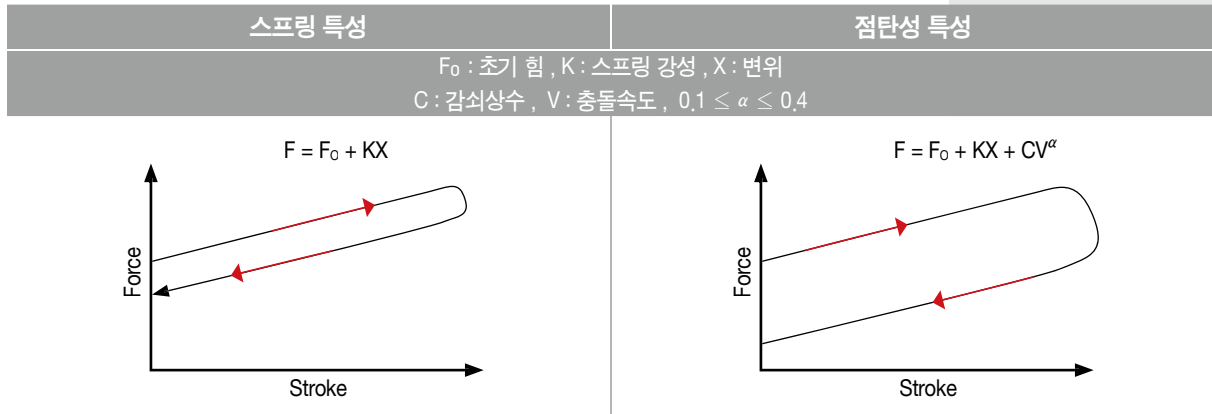




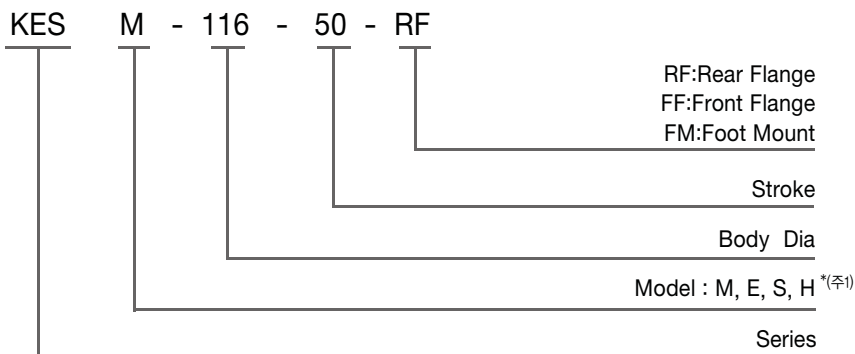
KES series는 점탄성유체의 유체 정역학적 압축 원리에 입각하여 스프링 또는 충격 완충기용으로 개발된 제품으로 구조가 단순하고 견고하여 작은 외관 크기에 비해 큰 감쇠력을 발휘할 수 있습니다. 하나의 구조에서 스프링 기능 및 충격 완충 기능을 모두 포함하고 있어 가스스프링이나 코일 스프링과 같은 복귀장치의 사용이 불필요하고, 광범위한 온도환경에서도 균일한 댐핑 성능을 유지할 수 있는 장점이 있습니다.

특징

- 최대 충돌속도 5m/s
- 사용온도 : -40 ℃~80℃
- Piston Rod : Hard Chrome(25 μ m 이상)
- Body 및 Mount : 흑착색 / 무전해 Ni도금/ 아연도금
- 사용처 : 모든 산업분야의 충격보호용, 특히 방어벽, 자동차, 철도차량, 해양산업, 제철, 제지산업등



KES Series Ordering Information



(주1)
M : Mini의 약어, 소형제품
E : ENERGY(에너지)의 약어
흡수에너지 기준 구별제품
S : Stroke 약어
Stroke 기준 구별제품
H : Heavy 약어, 중대형 제품

모델 선정 방법

Example : KESM Series

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



1. 총에너지 (E)

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

2. 모델가선택

KESM90-60 $E_T = 7 \text{ [kJ]} \quad (E < E_T)$

KESS50-150 $E_T = 6 \text{ [kJ]}$

3. 허용충돌횟수

■ case1 : KESM90-60 $C_e = 20 < 20 \cdot \frac{E_T}{E} = 20 \cdot \frac{7}{5.6} = 25 \text{ [impact/h]}$

■ case2 : KESS50-150 $C_e = 20 > 8 \cdot \frac{E_T}{E} = 8 \cdot \frac{6}{5.6} = 8.57 \text{ [impact/h]} \quad (\text{불만족})$

4. 유효행정

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

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

5. 유효반발력

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

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

6. 최종선택

KESM90-60

E_T : Max Energy/cycle(kJ)

모델 선정 방법

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. 총에너지 (E)

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

2. 모델가선택

KESE160-140 $E_T = 75 \text{ [kJ]} \quad (E < E_T)$

KESS110-400H $E_T = 100 \text{ [kJ]}$

3. 허용충돌횟수

■ case1 : KESE160-140 $C_e = 15 < 15 \cdot \frac{E_T}{E} = 15 \cdot \frac{75}{64.8} = 17.36 \text{ [impact/h]}$

■ case2 : KESS110-400H $C_e = 15 > 8 \cdot \frac{E_T}{E} = 8 \cdot \frac{100}{64.8} = 12.34 \text{ [impact/h]} \quad (\text{불만족})$

4. 유효행정

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

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

5. 유효반발력

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

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

6. 최종선택

KESE160-140

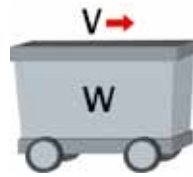
E_T : Max Energy/cycle(kJ)



모델 선정 방법

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. 총에너지 (E)

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

2. 모델가선정

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

3. 허용충돌횟수

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

4. 유효행정

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

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

5. 유효반발력

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

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

6. 최종선정

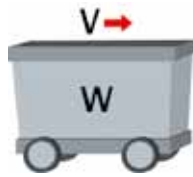
KESS110-400H

E_T : Max Energy/cycle(kJ)

모델 선정 방법

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. 총에너지 (E)

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

2. 모델가선정

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

3. 허용충돌횟수

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

4. 유효행정

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

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

5. 유효반발력

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

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

6. 최종선정

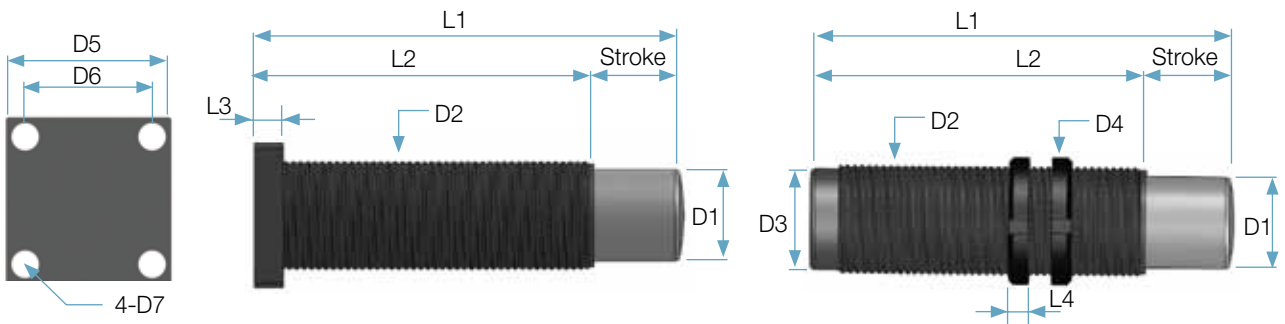
KESH175-850

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) max	Weight (kg)
			RDmin	RDmax		
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

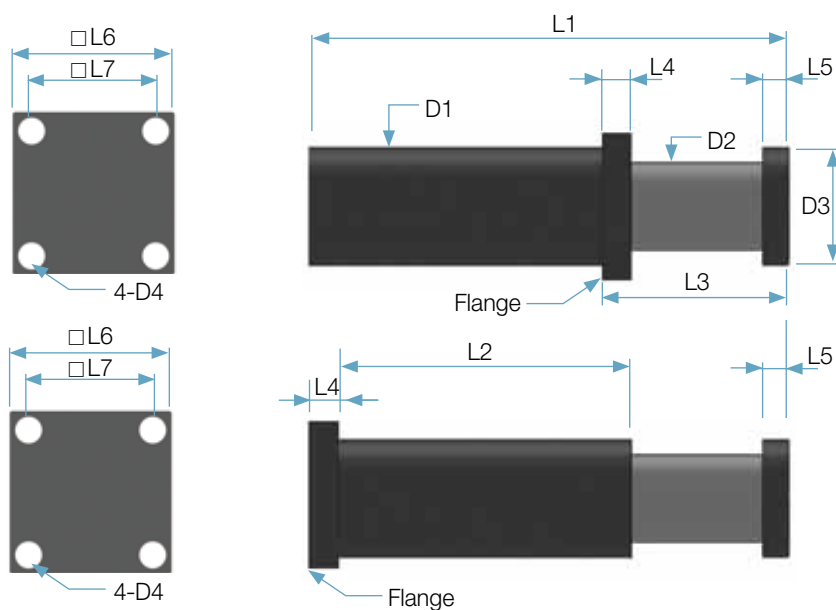


Dimensions (unit : mm)

Model	L1	L2	L3	L4	D1	D2	D3	D4	D5	D6	D7
mm	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) E _r	Dyn. Reaction Force (kN)		Impact Velocity (m/s) max	Weight (kg)
			RDmin	RDmax		
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



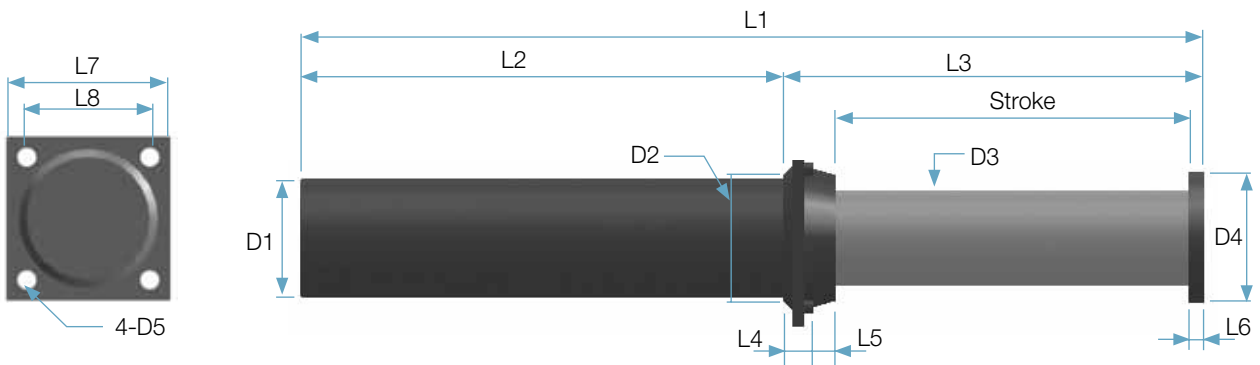
Dimensions (unit : mm)

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) max	Weight (kg)
			RDmin	RDmax		
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

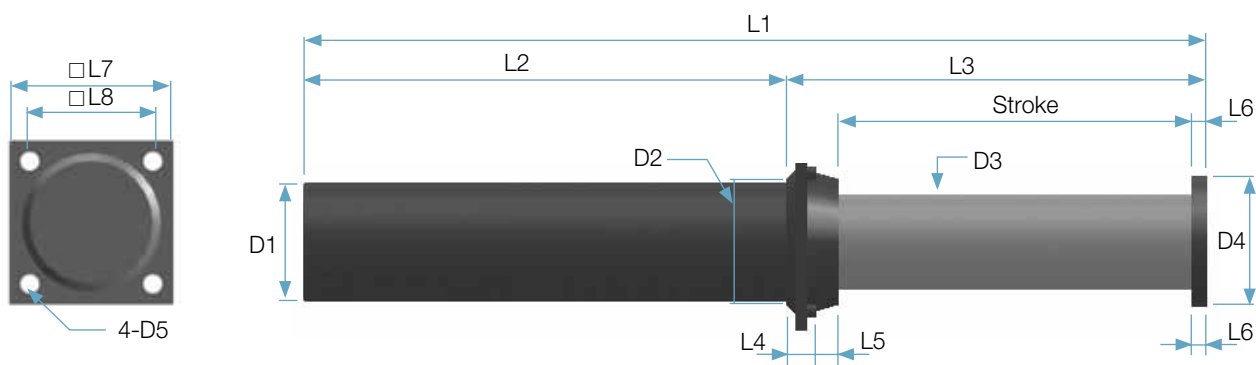


Dimensions (unit : mm)

Model	L1	L2	L3	L4	L5	L6	L7	L8	D1	D2	D3	D4	D5
Model	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	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) max	Weight (kg)
			RDmin	RDmax		
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