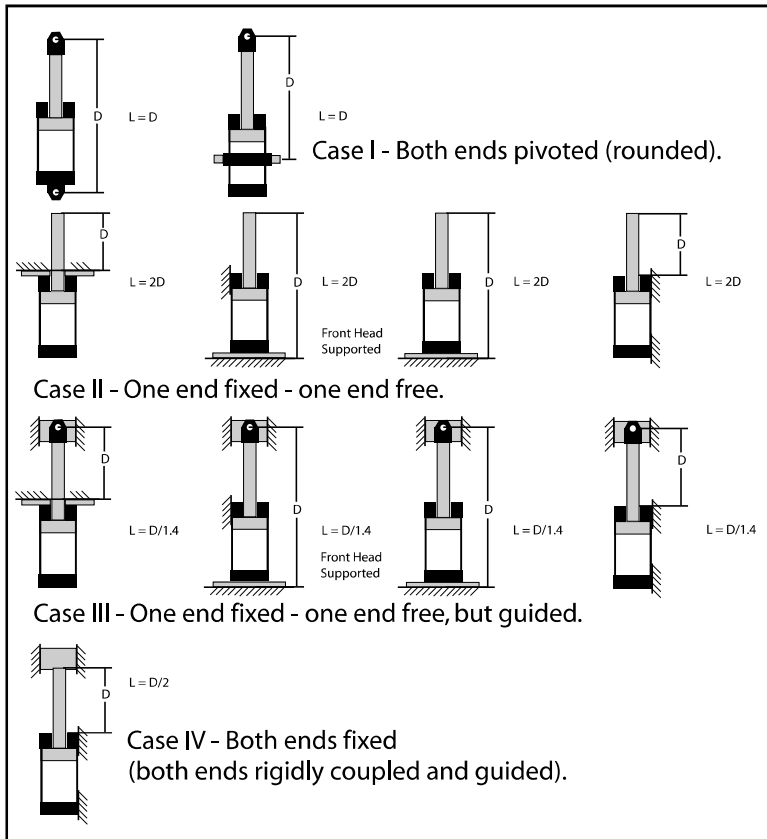


**101 SERIES ROUNDLINE  
PNEUMATIC AND HYDRAULIC CYLINDERS ..... 7**



# Series 101 Piston Rod Selector Chart

## VALUES OF "L" IN INCHES



THRUST LOAD IN LBS.	Piston Rod Diameters					
	3/4	1	1 1/4	1 1/2	1 3/4	2 1/4
100	107	191				
150	87	156				
200	75	135				
250	67	121				
300	61	110	171	247	334	
350	57	102	159	229	312	
400	53	96	148	214	292	
450	50	90	140	202	275	
500	47	86	133	191	261	
600	43	79	121	175	239	
700	40	72	112	162	221	
800	37	68	105	151	207	
900	35	64	99	142	195	
1000	33	61	94	135	187	305
1200	30	55	85	123	169	278
1400	28	51	74	114	156	257
1600	26	48	74	107	146	241
1800	25	45	70	101	138	227
2000	23	43	66	95	131	215
2200	22	41	63	91	125	205
2600	21	38	58	84	115	189
3000	19	35	54	78	107	176
3500	18	32	50	72	99	163
4000	16	30	47	67	93	152
5000	15	27	42	60	83	136
6000	13	25	38	55	76	124
7000	12	23	35	51	70	115
8000	11	22	33	47	66	107
9000		20	31	45	62	101
10000		19	29	42	59	96
12500		17	26	38	52	86
15000		16	24	35	48	78
17500		14	22	32	44	72
20000		13	21	30	42	68
25000		12	18	27	37	61
30000			17	24	34	55
40000				21	29	48
50000				19	26	43
60000					24	39
80000						34

**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

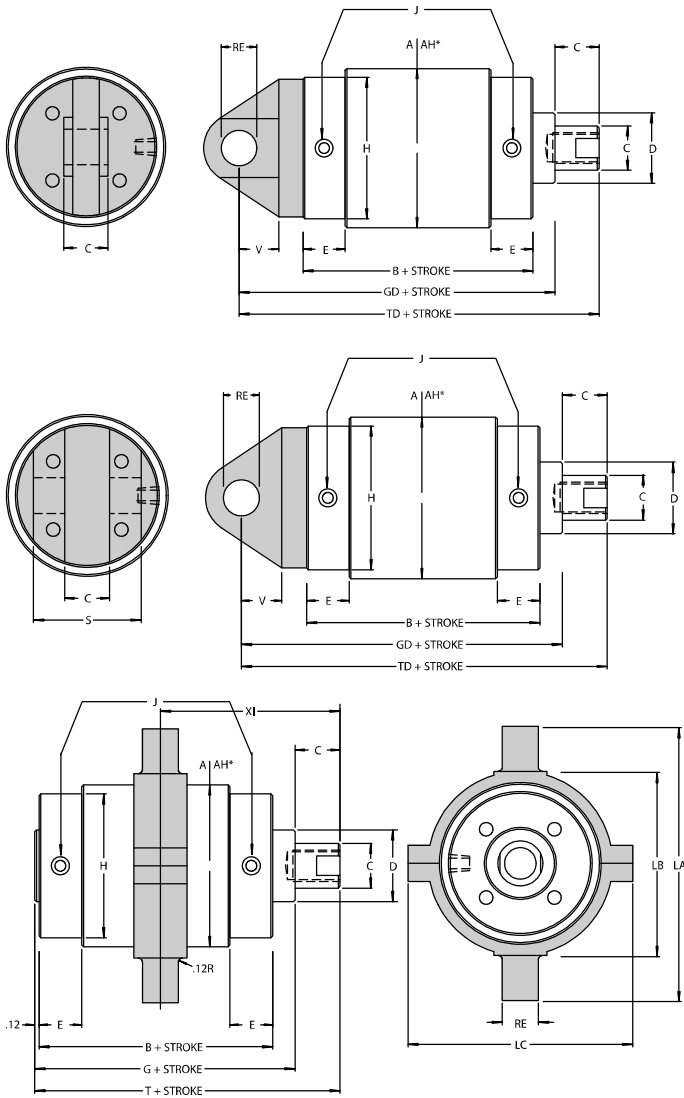
use values of "L" one-third greater than those on the chart shown. On the other hand, for a long stroke, horizontally mounted cylinder subjected to shock loading, it may be desirable to decrease the value of "L" by one-third.

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

1. Determine the maximum thrust required for 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.
7. In some cases the recommended piston rod diameter may exceed that of the piston rod available for the cylinder under consideration. If this happens, it may be necessary to use a larger bore cylinder, operating at a reduced pressure, in order to obtain the required column strength.

# Series 101

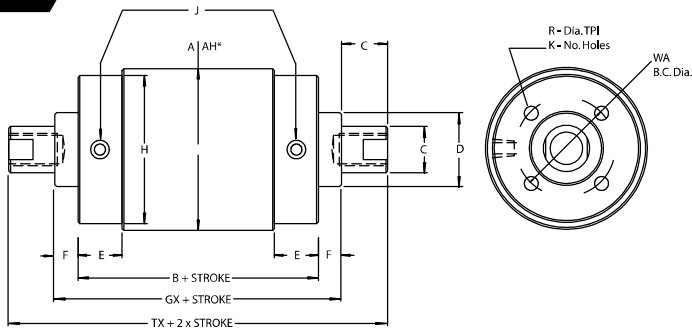
## Roundline Pneumatic and Hydraulic Light and Heavy Duty



BORE	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	
A	1 7/8	2 3/8	2 7/8	3 3/8	3 7/8	4 3/8	5 1/2	6 1/2	8 3/4	
AH*	2	2 1/2	3	3 1/2	4	4 1/2	5 3/4	6 3/4	9	
C	3/4	3/4	1	1	1 1/4	1 1/4	1 1/2	1 3/4	2 1/4	
D	1 3/8	1 3/8	1 3/4	1 3/4	2	2	2 5/8	3	4 1/2	
E	3/4	15/16	15/16	15/16	1 3/16	1 3/16	1 1/2	1 1/2	1 1/2	
F	1/2	1/2	9/16	9/16	5/8	5/8	3/4	3/4	13/16	
H	2 1/4	2 1/4	3	3	3 1/2	4	5	6	8	
(NPTF)										
J	1/4	3/8	3/8	3/8	1/2	1/2	3/4	3/4	3/4	
K	4	4	4	4	4	4	4	8	8	
L	5/8	5/8	7/8	7/8	1 1/8	1 1/8	1 3/8	1 1/2	2	
LA	3 3/4	3 13/16	5 1/8	5 11/16	7 1/16	7 5/8	9 1/16	11 7/16	14 7/8	
LB	2	2 1/16	3 1/4	3 13/16	4 9/16	5 1/8	6 5/16	7 11/16	10 13/16	
LC	2 7/8	3 1/16	4 1/4	4 13/16	5 11/16	6 1/4	7 11/16	9 3/16	11 15/16	
M	1/2-20	1/2-20	3/4-16	3/4-16	7/8-14	7/8-14	1-14	1 1/4-12	1 1/2-12	
N	3/4	3/4	1 1/8	1 1/8	1 5/16	1 5/16	1 1/2	1 7/8	2 1/4	
O	1 1/2	1 1/2	2	2	2 1/2	2 1/2	3	3 1/2	4 1/2	
P	5/8-18	5/8-18	7/8-14	7/8-14	1 1/8-12	1 1/8-12	1 3/8-12	1 1/2-12	2-12	
R	10-32	10-32	5/16-24	5/16-24	3/8-24	3/8-24	7/16-20	3/8-24	1/2-20	
RE	1/2	1/2	3/4	3/4	1	1	1 1/8	1 1/2	1 7/8	
S	1 3/4	1 3/4	2 1/4	2 1/4	3	3	3 3/8	5	4 1/2	
V	5/8	5/8	7/8	7/8	1 1/8	1 1/8	1 1/4	1 5/8	2	
W	1 13/16	1 13/16	2 5/16	2 5/16	2 11/16	2 11/16	3 1/2	4 1/4	6	
XI Min	2 13/16	3 3/8	3 9/16	3 9/16	4 1/4	4 1/4	5	5 9/16	6 3/8	
ADD STROKE	B	3 15/16	4 7/16	4 11/16	4 11/16	5 1/2	5 1/2	6 1/4	6 5/8	7 1/16
	G	4 9/16	5 3/16	5 3/8	5 3/8	6 1/4	6 1/4	7 1/8	7 1/2	8
	GD	5 1/2	6 1/8	6 5/8	6 5/8	7 15/16	7 15/16	8 7/8	9 9/16	10 9/16
	GX	4 15/16	5 9/16	5 13/16	5 13/16	6 3/4	6 3/4	7 3/4	8 3/8	8 11/16
	T	5 5/16	5 15/16	6 3/8	6 3/8	7 1/2	7 1/2	8 5/8	9 1/4	10 1/4
	TD	6 1/4	6 7/8	7 5/8	7 5/8	9 1/16	9 1/16	10 3/8	11 5/16	12 13/16
ADD 2X STROKE	XI Max	3 5/8	3 15/16	4 1/4	4 1/4	5	5	5 3/4	6 1/16	6 13/16
	TX	6 7/16	7 1/16	7 13/16	7 13/16	9 1/4	9 1/4	10 3/4	11 5/8	13 13/16

\*Heavy Duty Only

### Series 101 Section 7

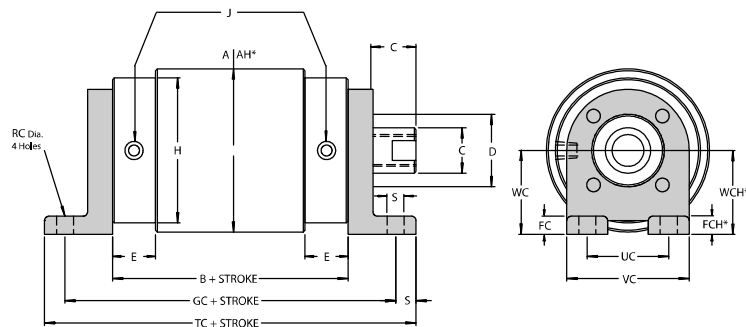
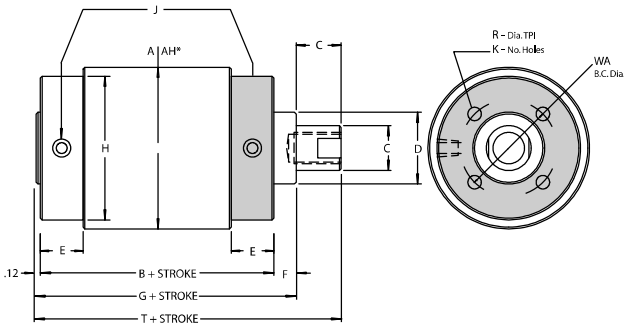
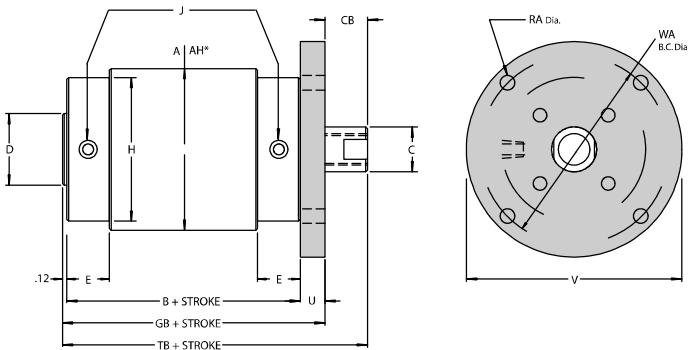
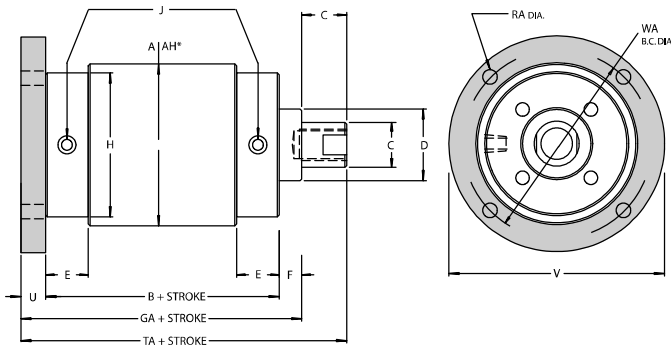


NOTE: The cylinder drawings shown are for reference only and are not to scale. The dimension charts must be used for design purposes.

# Series 101

## Roundline Pneumatic and Hydraulic

### Light and Heavy Duty

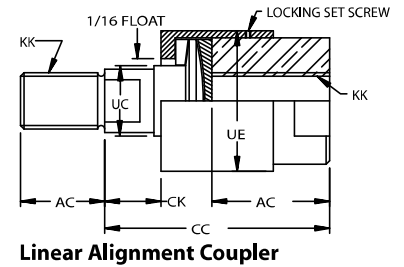
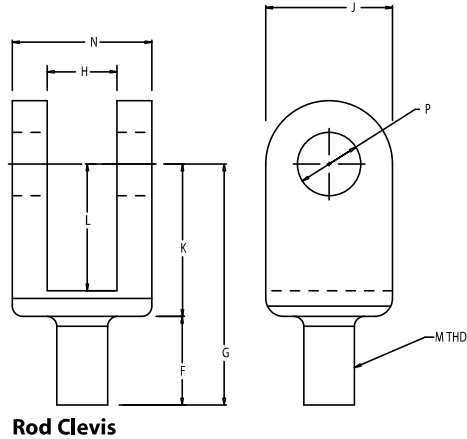
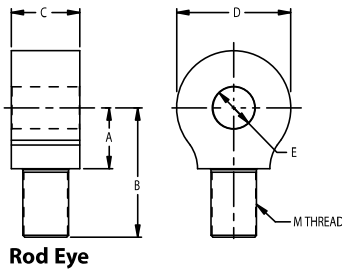


BORE	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	
A	1 7/8	2 3/8	2 7/8	3 3/8	3 7/8	4 3/8	5 1/2	6 1/2	8 3/4	
AH*	2	2 1/2	3	3 1/2	4	4 1/2	5 3/4	6 3/4	9	
C	3/4	3/4	1	1	1 1/4	1 1/4	1 1/2	1 3/4	2 1/4	
CB	1 1/16	1 1/16	1 5/16	1 5/16	1 3/16	1 3/16	1 7/16	1 11/16	2 3/16	
D	1 3/8	1 3/8	1 3/4	1 3/4	2	2	2 5/8	3	4 1/2	
E	3/4	1 5/16	1 5/16	1 5/16	1 3/16	1 3/16	1 1/2	1 1/2	1 1/2	
F	1/2	1/2	9/16	9/16	5/8	5/8	3/4	3/4	1 3/16	
FC	3/8	3/8	7/16	7/16	1/2	1/2	5/8	3/4	1 1/8	
FCH*	3/8	3/8	7/16	7/16	1/2	1/2	3/4	7/8	1 1/4	
H	2 1/4	2 1/4	3	3	3 1/2	4	5	6	8	
(NPTF)										
J	1/4	3/8	3/8	3/8	1/2	1/2	3/4	3/4	3/4	
K	4	4	4	4	4	4	4	8	8	
L	5/8	5/8	7/8	7/8	1 1/8	1 1/8	1 3/8	1 1/2	2	
M	1/2-20	1/2-20	3/4-16	3/4-16	7/8-14	7/8-14	1-14	1 1/4-12	1 1/2-12	
N	3/4	3/4	1 1/8	1 1/8	1 5/16	1 5/16	1 1/2	1 7/8	2 1/4	
O	1 1/2	1 1/2	2	2	2 1/2	2 1/2	3	3 1/2	4 1/2	
P	5/8-18	5/8-18	7/8-14	7/8-14	1 1/8-12	1 1/8-12	1 3/8-12	1 1/2-12	2-12	
R	10-32	10-32	5/16-24	5/16-24	3/8-24	3/8-24	7/16-20	3/8-24	1/2-20	
RA	9/32	9/32	11/32	11/32	13/32	13/32	17/32	21/32	25/32	
RC	9/32	9/32	13/32	13/32	15/32	15/32	17/32	21/32	25/32	
S	3/8	3/8	1/2	1/2	9/16	9/16	13/16	15/16	1 5/16	
U	9/16	9/16	5/8	5/8	11/16	11/16	13/16	13/16	7/8	
UC	1 1/2	1 1/2	1 7/8	1 7/8	2 1/4	2 1/4	3 1/8	3 7/8	5 5/8	
V	3 1/2	3 1/2	4 3/4	4 3/4	6	6	7 5/8	9	11 1/2	
VC	2 1/4	2 1/4	2 7/8	2 7/8	3 3/8	3 3/8	4 3/8	5 3/8	7 3/8	
W	1 13/16	1 13/16	2 5/16	2 5/16	2 11/16	2 11/16	3 1/2	4 1/4	6	
WA	2 7/8	2 7/8	4 1/16	4 1/16	5 1/4	5 1/4	6 5/8	7 3/4	10	
WC	1 5/16	1 5/16	1 13/16	1 13/16	2 5/16	2 5/16	2 13/16	3 5/16	4 7/16	
WCH*	1 5/16	1 5/16	1 13/16	1 13/16	2 5/16	2 5/16	2 15/16	3 7/16	4 9/16	
ADD STROKE	B	3 15/16	4 7/16	4 11/16	4 11/16	5 1/2	5 1/2	6 1/4	6 5/8	7 1/16
	G	4 9/16	5 3/16	5 3/8	5 3/8	6 1/4	6 1/4	7 1/8	7 1/2	8
	GA	5	5 5/8	5 7/8	5 7/8	6 13/16	6 13/16	7 13/16	8 3/16	8 3/4
	GB	4 5/8	5 1/4	5 7/16	5 7/16	6 5/16	6 5/16	7 3/16	7 9/16	8 1/16
	GC	5 11/16	6 5/16	6 13/16	6 13/16	8 1/8	8 1/8	9 1/8	9 3/4	10 9/16
	T	5 5/16	5 15/16	6 3/8	6 3/8	7 1/2	7 1/2	8 5/8	9 1/4	10 1/4
	TA	5 3/4	6 3/8	6 7/8	6 7/8	8 1/16	8 1/16	9 5/16	9 15/16	11
TB	5 5/16	5 15/16	6 3/8	6 3/8	7 1/2	7 1/2	8 5/8	9 1/4	10 1/4	
TC	6 7/16	7 1/16	7 13/16	7 13/16	9 1/4	9 1/4	10 3/8	11 1/4	12 5/16	

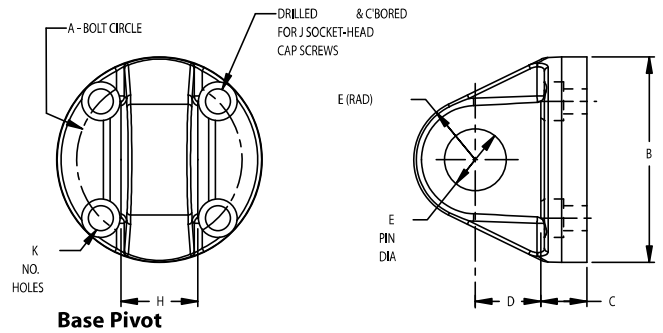
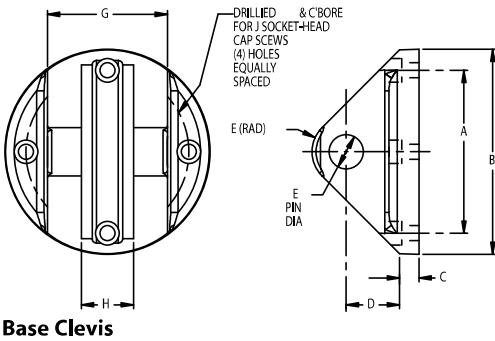
\*Heavy Duty Only

- NOTES:
1. Cushions, on the 1.50 Bore cylinders only are non-adjustable.
  2. Suffix "h" is used for heavy duty cylinders only.
  3. For pressure rating, see page 9.
  4. For accessories see page 150
  5. For seal kits see page 23.

# Series 101 Accessories



BORE	TH'D M	PART NO.	A	B	C	D	E	PART NO.		F	G	H	J	K	L	N	P	PART NO.	Q	R	S	T	
								CLEVIS	PIN														
1½ & 2	½-20	5679	⅝	1⅜	¾	1⅜	½	5012	52559-1	¾	2⅜	11/16	1¼	11/16	1⅜	5/8	526301-08	¾	2	1/2	1¼		
2½ & 3	¾-16	5680	⅞	2	1	115/16	¾	5013	52561-1	1⅞	3⅝	15/16	1¾	2½	2	1⅞	7/8	526301-12	1⅞	25/16	1/2	1¾	
3½ & 4	7/8-14	5681	1⅞	27/16	1¼	2	1	5014	52563-1	15/16	47/16	11/16	2	3⅞	2½	2⅞	1	526301-14	1⅞	25/16	1/2	1¾	
5	1-14	5682	1¼	2¾	1½	2¼	1⅞	5015	52564-1	1½	3¾	1½	2¼	2¼	1⅜	3⅞	1⅞	526301-16	1⅞	215/16	17/32	2½	
6	1¼-12	5683	1⅝	3½	1¾	3	1½	5016	52565-1	1⅞	43/16	1¾	3	215/16	1¾	3⅞	1½	526301-20	1⅞	215/16	17/32	2½	
8	1½-12	5684	2	4¼	2¼	3¾	1⅞	5017	52567-1	2¼	5⅞	2¼	3¾	3⅞	2⅞	4¾	1⅞	526301-24	2¼	4¾	7/8	3¼	



BORE	PART NO.		A	B	C	D	E	F	G	H	J	BORE	PART NO.		A	B	C	D	E	F	H	J	K
	BASE CLEVIS	PIN											BASE PIVOT	PIN									
1½ & 2	54472	52558-1	2⅜	3	1/2	¾	1/2	2¼	1¼	¾	5/16	1½ & 2	54458	52558-1	113/16	2¼	7/16	5/8	1/2	2¼	¾	#10	4
2½ & 3	54474	52560-1	3	3¾	5/8	1	¾	213/16	2¼	1	3/8	2½ & 3	54460	52560-1	25/16	2⅞	1/2	7/8	¾	213/16	1	5/16	4
3½ & 4	54476	52562-1	4	5	11/16	1¼	1	3⅞	3	1¼	3/8	3½ & 4	54462	52562-1	211/16	3⅞	11/16	1⅞	1	35/8	1¼	3/8	4
5	54478	52564-1	45/8	57/8	13/16	1⅞	1⅞	315/16	3⅞	1½	1/2	5	54464	52564-1	3½	4⅞	5/8	1¼	1⅞	315/16	1½	7/16	4
6	54480	52565-1	5⅞	63/8	13/16	1¾	1½	416	37/8	1¾	5/8	6	54466	52566-1	4¼	5⅞	9/16	15/8	1½	59/16	1¾	3/8	8
8	54482	52567-1	6¼	7¾	7/8	2⅞	17/8	516	4¾	2¼	3/4	8	54468	52567-1	6	7⅞	11/16	2	17/8	55/16	2¼	1/2	8

**Series 101  
Section 7**

# Series 101

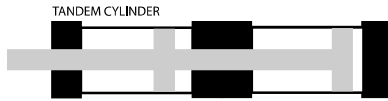
## 101 Cylinder Options

### Cylinder Construction

Ortman fluid power offers a number of variations in cylinder construction. Descriptions of the more common variation are described below, however Ortman's engineering staff is capable of designing many more special applications at your request.

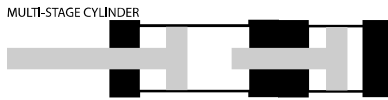
### Tandem Cylinders

Tandem cylinders are a combination of two cylinders of the same stroke length used in tandem to double cylinder force output. The pistons between the two cylinders are connected with a common rod. For proper results cylinders in the tandem arrangement should be energized simultaneously.



### Multi-stage Cylinders

Multi-stage cylinders combine multiple cylinders at different stroke lengths. Piston rods between the cylinders are not connected. This allows each cylinder to be energized independently in sequence to produce multiple stroke levels out of the foremost cylinder.



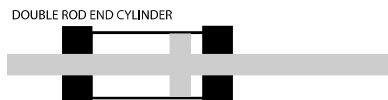
### Duplex Cylinders

Duplex cylinders are two independent cylinders combined together back-to-back. Duplex cylinders share common tie rods.



### Double Rod End Cylinders

Double rod end cylinders have two rods exiting at either end of the cylinder attached to a single piston. The advantage of double rod end cylinders is that they produce equal force and equal speed in either direction, while performing two operations with one stroke.



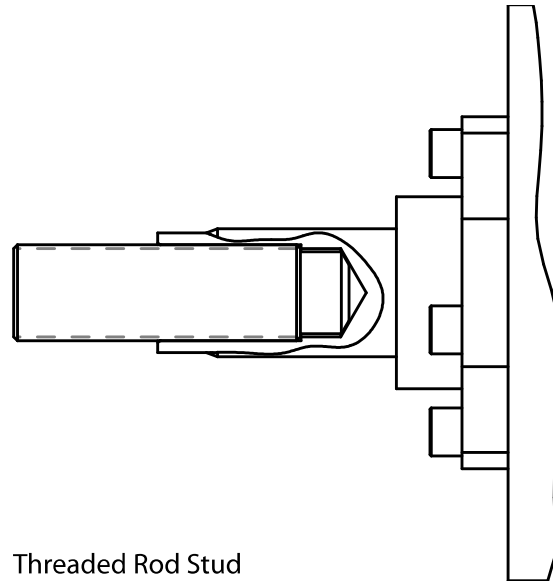
## Other 101 Options

### Metallic Rod Scrapers

Metallic rod scrapers should be used in place of synthetic wiper seals in applications where contaminants may cling or stick to the extended piston rod. Metallic rod scrapers are available upon request.

### Stainless Steel Piston Rods

In applications where the piston rod may be subjected to water, special wash-downs, or weather, stainless steel piston rods should be considered. Ortman stocks, but is not limited to, 303 and 17-4 ph stainless steel rod stock. Other commonly used stainless materials, such as 304 and 316, are available upon request.



Threaded Rod Stud

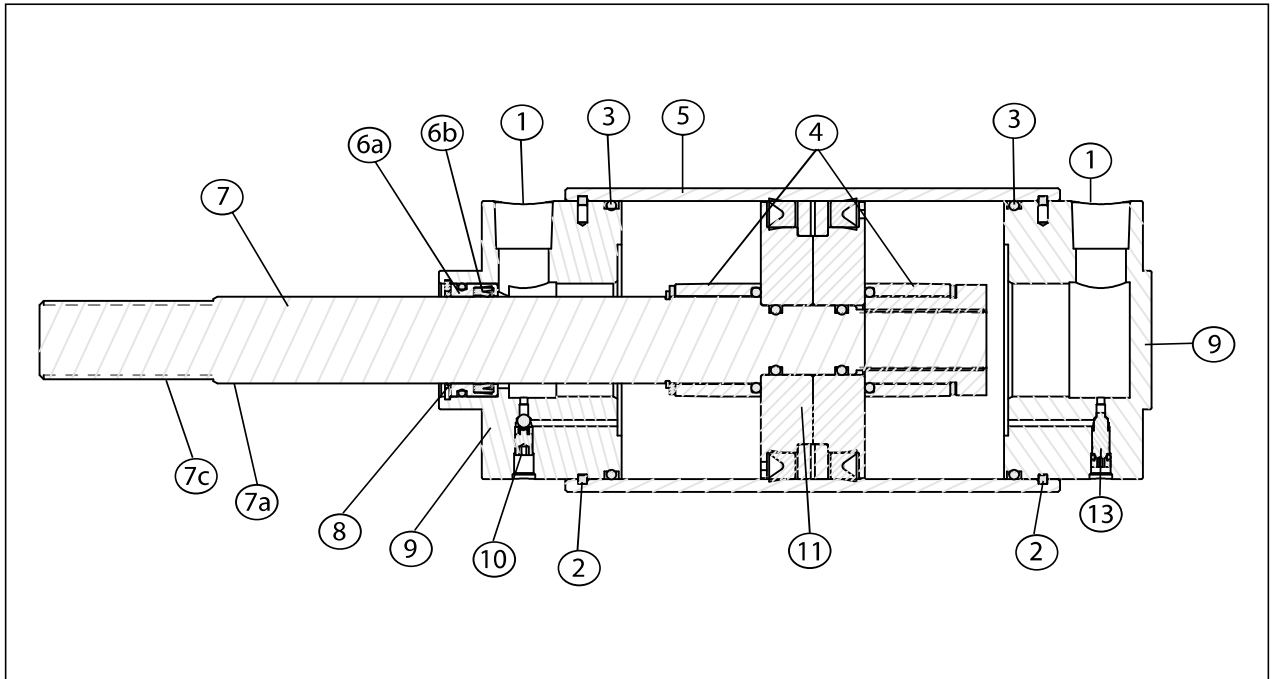
### Studded Rod Ends

Ortman offers studded rod ends for applications held in high tension where it may be possible to break or shear standard machined rod ends. For rod sizes  $\frac{5}{8}$ " to 2" in, a rolled thread stud can be threaded into a standard female rod end. Studded rod ends offer higher resistance to thread shear and are more economical to replace in case of fracture.

### Plated Finishes and Coatings

Ortman fluid power are also available in a number of plated finishes, such as NiCoTef®, Electroless Nickel, Flash Chrome, and Cad plating. Additionally we are prepared to handle most primer, paint and epoxy coating requirements. Contact the sales staff or an authorized distributor near you for details.

# Series 101 Features



**1. Ports**—Large, unrestricted ports permit maximum flow with minimum pressure drop. They can be relocated to any other desired position.

**2. Internal Key**—Made of stainless steel bar allows 360° rotation and quick removal of end covers.

**3. Head and Cap Seals**—Positive sealing synthetic rubber “O” rings seal tube I.D. Non-extrusion rings used for heavy duty cylinders.

**4. Cushions**—Self-aligning, extra long, bronze cushions. Machined to close tolerances provide maximum cushioning effect.

**5. Tubing**—Heavy wall steel is micro-honed to assure smooth operation with minimum friction.

**6. Rod Gland Cartridge**—Bronze bearing is accurately piloted in head to assure perfect alignment. Bearing and rod scraper are held in place by means of a retaining ring.

**a. Rod Bearing**—Bronze material assures minimum friction and wear.

**b. Rod Seal**—Flexible lip type with heavy web polyurethane compound is standard; has excellent abrasion resistance and is wear compensating; assures leak-proof performance and long life.

**7. Piston Rod**—Machined from medium carbon steel with 100,000 psi minimum yield; is hard chrome plated and highly polished.

**a.** Furnished standard with wrench flats, chamfered to protect rod seals during installation.

**b.** Furnished standard with female rod threads.

**c.** Male rod threads optional, at no additional cost.

**8. Rod Scraper**—Metallic; its scraping action prevents any outside matter from entering the cylinder.

**9. Steel Heads**—Are accurately machined to assure perfect alignment of piston rod and cylinder bore.

**10. Check Valve**—Flush type with large drilled passages. Assures full power start of return stroke.

**11. U-Cup Type Piston**—Is standard on all Series “101” cylinders. Flexible lip seals provide positive sealing, low friction and long life. Bronze piston bearing provides maximum support.

**12. SCR Type Piston**—Is optional. Used where long life is required. Metallic piston rings, however, permit a moderate amount of fluid by-pass. They are not recommended for air service.

**13. Cushion Adjusting Needle**—Flush type, also with large drilled passages providing maximum control of cushioning effect.