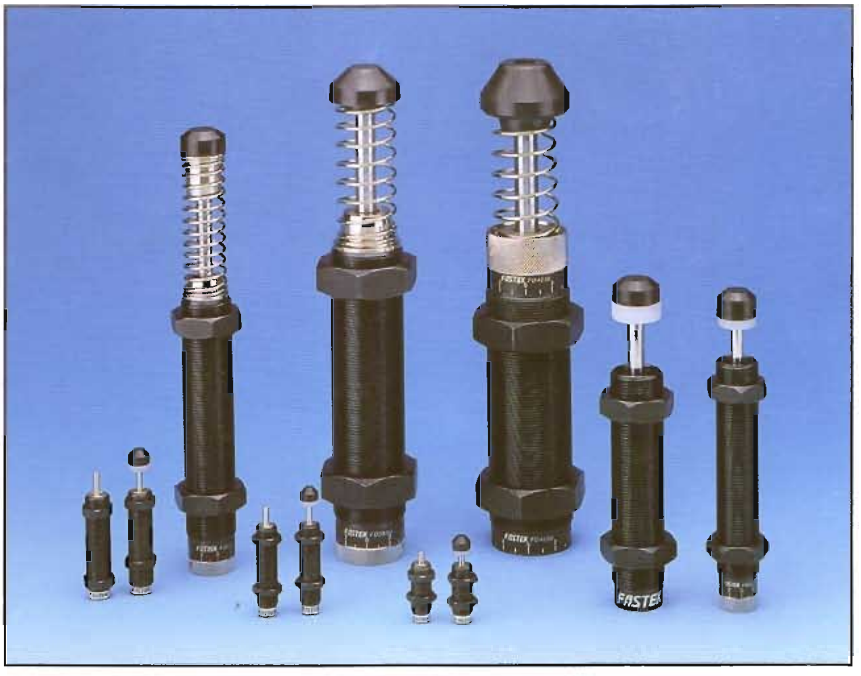
FASTEK

SHOCK ABSORBERS



FASTEK SHOCK ABSORBERS

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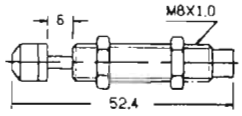
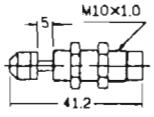
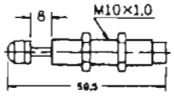
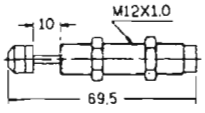
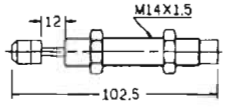
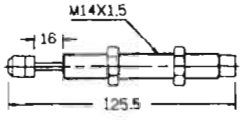
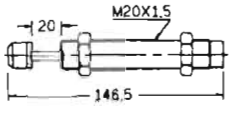
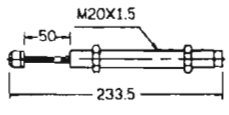
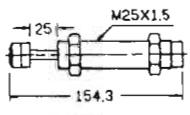
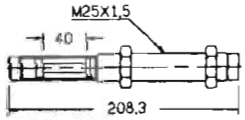
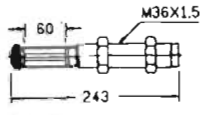
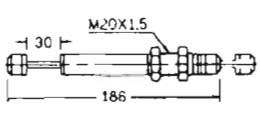
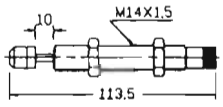
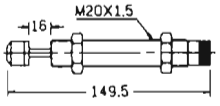
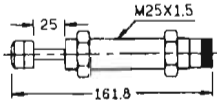
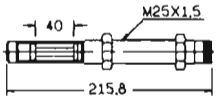
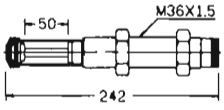
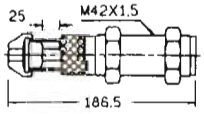
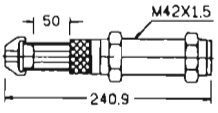
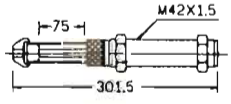
Specifications Table

■FC Series-self Compensation

Model	Dimensions	Max. Effective mass (Kg)	Max. Energy Absorbed per cycle (Nm)	Max. Impact Speed (m/s)	Without Cap	With Cap	Flange	Stop Collar	Page
FC-0806		0.5~6	2	0.5~2.0	○	○	-	○	5
FC-1005		1~7	3	0.8~3.5	○	○	-	○	5
FC-1008		2~9	4	0.8~3.0	○	○	-	○	6
FC-1210		5~30	5	0.8~3.0	○	○	-	○	6
FC-1412		8~100	15	0.8~3.0	○	○	-	○	7
FC-1416		10~150	20	0.8~3.0	○	○	-	○	7
FC-2020		30~700	40	1.0~3.5	○	○	-	○	8
FC-2050		600~1200	60	1.0~3.5	-	○	-	○	8
FC-2525		200~1500	80	1.0~4.0	-	○	-	○	9
FC-2540		300~2000	120	1.0~4.0	-	○	-	○	9
FC-3660		400~2400	250	1.0~4.0	-	○	○	○	10
FCD-2030		40~900	45	1.0~3.5	-	○	-	○	10

Specifications Table

■FC Series-self Compensation

Model	Dimensions	Max. Effective mass (Kg)	Max. Energy Absorbed per cycle (Nm)	Max. Impact Speed (m/s)	Without Cap	With Cap	Flange	Stop Collar	Page
FD-1410		80	20	3.0	○	○	-	○	11
FD-2016		200	25	3.5	○	○	-	○	11
FD-2525		400	85	3.5	-	○	-	○	12
FD-2540		700	100	3.5	-	○	-	○	12
FD-3650		1400	300	3	-	○	○	○	13
FD-4225		3000	260	3.5	-	○	○	-	13
FD-4250		4000	500	4.5	-	○	○	-	14
FD-4275		6000	750	4.5	-	○	○	-	14

Ordering Information

FC - 0806 - 1 - □

- FD : Adjustable
- FC : Non-Adjustable
- FCD : Double Cushion

Tube O.D.

Stroke mm

Select damping constant from graph:
- -1 : High Impact Speed
- -2 : Medium Impact Speed
- -3 : Low Impact Speed

Blank: With Cap
N : Without Cap

Why Do We Need Shock Absorbers

The simplest method to increase productivity is to raise machine operation speed. It often accompanies with excessive vibration and noise, damage to machines and products and decreasing in machine life. Most important of all, safety has to be sacrificed to a certain degree because of large shock forces generated.
FASTEK shock absorbers are developed to provide linear deceleration and therefore solve these problems. They can stop or change direction of moving objects smoothly and quietly without any compromising in safety. FASTEK shock absorbers are ideal for energy absorption and are being used whenever shock forces occur.

The Advantages Of Using FASTEK Shock Absorbers Include:

1. To increase production rate
2. To extend machine life
3. To simplify equipment design
4. To reduce maintenance
5. To reduce vibration and noise levels

Comparison Of Shock Absorbing Of Dash Pots, Rubber Materials Springs, Cylinder Cushion And FASTEK Shock Absorbers

In case of FASTEK shock absorbers compared with other buffering devices, such as spring, dash pots, air buffers, or rubber materials, resistant forces are different from one another. Only FASTEK shock absorbers can stop a moving object smoothly and quietly from the beginning to the end of impact stroke, Figure 1 shows a scheme of comparing shock forces generated by different cushioning materials. Through special design of fluid metering systen, FASTEK shock absorbers can provide a constant resistant force or linear deceleration throughout the entire impact stroke. all the kinetic energy of the moving object is converted into heat and dissipated into the air. Springs, air buffers and rubber materials only dissipate a small portion of the kinetic energy and store the renaining in elastic energy form. Therefore, large resistant forces and rebounding forces are inevitable near the end of the impact stroke. Without a delicate metering system, a dash pot will produce a large peak force at the beginning of the impact stroke.

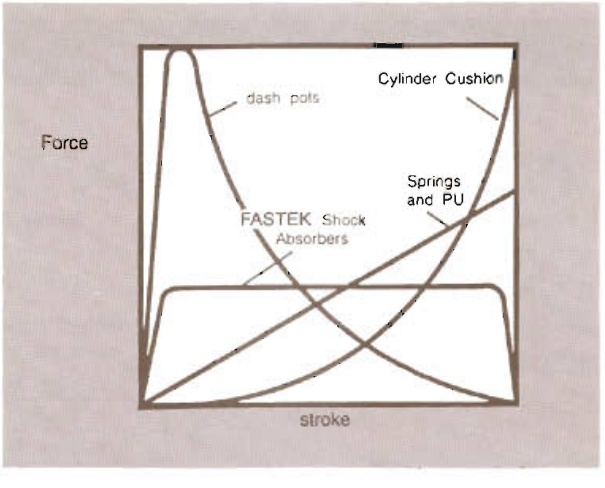
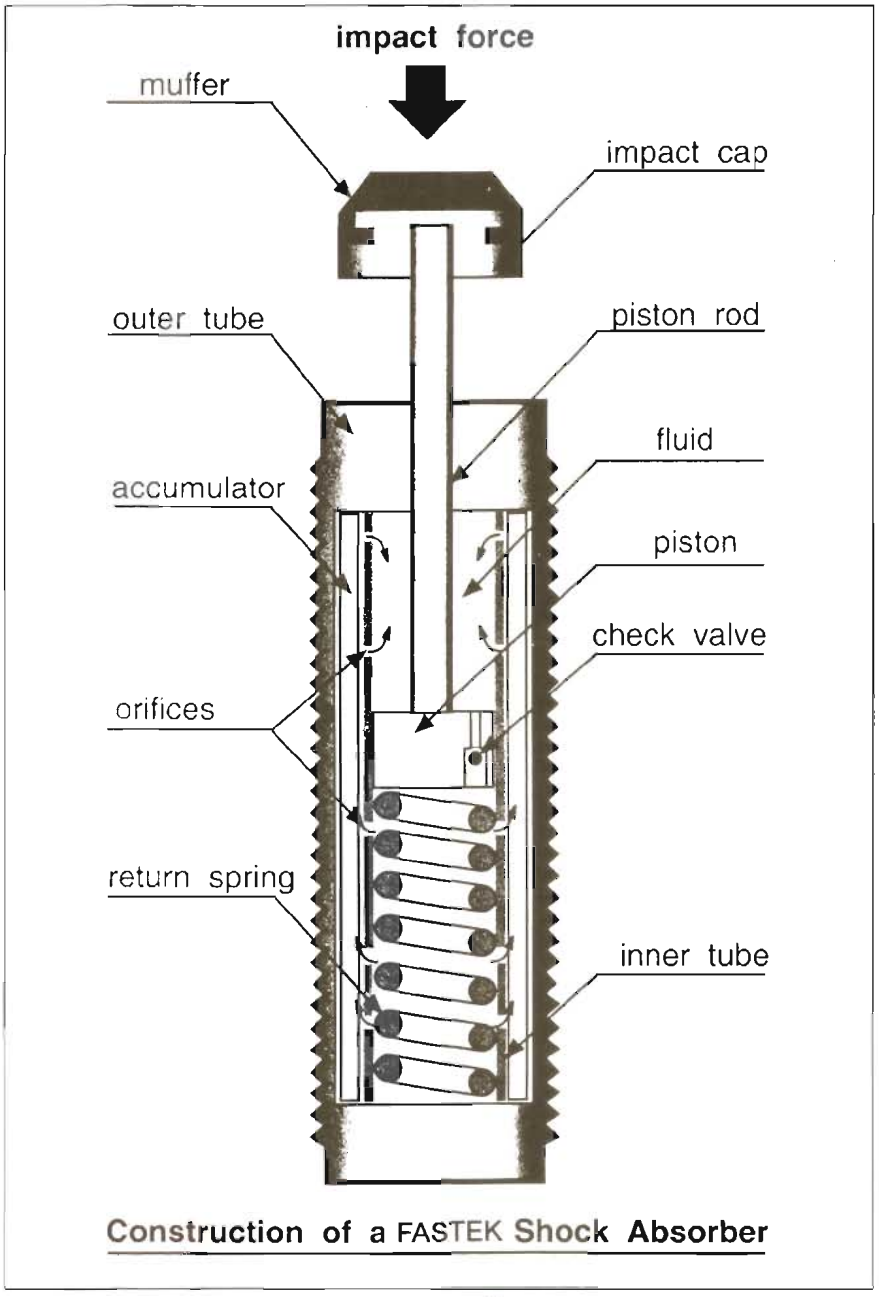


Figure 1

Operating Principles Of Shock Absorbers

All series of FASTEK shock absorbers are of such construction as shown in the following drawing. On impact the piston rod moves into the shock absorber and the hydraulic fluid is pushed into accumulator to produce resistant force. Owing to special spacing and sizing of orifices, the pressure in the inner tube remains constant throughout the entire impact stroke. By providing a linear deceleration, a FASTEK shock absorber brings the impacting object to stop smoothly and quiet. At the end of the impact stroke, the return spring pushes the piston to its original position for next cycle.

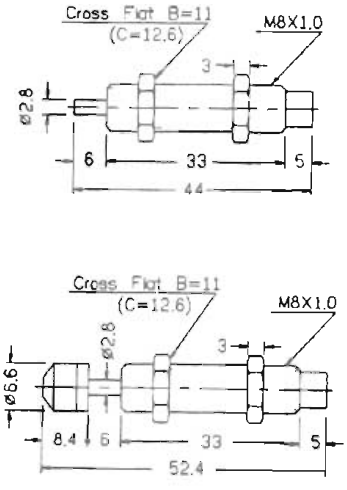
Construction of a FASTEK Shock Absorber

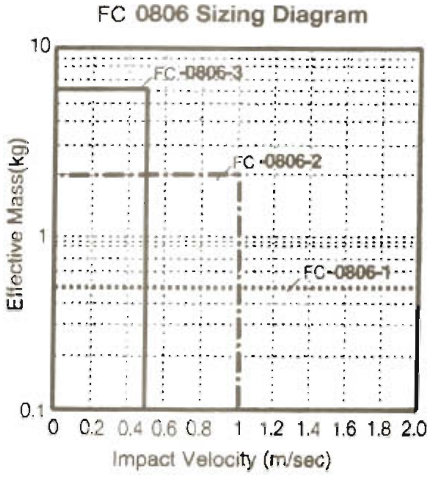


Construction of a FASTEK Shock Absorber

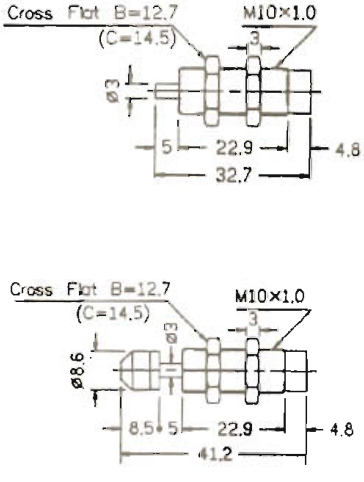
Figure 2

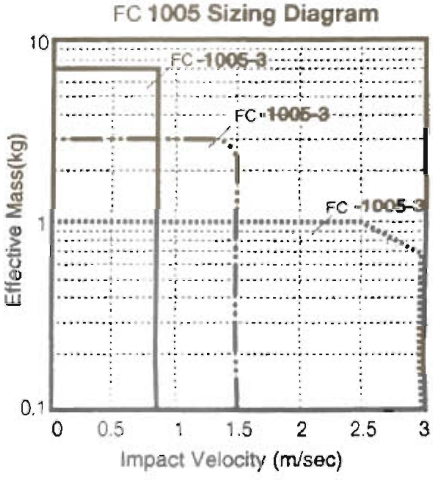
FC-0806





FC-1005

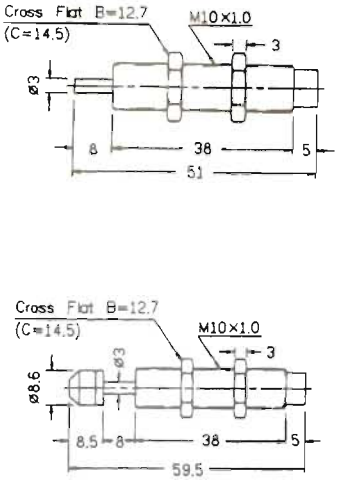


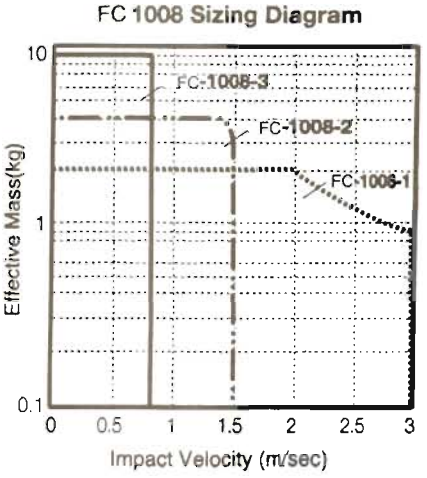


■The FC Series are non-adjustable shock absorbers with progressive damping characteristic and built-in "Self Compensation".

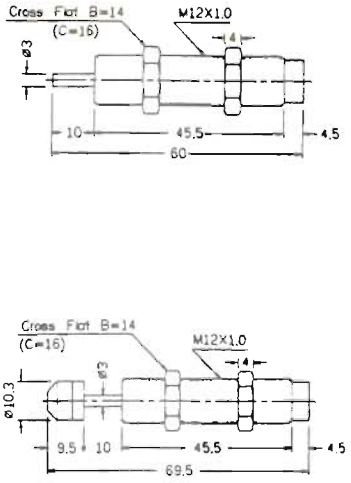
Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FC-0806-1	6	2	1200	0.5	2.0	-10~80	11
FC-0806-2	6	2	1200	2.0	1.0	-10~80	11
FC-0806-3	6	2	1200	6.0	0.5	-10~80	11
FC-1005-1	5	3	3600	1	3.0	-10~80	14
FC-1005-2	5	3	3600	3	1.5	-10~80	14
FC-1005-3	5	3	3600	7	0.8	-10~80	14

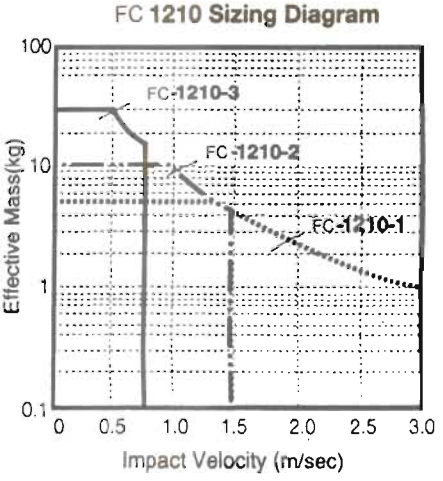
FC-1008





FC-1210





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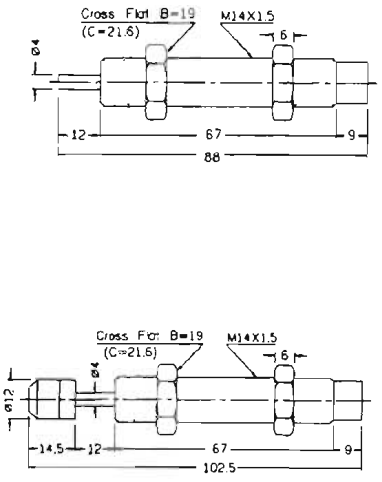
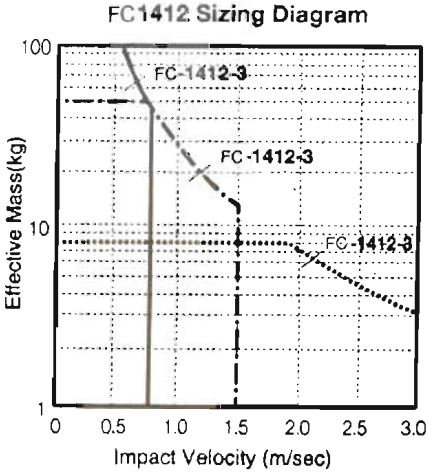
Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FC-1008-1	8	4	5000	2	3.0	-10~80	20
FC-1008-2	8	4	5000	4	1.5	-10~80	20
FC-1008-3	8	4	5000	9	0.8	-10~80	20
FC-1210-1	10	5	10000	5	3.0	-10~80	31.5
FC-1210-2	10	5	10000	10	1.5	-10~80	31.5
FC-1210-3	10	5	10000	30	0.8	-10~80	31.5

FC-1412





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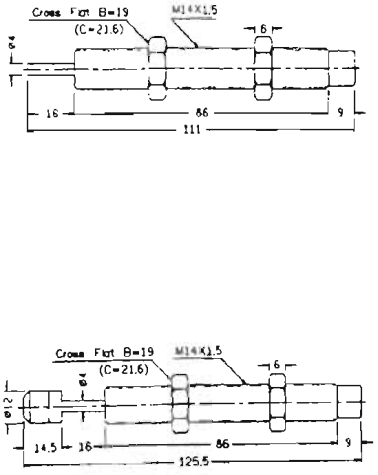

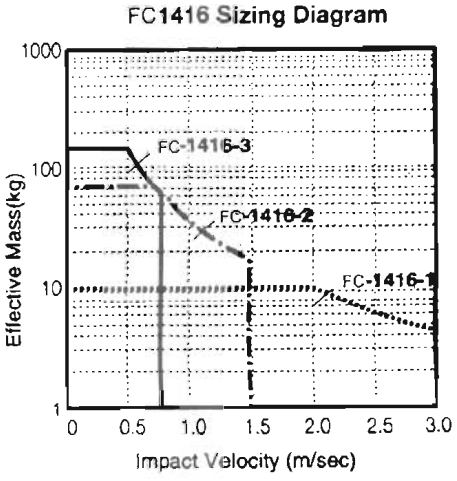

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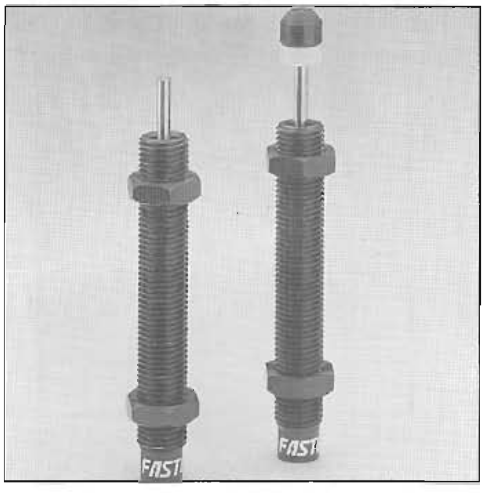
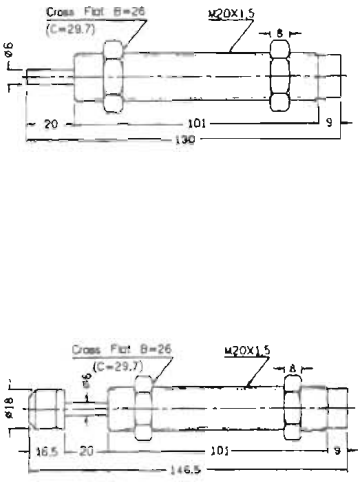
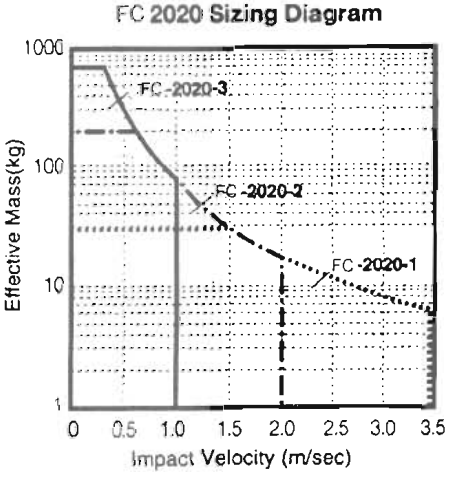
Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FC-1412-1	12	15	30000	8	3.0	-10~80	80
FC-1412-2	12	15	30000	50	1.5	-10~80	80
FC-1412-3	12	15	30000	100	0.8	-10~80	80
FC-1416-1	16	20	35000	10	3.0	-10~80	90
FC-1416-2	16	20	35000	17	1.5	-10~80	90
FC-1416-3	16	20	35000	150	0.8	-10~80	90

FC-2020







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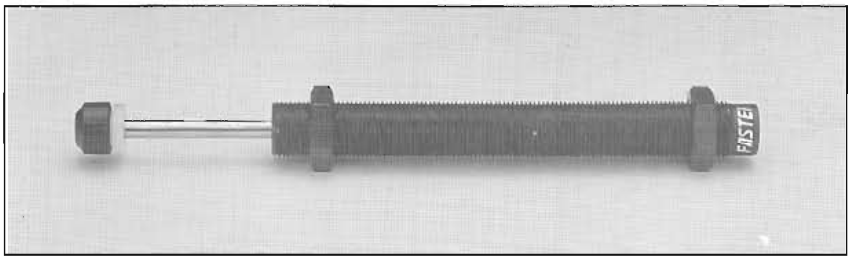

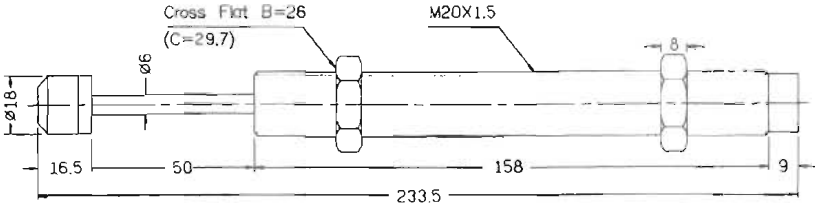

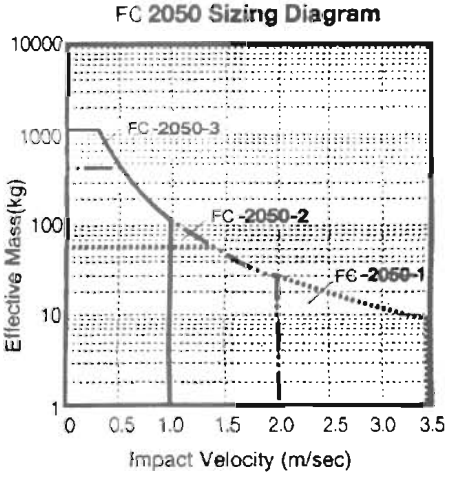

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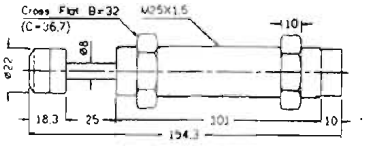
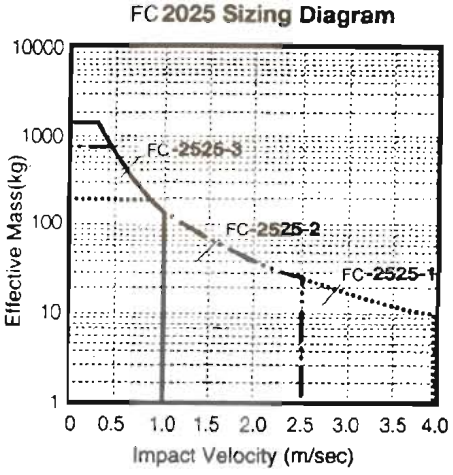
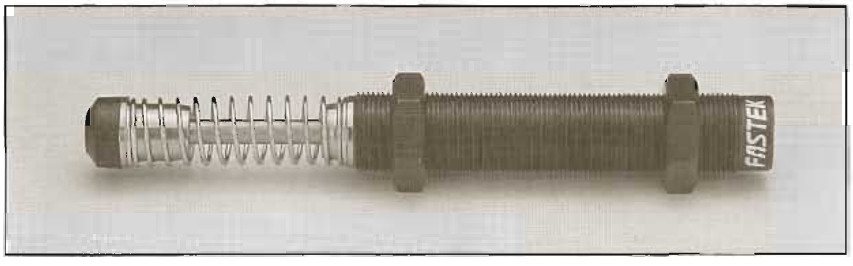
Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FC-2020-1	20	40	40000	30	3.5	-10~80	215
FC-2020-2	20	40	40000	200	2.0	-10~80	215
FC-2020-3	20	40	40000	700	1.0	-10~80	215
FC-2050-1	50	60	60000	60	3.5	-10~80	300
FC-2050-2	50	60	60000	400	2.0	-10~80	300
FC-2050-3	50	60	60000	1200	1.0	-10~80	300

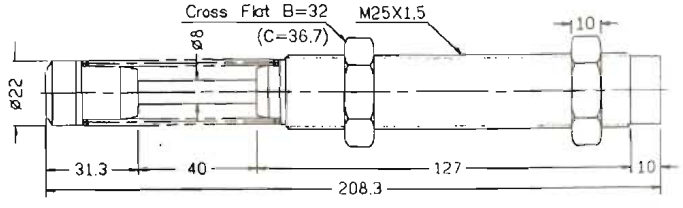
FC-2525

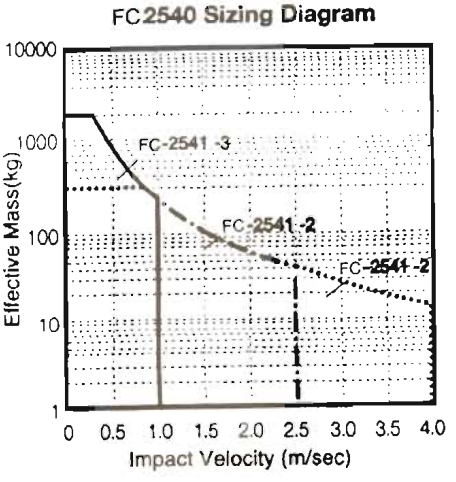




FC-2540



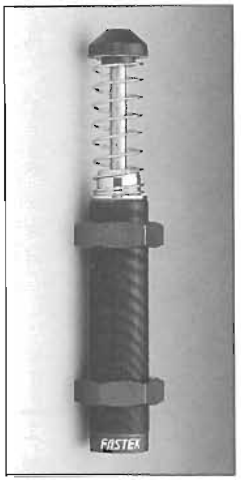


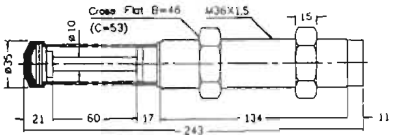


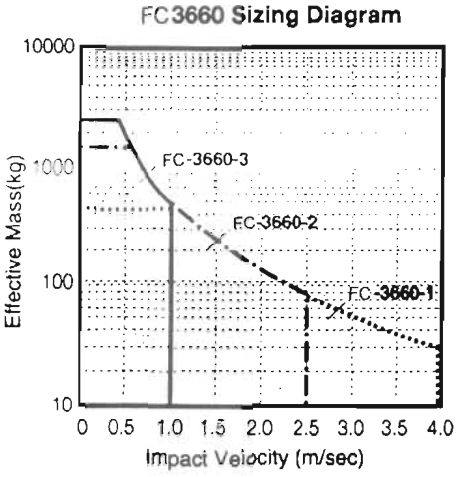
■The FC Series are non-adjustable shock absorbers with progressive damping characteristic and built-in "Self Compensation".

Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FC-2525-1	25	80	70000	200	4.0	-10~80	330
FC-2525-2	25	80	70000	800	2.5	-10~80	330
FC-2525-3	25	80	70000	1500	1.0	-10~80	330
FC-2540-1	40	120	75000	300	4.0	-10~80	430
FC-2540-2	40	120	75000	1200	2.5	-10~80	430
FC-2540-3	40	120	75000	2000	1.0	-10~80	430

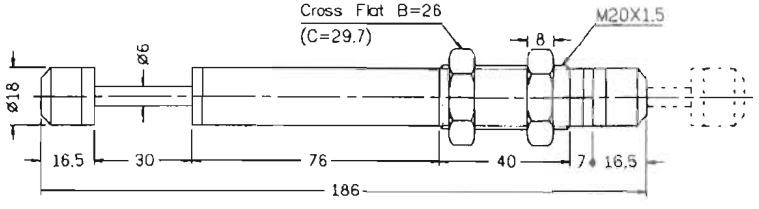
FC-3660

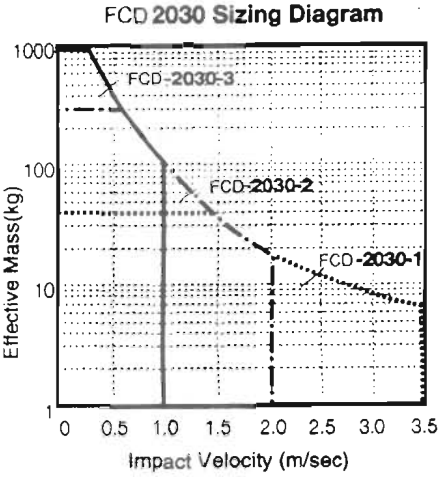






FCD-2030

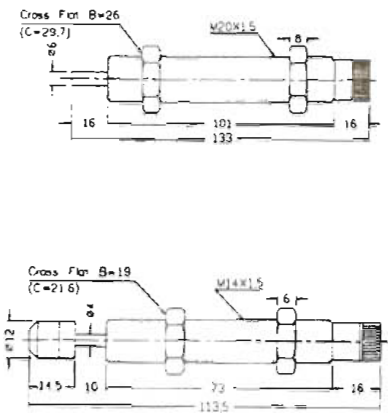


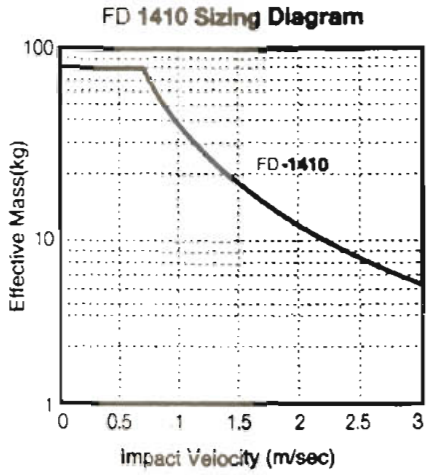


■The FC Series are non-adjustable shock absorbers with progressive damping characteristic and built-in "Self Compensation".

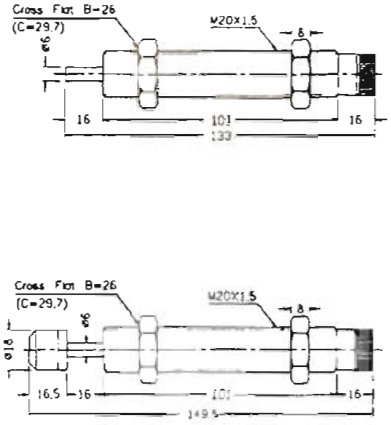
Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FC-3660-1	60	250	120000	400	4.0	-10~80	1030
FC-3660-2	60	250	120000	1500	2.5	-10~80	1030
FC-3660-3	60	250	120000	2400	1.0	-10~80	1030
FCD-2030-1	30	45	55000	40	3.5	-10~80	220
FCD-2030-2	30	45	55000	300	2.0	-10~80	220
FCD-2030-3	30	45	55000	900	1.0	-10~80	220

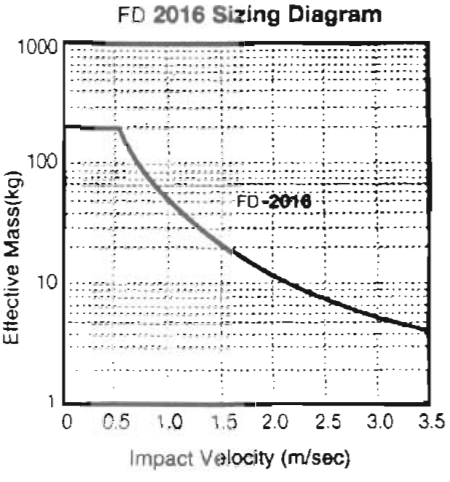
FD-1410





FD-2016

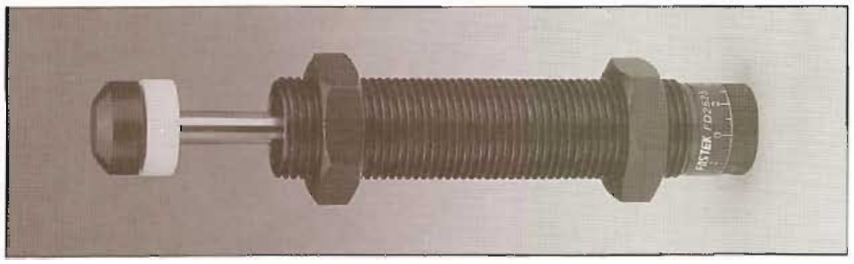


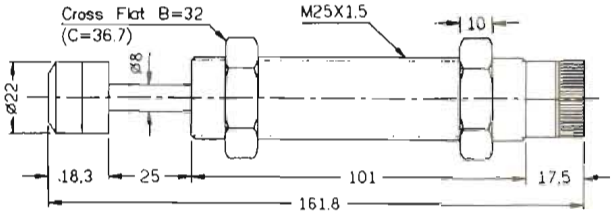


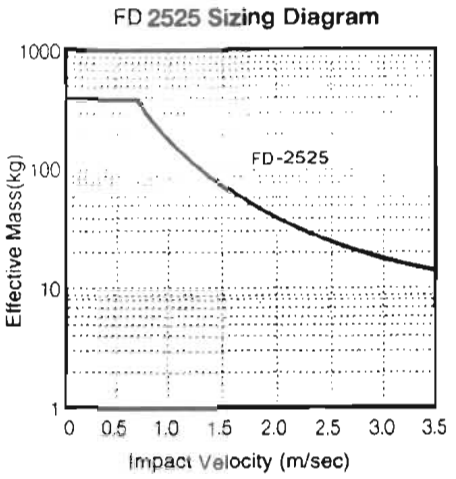
■The FD Series are adjustable shock absorbers with 360° vernier and setscrew locking.

Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FD-1410N	10	20	25000	80	3.0	-10~80	84
FD-1410	10	20	25000	80	3.0	-10~80	90
FD-2016N	16	25	30000	200	3.5	-10~80	222
FD-2016	16	25	30000	200	3.5	-10~80	230

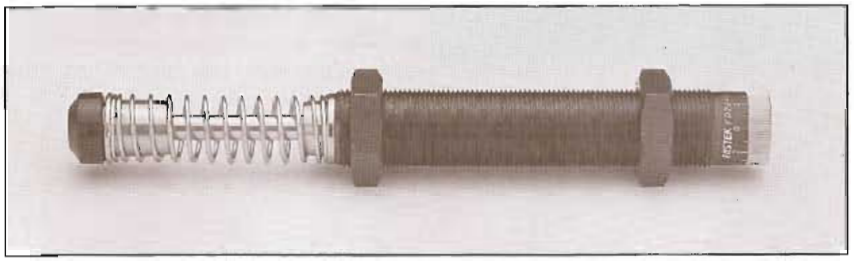
FD-2525

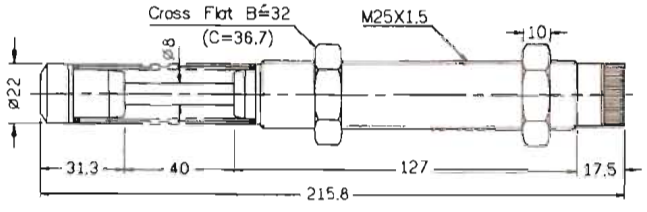


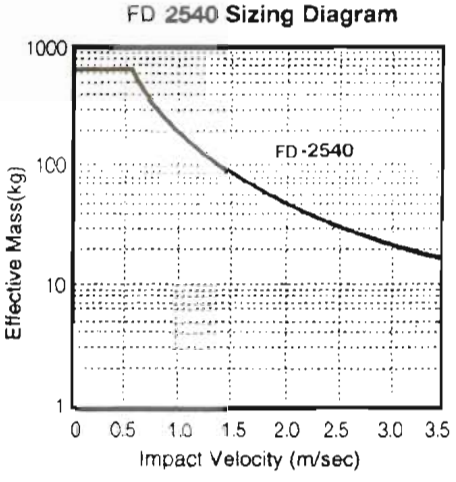




FD-2540



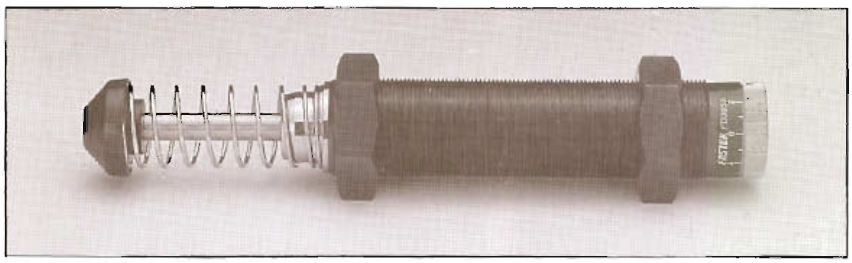


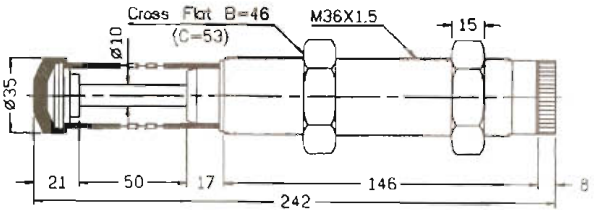


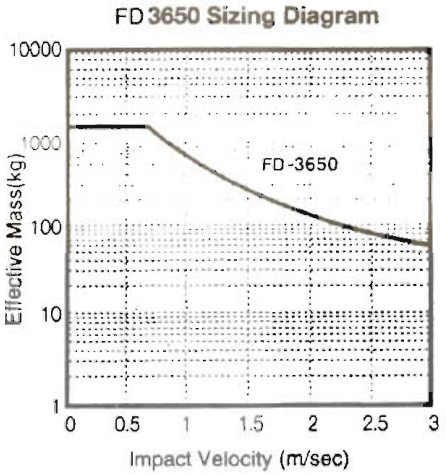
■The FD Series are adjustable shock absorbers with 360° vernier and setscrew locking.

Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FD-2525	25	85	70000	400	3.5	-10~80	
FD-2540	40	100	80000	700	3.5	-10~80	455

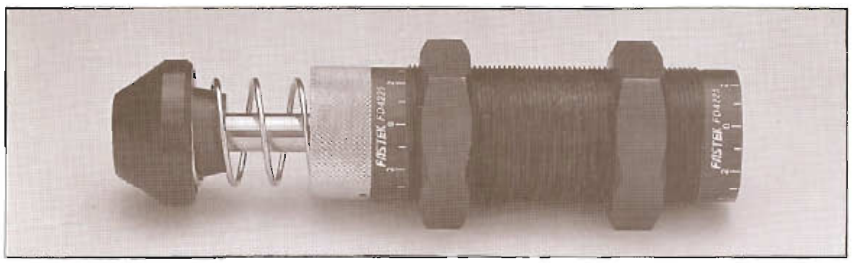
FD-3650

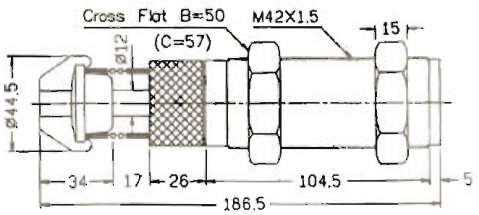


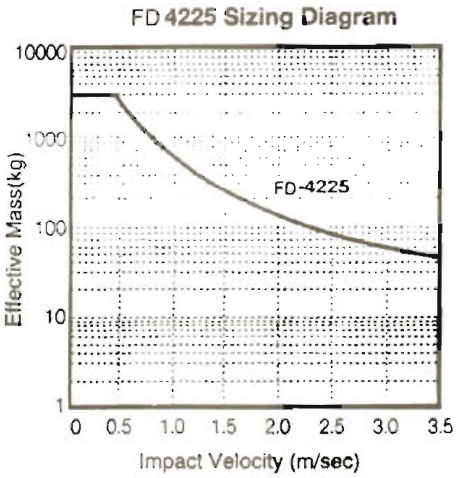




FD-4225



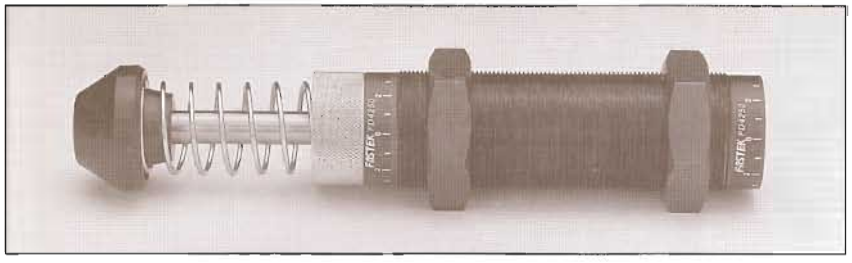


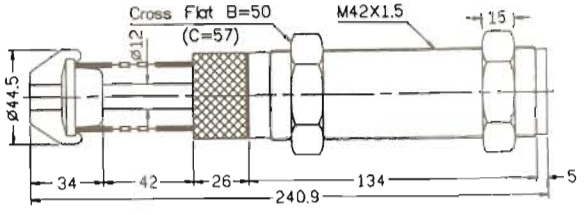


■The FD Series are adjustable shock absorbers with 360° vernier and setscrew locking.

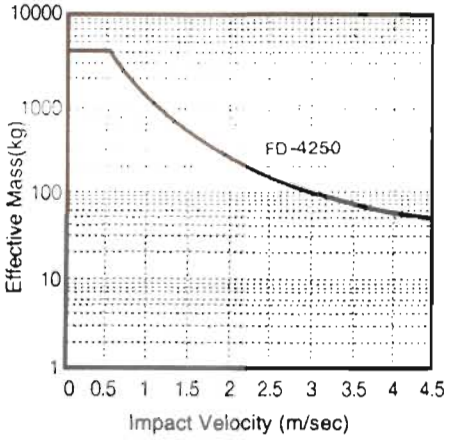
Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FD-3650	50	300	100000	1400	3	-10~80	1100
FD-4225	25	260	125000	3000	3.5	-10~80	1280

FD-4250

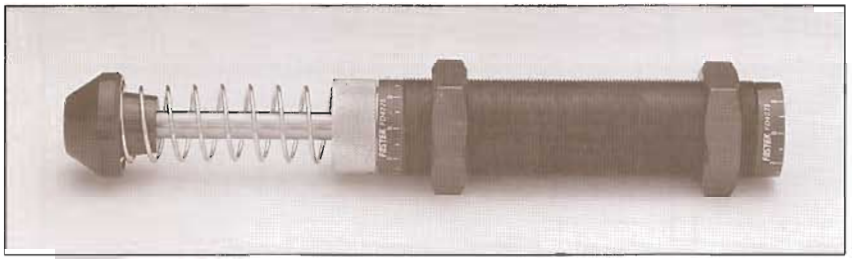


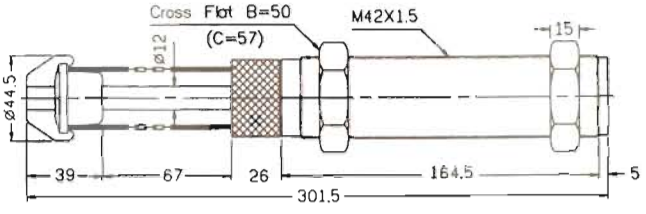


FD4250 Sizing Diagram

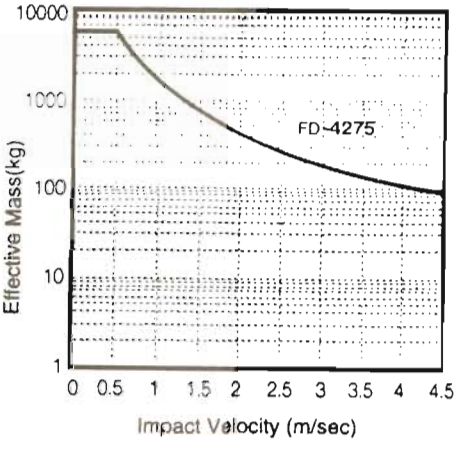


FD-4275





FD 4275 Sizing Diagram

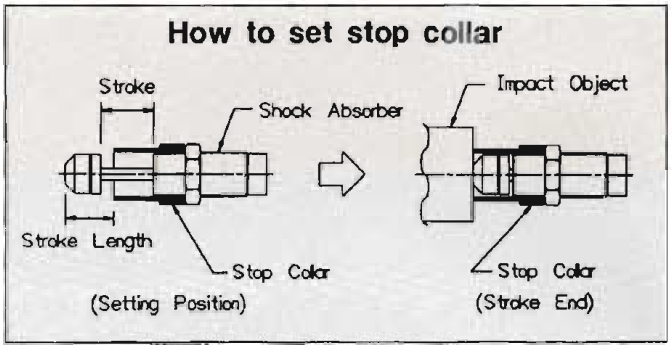


■The FD Series are adjustable shock absorbers with 360° vernier and setscrew locking.

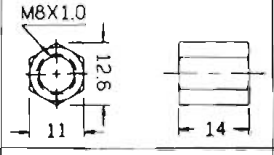
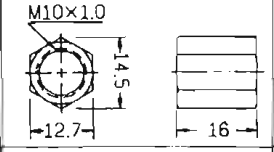
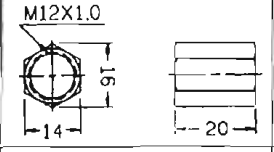
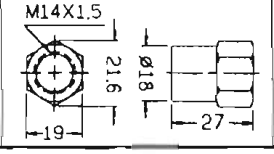
Model	Stroke (mm)	Max. Nm Per Cycle(Et)	Max. Nm Per Hour (ETC)	Max. Effective Mass(Me)kg	Max. Impact Speed (V) m/s	Operating Temperature (℃)	Weight (g)
FD-4250	50	500	150000	4000	4.5	-10~80	1490
FD-4275	75	750	180000	6000	4.5	-10~80	1710

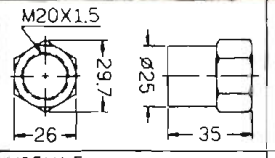
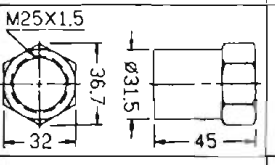
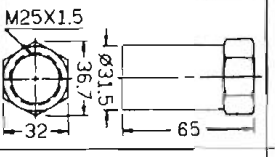
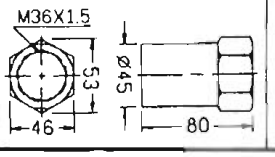
Stop Collars-SC Series

FASTEK Shock Absorber's stop collars are available from M8 × 1.0 to M36 × 1.5 and suitable for shock absorbers with or without cap. They also can be used for adjusting stroke and fixing position.



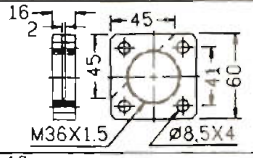
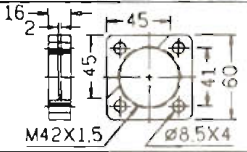
■Optional Accessories:

Model	Dimensions	Applicable For Shock Absorber Model
SC 08		*FC-0806
SC 10		*FC-1005 *FC-1008
SC 12		*FC-1210
SC 14		*FC-1412 *FC-1416 *FD-1410

Model	Dimensions	Applicable For Shock Absorber Model
SC 20		*FC-2020 *FCD-2030 *FC-2050 *FD-2016
SC 25		*FC-2525 *FD-2525
SC 40		*FC-2540 *FD-2540
SC 50		*FC-3660 *FD-3650

Flanges-F Series

■The flanges are used for fixing purpose and availabie in M36×1.5 and M42×1.5

Model	Dimensions	Applicable For Shock Absorber Model
F 36		*FC 3660 *FD 3650
F 42		*FD 4225 *FD 4250 *FD 4275

Notes:

1. Please install an Imm (approx.) mechanical stop before the end of impact stroke and do not drive shock absorbers into their final position under full load.
2. Reusing is prohibited after dismantling. Do not paint on the rod and threaded body.
3. Stop collar protects shock absorber's piston from buttoming out and can be used in adjusting stroke.
4. Please pay attention to assembly, especially on steel thickness & offcenter angle.
5. Install shock absorbers as close to the moving object's center as possible.
6. When installing over 2 pcs of shock absorbers, please ensure that they have the same stroke.

Considerations for selecting shock d absorbers:

1. Moving direction (in horizontal, free fall or rotary motion)
2. Total weight of impacting object
3. Propelling force (pneumatin/hydraulic cylinder, motor etc.)
4. Impact Velocity
5. Numbre of impact per hour
6. Applicable quantity of shock absorbers in impacting direction

Functions of hydraulic shock absorbers:

1. Eliminating vibration and absorbing striking energy in a short time
2. Reducing operating noise and offering a quiet working environment
3. Accelerating machine operation and elevating production capacity
4. Extending machine life time and reducing after sale service
5. Improving quality of products

Applications:

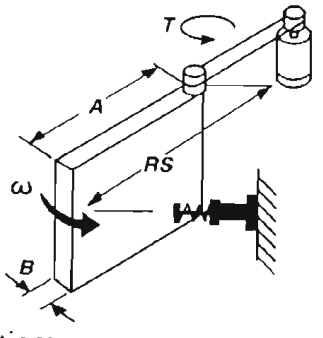
Robots for plastic injection moulding machine, pick and place robots, feeding equipment, screen print machines, converors, air cylinders, vibration conveyor systems, rolling doors, medical equipment, foundry industries, rodless cylinders, package machines, machine tools, rubber/ plastic machines, woodworking machines, aircraft industries, military equipment, education researches and automotive transfer lines

*** Customer's own specification is welcome**
*** The specifications are subject to change without advance notice.**

Example 7:Horizontal rotating door

Application data:

m = 20kg
ω = 2.0rad/s
T = 20Nm
Rs = 0.8m
A = 1.0m
B = 0.05m
S = 0.016m
C = 100/hr



Formulas and calculation:

$$I = \frac{m(4A^2+B^2)}{12} = \frac{20(4\cdot 1.0^2+0.05^2)}{12}$$

$$= 6.67\text{kg}\cdot\text{m}^2$$

$$E_K = \frac{I\omega^2}{2} = \frac{6.67\cdot 2.0^2}{2} = 13.34\text{Nm}$$

$$\theta = \frac{s}{R_S} = \frac{0.04}{0.8} = 0.05\text{rad}$$

$$E_D = T\cdot\theta = 20\cdot 0.05 = 1.0\text{Nm}$$

$$E_T = E_K + E_D = 13.34 + 1.0 = 14.34\text{Nm}$$

$$E_{TC} = E_T\cdot C = 14.34\cdot 100 = 1434\text{Nm/hr}$$

$$v = \omega\cdot R_s = 2.0\cdot 0.8 = 1.6\text{m/s}$$

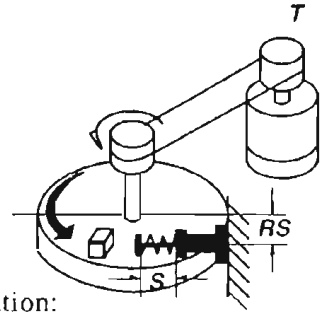
$$M_e = \frac{2E_T}{v^2} = \frac{2\cdot 14.34}{1.6^2} = 11.20\text{kg}$$

Choose from sizing diagram:FD2016 is adequate

Example 8:Rotary index table with propelling force

Application data:

m = 200kg
ω = 1.0rad/s
T = 100Nm
R = 0.5m
R_S = 0.4m
S = 0.04m
C = 100/hr



Formulas and calculation:

$$I = \frac{mR^2}{2} = \frac{200\cdot 0.5^2}{2} = 25\text{kg}\cdot\text{m}^2$$

$$E_K = \frac{I\omega^2}{2} = \frac{25\cdot 1.0^2}{2} = 12.5\text{Nm}$$

$$\theta = \frac{s}{R_s} = \frac{0.04}{0.4} = 0.1\text{rad}$$

$$E_D = T\cdot\theta = 100\cdot 0.1 = 10\text{Nm}$$

$$E_T = E_K + E_D = 12.5 + 10 = 22.5\text{Nm}$$

$$E_{TC} = E_T\cdot C = 22.5\cdot 50 = 1125\text{Nm/hr}$$

$$v = \omega\cdot R_s = 1.0\cdot 0.4 = 0.4\text{m/s}$$

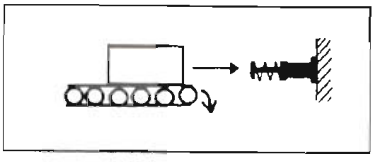
$$M_e = \frac{2E_T}{v^2} = \frac{2\cdot 22.5}{0.4^2} = 281\text{kg}$$

Choose from sizing diagram:FD4250 is adequate

Example 9:Horizontal mass on driven rollers

Application data:

m = 150kg
v = 0.5m/s
μ = 0.25
S = 0.02m
C = 120/hr



Formulas and calculation:

$$E_K = \frac{mv^2}{2} = \frac{150\cdot 0.5^2}{2} = 18.75\text{Nm}$$

$$E_D = F\cdot S = mg\mu\cdot s = 150\cdot 9.81\cdot 0.25\cdot 0.02$$

$$= 7.35\text{Nm}$$

$$E_T = E_K + E_D = 18.73 + 7.35 = 26.1\text{Nm}$$

$$E_{TC} = E_T\cdot C = 26.1\cdot 120 = 3132\text{Nm/hr}$$

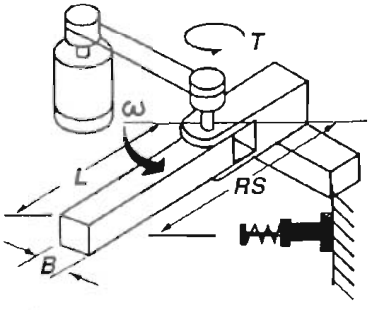
$$M_e = \frac{2E_T}{v_2} = \frac{2\cdot 26.1}{0.5^2} = 208.8\text{kg}$$

Choose from sizing diagram:FC2020-3 is adequate

Example 10:Rotating beam with driving force

Application data:

m = 40kg
A = 0.5m
B = 0.05m
ω = 2.0rad/s
T = 10Nm
R_s = 0.4m
S = 0.05m
C = 50/hr



Formulas and calculation:

$$I = \frac{m(4A^2+B^2)}{12} = \frac{40(4\cdot 0.5^2+0.05^2)}{12}$$

$$= 3.36\text{kg}\cdot\text{m}^2$$

$$E_K = \frac{I\omega^2}{2} = \frac{3.36\cdot 2.0^2}{2} = 6.8\text{Nm}$$

$$\theta = \frac{2}{R_s} = \frac{0.05}{0.4} = 0.125\text{rad}$$

$$E_D = T\cdot\theta = 10\cdot 0.125 = 1.25\text{Nm}$$

$$E_T = E_K + E_D = 6.8 + 1.25 = 8.05\text{Nm}$$

$$E_{TC} = E_T\cdot C = 8.05\cdot 50 = 402.5\text{Nm/hr}$$

$$v = \omega\cdot R_s = 2.0\cdot 0.4 = 0.8\text{m/s}$$

$$M_e = \frac{2E_T}{v^2} = \frac{2\cdot 8.05}{0.8^2} = 25.15\text{kg}$$

Choose from sizing diagram:FC1416-2 is adequate