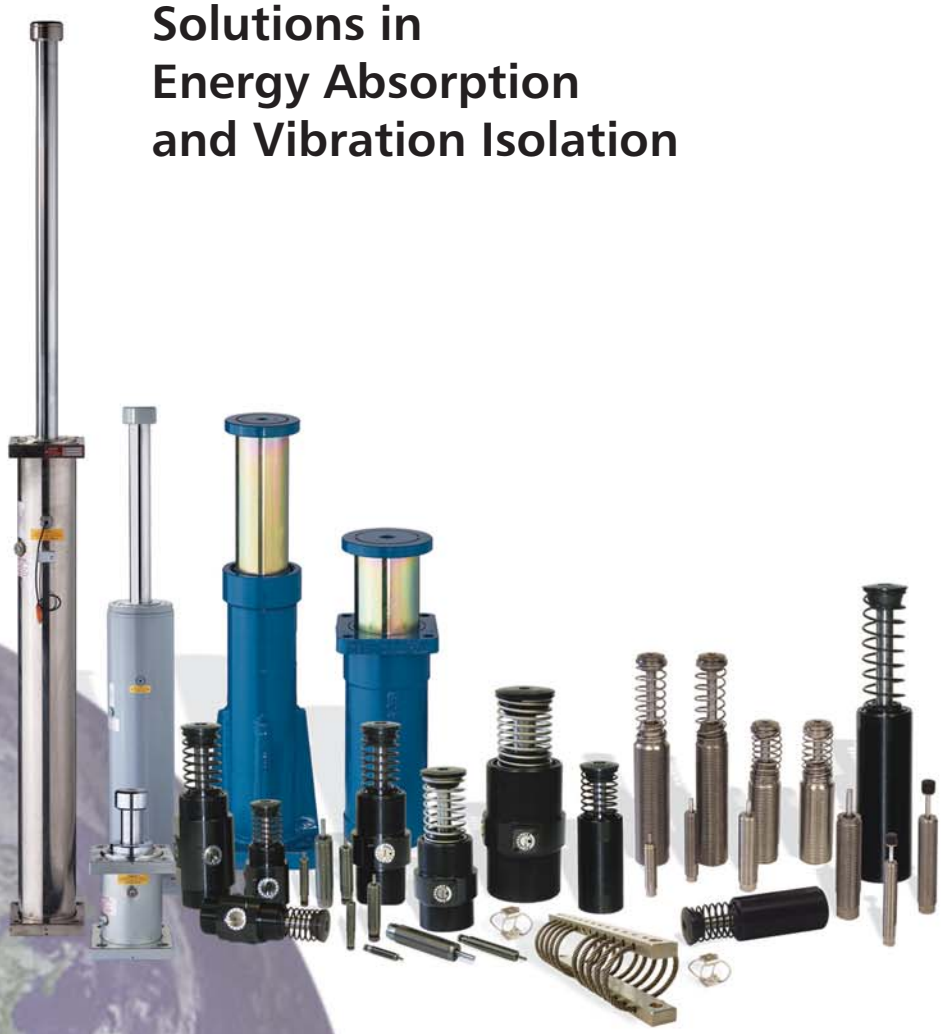
ITT

Shock Absorber Technologies

Engineered for life

Solutions in Energy Absorption and Vibration Isolation



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Overview

With its world headquarters located in Orchard Park, New York, USA, **ENIDINE Incorporated** is a world leader in the design and manufacture of standard and custom energy absorption and vibration isolation product solutions within the Industrial, Aerospace, Defense, Marine and Rail markets. Product ranges include shock absorbers, gas springs, rate controls, air springs, wire rope isolators, heavy industry buffers and emergency stops. With facilities strategically located throughout the world and in partnership with our vast global network of distributors, Enidine Incorporated continues to strengthen its presence within marketplace.

Founded in 1966, Enidine Incorporated now has close to 600 employees located throughout the globe in the United States, Germany, France, Japan, China and Korea. With a team of professionals in engineering, computer science, manufacturing, production and marketing our employees provide our customers the very best in service and application solutions.

"Enidine is widely recognized as the preferred source for energy absorption and vibration isolation products."

From Original Equipment Manufacturers (OEM) to aftermarket applications, Enidine offers a unique combination of product selection, engineering excellence and technical support to meet even the toughest energy absorption application requirements.

Global Manufacturing and Sales Facilities offer our customers:

- ***Highly Trained Distribution Network***
- ***State-of-the Art Engineering Capabilities***
- ***Custom Solution Development***
- ***Customer Service Specialists***
- ***Multiple Open Communication Channels***

If you are unsure whether one of our standard products meets your requirements, feel free to speak with one of our technical representatives **toll-free at 1-800-852-8508**, or contact us via **e-mail at techsales@enidine.com**.

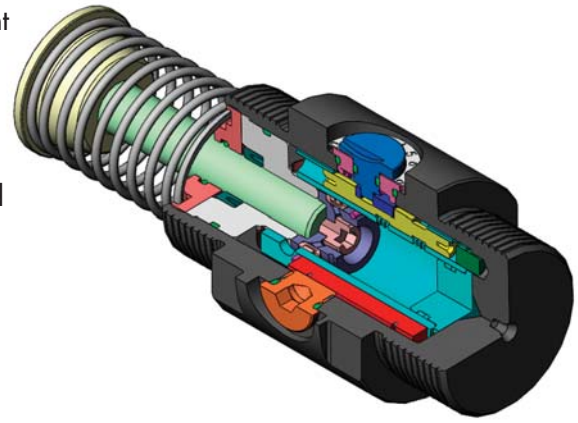
Products/Engineering/Technical Support

Enidine continually strives to provide the widest selection of shock absorbers and rate control products in the global marketplace. Through constant evaluation and testing, we bring our customers the most cost effective products with more features, greater performance and improved ease of use.

New Products and Services

Enidine engineers continue to monitor and influence trends in the motion control industry, allowing us to remain at the forefront of new energy absorption product development such as our new Xtreme Series shock absorbers (pg. 53) and our new HD Series shock Absorbers (pg. 69).

Our experienced engineering team has designed custom solutions for a wide variety of challenging applications, including automated warehousing systems and shock absorbers for hostile industrial environments such as glass manufacturing, among others. These custom application solutions have proven to be critical to our customers' success. Let Enidine engineers do the same for you.



Custom designs are not an exception at Enidine, they are an integral part of our business. Should your requirements fit outside of our standard product range, Enidine engineers can assist in developing special finishes, components, hybrid technologies and new designs to ensure a "best-fit" product solution customized to your exact specifications.

A talented engineering staff works to design and maintain the most efficient energy absorption product lines available today, using the latest engineering tools:

- ***Solid Modeling***
- ***3-D CAD Drawings***
- ***3-D Soluable Support Technology***
- ***Finite Element Analysis***
- ***Complete Product Verification Testing Facility***

New product designs get to market fast because they can be fully developed in virtual environments before a prototype is ever built. This saves time and lets us optimize the best solution using real performance criteria.

Global Service and Support

Enidine offers its customers a global network of customer service staff technical sales personnel that are available to assist you with all of your application needs.

- Operating with lean manufacturing and cellular production, Enidine produces higher quality custom and standard products with greater efficiency and within shorter lead times.
- An authorized Global Distribution Network is trained regularly by ENIDINE staff on new products and services ensuring they are better able to serve you.
- Global operations in United States, Germany, France, China, Japan and Korea.
- A comprehensive, website full of application information, technical data, sizing examples and information to assist in selecting the product that's right for you.

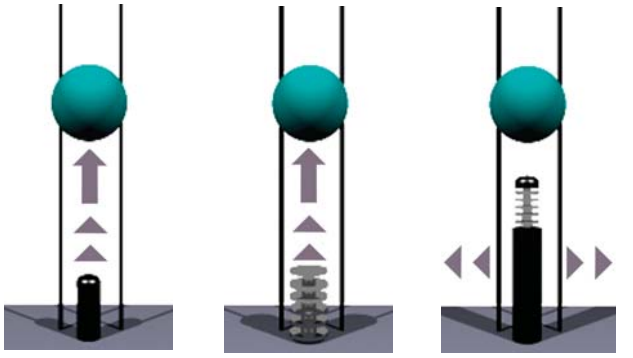
Our website also features a searchable worldwide distributor lookup to help facilitate fast, localized service. Contact us today for assistance with all of your application needs.

Our global customer service and technical sales departments are available to assist you find the solution that's right for your application needs. Call us at 1.800.852.8508 or e-mail us at industrialsales@enidine.com and let us get started today.

Theory of Energy Absorption
Enidine Incorporated

Overview

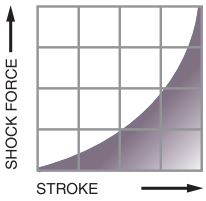
As companies strive to increase productivity by operating machinery at higher speeds, often the results are increased noise, damage to machinery/products, and excessive vibration. At the same time, safety and machine reliability are decreased. A variety of products are commonly used to solve these problems. However, they vary greatly in effectiveness and operation. Typical products used include rubber bumpers, springs, cylinder cushions and shock absorbers. The following illustrations compare how the most common products perform:



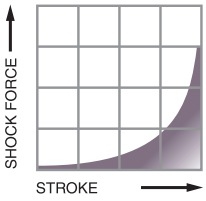
Rubber Bumper | **Metal Spring** | **Enidine Shock Absorber**

All moving objects possess kinetic energy. The amount of energy is dependent upon weight and velocity. A mechanical device that produces forces diametrically opposed to the direction of motion must be used to bring a moving object to rest.

Rubber bumpers and springs, although very inexpensive, have an undesirable recoil effect. Most of the energy absorbed by these at impact is actually stored. This stored energy is returned to the load, producing rebound and the potential for damage to the load or machinery. Rubber bumpers and springs initially provide low resisting force which increases with the stroke.



Cylinder cushions are limited in their range of operation. Most often they are not capable of absorbing energy generated by the system. By design, cushions have a relatively short stroke and operate at low pressures resulting in very low energy absorption. The remaining energy is transferred to the system, causing shock loading and vibration.



Shock absorbers provide controlled, predictable deceleration. These products work by converting kinetic energy to thermal energy. More specifically, motion applied to the piston of a hydraulic shock absorber pressurizes the fluid and forces it to flow through restricting orifices, causing the fluid to heat rapidly. The thermal energy is then transferred to the cylinder body and harmlessly dissipated to the atmosphere.

The advantages of using shock absorbers include:

1. Longer Machine Life – The use of shock absorbers significantly reduces shock and vibration to machinery. This eliminates machinery damage, reduces downtime and maintenance costs, while increasing machine life.

2. Higher Operating Speeds – Machines can be operated at higher speeds because shock absorbers control or gently stop moving objects. Therefore, production rates can be increased.

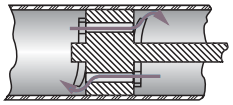
3. Improved Production Quality – Harmful side effects of motion, such as noise, vibration and damaging impacts, are moderated or eliminated so the quality of production is improved. Therefore, tolerances and fits are easier to maintain.

4. Safer Machinery Operation – Shock absorbers protect machinery and equipment operators by offering predictable, reliable and controlled deceleration. They can also be designed to meet specified safety standards, when required.

5. Competitive Advantage – Machines become more valuable because of increased productivity, longer life, lower maintenance costs and safer operation.

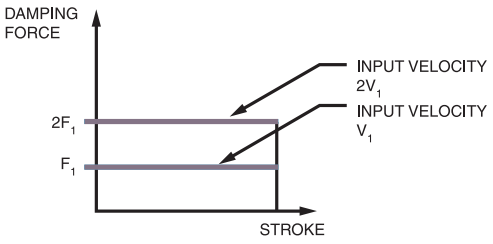
Automotive vs. Industrial Shock Absorbers

It is important to understand the differences that exist between the standard automotive-style shock absorber and the industrial shock absorber.

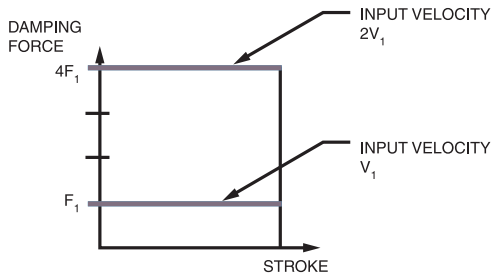


DEFLECTIVE BEAM ORIFICE

The automotive style employs the deflective beam and washer method of orificing. Industrial shock absorbers utilize single orifice, multi-orifice and metering pin configurations. The automotive type maintains a damping force which varies in direct proportion to the velocity of the piston, while the damping force in the industrial type varies in proportion to the square of the piston velocity. In addition, the damping force of the automotive type is independent of the stroke position while the damping force associated with the industrial type can be designed either dependent or independent of stroke position.



AUTOMOTIVE TYPE SHOCK ABSORBER



INDUSTRIAL TYPE SHOCK ABSORBER

ENIDINE www.enidine.com Email: industrialsales@enidine.com Tel.: 1-800-852-8508 ext. 111 Fax: 1-716-662-0406

Equally as important, automotive-style shock absorbers are designed to absorb only a specific amount of input energy. This means that, for any given geometric size of automotive shock absorber, it will have a limited amount of absorption capability compared to the industrial type.

This is explained by observing the structural design of the automotive type and the lower strength of materials commonly used. These materials can withstand the lower pressures commonly found in this type. The industrial shock absorber uses higher strength materials, enabling it to function at higher damping forces.

Adjustment Techniques

A properly adjusted shock absorber safely dissipates energy, reducing damaging shock loads and noise levels. For optimum adjustment setting see useable adjustment setting graphs. Watching and "listening" to a shock absorber as it functions aids in proper adjustment.

To correctly adjust a shock absorber, set the adjustment knob at zero (0) prior to system engagement. Cycle the mechanism and observe deceleration of the system.

If damping appears too soft (unit strokes with no visual deceleration and bangs at end of stroke), move indicator to next largest number. Adjustments must be made in gradual increments to avoid internal damage to the unit (e.g., adjust from 0 to 1, not 0 to 4).

Increase adjustment setting until smooth deceleration or control is achieved and negligible noise is heard when the system starts either to decelerate or comes to rest.

When abrupt deceleration occurs at the beginning of the stroke (banging at impact), the adjustment setting must be moved to a lower number to allow smooth deceleration.

If the shock absorber adjustment knob is set at the high end of the adjustment scale and abrupt deceleration occurs at the end of the stroke, a larger unit may be required.

Shock Absorber Performance When Weight or Impact Velocity Vary

When conditions change from the original calculated data or actual input, a shock absorber's performance can be greatly affected, causing failure or degradation of performance. Variations in input conditions after a shock absorber has been installed can cause internal damage, or at the very least, can result in unwanted damping performance. Variations in weight or impact velocity can be seen by examining the following energy curves:

Varying Impact Weight: Increasing the impact weight (impact velocity remains unchanged), without reorificing or readjustment will result in increased damping force at the end of the stroke. Figure 1 depicts this undesirable bottoming peak force. This force is then transferred to the mounting structure and impacting load.

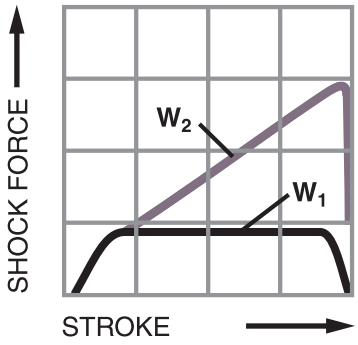
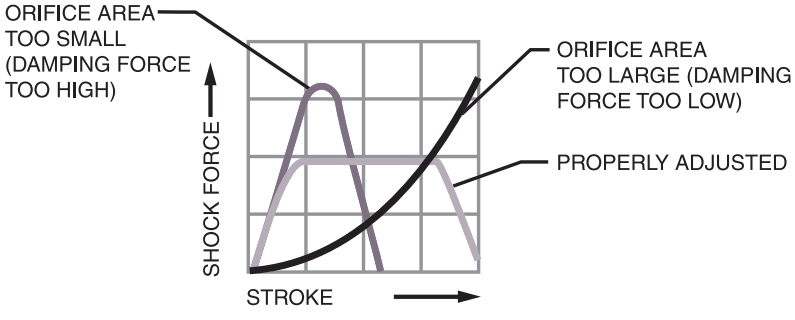


Figure 1

Varying Impact Velocity: Increasing impact velocity (weight remains the same) results in a radical change in the resultant shock force. Shock absorbers are velocity conscious products; therefore, the critical relationship to impact velocity must be carefully monitored. Figure 2 depicts the substantial change in shock force that occurs when the velocity is increased. Variations from original design data or errors in original data may cause damage to mounting structures and systems, or result in shock absorber failure if the shock force limits are exceeded.



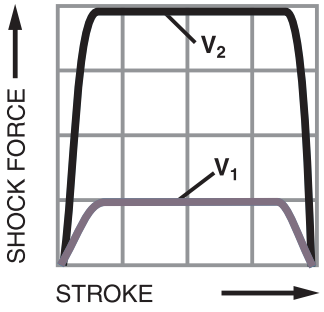


Figure 2

Shock Absorber Sizing Examples
Typical Shock Absorber Applications

SHOCK ABSORBER SIZING

Follow the next six steps to manually size Enidine shock absorbers:

STEP 1: Identify the following parameters. These must be known for all energy absorption calculations. Variations or additional information may be required in some cases.

A. Weight of the load to be stopped (lbs.)(Kg).
B. Velocity of the load upon impact with the shock absorber (in./sec.)(m/s).
C. External (propelling) forces acting on the load (lbs.)(N), if any.
D. Cyclic frequency at which the shock absorber will operate.
E. Orientation of the application's motion (i.e. horizontal, vertical up, vertical down, inclined, rotary horizontal, rotary vertical up, rotary vertical down).

NOTE: For rotary applications, it is necessary to determine both the radius of gyration (K) and the mass moment of inertia (I). Both of these terms locate the mass of a rotating object with respect to the pivot point. It is also necessary to determine the angular velocity (ω) and the torque (T).

STEP 2: Calculate the kinetic energy of the moving object.

$$E_K = \frac{W}{772} \times V^2 \text{ (linear) or } E_K = \frac{I}{2}\omega^2 \text{ (rotary) or } E_K = \frac{1}{2}MV^2 \text{ (metric)}$$

(Note: 772 = 2 x acceleration due to gravity)

Utilizing the Product Locators for Shock Absorbers located at the beginning of each product family section, select a model, either adjustable or non-adjustable, with a greater energy per cycle capacity than the value just calculated.

STEP 3: Calculate the work energy input from any external (propelling) forces acting on the load, using the stroke of the model selected in Step 2.

$$E_W = F_D \times S \text{ (linear) or } E_W = \frac{T}{R_S} \times S \text{ (rotary)}$$

Caution: The propelling force must not exceed the maximum propelling force listed for the model chosen. If the propelling force is too high, select a larger model and recalculate the work energy.

STEP 4: Calculate the total energy per cycle $E_T = E_K + E_W$

The model selected must have at least this much energy capacity. If not, select a model with greater energy capacity and return to Step 3.

STEP 5: Calculate the energy that must be absorbed per hour. Even though the shock absorber can absorb the energy in a single impact, it may not be able to dissipate the heat generated if the cycle rate is too high.

$$E_TC = E_T \times C$$

The model selected must have an energy per hour capacity greater than this calculated figure. If it is not greater, there are two options:

1. Choose another model that has more energy per hour capacity (because of larger diameter or stroke). Keep in mind that if the stroke changes, you must return to Step 3.
2. Use an Air/Oil Tank. The increased surface area of the tank and piping will increase the energy per hour capacity by 20 percent.

STEP 6: If you have selected an HP, PM, SPM, TK, or PRO Series model, refer to the sizing graph(s) in the appropriate series section to determine the required damping constant. If the point cannot be found in the sizing graph, you must select a larger model or choose a different series. Note that if the stroke changes, you must return to Step 3.

If you have selected an adjustable model (OEM, HP or HDA series), refer to the Useable Adjustment Setting Range graph for the chosen model. The impact velocity must fall within the limits shown on the graph.

RATE CONTROL SIZING

Follow the next five steps to manually size Enidine rate controls:

STEP 1: Identify the following parameters. These must be known for all rate control calculations. Variations or additional information may be required in some cases.

A. Weight of the load to be controlled (lbs.)(Kg)
B. Desired velocity of the load (in/sec.)(m/s)
C. External (propelling) force acting on the load (lbs.)(N), if any.
D. Cyclic frequency at which the rate control will operate.
E. Orientation of the application's motion (i.e. horizontal, vertical up, vertical down, inclined, rotary horizontal, rotary vertical up, rotary vertical down.)
F. Damping direction (i.e., tension [T], compression [C] or both [T and C].
G. Required stroke (in.)(mm)

NOTE: For rotary applications, please submit the application worksheet on page 104 to Enidine for sizing.

STEP 2: Calculate the propelling force at the rate control in each direction damping is required. (See sizing examples on page 6-12).

CAUTION: The propelling force in each direction must not exceed the maximum propelling force listed for the chosen model. If the propelling force is too high, select a larger model.

STEP 3: Calculate the total energy per cycle

$$E_T = E_W \text{ (tension)} + E_W \text{ (compression)}$$
$$E_W = F_D \times S$$

STEP 4: Calculate the total energy per hour

$$E_TC = E_T \times C$$

The model selected must have an energy per hour capacity greater than this calculated figure. If not, choose a model with a higher energy per hour capacity.

Compare the damping direction, stroke, propelling force, and total energy per hour to the values listed in the Rate Controls Engineering Data Charts (pages 105-110).

STEP 5: If you have selected a rate control, refer to the sizing graphs in the Rate Controls section to determine the required damping constant.

If you have selected an adjustable model (ADA), refer to the Useable Adjustment Setting Range graph for the chosen model. The desired velocity must fall within the limits shown on the graph.

Shock Absorber Sizing Examples
Typical Shock Absorber Applications

SYMBOLS

a = Acceleration (in./sec.^{2})(mls^2)
A = Width (in.)(m)
B = Thickness (in.)(m)
C = Number of cycles per hour
d = Cylinder bore diameter (in.)(mm)
D = Distance (in.)(m)
E_K = Kinetic energy (in-lbs.)(Nm)
E_T = Total energy per cycle (in-lbs./c)(Nm/c), $E_K + E_W$
E_TC = Total energy to be absorbed per hour (in-lbs./hr)(Nm/hr)
E_W = Work or drive energy (in-lbs.)(Nm)
F_D = Propelling force (lbs.)(N)
F_P = Shock force (lbs.)(N)
H = Height (in.)(m)
Hp = Motor rating (hp)(kw)
I = Mass moment of inertia (in-lbs./sec^2)(Kgm^2)
K = Radius of gyration (in.)(m)
L = Length (in.)(m)
P = Operating pressure (psi)(bar)
R_S = Mounting distance from pivot point (in.)(m)
S = Stroke of shock absorber (in.)(m)
t = Time (sec.)
T = Torque (in-lbs.)(Nm)
V = Impact velocity (in./sec.)(m/s)
W = Weight (lbs.)(Kg)
α = Angle of incline (degrees)
θ = Start point from true vertical 0° (degrees)
μ = Coefficient of friction
Ø = Angle of rotation (degrees)
ω = Angular velocity (radians/sec)

USEFUL FORMULAS

1. To Determine Shock Force

$$F_P = \frac{E_T}{S \times \mathbf{.85}}$$

For PRO and PM Series only, use

$$F_P = \frac{E_T}{S \times \mathbf{.50}}$$

2. To Determine Impact Velocity

A. If there is no acceleration (V is constant) (e.g., load being pushed by hydraulic cylinder or motor driven.) $V = \frac{D}{t}$

B. If there is acceleration. (e.g., load being pushed by air cylinder) $V = \frac{\mathbf{2} \times D}{t}$

3. To Determine Propelling Force Generated by Electric Motor

$$F_D = \frac{\mathbf{19{,}800} \times Hp}{V} \qquad F_D = \frac{\mathbf{30\ 000} \times Hp}{V} \text{ (metric)}$$

4. To Determine Propelling Force of Pneumatic or Hydraulic Cylinders

$F_D = \mathbf{.7854} \times d^2 \times P$ $F_D = 0,\mathbf{07854} \times d^2 \times P$ (metric)

5. Free Fall Applications

A. Find Velocity for a Free Falling Weight:
$V = \sqrt{\mathbf{772} \times H}$ $V = \sqrt{19,6 \times H}$ (metric)

B. Kinetic Energy of Free Falling Weight:
$E_K = W \times H$

6. Deceleration and G Load

A. To Determine Approximate G Load with a Given Stroke

$$G = \frac{F_P - F_D}{W} \qquad G = \frac{F_P - F_D}{kg \times 9,81} \text{ (metric)}$$

B. To Determine the Approximate Stroke with a Given G Load (Conventional Damping Only)

$$S = \frac{E_K}{GW\ .85 - .15\ F_D}$$

*For PRO/PM and TK Models:

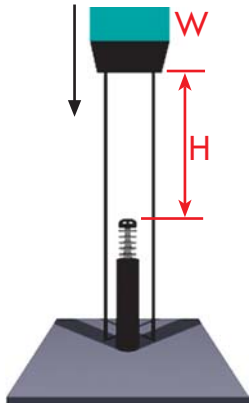
$$S = \frac{E_K}{GW\ .5 - .5\ F_D}$$

NOTE: Constants are printed in **bold**.

The following examples are shown using Imperial formulas and units of measure.

Shock Absorbers

EXAMPLE 1:
Vertical Free Falling Weight



STEP 1: Application Data
(W) Weight = 3,400 lbs.
(H) Height = 20 in.
(C) Cycles/Hr = 2

STEP 2: Calculate kinetic energy
$E_K = W \times H$
$E_K = 3,400 \times 20 = 68,000$ in-lbs.

Assume Model OEM 4.0M x 6 is adequate (Page 31).

STEP 3: Calculate work energy
$E_W = W \times S$
$E_W = 3,400 \times 6$
$E_W = 20,400$ in-lbs.

STEP 4: Calculate total energy per cycle
$E_T = E_K + E_W$
$E_T = 68,000 + 20,400$
$E_T = 88,400$ in-lbs./c

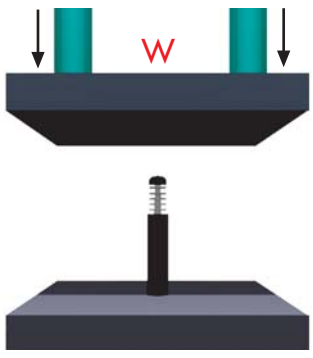
STEP 5: Calculate total energy per hour
$E_TC = E_T \times C$
$E_TC = 88,400 \times 2$
$E_TC = 176,800$ in-lbs./hr

STEP 6: Calculate impact velocity and confirm selection

$V = \sqrt{\mathbf{772} \times H}$
$V = \sqrt{\mathbf{772} \times 20}$
$V = 124$ in./sec.

Model OEM 4.0M x 6 is adequate.

EXAMPLE 2:
Vertical Moving Load with Propelling Force Downward



STEP 1: Application Data
(W) Weight = 3,400 lbs.
(V) Velocity = 80 in./sec.
(d) Cylinder bore dia. = 4 in.
(P) Pressure = 70 psi
(C) Cycles/Hr = 200

STEP 2: Calculate kinetic energy

$$E_K = \frac{W}{\mathbf{772}} \times V^2 = \frac{3,400}{\mathbf{772}} \times 80^2$$

$E_K = 28,187$ in-lbs.

Assume Model OEM 4.0M x 4 is adequate (Page 31).

STEP 3: Calculate work energy
$F_D = [\mathbf{.7854} \times d^2 \times P] + W$
$F_D = [\mathbf{.7854} \times 4^2 \times 70] + 3,400$
$F_D = 4,280$ lbs.
$E_W = F_D \times S$
$E_W = 4,280 \times 4$
$E_W = 17,120$ in-lbs.

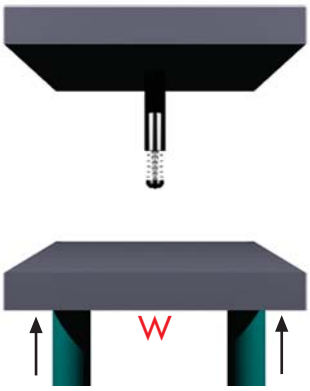
STEP 4: Calculate total energy per cycle
$E_T = E_K + E_W$
$E_T = 28,187 + 17,120$
$E_T = 45,307$ in-lbs./c

STEP 5: Calculate total energy per hour
$E_TC = E_T \times C$
$E_TC = 45,307 \times 200$
$E_TC = 9,061,400$ in-lbs./hr

Model OEM 4.0M x 4 is adequate.

Shock Absorber Sizing Examples
Typical Shock Absorber Applications

EXAMPLE 3:
Vertical Moving Load with Propelling Force Upward



STEP 1: Application Data
(W) Weight = 3,400 lbs.
(V) Velocity = 80 in./sec.
(d) 2 Cylinders bore dia. = 6 in.
(P) Operating pressure = 70 psi
(C) Cycles/Hr = 200

STEP 2: Calculate kinetic energy

$$E_K = \frac{W}{772} \times V^2 = \frac{3{,}400}{772} \times 80^2$$

E_K = 28,187 in-lbs.

Assume Model OEM 3.0M x 5 is adequate (Page 31).

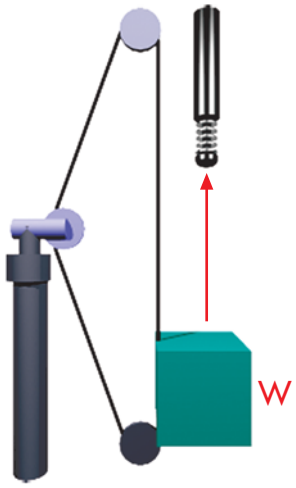
STEP 3: Calculate work energy
F_D = 2 x [**.7854** x d^2 x P] – W
F_D = 2 x [**.7854** x 6^2 x 70] – 3,400
F_D = 558 lbs.
E_W = F_D X S
E_W = 558 x 5
E_W = 2,790 in-lbs.

STEP 4: Calculate total energy per cycle
E_T = E_K + E_W
E_T = 28,187 + 2,790
E_T = 30,977 in-lbs./c

STEP 5: Calculate total energy per hour
E_TC = E_T x C
E_TC = 30,977 x 200
E_TC = 6,195,400 in-lbs./hr

Model OEM 3.0M x 5 is adequate.

EXAMPLE 4:
Vertical Moving Load with Propelling Force from Motor



(e.g., Load Moving Force Up)

STEP 1: Application Data
(W) Weight = 200 lbs.
(V) Velocity = 60 in./sec.
(Hp) Motor horsepower = 1.5 Hp
(C) Cycles/Hr = 100

STEP 2: Calculate kinetic energy

$$E_K = \frac{W}{772} \times V^2 = \frac{200}{772} \times 60^2$$

E_K = 933 in-lbs.

CASE A: UP
STEP 3: Calculate work energy

$$F_D = \frac{\mathbf{19{,}800} \times Hp}{V} - W$$

$$F_D = \frac{\mathbf{19{,}800} \times 1.5}{60} - 200$$

F_D = 295 lbs.

Assume Model OEM 1.25 x 2 is adequate (Page 24).
E_W = F_D X S
E_W = 295 x 2
E_W = 590 in-lbs.

STEP 4: Calculate total energy per cycle
E_T = E_K + E_W
E_T = 933 + 590
E_T = 1,523 in-lbs./c

STEP 5: Calculate total energy per hour
E_TC = E_T x C
E_TC = 1,523 x 100
E_TC = 152,300 in-lbs./hr
Model OEM 1.25 x 2 is adequate.

CASE B: DOWN
STEP 3: Calculate work energy

$$F_D = \frac{\mathbf{19{,}800} \times Hp}{V} + W$$

$$F_D = \frac{\mathbf{19{,}800} \times 1.5}{60} + 200$$

F_D = 695 lbs.

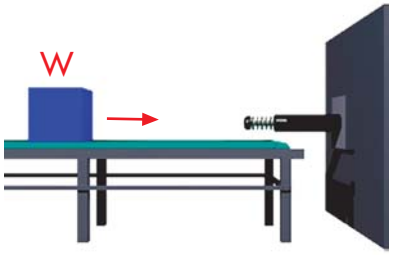
Assume Model OEMXT 2.0M x 2 is adequate (Page 29).
E_W = F_D x S
E_W = 695 x 2
E_W = 1,390 in-lbs.

STEP 4: Calculate total energy per cycle
E_T = E_K + E_W
E_T = 933 + 1,390
E_T = 2,323 in-lbs./c

STEP 5: Calculate total energy per hour
E_TC = E_T x C
E_TC = 2,323 x 100
E_TC = 232,300 in-lbs./hr

Model OEMXT 2.0M x 2 is adequate.

EXAMPLE 5:
Horizontal Moving Load



STEP 1: Application Data
(W) Weight = 1,950 lbs.
(V) Velocity = 60 in./sec.
(C) Cycles/Hr = 200

STEP 2: Calculate kinetic energy

$$E_K = \frac{W}{772} \times V^2$$

$$E_K = \frac{1950}{772} \times 60^2$$

E_K = 9,093 in-lbs.

Assume Model OEMXT 2.0M x 2 is adequate (Page 29).

STEP 3: Calculate work energy: N/A

STEP 4: Calculate total energy per cycle
E_T = E_K = 9,093 in-lbs./c

STEP 5: Calculate total energy per hour
E_TC = E_T x C
E_TC = 9,093 x 200
E_TC = 1,818,600 in-lbs./hr

Model OEMXT 2.0M x 2 is adequate.

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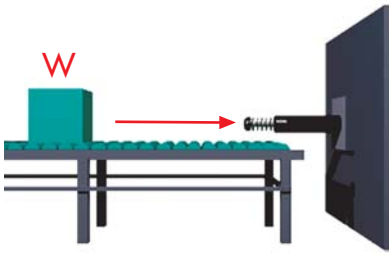
EXAMPLE 6:
Horizontal Moving Load with Propelling Force



STEP 1: Application Data
(W) Weight = 1,950 lbs.
(V) Velocity = 60 in./sec.
(d) Cylinder bore dia. = 3 in.
(P) Operating pressure = 70 psi
(C) Cycles/Hr = 200

STEP 2: Calculate kinetic energy

$$E_K = \frac{W}{\mathbf{772}} \times V^2$$

$$E_K = \frac{1{,}950}{\mathbf{772}} \times 60^2$$

E_K = 9,093 in-lbs.

Assume Model OEMXT 2.0M x 2 is adequate (Page 29).

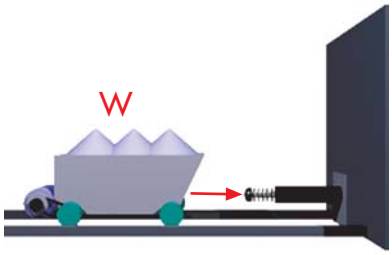
STEP 3: Calculate work energy
F_D = **.7854** x d^2 x P
F_D = **.7854** x 3^2 x 70
F_D = 495 lbs.
E_W = F_D x S
E_W = 495 x 2
E_W = 990 in-lbs.

STEP 4: Calculate total energy per cycle
E_T = E_K + E_W
E_T = 9,093 + 990
E_T = 10,083 in-lbs./c

STEP 5: Calculate total energy per hour
E_TC = E_T x C
E_TC = 10,083 x 200
E_TC = 2,016,600 in-lbs./hr

Model OEMXT 2.0M x 2 is adequate.

EXAMPLE 7:
Horizontal Moving Load, Motor Driven



STEP 1: Application Data
(W) Weight = 2,200 lbs.
(V) Velocity = 60 in./sec.
(Hp) Motor horsepower = 1.5 Hp
(C) Cycles/Hr = 120

STEP 2: Calculate kinetic energy

$$E_K = \frac{W}{\mathbf{772}} \times V^2$$

$$E_K = \frac{2{,}200}{\mathbf{772}} \times 60^2$$

E_K = 10,259 in-lbs

Assume Model OEMXT 2.0M x 2 is adequate (Page 29).

STEP 3: Calculate work energy

$$F_D = \frac{\mathbf{19{,}800} \times Hp}{V}$$

$$F_D = \frac{\mathbf{19{,}800} \times 1.5}{60}$$

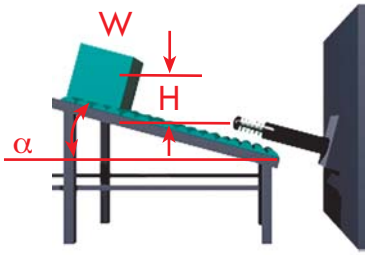
F_D = 495 lbs.
E_W = F_D x S
E_W = 495 x 2
E_W = 990 in-lbs.

STEP 4: Calculate total energy per cycle
E_T = E_K + E_W
E_T = 10,259 + 990
E_T = 11,249 in-lbs./c

STEP 5: Calculate total energy per hour
E_TC = E_T x C
E_TC = 11,249 x 120
E_TC = 1,349,880 in-lbs./hr

Model OEMXT 2.0M x 2 is adequate.

EXAMPLE 8:
Free Moving Load Down an Inclined Plane



STEP 1: Application Data
(W) Weight = 550 lbs.
(H) Height = 8 in.
(α) Angle of incline = 30°
(C) Cycles/Hr = 250

STEP 2: Calculate kinetic energy
E_K = W x H
E_K = 550 x 8
E_K = 4,400 in-lbs.

Assume Model OEMXT 1.5M x 3 is adequate (Page 27).

STEP 3: Calculate work energy
F_D = W x Sin α
F_D = 550 x .5
F_D = 275 lbs.
E_W = F_D x S
E_W = 275 x 3
E_W = 825 in-lbs.

STEP 4: Calculate total energy per cycle
E_T = E_K + E_W
E_T = 4,400 + 825
E_T = 5,225 in-lbs./c

STEP 5: Calculate total energy per hour
E_TC = E_T x C
E_TC = 5,225 x 250
E_TC = 1,306,250 in-lbs./hr

STEP 6: Calculate impact velocity and confirm selection

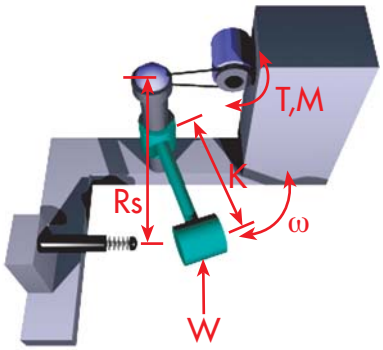
$$V = \sqrt{\mathbf{772} \times H}$$

$$V = \sqrt{\mathbf{772} \times 8} = 79 \text{ in./sec.}$$

Model OEMXT 1.5M x 3 is adequate.

Shock Absorber Sizing Examples
Typical Shock Absorber Applications

EXAMPLE 9:
Horizontal Rotating Mass



STEP 1: Application Data
(W) Weight = 200 lbs.
(ω) Angular velocity = 1.5 rad./sec.
(T) Torque = 1,065 in-lbs.
(K) Radius of gyration = 15 in.
(R_S) Mounting radius = 20 in.
(C) Cycles/Hr = 120

STEP 2: Calculate kinetic energy

$$I = \frac{W}{386} \times K^2$$

$$I = \frac{200}{386} \times 15^2$$

$$I = 117 \text{ in-lbs./sec.}^2$$

$$E_K = \frac{I \times \omega^2}{2}$$

$$E_K = \frac{117 \times 1.5^2}{2}$$

E_K = 132 in-lbs.
Assume Model STH .5M is adequate (Page 40).

STEP 3 Calculate work energy

$$F_D = \frac{T}{R_S}$$

$$F_D = \frac{1{,}065}{20}$$

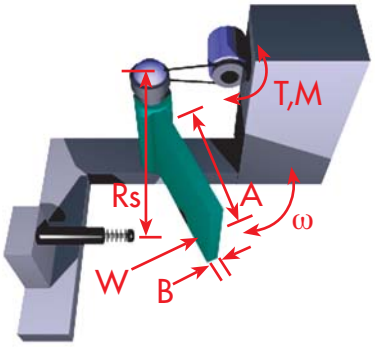
F_D = 53 lbs.
$E_W = F_D \times S$
E_W = 53 X .5
E_W = 27 in-lbs.

STEP 4: Calculate total energy per cycle
$E_T = E_K + E_W$
E_T = 132 + 27
E_T = 159 in-lbs./c

STEP 5: Calculate total energy per hour
$E_TC = E_T \times C$
E_TC = 159 X 120
E_TC = 19,080 in-lbs./hr

Model STH .5M is adequate.

EXAMPLE 10:
Horizontal Rotating Door



STEP 1: Application Data
(W) Weight = 50 lbs.
(ω) Angular velocity = 2.5 rad./sec.
(T) Torque = 100 in-lbs.
(R_S) Mounting radius = 20 in.
(A) Width = 40 in.
(B) Thickness = .5 in.
(C) Cycles/Hr = 250

STEP 2: Calculate kinetic energy

$$K = .289 \times \sqrt{4 \times A^2 + B^2}$$

$$K = .289 \times \sqrt{4 \times 40^2 + .5^2}$$

K = 23.12

$$I = \frac{W}{386} \times K^2$$

$$I = \frac{50}{386} \times 23.12^2$$

I = 69 in-lbs./sec.^{2}

$$E_K = \frac{I \times \omega^2}{2}$$

$$E_K = \frac{69 \times 2.5^2}{2}$$

E_K = 216 in-lbs.
Assume Model OEM .5 is adequate (Page 21).

STEP 3: Calculate work energy

$$F_D = \frac{T}{R_S}$$

$$F_D = \frac{100}{20}$$

F_D = 5 lbs.
$E_W = F_D \times S = 5 \times .5 = 2.5$ in-lbs.

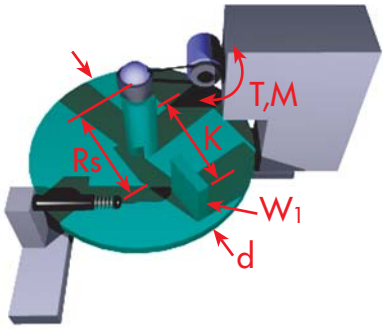
STEP 4: Calculate total energy per cycle
$E_T = E_K + E_W = 216 + 2.5 =$ 218.5 in-lbs./c

STEP 5: Calculate total energy per hour
$E_TC = E_T \times C = 218.5 \times 250 =$ 54,625 in-lbs./hr

STEP 6: Calculate impact velocity and confirm selection
$V = R_S \times \omega = 20 \times 2.5 = 50$ in./sec.

Model OEM .5 is adequate.

EXAMPLE 11:
Horizontal Moving Load, Rotary Table Motor Driven with Additional Load Installed



STEP 1: Application Data
(W) Weight = 440 lbs.
(W_1) Installed load = 110 lbs.
Rotational speed = 10 RPM
(T) Torque = 2,200 in-lbs.
Rotary table dia. = 20 in.
(K_{Load}) Radius of gyration = 8 in.
(R_S) Mounting radius = 8.86 in.
(C) Cycles/Hr = 1
(ω) Direction

Step 2: Calculate kinetic energy
To convert RPM to rad./sec., multiply by **.1047**
ω = RPM x **.1047** = 10 x **.1047** = **1.047** rad./sec.

$$I = \frac{W}{386} \times K^2$$

In this case, the mass moment of inertia of the table and the mass moment of inertia of the load on the table must be calculated.
K_{Table} =Table Radius x **.707**
K_{Table} =10 x **.707** = 7.07 in.

$$I_{Table} = \frac{W}{386} \times K^2_{Table}$$

$$I_{Table} = \frac{440}{386} \times 7.07^2 = 57 \text{ in-lbs./sec.}^2$$

$$I_{Load} = \frac{W_1}{386} \times K^2_{Load}$$

$$I_{Load} = \frac{110}{386} \times 8^2 = 18 \text{ in-lbs./sec.}^2$$

$$E_K = \frac{(I_{Table} + I_{Load}) \times \omega^2}{2}$$

$$E_K = \frac{(57 + 18) \times 1.047^2}{2} = 41 \text{ in-lbs.}$$

Assume Model PM 50 is adequate (Page 46).

STEP 3: Calculate work energy

$$F_D = \frac{T}{R_S} = \frac{2{,}200}{8.86} = 248 \text{ lbs.}$$

$E_W = F_D \times S = 248 \times .875 =$ 217 in-lbs.

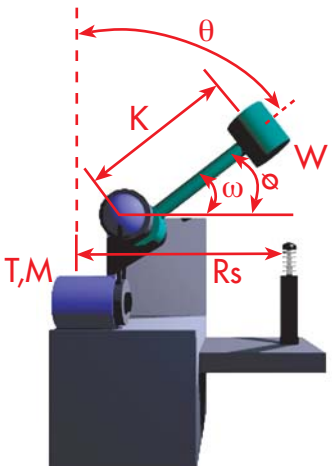
STEP 4: Calculate total energy per cycle
$E_T = E_K + E_W = 41 + 217 =$ 258 in-lbs./c

STEP 5: Calculate total energy per hour: not applicable, C = 1

STEP 6: Calculate impact velocity and confirm selection
$V = R_S \times \omega = 8.86 \times 1.047 =$ 9 in./sec.

From PM Sizing Graph.
Model PM 50-3 is adequate.

EXAMPLE 12:
Vertical Motor Driven Rotating Arm with Attached Load
CASE A–Load Aided by Gravity



STEP 1: Application Data
(W) Weight = 110 lbs.
(ω) Angular velocity = 2 rad./sec.
(T) Torque = 3,100 in-lbs.
(θ) Starting point of load from true vertical = 20°
(Ø) Angle of rotation at impact = 30°
(K_{Load}) Radius of gyration = 24 in.
(R_S) Mounting radius = 16 in.
(C) Cycles/Hr = 1

STEP 2: Calculate kinetic energy

$$I = \frac{W}{386} \times K^2 = \frac{110}{386} \times 24^2$$

$$I = 164 \text{ in-lbs-sec}^2$$

$$E_K = \frac{I \times \omega^2}{2}$$

$$E_K = \frac{164 \times 2^2}{2}$$

$$E_K = 328 \text{ in-lbs.}$$

Assume Model OEM 1.0 is adequate (Page 21).

CASE A

STEP 3: Calculate work energy

$$F_D = \frac{[T + (W \times K \times \text{Sin } (\theta + Ø))]}{R_S}$$

$$F_D = \frac{[3{,}100 + (110 \times 24 \times .77)]}{16}$$

$$F_D = 320.8 \text{ lbs.}$$

$$E_W = F_D \times S = 320.8 \times 1 = 320.8 \text{ in-lbs.}$$

STEP 4: Calculate total energy per cycle

$$E_T = E_K + E_W = 328 + 320.8$$

$$E_T = 648.8 \text{ in-lbs./c}$$

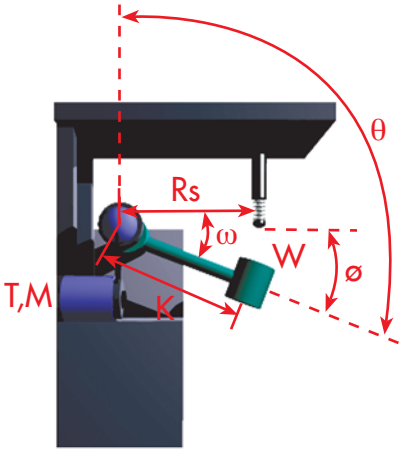
STEP 5: Calculate total energy per hour: not applicable, C = 1

STEP 6: Calculate impact velocity and confirm selection

$$V = R_S \times \omega = 16 \times 2 = 32 \text{ in./sec.}$$

Model LROEM 1.0 is adequate. Needed for higher calculated propelling force.

EXAMPLE 13:
Vertical Motor Driven Rotating Arm with Attached Load
CASE B–Load Opposing Gravity



STEP 1: Application Data
(W) Weight = 110 lbs.
(ω) Angular velocity = 2 rad./sec.
(T) Torque = 3,100 in-lbs.
(θ) Starting point of load from true vertical = 30°
(Ø) Angle of rotation at impact = 150°
(K_{Load}) Radius of gyration = 24 in.
(R_S) Mounting radius = 16 in.
(C) Cycles/Hr = 1

STEP 2: Calculate kinetic energy

$$I = \frac{W}{386} \times K^2 = \frac{110}{386} \times 24^2$$

$$I = 164 \text{ in-lbs-sec}^2$$

$$E_K = \frac{I \times \omega^2}{2}$$

$$E_K = \frac{164 \times 2^2}{2}$$

$$E_K = 328 \text{ in-lbs.}$$

Assume Model OEM 1.0 is adequate (Page 21).

CASE B

STEP 3: Calculate work energy

$$F_D = \frac{[T - (W \times K \times \text{Sin } (\theta - Ø))]}{R_S}$$

$$F_D = \frac{[3{,}100 - (110 \times 24 \times .77)]}{16}$$

$$E_W = F_D \times S = 67 \times 1 = 67 \text{ in-lbs.}$$

STEP 4: Calculate total energy per cycle

$$E_T = E_K + E_W = 328 + 67$$

$$E_T = 394.7 \text{ in-lbs./c}$$

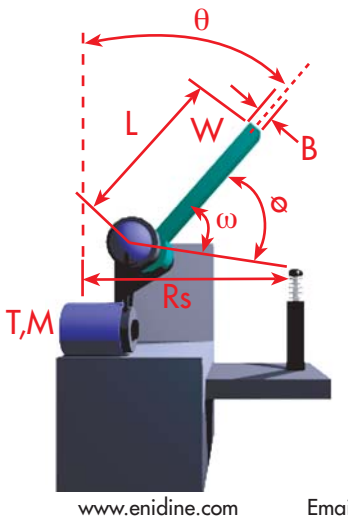
STEP 5: Calculate total energy per hour: not applicable, C = 1

STEP 6: Calculate impact velocityand confirm selection.

$$V = R_S \times \omega = 16 \times 2 = 32 \text{ in./sec.}$$

Model OEM 1.0 is adequate.

EXAMPLE 14:
Vertical Rotating Beam



STEP 1: Application Data
(W) Weight = 540 lbs.
(ω) Angular velocity = 3.5 rad./sec.
(T) Torque = 250 in-lbs.
(θ) Starting point of load from true vertical = 20°
(Ø) Angle of rotation at impact = 50°
(R_S) Mounting radius = 20 in.
(B) Thickness = 2.5 in.
(L) Length = 24 in.
(C) Cycles/Hr = 1

STEP 2: Calculate kinetic energy

$$K = .289 \times \sqrt{4 \times L^2 + B^2}$$

$$K = .289 \times \sqrt{4 \times 24^2 + 2.5^2} = 13.89$$

$$I = \frac{W}{386} \times K^2 = \frac{540}{386} \times 13.89$$

$$I = 270 \text{ in-lbs./sec.}^2$$

$$E_K = \frac{I \times \omega^2}{2} = \frac{270 \times 3.5^2}{2} = 1{,}653 \text{ in-lbs.}$$

Assume Model OEM 1.5M x 2 is adequate (Page 27).

STEP 3: Calculate work energy

$$F_D = \frac{T + (W \times K \times \text{Sin } (\theta + Ø))}{R_S}$$

$$F_D = \frac{250 + (540 \times 13.89 \times \text{Sin } (20° + 50°))}{20}$$

$$F_D = 365 \text{ lbs.}$$

$$E_W = F_D \times S = 365 \times 2 = 730 \text{ in-lbs.}$$

STEP 4: Calculate total energy per cycle

$$E_T = E_K + E_W = 1{,}653 + 730 = 2{,}383 \text{ in-lbs./c}$$

STEP 5: Calculate total energy per hour: not applicable, C = 1

STEP 6: Calculate impact velocity and confirm selection

$$V = R_S \times \omega = 20 \times 3.5 = 70 \text{ in./sec.}$$

Model OEM 1.5M x 2 is adequate.

Shock Absorber Sizing Examples
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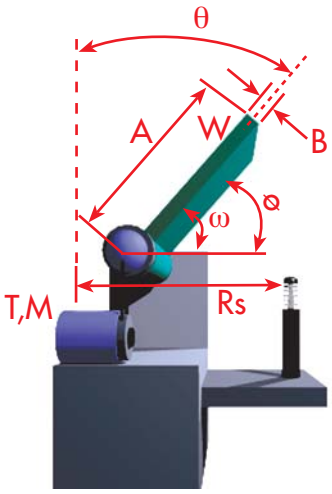
EXAMPLE 15:
Vertical Rotating Lid



STEP 1: Application Data
(W) Weight = 2,000 lbs.
(ω) Angular velocity = 2 rad./sec.
(Hp) Motor horsepower = .25 Hp
(θ) Starting point of load from true vertical = 30°
(Ø) Angle of rotation at impact = 60°
(R_S) Mounting radius = 30 in.
(A) Width = 60 in.
(B) Thickness = 1 in.
(C) Cycle/Hr = 1

STEP 2: Calculate kinetic energy

$K = \mathbf{.289} \times \sqrt{\mathbf{4} \times A^2 + B^2}$

$K = \mathbf{.289} \times \sqrt{\mathbf{4}} \times 60^2 + 1^2 = 34.68$ in.

$I = \frac{W}{\mathbf{386}} \times K^2 = \frac{2{,}000}{\mathbf{386}} \times 34.68^2$ in.

$I = 6{,}232$ in-lbs./sec.^{2}

$E_K = \frac{I \times \omega^2}{\mathbf{2}} = \frac{6{,}232 \times 2^2}{\mathbf{2}}$

$E_K = 12{,}464$ in-lbs.

Assume Model OEM 3.0M x 2 is adequate (Page 31).

STEP 3: Calculate work energy

$T = \frac{\mathbf{19{,}800} \times Hp}{\omega}$

$T = \frac{\mathbf{19{,}800} \times .25}{2} = 2{,}475$ in-lbs.

$F_D = \frac{T + (W \times K \times \sin(\theta + Ø))}{R_S}$

$F_D = \frac{2{,}475 + (2{,}000 \times 34.68 \times \sin(30° + 60°))}{30}$

$F_D = 2{,}395$ lbs.

$E_W = F_D \times S = 2{,}395 \times 2 = 4{,}790$ in-lbs.

STEP 4: Calculate total energy per cycle

$E_T = E_K + E_W = 12{,}464 + 4{,}790 = 17{,}254$ in-lbs./c

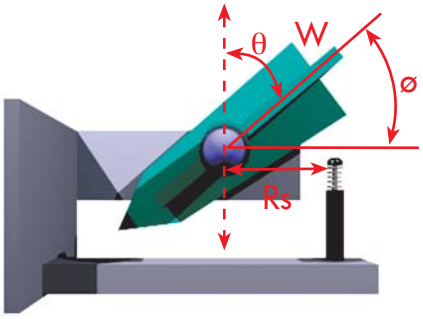
STEP 5: Calculate total energy per hour: not applicable, C = 1

STEP 6: Calculate impact velocity and confirm selection

$V = R_S \times \omega = 30 \times 2 = 60$ in./sec.

Model OEM 3.0M x 2 is adequate.

EXAMPLE 16:
Vertical Rotation with Known Intertia Aided by Gravity



STEP 1: Application Data
(W) Weight = 220.5 lbs .
(I) Known Intertia = 885 in-lbs/sec.^{2}
(C/G) Center-of-Gravity = 12 in.
(θ) Starting point from true vertical = 60°
(Ø) Angle of rotation at impact = 30°
(R_S) Mounting radius = 10 in.
(C) Cycles/Hr = 1

STEP 2: Calculate kinetic energy

$H = C/G \times [\cos(\theta) - \cos(Ø+\theta)]$

$H = 12 \times [\cos(60^\circ) - \cos(30°+60°)]$

$E_K = W \times H$

$E_K = 220.5 \times 6$

$E_K = 1{,}323$ in-lbs.

STEP 3: Calculate work energy

$F_D = (W \times C/G \times \sin(\theta + Ø))/R_S$

$F_D = (220.5 \times 12 \times \sin(60° + 30°))/10$

$F_D = 264.6$ lbs.

$E_W = F_D \times S = 264.6 \times 1 = 264.6$ in-lbs.

STEP 4: Calculate total energy per cycle

$E_T = E_K + E_W = 1{,}323 + 264.6$

$E_T = 1{,}587.6$ in-lbs/cyc.

STEP 5: Calculate total energy per hour: not applicable, C = 1

$E_TC = E_T \times C$

$E_TC = 1{,}587.6 \times 1$

$E_TC = 1{,}587.6$ in-lbs/hr.

STEP 6: Calculate impact velocity and confirm selection

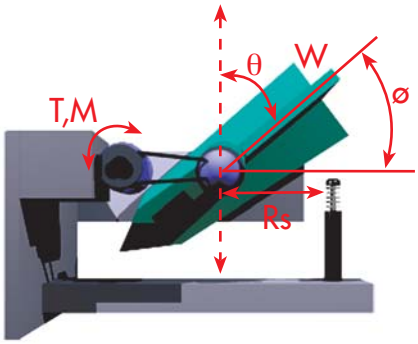
$\omega = ((2 \times E_K)/I)\ 0.5$

$\omega = ((2 \times 1{,}323)/885)\ 0.5 = 1.7$

$V = R_S \times \omega = 10 \times 1.7 = 17$ in./sec.

Model OEM 1.15M x 1 is adequate (Page 24).

EXAMPLE 17:
Vertical Rotation with Known Intertia Aided by Gravity (w/Torque)



STEP 1: Application Data
(W) Weight = 220.5 lbs .
(ω) Angular Velocity = 2 rad/sec.
(T) Torque = 2,750 in-lbs.
(I) Known Intertia = 885 in-lbs/sec.^{2}
(C/G) Center-of-Gravity = 12 in.
(θ) Starting point from true vertical = 60°
(Ø) Angle of rotation at impact = 30°
(R_S) Mounting radius = 10 in.
(C) Cycles/Hr = 100

STEP 2: Calculate kinetic energy

$E_K = (I \times \omega^2)/2$

$E_K = (885 \times 2^2)/2$

$E_K = 1{,}770$ in-lbs.

STEP 3: Calculate work energy

$F_D = [T - (W \times C/G \times \sin(\theta + Ø)]/R_S$

$F_D = [2{,}750 - (220.5 \times 12 \times \sin(60°+30°)]/10$

$F_D = 539.6$ lbs.

$E_W = F_D \times S = 539.6 \times 1 = 539.6$ in-lbs.

STEP 4: Calculate total energy per cycle

$E_T = E_K + E_W = 1{,}770 + 539.6$

$E_T = 2{,}309.6$ in-lbs/cyc.

STEP 5: Calculate total energy per hour: not applicable, C = 1

$E_TC = E_T \times C$

$E_TC = 2{,}309.6 \times 1$

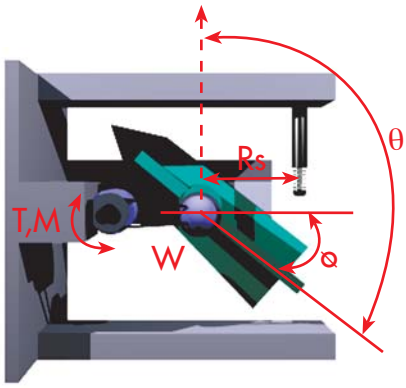
$E_TC = 230{,}960$ in-lbs/hr.

STEP 6: Calculate impact velocity and confirm selection

$V = R_S \times \omega = 10 \times 2 = 20$ in./sec.

Model OEM 1.15M x 1 is adequate (Page 24).

EXAMPLE 18:
Vertical Rotation with Known Intertia Aided by Gravity (w/Torque)



STEP 1: Application Data
(W) Weight = 220.5 lbs .
(ω) Angular Velocity = 2 rad/sec.
(T) Torque = 2,750 in-lbs.
(I) Known Intertia = 885 in-lbs/sec.^{2}
(C/G) Center-of-Gravity = 12 in.
(θ) Starting point from true vertical = 120°
(Ø) Angle of rotation at impact = 30°
(R_S) Mounting radius = 10 in.
(C) Cycles/Hr = 100

STEP 2: Calculate kinetic energy
$E_K = (I \times \omega^2)/2$
$E_K = (885 \times 2^2)/2$
$E_K = 1{,}770$ in-lbs.

STEP 3: Calculate work energy
$F_D = [T - (W \times C/G \times \text{Sin}\,(\theta - Ø)]/R_S$
$F_D = [2{,}750 - (220.5 \times 12 \times \text{Sin}\,(120° - 30°)]/10$
$F_D = 10.4$ lbs.
$E_W = F_D \times S = 10.4 \times 1 = 10.4$ in-lbs.

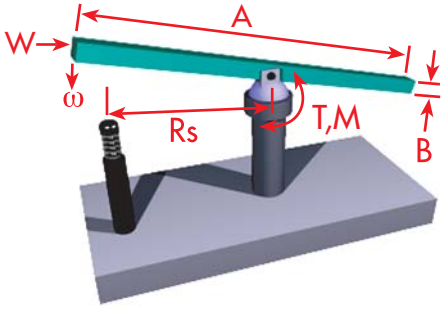
STEP 4: Calculate total energy per cycle
$E_T = E_K + E_W = 1{,}770 + 10.4$
$E_T = 1{,}780.4$ in-lbs/cyc.

STEP 5: Calculate total energy per hour: not applicable, C = 1
$E_TC = E_T \times C$
$E_TC = 1{,}780.4 \times 100$
$E_TC = 178{,}040$ in-lbs/hr.

STEP 6: Calculate impact velocity and confirm selection
$V = R_S \times \omega = 10 \times 2 = 20$ in./sec.

Model OEM 1.15M x 1 is adequate (Page 24).

EXAMPLE 19:
Vertical Roation Pinned at Center (w/Torque)



STEP 1: Application Data
(W) Weight = 220.5 lbs.
(ω) Angular velocity = 2 rad./sec.
(T) Torque = 2,750 in-lbs.
(A) Length = 40 in.
(R_S) Mounting radius = 10 in.
(B) Thickness = 2 in.
(C) Cycles/Hr = 100

STEP 2: Calculate kinetic energy
$K = .289 \times (A^2 + B^2)^{0.5}$
$K = .289 \times (40^2 + 2^2)^{0.5} = 11.6$ in.
$I = (W/386) \times K^2$
$I = (220.5/386) \times 11.6^2 = 76.9$ in-lb/sec^2
$E_K = (I \times \omega^2)/2$
$E_K = (76.9 \times 2^2)/2$
$E_K = 153.8$ in-lbs.

Assume Model OEM 1.0 is adequate (Page 21).

STEP 3: Calculate work energy
$F_D = T/R_S$
$F_D = 2{,}750/10$
$F_D = 275$ lbs.
$E_W = F_D \times S = 275 \times 1 = 275$ in-lbs.

STEP 4: Calculate total energy per cycle
$E_T = E_K + E_W = 153.8 + 275$
$E_T = 428.8$ in-lbs./cycle

STEP 5: Calculate total energy per hour
$E_TC = E_T \times C$
$E_TC = 428.8 \times 100$
$E_TC = 42{,}880$ in-lbs./hr.

STEP 6: Calculate impact velocity and confirm selection
$V = R_S \times \omega = 10 \times 2 = 20$ in./sec.

Model OEM 1.0 is adequate.

Shock Absorber Sizing Examples
Typical Shock Absorber and Crane Applications

Crane A		Per Buffer
Propelling Force Crane	lbs.	
Propelling Force Trolley	lbs.	
Weight of Crane	lbs.	
Weight of Trolley	lbs.	
Distance X_{min}	in.	
Distance X_{max}	in.	
Distance Y_{min}	in.	
Distance Y_{max}	in.	
Crane Velocity	in./sec.	
Trolley Velocity	in./sec.	

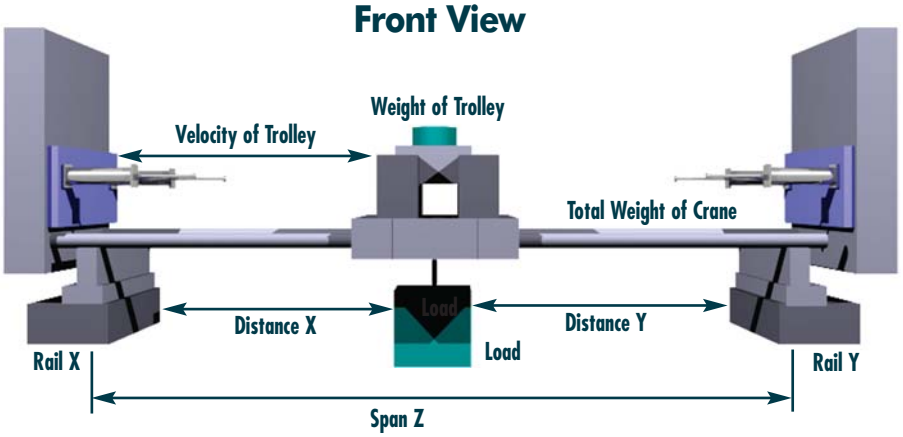
Crane B		Per Buffer
Propelling Force Crane	lbs.	
Propelling Force Trolley	lbs.	
Weight of Crane	lbs.	
Weight of Trolley	lbs.	
Distance X_{min}	in.	
Distance X_{max}	in.	
Distance Y_{min}	in.	
Distance Y_{max}	in.	
Crane Velocity	in./sec.	
Trolley Velocity	in./sec.	

Crane C		Per Buffer
Propelling Force Crane	lbs.	
Propelling Force Trolley	lbs.	
Weight of Crane	lbs.	
Weight of Trolley	lbs.	
Distance X_{min}	in.	
Distance X_{max}	in.	
Distance Y_{min}	in.	
Distance Y_{max}	in.	
Crane Velocity	in./sec.	
Trolley Velocity	in./sec.	

Please note:
Unless instructed otherwise, Enidine will always calculate with:

- 100% velocity v, and
- 100% propelling force F_D

Front View



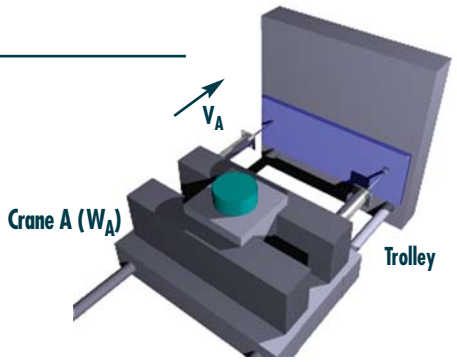
Plan Views

Application 1
Crane A against Solid Stop
Velocity:

$V_r = V_A$

Impact weight per buffer:

$W_D = \frac{W}{2}$

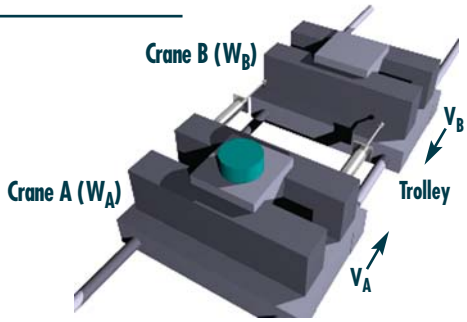


Application 2
Crane A against Crane B
Velocity:

$V_r = V_A + V_B$

Impact weight per buffer:

$W_D = \frac{W_A \bullet W_B}{W_A + W_B} \div 2$

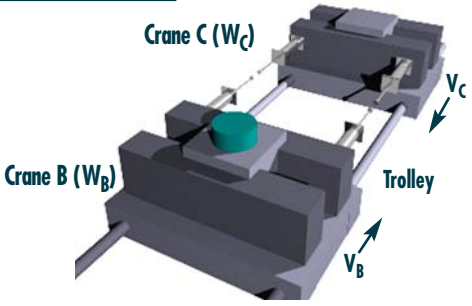


Application 3
Crane B against Crane C
Velocity:

$V_r = \frac{V_B + V_C}{2}$

Impact weight per buffer:

$W_D = \frac{W_B \bullet W_C}{W_B + W_C}$

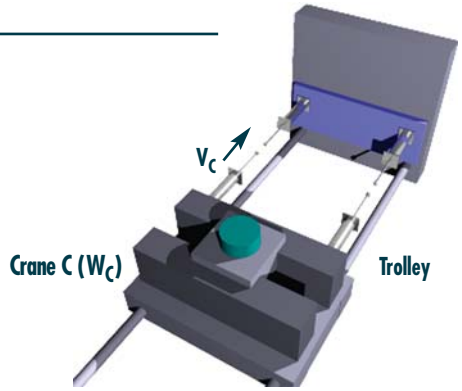


Application 4
Crane C against Solid Stop with Buffer
Velocity:

$V_r = \frac{V_C}{2}$

Impact weight per buffer:

$W_D = W_C$



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Shock Absorber Sizing Examples
Typical Shock Absorber and Crane Applications

Please note that this example is not based on any particular standard. The slung load can swing freely, and is therefore not taken into account in the calculation.

Calculation Example for Harbor Cranes as Application 1

Given Values

Total Weight of Crane:	**837,750 lbs.**
Weight of Trolley:	**99,200 lbs.**
Span:	**z = 3,940 in.**
Trolley Impact Distance:	**x = 3,540 in.**
Crane Velocity:	**V_{Crane} = 60 in./sec.**
Required Stroke:	**24 in.**
Trolley Velocity:	**$V_{Trolley}$ = 160 in./sec.**
Required Stroke:	**40 in.**

Determination of the Maximum Impact Weight W_{Dmax} per Buffer

Bridge Weight per Rail = $\frac{\text{crane weight}_{total} - \text{trolley weight}}{2}$

Bridge Weight per Rail = $\frac{837{,}750 \text{ lbs.} - 99{,}200 \text{ lbs.}}{2}$ = 369,275 lbs.

W_{Dmax} = Bridge Weight per Rail + Trolley Weight in Impact Position

$W_{Dmax} = 369{,}275 \text{ lbs.} + \frac{(99{,}200 \text{ lbs.} \bullet 3{,}540 \text{ in.})}{3{,}940 \text{ in.}}$

W_{Dmax} = 458,404 lbs.

Determine Size of Shock Absorber for Crane

$E_K = \frac{W_{Dmax}}{772} \bullet V_r^2$

$E_K = \frac{458{,}404 \text{ lbs.}}{772} \bullet (60 \text{ in./sec.})^2$

E_K = 2,137,635 in-lbs.

$V_r = V_A$ Application 1

E_K = Kinetic Energy

η = Efficiency

Selecting for required 24-inch stroke:

HD 5.0 x 24, maximum shock force ca. 104,786 lbs = $F_s = \frac{E_K}{s \bullet \eta}$

Determine Size of Shock Absorber for Trolley

W_D = Trolley Weight per Shock Absorber

$W_D = \frac{99{,}200 \text{ lbs.}}{2}$

W_D = 49,600 lbs.

$V_r = V_A$ Application 1

$E_K = \frac{W_D}{772} \bullet V_r^2$

$E_K = \frac{49{,}600 \text{ lbs.}}{772} \bullet (160 \text{ in./sec.})^2$

E_K = 1,644,767 in-lbs.

Selecting for required 40-inch stroke:

HD 4.0 x 40, maximum shock force ca. 48,376 lbs. = $F_s = \frac{E_K}{s \bullet \eta}$

Shock Absorber and Rate Controls Quick Selection Guide
Typical Selections

Use this **Enidine Product Quick Selection Guide** to quickly locate potential shock absorber models most suited for your requirements. Models are organized in order of smallest to largest energy capacity per cycle within their respective product families.

Enidine Adjustable Shock Absorbers

Catalog No. (Model)	(S) Stroke (in.)	(E_T) Max. in.-lbs./cycle	(E_TC) Max. in.-lbs./hour	Damping Type	Page No.
	1 in. = 25,4mm	1 in.-lb. = .11 Nm			
OEM 0.1M (B)	0.28	50	110,000	D	21
OEM .15M (B)	0.38	50	168,000	D	21
OEM .25 (B)	0.38	50	178,000	D	21
LROEM .25 (B)	0.38	50	178,000	D	21
OEM .35 (B)	0.50	150	300,000	D	21
LROEM .35 (B)	0.50	150	300,000	D	21
OEM .5 (B)	0.50	250	284,000	D	21
LROEM .5 (B)	0.50	250	284,000	D	21
OEM 1.0 (B)	1.00	650	622,000	C	21
LROEM 1.0 (B)	1.00	650	622,000	C	21
OEM 1.15 X 1	1.00	1,700	670,000	C	24
LROEM 1.15 X 1	1.00	1,700	670,000	C	24
OEM 1.15 X 2	2.00	3,400	875,000	C	24
LROEM 1.15 X 2	2.00	3,400	875,000	C	24
OEM 1.25 x 1	1.00	1,700	808,000	C	24
LROEM 1.25 x 1	1.00	1,700	808,000	C	24
OEM 1.25 x 2	2.00	3,400	986,000	C	24
LROEM 1.25 x 2	2.00	3,400	986,000	C	24
LROEMXT ¾ x 1	1.00	3,750	1,120,000	C	28
OEMXT ¾ x 1	1.00	3,750	1,120,000	C	28
LROEMXT 1.5M x 1	1.00	3,750	1,120,000	C	28
OEMXT 1.5M x 1	1.00	3,750	1,120,000	C	28
LROEMXT ¾ x 2	2.00	7,500	1,475,000	C	28
OEMXT ¾ x 2	2.00	7,500	1,475,000	C	28
LROEMXT 1.5M x 2	2.00	7,500	1,475,000	C	28
OEMXT 1.5M x 2	2.00	7,500	1,475,000	C	28
OEMXT ¾ x 3	3.00	11,500	1,775,000	C	28
OEMXT 1.5M x 3	3.00	11,500	1,775,000	C	28
LROEMXT 1⅛ x 1	1.00	6,000	2,000,000	C	28
LROEMXT 1⅛ x 2	2.00	20,000	2,400,000	C	29
OEMXT 1⅛ x 2	2.00	20,000	2,400,000	C	29
LROEMXT 2.0M x 2	2.00	20,000	2,400,000	C	29
OEMXT 2.0M x 2	2.00	20,000	2,400,000	C	29
OEM 3.0M x 2	2.00	20,000	3,290,000	C	31
OEMXT 1⅛ x 4	4.00	40,000	3,200,000	C	29
OEMXT 2.0M x 4	4.00	40,000	3,200,000	C	29
OEM 4.0M x 2	2.00	34,000	13,300,000	C	31
OEM 3.0M x 3.5	3.50	35,000	5,770,000	C	31
OEMXT 1⅛ x 6	6.00	60,000	3,730,000	C	29
OEMXT 2.0M x 6	6.00	60,000	3,730,000	C	29
OEM 3.0M x 5	5.00	50,000	8,260,000	C	31
OEM 3.0M x 6.5	6.50	65,000	10,750,000	C	31
OEM 4.0M x 4	4.00	68,000	16,000,000	C	31
OEM 4.0M x 6	6.00	102,000	18,600,000	C	31
OEM 4.0M x 8	8.00	136,000	21,300,000	C	31
OEM 4.0M x 10	10.00	170,000	24,000,000	C	31

Key for Damping Type:
D – Dashpot
C – Conventional
P – Progressive
SC – Self-compensating

Enidine Non-Adjustable Shock Absorbers

Catalog No. (Model)	(S) Stroke (in.)	(E_T) Max. in.-lbs./cycle	(E_TC) Max. in.-lbs./hour	Damping Type	Page No.
	1 in. = 25,4mm	1 in.-lb. = .11 Nm			
TK 6	0.25	9	31,863	D	38
TK 8	0.25	50	42,480	D	38
TK 21	0.25	20	36,000	D	39
PMX 8	0.25	25	50,000	SC	46
TK 10M	0.25	50	115,000	D	39
PMX 10	0.28	50	110,000	SC	46
PM 15	0.41	90	250,000	SC	46
PRO 15	0.41	90	250,000	P	61
STH .25M	0.25	100	39,000	D	40
SPM 25	0.50	180	260,000	SC	46
PM 25	0.63	235	300,000	SC	46
PRO 25	0.63	235	300,000	P	61
SPM 50	0.50	250	400,000	SC	46
PM 50	0.88	485	475,000	SC	46
PRO 50	0.88	485	475,000	P	61
STH .5M	0.50	585	390,000	D	40
PM 100	1.00	800	622,000	SC	46
PRO 100	1.00	800	622,000	P	61
PRO 110	1.56	1,700	670,000	P	63
PM 120	1.00	1,400	670,000	SC	49
PM 125	1.00	1,400	774,000	SC	49
PRO 120	1.00	1,400	670,000	P	63
PRO 125	1.00	1,400	774,000	P	63
PMXT 1525	1.00	3,250	1,120,000	SC	53
STH .75M	0.75	2,150	780,000	D	40
PM 220	2.00	2,750	800,000	SC	50
PM 225	2.00	2,750	900,000	SC	50
PRO 220	2.00	2,750	800,000	P	63
PRO 225	2.00	2,750	900,000	P	63
PMXT 1550	2.00	6,500	1,475,000	SC	53
STH 1.0M	1.00	4,400	1,300,000	D	40
PMXT 1575	3.00	10,000	1,775,000	SC	53
STH 1.0M x 2	2.00	8,800	2,100,000	D	40
PMXT 2050	2.00	16,500	2,400,000	SC	53
STH 1.5M x 1	1.00	10,200	2,200,000	D	40
PMXT 2100	4.00	33,000	3,200,000	SC	53
STH 1.5M x 2	2.00	20,400	3,200,000	D	40
PMXT 2150	6.00	50,000	3,730,000	SC	53

Key for Damping Type:
D – Dashpot
C – Conventional
P – Progressive
SC – Self-compensating

Shock Absorber and Rate Controls Quick Selection Guide
Typical Selections

Use this **Enidine Product Quick Selection Guide** to quickly locate potential shock absorber models most suited for your requirements. Models are organized in order of smallest to largest energy capacity per cycle within their respective product families.

Enidine Heavy Duty Shock Absorbers

Catalog No. (Model)	(S) Stroke (in.)	(E_T) Min./Max. in.-lbs./cycle		Damping Type	Page No.
	1 in. = 25,4mm	1 in.-lb. = .11 Nm			
HD 1.5 x (Stroke)	2-24	27,000	185,000	C, P, SC	73-74
HD 2.0 x (Stroke)	10-56	212,000	680,000	C, P, SC	75-76
HD 3.0 x (Stroke)	2-56	83,000	1,200,000	C, P, SC	77-78
HDA 3.0 x (Stroke)	2-12	40,000	240,000	C	77-78
HD 3.5 x (Stroke)	2-48	112,500	1,800,000	C, P, SC	79-80
HD 4.0 x (Stroke)	2-48	134,000	2,400,000	C, P, SC	81-82
HDA 4.0 x (Stroke)	2-10	120,000	600,000	C	81-82
HD 5.0 x (Stroke)	4-40	414,000	4,150,000	C, P, SC	83-84
HDA 5.0 x (Stroke)	4-12	327,000	1,000,000	C	83-84
HD 6.0 x (Stroke)	4-48	677,000	7,125,000	C, P, SC	85-86
HDA 6.0 x (Stroke)	4-12	540,000	1,625,000	C	85-86

Key for Damping Type:
D – Dashpot
C – Conventional
P – Progressive
SC – Self-compensating

Enidine Heavy Industry Shock Absorbers

Catalog No. (Model)	(S) Stroke (in.)	(E_T) Min./Max. in.-lbs./cycle		Damping Type	Page No.
	1 in. = 25,4mm	1 in.-lb. = .11 Nm			
HI 100 x (Stroke)	2-32	88,000	1,150,000	C, P, SC	91
HI 120 x (Stroke)	4-40	283,000	2,301,000	C, P, SC	91
HI 130 x (Stroke)	10-32	885,000	2,400,000	C, P, SC	92
HI 150 x (Stroke)	5-40	548,000	4,500,000	C, P, SC	92

Key for Damping Type:
D – Dashpot
C – Conventional
P – Progressive
SC – Self-compensating

Jarret Shock Absorbers

Catalog No. (Model)	(S) Stroke (in.)	(E_T) Min./Max. in.-lbs./cycle		Damping Type	Page No.
	1 in. = 25,4mm	1 in.-lb. = .11 Nm			
BC1N	0.5-3	885,000	123,910	–	95
BC5	4-7	221,000	1,327,612	–	96
XLR	6-31.5	53,000	1,327,612	–	97
LR	16-51	885,000	8,850,746	–	97

Key for Damping Type:
D – Dashpot
C – Conventional
P – Progressive
SC – Self-compensating

Enidine Adjustable Rate Controls

Catalog No. (Model)	(S) Stroke (in.)	(Fp) Max. Propelling Force		(E_TC) Max. in.-lbs./hour	Page No.
	1 in. = 25,4mm	Tension lbs.	Compression lbs.	1 in.-lb. = .11 Nm	
ADA 505	2.00	450	450	650,000	111
ADA 510	4.00	450	375	850,000	111
ADA 515	6.00	450	300	1,050,000	111
ADA 520	8.00	450	200	1,250,000	111
ADA 525	10.00	450	125	1,450,000	111
ADA 705	2.00	2,500	2,500	1,100,000	111
ADA 710	4.00	2,500	2,500	1,400,000	112
ADA 715	6.00	2,500	2,500	1,800,000	112
ADA 720	8.00	2,500	2,500	2,100,000	112
ADA 725	10.00	2,500	2,500	2,500,000	112
ADA 730	12.00	2,500	2,500	2,800,000	112
ADA 735	14.00	2,500	2,500	3,200,000	112
ADA 740	16.00	2,500	2,500	3,500,000	113
ADA 745	18.00	2,500	2,000	3,900,000	113
ADA 750	20.00	2,500	1,700	4,200,000	113
ADA 755	22.00	2,500	1,400	4,600,000	113
ADA 760	24.00	2,500	1,200	4,900,000	113
ADA 765	26.00	2,500	1,000	5,300,000	113
ADA 770	28.00	2,500	900	5,600,000	113
ADA 775	30.00	2,500	800	6,000,000	113
ADA 780	32.00	2,500	700	6,300,000	113

Enidine Non-Adjustable Rate Controls

Catalog No. (Model)	(S) Stroke (in.)	(Fp) Max. Propelling Force		(E_TC) Max. in.-lbs./hour	Page No.
	1 in. = 25,4mm	Tension lbs.	Compression lbs.	1 in.-lb. = .11 Nm	
DA 50 x 2	2.00	2,500	2,500	1,400,000	115
DA 50 x 4	4.00	2,500	2,500	1,700,000	115
DA 50 x 6	6.00	2,500	2,500	2,000,000	115
DA 50 x 8	8.00	2,500	2,500	2,300,000	115
DA 75 x 2	2.00	5,000	5,000	2,700,000	115
DA 75 x 4	4.00	5,000	5,000	3,100,000	115
DA 75 x 6	6.00	5,000	5,000	3,600,000	116
DA 75 x 8	8.00	5,000	5,000	4,100,000	116
DA 75 x 10	10.00	5,000	5,000	4,500,000	116
TB 100 x 4	4.00	10,000	10,000	4,400,000	116
TB 100 x 6	6.00	10,000	10,000	4,400,000	116

Key for Damping Type:
D – Dashpot
C – Conventional
P – Progressive
SC – Self-compensating

Adjustable Series Hydraulic Shock Absorbers
OEM Series

Overview

Enidine Adjustable Hydraulic Series shock absorbers offer the most flexible solutions to energy absorption application requirements when input parameters vary or are not clearly defined.

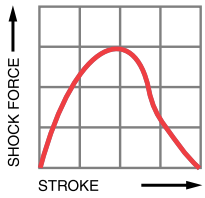
By simply turning an adjustment knob, the damping force can be changed to accommodate a wide range of conditions. Enidine offers the broadest range of adjustable shock absorbers and mounting accessories in the marketplace today.

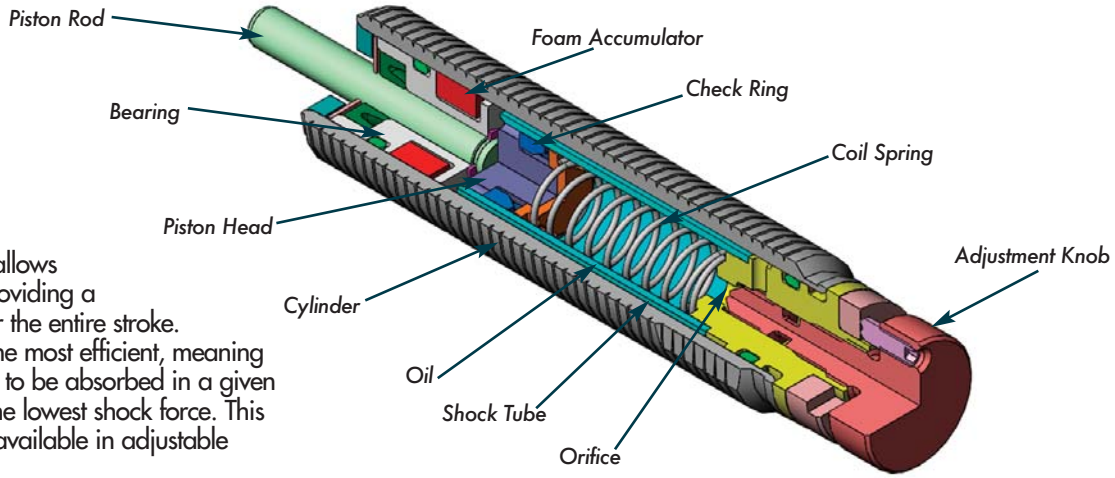
The Enidine **OEMXT Series** provides a low profile adjustment knob offered in imperial or metric thread configurations with stroke lengths of 1 to 6 inches. For drop-in competitive interchange. **Low Range (LROEMXT) Series** products are also available to control velocities as low as 3 in./sec. and propelling forces as high as 4,000 lbs. OEMXT and OEM Large Series shock absorbers are fully field repairable.

Features and Benefits

- Adjustable design lets you "fine-tune" your desired damping and lock the numbered adjustment setting.
- Internal orifice design provides deceleration with the most efficient damping characteristics, resulting in the lowest reaction forces in the industry.
- Threaded cylinders provide mounting flexibility and increased surface area for improved heat dissipation.
- Incorporated optional fluids and seal packages can expand the standard operating temperature range from (15°F to 180°F) to (–30°F to 210°F).
- ISO quality standards result in reliable, long-life operation.
- Operational parameters can be expanded through the use of Enidine's Low Range and High Performance products.
- Fully field repairable units are available in mid-bore and larger bore product ranges.
- Custom orificed non-adjustable units (CBOEM) can be engineered to meet specific application requirements.
- A select variety of surface finishes maintains original quality appearance and provides the longest corrosion resistance protection.

Enidine Adjustable Single Orifice Shock Absorbers



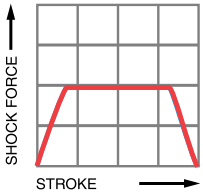


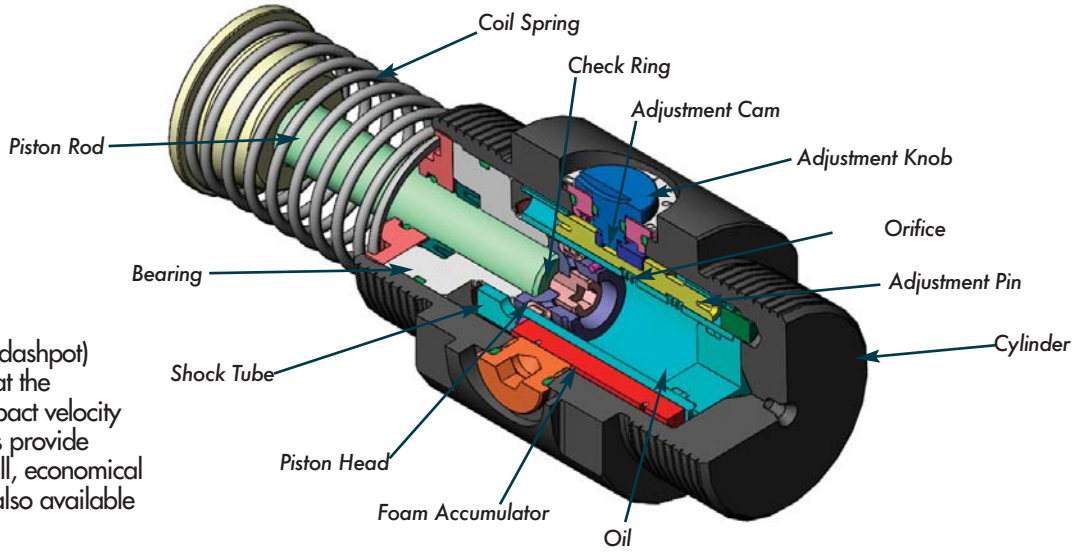
Conventional damping allows linear deceleration by providing a constant shock force over the entire stroke. This standard design is the most efficient, meaning it allows the most energy to be absorbed in a given stroke, while providing the lowest shock force. This type of damping is also available in adjustable shock absorbers.

The damping force of an Enidine single orifice shock absorber can be changed by turning the adjustment knob. Maximum damping force is achieved by turning the adjustment knob to eight (8), while minimum damping force is achieved by turning the adjustment knob to zero (0). Turning the adjustment knob causes the adjustment ball to increase or decrease the clearance (orifice area) between the ball and its seat, depending on rotation direction.

The internal structure of an adjustable single orifice shock absorber is shown above. When force is applied to the piston rod, the check ball is seated and the valve remains closed. Oil is forced out of the high pressure shock tube chamber through the orifice, creating internal pressure allowing smooth, controlled deceleration of the moving load. When the load is removed, the compressed coil spring moves to reposition the piston head, the check ball unseats, opening the valve that permits rapid piston rod return to the original extended position. The closed cellular foam accumulator compensates for fluid displaced by the piston rod during compression and extension. Without the fluid displacement volume provided by the foam accumulator, the closed system would be hydraulically locked. This type of orifice design results in .

Enidine Adjustable Multiple Orifice Shock Absorbers





Constant orifice area damping (dashpot) provides the largest shock force at the beginning of the stroke when impact velocity is highest. These shock absorbers provide high-energy absorption in a small, economical design. This type of damping is also available in adjustable shock absorbers.

The adjustable multiple orifice shock absorber is similar to the principles described earlier. The check ring replaces the check ball and the adjustment feature uses an adjustment pin instead of an adjustment ball. The damping force of the shock absorber can be changed by turning the adjustment knob. Maximum damping force is achieved by turning the adjustment knob to eight (8), while minimum damping force is achieved by turning the adjustment knob to zero (0).

Turning the adjustment knob rotates the adjustment cam within the shock absorber. The cam, in turn, moves the adjustment pin in the shock tube, closing or opening the orifice holes. By closing the orifice holes, the total orifice area of the shock absorber is reduced, thus increasing the damping force of the shock absorber. The adjustable shock absorber enables the user to change the damping force of the unit, should input conditions change, while still maintaining a conventional-type damping curve. Low velocity range (LR) series configurations are available for controlling velocities that fall below the standard adjustable range.

Adjustable Series Hydraulic Shock Absorbers
OEM Series

Adjustment Techniques

After properly sizing the shock absorber, the useable range of adjustment settings for the application can be determined:

1. Locate the intersection point of the application's impact velocity and the selected model graph line.
2. The intersection is the **maximum** adjustment setting to be used. Adjustments exceeding this maximum suggested setting could overload the shock absorber.
3. The useable adjustment setting range is from the 0 setting to the **maximum** adjustment setting as determined in step 2.

Example: OEM 1.25 x 1

1. Impact Velocity: 40 in./sec.
2. Intersection Point: Adjustment Setting 5
3. Useable Adjustment: Setting Range 0 to 5

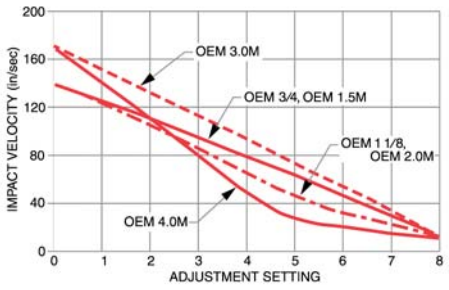
Example: (LR)OEMXT 1⅛ x 2

1. Impact Velocity: 20 in./sec.
2. Intersection Point: Adjustment Setting 3
3. Useable Adjustment: Setting Range 0 to 3

Useable Adjustment Setting Range

Position 0 provides minimum damping force.
Position 8 provides maximum damping force.

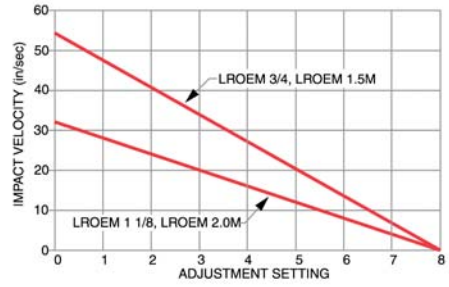
OEMXT Large



180° adjustment with setscrew locking.
OEMXT 3.0M – OEM 4.0M

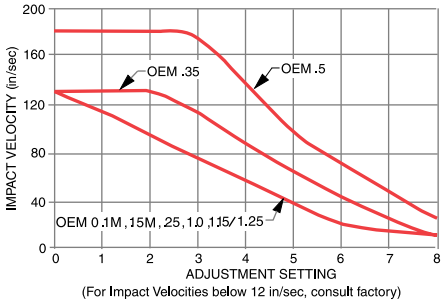
360° adjustment with setscrew locking. OEMXT 3/4 and OEMXT 1 1/8
OEMXT 1.5M and OEMXT 2.0M

(LR)OEMXT Large



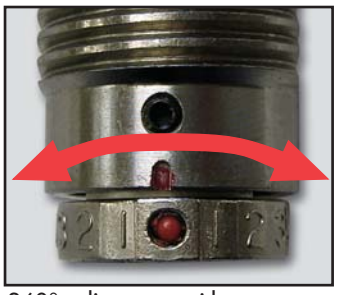
360° adjustment with setscrew locking
(LR)OEMXT 3/4 and (LR)OEMXT 1 1/8
(LR)OEMXT 1.5M and (LR)OEMXT 2.0M

Platinum OEM Small Series



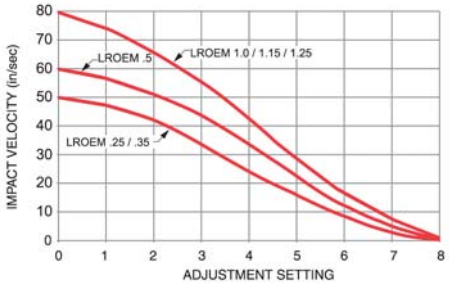
(For Impact Velocities below 12 in/sec, consult factory)

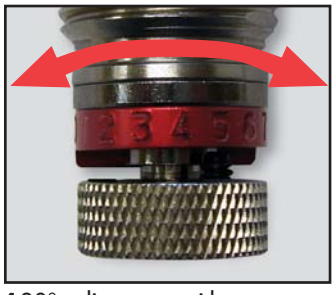
180° adjustment with setscrew locking
OEM 0.1M - OEM .5



360° adjustment with setscrew locking
OEM 1.0

Platinum (LR)OEM Small Series





180° adjustment with setscrew locking
(LR)OEM 0.15M - (LR)OEM .5

360° adjustment with setscrew locking
(LR)OEM 1.0

Ordering Information/Application Worksheet

Shock Absorbers

10 - **OEM 1.0** **B** **Application Data**

10 — Select quantity

OEM 1.0 — Select catalog number:
- OEM, HP (Adjustable)
- LROEM (Low range adjustable)
- CBOEM (Non-adjustable)
- AOEM/LRAOEM (Adjustable and low range adjustable air/oil return)
- CBAOEM (Non-adjustable air/oil return)

B — Select piston rod type:
- " " (No button)
- "B" (Button model, OEM 0.1M, .25, .35, .5 and 1.0 only)
- "CM" (Clevis Mount)
- "CMS" (Clevis Mount with Spring)

Application Data — Required for Engineered CBOEM and CBAOEM models only:
- Vertical or Horizontal motion
- Weight
- Impact velocity
- Propelling force (if any)
- Other (temperature or other environmental conditions)
- Cycles per hour

Shock Absorber Accessories

Example 1

10 Select quantity

LROEM 1 3/4-12 Lock Ring **(P/N F8E2940049)** Select catalog or part number

Example 2

5 Select quantity

UC 2940 Urethane Striker Cap **(P/N C92940079)** Select catalog or part number

Application Worksheet

FAX NO.: _____

DATE: _____

ATTN: _____

COMPANY: _____

The Enidine Application Worksheet makes shock absorber sizing and selection easier.

Fax, phone, or mail worksheet data to Enidine headquarters or your nearest Enidine subsidiary/affiliate or distributor. (See catalog back cover for Enidine locations, or visit www.enidine.com for a list of Enidine distributors.)

Upon Enidine's receipt of this worksheet, you will receive a detailed analysis of your application and product recommendations. (For custom design projects, Enidine representatives will consult with you for specification requirements.)

GENERAL INFORMATION

CONTACT: _____

DEPT/TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

TEL: _____ FAX: _____

EMAIL: _____

PRODUCTS MANUFACTURED: _____

_____

APPLICATION DESCRIPTION

_____

_____

Motion Direction (Check One):

☐ Horizontal ☐ Vertical ☐ Up ☐ Down ☐ Incline Angle _____ Height _____

☐ Rotary Horizontal ☐ Rotary Vertical ☐ Up ☐ Down

Weight (Min./Max.): _____ (lbs.)(Kg)

Cycle Rate _____ (cycles/hour)

Additional Propelling Force (If Known) _____ (lbs.)(N)

☐ Air Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar) Rod Dia.____(in.)(mm)

☐ Hydraulic Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar)
Rod Dia.____ (in.)(mm)

☐ Motor _____ (hp)(kW) Torque _____(in-lbs.)(Nm)

Ambient Temp. _____ °F (°C)

Environmental Considerations: _____

_____

SHOCK ABSORBER APPLICATION

(All Data Taken at Shock Absorber)

Number of Shock Absorbers to Stop Load

Impact Velocity (min./max.) _____ (in./sec.)(m/sec.)

Shock Absorber Stroke Requirements: _____(in.)(mm)

G Load Requirements _____(G)(m/sec^2)

RATE CONTROL APPLICATION

(All Data Taken at Rate Control)

Number of Rate Controls to Control the Load _____

Control Direction: ☐ Tension (T) ☐ Compression (C)

Required Stroke: _____(in.)(mm) Est. Stroke Time _____(sec.)

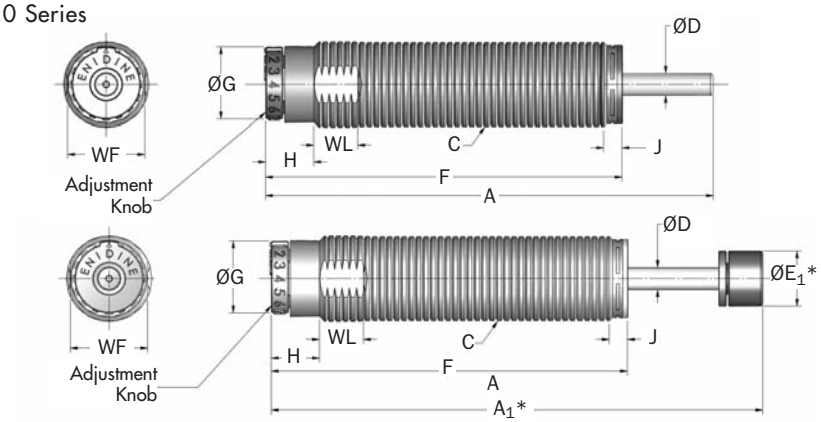
Estimated Velocity at the Rate Control _____(in./sec.)(m/sec)

Adjustable Series Hydraulic Shock Absorbers
OEM Small Bore Series

OEM 0.1M → (LR)OEM 1.0 Series

Technical Data

Standard



*Note: A_1 and E_1 apply to button models.

Catalog No./Model	(S) Stroke in. (mm)	Optimal Velocity Range in./sec. (m/s)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Reaction Force lbs. (N)	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs. (N)	Model Weight (mass) oz (g)
						Extended lbs. (N)	Compressed lbs. (N)		
OEM .1M (B)	0.28 (7,0)	12-130 (0,3-3,30)	50 (6,0)	110,000 (12 400)	275 (1 220)	0.5 (2,2)	1.0 (4,5)	80 (350)	1 (28)
OEM .15M (B)	0.38 (10,0)	12-130 (0,3-3,30)	50 (6,0)	168,000 (19 000)	200 (890)	0.8 (3,5)	1.7 (7,5)	80 (350)	2 (56)
OEM .25 (B)	0.38	12-130	50	178,000	200	0.8	1.7	80	2
OEM .25M (B)	(10,0)	(0,3-3,30)	(6,0)	(20 000)	(890)	(3,5)	(7,5)	(350)	(56)
LROEM .25 (B)	0.38	3-50	50	178,000	200	0.8	1.7	100	2
LROEM .25M (B)	(10,0)	(0,08-1,30)	(6,0)	(20 000)	(890)	(3,5)	(7,5)	(440)	(56)
OEM .35 (B)	0.50	12-130	150	300,000	450	1.0	2.2	120	3
OEM .35M (B)	(12,7)	(0,3-3,30)	(17,0)	(34 000)	(2 000)	(4,5)	(9,8)	(530)	(85)
LROEM .35 (B)	0.50	3-50	150	300,000	450	1.0	2.2	200	3
LROEM .35M (B)	(12,7)	(0,08-1,30)	(17,0)	(34 000)	(2 000)	(4,5)	(9,8)	(890)	(85)
OEM .5 (B)	0.50	12-180	250	284,000	775	1.3	2.8	150	5
OEM .5M (B)	(12,0)	(0,3-4,50)	(28,0)	(32 000)	(3 500)	(5,8)	(12,4)	(670)	(141)
LROEM .5 (B)	0.50	3-50	250	284,000	775	2.0	3.8	250	5
LROEM .5M (B)	(12,0)	(0,08-1,30)	(28,0)	(32 000)	(3 500)	(8,9)	(17,0)	(1 120)	(141)
OEM 1.0 (B)	1.00	12-130	650	622,000	1,000	3.0	6.0	300	10
OEM 1.0M (B)	(25,0)	(0,3-3,30)	(74,0)	(70 000)	(4 400)	(13,0)	(26,0)	(1 330)	(285)
OEM 1.0MF (B)	(25,0)	(0,3-3,30)	(74,0)	(70 000)	(4 400)	(13,0)	(26,0)	(1 330)	(285)
LROEM 1.0 (B)	1.00	3-50	650	622,000	1,000	3.0	6.0	450	10
LROEM 1.0M (B)	(25,0)	(0,08-1,30)	(74,0)	(70 000)	(4 400)	(13,0)	(27,0)	(2 016)	(285)
LROEM 1.0MF (B)	(25,0)	(0,08-1,30)	(74,0)	(70 000)	(4 400)	(13,0)	(27,0)	(2 016)	(285)

Catalog No./Model	A in. (mm)	A_1 in. (mm)	C in. (mm)	D in. (mm)	E_1 in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	WF in. (mm)	WL in. (mm)
OEM 0.1M (B)	2.25 (57,0)	2.63 (67,0)	M10 x 1,0	.12 (3,0)	0.34 (8,6)	1.95 (49,4)	.34 (8,6)	.40 (10,2)	– –	– –	– –
OEM .15M (B)	3.22 (81,8)	3.61 (91,7)	M12 x 1,0	.13 (3,3)	0.34 (8,6)	2.81 (71,4)	.43 (10,9)	.56 (14,2)	– –	.43 (11,0)	.38 (9,7)
(LR)OEM .25 (B)	3.22	3.59	¼-20 UNF	.13	0.44	2.81)	.43	.56	–	.44	.50
(LR)OEM .25M (B)	(81,8)	(91,2)	(M14 x 1,5)	(3,3)	(11,2)	(71,4	(10,9)	(14,2)	–	(12,0)	(12,7)
(LR)OEM .35 (B)	3.96	4.36	9/16-18 UNF	.16	0.44	3.44	.44	.57	.02	.50	.50
(LR)OEM .35M (B)	(100,6)	(110,7)	(M16 x 1,5)	(4,0)	(11,2)	(87,4)	(11,2)	(14,5)	(0,5)	(14,0)	(12,7)
(LR)OEM .5 (B)	3.88	4.35	¾-16 UNF	.19	0.50	3.31	.63	.67	–	.68	.50
(LR)OEM .5M (B)	(98,6)	(110,5)	(M20 x 1,5)	(4,8)	(12,7)	(84,1)	(16,0)	(17,0)	–	(18,0)	(12,7)
(LR)OEM 1.0 (B)	5.12	5.62	1-12 UNF	.25	0.62	4.09	.87	.55	.18	.88	.50
(LR)OEM 1.0M (B)	(130,0)	(142,7)	(M27 x 3,0)	(6,4)	(15,7)	(104,0)	(22,0)	(14,0)	(4,6)	(23,0)	(12,7)
(LR)OEM 1.0MF (B)	(130,0)	(142,7)	(M25 x 1,5)	(6,4)	(15,7)	(104,0)	(22,0)	(14,0)	(4,6)	(23,0)	(12,7)

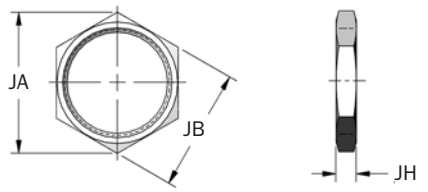
Notes: 1. All shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle. If less than 5%, a smaller model should be specified.
2. For mounting accessories, see pages 22-23.
3. (B) indicates button model of shock absorber. Buttons cannot be added to non-button models or removed from button models OEM .1M to OEM 1.0M.

Adjustable Series Hydraulic Shock Absorbers
OEM Small Bore Series

OEM 0.1M → (LR)OEM 1.0 Series

Accessories

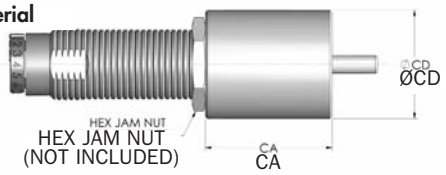
Jam Nut (JN)



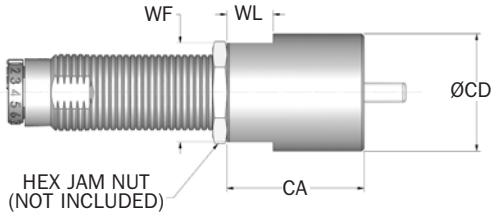
Catalog No./ Model	Part Number	Model (Ref)	JA in. (mm)	JB in. (mm)	JH in. (mm)	Weight (mass) oz. (g)
JN M10 x 1	J24421035	OEM 0.1M (B)	0.59 (15,0)	0.51 (13,0)	.13 (3,2)	0.1 (2)
JN M12 x 1	J25588035	OEM .15M (B)	0.68 (17,0)	0.59 (15,0)	.16 (4,0)	0.1 (2)
JN 1/2 - 20	J13935034	(LR)OEM .25 (B)	0.72	0.63	.12	0.1
JN M14 x 1,5	J23935035	(LR)OEM .25M (B)	(19,7)	(17,0)	(4,0)	(3)
JN 9/16 - 18	J14950034	(LR)OEM .35 (B)	1.01	0.88	.31	0.6
JN M16 x 1,5	J230844167	(LR)OEM .35M (B)	(20,0)	(19,0)	(6,0)	(5)
JN 3/4 - 16	J12646034	(LR)OEM .5 (B)	1.08	0.94	.18	0.3
JN M20 x 1,5	J22646035	(LR)OEM .5M (B)	(27,7)	(24,0)	(4,6)	(9)
JN 1-12	J11976034	(LR)OEM 1.0 (B)	1.30	1.13	.18	0.5
JN M27 x 3	J22587035	(LR)OEM 1.0M (B)	(37,0)	(32,0)	(4,6)	(15)
JN M25 x 1,5	J23004035	(LR)OEM 1.0MF (B)	(37,0)	(32,0)	(4,6)	(15)

Stop Collar (SC)

Imperial



Metric

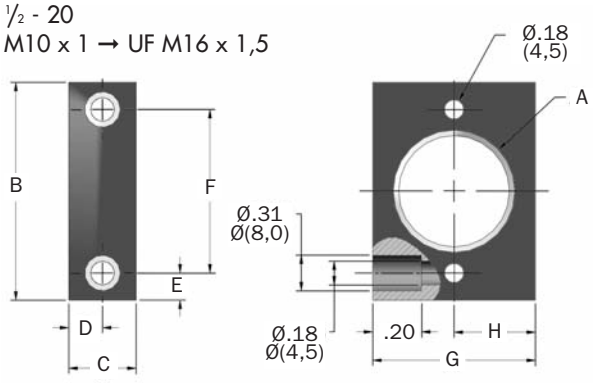


Catalog No./Model	Part Number	Model (Ref)	CA in. (mm)	CD in. (mm)	WF in. (mm)	WL in. (mm)	Weight (mass) oz. (g)
ΔSC M10 x 1	M98921058 M98921171	OEM 0.1M (B)	0.75 (19,0)	0.63 (14,3)	–	–	0.5 (11)
ΔSC M12 x 1	M95588058 M930289171	OEM 0.15M (B)	0.75 (19,0)	0.63 (16,0)	–	–	0.5 (14)
ΔSC 1/2 - 20	M93935057	(LR)OEM .25 (B)	1.00	0.75	–	–	1.0
ΔSC M14 x 1,5	M930281171		(25,4)	(19,0)	(19,0)	(12,0)	(38)
ΔSC 9/16 - 18	M94950199	(LR)OEM .35 (B)	1.00	0.69	–	–	1.0
ΔSC M16 x 1,5	M99018199		(25,4)	(19,0)			(18)
ΔSC 3/4 - 16	M92646057	(LR)OEM .5 (B)	1.50	1.00	–	–	2.0
ΔSC M20 x 1,5	M930282171		(38,0)	(25,4)	(22,0)	(12,0)	(63)
ΔSC 1-12 x 1	M92587057	(LR)OEM 1.0 (B)	1.75	1.50	–	–	8.0
ΔSC M27 x 3	M930283171	(LR)OEM 1.0M (B)	(50,8)	(38,0)	(32,0)	(15,0)	(215)
ΔSC M25 x 1,5	M930284171	(LR)OEM 1.0MF (B)					

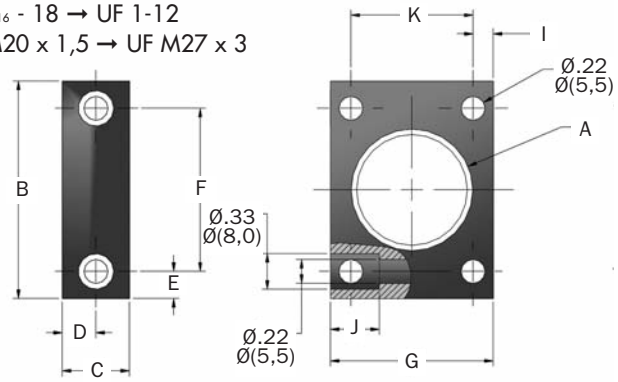
Notes: 1. *Do not use with urethane striker cap. 2. Δ= Non-standard lead time items, contact Enidine.

Universal Retaining Flange (Small Bore) (UF)

UF 1/2 - 20
UF M10 x 1 → UF M16 x 1,5



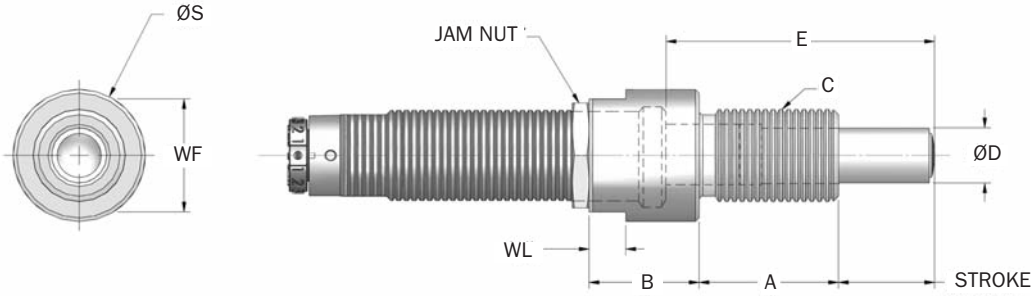
UF 9/16 - 18 → UF 1-12
UF M20 x 1,5 → UF M27 x 3



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	I in. (mm)	J in. (mm)	K in. (mm)
ΔUF M10 x 1	U16363189	OEM 0.1M(B)	M10 x 1 (M10 x 1)	1.50 (38,0)	.47 (12,0)	.24 (6,0)	.25 (6,25)	1.00 (25,5)	0.98 (25,0)	0.49 (12,5)	– –	.20 (5)	– –
ΔUF M12 x 1	U15588189	OEM .15M(B)	M12 x 1 (M12 x 1)	1.50 (38,0)	.47 (12,0)	.24 (6,0)	.25 (6,25)	1.00 (25,5)	0.98 (25,0)	0.49 (12,5)	– –	.20 (5)	– –
ΔUF 1/2 - 20	U13935095	(LR)OEM .25(B)	1/2 - 20 UNF	1.50	.56	.28	.25	1.00	1.00	0.50	–	.20	–
ΔUF M14 x 1,5	U13935143	(LR)OEM .25M	(M14 x 1,5)	(45,0)	(16,0)	(8,0)	(5,0)	(35,0)	(30,0)	(15,0)	–	(5)	–
ΔUF 9/16 - 18	U19018095	(LR)OEM .35(B)	9/16 - 18 UNF	1.81	.62	.31	.22	1.38	1.38	–	.19	.32	1.00
ΔUF M16 x 1,5	U19018143	(LR)OEM .35M	(M16 x 1,5)	(45,0)	(16,0)	(8,0)	(5,0)	(35,0)	(30,0)	(15,0)	–	–	–
ΔUF 3/4 - 16	U120275095	(LR)OEM .5(B)	3/4 - 16 UNF	2.00	.62	.31	.25	1.50	1.50	–	.19	.45	1.12
ΔUF M20x 1,5	U1202646143	(LR)OEM .5M	(M20 x 1,5)	(48,0)	(16,0)	(8,0)	(6,5)	(35,0)	(35,0)	–	(4,75)	(11,4)	(25,5)
ΔUF 1-12	U19599095	(LR)OEM 1.0(B)	1-12 UNF	2.00	.62	.31	.25	1.50	1.50	–	.19	.45	1.12
ΔUF M25 x 1,5	U12584143	(LR)OEM 1.0MF	(M25 x 5)	(48,0)	(16,0)	(8,0)	(6,5)	(35,0)	(35,0)	–	(4,75)	(11,4)	(25,5)
ΔUF M27 x 3	U12587143	(LR)OEM 1.0M	(M27 X 3)										

Δ= Non-standard lead time items, contact Enidine.

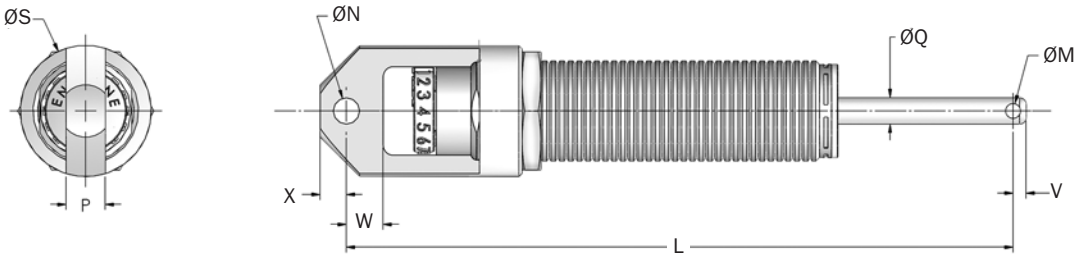
Side Load Adaptor (SLA)



Catalog No./Model	Part Number	Model (Ref)	Stroke in. (mm)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	S in. (mm)	WF in. (mm)	WL in. (mm)
SLA 10MF	SLA 33457	OEM 0.1M	.25 (6,4)	.47 (12)	.43 (11)	M10 x 1	.20 (5)	.85 (21,9)	.51 (13)	11 (11)	.28 (0,28)
SLA 12MF	SLA 33299	OEM .15M	.38 (10,0)	.71 (18)	.55 (14)	M12 x 1	.24 (6)	1.28 (32,4)	.63 (16)	13 (13)	.28 (0,28)
SLA ½ - 20 x .38	SLA 71133	(LR)OEM .25	.38	.71	.65	½ - 20 UNF	.31	1.37	.71	.63	.28
SLA 14MC	SLA 34756	(LR)OEM .25M	(10,0)	(18)	(16)	(M14 x 1,5)	(8)	(34,3)	(18)	(15)	(7,0)
SLA 9/16 - 18 x .50	SLA 71134	(LR)OEM .35	.5	.79	.63	9/16 - 18 UNF	.31	1.55	.71	.63	.28
SLA 16 MF	SLA 34757	(LR)OEM .35M	(12,7)	(20)	(16)	(M16 x 1)	(8)	(39,2)	(20)	(17)	(7,0)
SLA ¾ - 16 x .50	SLA 33847	(LR)OEM .5	.5	.94	.55	¾ - 16 UNF	.43	1.64	.98	.88	.28
SLA 20 MF	SLA 33262	(LR)OEM .5M	(12,7)	(24)	(14)	(M20 x 1,5)	(11)	(41,5)	(25)	(22)	(7,0)
SLA 1-12 x 1	SLA 33848	(LR)OEM 1.0	1.0	1.50	1.80	1-12 UNF	.59	2.88	1.42	1.25	.39
SLA 25 MF	SLA 33263	(LR)OEM 1.0MF	(25,0)	(38)	(30)	(M25 x 1,5)	(15)	(73,2)	(36)	(32)	(0,28)
SLA 27 MC	SLA 33296	(LR)OEM 1.0M	(25,0)	(38)	(30)	(M27 x 3)	(15)	(73,2)	(36)	(32)	(0,28)

Notes: 1. Maximum sideload angle is 30°. 2. Part Numbers in page color are non-standard lead time items, contact Enidine.

Clevis Mount



Catalog No./Model	(S) Stroke in. (mm)	L in. (mm)	M +.010/-.000 in. (mm)	N +.010/-.000 in. (mm)	P +.000/-.010 in. (mm)	Q in. (mm)	S in. (mm)	V in. (mm)	W in. (mm)	X in. (mm)	Weight (mass) oz. (g)
ΔOEM 1.0 CMS	1.0	6.38	.141 +.005/-.000	.251 +.005/-.000	.375 +.000/-.010	.25	1.25	.13	.35	.25	13.9
ΔOEM 1.0M CMS	25	162,1	3,58 +0,13/0	6,02 +0,13/0	9,5 0/-0,3	6,4	31,8	3,2	9,0	6,4	394

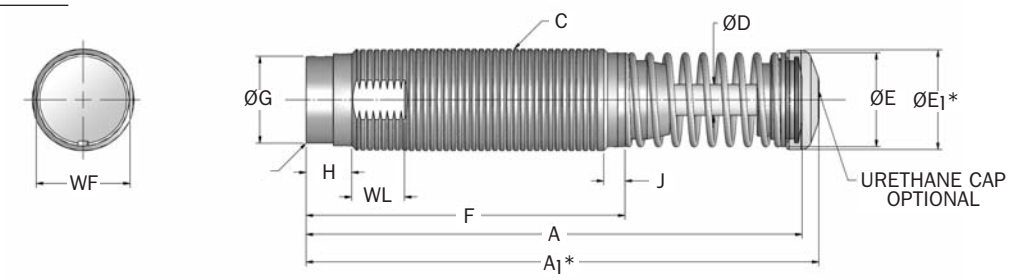
Notes: 1. Maximum sideload angle is 30°. 2. Δ= Non-standard lead time items, contact Enidine.

Adjustable Series Hydraulic Shock Absorbers
OEM Small Bore Series

OEM 1.15 → (LR)OEM 1.25 Series

Technical Data

Standard



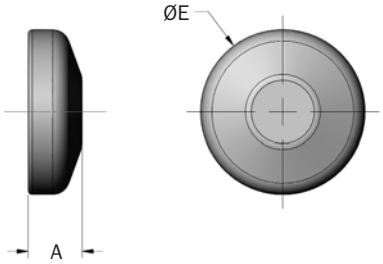
*Note: A_1 and E_1 apply to urethane striker cap accessory.

Catalog No./Model	(S) Stroke in. (mm)	Optimal Velocity Range in./sec. (m/s)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Reaction Force lbs. (N)	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs. (N)	Weight (mass) oz (g)
						Extended lbs. (N)	Compressed lbs. (N)		
ΔOEM 1.15 x 1	1.00	12-130	1,700	670,000	2,500	12.5	20.0	500	17
ΔOEM 1.15M x 1	(25,0)	(0,3-3,30)	(195,0)	(75 700)	(11 120)	(56,0)	(89,0)	(2 220)	(482)
ΔLROEM 1.15 x 1	1.00	3-80	1,700	670,000	2,500	12.5	20.0	750	17
ΔLROEM 1.15M x 1	(25,0)	(0,08-2,0)	(195,0)	(75 700)	(11 120)	(56,0)	(89,0)	(3 335)	(482)
ΔOEM 1.15 x 2	2.00	12-130	3,400	875,000	2,500	7.0	20.0	500	25
ΔOEM 1.15M x 2	(50,0)	(0,3-3,30)	(385,0)	(98 962)	(11 120)	(31,0)	(89,0)	(2 220)	(708)
ΔLROEM 1.15 x 2	2.00	3-80	3,400	875,000	2,500	7.0	20.0	750	25
ΔLROEM 1.15M x 2	(50,0)	(0,8-2,0)	(385,0)	(98 962)	(11 120)	(31,0)	(89,0)	(3 335)	(708)
ΔOEM 1.25 x 1	1.00	12-130	1,700	808,000	2,500	12.5	20.0	500	20
ΔOEM 1.25M x 1	(25,0)	(0,3-3,30)	(195,0)	(91 000)	(11 120)	(56,0)	(89,0)	(2 220)	(567)
ΔLROEM 1.25 x 1	1.00	3-80	1,700	808,000	2,500	12.5	20.0	750	20
ΔLROEM 1.25M x 1	(25,0)	(0,8-2,0)	(195,0)	(91 000)	(11 120)	(56,0)	(89,0)	(3 335)	(567)
ΔOEM 1.25 x 2	2.00	12-130	3,400	986,000	2,500	7.0	20.0	500	26
ΔOEM 1.25M x 2	(50,0)	(0,3-3,30)	(385,0)	(111 400)	(11 120)	(31,0)	(89,0)	(2 220)	(737)
ΔLROEM 1.25 x 2	2.00	3-80	3,400	986,000	2,500	7.0	20.0	750	26
ΔLROEM 1.25M x 2	(50,0)	(0,8-2,0)	(385,0)	(111 400)	(11 120)	(31,0)	(89,0)	(3 335)	(737)

Catalog No./Model	A in. (mm)	A_1 in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	E_1 in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	WF in. (mm)	WL in. (mm)
Δ(LR)OEM 1.15 x 1	5.92	6.12	1 ¼ - 12 UNF	.38	1.13	1.20	3.81	1.10	.55	.21	1.12	.63
Δ(LR)OEM 1.15M x 1	(150,0)	(155,5)	(M33 x 1,5)	(9,5)	(29,0)	(30,5)	(97,0)	(28,0)	(14,0)	(5,3)	(30,0)	(16,0)
Δ(LR)OEM 1.15 x 2	8.54	8.74	1 ¼ - 12 UNF	.38	1.13	1.20	5.43	1.10	.55	.21	1.12	.63
Δ(LR)OEM 1.15M x 2	(217,0)	(222,0)	(M33 x 1,5)	(9,5)	(29,0)	(30,5)	(138,0)	(28,0)	(14,0)	(5,3)	(30,0)	(16,0)
Δ(LR)OEM 1.25 x 1	5.92	6.12	1 ⅜ - 12 UNF	.38	1.13	1.20	3.81	1.10	.55	.21	1.25	.63
Δ(LR)OEM 1.25M x 1	(150,0)	(155,5)	(M36 x 1,5)	(9,5)	(29,0)	(30,5)	(97,0)	(28,0)	(14,0)	(5,3)	(33,0)	(16,0)
Δ(LR)OEM 1.25 x 2	8.54	8.74	1 ⅜ - 12 UNF	.38	1.13	1.20	5.43	1.10	.55	.21	1.25	.63
Δ(LR)OEM 1.25M x 2	(217,0)	(222,0)	(M36 x 1,5)	(9,5)	(29,0)	(30,5)	(138,0)	(28,0)	(14,0)	(5,3)	(33,0)	(16,0)

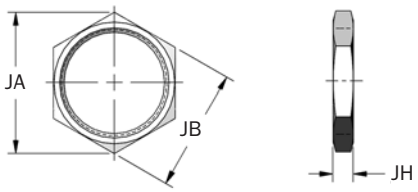
Notes: 1. All shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle. If less than 5%, a smaller model should be specified.
2. For mounting accessories, see pages 25-26.
3. Urethane striker caps are available as accessories for models OEM 1.15M x 1 to OEM 1.25M x 2.
4. Δ= Non-standard lead time items, contact Enidine.

Urethane Striker Cap (USC)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	E in. (mm)	Weight (mass) oz. (g)
UC 8609	C98609079	(LR)OEM 1.15/1.25	.39 (10,0)	1.20 (30,5)	0.2 (6)

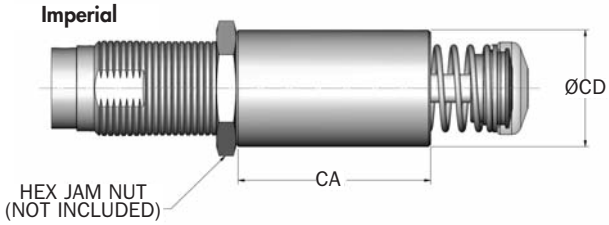
Jam Nut (JN)



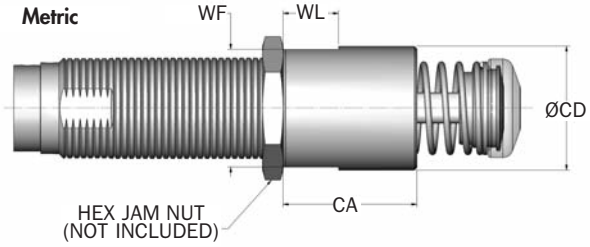
Catalog No./ Model	Part Number	Model (Ref)	JA in. (mm)	JB in. (mm)	JH in. (mm)	Weight (mass) oz. (g)
JN 1 ¼ - 12	J18609034	OEM 1.15	1.73	1.50	.25	0.9
JN M33 x 1,5	J28609035	(LR)OEM 1.15M	(47,3)	(41,0)	(6,4)	(27)
JN 1 ⅜ - 12	J13164034	OEM 1.25	1.88	1.63	.25	0.9
JN M36 x 1,5	J23164035	(LR)OEM 1.25M	(47,3)	(41,0)	(6,4)	(27)

Stop Collar (SC)

Imperial



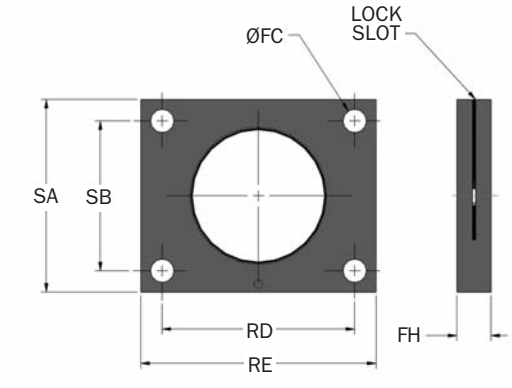
Metric



Catalog No./ Model	Part Number	Model (Ref)	CA in. (mm)	CD in. (mm)	WF in. (mm)	WL in. (mm)	Weight (mass) oz. (g)
ΔSC 1 ¼ - 12	M921049057	OEM 1.15	2.50	1.50	–	–	7.0
ΔSC M33 x 1.5	M921049171	OEM 1.15M	(44,5)	(38,1)	–	–	(215)
ΔSC 1 ⅜ - 12	M921293057	OEM 1.25	2.50	1.69	–	–	7.0
ΔSC M36 x 1,5	M930285171	OEM 1.25M	(63,5)	(43,0)	–	–	(210)
ΔSC 1-12HP x 1.56	M95568181	HP 110	2.00	1.50	–	–	–
ΔSC M25 x 2 x 1,56	M930288171	HP 110 MC	(50,8)	(38,0)	(32,0)	(15,0)	8.0
ΔSC M25 x 1,5 x 1,56	M931291171	HP 110 MF	(50,8)	(38,0)	(32,0)	(15,0)	(215)

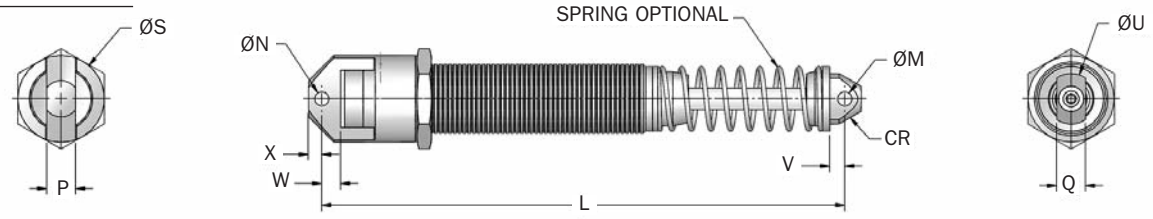
Notes: 1. *Do not use with urethane striker cap. 2. Δ= Non-standard lead time items, contact Enidine.

Rectangular Flange (RF)



Catalog No./ Model	Part Number	Model (Ref)	FC in. (mm)	FH in. (mm)	RD in. (mm)	RE in. (mm)	SA in. (mm)	SB in. (mm)	Bolt Size in. (mm)	Wt. (mass) oz. (g)
RF 1 ¼ - 12	N121049129	(LR)OEM 1.15	.22	.38	1.63	2.00	1.75	1.13	#10	1.0
RF M33 x 1,5	N121049141	(LR)OEM 1.15M	(5,5)	(9,5)	(41,3)	(50,8)	(44,5)	(28,6)	(M5)	(30)
RF 1 ⅜ - 12	N121293129	(LR)OEM 1.25	.22	.38	1.63	2.00	1.75	1.13	#10	1.0
RF M36 x 1,5	N121293129	(LR)OEM 1.25M	(5,5)	(9,5)	(41,3)	(58,8)	(44,5)	(28,6)	(M5)	(30)

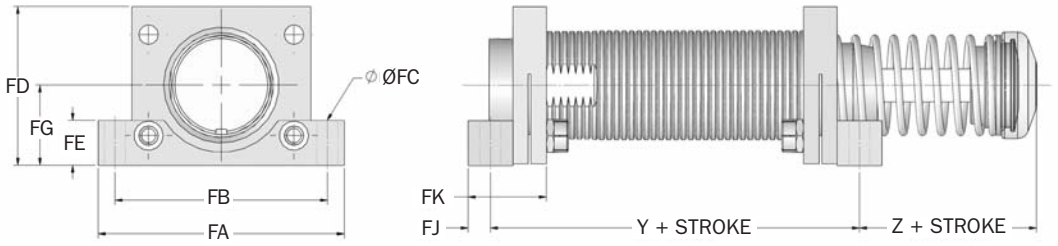
Clevis Mount



Catalog No./Model	(S) Stroke in. (mm)	L in. (mm)	M in. (mm)	N in. (mm)	P in. (mm)	Q in. (mm)	S in. (mm)	T in. (mm)	V in. (mm)	W in. (mm)	X in. (mm)	CR in. (mm)	Weight (mass) oz. (g)
Δ(LR)OEM 1.15 x 1 CM(S)	1.0 (25)	6.44 (163,6)	.251 +.005/-.000 (6,02) (+0,13/0)	.251 +.005/-.000 (6,02) (+0,13/0)	.500 +.000/-.010 (12,7) (0/-0,3)	.500 +.000/-.010 (12,7) (0/-0,3)	1.50 (38,1)	.88 (22,3)	.23 (6,0)	.33 (8,3)	.23 (5,9)	.44 (10,0)	1.6 (725)
Δ(LR)OEM 1.15 x 2 CM(S)	2.0 (50)	9.07 (230,4)	.251 +.005/-.000 (6,02) (+0,13/0)	.251 +.005/-.000 (6,02) (+0,13/0)	.500 +.000/-.010 (12,7) (0/-0,3	.500 +.000/-.010 (12,7) (0/-0,3)	1.50 (38,1)	.88 (22,3)	.23 (6,0)	.33 (8,3)	.23 (5,9)	.44 (10,0)	1.6 (861)
Δ(LR)OEM 1.25 x 1 CM(S)	1.0 +.005/-.000 (25)	6.44 +.005/-.000 (163,6)	.251 +.000/-.010 (6,02) (+0,13/0)	.251 +.000/-.010 (6,02) (+0,13/0)	.500 (12,7) (0/-0,3)	.500 (12,7) (0/-0,3)	1.50 (38,1)	.88 (22,3)	.23 (6,0)	.33 (8,3)	.23 (5,9)	.44 (10,0)	1.6 (725)
Δ(LR)OEM 1.25 x 2 CM(S)	2.0 (50)	9.07 (230,4)	.251 +0,13/0 (6,02) (+0,13/0)	.251 +0,13/0 (6,02) (+0,13/0)	.500 0/-0,3 (12,7) (0/-0,3)	.500 0/-0,3 (12,7) (0/-0,3)	1.50 (38,1)	.88 (22,3)	.23 (6,0)	.33 (8,3)	.23 (5,9)	.44 (10,0)	1.9 (861)

Notes: 1. "S" designates model is supplied with spring. 2. Δ= Non-standard lead time items, contact Enidine.

Flange Foot Mount

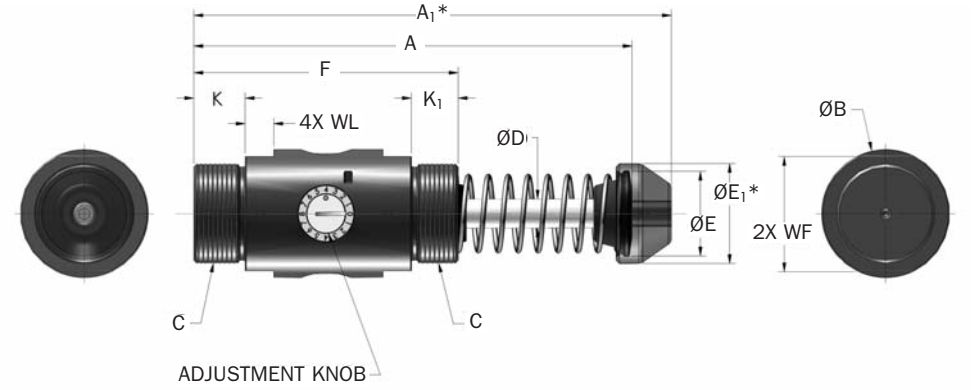


Catalog No/. Model	Part Number	Model (Ref)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	FK in. (mm)	Size in. (mm)	Bolt Weight lbs. (kg)
FM 1 ¼ - 12	2F21049305	(LR)OEM 1.15	2.23	1.25	2.75	2.38	.23	1.75	0.50	0.90	0.25	0.88	#10	4.0 oz.
FM 1 ⅜ - 12	2F21293305	(LR)OEM 1.25	2.23	1.25	2.75	2.38	.23	1.75	0.50	0.90	0.25	0.88	#10	4.0 oz.
FM M33 x 1,5	2F21049306	(LR)OEM 1.15M	(56,6)	(31,8)	(70,0)	(60,3)	(6,0)	(44,5)	(12,7)	(22,7)	(6,4)	(22,2)	(M5)	(100g)
FM M36 x 1,5	2F21293306	(LR)OEM 1.25M	(56,6)	(31,8)	(70,0)	(60,3)	(6,0)	(44,5)	(12,7)	(22,7)	(6,4)	(22,2)	(M5)	(100g)

OEMXT 3/4 & OEMXT 1.5M Series

Technical Data

Standard

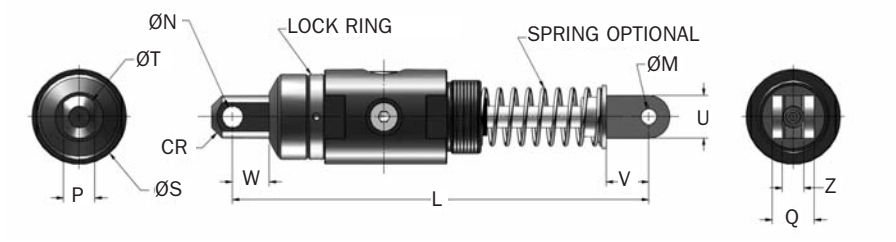


*Note: A_1 and E_1 apply to urethane striker cap accessory.

Imperial Catalog No./Model	(S) Stroke in.	Optimal Velocity Range in./sec.	(E_T) Max. in.-lbs./cycle	(E_TC) Max. in.-lbs./hour	(F_P) Max. Reaction Force lbs.	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs.	Weight lbs.
						Extended lbs.	Compressed lbs.		
OEMXT ¾ x 1	1	12-140	3,750	1,120,000	4,500	11	15	650	2.7
LROEMXT ¾ x 1	1	3-55	3,750	1,120,000	4,500	11	15	1,500	2.7
OEMXT ¾ x 2	2	12-140	7,500	1,475,000	4,500	7	15	650	3.7
LROEMXT ¾ x 2	2	3-55	7,500	1,475,000	4,500	11	18	1,500	3.7
OEMXT ¾ x 3	3	12-140	11,500	1,775,000	4,500	7	18	650	4.6
Metric Catalog No./Model	**(S) Stroke mm**	**Optimal Velocity Range mm/sec.**	**(E_T) Max. Nm/cycle**	**(E_TC) Max. Nm/hour**	**(F_P) Max. Reaction Force N**	**Nominal Coil Spring Force**		**(F_D) Max. Propelling Force N**	**Mass Kg**
						Extended N	**Compressed N**		
OEMXT 1.5M x 1	25,0	0,3-3,5	425	126 000	20 000	48	68	2 890	1,2
LROEMXT 1.5M x 1	25,0	0,08-1,3	425	126 000	20 000	48	68	6 660	1,2
OEMXT 1.5M x 2	50,0	0,3-3,5	850	167 000	20 000	29	68	2 890	1,7
LROEMXT 1.5M x 2	50,0	0,08-1,3	850	167 000	20 000	48	85	6 660	1,7
OEMXT 1.5M x 3	75,0	0,3-3,5	1 300	201 000	20 000	29	85	2 890	2,1

Imperial Catalog No./Model	C in.	A in.	A_1 in.	B in.	D in.	E in.	E_1 in.	F in.	K in.	K_1 in.	WF in.	WL in.
(LR)OEMXT ¾ x 1	1 ¾ - 12 UN	5.68	6.38	2.25	0.50	1.50	1.75	3.63	0.91	0.82	1.59	0.75
(LR)OEMXT ¾ x 2	1 ¾ - 12 UN	7.68	8.38	2.25	0.50	1.50	1.75	4.63	0.91	0.82	1.59	0.75
(LR)OEMXT ¾ x 3	1 ¾ - 12 UN	7.68	8.38	2.25	0.50	1.50	1.75	4.63	0.91	0.82	1.59	0.75
Metric Catalog No./Model	**C mm**	**A mm**	**A_1 mm**	**B mm**	**D mm**	**E mm**	**E_1 mm**	**F mm**	**K mm**	**K_1 mm**	**WF mm**	**WL mm**
(LR)OEMXT 1.5M x 1	M42 x 1.5	144	162	58	13	38	44	92	32	32	40,5	19
(LR)OEMXT 1.5M x 2	M42 x 1.5	195	213	58	13	38	44	118	45	45	40,5	19
(LR)OEMXT 1.5M x 3	M42 x 1.5	246	264	58	13	38	44	143	57	57	40,5	19

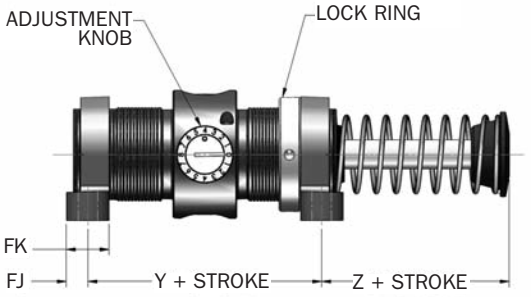
Clevis Mount

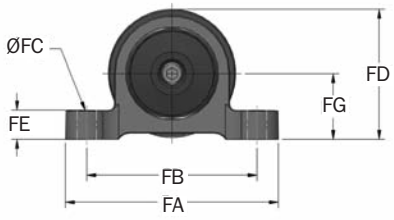


Catalog No./Model	(S) Stroke in. (mm)	L in. (mm)	M in. (mm)	N in. (mm)	P in (mm)	Q in. (mm)	S in. (mm)	T in. (mm)	U in. (mm)	V in. (mm)	W in. (mm)	Z in. (mm)	CR in. (mm)	Weight (mass) lbs. (Kg)
Δ(LR)OEMXT ¾ x 1 CM(S)	1.0	7.84 +.010/-.000	.376 +.010/-.000	.501 +.000/-.010	.750	1.00	2.00	1.00	1.00	1.01	.87 +.020/-.000	.505	.56	3.5
Δ(LR)OEMXT 1.5M x 1 CM(S)	(25)	(199,0)	(9,60) (+0,25/0)	(12,70) (+0,25/0)	(19,0) (0/-0,3)	(25,4)	(51,0)	(25,4)	(25,0)	(26,0)	(22,0)	(12,9) (+0,5/-0)	(14,3)	(1,59)
Δ(LR)OEMXT ¾ x 2 CM(S)	2.0	9.84	.376 +.010/-.000	.501 +.010/-.000	.750 +.000/-.010	1.00	2.00	1.00	1.00	1.01	.87	.505 +.020/-.000	.56	3.8
Δ(LR)OEMXT 1.5M x 2 CM(S)	(50)	(250,0)	(9,60) (+0,25/0)	(12,70) (+0,25/0)	(19,0) (0/-0,3)	(25,4)	(51,0)	(25,4)	(25,0)	(26,0)	(22,0)	(12,9) (+0,5/-0)	(14,3)	(1,7)
ΔOEMXT ¾ x 3 CM(S)	3.0	11.84	.376 +.010/-.000	.501 +.010/-.000	.750 +.000/-.010	1.00	2.00	1.00	1.00	1.01	.87	.505 +.020/-.000	.56	4.3
ΔOEMXT 1.5M x 3 CM(S)	(75)	(300,0)	(9,60) (+0,25/0)	(12,70) (+0,25/0)	(19,0) (0/-0,3)	(25,4)	(51,0)	(25,4)	(25,0)	(26,0)	(22,0)	(12,9) (+0,5/-0)	(14,3)	(1,95)

Notes: 1. "S" designates model is supplied with spring. 2. Δ = Non-standard lead time items, contact Enidine.

Flange Foot Mount



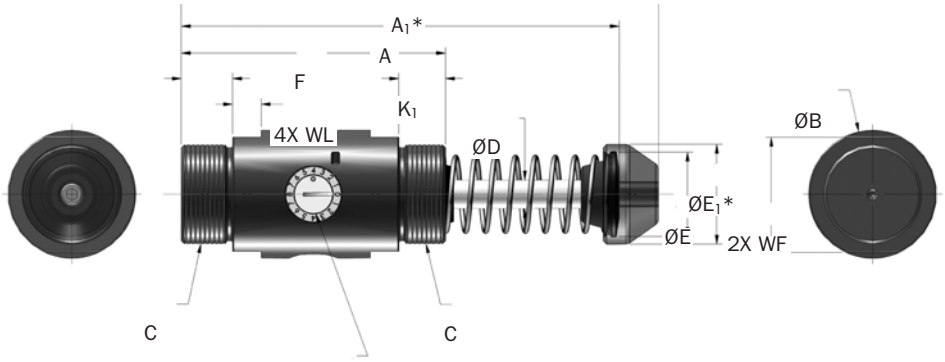


Catalog No./ Model	Part Number	Model (Ref)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	FK in. (mm)	Bolt Size in. (mm)	Weight (mass) lbs. (Kg)
FM 1 ¾-12	2FE2940	(LR)OEM ¾	2.38	1.06	3.75	3.00	.34	2.16	0.50	1.16	0.38	0.75	5/16	12.0 oz.
FM M42 x 1.5	2F2940	(LR)OEM 1.5M	(60,5)	(26,9)	(95,3)	(76,2)	(8,6)	(55,0)	(12,7)	(29,5)	(9,7)	(19,1)	(M8)	(370)g

OEMXT 1-⅛ & OEMXT 2.0M Series

Technical Data

Standard



ADJUSTMENT KNOB

*Note: A1 and E1 apply to urethane striker cap accessory.

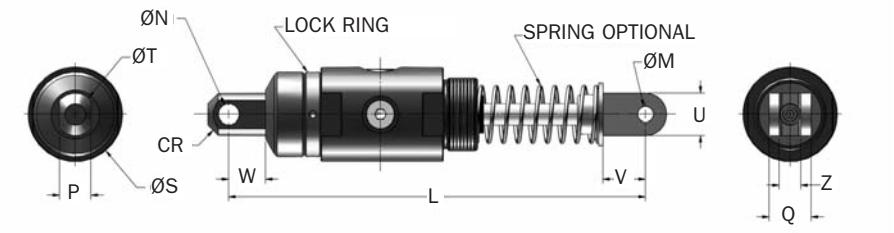
Imperial Catalog No./Model	(S) Stroke in.	Optimal Velocity Range in./sec.	(E_T) Max. in.-lbs./cycle	(E_TC) Max. in.-lbs./hour	(F_P) Max. Reaction Force lbs.	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs.	Weight lbs.
						Extended lbs.	Compressed lbs.		
Δ(LR)OEMXT 1 ⅛ x 1	1	3-30	10,000	2,000,000	11,500	26	35	4,000	4.5
OEMXT 1 ⅛ x 2	2	12-140	20,000	2,400,000	11,500	17	35	1,500	7.9
(LR)OEMXT 1 ⅛ x 2	2	3-30	20,000	2,400,000	11,500	17	35	4,000	7.9
OEMXT 1 ⅛ x 4	4	12-140	40,000	3,200,000	11,500	16	36	1,500	10.8
OEMXT 1 ⅛ x 6	6	12-140	60,000	3,730,000	11,500	20	64	1,500	14.1
Metric Catalog No./Model	**(S) Stroke mm**	**Optimal Velocity Range mm/sec.**	**(E_T) Max. Nm/cycle**	**(E_TC) Max. Nm/hour**	**(F_P) Max. Reaction Force N**	**Nominal Coil Spring Force**		**(F_D) Max. Propelling Force N**	**Mass Kg**
						Extended N	**Compressed N**		
Δ(LR)OEMXT 2.0M x 1	25,0	0,08-1,35	1 130	226 000	51 000	115	155	17 760	2,1
OEMXT 2.0M x 2	50,0	0,3-3,5	2 260	271 000	51 000	75	155	6 660	3,6
LROEMXT 2.0M x2	50,0	0,08-1,35	2 260	271 000	51 000	75	155	17 760	3,6
OEMXT 2.0M x 4	100,0	0,3-3,5	4 520	362 000	51 000	70	160	6 660	4,9
OEMXT 2.0M x 6	150,0	0,3-3,5	6 780	421 000	51 000	90	284	6 660	6,4

Note: Δ= Non-standard lead time items, contact Enidine.

Imperial Catalog No./Model	C in.	A in.	A_1 in.	B in.	D in.	E in.	E_1 in.	F in.	K in.	K_1 in.	WF in.	WL in.
Δ(LR)OEMXT 1 ⅛ x 1	2 ½ - 12 UN	6.90	7.55	3.00	0.75	2.00	2.25	4.50	1.03	1.03	2.75	1.00
(LR)OEMXT 1 ⅛ x 2	2 ½ - 12 UN	8.90	9.55	3.00	0.75	2.00	2.25	5.50	1.03	1.03	2.75	1.00
OEMXT 1 ⅛ x 4	2 ½ -12 UN	12.90	13.59	3.00	0.75	2.00	2.25	7.50	1.03	1.03	2.75	1.00
OEMXT 1 ⅛ x 6	2 ½ -12 UN	17.97	18.62	3.00	0.75	2.38	2.38	9.50	1.03	1.03	2.75	1.00
Metric Catalog No./Model	**C mm**	**A mm**	**A_1 mm**	**B mm**	**D mm**	**E mm**	**E_1 mm**	**F mm**	**K mm**	**K_1 mm**	**WF mm**	**WL mm**
Δ(LR)OEMXT 2.0M x 1	M64 x 2.0	175	192	77	19	50	57	114	26	26	70	25
LROEMXT 2.0M x 2	M64 x 2.0	226	243	77	19	50	57	140	26	26	70	25
OEMXT 2.0M x 4	M64 x 2.0	328	345	77	19	50	57	191	26	26	70	25
OEMXT 2.0M x 6	M64 x 2.0	456	473	77	19	57	57	241	26	26	70	25

Note: Δ= Non-standard lead time items, contact Enidine.

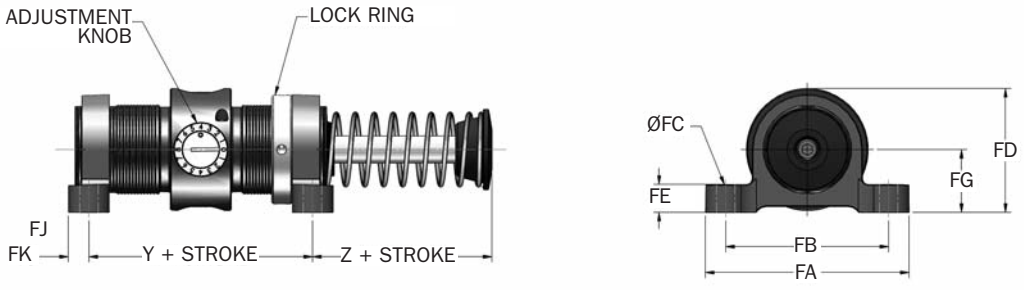
Clevis Mount



Catalog No./Model	(S) Stroke in. (mm)	L in. (mm)	M in. (mm)	N in. (mm)	P in. (mm)	Q in. (mm)	S in. (mm)	T in. (mm)	U in. (mm)	V in. (mm)	W in. (mm)	Z in. (mm)	CR in. (mm)	Weight (mass) lbs. (Kg)
Δ(LR)OEMXT 1 ⅛ x 2 CM(S)	2.0	12.06	.751 +.010/-.000	.751 +.010/-.000	1.250 +.000/-.010	.630	2.88	1.50	1.50	1.40	1.06	.630 +.020/-.000	.90	11.7
Δ(LR)OEMXT 2.0M x 2 CM (S)	(50)	(306,0)	(19,07) (+0,25/0)	(19,07) (+0,25/0)	(31,7) (0/-0,3)	(16,0)	(73,0)	(38,1)	(38,0)	(36,0)	(26,0)	(38,0) (+0,5/0,0)	(23,0)	(5,30)
ΔOEMXT 1 ⅛ x 4 CM(S)	4.0	16.06	.751 +.010/-.000	.751 +.010/-.000	1.250 +.000/-.010	.630	2.88	1.50	1.50	1.40	1.06	1.50 +.020/-.000	.90	13.4
ΔOEMXT 2.0M x 4 CM(S)	(100)	(408,0)	(19,07) (+0,25/0)	(19,07) (+0,25/0)	(31,7) (0/-0,3)	(16,0)	(73,0)	(38,0)	(38,0)	(36,0)	(26,0)	(38,0) (+0,5/0,0)	(23,0)	(6,08)
ΔOEMXT 1 ⅛ x 6 CM(S)	6.0	21.13	.751 +.010/-.000	.751 +.010/-.000	1.250 +.000/-.010	.630	2.88	1.50	1.50	1.40	1.06	1.50 +.020/-.000	.90	16.3
ΔOEMXT 2.0M x 6 CM(S)	(150)	(537,0)	(19,07) (+0,25/0)	(19,07) (+0,25/0)	(31,7) (0/-0,3)	(16,0)	(73,0)	(38,0)	(38,0)	(36,0)	(26,0)	(38,0) (+0,5/0,0)	(23,0)	(7,39)

Notes: 1. "S" designates model is supplied with spring. 2. Δ= Non-standard lead time items, contact Enidine.

Flange Foot Mount



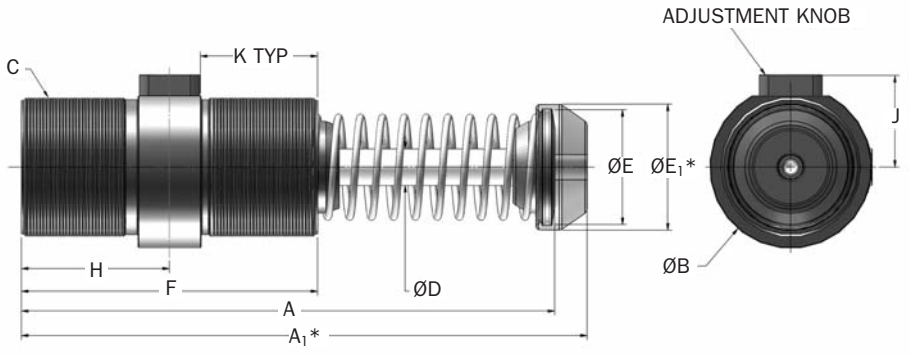
Catalog No./ Model	Part Number	Model (Ref)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	FK in. (mm)	Bolt Size in. (mm)	Weight (mass) lbs. (kg)	Notes
FM 2 ½ - 12	2FE3010	(LR)OEM 1 ⅛	3.00	1.56	5.63	4.88	.41	3.38	0.63	1.75	0.44	0.88	⅜	2.3	1
FM M64 x 2	2F3010	(LR)OEM 2.0M	(76,2)	(39,6)	(43,0)	(124,0)	(10,4)	(89,7)	(16,0)	(44,5)	(11,2)	(22,4)	M10	(1.08)	2

Notes: 1. OEM 1 ⅛ x 6 'Z' dimension is 2.69 in.
2. OEM 2.0M x 6 'Z' dimension is 68,3 mm

OEM 3.0M → OEM 4.0M Series

Technical Data

Standard



*Note: A_1 and E_1 apply to urethane striker cap accessory.

Catalog No./Model	(S) Stroke in. (mm)	Optimal Velocity Range in./sec. (mm)	(E_T) Max. in.-lbs./cycle (m/s)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Reaction Force lbs. (N)	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs. (N)	Weight (mass) lbs. (Kg)
						Extended lbs. (N)	Compressed lbs. (N)		
OEM 3.0M x 2	2.0 (50)	12-170 (0,3-4,3)	20,000 (2 300)	3,290,000 (372 000)	15,000 (67 000)	25 (110)	45 (200)	2,700 (12 000)	15.5 (7,0)
OEM 3.0M x 3.5	3.5 (90)	12-170 (0,3-4,3)	35,000 (4 000)	5,770,000 (652 000)	15,000 (67 000)	25 (110)	45 (200)	2,700 (12 000)	20.0 (9,1)
OEM 3.0M x 5	5.0 (125)	12-170 (0,3-4,3)	50,000 (5 700)	8,260,000 (933 000)	15,000 (67 000)	16 (71)	45 (200)	2,700 (12 000)	24.0 (10,9)
OEM 3.0M x 6.5	6.5 (165)	12-170 (0,3-4,3)	65,000 (7 300)	10,750,000 (1 215 000)	15,000 (67 000)	27 (120)	75 (330)	2,700 (12 000)	30.0 (13,6)
OEM 4.0M x 2	2.0 (50)	12-170 (0,3-4,3)	34,000 (3 800)	13,300,000 (1 503 000)	25,000 (111 000)	50 (225)	65 (290)	4,800 (21 000)	33.0 (15,0)
OEM 4.0M x 4	4.0 (100)	12-170 (0,3-4,3)	68,000 (7 700)	16,000,000 (1 808 000)	25,000 (111 000)	35 (155)	65 (290)	4,800 (21 000)	40.0 (18,2)
OEM 4.0M x 6	6.0 (150)	12-170 (0,3-4,3)	102,000 (11 500)	18,600,000 (2 102 000)	25,000 (111 000)	30 (135)	70 (310)	4,800 (21 000)	44.0 (20,0)
ΔOEM 4.0M x 8	8.0 (200)	12-170 (0,3-4,3)	136,000 (15 400)	21,300,000 (2 407 000)	25,000 (111 000)	40 (180)	80 (355)	4,800 (21 000)	66.0 (30,0)
ΔOEM 4.0M x 10	10.0 (250)	12-170 (0,3-4,3)	170,000 (19 200)	24,000,000 (2 712 000)	25,000 (111 000)	30 (135)	80 (355)	4,800 (21 000)	73.0 (33,0)

Note: Δ= Non-standard lead time items, contact Enidine.

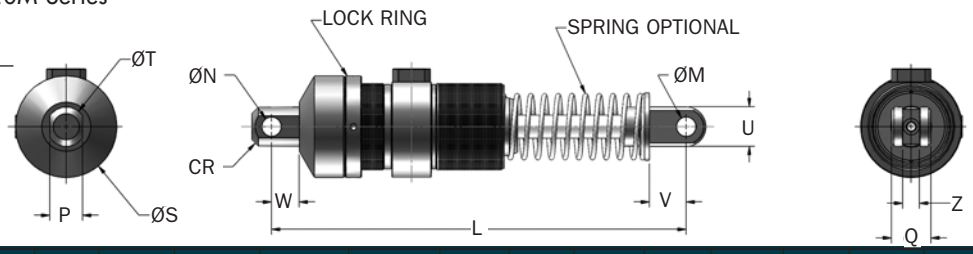
Catalog No./Model	A in. (mm)	A_1 in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	E_1 in. (mm)	F in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)
OEM 3.0M x 2	9.66 (245)	10.43 (265)	3.88 (98)	M85 x 2	0.88 (22)	2.75 (69)	3.00 (76)	5.53 (140)	2.77 (70)	2.25 (58)	2.02 (51
OEM 3.0M x 3.5	12.72 (323)	13.49 (343)	3.88 (98)	M85 x 2	0.88 (22)	2.75 (69)	3.00 (76)	7.06 (179)	3.53 (90)	2.25 (58)	2.78 (71)
OEM 3.0M x 5	15.72 (399)	16.49 (419)	3.88 (98)	M85 x 2	0.88 (22)	2.75 (69)	3.00 (76)	8.50 (217)	4.28 (109)	2.25 (58)	2.78 (71)
OEM 3.0M x 6.5	19.46 (494)	20.23 (514)	3.88 (98)	M85 x 2	0.88 (22)	3.19 (81)	3.19 (81)	10.06 (256)	5.03 (128)	2.25 (58)	2.78 (71)
OEM 4.0M x 2	12.32 (313)	13.20 (335)	5.00 (127)	M115 x 2	1.38 (35)	3.50 (88)	3.75 (95)	8.00 (203)	4.00 (102)	2.89 (74)	3.13 (80)
OEM 4.0M x 4	16.32 (414)	17.20 (436)	5.00 (127)	M115 x 2	1.38 (35)	3.50 (88)	3.75 (95)	10.00 (254)	5.00 (127)	2.89 (74)	4.13 (105)
OEM 4.0M x 6	20.32 (516)	21.20 (538)	5.00 (127)	M115 x 2	1.38 (35)	3.50 (88)	3.75 (95)	12.00 (305)	6.00 (153)	2.89 (74)	4.25 (108)
OEM 4.0M x 8	25.32 (643)	26.20 (665)	5.00 (127)	M115 x 2	1.38 (35)	3.50 (88)	3.75 (95)	14.00 (356)	7.00 (178)	2.89 (74)	4.25 (108)
OEM 4.0M x 10	29.32 (745)	30.20 (767)	5.00 (127)	M115 x 2	1.38 (35)	3.50 (88)	3.75 (95)	16.00 (406)	8.00 (203)	2.89 (74)	4.25 (108)

Notes: 1. All shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle. If less than 5%, a smaller model should be specified.
2. For mounting accessories, see pages 32.
3. Rear flange mounting of OEM 3.0M x 6.5, OEM 4.0M x 8 and OEM 4.0M x 10 models not recommended when mounting horizontally.

Adjustable Series Hydraulic Shock Absorbers
OEM Mid-Bore Series

OEM 3.0M → OEM 4.0M Series

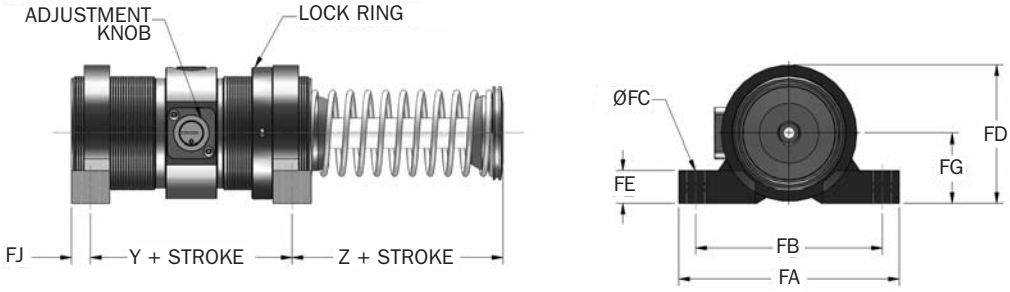
Clevis Mount



Catalog No./Model	(S) Stroke in. (mm)	L in. (mm)	M in. (mm)	N in. (mm)	P in. (mm)	Q in. (mm)	S in. (mm)	T in. (mm)	U in. (mm)	V in. (mm)	W in. (mm)	Z in. (mm)	CR in. (mm)	Weight (mass) lbs. (Kg)
ΔOEM 3.0M x 2 CM(S)	2.0	12.81	.751 +.010/-.000	.751 +.010/-.000	1.250 +.000/-.010	1.50	3.88	1.50	1.50	1.40	1.06	.630 +.020/-.000	.90	19.1
	(50)	(325,0)	(19,07) (+0,25/0)	(19,07) (+0,25/0)	(31,7) (0/-0,3)	(38,0)	(98,0)	(38,1)	(38,1)	(36,0)	(26,0)	(16,0) (+0.5/0)	(23,0)	(8,66)
ΔOEM 3.0M x 3.5 CM(S)	3.5	15.84	.751 +.010/-.000	.751 +.010/-.000	1.250 +.000/-.010	1.50	3.88	1.50	1.50	1.40	1.06	.630 +.020/-.000	.90	23.6
	(90)	(402,0)	(19,07) (+0,25/0)	(19,07 (+0,25/0)	(31,7) (0/-0,3)	(38,0)	(98,0)	(38,1)	(38,1)	(36,0)	(26,0)	(16,0) (+0.5/0)	(23,0)	(10,70)
ΔOEM 3.0M x 5 CM(S)	5.0	18.84	.751 +.010/-.000	.751 +.010/-.000	1.250 +.000/-.010	1.50	3.88	1.50	1.50	1.40	1.06	.630 +.020/-.000	.90	27.6
	(125)	(479,0)	(19,07) (+0,25/0)	(19,07 (+0,25/0)	(31,7) (0/-0,3)	(38,0)	(98,0)	(38,1)	(38,1)	(36,0)	(26,0)	(16,0) (+0.5/0)	(23,0)	(12,52)
ΔOEM 3.0M x 6.5 CM(S)	6.5	22.59	.751 +.010/-.000	.751 +.010/-.000	1.250 +.000/-.010	1.50	3.88	1.50	1.50	1.40	1.06	.630 +.020/-.000	.90	33.6
	(165)	(574,0)	(19,07) (+0,25/0)	(19,07) (+0,25/0)	(31,7) (0/-0,3)	(38,0)	(98,0)	(38,1)	(38,1)	(36,0)	(26,0)	(16,0) (+0.5/0)	(23,0)	(15,24)
ΔOEM 4.0M x 2 CM(S)	2.0	17.00	1.001 +.010/-.000	1.001 +.010/-.000	1.500 +.000/-.010	3.56	5.00	2.25	2.00	2.00	1.75	1.505 +.020/-.000	1.35	42.4
	(50)	(432,0)	(25,42) (+0,25/0)	(25,42) (+0,25/0)	(38,1) (0/-0,3)	(90,5)	(127,0)	(57,2)	(51,0)	(51,0)	(44,0)	(38,2) (+0.5/0)	(35,0)	(19,23)
ΔOEM 4.0M x 4 CM(S)	4.0	21.00	1.001 +.010/-.000	1.001 +.010/-.000	1.500 +.000/-.010	3.56	5.00	2.25	2.00	2.00	1.75	1.505 +.020/-.000	1.35	49.4
	(100)	(533,0)	(25,42) (+0,25/0)	(25,42) (+0,25/0)	(38,1) (0/-0,3)	(90,5)	(127,0)	(57,2)	(51,0)	(51,0)	(44,0)	(38,2) (+0.5/0)	(35,0)	(22,41)
ΔOEM 4.0M x 6 CM(S)	6.0	25.00	1.001 .010/-.000	1.001 +.010/-.000)	1.500 +.000/-.010	3.56	5.00	2.25	2.00	2.00	1.75	1.505 +.020/-.000	1.35	53.4
	(150)	(635,0)	(25,42) (+0,25/0)	(25,42) (+0,25/0)	(38,1) (0/-0,3)	(90,5)	(127,0)	(57,2)	(51,0)	(51,0)	(44,0)	(38,2) (+0.5/0)	(35,0)	(24,22)
ΔOEM 4.0M x 8 CM(S)	8.0	30.00	1.001 +.010/-.000	1.001 +.010/-.000	1.500 +.000/-.010	3.56	5.00	2.25	2.00	2.00	1.75	1.505 +.020/-.000	1.35	75.4
	(200)	(762,0)	(25,42) (+0,25/0)	(25,42) (+0,25/0)	(38,1) (0/-0,3)	(90,5)	(127,0)	(57,2)	(51,0)	(51,0)	(44,0)	(38,2) (+0.5/0)	(35,0)	(34,20)
ΔOEM 4.0M x 10 CM(S)	10.0	34.00	1.001 +.010/-.000	1.001 +.010/-.000	1.500 +.000/-.010	3.56	5.00	2.25	2.00	2.00	1.75	1.505 +.020/-.00	1.35	82.4
	(250)	(864,0)	(25,42) (+0,25/0)	(25,42) (+0,25/0)	(38,1) (0/-0,3)	(90,5)	(127,0)	(57,2)	(51,0)	(51,0)	(44,0)	(38,2) (+0.5/0)	(35,0)	(37,37)

Notes: 1. "S" indicates model is supplied with spring. 2. Δ = Non-standard lead time items, contact Enidine.

Flange Foot Mount

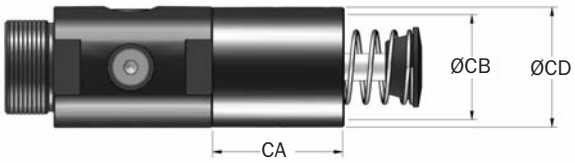


Catalog No./ Model	Part Number	Model (Ref)	J in. (mm)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	FK in. (mm)	Bolt Size in. (mm)	Weight (mass) lbs. (kg)	Notes
FM M85 x 2	2F3330	OEM 3.0M	2.25	3.19	2.32	6.50	5.50	.53	4.06	1.00	2.06	0.57	1.13	½	6.9	1
		OEM 3.0M	(58)	(81,0)	(59,0)	(165,0)	(139,7)	(13,5)	(103,0)	(25,4)	(52,3)	(14,1)	(28,7)	(M12)	(1 984)	1
FM M115 x 2	2F3720	OEM 4.0M	2.82	7.50	1.44	8.00	6.50	.65	5.88	1.50	3.13	0.63	2.50	⅝	8.6	2
		OEM 4.0M	(74)	(190,5)	(37,0)	(203,2)	(165,0)	(16,8)	(149,4)	(38,0)	(79,5)	(16,0)	(50,8)	(M16)	(3 900)	2

Notes:
1. OEM 3.0M x 6,5, Z dimension is 77,7mm.
2. OEM 4.0M x 8 and 4.0M x 10M, Z dimension is 62,0mm.
3. For rear foot mount, dimension FJ is 22,4mm.

Stop Collar (SC)

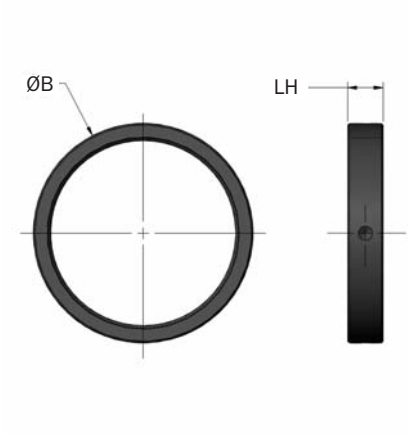
(LR)OEM ¾ → (LR)OEM 2.0M



Catalog No./Model	Part Number	Model (Ref)	CA in. (mm)	CB in. (mm)	CD in. (mm)	Weight (mass) oz. (g)
ΔSC 1 ¾ - 12 ΔSC M2 ½ - 12*	8KE2940	(LR)OEMXT ¾	1.94 (49,0)	1.94 (49,0)	2.22 (56,5)	12.0 (340)
ΔSC 2 ½ - 12 x 2 ΔSC M2 ½ - 12 x 2	8KE3010	(LR)OEMXT 1 ⅛ x 2 & 4	2.47 (63,0)	2.54 (65,0)	3.00 (76,0)	23.0 (652)
ΔSC 2 ½ - 12 x 6	8KE3012	OEMXT 1 ⅛ x 6	3.66 (93,0)	2.54 (65,0)	3.00 (76,0)	33.0 (936)
ΔSC M42 x 1.5 x 1	8K2940	(LR)OEMXT 1.5M x 1	2.44 (62,0)	1.94 (49,0)	2.22 (56,0)	14.0 (397)
ΔSC M42 x 1.5 x 2	8K2941	(LR)OEMXT 1.5M x 2	2.94 (75,0)	1.94 (49,0)	2.22 (56,0)	19.0 (539)
ΔSC M42 x 1.5 x 3	8K2942	OEMXT 1.5M x 3	3.44 (87,0)	1.94 (49,0)	2.22 (56,0)	23.0 (652)
ΔSC M64 x 2 x 2	8K3010 M93010057	(LR)OEMXT 2.0M x 2	3.50 (89,0)	2.54 (65,0)	3.00 (76,0)	33.0 (936)
ΔSC M64 x 2 x 4	8K3011 M93011057	OEMXT 2.0M x 4	4.50 (114,0)	2.54 (65,0)	3.00 (76,0)	42.0 (1191)
ΔSC M64 x 2 x 6	8K3012 M93012057	OEMXT 2.0M x 6	5.63 (143,0)	2.54 (65,0)	3.00 (76,0)	52.0 (1475)

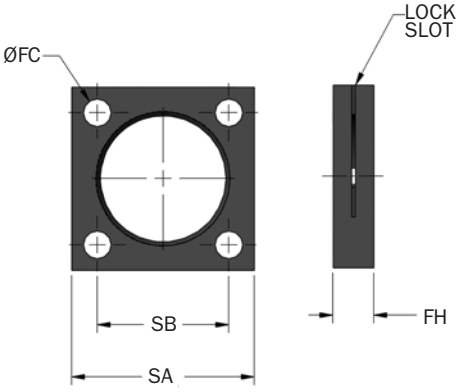
Notes: 1. * Do not use with urethane striker cap. 2. Δ = Non-standard lead time items, contact Enidine.

Lock Ring (LR)



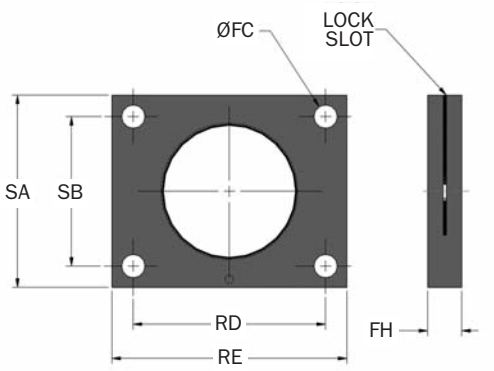
Catalog No./Model	Part Number	Model (Ref)	B in. (mm)	LH in. (mm)	Weight (mass) oz. (g)
LR 1 ¾ - 12	F8E2940049	(LR)OEMXT ¾	2.00 (50,8)	.38 (9,5)	2.0 (57)
LR 2 ½ - 12	F8E3010049	(LR)OEMXT 1 ⅛	2.88 (73,0)	.38 (9,5)	3.0 (85)
LR M42 x 1.5	F82940049	(LR)OEMXT 1.5M	2.00 (50,8)	.38 (9,6)	3.0 (85)
LR M64 x 2	F83010049	(LR)OEMXT 2.0M	2.88 (73,0)	.50 (12,7)	4.0 (114)
LR M85 x 2	F83330049	(LR)OEM 3.0M	3.88 (98,2)	.63 (16,0)	8.0 (226)
LR M115 x 2	F83720049	(LR)OEM 4.0M	5.00 (126,7)	.88 (22,4)	14.0 (397)

Square Flange (SF)



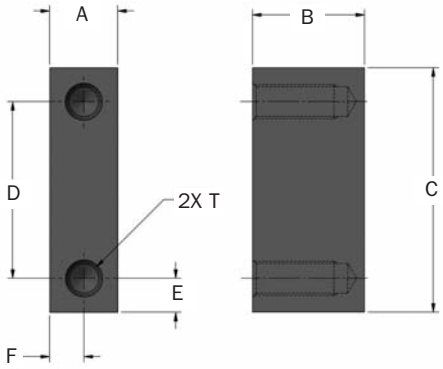
Catalog No./ Model	Part Number	Model (Ref)	FC in. (mm)	FH in. (mm)	SA in. (mm)	SB in. (mm)	Bolt Size in. (mm)	Weight (mass) oz. (g)
SF 1 ¾ - 12	M4E2940056	(LR)OEMXT ¾	.34 (8,6)	.50 (12,7)	2.25 (57,2)	1.63 (41,4)	5⁄16 (M8)	5.0 (140)
SF 2 ½ - 12	M4E3010056	(LR)OEMXT 1 ⅛	.41 (10,4)	.62 (15,7)	3.50 (90,0)	2.75 (89,0)	⅜ (M10)	20.0 (570)
SF M42 x 1.5	M42940056	(LR)OEMXT 1.5M	.34 (8,6)	.50 (12,7)	2.25 (57,2)	1.63 (41,4)	5⁄16 (M8)	5.0 (140)
SF M64 x 2	M43010056	(LR)OEMXT 2.0M	.41 (10,4)	.62 (15,7)	3.50 (90,0)	2.75 (89,0)	⅜ (M10)	20.0 (570)
SF M85 x 2	M43330056	OEM 3.0M	.53 (13,5)	.75 (19,0)	4.00 (101,6)	3.00 (76,2)	½ (M13)	24.0 (680)
SF M115 x 2	M43720056	OEM 4.0M	.65 (16,5)	1.00 (25,4)	5.50 (139,7)	4.38 (111,3)	⅝ (M16)	56.0 (1 590)

Rectangular Flange (RF)



Catalog No./ Model	Part Number	Model (Ref)	FC in. (mm)	FH in. (mm)	RD in. (mm)	RE in. (mm)	SA in. (mm)	SB in. (mm)	Bolt Size in. (mm)	Wt. (mass) oz. (g)
RF 1 3/4 -12	M5E2940053	(LR)OEMXT 3/4	.34 (8,6)	.50 (12,7)	2.38 (60,5)	3.00 (76,2)	2.25 (57,2)	1.63 (41,4)	5/16 (M8)	9.0 (260)
RF M42 x 1.5	M52940053	(LR)OEMXT 1.5M	.34 (8,6)	.50 (12,7)	2.38 (60,5)	3.00 (76,2)	2.25 (57,2)	1.63 (41,4)	5/16 (M8)	9.0 (260)
RF M85 x 2	M53330053	OEM 3.0M	.53 (13,5)	.75 (19,1)	4.00 (101,6)	5.00 (127,0)	4.00 (101,6)	3.00 (76,2)	1/2 (M13)	37.0 (1 040)

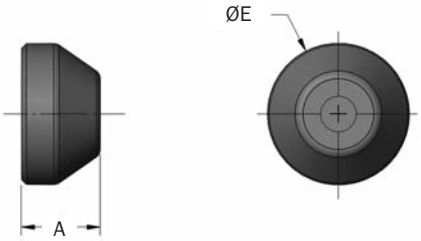
Stop Bar Kit



Kit Part Number	Model (Ref)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	T in. (mm)	Bolt Size in. (mm)	Weight (mass) oz. (g)
ΔT58706300 ΔT52940300	OEMXT 3/4	.63 (16,0)	1.03 (26,2)	2.25 (57,2)	1.63 (41,4)	.31 (7,9)	.32 (8,1)	5/16 - 24 UNF x 3/4 DEEP	5/16	6.1 (173)
ΔT58650300 ΔT53010300	OEMXT 1 1/8	.63 (12,7)	1.42 (36,1)	3.50 (88,9)	2.75 (69,9)	.38 (9,7)	.32 (8,1)	3/8 - 24 UNF x 3/4 DEEP	3/8	10.5 (298)

Notes: 1. Kit includes 2 Stop Bars, Rectangular Flange for OEM 3/4 and 1.5, Square Flange for 1 1/8 and 2.0 and Lock Ring.
2. Δ = Non-standard lead time items, contact Enidine.

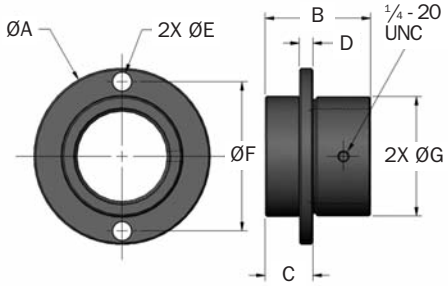
Urethane Striker Cap (UC)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	E_1 in. (mm)	Weight (mass) oz. (g)
UC 2940	C92940079	(LR)OEMXT 3/4	.97 (24,5)	1.75 (44,5)	0.5 (14)
UC 3010	C93010079	(LR)OEMXT 1 1/8	.95 (24,1)	2.25 (57,0)	0.8 (23)
UC 2940	C92940079	(LR)OEMXT 1.5M	.97 (24,5)	1.75 (44,5)	0.5 (14)
UC 3010	C93010079	(LR)OEMXT 2.0M	.95 (24,1)	2.25 (57,0)	0.8 (23)
UC 3330	C93330079	OEM 3.0M	1.22 (31,4)	3.00 (76,0)	3.0 (85)
UC 3720	C93720079	OEM 4.0M	1.47 (37,5)	3.75 (95,0)	6.0 (170)

Notes: For complete shock absorber dimension with urethane striker cap, refer to engineering data, pages 27-31.

Stop Collar With Flange (SCF)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	B in. (mm)	C ±.002 in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	Bolt Size in. (mm)	Weight (mass) oz. (g)
ΔSCF 1 3/4-12	M98640300	OEMXT 3/4	3.25 (83)	1.94 (49,3)	.88 (22,4)	.25 (6,4)	.34 (8,6)	2.75 (70)	2.20 (56)	5/16 (8)	20.5 (638)
ΔSCF 2 1/2-12	M98650300	OEMXT 1 1/8	4.25 (108)	2.47 (63)	1.00 (25,4)	.38 (9,7)	.34 (8,6)	3.50 (89)	2.95 (75)	5/16 (8)	39.8 (1 238)

Notes: 1. Locking set screw feature provided as standard. 2. Δ = Non-standard lead time items, contact Enidine.

Overview

ENIDINE non-adjustable micro-bore hydraulic shock absorbers can accommodate varying energy conditions. This family of tamperproof shock absorbers provides consistent performance, cycle after cycle. Non-adjustable models are designed to absorb maximum energy within a compact envelope size.

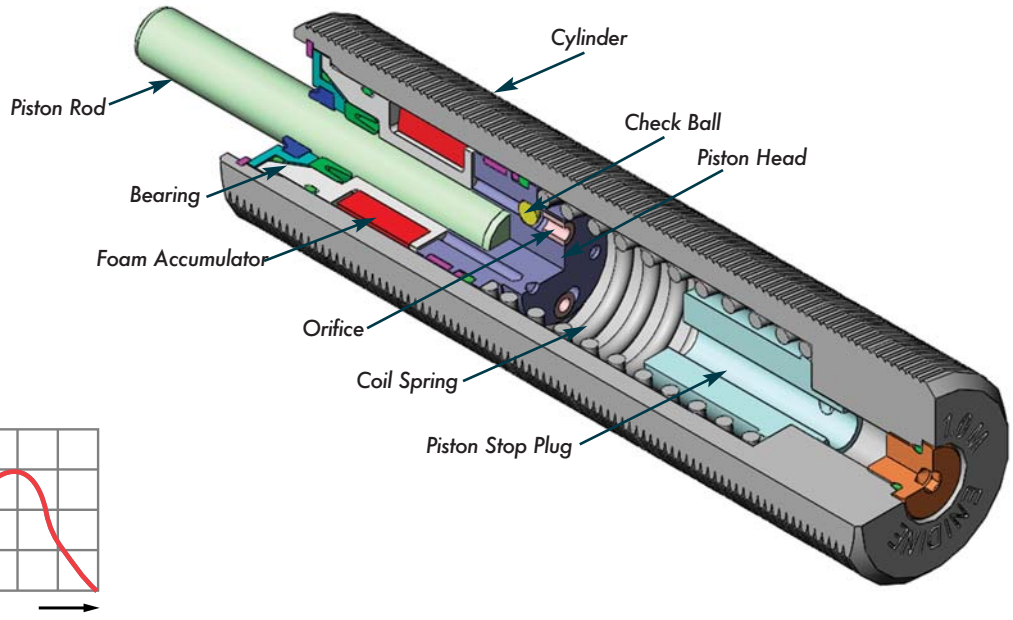
The **TK Series** is a versatile, miniature design which provides effective, reliable deceleration and vibration control for light loads. Models can accommodate a wide range of operating conditions.

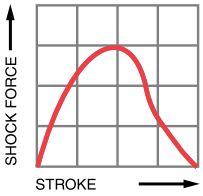
The Enidine **STH Series** offers the highest energy absorption capacity relative to its size. These custom-orificed shock absorbers are designed to meet exact application requirements. STH Series shock absorbers are available in fully threaded cylinder bodies, providing flexibility in mounting configurations.

Features and Benefits

- Extensive non-adjustable product line offers flexibility in both size and energy absorption capacity to fulfill a wide range of application requirements.
- Tamperproof design ensures repeatable performance.
- Special materials and finishes can be designed to meet specific customer requirements.
- Incorporating optional fluids and seal packages can expand the standard operating temperature range from (15°F to 180°F) to (–30°F to 210°F).
- Threaded cylinders provide mounting flexibility and increase surface area for improved heat dissipation.
- A select variety of surface finishes maintains original quality appearance and provides the longest corrosion resistance protection.
- ISO quality standards result in reliable, long-life operation.

Enidine Non-Adjustable Single-Orifice Shock Absorbers





Constant orifice area damping (dashpot) provides the largest shock force at the beginning of the stroke when impact velocity is highest. These shock absorbers provide high-energy absorption in a small, economical design.

The internal structure of a single orifice shock absorber is shown above. When a force is applied to the piston rod, the check ball is seated and the valve remains closed. Oil is forced through the orifice, creating internal pressure allowing smooth, controlled deceleration of the moving load. When the load is removed, the compressed coil spring moves to reposition the piston head, the check ball unseats, opening the valve that permits rapid return of the piston head rod to the original extended position.

The closed cellular foam accumulator is compressed by the oil during the stroke, compensating for fluid displaced by the piston rod during compression. Without the fluid displacement volume provided by the foam accumulator, the closed system would be hydraulically locked.

Single-orifice shock absorbers provide constant orifice area (dashpot) damping.

Ordering Information/Application Worksheet

Shock Absorbers

Example 1: Standard Products

10 TK 10 IF -2 B

- 10 — Select quantity
- TK 10 — Select catalog number
- IF — Select thread designation from engineering data chart (If applicable)
- -2 — Select damping constant from appropriate sizing graph
- B — Select piston rod type
  - "–" (without button)
  - "B" (with button)
  - "CM" (Clevis mount)

Example 2: Custom Orifice Products*

10 TK 21 APPLICATION DATA

- 10 — Select quantity
- TK 21 — Select catalog number
- APPLICATION DATA — Specify:
  - Vertical, rotary or horizontal motion
  - Weight
  - Impact velocity
  - Propelling force (if any)
  - Other (temperature or other environmental conditions)
  - Cycles per hour

*Enidine will specify individual part number for each application.

Accessories

Example 1

10 UF 3/4-16 (P/N U120275095)

- 10 — Select quantity
- UF 3/4-16 (P/N U120275095) — Universal Mounting Flange; Select catalog/part number

Example 2

5 UC 8609 (P/N C98609079)

- 5 — Select quantity
- UC 8609 (P/N C98609079) — Urethane Striker Cap; Select catalog/part number

Application Worksheet

FAX NO.:

DATE: _____

ATTN: _____

COMPANY: _____

The Enidine Application Worksheet makes shock absorber sizing and selection easier.

Fax, phone, or mail worksheet data to Enidine headquarters or your nearest Enidine subsidiary/affiliate or distributor. (See catalog back cover for Enidine locations, or visit www.enidine.com for a list of Enidine distributors.)

Upon Enidine's receipt of this worksheet, you will receive a detailed analysis of your application and product recommendations. (For custom design projects, Enidine representatives will consult with you for specification requirements.)

GENERAL INFORMATION

CONTACT: _____

DEPT/TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

TEL: _____ FAX: _____

EMAIL: _____

PRODUCTS MANUFACTURED: _____

APPLICATION DESCRIPTION

_____

_____

Motion Direction (Check One):

☐ Horizontal ☐ Vertical ☐ Up ☐ Down ☐ Incline Angle _____ Height _____

☐ Rotary Horizontal ☐ Rotary Vertical ☐ Up ☐ Down

Weight (Min./Max.): _____ (lbs.)(Kg)

Cycle Rate: _____ (cycles/hour)

Additional Propelling Force (If Known): _____ (lbs.)(N)

☐ Air Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar) Rod Dia.(in.)(mm)

☐ Hydraulic Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar) Rod Dia._ (in.)(mm)

☐ Motor _____ (hp)(kW) Torque _____(in-lbs.)(Nm)

Ambient Temp.: _____ °F (°C)

Environmental Considerations: _____

_____

SHOCK ABSORBER APPLICATION (All Data Taken at Shock Absorber)

Number Shock Absorbers to Stop Load

Impact Velocity (min./max.): _____ (in./sec.)(m/sec.)

Shock Absorber Stroke Requirements: _____(in.)(mm)

G Load Requirements: _____(G)(m/sec^2)

RATE CONTROL APPLICATION (All Data Taken at Shock Absorber)

Number of Rate Controls to Control the Load: _____

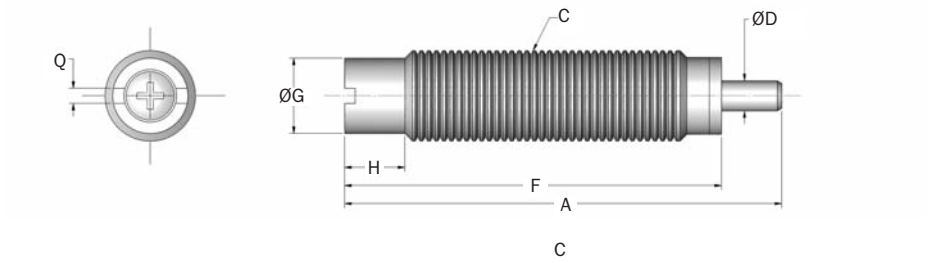
Control Direction: ☐ Tension (T) ☐ Compression (C)

Required Stroke: _____(in.)(mm) Est. Stroke Time: _____(sec.)

Estimated Velocity at the Rate Control: _____(in./sec.)(m/sec)

TK 6M, TK 8 Series

Standard

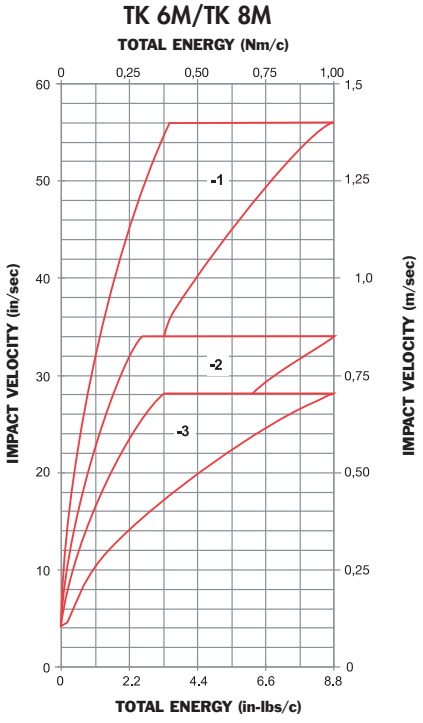


C

Catalog No./ Model	Bore Size in. (mm)	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/c)	(E_TC) Max. in.-lbs./hour (N/h)	(F_P) Max. Shock Force lbs. (N)	Nominal Coil Spring Force		Weight (mass) oz. (g)
						Extended lbs. (N)	Compressed lbs. (N)	
TK 6M	.28 (4,2)	.25 (4,0)	9 (1,0)	31,863 (3 600)	81 (360)	0.2 (1,0)	0.8 (3,5)	.14 (4)
TK 8M	.16 (4,2)	.25 (4,0)	9 (1,0)	42,480 (4 800)	81 (360)	0.2 (1,0)	0.8 (3,5)	.2 (6)

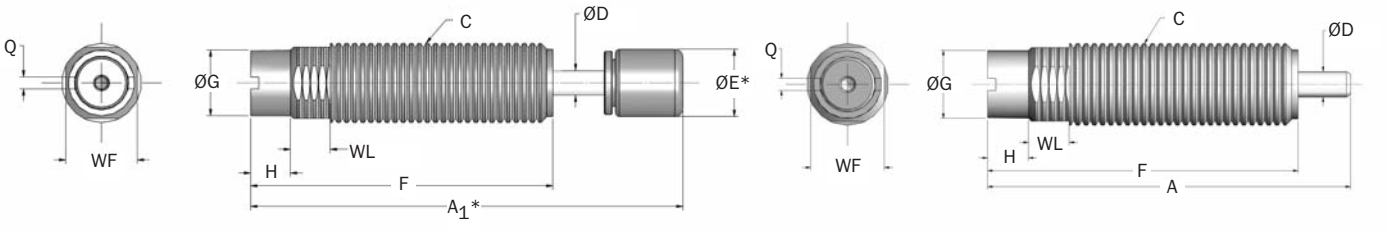
Catalog No./ Model	Damping Constant	A in. (mm)	C in. (mm)	ØD in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Q in. (mm)
TK 6M	-1, -2, -3	1.14 (29,0)	M6 x 0,5	.08 (2,0)	1.0 (25,0)	.20 (5,0)	.16 (4,0)	.04 (1,0)
TK 8M	-1, -2, -3	1.14 (29,0)	M8 x 1,0	.08 (2,0)	1.0 (25,0)	.25 (6,4)	.16 (4,0)	.04 (1,0)

Notes: 1. Dash numbers in page color are non-standard lead time items, contact Enidine.
2. A positive stop is required to prevent the bottoming of the TK 6 and TK 8 shock absorbers.



TK 10M Series

Standard



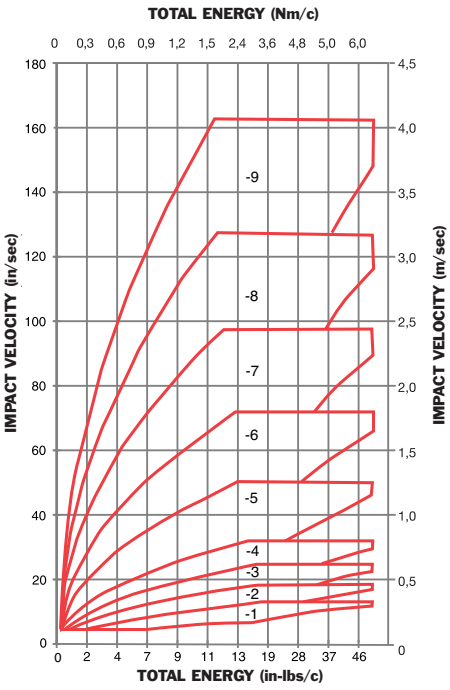
*Note: A_1 and E apply to button models and urethane striker cap accessory.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/c)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Shock Force lbs. (N)	Nominal Coil Spring Force Extended lbs. (N)	Nominal Coil Spring Force Compressed lbs. (N)	(F_D) Max. Propelling Force lbs. (N)	Weight (mass) oz. (g)
TK 10M (B)	.25 (6,4)	50 (6,0)	115,000 (13 000)	315 (1 400)	0.3 (1,5)	2.2 (10,0)	– –	.6 (17)

Catalog No./ Model	Damping Constant	A in. (mm)	A_1 in. (mm)	C in. (mm)	D in. (mm)	ØE in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Q in. (mm)	WF in. (mm)	WL in. (mm)	Stroke (S) in. (mm)
TK 10M (B)	-1 to -9	1.75 (44,6)	2.14 (54,4)	M10 x 1.0 M10 x 1,0	.12 (3,1)	.35 (8,5)	1.50 (38,0)	.33 (8,3)	.20 (5,0)	.06 (1,5)	.35 (9,0)	.16 (4,0)	0.25 (6,4)

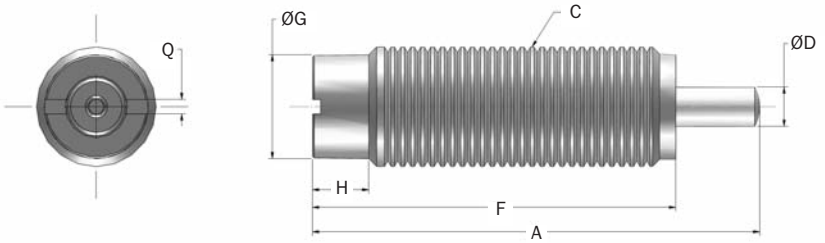
Note: Dash numbers in page color are non-standard lead time items, contact Enidine.

TK 10M



TK 21M Series

Standard



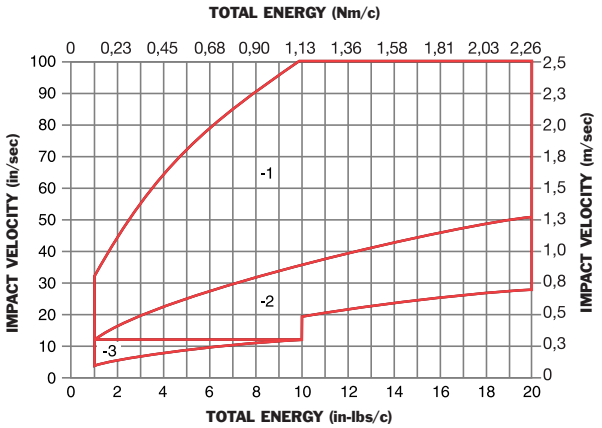
*Note: A_1 and E apply to button models and urethane striker cap accessory.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/c)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Shock Force lbs. (N)	Nominal Coil Spring Force Extended lbs. (N)	Nominal Coil Spring Force Compressed lbs. (N)	(F_D) Max. Propelling Force lbs. (N)	Weight (mass) oz. (g)
TK 21 TK 21M	.25 (6,4)	20 (2,2)	36,000 (4 100)	160 (700)	0.65 (2,9)	1.13 (5,0)	20 (89)	.4 (12)

Catalog No./ Model	Damping Constant	A in. (mm)	C in. (mm)	D in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Q in. (mm)
TK 21	-1, -2, -3	1.39	⅜ - 32 UNEF	.12	1.13	.32	.17	.05
TK 21M	-1, -2, -3	(35,4)	M10 x 1,0	(3,1)	(28,7)	(8,2)	(4,4)	(1,2)

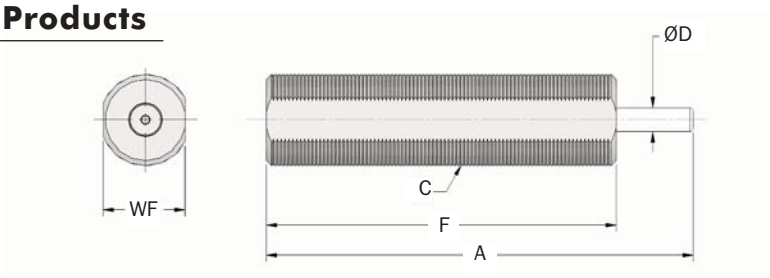
Note: A positive stop is required to prevent the bottoming of the TK 21 shock absorber.

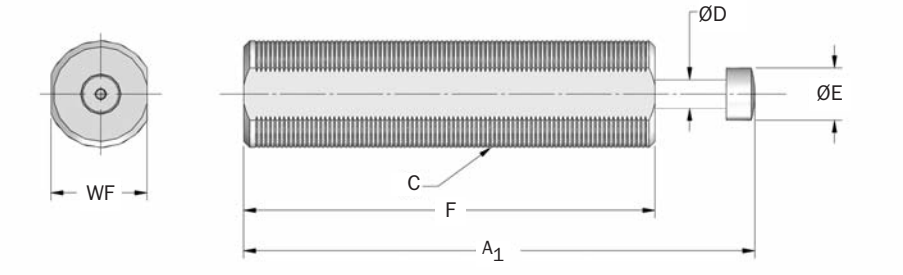
TK 21



STH .25M → STH 1.5M x 2 Series

Custom Orificed Products





Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/sec)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Shock Force lbs. (N)	Nominal Coil Spring Force		Model Weight lbs. (g)
					Extended lbs. (N)	Compressed lbs. (N)	
ΔSTH .25M	0.25 (6,0)	100 (11)	39,000 (4 420)	615 (2 730)	2.5 (11)	4.0 (18)	2.8 oz. (79)
ΔSTH .5M	0.50 (12,5)	585 (65)	390,000 (44 200)	1,800 (8 000)	4.0 (18)	7.0 (31)	7.7 oz (218)
ΔSTH .75M	0.75 (19,0)	2,180 (245)	780,000 (88 400)	4,400 (19 600)	8.0 (35)	20.0 (90)	1.1 (500)
ΔSTH 1.0M	1.00 (25,0)	4,400 (500)	1,300,000 (147 000)	6,700 (29 800)	22.0 (98)	53.0 (235)	1.6 (726)
ΔSTH 1.0M x 2	2.00 (50,0)	8,800 (1 000)	2,100,000 (235 000)	6,700 (29 800)	15.0 (66)	30.0 (133)	1.9 (862)
ΔSTH 1.5M x 1	1.00 (25,0)	10,200 (1 150)	2,200,000 (250 000)	14,600 (65 000)	20.0 (90)	51.0 (227)	3.1 (1 400)
ΔSTH 1.5M x 2	2.00 (50,0)	20,400 (2 300)	3,200,000 (360 000)	14,600 (65 000)	12.5 (56)	51.0 (227)	4.0 (1 800)

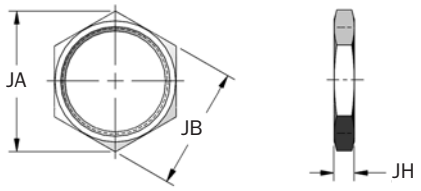
Notes: 1. Custom orificed application data needed.
2. All shock absorbers will function at 5% of their rated energy per cycle.
If less than 5%, a smaller model should be specified.
3. Enidine recommends a positive stop to prevent bottoming of the shock absorber.
4. Δ = Non-standard lead time items, contact Enidine.

Catalog No./ Model	A in. (mm)	A_1 in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	WF in. (mm)
STH .25M	– –	2.81 (71,0)	M14 X 1.0 M14 x 1,0	.19 (4,8)	.50 (12,7)	2.00 (51,0)	.50 (13,0)
STH .5M	– –	3.50 (89,0)	M22 X 1.5 M22 x 1,5	.22 (5,6)	.38 (9,5)	2.70 (68,5)	.88 (20,0)
STH .75M	– –	5.13 (130,0)	M30 X 2.0 M30 x 2,0	.31 (8,0)	.56 (14,3)	4.06 (103,0)	1.13 (27,0)
STH 1.0M	– –	6.70 (170,0)	M36 X 1.5 M36 x 1,5	.38 (9,5)	.69 (17,5)	5.38 (136,5)	1.25 (32,0)
STH 1.0M x 2	– –	9.38 (238,2)	M36 X 1.5 M36 x 1,5	.38 (9,5)	.69 (17,5)	7.02 (178,3)	1.25 (32,0)
STH 1.5M x 1	7.09 (180,0)	– –	M45 X 1.5 M45 x 1,5	.63 (16,0)	– –	6.06 (154,0)	1.63 (42,0)
STH 1.5M x 2	10.63 (270,0)	– –	M45 X 1.5 M45 x 1,5	.63 (16,0)	– –	8.62 (219,0)	1.63 (42,0)

TK 10 → STH 1.5M x 2 Series

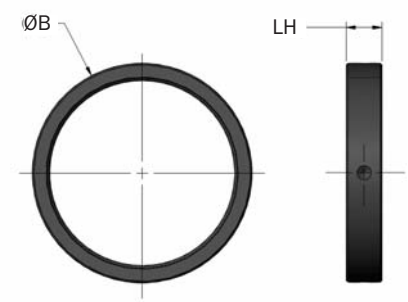
Accessories

Jam Nut (JN)



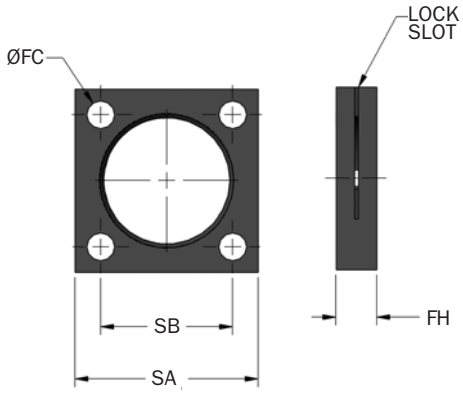
Catalog No./ Model	Part Number	Model (Ref)	JA in. (mm)	JB in. (mm)	JH in. (mm)	Weight (mass) oz. (g)
JN 3/8 - 32	J14421034	TK 21	.58 (14,7)	.50 (12,7)	.09 (2,2)	0.1 (2,8)
JN M10 x 1	J24421035	TK10M/TK21M	0.59 (15,0)	0.51 (13,0)	.13 (3,2)	0.1 (2,8)
JN M14 X 1	J24950035	STH .25M	.77 (19,7)	.67 (17,0)	.16 (4,0)	0.2 (3)
JN M22 X 1.5	J26402035	STH .5M	1.24 (31,5)	1.06 (27,0)	.22 (5,5)	0.5 (12)
JN M30 X 2	J30583035	STH .75M	1.63 (41,6)	1.42 (36,0)	.27 (7,0)	0.9 (26)
JN M36 X 1.5	J23164035	STH .1.0M	1.86 (41,6)	1.61 (36,0)	.25 (7,0)	0.9 (26)
JN M36 X 1.5	J23164035	STH 1.0 X 2M	1.86 (41,6)	1.61 (36,0)	.25 (7,0)	0.9 (26)

Lock Ring (LR)



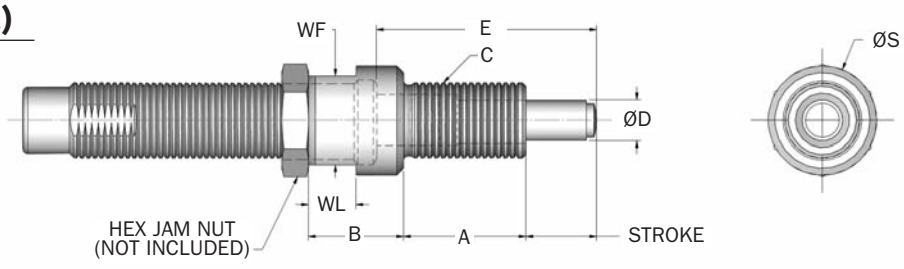
Catalog No./Model	Part Number	Model (Ref)	B in. (mm)	LH in. (mm)	Weight (mass) oz. (g)
LR M45 x 1.5	F88637049	STH 1.5 Series	2.25 (57,2)	.38 (9,5)	2.0 (75)

Square Flange (SF)



Catalog No.	Part Number	Model (Ref)	FC in. (mm)	FH in. (mm)	SA in. (mm)	SB in. (mm)	Bolt Size in. (mm)	Weight (mass) oz. (g)
SF M45 X 1.5	M48637129	STH 1.5 Series	.34 (8,6)	.50 (12,7)	2.25 (57,2)	1.63 (41,3)	5/16 (M8)	5 (142)

Side Load Adapter (SLA)

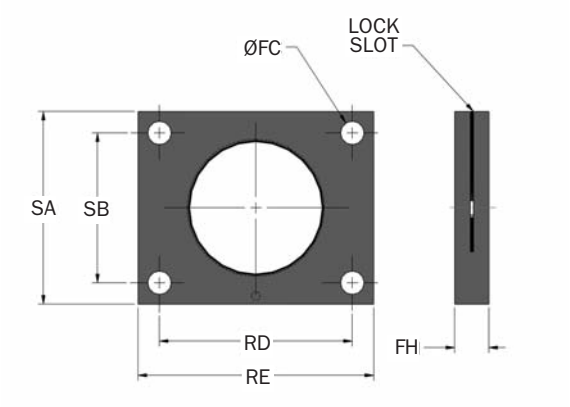


Catalog No./Model	Part Number	Model (Ref)	Stroke in. (mm)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	S in. (mm)	WF in. (mm)	WL in. (mm)
SLA 3/8 - 32 x .25	SLA 33843	TK 21	.26 (6,6)	.47 (12)	.43 (11)	3/8 - 32 UNEF	.20 (5,0)	.85 (21,6)	.51 (13,0)	.44 (11,0)	.16 (4,0)
SLA 10 MF	SLA 33457	TK 10M/TK 21M	.27 (6,9)	.47 (12)	.43 (11)	M10 X 1 M10 x 1	.20 (5,0)	.85 (21,6)	.51 (13,0)	.43 (11,0)	.16 (4,0)

Notes: 1. Maximum sideload angle is 30°. 2. Dash number in page color are non-standard lead time items, contact Enidine.

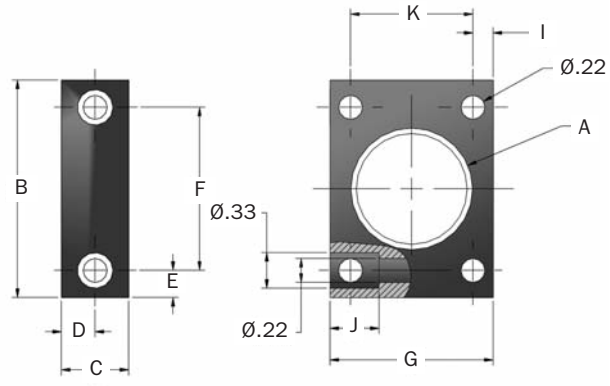
TK 10 → STH 1.5M x 2 Series

Rectangular Flange (RF)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	FC in. (mm)	FH in. (mm)	RD in. (mm)	RE in. (mm)	SA in. (mm)	SB in. (mm)	Bolt Size in. (mm)	Wt. (mass) oz. (g)
RF M45 x 1.5	M58637053	STH 1.5 Series	M45 x 1.5	.34 (8,6)	.50 (12,7)	2.38 (60,5)	3.00 (76,2)	2.25 (57,2)	1.63 (41,3)	5/16 (M8)	9 (142)

Universal Retaining Flange (UF)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)
UF M10 x 1	U16363189	TK 10M(B)/TK21M	M10 x 1	1.50 (38,0)	.47 (12,0)	.24 (6,0)	.25 (6,25)	1.00 (25,5)	1.00 (25)	.50 (12,5)	.20 (5)
UF 3/8 - 32	U19070095	TK21	3/8 - 32 UNF	1.50	.56	.28	.25	1.00	1.00	.50	.20

Overview

Enidine non-adjustable hydraulic shock absorbers can accommodate varying energy conditions. This family of tamperproof shock absorbers provides consistent performance, cycle after cycle. Non-adjustable models are designed to absorb maximum energy within a compact envelope size.

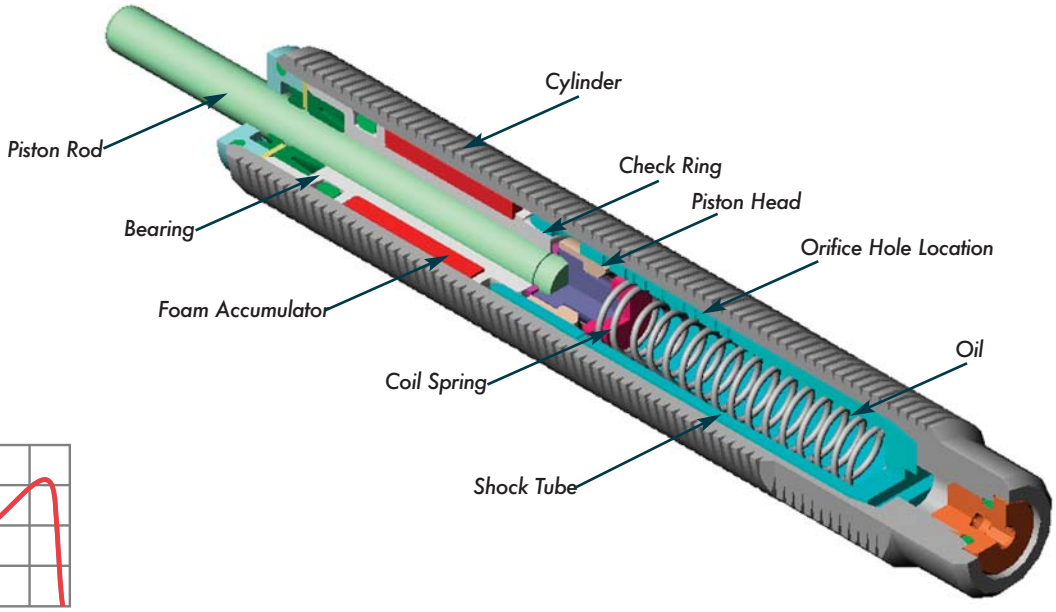
The **PM Series** uses a self-compensating design to provide energy absorption in low velocity and high drive force applications. The Platinum PM Series also includes the added benefit of corrosion-resistant, nickel-plated components and positive stop capabilities. Models can accommodate a wide range of operating conditions with varying masses or propelling forces.

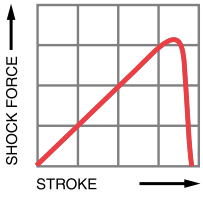
The Platinum **PRO Series** has unique progressive damping and a multi-orifice design that provides softer stops for medium-to-high impact velocities and fragile loads. The Platinum PRO Series also includes the added benefit of corrosion-resistant, nickel-plated components and positive stop capabilities. Models can accommodate a wide range of operating conditions.

Features and Benefits

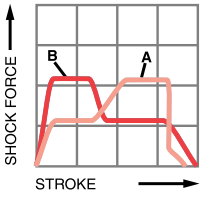
- Extensive non-adjustable product line offers flexibility in both size and energy absorption capacity to fulfill a wide range of application requirements.
- Tamperproof design ensures repeatable performance.
- Special materials and finishes can be designed to meet specific customer requirements.
- Incorporating optional fluids and seal packages can expand the standard operating temperature range from (15°F to 180°F) to (–30°F to 210°F).
- Threaded cylinders provide mounting flexibility and increase surface area for improved heat dissipation.
- A select variety of surface finishes maintains original quality appearance and provides the longest corrosion resistance protection.
- ISO quality standards result in reliable, long-life operation.

Enidine Non-Adjustable Multiple Orifice Shock Absorbers





Progressive damping provides deceleration with a gradually increasing shock force. The initial minimal resistance at impact protects delicate loads and machinery from damage. Progressive damping shock absorbers also have built-in self-compensation, so they can operate over a wide range of weights and velocities. This type of damping provides smooth deceleration in applications where energy conditions may change.



Self-compensating damping maintains acceptable deceleration with conventional type damping characteristics. Self-compensating shock absorbers operate over a wide range of weights and velocities. These shock absorbers are well suited for high drive force, low velocity applications, and where energy conditions may change. Curve A shows the ***shock force vs. stroke*** curve of a self-compensating shock absorber impacted with a low velocity and high drive force. Curve B shows the ***shock force vs. stroke*** curve of a self-compensating shock absorber impacted with a high velocity and low drive force.

The design of a multi-orifice shock absorber features a double cylinder arrangement with space between the concentric shock tube and cylinder, and a series of orifice holes drilled down the length of the shock tube wall.

During piston movement, the check ring is seated and oil is forced through the orifices in the shock tube wall, into the closed cellular foam accumulator and behind the piston head.

As the piston head moves it closes off orifice holes, thus reducing the available orifice area in proportion to the velocity. After the load is removed the coil spring pushes the piston rod outward. This unseats the check ring and permits the oil to flow from the accumulator and across the piston head, back into the shock tube. This allows quick repositioning for the next impact.

Low Pressure multiple orifice shock absorbers can provide progressive or self-compensating damping, depending on the impact conditions.

Shock Absorbers

Example 1: Standard Products

10 PRO 50 IF -2 B

- **10** — Select quantity
- **PRO 50** — Select catalog number
- **IF** — Select thread designation from engineering data chart (If applicable)
- **-2** — Select damping constant from appropriate sizing graph
- **B** — Select piston rod type
  - "–" (without button)
  - "B" (with button)
  - "CM" (Clevis mount)

Ordering Information/Application Worksheet

Example 2: Custom Orifice Products

10 PRO 100 APPLICATION DATA

- **10** — Select quantity
- **PRO 100** — Select catalog number
- **APPLICATION DATA** — Specify:
  - Vertical, rotary or horizontal motion
  - Weight
  - Impact velocity
  - Propelling force (if any)
  - Other (temperature or other environmental conditions)
  - Cycles per hour

*Enidine will specify individual part number for each application.

Accessories

Example 1

10 UF 3/4-16 Universal Mounting Flange
(P/N U120275095)

- **10** — Select quantity
- **UF 3/4-16 (P/N U120275095)** — Select catalog/part number

Example 2

5 UC 8609 Urethane Striker Cap
(P/N C98609079)

- **5** — Select quantity
- **UC 8609 (P/N C98609079)** — Select catalog/part number

Application Worksheet

FAX NO.: _____

DATE: _____

ATTN: _____

COMPANY: _____

The Enidine Application Worksheet makes shock absorber sizing and selection easier.

Fax, phone, or mail worksheet data to Enidine headquarters or your nearest Enidine subsidiary/affiliate or distributor. (See catalog back cover for Enidine locations, or visit www.enidine.com for a list of Enidine distributors.)

Upon Enidine's receipt of this worksheet, you will receive a detailed analysis of your application and product recommendations. (For custom design projects, Enidine representatives will consult with you for specification requirements.)

GENERAL INFORMATION

CONTACT: _____

DEPT/TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

TEL: _____ FAX: _____

EMAIL: _____

PRODUCTS MANUFACTURED: _____

APPLICATION DESCRIPTION

_____

_____

Motion Direction (Check One):

☐ Horizontal ☐ Vertical ☐ Up ☐ Down ☐ Incline Angle _____ Height _____

☐ Rotary Horizontal ☐ Rotary Vertical ☐ Up ☐ Down

Weight (Min./Max.): _____ (lbs.)(Kg)

Cycle Rate : _____ (cycles/hour)

Additional Propelling Force (If Known): _____ (lbs.)(N)

☐ Air Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar) Rod Dia.____(in.)(mm)

☐ Hydraulic Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar) Rod Dia._ (in.)(mm)

☐ Motor _____ (hp)(kW) Torque _____(in-lbs.)(Nm)

Ambient Temp.: _____ °F (°C)

Environmental Considerations: _____

_____

SHOCK ABSORBER APPLICATION

(All Data Taken at Shock Absorber)

Number Shock Absorbers to Stop Load

Impact Velocity (min./max.):_____ (in./sec.)(m/sec.)

Shock Absorber Stroke Requirements: _____(in.)(mm)

G Load Requirements: _____(G)(m/sec^2)

RATE CONTROL APPLICATION

(All Data Taken at Shock Absorber)

Number of Rate Controls to Control the Load: _____

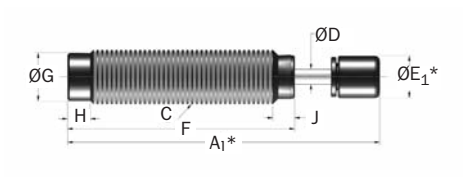
Control Direction: ☐ Tension (T) ☐ Compression (C)

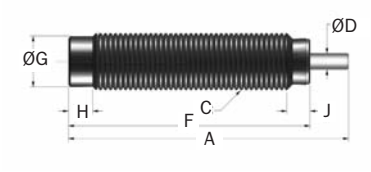
Required Stroke: _____(in.)(mm) Est. Stroke Time:_____(sec.)

Estimated Velocity at the Rate Control: _____(in./sec.)(m/sec)

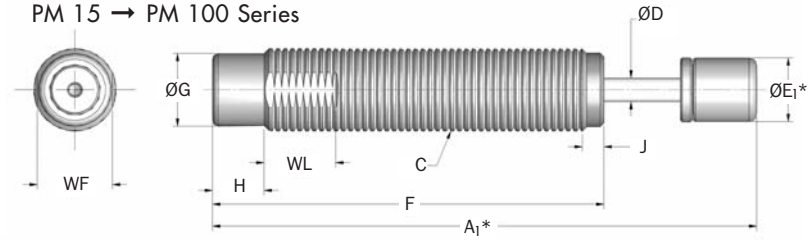
Standard

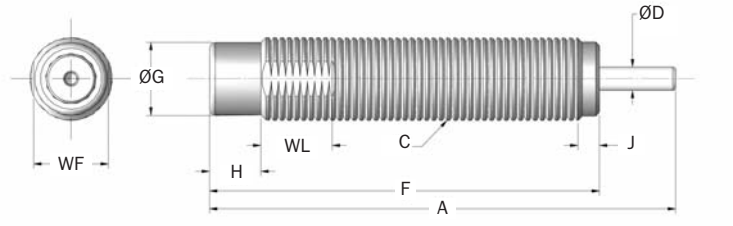
PMX 8 → PMX 10 Series





PM 15 → PM 100 Series





*Note: A_1 and E_1 apply to button models and urethane striker cap accessory.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Reaction Force lbs. (N)	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs. (N)	Model Weight lbs. (Kg)
					Extended lbs. (N)	Compressed lbs. (N)		
PMX 8 (B)	0.25 (6,4)	25 (3,0)	50,000 (5 650)	200 (890)	0.6 (2,7)	1.2 (5,6)	45 (200)	.5 (16)
PMX 10 (B)	0.28 (7,0)	50 (6,0)	110,000 (12 400)	360 (1 600)	0.5 (2,2)	1.0 (4,5)	80 (350)	1.0 (28)
PM 15 (B)	0.41 (10,4)	90 (10,0)	250,000 (28 200)	450 (2 000)	0.7 (3,0)	1.6 (7,0)	50 (220)	2.0 (56)
SPM 25 (B)	0.50 (12,7)	180 (20,0)	300,000 (34 000)	625 (2 800)	1.0 (4,5)	2.5 (11,0)	200 (890)	2.4 (68)
PM 25 (B)	0.63 (16,0)	235 (26,0)	350,000 (34 000)	625 (2 800)	1.0 (4,5)	2.5 (11,0)	200 (890)	2.4 (68)
SPM 50 (B)	0.50 (12,7)	250 (28,0)	400,000 (45 200)	850 (3 750)	1.5 (6,0)	3.5 (15,0)	360 (1 600)	4.0 (123)
PM 50 (B)	0.88 (22,0)	485 (54,0)	475,000 (53 700)	850 (3 750)	2.0 (8,9)	6.8 (30,0)	360 (1 600)	4.8 (136)
PM 100 (B)	1.00 (25,0)	800 (90,0)	622,000 (70 000)	1,250 (5 500)	3.0 (13,0)	6.0 (27,0)	500 (2 200)	10.5 (297)

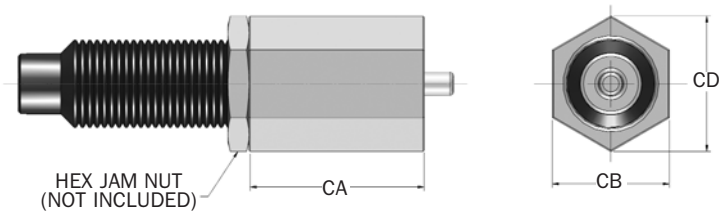
Catalog No./ Model	Damping Constant	A in. (mm)	A_1 in. (mm)	C in. (mm)	D in. (mm)	E_1 in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	WF in. (mm)	WL in. (mm)
PMX 8 IF (B)	-1,-2,-3	1.86 (47,0)	2.25 (57,0)	3/8 - 32 UNEF	.10 (2,5)	0.27 (6,8)	1.61 (40,9)	.26 (6,6)	.18 (4,6)	.10 (2,5)	–	–
PMX 8 MF (B)	-1,-2,-3			M8 x 0,75							–	–
PMX 8 MC (B)	-1,-2,-3			M8 x 1,0								
PMX 10 IF (B)	-1,-2,-3	2.12 (54,0)	2.51 (64,0)	7/16 - 28 UNEF	.12 (3,0)	0.34 (8,6)	1.83 (46,5)	.34 (8,6)	.18 (4,6)	.13 (3,3)	–	–
PMX 10 MF (B)	-1,-2,-3			M10 x 1,0							–	–
PM 15 IF (B)	-1,-2,-3	2.45 (62,2)	2.85 (72,4)	7/16 - 28 UNEF	.12 (3,0)	.40 (10,2)	2.10 (52,1)	.39 (9,9)	.27 (6,9)	.10 (2,5)	.39 (11,0)	.38 (9,5)
PM 15 MF(B)	-1,-2,-3			M12 x 1,0								
PM 15 IC (B)	-1,-2,-3			1/2 - 20 UNEF								
SPM 25 IF (B)	-1,-2,-3	3.25 (82,7)	3.63 (92,2)	1/2 - 20 UNF	.16 (4,0)	0.44 (11,2)	2.74 (69,5)	.43 (10,9)	.20 (5,1)	.04 (1,0)	(12,0) .50	.44 .50 (12,7) (12,0)
SPM 25 MF (B)	-1,-2,-3			M14 x 1,0								
SPM 25 IC (B)	-1,-2,-3			9/16 - 18 UNF								
SPM 25 MC (B)	-1,-2,-3			M14 x 1,5								
PM 25 IF (B)	-1,-2,-3	3.84 (97,5)	4.22 (107,2)	1/2 - 20 UNF	.16 (4,0)	.44 (11,2)	3.20 (81,3)	.43 (10,9)	.30 (7,6)	.04 (1,0)	(12,0) .50	.44 .50 (12,7) (12,0)
PM 25 MF (B)	-1,-2,-3			M14 x 1,0								
PM 25 IC (B)	-1,-2,-3			9/16 - 18 UNF								
PM 25 MC (B)	-1,-2,-3			M14 x 1,5								
SPM 50 IF (B)	-1,-2,-3	3.46 (87,9)	3.93 (99,9)	3/4 - 16 UNF	.19 (4,8)	0.50 (12,7)	2.93 (74,4)	.64 (16,3)	.30 (7,6)	.04 (1,0)	.68 (18,0)	.50 (12,7)
SPM 50 MC (B)	-1,-2,-3			M20 x 1,5								
PM 50 IF (B)	-1,-2,-3	4.66 (118,4)	5.13 (130,3)	3/4 - 16 UNF	.19 (4,8)	0.50 (12,7)	3.76 (95,5)	.64 (16,3)	.30 (7,6)	.04 (1,0)	.68 (18,0)	.50 (12,7)
PM 50 MC (B)	-1,-2,-3			M20 x 1,5								
PM 100 IF (B)	-1,-2,-3	5.07 (128,8)	5.57 (141,5)	1-12 UNF	.25 (6,4)	0.62 (15,7)	4.04 (102,6)	.87 (22,0)	.50 (12,7)	.18 (4,6)	.88 (23,0)	.50 (12,7)
PM 100 MF (B)	-1,-2,-3			M25 x 1,5								
PM 100 MC (B)	-1,-2,-3			M27 x 3,0								

Notes: 1. Dash numbers in page color are non-standard lead time items, contact Enidine.
2. See page 57 for constant damping curves.

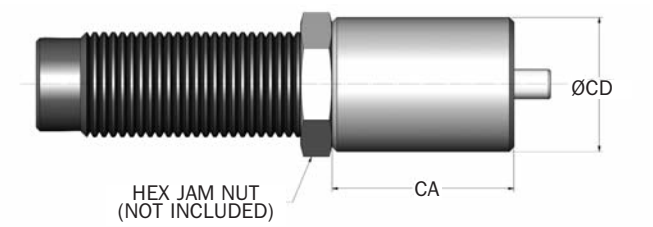
PMX 8 → PM 100 Series

Stop Collar (SC)

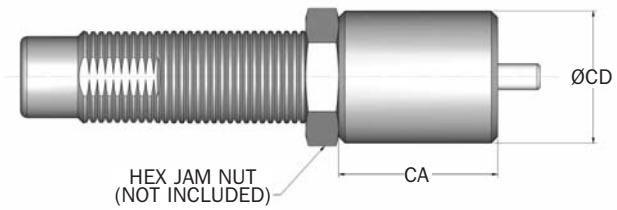
PMX8 (Metric/Imperial)



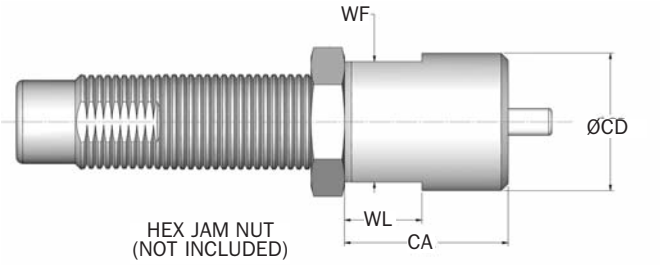
PMX10 (Metric/Imperial)



PM15 → PM100 (Imperial)

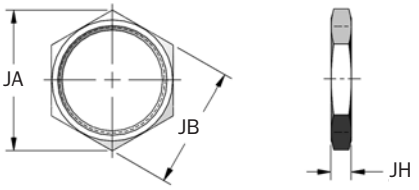


PM15(M) → PM100(M) (Metric)



Catalog No./ Model	Part Number	Model (Ref)	CA in. (mm)	CB in. (mm)	CD in. (mm)	WF in. (mm)	WL in. (mm)	Weight (mass) oz. (g)
SC 3/8 - 32	M99137057	PMX 8 (B)	0.75	.50	0.58	–	–	.5
SC M8 x 0,75	M99137175	PMX 8 MF (B)	(19,0)	(12,0)	(14,0)	–	–	(23)
SC M8 x 1	M99137058	PMX 8 MC (B)	(19,0)	(12,0)	(14,0)	–	–	(23)
SC 1/4 - 28	M95588057	PMX 10 IF (B)	0.75	–	0.63	–	–	.5
SC M10 x 1	M98921058	PMX 10 MF (B)	(19,0)	–	(14,3)	–	–	(11)
SC 7/16 - 28	M95588057	PM 15 (B)	0.75	–	0.63	–	–	.5
SC M12 x 1	M930289171	PM 15 M (B)	(19,0)	–	(16,0)	(14,0)	(9,0)	(14)
SC 1/2 - 20	M93935057	SPM/PM 25 IF (B)	1.00	–	0.75	–	–	1.0
SC M14 x 1,5	M930281171	SPM/PM 25 MF (B)	(25,4)	–	(21,0)	(19,0)	(12,0)	(38)
SC 9/16 - 18	M94950199	SPM/PM 25 IC (B)	1.00	–	0.69	–	–	1.0
SC M14 x 1	M930286171	SPM/PM 25 MF (B)	(25,4)	–	(18,0)	(17,0)	(12,0)	(20)
SC 3/4 - 16	M92646057	SPM/PM 50 (B)	1.50	–	1.00	–	–	2.0
SC M20 x 1,5	M930282171	SPM/PM 50 M (B)	(38,0)	–	(25,0)	(22,0)	(12,0)	(63)
SC 1-12 x 1	M92587057	PM 100 (B)	1.75	–	1.50	–	–	8.0
SC M25 x 1,5	M930284171	PM 100 MF (B)	(44,5)	–	(38,0)	(32,0)	(15,0)	(215)

Jam Nut (JN)

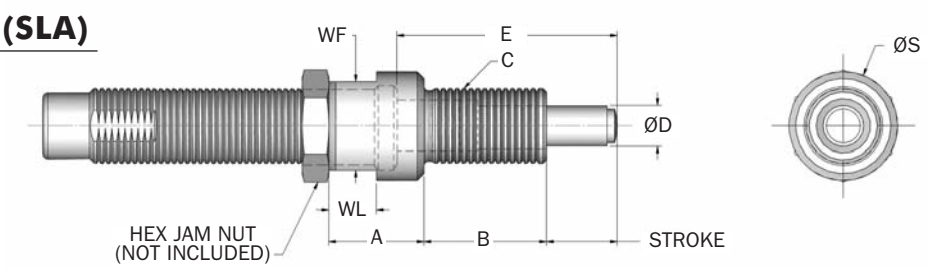


Catalog No./ Model	Part Number	Model (Ref)	JA in. (mm)	JB in. (mm)	JH in. (mm)	Weight (mass) oz. (g)
JN 3/8 - 32	J14421034	PMX 8 (B)	0.58	0.50	.09	0.1
JN M8 x 0,75	J29137185	PMX 8 MF (B)	(14,0)	(12,0)	(4,0)	(2)
JN M8 x 1	J29137035	PMX 8 MC (B)	(14,0)	(12,0)	(4,0)	(2)
JN 7/16 - 28	J15588034	PMX 10 IF (B)/PM 15 (B)	0.65	0.56	.16	0.1
JN M10 x 1	J24421035	PMX 10 MF (B)	(17,3)	(15,0)	(4,0)	(2)
JN M12 x 1	J25588035	PM 15 M (B)	(15,0)	(13,0)	(3,2)	(2)
JN 1/2 - 20	J13935034	SPM/PM 25 IF (B)	0.72	0.63	.12	0.1
JN M14 x 1	J24950035	SPM/PM 25 MF (B)	(19,7)	(17,0)	(4,0)	(3)
JN 9/16 - 18	J14950034	SPM/PM 25 IC (B)	1.01	0.88	.31	0.6
JN M14 x 1,5	J23935035	SPM/PM 25 MC (B)	(19,7)	(17,0)	(4,0)	(3)
JN 3/4 - 16	J12646034	SPM/PM 50 IC (B)	1.08	0.94	.18	0.3
JN M20 x 1,5	J22646035	SPM/PM 50 MC (B)	(27,7)	(24,0)	(4,6)	(9)
JN 1-12	J11976034	PM 100 (B)	1.30	1.13	.18	0.5
JN M25 x 1,5	J23004035	PM 100 MF (B)	(37,0)	(32,0)	(4,6)	(15)

Non-Adjustable Series Hydraulic Shock Absorbers
PM Series

PMX 8 → PM 100 Series

Side Load Adaptor (SLA)

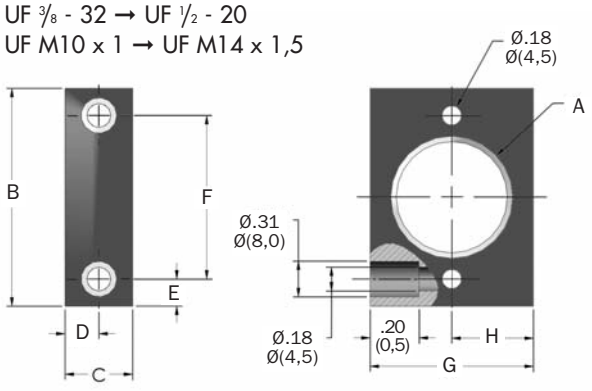


Catalog No./ Model	Part Number	Model (Ref)	Stroke in. (mm)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	S in. (mm)	WF in. (mm)	WL in. (mm)
SLA 7/16 - 28 x .28	SLA 33974	PMX 10	.28	.47	.43	7/16-28 UNEF	.20	.87	.63	.56	.16
SLA 10 MF	SLA 33457	PMX 10 MF	(6,4)	(12)	(11)	M10 x 1	(5,0)	(21,9)	(13,0)	(11,0)	(4,0)
SLA 7/16 - 28 x .41	SLA 33844	PM 15 IF	.41	.71	.55	7/16-28 UNEF	.24	1.28	.63	.56	.28
SLA 12 MF	SLA 33299	PM 15 MF	(10,0)	(18)	(14)	M12 x 1	(6,0)	(32,4)	(14,0)	(13,0)	(7,0)
SLA 1/2 - 20 x .41	SLA 71146	PM 15 IC	.41	.71	.55	1/2-20 UNF	.24	1.28	.63	.56	.28
SLA 1/2 - 20 x .63	SLA 33849	PM 25 IF	.63	1.02	.51	1/2-20 UNF	.31	1.62	.71	.63	.28
SLA 14 MF	SLA 33297	PM 25 MF	(16,0)	(26)	(13)	M14 x 1	(8,0)	(45,2)	(18,0)	(15,0)	(7,0)
SLA 9/16 - 18 x .63	SLA 33850	PM 25 IC	.63	1.02	.51	9/16-18 UNF	.31	1.62	.71	.63	.28
SLA 14 MC	SLA 33298	PM 25 MC	(12,7)	(20)	(16)	M14 x 1,5	(8,0)	(39,2)	(18,0)	(15,0)	(7,0)
SLA 1/2 - 20 x .50	SLA 33845	SPM 25 IF	.5	.79	.63	1/2-20 UNF	.31	1.55	.71	.63	.28
SLA 14 MFS	SLA 33306	SPM 25 MF	(12,7)	(20)	(16)	M14 x 1	(8,0)	(39,2)	(18,0)	(15,0)	(7,0)
SLA 7/16 - 18 x .50	SLA 33846	SPM 25 IC	.5	.79	.63	9/16-18 UNF	.31	1.55	.71	.63	.28
SLA 14 MCS	SLA 33301	SPM 25 MC	(12,7)	(20)	(16)	M14 x 1,5	(8,0)	(39,2)	(18,0)	(15,0)	(7,0)
SLA 3/4 - 16 x .88	SLA 33851	PM 50	.88	1.26	.67	3/4-16 UNF	.43	2.44	.98	.88	.28
SLA 20 MC	SLA 33302	PM 50 M	(22,0)	(32)	(17)	M20 x 1,5	(11,0)	(62,0)	(25,0)	(22,0)	(7,0)
SLA 3/4 - 16 x .50	SLA 33847	SPM 50	.5	.94	.55	3/4-16 UNF	.43	1.64	.98	.88	.28
SLA 20 MCS	SLA 33262	SPM 50 M	(12,7)	(24)	(14)	M20 x 1,5	(11,0)	(41,5)	(25,0)	(22,0)	(7,0)
SLA 1-12 x 1	SLA 33848	PM 100	1.00	1.50	1.18	1-12 UNF	.59	2.88	1.42	1.25	.39
SLA 25 MF	SLA 33263	PM 100 MF	(25,4)	(38)	(30)	M25 x 1,5	(15,0)	(73,2)	(36,0)	(32,0)	(7,0)
SLA 25 MC	SLA 33296	PM 100 MC	(25,4)	(38)	(30)	M27 x 3	(15,0)	(73,2)	(36,0)	(32,0)	(10,0)

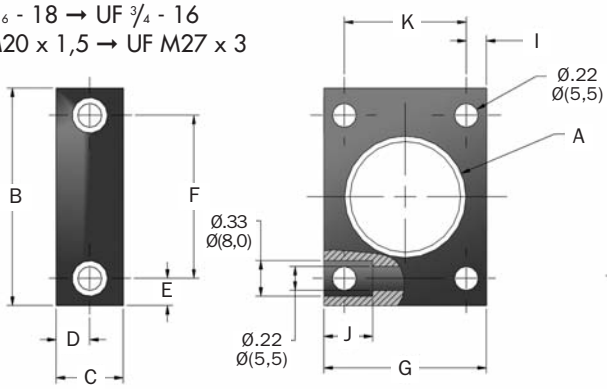
Notes: 1. Maximum sideload angle is 30°. 2. Part numbers in page color are non-standard lead time items, contact Enidine.

Universal Retaining Flange (UF)

UF 3/8 - 32 → UF 1/2 - 20
UF M10 x 1 → UF M14 x 1,5



UF 9/16 - 18 → UF 3/4 - 16
UF M20 x 1,5 → UF M27 x 3

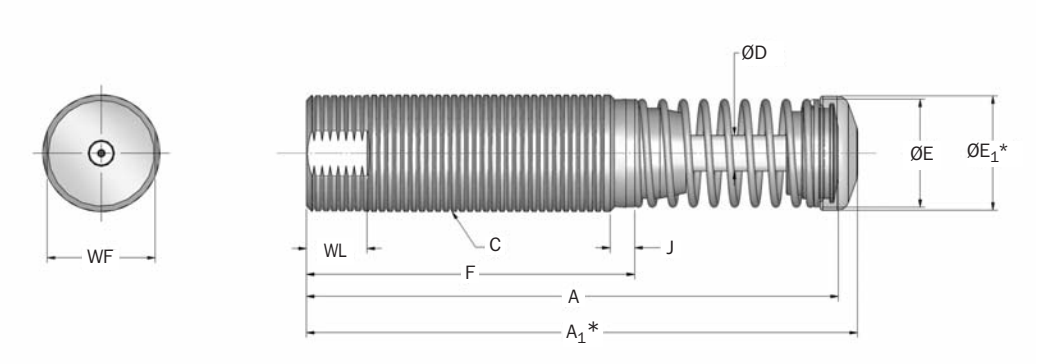


Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	I in. (mm)	J in. (mm)	K in. (mm)
UF 3/8 - 32	U19070095	PMX 8	3/8 - 32 UNF	1.50	.56	.28	.25	1.00	1.00	0.50	–	.20	–
UF M10 x 1	U16363189	PMX 10M	M10 x 1	(38,0)	(12,0)	(6,0)	(6,25)	(25,5)	(25,0)	(12,5)	–	(5,0)	–
UF 7/16 - 28	U15588095	PM 15 (B)/PMX 10 (B)	7/16 - 28 UNF	1.50	.56	.28	.25	1.00	1.00	0.50	–	.20	–
UF M12 x 1	U15588189	PMX 15 M (B)	M12 x 1	(38,0)	(12,0)	(6,0)	(6,25)	(25,5)	(25,0)	(12,5)	–	(5,0)	–
UF 1/2 - 20	U13935095	PM/SPM 25 IF (B)	1/2 - 20 UNF	1.50	.56	.28	.25	1.00	1.00	0.50	–	.20	–
UF M14 x 1	U14950189	PM/SPM 25 MF (B)	M14 x 1,5	(45,0)	(16,0)	(8,0)	(5,0)	(35,0)	(30,0)	(15,0)	–	(5,0)	–
UF 9/16 - 18	U19018095	PM/SPM 25 IC (B)	9/16 - 18 UNF	1.81	.62	.31	.22	1.38	1.38	–	.19	.32	1.00
UF M14 x 1,5	U13935143	PM/SPM 25 MC (B)	M14 x 1,5	(45,0)	(16,0)	(8,0)	(5,0)	(35,0)	(30,0)	(15,0)	–	(5,0)	–
UF 3/4 - 16	U120275095	PM/SPM 50 (B)	3/4 - 16 UNF	2.00	.62	.31	.25	1.50	1.50	–	.19	.45	1.12
UF M20x 1,5	U12646143	PM/SPM 50 MC (B)	M20 x 1,5	(48,0)	(16,0)	(8,0)	(6,5)	(35,0)	(35,0)	–	(4,75)	(10,0)	(25,5)
UF 1-12	U19599095	PM 100	1-12 UNF	2.00	.62	.31	.25	1.50	1.50	–	.19	.39	(25,5)
UF M25 x 1,5	U13004143	PM 100/110M	M25 x 1,5	(48,0)	(16,0)	(8,0)	(6,5)	(35,0)	(35,0)	–	(4,75)	(10,0)	(25,5)
UF M27 x 3	U12587143	PM 100 MC	M27 X 3	(48,0)	(16,0)	(8,0)	(6,5)	(35,0)	(35,0)	–	(4,75)	(10,0)	(25,5)

Notes: 1. Part numbers in page color are non-standard lead time items, contact Enidine.

PM 120 → PM 225 Series

Standard



*Note: A_1 and E_1 apply to button models and urethane striker cap accessory.

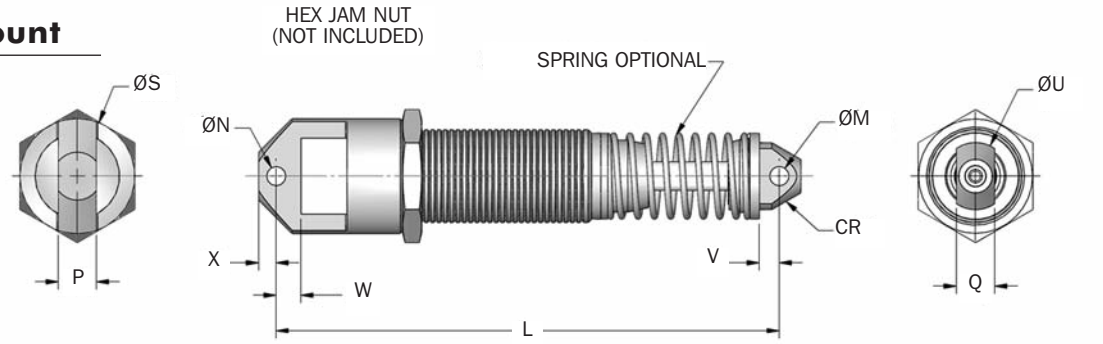
Catalog No./ Model	(S) Stroke in. (mm)	Optimal Velocity Range in./sec. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Reaction Force lbs. (N)	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs. (N)	Weight (mass) lbs. (Kg)
						Extended lbs. (N)	Compressed lbs. (N)		
PM 120 IF (B)	0.63	1.00	1,400	670,000	2,500	12.5	20.0	700	17.0
PM 120 MF (B)	(16,0)	(25,0)	(160,0)	(75 700)	(11 120)	(56,0)	(89,0)	(3 100)	(482)
PM 125 IF (B)	0.63	1.00	1,400	774,000	2,500	12.5	20.0	700	21.0
PM 125 MF (B)	(16,0)	(25,0)	(160,0)	(91 000)	(11 120)	(56,0)	(89,0)	(3 100)	(595)
PM 220 IF (B)	0.63	2.00	2,750	800,000	2,500	7.0	20.0	700	23.0
PM 220 MF (B)	(16,0)	(50,0)	(310,0)	(90 300)	(11 120)	(31,0)	(89,0)	(3 100)	(652)
PM 225 IF (B)	0.63	2.00	2,750	900,000	2,500	7.0	20.0	700	27.0
PM 225 MF (B)	(16,0)	(50,0)	(310,0)	(111 000)	(11 120)	(31,0)	(89,0)	(3 100)	(765)

Catalog No./ Model	Damping Constant	A in. (mm)	A_1 in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	E_1 in. (mm)	F in. (mm)	J in. (mm)	WF in. (mm)	WL in. (mm)
PM 120 IF (B)	-1,-2,-3	5.52	5.72	1 1/4-12 UNF	.38	1.13	1.20	3.41	.21	1.12	.63
PM 120MF (B)	-1,-2,-3	(140,2)	(145,3)	M33 x 1,5	(9,5)	(29,0)	(30,5)	(87,0)	(5,3)	(30,0)	(16,0)
PM 125 IF (B)	-1,-2,-3	5.52	5.72	1 3/8-12 UNF	.38	1.13	1.20	3.41	.21	1.12	.63
PM 125 MF (B)	-1,-2,-3	(140,2)	(145,3)	M36 x 1,5	(9,5)	(29,0)	(30,5)	(87,0)	(5,3)	(33,0)	(16,0)
PM 220 IF (B)	-1,-2,-3	8.14	8.34	1 1/4-12 UNF	.38	1.13	1.20	5.03	.21	1.12	.63
PM 220 MF (B)	-1,-2,-3	(207,0)	(212,0)	M33 x 1,5	(9,5)	(29,0)	(30,5)	(128,0)	(5,3)	(30,0)	(16,0)
PM 225 IF (B)	-1,-2,-3	8.14	8.34	1 3/8-12 UNF	.38	1.13	1.20	5.03	.21	1.25	.63
PM 225 MF (B)	-1,-2,-3	(207,0)	(212,0)	M36 x 1,5	(9,5)	(29,0)	(30,5)	(128,)0	(5,3)	(33,0)	(16,0)

Notes: 1. Dash numbers in page color are non-standard lead time items, contact Enidine.
2. See page 57 for constant damping curves.

PM 120 → PM 225 Series

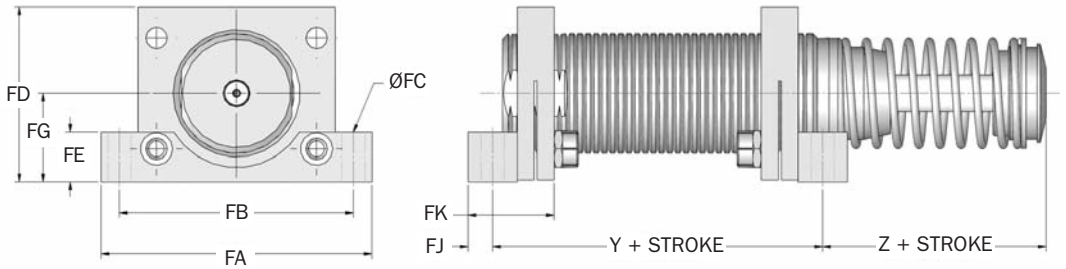
Clevis Mount



Catalog No./ Model	L in. (mm)	M +.005/-.000 in. (mm)	N +.005/-.000 in. (mm)	P +.000/-.010 in. (mm)	Q +.000/-.010 in. (mm)	S in. (mm)	U in. (mm)	V in. (mm)	W in. (mm)	X in. (mm)	CR in. (mm)	Weight (mass) lbs. (Kg)
ΔPM 120 CM (S)	6.59 (167)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (23)	.23 (6)	.48 (12)	.31 (6,1)	.44 (11,2)	1.3 (0,59)
ΔPM 220 CM (S)	9.22 (234)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (23)	.23 (6)	.48 (12)	.31 (6,1)	.44 (11,2)	1.7 (0,77)
ΔPM 125 CM (S)	6.59 (180)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (22)	.23 (6)	.93 (24)	.23 (6,0)	.44 (11,2)	1.6 (0,73)
ΔPM 225 CM (S)	9.22 (230)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (22)	.23 (6)	.93 (24)	.23 (6,0)	.44 (11,2)	1.9 (0,86)

Notes: 1. Δ= Non-standard lead time items, contact Enidine.
2. (S) indicates model comes with spring.

Flange Foot Mount



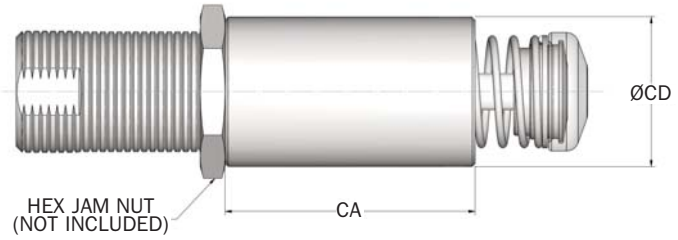
Catalog No./ Model	Part Number	Model (Ref)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	FK in. (mm)	Bolt Size in. (mm)	Kit Weight oz. (g)
FM 1 ¼ - 12	2F21049305	PM 120/220	2.25	1.25	2.75	2.38	.23	1.77	.50	.90	.25	.88	#10	4.0
FM M33 x 1,5	2F21049306	PM 120/220M	(57,2)	(31,8)	(70,0)	(60,3)	(5,90)	(45,0)	(12,7)	(22,7)	(6,4)	(22,2)	(M5)	(100)
FM 1 ⅜ - 12	2F21293305	PM 125/225	2.25	1.25	2.75	2.38	.23	1.77	.50	.90	.25	.88	#10	4.0
FM M36 x 1,5	2F21293306	PM 125/225M	(57,2)	(31,8)	(70,0)	(60,3)	(5,90)	(45,0)	(12,7)	(22,7)	(6,4)	(22,2)	(M5)	(100)

Notes: 1. Shock absorber must be ordered separately from foot mount kit.
2. All foot mount kits include two foot mounts.

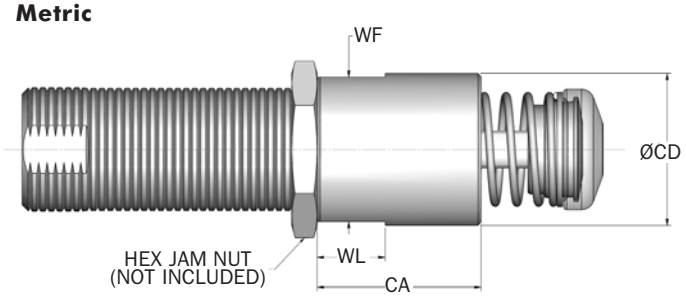
PM 120 → PM 225 Series

Stop Collar (SC)

Imperial

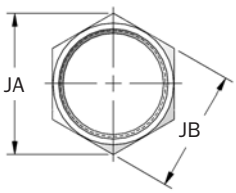


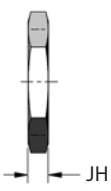
Metric



Catalog No./ Model	Part Number	Model (Ref)	CA in. (mm)	CD in. (mm)	WF in. (mm)	WL in. (mm)	Weight (mass) oz. (g)
SC 1 ¼-12	M921049057	PM 120/220	2.50	1.50	–	–	7.0
SC M33 x 1,5	M930290171	PM 120/220 M	(41,0)	(38,0)	(36,0)	(17,0)	(210)
SC 1 ⅜-12	M921293057	PM 120/220	2.50	1.69	–	–	7.0
SC M36 x 1,5	M930285058	PM 120/220 M	(63,5)	(43,0)	(41,0)	(18,0)	(210)

Jam Nut (JN)

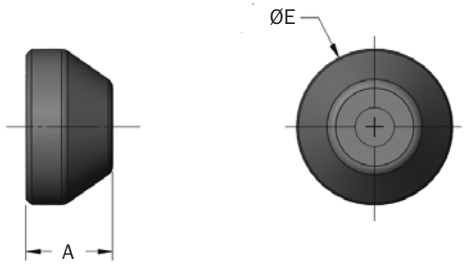




Catalog No./ Model	Part Number	Model (Ref)	JA in. (mm)	JB in. (mm)	JH in. (mm)	Weight (mass) oz. (g)
JN 1 ¼-12	J18609034	PM120/220	1.73	1.50	.25	0.9
JN M33 x 1,5	F88637049	PM120/220 M	(47,3)	(41,0)	(6,4)	(27)
JN 1 ⅜-12	J13164034	PM125/225	1.73	1.50	.25	0.9
JN M36 x 1,5	F83010049	PM125/225 M	(47,3)	(41,0)	(6,4)	(27)

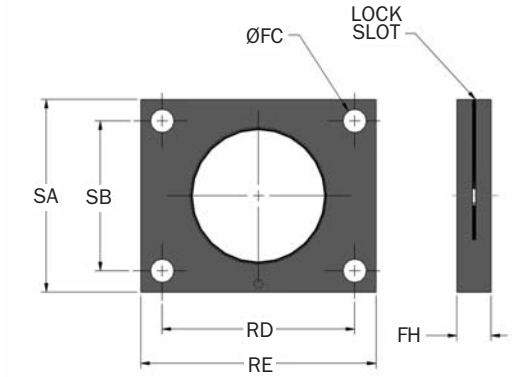
PM 120 → PM 225 Series

Urethane Striker Cap (USC)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	E_1 in. (mm)	Weight (mass) oz. (g)
UC 8609	C98609079	PM 120, 125, 220 & 225	.39 (10,0)	1.20 (30,5)	0.1 (3)

Rectangular Flange (RF)

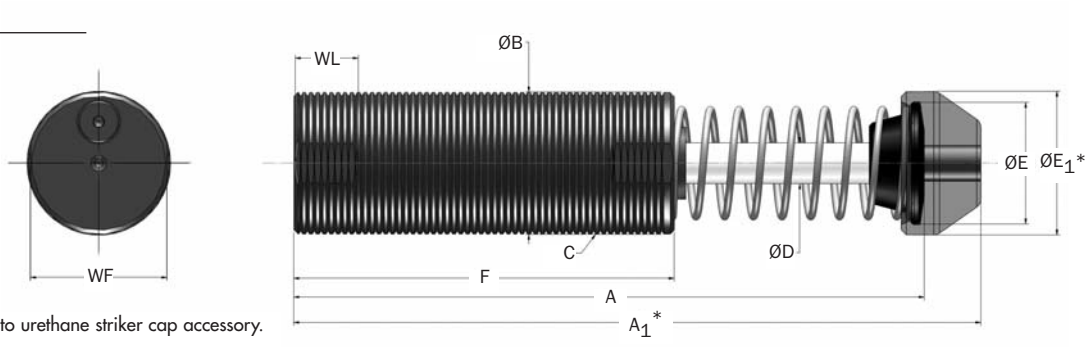


Catalog No./ Model	Part Number	Model (Ref)	FC in. (mm)	FH in. (mm)	RD in. (mm)	RE in. (mm)	SA in. (mm)	SB in. (mm)	Bolt Size in. (mm)	Wt. (mass) oz. (g)
RF 1 ¼ - 12	N121049129	PM 120/220	.22	.38	1.63	2.00	1.75	1.13	#10	1.0
RF M33 x 1,5	N121049141	PM 120/ 220M	(5,5)	(9,5)	(41,3)	(50,8)	(44,5)	(28,6)	(M5)	(30)
RF 1 ⅜ - 12	N121293129	PM 125/225	.22	.38	1.63	2.00	1.75	1.13	#10	1.0
RF M36 x 1,5	N121293129	PM 125/225M	(5,5)	(9,5)	(41,3)	(58,8)	(44,5)	(28,6)	(M5)	(30)

Non-Adjustable Series Hydraulic Shock Absorbers
PMXT Mid-Bore Series

PMXT 1525 → PMXT 2150 Series

Standard



*Note: A_1 and E_1 apply to urethane striker cap accessory.

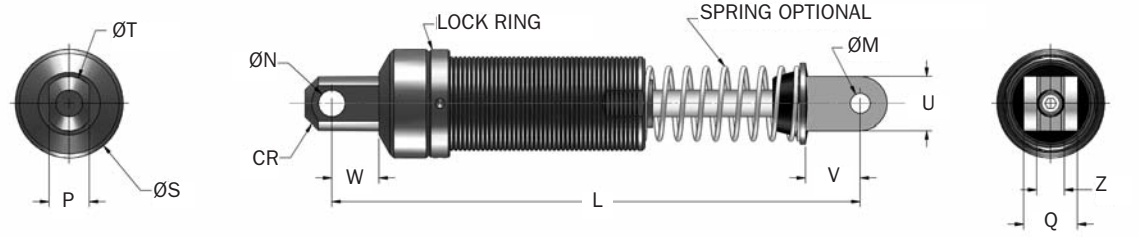
Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Reaction Force lbs. (N)	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs. (N)	Weight (mass) lbs. (Kg)
					Extended lbs. (N)	Compressed lbs. (N)		
PMXT 1525	1.00 (25,0)	3,250 (367,0)	1,120,000 (126 000)	6,500 (29 000)	11.0 (48,0)	15.0 (68,0)	1,500 (6 700)	2.2 (1,0)
PMXT 1550	2.00 (50,0)	6,500 (735,0)	1,475,000 (167 000)	6,500 (29 000)	11.0 (29,0)	18.0 (78,0)	1,500 (6 700)	2.4 (1,1)
PMXT 1575	3.00 (75,0)	10,000 (1 130,0)	1,775,000 (201 000)	6,500 (29 000)	7.0 (31,0)	18.0 (78,0)	1,500 (6 700)	2.7 (1,3)
PMXT 2050	2.00 (50,0)	16,500 (1 865,0)	2,400,000 (271 000)	13,750 (60 500)	17.0 (80,0)	35.0 (155,0)	4,000 (17 800)	6.0 (2,7)
PMXT 2100	4.00 (100,0)	33,000 (3 729,0)	3,200,000 (362 000)	13,750 (60 500)	16.0 (69,0)	36.0 (160,0)	4,000 (17 800)	7.3 (3,3)
PMXT 2150	6.00 (150,0)	50,000 (5 650,0)	3,730,000 (421 000)	13,750 (60 500)	20.0 (87,0)	64.0 (285,0)	4,000 (17 800)	9.3 (4,2)

Catalog No./ Model	Damping Constant	A in. (mm)	A_1 in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	E_1 in. (mm)	F in. (mm)	WF in. (mm)	WL in. (mm)
PMXT 1525 IF	-1,-2,-3	5.68	6.37	(IF) 1 3/4-12 UN	.50	1.48	1.75	3.63	1.70	0.75
PMXT 1525 MF	-1,-2,-3	(144,0)	(162,0)	(MF) M45 x 1,5	(12,7)	(38,0)	(44,5)	(92,0)	(43,5)	(19,0)
PMXT 1550 IF	-1,-2,-3	7.68	8.37	(IF) 1 3/4-12 UN	.50	1.48	1.75	4.63	1.70	0.75
PMXT 1550 MF	-1,-2,-3	(195,0)	(213,0)	(MF) M45 x 1,5	(12,7)	(38,0)	(44,5)	(118,0)	(43,5)	(19,0)
PMXT 1575 IF	-1,-2,-3	9.68	10.37	(IF) 1 3/4-12 UN	.50	1.48	1.75	5.63	1.70	0.75
PMXT 1575 MF	-1,-2,-3	(246,0)	(264,0)	(MF) M45 x 1,5	(12,7)	(38,0)	(44,5)	(143,0)	(43,5)	(19,0)
PMXT 2050 IF	-1,-2,-3	8.90	9.55	(IF) 2 1/2-12 UN	.75	1.98	2.25	5.50	2.42	0.75
PMXT 2050 MF	-1,-2,-3	(226,0)	(243,0)	(MF) M64 x 2,0	(19,0)	(50,0)	(57,0)	(140,0)	(61,5)	(19,0)
PMXT 2100 IF	-1,-2,-3	12.90	13.55	(IF) 2 1/2-12 UN	.75	1.98	2.25	7.50	2.42	0.75
PMXT 2100 MF	-1,-2,-3	(328,0)	(345,0)	(MF) M64 x 2,0	(19,0)	(50,0)	(57,0)	(191,0)	(61,5)	(19,0)
PMXT 2150 IF	-1,-2,-3	17.97	18.62	(IF) 2 1/2-12 UN	.75	2.38	2.38	9.50	2.42	0.75
PMXT 2150 MF	-1,-2,-3	(956,0)	(473,0)	(MF) M64 x 2,0	(19,0)	(60,0)	(60,0)	(241,0)	(61,5)	(19,0)

Notes: 1. Dash numbers in page color are non-standard lead time items, contact Enidine.
2. See page 59 for constant damping curves.
3. Urethane striker caps are available as accessories for models PM 1525 to PM 2150.

PMXT 1525 CM → PMXT 2150 CM Series

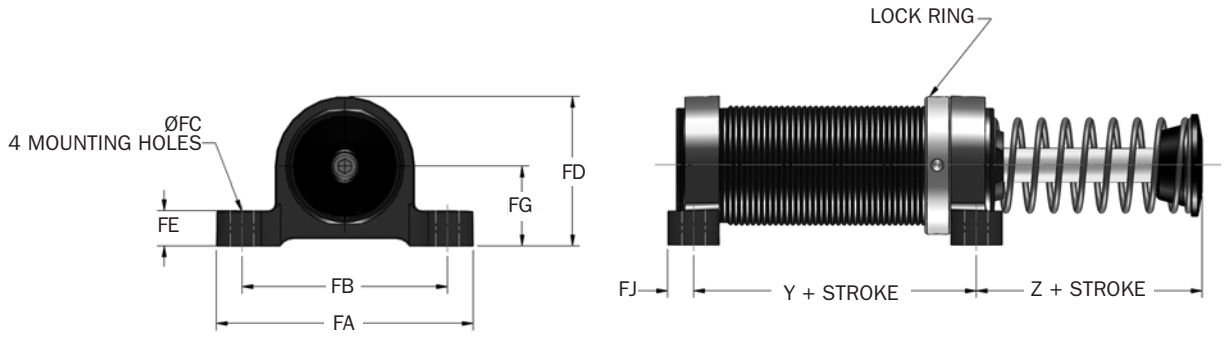
Clevis Mount



Catalog No./ Model	L in. (mm)	M +.005/-.000 (+0,13/-0,00) in. (mm)	N +.005/-.000 (+0,13/-0,00) in. (mm)	P +.000/-.010 (+0,00/-0,25) in. (mm)	Q +.000/-.010 (+0,00/-0,25) in. (mm)	S in. (mm)	T in. (mm)	U in. (mm)	V in. (mm)	W in. (mm)	Z +.020/-.000 (+0,51/-0,00) in. (mm)	CR in. (mm)	Weight (mass) lbs. (Kg)
ΔPMXT 1525 CM (S)	7.84 (199)	.376 (9,60)	.501 (12,70)	.750 (19,00)	1.00 (25,4)	2.00 (51)	1.00 (25)	1.00 (25)	1.01 (26)	.87 (22)	.505 (12,9)	.56 (14,3)	3.0 (1,36)
ΔPMXT 1550 CM (S)	9.84 (250)	.376 (9,60)	.501 (12,70)	.750 (19,00)	1.00 (25,4)	2.00 (51)	1.00 (25)	1.00 (25)	1.01 (26)	.87 (22)	.505 (12,9)	.56 (14,3)	3.2 (1,45)
ΔPMXT 1575 CM (S)	11.84 (300)	.376 (9,60)	.501 (12,70)	.750 (19,00)	1.00 (25,4)	2.00 (51)	1.00 (25)	1.00 (25)	1.01 (26)	.87 (22)	.505 (12,9)	.56 (14,3)	3.6 (1,63)
ΔPMXT 2050 CM (S)	12.06 (306)	.751 (19,07)	.751 (19,07)	1.250 (31,70)	1.50 (38,0)	2.88 (73)	1.50 (38)	1.50 (38)	1.40 (35)	1.06 (26)	.630 (16,0)	.90 (23,0)	8.2 (3,72)
ΔPMXT 2100 CM (S)	16.06 (408)	.751 (19,07)	.751 (19,07)	1.250 (31,70)	1.50 (38,0)	2.88 (73)	1.50 (38)	1.50 (38)	1.40 (35)	1.06 (26)	.630 (16,0)	.90 (23,0)	9.3 (4,22)
ΔPMXT 2150 CM (S)	21.13 (537)	.751 (19,07)	.751 (19,07)	1.250 (31,70)	1.50 (38,0)	2.88 (73)	1.50 (38)	1.50 (38)	1.40 (35)	1.06 (26)	.630 (16,0)	.90 (23,0)	11.2 (5,08)

Notes: 1. Δ= Non-standard lead time items, contact Enidine.
2. (S) indicates model comes with spring.

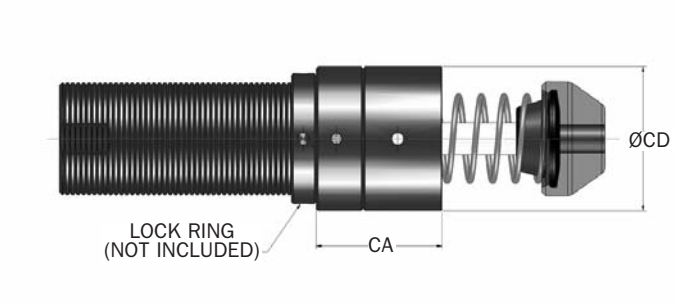
Flange Foot Mount



Catalog No./ Model	Part Number	Model (Ref)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Bolt Size in. (mm)	Kit Weight oz. (g)	Notes
FM 1 ¾ - 12	2FE2740	PMXT 1500 Series	2.38	1.06	3.75	3.00	.34	2.16	.50	1.16	.38	5/16	12.0 oz.	3
FM M45 x 1,5	2F8637	PMXT 1500M Series	(60,5)	(26,9)	(95,3)	(76,2)	(8,60)	(55,0)	(12,7)	(29,5)	(9,7)	M8	(370)	3
FM 2 ½ - 12	2FE3010	PMXXT 2000 Series	3.00	1.56	5.63	4.88	.41	3.38	.63	1.75	.44	3/8	2.3 lbs.	1,3
FM M64 x 2	2F3010	PMXT 2000M Series	(76,2)	(39,6)	(143,0)	(124,0)	(10,40)	(85,6)	(16,0)	(44,5)	(11,2)	M10	(1 050)	1,3

Notes: 1. PM 2150 Z dimension is 2.69 in.
2. Shock absorber must be ordered separately from foot mount kit.
3. All foot mount kits include two foot mounts and lock ring.

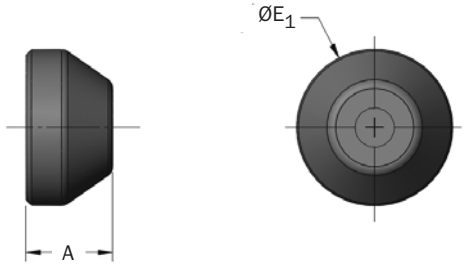
Stop Collar (SC)



Catalog No./ Model	Part Number	Model (Ref)	CA in. (mm)	CD in. (mm)	Weight (mass) oz. (g)
SC 1 ¾ - 12	8KE2940	PMXT 1500 Series	1.94	2.22	12.0
SC M45 x 1,5	8K8637	PMXT 1500M Series	(49,0)	(56,5)	(340)
SC 2 ½ - 12 x 2	8KE3010	PMXT 2050 / 2100 Series	2.47	3.00	23.0
SC M64 x 2 x 2	M93010057	PMXT 2050M Series	(89,0)	(76,0)	(936)
SC 2 ½ - 12 x 6	8KE3012	PMXT 2150 Series	3.66	3.00	35.0
SC M64 x 2 x 4	M93011057	PMXT 2100M Series	(114,0)	(76,0)	(1 191)
SC M64 x 2 x 6	M93012057	PMXT 2150M Series	(143,0)	(76,0)	(1 475)

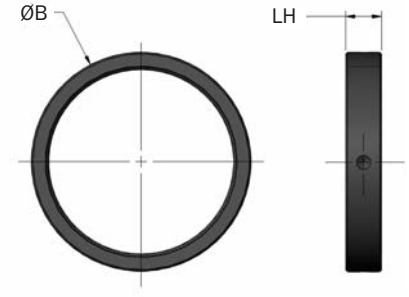
Note: 1. Part numbers in page color are non-standard lead time items, contact Enidine.

Urethane Striker Cap (USC)



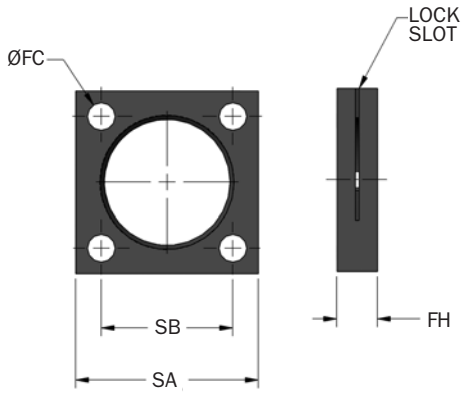
Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	E_1 in. (mm)	Weight (mass) oz. (g)
UC 2940	C92940079	PMXT 1500	.97 (24,5)	1.75 (44,5)	0.5 (14)
UC 3010	C93010079	PMXT 2000	.95 (24,0)	2.25 (57,0)	0.8 (23)

Lock Ring (LR)



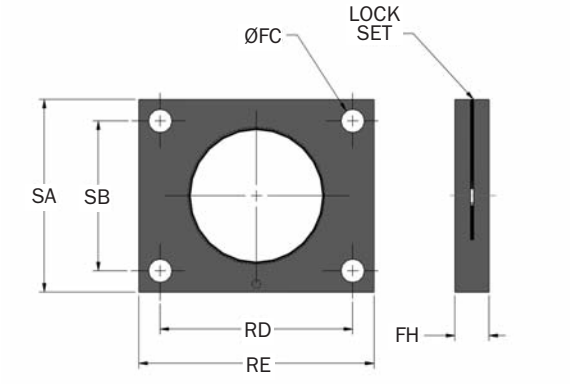
Catalog No./Model	Part Number	Model (Ref)	B in. (mm)	LH in. (mm)	Weight (mass) oz. (g)
LR 1 ¾ - 12	F8E2940049	PMXT 1500 Series	2.00	.38	2.0
LR M45 x 1,5	F88637049	PMXT 1500M Series	(57,2)	(9,5)	(75)
LR 2 ½ - 12	F8E3010049	PMXT 2000 Series	2.88	.38	3.0
LR M64 x 2	F83010049	PMXT 2000M Series	(72,9)	(12,7)	(85)

Square Flange (SF)



Catalog No./ Model	Part Number	Model (Ref)	FC in. (mm)	FH in. (mm)	SA in. (mm)	SB in. (mm)	Bolt Size in. (mm)	Weight (mass) oz. (g)
SF 1 ¾ - 12	M4E2940056	PMXT 1500 Series	.34	.50	2.25	1.63	5/16	5
SF M45 x 1,5	M48637056	PMXT 1500M Series	(8,6)	(12,7)	(57,2)	(41,3)	(M8)	(140)
SF 2 ½ - 12	M4E3010056	PMXT 2000 Series	.41	.62	3.50	2.75	⅜	20
SF M64 x 2	M43010056	PMXT 2000M Series	(10,4)	(15,7)	(85,1)	(69,9)	(M10)	(570)

Rectangular Flange (RF)

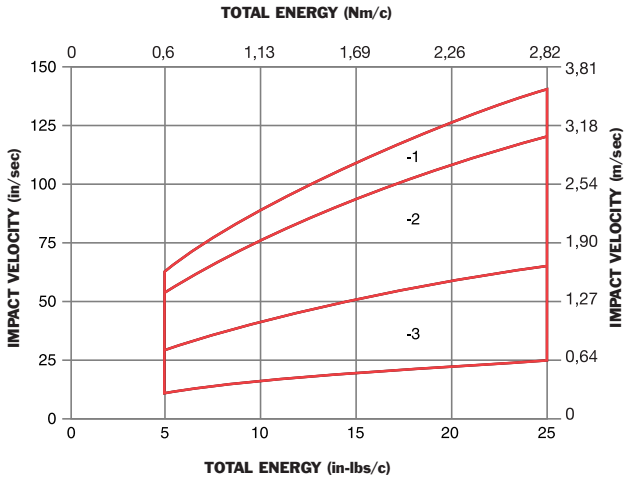


Catalog No./ Model	Part Number	FC Model (Ref)	FH in. (mm)	RD in. (mm)	RE in. (mm)	SA in. (mm)	SB in. (mm)	Size in. (mm)	Bolt (mass) in. (mm)	Wt. oz. (g)
RF 1 ¾ - 12	M5E2940053	PMXT 1500 Series	.34	.50	2.38	3.00	2.25	1.63	5/16	9
RF M45 x 1,5	M58637053	PMXT 1500M Series	(8,6)	(12,7)	(60,5)	(76,2)	(57,2)	(41,4)	(M8)	(260)

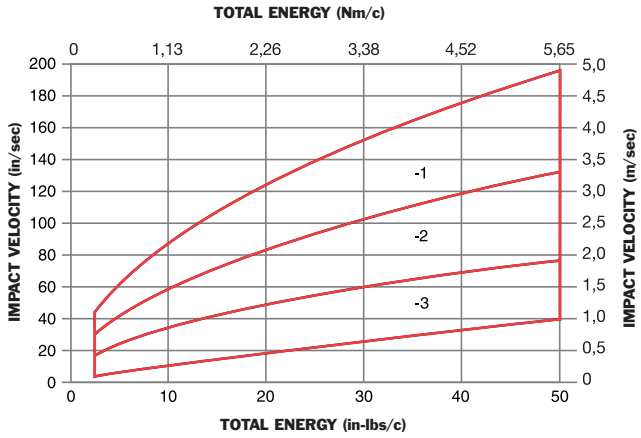
PMX 8 → SPM 25 Series

Sizing Curves

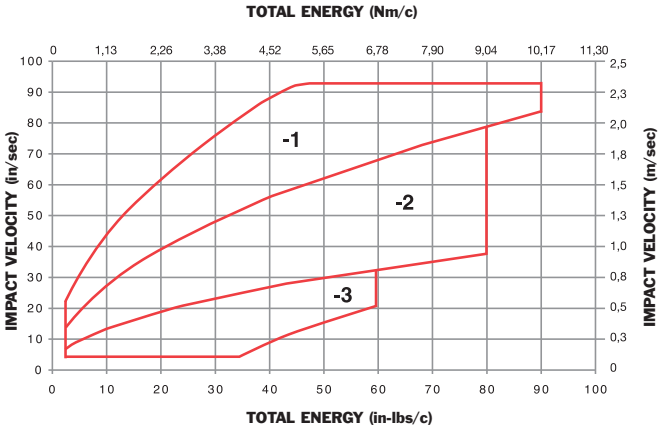
PMX 8



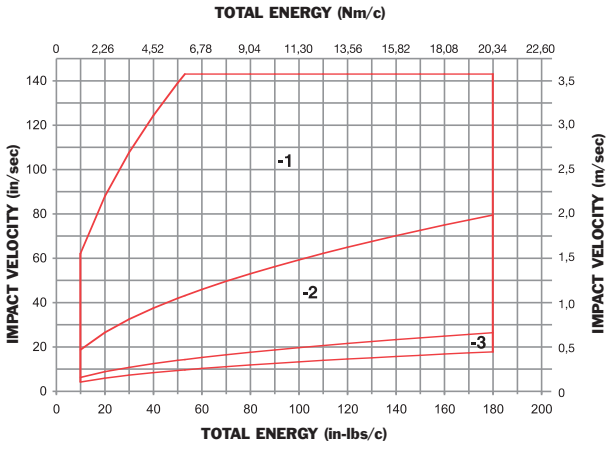
PMX 10



PM 15



SPM 25

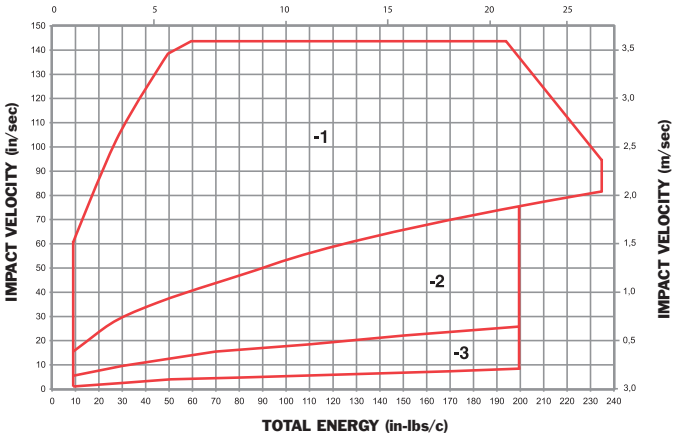


Note: Minimum impact velocity for PM models is 4 in./sec. (0,1 m/sec)

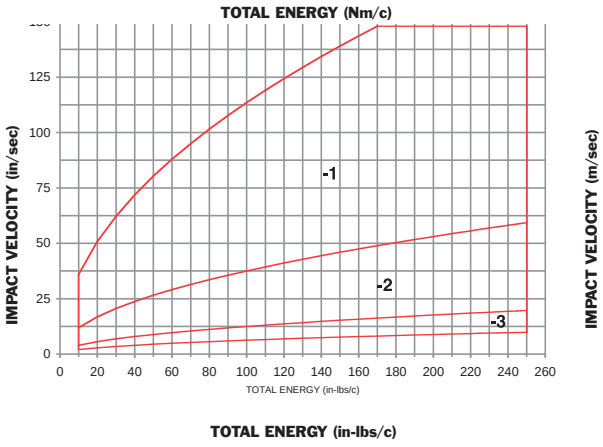
PM 25 → PM 100 Series

Sizing Curves

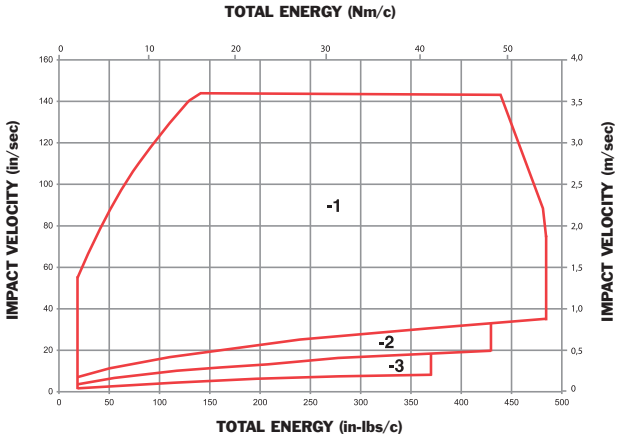
PM 25



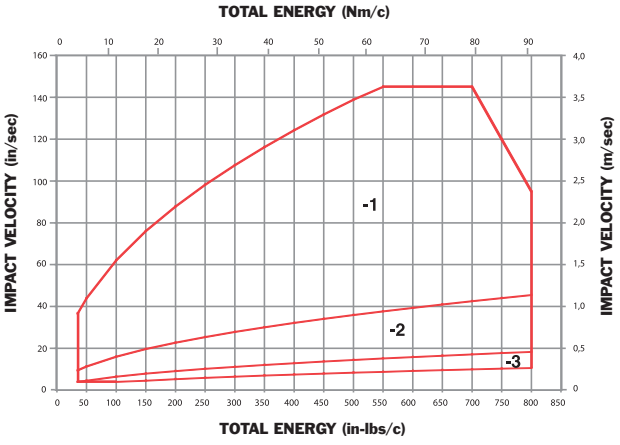
SPM 50



PM 50



PM 100



Note: Minimum impact velocity for PM models is 4 in./sec. (0,1 m/sec)

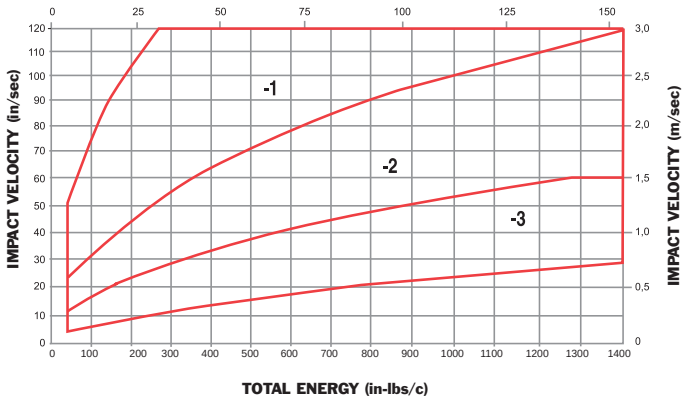
Non-Adjustable Series Hydraulic Shock Absorbers

PMXT Mid-Bore Series

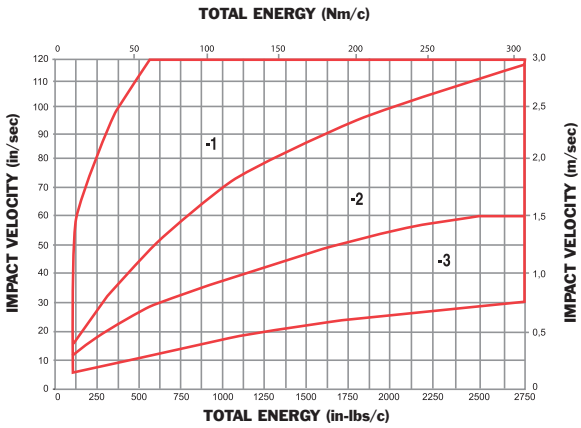
PM 120/125 → PMXT 1550 Series

Sizing Curves

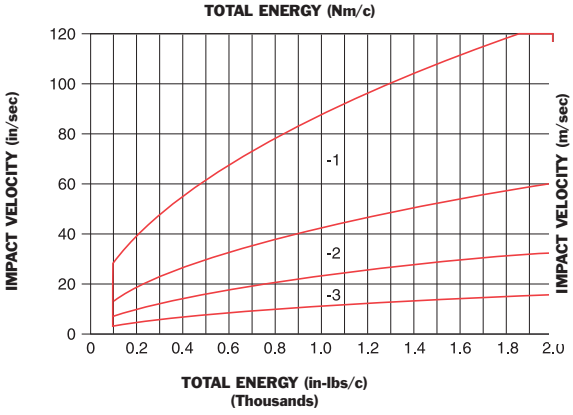
PM 120/125



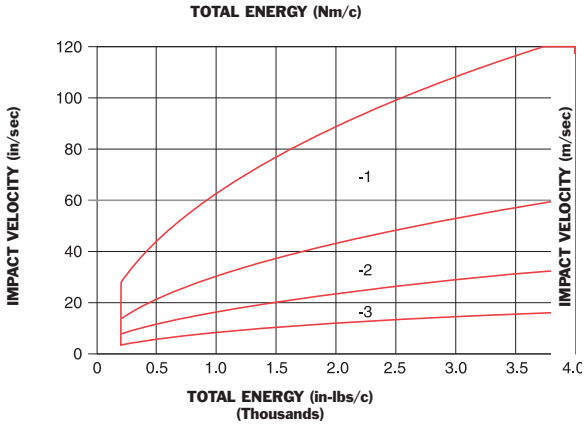
PM 220/225



PMXT 1525



PMXT 1550



Note: Minimum impact velocity for PM models is 4 in./sec. (0,1 m/sec)

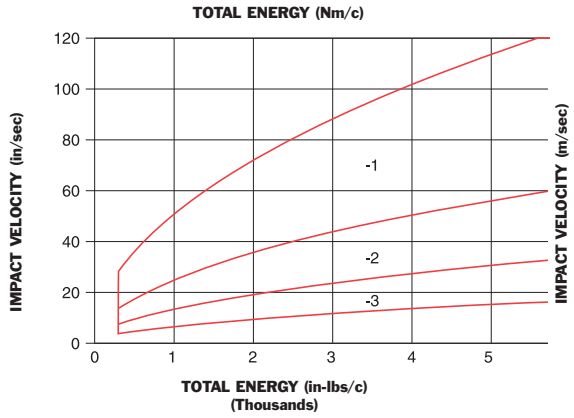
Non-Adjustable Series Hydraulic Shock Absorbers

PMXT Mid-Bore Series

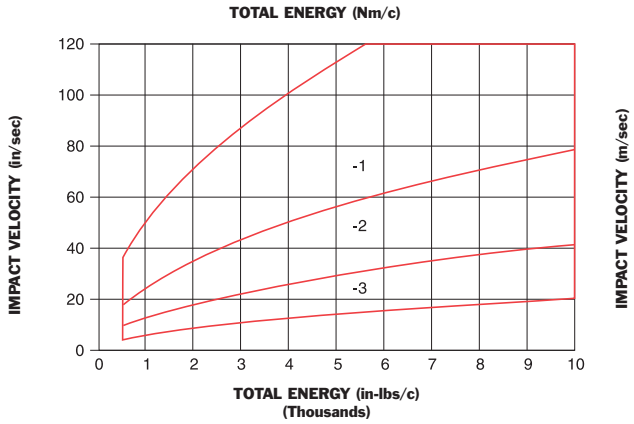
PMXT 1575 → PMXT 2150 Series

Sizing Curves

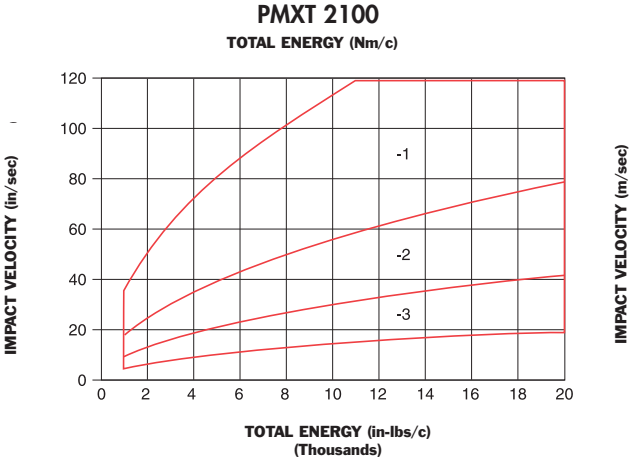
PMXT 1575



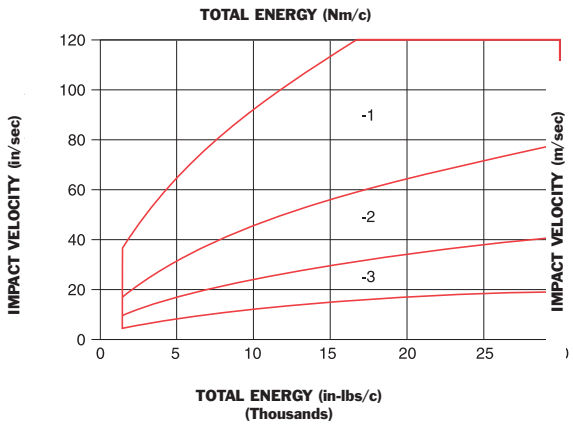
PMXT 2050



PMXT 2100



PMXT 2150

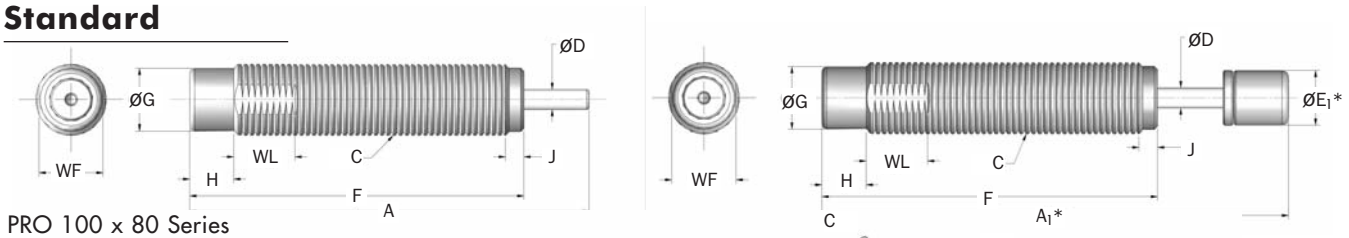


Note: Minimum impact velocity for PM models is 4 in./sec. (0,1 m/sec)

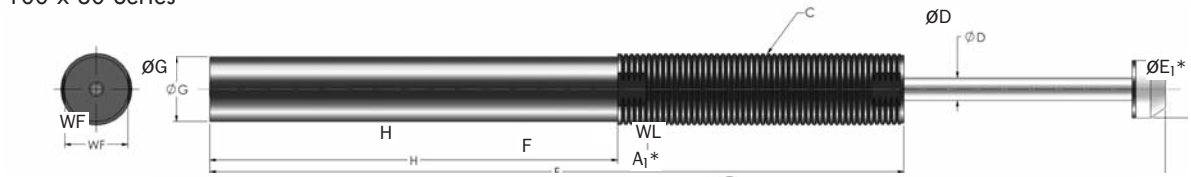
PRO 15 → PRO 100 Series

Standard

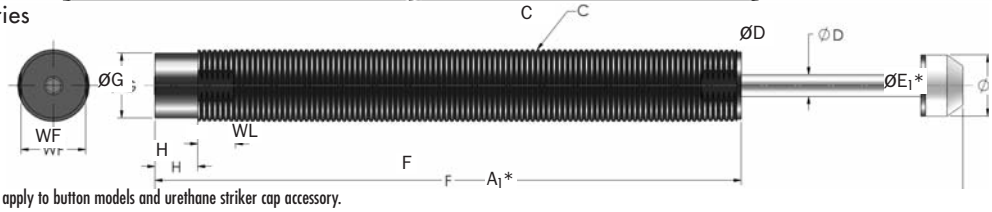
Technical Data



PRO 100 x 80 Series



PRO 100 x 50 Series



*Note: A_1 and E_1 apply to button models and urethane striker cap accessory.

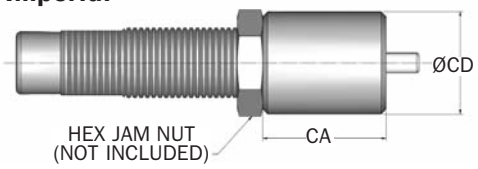
Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Shock Force lbs. (N)	(F_D) Max. Extended lbs.) (N)	Nominal Coil Spring Force		Weight (mass) oz. (g)
						Compressed lbs. (N)	Propelling Force lbs. (N)	
PRO 15 IF (B) PRO 15 MF (B) PRO 15 IC (B)	0.41 (10,4)	90 (10,0)	250,000 (28 200)	450 (2 000)	0.7 (3,0)	1.6 (7,0)	50 (220)	2.0 (56)
PRO 25 IF (B) PRO 25 MF (B)	0.63 (16,0)	235 (26,0)	300,000 (34 000)	625 (2 800)	1.0 (4,5)	2.5 (11,0)	120 (530)	2.4 (68)
PRO 25 IC (B) PRO 25 MC (B)	0.63 (16,0)	235 (26,0)	300,000 (34 000)	625 (2 800)	1.0 (4,5)	2.5 (11,0)	120 (530)	2.4 (68)
PRO 50 IF (B) PRO 50 MC (B)	0.88 (22,0)	485 (54,0)	475,000 (53 700)	850 (3 750)	2.0 (8,9)	6.8 (30,0)	200 (890)	4.8 (136)
PRO 50 MC x 50	1.97 (50)	650 (74,0)	306,000 (34 600)	750 (3 336)	2.0 (8,9)	4.7 (21)	200 (890)	14 (390)
PRO 100 IF (B) PRO 100 MF (B) PRO 100 MC (B)	1.00 (25,0) (25,0)	800 (90,0) (90,0)	622,000 (70 000) (70 000)	1,250 (5 500) (5 500)	3.0 (13,9) (13,9)	6.0 (27,0) (27,0)	350 (1 550) (1 550)	10.5 (297) (297)
PRO 100 MC x 80	3.15 (80)	2,300 (260)	761,000 (86 000)	1,500 (6 672)	4.5 (20)	10.8 (48)	350 (1 550)	20 (570)

Catalog No./ Model	Damping Constant	A (mm)	A_1 (mm)	C (mm)	D (mm)	E_1 (mm)	F (mm)	G (mm)	H (mm)	J (mm)	WF (mm)	WL (mm)
PRO 15 IF (B)	-1,-2,-3	2.45	2.85	7/16 - 28 UNEF	.12	.40	2.10	.39	.27	.10	.39	.38
PRO 15 MF (B)	-1,-2,-3	(62,2)	(72,4)	M12 x 1,0	(3,0)	(10,2)	(52,1)	(9,9)	(6,9)	(2,5)	(11,0)	(9,5)
PRO 15 IC (B)	-1,-2,-3	2.45	2.85	½ - 20 UNEF	.12	.40	2.10	.39	.27	.10	.39	.38
PRO 25 IF (B)	-1,-2,-3	3.84	4.22	½ - 20 UNF	.16	.44	3.20	.43	.30	.04	.44	.50
PRO 25 MF (B)	-1,-2,-3	(97,5)	(107,2)	M14 x 1,0	(4,0)	(11,2)	(81,3)	(10,9)	(7,6)	(1,0)	(12,0)	(12,7)
PRO 25 IC (B)	-1,-2,-3	3.84	4.22	9/16 - 18 UNF	.16	.44	3.20	.43	.30	.04	.50	.50
PRO 25 MC (B)	-1,-2,-3	(97,5)	(107,2)	M14 x 1,5	(4,0)	(11,2)	(81,3)	(10,9)	(7,6)	(1,0)	(12,0)	(12,7)
PRO 50 IF (B)	-1,-2,-3	4.66	5.13	¾ - 16 UNF	.19	.50	3.76	.64	.30	.04	.68	.50
PRO 50 MC (B)	-1,-2,-3	(118,4)	(130,3)	M20 x 1,5	(4,8)	(12,7)	(95,5)	(16,3)	(7,6)	(1,0)	(18,0)	(12,7)
PRO 50 MC x 50	-1,-2,-3 -1,-2,-3	– –	8.86 (225)	M20 x 1,5	0.24 (6)	0.67 (17)	6.38 (162)	0.71 (18,0)	0.47 (12,0)	– –	0.71 (18,0)	0.39 (10,0)
PRO 100 IF (B)	-1,-2,-3	5.07	5.57	1-12 UNF	0.25	0.62	4.04	0.87	0.50	0.18	0.88	0.50
PRO 100 MF (B)	-1,-2,-3	(128,8)	(141,5)	M25 x 1,5	(6,4)	(15,7)	(102,6)	(22,2)	(12,7)	(4,6)	(23,0)	(12,7)
PRO 100 MC (B)	-1,-2,-3	(128,8)	(141,5)	M27 x 3,0	(6,4)	(15,7)	(102,6)	(22,0)	(12,7)	(4,6)	(23,0)	(12,7)
PRO 100 MC x 80	-1,-2,-3	– –	13.19 (335)	M25 x 2,0	0.31 (8)	0.79 (20)	9.53 (242)	0.89 (22,5)	5.63 (143)	– –	0.87 (22)	0.39 (10)

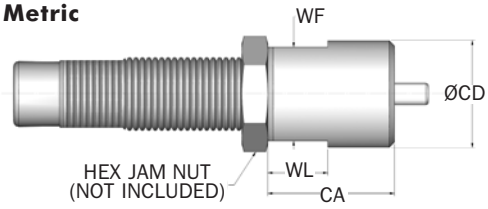
Notes: 1. See page 67 for constant damping curves. 2. (B) indicates button model of shock absorber.
3. Buttons cannot be added to non-button models or removed from button models.

Stop Collar (SC)

Imperial

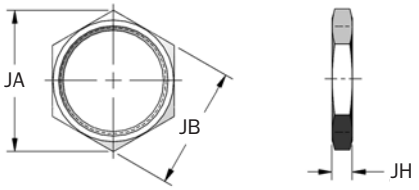


Metric



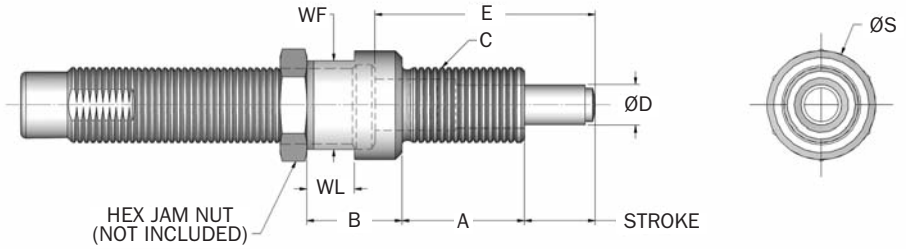
Catalog No./ Model	Part Number	Model (Ref)	CA in. (mm)	CD in. (mm)	WF in. (mm)	WL in. (mm)	Weight (mass) oz. (g)
SC 7/16 - 28	M95588057	PRO 15 (B)	0.75	.63	–	–	.5
SC M12 x 1	M930289171	PRO 15 M (B)	(19,0)	(16,0)	(14,0)	(9,0)	(14)
SC 1/2 - 20	M93935057	PRO 25 IF (B)	1.00	0.75	–	–	1.0
SC M14 x 1	M930286171	PRO 25 MF (B)	(25,4)	(18,0)	(17,0)	(12,0)	(20)
SC 9/16 - 18	M94950199	PRO 25 IC (B)	1.00	0.69	–	–	1.0
SC M14 x1,5	M930281171	PRO 25 MC (B)	(25,4)	(21,0)	(19,0)	(12,0)	(38)
SC 3/4 - 16	M92646057	PRO 50 (B)	1.50	1.00	–	–	2.0
SC M20 x 1,5	M930282171	PRO 50 M (B)	(38,0)	(25,0)	(22,0)	(12,0)	(63)
SC 1-12 x 1	M92587057	PRO 100 (B)	1.75	1.50	–	–	8.0
SC M25 x 1,5	M930284171	PRO 100 MF (B)	(44,5)	(38,0)	(32,0)	(15,0)	(215)

Jam Nut (JN)



Catalog No./ Model	Part Number	Model (Ref)	JA in. (mm)	JB in. (mm)	JH in. (mm)	Weight (mass) oz. (g)
JN 7/16 - 28	J15588034	PRO 15 (B)	0.65	0.56	.16	0.1
JN M12 x 1	J25588035	PRO 15 MF (B)	(17,3)	(15,0)	(4,0)	(2)
JN 9/16 - 18	J14950034	PRO 25 IC (B)	1.01	0.88	.31	0.6
JN M14 x 1,5	J23935035	PRO 25 MC (B)	(19,7)	(17,0)	(4,0)	(3)
JN 1/2 - 20	J13935034	PRO 25 IF (B)	0.72	0.63	.12	0.1
JN M14 x 1	J124950035	PRO 25 MF (B)	(19,7)	(17,0)	(4,0)	(3)
JN 3/4 - 16	J12646034	PRO 50 (B)	1.08	0.94	.18	0.3
JN M20 x 1,5	J22646035	PRO 50 MC (B)	(27,7)	(24,0)	(4,6)	(9)
JN 1-12	J11976034	PRO 100 (B)	1.30	1.13	.18	0.5
JN M25 x 1,5	J23004035	PRO 100 MF (B)	(37,0)	(32,0)	(4,6)	(15)

Side Load Adaptor (SLA)

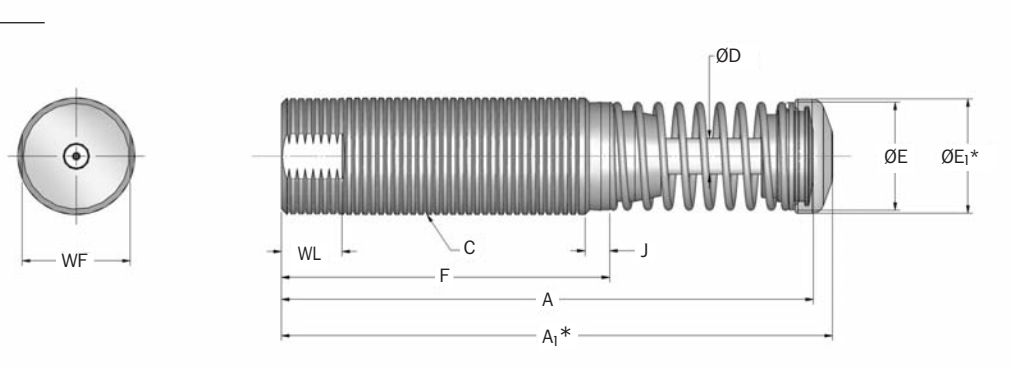


Catalog No./Model	Part Number	Model (Ref)	Stroke in. (mm)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	S in. (mm)	WF in. (mm)	WL in. (mm)
SLA 7/16 - 28 x .41	SLA 33844	PRO 15 IF (B)	.41	.71	.55	7/16 - 28 UNEF	.24	1.28	.63	.56	.28
SLA 12 MF	SLA 33299	PRO 15 MF (B)	(10,0)	(18)	(14)	M12 x 1	(6,0)	(32,4)	(14,0)	(13,0)	(7,0)
SLA 1/2 - 20 x .41	SLA 71146	PRO 15 IC (B)	.41	.71	.55	1/2 - 20 UNF	.24	1.28	.63	.56	.28
SLA 1/2 - 20 x .63	SLA 33849	PRO 25 IF (B)	.63	1.02	.51	1/2 - 20 UNF	.31	1.62	.71	.63	.28
SLA 14 MF	SLA 33297	PRO 25 MF (B)	(16)	(26)	(13)	M14 x 1	(8,0)	(45,2)	(18,0)	(15,0)	(7,0)
SLA 9/16 - 18 x .63	SLA 33850	PRO 25 IC (B)	.63	1.02	.51	9/16 - 18 UNF	.31	1.62	.71	.63	.28
SLA 14 MC	SLA 33298	PRO 25 MC (B)	(12,7)	(20)	(16)	M14 x 1,5	(8,0)	(45,2)	(18,0)	(15,0)	(7,0)
SLA 3/4 - 16 x .88	SLA 33851	PRO 50 (B)	.88	1.26	.67	3/4 - 16 UNF	.43	2.44	.98	.88	.28
SLA 20 MC	SLA 33302	PRO 50 M (B)	(22,0)	(32)	(17)	M20 x 1,5	(11,0)	(62)	(25,0)	(22,0)	(7,0)
SLA 1-12 x 1	SLA 33848	PRO 100 (B)	1.00	1.50	1.18	1-12 UNF	.59	2.88	1.42	1.25	.39
SLA 25 MF	SLA 33263	PRO 100 MF (B)	(25,4)	(38)	(30)	M25 x 1,5	(15,0)	(73,2)	(36,0)	(32,0)	(7,0)
SLA 27 MC	SLA 33296	PRO 100 MC (B)	(25,4)	(38)	(30)	M27 x 3	(15,0)	(73,2)	(36,0)	(32,0)	(10,0)

Notes: 1. Maximum sideload angle is 30°
2. Do Not use with button models.
3. Part numbers in page color are non-standard lead time items, contact Enidine.

PRO 110 → PRO 225 Series

Standard



*Note: A_1 and E_1 apply to button models and urethane striker cap accessory.

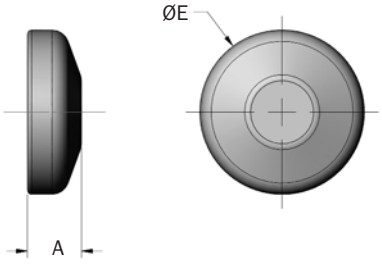
Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/h)	(F_P) Max. Shock Force lbs. (N)	Nominal Coil Spring Force		(F_D) Max. Propelling Force lbs. (N)	Weight (mass) oz. (g)
					Extended lbs. (N)	Compressed lbs. (N)		
PRO 110 IF	1.56	1,700	670,000	1,700	4.0	11.0	500	16.0
PRO 110 MF	(40,0)	(190,0)	(75 700)	(7 500)	(18,0)	(49,0)	(2 220)	(454)
PRO 110 MC	(40,0)	(190,0)	(75 700)	(7 500)	(18,0)	(49,0)	(2 220)	(454)
PRO 120 IF	1.00	1,400	670,000	2,500	12.5	20.0	500	17.0
PRO 120 MF	(25,0)	(160,0)	(75 700)	(11 120)	(56,0)	(89,0)	(2 220)	(482)
PRO 125 IF	1.00	1,400	774,000	2,500	12.5	20.0	500	17.0
PRO 125 MF	(25,0)	(160,0)	(87 500)	(11 120)	(56,0)	(89,0)	(2 220)	(482)
PRO 220 IF	2.00	2,750	800,000	2,500	7.0	20.0	500	26.0
PRO 220 MF	(50,0)	(310,0)	(90 300)	(11 120)	(31,0)	(89,0)	(2 220)	(737)
PRO 225 IF	2.00	2,750	900,000	2,500	7.0	20.0	500	26.0
PRO 225 MF	(50,0)	(310,0)	(111 000)	(11 120)	(31,0)	(89,0)	(2 220)	(737)

Note: See page 68 for constant damping curves.

Catalog No./ Model	Damping Constant	A (mm)	A_1 (mm)	C (mm)	D (mm)	E (mm)	E_1 (mm)	F (mm)	J (mm)	WF (mm)	WL (mm)
PRO 110 IF	-1, -2, -3	7.93	8.06	1-12 UNF	.31	0.88	0.88	5.00	.06	–	–
PRO 110 MF	-1, -2, -3	(201,4)	(204,7)	M25 x 1,5	(8,0)	(22,2)	(22,2)	(127,0)	(1,5)	–	–
PRO 110 MC	-1, -2, -3	(201,4)	(204,7)	M25 x 2,0	(8,0)	(22,2)	(22,2)	(127,0)	(1,5)	–	–
PRO 120 IF	-1, -2, -3	5.52	5.72	1 ¼ - 12 UNF	.38	1.13	1.20	3.41	.21	1.12	.63
PRO 120 MF	-1, -2, -3	(140,2)	(145,3)	M33 x 1,5	(9,5)	(29,0)	(30,5)	(87,0)	(5,3)	(30,0)	(16,0)
PRO 125 IF	-1, -2, -3	5.52	5.72	1 ⅜ - 12 UNF	.38	1.13	1.20	3.41	.21	1.25	.63
PRO 125 MF	-1, -2, -3	(140,2)	(145,3)	M36 x 1,5	(9,5)	(29,0)	(30,5)	(87,0)	(5,3)	(33,0)	(16,0)
PRO 220 IF	-1, -2, -3	8.14	8.34	1 ¼ - 12 UNF	.38	1.13	1.20	5.03	.21	1.12	.63
PRO 220 MF	-1, -2, -3	(207,0)	(212,0)	M33 x 1,5	(9,5)	(29,0)	(30,5)	(128,0)	(5,3)	(30,0)	(16,0)
PRO 225 IF	-1, -2, -3	8.14	8.34	1 ⅜ - 12 UNF	.38	1.13	1.20	5.03	.21	1.25	.63
PRO 225 MF	-1, -2, -3	(207,0)	(212,0)	M36 x 1,5	(9,5)	(29,0)	(30,5)	(128,0)	(5,3)	(33,0)	(16,0)

Notes: 1. Dash numbers in page color are non-standard lead time items, contact Enidine. 2. Urethane striker caps are available as accessories.

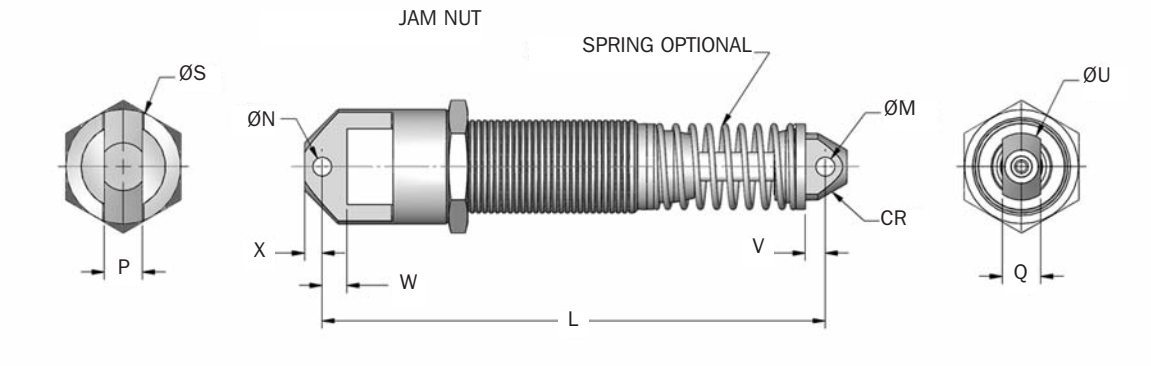
Urethane Striker Cap (USC)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	E_1 in. (mm)	Weight (mass) oz. (g)
UC 5568	C95568079	PRO 110	.39 (10,0)	0.88 (22,0)	0.1 (3)
UC 8609	C98609079	PRO 120,125, 220 & 225	.39 (10,0)	1.20 (30,5)	0.1 (3)

PRO 110 → PRO 225 Series

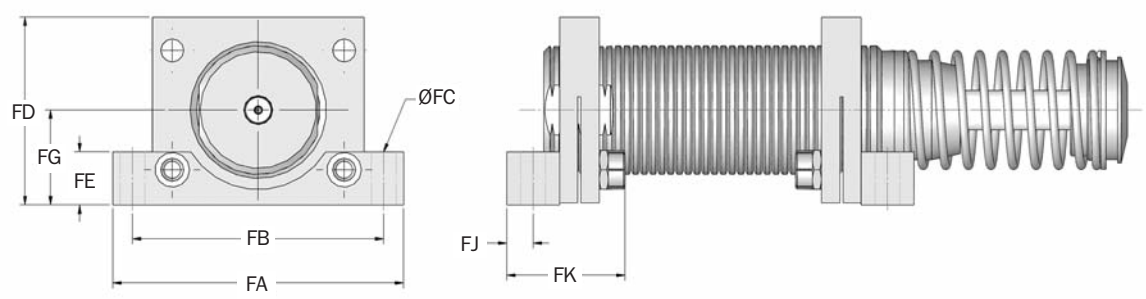
Clevis Mount



Catalog No./ Model	L in. (mm)	M +.005/-.000 in. (mm)	N +.005/-.000 in. (mm)	P +.000/-.010 in. (mm)	Q +.000/-.010 in. (mm)	S in. (mm)	U in. (mm)	V in. (mm)	W in. (mm)	X in. (mm)	CR in. (mm)	Weight (mass) lbs. (Kg)
ΔPRO 110 CM (S)	8.32 (211)	.197 (5,00)	.251 (5,00)	.375 (8,00)	.315 (8,00)	1.25 (28)	.88 (22)	.42 (11)	.51 (13)	.25 (5,0)	.25 (7,0)	1.2 (0,54)
ΔPRO 120 CM (S)	6.59 (167)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (23)	.23 (6)	.48 (12)	.31 (6,1)	.44 (11,2)	1.3 (0,59)
ΔPRO 125 CM (S)	6.59 (180)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (22)	.23 (6)	.93 (24)	.23 (6,0)	.44 (11,2)	1.6 (0,73)
ΔPRO 220 CM (S)	9.22 (234)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (23)	.23 (6)	.48 (12)	.31 (6,1)	.44 (11,2)	1.7 (0,77)
ΔPRO 225 CM (S)	9.22 (230)	.251 (6,38)	.251 (6,38)	.500 (12,70)	.500 (12,70)	1.50 (38)	.88 (22)	.23 (6)	.93 (24)	.23 (6,0)	.44 (11,2)	1.9 (0,86)

Notes: 1. (S) indicates model comes with spring. 2. Δ = Non-standard lead time items, contact Enidine.

Flange Foot Mount

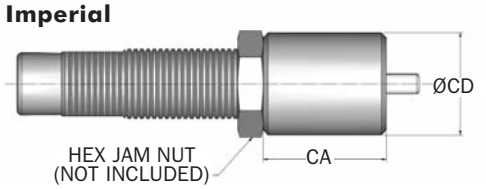


Catalog No./ Model	Part Number	Model (Ref)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	FK in. (mm)	Bolt Size in. (mm)	Kit Weight oz. (g)	Notes
FM 1 ¼ - 12	2F21049305	PRO 120 /220	2.25	1.25	2.75	2.38	.23	1.77	.50	.90	.25	.88	#10	4.0 oz	2
FM 33 x 1,5	2F21049306	PRO 120 M/220 M	(57,2)	(31,8)	(70,0)	(60,3)	(5,90)	(45,0)	(12,7)	(22,7)	(6,4)	(22,2)	(M5)	(100)	
FM 1 ⅜ - 12	2F21293305	PRO 120 /220	2.25	1.25	2.75	2.38	.23	1.77	.50	.90	.25	.88	#10	4.0 oz	1,2
FM 36 x 1,5	2F21293306	PRO 120 /220 M	(57,2)	(31,8)	(70,0)	(60,3)	(5,90)	(45,0)	(12,7)	(22,7)	(6,4)	(22,2)	(M5)	(100)	

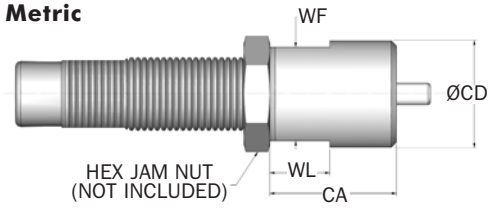
Notes: 1. Shock absorber must be ordered separately from foot mount kit.
2. All foot mount kits include two foot mounts

Stop Collar (SC)

Imperial

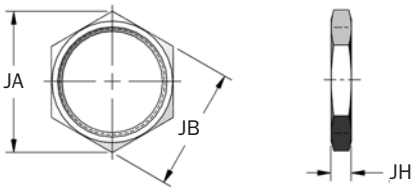


Metric



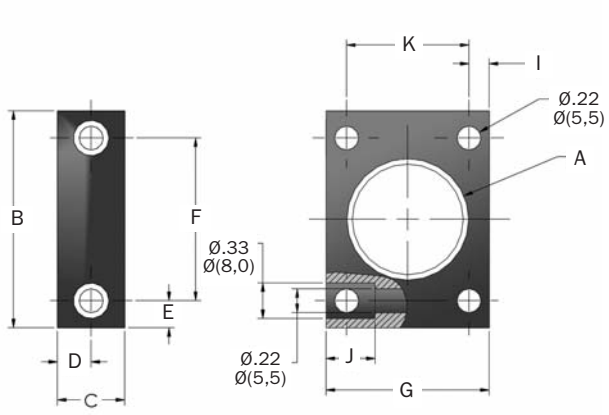
Catalog No./ Model	Part Number	Model (Ref)	CA in. (mm)	CD in. (mm)	WF in. (mm)	WL in. (mm)	Weight (mass) oz. (g)
SC 1-12 x 1.56	M95568181	PRO 110	2.00	1.50	–	–	8.0
SC M25 x 1,5 x 40	M931291171	PRO 110 MF	(44,5)	(38,0)	(32,0)	(15,0)	(215)
SC M25 x 1,5	M930284171	PRO 110 MC	(44,5)	(38,0)	(32,0)	(15,0)	(215)
SC 1 ¼ - 12	M921049057	PRO 120/220	2.50	1.50	–	–	7.0
SC M33 x 1,5	M930290171	PRO 120/220 M	(41,0)	(38,0)	(36,0)	(17,0)	(210)
SC 1 ⅜ - 12	M921293057	PRO 120/220	2.50	1.50	–	–	7.0
SC M36 x 1,5	M930285058	PRO 120/220 M	(41,0)	(38,0)	(41,0)	(18,0)	(210)

Jam Nut (JN)



Catalog No./ Model	Part Number	Model (Ref)	JA in. (mm)	JB in. (mm)	JH in. (mm)	Weight (mass) oz. (g)
JN 1-12	J11976034	PRO 110	1.30	1.13	.18	0.5
JN 25 x 1,5	J23004035	PRO 110 MF	(37,0)	(32,0)	(4,6)	(15)
JN 25 x 2	J25568035	PRO 110 MC	(37,0)	(32,0)	(4,6)	(15)
JN 1 ⅜ - 12	J13164034	PRO 120/220	1.88	1.63	.25	0.9
JN 33 x 1,5	J28609035	PRO 120/220 M	(47,3)	(41,0)	(6,4)	(27)
JN 36 x 1,5	J23164035	PRO 125/225 M	(47,3)	(41,0)	(6,4)	(27)

Universal Retaining Flange (UF)



Catalog No./ Model	Part Number	Model (Ref)	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	I in. (mm)	J in. (mm)	K in. (mm)
UF 1-12	U19599095	PRO 100/110	1-12 UNF	2.00	.62	.31	.25	1.50	1.50	.19	.45	1.12
UF M25 x 1,5*	U13004143	PRO 110 M	M25 x 1,5	(48)	(16,0)	(8,0)	(6.5)	(35,0)	(35,0)	(4,75)	(10,0)	(25,5)
UF M25 x 2*	U15568143	PRO 110 MC	M25 x 2									

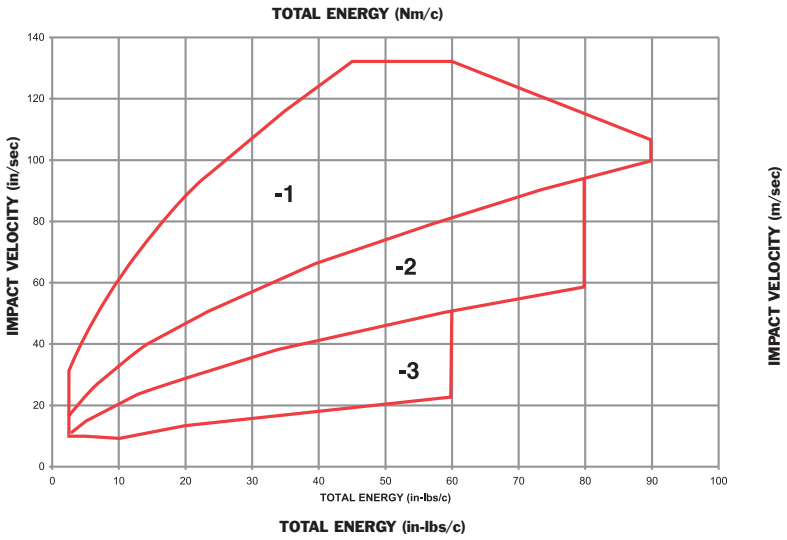
Note: *Please use Enidine jam nuts only.

Non-Adjustable Series Hydraulic Shock Absorbers
PM Series

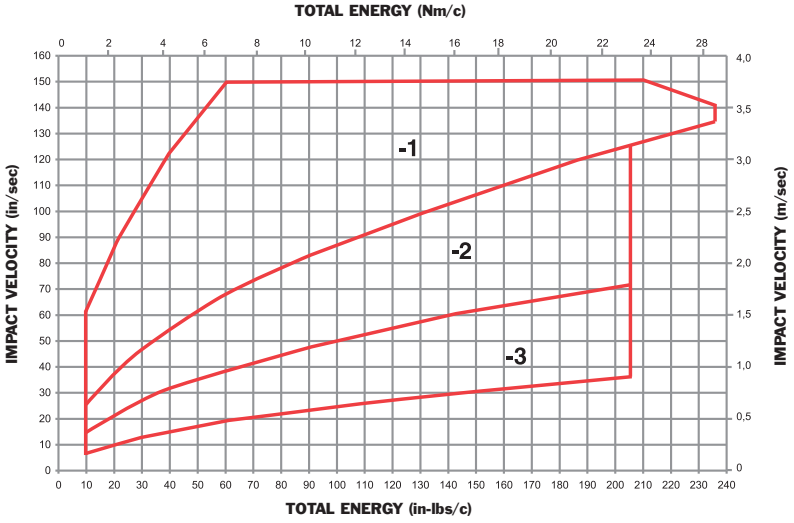
PRO 15 → PRO 50 Series

Sizing Curves

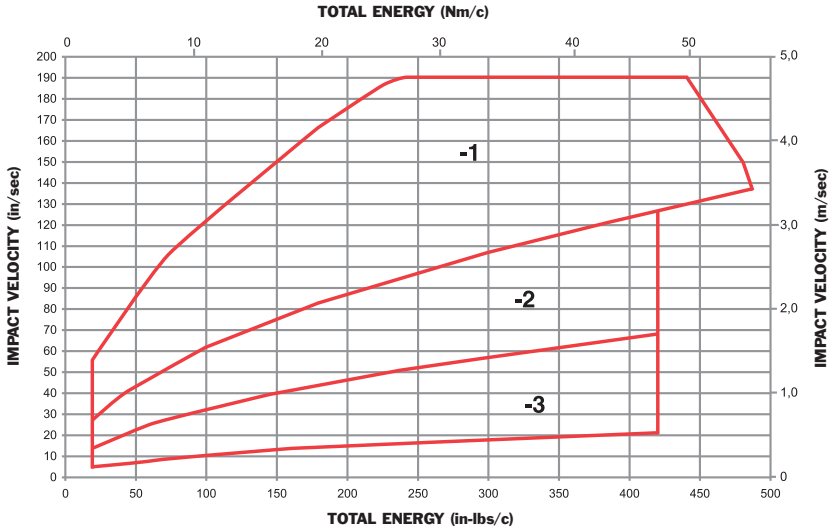
PRO 15



PRO 25



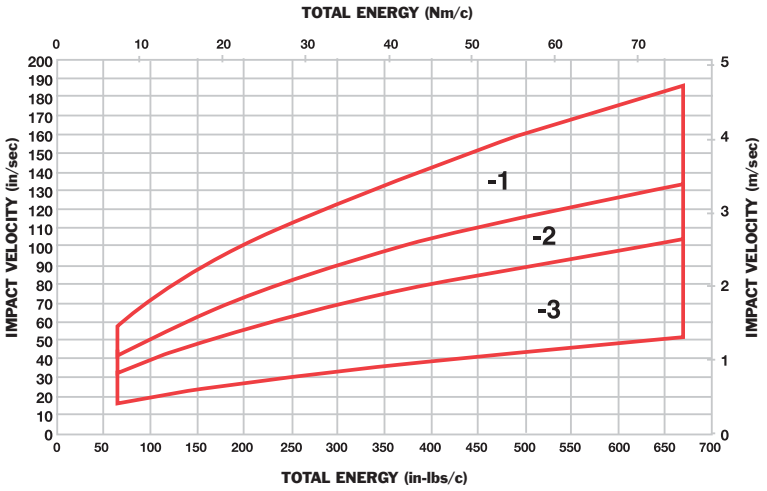
PRO 50



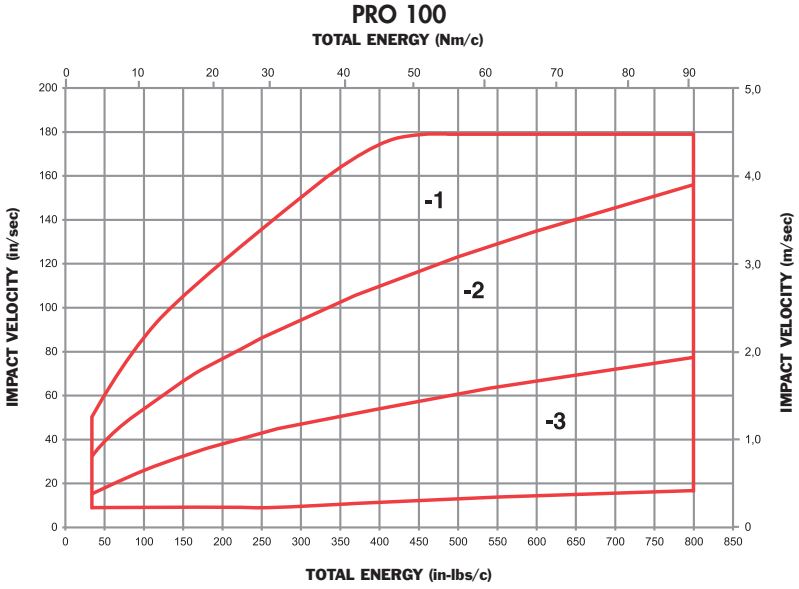
PRO 50 x 50 → PRO 100 x 80 Series

Sizing Curves

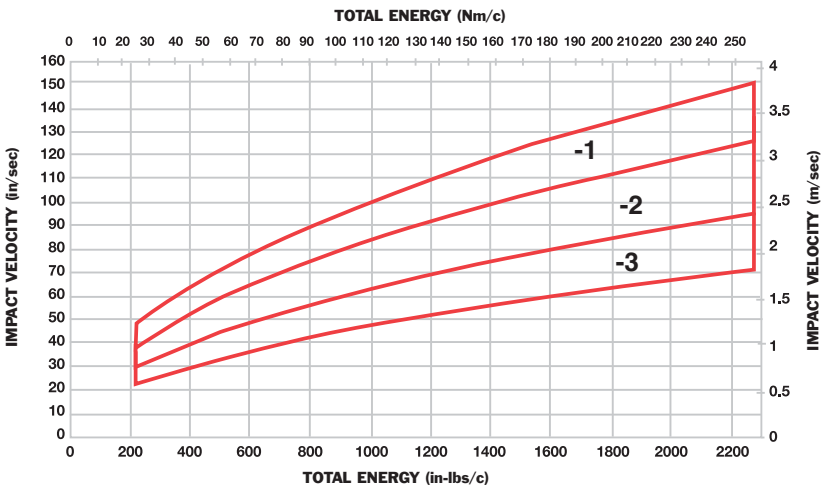
PRO 50 x 50



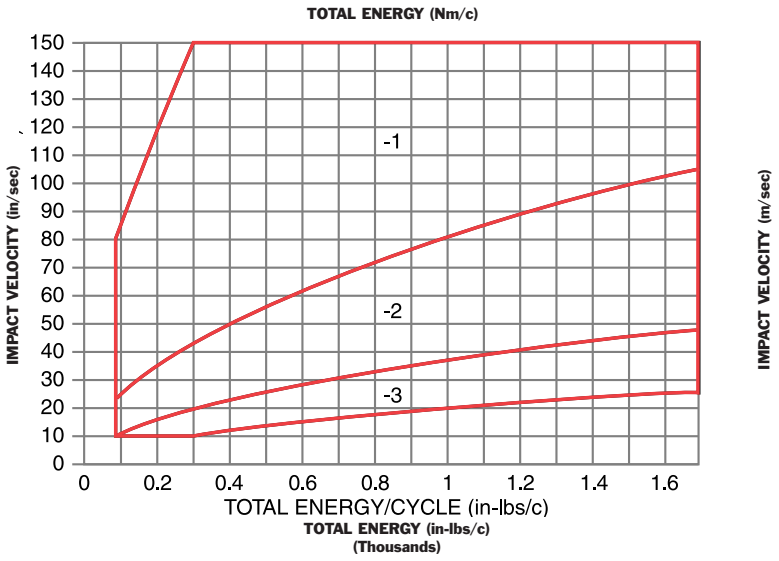
PRO 100



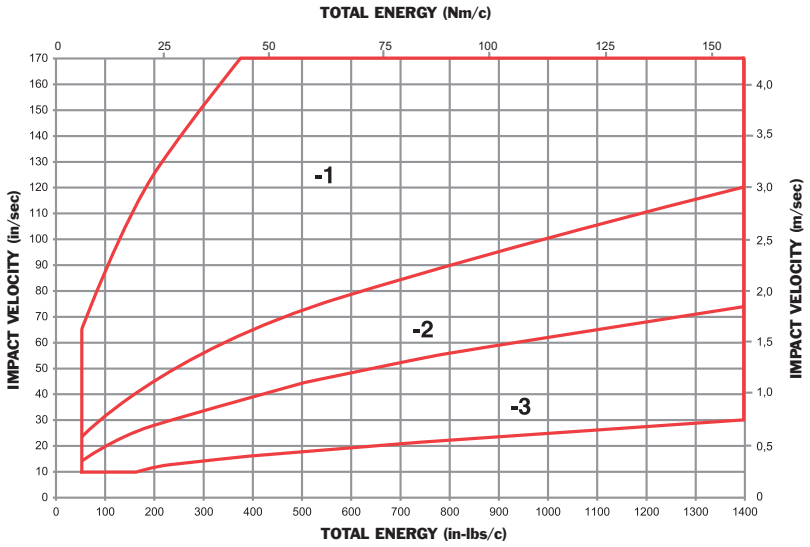
PRO 100 x 80



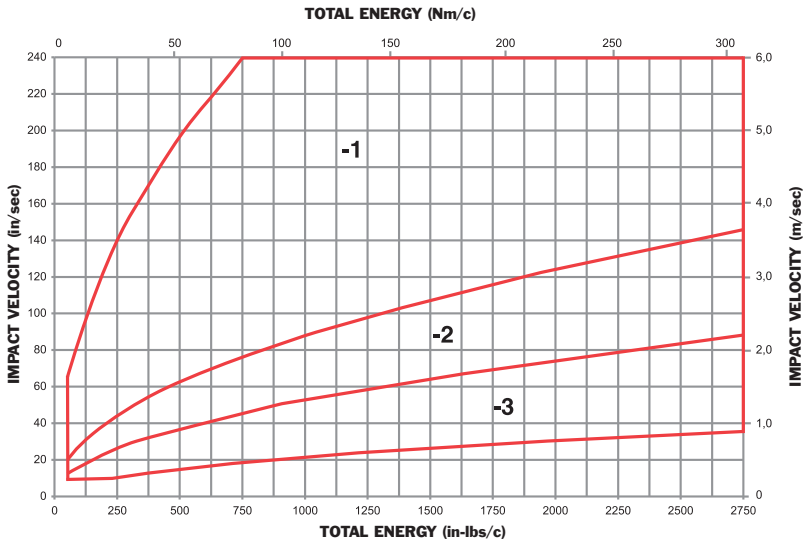
PRO 110



PRO 125



PRO 225



Heavy Duty Shock Absorbers
HD, HDA Series

Overview

Enidine Heavy Duty Series (HD/HDA) large-bore hydraulic shock absorbers protect equipment from large impacts in applications such as automated storage and retrieval systems, as well as overhead bridge and trolley cranes.

They are available in a wide variety of stroke lengths and damping characteristics to increase equipment life and meet stringent deceleration requirements.

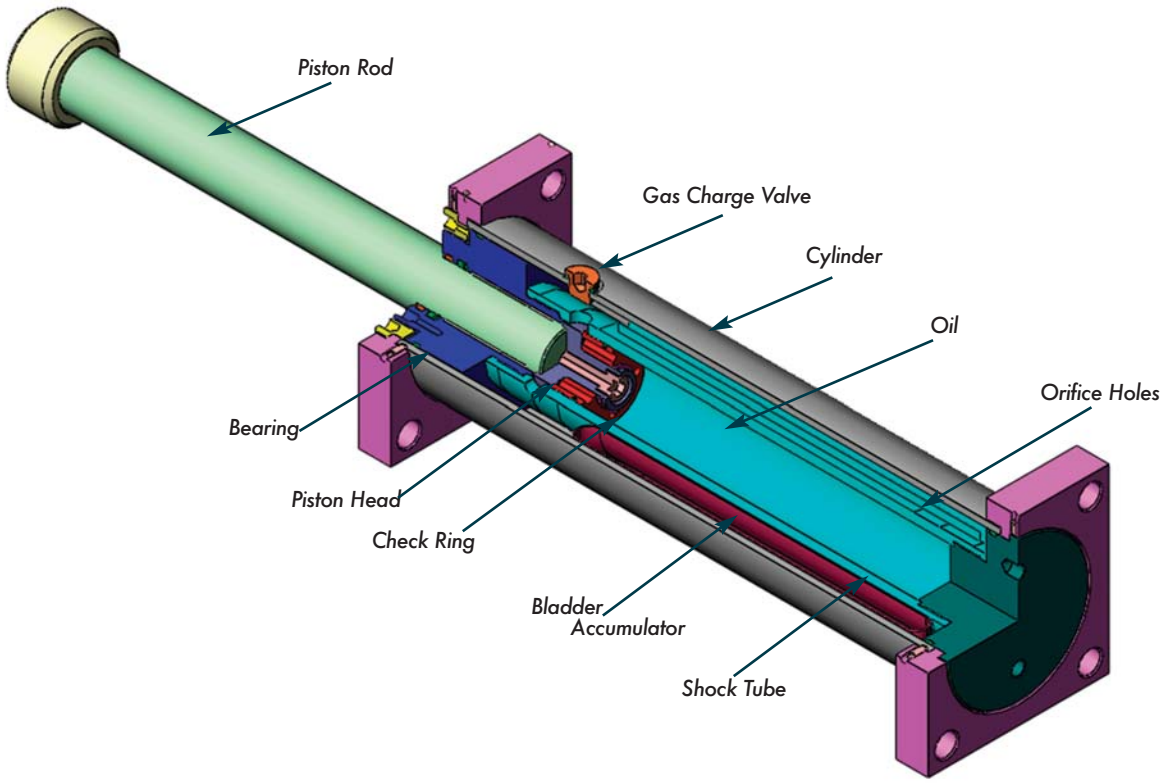
HD Series
Custom-orificed design accommodates specified damping requirements. Computer generated output performance simulation is used to optimize the orifice configuration. Available in standard bore dimensions of up to 6 in. (150mm) and strokes over 60 in. (1525mm).

HDA Series
Adjustable units enable the user to modify shock absorber resistance to accommodate load velocity variations, with strokes up to 12in. (305mm). Standard adjustable configurations available. Special bore sizes and strokes for both HD and HDA Series models are available upon request.

Features and Benefits

- Compact design smoothly and safely decelerates large energy capacity loads up to 8,000,000 in-lbs. per cycle (903 880 Nm)
- Engineered to meet OSHA, AISE, CMMA and other safety specifications such as DIN and FEM.
- Internal air charged bladder accumulator replaces mechanical return springs, providing shorter overall length and reduced weight.
- Wide variety of optional configurations including bellows, clevis mounts and safety cables.
- Available in standard adjustable or custom-orificed non-adjustable models.
- Zinc plated external components provide enhanced corrosion protection.
- Epoxy painting and special rod materials are available for use in highly corrosive environments.
- All sizes are fully field repairable.
- Piston rod extension sensor systems available for reuse safety requirements.
- Incorporating optional fluids and seal packages can expand standard operating temperature range from 15°F to 140°F to -30°F to 210°F (-10°C to 60°C) to (-35°C to 100°C)

Enidine Heavy Duty (HD) Large-bore Series Shock Absorbers



The Enidine HD/HDA Series is a large-bore, multi-orifice family of shock absorbers which incorporates a double cylinder arrangement with space between the concentric shock tube and cylinder, and a series of orifice holes drilled down the length of the shock tube wall.

During piston movement, the check ring is seated and oil is forced through the orifices in the shock tube wall, into the gas charged bladder/accumulator area, and behind the piston head. The orifice area decreases as the piston moves and closes the orifice holes. The bladder/accumulator is also compressed by the oil during the compression stroke, which compensates for the fluid displaced by the piston rod during compression.

During repositioning, the pressure from the bladder/accumulator pushes the piston rod outward. This unseats the check ring and permits oil to flow rapidly through the piston head into the front of the shock tube. The unique gas-charged bladder accumulator replaces mechanical return springs, decreasing overall product size and weight.

The HD/HDA Series can provide conventional, progressive or self-compensating damping. Their compact, heavy-duty design safely and effectively decelerates large moving loads, with energy capacities of up to 8,000,000 in-lbs. per cycle (903 880 Nm).

HD/HDA Sizing Examples

1. Determine load weight (lbs. or Kg), impact velocity (in./sec or m/s), propelling force (lbs. or N) if any, cycles per hour and stroke (in. or mm) required.
2. Calculate total energy per cycle (in.-lbs./c or Nm/c) and total energy per hour (in.-lbs./hr or Nm/hr). Consult this catalog's sizing examples (pages 5-6) for assistance, if required.
3. Compare the calculated total energy per cycle (in-lbs./c or Nm/c) and total energy per hour (in.-lbs./hr or Nm/hr), to the values listed in the HD/HDA Series Engineering Data charts. For HDA selection, the impact velocity must be below 130 in./sec. (3.3 m/s).
4. Select the appropriate HD/HDA Series model.

Example: Horizontal Application

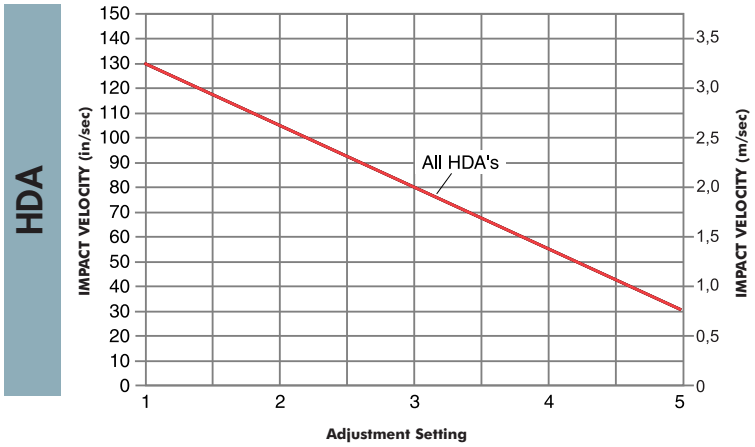
1. Weight (W): 55,000 lbs. (24 950 Kg)
   Velocity (V): 43 in./sec. (1,1 m/s)
   Propelling Force (F_D): 6,700 lbs. (29 803 N)
   Cycles/Hour (C): 10 cycles/hr
   Stroke (S): 5 in. (127 mm)

2. Total Energy/Cycle (E_T): 165,229 in.-lbs./c (18 6668 Nm/c)
   Total Energy/Hour (E_TC): 1,652,290 in.-lbs./hr (18 6668 Nm/h)

3. Compare total energy per cycle and total energy per hour to the HD/HDA Series Engineering Data charts (pages 13-27).
4. Selection: HD 3.0 x 5 (HDA is not appropriate because maximum in.-lbs. per cycle (Nm per cycle) are exceeded).

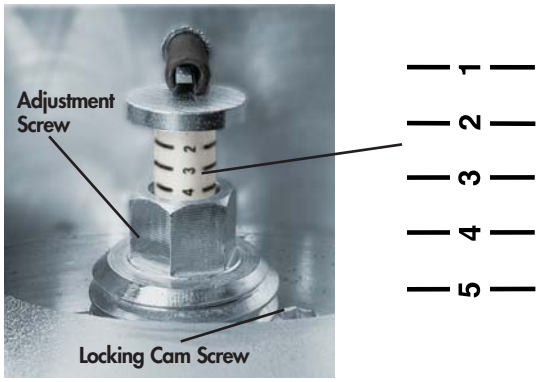
Adjustment Techniques

Useable Adjustment Setting Range



Damping Force

Position 1 provides minimum damping force.
Position 5 provides maximum damping force.



Adjustment is accomplished by turning the adjustment screw. Once the desired setting has been reached, lock in place by tightening the locking cam screw.

After properly sizing an HDA shock absorber, the useable range of adjustment settings can be determined:

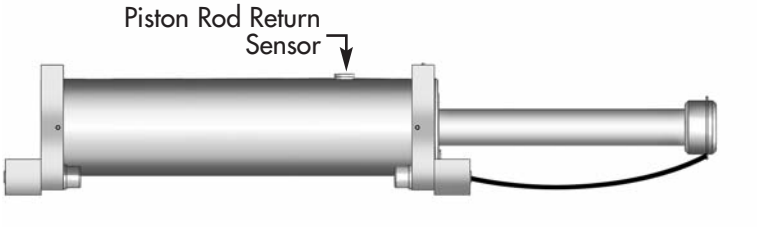
1. Locate the intersection point of the application's impact velocity and the HDA model graph line.
2. The intersection is the maximum adjustment setting to be used. Adjustments exceeding this setting could overload the shock absorber.
3. The useable adjustment setting range is from setting 1 to the MAXIMUM adjustment setting as determined in step 2.

EXAMPLE: HDA Series

1. Impact Velocity:	80 in./sec. (2 m/s)
2. Intersection Point:	Adjustment Setting 3
3. Useable Adjustment Setting Range:	1 to 3

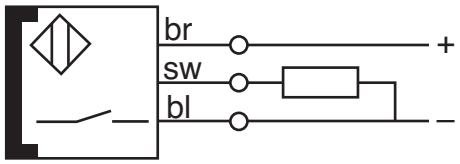
Optional Piston Rod Return Sensor

- Magnetic proximity sensor indicates complete piston rod return with 10-foot (3 m) long cable.
- If complete piston rod does not return the circuit remains open. This can be used to trigger a system shut-off.
- Contact Enidine for other available sensor types.



FM: Front and Rear Foot Mount
Also shown is optional safety cable, typically used in overhead applications.

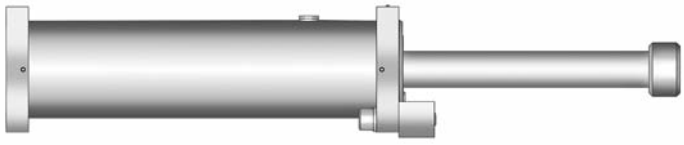
Sensor Specifications



- Voltage 10 - 30V
- Load Current ≤ 200 mA
- Leakage Current ≤ 80 mA
- Load Capacitance ≤ 1.0 mF
- Ambient Temperature: -15° to 160°F (-40° to 71°C)

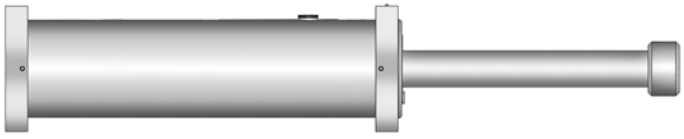
Ordering Information

Typical mounting methods are shown below. Special mounting requirements can be accommodated upon request.

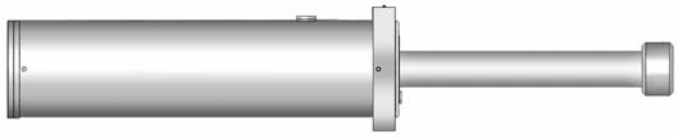


TM: Rear Flange Front Foot Mount

FM: Front and Rear Foot Mount
Also shown is optional safety cable, typically used in overhead applications.

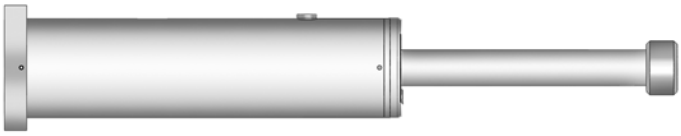


TF: Front and Rear Flanges



FF: Front Flange

CJ/CM: Clevis Mount



FR: Rear Flange

Note: Rear flange mounting not recommended for stroke lengths above 12 inches (300 mm).

Shock Absorbers

Note: HD models are custom-orificed, therefore all information must be provided to Enidine for unique part number assignment.

Example:

4 — Select quantity

HD 3.0 x 5 — Select HD (Non-Adjustable) or HDA (Adjustable) Catalog No. from Engineering Data Chart

TM — Select mounting method

- TM (Rear flange front foot mount)
- FM (Front and rear foot mount)
- TF (Front and rear flanges)
- FF (Front flange)
- FR (Rear flange)
- CJ (Imperial clevis mount)
- CM (Metric clevis mount)

C — Options

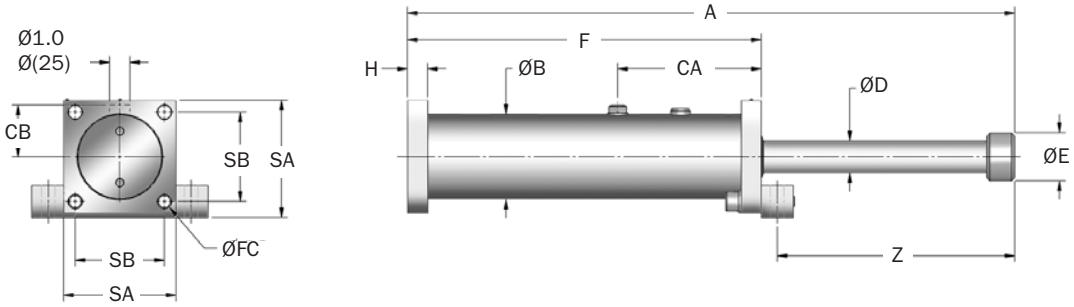
- C (Sensor cable)
- P (Sensor plug)
- SC (Safety cable)

APPLICATION DATA

Required for HD models:

- Vertical or horizontal motion
- Weight
- Impact velocity
- Propelling force (if any)
- Cycles/Hr
- Other (temperature or other environmental conditions, safety standards, etc.)

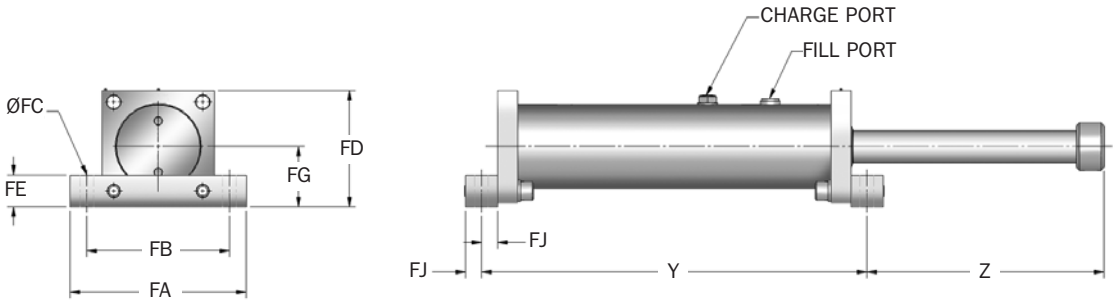
HD 1.5 x 2 → HD 1.5 x 24 Series



Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight (lbs.) (Kg)
						SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD 1.5 x 2	2 (50)	27,000 (3 000)	1,590,000 (180 000)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	22 (10)
HD 1.5 x 4	4 (100)	53,000 (5 950)	3,160,000 (357 000)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	24 (12)
HD 1.5 x 6	6 (150)	79,000 (8 930)	4,742,000 (535 800)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	26 (12)
HD 1.5 x 8	8 (200)	106,000 (11 900)	6,319,000 (714 000)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	29 (13)
HD 1.5 x 10	10 (250)	132,000 (14 900)	7,426,000 (839 181)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	31 (14)
HD 1.5 x 12	12 (300)	158,000 (17 800)	8,315,000 (939 646)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	35 (16)
HD 1.5 x 14	14 (350)	184,000 (20 800)	9,187,000 (1 038 141)	15,750 (70 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	37 (17)
HD 1.5 x 16	16 (400)	180,000 (20 400)	10,076,000 (1 138 606)	13,500 (60 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	40 (18)
HD 1.5 x 18	18 (450)	162,000 (18 300)	9,717,000 (1 098 000)	10,750 (48 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	42 (19)
HD 1.5 x 20	20 (500)	146,000 (16 500)	8,761,000 (990 000)	8,750 (39 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	44 (20)
HD 1.5 x 24	24 (600)	126,000 (14 200)	7,540,000 (852 000)	6,250 (28 000)	63 (280)	4.7 (120)	3.5 (90)	½ (M12)	50 (23)

HD 1.5 x 2 → HD 1.5 x 24 Series



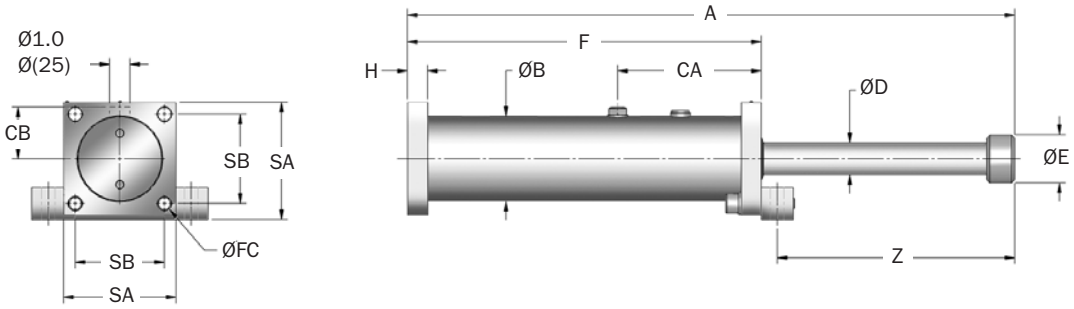
Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

									Foot Mount Dimensions							Charge Port Dimensions	
Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	H in. (mm)	Y in. (mm)	Z in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	CA in. (mm)	CB in (mm)
HD 1.5 x 2	12.2 (310)	3.5 (90)	1.1 (28)	2.0 (50)	8.2 (208)	0.8 (20)	9.4 (240)	3.4 (86)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 4	16.1 (410)	3.5 (90)	1.1 (28)	2.0 (50)	10.2 (258)	0.8 (20)	11.4 (290)	5.3 (136)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 6	20.1 (510)	3.5 (90)	1.1 (28)	2.0 (50)	12.2 (308)	0.8 (20)	13.4 (340)	7.3 (186)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 8	24.1 (613)	3.5 (90)	1.1 (28)	2.0 (50)	14.2 (360)	0.8 (20)	15.4 (392)	9.3 (237)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 10	28.2 (715)	3.5 (90)	1.1 (28)	2.0 (50)	16.2 (411)	0.8 (20)	17.4 (443)	11.4 (288)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 12	32.2 (817)	3.5 (90)	1.1 (28)	2.0 (50)	18.2 (462)	0.8 (20)	19.4 (494)	13.4 (339)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 14	36.1 (918)	3.5 (90)	1.1 (28)	2.0 (50)	20.2 (512)	0.8 (20)	21.4 (544)	15.3 (390)	6.5 (154)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (1440	2.2 (56)
HD 1.5 x 16	40.1 (1 019)	3.5 (90)	1.1 (28)	2.0 (50)	22.2 (563)	0.8 (20)	23.4 (595)	17.3 (440)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 18	44.1 (1 121)	3.5 (90)	1.1 (28)	2.0 (50)	24.2 (614)	0.8 (20)	25.4 (646)	19.3 (491)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 20	48.2 (1 223)	3.5 (90)	1.1 (28)	2.0 (50)	26.2 (665)	0.8 (20)	27.4 (697)	21.4 (542)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)
HD 1.5 x 24	56.2 (1 427)	3.5 (90)	1.1 (28)	2.0 (50)	30.2 (767)	0.8 (20)	31.4 (799)	25.4 (644)	6.5 (165)	5.5 (140)	.55 (14)	4.9 (125)	1.3 (32)	2.5 (65)	.63 (16)	5.7 (144)	2.2 (56)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. Maximum cycle rate is 60 cycles/hr.
6. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

HD 2.0 x 10 → HD 2.0 x 56 Series



Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight (lbs.) (Kg)
						SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD 2.0 x 10	10 (250)	212,000 (24 000)	9,403,000 (1 062 482)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	51 (23)
HD 2.0 x 12	12 (300)	248,000 (28 000)	10,490,000 (1 185 355)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	55 (25)
HD 2.0 x 14	14 (350)	290,000 (32 700)	11,577,000 (1 308 227)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	60 (27)
HD 2.0 x 16	16 (400)	331,000 (37 400)	12,665,000 (1 431 099)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	64 (29)
HD 2.0 x 18	18 (450)	372,000 (42 000)	13,752,000 (1 553 971)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	68 (31)
HD 2.0 x 20	20 (500)	414,000 (46 800)	14,818,000 (1 674 434)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	73 (33)
HD 2.0 x 24	24 (600)	496,000 (56 100)	16,993,000 (1 920 178)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	79 (36)
HD 2.0 x 28	28 (700)	580,000 (65 500)	19,168,000 (2 165 922)	25,000 (110 000)	100 (440)	5.5 (140)	4.4 (111)	⅝ (M16)	93 (42)
HD 2.0 x 32	32 (800)	662,000 (74 800)	23,005,000 (2 599 589)	25,000 (110 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	108 (49)
HD 2.0 x 36	36 (900)	677,000 (76 500)	25,137,000 (2 840 514)	22,500 (100 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	117 (53)
HD 2.0 x 40	40 (1 000)	647,000 (73 100)	27,270,000 (3 081 440)	19,000 (86 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	124 (56)
HD 2.0 x 48	48 (1 200)	542,000 (61 200)	31,534,000 (3 563 292)	13,500 (60 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	141 (64)
HD 2.0 x 56	56 (1 400)	367,000 (41 650)	22,000,000 (2 500 000)	7,900 (35 000)	125 (560)	5.5 (140)	4.4 (111)	⅝ (M16)	161 (73)

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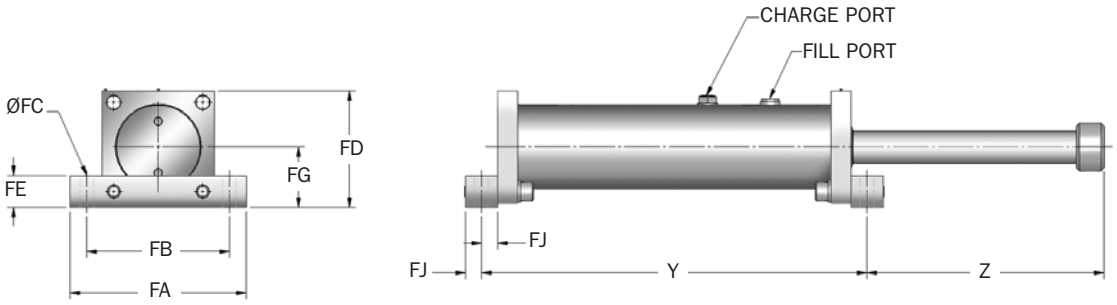
HD 2.0 x 10 → HD 2.0 x 56 Series

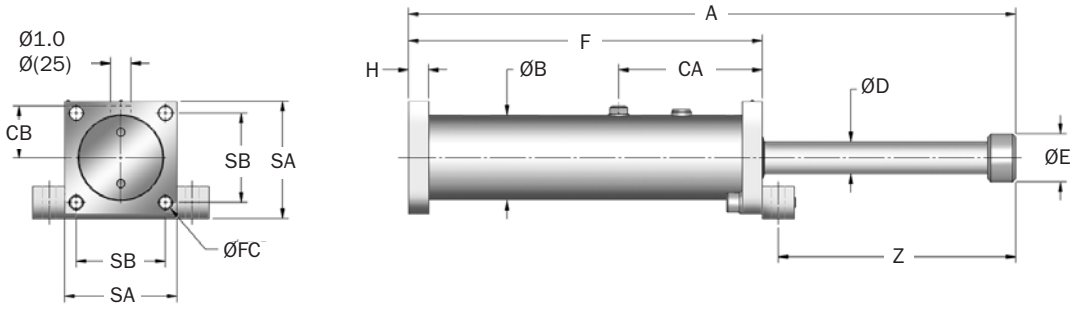


Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	H in. (mm)	Y in. (mm)	Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)
HD 2.0 x 10	29.8 (757)	4.3 (110)	1.6 (40)	2.4 (60)	17.4 (441)	1.0 (25)	19.0 (481)	11.6 (296)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 12	33.8 (859)	4.3 (110)	1.6 (40)	2.4 (60)	19.4 (492)	1.0 (25)	21.0 (532)	13.6 (347)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 14	37.8 (960)	4.3 (110)	1.6 (40)	2.4 (60)	21.4 (543)	1.0 (25)	23.0 (583)	15.6 (397)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 16	41.8 (1 062)	4.3 (110)	1.6 (40)	2.4 (60)	23.4 (594)	1.0 (25)	25.0 (634)	17.6 (448)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 18	45.8 (1 164)	4.3 (110)	1.6 (40)	2.4 (60)	25.4 (645)	1.0 (25)	27.0 (685)	19.6 (499)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 20	49.8 (1 265)	4.3 (110)	1.6 (40)	2.4 (60)	27.4 (695)	1.0 (25)	29.0 (735)	21.6 (550)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 24	57.8 (1 469)	4.3 (110)	1.6 (40)	2.4 (60)	31.4 (797)	1.0 (25)	33.0 (837)	25.6 (652)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 28	65.8 (1 672)	4.3 (110)	1.6 (40)	2.4 (60)	35.4 (899)	1.0 (25)	37.0 (939)	29.6 (753)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	7.0 (179)	2.6 (65)
HD 2.0 x 32	76.9 (1 953)	4.3 (110)	1.6 (40)	2.4 (60)	42.5 (1 079)	1.0 (25)	44.0 (1 119)	33.7 (854)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 36	84.7 (2 151)	4.3 (110)	1.6 (40)	2.4 (60)	46.4 (1 179)	1.0 (25)	48.0 (1 219)	37.5 (952)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 40	92.6 (2 351)	4.3 (110)	1.6 (40)	2.4 (60)	50.4 (1 279)	1.0 (25)	52.0 (1 319)	41.4 (1 052)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 48	108.3 (2 751)	4.3 (110)	1.6 (40)	2.4 (60)	58.0 (1 472)	1.0 (25)	59.5 (1 512)	49.6 (1 259)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)
HD 2.0 x 56	124.8 (3 171)	4.3 (110)	1.6 (40)	2.4 (60)	66.5 (1 689)	1.0 (25)	68.1 (1 729)	57.5 (1 462)	8.7 (220)	7.0 (178)	.67 (17)	5.8 (146)	1.6 (40)	3.0 (76)	.80 (20)	10.2 (260)	2.6 (65)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. Maximum cycle rate is 60 cycles/hr.
6. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

HD(A) 3.0 x 2 → HD 3.0 x 56 Series

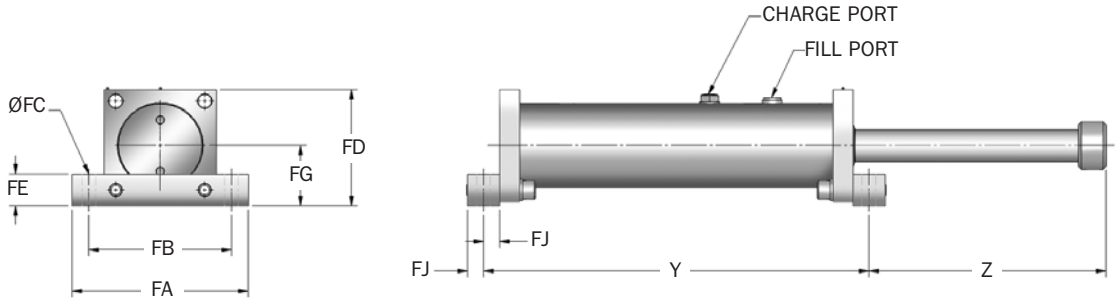


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD (E_T) Max. in.-lbs./cycle (Nm/cycle)	HD (E_TC) Max. in.-lbs./hour (Nm/hr)	HDA (E_T) Max. in.-lbs./cycle (Nm/cycle)	HDA (E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions SA in. (mm)	Flange Dimensions SB in. (mm)	Flange Dimensions Rec. Bolt Size in. (mm)	Model Weight lbs. (Kg)
HD(A) 3.0 x 2	2 (50)	83,000 (9 350)	4,965,000 (561 000)	40,000 (4 500)	2,400,000 (270 000)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	40 (21)
HD(A) 3.0 x 3	3 (75)	124,000 (14 000)	5,924,000 (669 412)	60,000 (6 800)	3,600,000 (408 000)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	42 (22)
HD(A) 3.0 x 5	5 (125)	207,000 (23 400)	7,210,000 (814 689)	100,000 (11 300)	6,000,000 (678 000)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	48 (25)
HD(A) 3.0 x 8	8 (200)	331,000 (37 400)	9,100,000 (1 028 331)	160,000 (18 100)	9,400,000 (1 056 816)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	57 (29)
HD 3.0 x 10	10 (250)	414,000 (46 800)	10,386,000 (1 173 607)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	64 (32)
HD(A) 3.0 x 12	12 (300)	497,000 (56 100)	11,672,000 (1 318 884)	240,000 (27 200)	12,000,000 (1 347 370)	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	71 (35)
HD 3.0 x 14	14 (350)	580,000 (65 500)	14,218,000 (1 606 589)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	88 (43)
HD 3.0 x 16	16 (400)	662,000 (74 800)	15,478,000 (1 749 017)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	93 (45)
HD 3.0 x 18	18 (450)	745,000 (84 200)	16,789,000 (1 897 142)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	99 (48)
HD 3.0 x 20	20 (500)	828,000 (93 500)	18,075,000 (2 042 419)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	106 (51)
HD 3.0 x 24	24 (600)	993,000 (112 200)	20,621,000 (2 330 124)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	119 (57)
HD 3.0 x 28	28 (700)	1,159,000 (130 900)	23,192,000 (2 620 677)	– –	– –	50,000 (220 000)	125 (550)	6.7 (170)	4.9 (125)	3/4 (M20)	130 (62)
HD 3.0 x 32	32 (800)	1,083,000 (122 400)	25,738,000 (2 908 382)	– –	– –	40,500 (180 000)	160 (710)	6.7 (170)	4.9 (125)	3/4 (M20)	143 (68)
HD 3.0 x 36	36 (900)	1,083,000 (122 400)	29,343,000 (3 315 726)	– –	– –	36,000 (160 000)	160 (710)	6.7 (170)	4.9 (125)	3/4 (M20)	163 (77)
HD 3.0 x 40	40 (1 000)	1,053,000 (119 000)	31,864,000 (3 600 582)	– –	– –	31,500 (140 000)	160 (710)	6.7 (170)	4.9 (125)	3/4 (M20)	176 (85)
HD 3.0 x 48	48 (1 200)	867,000 (97 900)	36,905,000 (4 170 294)	– –	– –	21,500 (96 000)	160 (710)	6.7 (170)	4.9 (125)	3/4 (M20)	200 (94)
HD 3.0 x 56	56 (1 422)	576,000 (65 450)	34,320,000 (3 900 000)	– –	– –	12,500 (55 000)	160 (710)	6.7 (170)	4.9 (125)	3/4 (M20)	235 (106)

Heavy Duty Series Shock Absorber
HD/HDA Series

HD 3.0 x 2 → HD 3.0 x 56 Series



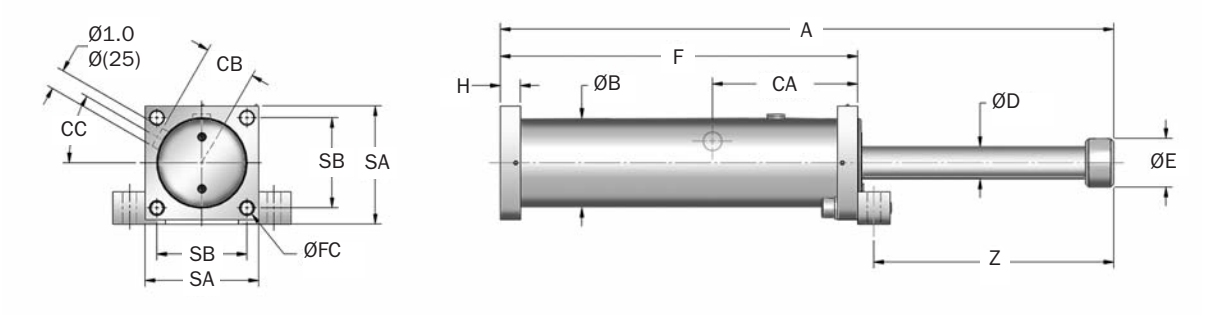
Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)
HD(A) 3.0 x 2	13.2 (336)	5.1 (130)	1.8 (45)	2.8 (70)	8.0 (203)	8.4 (213)	1.0 (25)	10.0 (253)	10.4 (263)	4.2 (108)	3.8 (98)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 3	15.2 (387)	5.1 (130)	1.8 (45)	2.8 (70)	9.0 (229)	9.4 (239)	1.0 (25)	11.0 (279)	11.4 (289)	5.2 (133)	4.8 (123)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 5	19.2 (489)	5.1 (130)	1.8 (45)	2.8 (70)	11.0 (280)	11.4 9290)	1.0 (25)	13.0 (330)	13.4 (340)	7.2 (184)	6.8 (174)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 8	25.2 (640)	5.1 (130)	1.8 (45)	2.8 (70)	14.0 (355)	14.4 (365)	1.0 (25)	16.0 (405)	16.4 (415)	10.2 (260)	9.8 (250)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD 3.0 x 10	29.2 (742)	5.1 (130)	1.8 (45)	2.8 (70)	16.0 (406)	N/A –	1.0 (25)	18.0 (456)	N/A –	12.2 (311)	N/A –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD(A) 3.0 x 12	33.2 (844)	5.1 (130)	1.8 (45)	2.8 (70)	18.0 (457)	18.4 (467)	1.0 (25)	20.0 (507)	20.4 (517)	14.2 (362)	13.8 (352)	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	5.3 (134)	3.0 (75)
HD 3.0 x 14	39.2 (995)	5.1 (130)	1.8 (45)	2.8 (70)	22.0 (558)	– –	1.0 (25)	24.0 (608)	– –	16.2 (412)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 16	43.2 (1 097)	5.1 (130)	1.8 (45)	2.8 (70)	24.0 (609)	– –	1.0 (25)	26.0 (659)	– –	18.2 (463)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 18	47.2 (1 199)	5.1 (130)	1.8 (45)	2.8 (70)	26.0 (660)	– –	1.0 (25)	28.0 (710)	– –	20.2 (514)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 20	51.2 (1 301)	5.1 (130)	1.8 (45)	2.8 (70)	28.0 (711)	– –	1.0 (25)	30.0 (761)	– –	22.2 (565)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 24	59.2 (1 504)	5.1 (130)	1.8 (45)	2.8 (70)	32.0 (812)	– –	1.0 (25)	34.0 (862)	– –	26.2 (667)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 28	67.2 (1 707)	5.1 (130)	1.8 (45)	2.8 (70)	36.0 (914)	– –	1.0 (25)	38.0 (964)	– –	30.2 (768)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 32	75.2 (1 910)	5.1 (130)	1.8 (45)	2.8 (70)	40.0 (1 015)	– –	1.0 (25)	42.0 (1 065)	– –	34.2 (870)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	7.2 (184)	3.0 (75)
HD 3.0 x 36	84.9 (2 156)	5.1 (130)	1.8 (45)	2.8 (70)	45.8 (1 164)	– –	1.0 (25)	47.8 (1 214)	– –	38.1 (967)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	9.2 (234)	3.0 (75)
HD 3.0 x 40	92.8 (2 356)	5.1 (130)	1.8 (45)	2.8 (70)	49.8 (1 264)	– –	1.0 (25)	51.7 (1 314)	– –	42.1 (1 067)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50	3.5 (88	1.0 (25)	9.2 (234)	3.0 (75)
HD 3.0 x 48	108.5 (2 756)	5.1 (130)	1.8 (45)	2.8 (70)	57.6 (1 464)	– –	1.0 (25)	59.6 (1 514)	– –	49.9 (1 267)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	9.2 (234)	3.0 (75)
HD 3.0 x 56	124.2 (3 156)	5.1 (130)	1.8 (45)	2.8 (70)	65.5 (1 664)	– –	1.0 (25)	67.5 (1 714)	– –	57.7 (1 467)	– –	10.0 (255)	8.5 (216)	.87 (22)	6.8 (173)	2.0 (50)	3.5 (88)	1.0 (25)	9.2 (234)	3.0 (75)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. HDA models which have an impact velocity below 30 in./sec. (0,8 m/s), please contact Enidine for sizing assistance.
6. Maximum cycle rate is 60 cycles/hr.
7. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

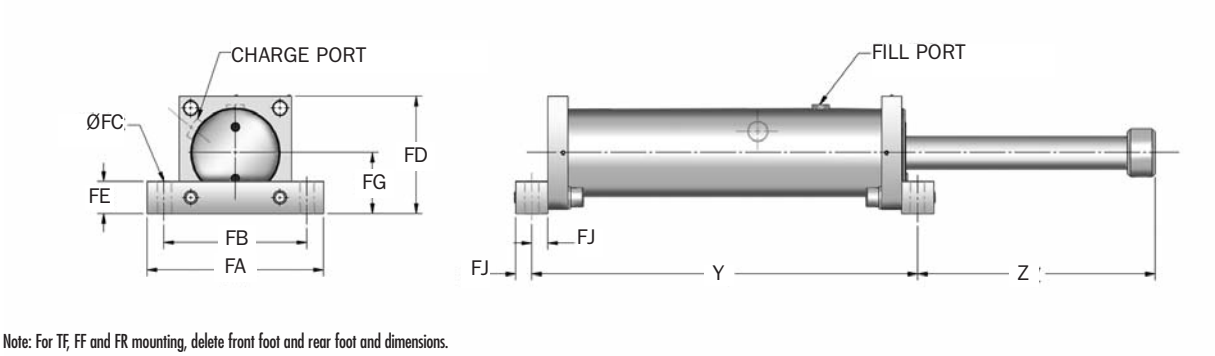
HD 3.5 x 2 → HD 3.5 x 48 Series



Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	(E_T) Max. in.-lbs./cycle (Nm/cycle)	(E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions			Model Weight (lbs.) (Kg)
						SA in. (mm)	SB in. (mm)	Rec. Bolt Size in. (mm)	
HD 3.5 x 2	2 (50)	112,500 (12 750)	7,345,500 (830 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	73 (33)
HD 3.5 x 4	4 (100)	225,500 (25 500)	8,850,000 (1 000 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	82 (37)
HD 3.5 x 6	6 (150)	338,500 (38 250)	10,620,000 (1 200 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	90 (41)
HD 3.5 x 8	8 (200)	451,500 (51 000)	11,947,500 (1 350 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	99 (45)
HD 3.5 x 10	10 (250)	564,000 (63 750)	13,717,500 (1 550 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	108 (49)
HD 3.5 x 12	12 (300)	677,000 (76 500)	15,045,000 (1 700 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	117 (53)
HD 3.5 x 16	16 (400)	903,000 (102 000)	18,142,500 (2 050 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	132 (60)
HD 3.5 x 20	20 (500)	1,128,500 (127 500)	23,010,000 (2 600 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	163 (74)
HD 3.5 x 24	24 (600)	1,354,000 (153 000)	25,665,000 (2 900 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	179 (81)
HD 3.5 x 28	28 (700)	1,580,000 (178 500)	28,762,500 (3 250 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	196 (89)
HD 3.5 x 32	32 (800)	1,805,500 (204 000)	31,860,000 (3 600 000)	67,500 (300 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	214 (97)
HD 3.5 x 36	36 (900)	1,760,000 (198 900)	34,957,500 (3 950 000)	58,500 (260 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	231 (105)
HD 3.5 x 40	40 (1 000)	1,617,500 (182 750)	38,055,000 (4 300 000)	48,500 (215 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	247 (112)
HD 3.5 x 48	48 (1 200)	1,400,000 (158 100)	44,250,000 (5 000 000)	35,000 (155 000)	195 (860)	7.9 (200)	6.3 (160)	¾ (M20)	282 (128)

HD 3.5 x 10 → HD 3.5 x 48 Series

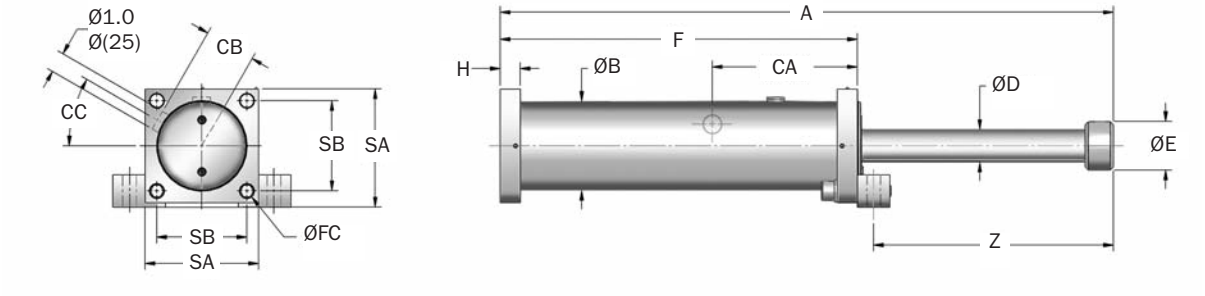


Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	H in. (mm)	Y in. (mm)	Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)	CC deg.
HD 3.5 x 2	13.9 (658)	6.1 (155)	2.2 (56)	3.2 (82)	9.6 (396)	1.0 (25)	11.6 (446)	3.3 (237)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 4	18.0 (760)	6.1 (155)	2.2 (56)	3.2 (82)	11.6 (447)	1.0 (25)	13.6 (497)	5.4 (288)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 6	21.9 (862)	6.1 (155)	2.2 (56)	3.2 (82)	13.6 (498)	1.0 (25)	15.6 (548)	7.3 (339)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 8	25.9 (1 064)	6.1 (155)	2.2 (56)	3.2 (82)	15.6 (599)	1.0 (25)	17.6 (649)	9.3 (440)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 10	29.9 (354)	6.1 (155)	2.2 (56)	3.2 (82)	17.6 (244)	1.0 (25)	19.6 (294)	11.3 (85)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 12	33.9 (456)	6.1 (155)	2.2 (56)	3.2 (82)	19.6 (295)	1.0 (25)	21.6 (345)	13.3 (136)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 16	41.9 (556)	6.1 (155)	2.2 (56)	3.2 (82)	23.6 (345)	1.0 (25)	25.6 (395)	17.3 (186)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	5.5 (139)	3.4 (86)	90° (90°)
HD 3.5 x 20	52.0 (1 323)	6.1 (155)	2.2 (56)	3.2 (82)	29.8 (756)	1.0 (25)	31.8 (806)	21.2 (542)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 24	60.1 (1 527)	6.1 (155)	2.2 (56)	3.2 (82)	33.8 (858)	1.0 (25)	35.8 (908)	25.3 (644)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 28	68.0 (1 729)	6.1 (155)	2.2 (56)	3.2 (82)	37.8 (959)	1.0 (25)	39.8 (1 009)	29.2 (745)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 32	76.1 (1 933)	6.1 (155)	2.2 (56)	3.2 (82)	41.8 (1 061)	1.0 (25)	43.8 (1 111)	33.2 (847)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 36	84.1 (2 137)	6.1 (155)	2.2 (56)	3.2 (82)	45.8 (1 163)	1.0 (25)	47.8 (1 213)	37.3 (949)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 40	92.1 (2 339)	6.1 (155)	2.2 (56)	3.2 (82)	49.8 (1 264)	1.0 (25)	51.8 (1 314)	41.3 (1 050)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)
HD 3.5 x 48	107.8 (2 739)	6.1 (155)	2.2 (56)	3.2 (82)	57.6 (1 464)	1.0 (25)	59.6 (1 514)	49.2 (1 250)	11.8 (300)	9.8 (250)	1.06 (27)	8.3 (210)	2.0 (50)	4.3 (110)	1.0 (25)	7.6 (194)	3.4 (86)	90° (90°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. Maximum cycle rate is 60 cycles/hr.
6. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

HD(A) 4.0 x 2 → HD 4.0 x 48 Series

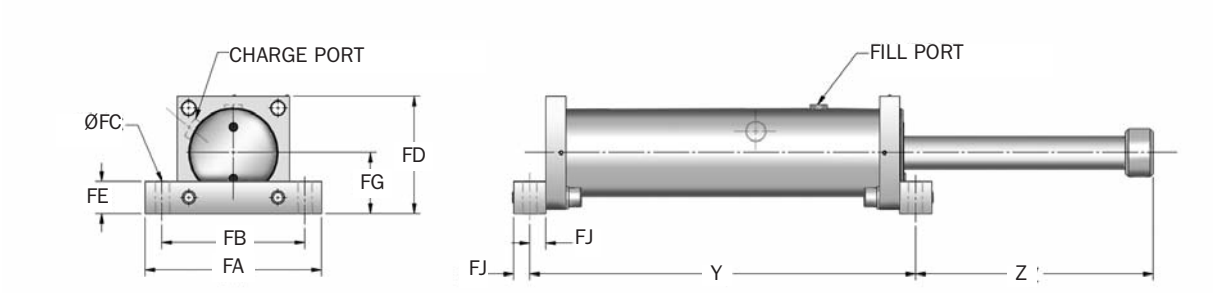


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD (E_T) Max. in.-lbs./cycle (Nm/cycle)	HD (E_TC) Max. in.-lbs./hour (Nm/hr)	HDA (E_T) Max. in.-lbs./cycle (Nm/cycle)	HDA (E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions SA in. (mm)	Flange Dimensions SB in. (mm)	Flange Dimensions Rec. Bolt Size in. (mm)	Model Weight lbs. (Kg)
HD(A) 4.0 x 2	2 (50)	134,000 (15 100)	8,018,000 (906 000)	120,000 (13 500)	7,200,000 (810 000)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	141 (64)
HD(A) 4.0 x 4	4 (100)	268,000 (30 200)	13,302,000 (1 503 152)	240,000 (27 000)	13,700,000 (1 546 721)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	154 (70)
HD(A) 4.0 x 6	6 (150)	400,000 (45 300)	15,230,000 (1 721 000)	360,000 (40 500)	15,600,000 (1 764 569)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	168 (76)
HD(A) 4.0 x 8	8 (200)	535,000 (60 400)	17,235,000 (1 947 562)	480,000 (54 000)	17,600,000 (1 991 131)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	181 (82)
HD(A) 4.0 x 10	10 (250)	668,000 (75 400)	19,163,000 (2 165 410)	600,000 (67 500)	19,600,000 (2 208 980)	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	192 (87)
HD 4.0 x 12	12 (300)	800,000 (90 500)	24,754,000 (2 797 169)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	238 (108)
HD 4.0 x 16	16 (400)	1,068,000 (120 700)	28,648,000 (3 237 222)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M(24)	265 (120)
HD 4.0 x 20	20 (500)	1,336,000 (150 900)	32,581,000 (3 681 633)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	290 (131)
HD 4.0 x 24	24 (600)	1,602,000 (181 000)	36,514,000 (4 126 043)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	317 (144)
HD 4.0 x 28	28 (700)	1,870,000 (211 200)	40,408,000 (4 566 096)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	346 (157)
HD 4.0 x 32	32 (800)	2,137,000 (241 400)	44,341,000 (5 010 506)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	375 (170)
HD 4.0 x 36	36 (900)	2,404,000 (271 600)	48,274,000 (5 454 916)	– –	– –	80,000 (355 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	403 (183)
HD 4.0 x 40	40 (1 000)	2,182,000 (246 500)	52,168,000 (5 894 969)	– –	– –	65,000 (290 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	430 (195)
HD 4.0 x 48	48 (1 200)	1,806,000 (204 000)	59,880,000 (6 766 361)	– –	– –	45,000 (200 000)	245 (1 090)	9.8 (250)	7.8 (197)	1 (M24)	485 (220)

Heavy Duty Series Shock Absorber
HD/HDA Series

HD 4.0 x 2 → HD 4.0 x 48 Series



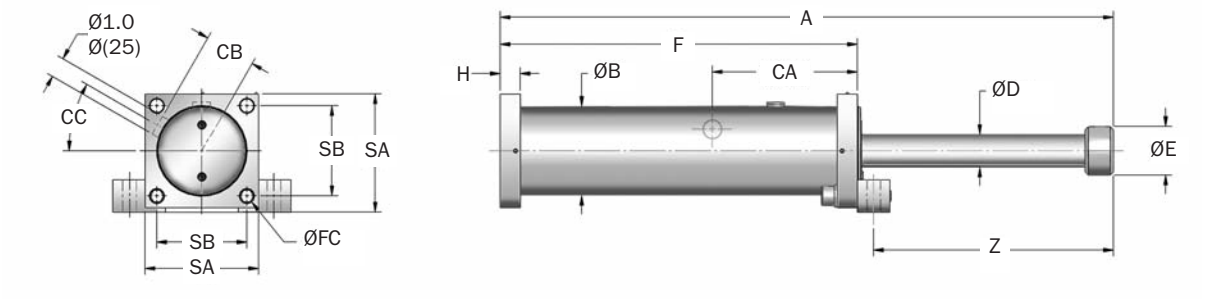
Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)	CC deg.
HD(A) 4.0 x 2	16.9 (430)	7.9 (200)	2.5 (63)	3.9 (100)	11.6 (294)	12.0 (304)	1.6 (40)	13.5 (344)	13.9 (354)	4.4 (111)	4.0 (101)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 4	20.9 (532)	7.9 (200)	2.5 (63)	3.9 (100)	13.6 (345)	14.0 (355)	1.6 (40)	15.5 (395)	15.9 (405)	6.4 (162)	6.0 (152)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 6	24.9 (632)	7.9 (200)	2.5 (63)	3.9 (100)	15.6 (395)	16.0 (405)	1.6 (40)	17.5 (445)	17.9 (455)	8.4 (212)	8.0 (202)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 8	28.9 (735)	7.9 (200)	2.5 (63)	3.9 (100)	17.6 (447)	18.0 (457)	1.6 (40)	19.5 (497)	19.9 (507)	10.4 (263)	10.0 (253)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD(A) 4.0 x 10	32.9 (836)	7.9 (200)	2.5 (63)	3.9 (100)	19.6 (497)	20.0 (507)	1.6 (40)	21.5 (547)	21.9 (557)	12.4 (314)	12.0 (304)	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	8.7 (220)	4.2 (107)	155° (155°)
HD 4.0 x 12	40.6 (1 032)	7.9 (200)	2.5 (63)	3.9 (100)	25.3 (642)	– –	1.6 (40)	27.2 (692)	– –	14.4 (365)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 16	48.6 (1 234)	7.9 (200)	2.5 (63)	3.9 (100)	29.3 (743)	– –	1.6 (40)	31.2 (793)	– –	18.4 (466)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 20	56.6 (1 438)	7.9 (200)	2.5 (63)	3.9 (100)	33.3 (845)	– –	1.6 (40)	35.2 (895)	– –	22.4 (568)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 24	64.6 (1 642)	7.9 (200)	2.5 (63)	3.9 (100)	37.3 (947)	– –	1.6 (40)	39.2 (997)	– –	26.5 (670)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 28	72.6 (1 844)	7.9 (200)	2.5 (63)	3.9 (100)	41.3 (1 048)	– –	1.6 (40)	43.2 (1 098)	– –	30.4 (771)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 32	80.6 (2 048)	7.9 (200)	2.5 (63)	3.9 (100)	45.3 (1 150)	– –	1.6 (40)	47.2 (1 200)	– –	34.4 (873)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 36	88.7 (2 252)	7.9 (200)	2.5 (63)	3.9 (100)	49.3 (1 252)	– –	1.6 (40)	51.2 (1 302)	– –	38.5 (975)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 40	96.6 (2 454)	7.9 (200)	2.5 (63)	3.9 (100)	53.3 (1 353)	– –	1.6 (40)	55.2 (1 403)	– –	42.4 (1 076)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)
HD 4.0 x 48	112.4 (2 854)	7.9 (200)	2.5 (63)	3.9 (100)	61.1 (1 553)	– –	1.6 (40)	63.1 (1 603)	– –	50.3 (1 276)	– –	14.2 (360)	12.5 (317)	1.06 (27)	9.9 (252)	2.0 (50)	5.0 (127)	1.0 (25)	12.2 (310)	4.2 (107)	30° (30°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. HDA models which have an impact velocity below 30 in./sec. (0,8 m/s), please contact Enidine for sizing assistance.
6. Maximum cycle rate is 60 cycles/hr.
7. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

HD(A) 5.0 x 4 → HD 5.0 x 48 Series

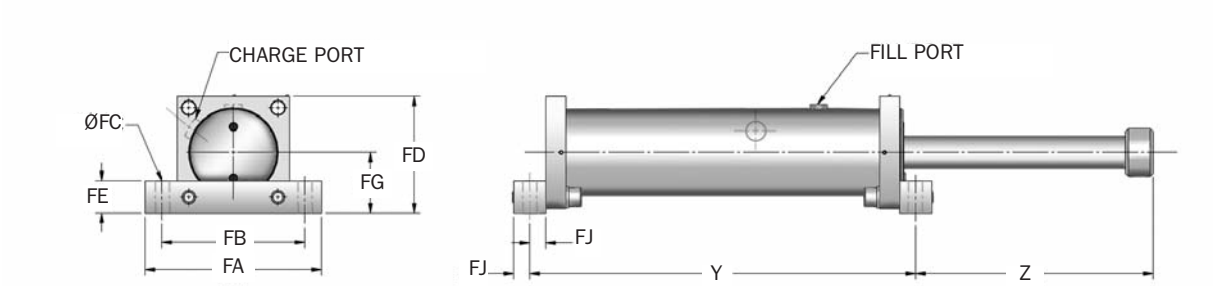


Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD (E_T) Max. in.-lbs./cycle (Nm/cycle)	HD (E_TC) Max. in.-lbs./hour (Nm/hr)	HDA (E_T) Max. in.-lbs./cycle (Nm/cycle)	HDA (E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions SA in. (mm)	Flange Dimensions SB in. (mm)	Flange Dimensions Rec. Bolt Size in. (mm)	Model Weight lbs. (Kg)
HD(A) 5.0 x 4	4 (100)	414,000 (46 700)	15,600,000 (1 762 621)	327,000 (37 000)	16,000,000 (1 809 624)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	192 (87)
HD(A) 5.0 x 6	6 (150)	620,000 (70 000)	17,720,000 (2 002 337)	500,000 (56 000)	18,000,000 (2 049 340)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	207 (94)
HD(A) 5.0 x 8	8 (200)	828,000 (93 500)	19,841,000 (2 242 053)	660,000 (74 500)	20,250,000 (2 289 057)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	223 (101)
HD(A) 5.0 x 10	10 (250)	1,036,000 (117 000)	21,921,000 (2 477 070)	827,000 (93 500)	22,300,000 (2 524 073)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	238 (108)
HD(A) 5.0 x 12	12 (300)	1,239,000 (140 000)	24,042,000 (2 716 786)	990,000 (112 000)	24,500,000 (2 763 789)	124,000 (550 000)	400 (1 760)	10.8 (275)	8.7 (220)	1 ¼ (M30)	251 (114)
HD 5.0 x 16	16 (400)	1,655,000 (187 000)	28,285,000 (3 196 219)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	282 (128)
HD 5.0 x 20	20 (500)	2,071,000 (234 000)	36,688,000 (4 145 684)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	348 (158)
HD 5.0 x 24	24 (600)	2,478,000 (280 000)	40,930,000 (4 625 117)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	377 (171)
HD 5.0 x 28	28 (700)	2,894,000 (327 000)	45,132,000 (5 099 849)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	407 (185)
HD 5.0 x 32	32 (800)	3,310,000 (374 000)	49,374,000 (5 579 282)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	437 (198)
HD 5.0 x 40	40 (1 000)	4,133,000 (467 000)	57,818,000 (6 533 447)	– –	– –	124,000 (550 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	496 (225)
HD 5.0 x 48	48 (1 200)	3,700,000 (418 000)	66,262,000 (7 487 613)	– –	– –	92,000 (410 000)	400 (1 760)	10.8 (250)	8.7 (197)	1 ¼ (M24)	534 (242)

ENIDINE An IMC Company www.enidine.com Email: industrialsales@enidine.com Tel.: 1-800-852-8508 ext. 111 Fax: 1-716-662-0406

HD(A) 5.0 x 4 → HD 5.0 x 48 Series



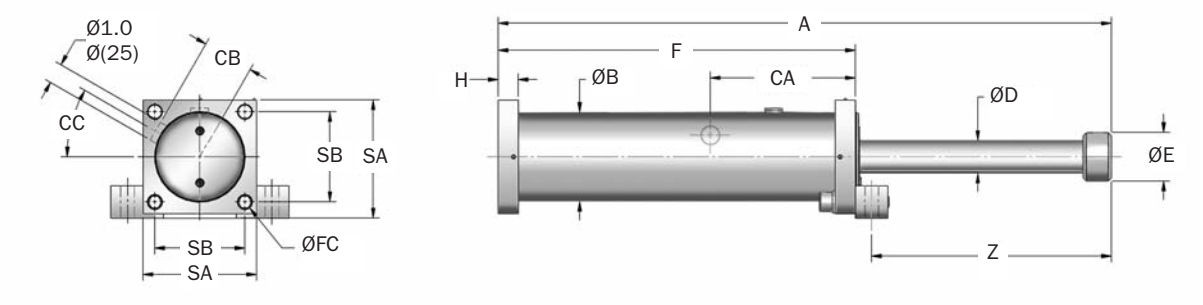
Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions							Charge Port Dimensions		
												FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	CA in. (mm)	CB in. (mm)	CC deg.
HD(A) 5.0 x 4	23.3 (591)	8.5 (215)	3.1 (80)	4.9 (125)	14.8 (375)	15.2 (385)	1.6 (40)	17.1 (435)	17.5 (445)	7.4 (186)	7.0 (176)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 6	27.3 (693)	8.5 (215)	3.1 (80)	4.9 (125)	16.8 (426)	17.2 (436)	1.6 (40)	19.1 (486)	19.5 (496)	9.4 (237)	9.0 (227)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 8	31.3 (795)	8.5 (215)	3.1 (80)	4.9 (125)	18.8 (477)	19.2 (487)	1.6 (40)	21.1 (537)	21.5 (547)	11.4 (288)	11.0 (278)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 10	35.3 (895)	8.5 (215)	3.1 (80)	4.9 (125)	20.8 (527)	21.2 (537)	1.6 (40)	23.1 (587)	23.5 (597)	13.4 (338)	13.0 (328)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD(A) 5.0 x 12	39.3 (997)	8.5 (215)	3.1 (80)	4.9 (125)	22.8 (578)	23.2 (588)	1.6 (40)	25.1 (638)	25.5 (648)	15.4 (389)	15.0 (379)	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (2780	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD 5.0 x 16	47.3 (1 201)	8.5 (215)	3.1 (80)	4.9 (125)	26.8 (680)	– –	1.6 (40)	29.1 (740)	– –	19.4 (491)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	9.1 (230)	4.6 (117)	25° (25°)
HD 5.0 x 20	59.2 (1 504)	8.5 (215)	3.1 (80)	4.9 (125)	34.7 (882)	– –	1.6 (40)	37.1 (942)	– –	23.3 (592)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 24	67.2 (1 708)	8.5 (215)	3.1 (80)	4.9 (125)	38.7 (984)	– –	1.6 (40)	41.1 (1 044)	– –	27.3 (694)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 28	75.2 (1 910)	8.5 (215)	3.1 (80)	4.9 (125)	42.7 (1 085)	– –	1.6 (40)	45.1 (1 145)	– –	31.3 (795)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 32	83.2 (2 114)	8.5 (215)	3.1 (80)	4.9 (125)	46.7 (1 187)	– –	1.6 (40)	49.1 (1 247)	– –	35.3 (897)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 40	99.2 (2 520)	8.5 (215)	3.1 (80)	4.9 (125)	54.7 (1 390)	– –	1.6 (40)	57.1 (1 450)	– –	43.3 (1 100)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)
HD 5.0 x 48	115.0 (2 920)	8.5 (215)	3.1 (80)	4.9 (125)	62.6 (1 590)	– –	1.6 (40)	65.0 (1 650)	– –	51.3 (1 300)	– –	15.7 (400)	13.4 (340)	1.3 (33)	10.9 (278)	2.4 (60)	5.5 (140)	1.2 (30)	13.0 (230)	4.6 (117)	25° (25°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. HDA models which have an impact velocity below 30 in./sec. (0,8 m/s), please contact Enidine for sizing assistance.
6. Maximum cycle rate is 60 cycles/hr.
7. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

Heavy Duty Series Shock Absorber
HD/HDA Series

HD(A) 6.0 x 4 → HD 6.0 x 48 Series



Note: For TF, FF and FR mounting, delete front foot and dimensions.

Catalog No./ Model	(S) Stroke in. (mm)	HD (E_T) Max. in.-lbs./cycle (Nm/cycle)	HD (E_TC) Max. in.-lbs./hour (Nm/hr)	HDA (E_T) Max. in.-lbs./cycle (Nm/cycle)	HDA (E_TC) Max. in.-lbs./hour (Nm/hr)	(F_P) Max. Shock Force lbs. (N)	Nominal Return Force lbs. (N)	Flange Dimensions SA in. (mm)	Flange Dimensions SB in. (mm)	Flange Dimensions Rec. Bolt Size in. (mm)	Model Weight lbs. (Kg)
HD(A) 6.0 x 4	4 (100)	677,000 (76 500)	21,280,000 (2 404 568)	540,000 (61 000)	22,000,000 (2 464 532)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	362 (164)
HD(A) 6.0 x 6	6 (150)	1,010,000 (114 000)	23,933,000 (2 704 389)	810,000 (91 500)	24,500,000 (2 764 353)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	386 (175)
HD(A) 6.0 x 8	8 (200)	1,354,000 (153 000)	26,586,000 (3 004 211)	1,080,000 (122 000)	27,000,000 (3 064 175)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	410 (186)
HD(A) 6.0 x 10	10 (250)	1,690,000 (191 000)	29,345,000 (3 316 025)	1,350,000 (152 500)	30,000,000 (3 375 989)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	432 (196)
HD(A) 6.0 x 12	12 (300)	1,982,000 (224 000)	32,052,000 (3 621 843)	1,620,000 (183 000)	33,000,000 (3 681 807)	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	456 (207)
HD 6.0 x 16	16 (400)	2,708,000 (306 000)	37,465,000 (4 233 478)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	503 (228)
HD 6.0 x 20	20 (500)	3,380,000 (382 000)	42,877,000 (4 845 114)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	551 (250)
HD 6.0 x 24	24 (600)	4,062,000 (459 000)	53,862,000 (6 086 375)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	681 (309)
HD 6.0 x 30	30 (750)	5,070,000 (573 000)	61,928,000 (6 997 832)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	752 (341)
HD 6.0 x 36	36 (900)	6,093,000 (688 500)	70,047,000 (7 915 285)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	822 (373)
HD 6.0 X 42	42 (1 050)	7,106,000 (803 000)	78,113,000 (8 826 743)	– –	– –	202,250 (900 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	893 (405)
HD 6.0 x 48	48 (1 200)	7,125,000 (805 000)	86,232,000 (9 744 196)	– –	– –	178,000 (790 000)	625 (2 750)	13.0 (330)	10.2 (260)	1 ½ (M36)	966 (438)

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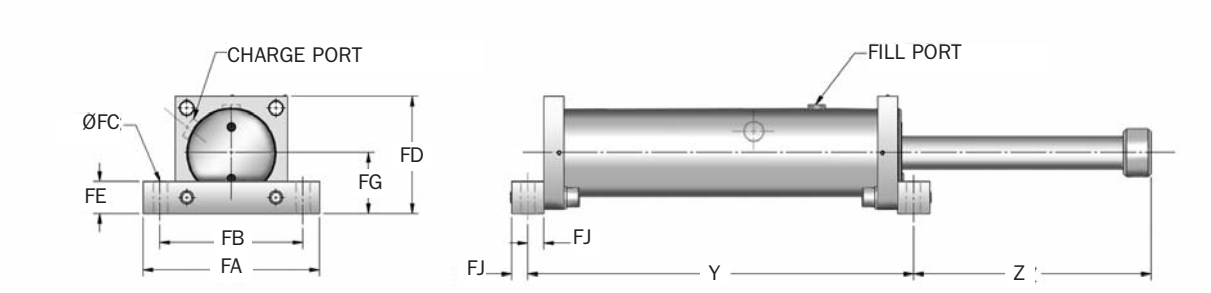
HD(A) 6.0 x 4 → HD 6.0 x 48 Series



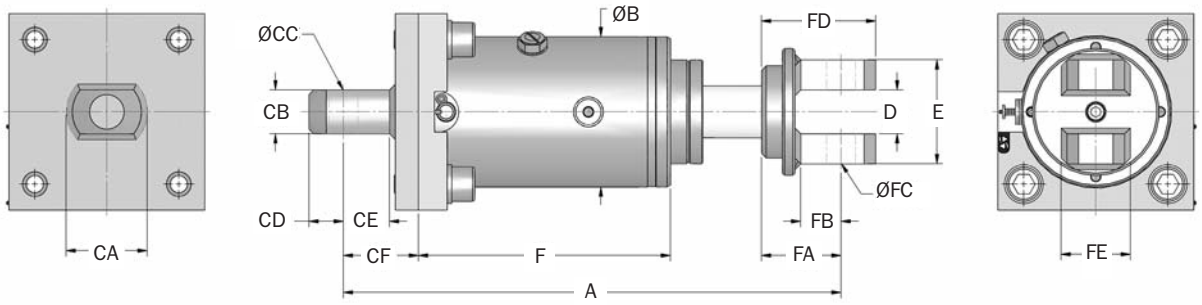
Note: For TF, FF and FR mounting, delete front foot and rear foot and dimensions.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	H in. (mm)	HD Y in. (mm)	HDA Y in. (mm)	HD Z in. (mm)	HDA Z in. (mm)	Foot Mount Dimensions FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)	FG in. (mm)	FJ in. (mm)	Charge Port Dimensions CA in. (mm)	CB in. (mm)	CC deg.
HD(A) 6.0 x 4	25.1 (637)	10.8 (275)	3.9 (100)	6.3 (160)	15.4 (391)	15.8 (401)	2.0 (50)	18.2 (461)	18.6 (471)	8.3 (211)	7.9 (201)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 6	29.1 (737)	10.8 (275)	3.9 (100)	6.3 (160)	17.4 (441)	17.8 (451)	2.0 (50)	20.2 (511)	20.6 (521)	10.3 (261)	9.9 (251)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 8	33.1 (839)	10.8 (275)	3.9 (100)	6.3 (160)	19.4 (492)	19.8 (502)	2.0 (50)	22.2 (562)	22.6 (572)	12.3 (312)	11.9 (302)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 10	37.1 (941)	10.8 (275)	3.9 (100)	6.3 (160)	21.4 (543)	21.8 (553)	2.0 (50)	24.2 (613)	24.6 (623)	14.3 (363)	13.9 (353)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD(A) 6.0 x 12	41.1 (1043)	10.8 (275)	3.9 (100)	6.3 (160)	23.4 (594)	23.8 (604)	2.0 (50)	26.2 (664)	26.6 (674)	16.3 (414)	15.9 (404)	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD 6.0 x 16	49.1 (1 246)	10.8 (275)	3.9 (100)	6.3 (160)	27.4 (696)	– –	2.0 (50)	30.2 (766)	– –	20.3 (515)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD 6.0 x 20	57.1 (1 450)	10.8 (275)	3.9 (100)	6.3 (160)	31.4 (798)	– –	2.0 (50)	34.2 (868)	– –	24.3 (617)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	7.8 (197)	5.7 (144)	30° (30°)
HD 6.0 x 24	69.7 (1 769)	10.8 (275)	3.9 (100)	6.3 (160)	40.0 (1 015)	– –	2.0 (50)	42.7 (1 085)	– –	28.4 (719)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 30	81.6 (2 073)	10.8 (275)	3.9 (100)	6.3 (160)	46.0 (1 167)	– –	2.0 (50)	48.7 (1 237)	– –	34.3 (871)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 36	93.7 (2 379)	10.8 (275)	3.9 (100)	6.3 (160)	52.0 (1 320)	– –	2.0 (50)	54.7 (1 390)	– –	40.4 (1 024)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 42	105.6 (2 683)	10.8 (275)	3.9 (100)	6.3 (160)	58.0 (1 472)	– –	2.0 (50)	60.7 (1 542)	– –	46.3 (1 176)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)
HD 6.0 x 48	117.7 (2 989)	10.8 (275)	3.9 (100)	6.3 (160)	64.0 (1 625)	– –	2.0 (50)	66.7 (1 695)	– –	52.4 (1 329)	– –	17.7 (450)	15.0 (380)	1.6 (40)	13.1 (333)	2.8 (70)	6.6 (168)	1.4 (35)	12.3 (312)	5.7 (144)	30° (30°)

Notes: 1. HD shock absorbers will function satisfactorily at 5% of their maximum rated energy per cycle.
HDA models will function satisfactorily at 10% of their maximum rated energy per cycle. If less than these values, a smaller model should be specified.
2. It is recommended that the customer consult Enidine for safety-related overhead crane applications.
3. The energy data listed is for ideal linear impacts only. If side load conditions exist in the application, contact Enidine for sizing assistance.
4. Rear flange mounting of 12 inch (300 mm) strokes and longer not recommended. Front and rear flange or foot mount configurations are recommended.
5. For impact velocities over 180 in./sec. (4.5 m/s), consult factory.

HD(A) 3.0 x 2 → HD(A) 5.0 x 12 Series

Clevis Mounts (CM)



Note: Piston clevis dimensions are typical both ends on HD(A) 4.0 models.

Catalog No./ Model	A in. (mm)	B in. (mm)	D in. (mm)	E in. (mm)	HD F in. (mm)	HDA F in. (mm)	Cylinder Clevis Dimensions						Piston Clevis Dimensions				
							CA in. (mm)	CB in. (mm)	CC in. (mm)	CD in. (mm)	CE in. (mm)	CF in. (mm)	FA in. (mm)	FB in. (mm)	FC in. (mm)	FD in. (mm)	FE in. (mm)
HD(A) 3.0 x 2	17.0 (432)	5.1 (130)	1.5 (38)	3.5 (90)	8.2 (209)	8.6 (219)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 3	19.0 (483)	5.1 (130)	1.5 (38)	3.5 (90)	9.2 (235)	9.6 (245)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 5	23.0 (585)	5.1 (130)	1.5 (38)	3.5 (90)	11.2 (286)	11.6 (296)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 8	29.0 (736)	5.1 (130)	1.5 (38)	3.5 (90)	14.2 (361)	14.6 (371)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 10	330 (838)	5.1 (130)	1.5 (38)	3.5 (90)	16.2 (412)	– –	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 3.0 x 12	37.0 (940)	5.1 (130)	1.5 (38)	3.5 (90)	16.8 (463)	17.2 (473)	2.4 (60)	1.5 (38)	1.0 (25)	1.2 (30)	1.5 (37)	2.6 (65)	2.7 (69)	1.3 (32)	1.0 (25)	3.9 (99)	2.0 (50)
HD(A) 4.0 x 2	22.4 (570)	7.9 (200)	2.6 (65)	5.5 (140)	12.0 (304)	12.4 (314)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 4	26.4 (672)	7.9 (200)	2.6 (65)	5.5 (140)	14.0 (355)	14.4 (365)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 6	30.4 (772)	7.9 (200)	2.6 (65)	5.5 (140)	16.0 (405)	16.4 (415)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 8	34.4 (875)	7.9 (200)	2.6 (65)	5.5 (140)	18.0 (457)	18.4 (467)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 4.0 x 10	38.4 (976)	7.9 (200)	2.6 (65)	5.5 (140)	20.0 (507)	20.4 (517)	– –	– –	– –	– –	– –	3.5 (90)	3.9 (100)	2.0 (50)	2.0 (50)	5.9 (150)	3.9 (100)
HD(A) 5.0 x 4	29.6 (751)	8.5 (215)	2.8 (70)	5.9 (150)	15.2 (386)	15.6 (396)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 6	33.6 (853)	8.5 (215)	2.8 (70)	5.9 (150)	17.2 (437)	17.6 (447)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 8	37.6 (955)	8.5 (215)	2.8 (70)	5.9 (150)	19.2 (488)	19.6 (498)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 10	41.6 (1 055)	8.5 (215)	2.8 (70)	5.9 (150)	21.2 (538)	21.6 (548)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)
HD(A) 5.0 x 12	45.6 (1 157)	8.5 (215)	2.8 (70)	5.9 (150)	23.2 (589)	23.6 (599)	– –	– –	– –	– –	– –	3.9 (100)	4.5 (115)	2.8 (70)	2.3 (60)	6.9 (175)	3.9 (100)

Notes

Overview

HI Series

Enidine's **Heavy Industry (HI) Series** buffers safely protect heavy machinery and equipment during the transfer of materials and movement of products. The large-bore, high-capacity buffers are individually designed to decelerate moving loads under various conditions and in compliance with industry mandated safety standards. Control of bridge cranes, trolley platforms, large container transfer and transportation safety stops are typical installations. Industry-proven design technologies, coupled with the experience of a globally installed product base, ensure deliverable performance that exceeds customer expectations.

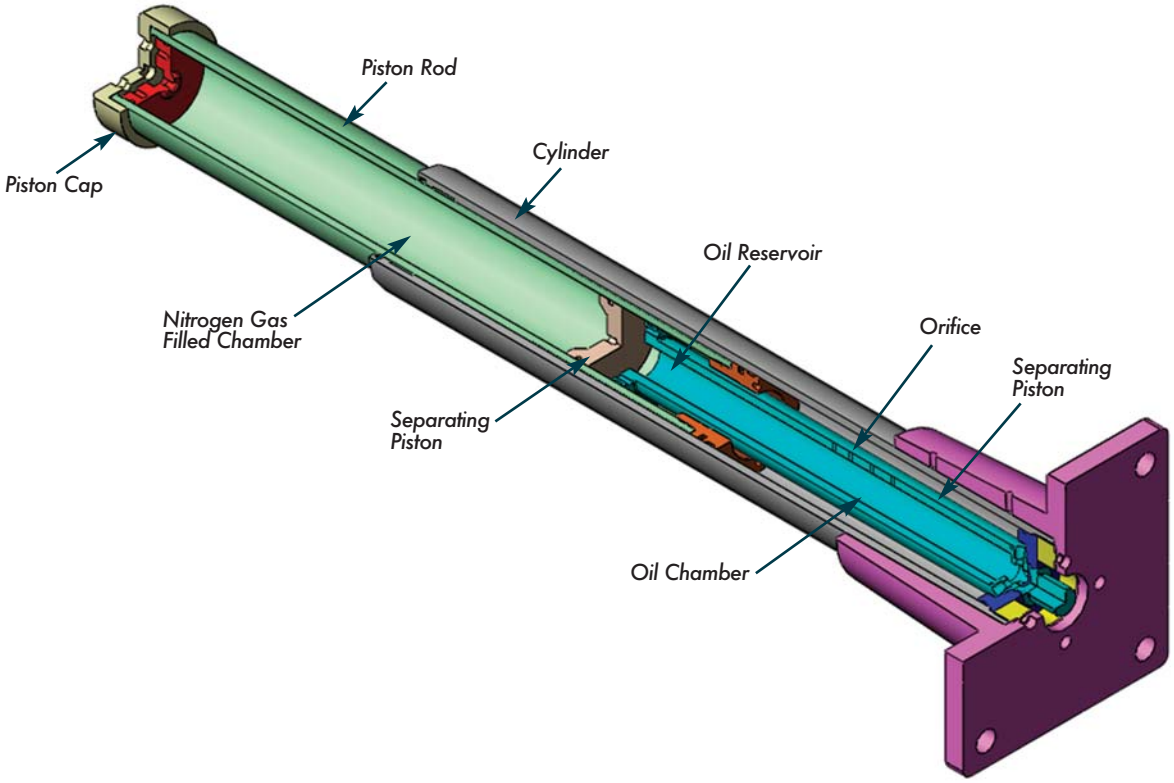
The oversize bore area results in optimal energy absorption capabilities and increased internal safety factors. State-of-the-art testing facilities ensure integrity of design and product performance.

Features and Benefits

- Compact design smoothly and safely decelerates large energy capacity loads up to 4 million in-lbs. per cycle with standard stroke lengths.
- Engineered to meet OSHA, AISE, CMMA and other safety specifications such as DIN and FEM.
- Nitrogen-charged return system allows for soft deceleration and positive return in a maintenance-free package.
- Wide variety of optional configurations including protective bellows and safety cables.
- Available in custom-orificed non-adjustable models.
- Special epoxy painting and rod materials are available for use in highly corrosive environments.
- Surface treatment (Sea water resistant)
  Housing: gray color, three-part epoxy
  Piston Rod: hard-chrome plated steel
- Incorporating optional fluids and seal packages available to expand standard operating temperature range from (0°F to 175°F) to (-30°F to 250°F) (-10°C to 60°C) to (-35°C to 100°C)

Ordering Information

Enidine Heavy Industry (HI) Series Buffers

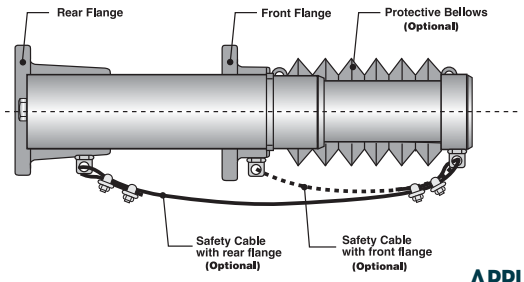


Enidine's Heavy Industry Series (HI) buffers safely protect heavy machinery and equipment during the transfer of materials and movement of products. The large-bore, high-capacity buffers are individually designed to decelerate moving loads under various conditions and in compliance with industry mandated safety standards. Control of bridge cranes, trolley platforms, large container transfer and transportation safety stops are typical installation examples. Industry-proven design technologies, coupled with the experience of a globally installed product base, ensure deliverable performance that exceeds customer expectations.

Prior to HI Series buffer manufacture, computer-simulated response curves are generated to model actual conditions, verify product performance, confirm damping characteristics and generate unique custom-orificed designs that accommodate multi-condition or specific damping requirements.

Characteristics of the HI Series include a nitrogen-charged return system that allows for soft deceleration and positive return in a maintenance-free package. The oversize bore area results in optimal energy absorption capabilities and increased internal safety factors. State-of-the-art testing facilities ensure integrity of design and product performance.

Ordering Example



Mounting bracket flange:
Standard: Rear or Front mount

Example:

4
Select quantity

HI 120 x 100
Select HI Series model from Engineering Data Chart

FR
Select mounting method
- FF (Flange Front)
- FR (Flange Rear)

B
Additional Options
- B Protective Bellows
- C Safety cable

APPLICATION DATA

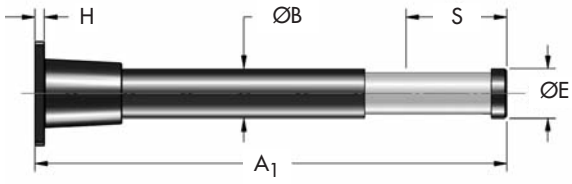
Required for all models:
- Vertical/Horizontal Motion
- Weight
- Impact Velocity
- Propelling Force (if any)
- Cycles/Hour
- Temperature/Environment
- Applicable Standards

Heavy Industry Shock Absorbers

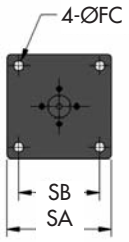
HI Series

HI 50 x 50 → HI 120 x 1000 Series

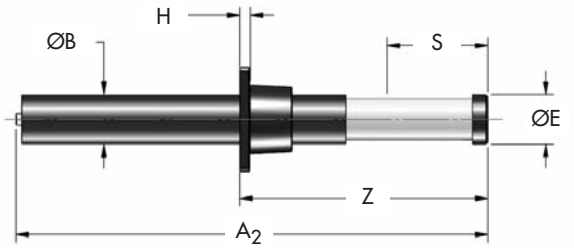
Technical Data



FR (FLANGE REAR)



MOUNTING FLANGE



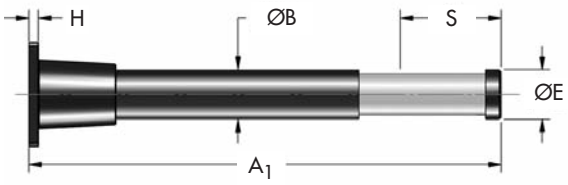
FF (FLANGE FRONT)

Catalog No./ Model	S Stroke in. (mm)	Max. Energy/cycle in.-lbs. (Nm)	Max. Shock Force lbs. (kN)	Return Force Extension lbs. (kN)	Return Force Compression lbs. (kN)	Weight lbs. (Kg)	A_1 in. (mm)	A_2 in. (mm)	Z in. (mm)	H in. (mm)	ØB in. (mm)	SA in. (mm)	SB in. (mm)	ØFC in. (mm)	BOLT SIZE in. (mm)	ØE in. (mm)
HI 50 x 50	2 (50)	27,000 (3 050)	15,000 (67)	70 (0,3)	140 (0,6)	11 (5)	10.3 (262)	– –	– –	0.6 (15)	2.36 (60)	3.94 (100)	2.76 (70)	0.59 (15)	½ (M14)	2.28 (58)
HI 50 x 100	3.9 (100)	55,500 (6 200)	15,000 (67)	70 (0,3)	140 (0,6)	20 (9)	15.4 (392)	– –	– –	0.6 (15)	2.36 (60)	3.94 (100)	2.76 (70)	0.59 (15)	½ (M14)	2.28 (58)
HI 80 x 50	2 (50)	60,000 (6 700)	37,750 (168)	225 (1,0)	430 (1,9)	33 (15)	11.4 (290)	– –	– –	0.6 (15)	3.15 (80)	5.04 (128)	3.50 (89)	0.79 (20)	¾ (M18)	3.11 (79)
HI 80 x 100	3.9 (100)	120,000 (13 500)	37,750 (168)	225 (1,0)	1,800 (8,0)	42 (19)	15.4 (390)	– –	– –	0.6 (15)	3.15 (80)	5.04 (128)	3.50 (89)	0.79 (20)	¾ (M18)	3.11 (79)
HI 100 x 50	2 (50)	88,500 (10 000)	56,200 (250)	370 (1,65)	4,050 (18,0)	36 (16)	11.9 (302)	11.9 (301)	6.9 (175)	0.8 (20)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 100 x 100	3.9 (100)	177,000 (20 000)	56,200 (250)	370 (1,65)	4,050 (18,0)	49 (22)	18.9 (479)	18.6 (473)	9.7 (245)	0.8 (20)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 100 x 150	5.9 (150)	265,500 (30 000)	56,200 (250)	370 (1,65)	4,050 (18,0)	62 (28)	24.3 (618)	24.1 (612)	11.8 (300)	0.8 (20)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 100 x 200	7.9 (200)	354,000 (40 000)	56,200 (250)	370 (1,65)	4,050 (18,0)	71 (32)	29.8 (756)	29.5 (750)	15.4 (390)	0.8 (20)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 100 x 400	15.7 (400)	708,060 (80 000)	52,830 (235)	370 (1,65)	4,050 (18,0)	101 (46)	53.1 (1 349)	53.0 (1 345)	25.4 (645)	1.0 (25)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 100 x 500	19.7 (500)	831,900 (94 000)	52,800 (235)	370 (1,65)	4,050 (18,0)	115 (52)	– –	63.6 (1 616)	35.0 (890)	0.8 (20)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 100 x 600	23.6 (600)	991,200 (112 000)	51,700 (230)	370 (1,65)	4,050 (18,0)	128 (58)	– –	74.3 (1 888)	40.9 (1 040)	0.8 (20)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 100 x 800	31.5 (800)	1,168,200 (132 000)	46,085 (205)	370 (1,65)	4,050 (18,0)	152 (69)	– –	95.5 (2 426)	53.0 (1 345)	0.8 (20)	3.94 (100)	5.91 (150)	4.72 (120)	0.71 (18)	⅝ (M16)	3.90 (99)
HI 120 x 100	3.9 (100)	283,200 (32 000)	89,920 (400)	630 (2,8)	11,250 (50,0)	75 (34)	18.5 (471)	18.4 (467)	10.6 (270)	0.8 (20)	4.72 (120)	8.66 (220)	6.69 (170)	1.02 (26)	1 (M24)	4.69 (119)
HI 120 x 150	5.9 (150)	424,800 (48 000)	89,920 (400)	630 (2,8)	11,250 (50,0)	86 (39)	23.5 (597)	23.3 (593)	13.0 (330)	0.8 (20)	4.72 (120)	8.66 (220)	6.69 (170)	1.02 (26)	1 (M24)	4.69 (119)
HI 120 x 200	7.9 (200)	566,400 (64 000)	89,920 (400)	630 (2,8)	11,250 (50,0)	95 (43)	28.5 (724)	28.3 (720)	15.4 (390)	0.8 (20)	4.72 (120)	8.66 (220)	6.69 (170)	1.02 (26)	1 (M24)	4.69 (119)
HI 120 x 300	11.8 (300)	831,900 (94 000)	89,920 (400)	630 (2,8)	11,250 (50,0)	117 (53)	38.3 (973)	38.1 (969)	20.5 (520)	0.8 (20)	4.72 (120)	8.66 (220)	6.69) (170	1.02 (26)	1 (M24)	4.69 (119)
HI 120 x 400	15.7 (400)	1,106,300 (125 000)	89,920 (400)	630 (2,8)	11,250 (50,0)	192 (87)	48.2 (1 225)	48.1 (1 221)	26.8 (680)	1.0 (25)	4.72 (120)	8.66 (220)	6.69 (170)	1.02 (26)	1 (M24)	4.69 (119)
HI 120 x 600	23.6 (600)	1,663,900 (188 000)	89,920 (400)	630 (2,8)	11,250 (50,0)	232 (105)	– –	67.9 (1 725)	36.0 (915)	1.0 (25)	4.72 (120)	8.66 (220)	6.69 (170)	1.02 (26)	1 (M24)	4.69 (119)
HI 120 x 800	31.5 (800)	1,991,250 (225 000)	78,690 (350)	630 (2,8)	11,250 (50,0)	243 (110)	– –	91.8 (2 332)	50.8 (1 290)	1.0 (25)	4.72 (120)	8.66 (220)	6.69 (170)	1.02 (26)	1 (M24)	4.69 (119)
HI 120 x 1000	39.4 (1000)	2,301,000 (260 000)	73,060 (325)	630 (2,8)	11,250 (50,0)	256 (116)	– –	111.7 (2 836)	53.5 (1 360)	1.0 (25)	4.72 (120)	8.66 (220)	6.69 (170)	1.02 (26)	1 (M24)	4.69 (119)

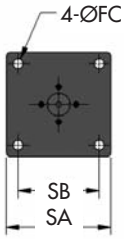
Heavy Industry Shock Absorbers
HI Series

HI 130 x 250 → HI 150 x 1000 Series

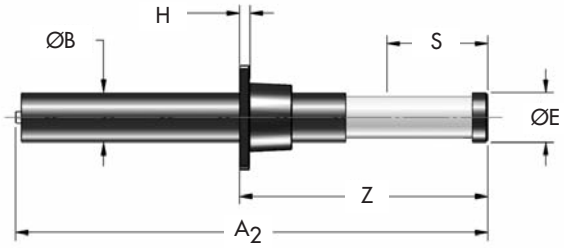
Technical Data



FR (FLANGE REAR)



MOUNTING FLANGE



FF (FLANGE FRONT)

Catalog No./ Model	Max. S Stroke in. (mm)	Max. Energy/cycle in.-lbs. (Nm)	Shock Force lbs. (kN)	Return Force		Weight lbs. (Kg)	A_1 in. (mm)	A_2 in. (mm)	Z in. (mm)	H in. (mm)	ØB in. (mm)	SA in. (mm)	SB in. (mm)	ØFC in. (mm)	BOLT SIZE in. (mm)	ØE in. (mm)
				Extension lbs. (kN)	Compression lbs. (kN)											
HI 130 x 250	9.8 (250)	885,000 (100 000)	112,400 (500)	720 (3,2)	14,400 (64,0)	159 (72)	35.3 (897)	35.2 (893)	21.5 (545)	1.0 (25)	5.12 (130)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.08 (129)
HI 130 x 300	11.8 (300)	1,062,000 (120 000)	112,400 (500)	720 (3,2)	14,400 (64,0)	175 (79)	40.5 (1 029)	40.4 (1 025)	23.8 (605)	1.0 (25)	5.12 (130)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.08 (129)
HI 130 x 400	15.7 (400)	1,416,100 (160 000)	112,400 (500)	720 (3,2)	14,400 (64,0)	199 (90)	50.9 (1 293)	50.8 (1 289)	28.9 (735)	1.0 (25)	5.12 (130)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.08 (129)
HI 130 x 600	23.6 (600)	1,858,500 (210 000)	97,790 (435)	720 (3,2)	14,400 (64,0)	263 (119)	– –	75.5 (1 917)	41.7 (1 060)	1.0 (25)	5.12 (130)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.08 (129)
HI 130 x 800	31.5 (800)	2,388,500 (270 000)	94,415 (420)	720 (3,2)	14,400 (64,0)	309 (140)	– –	96.3 (2 445)	53.2 (1 350)	1.0 (25)	5.12 (130)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.08 (129)
HI 150 x 115	4.5 (115)	548,700 (62 000)	150,600 (670)	1,125 (5,0)	21,600 (96,0)	124 (56)	20.4 (517)	20.2 (513)	12.6 (320)	0.8 (20)	5.91 (150)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.87 (149)
HI 150 x 150	5.9 (150)	725,700 (82 000)	150,600 (670)	1,125 (5,0)	21,600 (96,0)	130 (59)	23.9 (606)	23.7 (602)	14.0 (355)	1.0 (25)	5.91 (150)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.87 (149)
HI 150 x 400	15.7 (400)	1,947,000 (220 000)	150,600 (670)	1,125 (5,0)	21,600 (96,0)	216 (98)	49.2 (1 249)	49.0 (1 245)	28.0 (710)	1.0 (25)	5.91 (150)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.87 (149)
HI 150 x 500	19.7 (500)	2,433,900 (275 000)	150,600 (670)	1,125 (5,0)	21,600 (96,0)	243 (110)	– –	59.0 (1 498)	30.3 (770)	1.0 (25)	5.91 (150)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.87 (149)
HI 150 x 600	23.6 (600)	2,920,500 (330 000)	150,600 (670)	1,125 (5,0)	21,600 (96,0)	265 (120)	– –	69.0 (1 752)	34.4 (875)	1.0 (25)	5.91 (150)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.87 (149)
HI 150 x 800	31.5 (800)	3,965,100 (448 000)	157,360 (700)	1,125 (5,0)	21,600 (96,0)	364 (165)	– –	93.0 (2 363)	48.8 (1 240)	1.0 (25)	5.91 (150)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.87 (149)
HI 150 x 1000	39.4 (1000)	4,513,500 (510 000)	142,750 (635)	1,125 (5,0)	21,600 (96,0)	397 (180)	– –	113.4 (2 880)	62.8 (1 595)	1.0 (25)	5.91 (150)	10.63 (270)	8.27 (210)	1.02 (26)	1 (M24)	5.87 (149)

Overview

The design of Jarret Industrial Shock Absorber utilizes the unique compression and shear characteristics of specially formulated silicone elastomers.

These characteristics allow the energy absorption and return spring functions to be combined into a single unit **without the need for an additional gas or mechanical spring stroke return mechanism**.

Applications

Shock protection for all types of industries including:
Defense, Automobile, Railroad, Materials Handling, Marine, Pulp/Paper, Metal Producing and Processing.

Advantages:

- Simple design - High reliability
- High damping coefficient
- Low sensitivity to temperature variances

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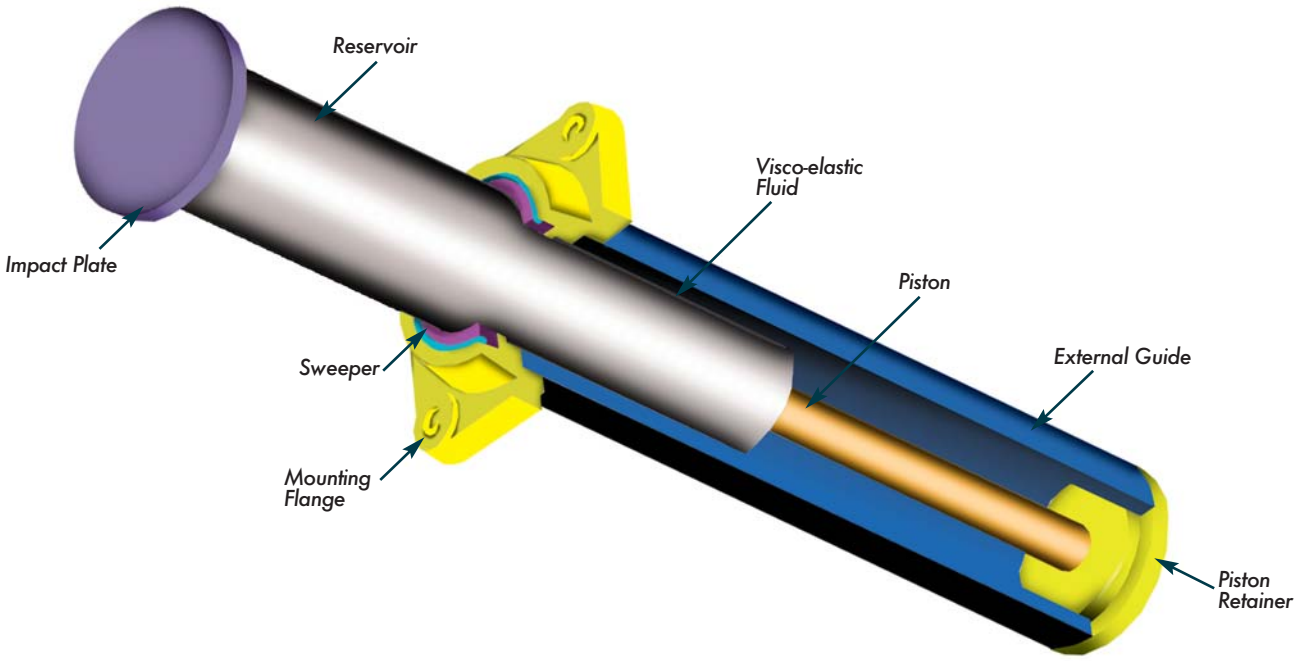
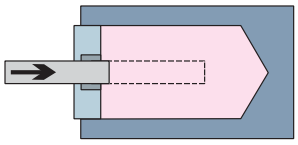
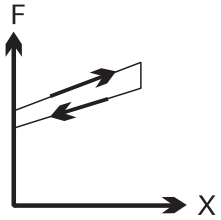
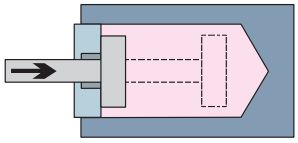


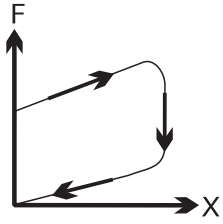
Visco-elastic technology makes use of the fundamental properties of specially formulated Jarret visco-elastic fluids.





Compressibility:
Preloaded spring function
- $F = F_0 + KX$





Viscosity:
Shock absorber function
- $F = F_0 + KX + CV^{\alpha}$ with α between 0,1 and 0,4

The two functions can be used separately or in combination, in the same product:

Preloaded Spring:
Spring Function Only
- Hysteresis of between 5% and 10%
- Reduced weight and space requirement
- Force/stroke characteristic is independent of actuation speed

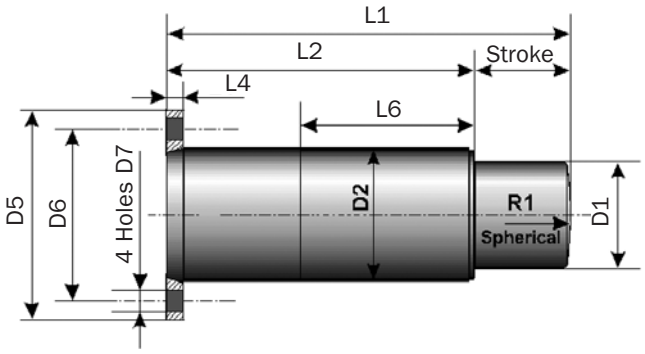
Preloaded Spring Shock Absorbers:
Combine Spring and Shock Absorber Functions
- Dissipate between 30% and 100% of energy
- Force/stroke characteristics remain relatively unchanged between 15°F and 160°F (-10°C and + 70°C)

Shock Absorber Without Spring Return:
Shock Absorbing Function Only
- Dampening devices
- Blocking Devices

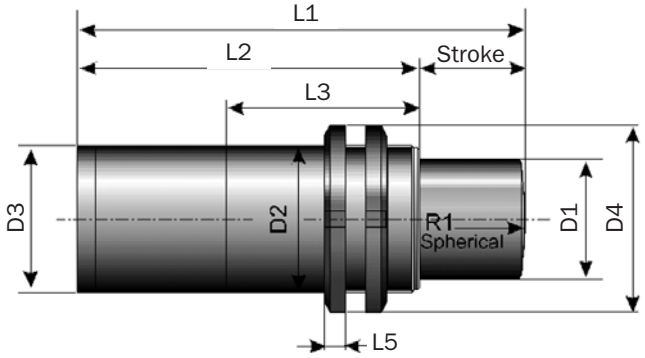
Jarret Shock Absorbers
BC1N Series

BC1ZN → BC1GN Series

Technical Data



Rear flange mounting - Fa



Threaded body mounting - Fc

Catalog No./ Model	Max Energy Capacity in-lbs. (kJ)	Stroke in. (mm)	Return Force		Rdy0 lbs. (kN)	Rdymax Max Shock Force lbs. (kN)
			Extension lbs. (kN)	Compression lbs. (kN)		
BC1ZN	885 (0,1)	0.47 (12)	211.3 (0,94)	1,213.97 (5,4)	1349 (6)	2473 (11)
BC1BN	3806 (0,43)	0.87 (22)	562 (2,5)	3,147.32 (14,0)	3,147 (14)	6070 (27)
BC1DN	13,276 (1,5)	1.4 (35)	1,169 (5,2)	6,474.5 (28,8)	6,295 (28)	13,489 (60)
BC1EN	30,093 (3,4)	1.8 (45)	1,753.5 (7,8)	9,666.78 (43,0)	10,116 (45)	22,481 (100)
BC1FN	61,955 (7)	2.4 (60)	3,057.4 (13,6)	17,220.36 (76,6)	20,233 (90)	33,721 (150)
BC1GN	123,910 (14)	3.1 (80)	4,271.4 (19,0)	29,225.16 (130,0)	29,225 (130)	51,706 (230)

Catalog No./ Model	L1 in. (mm)	L2 in. (mm)	L3 in. (mm)	L4 in. (mm)	L5 in. (mm)	L6 in. (mm)	R1 in. (mm)	D1 in. (mm)	D2 in. (mm)	D3 in. (mm)	D4 in. (mm)	D5 in. (mm)	D6 in. (mm)	D7 in. (mm)	Mass lbs. (kg.)
BC1ZN	2.95 (75)	2.1 (53)	2.1 (52)	0.39 (10)	0.28 (7)	1.7 (43)	– –	0.75 (19)	M25 x 1,5	0.79 (20)	1.5 (38)	2.2 (57)	1.6 (41)	0.28 (7)	0.7 (0,3)
BC1BN	4.7 (120)	3.9 (98)	3.8 (96)	0.47 (12)	0.31 (8)	3.4 (86)	– –	1.0 (25)	M35 x 1,5	1.3 (32)	2.0 (52)	3.1 (80)	2.4 (60)	0.35 (9)	1.5 (0,7)
BC1BN-M	4.7 (120)	3.9 (98)	3.8 (96)	0.47 (12)	0.35 (9)	– -	– –	1.0 (25)	M40 x 1,5	1.3 (32)	2.3 (58)	– –	– –	– –	1.8 (0,8)
BC1DN-70	6.9 (175)	5.5 (140)	5.4 (138)	0.47 (12)	0.43 (11)	5.0 (128)	– –	1.5 (38)	M50 x 1,5	1.8 (45)	2.8 (70)	3.5 (90)	2.8 (70)	0.35 (9)	4.2 (1,9)
BC1DN-85	6.9 (175)	5.5 (140)	5.4 (138)	0.47 (12)	0.43 (11)	5.0 (128)	– –	1.5 (38)	M50 x 1,5	1.8 (45)	2.8 (70)	4.2 (106)	3.3 (85)	0.43 (11)	4.4 (2)
BC1DN-M	6.9 (175))	5.5 (140)	5.4 (138)	0.47 (12)	0.43 (11)	– –	– –	1.5 (38)	M60 x 2	1.8 (45)	2.8 (70)	– –	– –	– –	4.4 (2)
BC1EN	8.4 (213)	6.6 (168)	6.2 (158)	0.39 (10)	0.51 (13)	6.2 (158)	R. 5.1 (R.130)	2.4 (60)	M75 x 2	2.8 (72)	3.9 (98)	4.8 (122)	4.0 (100)	0.43 (11)	11 (5)
BC1FN	10.6 (270)	8.3 (210)	5.1 (130)	0.47 (12)	0.63 (16)	5.1 (130)	R. 5.9 (R.150)	2.9 (74,5)	M90 x 2	3.5 (90)	4.7 (120)	5.9 (150)	4.7 (120)	0.51 (13)	23.1 (10,5)
BC1GN	13.3 (337)	10.1 (257)	5.7 (145)	0.55 (14)	0.75 (19)	5.7 (145)	R. 13.8 (R.350)	3.5 (90)	M110 x 2	4.3 (110)	5.7 (145)	6.9 (175)	5.6 (143)	0.70 (18)	37.5 (17)

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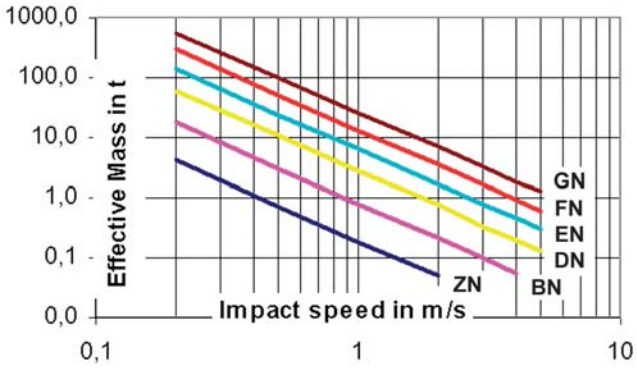
BC1ZN → BC1GN Series

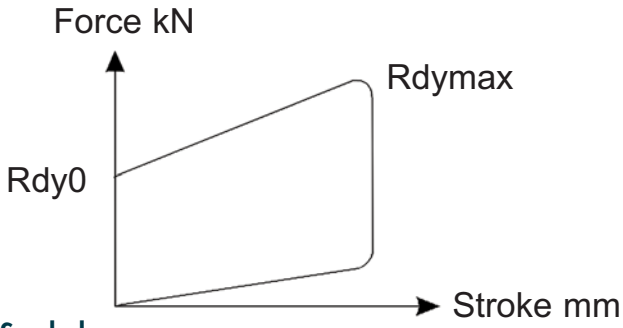
Application Worksheet

1 - Selection Chart



Based On

- ☐ Impact velocity : 2 m/s
- ☐ Operating temperature : - 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity
C = Maximum Stroke
Rdy = Dynamic Reaction

2 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

3 - Allowable Impact Frequency

$$F < 20 \times \frac{En}{E} \text{ Impacts/hour}$$

4 - Effective Stroke Calculation

$$Ce = C\left(\sqrt{\frac{E}{En\,(0{,}03\,V + 0{,}24)}} + 1{,}36 - 1{,}17\right)$$

5 - Calculation of Effective Reaction Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy0}{C}\right) \times Ce + Rdy0\right](0{,}1V + 0{,}8)$$

6 - Application Example

Given data: Effective mass = 15 t,
Effective speed = 0,8 m/s
Impact frequency: 25 impacts/hour

1: BC1FN Selected

2: Energy dissipated per impact is: 4,8 kJ

3: Allowable impact frequency < 20x7/4.8

4: Required stroke is 49 mm

$$Ce = 60\left(\sqrt{\frac{4{,}8}{7\,(0{,}03 \times 0.8 + 0{,}24)}} + 1{,}36 - 1{,}17\right)$$

5: With an Rdy_e = [(150 - 90) x 49/60) + 90)] x (0,1 x 0,8 + 0,8) = 122 kN

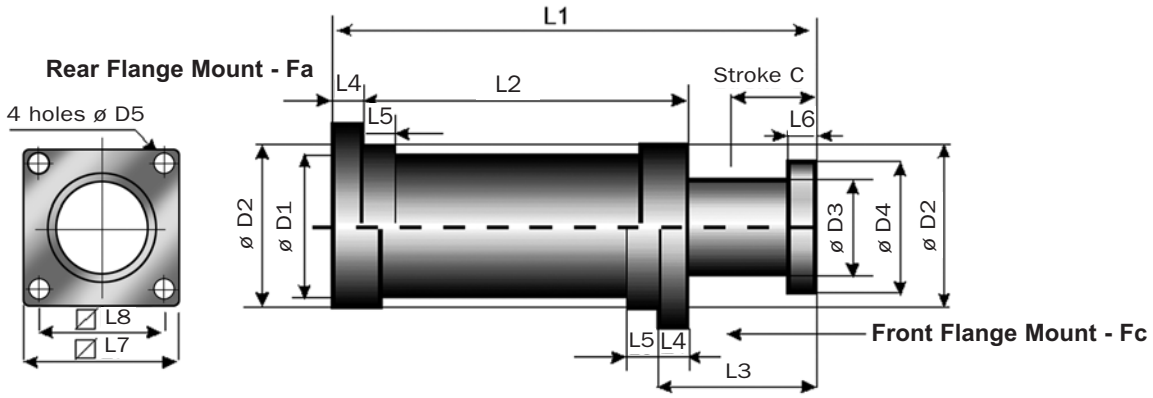
Compare with standard mechanical characteristics:

En = 7 kJ, C = 60mm, Rdy0 = 90 kN and
Rdymax = 150 kN

All performance characteristics can be modified. Please advise us of your specific requirements.

BC5A → BC5E Series

Technical Data



Catalog No./ Model	Max Energy Capacity in-lbs. (kJ)	Stroke in. (mm)	Return Force		Rdy0 lbs. (kN)	Rdymax Max Shock Force lbs. (kN)
			Extension lbs. (kN)	Compression lbs. (kN)		
BC5A-105	221,268 (25)	4.1 (105)	4,159 (18,5)	31,630 (140,7)	37,543 (167)	69,691 (310)
BC5B-130	442,537 (50)	4.7 (130)	13,039 (58,0)	58,416 (259,9)	69,691 (310)	121,397 (540)
BC5C-140	663,806 (75)	5.5 (140)	11,015 (49,0)	73,827 (328,4)	89,924 (400)	157,366 (700)
BC5D-160	885,075 (100)	6.3 (160)	13,376 (59,5)	85,427 (380,0)	105,660 (470)	184,343 (820)
BC5E-180	1,327,612 (150)	7.1 (180)	26,269 (117,0)	122,656 (546)	143,878 (640)	247,290 (1 100)

Catalog No./ Model	L1 in. (mm)	L2 in. (mm)	L3 in. (mm)	L4 in. (mm)	L5 in. (mm)	L6 in. (mm)	L7 in. (mm)	L8 in. (mm)	D1 in. (mm)	D2 in. (mm)	D3 in. (mm)	D4 in. (mm)	D5 in. (mm)	Mass lbs. (kg)
BC5A	16.3 (415)	10.8 (275)	5.5 (140)	0.79 (20)	1.2 (30)	0.59 (15)	5.3 (135)	4.1 (105)	4.6 (116)	4.6 (116)	3.4 (87)	4.7 (120)	0.55 (14)	55 (25)
BC5B	19.7 (500)	12.8 (325)	6.9 (175)	1.0 (25)	1.3 (33)	1.2 (30)	6.1 (155)	4.9 (125)	5.6 (142)	5.6 (142)	4.5 (115)	5.4 (138)	0.55 (14)	88 (40)
BC5C	20.5 (520)	12.4 (315)	8.1 (205)	1.2 (30)	1.4 (36)	1.4 (35)	6.9 (175)	5.5 (140)	6.3 (160)	6.3 (160)	5.2 (132)	6.2 (158)	0.70 (18)	99 (45)
BC5D	23 (585)	13.8 (350)	9.3 (235)	1.4 (35)	1.6 (40)	1.6 (40)	8.5 (215)	6.7 (170)	7.1 (180)	7.1 (180)	6.0 (153)	7.3 (185)	0.87 (22)	161 (73)
BC5E	26.4 (670)	15.9 (405)	10.4 (265)	1.6 (40)	1.8 (45)	1.8 (45)	9.8 (250)	7.7 (195)	8.5 (215)	8.5 (215)	7.2 (182)	8.7 (220)	1.0 (26)	258 (117)

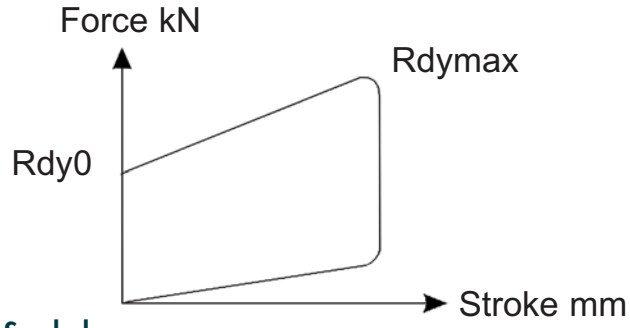
Impact Speed: BC5 Series shock absorbers are designed for impact velocities of up to 4 m/sec. Higher impact velocities require custom modification.

BC5A → BC5E Series

Application Worksheet

Based On

- ☐ Impact velocity : 2 m/s
- ☐ Operating temperature : - 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity
C = Maximum Stroke
Rdy = Dynamic Reaction

1 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

2 - Allowable Impact Frequency

$$F < 15 \times \frac{En}{E} \text{ Impacts/hour}$$

3 - Effective Stroke Calculation

$$Ce = C\left(\sqrt{\frac{E}{En\,(0{,}03\,V + 0{,}24)}} + 1{,}36 - 1{,}17\right)$$

4 - Calculation of Effective Reaction Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy0}{C}\right) \times Ce + Rdy0\right](0{,}1V + 0{,}8)$$

5 - Application Example

Data: Two shock absorbers in series, Effective mass m =300 t, Impact speed v = 1,2 m/s (which is an impact of 0,6 m/s on each shock absorber), Impact frequency = 15 impacts/hour, Maximum allowable structural load 1000 kN

1: $E = \frac{1}{2}\left(\frac{1}{2} mV^2\right)$ - Selection BC5-E

2: Maximum allowable impact frequency is $15 \times \frac{150}{108}$ 21 impacts/hour. Therefore 15 impacts/hour is acceptable.

3: Required stroke is 167 mm

$$Ce = 180 \times \left(\sqrt{\frac{108}{150\,(0{,}03 \times 0.6 + 0{,}24)}} + 1{,}36 - 1{,}17\right) = 156 \text{ mm}$$

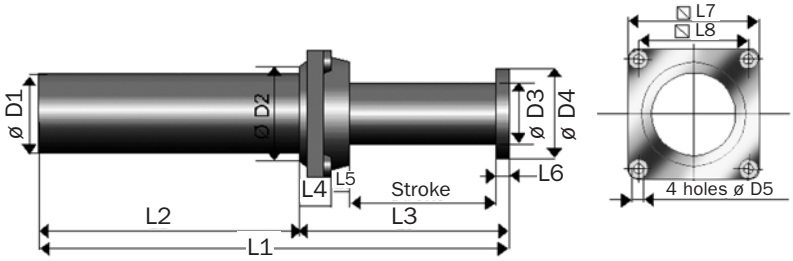
4: $$Rdye = \left[(1\,100 - 640) \times \frac{156}{180} + 640\right](0{,}1 \times 0{,}6 + 0{,}8)$$

= 893 kN < 1000 kN, maximum allowable impact frequency

Compare with standard mechanical characteristics for each shock absorber:

En = 150 kJ, C = 180 mm, Rdy0 = 640 kN and Rdy_{max} = 1100 kN

All performance characteristics can be modified. Please advise us of your specific requirements.



XLR Series - Front Flange Mount- Fc

Catalog No./ Model	Max Energy Capacity in-lbs. (kJ)	Stroke in. (mm)	Return Force		Rdy0 lbs. (kN)	Rdymax Max Shock Force lbs. (kN)
			Extension lbs. (kN)	Compression lbs. (kN)		
XLR6-150	53,104 (6)	5.9 (150)	652 (2,9)	4,609 (20,5)	5,620 (25)	11,240 (50)
XLR12-150	106,209 (12)	5.9 (150)	1,866 (8,3)	8,655 (38,5)	14,837 (66)	22,481 (100)
XLR12-200	106,209 (12)	7.9 (200)	1,259 (5,6)	6,744 (30,0)	9,442 (42)	17,535 (78)
XLR25-200	221,269 (25)	7.9 (200)	3,012 (13,4)	16,726 (74,4)	21,537 (95)	33,721 (150)
XLR25-270	221,269 (25)	10.6 (270)	2,495 (11,1)	11,555 (51,4)	14,837 (66)	25,179 (112)
XLR50-275	442,537 (50)	10.8 (275)	4,429 (19,7)	29,225 (130,0)	26,527 (118)	51,706 (230)
XLR50-400	442,537 (50)	15.7 (400)	2,900 (12,9)	18,839 (83,8)	16,861 (75)	33,721 (150)
XLR100-400	885,075 (100)	15.7 (400)	5,620 (25,0)	36,531 (162,5)	39,342 (175)	71,939 (320)
XLR100-600	885,075 (100)	23.6 (600)	2,608 (11,6)	29,765 (132,4)	19,109 (85)	51,706 (230)
XLR150-800	1,327,612 (150)	31.5 (800)	5,216 (23,2)	34,216 (152,2)	17,984 (80)	56,202 (250)

Impact Speed: Types XLR and BCLR Series shock absorbers are designed for impact velocities of up to 2 m/sec.
Higher impact velocities require custom modification.

Catalog No./ Model	L1 in. (mm)	L2 in. (mm)	L3 in. (mm)	L4 in. (mm)	L5 in. (mm)	L6 in. (mm)	L7 in. (mm)	L8 in. (mm)	D1 in. (mm)	D2 in. (mm)	D3 in. (mm)	D4 in. (mm)	D5 in. (mm)	Mass lbs. (kg.)
XLR6-150	16.1 (410)	9.1 (231)	7.0 (179)	0.75 (19)	0 (0)	0.39 (10)	3.5 (90)	2.8 (70)	2.0 (50)	3.5 (90)	1.5 (38)	2.0 (50)	0.35 (9)	9.3 (4,2)
XLR12-150	18.9 (480)	11.2 (285)	7.7 (195)	0.71 (18)	0.60 (15)	0.47 (12)	4.3 (110)	3.3 (85)	3.0 (75)	3.5 (90)	2.2 (57)	3.1 (80)	0.43 (11)	24.3 (11)
XLR12-200	20.9 (530)	11.2 (285)	9.6 (245)	0.71 (18)	0.60 (15)	0.47 (12)	4.3 (110)	3.3 (85)	3.0 (75)	3.5 (90)	2.2 (57)	3.1 (80)	0.43 (11)	24.3 (11)
XLR25-200	24.4 (620)	14.6 (370)	9.8 (250)	0.79 (20)	0.71 (18)	0.47 (12)	5.3 (135)	4.1 (105)	3.5 (90)	4.3 (110)	2.8 (72)	4.0 (100)	0.6 (14)	44.1 (20)
XLR25-270	27.2 (690)	14.6 (370)	12.6 (320)	0.79 (20)	0.71 (180	0.47 (12)	5.3 (135)	4.1 (105)	3.5 (90)	4.3 (110)	2.8 (72)	4.0 (100)	0.6 (14)	55.1 (25)
XLR50-275	33.7 (855)	20.5 (520)	13.2 (335)	1.0 (25)	0.79 (20)	0.60 (15)	6.9 (175)	5.5 (140)	4.3 (110)	5.9 (150)	3.4 (87)	4.7 (120)	0.71 (18)	88.2 (40)
XLR50-400	38.6 (980)	20.5 (520)	18.1 (460)	1.0 (25)	0.79 (20)	0.60 (15)	6.9 (175)	5.5 (140)	4.3 (110)	5.9 (150)	3.4 (87)	4.7 (120)	0.71 (18)	88.2 (40)
XLR100-400	53.9 (1370)	35.8 (910)	18.1 (460)	1.0 (25)	0.79 (20)	0.60 (15)	6.9 (175)	5.5 (140)	4.3 (110)	5.9 (150)	3.4 (87)	4.7 (120)	0.71 (18)	143.3 (65)
XLR100-600	61.8 (1570)	35.8 (910)	26.0 (660)	1.0 (25)	0.79 (20)	0.60 (15)	6.9 (175)	5.5 (140)	4.3 (110)	5.9 (150)	3.4 (87)	4.7 (120)	0.71 (18)	143.3 (65)
XLR150-800	103.9 (2640)	70.1 (1780)	33.9 (860)	1.0 (25)	0.79 (20)	0.60 (15)	6.9 (175)	5.5 (140)	4.3 (110)	5.9 (150)	3.4 (87)	4.7 (120)	0.71 (18)	253.5 (115)

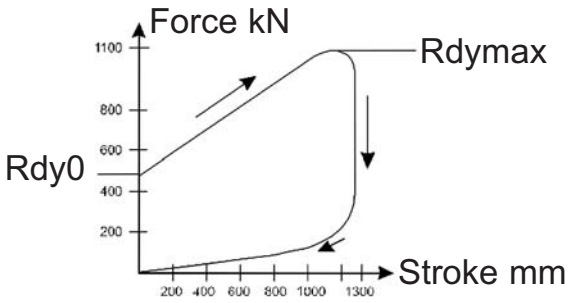
Rear Flange Mounting - Fa on Request.

XLR6-150 → XLR-800 Series

Application Worksheet

Based On

- ☐ Impact velocity : 2 m/s
- ☐ Operating temperature : - 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc & Painting
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity
C = Maximum Stroke
Rdy = Dynamic Reaction

1 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

2 - Allowable Impact Frequency

$$F < 8 \times \frac{En}{E} \text{ Impacts/hour}$$

3 - Required Stroke Calculation

$$Ce = C \left(\sqrt{\frac{E}{En\ (0{,}027\ V + 0{,}22)}} + 1{,}83 - 1{,}35 \right)$$

4 - Calculation of Effective Reaction Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy0}{C} \right) \times Ce + Rdy0 \right] (0{,}1V + 0{,}8)$$

5 - Application Example

Data: Effective mass = 30 t
Effective impact speed = 2,2 m/s
Maximum allowable structural force: 350 kN

1: BCLR400 selected

2: Energy dissipated/impact is 72,6 kJ

3: Maximum allowable impact frequency
8 x 100 / 72,6 = 11 (10<11 impacts/hour is acceptable)

4: Effective stroke:

$$Ce = 850 \times \left(\sqrt{\frac{274}{400\ (0{,}027 \times 2.7 + 0{,}22)}} + 1{,}83 - 1{,}35 \right)$$

Ce = 301.8 mm

5: Rdye = 284.4 (0,1 x 2,2 + 0,87) = 290,1 kN

(which is less than maximum allowable reaction force of 350 kN)

Compare with standard performance characteristics:

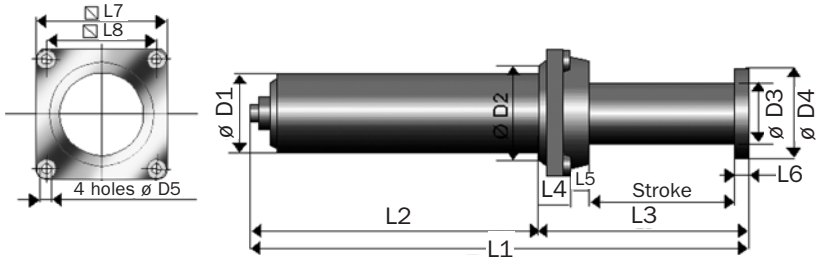
En = 100 kJ, C = 400 mm,
Rdymax = 320 kN
Rdy0 = 175 kN

All performance characteristics can be modified.
Please advise us of your specific requirements.

Jarret Shock Absorbers
BCLR Series

BCLR-100 → BCLR-1000 Series

Technical Data



BCLR Series - Front Flange Mount - Fc

Catalog No./ Model	Max Energy Capacity in-lbs. (kJ)	Stroke in. (mm)	Return Force		Rdy0 lbs. (kN)	Rdymax Max Shock Force lbs. (kN)
			Extension lbs. (kN)	Compression lbs. (kN)		
BCLR-100	885,075 (100)	15.7 (400)	6,744 (30,0)	36,403 (161,9)	42,714 (190)	69,691 (310)
BCLR-150	1,327,612 (150)	19.7 (500)	9,330 (41,5)	47,300 (201,4)	44,962 (200)	85,427 (380)
BCLR-220S	1,947,614 (220)	15.7 (400)	10,105 (45,0)	60,698 (270,0)	85,427 (380)	153,944 (685)
BCLR-250	2,212,686 (250)	25.6 (650)	10,116 (45,0)	56,877 (253,0)	60,698 (270)	110,156 (490)
BCLR-400	3,540,298 (400)	33.5 (850)	11,144 (49,6)	69,214 (307,9)	74,187 (330)	134,885 (600)
BCLR-600	5,310,477 (600)	41.3 (1050)	10,678 (47,5)	79,020 (351,5)	83,179 (370)	166,359 (740)
BCLR-800	7,080,597 (800)	47.2 (1200)	14,433 (64,2)	99,141 (441,0)	96,668 (430)	193,336 (860)
BCLR-1000	8,850,746 (1000)	51.2 (1300)	19,109 (85,0)	120,048 (534,0)	112,405 (500)	224,809 (1000)

Impact Speed: Types XLR and BCLR Series shock absorbers are designed for impact velocities of up to 2 m/sec.
Higher impact velocities require custom modification.

Catalog No./ Model	L1 in. (mm)	L2 in. (mm)	L3 in. (mm)	L4 in. (mm)	L5 in. (mm)	L6 in. (mm)	L7 in. (mm)	L8 in. (mm)	D1 in. (mm)	D2 in. (mm)	D3 in. (mm)	D4 in. (mm)	D5 in. (mm)	Mass lbs. (kg.)
BCLR-100	44.1 (1120)	26.0 (660)	18.1 (460)	1.0 (25)	0.79 (20)	0.60 (15)	6.9 (175)	5.5 (140)	5.1 (130)	5.9 (150)	4.3 (110)	5.5 (140)	0.71 (18)	139.0 (63)
BCLR-150	53.1 (1350)	30.5 (775)	22.6 (575)	1.2 (30)	1.0 (25)	0.79 (20)	8.5 (215)	6.7 (170)	5.5 (140)	7.3 (185)	4.7 (120)	5.9 (150)	0.87 (22)	198.4 (90)
BCLR-220S	49.5 (1258)	30.8 (783))	18.7 (475)	1.2 (30)	1.0 (25)	0.79 (20)	8.5 (215)	6.7 (170)	5.5 (140)	7.3 (185)	4.7 (120)	5.9 (150)	0.87 (22)	220.5 (100)
BCLR-250	68.9 (1750)	40.4 (1025)	28.5 (725)	1.2 (30)	1.0 (25)	0.79 (20)	8.5 (215)	6.7 (170)	6.1 (155)	7.3 (185)	6.9 (135)	6.7 (170)	0.87 (22)	297.6 (135)
BCLR-400	86.0 (2185)	49.2 (1250)	36.8 (935)	1.4 (35)	1.0 (25)	1.0 (25)	10.4 (265)	8.3 (210)	6.9 (175)	9.3 (235)	5.9 (150)	7.5 (190)	1.1 (27)	480.6 (218)
BCLR-600	100.6 (2555)	55.9 (1420)	44.7 (1135)	1.4 (35)	1.0 (25)	1.0 (25)	10.4 (265)	8.3 (210)	7.9 (200)	9.3 (235)	6.9 (175)	8.5 (215)	1.1 (27)	650.4 (295)
BCLR-800	115.6 (2935)	64.2 (1630)	51.4 (1305)	1.6 (40)	1.4 (35)	1.2 (30)	11.8 (300)	9.4 (240)	8.7 (220)	10.6 (270)	7.5 (190)	9.3 (235)	1.2 (30)	926 (420)
BCLR-1000	127.0 (3225)	71.7 (1820)	55.3 (1405)	1.6 (40)	1.4 (35)	1.2 (30)	11.8 (300)	9.4 (240)	9.1 (230)	10.6 (270)	8.1 (205)	9.8 (248)	1.2 (30)	1036.2 (470)

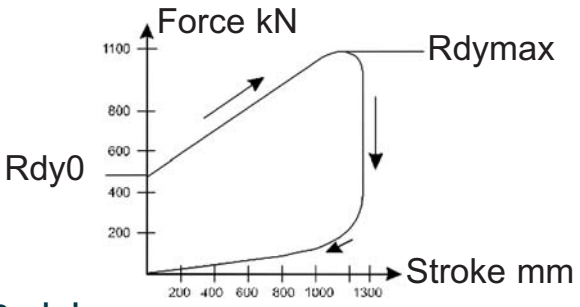
Rear Flange Mounting - Fa on Request.

BCLR-100 → BCLR-1000 Series

Application Worksheet

Based On

- ☐ Impact velocity : 2 m/s
- ☐ Operating temperature : - 20° to + 40°C
- ☐ Surface protection : Electrolytic zinc & Painting
- ☐ Dynamic performance diagram



Symbols:

En = Energy Capacity
C = Maximum Stroke
Rdy = Dynamic Reaction

1 - Energy Calculation

$$E = \frac{1}{2} M_e V_e^2$$

2 - Allowable Impact Frequency

$$F < 8 \times \frac{En}{E} \text{ Impacts/hour}$$

3 - Required Stroke Calculation

$$Ce = C \left(\sqrt{\frac{E}{En\ (0{,}027\ V + 0{,}22)}} + 1{,}83 - 1{,}35 \right)$$

4 - Calculation of Effective Reaction Rdy_e

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy0}{C} \right) \times Ce + Rdy0 \right] (0{,}1V + 0{,}8)$$

5 - Application Example

Data: Effective mass = 75 t
Effective impact speed = 2,7 m/s
Maximum allowable structural force: 650 kN

1: BCLR400 selected

2: Energy dissipated/impact is 274 kJ

3: Maximum allowable impact frequency
8 x 400 / 274 = 12 (10 impacts/hour is acceptable)

4: Effective stroke:

$$Ce = 850 \times \left(\sqrt{\frac{274}{400\ (0{,}027 \times 2.7 + 0{,}22)}} + 1{,}83 - 1{,}35 \right)$$

Ce = 587mm

5: Rdye = 520 (0,1 x 2,7 + 0,8) = 556 kN

(which is less than maximum allowable reaction force of 650 kN)

Compare with Standard
Performance characteristics are:
En = 400 kJ, C = 850 mm,
Rdymax = 600 kN
Rdy0 = 330 kN

All performance characteristics can be modified.
Please advise us of your specific requirements.

Overview

Enidine Rate Controls are designed to regulate the speed and time required for a mechanism to move from one position to another. Adjustable and non-adjustable models are available to accommodate a wide variety of motion control applications. Both single and double acting hydraulic damper designs allow smooth, controllable machine operation by providing rate control for both linear and rotational (hinged) loads. Each product family offers a variety of stroke lengths from which to choose.

Adjustable, Double Acting (ADA 500 and ADA 700 Series) rate controls regulate speed in both tension and/or compression modes independently. ADA products let the user adjust the rate to suit specific application requirements. Fixed orifice interchangeable cartridges are available for the ADA 500 Series, which provide tamperproof operation once the desired rate has been determined. An optional remote adjustment cable provides adjustment control in otherwise inaccessible locations for the ADA 500 Series.

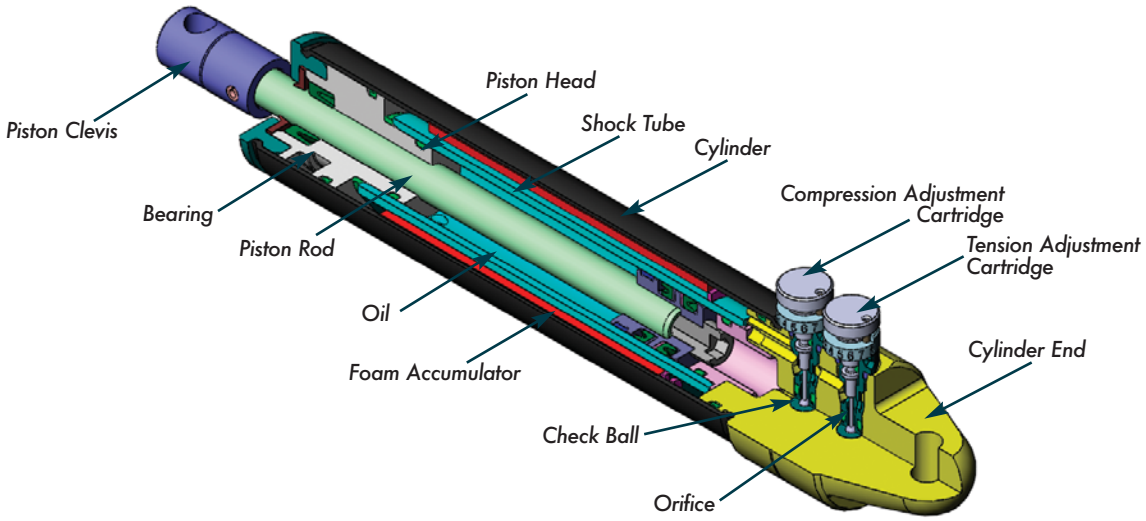
The **DA Series** are non-adjustable, custom-orificed at factory, double acting rate controls which provide smooth, reliable motion control for high load capacities. Tow Bar (TB) snubbers are specially designed DA's which dampen the abrupt starts and stops of power and free conveying systems.

Features and Benefits

- Extensive product line offers flexibility in both size and load capacities to fulfill a wide range of application requirements.
- ISO quality standards result in reliable, long-life operation.
- A select variety of surface finishes maintains original quality appearance and provides the longest corrosion resistance protection.
- Custom stroke lengths and damping characteristics can be designed to suit your application requirements.
- Incorporating optional fluids can expand the standard operational temperature range from (15°F to 180°F) to (–30°F to 210°F).
- Special materials and finishes available to meet specific customer requirements.

Adjustable Double Acting (ADA) Series Rate Control

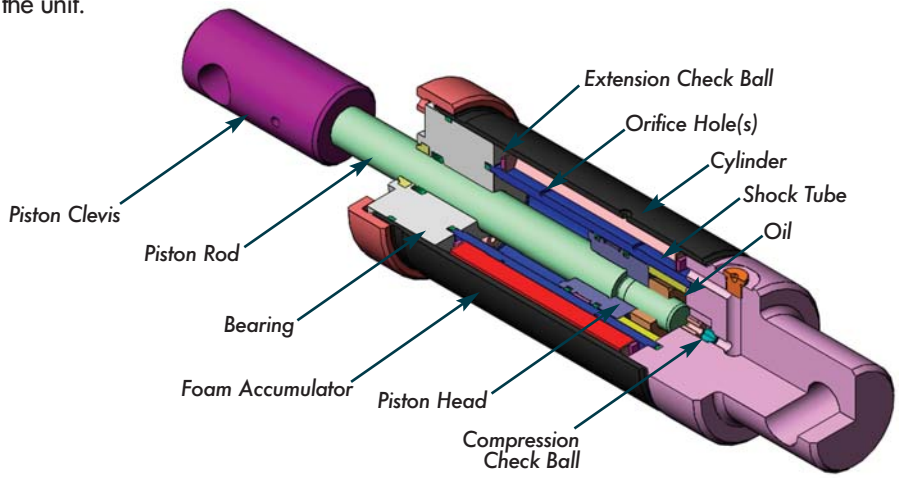
Overview



Enidine Double Acting Adjustable (ADA) rate controls control the velocity of both linear and rotational loads throughout their entire motion. Adjustment cartridges on the ADA 500 Series allow flexibility in controlling the speed for an applied force in both the tension and compression directions. Maximum damping is achieved by turning the adjustment knob to the number eight (8) setting, while turning the knob to the zero (0) setting provides minimal resistance. Interchangeable, threaded, fixed-orifice cartridges can provide consistent, tamper-resistant damping to meet particular application requirements.

The ADA 500 Series utilizes two independent adjustment cartridges for motion control in each direction, housed in the cylinder end. The ADA 700 Series has independently controlled tension and compression capabilities located at each end of the unit.

Resistance is controlled by using a wrench key at either end of the rate control and adjusting the movement by following the stiffer (+) or softer (-) indications. When the rate control is compressed, the oil is orificed through the compression adjustment cartridge and flows freely through the tension adjustment cartridge. The tension cartridge check ball unseats and allows free flow of the oil to the rod end of the shock tube. A foam accumulator is utilized to accept the volume of oil displaced by the piston rod. When the rate control is extended, oil is moved through an internal flow path in the shock tube and is orificed through the tension adjustment cartridge. The compression cartridge check ball unseats and allows free flow of the oil into the blind end of the shock tube.



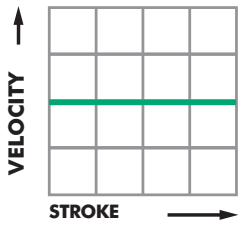
DA Series rate controls are ideally suited for high-energy, heavy load applications requiring rate control in tension, compression or both directions. These non-adjustable, custom-orificed units are designed to specific input conditions, and allow for single and multiple orifice configurations.

Upon compression of the rate control, the compression check ball seats. As the piston head moves, oil is forced through the orifice hole(s) located in the shock tube, producing the required damping force. After the oil has passed through the orifice hole(s), a portion of the oil passes through the extension check valve and fills the rod end of the shock tube. The remainder of the oil volume displaced by the piston rod compresses the foam accumulator.

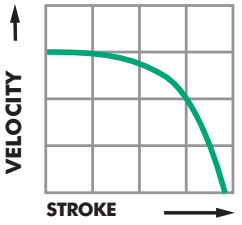
Upon extension of the rate control, the extension check ball seats. As the piston head moves, oil is forced through the orifice hole(s) located in the shock tube producing the required damping force. The compression check ball is unseated by the flow of oil which fills the blind end of the shock tube.

Overview

Enidine Rate Controls are used to regulate the speed or time required for a mechanism to move from one position to another. They use proven technology to enhance performance in a variety of product applications. Rate controls are typically used to control pneumatic cylinders, linear slides, lids, and other moving mechanisms.



SINGLE ORIFICE RATE CONTROL
CONSTANT FORCE OPERATION



MULTIPLE ORIFICE RATE CONTROL
CONSTANT FORCE OPERATION

The advantages of using rate controls include:

1. **Longer Machine Life –** The use of rate controls significantly reduces shock and vibration to machinery caused by uncontrolled machine operation. This further reduces machinery damage, downtime and maintenance costs, while increasing machine life.

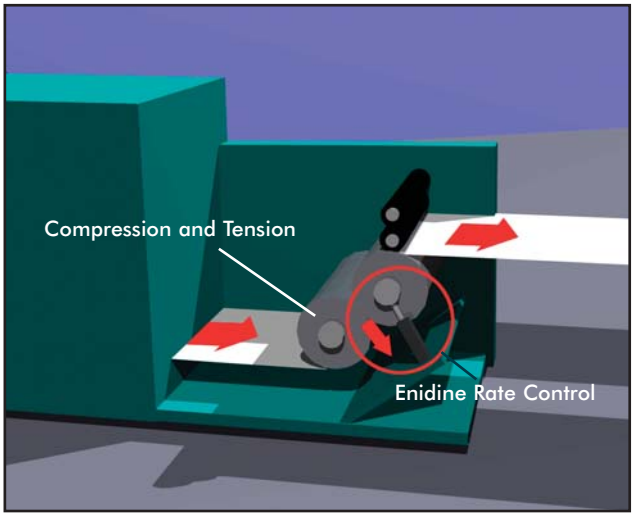
2. **Improved Production Quality –** Harmful effects of uncontrolled motion, such as noise, vibration and damaging impacts, are moderated or eliminated so that production quality is improved.

3. **Safer Machinery Operation –** Rate controls protect machinery and equipment operators by offering predictable, reliable and controlled machine operation.

4. **Competitive Advantage –** Machines and end products become more valuable because of increased productivity, longer life, lower maintenance and safer operation.

Enidine offers a wide range of rate controls that provide motion control in tension, compression, or both directions. Adjustable and non-adjustable tamperproof models are available to fit your particular application requirements.

The resisting force provided by Enidine rate controls is typically constant over the entire stroke when the piston rod is moved at a constant velocity, since the rate controls are single orifice products. DA Series models can be custom orificed to provide increasing resisting force over the stroke through the use of multiple orifices in the shock tube. This can be beneficial when controlling the velocity of a lid as it closes, since the torque from the weight of the lid changes as it closes.



Typical Application: Print Rollers and Paper Tensioners

Rate Control Adjustment Techniques

A properly adjusted rate control safely controls machinery operation, and reduces noise levels from uncontrolled motion. To correctly adjust the rate control after it has been properly sized for the application, set the adjustment knob (per the useable adjustment setting graphs for the applicable model. Cycle the mechanism and observe the motion of the system.

If the motion of the mechanism is too fast, move the adjustment dial to the next largest number until the desired velocity is achieved.

If the motion of the mechanism is too slow, move the adjustment dial to the next smallest number until the desired velocity is achieved.

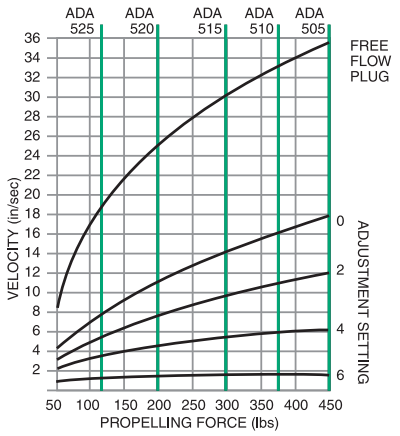
Adjustment Techniques

ADA 500

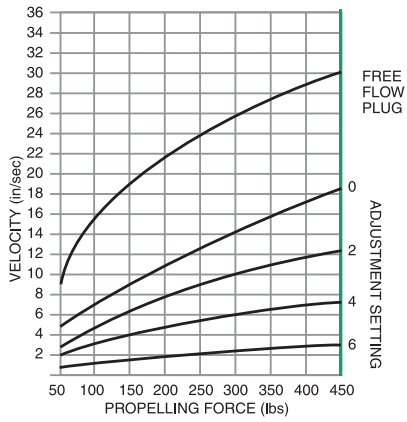
Useable Adjustment Setting Range

Green lines are model's maximum allowable propelling force.

Compression Mode Adjustment Setting Curve



Tension Mode Adjustment Setting Curve



Damping Force

Position 0 provides minimum damping force.
Position 8 provides maximum damping force.
180° adjustment with setscrew locking.

1. Determine the damping direction (tension [T], compression [C] or both [T and C]), stroke (in. or mm) required, propelling force (lbs. or N), desired velocity (in./sec. or m/s) and cycles per hour.

2. Calculate total energy per hour (in-lbs./hr or Nm/hr).

3. Compare the damping direction (T, C, or T and C), stroke (in. or mm) required, propelling force (lbs. or N) and total energy per hour (in-lbs./hr or Nm/hr) to the values listed in the Rate Controls Engineering Data charts.

NOTE: Propelling force and velocity should be measured at the location of the rate control.

4. Determine if adjustable or non-adjustable model is desired.

5. Select the appropriate rate control model.

A. For adjustable rate control models, refer to the Useable Adjustment Settings section for the selected model to determine the proper adjustment setting.

B. For non-adjustable rate control models, refer to the Damping Constant Selection Instructions for the selected model to determine the proper damping constant.

Example:

1. Damping Direction (T, C or T and C): T and C
Stroke (S): 4 in. (102 mm)
Propelling Force (F_D): 200 lbs. (890 N) (T and C)
Velocity (V): 8 in./sec. (0.2 m/s)
Cycles/Hour (C): 20

2. Total Energy/Hour: 16,000 in-lbs./hr (1 808 Nm/hr) compression
16,000 in-lbs./hr (1 808 Nm/hr) tension
32,000 in-lbs./hr (3 616 Nm/hr) Total

3. Compare damping direction (T and C), stroke, propelling force and total energy per hour, to the values listed in the rate controls engineering data charts.

4. An adjustable model is desired.

5. Selection: ADA 510 (T and C), The proper adjustment is two (2) in tension and compression per the ADA 500 Series Useable Adjustment Setting Range Curves.

After properly sizing the ADA, the adjustment setting can be determined.

1. To determine the approximate adjustment setting when the selected model, propelling force, and velocity are known: compare velocity to the propelling force in the compression and/or tension mode adjustment setting curves. The intersection point of the velocity and the propelling force is the approximate adjustment setting to be used. Adjustment higher or lower than this setting will result in slower or faster damper operation, respectively.

2. To determine the velocity when the selected model, adjustment setting, and propelling force are known: compare the propelling force to the adjustment setting in the compression and/or tension mode adjustment setting curves. The intersection point of the propelling force and the adjustment setting is the approximate velocity for the selected model. Higher velocities are obtained at lower adjustment settings and lower velocities are obtained at higher adjustment settings.

EXAMPLE: Double Acting Application

Stroke required: 2 in. (51 mm)
Control direction: Tension and Compression
Propelling force: 350 lbs. (1 557 N) (tension),
400 lbs. (1 780 N) (compression)
Selection: ADA 505
1. Velocity: 11 in./sec. (.28 m/s) (tension),
6 in./sec. (.15 m/s) (compression)
Intersection point: Adjustment setting 2 (tension),
4 (compression)
2. Adjustment setting: 2 (tension), 4 (compression)
Velocity: 11 in./sec. (.28 m/s) (tension),
6 in./sec. (.15 m/s) (compression)

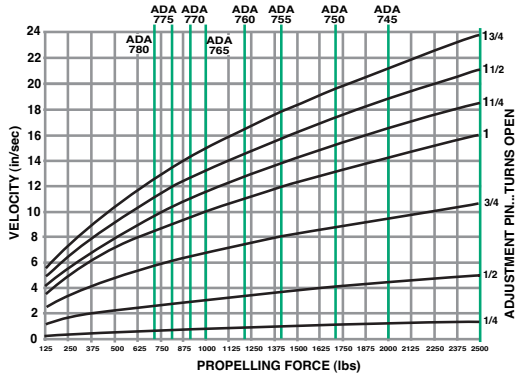
NOTE: When a free flow plug is used, the intersection point of the propelling force and free flow plug curve determines the velocity.

NOTE: Propelling force and velocity should be measured at the location of the rate control.

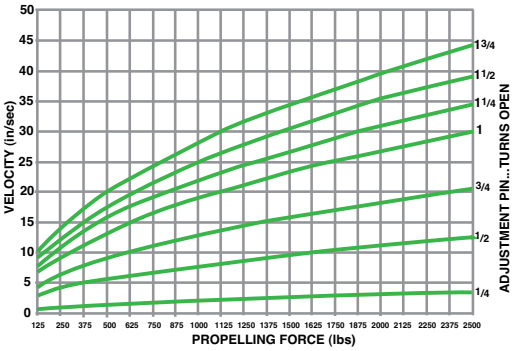
Useable Adjustment Setting Range

Red lines are model's maximum allowable propelling force.

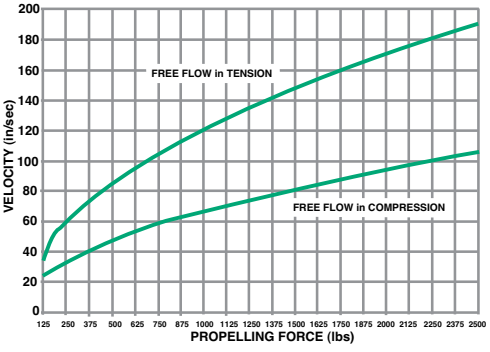
Compression



Tension



Free Flow



Damping Force

Turn adjustment pin 1 ¾ turns open to provide minimum damping force. Turn adjustment pin fully closed to provide maximum damping force.

1. To determine the approximate adjustment setting, when the selected model, propelling force, and velocity are known, compare velocity to the propelling force in the compression and/or tension mode adjustment setting curves. The intersection point of the velocity and the propelling force is the approximate adjustment setting to be used. Adjustment lower or higher than this setting will result in slower or faster damper operation respectively.

2. To determine the velocity, when the selected model, adjustment setting, and propelling force are known, compare the propelling force to the adjustment setting in the compression and/or tension mode adjustment setting curves. The intersection point of the propelling force and the adjustment setting is the approximate velocity for the selected model. Higher velocities are obtained at higher adjustment settings and lower velocities are obtained at lower adjustment settings.

3. A 1.5mm Hex Wrench (provided) is required to adjust the unit.

NOTE: When a free flow plug is used, the intersection point of the propelling force and free flow plug curve determines the velocity.

EXAMPLE: Adjustable Double Acting Rate Control Application

Stroke required:	6 in. (152 mm)
Control direction:	Tension and Compression
Propelling force:	1,000 lbs. (4 4448 N) (tension), 1,625 lbs. (7 228 N) (compression)
Selection:	ADA 715
1. Velocity:	25 in./sec. (0,635 m/s) (tension), 4 in./sec. (0,1 m/s) (compression)
Intersection point:	Adjustment setting 1 ½ (tension), ½ (compression)
2. Adjustment setting:	1 ½ (tension), ½ (compression)
Velocity:	25 in./sec. (0,635 m/s) (tension), 4 in./sec. (0,1 m/s) (compression)

NOTE: Propelling force and velocity should be measured at the location of the rate control.

Ordering Information/Application Worksheet

ADA Series

Example:

10 — Select quantity

ADA 505 — Select Catalog No. from Engineering Data chart or Accessory chart

T4 — Select Tension Mode
- •T Adjustable
- •T (0-6) Non-Adjustable*
- •P Free Flow

C — Select Compression Mode
- •C Adjustable
- •C (0-6) Non-Adjustable*
- •P Free Flow

*Note: Select adjustment setting (from Adjustment Setting Curve[s]) to be duplicated in non-adjustable cartridge.

DA Series

All DA Models are custom orificed. Application data must be supplied when ordering.

Please provide all application data for unique part number assignment.

Example: **10** — Select quantity

DA 50 X 2 — Select Catalog No. from Engineering Data chart

APPLICATION DATA

Specify for damping in tension, compression or both, as applicable:
- Vertical, Horizontal or Rotary† Motion
- Propelling Force
- Other (temperature, environmental conditions, etc.)
- Velocity
- Cycles per Hour
- Weight

NOTE: Propelling force and velocity should be measured at the location of the rate control.

Application Worksheet

FAX NO.: _____

DATE: _____

ATTN: _____

COMPANY: _____

The Enidine Application Worksheet makes shock absorber sizing and selection easier.

Fax, phone, or mail worksheet data to Enidine headquarters or your nearest Enidine subsidiary/affiliate or distributor. (See catalog back cover for Enidine locations, or visit www.enidine.com for a list of Enidine distributors.)

Upon Enidine's receipt of this worksheet, you will receive a detailed analysis of your application and product recommendations. (For custom design projects, Enidine representatives will consult with you for specification requirements.)

GENERAL INFORMATION

CONTACT: _____

DEPT/TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

TEL: _____ FAX: _____

EMAIL: _____

PRODUCTS MANUFACTURED: _____

APPLICATION DESCRIPTION

_____

_____

Motion Direction (Check One):

☐ Horizontal ☐ Vertical ☐ Up ☐ Down ☐ Incline Angle _____ Height _____

☐ Rotary Horizontal ☐ Rotary Vertical ☐ Up ☐ Down

Weight (Min./Max.): _____ (lbs.)(Kg)

Cycle Rate: _____ (cycles/hour)

Additional Propelling Force (If Known): _____ (lbs.)(N)

☐ Air Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar) Rod Dia.____(in.)(mm)

☐ Hydraulic Cyl: Bore ____ (in.)(mm) Max. Pressure ____(psi)(bar)
Rod Dia.___ (in.)(mm)

☐ Motor _____ (hp)(kW) Torque _____(in-lbs.)(Nm)

Ambient Temp.: _____ °F (°C)

Environmental Considerations: _____

_____

SHOCK ABSORBER APPLICATION

(All Data Taken at Shock Absorber)

Number Shock Absorbers to Stop Load

Impact Velocity (min./max.): _____ (in./sec.)(m/sec.)

Shock Absorber Stroke Requirements: _____(in.)(mm)

G Load Requirements: _____(G)(m/sec^2)

RATE CONTROL APPLICATION

(All Data Taken at Rate Control)

Number of Rate Controls to Control the Load: _____

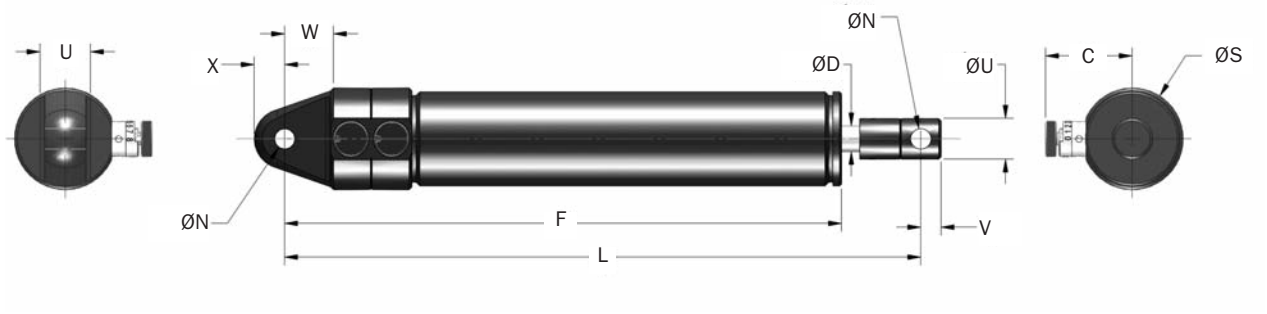
Control Direction: ☐ Tension (T) ☐ Compression (C)

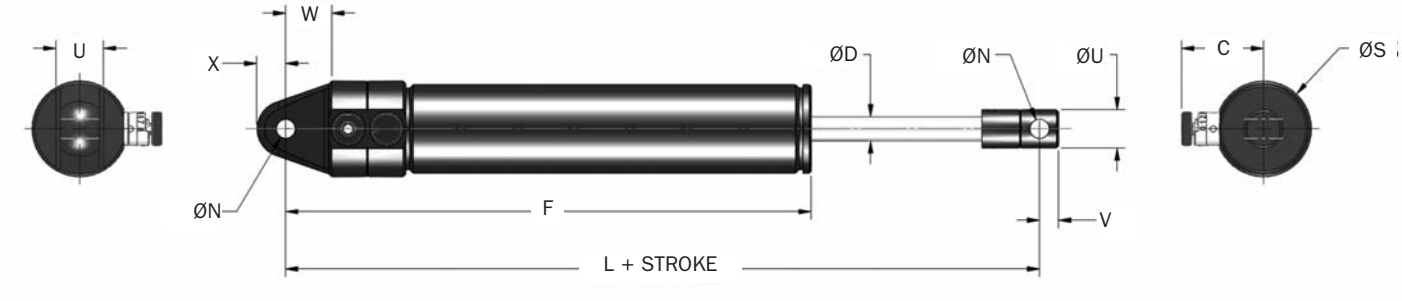
Required Stroke: _____(in.)(mm) Est. Stroke Time _____(sec.)

Estimated Velocity at the Rate Control _____(in./sec.)(m/sec)

ADA 505 → ADA 525 Series

Technical Data

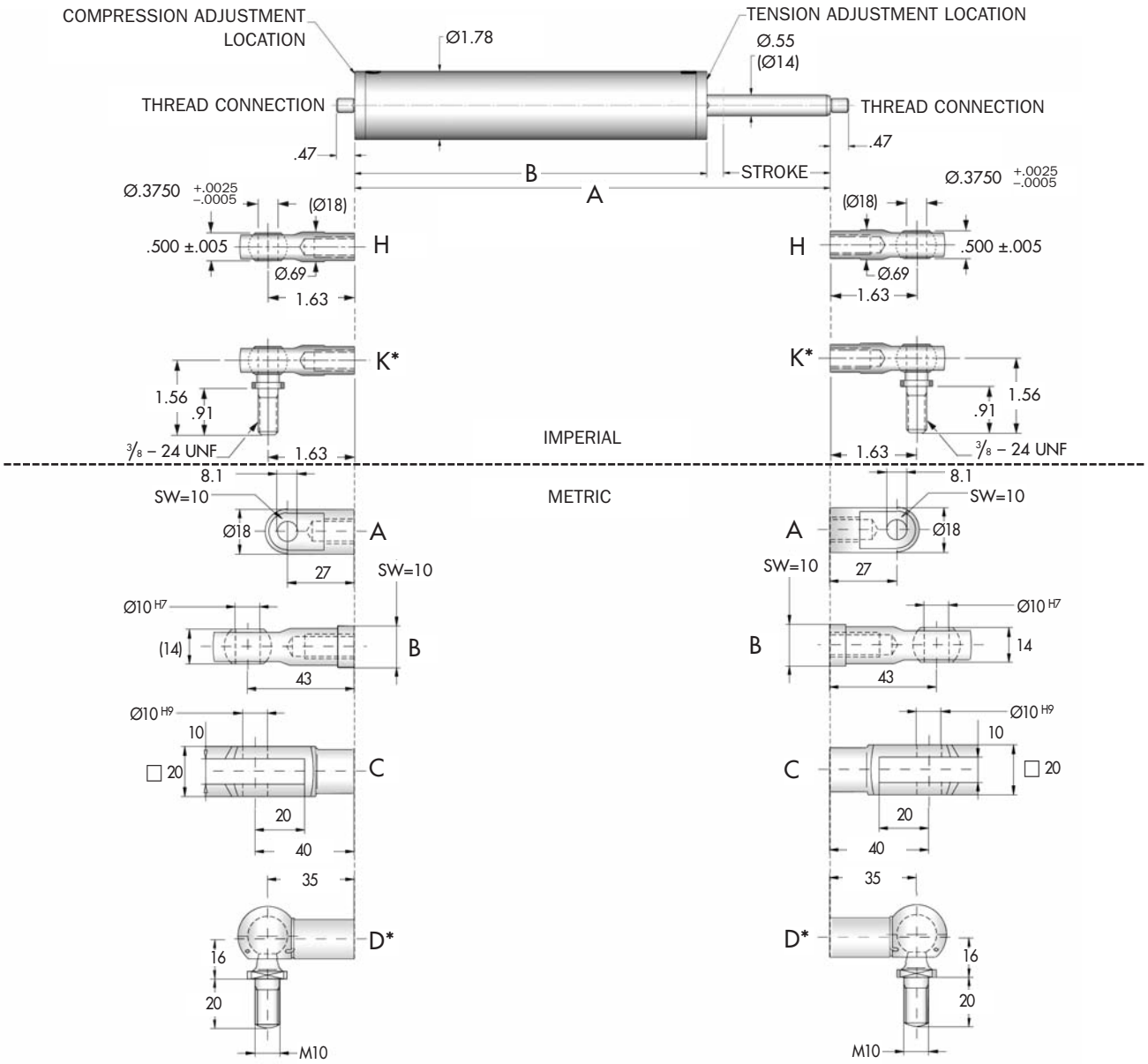




Catalog No./ Model	Damping Direction	Bore Size in. (mm)	(S) Stroke in. (mm)	(F_D) Max. Propelling Force Extension lbs. (N)	(F_D) Max. Propelling Force Compression lbs. (N)	(E_TC) Max. in.-lbs./hour (Nm/hr)	Model Weight lbs. (Kg)
ADA 505	T, C or T and C	.63	2	450	450	650,000	0.68
ADA 505M		(16,0)	(50,0)	(2 000)	(2 000)	(73 450)	(0,3)
ADA 510	T, C or T and C	.63	4	450	375	850,000	0.80
ADA 510M		(16,0)	(100,0)	(2 000)	(1 670)	(96 050)	(0,372)
ADA 515	T, C or T and C	.63	6	450	300	1,050,000	1.0
ADA 515M		(16,0)	(150,0)	(2 000)	(1 335)	(118 650)	(0,445)
ADA 520	T, C or T and C	.63	8	450	200	1,250,000	1.1
ADA 520M		(16,0)	(200,0)	(2 000)	(900)	(141 250)	(0,520)
ADA 525	T, C or T and C	.63	10	450	125	1,450,000	1.3
ADA 525M		(16,0)	(250)	(2 000)	(550)	(163 850)	(0,590)

Catalog No./ Model	C in. (mm)	D in. (mm)	F in. (mm)	L in. (mm)	N +.005/-.000 +0,13/-0,00 in. (mm)	S in. (mm)	U +.000/-.010 +0,00/-0,381 in. (mm)	V in. (mm)	W in. (mm)	X in. (mm)	(S) Stroke in. (mm)	Damping Direction in. (mm)
ADA 505	1.06	.31	6.87	.251	7.81	.500	1.25	.25	.563	.375	2	T, C or T and C
ADA 505M	(27,0)	(8,0)	(173,0)	(6,0)	(200)	(12,7)	(31,8)	(6,3)	(14,2)	(9,5)	(50,0)	
ADA 510	1.06	.31	8.87	.251	9.81	.500	1.25	.25	.563	.375	4	T, C or T and C
ADA 510M	(27,0)	(8,0)	(224,0)	(6,0)	(250)	(12,7)	(31,8)	(6,3)	(14,2)	(9,5)	(100,0)	
ADA 515	1.06	.31	10.87	.251	11.81	.500	1.25	.25	.563	.375	6	T, C or T and C
ADA 515M	(27,0)	(8,0)	(275,0)	(6,0)	(300)	(12,7)	(31,8)	(6,3)	(14,2)	(9,5)	(150,0)	
ADA 520	1.06	.31	12.87	.251	13.81	.500	1.25	.25	.563	.375	8	T, C or T and C
ADA 520M	(27,0)	(8,0)	(325,0)	(6,0)	(350)	(12,7)	(31,8)	(6,3)	(14,2)	(9,5)	(200,0)	
ADA 525	1.06	.31	14.87	.251	15.81	.500	1.25	.25	.563	.375	10	T, C or T and C
ADA 525M	(27,0)	(8,0)	(376,0)	(6,0)	(400)	(12,7)	(31,8)	(6,3)	(14,2)	(9,5)	(250,0)	

ADA 705 → ADA 735 Series

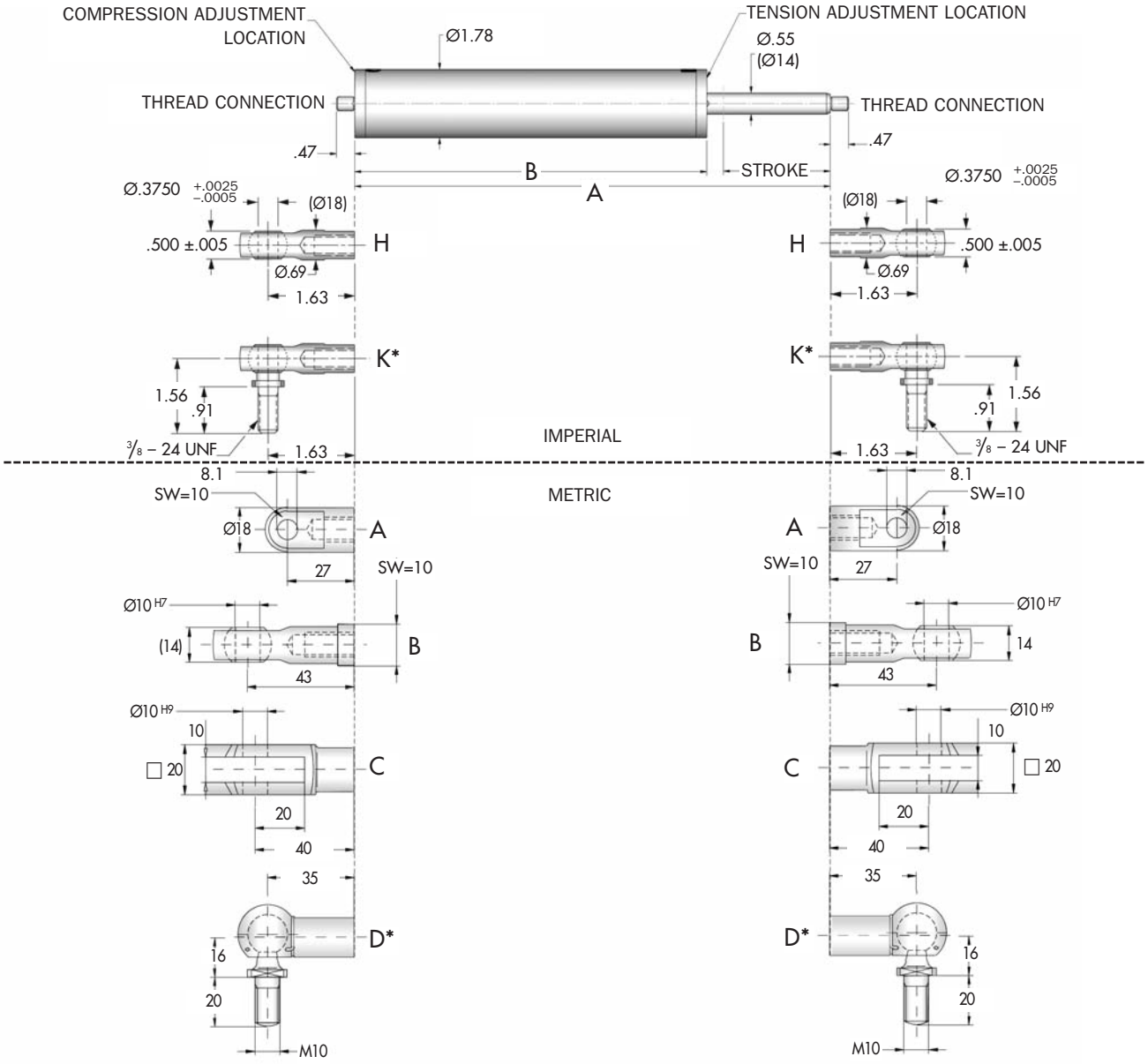


Catalog No./ Model	Damping Direction	Bore Size in. (mm)	(S) Stroke in. (mm)	(F_D) Max. Propelling Force Tension lbs. (N)	(F_D) Max. Propelling Force Compression lbs. (N)	(E_TC) Max in.-lbs./hour (m/s)	Model Weight lbs. (Kg)	A in. (mm)	B in. (mm)
ADA 705	T, C or T and C	.98 (25)	2 (50,0)	2,500 (11 000)	2,500 (11 000)	1,100,000 (129 000)	3.5 (1,6)	9.35 (237)	7.10 (180)
ADA 710	T, C or T and C	.98 (25)	4 (100,0)	2,500 (11 000)	2,500 (11 000)	1,400,000 (168 000)	4.4 (2,0)	13.35 (339)	9.10 (231)
ADA 715	T, C or T and C	.98 (25)	6 (150,0)	2,500 (11 000)	2,500 (11 000)	1,800,000 (206 000)	5.1 (2,3)	17.35 (441)	11.10 (282)
ADA 720	T, C or T and C	.98 (25)	8 (200,0)	2,500 (11 000)	2,500 (11 000)	2,100,000 (247 000)	5.7 (2,6)	21.30 (541)	13.10 (332)
ADA 725	T, C or T and C	.98 (25)	10 (250,0)	2,500 (11 000)	2,500 (11 000)	2,500,000 (286 000)	6.4 (2,9)	25.30 (643)	15.10 (383)
ADA 730	T, C or T and C	.98 (25)	12 (300,0)	2,500 (11 000)	2,500 (11 000)	2,800,000 (326 000)	7.1 (3,2)	29.35 (745)	17.10 (434)
ADA 735	T, C or T and C	.98 (25)	14 (350,0)	2,500 (11 000)	2,500 (11 000)	3,200,000 (366 000)	7.9 (3,6)	33.35 (847)	19.10 (485)

*Notes: 1. The maximum load capacity for mounting option K and D is 650 lbs.
2. The maximum load capacity for mounting option K and D is 1 600 N

Technical Data

ADA 740 → ADA 780 Series

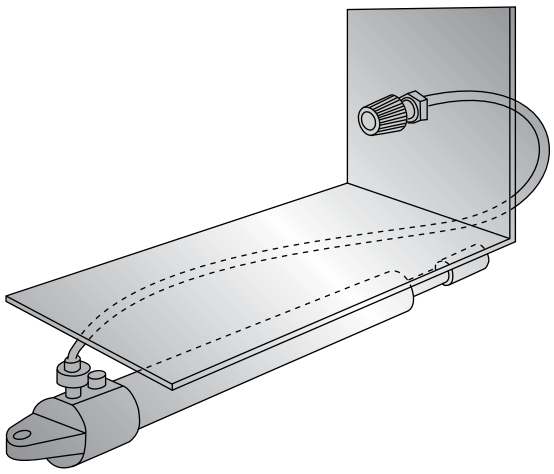


Catalog No./ Model	Damping Direction	Bore Size in. (mm)	(S) Stroke in. (mm)	(F_D) Max. Propelling Force Tension lbs. (N)	(F_D) Max. Propelling Force Compression lbs. (N)	(E_TC) Max in.-lbs./hour (m/s)	Model Weight lbs. (Kg)	A in. (mm)	B in. (mm)
ADA 740	T, C or T and C	.98 (25,0)	16 (400)	2,500 (11 000)	2,500 (11 000)	3,500,000 (405 000)	8.6 (3,9)	37.30 (947)	21.10 (535)
ADA 745	T, C or T and C	.98 (25,0)	18 (450)	2,500 (11 000)	2,000 (8 800)	3,900,000 (444 000)	9.3 (4,2)	41.30 (1 049)	23.10 (586)
ADA 750	T, C or T and C	.98 (25,0)	20 (500)	2,500 (11 000)	1,700 (7 500)	4,200,000 (484 000)	9.9 (4,5)	45.30 (1 151)	25.10 (637)
ADA 755	T, C or T and C	.98 (25,0)	22 (550)	2,500 (11 000)	1,400 (6 200)	4,600,000 (524 000)	10.6 (4,8)	49.35 (1 253)	27.10 (688)
ADA 760	T, C or T and C	.98 (25,0)	24 (600)	2,500 (11 000)	1,200 (5 300)	4,900,000 (563 000)	11.5 (5,2)	53.35 (1 355)	29.10 (739)
ADA 765	T, C or T and C	.98 (25,0)	26 (650)	2,500 (11 000)	1,000 (4 500)	5,300,000 (603 000)	12.1 (5,5)	57.35 (1 457)	31.10 (790)
ADA 770	T, C or T and C	.98 (25,0)	28 (700)	2,500 (11 000)	900 (4 000)	5,600,000 (642 000)	12.8 (5,8)	61.30 (1 557)	33.10 (840)
ADA 775	T, C or T and C	.98 (25,0)	30 (750)	2,500 (11 000)	800 (3 500)	6,000,000 (681 000)	13.4 (6,1)	65.30 (1 659)	35.10 (891)
ADA 780	T, C or T and C	.98 (25,0)	32 (800)	2,500 (11 000)	700 (3 100)	6,300,000 (721 000)	14.3 (6,5)	69.35 (1 761)	37.10 (942)

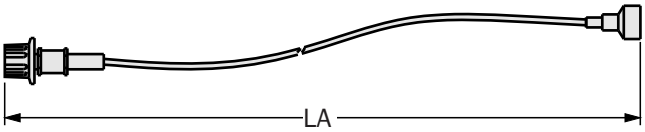
*Notes: 1. The maximum load capacity for mounting option for K and D is 650 lbs. 2. The maximum load capacity for mounting option for K and D is 1 600 N.

Remote Adjustment Cable for ADA 500 Series

Enidine will custom fit a remote adjustment cable for applications where the ADA unit will be mounted in non-accessible locations. Contact Enidine for more information.

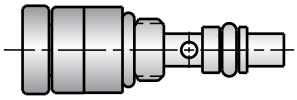


Note: If rotary application, please complete application worksheet on page 104 and forward to Enidine.

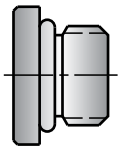


Standard remote adjustment cable length is 48" (1220 mm). Optional lengths available upon request.
Note: Remote adjustment cable can be used in a single position only.

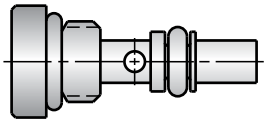
Adjustable Cartridge



Free Flow Plug



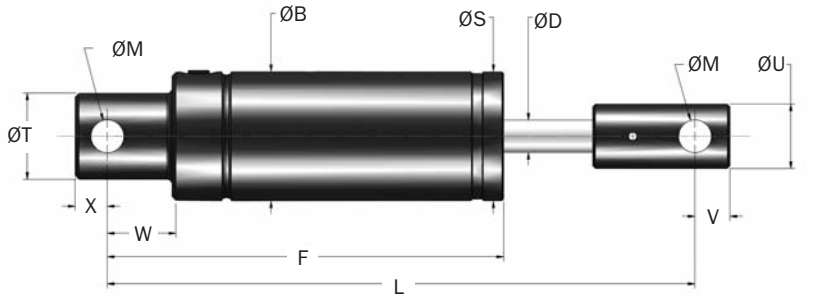
Non-Adjustable Cartridge

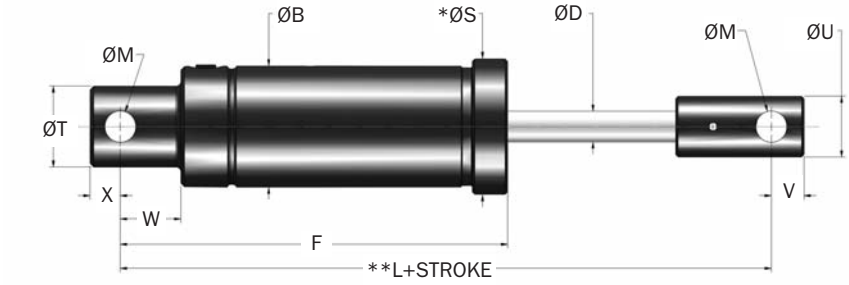


Catalog No.	Part Number	Accessory Description	LA in. (mm)	Weight oz. (g)
RAC48	1K495748	Remote Adjustment Cable	48 (1220)	7 (191)
RAC4957	AJ4957325	Adjustable Cartridge	**Notes**	
NAC "x"	NJ"x"4957327	Non-Adjustable Cartridge (0-6)	"x" specify desired setting "0-6". May be used in place of adjustable cartridge.	
CW4957	2L4957302	Cartridge Wrench	For installing adjustable and non-adjustable cartridges.	
FFP4957	PA4957326	Free Flow Plug	Provides least amount of damping force for ADA Models.	

Technical Data

DA 50 x 2 → DA 75 x 4 Series
DA 75M x 50 → DA 75M x 100 Series





Catalog No./ Model	Damping Direction	Bore Size in. (mm)	(S) Stroke in. (mm)	(F_D) Max. Propelling Force lbs. (N)	(E_T) Max. in.-lbs./cycle (N/cycle)	(E_TC) Max. in-lbs/hr (m/s)	Model Weight lbs. (Kg)
DA 50 x 2	T, C or T and C	1.13 (28,7)	2 (50,8)	2,500 (11 121)	5,000 (565)	1,400,000 (158 179)	3.5 (1,59)
DA 50 x 4	T, C or T and C	1.13 (28,7)	4 (101,6)	2,500 (11 121)	10,000 (1 120)	1,700,000 (192 074)	5.0 (2,27)
DA 50 x 6	T, C or T and C	1.13 (28,7)	6 (152,4)	2,500 (11 121)	15,000 (1 695)	2,000,000 (225 970)	6.5 (2,95)
DA 50 x 8	T, C or T and C	1.13 (28,7)	8 (203,2)	2,500 (11 121)	20,000 (2 260)	2,300,000 (259 865)	8.0 (3,63)
DA 75 x 2 DA 75M x 50	T, C or T and C	1.50 (38,0)	2 (50,0)	5,000 (22 250)	10,000 (1 120)	2,700,000 (305 000)	25.0 (11,4)
DA 75 x 4 DA 75M x 100	T, C or T and C	1.50 (38,0)	4 (100,0)	5,000 (22 250)	20,000 (2 240)	3,100,000 (350 000)	29.0 (13,2)

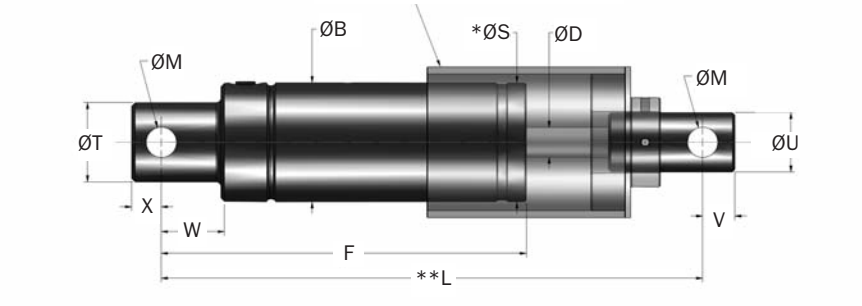
Catalog No./ Model	B in. (mm)	D in. (mm)	F in. (mm)	L in. (mm)	M ±.015 (±0,38) in. (mm)	S in. (mm)	T ±.015 (±0,38) in. (mm)	U ±.010 (±0,25) in. (mm)	V in. (mm)	W in. (mm)	X in. (mm)	(S) Stroke in. (mm)
DA 50 x 2	2.00 (50,8)	0.56 (14,2)	7.59 (193)	9.98 (253)	.578 (14,7)	2.25 (57,2)	1.50 (38,1)	1.125 (28,6)	.56 (14,2)	1.13 (28,7)	.56 (14,2)	2 (50,8)
DA 50 x 4	2.00 (50,8)	0.56 (14,2)	9.59 (243)	11.98 (304)	.578 (14,7)	2.25 (57,2)	1.50 (38,1)	1.125 (28,6)	.56 (14,2)	1.13 (28,7)	.56 (14,2)	4 (101,6)
DA 50 x 6	2.00 (50,8)	0.56 (14,2)	11.59 (294)	13.98 (355)	.578 (14,7)	2.25 (57,2)	1.50 (38,1)	1.125 (28,6)	.56 (14,2)	1.13 (28,7)	.56 (14,2)	6 (152,4)
DA 50 x 8	2.00 (50,8)	0.56 (14,2)	13.59 (345)	15.98 (406)	.578 (14,7)	2.25 (57,2)	1.50 (38,1)	1.125 (28,6)	.56 (14,2)	1.13 (28,7)	.56 (14,2)	8 (203,2)
DA 75 x 2 DA 75M x 50	3.00 (76,0)	0.75 (19,0)	9.58 (245)	13.75 (348)	.765 (19,4)	3.38 (86,0)	2.00 (51,0)	1.500 (38,0)	.81 (21,0)	1.50 (38,0)	.75 (19,0)	2 (50,0)
DA 75 x 4 DA 75M x 100	3.00 (76,0)	0.75 (19,0)	11.58 (295)	15.75 (398)	.765 (19,4)	3.38 (86,0)	2.00 (51,0)	1.500 (38,0)	.81 (21,0)	1.50 (38,0)	.75 (19,0)	4 (100,0)

Notes: 1. DA Models will function at 10% of their maximum rated energy per cycle. If less than 10%, a smaller model should be specified.
2. Provide a positive stop 12 in. before end of stroke in tension and compression to prevent internal bottoming.
3. For optimal performance in vertical applications using compression, mount the rate control with the piston rod down.
4. * ØS indicates outside diameter of optional protective sleeve for TB models.
5. ** Dimension L is controlled by a 2.0 in. stroke limiter.

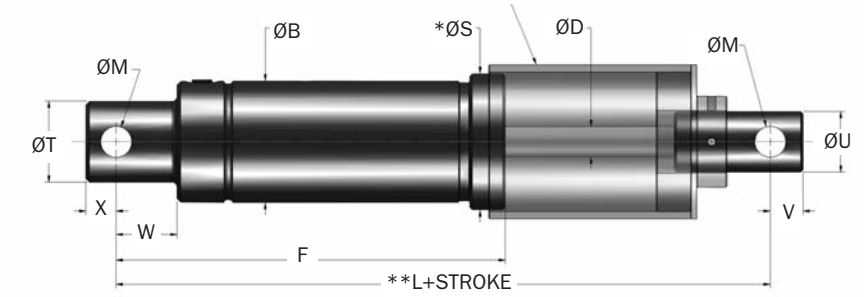
Technical Data

DA 75 x 6 → TB 100 x 6 Series
DA 75M x 150 → DA 75M x 250 Series

OPTIONAL PROTECTIVE SLEEVE,
TOW BAR (TB) MODELS ONLY



OPTIONAL PROTECTIVE SLEEVE,
TOW BAR (TB) MODELS ONLY



Catalog No./ Model	Damping Direction	Bore Size in. (mm)	(S) Stroke in. (mm)	(F_D) Max. Propelling Force lbs. (N)	(E_T) Max. in.-lbs./cycle (N/cycle)	(E_TC) Max. in-lbs/hr (m/s)	Model Weight lbs. (Kg)
DA 75 x 6 DA 75M x 100	T, C or T and C	1.50 (38,0)	6 (150,0)	5,000 (22 250)	30,000 (3 360)	3,600,000 (406 000)	33.0 (15,0)
DA 75 x 8 DA 75M x 150	T, C or T and C	1.50 (38,0)	8 (200,0)	5,000 (22 250)	40,000 (4 480)	4,100,000 (463 000)	37.0 (16,8)
DA 75 x 10 DA 75M x 250	T, C or T and C	1.50 (38,0)	10 (250,0)	5,000 (22 250)	50,000 (5 600)	4,500,000 (508 000)	41.0 (18,6)
TB 100 x 4	T and C	2.25 (57,2)	4 (100,0)	10,000 (44 482)	40,000 (4 480)	4,400,000 (497 133)	32.0 (14,5)
TB 100 x 6	T and C	2.25 (57,2)	6 (150,0)	10,000 (44 482)	60,000 (6 779)	4,400,000 (497 133)	32.0 (14,5)

Catalog No./ Model	B in. (mm)	D in. (mm)	F in. (mm)	L in. (mm)	M ±.015 (±0,38) in. (mm)	S in. (mm)	T ±.015 (±0,38) in. (mm)	U ±.010 (±0,25) in. (mm)	V in. (mm)	W in. (mm)	X in. (mm)	(S) Stroke in. (mm)
DA 75 x 6 DA 75M x 100	3.00 (76,0)	0.75 (19,0)	13.58 (345)	17.75 (448)	.765 (19,4)	3.38 (86,0)	2.00 (51,0)	1.500 (38,0)	.81 (21,0)	1.50 (38,0)	.75 (19,0)	6 (150,0)
DA 75 x 8 DA 75M x 150	3.00 (76,0)	0.75 (19,0)	15.58 (395)	19.75 (498)	.765 (19,4)	3.38 (86,0)	2.00 (51,0)	1.500 (38,0)	.81 (21,0)	1.50 (38,0)	.75 (19,0)	8 (200,0)
DA 75 x 10 DA 75M x 250	3.00 (76,0)	0.75 (19,0)	17.58 (445)	21.75 (548)	.765 (19,4)	3.38 (86,0)	2.00 (51,0)	1.500 (38,0)	.81 (21,0)	1.50 (38,0)	.75 (19,0)	10 (250,0)
TB 100 x 4	2.75 (70,0)	1.00 (25,4)	18.88 (480)	24.25** (616)	.750 (19,1)	3.25* (82,6)	2.50 (63,5)	1.500 (38,0)	.75 (19,1)	1.75 (38,0)	.75 (19,0)	4 (100,0)
TB 100 x 6	2.75 (70,0)	1.00 (25,4)	18.88 (480)	22.25** (565)	.750 (19,1)	3.25* (82,6)	2.50 (63,5)	1.500 (38,0)	.75 (19,1)	1.75 (38,0)	.75 (19,0)	6 (150,0)

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4. * ØS indicates outside diameter of optional protective sleeve for TB models.
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Notes

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