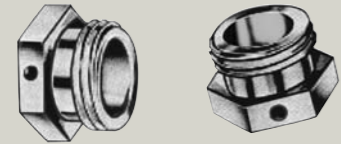


## HPTR CYLINDER DESIGN OPTIONS

### CYLINDER BREATHERS

Standard Energy® cylinder breathers contain a screen element retained by a star washer. Efficiency is improved by periodically putting several drops of oil in the breather hole.



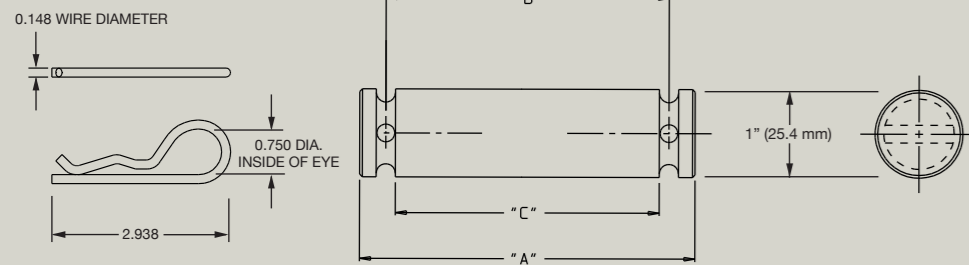
#### Cylinder Breathers Specifications

Part No.	Thread Size	Overall Length	Hex	Weight
0A002694	3/8" NPTF	5/8" (15.9mm)	7/8" (22.2mm)	3/4 oz. (21.3g)
0A002696	1/2" NPTF	9/16" (14.3mm)	7/8" (22.2mm)	3/4 oz. (21.3g)
0A009431	9/16-18 UNF (SAE-6 ORB)	5/8" (15.9mm)	7/8" (22.2mm)	3/4 oz. (21.3g)
16329A	3/4-16 UNF (SAE-8 ORB)	13/16" (20.6mm)	7/8" (22.2mm)	3/4 oz. (21.3g)
17989A	3/4-16 UNF (SAE-8 ORB)	3/4" (19.1mm)	7/8" (22.2mm)	3/4 oz. (21.3g)

Part number 17989A contains a sintered element with a 10 micron filtration rating. The other breathers do not carry a filtration rating.

### CLEVIS PINS

Clevis pins, in four different lengths, are designed for all types of hydraulic applications. These pins are plated to resist rust or corrosion. They improve alignment and reduce shaft and seal wear caused by worn pins.



#### Clevis Pins Specifications

Pin & Clip	A	B	C	Standard Packaging
35890B	3.1" (78 mm)	2.5" (64 mm)	2.25" (57 mm)	25
35891B	3.3" (84 mm)	2.7" (69 mm)	2.5" (64 mm)	25
35892B	3.8" (97 mm)	3.2" (81 mm)	3" (76 mm)	25

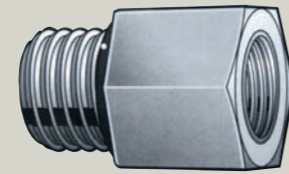
NOTE: Separate clip is Energy p/n 35879X

Comes complete with clip. Extra clips bulked packed at 150.

### SAE TO PIPE ADAPTERS

#### SAE to Pipe Adapters

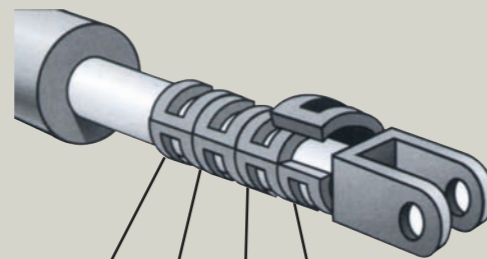
Part No.	Thread Size	Overall Length	Hex
20895B	SAE #6 ORB to 3/8" NPTF	1-13/64" (30.6mm)	7/8" (22.2mm)
20894B	SAE #8 ORB to 1/2" NPTF	1-1/2" (38.1mm)	1-1/8" (28.6mm)



### STROKE CONTROL SEGMENTS

These provide a simple means of controlling the stroke of standard cylinders. Stroke control segments are sold in sets, each containing four individual segments.

Model 83217: For 1-1/8" (28.6 mm) and 1-1/2" (38.1 mm) rod sizes.  
Model 20917A: For 2" (50.8 mm) rod sizes.



1-1/2" (38.1 mm)	1-1/4" (31.8 mm)	1" (25.4 mm)	3/4" (19.1 mm)	Model 83217
4-1/4" (108 mm)	2" (50.8 mm)	1-1/2" (38.1 mm)	1" (25.4 mm)	Model 20917A

## COLUMN STRENGTH CURVES

1. Find column load on vertical axis of graph. Find extended pin centers of cylinder on horizontal axis. The intersection of the line running horizontally from the load axis and the line running vertically from the pin center axis locates the rod load zone. The nearest curve above the intersection indicates the minimum allowable rod size.

2. These curves indicate axial load limits only. When side loads are present consult factory.

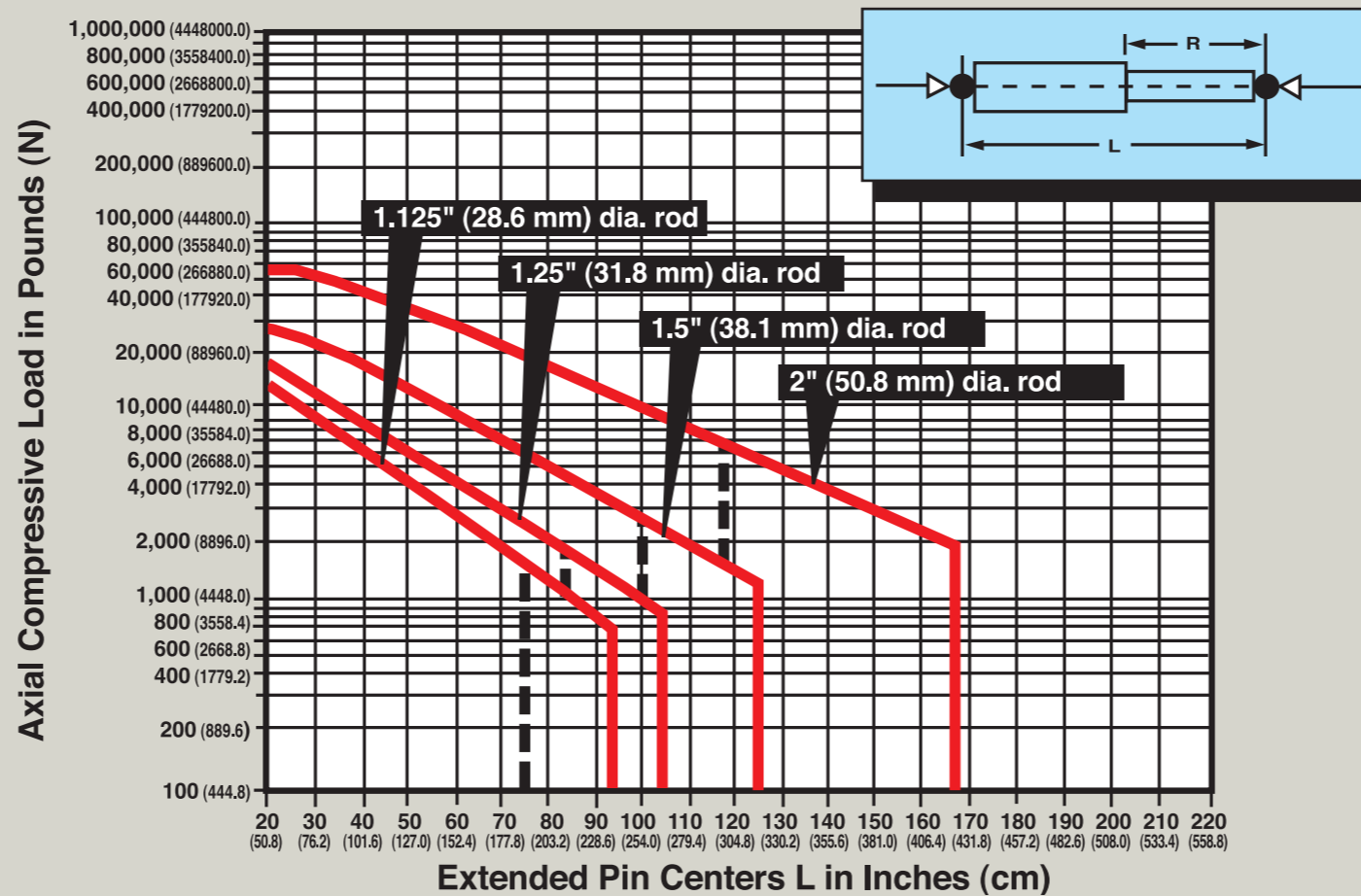
3. The above curves apply to cylinders where the rod out dimension (R) is approximately 50% of the full extended pin center dimension (L).

If the rod out dimension exceeds 60% of the fully extended pin center dimension, consult factory.

4. The vertical portion of the respective curves indicate the maximum recommended extended length. Consult factory if an application must exceed the recommended maximum extended length. The vertical dashed line indicates the preferred maximum extended length.

5. The curves indicate column strength of the pin-mounted cylinders with no intermediate support. The above curves apply to cylinders with solid rods only. Bracing cylinder at the rod guide area will increase column strength. Consult factory for relevant application information.

### CYLINDER FORCE CHART



- 6 -

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Energy® is a member of:  
• NFPA (National Fluid Power Association)

00.336.1



ISO 9001:2008

Energy® Mfg. Co., Inc.

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Form No. HPTR-4/2011



## HPTR SERIES HIGH-PRESSURE TIE-ROD HYDRAULIC CYLINDERS

#### Bore Diameters:

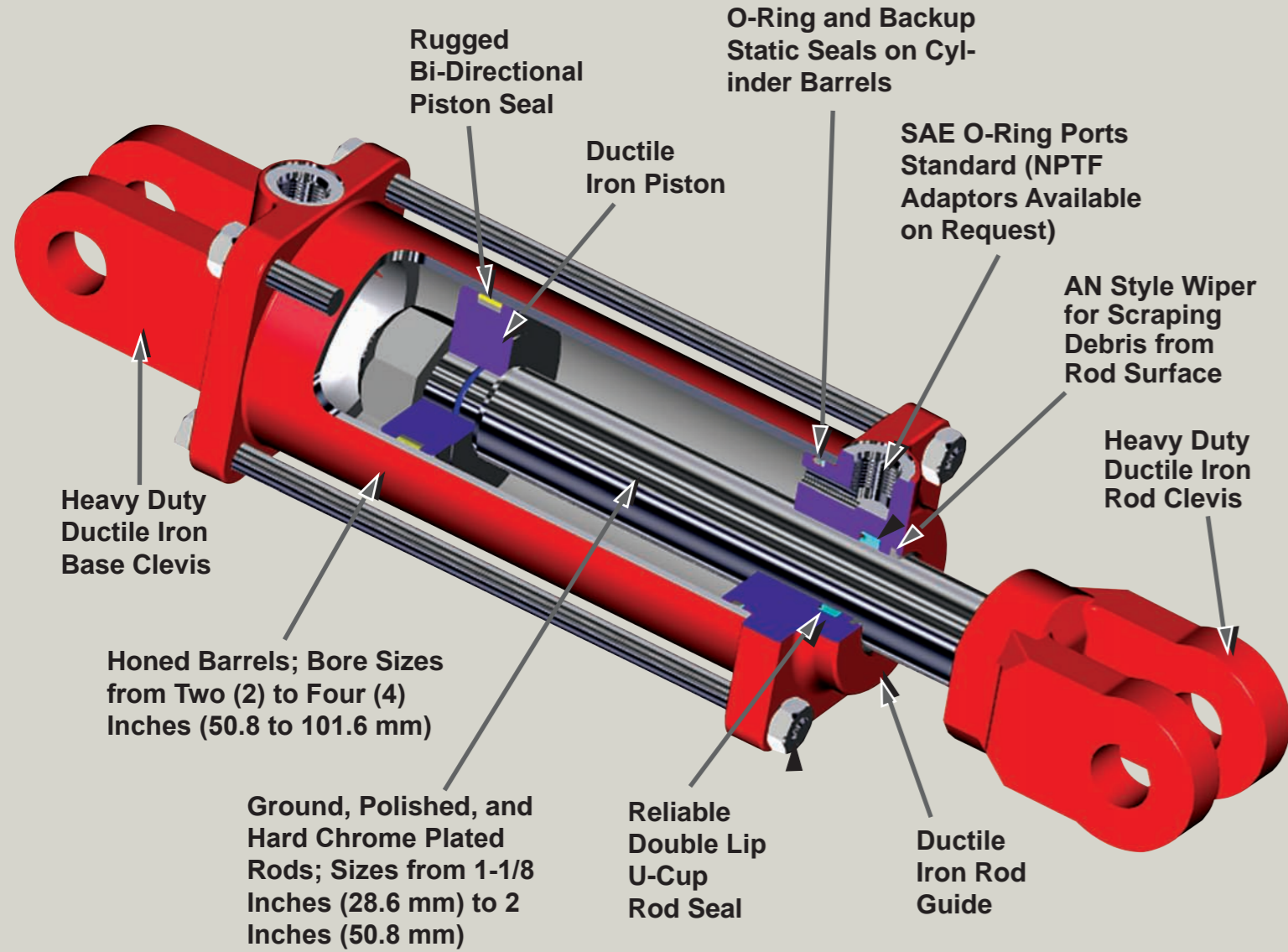
2.00" (50.8mm)  
2.50" (63.5mm)  
3.00" (76.2mm)  
3.50" (88.9mm)  
4.00" (101.6mm)



For Working Pressures to 3265 PSIG (225 BAR)

# HPTR HYDRAULIC CYLINDER DESIGN AND CONSTRUCTION

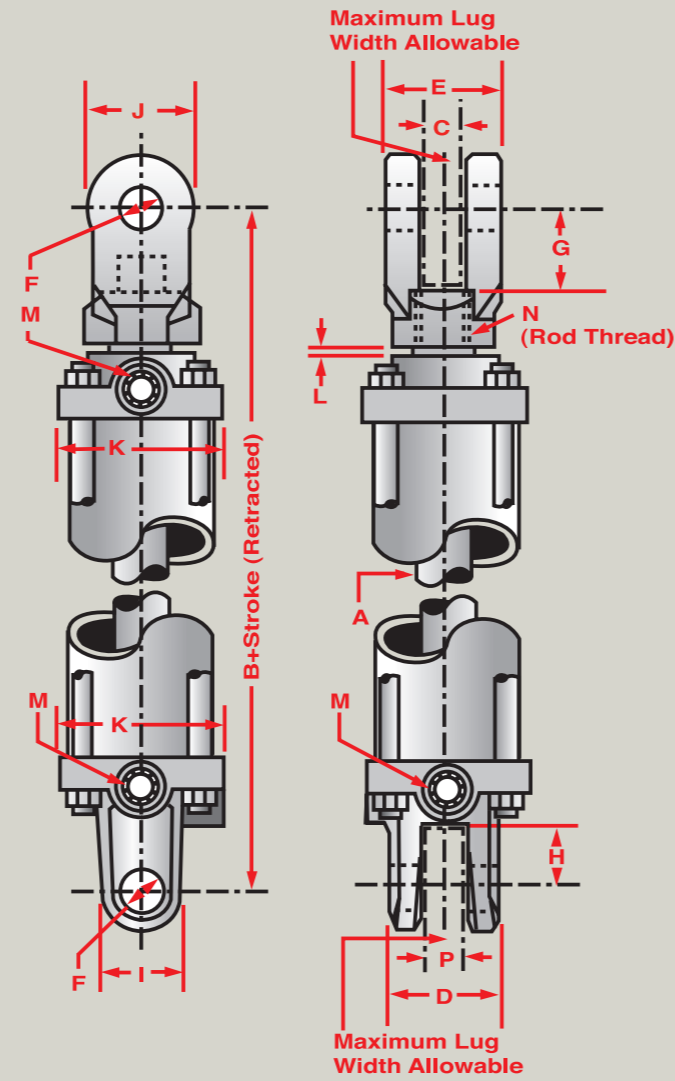
3265 PSIG (225 BAR) Working Pressure Capability; Higher Than Most Other Tie-Rod Type Cylinders.



Clear Zinc Plated Steel Clevis Pins and Clips Furnished as Standard

Strokes to 48 Inches (121.9 cm) in 1/4 Inch (6.4 mm) Increments

# SPECIFICATIONS - CUSTOM STROKE LENGTH MODELS



**WARNING:** Check device swing clearance before installation or serious injury may result. Clearance between the clevis and mounting lug will affect fatigue life. A large clearance will reduce fatigue strength and may create a hazard.

These cylinders are rated for 3256 PSIG (225 bar) working pressure, although the safe working pressure may be greatly reduced when cylinders are operated in the extend mode due to rod buckling considerations.

Please consult the factory if assistance in sizing is needed!

Also, cylinders with fully extended lengths of 40 inches (101.6 cm) or greater, when used in the extend mode, should include a stop tube of one (1) inch (2.54 cm) for each ten inches (25.4 cm) of fully extended length over 40 inches (101.6 cm).

**CAUTION:** These cylinders are designed for limited duty use at 3265 PSIG (225 bar) maximum pressure. Consult factory if your application requires maximum pressure and full reversal loading where failure could result in injury to persons or property damage.

**How To Specify HPTR Series Cylinders**

Energy® custom length tie rod cylinders are specified by the following model code:

**7 20 24**

24 Inch (61 cm) Stroke Length (Example)

2 Inch (50.8 mm) Bore Size (Example)

Series Prefix Number (Does Not Change)

Custom Stroke Lengths																
Bore Diameter	A	B (Retracted)	C	D	E	F (Pin Dia.)	G	H	I	J	K (Approx.)	L	M	N (Rod Thrd)	P	
2" (50.8 mm)	1.125" (28.6 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.375" (60.3 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	1.75" (44.5 mm)	1.625" (41.3 mm)	2.5" (63.5 mm)	76.2 mm	4.7 mm	3/16-18 UNF (SAE-6 ORB)	1-1/8-12 UNF	1.25" (31.8 mm)	
2.5" (63.5 mm)	1.125" (28.6 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.625" (66.7 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	1.625" (41.3 mm)	1.875" (47.6 mm)	2.5" (63.5 mm)	3.5" (88.9 mm)	.187" (4.7 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/8-12 UNF	1.25" (31.8 mm)	
3" (76.2 mm)	1.25" (31.8 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.593" (65.9 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	1.562" (39.7 mm)	1.875" (47.6 mm)	2.5" (63.5 mm)	3.75" (95.3 mm)	.187" (4.7 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/4-12 UNF	1" (25.4 mm)	
3.5" (88.9 mm)	1.5" (38.1 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.718" (69 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	2.062" (52.4 mm)	2.25" (57.2 mm)	2.5" (63.5 mm)	4.25" (108 mm)	.187" (4.7 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/2-12 UNF	1" (25.4 mm)	
4" (101.6 mm)	2" (50.8 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.718" (69 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	2.062" (52.4 mm)	2.5" (63.5 mm)	2.5" (63.5 mm)	4.75" (120.7 mm)	.187" (4.7 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/2-12 UNF	1" (25.4 mm)	

# ASAE SPECIFICATIONS / MODEL NUMBERS

**ASAE 8-INCH (20.3 CM) STROKE, 20-1/4" (51.4 CM) CENTER TO CENTER RETRACTED**

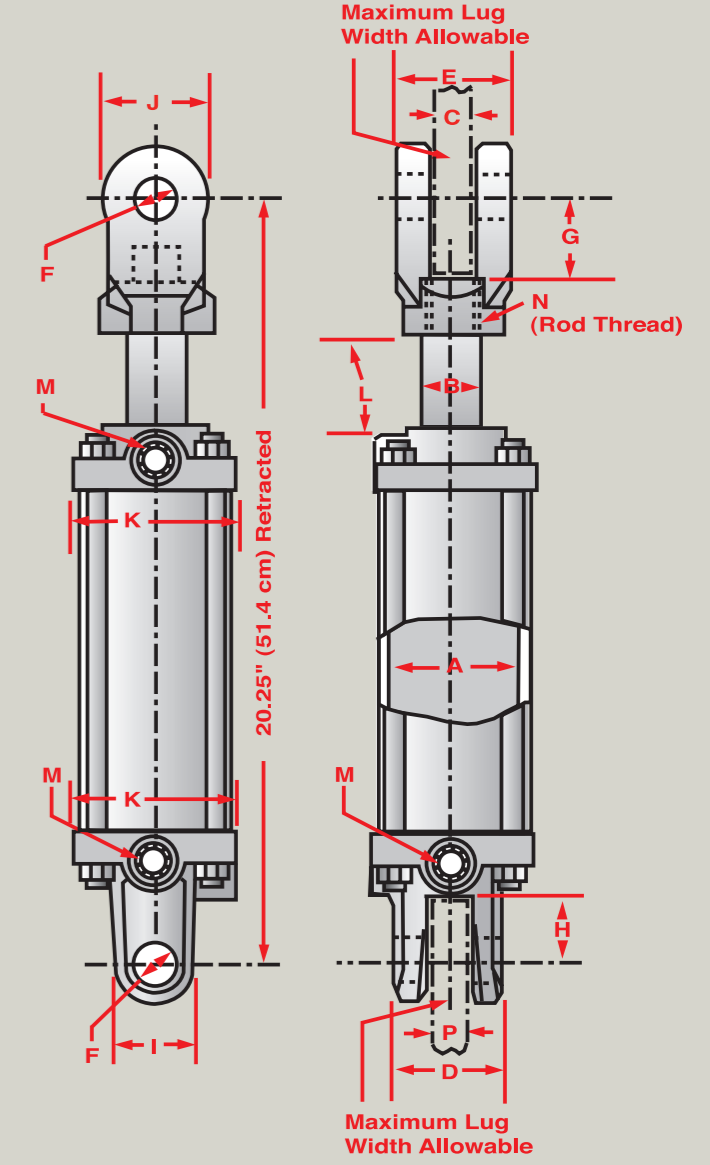


**WARNING:** The 4" (10.2 cm) bore cylinders listed below have 1.0" (2.54 cm) pins to meet ASAE standard S201.4 for agricultural tractors and trail-type implements with cylinder thrust loads on the pins below 18,000 lbs. (80,064 N) (1,450 PSIG [100 bar] pressure in extend mode). The service life at higher loads is severely reduced, and could potentially create a hazard.

These cylinders have the same construction and operating specifications as the custom length models on page 3. These models, however, are furnished as standard eight-inch (20.3 cm) stroke cylinders that meet ASAE mounting standards for that specific bore size.

Please use caution in applying the four-inch (10.2 cm) bore model listed in the chart below. Although the cylinder is rated for service up to 3265 PSIG (225 bar), the one-inch (2.54 cm) pins that are called for as part of ASAE standard S201.4 are for use on implements with loads induced on the pins below 1450 PSIG (100 bar) in four-inch (10.2 cm) bore cylinders. The service life at higher pressures is severely reduced and could potentially create a hazard. Normal service may be expected at 3265 PSIG (225 bar) in an application if the cylinder is loaded in only one direction.

Consult the factory for further information on pin life!



ASAE Models																
Part Number	A (Bore Dia.)	B	C	D	E	F (Pin Dia.)	G	H	I	J	K (Approx.)	L	M	N (Rod Thrd)	P	
D-1320	2" (50.8 mm)	1.125" (28.6 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.375" (60.3 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	1.75" (44.5 mm)	1.625" (41.3 mm)	2.5" (63.5 mm)	76.2 mm	2.187" (55.5 mm)	9/16-18 UNF (SAE-6 ORB)	1-1/8-12 UNF (31.8 mm)	
D-1325	2.5" (63.5 mm)	1.125" (28.6 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.625" (66.7 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	1.625" (41.3 mm)	1.875" (47.6 mm)	2.5" (63.5 mm)	85.7 mm	2.187" (55.5 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/8-12 UNF (31.8 mm)	
D-1330	3" (76.2 mm)	1.25" (31.8 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.593" (65.9 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	1.562" (39.7 mm)	1.875" (47.6 mm)	2.5" (63.5 mm)	3.75" (95.3 mm)	2.187" (55.5 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/4-12 UNF (25.4 mm)	
D-1335	3.5" (88.9 mm)	1.5" (38.1 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.718" (69 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	2.062" (52.4 mm)	2.25" (57.2 mm)	2.5" (63.5 mm)	4.25" (108 mm)	2.187" (55.5 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/2-12 UNF (25.4 mm)	
D-1338	4" (101.6 mm)	1.5" (38.1 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.718" (69 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	2.062" (52.4 mm)	2.5" (63.5 mm)	4.75" (120.7 mm)	2.187" (55.5 mm)	2.187" (55.5 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/2-12 UNF (25.4 mm)	
D-1340	4" (101.6 mm)	2" (50.8 mm)	10.25" (26.04 cm)	1.125" (28.6 mm)	2.718" (69 mm)	2.75" (69.9 mm)	1" (25.4 mm)	1.875" (47.6 mm)	2.062" (52.4 mm)	2.5" (63.5 mm)	4.75" (120.7 mm)	2.187" (55.5 mm)	2.187" (55.5 mm)	3/4-16 UNF (SAE-8 ORB)	1-1/2-12 UNF (25.4 mm)	