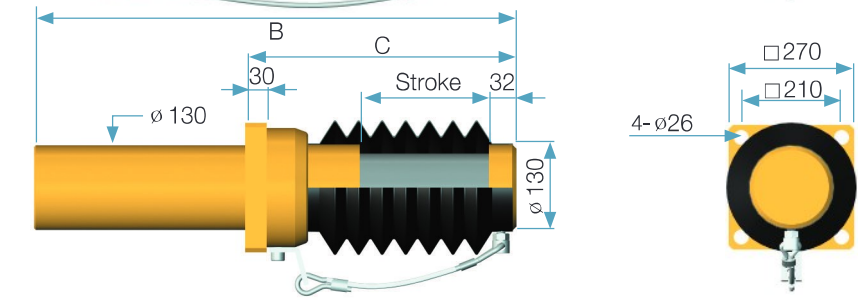
## KHG 130 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG130-250 | 250 | 120 | 8,200 | 550 | 4.5 | 40 | 4.5 | 4 | 85 |
| -300 | 300 | 140 | 9,600 | 550 | | 40 | 4.5 | 4 | 92 |
| -400 | 400 | 180 | 12,000 | 550 | | 50 | 4 | 3.5 | 106 |
| -500 | 500 | 220 | 15,000 | 550 | | 50 | 3.5 | 3.5 | 118 |
| -600 | 600 | 260 | 17,800 | 550 | | 50 | 2 | 1.5 | 127 |
| -800 | 800 | 300 | 19,000 | 460 | | 50 | 2 | 1.5 | 148 |

Rear Mount

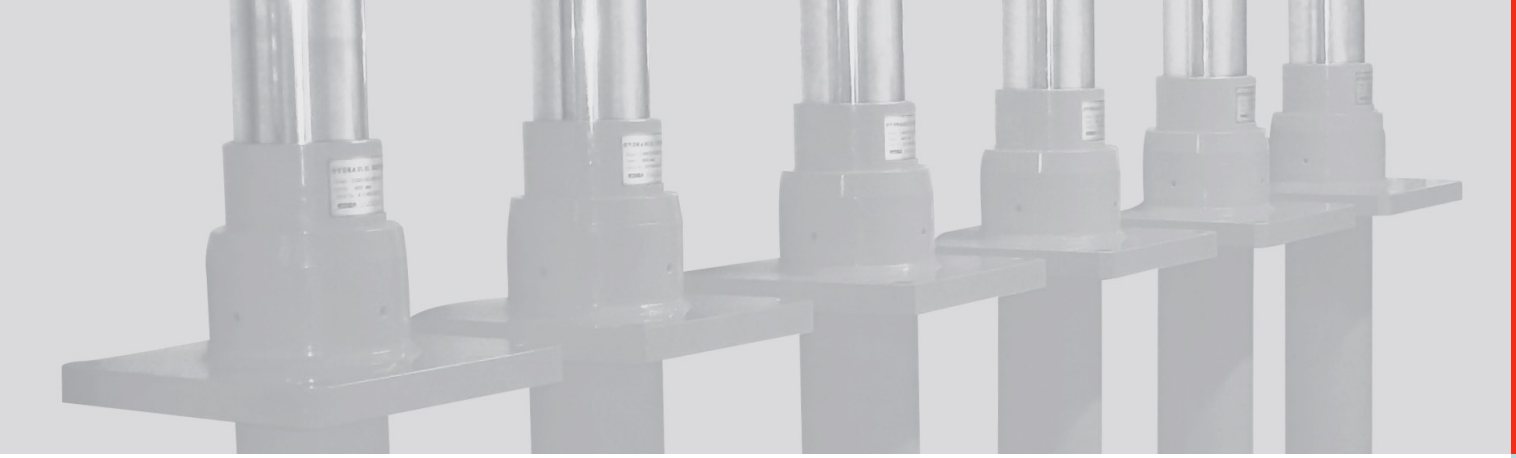



Front Mount




## Dimensions (unit : mm)

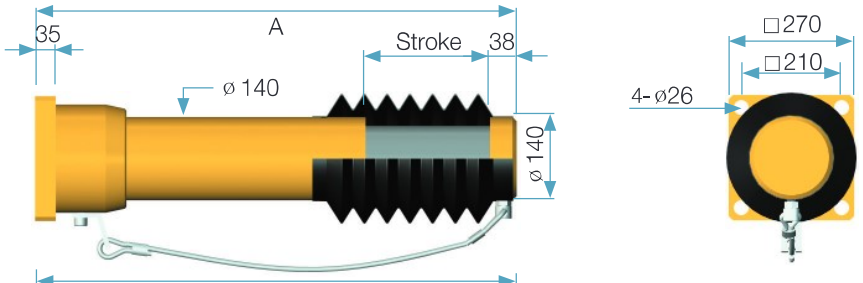
| Model | Stroke (mm) S | Rear Type A | Front Type B | Front Type C | Mounting Bolt Size |
|---|---|---|---|---|---|
| KHG130-250 | 250 | 897 | 877 | 545 | 24 |
| -300 | 300 | 1,029 | 1,009 | 605 | |
| -400 | 400 | 1,293 | 1,273 | 735 | |
| -500 | 500 | 1,602 | 1,582 | 820 | |
| -600 | 600 | - | 1,917 | 1,060 | |
| -800 | 800 | - | 2,445 | 1,350 | |



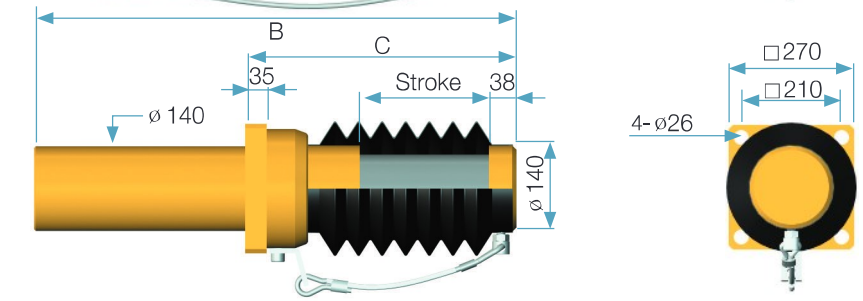
## KHG 140 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG 140-100 | 100 | 62 | 3,800 | 760 | | 38 | 4.5 | 4 | 60 |
| -150 | 150 | 91 | 5,800 | 760 | | 65 | 4.5 | 4 | 72 |
| -200 | 200 | 124 | 9,800 | 730 | | 70 | 4 | 3.5 | 85 |
| -300 | 300 | 175 | 12,000 | 730 | | 70 | 3.5 | 2.5 | 110 |
| -400 | 400 | 234 | 15,000 | 730 | 5.5 | 78 | 2.5 | 1.5 | 135 |
| -500 | 500 | 270 | 17,000 | 680 | | 78 | 2 | 1.3 | 150 |
| -600 | 600 | 300 | 20,000 | 630 | | 78 | 2 | 1.3 | 160 |
| -800 | 800 | 325 | 25,000 | 510 | | 78 | 2 | 1.3 | 185 |
| -1000 | 1,000 | 360 | 27,500 | 450 | | 78 | 1.6 | 1.2 | 200 |

Rear Mount




Front Mount



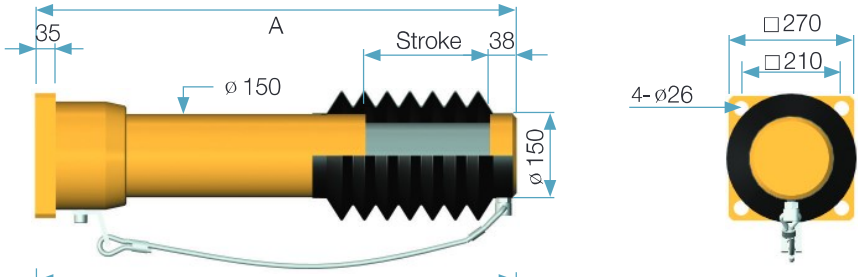

## Dimensions (unit : mm)

| Model | Stroke (mm) S | Rear Type | Front Type | | Mounting Bolt Size |
|---|---|---|---|---|---|
| | | A | B | C | |
| KHG140-100 | 100 | 480 | 460 | 297 | 24 |
| -150 | 150 | 620 | 600 | 360 | |
| -200 | 200 | 770 | 750 | 422 | |
| -300 | 300 | 1,060 | 1,040 | 547 | |
| -400 | 400 | 1,350 | 1,330 | 712 | |
| -500 | 500 | 1,630 | 1,610 | 847 | |
| -600 | 600 | 1,930 | 1,910 | 982 | |
| -800 | 800 | 2,350 | 2,330 | 1,252 | |
| -1000 | 1,000 | - | 2,880 | 1,595 | |

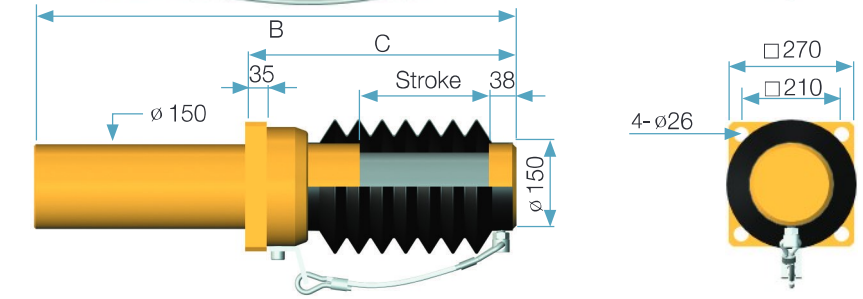
## KHG 150 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG150-100 | 100 | 70 | 4,000 | 880 | 6.2 | 45 | 4 | 4.5 | 77 |
| -200 | 200 | 136 | 7,200 | 850 | | 75 | 4 | 3.5 | 90 |
| -300 | 300 | 183 | 13,000 | 770 | | 75 | 3.5 | 3.5 | 135 |
| -400 | 400 | 243 | 13,500 | 760 | | 75 | 3 | 3 | 146 |
| -500 | 500 | 285 | 17,400 | 710 | | 85 | 3 | 2.5 | 166 |
| -600 | 600 | 323 | 21,000 | 670 | | 85 | 2.5 | 2 | 176 |
| -800 | 800 | 367 | 25,600 | 580 | | 85 | 2 | 1.5 | 220 |
| -1000 | 1,000 | 410 | 28,000 | 510 | | 85 | 2 | 1.5 | 253 |

Rear Mount

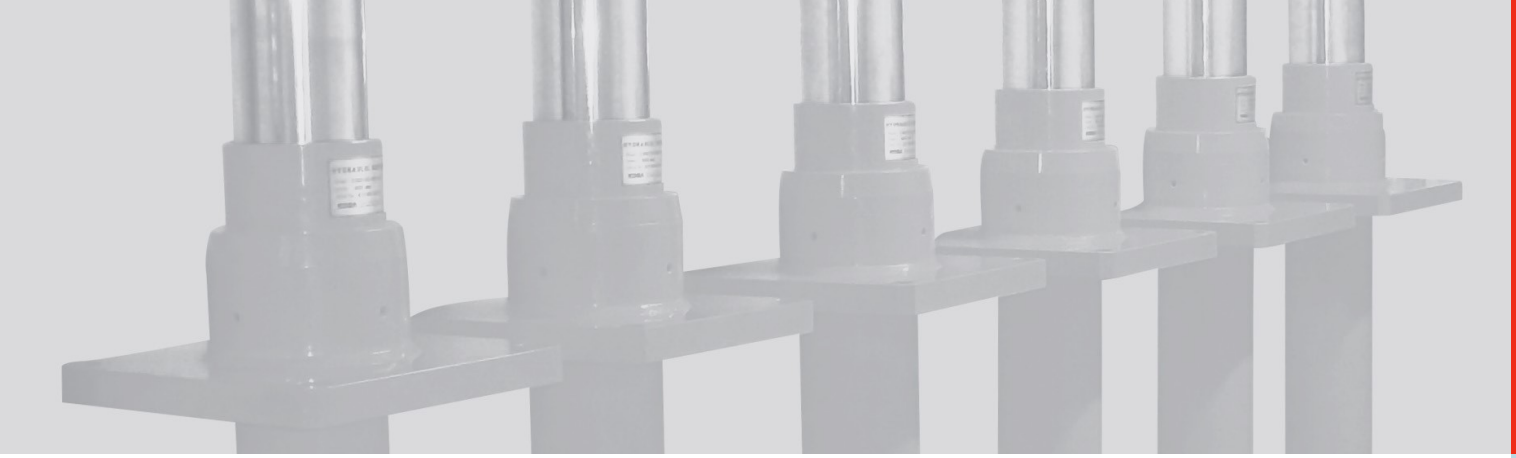



Front Mount




## Dimensions (unit : mm)

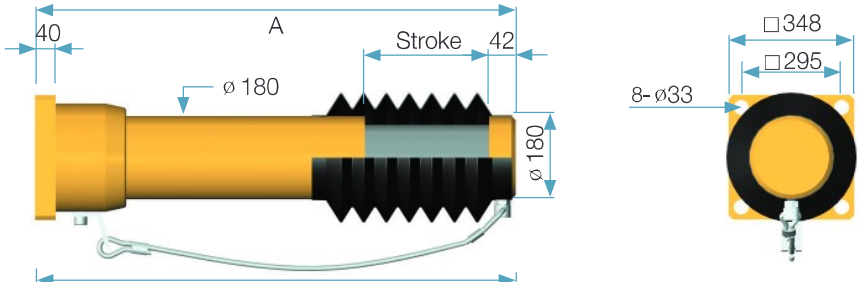
| Model | Stroke (mm) S | Rear Type | Front Type | | Mounting Bolt Size |
|---|---|---|---|---|---|
| | | A | B | C | |
| KHG150-100 | 100 | 510 | 490 | 327 | 24 |
| -200 | 200 | 800 | 780 | 452 | |
| -300 | 300 | 1,090 | 1,070 | 577 | |
| -400 | 400 | 1,280 | 1,260 | 740 | |
| -500 | 500 | 1,660 | 1,640 | 800 | |
| -600 | 600 | 1,960 | 1,940 | 905 | |
| -800 | 800 | 2,360 | 2,340 | 1,270 | |
| -1000 | 1,000 | 2,910 | 2,890 | 1,625 | |



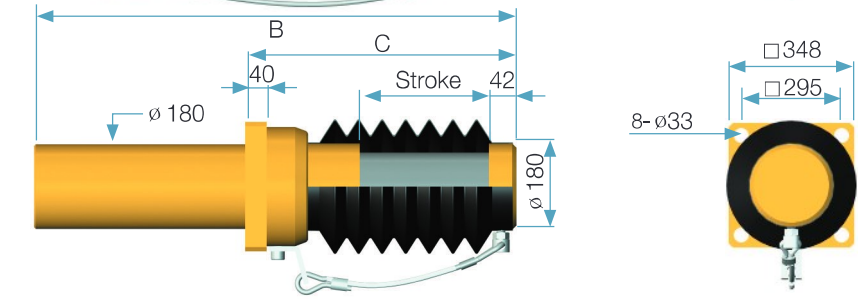
## KHG 180 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | | Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | R Type | F Type | |
| KHG 180-100 | 100 | 80 | 4,500 | 980 | 8 | 75 | 4.5 | 4 | 110 |
| -200 | 200 | 160 | 10,000 | 980 | | 80 | 4.5 | 4 | 126 |
| -250 | 250 | 200 | 12,800 | 980 | | 80 | 4.5 | 4 | 140 |
| -400 | 400 | 280 | 14,500 | 880 | | 90 | 4.5 | 4 | 168 |
| -500 | 500 | 350 | 18,000 | 880 | | 100 | 4 | 3.5 | 198 |
| -600 | 600 | 430 | 23,000 | 890 | | 100 | 3.5 | 3 | 235 |
| -800 | 800 | 570 | 27,000 | 890 | | 100 | 3 | 2.5 | 295 |
| -1000 | 1,000 | 720 | 29,000 | 890 | | 110 | 2.5 | 2 | 360 |

Rear Mount




Front Mount




## Dimensions (unit : mm)

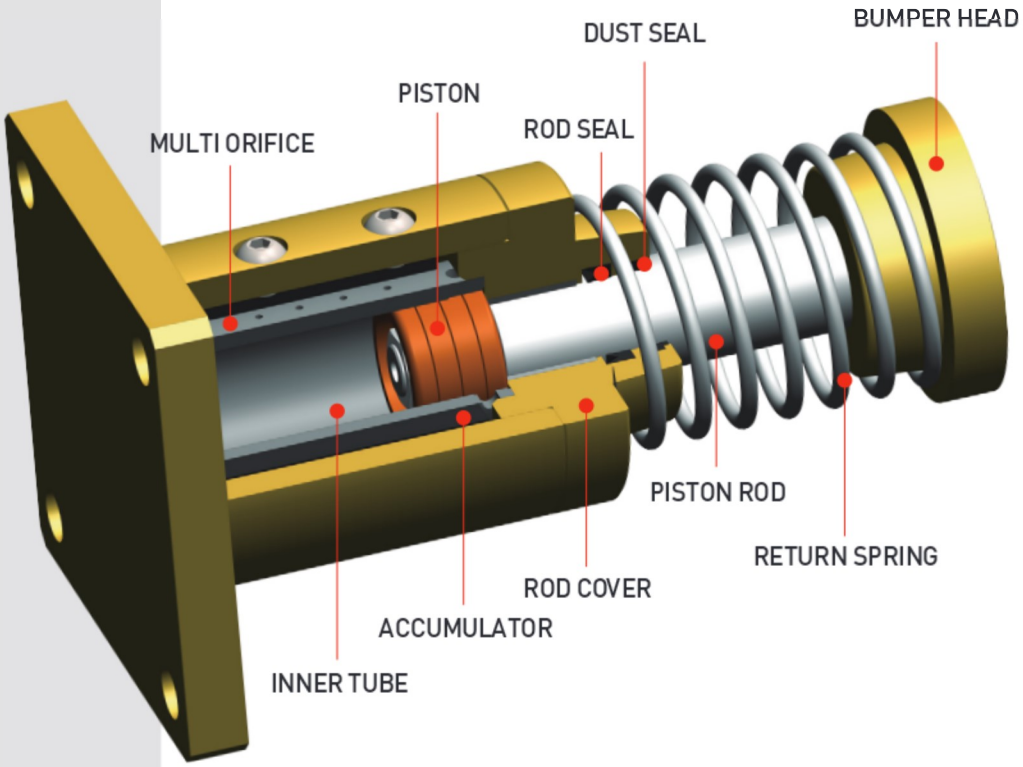
| Model | Stroke (mm) S | Rear Type | Front Type | | Mounting Bolt Size |
|---|---|---|---|---|---|
| | | A | B | C | |
| KHG180-100 | 100 | 491 | 471 | 350 | 30 |
| -200 | 200 | 760 | 740 | 450 | |
| -250 | 250 | 850 | 830 | 550 | |
| -400 | 400 | 1,486 | 1,466 | 804 | |
| -500 | 500 | 1,766 | 1,746 | 939 | |
| -600 | 600 | 2,066 | 2,046 | 1,074 | |
| -800 | 800 | 2,666 | 2,646 | 1,344 | |
| -1000 | 1,000 | 3,226 | 3,206 | 1,614 | |

# KHS Series
## Hydraulic Buffer

KOBA
Best Energy Absorption

*KHS Series - high efficient heavy duty buffer*

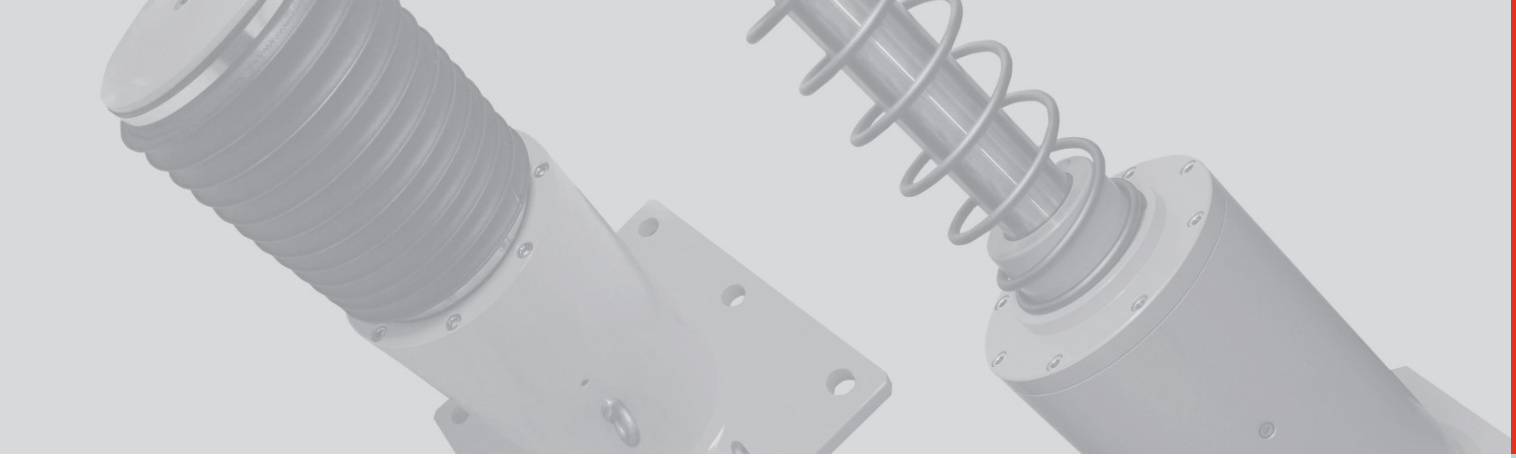
*When the moving load is collided to bumper head, the piston rod enters inner tube according to stroke.*
*The check valve is closed and oil is discharging out of inner tube through orifices In this process,*
*the oil is increased as much as the volume of piston rod and is saved in accumulator*
*During this process, KHS model absorbs the impact force with damping force.*
*In return, Check valve opens and compressed coil spring makes the piston rod returned to original position.*



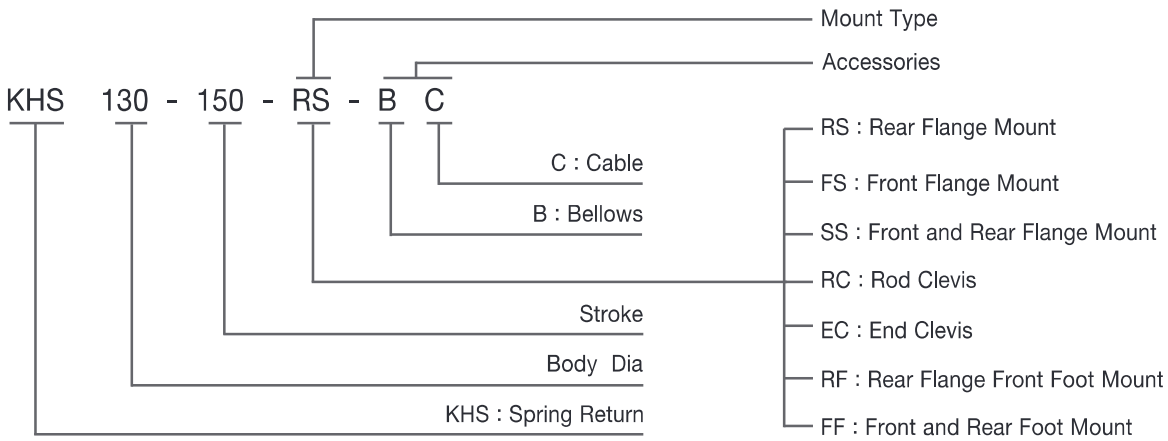

## Feature

KHS Series is large hydraulic buffer. KHS Series is designed and manufactured the multiple orifices to fit the conditions and requirements of each user for high efficiency buffering. It is suitable for production lines that require emergency control and repetitive operation control. KOBA hydraulic buffer is met the Global industrial safety standards like OSHA, AISE, CMMA, DIN, and FEM.

- Adjustment : self-adjustment customized
- Damping fluid : Oil
- Temperature range (-10~80℃), Special (-30~100℃)
- Return force : Coil Return Spring
- Piston Rod : Hard Chrome( over 25㎛)
- Body protection : Epoxy Paint Coatings
- Application : container crane, harbour crane, overhead crane, amusement rids, steel plants



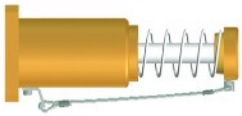
## KHS Series Ordering Information




## Accessory

Bellows Cover

Clevis Mounting

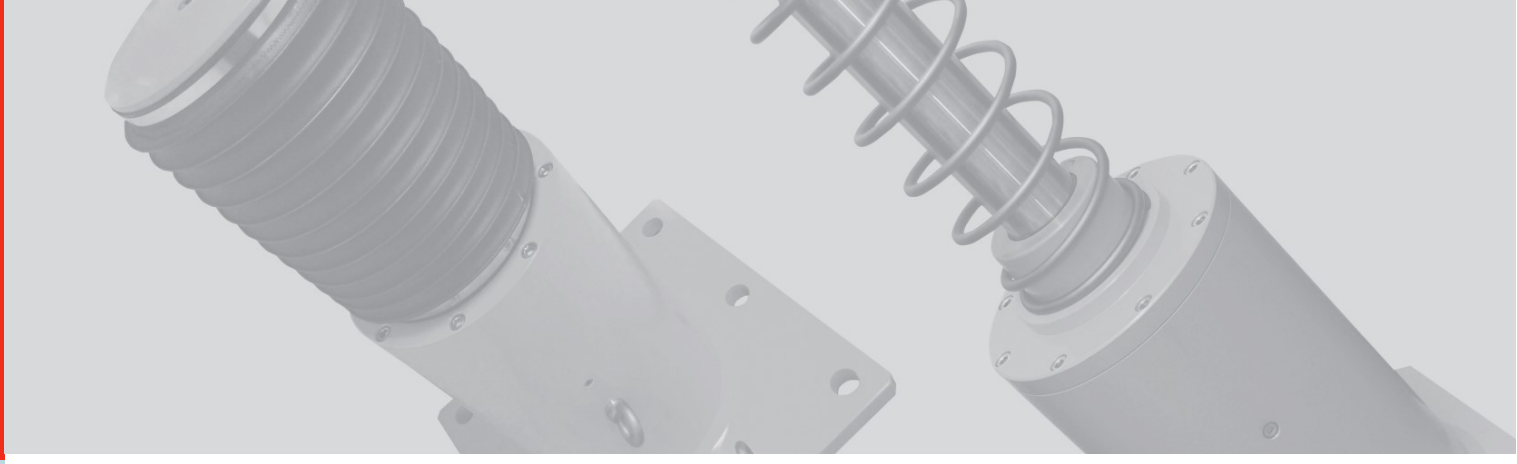


Front & Rear Safety Cable

Front Mount

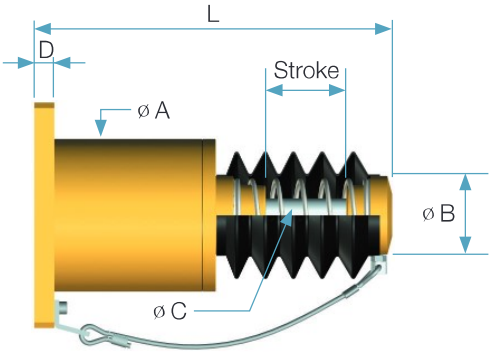
## Special Order

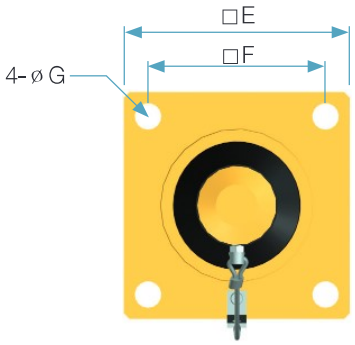
- Temperature : -30~100℃
- Special Coatings
- Body Chrome Plating
- Stainless Steel



## KHS 64, 90, 100 Series
## Engineering Data

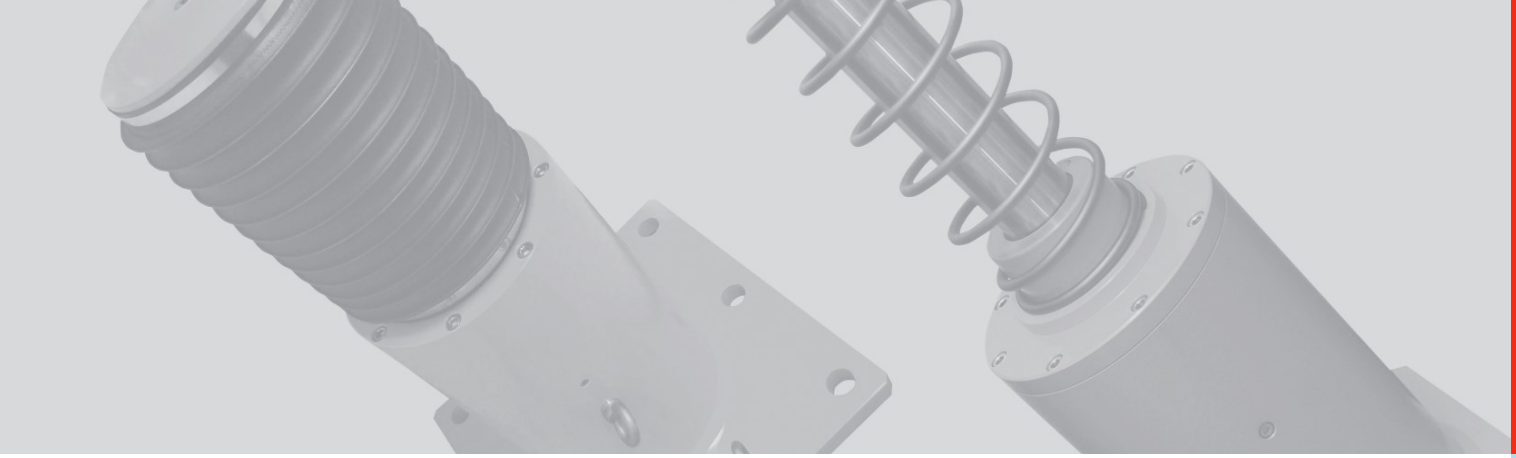
| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | | |
| KHS 64-50 | 50 | 0.5 | 10 | 12.5 | 6.5 | 14.8 | 3 | 3 |
| KHS 90-50 | 50 | 4 | 80 | 100 | 14.2 | 30.5 | 3 | 8.5 |
| 75 | 75 | 6 | 108 | 100 | 10.5 | 19 | 3 | 9.5 |
| -100 | 100 | 8 | 128 | 100 | 9.9 | 42 | 3 | 12 |
| KHS 100-50 | 50 | 4.4 | 79 | 110 | 14.2 | 30.5 | 3 | 14 |
| -100 | 100 | 8.8 | 140 | 110 | 9.9 | 42 | 3 | 17 |



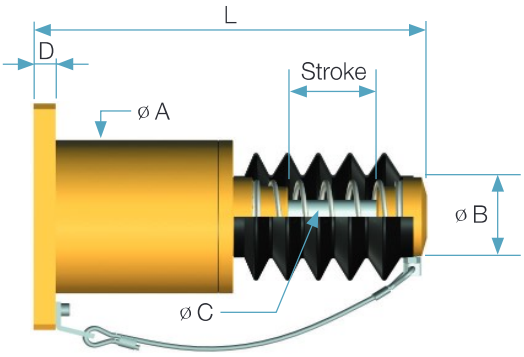

## Dimensions (unit : mm)

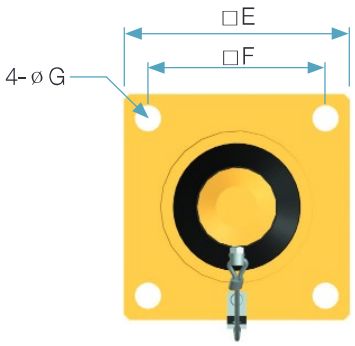
| Model | Stroke (mm) S | L | ø A | ø B | ø C (Rod) | D | E | F | 4-ø G |
|---|---|---|---|---|---|---|---|---|---|
| KHS64 - 50 | 50 | 200 | 64 | 56 | 20 | 12 | 90 | 65 | 4-ø 11 |
| KHS90 - 50 | 50 | 240 | 90 | 78 | 30 | 16 | 130 | 100 | 4-ø 14 |
| -75 | 75 | 280 | 90 | 78 | 30 | 16 | 130 | 100 | 4-ø 14 |
| -100 | 100 | 360 | 90 | 78 | 30 | 16 | 130 | 100 | 4-ø 14 |
| KHS100 - 50 | 50 | 240 | 100 | 84 | 30 | 16 | 130 | 100 | 4-ø 14 |
| -100 | 100 | 340 | 100 | 84 | 30 | 16 | 130 | 100 | 4-ø 14 |



## KHS 130, 170, 190 Series
## Engineering Data

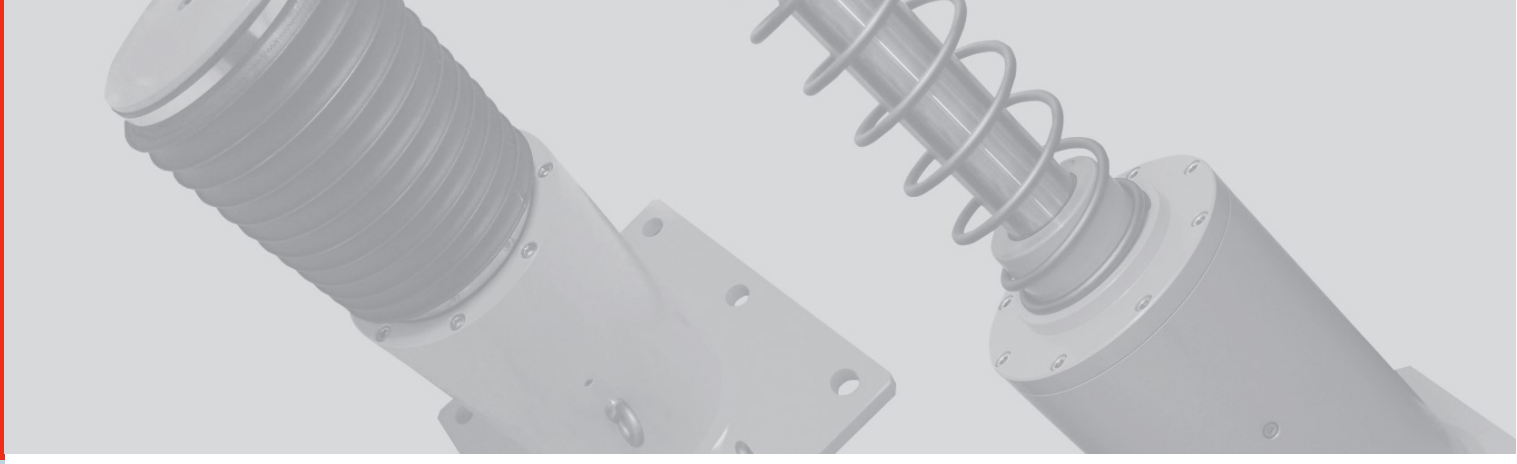
| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | | |
| KHS 130-70 | 70 | 10 | 170 | 179 | 18.2 | 42.5 | 3 | 21 |
| -100 | 100 | 15 | 270 | 188 | 17.8 | 48 | 3 | 24 |
| -150 | 150 | 21 | 294 | 175 | 18.3 | 53.5 | 2.5 | 28 |
| KHS 170-80 | 80 | 22 | 396 | 340 | 18.2 | 44.3 | 3 | 38 |
| -150 | 150 | 41 | 574 | 340 | 18.3 | 53.5 | 2 | 48 |
| KHS 190-100 | 100 | 40 | 720 | 500 | 17.8 | 48 | 2.5 | 52 |
| -150 | 150 | 60 | 840 | 500 | 18.3 | 53.5 | 2 | 64 |



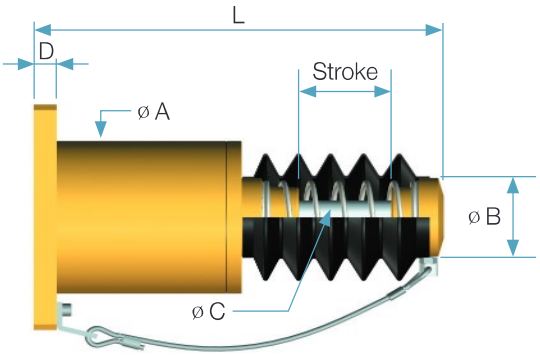

## Dimensions (unit : mm)

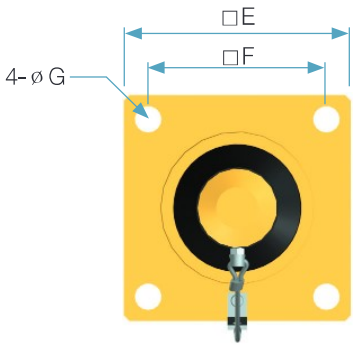
| Model | Stroke (mm) S | L | ø A | ø B | ø C (Rod) | D | E | F | 4-ø G |
|---|---|---|---|---|---|---|---|---|---|
| KHS130 - 70 | 70 | 290 | 130 | 98 | 35 | 19 | 170 | 130 | 4-ø 22 |
| -100 | 100 | 350 | 130 | 98 | 35 | 19 | 170 | 130 | 4-ø 22 |
| -150 | 150 | 490 | 130 | 98 | 35 | 19 | 170 | 130 | 4-ø 22 |
| KHS170 - 80 | 80 | 360 | 170 | 98 | 50 | 22 | 220 | 170 | 4-ø 26 |
| -150 | 150 | 500 | 170 | 98 | 50 | 22 | 220 | 170 | 4-ø 26 |
| KHS190 - 100 | 100 | 440 | 190 | 98 | 50 | 25 | 280 | 220 | 4-ø 33 |
| -150 | 150 | 540 | 190 | 98 | 50 | 25 | 280 | 220 | 4-ø 33 |



## KHS 220, 250 Series
## Engineering Data

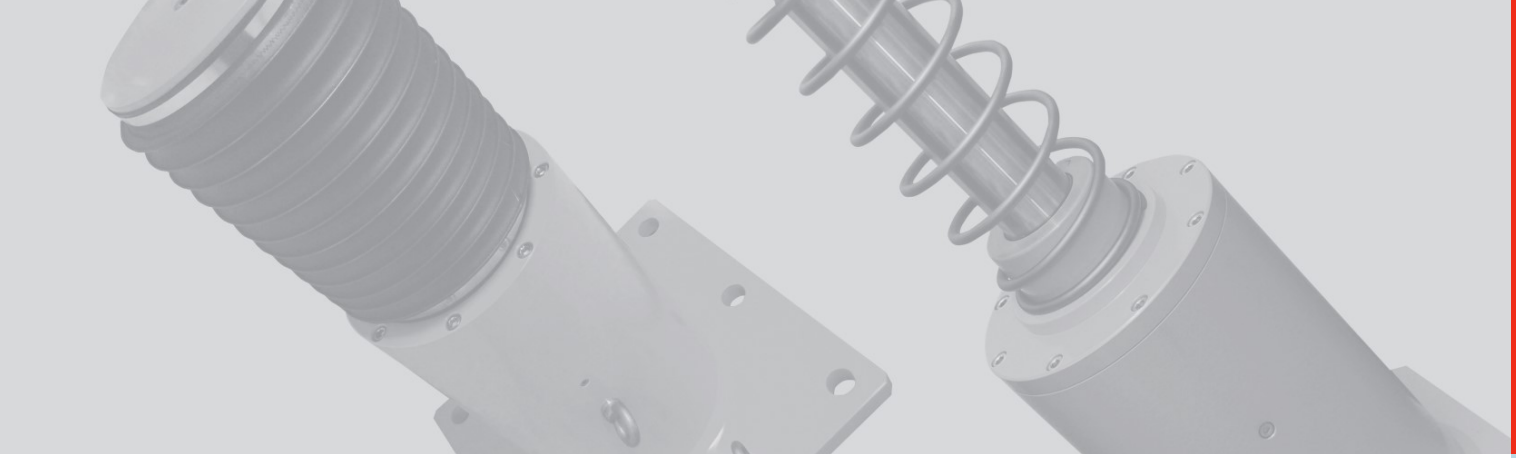
| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | | |
| KHS 220-100 | 100 | 44 | 792 | 550 | 40.5 | 134 | 2.5 | 69 |
| -150 | 150 | 66 | 924 | 550 | 41.8 | 131 | 2 | 76 |
| KHS 250-100 | 100 | 60 | 1,080 | 750 | 38.5 | 111.2 | 2.5 | 130 |
| -150 | 150 | 90 | 1,260 | 750 | 34.2 | 107.5 | 2 | 140 |
| -200 | 200 | 120 | 1,560 | 750 | 33 | 105 | 2 | 150 |
| -300 | 300 | 180 | 2,160 | 750 | 38 | 121.8 | 2 | 170 |



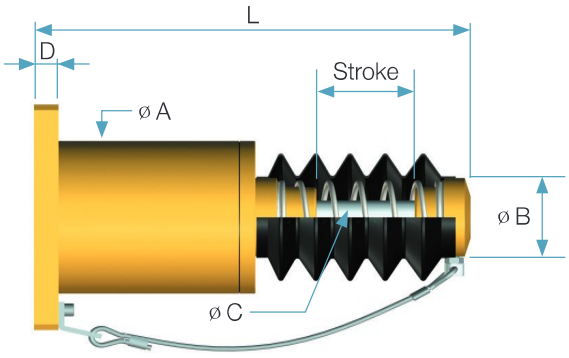

## Dimensions (unit : mm)

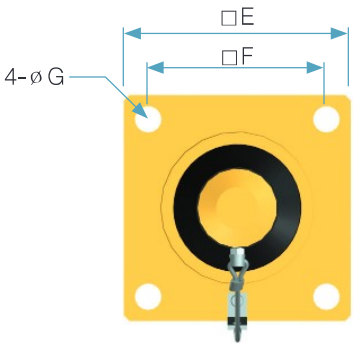
| Model | Stroke (mm) S | L | ø A | ø B | ø C (Rod) | D | E | F | 4-ø G |
|---|---|---|---|---|---|---|---|---|---|
| KHS220 - 100 | 100 | 440 | 220 | 116 | 60 | 25 | 280 | 220 | 4-ø 33 |
| -150 | 150 | 540 | 220 | 116 | 60 | 25 | 280 | 220 | 4-ø 33 |
| KHS250 - 100 | 100 | 480 | 250 | 138 | 70 | 32 | 320 | 250 | 4-ø 33 |
| -150 | 150 | 650 | 250 | 158 | 70 | 32 | 320 | 250 | 4-ø 33 |
| -200 | 200 | 750 | 250 | 158 | 70 | 32 | 320 | 250 | 4-ø 33 |
| -300 | 300 | 880 | 250 | 158 | 70 | 32 | 320 | 250 | 4-ø 33 |



## KHS 300, 340, 360 Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Max.Energy / Hour (kJ/h) $E_TC$ | Max Buffer Force (kN) $F_S$ | Recoil Force (kN) | | Max Side Load Angle (°) | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ext | Comp | | |
| KHS 300-150 | 150 | 117 | 1,638 | 975 | 46 | 142 | 2 | 186 |
| -250 | 250 | 180 | 2,340 | 1,125 | 45 | 151 | 1.5 | 206 |
| KHS 340-200 | 200 | 200 | 2,600 | 1,250 | 51 | 162 | 1.5 | 275 |
| -300 | 300 | 300 | 3,600 | 1,250 | 49 | 176 | 1.5 | 305 |
| KHS 360-250 | 250 | 294 | 3,822 | 1,470 | 68 | 178 | 1.5 | 324 |
| -400 | 400 | 470 | 4,700 | 1,470 | 64 | 182 | 1.5 | 376 |

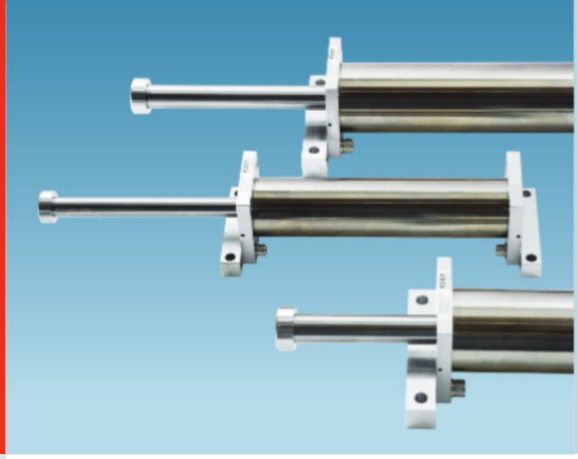



## Dimensions (unit : mm)

| Model | Stroke (mm) S | L | ø A | ø B | ø C (Rod) | D | E | F | 4-ø G |
|---|---|---|---|---|---|---|---|---|---|
| KHS300 - 150 | 150 | 650 | 300 | 170 | 80 | 36 | 400 | 300 | 4-ø 33 |
| -250 | 250 | 850 | 300 | 170 | 80 | 36 | 400 | 300 | 4-ø 33 |
| KHS340 -200 | 200 | 800 | 340 | 228 | 100 | 45 | 440 | 340 | 4-ø 39 |
| -300 | 300 | 1,000 | 340 | 228 | 100 | 45 | 440 | 340 | 4-ø 39 |
| KHS360 - 250 | 250 | 900 | 356 | 280 | 100 | 45 | 460 | 360 | 4-ø 39 |
| -400 | 400 | 1,200 | 356 | 280 | 100 | 45 | 460 | 360 | 4-ø 39 |

# KCSC Series
## Stacker Crane Buffers



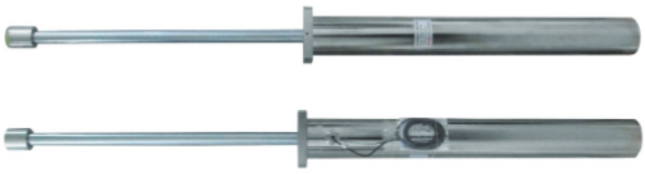
KOBA
Best Energy Absorption

*KCSC series is used usually in stacker crane of Automatic distributing system. KCSC has wide range of capacity and stroke (Stroke 1500mm, Capacity 930 kJ). It is possible to design and manufacture for special purpose as customer's request. KOBA hydraulic buffer is met the Global industrial safety standards like OSHA, AISE, CMMA, DIN, and FEM.*

*KCSC has similar structure and principle as that of KHG but KCSC is designed to have large volume of Gas compared with that of oil so it has Low Peak and Low Recoil Force. This point makes the application operate with minimum resistance force and absorb the impact force smoothly and progressively in emergency case.*

## Feature

- Cycle rate : up to 60 cycle/h
- Standard impact velocity : 3.8 m/s
- Temperature range (-10~80℃)
  Special (-30~100℃)
- Return : Nitrogen Gas
- Piston Rod : Hard Chrome( over 25㎛)
- Body protection : zinc plated or 3-layer epoxy paint (option)
- Options
  - Protective Bellows
  - Safety Cable
  - Urethane Cap
  - Mounting Plates
  - Foot Mounts
  - Sensor

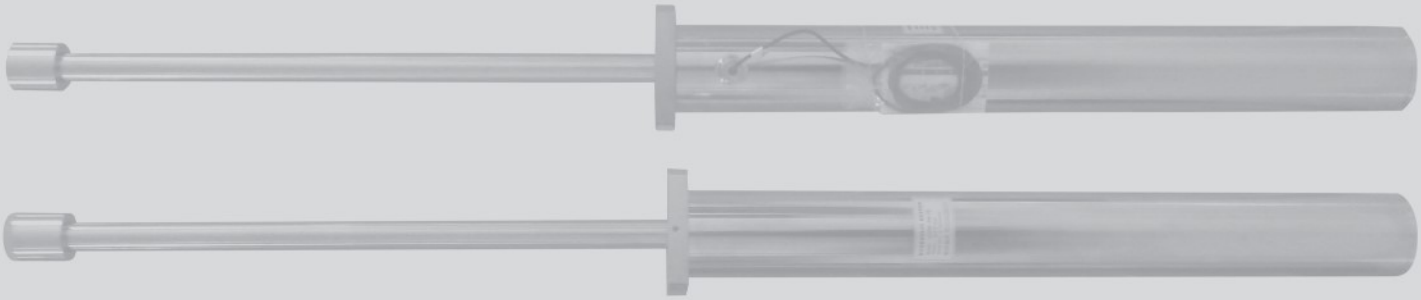


Special type : Sensor/Urethane Cap

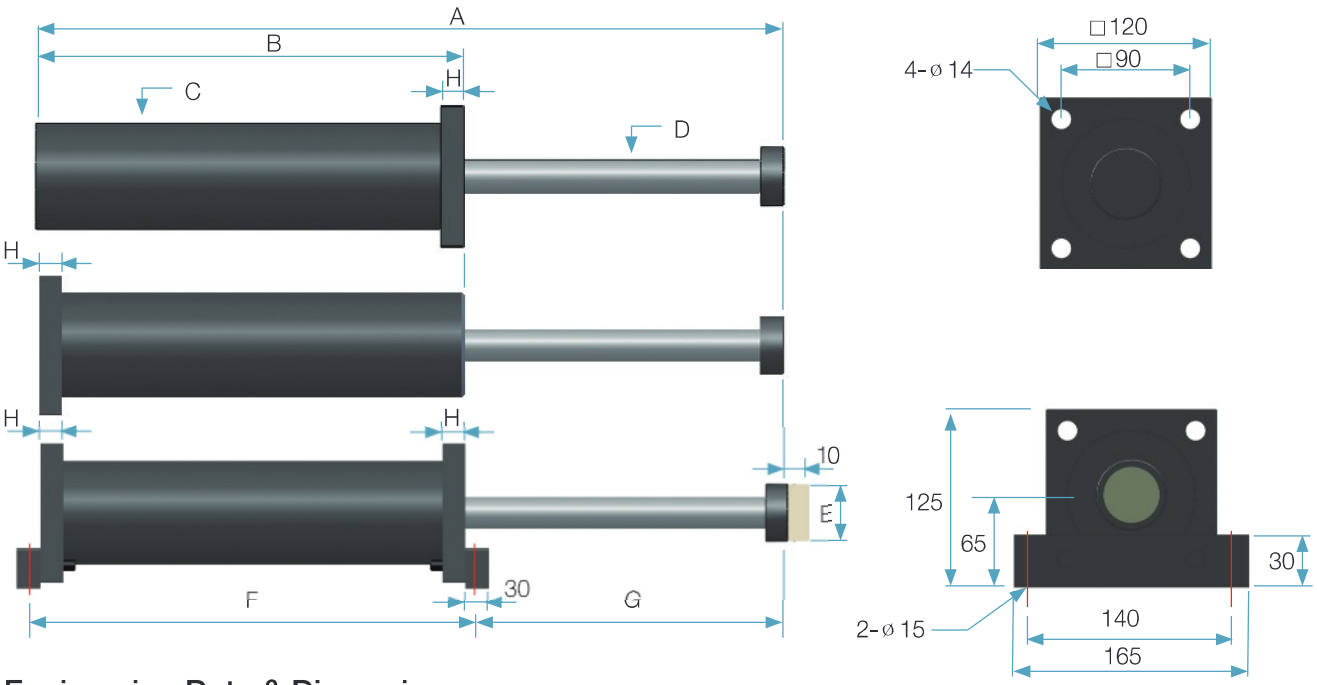
## KCSC Series Ordering Information

KCSC 90 - 50 - RS - SC

- SC — Accessories
  - B : Protective Bellows
  - SC : Safety Cable
  - UC : Urethane Cap
  - S : Sensor
- RS — FS:Front Flange / RS:Rear Flange / FM:Foot Mount
- 50 — Stroke
- 90 — Body Dia
- KCSC — Series

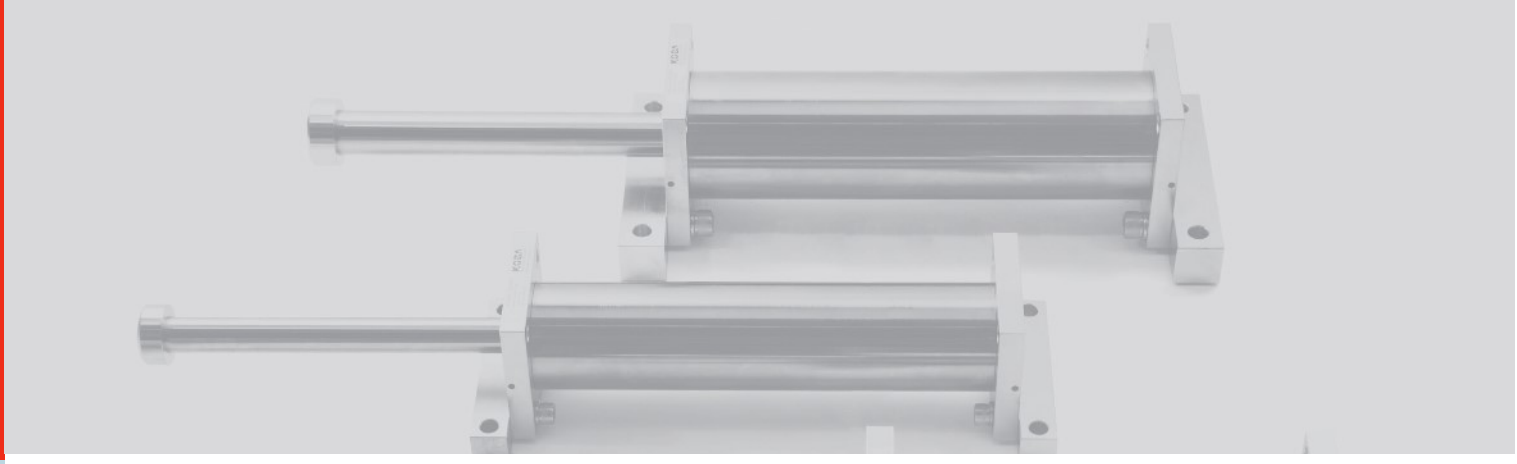


## KCSC 90 Series

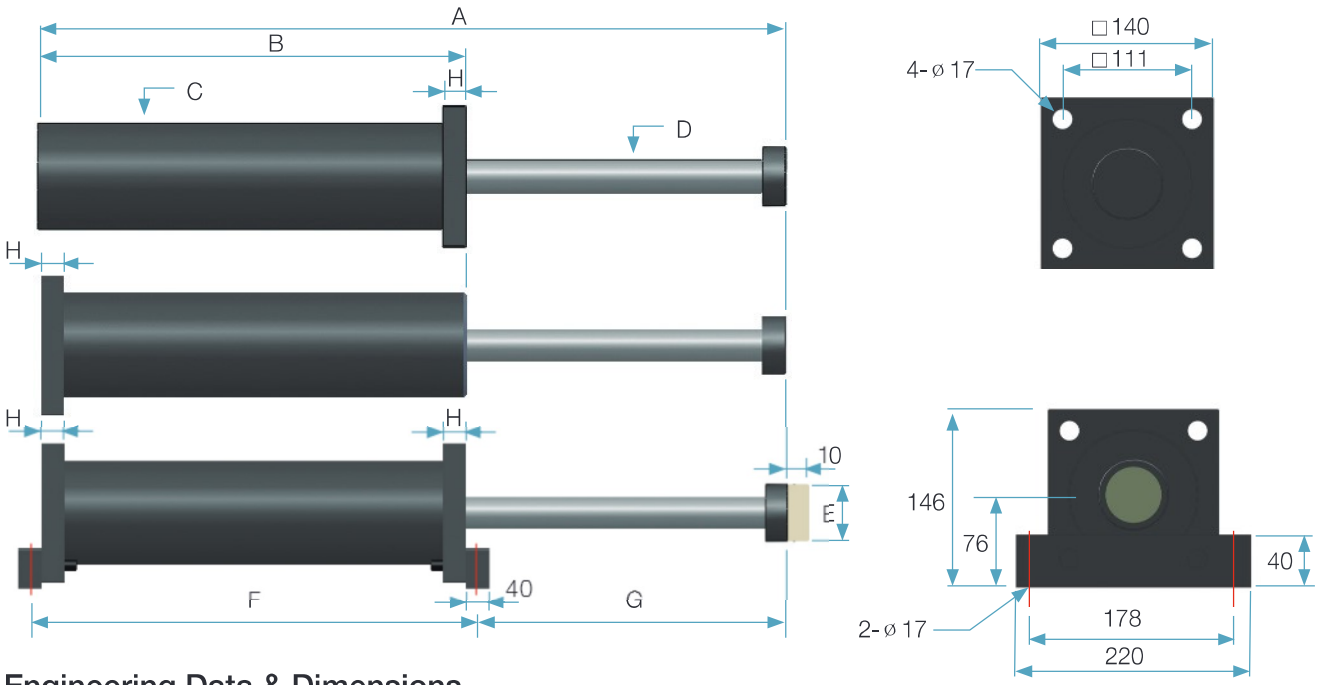



## Engineering Data & Dimensions

| Model | Stroke (mm) S | Max. Energy /Cycle (kJ) $E_T$ | Max. Energy /Hour (kJ/hr) $E_TC$ | Max. Shock Foce (kN) $F_S$ | Dimension (unit : mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | E | F | G | H |
| KCSC90-50 | 50 | 4 | 193 | 75 | 310 | 208 | 90 | 30 | 50 | 240 | 86 | 20 |
| -100 | 100 | 7 | 395 | 75 | 410 | 258 | 90 | 30 | 50 | 290 | 136 | 20 |
| -150 | 150 | 10 | 588 | 75 | 510 | 308 | 90 | 30 | 50 | 340 | 186 | 20 |
| -200 | 200 | 13 | 784 | 75 | 613 | 360 | 90 | 30 | 50 | 392 | 237 | 20 |
| -250 | 250 | 16 | 839 | 75 | 715 | 411 | 90 | 30 | 50 | 443 | 288 | 20 |
| -300 | 300 | 20 | 940 | 75 | 817 | 462 | 90 | 30 | 50 | 494 | 339 | 20 |
| -350 | 350 | 23 | 1,265 | 75 | 918 | 512 | 90 | 30 | 50 | 544 | 390 | 20 |
| -400 | 400 | 21 | 1,150 | 67 | 1,019 | 563 | 90 | 30 | 50 | 595 | 440 | 20 |
| -450 | 450 | 20 | 1,090 | 55 | 1,121 | 614 | 90 | 30 | 50 | 646 | 491 | 20 |
| -500 | 500 | 19 | 1,060 | 47 | 1,223 | 665 | 90 | 30 | 50 | 697 | 542 | 20 |
| -600 | 600 | 15 | 880 | 31 | 1,427 | 767 | 90 | 30 | 50 | 799 | 644 | 20 |
| -700 | 700 | 13 | 610 | 24 | 1,668 | 910 | 90 | 30 | 50 | 956 | 742 | 20 |
| -800 | 800 | 12 | 539 | 19 | 1,888 | 1,030 | 90 | 30 | 50 | 1,076 | 842 | 20 |

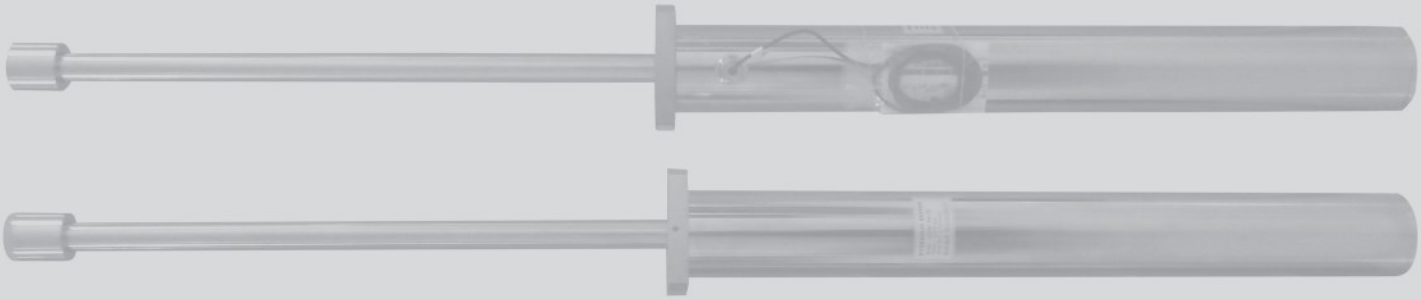


## KCSC 110 Series

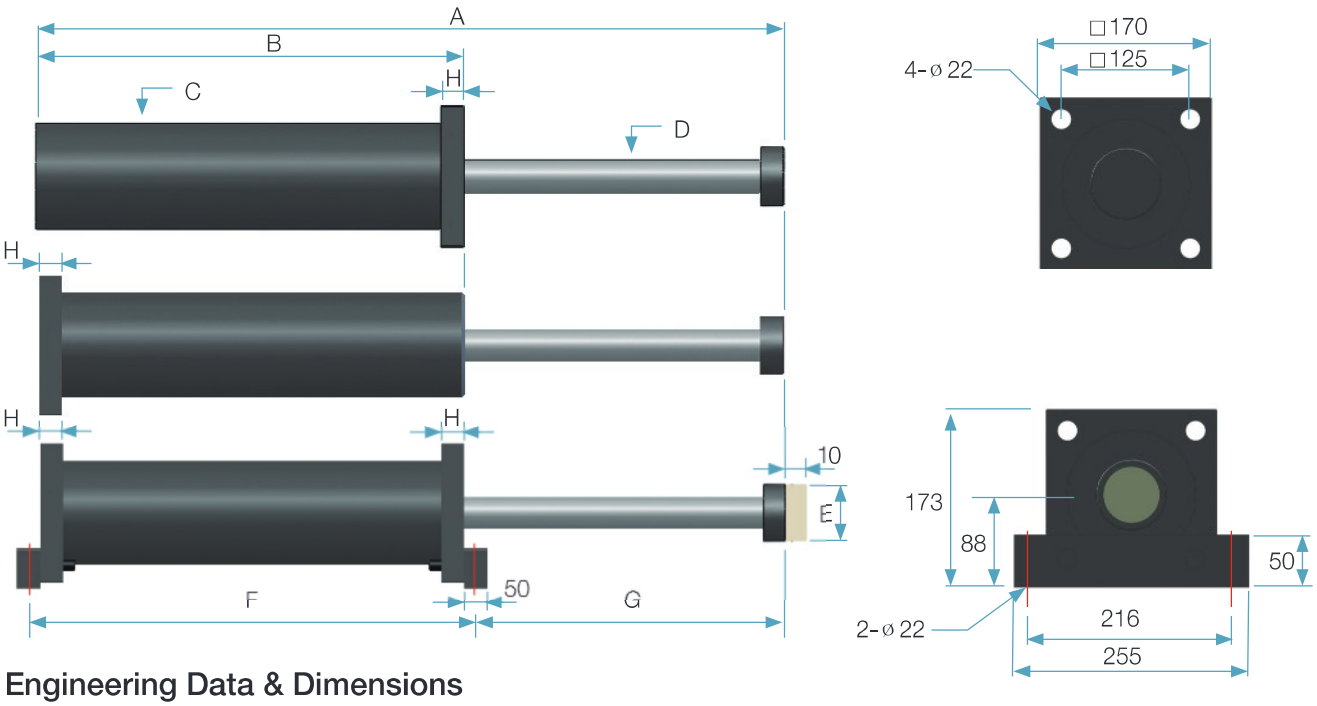



## Engineering Data & Dimensions

| Model | Stroke (mm) S | Max. Energy /Cycle (kJ) $E_T$ | Max. Energy /Hour (kJ/hr) $E_TC$ | Max. Shock Foce (kN) $F_S$ | Dimension (unit : mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | E | F | G | H |
| KCSC110-50 | 50 | 5 | 296 | 115 | 370 | 230 | 113 | 40 | 60 | 270 | 120 | 25 |
| -100 | 100 | 10 | 568 | 115 | 470 | 280 | 113 | 40 | 60 | 340 | 170 | 25 |
| -150 | 150 | 15 | 881 | 115 | 553 | 339 | 113 | 40 | 60 | 379 | 194 | 25 |
| -200 | 200 | 20 | 934 | 115 | 655 | 390 | 113 | 40 | 60 | 430 | 245 | 25 |
| -250 | 250 | 25 | 1,056 | 115 | 757 | 441 | 113 | 40 | 60 | 481 | 296 | 25 |
| -300 | 300 | 29 | 1,186 | 115 | 859 | 492 | 113 | 40 | 60 | 532 | 347 | 25 |
| -350 | 350 | 34 | 1,352 | 115 | 960 | 543 | 113 | 40 | 60 | 583 | 397 | 25 |
| -400 | 400 | 39 | 1,517 | 115 | 1,062 | 594 | 113 | 40 | 60 | 634 | 448 | 25 |
| -450 | 450 | 44 | 1,680 | 115 | 1,164 | 645 | 113 | 40 | 60 | 685 | 499 | 25 |
| -500 | 500 | 49 | 1,845 | 115 | 1,256 | 695 | 113 | 40 | 60 | 735 | 550 | 25 |
| -600 | 600 | 59 | 2,168 | 115 | 1,469 | 797 | 113 | 40 | 60 | 837 | 652 | 25 |
| -700 | 700 | 69 | 2,485 | 115 | 1,672 | 899 | 113 | 40 | 60 | 939 | 753 | 25 |
| -800 | 800 | 79 | 2,806 | 115 | 1,953 | 1,079 | 113 | 40 | 60 | 1,119 | 854 | 25 |
| -900 | 900 | 88 | 3,130 | 115 | 2,151 | 1,179 | 113 | 40 | 60 | 1,219 | 952 | 25 |
| -1000 | 1,000 | 73 | 3,483 | 92 | 2,351 | 1,279 | 113 | 40 | 60 | 1,319 | 1,052 | 25 |
| -1200 | 1,200 | 60 | 2,758 | 63 | 2,751 | 1,479 | 113 | 40 | 60 | 1,519 | 1,252 | 25 |
| -1400 | 1,400 | 41 | 1,917 | 37 | 3,171 | 1,689 | 113 | 40 | 60 | 1,729 | 1,462 | 25 |

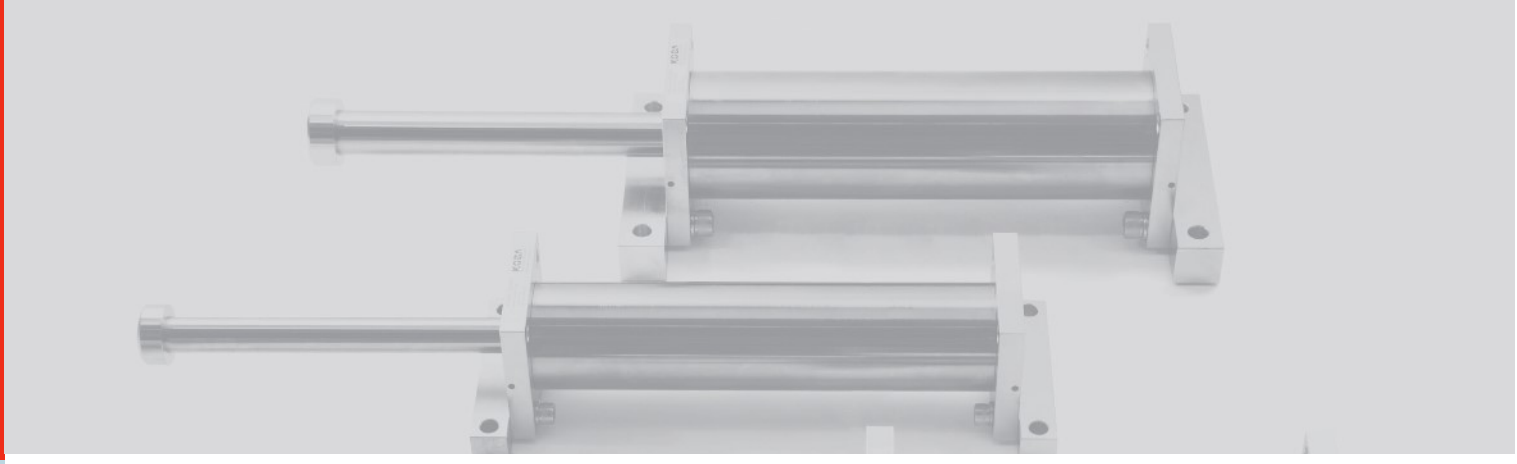


## KCSC 130 Series

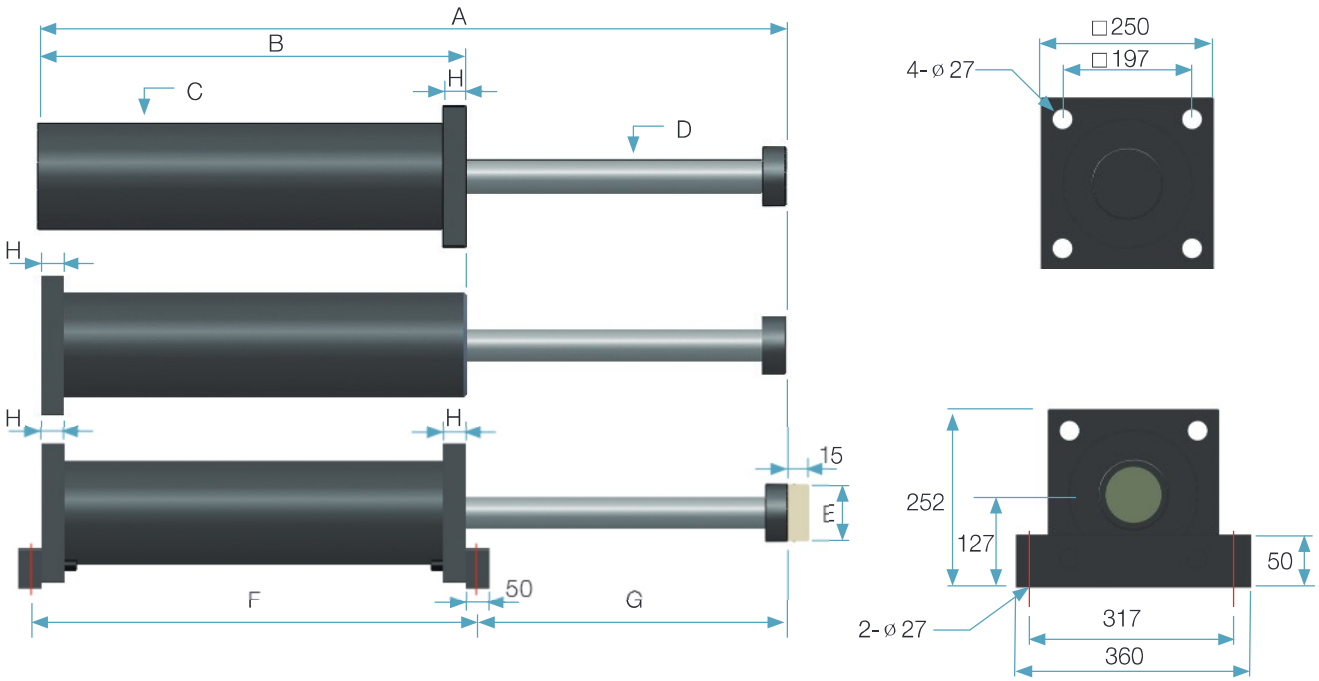



## Engineering Data & Dimensions

| Model | Stroke (mm) S | Max. Energy /Cycle (kJ) $E_T$ | Max. Energy /Hour (kJ/hr) $E_TC$ | Max. Shock Foce (kN) $F_S$ | Dimension (unit : mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | E | F | G | H |
| KCSC130-50 | 50 | 10 | 590 | 245 | 336 | 203 | 138 | 45 | 70 | 253 | 108 | 25 |
| -75 | 75 | 15 | 659 | 245 | 387 | 229 | 138 | 45 | 70 | 279 | 133 | 25 |
| -125 | 125 | 25 | 815 | 245 | 489 | 280 | 138 | 45 | 70 | 330 | 184 | 25 |
| -200 | 200 | 39 | 1,110 | 245 | 640 | 355 | 138 | 45 | 70 | 405 | 260 | 25 |
| -250 | 250 | 49 | 1,314 | 245 | 742 | 406 | 138 | 45 | 70 | 456 | 311 | 25 |
| -300 | 300 | 58 | 1,512 | 245 | 844 | 457 | 138 | 45 | 70 | 507 | 362 | 25 |
| -350 | 350 | 68 | 1,736 | 245 | 995 | 558 | 138 | 45 | 70 | 608 | 412 | 25 |
| -400 | 400 | 78 | 1,934 | 245 | 1,097 | 609 | 138 | 45 | 70 | 659 | 463 | 25 |
| -450 | 450 | 88 | 2,133 | 245 | 1,199 | 660 | 138 | 45 | 70 | 710 | 514 | 25 |
| -500 | 500 | 97 | 2,329 | 245 | 1,301 | 711 | 138 | 45 | 70 | 761 | 565 | 25 |
| -600 | 600 | 116 | 2,714 | 245 | 1,504 | 812 | 138 | 45 | 70 | 862 | 667 | 25 |
| -700 | 700 | 136 | 3,102 | 245 | 1,707 | 914 | 138 | 45 | 70 | 964 | 768 | 25 |
| -800 | 800 | 155 | 3,486 | 215 | 1,910 | 1,015 | 138 | 45 | 70 | 1,065 | 870 | 25 |
| -900 | 900 | 167 | 3,785 | 181 | 2,156 | 1,164 | 138 | 45 | 70 | 1,214 | 967 | 25 |
| -1000 | 1,000 | 117 | 3,824 | 147 | 2,356 | 1,264 | 138 | 45 | 70 | 1,314 | 1,067 | 25 |
| -1200 | 1,200 | 103 | 4,722 | 107 | 2,756 | 1,464 | 138 | 45 | 70 | 1,514 | 1,267 | 25 |
| -1400 | 1,400 | 73 | 2,851 | 66 | 3,156 | 1,664 | 138 | 45 | 70 | 1,714 | 1,467 | 25 |
| -1500 | 1,500 | 66 | 2,438 | 55 | 3,384 | 1,778 | 138 | 45 | 70 | 1,828 | 1,581 | 25 |

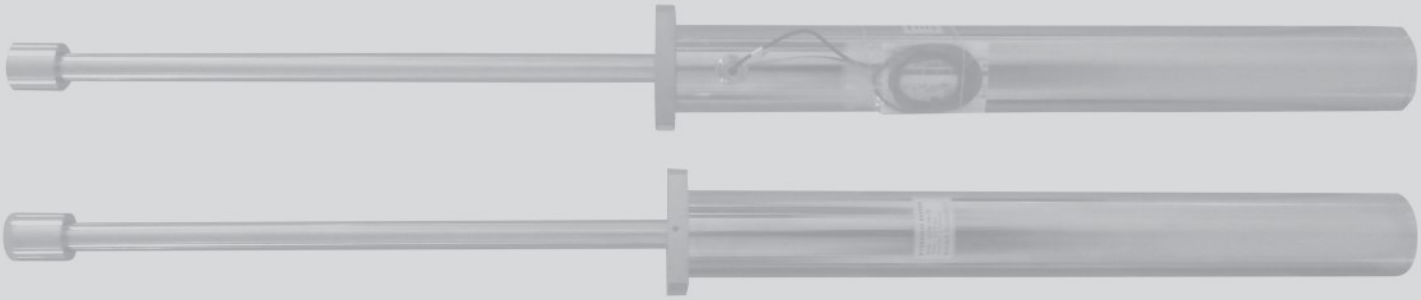


## KCSC 200 Series

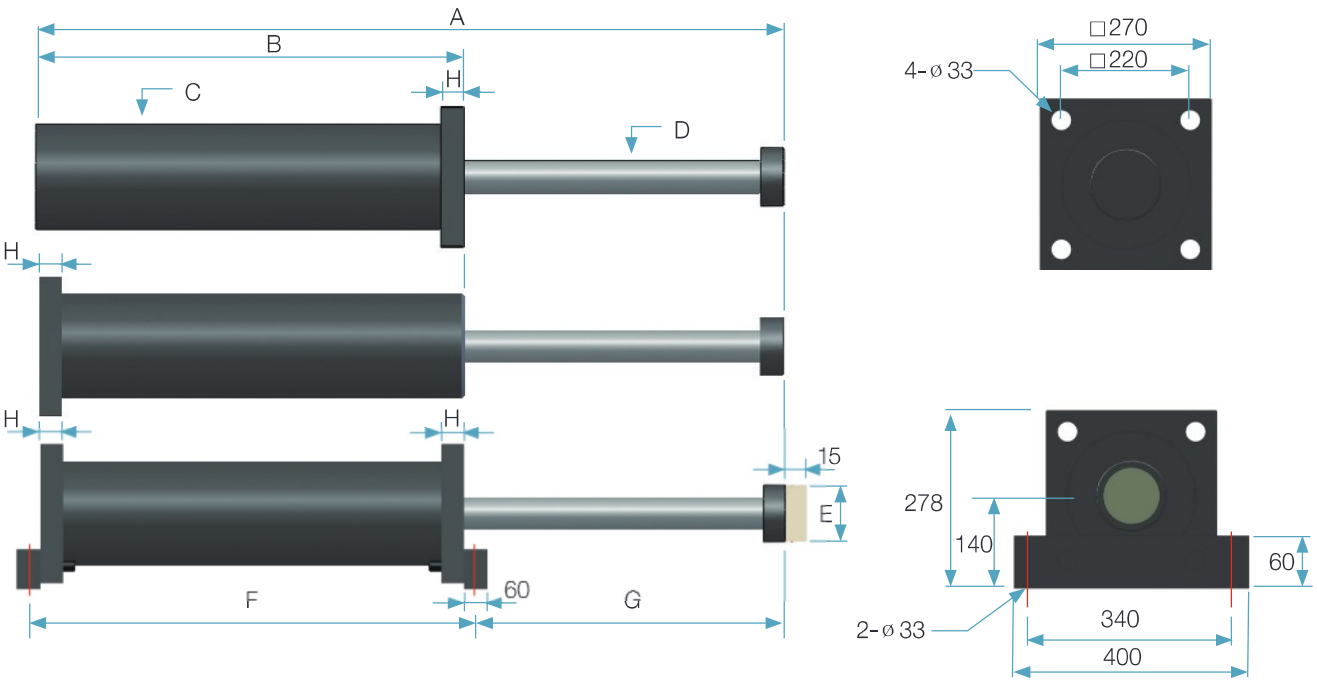



## Engineering Data & Dimensions

| Model | Stroke (mm) S | Max. Energy /Cycle (kJ) $E_T$ | Max. Energy /Hour (kJ/hr) $E_TC$ | Max. Shock Foce (kN) $F_S$ | Dimension (unit : mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | E | F | G | H |
| KCSC200-50 | 50 | 16 | 943 | 370 | 430 | 294 | 200 | 65 | 100 | 344 | 111 | 40 |
| -100 | 100 | 31 | 1,534 | 370 | 532 | 345 | 200 | 65 | 100 | 395 | 162 | 40 |
| -150 | 150 | 47 | 1,756 | 370 | 632 | 395 | 200 | 65 | 100 | 445 | 212 | 40 |
| -200 | 200 | 63 | 1,988 | 370 | 735 | 447 | 200 | 65 | 100 | 497 | 263 | 40 |
| -250 | 250 | 79 | 2,210 | 370 | 836 | 497 | 200 | 65 | 100 | 547 | 314 | 40 |
| -300 | 300 | 93 | 2,855 | 370 | 1,032 | 642 | 200 | 65 | 100 | 692 | 365 | 40 |
| -400 | 400 | 126 | 3,304 | 370 | 1,234 | 743 | 200 | 65 | 100 | 793 | 466 | 40 |
| -500 | 500 | 157 | 3,758 | 370 | 1,438 | 845 | 200 | 65 | 100 | 895 | 568 | 40 |
| -600 | 600 | 188 | 4,211 | 370 | 1,642 | 947 | 200 | 65 | 100 | 997 | 670 | 40 |
| -700 | 700 | 220 | 4,661 | 370 | 1,844 | 1,048 | 200 | 65 | 100 | 1098 | 771 | 40 |
| -800 | 800 | 251 | 5,114 | 370 | 2,048 | 1,150 | 200 | 65 | 100 | 1,200 | 873 | 40 |
| -900 | 900 | 283 | 5,568 | 370 | 2,252 | 1,252 | 200 | 65 | 100 | 1,302 | 975 | 40 |
| -1000 | 1,000 | 240 | 6,117 | 300 | 2,454 | 1,353 | 200 | 65 | 100 | 1,403 | 1,076 | 40 |
| -1200 | 1,200 | 210 | 4,920 | 200 | 2,854 | 1,553 | 200 | 65 | 100 | 1,603 | 1,276 | 40 |

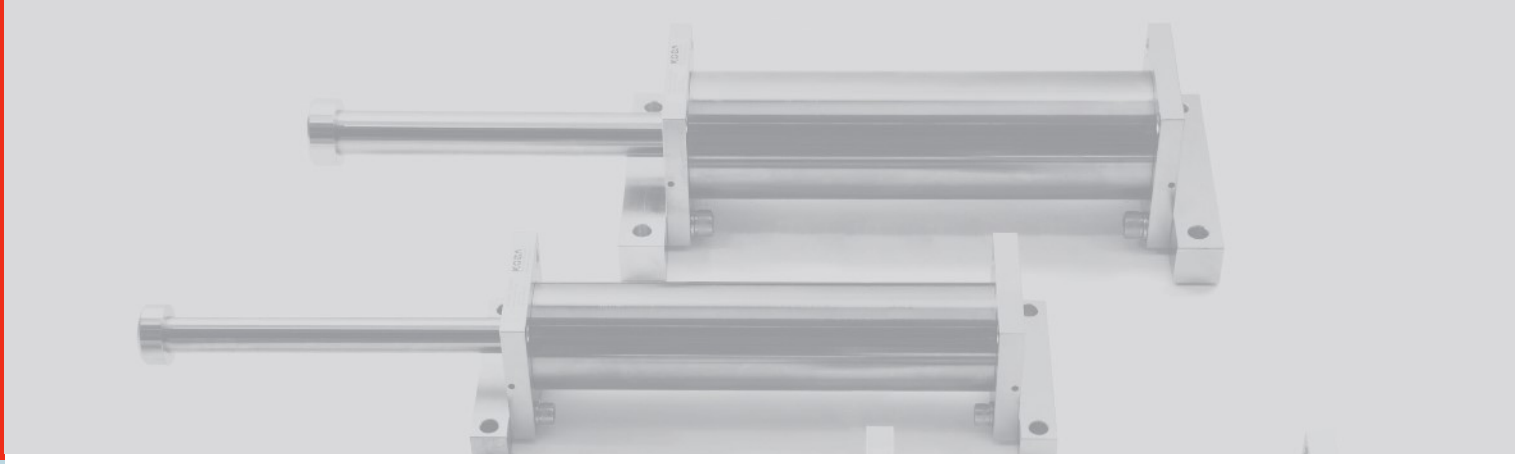


## KCSC 215 Series

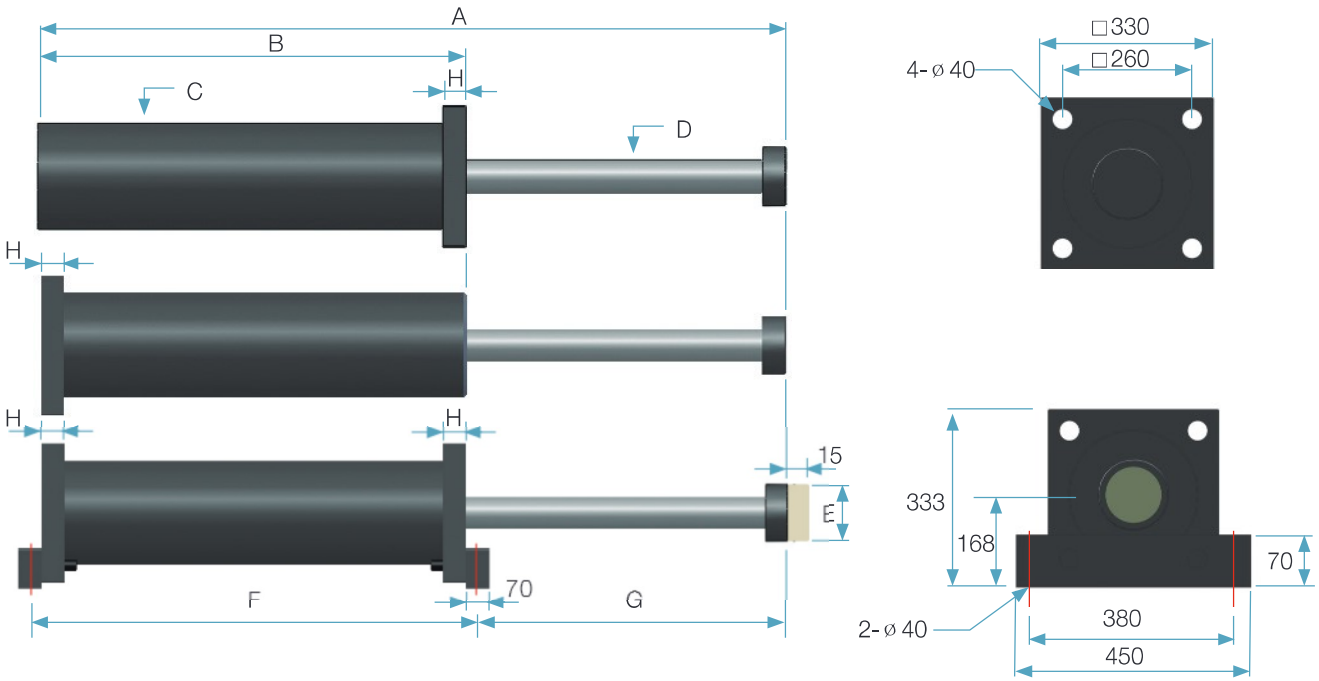



## Engineering Data & Dimensions

| Model | Stroke (mm) S | Max. Energy /Cycle (kJ) $E_T$ | Max. Energy /Hour (kJ/hr) $E_TC$ | Max. Shock Foce (kN) $F_s$ | Dimension (unit : mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | E | F | G | H |
| KCSC215-100 | 100 | 48 | 1,804 | 560 | 591 | 375 | 215 | 80 | 125 | 435 | 186 | 40 |
| -150 | 150 | 72 | 2,051 | 560 | 693 | 426 | 215 | 80 | 125 | 486 | 237 | 40 |
| -200 | 200 | 96 | 2,290 | 560 | 795 | 477 | 215 | 80 | 125 | 537 | 288 | 40 |
| -250 | 250 | 120 | 2,530 | 560 | 895 | 527 | 215 | 80 | 125 | 587 | 338 | 40 |
| -300 | 300 | 143 | 2,775 | 560 | 997 | 578 | 215 | 80 | 125 | 638 | 389 | 40 |
| -400 | 400 | 191 | 3,265 | 560 | 1,201 | 680 | 215 | 80 | 125 | 740 | 491 | 40 |
| -500 | 500 | 239 | 4,234 | 560 | 1,504 | 882 | 215 | 80 | 125 | 942 | 592 | 40 |
| -600 | 600 | 287 | 4,741 | 560 | 1,708 | 984 | 215 | 80 | 125 | 1,044 | 694 | 40 |
| -700 | 700 | 334 | 5,209 | 560 | 1,910 | 1,085 | 215 | 80 | 125 | 1,145 | 795 | 40 |
| -800 | 800 | 382 | 5,699 | 560 | 2,114 | 1,187 | 215 | 80 | 125 | 1,247 | 897 | 40 |
| -1000 | 1,000 | 478 | 6,687 | 560 | 2,520 | 1,390 | 215 | 80 | 125 | 1,450 | 1,100 | 40 |
| -1200 | 1,200 | 417 | 6,255 | 435 | 2,920 | 1,590 | 215 | 80 | 125 | 1,650 | 1,300 | 40 |



## KCSC 275 Series




## Engineering Data & Dimensions

| Model | Stroke (mm) S | Max. Energy /Cycle (kJ) $E_T$ | Max. Energy /Hour (kJ/hr) $E_TC$ | Max. Shock Foce (kN) $F_S$ | Dimension (unit : mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | E | F | G | H |
| KCSC275-100 | 100 | 78 | 2,445 | 915 | 637 | 391 | 275 | 100 | 160 | 461 | 211 | 50 |
| -150 | 150 | 117 | 2,766 | 915 | 737 | 441 | 275 | 100 | 160 | 511 | 261 | 50 |
| -200 | 200 | 156 | 3,053 | 915 | 839 | 492 | 275 | 100 | 160 | 562 | 312 | 50 |
| -250 | 250 | 194 | 3,373 | 915 | 941 | 543 | 275 | 100 | 160 | 613 | 363 | 50 |
| -300 | 300 | 233 | 3,767 | 915 | 1,043 | 594 | 275 | 100 | 160 | 664 | 414 | 50 |
| -400 | 400 | 311 | 4,303 | 915 | 1,246 | 696 | 275 | 100 | 160 | 766 | 515 | 50 |
| -500 | 500 | 389 | 4,934 | 915 | 1,450 | 798 | 275 | 100 | 160 | 868 | 617 | 50 |
| -600 | 600 | 467 | 6,186 | 915 | 1,769 | 1,015 | 275 | 100 | 160 | 1,085 | 719 | 50 |
| -750 | 750 | 583 | 7,117 | 915 | 2,073 | 1,167 | 275 | 100 | 160 | 1,237 | 871 | 50 |
| -900 | 900 | 700 | 8,048 | 915 | 2,379 | 1,320 | 275 | 100 | 160 | 1,390 | 1,024 | 50 |
| -1050 | 1,050 | 816 | 8,970 | 915 | 2,683 | 1,472 | 275 | 100 | 160 | 1,542 | 1,176 | 50 |
| -1200 | 1,200 | 790 | 8,061 | 827 | 2,989 | 1,625 | 275 | 100 | 160 | 1,695 | 1,329 | 50 |

KOBA
Best Energy Absorption

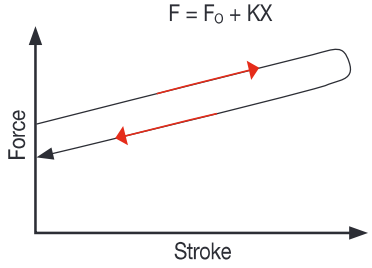
# KES Series
## Visco-Elastic Buffer

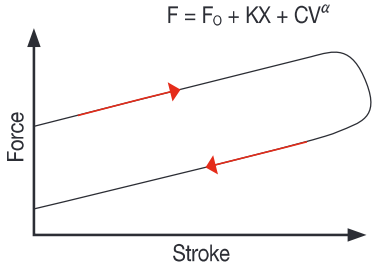
*KES series is designed and developed to use the unique hydrostatic compression characteristics of special Visco-elastomers. KES has compact and reliable design and high damping coefficient. KES has advantage to get energy absorption and return spring function in a single unit without additional gas or mechanical spring return mechanism. It is allowed to use various range of temperature with stable damping force.*

## Brief Overview

- Impact velocity up to 5m/s
- Temperature range : -40 ℃~80℃
- Piston Rod : Hard Chrome( over 25㎛)
- Body protection : epoxy paint, nickel or zinc plated

| Preload spring function | Visco-elastic function |
|---|---|
| $F_0$ : initial force<br>C : damping coefficient , V : impact velocity , $0.1 \leq \alpha \leq 0.4$ | |
| $F = F_0 + KX$ | $F = F_0 + KX + CV^{\alpha}$ |




## KES Series Ordering Information

KES M - 116 - 50 - RF

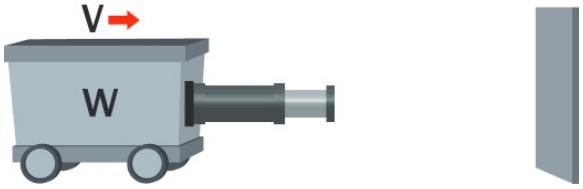
- RF:Rear Flange, FF:Front Flange, FM:Foot Mount
- Stroke
- Body Dia
- Model : M, E, S, H
- Series

M : Mini
E : ENERGY
S : Stroke
H : Heavy

## Application worksheet (Model selection)

### Example : KESM Series

- Impact velocity ($V_e$) : 1.5 m/s
- Impact mass ($W_e$) : 5 ton
- Impact frequency : 20 impact/h




1. Energy calculation (E)

$$E_T = \frac{1}{2} W_e V_e^2 \qquad E = \frac{1}{2} \times 5{,}000 \times 1.5^2 = 5{,}625\ Nm = 5.6\ kJ$$

2. Temporary Model Selection

KESM90-60 $\qquad E_T = 7\,[kJ] \qquad (E < E_T)$

KESS50-150 $\qquad E_T = 6\,[kJ]$

3. Allowable Impact Frequency

- case1 : KESM90-60 $\qquad C_e = 20 < 20 \cdot \frac{E_T}{E} = 20 \cdot \frac{7}{5.6} = 25\ [\text{impact/h}]$
- case2 : KESS50-150 $\qquad C_e = 20 > 8 \cdot \frac{E_T}{E} = 8 \cdot \frac{6}{5.6} = 8.57\ [\text{impact/h}]$ (Not satisfied)

4. Required Stroke Calculation

$$S_e = S\left(\sqrt{\frac{E}{E_T(0.03V + 0.24)}} + 1.36 - 1.17\right)$$

$$= 60\left(\sqrt{\frac{5.6}{7\,(0.03 \times 1.5 + 0.24)}} + 1.36 - 1.17\right) = 52.3[\text{mm}]$$

5. Calculation of Effective Reaction

$$F_{ME} = \left[\left(\frac{RDmax - RDmin}{S}\right) S_e + RDmin\right](0.1 \times V_e + 0.8)$$

$$= \left[\left(\frac{150 - 90}{60}\right) \times 52.3 + 90\right](0.1 \times 1.5 + 0.8) = 135.18[\text{kN}]$$

6. Final Model Selection

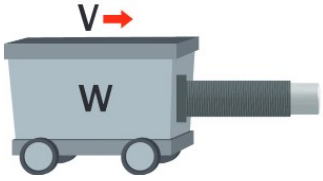
KESM90-60

$E_T$ : Max Energy/cycle(kJ)

## Application worksheet (Model selection)

### Example : KESE Series

- Impact velocity ($V_e$) : 1.8 m/s
- Impact mass ($W_e$) : 40 ton
- Impact frequency ($C_e$) : 15 impact/h




1. Energy calculation (E)

$$E_T = \frac{1}{2} W_e V_e^2 \qquad E = \frac{1}{2} \times 40{,}000 \times 1.8^2 = 64{,}800\ Nm = 64.8\ kJ$$

2. Temporary Model Selection

KESE160-140 $\qquad E_T = 75\,[kJ] \qquad (E < E_T)$

KESS110-400H $\qquad E_T = 100\,[kJ]$

3. Allowable Impact Frequency

- case1 : KESE160-140 $\qquad C_e = 15 < 15 \cdot \frac{E_T}{E} = 15 \cdot \frac{75}{64.8} = 17.36$ [impact/h]
- case2 : KESS110-400H $\qquad C_e = 15 > 8 \cdot \frac{E_T}{E} = 8 \cdot \frac{100}{64.8} = 12.34$ [impact/h] (Not satisfied)

4. Required Stroke Calculation

$$S_e = S\left(\sqrt{\frac{E}{E_T(0.03V + 0.24)}} + 1.36 - 1.17\right)$$

$$= 140\left(\sqrt{\frac{64.8}{75\,(0.03 \times 1.8 + 0.24)}} + 1.36 - 1.17\right) = 126.47[\text{mm}]$$

5. Calculation of Effective Reaction

$$F_{ME} = \left[\left(\frac{RDmax - RDmin}{S}\right)S_e + RDmin\right](0.1 \times V_e + 0.8)$$

$$= \left[\left(\frac{700 - 400}{140}\right) \times 126.47 + 400\right](0.1 \times 1.8 + 0.8) = 657.87[\text{kN}]$$

6. Final Model Selection

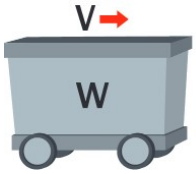
KESE160-140

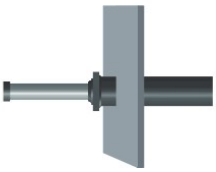
$E_T$ : Max Energy/cycle(kJ)

## Application worksheet (Model selection)

### Example : KESS Series

- Impact velocity ($V_e$) : 2.8 m/s
- Impactor mass ($W_e$) : 20 ton
- Impact frequency ($C_e$) : 8 impact/h
- Allowable Reaction Force : 350 kN
- Allowable D1 : 150 mm



1. Energy calculation (E)

$$E = \frac{1}{2} W_e V_e^2 \qquad E = \frac{1}{2} \times 20{,}000 \times 2.8^2 = 78{,}400\ Nm = 78.4\ kJ$$

2. Temporary Model Selection

KESS110-400H $\qquad E_T = 100\,[kJ] \qquad (E < E_T)$

3. Allowable Impact Frequency

$$C_e = 8 < 8 \cdot \frac{E_T}{E} = 8 \cdot \frac{100}{78.4} = 10.2\ [\text{impact/h}]$$

4. Required Stroke Calculation

$$S_e = S\left(\sqrt{\frac{E}{E_T(0.03V + 0.24)}} + 1.36 - 1.17\right)$$

$$= 400\left(\sqrt{\frac{78.4}{100\,(0.03 \times 2.8 + 0.24)}} + 1.36 - 1.17\right) = 290.8[\text{mm}]$$

5. Calculation of Effective Reaction

$$F_{ME} = \left[\left(\frac{RDmax - RDmin}{S}\right) S_e + RDmin\right](0.1 \times V_e + 0.8)$$

$$= \left[\left(\frac{320 - 175}{400}\right) \times 290.8 + 175\right](0.1 \times 2.8 + 0.8) = 302.8[\text{kN}]$$

6. Final Model Selection

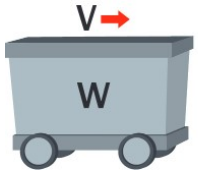
KESS110-400H

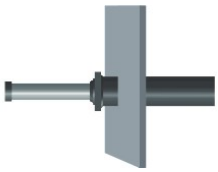
$E_T$ : Max Energy/cycle(kJ)

## Application worksheet (Model selection)

### Example : KESH Series

- Impact velocity ($V_e$) : 2.8 m/s
- Impactor mass ($W_e$) : 80 ton
- Impact frequency ($C_e$) : 8 impact/h
- Allowable Reaction Force : 650 kN



1. Energy calculation (E)

$$E = \frac{1}{2} W_e V_e^2 \qquad E = \frac{1}{2} \times 80{,}000 \times 2.8^2 = 313{,}600\ Nm = 313.6\ kJ$$

2. Temporary Model Selection

KESH175-850 $\qquad E_T = 400\,[kJ] \qquad (E < E_T)$

3. Allowable Impact Frequency

$$C_e = 8 < 8 \cdot \frac{E_T}{E} = 8 \cdot \frac{400}{313.6} = 10.2\ [\text{impact/h}]$$

4. Required Stroke Calculation

$$S_e = S\left(\sqrt{\frac{E}{E_T(0.03V + 0.24)}} + 1.36 - 1.17\right)$$

$$= 850\left(\sqrt{\frac{313.6}{400\,(0.03 \times 2.8 + 0.24)}} + 1.36 - 1.17\right) = 658.0[\text{mm}]$$

5. Calculation of Effective Reaction

$$F_{ME} = \left[\left(\frac{RDmax - RDmin}{S}\right) S_e + RDmin\right](0.1 \times V_e + 0.8)$$

$$= \left[\left(\frac{600\text{-}330}{850}\right) \times 658.0 + 330\right](0.1 \times 2.8 + 0.8) = 582.1[\text{kN}]$$

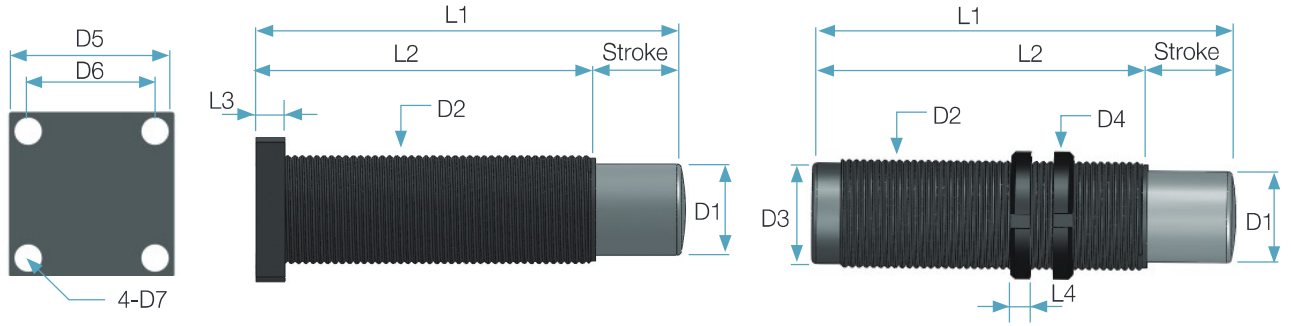
6. Final Model Selection

KESH175-850

$E_T$ : Max Energy/cycle(kJ)

## KESM Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Dyn. Reaction Force (kN) | | Impact Velocity (m/s) | Weight (kg) |
|---|---|---|---|---|---|---|
| | | | RDmin | RDmax | max | |
| KESM25- 12 | 12 | 0.1 | 6 | 11 | 2 | 0.3 |
| KESM35- 22 | 22 | 0.4 | 14 | 27 | 4 | 0.7 |
| KESM40- 22 | 22 | 0.4 | 14 | 27 | 5 | 0.8 |
| KESM50- 35 | 35 | 1.5 | 28 | 60 | 5 | 1.9 |
| KESM60- 35 | 35 | 1.5 | 28 | 60 | 5 | 2 |
| KESM75- 45 | 45 | 3.5 | 45 | 100 | 5 | 5 |
| KESM90- 60 | 60 | 7 | 90 | 150 | 5 | 10.5 |
| KESM110-80 | 80 | 14 | 130 | 230 | 5 | 17 |

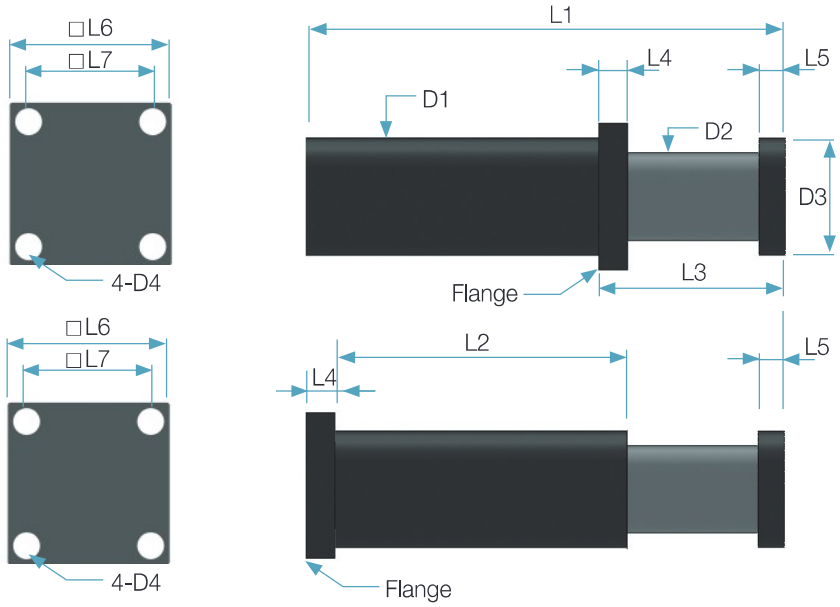



## Dimensions (unit : mm)

| | L1 | L2 | L3 | L4 | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm |
| KESM25-12 | 75 | 53 | 10 | 7 | 19 | M25x1.5 | 20 | 38 | 57 | 41 | 7 |
| KESM35-22 | 120 | 98 | 12 | 8 | 25 | M35x1.5 | 32 | 52 | 80 | 60 | 9 |
| KESM40-22 | 120 | 98 | 12 | 9 | 25 | M40x1.5 | 32 | 58 | - | - | - |
| KESM50-35 | 175 | 140 | 12 | 11 | 38 | M50x1.5 | 45 | 70 | 90 | 70 | 9 |
| KESM60-35 | 175 | 140 | 12 | 11 | 38 | M60x2.0 | 45 | 70 | - | - | - |
| KESM75-45 | 213 | 168 | 10 | 13 | 60 | M75x2.0 | 72 | 98 | 122 | 100 | 11 |
| KESM90-60 | 270 | 210 | 12 | 16 | 74.5 | M90x2.0 | 90 | 120 | 150 | 120 | 13 |
| KESM110-80 | 337 | 257 | 14 | 19 | 90 | M110x2.0 | 110 | 145 | 175 | 143 | 18 |

## KESE Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) ET | Dyn. Reaction Force (kN) | | Impact Velocity (m/s) | Weight (kg) |
|---|---|---|---|---|---|---|
| | | | RDmin | RDmax | max | |
| KESE116-105 | 105 | 25 | 167 | 310 | 4 | 25 |
| KESE142-130 | 130 | 50 | 260 | 500 | 4 | 37 |
| KESE160-140 | 140 | 75 | 400 | 700 | 4 | 45 |
| KESE180-160 | 160 | 100 | 470 | 820 | 4 | 73 |
| KESE215-180 | 180 | 150 | 640 | 1100 | 4 | 117 |

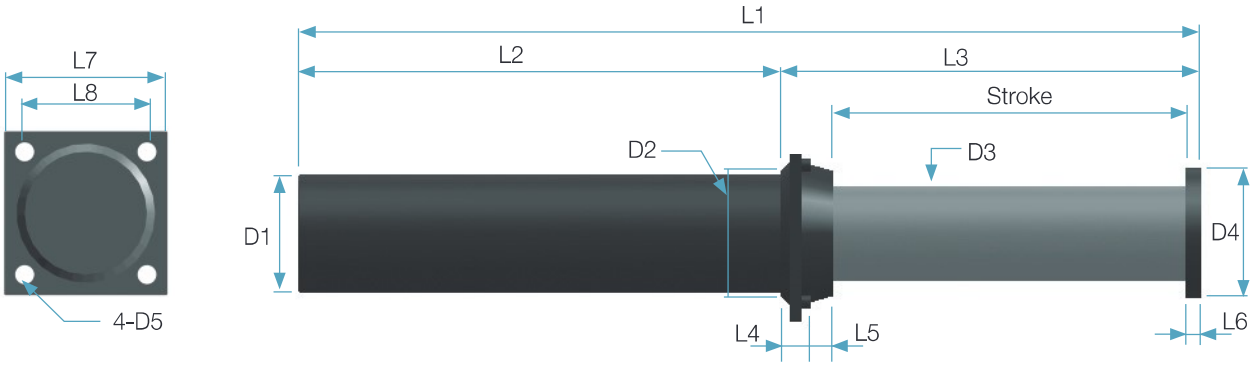



## Dimensions (unit : mm)

| Model | L1 | L2 | L3 | L4 | L5 | L6 | L7 | D1 | D2 | D3 | D4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KESE116-105 | 415 | 275 | 140 | 20 | 15 | 135 | 105 | 116 | 87 | 120 | 14 |
| KESE142-130 | 500 | 325 | 175 | 30 | 15 | 155 | 125 | 142 | 117 | 140 | 15 |
| KESE160-140 | 520 | 315 | 205 | 30 | 35 | 175 | 140 | 160 | 132 | 158 | 18 |
| KESE180-160 | 585 | 350 | 235 | 35 | 40 | 215 | 170 | 180 | 153 | 185 | 22 |
| KESE215-180 | 670 | 405 | 265 | 40 | 45 | 250 | 195 | 215 | 182 | 220 | 26 |

## KESS Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Dyn. Reaction Force (kN) | | Impact Velocity (m/s) | Weight (kg) |
|---|---|---|---|---|---|---|
| | | | RDmin | RDmax | max | |
| KESS50- 150 | 150 | 6 | 25 | 50 | 3 | 4.2 |
| KESS75- 150 | 150 | 12 | 66 | 100 | 3 | 11 |
| KESS75- 200 | 200 | 12 | 42 | 78 | 3 | 11 |
| KESS90- 200 | 200 | 25 | 95 | 150 | 3 | 20 |
| KESS90- 270 | 270 | 25 | 66 | 112 | 3 | 25 |
| KESS110- 275 | 275 | 50 | 118 | 230 | 3 | 40 |
| KESS110- 400 | 400 | 50 | 75 | 150 | 3 | 40 |
| **KESS110-400H** | 400 | 100 | 175 | 320 | 3 | 65 |
| KESS110- 600 | 600 | 100 | 85 | 230 | 3 | 65 |
| KESS110- 800 | 800 | 150 | 80 | 250 | 3 | 115 |

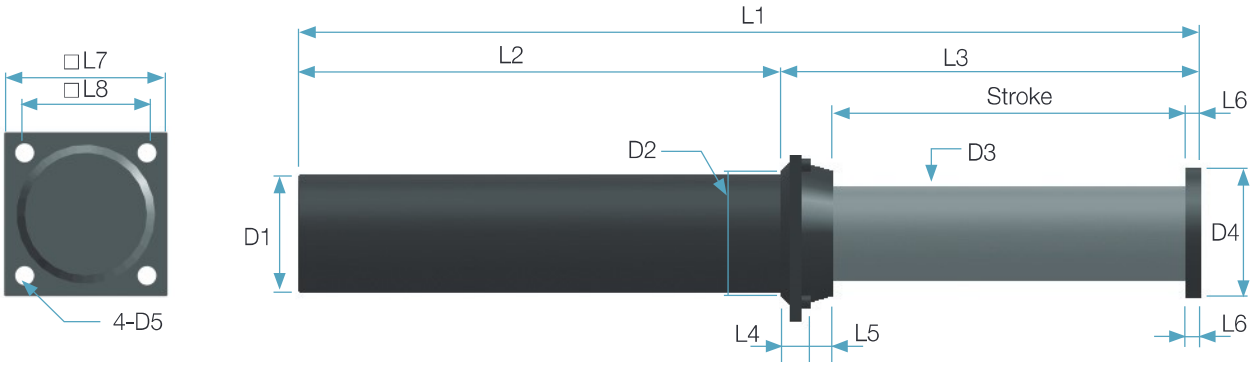



## Dimensions (unit : mm)

| Model | L1 mm | L2 mm | L3 mm | L4 mm | L5 mm | L6 mm | L7 mm | L8 mm | D1 mm | D2 mm | D3 mm | D4 mm | D5 mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KESS50- 150 | 410 | 231 | 179 | 19 | 0 | 10 | 90 | 70 | 50 | 90 | 38 | 50 | 9 |
| KESS75- 150 | 480 | 285 | 195 | 18 | 15 | 12 | 110 | 85 | 75 | 90 | 57 | 80 | 11 |
| KESS75- 200 | 530 | 285 | 245 | 18 | 15 | 12 | 110 | 85 | 75 | 90 | 57 | 80 | 11 |
| KESS90- 200 | 620 | 370 | 250 | 20 | 18 | 12 | 135 | 105 | 90 | 110 | 72 | 100 | 14 |
| KESS90- 270 | 690 | 370 | 320 | 20 | 18 | 12 | 135 | 105 | 90 | 110 | 72 | 100 | 14 |
| KESS110-275 | 855 | 520 | 335 | 25 | 20 | 15 | 175 | 140 | 110 | 150 | 87 | 120 | 18 |
| KESS110-400 | 980 | 520 | 460 | 25 | 20 | 15 | 175 | 140 | 110 | 150 | 87 | 120 | 18 |
| **KESS110-400H** | 1,370 | 910 | 460 | 25 | 20 | 15 | 175 | 140 | 110 | 150 | 87 | 120 | 18 |
| KESS110-600 | 1,570 | 910 | 660 | 25 | 20 | 15 | 175 | 140 | 110 | 150 | 87 | 120 | 18 |
| KESS110-800 | 2,640 | 1,780 | 860 | 25 | 20 | 15 | 175 | 140 | 110 | 150 | 87 | 120 | 18 |

## KESH Series
## Engineering Data

| Model | Stroke (mm) S | Max.Energy / Cycle (kJ) $E_T$ | Dyn. Reaction Force (kN) | | Impact Velocity (m/s) | Weight (kg) |
|---|---|---|---|---|---|---|
| | | | RDmin | RDmax | max | |
| KESH130- 400 | 400 | 100 | 190 | 310 | 3 | 63 |
| KESH140- 500 | 500 | 150 | 200 | 380 | 3 | 90 |
| **KESH140-400H** | 400 | 220 | 380 | 685 | 3 | 100 |
| KESH155- 650 | 650 | 250 | 270 | 490 | 3 | 135 |
| KESH175- 850 | 850 | 400 | 330 | 600 | 3 | 218 |
| KESH200- 1050 | 1,050 | 600 | 370 | 740 | 3 | 295 |
| KESH220- 1200 | 1,200 | 800 | 430 | 860 | 3 | 420 |
| KESH230- 1300 | 1,300 | 1,000 | 500 | 1,000 | 3 | 470 |



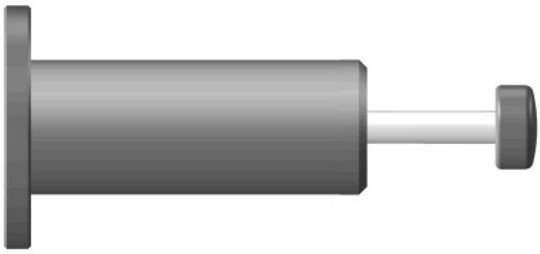

## Dimensions (unit : mm)

| Model | L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | D1 | D2 | D3 | D4 | D5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm |
| KESH130- 400 | 1,120 | 660 | 460 | 25 | 20 | 15 | 175 | 140 | 130 | 150 | 110 | 140 | 18 |
| KESH140- 500 | 1,350 | 775 | 575 | 30 | 25 | 20 | 215 | 170 | 140 | 185 | 120 | 150 | 22 |
| **KESH140-400H** | 1,258 | 783 | 475 | 30 | 25 | 20 | 215 | 170 | 140 | 185 | 120 | 150 | 22 |
| KESH155- 650 | 1,750 | 1,025 | 725 | 30 | 25 | 20 | 215 | 170 | 155 | 185 | 135 | 170 | 22 |
| KESH175- 850 | 2,185 | 1,250 | 935 | 35 | 25 | 25 | 265 | 210 | 175 | 235 | 150 | 190 | 27 |
| KESH200- 1050 | 2,555 | 1,420 | 1,135 | 35 | 25 | 25 | 265 | 210 | 200 | 235 | 175 | 215 | 27 |
| KESH220- 1200 | 2,935 | 1,630 | 1,305 | 40 | 35 | 30 | 300 | 240 | 220 | 270 | 190 | 235 | 30 |
| KESH230- 1300 | 3,225 | 1,820 | 1,405 | 40 | 35 | 30 | 300 | 240 | 230 | 270 | 205 | 248 | 30 |

# KVD Series
## Elasto-Fluid
## Heavy Duty Buffer

KOBA
Best Energy Absorption

*KVD Series is designed and developed to use the unique hydrostatic compression characteristics of special Visco-elastomers. KVD has compact and reliable design and high damping coefficient. KVD has advantage to get energy absorption and return spring function in a single unit without additional gas or mechanical spring*



Rear Flange Mount type

## Feature

- Long life span without maintenance and leakage
- 700kN up to 1,500kN(customer product)
- Temp erature range : -20℃~80℃
- Impact velocity : 0.02 ~ 5m/s
- Option : Bellows, Safety Cable
- Body protection : zinc plated or epoxy painting
- Option : Special painting : -40℃~120℃

## KVD Series Ordering Information

KVD 100 - 100 - RS - BC

- Accessory
  - C : Safety Cable
  - B : Bellows
- Mount Type
  - RS : Rear Flange Mount
  - FS : Front Flange Mount(option)
- Stroke
- Body Dia.
- Series

# www.kobapage.com




KOBA
Best Energy Absorption


**KOBA Co., Ltd.**

12F, A BLOCK, KABEULGREATVALLEY 32
DIGITALRO – 9GIL, GUMCHEON–GU, SEOUL, KOREA
Tel : +82-2-3397-7800 Fax : +82-2-3397-7811 E-mail : koba@koba.co.kr


※The specifications in catalog are subject to change without notice in order to improve performance