



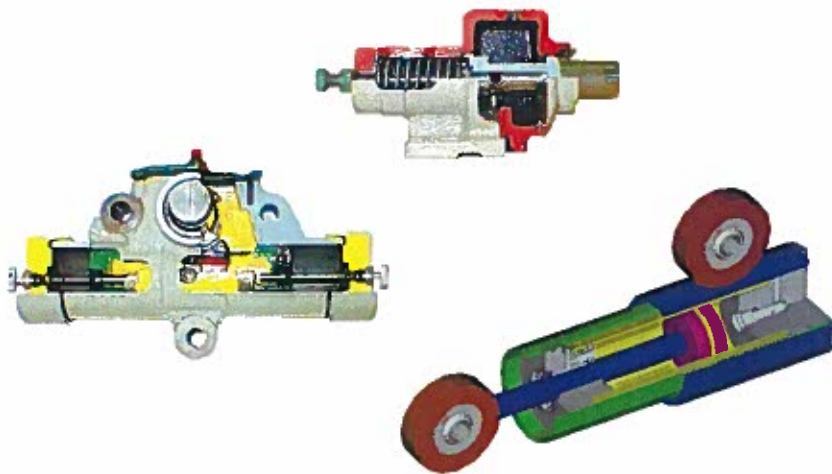
Modern Industries, Inc.

613 West 11th Street, Erie, PA 16512

Phone: 814/455-8061

Fax: 814/453-4382

HYDRAULIC PRODUCTS DIVISION



Custom Shock Absorbers



At Modern's state-of-the-art facilities we design, manufacture and assemble custom shock absorbers to fit your specifications.

www.modernind.com

ROTARY SHOCK ABSORBERS
SELF MOUNTING SHOCK ARM
HYDRAULIC DASHPOT
LINEAR HYDRAULIC SHOCK



Why Modern Shock Absorbers?



Controls Motion Where YOU Need It

- * SELF-CONTAINED HYDRAULIC SHOCK ABSORBERS.
- * YEARS OF FIELD-PROVEN DESIGN RELIABILITY
- * CONSISTENT OPERATION THROUGH HYDRAULICS
- * NO EXTERNAL ATTACHMENTS OR POWER SOURCES REQUIRED
- * CONTROLS NOISE, VIBRATION, IMPACT AND MOTION
- * PRECISION ENGINEERING DESIGNS.
- * PROVIDES LONGER MACHINE LIFE
- * UNEQUALED PRODUCT LINE VARIETY.
- * HIGHEST QUALITY.
- * ASSISTANCE IN APPLICATION
- * REDUCES STRUCTURAL FATIGUE AND PREMATURE FAILURE
- * CONTROLS NOISE, VIBRATION, IMPACT AND MOTION
- * SERVES PRODUCTION, ENGINEERING AND MAINTENANCE NEEDS

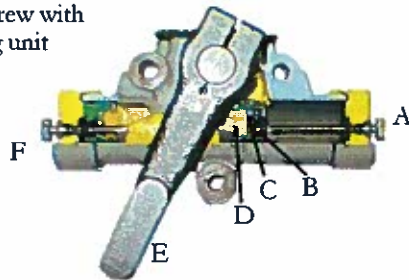
All models are not shown. For a full catalog please contact Modern Industries Hydraulic Products Division at (814) 455-8061 or email your request at hpsales@mi-erie.com.

Visit our website for an on-line request for quote at www.modernind.com

YOUR IMAGINATION IS THE LIMIT

ROTARY SHOCK ABSORBERS

- A - Right load metering screw with sealed packing and packing unit
- B - Safety Valve
- C - Bypass Valve
- D - Piston
- E - Rocker Arm
- F - Left Metering Screw



SERIES 70

Shown with split-adjustable metering screw with steel end caps and heavy duty alloy shaft.

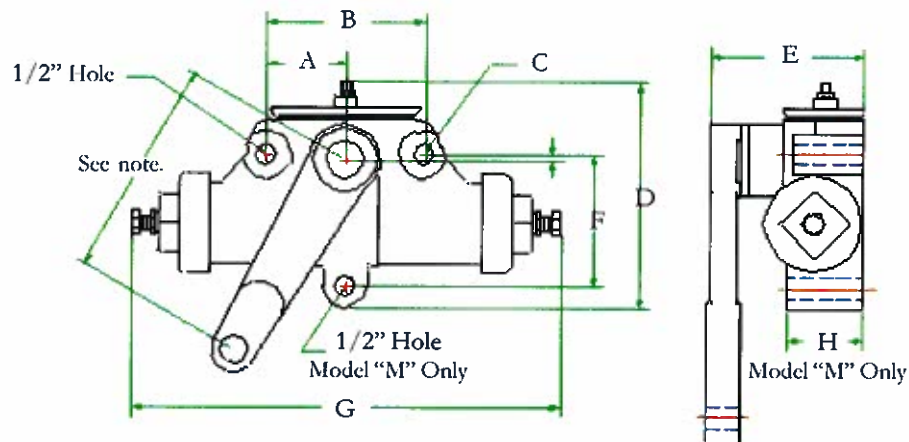
SERIES 50

Basic model shown with standard arm and cast iron end caps with preset orifice metering screws.



Outstanding Features

- INDEPENDENT ORIFICE ADJUSTMENT OF EACH END
- FLEXIBLE ORIFICE SPECIFICATIONS
- ADJUSTABLE STROKE LENGTH
- SAFETY VALVE
- 360° CHOICE IN OPERATING ARM LOCATION
- LARGE CHOICE OF ARMS



SERIES 50, MODEL "L"

A	1-15/32	C	0	E	3-3/4	C	10-1/2
B	2-15/16	D	4-1/2	F	---		

SERIES 70, MODEL "M"

A	2-0	C	1/8	E	4-0	C	11-1/4
B	4-0	D	5-3/4	F	3-3/8		1-15/16

* Standard 6, 9 and 12" arm forgings are available.

* Special lengths and offsets can be furnished

* Hydraulic products reserves the right to make departure from the specifications for reason of design improvement.

SERIES 50 AND 70

ADJUSTABLE HYDRAULIC ROTARY SHOCK ABSORBERS
Series 60 2" and 3" Rotary Shock Absorbers

Angular Travel:

100° Maximum
 360° Choice in Arm Position

Operating Temperature Range:

-30° F. to 160° F.

Direction of Travel:

Single Action Clockwise
 Single or Double Action Counter-Clockwise

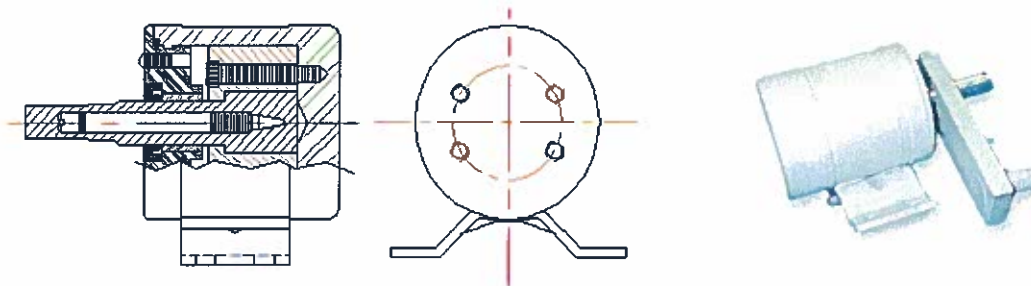
Capacity:

10 to 5,000 Inch pounds

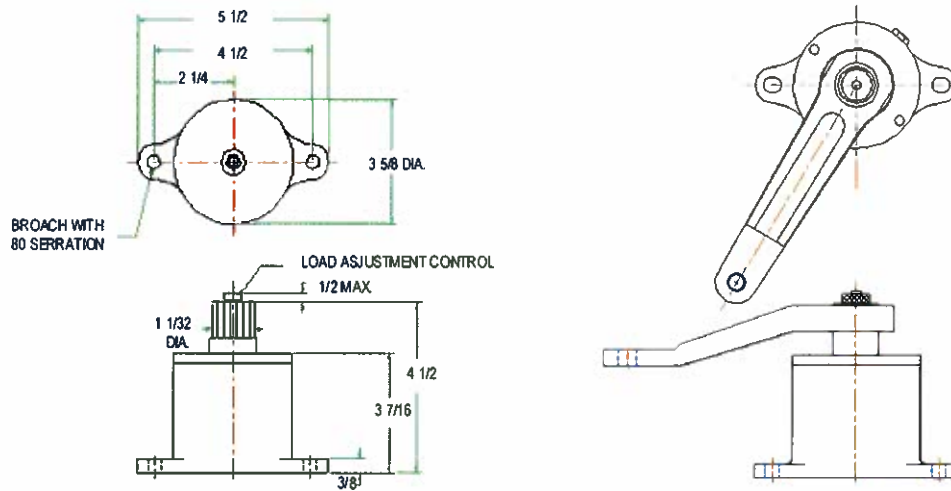


Fully Adjustable:
 to 200 Inch Pounds

2" Rotary, Model 20



3" Rotary, Model 30



Typical 3 inch Rotary - Do not scale.

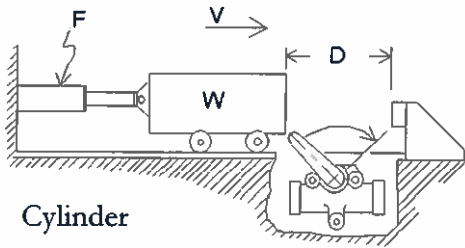
ROTARY SHOCK ABSORBERS

APPLICATION ENGINEERING PROCEDURE ROTARY SHOCK ABSORBERS

The examples of shock absorber mounting shown below illustrating typical applications, can be used to aid in sizing the shock absorber unit to the system. It is recommended that the system should be designed at 60% of the units rated capacity. This allows the best unit adjustment control (Mid range of adjustment). **CAUTION:** Exceeding the published maximum energy, angle of travel, or using either end of the unit's travel as a positive stop for the system **VOIDS** the warranty of the unit.

Powered Trolley

Recommend Standard Series 50



$$E = .1865 \times W \times V^2 + F \times D$$

$$E = (.1865) (500) (9) + (100)$$

$$E = 1440 \text{ in. lb. energy}$$

$$G = \frac{.1865 \times V}{D}$$

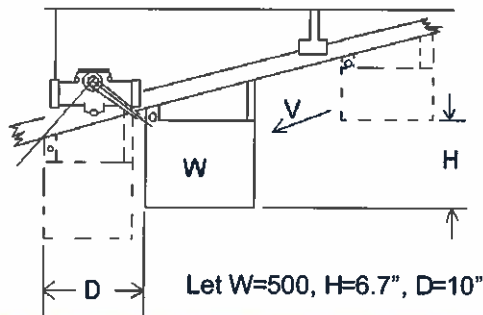
$$G = \frac{(.1865)(9)}{6} = .28\text{g's of force}$$

$$T = \frac{D}{6 \times V} = \text{deceleration}$$

$$T = \frac{6}{(6)(3)} = .333 \text{ sec. time}$$

Ceiling Mounted Gravity Incline Trolley

Recommend Standard Series 70



$$E = W \times H$$

$$E = (500) (6.7) = 3350 \text{ in lb. energy}$$

$$V = \sqrt{5.367(H)}$$

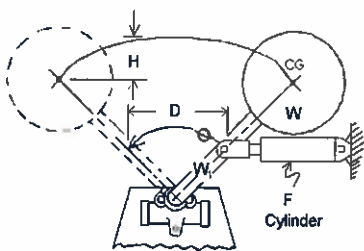
$$V = \sqrt{(5.367)(6.7)} = 6 \text{ Ft., sec.}$$

$$G = \frac{.1865 \times V^2}{D}$$

$$G = \frac{(.1865)(36)}{10} = .6714 \text{ g's of force}$$

Power Swinging Load

Recommend Standard Heavy Duty Series 70



$$E = W \times H + F \times D$$

$$E = (500) (6.7) + (100) (10)$$

$$E = 4350 \text{ IN. LB. ENERGY}$$

IF THE INPUT POWER IS
TORQUE THRU AN ANGLE:

$$E = W \times H + T \times \phi$$

$$E = (500) (6.7) + (955) (1.047)$$

$$E = 4350 \text{ IN. LB. ENERGY}$$

IF THE WEIGHT OF THE ARM (W₁)
IS GREATER THAN 10% OF W:

$$E = (W \times W_1) \times H + T \times \phi$$

$$E = (500 + 55) (6.7) + (955) (1.047)$$

$$E = 4718.5 \text{ IN. LB. ENERGY}$$

Let W = 500#, W₁ = 55#, H = 6.7", D = 10"
F = 100#, T = 955 inch lbs., ϕ = 1.047 radians.

Symbols

E=Energy....inch pounds
W=Weight....pounds
V=Contact Velocity....FT/Sec.
Note: Contact Engineering Dept.
velocity exceeds 20ft./sec.

H=Total Vertical Distance....inches
t =Deceleration Time....sec.
D=Shock Absorber Stroke....inches
G=Deceleration Force....pounds
F=Driving Force....pounds

T=Propelling Torque....inch pounds
 ϕ =Deceleration angle....rations
Note: 1 ration = 57.3 Degrees

SELF-MOUNTING SHOCK ABSORBER ARM



Permits assembly and adjustment to optimum position at installation.

Features:

Standard Features:

- * 1/2" Dia. Connecting Hole
- * 12" Center Distance (Shaft To Connecting Hole)

Optional Features:

- * Connecting Hole Size to 5/8"
- * Special Sizes Upon Request

Available for Series 50, 60, 70 and Model 30

Series 50, Model "L"

Part No. 2600 - 12"

Part No. 2617 - 9"

Part No. 2613 - 6"

Series 70, Model "M"

Part No. 2601 - 12"

Part No. 2618 - 9"

Part No. 2614 - 6"

Series 60, 3" Rotary:

See Series 70



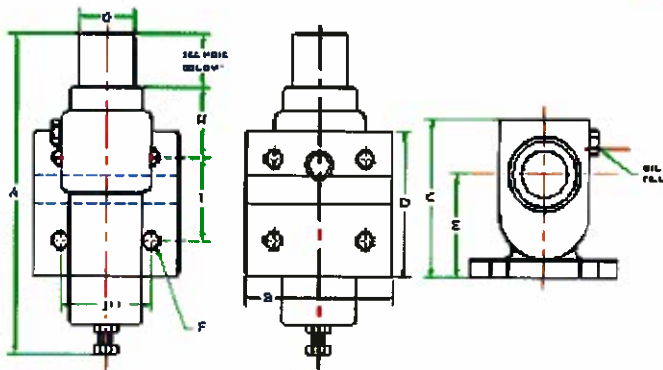
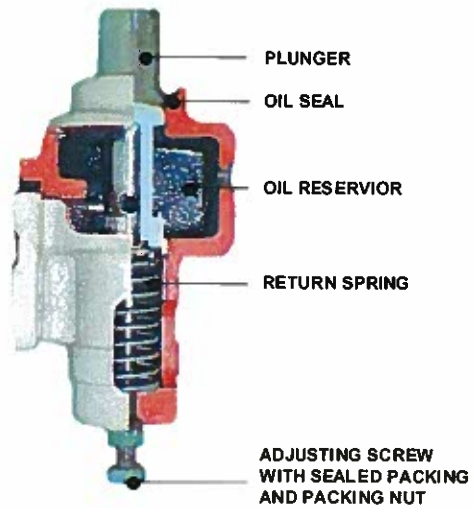
HYDRAULIC DASHPOT MODEL "O"
CAPACITY 1500 LBS.

Single Action - Spring Return
Vertical or Horizontal Mounting

Hydraulic Products proven design will help you increase your production while reducing maintenance, noise and vibration.

Outstanding Features:

- * Fully hydraulic permitting flexible orifice specification
- * Long Life - rugged design
- * Simple sturdy universal mounting
- * Smooth - controlled action
- * Case hardened and ground plunger
- * Rugged oil seal protection
- * Choice of stroke length
- * Harden Shaft
- * Quality Rod Seal



- A = 6 5/8"
- B = 3 1/4"
- C = 2 7/8"
- D = 2 1/2"
- E = 1 5/8"
- F = 5/16"-18 THD
- G = 1"
- H = 1 9/16"
- I = 1 9/16"
- J = 1 7/8"

- * Standard stroke lengths 5/8" and 1" Special lengths available on request
- ** Standard mounting holes shown, Special mounting hole per customer requirements.

Currently used in the following applications:

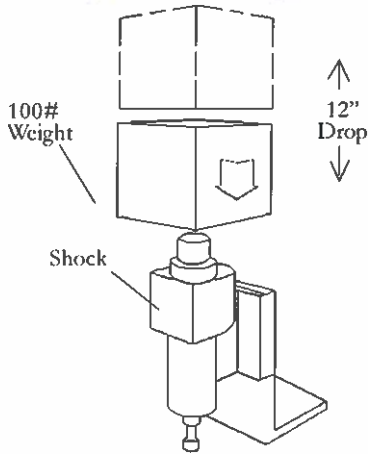
Trolleys, Machinery, Material Handling, Jigs and Fixtures, Swinging, Loads, Turn Tables, Push Trucks, Conveyors, Open Doors, Cranes

APPLICATION ENGINEERING PROCEDURE LINEAR SHOCK ABSORBERS

The examples of shock absorber mounting shown below illustrating typical applications, can be used to aid in sizing the shock absorber unit to the system. It is recommended that the system should be designed at 60% of the units rated capacity. This allows the best unit adjustment control (Mid range of adjustment). **CAUTION:** Exceeding the published maximum energy, angle of travel, or using either end of the unit's travel as a positive stop for the system **VOIDS** the warranty of the unit.

Example No. 1

(Free Falling Weight)



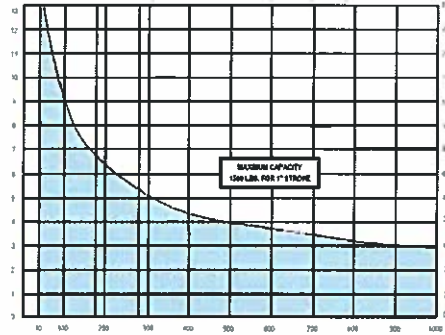
$$E = WH$$

$$E = 100 \times 12''$$

$$E = 1200 \text{ Inch lbs.}$$

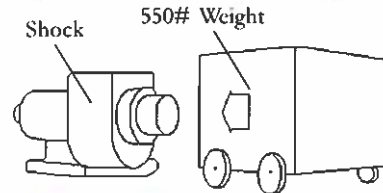
Energy does not exceed capacity of shock.
Use pin No. 2A in chart. If weight falls on dividing line, use the highest No. pin.

Selection Chart Values are based on energy value at contact.



Example No. 2

(Pure Inertia - No Driving Force)



$$E = .19xWV^2$$

$$E = .19x550x3^2$$

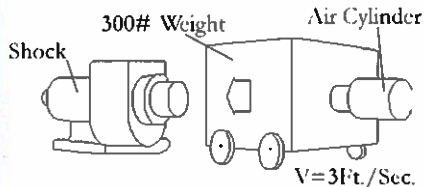
$$E = 940 \text{ Inch lbs.}$$

Using pin selection chart, pin No. 5A should be used.

Example No. 3

(Inertia Plus Force)

3" CYL. at 50 PSI-353# FORCE



$$E = .19xWV^2 + F \times S$$

$$E = .19 \times 300 \times 3^2 + 353 \times 1$$

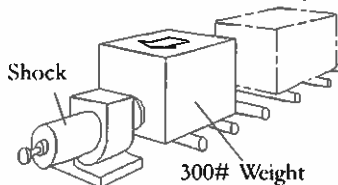
$$E = 866 \text{ Inch lbs.}$$

In this application, consult our Engineering dept. for proper pin selection.

Example No. 4

(Pure Inertia - No Driving Force)

HEIGHT OF DROP=4" AT CQ



$$E = WH$$

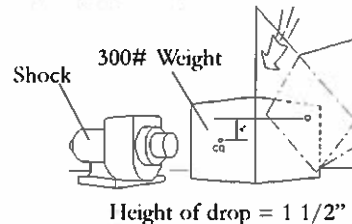
$$E = 800 \times 12''$$

$$E = 1200 \text{ inch lbs.}$$

Use pin selection selection chart, pin No 6A should be used.

Example No. 4

(Swinging Load)



$$E = WH$$

$$E = 300 \times 4''$$

$$E = 1200 \text{ inch lbs.}$$

Use pin selection selection chart, pin No 4A should be used.

Symbols

CG = Center of gravity
E = Energy in inch lbs.
F = Force in lbs.
V = Velocity in ft./sec.

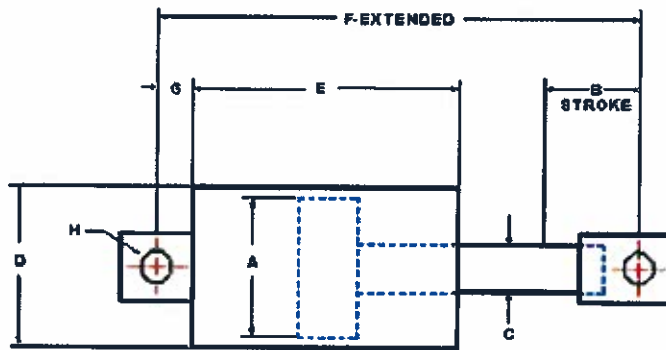
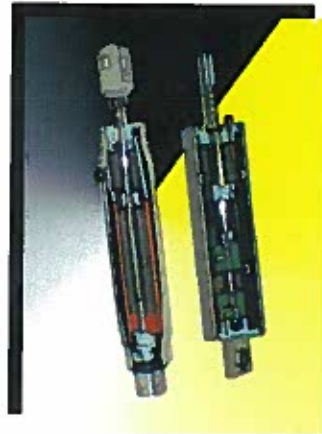
H = Height in inches
W = Weight in lbs.
S = Shock absorber stroke in inches

LINEAR TYPE HYDRAULIC SHOCK ABSORBER SERIES 20

Contact Hydraulic Products for units other than those listed. Our proven design will help you increase your production while reducing maintenance, noise and vibration.

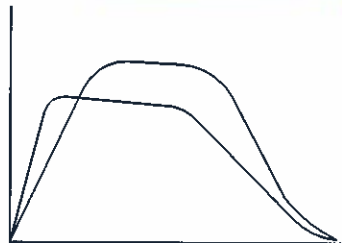
Features

- Custom Configuration
- Single or Double Acting
- Constant Force
- Optional Mounting
- Capacities to 30,000 Inch Pounds
- Choice of Bore and Stroke
- Completely Self-Contained
- Zero Maintenance



PART NUMBER	A	B	C	D	E	F	G	H
5005	1.250	2 1/2	7/16	2	7 9/16	12 1/2	3/4	1/2
5154	3	2 1/2	1-20	4	12 1/8	23 5/16	1 7/16	1 1/4
5170	3/4	1.25	3/8	7/8	4 13/16	7 3/8	.44	1/2
5187	1	4	1/4	1 1/8	7 3/4	14 3/4	.7	.190 & .250

PART NUMBER	MAX. CAPACITY	MAX. VELOCIT
5005	2000"/LBS.	6 FT./SEC.
5154	30,000/LBS	8 FT./SEC.



TYPICAL FORCES
TIME DIAGRAMS

ADJUSTABLE TO VARIOUS
REQUIREMENTS

CONTACT MODERN INDUSTRIES FOR UNITS OTHER THAN THOSE LISTED.

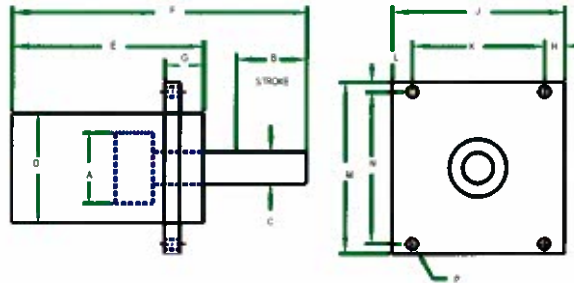
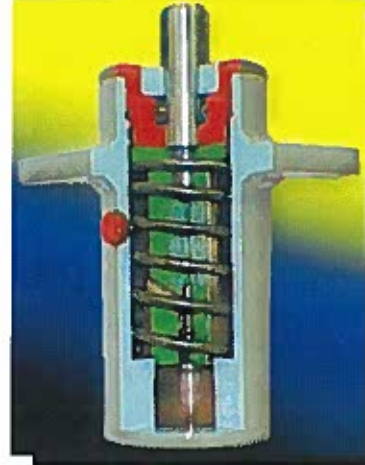
LINEAR SHOCK ABSORBERS

BUMPER TYPE HYDRAULIC SHOCK ABSORBER

Contact Hydraulic Products for units other than those listed. Our proven design will help you increase your production while reducing maintenance, noise and vibration.

Features

- Custom Configuration
- Single Action - Spring Return
- Completely Self Contained
- Custom Orifice
- Choice of Bore and Stroke
- Optional Mounting
- Capacities to 30,000 Inch Pounds



PART NUMBER	A	B	C	D	E	F	G	H	J	K	L	M	N	P
*5163	1	1	1/2	2 3/8	4 3/4	6 1/4	*2							
5164	1.5	1	1	3	6 3/8	7 1/2	1 7/8	1/2	4 1/2	3 1/2	1/2	4	3	3/8-16
5166	3	1.5	1 1/4	5	8	12 3/8	3/4	1/2	5 3/8	4 3/8	1/2	5 3/8	4 3/8	9/16
5169	3	2	1 1/4	5	8 3/4	11 1/8	1	1/2	5 3/8	4 3/8	1/2	5 3/8	4 3/8	9/16
5141-1	2	5	1 1/4	4	11 15/16	18 15/16	2 1/4		5 1/2 BC	4 7/8		5 1/2 BC	4 7/8 BC	1/2

PART NUMBER	MAX. CAPACITY	MAX. VELOCITY	SPRING RESET FORCE-Pounds
5163	3000"/LBS	12 FT./SEC.	15
5164	6000"/LBS	15 FT./SEC.	60
5166	15,000"/LBS	18 FT./SEC.	105
5169	20,000"/LBS	20 FT./SEC.	150
5141-1	60,000"/LBS	6 FT./SEC.	100

*2 3/8 THREAD

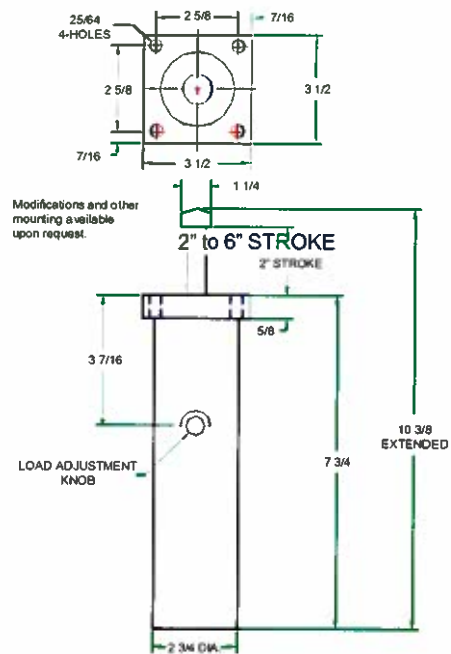
SERIES 30 SHOCK ABSORBER

ADJUSTABLE HYDRAULIC BUMPER TYPE SHOCK ABSORBER

Contact Hydraulic Products for units other than those listed. Our proven design will help you increase your production while reducing maintenance, noise and vibration.

Features

Constant Deceleration
Easy Field Adjustment
6,000⁰⁰/LBS Capacity
Adjustable to 200⁰⁰/LBS
Hardened Impact Cap
Optional Mounting



SERIES 10 SHOCK ABSORBER

The Hydraulic Products Division is one of 4 divisions at Modern Industries, Inc.

Information about other divisions of Modern can be obtained at our web site www.modernind.com or you can contact us at (814) 455-8061.

Machining Division

Heat Treat Division

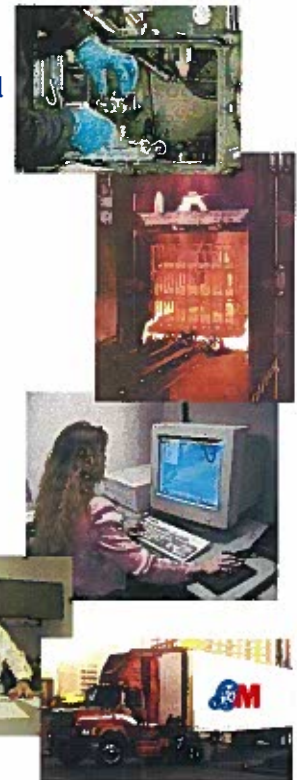
Hydraulic Products Division

Materials Research Division



Modern Industries was founded in Erie, Pennsylvania, in 1946, by a 26 year old, second generation immigrant, World War II sailor, and tool and die craftsman Herbert S. Sweny.

Incorporated in Pennsylvania in 1960, Modern is guided by the vision of a strong work ethic, a thirst for knowledge, and mutual respect. With family ownership, the founder as president, five sons as managing officers, and many other managers and employees who have grown with the business, Modern has been able to make decisions based on long-term benefit rather than short-term gain. Today, Modern has four divisions, over 450 employees and over 350,000 square feet of manufacturing, engineering, and administrative areas.



MODERN INDUSTRIES, INC.