

*Cushioneers*®  
**Leakproof  
Impact  
Absorbers**



**ADJUSTABLE AND SELF-ADJUSTING**



**FLUID POWER**®

# Cushioneer's Quality Manufacturing and Unique Design Provide You with the BEST in Long-Lasting Impact Absorption

## Cushioneer Applications

CUSHIONEERS are designed to smoothly decelerate fast moving equipment. The plunger rod on a CUSHIONEER moves relatively fast at the beginning of its stroke and *steadily slows* as the moving load depresses the plunger rod. If you need to control the speed (velocity) of your equipment, you should select a KINECHEK from our bulletin S-66. The plunger rod on a KINECHEK moves smoothly at a *constant velocity* throughout its entire stroke length. CUSHIONEERS are ideal for use on devices operated by air cylinders, moving carriages, falling weights, spring returned mechanisms, flying die cutoffs, packaging machinery, book binding equipment, anything that must move fast and stop quickly.

## Leakproof

A CUSHIONEER is absolutely leakproof in any position because its plunger is hermetically sealed by a patented, frictionless, rolling diaphragm. It won't leak a drop of fluid a year unless damaged, so no external fluid reservoir is needed. CUSHIONEERS are so clean they are used on food processing equipment, business machines, and optical devices, as well as on production machinery.

## Eliminate Shock and Noise

CUSHIONEERS bring fast moving parts of machines to an instant stop without bang or bounce. Your machinery can run faster than ever before—trouble free. They are small and streamlined, handy to mount in tight spots where room is limited, yet powerful enough to solve most of the shock problems in industrial plants. Simple to install—just mount so device to be stopped strikes plunger squarely.

## Powerful-Miniaturized

CUSHIONEERS are smaller for their load capacity than conventional shock absorbers, and their stopping action is creamy-smooth, not jerky. Excellent for high speed, slow speed, heavy or light loads, and you don't have to make repeated adjustments when temperature varies because CUSHIONEERS do not contain ordinary hydraulic oil. Instead, they are filled with a superior silicone fluid which is much more constant in viscosity during temperature changes.

## Instant Plunger Return

Plunger rod shoots back out instantly when load movement reverses. This feature makes CUSHIONEERS unequalled for use with high speed machines. The frictionless plunger returns outward so quickly that it stays in contact with the reversing load to the limit of the plunger stroke. Therefore, the CUSHIONEER is always ready when the next impact blow strikes. See Tables for plunger return times.

## Cushioneers Save You Money

They protect your machines against wear, permit speed-ups, and save maintenance expense by not requiring periodic replenishment of fluid or seals. There are no sliding seals to wear and leak. Air bubbles can never enter the fluid to interfere with operation. An average life of millions of cycles is due to a leakproof diaphragm, all-metal piston mated to a steel cylinder, and stainless steel plunger rod—all permanently lubricated.

## No Maintenance Necessary

CUSHIONEER rolling diaphragm seals will successfully withstand endurance tests of 10,000,000 cycles without leaking. These tests ensure that the CUSHIONEER will operate for millions of cycles without noticeable wear. An integral rod wiper protects the seal and other internal parts of the CUSHIONEER from contamination by cutting oils, moisture and dust. All moving parts are permanently lubricated and contribute to an extremely long life without maintenance.

## Quality Standard

Deschner Corporation is the originator of the "Cushioneer®" leakproof hydraulic shock absorber. These miniaturized shock absorbers have been in use since 1960. They are unequalled in their design sophistication and quality of manufacture. Each and every Cushioneer is thoroughly tested and must meet rigid performance standards before it is approved for shipment. This is your assurance of receiving a product of the highest possible quality.

# CUSHIONEER—just install it and forget it!

# The Adjustable Cushioneer

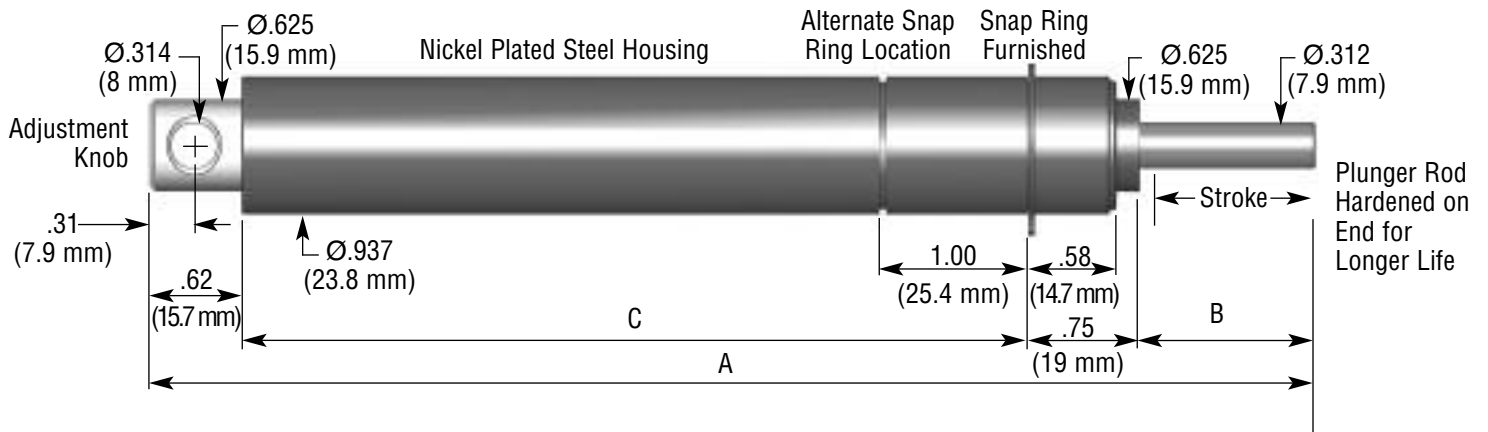


Table 1

## Choose Your Adjustable Cushioneer From This Table

| Model Number           | 2003-31-½                           | 2002-31-½                           | 2003-31-1                           | 2002-31-1                           | 2003-31-2                           | 2002-31-2                               |
|------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---|
| Application            | Light Duty                          | Standard Duty                       | Light Duty                          | Standard Duty                       | Light Duty                          | Standard Duty                           |
| Stroke Length          | .5 in (12.7mm)                      | .5 in (12.7mm)                      | 1 in (25.4 mm)                      | 1 in (25.4 mm)                      | 2 in (50.8 mm)                      | 2 in (50.8 mm)                          |
| Plunger Return Force   | 3.75 lbs (16.7 N)                   | 4.00 lbs (17.8 N)                   | 3.75 lbs (16.7 N)                   | 4.00 lbs (17.8 N)                   | 4.00 lbs (17.8 N)                   | 4.00 lbs (17.8 N)                       |
| Plunger Return Time*   | 0.015 sec                           | 0.031 sec                           | 0.036 sec                           | 0.058 sec                           | 0.066 sec                           | 0.106 sec                               |
| Single Impact Capacity | 2 to 200 in-lbs<br>(0.2 to 22.6 Nm) | 4 to 400 in-lbs<br>(0.4 to 45.2 Nm) | 4 to 400 in-lbs<br>(0.4 to 45.2 Nm) | 8 to 800 in-lbs<br>(0.9 to 90.4 Nm) | 8 to 800 in-lbs<br>(0.9 to 90.4 Nm) | 16 to 1,600 in-lbs<br>(1.8 to 180.8 Nm) |
| Sustained Capacity**   | 9,000 in-lbs/min (1,017 Nm/min)     |                                     | 10,000 in-lbs/min (1,130 Nm/min)    |                                     | 11,500 in-lbs/min (1,300 Nm/min)    |   |
| Weight                 | 10.0 oz (284 g)                     |                                     | 11.0 oz (312 g)                     |                                     | 14.5 oz (411 g)                     |   |
| Dimension A            | 6.33 in (160.8 mm)                  |                                     | 7.83 in (198.9 mm)                  |                                     | 10.87 in (276.1 mm)                 |   |
| Dimension B            | 0.69 in (17.5 mm)                   |                                     | 1.19 in (30.2 mm)                   |                                     | 2.19 in (55.6 mm)                   |   |
| Dimension C            | 4.28 in (108.7 mm)                  |                                     | 5.28 in (134.1 mm)                  |                                     | 7.31 in (185.7 mm)                  |   |

Minimum force to operate plunger full stroke: 5 lbs. (22.2 N)

Minimum operating temperature: 40° F (4.4°C)

Maximum velocity of load striking plunger: 144 in/sec (365 cm/sec)

Maximum operating temperature: 130° F (54°C)

\* Cushioneer completes its deceleration action 1/32" (0.8 mm) before the plunger reaches the bottom of the stroke. Return times shown apply only if plunger is not permitted to bottom. \*\* Values shown for sustained capacity are for operating temperatures below 130°F (54°C).

**ADJUSTABLE CUSHIONEER** The patented adjustment on Cushioners is radically different in design. During a working stroke, the piston gradually closes an entire meshwork of up to 25 fluid escape ports in the high pressure cylinder to decelerate and stop the moving load. Rotation of the adjustment knob alters the flow restriction at all escape ports according to the effect each port has on the decelerating action. This adjustment of all the ports prevents jerky action and allows you to dial in a smooth rate of deceleration for fast, slow, heavy or light loads after the Cushioneer is installed.

**EASY TO ADJUST** Insert a rod in cross hole of adjustment knob and rotate knob until moving load settles softly against your safety stop. Plunger is automatically returned outward by light internal spring force as load is removed.



**NEW!**

# The Self-Adjusting Cushioneer

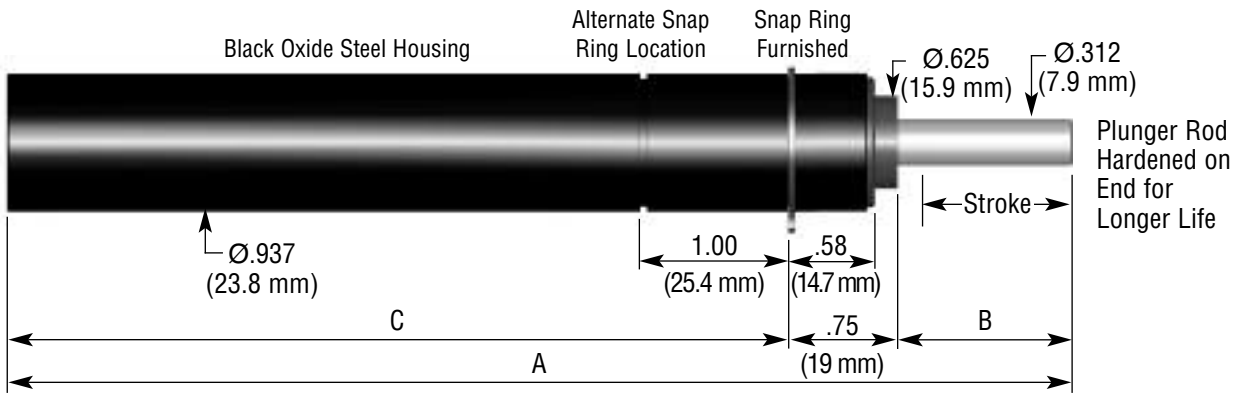


Table 2

## Choose Your Self-Adjusting Cushioneer From This Table

| Model Number           | 6000-31-½                        | 6000-31-1                        | 6000-31-2                            |
|------------------------|----------------------------------|----------------------------------|--------------------------------------|
| Stroke Length          | .5 in (12.7 mm)                  | 1 in (25.4 mm)                   | 2 in (50.8 mm)                       |
| Plunger Return Force   | 3.75 lbs (16.7 N)                | 3.75 lbs (16.7 N)                | 4.00 lbs (17.8 N)                    |
| Plunger Return Time*   | 0.015 sec                        | 0.036 sec                        | 0.106 sec                            |
| Single Impact Capacity | 4 to 400 in-lbs (0.4 to 45.2 Nm) | 8 to 800 in-lbs (0.9 to 90.4 Nm) | 15 to 1,500 in-lbs (1.7 to 169.4 Nm) |
| Sustained Capacity**   | 10,000 in-lbs/min (1,130 Nm/min) | 10,000 in-lbs/min (1,130 Nm/min) | 14,000 in-lbs/min (1,580 Nm/min)     |
| Weight                 | 8.7 oz (247 g)                   | 10.4 oz (295 g)                  | 14.0 oz (397 g)                      |
| Dimension A            | 5.72 in (145.3 mm)               | 7.22 in (183.4 mm)               | 10.25 in (260.3 mm)                  |
| Dimension B            | 0.69 in (17.5mm)                 | 1.19 in (30.2 mm)                | 2.19 in (55.6 mm)                    |
| Dimension C            | 4.28 in (108.7 mm)               | 5.28 in (134.1 mm)               | 7.31 in (185.7 mm)                   |

Minimum force to operate plunger full stroke: 5 lbs. (22.2 N)

Minimum operating temperature: 40°F (4.4°C)

Maximum velocity of load striking plunger: 144 in/sec (365 cm/sec)

Maximum operating temperature: 130°F (54°C)

\* Cushioneer completes its deceleration action 1/32" (0.8 mm) before the plunger reaches the bottom of the stroke. Return times shown apply only if plunger is not permitted to bottom. \*\* Values shown for sustained capacity are for operating temperatures below 130°F (54°C).

**SELF-ADJUSTING CUSHIONEER** The cylinder in the 6000 series self-adjusting Cushioneer features a pattern of grooves in the high pressure cylinder I.D. which guides the fluid past the advancing piston. The grooves are distributed over the length of the stroke in such a way

that the available bypass area is reduced the further the piston advances. Therefore, the resistance increases as the plunger rod is depressed. The groove pattern is designed to maintain a constant flow rate even under large changes in impact energy and the resulting changes in fluid pressure. The result is a shock absorber that automatically adjusts to a wide range of impact loads and provides a smooth stopping action for any load within its capacity. **Note: The self-adjusting feature mandates the use of the full stroke of the Cushioneer but is not designed to be an end stop. Therefore, it is important not to bottom out the plunger.**



6000-31-½

6000-31-1

6000-31-2

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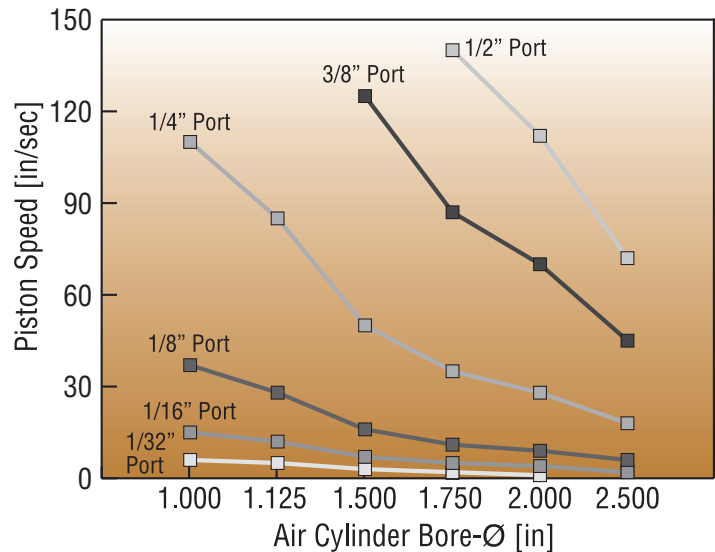
# Impact Energy Calculation Worksheet

Chart 1

The Energy that a shock absorber must absorb originates from the weight and velocity of the moving mass (kinetic energy) that is to be decelerated, and from any mechanical or pneumatic force that is driving this mass. It can also originate from a free falling mass.

Please choose the option that matches your application and fill in the blanks in the formulas to determine the generated energy level. Next, choose a Cushioneer® with sufficient capacity from Table 1 (adjustable) on page 2 or Table 2 (self-adjusting) on page 3.

Estimated Cylinder Speeds @ 80-100 PSI



## Kinetic Energy

(used for Option 1 and 2)

$$E_{kin} = \frac{1}{2} mv^2 = 0.0013 \times w \times v^2$$

$$E_{kin} = \text{_____} \text{ [in-lbs]}$$

w weight [lbs] \_\_\_\_\_

v velocity [in/sec] \_\_\_\_\_

Use chart 1 to estimate velocity if needed

Note: the variable **L** in the following formulas is the stroke length of the Cushioneer.

## Option 1

### Kinetic Energy and Energy from Pneumatic Driving Force

$$E_{pneum} = \frac{\pi}{4} D^2 \times L \times p = 0.7854 \times D^2 \times L \times p$$

$$E_{pneum} = \text{_____} \text{ [in-lbs]}$$

$$\text{Impact Energy } E_{impact} = E_{kin} + E_{pneum} = \text{_____} \text{ [in-lbs]}$$

D Air Cyl. Bore [in] \_\_\_\_\_

L Cushioneer Stroke [in] \_\_\_\_\_

p Air Pressure [psi] \_\_\_\_\_

## Option 2

### Kinetic Energy and Energy from Mechanical Driving Force

$$E_{force} = F \times L$$

$$E_{force} = \text{_____} \text{ [in-lbs]}$$

$$\text{Impact Energy } E_{impact} = E_{kin} + E_{force} = \text{_____} \text{ [in-lbs]}$$

F Force [lbs] \_\_\_\_\_

L Cushioneer Stroke [in] \_\_\_\_\_

## Option 3

### Energy from Free Falling Mass

$$E_{fall} = W \times h$$

$$\text{Impact Energy } E_{fall} = \text{_____} \text{ [in-lbs]}$$

w Weight [lbs] \_\_\_\_\_

h Height [in] \_\_\_\_\_

Distance to Impact Point

Please use the formula below to calculate the Energy Absorption during Extended Use

$$\text{Number of Impacts/Minute} = \text{_____}$$

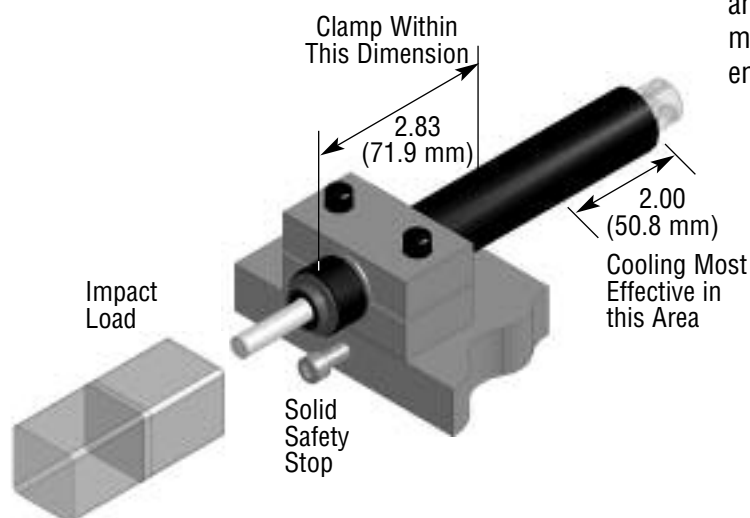
$$\text{Sustained Capacity} = E_{impact} \times \text{Impacts/Minute} = \text{_____} \text{ [in-lbs/min]}$$

Hold operating temperature below 130°F (54°C).

# Important Information

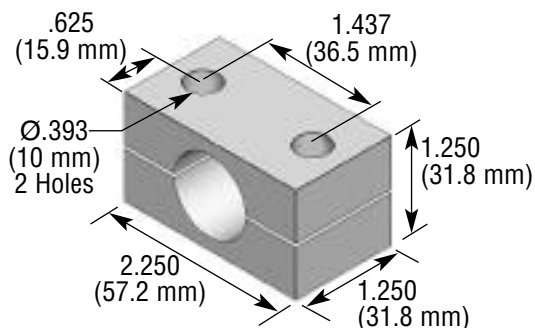
**MOUNTING ARRANGEMENTS** Mount on flat surfaces with block A10031 at either snap ring groove, or use spacer for intermediate position. Thrust is taken by snap ring furnished. Can be mounted in round holes and retained by snap rings in light duty installations. If application is severe, body should be clamped radially by split mounting to prevent body working in hole. Do not use set screws to retain body.

**SAFETY STOP** To avoid damaging Cushioneer, to protect your equipment, and for quickest plunger return after a working stroke, provide a solid safety stop to stop the moving load approximately 1/32" (0.8 mm) before CUSHIONEER plunger reaches bottom of its own stroke.



**IMPORTANT** End of CUSHIONEER plunger is hardened for wear resistance. Align CUSHIONEER accurately with direction of load movement so that moving load contacts plunger squarely during entire stroke of plunger. Load should never slide on end of plunger or cause plunger to twist during its stroke, otherwise plunger seal and bushing life may be shortened.

**CUSHIONEERS** get hot because they convert impact energy to heat. The seals in a cool unit last longer than those in a hot unit. Operating temperature should be held below 130°F (54°C) if a seal life of millions of operations is expected. Exhaust blast from an air cylinder is excellent for keeping a CUSHIONEER cool and ensures a normal length of life for the seals. For maximum effectiveness, have air strike within 2" of end of housing as shown, but not on nameplate.



A10031 Mounting Block Accessory  
Consists of upper & lower halves which are identical and symmetrical around center line.

**Guarantee and Limitation of Liability** Every hydraulic unit is fully guaranteed against defects in workmanship or material. Within one year from the date of shipment to the original purchaser, any unit which has proven defective will be repaired without charge, F.O.B. factory, when unit is shipped prepaid to factory. The Company is not responsible for any damage resulting from tampering, abuse, or incorrect application. The Company's liability on any claim of any kind, including negligence, for any loss or damage arising

out of, connected with or resulting from the design, manufacture, sale, delivery, resale, installation or installation advice, inspection, repair, operation, or use, of any equipment described herein, shall in no case exceed the price allocable to the equipment which gives rise to the claim and shall terminate four years after the date of original shipment. The purchaser, by acceptance of any of the Company's products described herein, assumes all liability of the consequence of the use of those products.



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