



CONTROL LINE EQUIPMENT, INC.



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MIDGET CYLINDERS

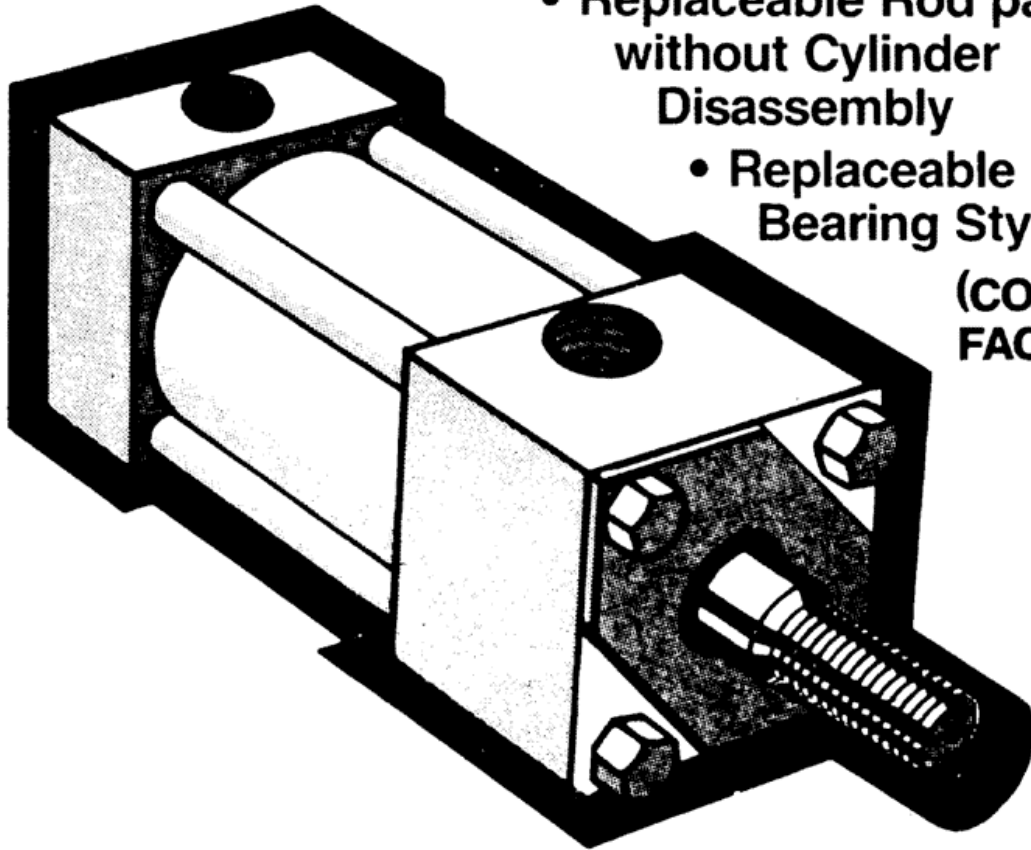
2 BORE SIZES
3/4" & 1 - 1/8"

HEAVY DUTY — 1500 P.S.I. OIL
MEDIUM DUTY — 750 P.S.I. OIL
200 P.S.I. AIR

NEW FEATURES—

- Replaceable Rod packing without Cylinder Disassembly
- Replaceable Rod Bearing Styles

(CONSULT
FACTORY)



MOUNTINGS

EXTENDED TIE RODS
HEAD END FLANGE
CAP END FLANGE
FOOT
PIVOT
CLEVIS

SINGLE END AND THRU-ROD CYLINDERS

2:1 ROD DIAMETERS

COMBINATION AIR/OIL CYLINDERS

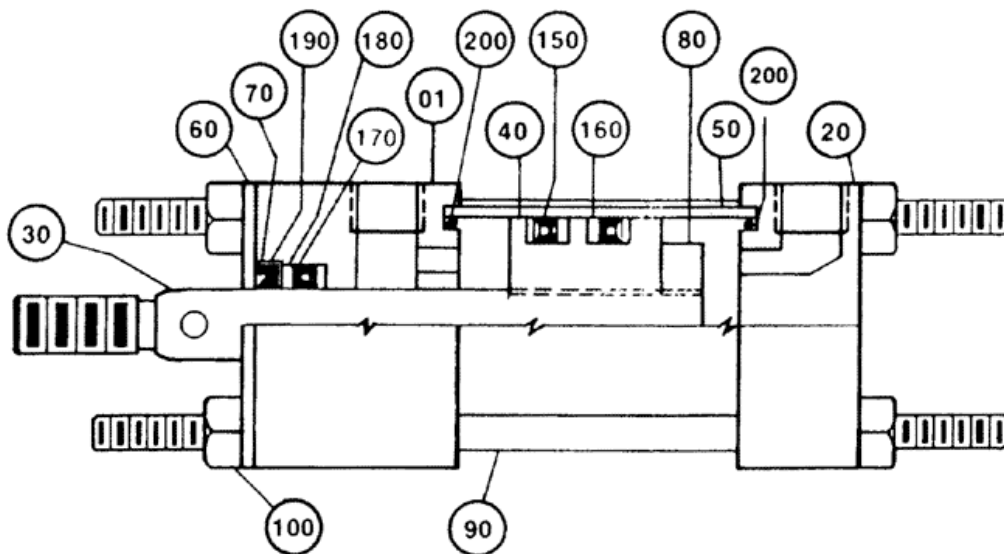
3-POSITION CYLINDERS

FORM ALH8412

MIDGET CYLINDERS

3/4 & 1 - 1/8 BORE

MEDIUM & HEAVY
DUTY CYLINDERS



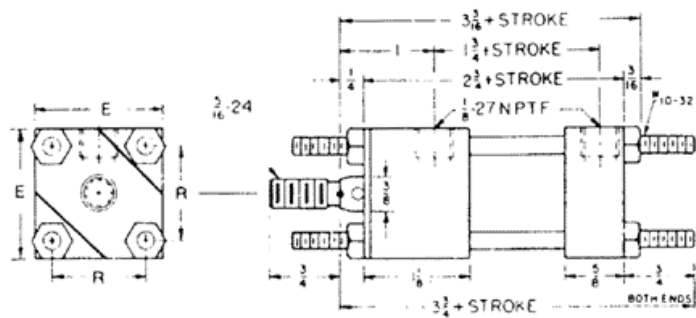
- 01 **HEAD END COVER** — High strength die cast ZAMAC zinc heads assure perfect alignment of piston rod and cylinder bore. Long bearing lengths on piston and in rod gland contribute to longer life.
- 20 **CAP END COVER** — High strength die cast ZAMAC zinc.
- 30 **PISTON ROD** — Stainless steel ground and polished on standard rod (3/8" dia.) cylinders. NOTE - Thread is a reduced diameter to prevent packing damage during the infrequent repacking. 2:1 rods are 60,000 p.s.i. minimum yield, medium carbon steel, hard chrome plated.
- 40 **PISTON** — One piece aluminum alloy, threaded onto piston rod, and locked in place with a prevailing-torque lock nut.
- 50 **CYLINDER WALL** — Drawn-over-mandrel (D.O.M.) steel tube for hydraulic service. Hard coated aluminum tube for air service.
- 60 **ROD GLAND RETAINER** — Permits easy replacement of wiper and rod gland packer from outside without dismantling the cylinder.
- 70 **ROD WIPER RETAINER** — Heat treated steel cup prevents the force exerted by the rod gland Block Vee Packer from distorting the wiper.
- 80 **LOCK NUT** — All metal prevailing-torque lock nut locks piston in place on threaded piston rod.
- 90 **TIE RODS** — Made from carbon steel, pre-stressed at assembly to minimize the possibility of rod elongation.
- 100 **TIE ROD LOCKNUTS** — Prevailing torque lock nuts (all metal) assure that tie rod pre-stressing will be maintained.
- 150 **BUNA N BLOCK VEE PACKERS** — Self compensating, provide self sealing, low friction and minimum break-away. Optional packers are available for high temperature and phosphate ester service.
- 160 **PACKING BACK-UP WASHER** — Prevents packer extrusion on high pressure on Heavy Duty Cylinders.
- 170 **ROD GLAND PACKING** — Buna N Block Vee is self-adjusting and wear compensating, has low coefficient of friction and minimum static breakaway. Optional packers are available for high temperature and phosphate ester service.
- 180 **ROD PACKING BACK-UP WASHER** — Prevents packer extrusion on high pressure on Heavy Duty Cylinders.
- 190 **ROD WIPER** — Buna N lip type wiper keeps external contaminants from entering rod gland. For severe service, Disogrin Wipers are available.
- 200 **O-RING TUBE SEALS** — Buna N, positive sealing, confined in groove to prevent extrusion.

MIDGET CYLINDERS

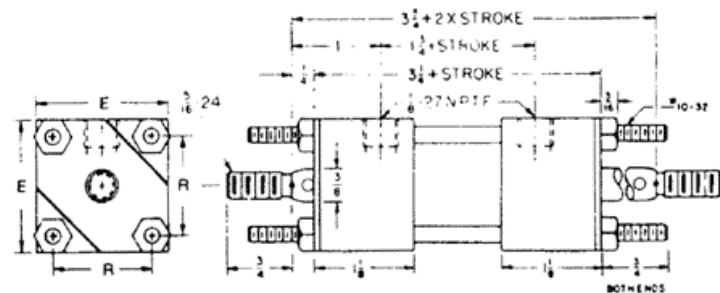
3/4 & 1 - 1/8 BORE

STANDARD DIAMETER
PISTON ROD

Medium Duty (Series A) - 200 p.s.i. Air
Medium Duty (Series L) - 750 p.s.i. Hydraulic
Heavy Duty (Series H) - 1500 p.s.i. Hydraulic

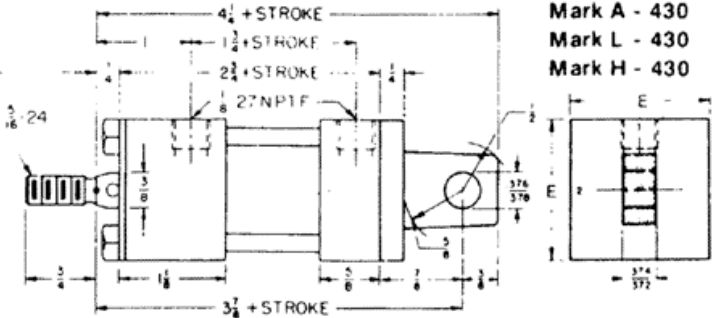
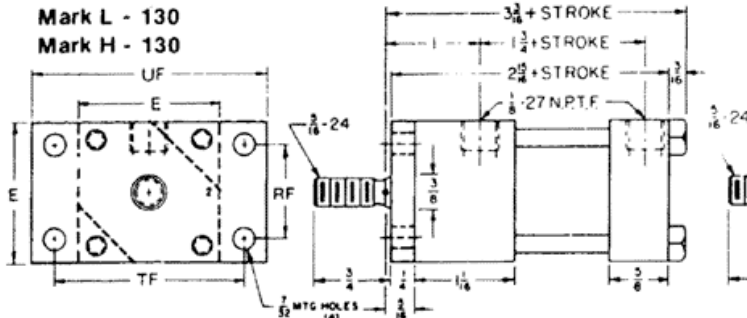


Mark A - 110 Mark L - 110 Mark H - 110	Tie Rods Extended Both Ends
Mark A - 111 Mark L - 111 Mark H - 111	Tie Rods Extended Cap (Blind) End
Mark A - 112 Mark L - 112 Mark H - 112	Tie Rods Extended Head (Rod) End



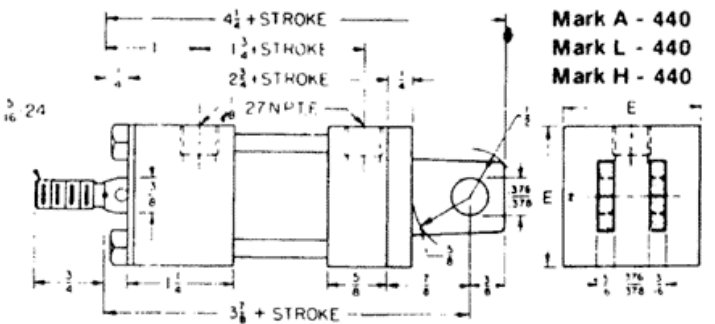
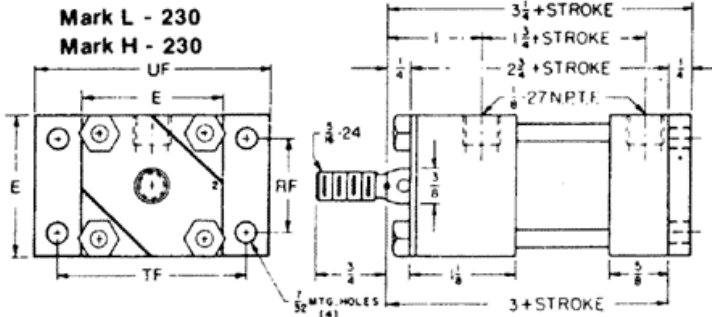
TRA/TRL - 110 Mark TRH - 110	Tie Rods Extended Both Ends
TRA/TRL - 112 Mark TRH - 112	Tie Rods Extended Head End

Mark A - 130
Mark L - 130
Mark H - 130



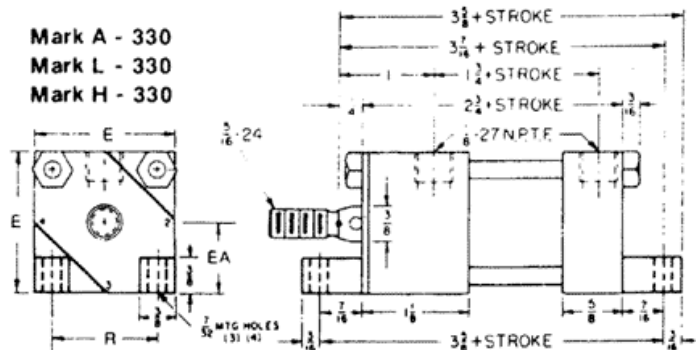
Mark A - 430
Mark L - 430
Mark H - 430

Mark A - 230
Mark L - 230
Mark H - 230



Mark A - 440
Mark L - 440
Mark H - 440

Mark A - 330
Mark L - 330
Mark H - 330

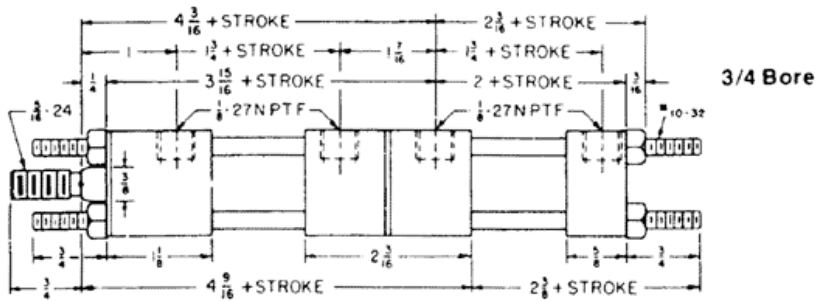


DIMENSIONS

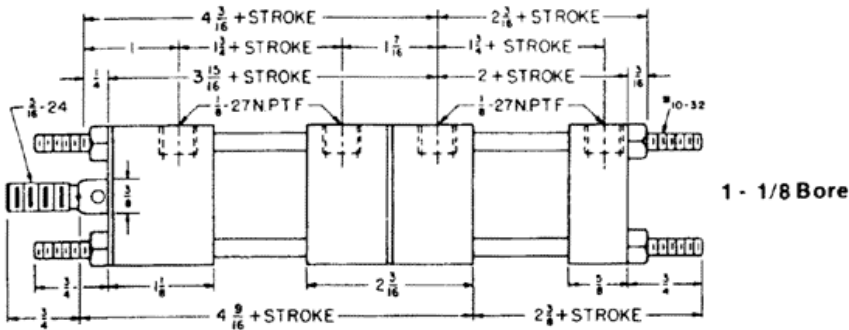
BORE SIZE	E	EA	R	RF	TF	UF
3/4	1 - 1/8	.568 .588	25/32	5/8	1 - 5/8	2 - 1/8
1 - 1/8	1 - 1/2	.740 .760	1 - 1/8	1	2	2 - 1/2

MIDGET CYLINDERS

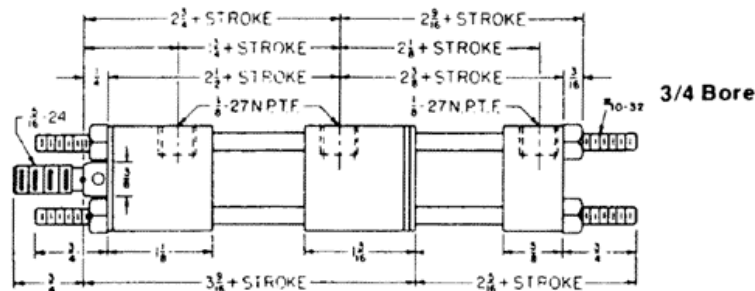
3/4 & 1 - 1/8 BORE



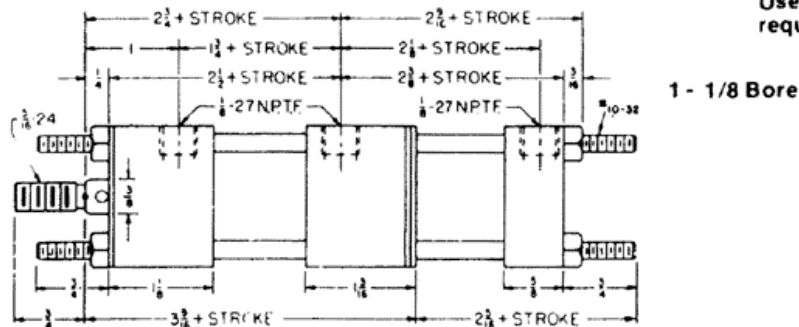
3/4 Bore



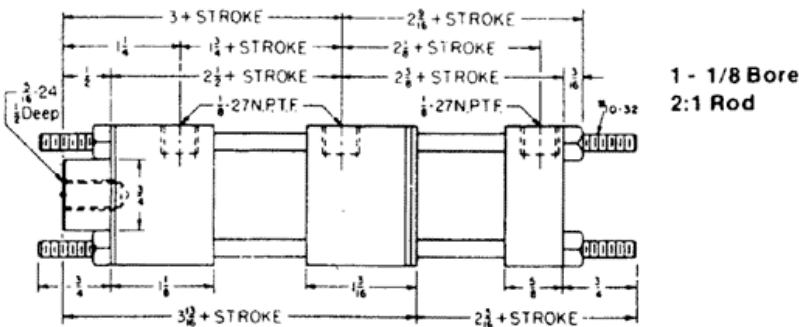
1 - 1/8 Bore



3/4 Bore



1 - 1/8 Bore



1 - 1/8 Bore
2:1 Rod

COMBINATION AIR/OIL CYLINDERS (MARK CA SERIES)

- CA - 110 (Tie Rods Extended Both Ends)
- CA - 111 (Tie Rods Extended Cap End)
- CA - 112 (Tie Rods Extended Head End)

Medium Duty (Series A) = 200 p.s.i. Air
= 750 p.s.i. Hydraulic

Combination Air/Oil Cylinders are available in all mounting styles.

Use these dimensions as basic, then add the mounting required.

3 POSITION CYLINDERS Mark A3P, L3P, and H3P

Medium Duty (Series A) - 200 p.s.i. Air
Medium Duty (Series L) - 750 p.s.i. Hydraulic
Heavy Duty (Series H) - 2000 p.s.i. Hydraulic

3 Position Cylinders are available in all mounting styles. Use these dimensions as basic, then add the mounting required.

A3P - 110 L3P - 110 H3P - 110	Tie Rods Extended Both Ends
A3P - 111 L3P - 111 H3P - 111	Tie Rods Extended Cap End
A3P - 112 L3P - 112 H3P - 112	Tie Rods Extended Head End

A3P - 115 L3P - 115 H3P - 115	Tie Rods Extended Both Ends
A3P - 116 L3P - 116 H3P - 116	Tie Rods Extended Cap End
A3P - 117 L3P - 117 H3P - 117	Tie Rods Extended Head End

MIDGET CYLINDERS

3/4 & 1 - 1/8 BORE

GENERAL INFORMATION

A word about Rod Gland seepage

When the rod end of a cylinder is open to exhaust or tank, there is usually little or no back pressure to keep the rod gland packer lip tight against the piston rod. A microscopic film of oil can therefore go out on the advancing piston rod. However, on the retract stroke, the rod end is pressurized, and the packing lip is forced against the piston rod to seal it.

Most of the seepage problems come from the sealed rod gland packer scraping the rod clean. The microscopic oil film from the previous advance stroke collects to form a drop of oil.

GUARANTEE

Our products are 100% inspected and tested before shipment. They are guaranteed for 90 days from date of shipment against defects in material or workmanship, when not mis-applied or mis-used. This guarantee is restricted to the replacement of parts or completed product and no allowance will be made for labor or other expense required to repair or replace such defective material, nor shall we be liable for any damages beyond the price of the defective material.

PRICES

Subject to change without notice, but any such price changes shall not apply to orders previously accepted.

DESIGN

We reserve the right to alter specifications and/or dimensions without notice. Any change in current models does not imply that products already in service will be modified to current design.

RETURNED GOODS

No purchases are to be returned after shipment for any reason without prior consent. All returns are subject to a handling charge which is to cover the cost of handling, disassembly, inspection, rework where applicable, restocking and record work.

Complete cylinders are not stocked as units, but are assembled from stocked components. Return shipping charges shall be prepaid.

OPERATING TEMPERATURES

Control Line cylinders will operate satisfactorily at ambient temperature from 40° F to 180° F, and intermittent temperatures (1 minute out of 5 minutes) up to 200° F. For operating temperatures above or below this range, please consult our factory.

OPERATING PRESSURES

Control Line cylinders will give good service with ample safety factor in the pressure ranges specified. On hydraulic service, our guarantee is void if there is evidence of surge pressures which would exceed the safety factor at the pressure for which the cylinder was intended.

OPERATING MEDIUM

Unless otherwise specified; Buna N packings will be furnished for mineral oil base hydraulic fluids and for air. If you use phosphate ester base hydraulic fluid or any medium which is not compatible with Buna N Compound, please specify.

TO OBTAIN ALL THE BENEFITS FROM YOUR CYLINDERS

- (1) When a cylinder is stored for future use, be sure it is amply lubricated, particularly inside the tube and on the piston rod, as packings will tend to adhere to dry metal surfaces over extended storage.
- (2) A cylinder is NOT a structural unit nor a machine member. It is designed for one purpose only – to push and pull. It is not designed to be a guide or a machine way.
- (3) Please be sure your alignment between the work and the piston rod at both ends of its stroke is faultless. Misalignment will cause mechanical interference and shorten the life of the cylinder.
- (4) Wherever possible, please try to have a maximum of two points of alignment. It is difficult, particularly after servicing, to obtain an identical mounting to the original installation, due to tolerances and allowances on clearance holes, concentricity of threads, etc. When more than two points of alignment are encountered, your problems multiply. If you use a rigidly mounted cylinder (Foot, Flange) plan to allow some "float" to the piston rod end attachment. On Pivot Mounted cylinders (Pivot or Clevis) plan to allow some "float" in the plane at right angles to the piston rod plane.

NOTE: Unless otherwise specified, cylinders will be furnished standard as follows:

- (1) Port locations as shown
- (2) Rod extension and threading as shown
- (3) For temperature service to 180° F

Cylinder components are stocked in stroke length increments of 1". Complete assemblies are not stocked but are made to order promptly from interchangeable parts.

Cylinders will be furnished in fractional stroke lengths, but with the same overall length as the next longer unit inch at no additional charge. A spacer bushing in the rod end of the cylinder will restrict the stroke to your specification. For example, a 1-1/8" stroke cylinder will have the same overall length as a 2" stroke cylinder, but the piston rod travel will be limited to 1-1/8" from its retracted position. If you require this spacer bushing on the blind end of the cylinder to limit the "IN" stroke please specify, as this is not standard, but is available at no extra charge. If you require that the cylinder overall length be reduced to match a fractional stroke, an extra charge is added.

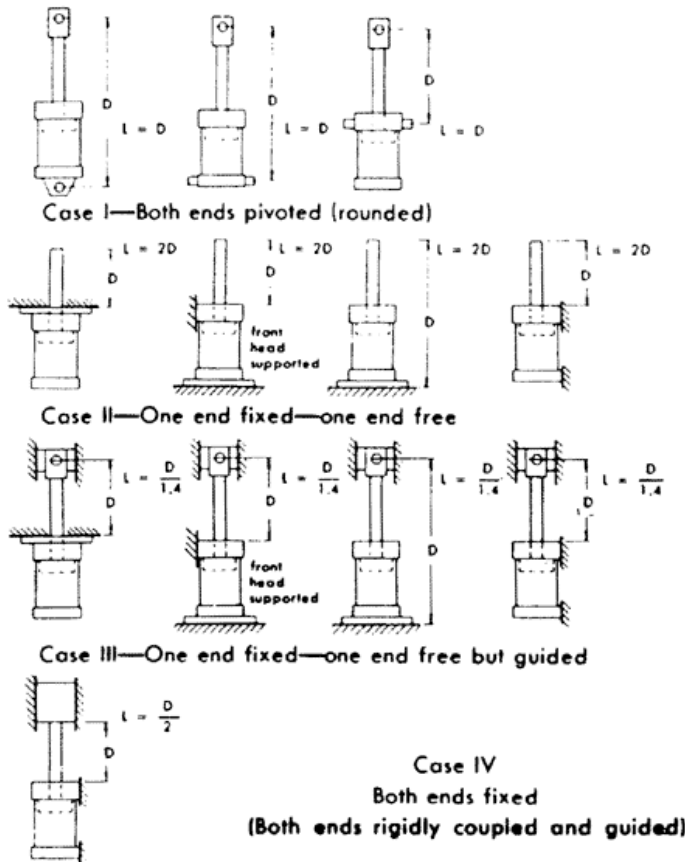
CAPACITY CHART

Force at Following Pressures – Neglecting Friction		250	500	750	1000	1500	2000
BORE							
3/4	Push	110	220	331	441	662	883
	Pull	82	165	247	330	495	660
1-1/8	Push	248	497	745	994	1491	1988
	Pull · 3/8 rod	220	441	662	883	1325	1767
	Pull · 3/4 rod	138	276	414	552	888	1104

MIDGET CYLINDERS

3/4 & 1 - 1/8 BORE

PISTON ROD
SELECTOR CHART



THE PISTON ROD in a cylinder acts as a column and, as such, is subjected not only to compressive stresses, but also buckling stresses which are a function of the moment of inertia for a constant modulus of elasticity. The "column strength" of a piston rod cannot be increased by using higher tensile strength or heat treated materials. For this reason, it is sometimes necessary to use an oversize piston rod strictly for the purpose of achieving the necessary "column strength."

The data shown in chart form is based on Euler's equation for a vertical column with both ends rounded (see Case I illustration). The values of "L" shown in the chart are approximately one-half of the theoretical limit of "L" as determined by this equation.

Factors such as vertical or horizontal mounting, shock or non-shock loading, frequency of operation, etc. should be taken into consideration in selecting a permissible value of "L." The values shown indicate our recommended maximum "column lengths" for the various piston rods under specified compressive loads and may be considered safe for most normal cylinder applications, both horizontal and vertical. Deviations from these recommendations are, of course, a matter of engineering judgment based on a knowledge of the application. In some vertical applications, it may be possible to use values of "L" one-third greater than those on the chart shown. On the other hand, for a long stroke, horizontally mounted cylinder subjected to shock-loading, it may be desirable to decrease the value of "L" by one-third.

To determine the proper piston rod diameter for your application, proceed as follows:

1. Determine the maximum thrust required in your application.
2. Identify your installation with one of those illustrated as Case I, II, III or IV.
3. Determine the recommended stop tube length, if one is required. (See "stop tubes" below.)
4. Determine the value of "L" for your installation with the piston rod in the fully extended position.
5. Now, referring to the chart, select the thrust figure that equals or exceeds your requirements.
6. Scan to the right on the chart until the value of "L" equals or exceeds the "L" dimension on your cylinder installation.

STOP TUBES—The function of a stop tube is to act as a spacer to increase the distance between the piston and piston rod bearing when the piston rod is in its fully extended position. This increase in spacing serves to reduce bearing loads and, at the same time, increases the structural rigidity of the assembly to prevent buckling and jack-knifing.

A stop tube is recommended for cylinders mounted as shown in Cases I and II whenever "L" exceeds 40". Use 1" of stop tube for every 10" over the basic 40" value of "L." In case of fractions, always go to the next full inch. For example, if "L" = 83", the stop tube length would become 5". Cylinders mounted as those shown in Cases III and IV do not normally require stop tubes, but the decision should be based on the factors involved in the particular application under consideration.

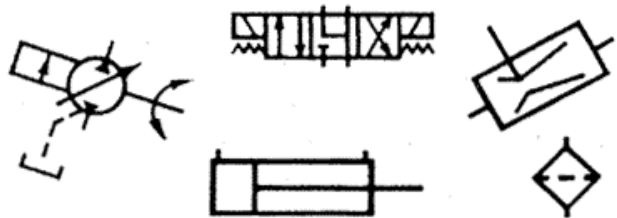
VALUE OF "L" IN INCHES

PISTON ROD DIA.	THRUST IN POUNDS																		
	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200	1400	1600	1800	2000
3/8	26	22	19	17	15	14	13	13	12	11	10	9	9	8	8	7	7	6	6
3/4	107	88	76	68	62	58	54	51	48	44	41	38	36	34	31	29	27	25	24

CYLINDER & MOUNTING BRACKET WEIGHTS (Base-Zero Stroke)

BORE SIZE	MARK A,L&H-110	MARK A,L&H-130	MARK A,L&H-330	MARK TRA,TRL,TRH-110	MARK A,L&H-115	Add per Inch Stroke
	A,L&H-111	A,L&H-230	A,L&H-430	CA-110	A,L&H-116	
3/4	10 oz.	13 oz.	11 oz.	15 oz.	22 oz.	2 oz.
1-1/8	15 oz.	20 oz.	16 oz.	21 oz.	22 oz.	2 oz.

Base Pivot 1 oz.
Base Clevis 1 oz.
Rod Eye 3 oz.
Rod Clevis 3 oz.



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