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 re-packing. 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 breakaway. Optional packers are available for high temperature and phosphate ester service.

180 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

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<thead>
<tr>
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<td>Both Ends</td>
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<tr>
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<td>111</td>
<td></td>
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<tr>
<td>H - 110</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>A - 111</td>
<td>112</td>
<td>Gap (Blind) End</td>
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<td>H - 111</td>
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<td>A - 130</td>
<td>110</td>
<td>Tie Rods Extended</td>
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<td>L - 130</td>
<td>110</td>
<td>Head (Rod) End</td>
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<td>110</td>
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<td>L - 230</td>
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<td>H - 230</td>
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<tr>
<td>A - 330</td>
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<tr>
<td>L - 330</td>
<td>112</td>
<td></td>
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<tr>
<td>H - 330</td>
<td>112</td>
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TRJ/TRL - 110
Mark TRH - 110 Tie Rods Extended
Both Ends

TRJ/TRL - 112
Mark TRH - 112 Tie Rods Extended
Head End

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

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

DIMENSIONS

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<th>RF</th>
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<td>.760</td>
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Page 3
MIDGET CYLINDERS

3/4 & 1 - 1/8 BORE

2:1 DIAMETER
Piston Rod

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<th>Mark A</th>
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<th>Mark H</th>
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<table>
<thead>
<tr>
<th>Tie Rods Extended Both Ends</th>
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</thead>
<tbody>
<tr>
<td>Tie Rods Extended Cap (Blind) End</td>
</tr>
<tr>
<td>Tie Rods Extended Head (Rod) End</td>
</tr>
</tbody>
</table>

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

ROD PIVOT

ROD CLEVIS

BASE PIVOT

BASE CLEVIS

CLEVIS PIN WITH SNAP RINGS (2) NOT SHOWN

CONVERTS FEMALE TO MALE THREAD ON 2:1 RODS

DIMENSIONS

<table>
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<tr>
<th>Bore Size</th>
<th>E</th>
<th>EA</th>
<th>MM</th>
<th>R</th>
<th>RF</th>
<th>TF</th>
<th>UF</th>
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</thead>
<tbody>
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<td>1/2</td>
<td>.740</td>
<td>.760</td>
<td>3/4</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Page 4
MIDGET CYLINDERS

COMBINATION AIR/OIL CYLINDERS (MARK CA SERIES)

3/4 & 1 - 1/8 BORE

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.

1 - 1/8 Bore

3/4 Bore

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.

1 - 1/8 Bore

1 - 1/8 Bore

2:1 Rod

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
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 packing 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 packing 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 expenses 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 100°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 PRESURES
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 brake 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, you 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

<table>
<thead>
<tr>
<th>BORE</th>
<th>Force at Following Pressures — Neglecting Friction</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>250 500 750 1000 1500 2000</td>
</tr>
<tr>
<td>3/4</td>
<td>Push</td>
</tr>
<tr>
<td></td>
<td>110  220 331 441 662 883</td>
</tr>
<tr>
<td></td>
<td>248  497 745 994 1491 1988</td>
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</table>
MIDGET CYLINDERS

3/4 & 1 - 1/8 BORE

PISTON ROD SELECTOR CHART

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 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 9". 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

<table>
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<tr>
<th>PISTON ROD DIA.</th>
<th>THROTTLED</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
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<th>450</th>
<th>500</th>
<th>600</th>
<th>700</th>
<th>800</th>
<th>900</th>
<th>1000</th>
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<th>1400</th>
<th>1600</th>
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<td>17</td>
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<tr>
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CYLINDER & MOUNTING BRACKET WEIGHTS (Base-Zero Stroke)

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<tbody>
<tr>
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<td>11 oz.</td>
<td>15 oz.</td>
<td>18 oz.</td>
<td>22 oz.</td>
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<td>2 oz.</td>
<td>2 oz.</td>
<td>3 oz.</td>
<td>3 oz.</td>
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<td>2 oz.</td>
</tr>
<tr>
<td>1-1/8</td>
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<td>11 oz.</td>
<td>15 oz.</td>
<td>18 oz.</td>
<td>22 oz.</td>
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Page 7