SECTION ....PAGE

W = Moving Weight, lbs
V = Impact Velocity, ft/sec
F_P = Total Propelling Force, lbs
D_C = Propelling Cylinder Bore, inches
D_R = Propelling Cylinder Rod Diameter, inches
P = Pressure in Propelling Cylinder, psi

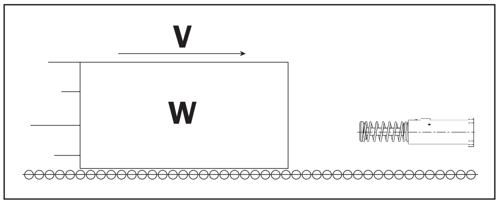
HP = Horsepower of Drive Motor
SF = Stall Factor: 2.5 for A.C. Motor, 3.5 for D.C. Motor
S = Shock Absorber Stroke, inches
C = Number of Cycles per Hour
E_K = Kinetic Energy, in.- lbs

E_P = Propelling Force Energy, in.- lbs
E_C = Energy per Cycle, in.- lbs
E_H = Energy per Hour, in.- lbs/hr
W_E = Effective Weight, lbs
W_EV^2 = Parameter for use with Size Selection Tables

*For impact velocities of less than 1 ft/sec consult EFDYN engineering department

FORMULAS: **EXAMPLES:**

WEIGHT WITH NO PROPELLING FORCE



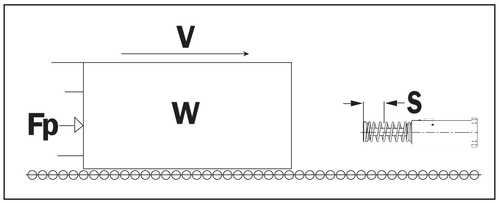
Formulas:

$E_K = 0.187 \bullet W \bullet V^2$
$E_C = E_K$
$E_H = C \bullet E_C$
$W_E = W$
$W_EV^2 = W \bullet V^2$

Example:

W = 10,000 lbs; V = 5 ft/sec; C = 6/hr
$E_K = 0.187 \bullet (10{,}000) \bullet (5)^2 = 46{,}750$ in.-lbs
$E_H = 6 \bullet (46{,}750) = 280{,}500$ in.-lbs/hr
$W_E = 10{,}000$ lbs
$W_EV^2 = 10{,}000 \bullet (5)^2 = 250{,}000$
Select RCOS-1.5X5-BS-RD-99

WEIGHT WITH PROPELLING FORCE



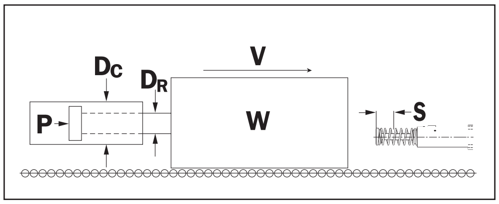
Formulas:

$E_K = 0.187 \bullet W \bullet V^2$
$E_P = F_P \bullet S$
$E_C = E_K + E_P$
$E_H = C \bullet E_C$
$W_E = E_C/(.187 \bullet V^2)$
$W_EV^2 = E_C/.187$

Example:

W = 500 lbs; V = 10 ft/sec; F_P = 400 lbs; C = 100/hr; S = 2 in.
$E_K = 0.187 \bullet (500) \bullet (10)^2 = 9{,}350$ in.-lbs
$E_P = 400 \bullet (2) \bullet = 800$ in.-lbs
$E_C = 9{,}350 + 800 = 10{,}150$ in.-lbs
$E_H = 100 \bullet (10{,}150) = 1{,}015{,}000$ in.-lbs/hr
$W_E = 10{,}150/[(.187) \bullet (10)^2] = 543$ lbs
$W_EV^2 = 10{,}150/.187 = 54{,}280$
Select RCOS-1.125X2-BS-RC-99

WEIGHT WITH PROPELLING CYLINDERS



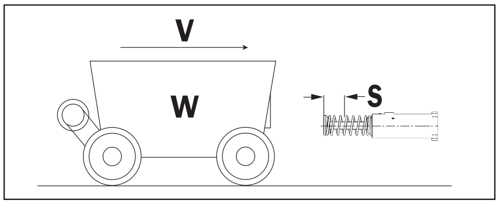
Formulas:

$E_K = 0.187 \bullet W \bullet V^2$
$F_P = 0.785 \bullet (D_C{}^2 - D_R{}^2) \bullet P$
$E_P = F_P \bullet S$
$E_C = E_K + E_P$
$E_H = C \bullet E_C$
$W_E = E_C/(.187 \bullet V^2)$
$W_EV^2 = E_C/.187$

Example:

W = 2,000 lbs; V = 4 ft/sec; D_C = 2 in.; D_R = 1 in.
P = 1000 psi; C = 20/hr; S = 4 in.
$E_K = 0.187 \bullet (2{,}000) \bullet (4)^2 = 5{,}980$ in.-lbs
$F_P = .785 \bullet [(2)^2 - (1)^2] \bullet (1{,}000) = 2355$ lbs
$E_P = 2355 \bullet (4) \bullet = 9{,}420$ in.-lbs
$E_C = 5980 + 9420 = 15{,}400$ in.-lbs
$E_H = 20 \bullet (15{,}400) = 308{,}000$ in.-lbs/hr
$W_E = 15{,}400/[(.187) \bullet (4)^2] = 5147$ lbs
$W_EV^2 = 15{,}400/.187 = 82{,}350$
Select RCOS-1.125X4-BS-RD-99

WEIGHT WITH MOTOR DRIVE



Formulas:

$E_K = 0.187 \bullet W \bullet V^2$
$F_P = 550 \bullet HP \bullet SF/V$
$E_P = F_P \bullet S$
$E_C = E_K + E_P$
$E_H = C \bullet E_C$
$W_E = E_C/(.187 \bullet V^2)$
$W_EV^2 = E_C/.187$

Example:

W = 250 lbs; V = 7 ft/sec; HP = 1/2 (AC); C = 200/hr; S = 2 in.
$E_K = 0.187 \bullet (250) \bullet (7)^2 = 2{,}291$ in.-lbs
$F_P = 550 \bullet (.5) \bullet (2.5)/7 = 98$ lbs
$E_P = 98 \bullet (2) \bullet = 196$ in.-lbs
$E_C = 2291 + 196 = 2{,}487$ in.-lbs
$E_H = 200 \bullet (2{,}487) = 497{,}000$ in.-lbs/hr
$W_E = 2{,}487/[(.187) \bullet (7)^2] = 271$ lbs
$W_EV^2 = 2487/.187 = 13{,}300$
Select SAS-3/4x2-BS-MH-99

W = Moving Weight, lbs
V = Impact Velocity, ft/sec
F_E = External Propelling Force, lbs
F_P = Total Propelling Force, lbs
L = Total Distance Moved by Weight, including stroke inches

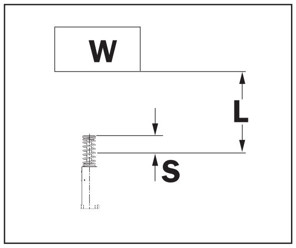
S = Shock Absorber Stroke, inches
C = Number of Cycles per Hour
E_K = Kinetic Energy, in.- lbs
E_P = Propelling Force Energy, in.- lbs
E_C = Energy per Cycle, in.- lbs

E_H = Energy per Hour, in.- lbs/hr
W_E = Effective Weight, lbs
W_EV^2 = Parameter for use with Size Selection Tables
A = Angle of Inclined Plane from Horizontal, deg

*For impact velocities of less than 1 ft/sec consult EFDYN engineering department

FORMULAS: **EXAMPLES:**

WEIGHT IN VERTICAL FREE FALL



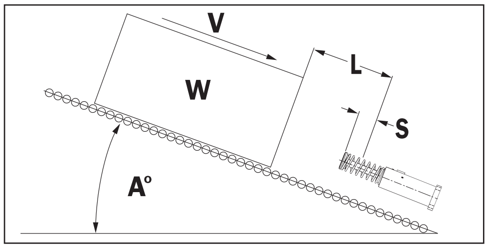
Formulas:

F_P = W
E_K = W•(L-S)
E_P = W•S
E_C = E_K+E_P, or E_C = W•L
E_H = C•E_C
W_E = E_C/(L-S)
W_EV^2 = E_C/.187
V = $[(L\text{-}S)/.187]^{1/2}$
(not usually needed for sizing)

Examples:

W = 5,000 lbs; L = 48 in.; C = 10/hr; S = 8 in.
E_C = 5,000•(48) = 240,000 in.-lbs
E_H = 10• (240,000) = 2,400,000 in.-lbs/hr
W_E = 240,000/(48-8) = 6,000 lbs
W_EV^2 = 240,000/.187 = 1,283,400
Select RCOS-3X8-BS-RC-99

WEIGHT SLIDING FREELY DOWN INCLINE



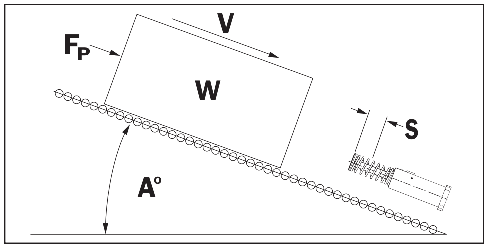
Formulas:

F_P = W• Sin (A)
E_K = F_P•(L-S)
E_P = F_P•S
E_C = E_K+E_P, or E_C = F_P•L
E_H = C•E_C
W_E = W•L/(L-S)
W_EV^2 = E_C/.187
V = $[(L\text{-}S)\cdot\text{Sin (A)}/.187]^{1/2}$
(not usually needed for sizing)

Examples:

W = 25,000 lbs; A = 30°; L = 120 in.; C = 5/hr; S = 12 in.
F_P = 25,000•Sin(30°) = 12,500 lbs
E_K = 12,500•(120-12) = 1,350,000 in.-lbs
E_P = 12,500•(12) = 150,000 in.-lbs
E_C = 12,500•(120) = 1,500,000 in.-lbs
E_H = 5• (1,500,000) = 7,500,000 in.-lbs/hr
W_E = 25,000•(120)/(120-12) = 27,800 lbs
W_EV^2 = 1,500,000/.187 = 8.021,400
Select RCOS-4X12-BS-RC-99, 2 Required

DOWN INCLINE WITH PROPELLING FORCE



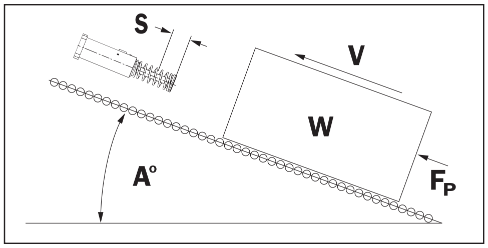
Formulas:

F_P = F_E+W•Sin(A)
V = must be specified
E_K = 0.187•W•V^2
E_P = F_P•S
E_C = E_K+E_P
E_H = C•E_C
W_E = E_C/(.187•V^2)
W_EV^2 = E_C/.187

Examples:

W = 6,000 lbs; F_E = 4,000 lbs; A = 45°; V = 6 ft/sec; C = 20/hr; S = 12 in.
F_P = 4,000 + 6,000•Sin(45°) = 8,240 lbs
E_K = 0.187•(6,000)•$(6)^2$ = 40,390 in.-lbs
E_P = 8,240•(6) = 49,450 in.-lbs
E_C = 40,390 + 49,450 = 89,840 in.-lbs
E_H = 20• (89,840) = 1,797,000 in.-lbs/hr
W_E = 89,840/[(.187)•$(6)^2$] = 13,345 lbs
W_EV^2 = 89,840/.187 = 480,400
Select RCOS-2X6-BS-RD-99

UP INCLINE WITH PROPELLING FORCE



Formulas:

F_P = F_E - W•Sin(A)
V = must be specified
E_K = 0.187•W•V^2
E_P = F_P•S
E_C = E_K+E_P
E_H = C•E_C
W_E = E_C/(.187•V^2)
W_EV^2 = E_C/.187

Examples:

W = 800 lbs; F_E = 500 lbs; A = 15°; V = 5 ft/sec; C = 200/hr; S = 3 in.
F_P = 500 - 800•Sin(15°) = 293 lbs
E_K = 0.187•(800)•$(5)^2$ = 3,740 in.-lbs
E_P = 293•(3) = 879 in.-lbs
E_C = 3,740 + 879 = 4,619 in.-lbs
E_H = 200• (4,619) = 923,800 in.-lbs/hr
W_E = 4,619/[(.187)•$(5)^2$] = 988 lbs
W_EV^2 = 4,619/.187 = 24,700
Select SAS - 3/4X3-BS-MH-99

**If R-series model is selected, the model description should include -20 instead of -99 to indicate a rod-down orientation.

W = Moving Weight, lbs
V = Impact Velocity, ft/sec
W_A = Apparent Weight at Shock Absorber, lbs
ω = Angular Velocity, deg/sec
θ = Angle from Vertical at Impact, deg
I = Moment of Inertia, lb-ft-sec^2
K = Radius of Gyration, inches
T = Propelling Torque, lb-inch

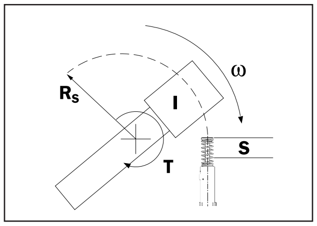
R_S = Mounting Radius of Shock, inches
R_T = Radius to Edge of Turntable, inches
F_P = Total Propelling Force, lbs
S = Shock Absorber Stroke, inches
H = Thickness of Object, inches
L = Length of Object, inches
d = Distance from Pivot to C.G. of Weight, inches
C = Number of Cycles per Hour

E_K = Kinetic Energy, in.- lbs
E_P = Propelling Force Energy, in.- lbs
E_C = Energy per Cycle, in.- lbs
E_H = Energy per Hour, in.- lbs/hr
W_E = Effective Weight, lbs
W_EV^2 = Parameter for use with Size Selection Tables

*For impact velocities of less than 1 ft/sec consult EFDYN engineering department

FORMULAS: **EXAMPLE:**

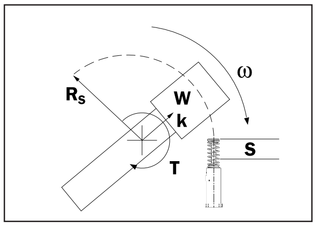
VERTICAL AXIS, MOMENT OF INERTIA



$W_A = 4{,}633 \bullet I/R_S^2$
$V = R_S \bullet \omega/688$
$F_P = T/R_S$
$E_K = 0.187 \bullet W_A \bullet V^2$
$E_P = F_P \bullet S$
$E_C = E_K + E_P$
$E_H = C \bullet E_C$
$W_E = E_C/(.187 \bullet V^2)$
$W_EV^2 = E_C/.187$

I = 50,000 lb-ft-sec^2; ω = 15°/sec; T = 400,00 lb-in.; R_S = 100 in.; C = 25/hr; S = 5 in.
W_A = 4633•(50,000)/(100)^2 = 23,160 lbs
V = 100•(15)/688 = 2.18 ft/sec
F_P = 400,000/100 = 4,000 lbs
E_K = 0.187•(23,160)•(2.18)^2 = 20,590 in.-lbs
E_P = 4,000 • 5 = 20,000 in.-lbs
E_C = 20,590/ + 20,000 = 40,590 in.-lbs
E_H = 25•(40,590) = 1,015,000 in.-lbs/hr
W_E = 40,590/[.187•(2.18)^2] = 45,660 lbs
W_EV^2 = 40,590/.187 = 217,100
Select RCOS-1.5X5-BS-RE-99

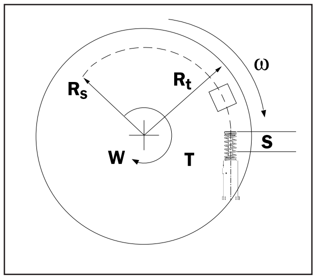
VERTICAL AXIS, RADIUS OF GYRATION



$W_A = W \bullet k^2/R_S^2$
$V = R_S \bullet \omega/688$
$F_P = T/R_S$
$E_K = 0.187 \bullet W_A \bullet V^2$
$E_P = F_P \bullet S$
$E_C = E_K + E_P$
$E_H = C \bullet E_C$
$W_E = E_C/(.187 \bullet V^2)$
$W_EV^2 = E_C/.187$

W = 500 lbs; k = 20 in.; ω = 360°/sec; T = 3,000 lb-in.; R_S = 15 in.; C = 75/hr; S = 2 in.
W_A = 500•(20)^2/(15)^2 = 889 lbs
V = 15•(360)/688 = 7.85 ft/sec
F_P = 3,000/15 = 200 lbs
E_K = 0.187•(889)•(7.85)^2 = 10,240 in.-lbs
E_P = 200•(2) = 400 in.-lbs
E_C = 10,240 + 400 = 10,640 in.-lbs
E_H = 75•(10,640) = 798,000 in.-lbs/hr
W_E = 10,640/[.187•(7.85)^2] = 924 lbs
W_EV^2 = 10,640/.187 = 56,900
Select RCOS-1.125X2-BS-RC-99

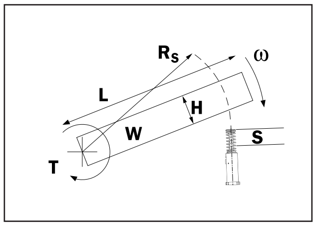
TURNTABLE



$W_A = W \bullet R_T^2/(2 \bullet R_S^2)$
$V = R_S \bullet \omega/688$
$F_P = T/R_S$
$E_K = 0.187 \bullet W_A \bullet V^2$
$E_P = F_P \bullet S$
$E_C = E_K + E_P$
$E_H = C \bullet E_C$
$W_E = E_C/(.187 \bullet V^2)$
$W_EV^2 = E_C/.187$

W = 200 lbs; ω = 250°/sec; T = 5,000 lb-in.; R_T = 15 in.; R_S = 12 in.; C = 500/hr; S = 1 in.
W_A = 200•(15)^2/[(2•12)^2] = 156 lbs
V = 12•(250)/688 = 4.36 ft/sec
F_P = 5,000/12 = 417 lbs
E_K = 0.187•(156)•(4.36)^2 = 555 in.-lbs
E_P = 417•(1) = 417 in.-lbs
E_C = 555 + 417 = 972 in.-lbs
E_H = 500•(972) = 486,000 in.-lbs/hr
W_E = 972/[.187•(4.36)^2] = 273 lbs
W_EV^2 = 972/.187 = 5,200
Select SAS-3/4X1-BS-MH-99

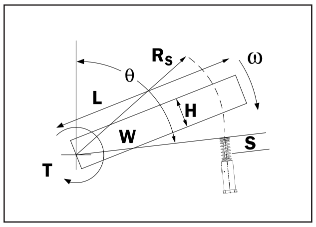
VERTICAL AXIS, UNIFORM ARM



$W_A = W \bullet (H^2 + 4 X L^2)/(12 \bullet R_S^2)$
$V = R_S \bullet \omega/688$
$F_P = T/R_S$
$E_K = 0.187 \bullet W_A \bullet V^2$
$E_P = F_P \bullet S$
$E_C = E_K + E_P$
$E_H = C \bullet E_C$
$W_E = E_C/(.187 \bullet V^2)$
$W_EV^2 = E_C/.187$

W = 2,000 lbs; ω = 90°/sec; T = 48,000 lb-in.; R_S = 45 in.; H = 5 in.; L = 60 in.; C = 60/hr; S = 4 in.
W_A = 2,000•[(5)^2+4•(60)^2]/[12•(45)^2] = 1187 lbs
V = 45•(90)/688 = 5.89 ft/sec
F_P = 48,000/45 = 1,067 lbs
E_K = 0.187•(1187)•(5.89)^2 = 7690 in.-lbs
E_P = 1067•(4) = 4270 in.-lbs
E_C = 7690 + 4270 = 11,960 in.-lbs
E_H = 60•(11,960) = 717,700 in.-lbs/hr
W_E = 11,960/[.187•(5.89)^2] = 1850 lbs
W_EV^2 = 11,960/.187 = 63,960
Select RCOS-1.125X4-BS-RC-99

HORIZONTAL AXIS, UNIFORM ARM

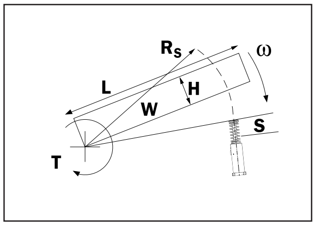


$W_A = W\bullet(H^2+4\bullet L^2)/(12\bullet R_S^2)$
$V = R_S\bullet\omega/688$
$F_P = [T+.5\bullet L\bullet W\bullet \mathrm{Sin}(\theta)]/R_S$
$E_K = 0.187\bullet W_A\bullet V^2$
$E_P = F_P\bullet S$
$E_C = E_K+E_P$
$E_H = C\bullet E_C$
$W_E = E_C/(.187\bullet V^2)$
$W_EV^2 = E_C/.187$

W = 500 lbs; ω = 150°/sec; T = 9,000 lb-in.; R_S = 18 in.; H = 2 in.; L = 36 in.; θ = 75°; C = 100/hr; S = 3 in.
W_A = 500•[(2)²+4•(36)²]/[12•(18)²] = 667 lbs
V = 18•(150)/688 = 3.92 ft/sec
F_P = [9,000+.5•(36)•(500)•Sin(75°)]/18 = 983 lbs
E_K = 0.187•(667)•(3.92)² = 1,920 in.-lbs

E_P = 983•(3) = 2950 in.-lbs
E_C = 1,920 + 2,950 = 4,870 in.-lbs
E_H = 100•(4,870) = 487,000 in.-lbs/hr
W_E = 4,870/[.187•(3.92)²] = 1690 lbs
W_EV^2 = 4,870/.187 = 26,050
Select SAS-3/4X3-BS-MH-99

VERTICAL AXIS, DOOR

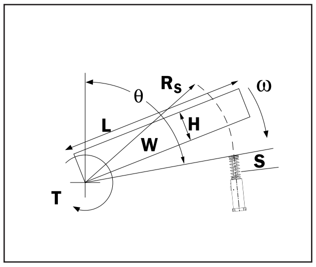


$W_A = W\bullet(H^2+L^2)/(3\bullet R_S^2)$
$V = R_S\bullet\omega/688$
$F_P = T/R_S$
$E_K = 0.187\bullet W_A\bullet V^2$
$E_P = F_P\bullet S$
$E_C = E_K+E_P$
$E_H = C\bullet E_C$
$W_E = E_C/(.187\bullet V^2)$
$W_EV^2 = E_C/.187$

W = 300 lbs; ω = 180°/sec; T = 2,000 lb-in.; R_S = 30 in.; H = 2 in.; L = 48 in.; C = 300/hr; S = 2 in.
W_A = 300•[(2)²+(48)²]/[3•(30)²]= 256 lbs
V = 30•(180)/688 = 7.85 ft/sec
F_P = 2,000/30 = 66.7 lbs
E_K = 0.187•(256)•(7.85)² = 2,590 in.-lbs

E_P = 66.7•(2) = 133 in.-lbs
E_C = 2,950 + 133 = 3,083 in.-lbs
E_H = 300•(3,083) = 924,700 in.-lbs/hr
W_E = 3,083/[.187•(7.85)²] = 268 lbs
W_EV^2 = 3,083/.187 = 16,500
Select SAS-3/4X2-BS-MH-99

HORIZONTAL AXIS, DOOR

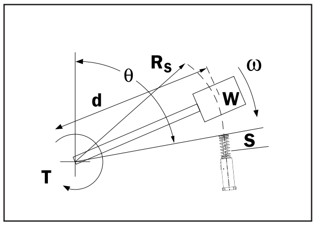


$W_A = W\bullet(H^2+L^2)/(3\bullet R_S^2)$
$V = R_S\bullet\omega/688$
$F_P = [T+.5\bullet L\bullet W\bullet \mathrm{Sin}(\theta)]/R_S$
$E_K = 0.187\bullet W_A\bullet V^2$
$E_P = F_P\bullet S$
$E_C = E_K+E_P$
$E_H = C\bullet E_C$
$W_E = E_C/(.187\bullet V^2)$
$W_EV^2 = E_C/.187$

W = 1200 lbs; ω = 150°/sec; T = 5,000 lb-in.; R_S = 40 in.; H = 3 in.; L = 50 in.; θ = 80°; C = 100/hr; S = 4 in.
W_A = 1200•[(3)²+(50)²]/[3•(40)²] = 627 lbs
V = 40•(150)/688 = 8.72 ft/sec
F_P = [5,000+.5•(50)•(1200)•Sin(80°)]/40 = 864 lbs
E_K = 0.187•(627)•(8.72)² = 8920 in.-lbs

E_P = 864•(4) = 3460 in.-lbs
E_C = 8,920 + 3,460 = 12,380 in.-lbs
E_H = 100•(12,380) = 1,238,000 in.-lbs/hr
W_E = 12,380/[.187•(8.72)²] = 870 lbs
W_EV^2 = 12,380/.187 = 66,200
Select RCOS-1.125X4-BS-RC-99

HORIZONTAL AXIS, WEIGHT AT RADIUS

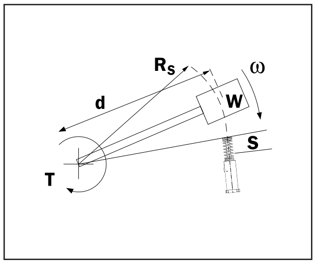


$W_A = W\bullet d^2/R_S^2$
$V = R_S\bullet\omega/688$
$F_P = [T+.5\bullet L\bullet d\bullet \mathrm{Sin}(\theta)]/R_S$
$E_K = 0.187\bullet W_A\bullet V^2$
$E_P = F_P\bullet S$
$E_C = E_K+E_P$
$E_H = C\bullet E_C$
$W_E = E_C/(.187\bullet V^2)$
$W_EV^2 = E_C/.187$

W = 8,000 lbs; ω = 90°/sec; T = 45,000 lb-in.; R_S = 30 in.; d = 42 in.; θ = 45°; C = 30/hr; S = 6 in.
W_A = 8,000•(42)²/(30)² = 15,680 lbs
V = 30•(90)/688 = 3.92 ft/sec
F_P = [45,000+.5•(42)•(8,000)•Sin(45°)]/30 = 5460 lbs
E_K = 0.187•(15,680)•(3.92)² = 45,160 in.-lbs

E_P = 5460•(6) = 32,760 in.-lbs
E_C = 45,160 + 32,760 = 77,920 in.-lbs
E_H = 30•(77,920) = 2,338,000 in.-lbs/hr
W_E = 77,920/[.187•(3.92)²] = 27,060 lbs
W_EV^2 = 77,920/.187 = 416,700
Select RCOS-2X6-BS-RE-99

VERTICAL AXIS, WEIGHT AT RADIUS

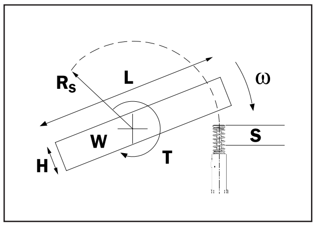


$W_A = W\bullet d^2/R_S^2$
$V = R_S\bullet\omega/688$
$F_P = T/R_S$
$E_K = 0.187\bullet W_A\bullet V^2$
$E_P = F_P\bullet S$
$E_C = E_K+E_P$
$E_H = C\bullet E_C$
$W_E = E_C/(.187\bullet V^2)$
$W_EV^2 = E_C/.187$

W = 15,000 lbs; ω = 60°/sec; T = 150,000 lb-in.; R_S = 36 in.; d = 84 in.; C = 20/hr; S = 8 in.
W_A = 15,000•(84)²/(36)² = 81,670 lbs
V = 36•(60)/688 = 3.14 ft/sec
F_P = 150,000/36 = 4170 lbs
E_K = 0.187•(81,670)•(3.14)² = 150,500 in.-lbs
E_P = 4,170•(8) = 33,330 in.-lbs

E_C = 150,500 + 33,300 = 183,800 in.-lbs
E_H = 20•(183,8000) = 3,676,000 in.-lbs/hr
W_E = 183,800/[.187•(3.14)²] = 99,700 lbs
W_EV^2 = 183,800/.187 = 982,900
Select RCOS-3X8-BS-RE-99

TURNOVER



$W_A = W\bullet(H^2+L^2)/(12\bullet R_S^2)$
$V = R_S\bullet\omega/688$
$F_P = T/R_S$
$E_K = 0.187\bullet W_A\bullet V^2$
$E_P = F_P\bullet S$
$E_C = E_K+E_P$
$E_H = C\bullet E_C$
$W_E = E_C/(.187\bullet V^2)$
$W_EV^2 = E_C/.187$

W = 600 lbs; ω = 120°/sec; T = 12,000 lb-in.; R_S = 20 in.; H = 2 in.; L = 48 in.;C = 150/hr; S = 2 in.
W_A = 600•[(2)²+(48)²]/[12•(20)²] = 289 lbs
V = 20•(120)/688 = 3.49 ft/sec
F_P = 12,000/20 = 600 lbs
E_K = 0.187•(289)•(3.49)² = 658 in.-lbs

E_P = 600•(2) = 1,200 in.-lbs
E_C = 658 + 1,200 = 1,858 in.-lbs
E_H = 150•(1,858) = 278,600 in.-lbs/hr
W_E = 1,858/[.187•(3.49)²] = 816 lbs
W_EV^2 = 1,858/.187 = 9,930
Select SAS-3/4X2-BS-MH-99

Application Worksheet

Fax to: 918.835.3334

At EFDYN, we want our customers to be totally satisfied with their purchase. Therefore, each EFDYN Shock Absorber is tailored to your load requirements regardless of whether it is a standard or a custom-orificed unit. In order to do so, the following data is necessary to ease the process of sizing and selecting your ideal shock absorber.

Please fax, phone, or email worksheet data to EFDYN, and we will send you a detailed assessment of your application and product proposals. If you are interested in a custom designed shock, please indicate any special information or a sketch/drawing on a separate sheet. An EFDYN representative will contact you for additional information if required.

Contact Information

Name: ______________________________

Phone No.: ______________________________

Fax #: ______________________________

Email: ______________________________

Date: ______________________________

Industry/Products: ______________________________

Application Information

Description: ______________________________

____

Direction of Motion:

❏ Horizontal ❏ Vertical ❏ Rotary Horizontal ❏ Rotary Vertical ❏ Incline_______(°)

Position of Shock if Vertical: ❏ Rod Up ❏ Rod Down

Impact Weight (Min/Max): ______________________________(lbs)

Impact Velocity (Min/Max): ______________________________(in/sec)

Cycle Rate: ______________________________(Cycles/hr)

Propelling Force (if any): ______________________________(lbs)

Type of Propelling Force: ❏ Air Cyl.: Bore ______(in) Max psi _______ Rod dia _______(in)

❏ Hydraulic Cyl.: Bore ______(in) Max psi _______ Rod dia _______(in)

❏ Motor: H/P _______________ Torque __________(in-lbs))

No. of Shocks to Take Load: ______________________________

Desired Stroke of Shock(s): ______________________________(in)

G Load Requirements: ______________________________(G)

Desired Return Method: ❏ Air ❏ Spring ❏ Mechanical

Desired Mounting Style: ❏ Threads ❏ Front Flange ❏ Rear Flange

❏ Clevis ❏ Foot (lug) mount ❏ Other ______________________________

Ambient Temperature: ______________________________(°F)

Operating Environment Concerns: ______________________________

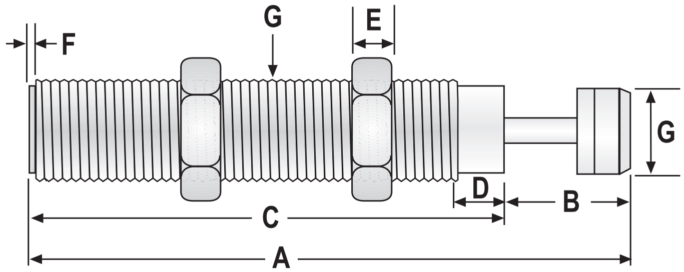
Special Fluid Requirements: ______________________________

Please include any application sketches or additional notes on separate page.

Self Compensating Minibuffers

EFM Series

- **Operating Temperature: 14° to 176°F (-10° to 80°C)**
- **Two locknuts provided with each minibuffer**
- **Flange and Footlug mounts available**



SPECIFICATIONS: EFM MINIBUFFERS

DIMENSIONS IN INCHES (MM)

MODEL	STROKE	A	B	C	D	E	F	G	H
EFM 08-06-6C, 7C, 8C	.24 (6)	2.17 (55)	.57 (14.5)	1.60 (40.5)	-	.12 (3)	.19 (5)	.26 (6.5)	M8 X 1.0
EFM 10-08-6C, 7C, 8C	.31 (8)	2.44 (62)	.65 (16.5)	1.79 (45.5)	-	.12 (3)	.19 (5)	.33 (8.5)	M10 X 1.0
EFM 12-10-6C, 7C, 8C	.39 (10)	2.83 (72)	.77 (19.5)	2.11 (53.5)	-	.16 (4)	.18 (4.5)	.41 (10.5)	M12 X 1.0
EFM 10-20-1C, 2C EFM 10-20-6C, 7C	.80 (20)	4.90 (125)	1.36 (35)	3.54 (90)	.12 (3)	.31 (8)	.43 (11)	.71 (18)	7/8-14 UNF (-1,-2) M20 X 1.5 (-6,-7)
EFM 11-25-1C, 2C EFM 11-25-6C, 7C	1.0 (25)	5.06 (128)	1.71 (43)	3.35 (85)	.55 (14)	.39 (10)	.12 (3)	.87 (22)	1-12 UNF (-1, -2) M25 X 2.0 (-6, -7)
EFM 27-25-7C, 8C	1.0 (25)	5.93 (151)	1.56 (40)	4.4 (111)	-	.39 (10)	.39 (10)	.89 (23)	M27 X 3.0
EFM 11-40-1C EFM 11-40-6C	1.6 (40)	8.31 (211)	3.25 (83)	5.06 (129)	.55 (14)	.39 (10)	.12 (3)	.87 (22)	1-12 UNF (-1) M25 X 2.0 (-6)
EFM 20-50-2C	2.0 (50)	9.57 (243)	3.47 (88)	6.10 (155)	.71 (18)	.59 (15)	.55 (14)	1.18 (30)	M36 X 1.5

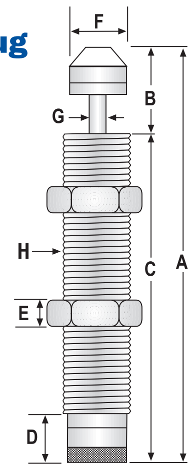
SIZE SELECTION

MODEL	EFFECTIVE WEIGHT lbs (kg)	ENERGY PER CYCLE In lbs (Nm)	ENERGY PER HOUR In lbs (Nm)	MAX IMPACT SPEED In/Sec (m/sec)	SPRING FORCE lbs (kgf) Ext.	SPRING FORCE lbs (kgf) Comp.	MAX CYCLES PER MINUTE	WEIGHT lbs. (g)
EFM 08-06-6C	12 (5.6)	16 (1.8)	21,000 (2,400)	78 (2.0)	.4 (.18)	.9 (.41)	22	.2 (.01)
EFM 08-06-7C	22 (10)	16 (1.8)	21,000 (2,400)	47 (1.2)	.4 (.18)	.9 (.41)	22	.2 (.01)
EFM 08-06-8C	50 (23)	16 (1.8)	21,000 (2,400)	31 (.8)	.4 (.18)	.9 (.41)	22	.2 (.01)
EFM 10-08-6C	9.7 (4.4)	28 (3.2)	50,400 (5,760)	101 (2.6)	.5 (.23)	1.0 (.45)	30	.3 (.01)
EFM 10-08-7C	22 (10)	28 (3.2)	50,400 (5,760)	59 (1.5)	.5 (.23)	1.0 (.45)	30	.3 (.01)
EFM 10-08-8C	88 (40)	28 (3.2)	50,400 (5,760)	31 (.8)	.5 (.23)	1.0 (.45)	30	.3 (.01)
EFM 12-10-6C	26.4 (12)	53 (6)	95,500 (10,800)	101 (2.6)	.8 (1.8)	3.7 (1.7)	30	.4 (.02)
EFM 12-10-7C	41 (19)	53 (6)	95,500 (10,800)	59 (1.5)	.8 (1.8)	3.7 (1.7)	30	.4 (.02)
EFM 12-10-8C	165 (75)	53 (6)	95,500 (10,800)	31 (.8)	.8 (1.8)	3.7 (1.7)	30	.4 (.02)
EFM 10-20-1C EFM 10-20-6C	66 (30)	260 (29)	468,000 (52,800)	55 (1.4)	2.0 (0.9)	5.1 (2.3)	30	.4 (.02)
EFM 10-20-2C EFM 10-20-7C	33 (15)	260 (29)	468,000 (52,800)	79 (2.0)	2.0 (0.9)	5.1 (2.3)	30	.4 (.02)
EFM 11-25-1C EFM 11-25-6C	242 (110)	712 (80)	640,800 (72,300)	47 (1.2)	4.4 (2.0)	7.1 (3.2)	15	.64 (.03)
EFM 11-25-2C EFM 11-25-7C	75 (34)	712 (80)	640,800 (72,300)	87 (2.2)	4.4 (2.0)	7.1 (3.2)	15	.64 (.03)
EFM 27-25-7C	952 (433)	690 (78)	621,400 (70,200)	79 (2.0)	4.4 (2.0)	7.1 (3.2)	15	.79 (.04)
EFM 27-25-8C	3812 (1733)	690 (78)	621,400 (70,200)	47 (1.2)	4.4 (2.0)	7.1 (3.2)	15	.79 (.04)
EFM 11-40-1C EFM 11-40-6C	662 (300)	1042 (118)	750,240 (84,700)	118 (3.0)	4.4 (2.0)	12.6 (5.7)	12	1.32 (.06)
EFM 20-50-2C	2205 (1002)	3472 (392)	1,666,560 (188,100)	118 (3.0)	6.6 (3.0)	18.3 (8.3)	8	2.21 (.10)

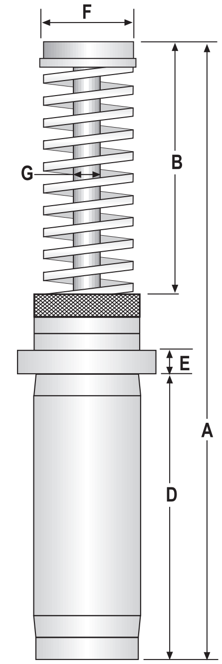
Adjustable Minibuffers

EFMA & EFA Series

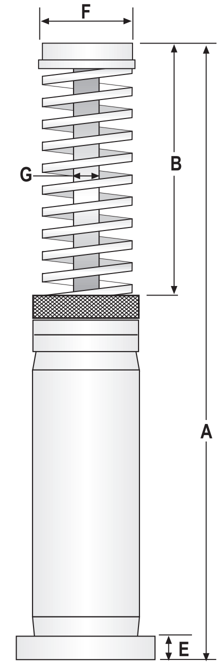
- **Operating Temperature: 14° to 176°F (-10° to 80°C)**
- **Two locknuts provided with each minibuffer**
- **Flange and Footlug mounts available**



EFMA

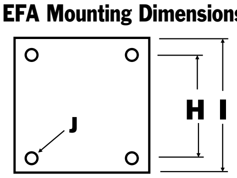


EFA 20-50-FC



EFA 20-50-RC

EFA Mounting Dimensions



H - 38 (1.50)
I- 50 (1.97)
J - 5.5 (0.22) dia.

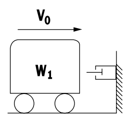
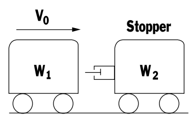
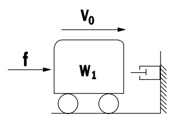
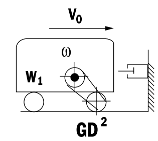
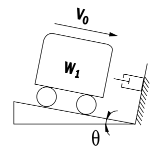
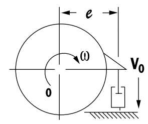
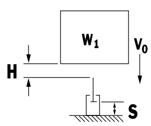
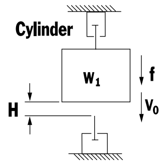
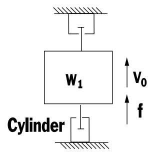
SPECIFICATIONS: EFA & EFMA MINIBUFFERS

DIMENSIONS IN INCHES (MM)

MODEL	STROKE	A	B	C	D	E	F	G	H
EFMA 7-15-1C EFMA 7-15-6C	.60 (15)	4.33 (110)	1.01 (26)	3.32 (84)	.49 (12)	.24 (6)	.47 (12)	.14 (4)	5/8-18 UNF (-1) M14 X 1.0 (-6)
EFMA 20-16-1C	.63 (16)	5.12 (130)	1.18 (30)	3.9 (100)	.6 (15)	.31 (8)	.71 (18)	.20 (5)	3/4-16 UNF
EFMA 10-20-1C EFMA 10-20-6C	.80 (20)	5.08 (129)	1.37 (35)	3.71 (94)	.49 (12)	.31 (8)	.71 (18)	.20 (5)	7/8-14 UNF (-1) M20 X 1.5 (-6)
EFMA 11-25-1C EFMA 11-25-6C	1.0 (25)	6.02 (153)	1.73 (44)	4.29 (109)	.47 (12)	.39 (10)	.87 (22)	.35 (9)	1-12 UNF (-1) M25 X 2.0 (-6)
EFMA 27-25-6C	1.0 (25)	6.14 (156)	1.56 (40)	4.6 (117)	.63 (16)	.39 (10)	.90 (23)	.31 (8)	M27 X 3.0
EFA 20-50-FC	2.0 (50)	9.06 (230)	3.54 (90)	-	3.92 (100)	.39 (10)	1.10 (28)	.39 (10)	-
EFA 20-50-RC	2.0 (50)	9.06 (230)	3.54 (90)	-	-	.39 (10)	1.10 (28)	.39 (10)	-

SIZE SELECTION

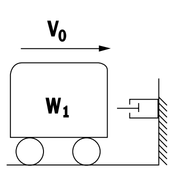
MODEL	MAX EFFECTIVE WEIGHT lbs (kg)	ENERGY PER CYCLE In lbs (Nm)	ENERGY PER HOUR In lbs (Nm)	MAX IMPACT SPEED In/Sec (m/sec)	SPRING FORCE lbs (kgf) EXT.	SPRING FORCE lbs (kgf) COMP	MAX CYCLES PER MINUTE	WEIGHT lbs. (g)
EFMA 7-15-1C EFMA 7-15-6C	STEP 1 7.5 (3.4) STEP 2 18 (8) STEP 3 44 (20) STEP 4 75 (34)	87 (10)	313,200 (35,900)	STEP 1 95 (2.4) STEP 2 63 (1.6) STEP 3 39 (1.0) STEP 4 31 (.8)	0.9 (0.4)	2.4 (1.1)	60	.26 (.01)
EFMA 20-16-1C	500 (227)	250 (29)	450,000 (50,800)	125 (3.2)	2.0 (0.9)	5.1 (2.3)	30	.48 (.02)
EFMA 10-20-1C EFMA 10-20-6C	STEP 1 18 (8) STEP 2 33 (15) STEP 3 66 (30) STEP 4 161 (73)	260 (30)	468,000 (52,800)	STEP 1 106 (2.7) STEP 2 79 (2.0) STEP 3 55 (1.4) STEP 4 35 (.9)	2.0 (0.9)	5.1 (2.3)	30	.40 (.02)
EFMA 11-25-1C EFMA 11-25-6C	STEP 1 42 (19) STEP 2 75 (34) STEP 3 242 (110) STEP 4 728 (330)	712 (82)	640,800 (72,300)	STEP 1 114 (2.9) STEP 2 87 (2.2) STEP 3 47 (1.2) STEP 4 28 (.7)	4.4 (2.0)	7.1 (3.2)	15	.64 (.03)
EFMA 27-25-6C	1375 (625)	690 (78)	621,400 (70,200)	79 (2.0)	4.4 (2.0)	7.1 (3.2)	15	.83 (.04)
EFA 20-50-FC EFA 20-50-RC	2200 (1000)	3472 (392)	1,666,560 (188,100)	118 (3.0)	6.6 (3.0)	18.3 (8.3)	8	2.21 (.1)

	Horizontal Impact (Stationary)	Horizontal Impact (Movable)	Horizontal Impact With Pushing Porce	Horizontal Impact With Rotation	Impact with Some Incline	Rotary
Applications						
Effective Impact Weight kgf (lbs.)	$We = \frac{W_1}{n}$	$We = \frac{W_1 \times W_2}{(W_1+W_2)\,n}$	$We = \frac{W_1 + \frac{2g\,f\,S}{V_0^2}}{n}$	$We = \frac{W_1 + 1/4\,GD^2\left(\frac{W^2}{V_0^2}\right)}{n}$	$We = \frac{W_1 + \left(1+\frac{2g\,\sin\theta S}{V_0^2}\right)}{n}$	$We = \frac{\mathbf{I}\,g}{\ell^2 \cdot n}$ $(V_0 = \ell \cdot \omega)$
Absorption Energy	$E = \frac{W_1 \cdot V_0^2}{2g \cdot n}$	$E = \frac{W_1 \cdot W_2 \cdot V_0^2}{2g(W_1+W_2)\,n}$	$E = \frac{W_1 \cdot V_0^2}{2gn} + \frac{f \cdot S}{n}$	$E = \frac{W_1 \cdot V_0^2}{2gn} + \frac{GD^2\,\omega^2}{8gn}$	$E = \frac{W_1 \cdot V_0^2}{2gn} + WS\sin\theta$	$E = \frac{\mathbf{I}\omega^2}{2n}$ $\left(\omega = \frac{2\pi n}{60}\right)$
	Free Fall Impact	Cylinder Bottoming	Cylinder Topping			
Applications						
Effective Impact Weight kgf (lbs.)	$We = \frac{W_1\left(1+\frac{2gS}{V_0^2}\right)}{n}$ $(V_0 = \sqrt{2gH})$	$We = \frac{W_1 + \frac{2gS(f+W_1)}{V_0^2}}{n}$	$We = \frac{W_1 + \frac{2gS(f-W_1)}{V_0^2}}{n}$			
Absorption Energy	$E = \frac{W_1 \cdot V_0^2}{2gn} + \frac{W_1 S}{n}$	$E = \frac{W_1 \cdot V_0^2}{2gn} + \frac{(f+W_1)S}{n}$	$E = \frac{W_1 \cdot V_0^2}{2gn} + \frac{(f-W_1)S}{n}$			

E = Absorption Energy [kgf m (in. lbs.)]
We = Effective Impact Weight [kgf (lbs.)]
W_1, W_2 = Impact Weight [kgf (lbs.)]
V_0 = Impact Speed [m/s (in./s)]
S = Stroke [m (in]
f = Pushing Force [kgf (lbs.)]
n = No. of Buffers
g = Acceleration of Gravity [= 9.8 m/s² (= 386 in/s²)]
ω = Angular Velocity [rad/s (rad/s)]
ℓ = Distance [m (in.)]
H = Fall Height [m (in.)]
I = Moment of Inertia [kgf m s² (in. lbs. - sec²)]
N = Rotation Speed [rpm]
θ = Inclined Angle [rad]
GD^2 = Rotational Inertia [kgf m² (lbs. in²)]

EXAMPLES:

Application: Factory Conveyor
Example A - Speed and weight of conveyed object is constant, needing only a fixed setting Minibuffer.



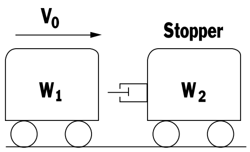
Weight W_1 : 200 lbs.
Speed V_0 : 45 in/sec

$$We = \frac{W_1}{n} = \frac{200}{1} = 200$$

$$E = \frac{W_1 \cdot V_0^2}{2g \cdot n} = \frac{200 \times (45)^2}{2 \times 386 \times 1} = 525$$

Select EFM 11-25-1 from specification chart on page 26.

Example B - Two different object are conveyed, requiring an adjustable Minibuffer.



Weight W_1 : 150 lbs.
W_2 : 30 lbs.
Speed V_0 : 35 in/sec

Object W1

$$We_1 = \frac{W_1}{n} = \frac{150}{1} = 150$$

$$E_1 = \frac{W_1 \cdot V_0^2}{2g \cdot n} = \frac{150 \times (35)^2}{2 \times 386 \times 1} = 238$$

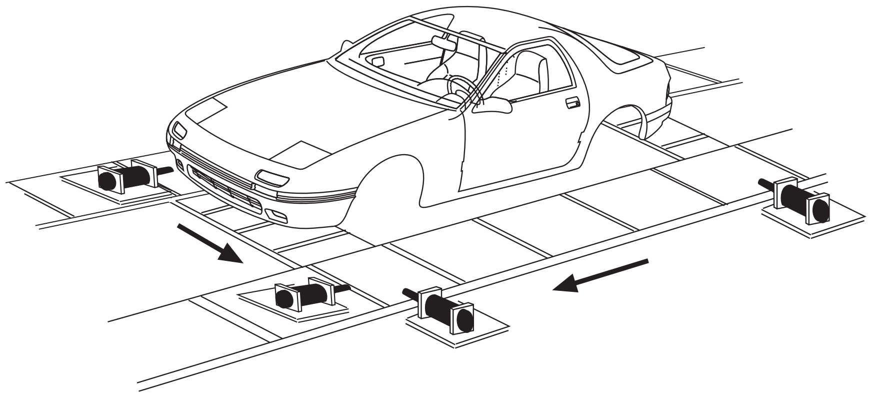
Object W2

$$We_2 = \frac{W_2}{n} = \frac{30}{1} = 30$$

$$E_2 = \frac{W_2 \cdot V_0^2}{2g \cdot n} = \frac{30 \times (35)^2}{2 \times 386 \times 1} = 47.6$$

Select EFMA 10-20-1 from specification chart on page 27.

SAS ½", ¾" & 1⅛" BORE MODEL



MODEL	WE EFFECTIVE WEIGHT (lbs.) LM (LIGHT)	MH (MEDIUM)	HV (HEAVY)	ENERGY PER CYCLE (In-lbs)	ENERGY PER HOUR (In-lbs) SELF CONTAINED	AIR RETURN	(B) WE x V²	WEIGHT lbs
SAS 1/2 x 1	10 - 360	30 - 1,080	90 - 3,240	440	750,000	1,700,000	2,850	.75
SAS 1/2 X 2	15 - 540	45 - 1,620	135 - 4,860	880	870,000	1,800,000	5,700	1
SAS 1/2 X 2 1/2	18 - 640	55 - 1,980	165 - 5,940	1,100	930,000	1,850,000	7,125	1.5
SAS 1/2 X 3	20 - 720	60 - 2,160	180 - 6,480	1,320	990,000	1,900,000	8,550	1.75
SAS 3/4 X 1	30 – 1,080	100 – 3,600	500 – 18,000	1,450	1,100,000	3,100,000	9,340	3
SAS 3/4 X 2	40 – 1,440	125 – 4,500	600 – 21,600	2,900	1,300,000	3,300,000	18,680	4
SAS 3/4 X 3	50 – 1,800	150 – 5,400	700 – 25,200	4,350	1,600,000	3,600,000	28,020	5
SAS 3/4 X 4	60 – 2,160	200 – 7,200	1,000 – 36,000	5,800	1,800,000	3,800,000	37,360	6
SAS 1 1/8 X 2	75 – 2,700	200 – 7,200	1,000 – 36,000	7,900	1,500,000	4,500,000	42,403	8
SAS 1 1/8 X 4	100 – 3,600	300 – 10,800	2,000 – 72,000	15,800	2,000,000	5,000,000	84,807	11
SAS 1 1/8 X 6	150 – 4,500	400 – 14,400	3,000 – 108,000	23,800	2,500,000	5,500,000	127,211	15

HOW TO ORDER SAS SHOCK ABSORBERS

The model designation for SAS self-adjusting shock absorbers is a coded description of the unit defined as shown in this example.

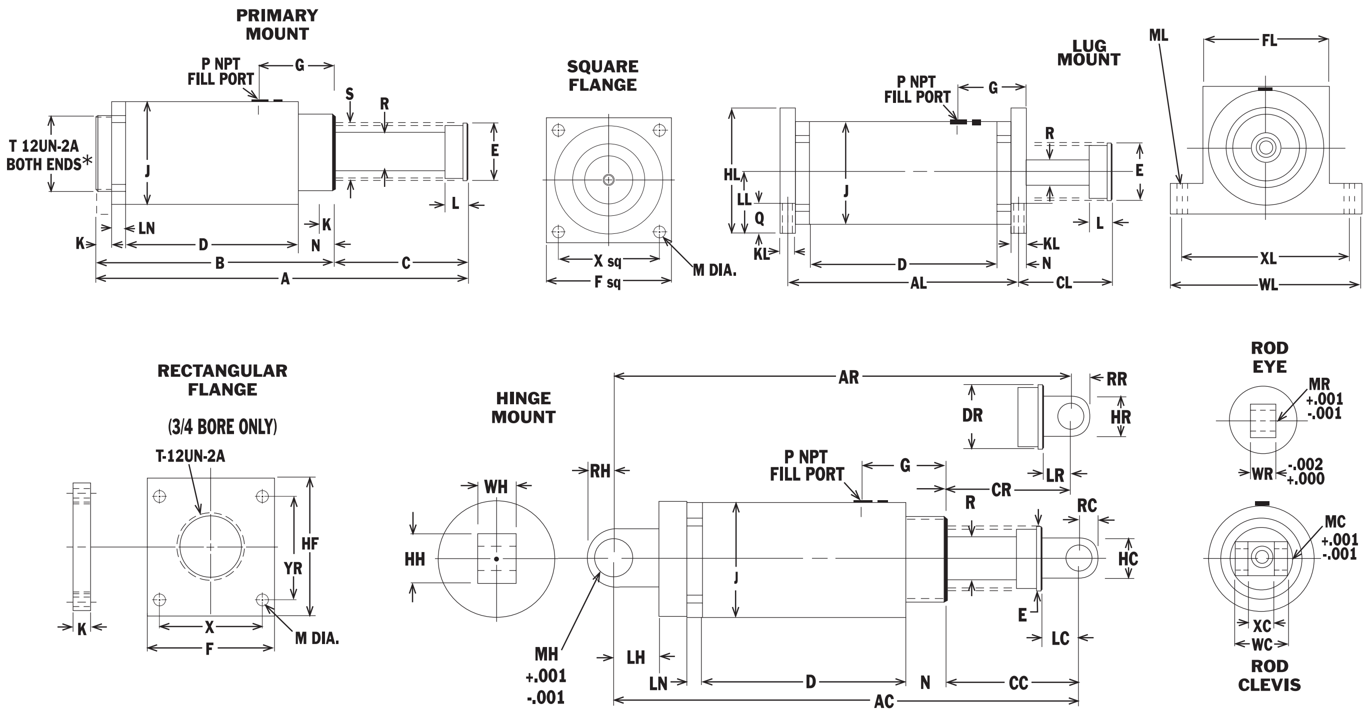
SAS•3/4•2•FS•MH•99

- Efdyn's Self Adjusting Shock Absorber
- Nominal Bore Size 3/4 or 1 1/8
- Stroke Length
- Mounting Style • **P**-Primary • **B**-Sq. Back Flange • **F**-Sq. Front Flange • **BT**-Rectangular Back Flange • **R**-Rod Eye • **C**-Rod Clevis • **H**-Hinge Mount • **L**-Lug Mount (Front & Rear) **FT**-Rectangular Front Flange
- Piston Rod Return Method **S**-Spring Return **A**- Air (External Accumulator Required)
- Selected Metering Designation
- Designates Standard Unit Without Modifications

INFORMATION NEEDED FOR SIZING SHOCKS

W - Weight of moving objects (lbs.)
V - Impact Velocity (FPS)
F_P - Driving (propelling) Force (lbs.)
S - Stroke (inches)

- If no propelling force (F) exists then W_e = W.
- The maximum velocity allowable for a shock absorber can be determined by using (B) values in the table.
- Minimum velocity is 1.0 FPS for all load ranges.



*Metric thread is m64 x 2.0 (available on the 1 1/8" bore model only)

DIMENSIONS IN INCHES

MODEL	STROKE	A	AC	AR	AL	B	C	CC	CL	CR	D	E	S
SAS 1/2 X 1	1	5.45	N/A	N/A	N/A	3.25	2.20	N/A	N/A	N/A	1.98	1.00	.98
SAS 1/2 X 2	2	7.45	N/A	N/A	N/A	4.25	3.20	N/A	N/A	N/A	2.48	1.00	.98
SAS 1/2 X 2 1/2	2 1/2	8.88	N/A	N/A	N/A	4.75	4.13	N/A	N/A	N/A	2.98	1.00	.98
SAS 1/2 X 3	3	9.88	N/A	N/A	N/A	5.25	4.63	N/A	N/A	N/A	3.98	1.00	.98
SAS 3/4 X 1	1	5.69	7.84	N/A	3.34	3.72	1.97	2.56	2.15	N/A	1.97	1.50	1.31
SAS 3/4 X 2	2	7.69	9.84	N/A	4.34	4.72	2.97	3.56	3.15	N/A	2.97	1.50	1.31
SAS 3/4 X 3	3	9.69	11.84	N/A	5.34	5.72	3.97	4.56	4.15	N/A	3.97	1.50	1.31
SAS 3/4 X 4	4	13.06	15.21	N/A	6.34	6.72	6.34	6.93	6.15	N/A	4.97	1.50	1.31
SAS 1 1/8 X 2	2	8.88	12.16	11.63	4.88	5.50	3.38	4.79	3.69	4.26	3.44	2.00	1.88
SAS 1 1/8 X 4	4	12.88	16.16	15.63	6.88	7.50	5.38	6.79	5.69	6.26	5.44	2.00	1.91
SAS 1 1/8 X 6	6	17.75	20.84	20.31	8.88	9.50	8.25	9.47	8.56	8.94	7.44	2.75*	2.73

* For air use 2.00

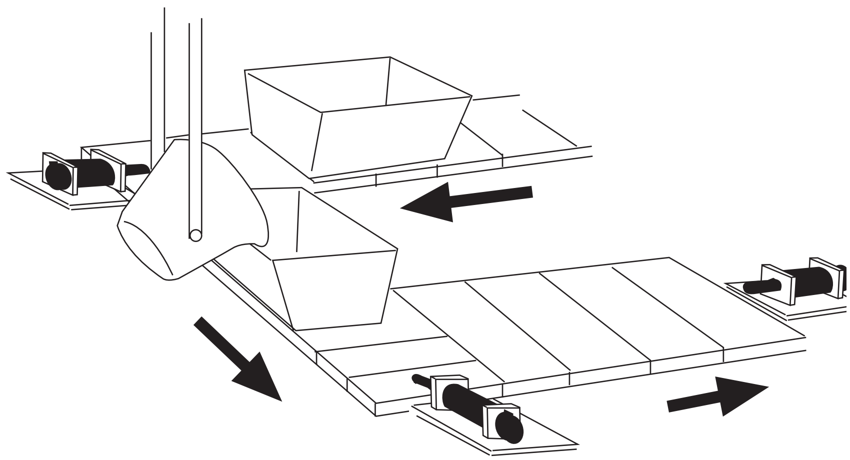
COMMON DIMENSIONS IN INCHES

MODEL	DR	F	FL	G	HC	HF	HH	HL	HR	J	K	KL	L	LC	LH	LL	LN	LR	M	MC
SAS 1/2	N/A	2.00	2.00	.91	N/A	N/A	N/A	2.00	N/A	1.50	.38	.38	.50	N/A	N/A	1.00	.25	N/A	.22	N/A
SAS 3/4	N/A	2.25	2.25	1.23	1.00	3.00	1.00	2.25	N/A	2.25	.50	.63	.63	.69	1.06	1.15	.38	N/A	.34	.3765
SAS 1 1/8	2.00*	3.50	3.50	1.63	1.38	N/A	1.94	3.50	1.13	3.00	.63	.63	1.00	1.41	1.31	1.75	.38	1.13	.41	.7515

MODEL	MH	ML	MR	N	P	Q	R	RC	RH	RR	T	WC	WH	WL	WR	X	XC	XL	YR
SAS 1/2	N/A	.22	N/A	.61	.125	.38	.38	N/A	N/A	N/A	1.25	N/A	N/A	3.00	N/A	1.50	N/A	2.50	N/A
SAS 3/4	.5015	.34	N/A	.88	.125	.56	.50	.50	.50	N/A	1.75	1.00	.75	3.75	N/A	1.63	.52	3.00	2.38
SAS 1 1/8	.7515	.42	.501	1.03	.250	.75	.75	.69	.75	.63	2.50	1.50	1.25	5.63	.75	2.75	.63	4.88	N/A

* Use 2.75 on 6" stroke spring return

SAS 1½" & 2" BORE MODEL



BORE	STROKE	WE EFFECTIVE WEIGHT (lbs.) LM (LIGHT)	MH (MEDIUM)	HV (HEAVY)	ENERGY PER CYCLE (In-lbs)	ENERGY PER HOUR (In-lbs) SELF CONTAINED	AIR RETURN	(B) WE x V²	WEIGHT lbs
1½	2	200 – 7,200	1,000 – 36,000	2,000 – 72,000	14,100	1,800,000	4,800,000	75,384	15
	3 1/2	250 – 9,000	1,500 – 54,000	3,000 – 108,000	24,600	2,100,000	5,100,000	131,923	17
	5	300 – 10,800	2,000 – 72,000	4,000 – 144,000	35,200	2,500,000	5,500,000	188,461	21
	6 1/2	350 – 12,600	2,500 – 90,000	5,000 – 180,000	45,800	2,900,000	5,900,000	244,998	24
	8	400 – 14,400	3,000 – 108,000	6,000 – 216,000	56,300	3,200,000	8,200,000	301,538	28
	10	450 – 16,200	3,500 – 126,000	7,000 – 252,000	70,400	3,800,000	8,800,000	376,922	32
2	2	500 – 18,000	2,000 – 72,000	3,000 – 108,000	24,600	3,600,000	8,600,000	131,923	35
	4	750 – 27,000	2,500 – 90,000	5,000 – 180,000	49,300	4,300,000	9,300,000	263,846	41
	6	1,000 – 36,000	3,000 – 108,000	7,000 – 252,000	74,000	5,000,000	13,000,000	395,769	48
	8	1,250 – 45,000	3,500 – 126,000	9,000 – 324,000	99,000	5,700,000	14,000,000	527,692	55
	10	1,500 – 54,000	4,000 – 144,000	11,000 – 396,000	123,000	6,400,000	17,000,000	659,615	61

HOW TO ORDER SAS SHOCK ABSORBERS

The model designation for SAS self-adjusting shock absorbers is a coded description of the unit defined as shown in this example.

SAS•1½•2•FS•MH•99

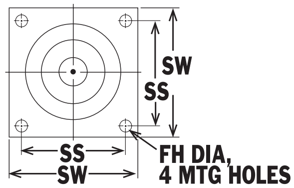
- **SAS** – Efdyn's Self Adjusting Shock Absorber
- **1½** – Nominal Bore Size 1 1/2 or 2
- **2** – Stroke Length
- **F** – Mounting Style • **P**-Primary • **B**-Sq. Back Flange • **F**-Sq. Front Flange • **BT**-Rectangular Back Flange • **R**-Rod Eye • **C**-Rod Clevis • **H**-Hinge Mount • **L**-Lug Mount (Front & Rear) • **FT**-Rectangular Front Flange
- **S** – Piston Rod Return Method **S**-Spring Return **A**- Air (External Accumulator Required)
- **MH** – Selected Metering Designation
- **99** – Designates Standard Unit Without Modifications

INFORMATION NEEDED FOR SIZING SHOCKS

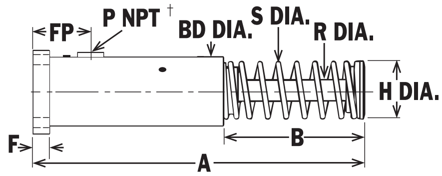
W - Weight of moving objects (lbs.)
V - Impact Velocity (FPS)
F_P - Driving (propelling) Force (lbs.)
S - Stroke (inches)

- If no propelling force (F) exists then W_e = W.
- The maximum velocity allowable for a shock absorber can be determined by using (B) values in the table.
- Minimum velocity is 1.0 FPS for all load ranges.

ASK ABOUT OUR EXPEDITE SERVICE!

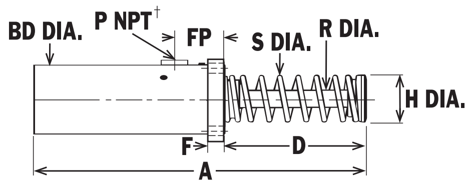


SQUARE FLANGE

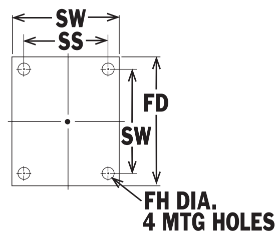


BACK FLANGE MOUNT

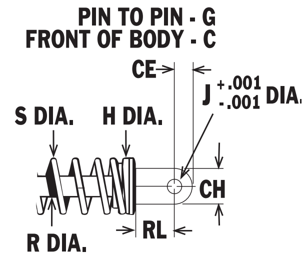
† Single port- standard
Double Port- optional

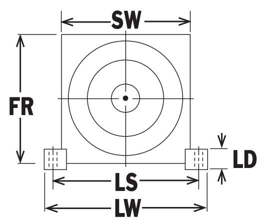


RECTANGULAR FLANGE

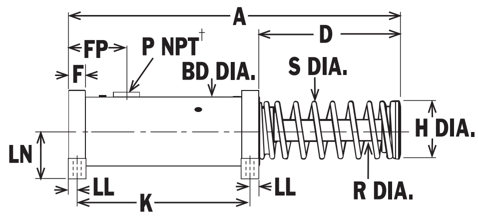


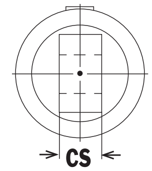
RECTANGULAR FLANGE



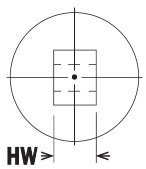


LUG MOUNT

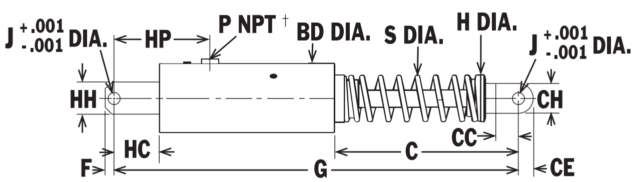


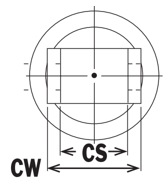


ROD EYE



HINGE MOUNT





ROD CLEVIS

DIMENSIONS IN INCHES

STROKE	A		B		C		D		G						
	STD	FDY	STD	FDY	STD	FDY	STD	FDY	STD	FDY	H	K	S	HC	HP
1 1/2 X 2 S & A	9.71	10.46	4.33	5.08	6.08	6.58	4.15	4.90	12.93	13.68	2.75	5.18	2.75	1.50	3.50
1 1/2 X 3 1/2 S & A	12.71	13.46	5.83	6.58	7.58	8.33	5.65	6.40	15.96	16.71	2.75	6.88	2.75	1.50	3.50
1 1/2 X 5 S & A	15.71	16.46	7.33	8.08	9.08	9.83	7.15	7.90	18.96	19.71	2.75	8.18	2.75	1.50	3.50
1 1/2 X 6 1/2A	19.46	19.46	9.58	9.58	11.33	11.33	9.40	9.40	22.71	22.71	2.75	9.68	N/A	1.50	3.50
1 1/2 X 6 1/2S	19.46	19.46	9.58	9.58	11.33	11.33	9.40	9.40	22.71	22.71	3.00	9.68	2.75	1.50	3.50
1 1/2 X 8A	22.46	22.46	11.08	11.08	12.83	12.83	10.90	10.90	25.71	25.71	2.75	11.18	N/A	1.50	3.50
1 1/2 X 8S	22.96	22.96	11.58	11.58	13.33	13.33	11.40	11.40	26.21	26.21	3.50	11.18	3.00	1.50	3.50
1 1/2 X 10A	26.46	26.46	13.08	13.08	14.83	14.83	12.90	12.90	29.71	29.71	2.75	13.18	N/A	1.50	3.50
1 1/2 X 10S	26.96	26.96	13.58	13.58	15.33	15.33	13.40	13.40	30.21	30.21	4.00	13.18	3.50	1.50	3.50
2 X 2 S & A	12.31	12.81	4.56	5.06	6.59	6.59	4.31	4.81	17.00	17.00	3.12	9.50	3.12	2.66	6.16
2 X 4 S & A	16.31	16.81	6.56	7.06	8.59	8.59	6.31	6.81	21.00	21.00	3.12	11.50	3.12	2.66	6.16
2 X 6 S & A	20.31	20.81	8.56	9.06	10.59	10.59	8.31	8.81	25.00	25.00	3.12	13.50	3.12	2.66	6.16
2 X 8A	24.31	24.81	10.56	11.06	13.59	13.59	10.31	10.81	29.00	29.00	3.12	15.50	N/A	1.66	5.16
2 X 8S	25.31	25.31	11.56	11.56	13.33	13.33	11.31	11.31	29.00	29.00	4.12	15.50	4.12	1.66	5.16
2 X 10A	28.31	28.81	13.06	13.06	15.59	15.59	12.31	12.81	33.00	33.00	3.12	17.50	N/A	1.66	5.16
2 X 10S	29.31	29.31	13.56	13.56	15.59	15.59	13.31	13.31	33.00	33.00	4.50	17.50	4.50	1.66	5.16

DIMENSIONS IN INCHES

BORE	BD	CC	CE	CH	CS	CW	F	FD	FH	FP	FR	HH	HW	J	LD	LL	LN	LS	LW	P	R	RL	SS	SW
1 1/2	3.50	1.41	.62	1.25	.62	1.50	.75	5.00	.531	2.00	4.03	1.50	1.25	.750	.75	.48	2.03	5.50	6.50	.50	1.125	2.00	3.00	4.00
2	5.00	1.31	1.00	2.00	1.50	3.00	1.00	N/A	.656	3.50	5.87	2.25	1.50	1.000	1.50	.62	3.12	6.50	8.00	.75	1.500	2.25	4.38	5.50

SAS 1½" & 2"

ASB 7/8” Bore SHOK BLOC®

INFORMATION FOR ASB SHOCKS

- 1, 2 AND 3” STROKE SIZES
- COMPACT, ONE PIECE BODY
- FIELD ADJUSTABLE
- INTERCHANGABLE WITH LOWER CAPACITY UNITS
- RUGGED, FEW MOVING PARTS
- OFF THE SHELF DELIVERY

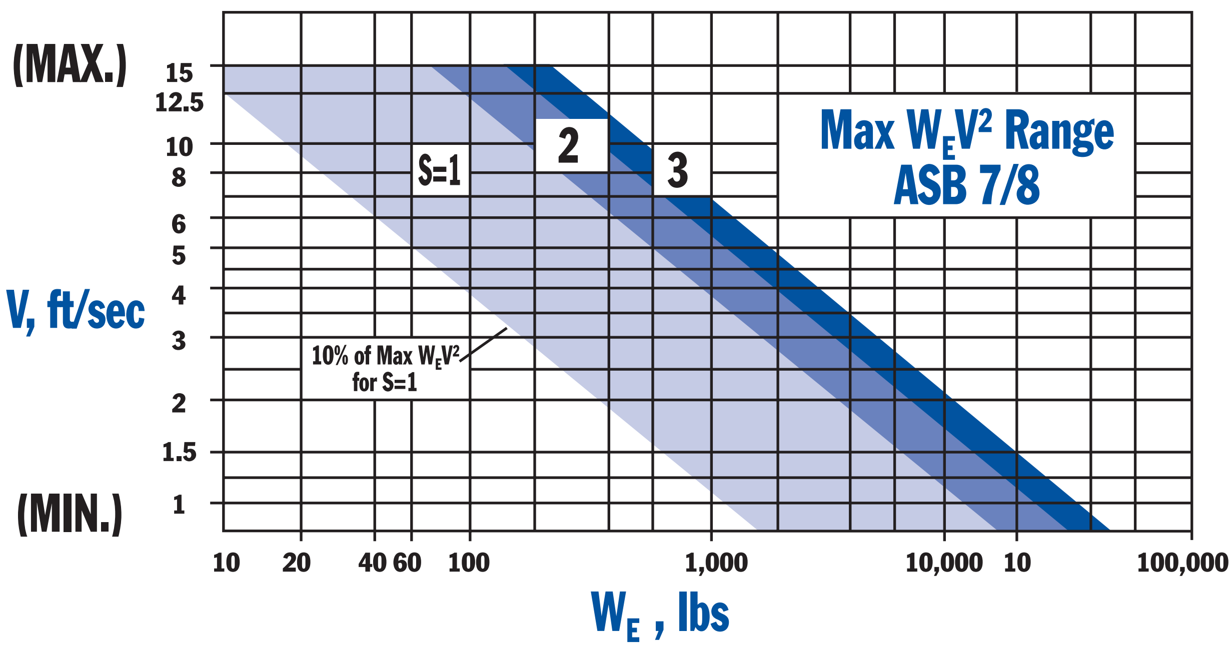
HOW TO ORDER ASB SHOCK-BLOCS

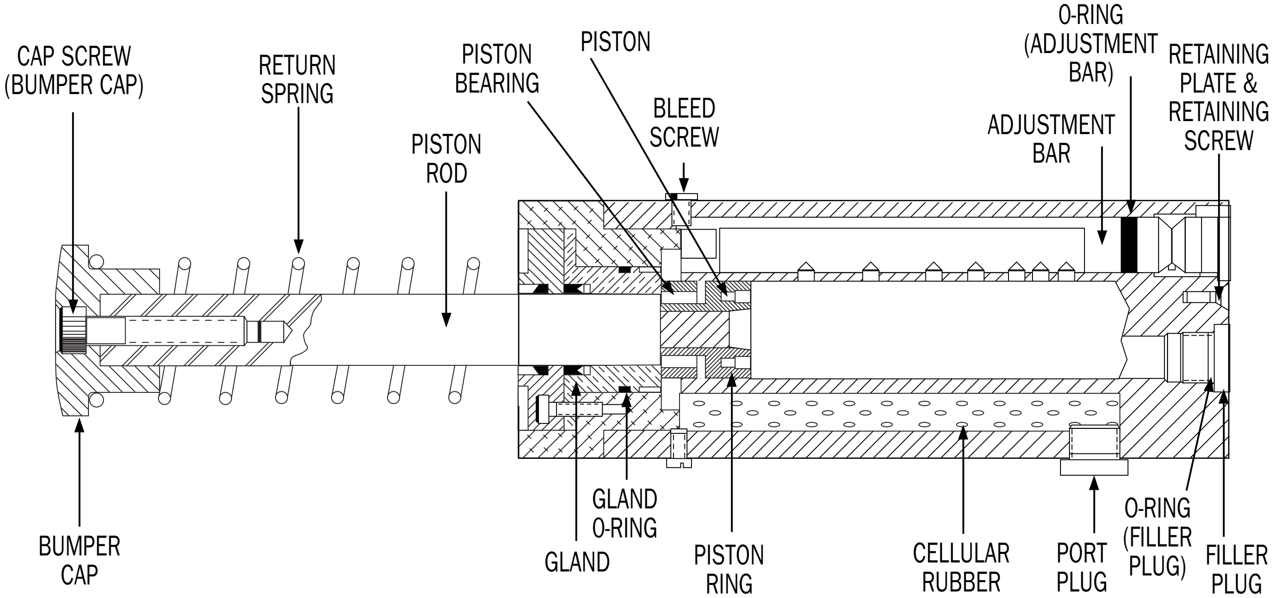
The model designation for ASB SHOK-BLOCS shock absorbers is a coded description of the unit defined as shown in this example.

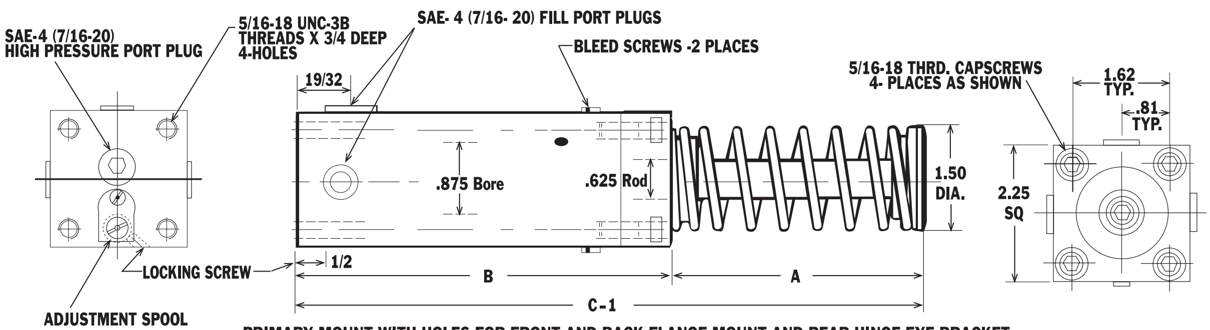
ASB • 7/8 • 1 • PS • 99

- ASB: Adjustable Hydraulic SHOK BLOC
- 7/8: Nominal Bore Size
- 1: Stroke Length
- P: Mounting Style • **P**-Primary • **B**-Sq. Back Flange • **F**-Sq. Front Flange • **HR**- Hinge-Rod Eye • **HC**-Hinge-Clevis • **L**-Lug Mount (Front & Rear)
- S: Piston Rod Return Method **S**-Spring Return **A**- Air
- 99: All standard units include designation “99” to indicate they are not modified

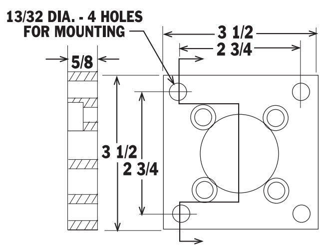
SIZE SELECTION GRAPH



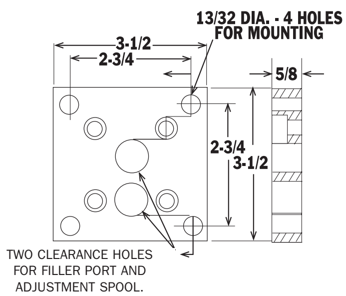




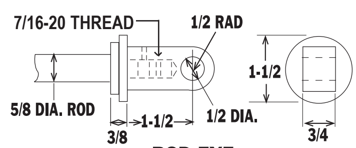
PRIMARY MOUNT WITH HOLES FOR FRONT AND BACK FLANGE MOUNT AND REAR HINGE EYE BRACKET.



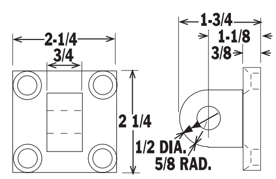
FRONT FLANGE MOUNT



REAR FLANGE MOUNT



ROD EYE



REAR HINGE EYE BRACKET

Stroke	*Maximum Working Capacity inch-pounds	**Heat Dissipation Capacity inch-pounds per minute
1	3,000	24,600
2	6,000	27,800
3	9,000	33,500

*Consult factory for optimum adjustability if unit selected will be used above 80% of its max. working capacity rating when impact velocities are 1.0 F.P.S. or less and under 60% of its max. working capacity rating when impact velocities are 15.0 F.P.S. or greater.

**Heat capacity ratings can be increased by using special fluid and seals and/or circulating hydraulic systems– consult factory.

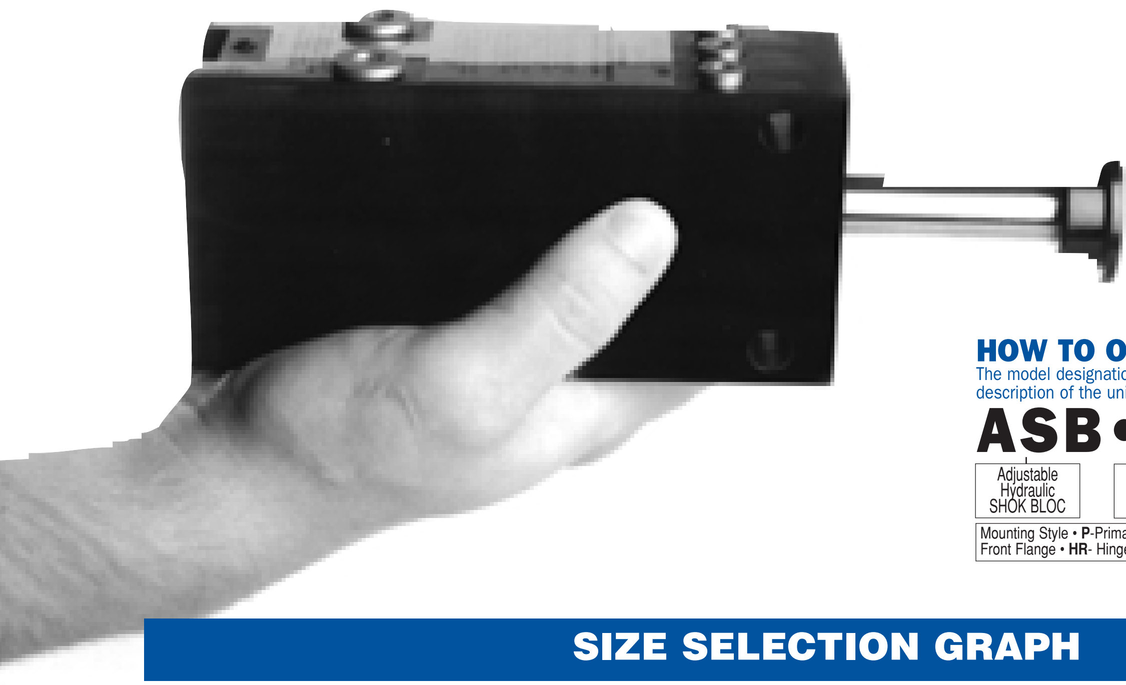
DIMENSIONS (INCHES)				
STROKE	A	B	C-1	C-2*
1	2 1/8	3 3/4	5 7/8	8 5/16
2	3 1/8	4 3/4	7 7/8	10 5/16
3	4 1/8	5 3/4	9 7/8	12 5/16

* Center line of Rod Eye Pin Hole to center of Rear Hinge Pin Hole when Piston rod is fully extended.

ASB 1⅛" Bore SHOK BLOC®

INFORMATION FOR ASB SHOCKS

- 1, 2 AND 3" STROKE SIZES
- COMPACT, ONE PIECE BODY
- FIELD ADJUSTABLE
- INTERCHANGABLE WITH LOWER CAPACITY UNITS
- RUGGED, FEW MOVING PARTS
- OFF THE SHELF DELIVERY



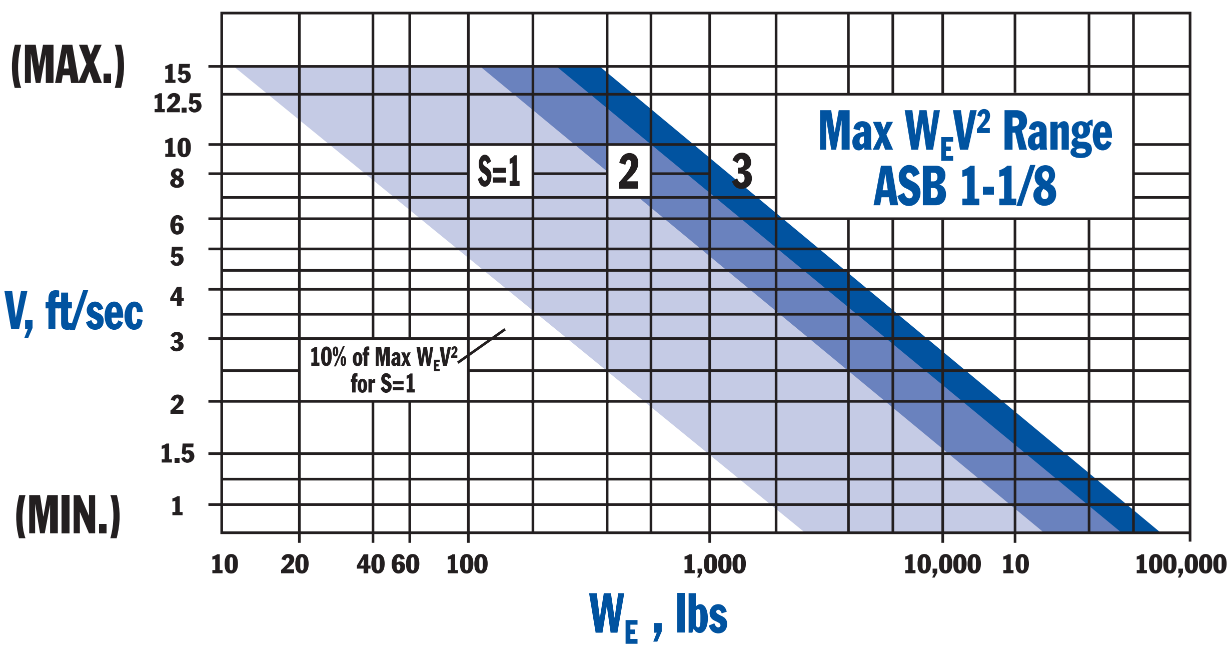
HOW TO ORDER ASB SHOCK-BLOCS

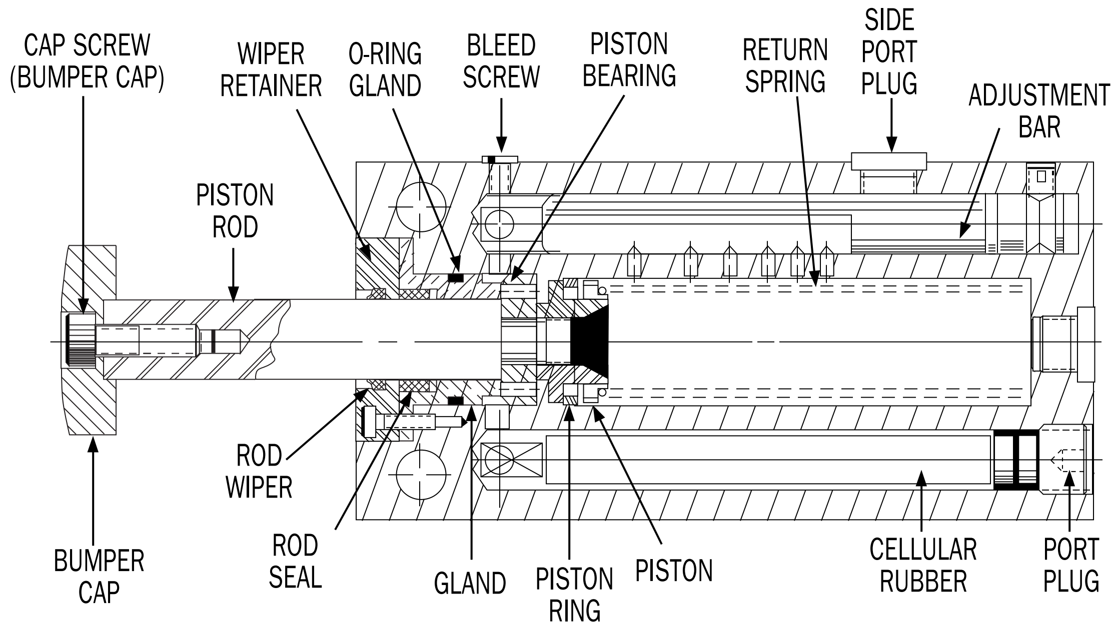
The model designation for ASB SHOK-BLOCS shock absorbers is a coded description of the unit defined as shown in this example.

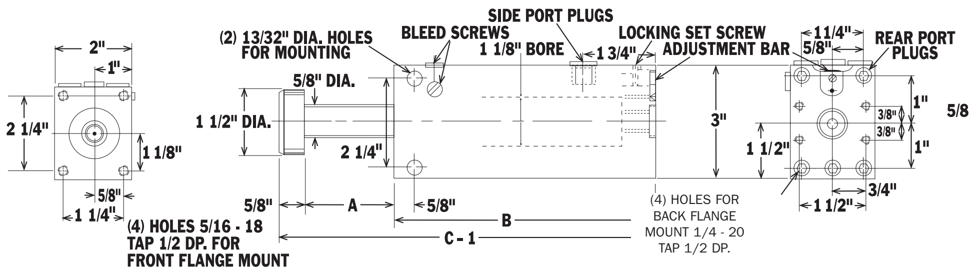
ASB • 1 • 1 • PS • 99

- ASB: Adjustable Hydraulic SHOK BLOC
- 1: Nominal Bore Size
- 1: Stroke Length
- P: Mounting Style • **P**-Primary • **B**-Sq. Back Flange • **F**-Sq. Front Flange • **HR**- Hinge-Rod Eye • **HC**-Hinge-Clevis •
- S: Piston Rod Return Method **S**-Spring Return **A**- Air
- 99: All standard units include designation "99" to indicate they are not modified

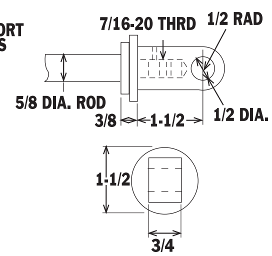
SIZE SELECTION GRAPH



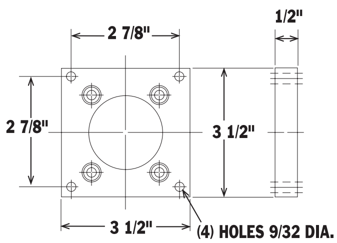




PRIMARY MOUNT WITH HOLES FOR FRONT AND BACK FLANGE MOUNT AND REAR HINGE EYE BRACKET

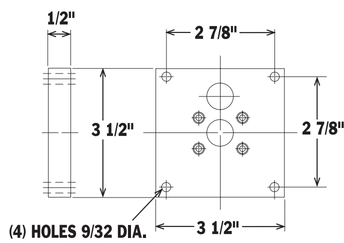


ROD EYE

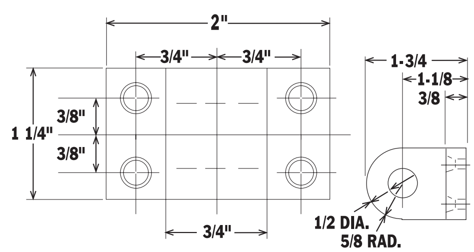


FRONT FLANGE MOUNT

* This flange will be provided in 4 3/4" diameter round style until quantities are depleted



REAR FLANGE MOUNT



REAR HINGE EYE BRACKET

Stroke	*Maximum Working Capacity inch-pounds	**Heat Dissipation Capacity inch-pounds per minute
1	5,000	40,000
2	10,000	50,000
3	15,000	60,000

*Consult factory for optimum adjustability if unit selected will be used above 80% of its max. Working capacity rating when impact velocities are 1.0 F.P.S. or less and under 60% of its max. Working capacity rating when impact velocities are 15.0 F.P.S. or greater.

**Heat capacity ratings can be increased by using special fluid and seals and/or circulating hydraulic systems– consult factory.

DIMENSIONS (INCHES)				
STROKE	A	B	C-1	C-2*
1	1 1/8	4 5/8	6 3/8	8 5/8
2	2 1/8	6 1/4	9	11 1/4
3	3 1/8	8	11 3/4	14

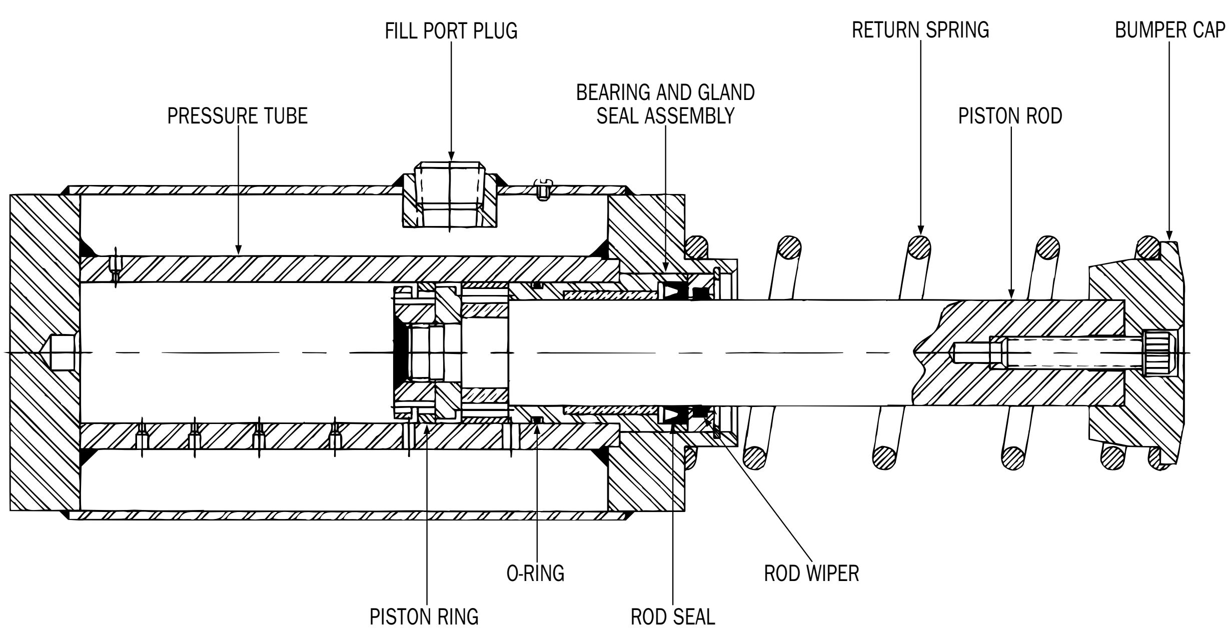
* Center line of Rod Eye Pin Hole to center of Rear Hinge Pin Hole when Piston rod is fully extended.

RNSA - SELF ADJUSTING SHOCKS
RCOS - CUSTOM ORIFICED SHOCK
RCBS - CRANE BUMPER SHOCK

R-SERIES SHOCK ABSORBERS

- **EFFECTIVE WEIGHT RANGE: 15 - 2,100,000 LBS.**
- **STAINLESS STEEL MODELS AVAILABLE**
- **SOLID ALL WELDED HEAVY DUTY CONSTRUCTION**
- **OPERATING TEMPERATURE RANGE: -10ºF TO 150ºF**

THE R-SERIES SHOCK ABSORBER IS A RUGGED INDUSTRIAL SHOCK ABSORBER THAT WILL FIT VIRTUALLY EVERY APPLICATION. IT IS AVAILABLE IN CUSTOM ORIFICED, SELF ADJUSTING, AND CRANE BUMPER MODELS WITH A VARIETY OF MOUNTING STYLES AND PISTON ROD RETURN METHODS.



- **HIGH TEMPERATURE FLUIDS AVAILABLE ON REQUEST**
- **6” AND 8” BORE SIZES AVAILABLE**
- **USED IN PAPER MILLS, FOUNDRIES, SAW MILLS, OVERHEAD CRANES, STACKER CRANES, MACHINE TOOLS, PACKAGING EQUIPMENT, AUTOMATED ASSEMBLY LINES, STEEL MILLS, AND MATERIAL HANDLING**

HOW TO ORDER R-SERIES SHOCK ABSORBERS

The model designation for R-series shock absorbers is a coded description of the unit defined as shown in this example.

RXXX • 1 1/8 X 2 • BS • RE • 99

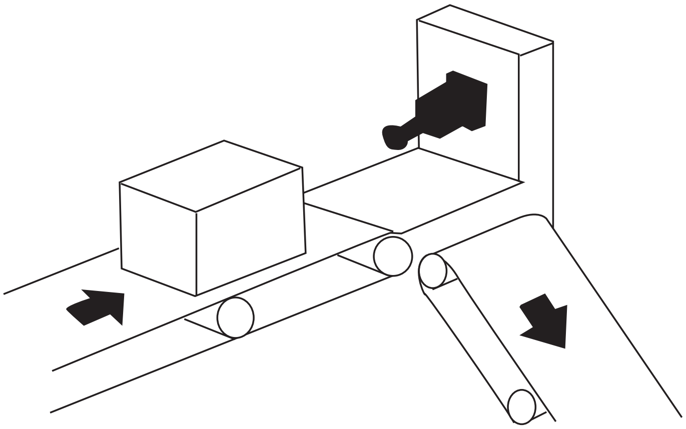
- **RXXX**: RCOS- Custom Orificed, RNSA- Self Adjusting, RCBS- Crane Bumper
- **1 1/8**: Bore Size
- **2**: Stroke Length
- **B**: Mounting Method — F- Front Square Flange • B- Back Square Flange • BP- Back Primary • *FP-Front Primary • *FBP-Front-Back Primary • L-Lug Mount • BL-Square Back Flange-Front Lug • HC-Rear Hinge-Front Clevis • HR-Rear Hinge-Front Rod Eye • **RB- Rectangular Back Flange • **RF-Rectangular Front Flange
- **S**: Piston Rod Return Method — S- Spring Return, A- Air (external accumulator required), M- Mechanical, C- Air Charged
- **RE**: Selected Metering Designation
- **99**: Designates Standard Unit Without Modifications

* Not available in external spring return models. (except in 4” bore)

** Available in 1 1/2” and 3” bore only

R-SERIES SHOCK ABSORBER

1⅛" BORE MODEL



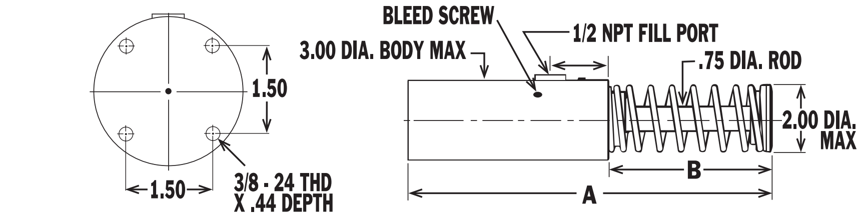
RNSA: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (LBS.) LM (LIGHT)	MH (MEDIUM)	HV (HEAVY)	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
1⅛	2	75 – 2,700	200 – 7,200	1,000 – 36,000	8,000	1,300,000	4,300,000	42,400	12
	4	100 – 3,600	300 – 10,800	2,000 – 72,000	16,000	1,700,000	4,700,000	84,500	14
	6	125 – 4,500	400 – 14,400	3,000 – 108,000	24,000	2,200,000	5,200,000	127,200	17
	8	150 – 5,400	500 – 18,000	4,000 – 144,000	32,000	2,600,000	5,600,000	169,600	20

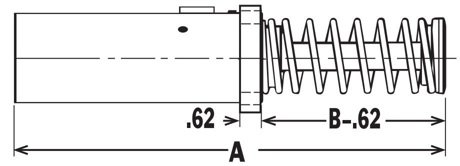
For standard metered shocks, use W_EV^2 to select size from Size Selection Tables.
The maximum velocity allowable for a shock absorber can be determined by using (B) values in the table.

RCOS / RCBS: SIZE SELECTION TABLE

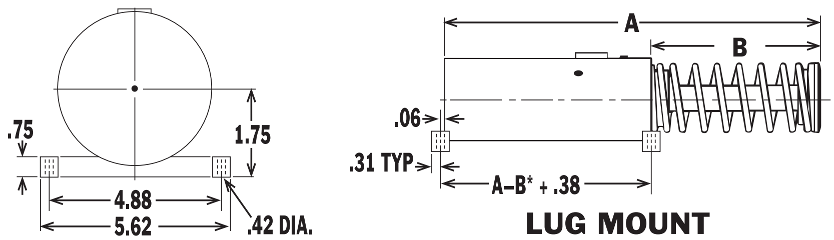
BORE	STROKE	WE EFFECTIVE WEIGHT (LBS) RA	RB	RC	RD	RE	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
1⅛	2	15 – 90	80 – 450	360 – 2,160	1,770 – 10,600	8,500 - 51,000	11,000	1,300,000	4,300,000	58,000	12
	4	20 – 120	100 – 600	500 – 3,000	2,500 - 15,000	9,000 - 54,000	22,000	1,700,000	4,700,000	116,000	14
	6	25 – 150	130 – 750	630 – 3,750	3,100 - 18,000	10,000 - 60,000	32,000	2,200,000	5,200,000	174,000	17
	8	30 – 180	150 – 870	710 – 4,300	3,500 – 21,000	11,000 - 66,000	43,000	2,600,000	5,600,000	232,000	20
	12	40 – 240	200 – 1,170	960 – 5,700	4,700 - 28,000	12,500 - 75,000	65,000	4,800,000	9,800,000	291,000	24
	18	50 - 300	250 – 1,470	1,200 – 7,200	5,900 - 35,000	15,000 – 90,000	97,000	6,000,000	14,000,000	435,000	28



PRIMARY MOUNT END VIEW **PRIMARY MOUNT**

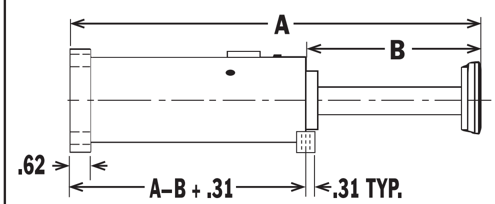


FRONT FLANGE MOUNT

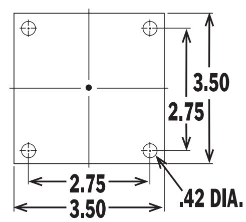


LUG MOUNT END VIEW **LUG MOUNT**

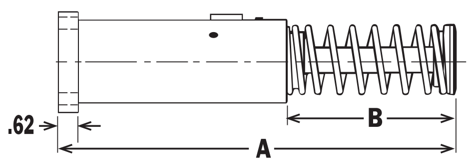
* CONSULT FACTORY FOR SPECIAL LUG MOUNT DIMENSIONS



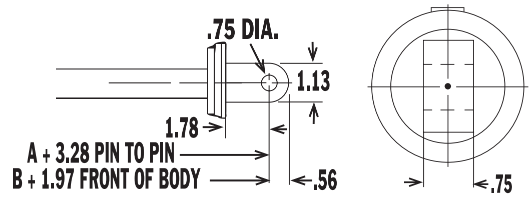
BACK FLANGE FRONT LUGMOUNT



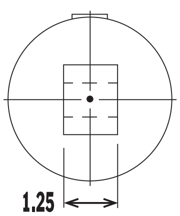
SQUARE FLANGE



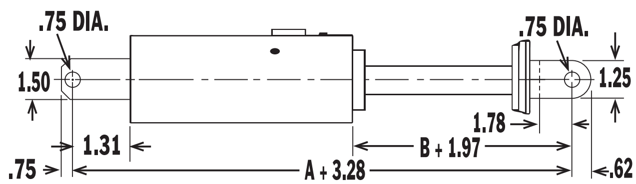
BACK FLANGE MOUNT



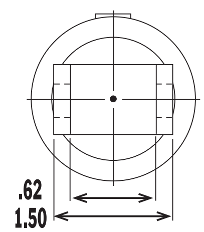
ROD EYE **ROD EYE END VIEW**



HINGE LUG END VIEW



HINGE ROD CLEVIS MOUNT



ROD CLEVIS END VIEW

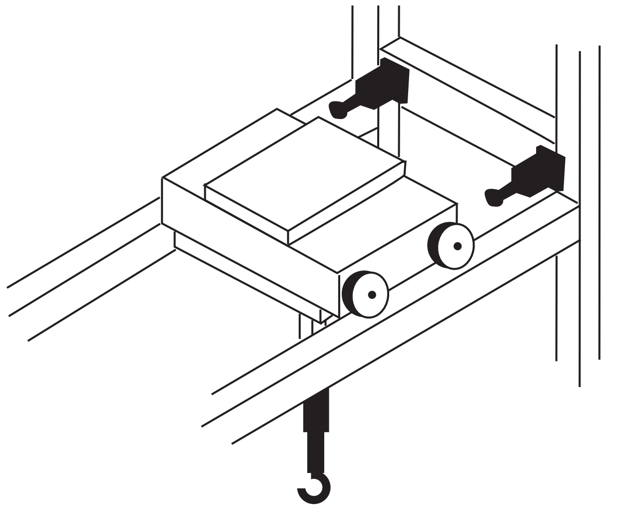
- 12", 18" and 24" stroke models have internal springs.
- Front end primary mount not available on external spring models.
- RCBS models are equipped with a safety chain.
- Add 1½" to A and B for models with chain.

DIMENSIONS

STROKE	(S) SPRING RETURN MODELS DIM. A	DIM. B	(A) AIR RETURN (C) AIR CHARGED RETURN (M) MECHANICAL RETURN MODELS DIM. A	DIM. B
2	8.88	4.00	8.88	4.00
4	12.88	6.00	12.88	6.00
6	17.88	9.00	17.88	9.00
8	22.88	12.00	20.75	10.13
12	36.75	14.13	29.75	14.13
18	53.25	20.13	42.75	20.13
24	72.75	26.13	58.75	26.13

R-SERIES SHOCK ABSORBER

1½" BORE MODEL



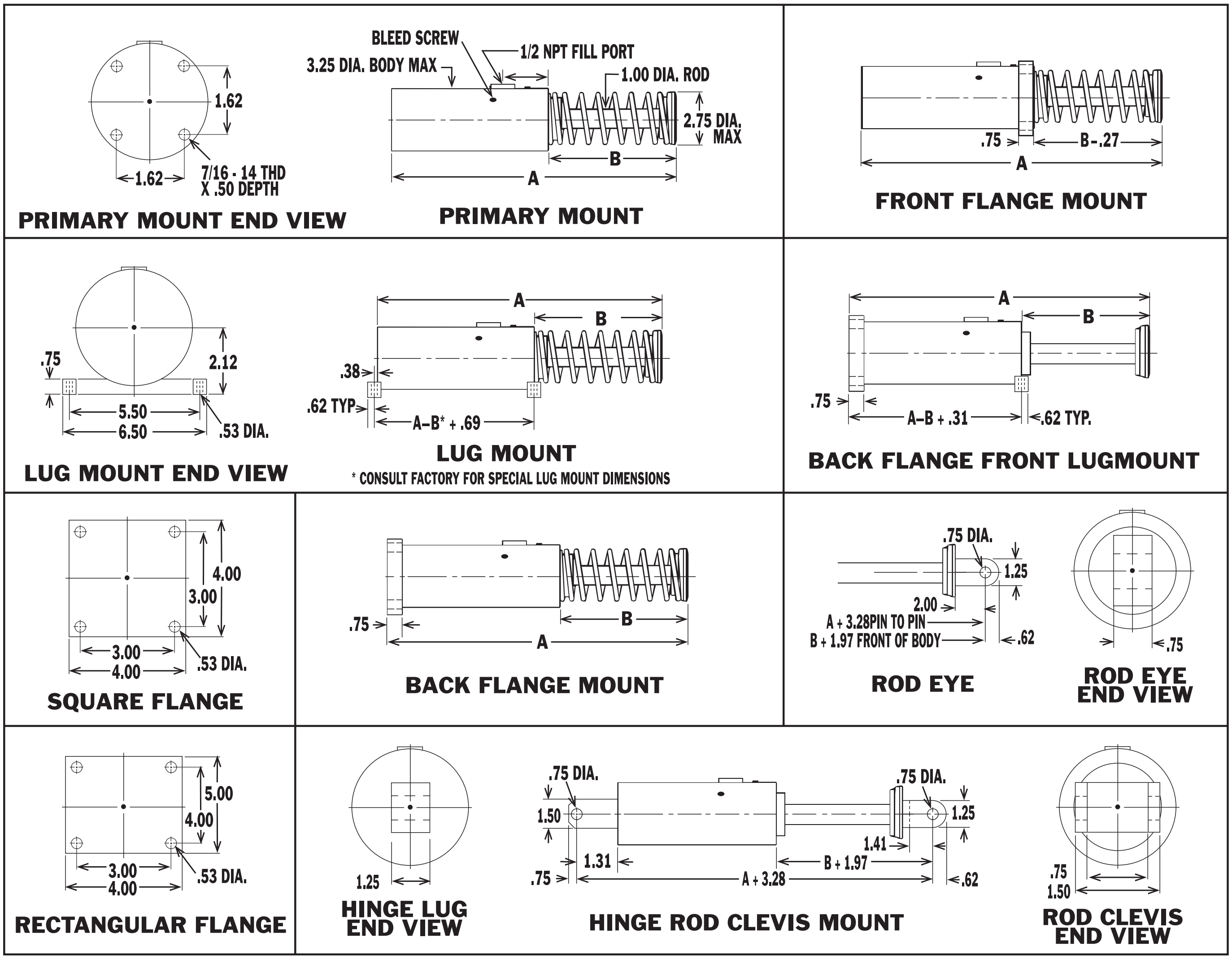
RNSA: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT IN (LBS.) LM (LIGHT)	MH (MEDIUM)	HV (HEAVY)	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V^2	WEIGHT LBS
1½	2	200 – 7,200	1,000 – 36,000	2,000 – 72,000	14,000	1,600,000	4,600,000	75,400	15
	3 1/2	250 – 9,000	1,500 – 54,000	3,000 – 108,000	25,000	1,900,000	4,900,000	131,900	17
	5	300 – 10,800	2,000 – 72,000	4,000 – 144,000	35,000	2,200,000	5,200,000	188,500	21
	6 1/2	350 – 12,600	2,500 – 90,000	5,000 – 180,000	46,000	2,600,000	5,600,000	245,000	24
	8	400 – 14,400	3,000 – 108,000	6,000 – 216,000	56,000	2,900,000	7,900,000	302,000	28
	10	450 – 16,200	3,500 – 126,000	7,000 – 252,000	70,000	3,400,000	8,400,000	377,000	32

For standard metered shocks, use $W_E V^2$ to select size from Size Selection Tables.
The maximum velocity allowable for a shock absorber can be determined by using (B) values in the table.

RCOS / RCBS: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (LBS) RA	RB	RC	RD	RE	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V^2	WEIGHT LBS
1½	2	30 – 180	140 – 870	710 – 4,200	3,500 – 21,000	12,500 – 75,000	19,000	1,600,000	4,600,000	102,000	15
	3 1/2	40 – 240	200 – 1,170	950 – 5,700	4,700 – 28,000	13,500 – 81,000	34,000	1,900,000	4,900,000	181,000	17
	5	50 – 300	240 – 1,470	1,200 – 7,000	6,000 – 35,000	14,500 – 87,000	48,000	2,200,000	5,200,000	258,000	21
	6 1/2	60 – 360	300 – 1,770	1,400 – 9,000	7,000 – 42,000	15,500 – 93,000	62,000	2,600,000	5,600,000	336,000	24
	8	70 – 420	340 – 2,070	1,700 – 10,000	8,000 – 50,000	16,500 – 99,000	77,000	2,900,000	7,900,000	414,000	28
	10	80 – 480	400 – 2,370	1,900 – 12,000	9,000 – 57,000	18,000 – 108,000	96,000	3,400,000	8,400,000	517,000	32
	12	90 – 540	440 – 2,670	2,200 – 13,000	11,000 – 64,000	19,500 – 117,000	115,000	5,800,000	14,000,000	621,000	36
	18	100 – 600	500 – 2,970	2,400 – 15,000	12,000 – 71,000	23,500 – 141,000	173,000	8,700,000	17,000,000	931,000	50
	24	110 - 660	540 – 3,270	2,700 – 16,000	13,000 – 78,000	27,000 – 162,000	234,000	11,000,000	22,000,000	1,242,000	74



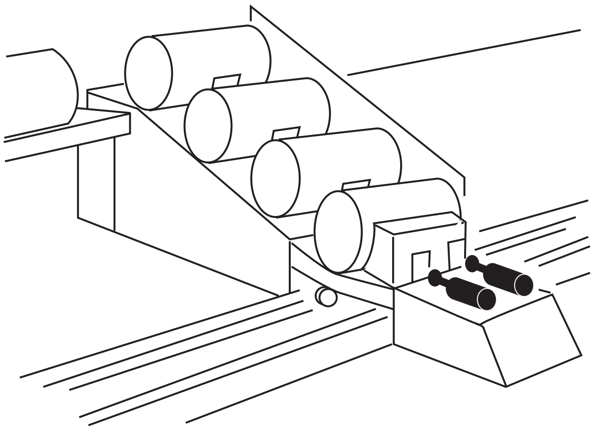
- **12", 18", 24" and 36" stroke models have internal springs.**
- **Front end primary mount not available on external spring models.**
- **RCBS models are equipped with a safety chain.**
- **Add 1½" to A and B for models with chain.**

DIMENSIONS

	(S) SPRING RETURN MODELS		(A) AIR RETURN (C) AIR CHARGED RETURN (M) MECHANICAL RETURN MODELS	
STROKE	DIM. A	DIM. B	DIM. A	DIM. B
2	9.69	4.40	9.69	4.40
3 1/2	12.69	5.90	12.69	5.90
5	15.69	7.40	15.69	7.40
6 1/2	20.96	11.15	19.44	9.65
8	23.96	12.65	21.50	10.19
10	27.96	14.65	25.50	12.19
12	38.25	14.19	30.00	14.19
18	57.25	20.19	44.00	20.19
24	73.50	26.19	57.00	26.19
36	112.25	38.19	84.00	38.19

R-SERIES SHOCK ABSORBER

2" BORE MODEL



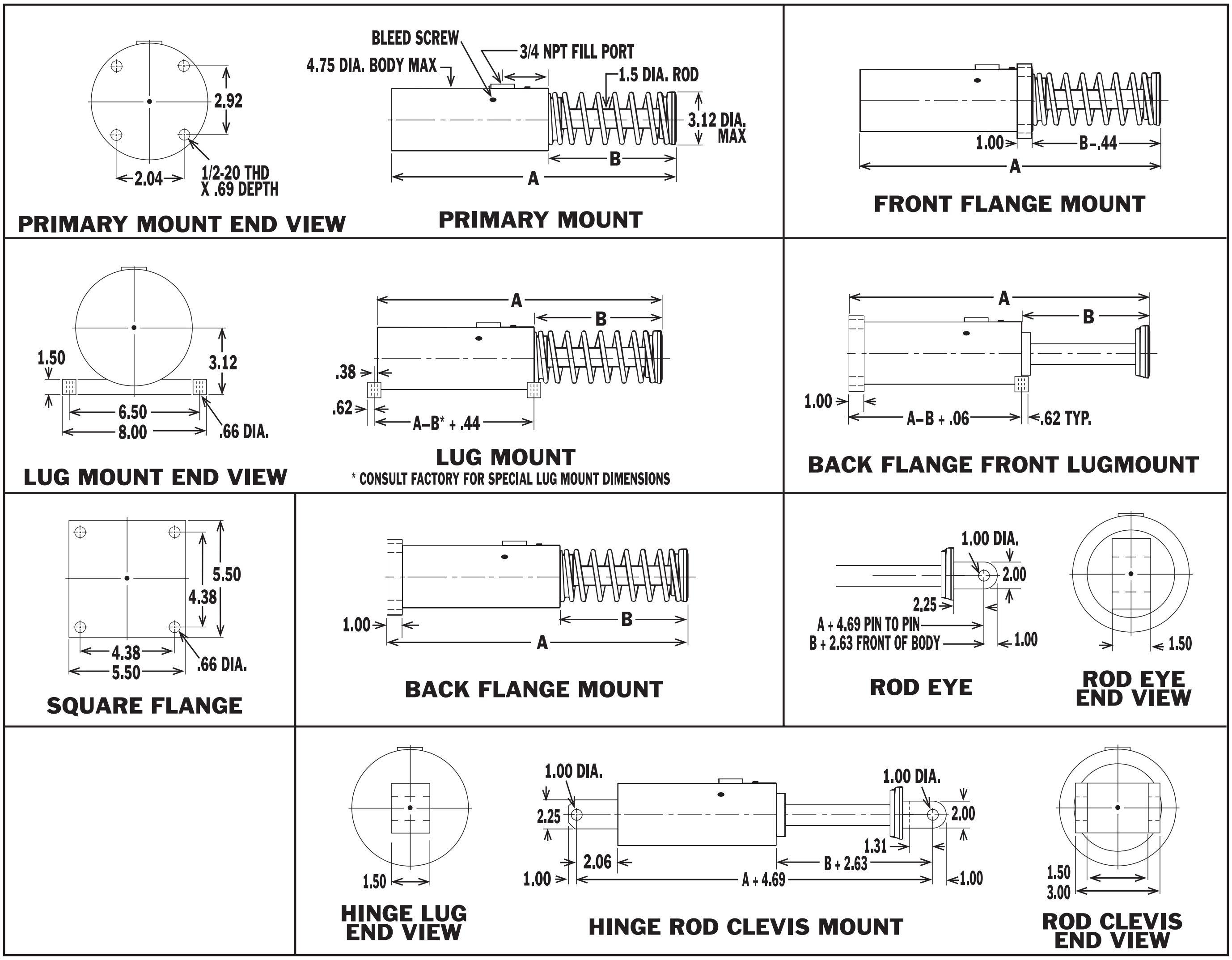
RNSA: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (LBS) LM (LIGHT)	MH (MEDIUM)	HV (HEAVY)	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
2	2	500 – 18,000	2,000 – 72,000	3,000 – 108,000	25,000	3,300 000	8,300,000	132,000	35
	4	750 – 27,000	2,500 – 90,000	5,000 – 180,000	49,000	3,900,000	8,900,000	264,000	41
	6	1,000 – 36,000	3,000 – 108,000	7,000 – 252,000	74,000	4,600,000	9,600,000	396,000	48
	8	1,250 – 45,000	3,500 – 126,000	9,000 – 324,000	99,000	5,200,000	13,000,000	528,000	55
	10	1,500 – 54,000	4,000 – 144,000	11,000 – 396,000	123,000	5,900,000	14,000,000	660,000	61
	12	1,750 – 63,000	4,500 – 180,000	13,000 – 468,000	148,000	6,500,000	15,000,000	792,000	67

For standard metered shocks, use $W_E V^2$ to select size from Size Selection Tables.
The maximum velocity allowable for a shock absorber can be determined by using (B) values in the table.

RCOS / RCBS: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (LBS) RA	RB	RC	RD	RE	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
2	2	30 – 180	140 – 870	710 – 4,200	3,500 – 21,000	16,000 – 96,000	34,000	3,300 000	8,300,000	180,000	35
	4	40 – 240	200 – 1,170	950 – 5,700	4,700 – 28,000	18,000 – 108,000	67,000	3,900,000	8,900,000	360,000	41
	6	50 – 300	240 – 1,470	1,200 – 7,000	6,000 – 35,000	20,000 – 120,000	101,000	4,600,000	9,600,000	540,000	48
	8	60 – 360	300 – 1,770	1,400 – 9,000	7,000 – 42,000	22,000 – 132,000	134,000	5,200,000	13,000,000	720,000	55
	10	70 – 420	340 – 2,070	1,700 – 10,000	8,000 – 50,000	24,000 – 144,000	168,000	5,900,000	14,000,000	906,000	61
	12	80 – 480	400 – 2,370	1,900 – 12,000	9,000 – 57,000	26,000 – 156,000	202,000	6,500,000	15,000,000	1,080,000	67
	18	90 – 540	440 – 2,670	2,200 – 13,000	11,000 – 64,000	36,000 – 216,000	302,000	13,000,000	24,000,000	1,620,000	86
	24	100 – 600	500 – 2,970	2,400 – 15,000	12,000 – 71,000	48,000 – 288,000	403,000	16,000,000	32,000,000	2,160,000	105
	36	110 - 660	540 – 3,270	2,700 – 16,000	13,000 – 78,000	60,000 – 360,000	504,000	24,000,000	48,000,000	3,240,000	142



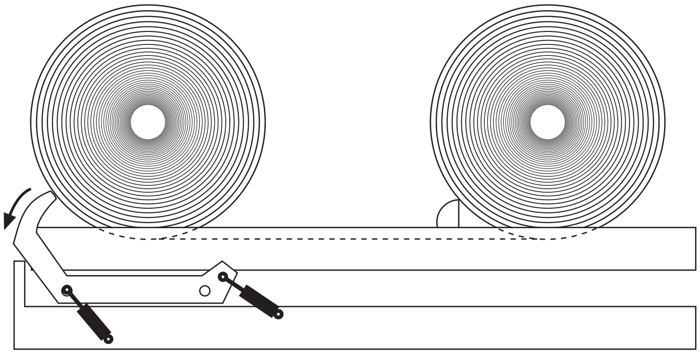
- **18”, 24”,30”, 36”, 42” and 48” stroke models have internal springs.**
- **Front end primary mount not available on external spring models.**
- **RCBS models are equipped with a safety chain.**
- **Add 1½” to A and B for models with chain.**

DIMENSIONS

	(S) SPRING RETURN MODELS		(A) AIR RETURN (C) AIR CHARGED RETURN (M) MECHANICAL RETURN MODELS	
STROKE	DIM. A	DIM. B	DIM. A	DIM. B
2	12.31	4.75	12.31	4.75
4	16.31	6.75	16.31	6.75
6	20.31	8.75	20.31	8.75
8	25.81	12.25	24.31	10.75
10	29.81	14.25	28.31	12.75
12	34.31	16.75	31.81	14.25
18	56.81	20.25	45.31	20.25
24	73.81	26.25	58.31	26.25
30	90.81	32.25	71.31	32.25
36	107.81	38.25	84.31	38.25
42	127.81	44.25	100.31	44.25
48	143.81	50.25	112.81	50.25

R-SERIES SHOCK ABSORBER

3” BORE MODEL



RNSA: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (IN-LBS) LM (LIGHT)	MH (MEDIUM)	HV (HEAVY)	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
3	4	750 – 27,000	2,500 – 90,000	10,000 – 360,000	106,000	5,000,000	10,000,000	565,000	55
	5	1,000 – 36,000	3,000 – 108,000	12,000 – 432,000	132,000	5,400,000	10,400,000	707,000	63
	8	1,250 – 45,000	3,500 – 126,000	14,000 – 504,000	211,000	6,600,000	14,000,000	1,131,000	81
	12	1,500 – 54,000	4,000 – 144,000	16,000 – 576,000	317,000	8,200,000	16,000,000	1,696,000	110
	16	1,750 – 63,000	4,500 – 180,000	18,000 – 648,000	422,000	9,800,000	20,000,000	2,262,000	148

For standard metered shocks, use $W_E V^2$ to select size from Size Selection Tables.
The maximum velocity allowable for a shock absorber can be determined by using (B) values in the table.

RCOS / RCBS: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (LBS) RA	RB	RC	RD	RE	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
3	4	100 – 600	500 – 2,900	2,400 – 14,400	11,800 – 71,000	36,000 – 216,000	144,000	5,000,000	10,000,000	750,000	55
	5	150 – 900	730 – 4,400	3,600 – 21,600	17,600 – 106,000	51,000 – 306,000	180,000	5,400,000	10,400,000	960,000	63
	8	200 – 1,200	1,000 – 5,900	4,800 – 28,800	23,500 – 141,000	66,000 – 396,000	288,000	6,600,000	14,000,000	1,500,000	81
	12	250 – 1,500	1,200 – 7,400	6,000 – 36,000	29,400 – 176,000	81,000 – 486,000	432,000	8,200,000	16,000,000	2,250,000	110
	16	300 – 1,800	1,500 – 8,800	7,200 – 43,200	35,000 – 212,000	96,000 – 576,000	576,000	9,800,000	20,000,000	3,000,000	148
	24	350 – 2,100	1,700 – 10,300	8,400 – 50,400	41,000 – 247,000	111,000 – 666,000	864,000	19,000,000	35,000,000	4,500,000	220
	36	400 – 2,400	2,000 – 11,800	9,600 – 57,600	47,000 – 282,000	126,000 – 756,000	1,296,000	27,000,000	51,000,000	6,750,000	387
	48	450 – 2,700	2,200 – 13,200	10,800 – 64,800	53,000 – 316,000	141,000 – 846,000	1,728,000	35,000,000	65,000,000	9,000,000	520

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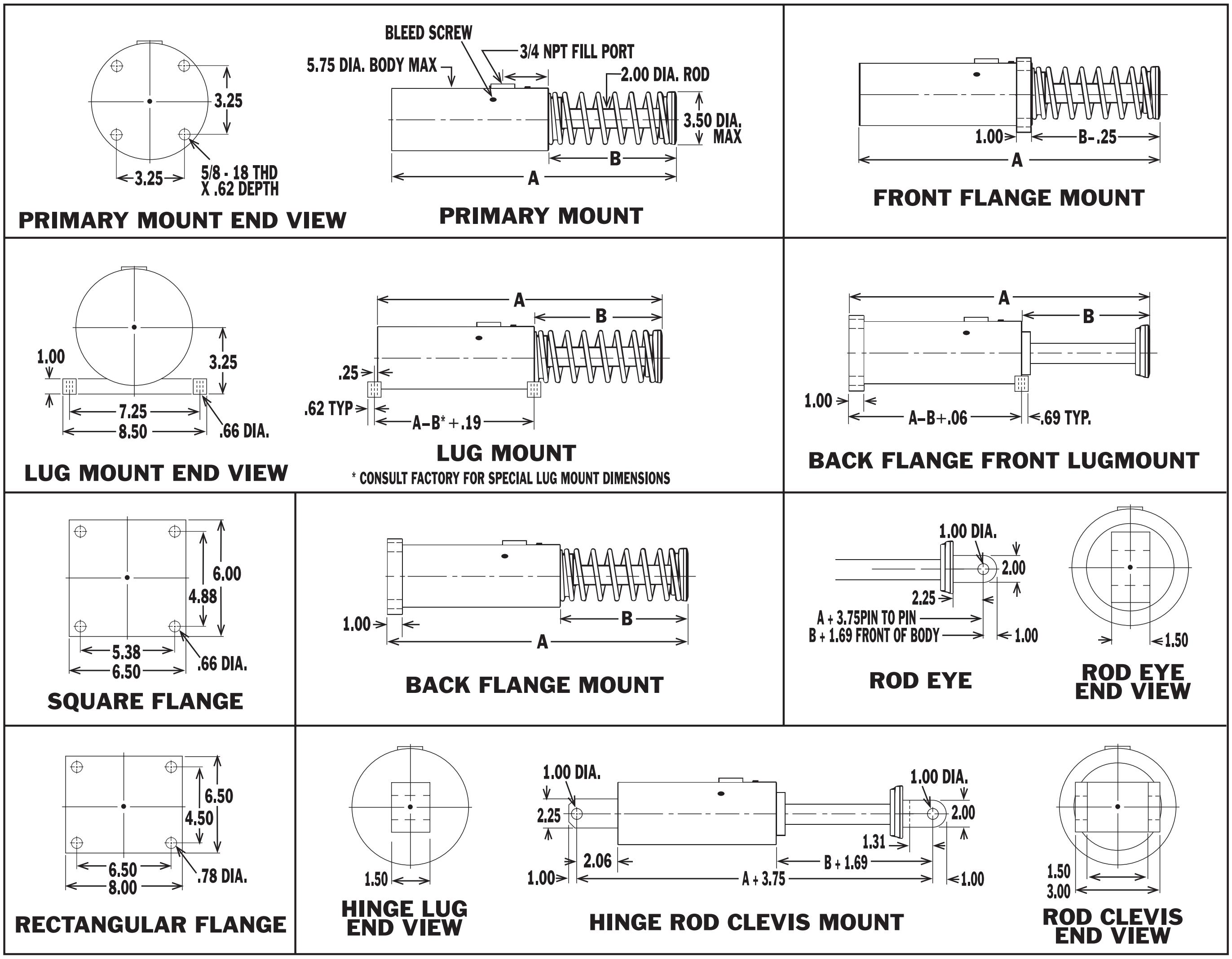


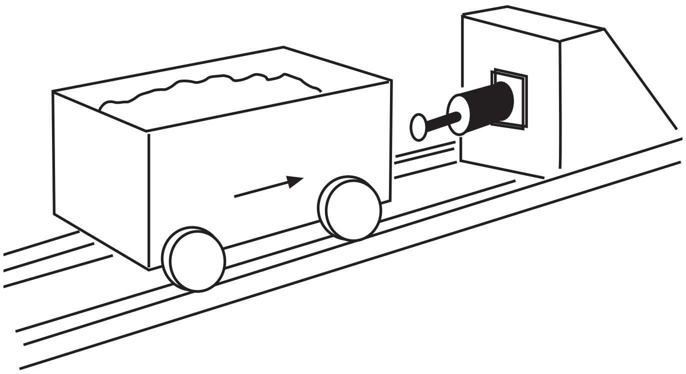
- **24”, 36”, 48” and 60” stroke models have internal springs.**
- **Front end primary mount not available on external spring models.**
- **RCBS models are equipped with a safety chain.**
- **Add 1½” to A and B for models with chain.**

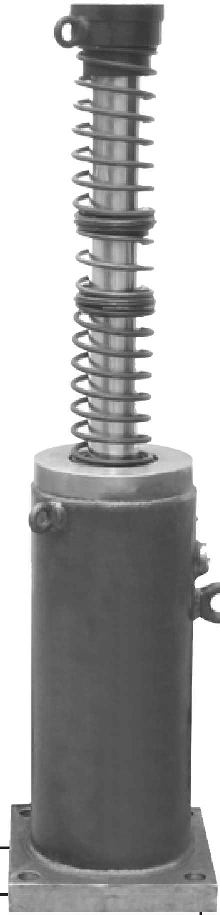
DIMENSIONS

	(S) SPRING RETURN MODELS		(A) AIR RETURN (C) AIR CHARGED RETURN (M) MECHANICAL RETURN MODELS	
STROKE	DIM. A	DIM. B	DIM. A	DIM. B
4	17.25	7.50	17.25	7.50
5	19.25	8.50	19.25	8.50
8	27.44	13.69	25.25	11.50
12	37.44	19.69	35.03	17.28
16	49.75	26.00	43.44	19.69
24	70.94	26.88	59.94	26.88
36	103.94	38.88	85.94	38.88
48	136.94	50.88	111.94	50.88
60	169.94	62.88	137.94	62.88

R-SERIES SHOCK ABSORBER

4” BORE MODEL





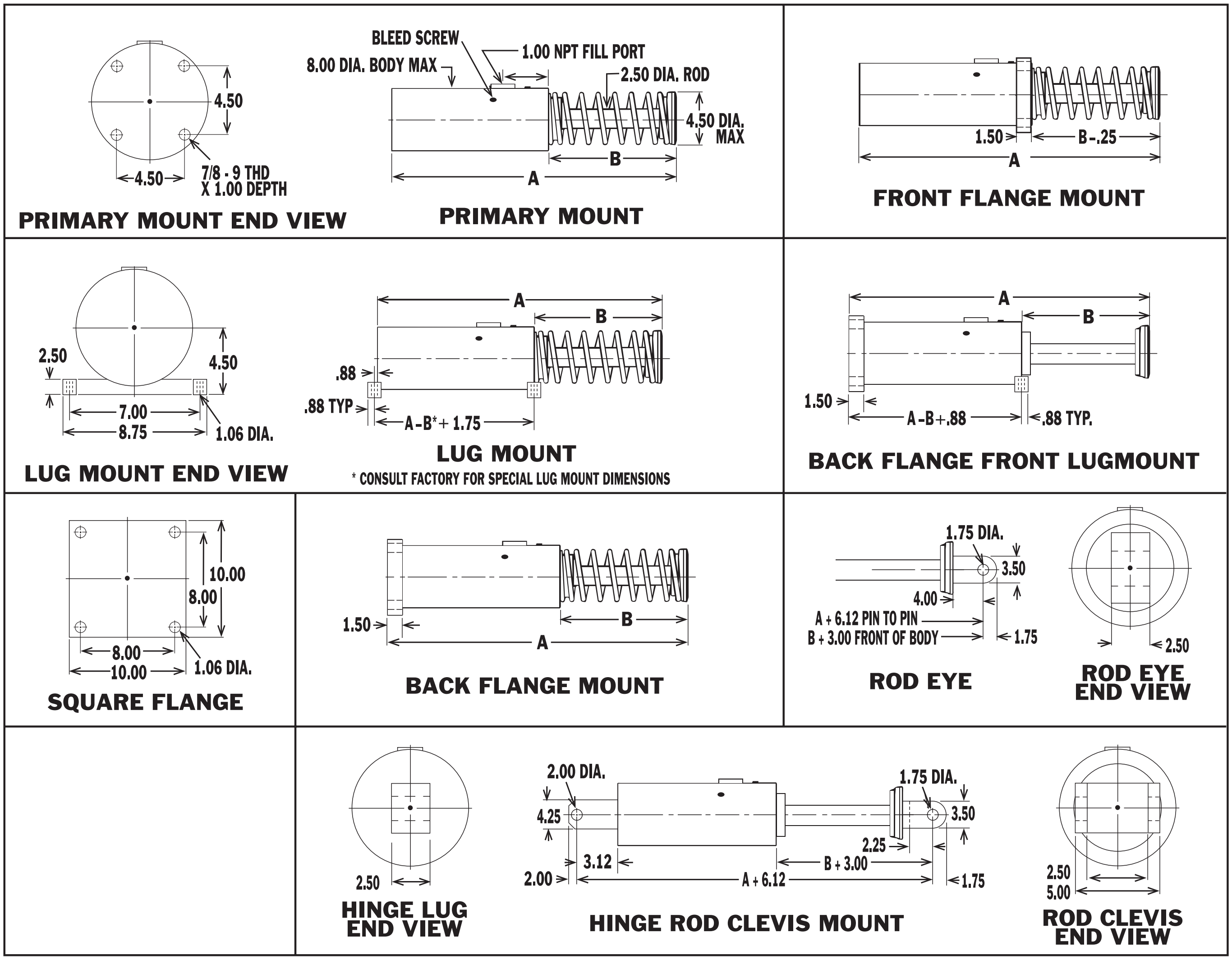
RNSA: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (LBS) LM (LIGHT)	MH (MEDIUM)	HV (HEAVY)	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
4	4	1,500 – 54,000	4,000 – 144,000	15,000 – 540,000	199,000	9,500,000	20,000,000	1,065,000	180
	6	2,000 – 72,000	5,000 – 180,000	20,000 – 720,000	298,000	11,000,000	22,000,000	1,597,000	215
	8	2,500 – 90,000	6,000 – 216,000	25,000 – 900,000	398,000	12,000,000	23,000,000	2,130,000	245
	10	3,000 – 108,000	7,000 – 252,000	30,000 – 1,080,000	498,000	13,000,000	24,000,000	2,662,000	276
	12	3,500 – 126,000	8,000 – 288,000	35,000 – 1,260,000	597,000	14,000,000	30,000,000	3,194,000	306
	16	4,000 – 144,000	9,000 – 324,000	40,000 – 1,440,000	796,000	16,000,000	32,000,000	4,259,000	367

For standard metered shocks, use $W_E V^2$ to select size from Size Selection Tables.
The maximum velocity allowable for a shock absorber can be determined by using (B) values in the table.

RCOS / RCBS: SIZE SELECTION TABLE

BORE	STROKE	WE EFFECTIVE WEIGHT (LBS) RA	RB	RC	RD	RE	ENERGY PER CYCLE (IN-LBS)	ENERGY PER HOUR (IN-LBS) SELF CONTAINED	AIR RETURN	(B) WE X V²	WEIGHT LBS
4	4	100 – 600	500 – 2,900	2,400 – 14,000	12,000 – 71,000	50,000 – 300,000	271,000	9,500,000	20,000,000	1,456,000	180
	6	150 – 900	700 – 4,400	3,600 – 22,000	18,000 – 106,000	70,000 – 420,000	407,000	11,000,000	22,000,000	2,184,000	215
	8	200 – 1,200	1,000 – 5,900	4,800 – 29,000	24,000 – 141,000	90,000 – 540,000	542,000	12,000,000	23,000,000	2,912,000	245
	10	250 – 1,500	1,200 – 7,400	6,000 – 36,000	29,000 – 176,000	110,000 – 660,000	678,000	13,000,000	24,000,000	3,640,000	276
	12	300 – 1,800	1,500 – 8,800	7,000 – 43,000	35,000 – 212,000	130,000 – 780,000	814,000	14,000,000	30,000,000	4,368,000	306
	16	350 – 2,100	1,700 – 10,300	8,000 – 50,000	41,000 – 247,000	150,000 – 900,000	1,085,000	16,000,000	32,000,000	5,824,000	367
	24	400 – 2,400	2,000 – 11,800	10,000 – 58,000	47,000 – 282,000	200,000 – 1,200,000	1,356,000	28,000,000	52,000,000	8,736,000	490
	36	450 – 2,700	2,200 – 13,200	11,000 – 65,000	53,000 – 317,000	250,000 – 1,500,000	2,034,000	40,000,000	70,000,000	13,104,000	675
	48	500 – 3,000	2,500 – 14,700	12,000 – 72,000	59,000 – 353,000	300,000 – 1,800,000	2,712,000	51,000,000	87,000,000	17,472,000	900
	60	550 – 3,300	2,700 – 16,200	13,000 – 79,000	65,000 – 388,000	350,000 – 2,100,000	3,390,000	62,000,000	98,000,000	21,840,000	1125



- 24", 36", 48", 60" and 72" stroke models have internal springs.
- Front end primary mount not available on external spring models.
- RCBS models are equipped with a safety chain.
- Add 1½" to A and B for models with chain.

DIMENSIONS

STROKE	(S) SPRING RETURN MODELS DIM. A	(S) SPRING RETURN MODELS DIM. B	(A) AIR RETURN (C) AIR CHARGED RETURN (M) MECHANICAL RETURN MODELS DIM. A	(A) AIR RETURN (C) AIR CHARGED RETURN (M) MECHANICAL RETURN MODELS DIM. B
4	20.25	7.00	20.25	7.00
6	25.50	10.25	23.50	8.25
8	30.50	13.25	27.50	10.25
10	35.75	16.50	31.50	12.25
12	41.00	19.75	35.50	14.25
16	51.25	26.00	43.50	18.25
24	74.00	26.25	61.25	26.25
36	106.25	38.25	86.25	38.25
48	138.25	50.25	111.25	50.25
60	170.25	62.25	136.25	62.25
72	209.25	74.25	170.25	74.25

MASA EXTRA HEAVY DUTY ADJUSTABLE

1⅛", 2", & 4" BORE

MASA 1⅛", 2" & 4"

Dimensions Common To Spring Or Air Return			
Symbol	Bore Size (Inches)		
	1 1/8	2	4
B	1 1/8	2	4
C	3/4	1 1/4	2 1/2
D	7/8	1 3/16	1 3/4
E	1 1/2	2 3/8	4 3/4
F	3/4	1	1 1/2
G	2 1/2	3 1/2	6 7/8
H	3 1/2	5	8 1/4
J	3/4	1	2 1/8
K	1 1/4	1 13/16	2 13/16
L	4	5 1/2	10
M	3 1/4	4 1/2	8 3/8
N	2 3/4	4	6 3/8
P	13/32	17/32	1 1/16
Q	3/8 -24	1/2-20	1-14
R	9/16	11/16	1 5/16
S*	3/4 - 16	1 5/16 - 12	1 5/8 - 12
T	1 3/4	2	4
U	1 1/8	1 11/16	3 1/16
V	17/32	17/32	13/16
W	7/16	9/16	7/8
X	1 1/2	2 7/16	3 3/4
Y	5/8	1	1 1/2
Z	7/8	1 1/2	2 1/4
BB	3 1/2	4 5/8	8 3/4
CB	1 1/4	1 1/2	2 1/2
CC	2 5/8	3 1/2	7
CD	3/4	1	1 3/4
CF	1	1 5/16	2 1/4
CL	2	2 3/4	4 1/2
CR	3/4	1	1 3/4
CW	5/8	3/4	1 1/4
DC	1/2	1	1 3/4
DD	1 15/16	2 5/8	4 3/8
EE	1 1/8	1 3/8	2 1/2
FC	1	2	3 1/2
FF	7/8	1 1/2	2 1/4
GG	4 1/2	6 1/4	10 1/8
HH	3 5/8	5 1/8	8 3/8
JJ	1 7/16	1 13/16	3 11/16
KK	5/8	1	1 1/2
LC	1 7/8	3 3/8	4 3/4
LL	15/32	21/32	1 1/16
MM	3/4	1	1 1/2
RC	1/2	1	1 3/4
SC	3/8	9/16	3/4
WC	3/4	1 1/2	2 1/2

Note: NPT ports are standard
*S= SAE Straight thread ports (optional)

- **HIGH CAPACITY IN CONJUNCTION WITH A COMPACTNESS DESIGNED TO FIT TIGHT PLACES**
- **AVAILABLE IN 2, 4, 6, 8 AND 10 INCH STROKE LENGTHS IN BOTH SPRING AND AIR RETURN MODELS**
- **UNIFORM DECELERATION WHERE LOAD CONDITIONS VARY WIDELY**

***MAXIMUM WORKING CAPACITY Inch-Lbs.				*HEAT DISSIPATION CAPACITY Inch-Lbs. Per Hour					
	Bore Size			Bore Size (Spring Return Models)			Bore Size (Air Return Models)		
Stroke**	1 1/8	2	4	1 1/8	2	4	1 1/8	2	4
2	15,000	47,000	-	2,700,000	4,480,000	—	8,190,000	13,900,000	—
4	30,000	94,000	376,000	3,850,000	6,007,000	13,180,000	10,810,000	17,100,000	31,060,000
6	45,000	141,000	564,000	—	7,410,000	15,030,000	10,810,000	17,100,000	34,800,000
8	—	188,000	752,000	—	—	16,700,000	—	19,235,000	38,590,000
10	—	—	940,000	—	—	—	—	—	38,590,000

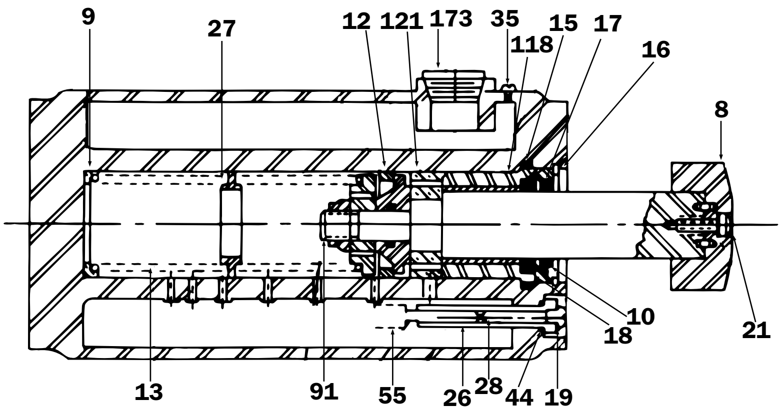
* Heat capacity ratings are based on still air conditions (80°F ambient) and max. hydraulic fluid operating temperature of 200°F. Spring return model ratings apply to self-contained units. Air return model ratings apply to units with circulating hydraulic systems (external reservoir - double connecting ports). Heat capacity ratings can be increased using special fluid and seals and/or heat exchanger systems. Consult factory.

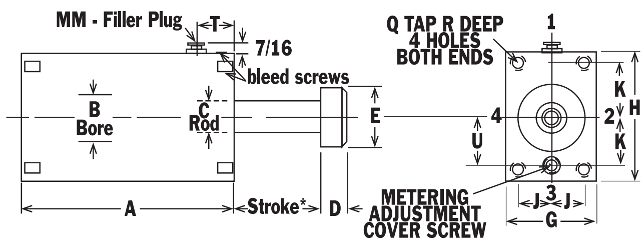
** When load propelling force exceeds 25% of total stopping force, based on maximum unit capacity rating, external mechanical load stops are recommended. Mechanical load stops must be positioned to allow piston rod to compress to within 1/16" of completing full stroke. If mechanical load stops cannot be positioned this accurately, specify piston rod extension for additional clearance as full stroke must be utilized for proper unit performance.

*** Consult factory for optimum adjustability if unit selected will be used above 80% of its max. working capacity rating when impact velocities are 1.0 FPS or less, and under 60% of its max. working capacity rating when impact velocities are 15.0 FPS or greater. For front flange mounts, use 65% of above working capacity ratings.

Dimension A							
Air Return				Spring Return			
	Bore Size (Inches)				Bore Size (Inches)		
Stroke	1 1/8	2	4	Stroke	1 1/8	2	4
2	7 7/8	8 5/8	—	2	7 7/8	8 5/8	—
4	11 3/4	12 5/8	15	4	11 3/4	12 5/8	15
6	11 3/4	12 5/8	17 7/8	6	—	16 5/8	17 7/8
8	—	16 5/8	21 1/4	8	—	—	21 1/4
10	—	—	21 1/4	10	—	—	—

8	Bumper Cap	26	Adjusting Screw Bushing
9	Spring Seat (MASA-1 only)	27	Spring Spacer
10	Rod Wiper	28	Adjustment Screw
12	Piston Ring	173	Filler Plug
13	Return Spring	35	Bleed Screw
15	O-Ring	44	O-Ring
16	Retaining Ring	91	Piston Rod and Piston
17	Rod Seal	55	Wedge Rod (MASA-4 only)
18	Wiper Retainer	118	Gland Bearing
19	Adjusting Screw	120	Lock Washer
21	Cap Screw	121	Piston Bearing



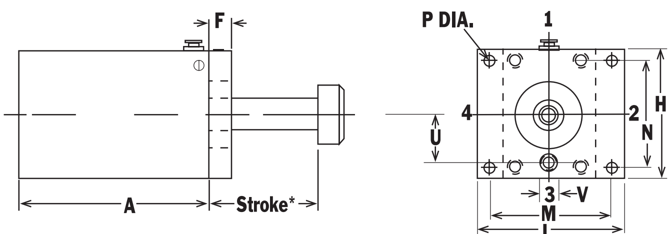


PRIMARY MOUNT - STYLE "P"

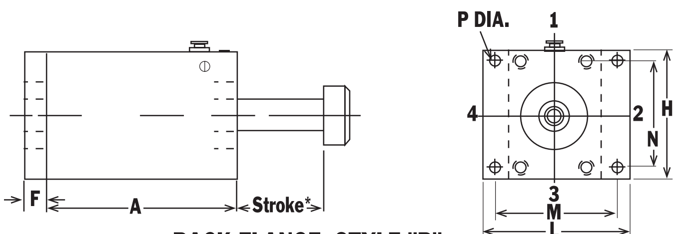
HOW TO ORDER MASA SHOCK ABSORBERS

MASA•1•2•BS•99

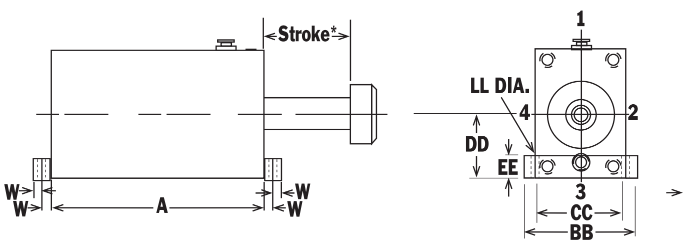
- MASA — Efdyn's Adjustable Shock Absorber Prefix
- 1 — Nominal Bore Size
- 2 — Stroke Length
- BS — Mounting Style • **P**-Primary • **B**- Back Flange • **F**- Front Flange • **L**-Lug • **S**- Side Mount • **HC**- Hinge-Clevis • **HR**- Hinge-Rod eye; Piston Rod Return Method **S**-Spring Return **A**- Air (External Accumulator Required)
- 99 — Designates Standard Unit Without Modifications



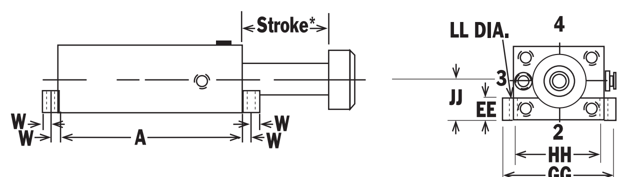
FRONT FLANGE - STYLE "F"



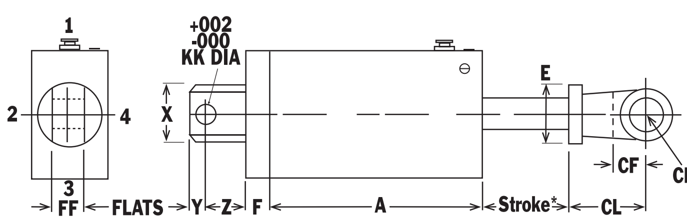
BACK FLANGE- STYLE "B"



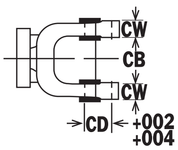
LUG MOUNT - STYLE "L"



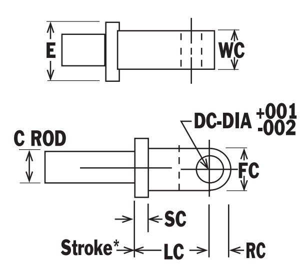
SIDE MOUNT - STYLE "S"



HINGE MOUNT - STYLE "H"



ROD CLEVIS "C"



ROD EYE "R"

* For foundry service, add 1/2" rod extension on back flange hinge and lug mount units and 2" rod extension for front flange mount units.

AR Series Adjustable Shock Absorber

THE SHOCK ABSORBER BUILT TO WITHSTAND THE ABUSE OF FOUNDRY AND STEEL MILL SERVICE.

THESE FEATURES PROLONG THE LIFE AND ENSURE PEAK PERFORMANCE FOR EQUIPMENT WHICH REQUIRES HEAVY DUTY SERVICE:

- **UNIFORM RATE OF DECELERATION, THROUGHOUT THE LENGTH OF WORKING STROKE AND ADJUSTMENT RANGE**
- **CAPACITIES TO ONE MILLION INCH POUNDS**
- **BORE SIZES 1⅛, 2 AND 4 INCH**
- **SPRING OR AIR RETURN**
- **STROKE LENGTH TO 10 INCHES**

HOW TO ORDER THE AR SERIES SHOCK ABSORBERS

ARS•B•1⅛•2•PS•99

AR	Efdyn's Adjustable Shock Absorber Prefix
S	S– Standard Model F– Foundry Model with 1/2" rod extension T– Foundry Model with 2" rod extension
B	Standard Adjustment location • B–Back • F–Front
1⅛	Nominal Bore Size
2	Stroke Length
P	Mounting Style • P-Primary • B- Back Flange • F- Front Flange • L-Lug • HR- Hinge-Rod eye
S	Piston Rod Return Method S-Spring Return A- Air (External Accumulator Required)
99	Designates Standard Unit Without Modifications

***MAXIMUM WORKING CAPACITY Inch-Lbs.				*HEAT DISSIPATION CAPACITY Inch-Lbs. Per Hour					
	Bore Size			Bore Size (Spring Return Models)			Bore Size (Air Return Models)		
Stroke**	1 1/8	2	4	1 1/8	2	4	1 1/8	2	4
2	15,000	47,000	-	4,050,000	5,340,000	—	12,200,000	16,640,000	—
4	30,000	94,000	376,000	4,510,000	6,120,000	12,600,000	12,650,000	17,420,000	29,700,000
6	45,000	141,000	564,000	5,590,000	7,070,000	13,900,000	13,750,000	17,875,000	30,945,000
8	—	188,000	752,000	—	8,400,000	15,900,000	—	18,350,000	32,100,000
10	—	235,000	940,000	—	9,600,000	17,600,000	—	18,900,000	33,000,000

Dimensions Common To Spring Or Air Return

Symbol	Bore Size (Inches)		
A	1 1/8	2	4
B	1 1/8	2	4
C	3/4	1 1/4	2 1/2
D	7/8	1 3/16	1 3/4
E	1 1/2	2 3/8	4 3/4
F	3/4	1	1 1/2
G	2 1/2	3 9/16	6 7/8
H	4	5	8 1/2
J	2 1/2	3 9/16	6
K	1 3/16	1 3/4	3 3/16
L	4 1/2	5 1/2	10
M	3 1/2	4 1/2	8
N	3 1/2	4	8
P	15/32	17/32	1 1/16
Q	7/16 - 14	1/2-20	7/8-9
R	9/16	11/16	1 1/4
S	3/4 - 16	1 5/16 - 12	1 5/8 - 12
T	1 1/16	1 13/16	2 15/16
U	1 1/4	1 3/4	3 1/8
V	4 1/2	5	10
W	7/16	9/16	7/8
X	1 7/16	2 7/16	4 1/4
Y	3/4	1 1/4	2
Z	1 1/4	2	3 1/8
BB	4 1/2	5 1/2	8 3/4
CB	3/4	1 1/4	2
CC	3 5/8	4 1/4	7
CD	1/2	1	1 3/4
CF	1	2	3 1/2
CL	1 7/8	3 3/8	4 3/4
CR	1/2	1	1 3/4
CW	3/4	1 1/2	2 1/2
DD	2 1/8	2 3/4	4 1/2
EE	1 3/4	1 3/4	2 3/4
FF	1	1 1/2	2 1/2
LB	2	2 3/8	4 1/2
LF	2	2 9/16	4 1/2
JJ	15/32	21/32	1 1/16
KK	3/4	1	1 1/2
CS	3/8	9/16	3/4

* Heat capacity ratings are based on still air conditions (80°F ambient) and max. hydraulic fluid operating temperature of 200°F. Spring return model ratings apply to self-contained units. Air return model ratings apply to units with circulating hydraulic systems (external reservoir - double connecting ports). Heat capacity ratings can be increased using special fluid and seals and/or heat exchanger systems. Consult factory.

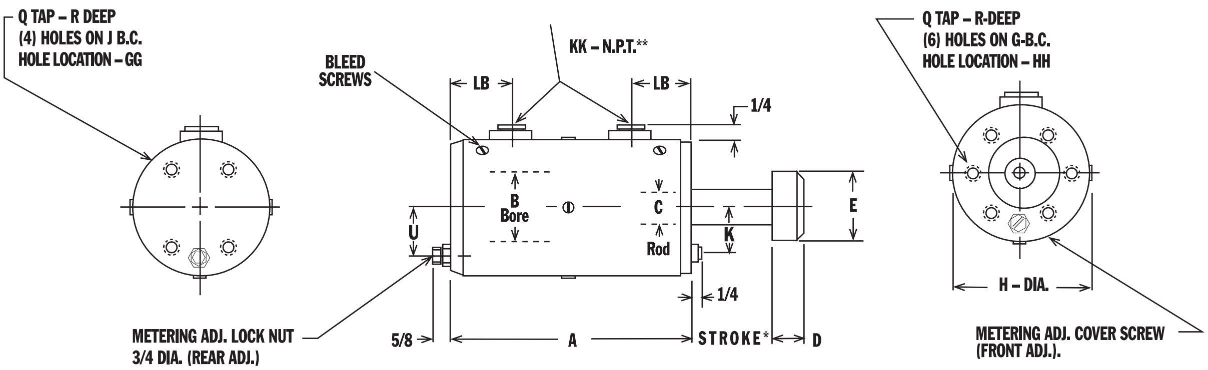
** When load propelling force exceeds 25% of total stopping force, based on maximum unit capacity rating, external mechanical load stops are recommended. Mechanical load stops must be positioned to allow piston rod to compress to within 1/16" of completing full stroke. If mechanical load stops cannot be positioned this accurately, specify piston rod extension for additional clearance as full stroke must be utilized for proper unit performance.

*** Consult factory for optimum adjustability if unit selected will be used above 80% of its max. working capacity rating when impact velocities are 1.0 FPS or less, and under 60% of its max. working capacity rating when impact velocities are 15.0 FPS or greater.

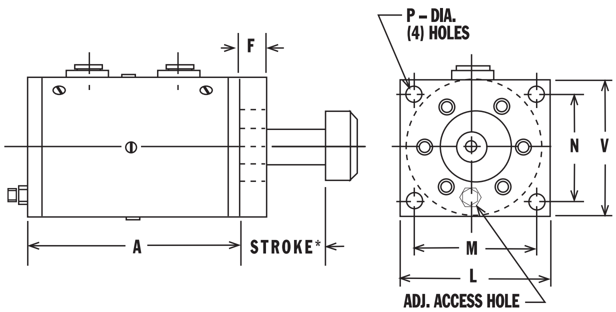
Dimension A

Spring Return Bore Size (Inches)				Air Return Bore Size (Inches)			
Stroke	1 1/8	2	4	Stroke	1 1/8	2	4
2	11 1/8	11 1/8	—	2	11 1/8	11 1/8	—
4	13 1/8	13 7/8	16 1/4	4	13 1/8	13 7/8	16 1/4
6	17 7/8	17 1/8	18 3/4	6	13 7/8	15 1/8	18
8	—	21 3/4	22 7/8	8	—	17 1/8	20
10	—	26 1/4	26 1/4	10	—	19 1/8	22

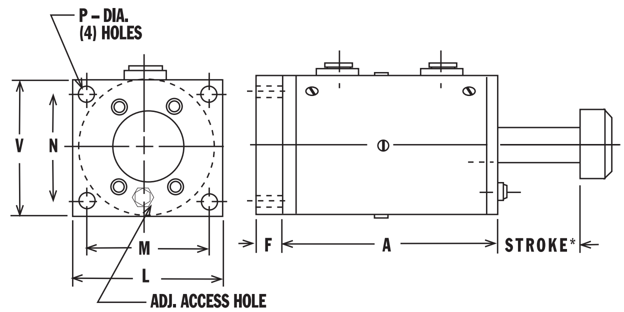
ASK ABOUT OUR EXPEDITE SERVICE!



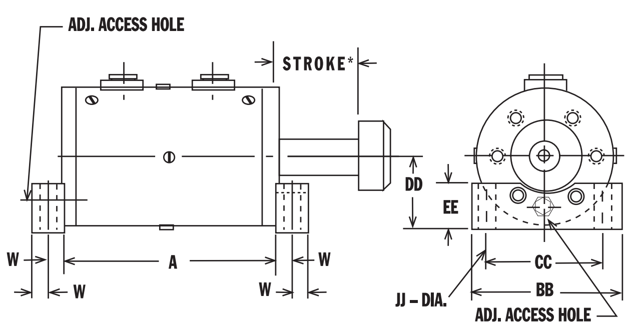
PRIMARY MOUNT – STYLE "P"



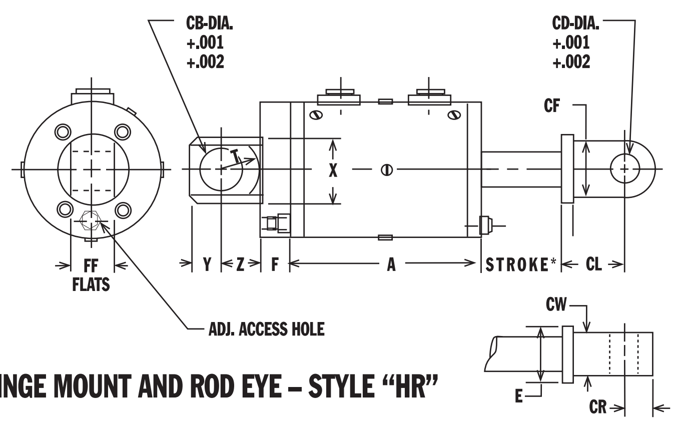
FRONT FLANGE MOUNT – STYLE "F"



BACK FLANGE MOUNT – STYLE "B"



LUG MOUNT – STYLE "L"

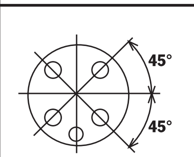
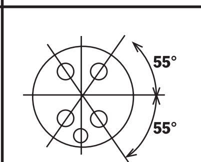
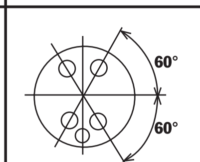
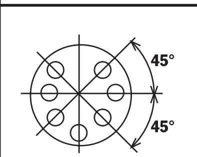
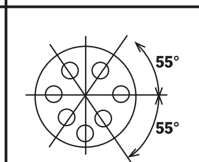
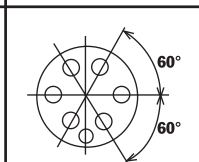


HINGE MOUNT AND ROD EYE – STYLE "HR"

* Add 1/2" for rod extension on Model ARF and 2" rod extension on model ART foundry type units.

** Double ports (NPT) standard on all bore sizes. S=SAE ports can be provided as option.

HOLE LOCATION

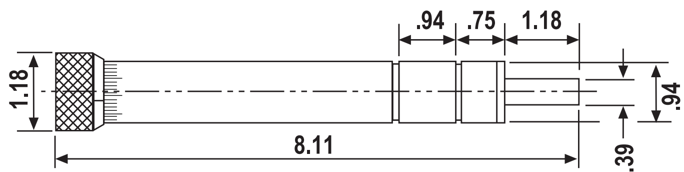
TYPE	BORE SIZE			TYPE	BORE SIZE		
	1 1/8	2	4		1 1/8	2	4
GG	 45° 45°	 55° 55°	 60° 60°	HH	 45° 45°	 55° 55°	 60° 60°

Hydraulic Speed Controllers

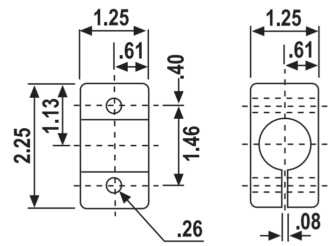
SR30 and SR60

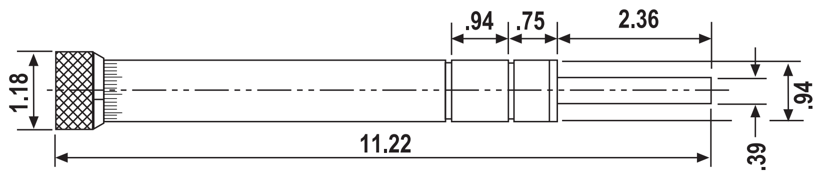
- **Ideal for robot drilling equipment, conveyor lines, pneumatic tools, woodworking equipment, and grinding and cutting machines.**
- **Available in 1.18 and 2.36 inch strokes.**
- **Adjustable.**

MODEL	MAX TRAVEL	OPERATING TEMPERATURE	MAX LOAD	PERMISSIBLE IMPACT	MAX IMPACT SPEED	WEIGHT
SR30	1.18 inches	32-150°F	33 - 1100 lbs	20 in-lbf	.02-1.18 in. sec. (on 220 lb. load)	1.5 lbs
SR60	2.36 inches					1.75 lbs

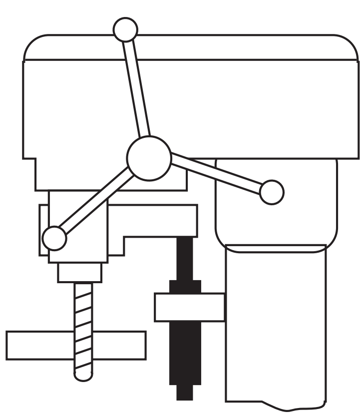


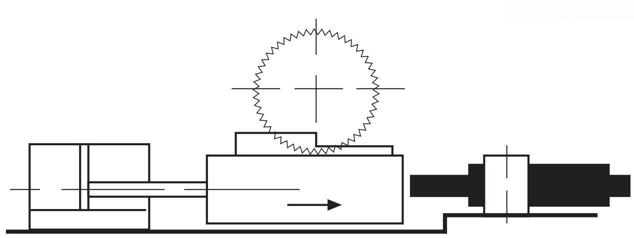
SR30





SR60





TecsPak® Bumpers

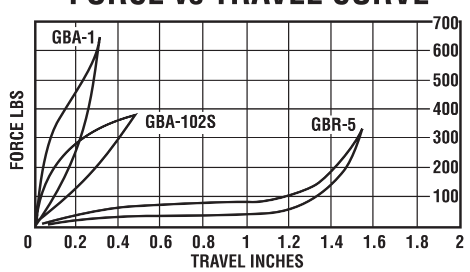
EFDYN

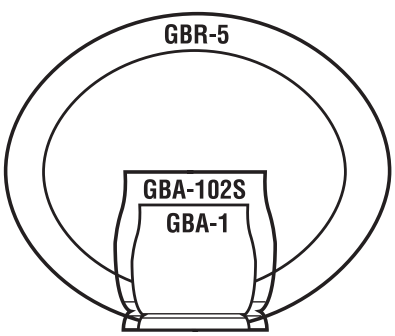
THE NEXT ADVANCE IN ENERGY ABSORPTION

The next advance in energy absorption is available today. TecsPak bumpers are highly engineered elastomeric products designed to absorb more energy per unit of weight and volume than most known materials. TecsPak bumpers are ideal for energy management problems involving shock isolation and vibration isolation. In addition, the performance characteristics of TecsPak bumpers significantly outperform rubber, urethane, and coiled steel. The unmatched durability, performance and design flexibility provide the cost-effective solution to your energy absorption requirements. TecsPak is a patented thermoplastic elastomer originally developed for high end load railroad applications. The unique shape, combined with the proprietary processing of the DuPont HYTREL® base material, results in a bumper that precisely meets the required load rates.

TecsPak® Bumpers vs. Rubber and Polyurethane

FORCE vs TRAVEL CURVE





TecsPak® bumpers offer an operation life which far exceeds that of other tested energy absorbing devices, lasting 20 times longer than urethane and 10 times longer than rubber in comparative tests. TecsPak is extremely inert and resists exposure to dirt, oils, hydraulic fluid, gasoline and diesel fuels. Operating temperature range is -40°F to 120°F.

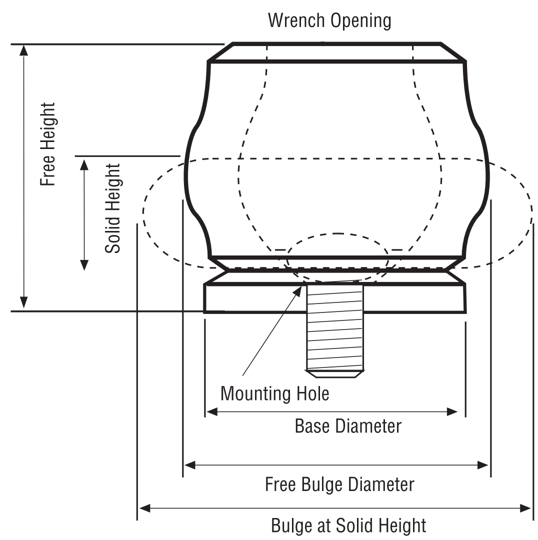
TecsPak bumpers represent the next step in energy absorption because they are engineered to meet demanding performance requirements in an array of applications. Superior durability cuts downtime maintenance for increased productivity. Design flexibility ranges from ultra light to massive end loads. Applications are found throughout the mining, automotive and general industrial markets where energy impact and vibration must be managed.

TecsPak® Bumpers

Typical applications include:

GBA

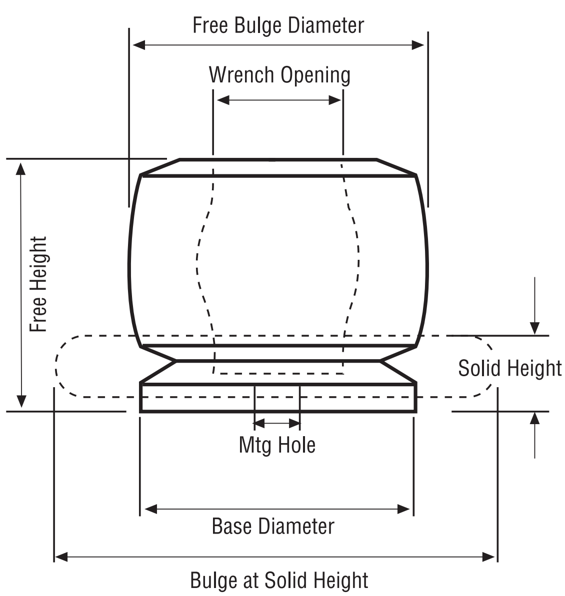
- Sawmill and Debarking Equipment
- Mining/Heavy Construction Machinery
- Gantry/Trolley, Shipyard Bulkhead and Heavy Door Bumpers
- Steel Mill Press Room, Stamping and Foundry Equipment



BUMPER	FREE HEIGHT	FREE BULGE	WRENCH OPENING	BASE DIA.	MOUNTING HOLE	SOLID HEIGHT	BULGE @ SOLID HT.	RATED ENERGY CAPACITY (IN-LBS.)	PEAK DYNAMIC FORCE (LBS.)	SHIPPING WEIGHT (OZ.)
GBA-1	0.76	0.85	0.41	0.75	0.31	0.40	1.07	100	700.00	0.16
GBA-2	1.01	1.11	0.56	0.98	0.31	0.53	1.43	250	1,200	0.37
GBA-3	1.18	1.35	0.66	1.16	0.31	0.63	1.70	400	2,000	0.62
GBA-4	1.31	1.47	0.72	1.28	0.31	0.69	1.88	550	2,400	0.86
GBA-5	1.37	1.55	0.80	1.35	0.42	0.73	1.97	700	2,500	1.00
GBA-6	1.49	1.70	0.79	1.48	0.42	0.80	2.15	900	3,600	1.40
GBA-7	1.62	1.83	0.93	1.61	0.55	0.86	2.33	1100	3,300	1.70
GBA-8	1.77	1.96	1.02	1.71	0.55	0.92	2.51	1400	3,800	2.00
GBA-9	1.86	2.14	1.04	1.85	0.55	0.99	2.69	1700	5,000	2.20
GBA-10	2.02	2.25	1.16	1.97	0.55	1.06	2.86	2000	5,000	3.10
GBA-11	2.11	2.43	1.23	2.08	0.55	1.12	3.05	2500	5,300	3.70
GBA-12	2.26	2.54	1.30	2.23	0.55	1.19	3.22	3000	6,100	4.60
GBA-13	2.38	2.70	1.38	2.35	0.55	1.25	3.40	3500	6,600	5.10
GBA-14	2.54	2.81	1.41	2.46	0.81	1.32	3.58	4000	7,500	6.10
GBA-15	2.72	3.10	1.57	2.71	0.79	1.45	3.94	5000	8,300	7.80
GBA-16	2.91	3.22	1.69	2.82	0.81	1.52	4.12	6000	8,700	9.10
GBA-17	3.00	3.35	1.70	2.95	0.81	1.58	4.30	7000	9,600	10.60
GBA-18	3.13	3.50	1.78	3.07	0.81	1.65	4.48	8000	10,800	11.80
GBA-19	3.37	3.83	1.92	3.34	0.81	1.78	4.83	10000	14,000	14.90
GBA-20	3.98	4.56	2.26	3.39	0.81	2.11	5.73	17000	18,500	26.10

GBA-S

- Hydraulic and Pneumatic Actuated Machinery
- Packaging, Bottling, Canning, Sealing, Wrapping and Textile Machinery
- High Capacity Machine Tools/ Robotics
- Carriage and Turret Stops

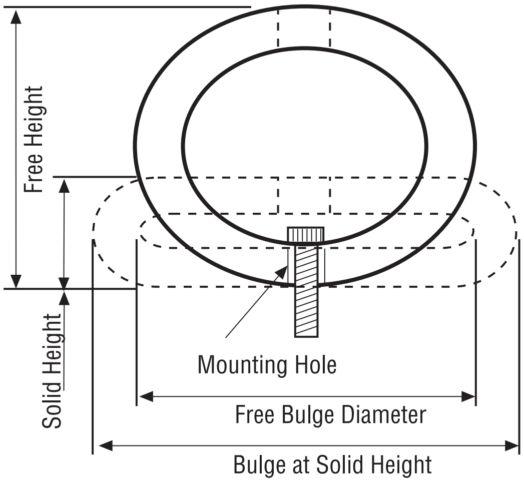


BUMPER	FREE HEIGHT	FREE BULGE	WRENCH OPENING	BASE DIA.	MOUNTING HOLE	SOLID HEIGHT	BULGE @ SOLID HT.	RATED ENERGY CAPACITY (IN-LBS.)	PEAK DYNAMIC FORCE (LBS.)	SHIPPING WEIGHT (OZ.)
GBA-101S	0.82	0.79	0.48	0.73	0.31	0.40	1.08	50	300	0.14
GBA-102S	1.09	1.02	0.63	0.98	0.31	0.53	1.45	100	400	0.32
GBA-103S	1.27	1.24	0.77	1.18	0.31	0.63	1.72	200	600	0.56
GBA-104S	1.42	1.38	0.84	1.28	0.31	0.69	1.90	250	700	0.77
GBA-105S	1.48	1.46	0.82	1.35	0.31	0.73	1.99	300	900	1.00
GBA-106S	1.63	1.60	0.93	1.48	0.55	0.79	2.17	400	1,100	1.30
GBA-107S	1.77	1.73	0.97	1.58	0.55	0.86	2.35	550	1,300	1.50
GBA-108S	1.91	1.88	1.09	1.73	0.55	0.92	2.53	700	1,600	2.10
GBA-109S	2.03	1.99	1.12	1.85	0.55	0.99	2.71	800	1,900	2.50
GBA-110S	2.18	2.11	1.21	1.97	0.55	1.06	2.89	1,000	2,000	2.80
GBA-111S	2.33	2.28	1.30	2.09	0.55	1.12	3.07	1,200	2,200	3.50
GBA-112S	2.45	2.40	1.39	2.21	0.81	1.19	3.25	1,400	2,600	4.20
GBA-113S	2.58	2.53	1.46	2.33	0.81	1.25	3.43	1,700	3,000	5.00
GBA-114S	2.71	2.67	1.51	2.48	0.81	1.32	3.61	2,000	3,500	5.70
GBA-115S	2.96	2.94	1.70	2.71	0.80	1.45	3.97	2,500	3,500	7.40
GBA-116S	3.11	3.05	1.82	2.82	0.81	1.52	4.15	3,000	3,700	8.50
GBA-117S	3.31	3.24	1.88	2.95	0.81	1.58	4.33	3,500	4,300	9.60
GBA-118S	3.36	3.29	1.97	3.07	0.81	1.65	4.52	4,000	4,400	10.60
GBA-119S	3.62	3.55	2.14	3.32	0.81	1.78	4.88	5,000	5,300	13.80
GBA-120S	4.31	4.22	2.56	3.95	0.81	2.11	5.78	8,000	5,500	21.60

TecsPak® Bumpers

GBR

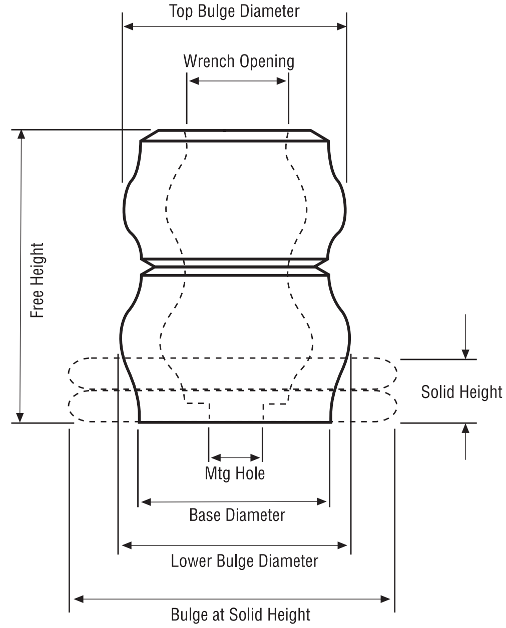
- Business Machines
- Pneumatically Powered Equipment
- Robotics, Light Weight Automatic Machinery and Scale Apparatus
- Electronic Switch Gears
- Door/Shroud and Enclosures
- Ventilation Dampers
- Fitness Equipment
- Amusement Rides



BUMPER	FREE HEIGHT	FREE BULGE	WIDTH OPENING	MOUNTING HOLE	SOLID HEIGHT	BULGE @ SOLID HT.	RATED ENERGY CAPACITY (IN-LBS.)	PEAK DYNAMIC FORCE (LBS.)	SHIPPING WEIGHT (OZ.)
GBR-1	0.97	1.12	0.52	0.22	0.32	1.51	10	75	0.24
GBR-2	1.25	1.44	0.76	0.22	0.41	1.96	20	100	0.48
GBR-3	1.47	1.68	0.78	0.22	0.48	2.27	30	150	0.6
GBR-4	1.72	1.95	1.35	0.22	0.37	2.68	50	200	0.9
GBR-5	2.17	2.48	1.70	0.22	0.47	3.43	100	300	1.8
GBR-6	2.31	2.61	1.82	0.22	0.74	3.47	200	475	2.8
GBR-7	2.65	3.00	1.80	0.28	0.85	4.03	300	600	3.6
GBR-8	2.88	3.28	2.00	0.28	0.92	4.30	400	725	5.3
GBR-9	2.88	3.33	2.65	0.40	0.92	4.37	600	1,000	6.9
GBR-10	3.27	3.67	3.25	0.40	1.03	4.87	800	1,250	10.3
GBR-11	3.47	3.94	3.20	0.40	1.11	5.22	1,000	1,400	11.4

TCB

TecsPak crane bumpers are the proven and cost-effective choice for high load energy management systems, with excellent resistance to chemicals and humidity. These bumpers are designed to meet the minimum requirements of existing industry standards-OSHA and CMAA-through the use of a unique “Dual-concept for the device’s spring rate.”

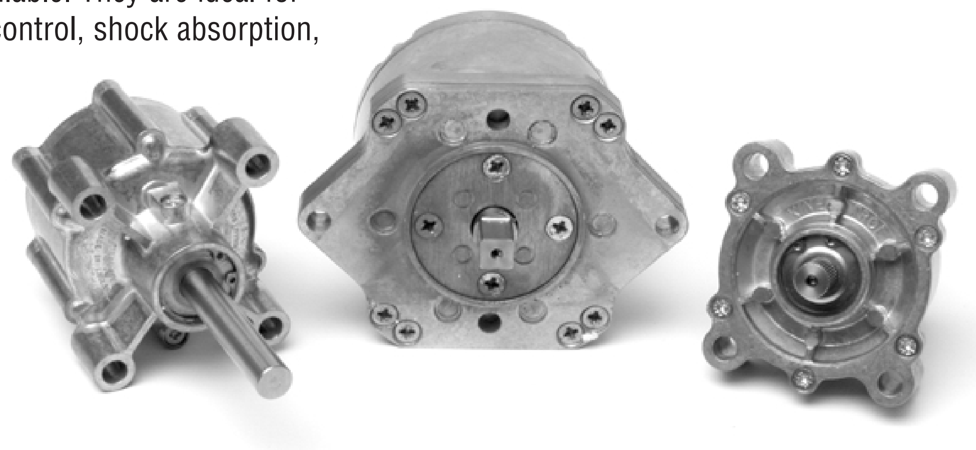


BUMPER	FREE HEIGHT	TOP/FREE BULGE	LOWER BULGE	WRENCH OPENING	BASE DIA.	MOUNTING HOLE	SOLID HEIGHT	BULGE @ SOLID HT.	RATED ENERGY CAPACITY (FT-LBS.)	PEAK DYNAMIC FORCE (LBS.)	SHIPPING WEIGHT (LBS.)
TCB-1B	3.12	2.43	2.50	1.09	2.04	0.54	0.69	3.50	330	18,000	0.35
TCB-2B	3.78	2.86	2.90	1.29	2.41	0.54	0.80	4.50	720	37,000	0.52
TCB-3B	3.68	3.28	3.28	1.45	2.70	0.54	0.80	5.00	1,400	82,000	0.62
TCB-4B	2.09	4.25	N/A	1.11	3.02	0.54	0.90	5.25	1,400	102,000	0.78
TCB-5B	2.67	3.48	N/A	1.26	2.64	0.54	0.75	4.88	1,200	112,000	0.56
TCB-6B	3.20	3.94	N/A	1.72	3.59	0.54	1.00	5.88	1,300	57,000	1.13
TCB-7B	2.19	3.38	N/A	1.46	3.06	0.54	0.67	5.25	890	71,000	0.56
TCB-8B	3.85	4.00	N/A	1.60	3.22	0.80	1.38	5.50	1,450	50,000	1.13
TCB-9B	4.63	5.50	5.75	1.72	3.90	0.80	2.00	7.50	6,140	185,000	3.28
TCB-10B	4.18	5.35	N/A	1.72	4.16	0.80	1.63	7.00	3,130	112,000	2.38
TCB-11B	5.08	4.62	N/A	1.72	3.92	0.80	1.25	7.38	2,730	110,000	2.21
TCB-12B	7.38	5.26	5.28	2.52	4.62	0.80	1.63	8.44	5,375	160,000	3.44
TCB-13B	4.54	5.38	N/A	1.68	4.44	0.80	1.00	8.50	4,675	205,000	2.38
TCB-14B	6.54	6.60	N/A	2.82	5.77	0.80	1.65	10.25	7,440	220,000	5.13
TCB-15B	8.90	6.00	6.00	2.92	5.15	0.80	1.88	9.50	5,350	135,000	5.13
TCB-16B	9.50	5.84	5.88	2.90	5.19	0.80	2.50	8.81	6,530	126,000	5.69
TCB-17B	9.92	6.90	6.93	3.40	5.90	0.80	2.13	11.00	9,375	192,000	7.94

OTHER EFDYN PRODUCTS

Dashpots

EFDYN's rotary dashpots are precision fluid damping devices, giving smooth resistance to shaft rotation. Dashpots are offered in vane or continuous rotation models with both adjustable and non-adjustable models available. They are ideal for vibration damping, speed control, shock absorption, slipping drives and mechanical delays.

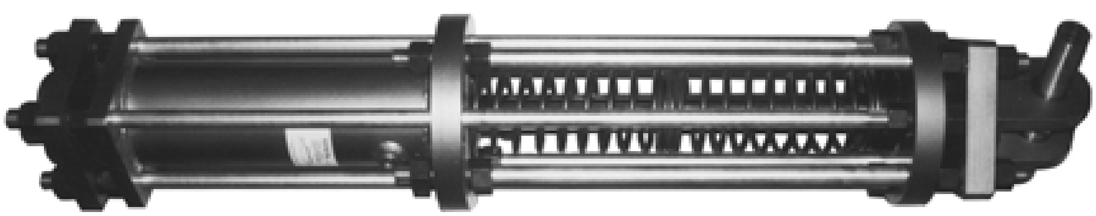


Call us today with your rotary dashpot application.
1-800-950-1172

Contact EFDYN today for your dashpot catalog.

Custom Shocks

Although most applications can be solved with EFDYN's standard products, occasionally custom engineering is required to achieve unique objectives and maintain unusual parameters. Call EFDYN at 1-800-950-1172 for a free consultation regarding a customized solution to your motion control needs. While standard delivery for most custom items is 4 weeks; your priority orders can be shipped within 7 to 10 business days using EFDYN's expedite service.



MODEL CBS/COS

- Multi-Stage Metering
- Bore Sizes: 1 1/8", 2", 4", 6" and 8"
- Stroke Lengths from 2 to 48 inches
- Custom-Metered and Tamper Proof

MODEL ES SHOCK ABSORBERS

- Custom Orificed
- Bore Sizes: 1 1/8", 2' AND 4"
- Stroke Lengths from 1 to 10 inches

THESE PRODUCTS AVAILABLE FOR REPLACEMENT ONLY
(NOT FOR NEW APPLICATION)