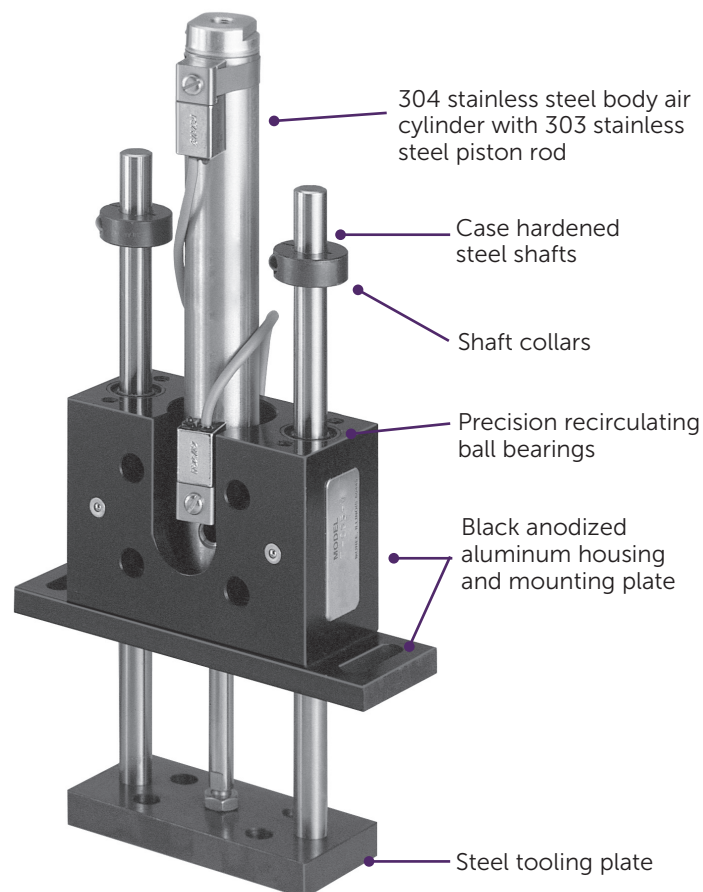
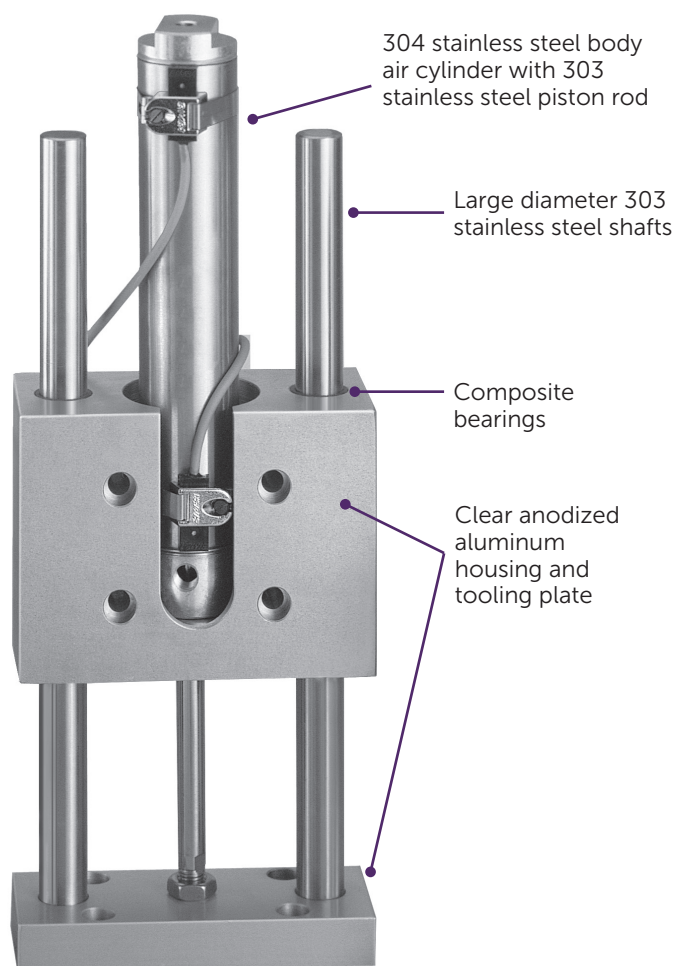


T and TE Series Linear Thrusters



TE Series

- Large diameter stainless steel shafts (hard chrome-plated carbon steel on 2-1/2" and 3" bores).
- Mounting plate and shaft collars optional.
- High-strength composite bearing made of fiber-imbedded plastic.
- Composite bearing may perform better in certain environments (for example, dust or lint).
- Composite bearing/stainless steel shaft combination is ideal for corrosive environments.
- High load capabilities.

T Series

- Less friction
- High precision
- Easily accessible lubrication ports
- Mounting plate and shaft collars standard

Advantages

- IMI Bimba stainless steel body air cylinders for long, reliable life.
- Optional magnetic piston for use with Hall Effect or Magnetic Reed Switches. (Hall Effect Switch not available for 9/16" bore.)
- Optional adjustable cushions for smooth deceleration of load at end of stroke. (Not available for 9/16".)
- Optional internal or external bumpers to absorb shock or adjust stroke.
- Easily accessible ports.
- Choice of TE (composite bearing) and T (ball bearing).

Engineering Data (T-Series Models)

Components:

- Case hardened steel shafts
- Steel tooling plate and collars
- Black anodized aluminum housing and mounting plate
- Precision recirculating ball bearings

Cylinder:

- 304 stainless steel body
- High-strength aluminum alloy porting ends
- 303 stainless steel piston rods
- Buna N “U” cup seals
- Sintered bronze rod guide bushing

Options:

- Internal Buna N or external urethane bumpers
- Patented adjustable cushions*
- Buna N magnet for position sensing

Lubrication:

- The two spring-loaded oiler ports on the housing face should receive several drops of medium to heavy inhibited hydraulic or general purpose oil every 100 hours of operation. For applications that involve rapid cycling, oil these ports more often.

Engineering Data (Multiple Position Models)

Components:

- Case hardened or hard chrome plated carbon steel shafts
- Steel or clear anodized aluminum tooling plate and collars
- Precision recirculating ball bearings or plastic composite

Cylinder:

- 304 stainless steel body
- High-strength aluminum alloy porting ends
- 303 stainless steel piston rods
- Buna N “U” cup seals
- Sintered bronze rod guide bushing

Options:

- Internal Buna N or external urethane bumpers
- Buna N magnet for position sensing

Lubrication:

- Air cylinders are pre-lubricated and sealed at the factory for extensive maintenance-free life. Cylinder life can be lengthened by providing additional lubricant with an air line mist lubricator or direct introduction of oil to the cylinder every 500 hours of operation. Recommended oil is medium to heavy inhibited hydraulic and general purpose oil.
- The two spring-loaded oiler ports on the housing face should also receive several drops of the same oil every 100 hours of operation. For applications that involve rapid cycling, oil these ports more often.
- T-700 series incorporates grease fittings.

Engineering Data (T4 Models)

Components:

- Case hardened steel shafts
- Steel tooling plate and collars
- Black anodized aluminum housing and mounting plate
- Precision recirculating ball bearings

Cylinder:

- 304 stainless steel body
- High-strength aluminum alloy porting ends
- 303 stainless steel piston rods
- Buna N “U” cup seals
- Sintered bronze rod guide bushing

Options:

- Internal Buna N or external urethane bumpers
- Patented adjustable cushions
- Buna N magnet for position sensing

Lubrication:

- Air cylinders are pre-lubricated and sealed at the factory for extensive maintenance-free life. Cylinder life can be lengthened by providing additional lubricant with an air line mist lubricator or direct introduction of oil to the cylinder every 500 hours of operation. Recommended oils are medium to heavy inhibited hydraulic and general purpose oil.
- The two spring-loaded oiler ports on the housing face should also receive several drops of the same oil every 100 hours of operation. For applications that involve rapid cycling, oil these ports more often.

Approximate Weights (T4 Models)

Bore	Base Weight (lbs.)	Adder per 1" (lbs.)
2" (31)	24	0.67
2-1/2" (50)	41	1.16
3" (70)	82.5	1.82

Engineering Data (Movable Housing Models)

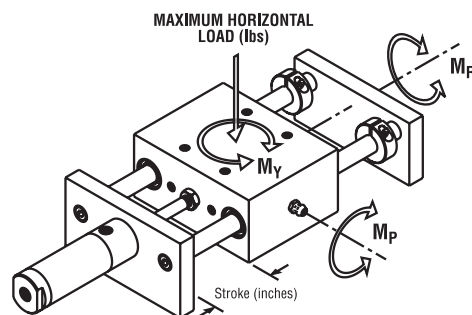
Horizontal and Torsional Load Capacities

The following charts and tables provide loading and deflection data to assist in the sizing of Movable Housing Linear Thrusters. The Capacity tables provide the maximum loading for the thrusters under dynamic and static conditions.

The dynamic capacities are presented as a function of travel life stated in millions of linear inches. As shown by the tables, the travel life is a function of load. Therefore, higher dynamic loads can be applied but will reduce travel life.

The deflection curves shown reflect the theoretical deflections of the guide shafts at mid-stroke.

Example: The 02 bore has a maximum dynamic load capacity of 45 lbs. for a travel life of 200 million inches.



Horizontal Load Capacity

Bore	Max Dynamic Load (lbs)				Max Static Load (lbs)
	Travel Life (x 10 ⁶ inches)				
	50	200	500	1000	
02	71	45	32	26	87
04/09	209	131	96	76	256
17	328	231	169	133	328
31/50	403	259	190	150	403
70	938	579	419	326	1062

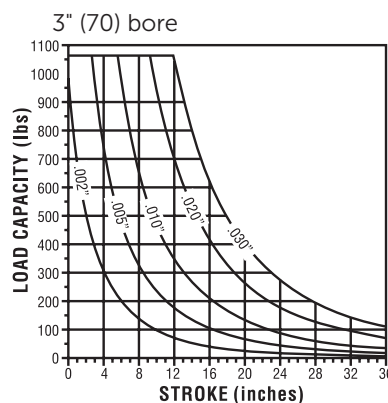
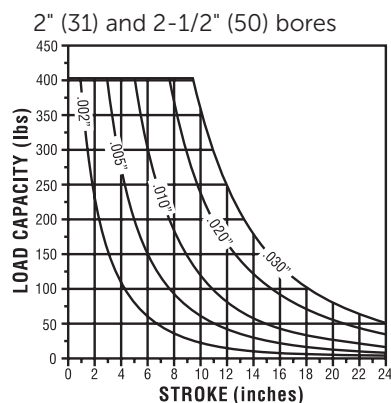
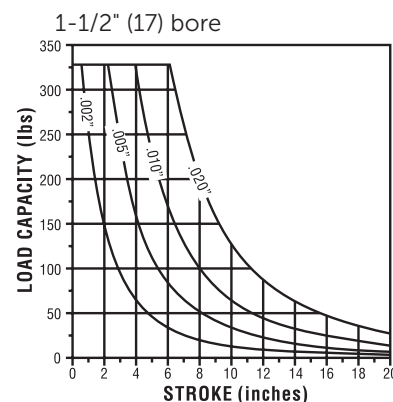
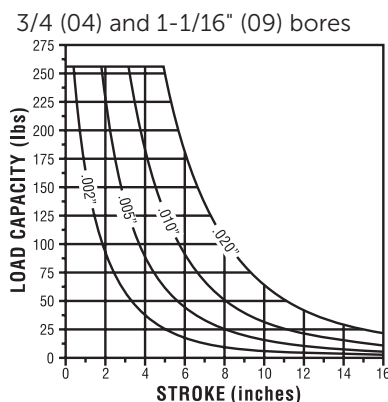
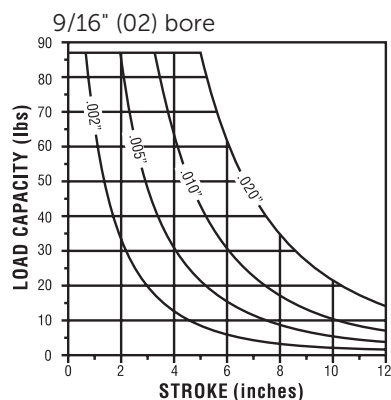
Torque Capacity - M_R

Bore	Max Dynamic Torque (in-lbs)				Max Static Torque (in-lbs)
	Travel Life (x 10 ⁶ inches)				
	50	200	500	1000	
02	68	43	32	25	82
04/09	159	100	74	59	193
17	372	267	196	156	372
31/50	430	279	205	163	430
70	1756	1106	815	647	1952

Torque Capacity - M_P and M_Y

Bore	Max Dynamic Torque (in-lbs)				Max Static Torque (in-lbs)
	Travel Life (x 10 ⁶ inches)				
	50	200	500	1000	
02	77	48	36	28	93
04/09	331	209	154	122	403
17	662	474	349	277	662
31/50	1012	655	483	383	1012
70	3875	2441	1798	1427	4308

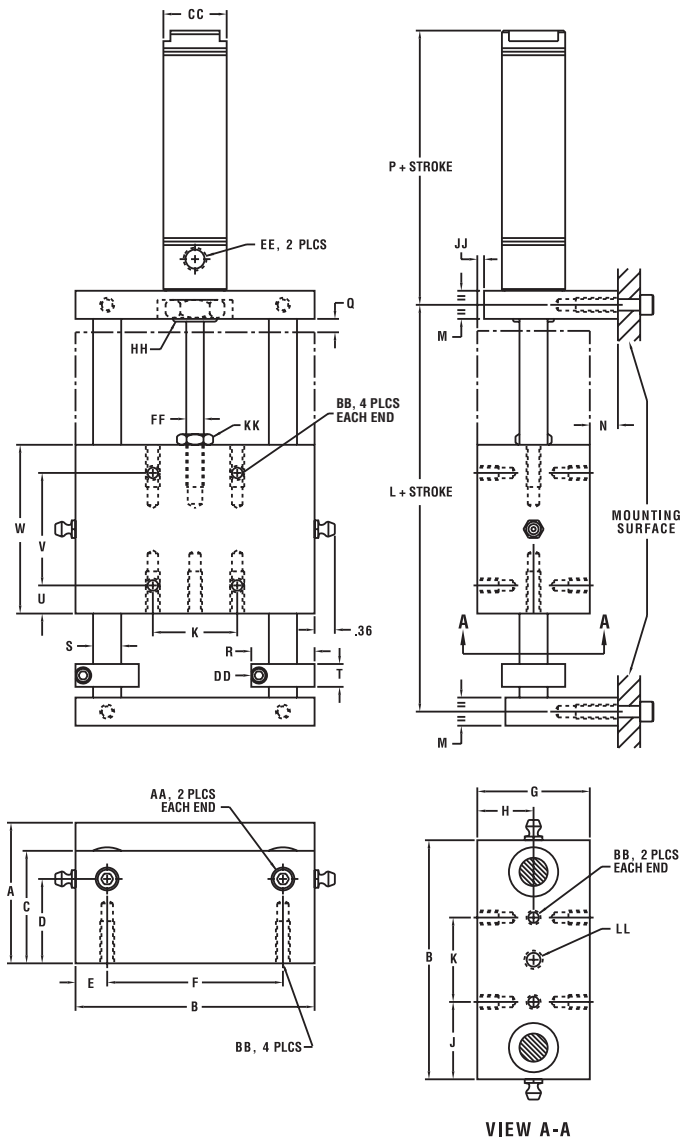
Horizontal Load and Deflection Charts



Approximate Weights

Bore	Base (lbs)	Adder per inch of stroke
02	1.8	0.10
04/09	3.6	0.20
17	8.5	0.29
31/50	12.5	0.42
70	47.5	1.12

Dimensions (Movable Housing Models)



NOTE: All dimensions are in inches.

Bore	9/16"	3/4"	1-1/16"	1-1/2"	2"	2-1/2"	3"
A	1.50	2.50	2.50	3.00	3.50	4.00	5.002
B	3.00	4.25	4.25	5.50	7.00	8.50	11.00
C	1.25	2.00	2.00	2.50	3.00	3.50	4.00
D	0.87	1.50	1.50	1.75	2.00	2.25	2.75
E	0.44	0.56	0.56	0.75	1.00	1.125	1.50
F	2.125	3.125	3.125	4.00	5.00	6.25	8.00
G	1.25	2.00	2.00	2.50	3.00	3.50	4.00
H	0.62	1.00	1.00	1.25	1.50	1.75	2.00
J	1.00	1.38	1.38	1.75	2.00	2.50	3.50
K	1.00	1.50	1.50	2.00	3.00	3.50	4.00
L	4.38	4.63	4.63	6.00	6.50	8.50	11.00
M	0.38	0.50	0.50	0.75	0.75	1.00	1.00
N	0.25	0.50	0.50	0.50	0.50	0.50	0.75
P	2.10	2.72	2.88	3.19	3.88	4.00	4.38
Q	0.21	0.21	0.21	0.38	0.911	0.581	0.51
R	0.87	1.12	1.12	1.31	1.50	1.75	2.06
S	0.375	0.50	0.50	0.625	0.75	1.00	1.25
T	0.34	0.41	0.41	0.44	0.50	0.50	0.50
U	0.50	0.50	0.50	0.75	0.75	1.00	1.00
V	2.00	2.00	2.00	2.50	2.50	4.00	5.00
W	3.00	3.00	3.00	4.00	4.00	6.00	7.00
AA	10-32	1/4-20	1/4-20	3/8-16	3/8-16	1/2-13	1/2-13
BB	10-32	1/4-20	1/4-20	5/16-18	3/8-16	7/16-14	1/2-13
CC	0.62	0.81	1.12	1.56	2.08	2.62	3.16
DD	6-32	8-32	8-32	10-32	1/4-28	1/4-28	1/4-28
EE	10-32	1/8 NPT	1/8 NPT	1/8 NPT	1/4 NPT	1/4 NPT	3/8 NPT
FF	0.188	0.25	0.312	0.437	0.625	0.625	0.75
HH	7/16-20	5/8-18	5/8-18	3/4-16	1-1/4-12	1-3/8-12	1-1/2-12
JJ	0.06	0.12	0.12	0.12	0.12	0.12	-
KK	10-32	1/4-28	5/16-24	7/16-20	1/2-20	1/2-20	5/8-18
LL	1/4-28	5/16-24	1/4-28	1/2-20	5/8-18	5/8-18	1-14

NOTES:

Dimension Q = 0.70 inches for strokes longer than 6 inches.

Dimension shown is to top of cylinder end mounting plate.
Dimension to top of housing is 4.75 inches.

Dimensional Notes:

- Cylinder options Q, C, B will increase the overall length of the cylinder. Dimension P will grow (see charts below).
- When specifying Position Feedback (TMHF or TEMHF), or the IMI Bimba 500 Cylinder (option H), dimension P will increase and the stroke will be reduced.

Contact 1-800-44-IMI Bimba for dimensional information.

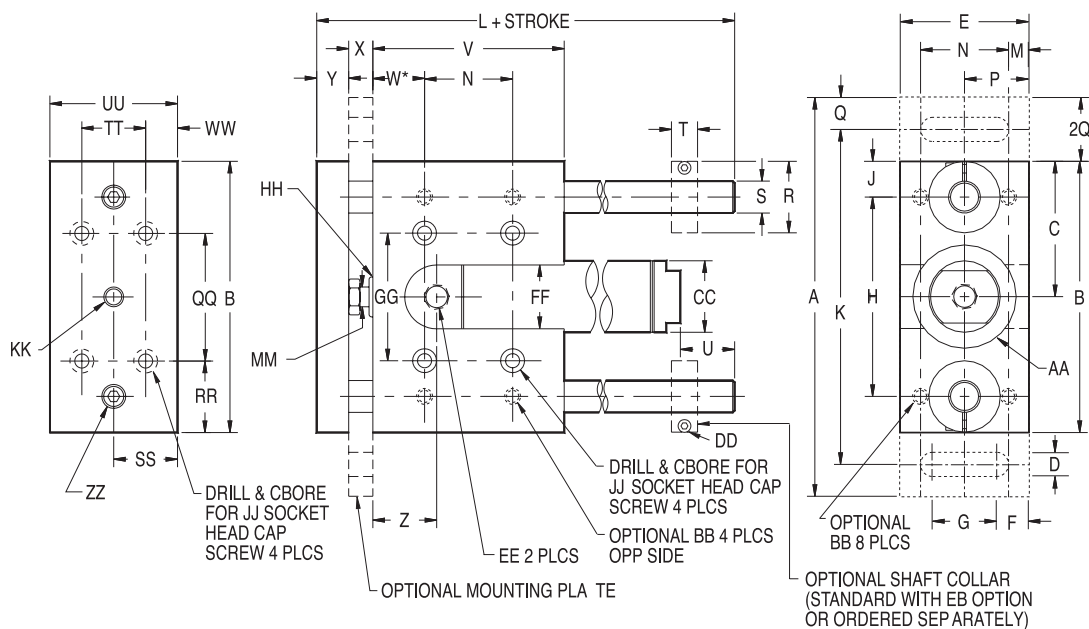
P Dimension Length Adders

Bore	9/16"	3/4"	1-1/16"	1-1/2"	2"	2-1/2"	3"
B-Option	0.13	--	0.13	0.13	0.25	0.25	0.25
C-Option	N/A	0.43	0.25	0.18	0.38	0.38	0.44
Q-Option	0.03	0.44	0.25	0.19	0.38	0.38	0.44
Z-Option	N/A	N/A	0.35	0.25	0.34	N/A	N/A
PFC-Option	N/A	N/A	0.90	0.94	0.85	1.41	1.22

Q Dimension Length Adders

Bore	9/16"	3/4"	1-1/16"	1-1/2"	2"	2-1/2"	3"
Z-Option	N/A	N/A	0.57	0.40	0.30	N/A	N/A
PFC-Option	N/A	N/A	0.48	0.12	0.05	0.17	0.43

Dimensions (TE Models)



Bore	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
9/16" (02)	3.50	2.50	1.25	0.22	1.00	0.31	0.38	1.75	0.38	3.00	3.50	0.12	0.75	0.50	0.25
3/4" (04)	4.50	3.00	1.50	0.25	1.25	0.38	0.50	2.12	0.44	3.75	4.25	0.16	0.94	0.62	0.38
1-1/16" (09)	6.25	4.25	2.12	0.38	2.00	0.50	1.00	3.12	0.56	5.25	5.00	0.31	1.38	1.00	0.50
1-1/2" (17)	7.50	5.50	2.75	0.44	2.50	0.59	1.31	4.00	0.75	6.50	6.38	0.38	1.75	1.25	0.50
2" (31)	8.00	6.00	3.00	0.44	3.00	0.75	1.50	4.25	0.88	7.00	7.12	0.50	2.00	1.50	0.50
2-1/2" (50)	11.50	7.50	3.75	0.69	3.50	0.84	1.81	5.37	1.06	9.50	9.75	0.50	2.50	1.75	1.00
3" (70)	13.00	9.00	4.50	0.81	4.50	1.15	2.19	6.50	1.25	11.00	11.50	0.75	3.00	2.25	1.00

Bore	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE
9/16" (02)	0.88	0.38	0.34	0.60	2.25	1.25	0.25	0.38	0.86	0.75	8-32	0.62	6-32	10-32
3/4" (04)	1.12	0.50	0.41	0.52	2.50	0.78	0.38	0.50	0.85	1.00	10-32	0.81	8-32	1/8 NPT
1-1/16" (09)	1.31	0.62	0.44	0.98	3.00	0.81	0.38	0.62	1.00	1.50	1/4-20	1.12	10-32	1/8 NPT
1-1/2" (17)	1.50	0.75	0.50	1.57	4.00	1.12	0.50	0.75	1.38	2.00	5/16-18	1.56	1/4-28	1/8 NPT
2" (31)	1.62	0.88	0.50	1.07	4.00	1.00	0.75	1.00	1.60	2.25	5/16-18	2.08	1/4-28	1/4 NPT
2-1/2" (50)	1.87	1.13	0.50	2.20	6.00	1.75	0.75	1.25	1.45	3.00	3/8-16	2.62	1/4-28	1/4 NPT
3" (70)	2.25	1.38	0.56	3.73	7.00	2.00	1.00	1.50	1.62	3.50	1/2-13	3.12	1/4-28	3/8 NPT

Bore	FF	GG	HH	JJ	KK	MM	QQ	RR	SS	TT	UU	WW	ZZ
9/16" (02)	0.69	1.00	7/16-20	#8	10-32	0.19	1.25	0.63	0.45	0.60	0.90	0.15	#10-32
3/4" (04)	0.94	1.25	5/8-18	#10	1/4-28	0.25	1.50	0.75	0.58	0.75	1.15	0.20	1/4-20
1-1/16" (09)	1.12	1.88	5/8-18	1/4	5/16-24	0.31	2.00	1.12	0.88	1.00	1.75	0.38	5/16-18
1-1/2" (17)	1.12	2.38	3/4-16	5/16	7/16-20	0.44	3.00	1.25	1.12	1.50	2.25	0.38	3/8-16
2" (31)	1.25	2.70	1-1/4-12	5/16	1/2-20	0.62	3.00	1.50	1.38	2.00	2.75	0.38	3/8-16
2-1/2" (50)	1.50	3.50	1-3/8-12	3/8	1/2-20	0.63	3.75	1.88	1.63	2.25	3.25	0.50	1/2-13
3" (70)	1.75	4.20	1-1/2-12	1/2	5/8-18	0.75	4.50	2.25	2.00	2.75	4.00	0.63	3/4-16

NOTES:

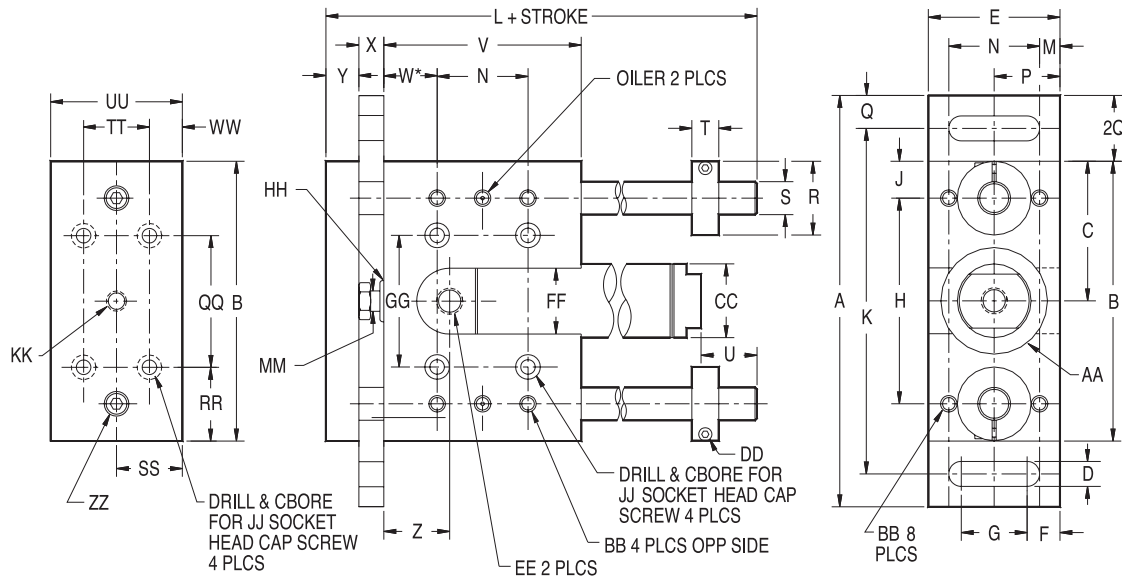
9/16" (02) model: Drawing is not an accurate depiction.

Linear Thrusters ordered with adjustable cushions incorporate a side port on rear of cylinder.

Linear Thrusters ordered with PFC Technology (model TEF) include a sideported, extended rearhead.

Dimension X will also grow as much as 3/16". Contact Technical Assistance for details.

Dimensions (T Models)



Bore	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
9/16" (02)	3.50	2.50	1.25	0.22	1.00	0.31	0.38	1.75	0.38	3.00	3.50	0.12	0.75	0.50	0.25	0.62
3/4" (04)	4.50	3.00	1.50	0.25	1.25	0.38	0.50	2.12	0.44	3.75	4.12	0.16	0.94	0.62	0.38	0.88
1-1/16" (09)	6.25	4.25	2.12	0.38	2.00	0.50	1.00	3.12	0.56	5.25	4.75	0.31	1.38	1.00	0.50	1.12
1-1/2" (17)	7.50	5.50	2.75	0.44	2.50	0.59	1.31	4.00	0.75	6.50	6.25	0.38	1.75	1.25	0.50	1.31
2" (31)	9.50	7.00	3.50	0.56	4.00	1.22	1.56	5.00	1.00	8.25	7.00	0.94	2.12	2.00	0.63	1.50
2-1/2" (50)	12.50	8.50	4.25	0.63	4.50	1.25	2.00	6.25	1.13	10.50	9.50	0.94	2.63	2.25	1.00	1.75
3" (70)	15.00	11.00	5.50	0.81	6.00	1.41	3.19	8.00	1.50	13.00	11.50	1.00	4.00	3.00	1.00	2.06

Bore	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF
9/16" (02)	0.25	0.28	0.67	2.25	1.25	0.25	0.31	0.86	0.75	8-32	0.62	4-40	10-32	0.69
3/4" (04)	0.38	0.34	0.51	2.50	0.78	0.38	0.38	0.85	0.94	10-32	0.81	6-32	1/8 NPT	0.94
1-1/16" (09)	0.50	0.41	0.85	3.00	0.81	0.38	0.50	1.00	1.62	1/4-20	1.12	8-32	1/8 NPT	1.12
1-1/2" (17)	0.62	0.44	1.44	4.00	1.12	0.50	0.75	1.50	2.12	5/16-18	1.56	10-32	1/8 NPT	1.12
2" (31)	0.75	0.50	0.95	4.00	0.94	0.75	1.00	1.60	3.00	3/8-16	2.08	1/4-28	1/4 NPT	1.25
2-1/2" (50)	1.00	0.50	2.92	6.00	1.69	0.75	1.25	1.48	3.50	3/8-16	2.62	1/4-28	1/4 NPT	1.25
3" (70)	1.25	0.50	3.75	7.00	1.50	1.00	1.50	1.88	4.63	1/2-13	3.12	1/4-28	3/8 NPT	1.25

Bore	GG	HH	JJ	KK	MM	QQ	RR	SS	TT	UU	WW	ZZ
9/16" (02)	1.00	7/16-20	#8	10-32	0.19	1.25	0.62	0.50	0.60	1.00	0.20	N/A
3/4" (04)	1.25	5/8-18	#10	1/4-28	0.25	1.50	0.75	0.62	0.75	1.25	0.25	10-32
1-1/16" (09)	1.88	5/8-18	1/4	5/16-24	0.31	2.00	1.12	1.00	1.00	2.00	0.50	1/4-20
1-1/2" (17)	2.38	3/4-16	5/16	7/16-20	0.437	3.00	1.25	1.25	1.50	2.50	0.50	3/8-16
2" (31)	3.25	1-1/4-12	3/8	1/2-20	0.625	4.00	1.50	1.50	2.00	3.00	0.50	3/8-16
2-1/2" (50)	4.10	1-3/8-12	3/8	1/2-20	0.63	4.75	1.76	2.00	3.00	4.00	0.50	1/2-13
3" (70)	5.25	1-1/2-12	1/2	5/8-18	0.75	6.00	2.50	2.00	3.00	4.00	0.50	3/4-16

NOTES:

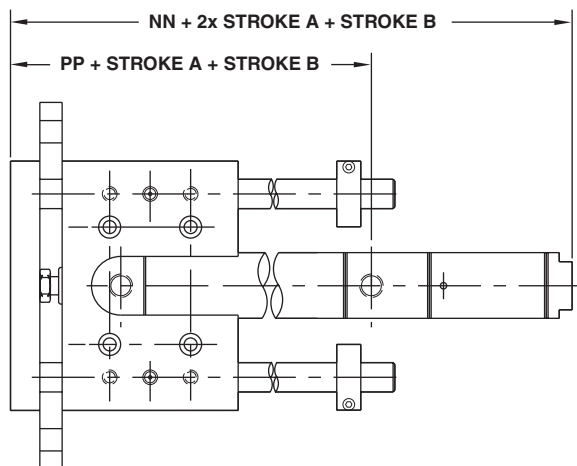
9/16" (02) model: Drawing is not an accurate depiction.

Linear Thrusters ordered with adjustable cushions incorporate a side port on rear of cylinder.

Linear Thrusters ordered with PFC Technology (model TEF) include a sideported, extended rearhead.

Dimension X will also grow as much as 3/16". Contact Technical Assistance for details.

Dimensions (Multiple Position Thruster Models)

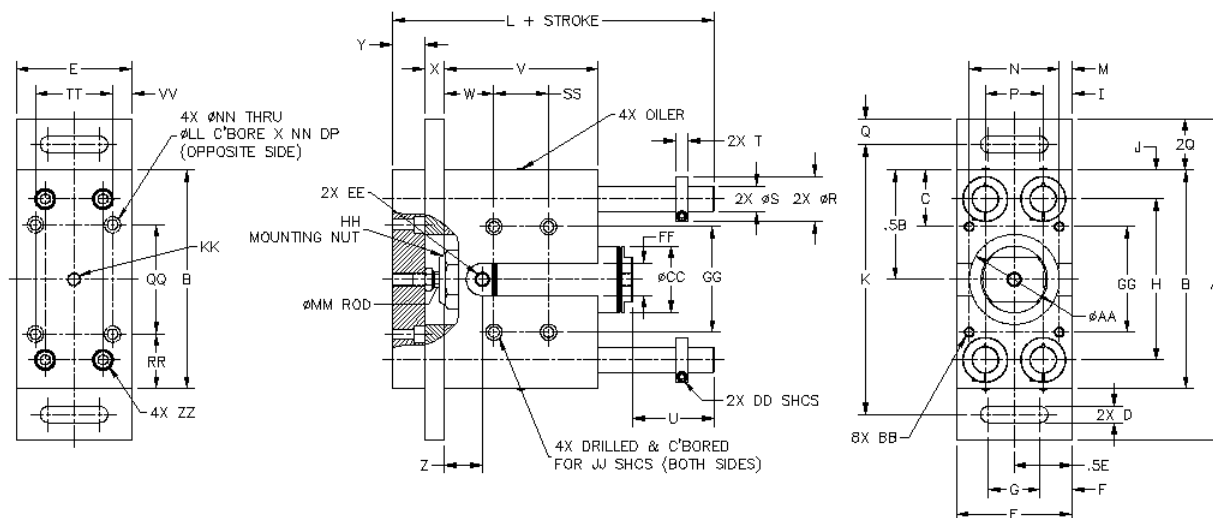


(T Series shown)

Bore Size	NN	PP
9/16" (02)	4.67	2.80
3/4" (04)	6.11	3.76
1-1/16" (09)	6.62	3.90
1-1/2" (17)	7.62	4.81
2" (31)	9.61	6.14

NOTE: Additional T and TE dimensions can be found on pages 307 and 308.

Dimensions (T4 Models)



Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R
2" (31)	9.50	7.00	1.75	0.56	4.00	1.22	1.56	5.25	1.00	0.88	8.25	7.00	0.63	2.75	2.00	0.63	1.50
2-1/2" (50)	12.50	8.50	2.20	0.63	4.50	1.25	2.00	6.25	1.13	1.13	10.50	9.50	0.50	3.50	2.25	1.00	1.75
3" (70)	15.00	11.00	2.88	0.81	6.00	1.41	3.19	8.00	1.50	1.50	13.00	11.50	0.50	5.00	3.00	1.00	2.06

Bore	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH
2" (31)	0.75	0.50	0.95	4.00	1.25	0.75	1.00	1.53	3.00	3/8-16	2.08	1/4-28	1/4 NPT	1.25	3.50	1-1/4-12
2-1/2" (50)	1.00	0.50	3.17	6.00	1.94	0.75	1.25	1.49	3.50	3/8-16	2.62	1/4-28	1/4 NPT	1.25	4.10	1-3/8-12
3" (70)	1.25	0.50	3.87	7.00	1.75	1.00	1.50	1.97	4.63	1/2-13	3.12	1/4-28	3/8 NPT	1.25	5.25	1-3/8-12

Bore	JJ	KK	LL	MM	NN	QQ	RR	SS	TT	UU	VV	ZZ
2" (31)	3/8	1/2-20	0.63	0.63	0.41	3.50	1.75	1.50	3.00	10.00	0.50	3/8-16 SHCS
2-1/2" (50)	3/8	1/2-20	0.63	0.63	0.41	4.25	2.13	2.13	3.00	12.25	0.75	1/2-13 SHCS
3" (70)	1/2	5/8-18	0.81	0.75	0.53	5.50	2.75	3.50	4.50	15.00	0.75	3/4-16 Hex Bolt

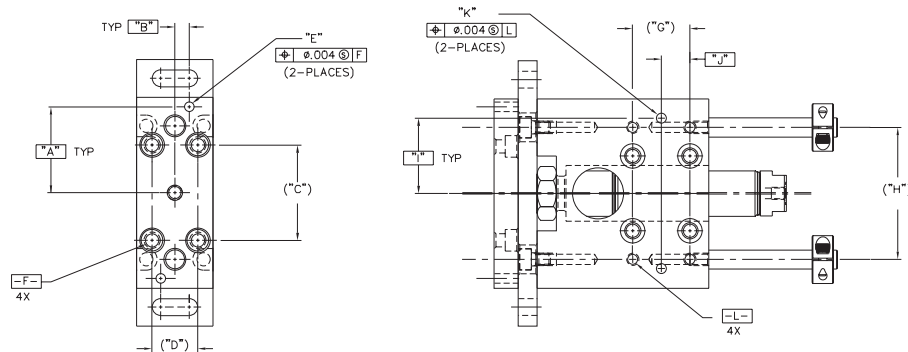
Linear Thrusters ordered with adjustable cushions incorporate a side port on rear of cylinder.

Approximate Weights (T and TE Series)

Bore	Base Weight (oz.)	Adder per 1" (oz.)	Mounting Plate (oz.)
9/16" (02)	13	1	1
3/4" (04)	32	2.2	2.2
1-1/16" (09)	46	5.7	5
1-1/2" (17)	154	6.3	10
2" (31)	296	8.3	32
Model T			
2-1/2" (50)	586	9.9	191
3" (70)	1048	15.2	408
Model TE			
2-1/2" (50)	400	11.7	137
3" (70)	640	17.6	265

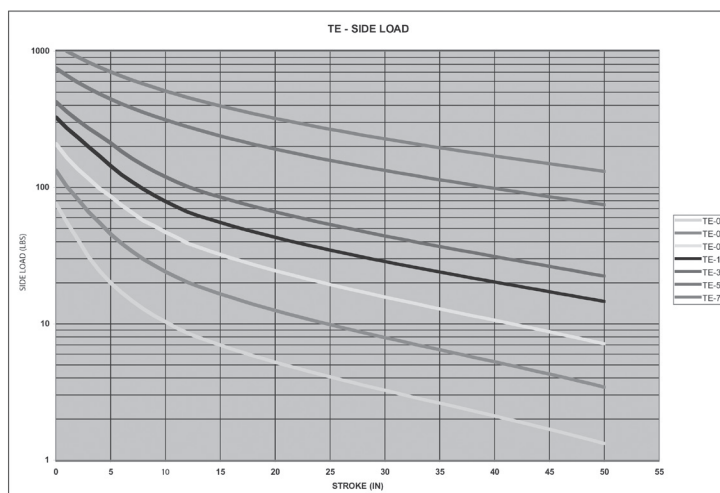
Transition Plates

Dowel Pin Hole Locations



Bore	A	B	C	D	E	G	H	I	J	K
020 (9/16")	1.125	.188	1.250	.600	.1270/.1280 THRU.	.750	1.750	.8750	.375	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.313	.250	1.500	.750	.1895/.1905 THRU.	.938	2.125	1.1250	.469	.1895/.1905 x .290/.310 DP.
090 (1-1/16")	1.813	.375	2.000	1.000	.2520/.2530 THRU.	1.375	3.125	1.5625	.688	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.375	.500	3.000	1.500	.3145/.3155 THRU.	1.750	4.000	2.0000	.875	.3145/.3155 x .560/.580 DP.
310 (2")	3.000	.625	4.000	2.000	.3770/.3780 THRU.	2.125	5.000	2.5000	1.063	.3770/.3780 x .810/.830 DP.
310 (2") TE	2.500	.625	3.000	2.000	.3770/.3780 THRU.	2.000	4.250	2.1250	1.000	.3770/.3780 x .810/.830 DP.
500 (2-1/2")	3.750	1.000	4.750	3.000	.3770/.3780 THRU.	2.630	6.250	3.1250	1.312	.3770/.3780 x 1.000/1.020 DP.
500 (2-1/2") TE	3.250	.750	3.750	2.250	.3770/.3780 THRU.	2.500	5.375	2.6875	1.250	.3770/.3780 x 1.000/1.020 DP.
700 (3")	4.750	1.000	6.000	3.000	.5020/.5030 THRU.	4.000	8.000	4.0000	2.000	.5020/.5030 x 1.250/1.270 DP.
700 (3") TE	4.000	1.000	4.500	2.750	.5020/.5030 THRU.	3.000	6.500	3.2500	1.500	.5020/.5030 x 1.250/1.270 DP.

Maximum Side Loads (lbs) (TE Models)



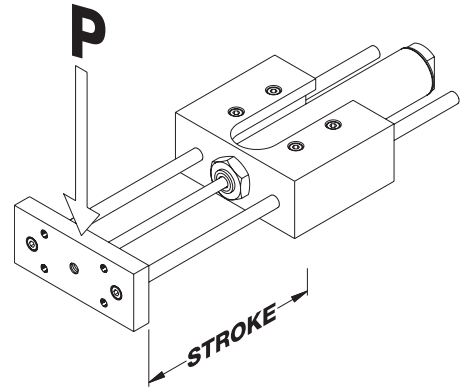
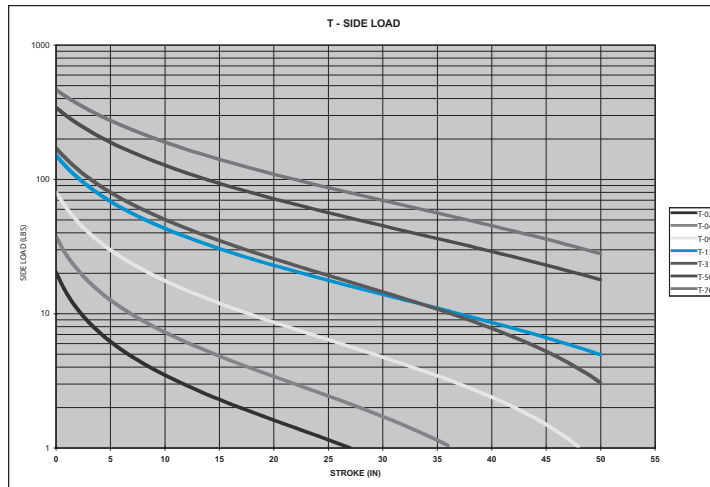
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
TE-02	76.52	55.8	41.50	31.00	24.40	19.96	16.94	14.65	12.83	11.44	10.32	9.30	8.54	7.95
TE-04	133.95	102.00	82.00	66.00	55.02	45.50	38.78	33.77	29.78	26.71	24.11	21.99	20.16	18.81
TE-09	210.00	165.60	136.00	116.00	98.00	86.00	74.00	65.00	57.00	52.00	47.00	43.00	39.00	36.46
TE-17	328.24	273.00	233.00	199.00	170.00	144.00	124.00	109.00	97.00	87.00	79.00	72.00	66.00	62.03
TE-31	425.18	359.17	310.00	271.00	240.00	211.67	183.91	162.33	145.22	131.26	119.66	109.74	101.38	95.03
TE-50	752.44	661.79	590.3	532.45	484.67	444.52	410.31	380.8	355.07	332.44	312.38	294.46	278.35	263.80
TE-70	1000.00	999.87	905.3	826.67	760.25	703.38	654.14	611.07	573.07	539.30	509.07	481.85	457.20	434.78

	14	15	16	17	18	19	20	21	22	23	24	25	26	27
TE-02	7.43	6.96	6.54	6.16	5.82	5.51	5.22	4.95	4.71	4.48	4.27	4.07	3.89	3.71
TE-04	17.61	16.53	15.57	14.70	13.90	13.18	12.51	11.89	11.32	10.79	10.30	9.84	9.41	9.00
TE-09	34.20	32.17	30.35	28.69	27.18	25.79	24.52	23.34	22.25	21.23	20.29	19.40	18.57	17.79
TE-17	58.48	55.27	52.36	49.71	47.28	45.05	42.99	41.08	39.31	37.66	36.12	34.67	33.31	32.03
TE-31	89.66	84.80	80.39	76.36	72.67	69.26	66.12	63.20	60.49	57.96	55.59	53.37	51.28	49.32
TE-50	250.57	238.5	227.44	217.25	207.85	199.14	191.04	183.49	176.43	169.82	163.62	157.77	152.26	147.06
TE-70	414.28	395.47	378.15	362.13	347.28	333.46	320.58	308.53	297.23	286.62	276.63	267.21	258.30	249.87

	28	29	30	31	32	33	34	35	36	37	38	39	40	41
TE-02	3.55	3.39	3.25	3.11	2.97	2.85	2.73	2.61	2.50	2.40	2.29	2.20	2.10	2.01
TE-04	8.62	8.25	7.91	7.59	7.28	6.98	6.70	6.43	6.18	5.93	5.69	5.47	5.25	5.04
TE-09	17.06	16.36	15.70	15.08	14.48	13.92	13.38	12.86	12.37	11.90	11.44	11.01	10.59	10.19
TE-17	30.83	29.69	28.61	27.58	26.61	25.68	24.79	23.95	23.14	22.37	21.63	20.91	20.23	19.57
TE-31	47.46	45.70	44.04	42.46	40.96	39.52	38.16	36.85	35.60	34.41	33.26	32.16	31.10	30.08
TE-50	142.13	137.46	133.02	128.79	124.77	120.93	117.27	113.76	110.41	107.19	104.10	101.13	98.27	95.52
TE-70	241.87	234.28	227.05	220.17	213.6	207.32	201.32	195.58	190.07	184.78	179.71	174.82	170.12	165.60

	42	43	44	45	46	47	48	49	50
TE-02	1.93	1.84	1.76	1.68	1.60	1.53	1.46	1.39	1.32
TE-04	4.83	4.64	4.45	4.26	4.09	3.91	3.75	3.58	3.43
TE-09	9.80	9.42	9.06	8.71	8.37	8.04	7.73	7.42	7.12
TE-17	18.94	18.33	17.74	17.17	16.61	16.08	15.56	15.06	14.58
TE-31	29.10	28.15	27.24	26.35	25.50	24.67	23.87	23.09	22.34
TE-50	92.87	90.32	87.85	85.47	83.16	80.93	78.77	76.67	74.64
TE-70	161.23	157.01	152.94	149.01	145.20	141.52	137.95	134.49	131.13

Maximum Side Loads (lbs) (T Models)



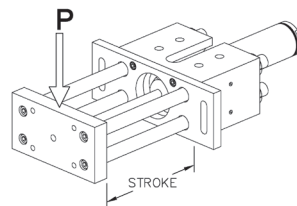
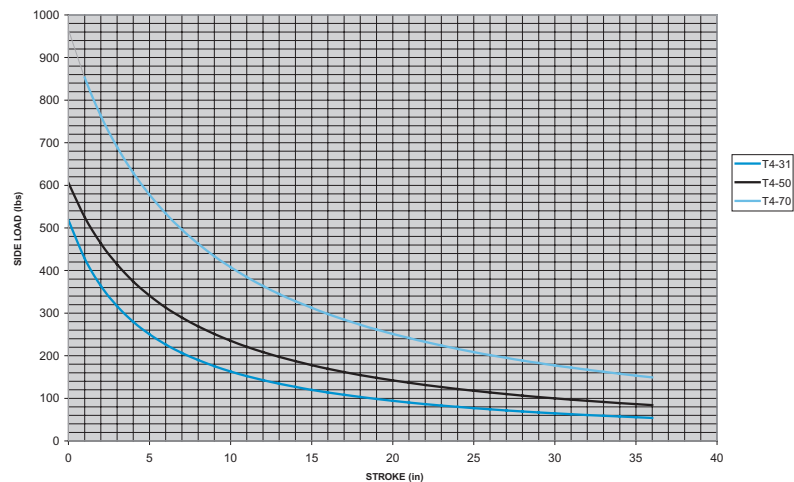
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TE-02	20.34	14.11	10.76	8.67	7.24	6.19	5.40	4.77	4.26	3.84	3.48	3.18	2.91	2.68	2.48
TE-04	37.49	27.17	21.23	17.38	14.66	12.65	11.09	9.85	8.83	7.98	7.26	6.64	6.10	5.63	5.21
TE-09	80.50	60.61	48.46	40.26	34.34	29.87	26.37	23.54	21.22	19.27	17.61	16.17	14.92	13.82	12.83
TE-17	151.62	122.73	102.88	88.39	77.34	68.63	61.58	55.75	50.86	46.68	43.07	39.92	37.14	34.67	32.47
TE-31	171.30	140.62	118.91	102.73	90.19	80.18	72.00	65.19	59.41	54.46	50.16	46.38	43.04	40.06	37.39
TE-50	342.37	295.93	260.13	231.67	208.5	189.25	173.00	159.10	147.06	136.52	127.22	118.95	111.54	104.85	98.80
TE-70	465.67	410.17	365.92	329.78	299.7	274.27	252.46	233.56	217.00	202.37	189.34	177.66	167.13	157.57	148.86

	15	16	17	18	19	20	21	22	23	24	25	26	27	28
T-02	2.30	2.13	1.98	1.85	1.72	1.61	1.50	1.41	1.31	1.23	1.15	1.07	1.00	-
T-04	4.83	4.49	4.18	3.90	3.64	3.40	3.18	2.98	2.78	2.60	2.44	2.28	2.12	1.98
T-09	11.96	11.16	10.44	9.79	9.18	8.63	8.11	7.64	7.19	6.78	6.39	6.02	5.67	5.34
T-17	30.48	28.67	27.03	25.53	24.15	22.87	21.69	20.59	19.57	18.61	17.71	16.86	16.06	15.31
T-31	34.97	32.77	30.77	28.92	27.22	25.65	24.19	22.83	21.56	20.37	19.25	18.2	17.20	16.26
T-50	93.28	88.33	83.58	79.30	75.33	71.64	68.20	64.99	61.97	59.14	56.48	53.96	51.58	49.32
T-70	140.88	133.54	126.77	120.49	114.66	109.22	104.14	99.37	94.89	90.67	86.68	82.91	79.34	75.94

	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
T-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T-04	1.84	1.71	1.59	1.47	1.36	1.25	1.14	1.04	-	-	-	-	-	-	-	-	-
T-09	5.03	4.74	4.45	4.18	3.93	3.68	3.45	3.22	3.00	2.79	2.59	2.39	2.20	2.02	1.84	1.67	1.50
T-17	14.60	13.92	13.28	12.66	12.08	11.52	10.98	10.47	9.98	9.50	9.05	8.61	8.19	7.78	7.38	7.00	6.63
T-31	15.36	14.51	13.70	12.93	12.19	11.48	10.80	10.15	9.52	8.92	8.34	7.78	7.24	6.72	6.21	5.72	5.24
T-50	47.18	45.14	43.20	41.35	39.58	37.89	36.26	34.70	33.21	31.77	30.38	29.05	27.76	26.51	25.30	24.14	23.01
T-70	72.72	69.64	66.71	63.90	61.22	58.64	56.18	53.8	51.52	49.33	47.21	45.16	43.19	41.28	39.43	37.64	35.91

	46	47	48	49	50
T-02	-	-	-	-	-
T-04	-	-	-	-	-
T-09	1.33	1.17	1.02	-	-
T-17	6.27	5.92	5.58	5.25	4.93
T-31	4.78	4.33	3.89	3.47	3.05
T-50	21.91	20.85	19.82	18.82	17.84
T-70	34.22	32.59	31.00	29.46	27.95

Maximum Side Loads (lbs) (T4 Models)



	0	1	2	3	4
T4-31	518.70	428.08	364.07	316.45	279.63
T4-50	605.94	525.43	463.46	414.28	374.30
T4-70	965.54	852.80	763.04	689.88	629.11

	5	6	7	8	9
T4-31	250.32	226.43	206.58	189.83	175.51
T4-50	341.16	313.25	289.41	268.83	250.86
T4-70	577.82	533.96	496.02	462.88	433.68

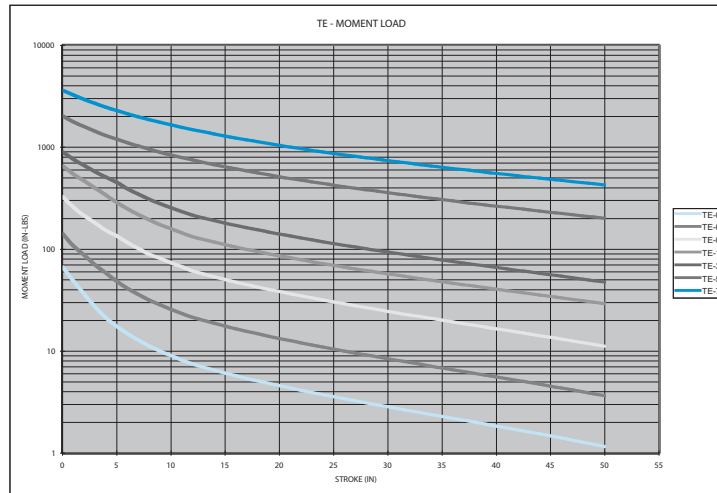
	10	11	12	13	14
T4-31	163.12	152.30	142.76	134.30	126.74
T4-50	235.05	221.03	208.50	197.25	187.09
T4-70	407.77	384.60	363.78	344.95	327.85

	15	16	17	18	19
T4-31	119.94	113.79	108.21	103.11	98.45
T4-50	177.86	169.45	161.75	154.67	148.14
T4-70	312.25	297.97	284.83	272.71	261.49

	20	21	22	23	24
T4-31	94.16	90.20	86.54	83.14	79.97
T4-50	142.11	136.50	131.29	126.43	129.89
T4-70	251.09	241.40	232.36	223.91	215.99

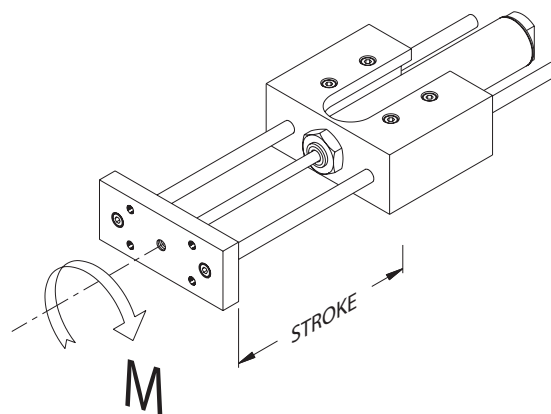
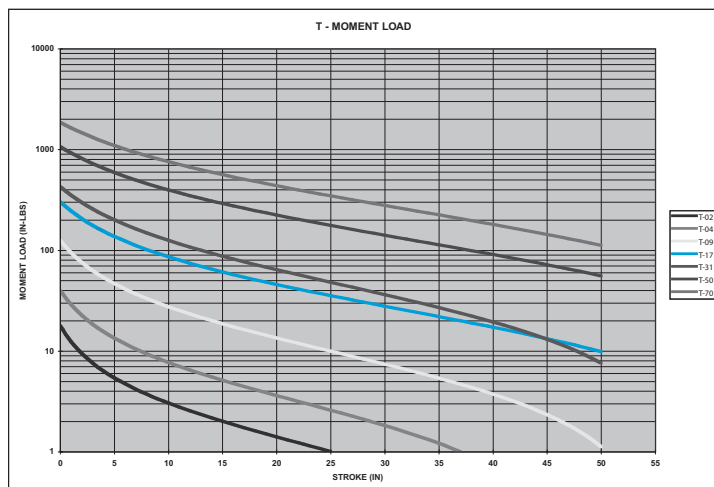
	25	26	27	28	29	30	31	32	33	34	35	36
T4-31	77.02	74.26	71.68	69.25	66.96	64.81	62.78	60.86	59.03	57.31	55.67	54.11
T4-50	117.63	113.64	109.88	106.33	102.99	99.83	96.83	94.00	91.30	88.74	86.30	83.97
T4-70	208.56	201.56	194.97	188.74	182.85	177.28	171.99	166.97	162.19	157.64	153.30	149.17

Maximum Moments (in-lbs) (TE Models)



	0	1	2	3	4	5	6	7	8	9	10	11	12
TE-02	66.96	48.83	36.31	27.13	21.35	17.47	14.82	12.82	11.23	10.01	9.03	8.14	7.47
TE-04	142.32	108.38	87.13	70.13	58.46	48.34	41.20	35.88	31.64	28.38	25.62	23.36	21.42
TE-09	328.12	258.75	212.50	181.25	153.13	134.38	115.63	101.56	89.06	81.25	73.44	67.19	60.94
TE-17	656.48	546.00	466.00	398.00	340.00	288.00	248.00	218.00	194.00	174	158.00	144.00	132.00
TE-31	903.51	763.24	658.75	575.88	510.00	449.80	390.81	344.95	308.59	278.93	254.28	233.2	215.43
TE-50	2022.18	1778.57	1586.43	1430.96	1302.54	1194.65	1102.70	1023.39	954.26	893.44	839.52	791.36	748.08
TE-70	3623.75	3249.57	2942.22	2686.67	2470.8	2285.99	2125.94	1985.97	1862.49	1752.72	1654.47	1566.00	1485.90
	13	14	15	16	17	18	19	20	21	22	23	24	25
TE-02	6.95	6.50	6.09	5.72	5.39	5.09	4.82	4.57	4.34	4.12	3.92	3.74	3.56
TE-04	19.98	18.71	17.57	16.54	15.62	14.77	14.00	13.29	12.64	12.03	11.47	10.94	10.45
TE-09	56.97	53.44	50.27	47.41	44.82	42.46	40.30	38.31	36.47	34.76	33.18	31.70	30.32
TE-17	124.07	116.95	110.54	104.72	99.42	94.56	90.10	85.98	82.17	78.62	75.32	72.23	69.34
TE-31	201.93	190.52	180.20	170.83	162.27	154.41	147.18	140.50	134.30	128.54	123.16	118.13	113.42
TE-50	708.96	673.41	640.97	611.24	583.87	558.60	535.18	513.41	493.13	474.16	456.40	439.72	424.01
TE-70	1413.03	1346.42	1285.29	1228.98	1176.92	1128.65	1083.75	1041.87	1002.71	966.01	931.52	899.05	868.43
	26	27	28	29	30	31	32	33	34	35	36	37	38
TE-02	3.4	3.25	3.1	2.97	2.84	2.72	2.6	2.49	2.39	2.29	2.19	2.1	2.01
TE-04	9.99	9.56	9.15	8.77	8.41	8.06	7.73	7.42	7.12	6.83	6.56	6.3	6.05
TE-09	29.02	27.8	26.65	25.56	24.53	23.56	22.63	21.74	20.9	20.1	19.33	18.59	17.88
TE-17	66.62	64.07	61.65	59.37	57.21	55.16	53.21	51.36	49.59	47.9	46.28	44.74	43.25
TE-31	108.98	104.8	100.86	97.12	93.59	90.23	87.03	83.99	81.09	78.31	75.66	73.12	70.68
TE-50	409.21	395.21	381.97	369.41	357.48	346.14	335.33	325.01	315.16	305.74	296.71	288.06	279.76
TE-70	839.48	812.08	786.09	761.4	737.91	715.54	694.19	673.8	654.3	635.63	617.73	600.55	584.05
	39	40	41	42	43	44	45	46	47	48	49	50	
TE-02	1.92	1.84	1.76	1.68	1.61	1.54	1.47	1.4	1.34	1.28	1.21	1.15	
TE-04	5.81	5.58	5.35	5.14	4.93	4.73	4.53	4.34	4.16	3.98	3.81	3.64	
TE-09	17.2	16.55	15.92	15.31	14.73	14.16	13.61	13.08	12.57	12.07	11.59	11.12	
TE-17	41.83	40.46	39.14	37.87	36.65	35.47	34.33	33.23	32.16	31.13	30.12	29.15	
TE-31	68.34	66.09	63.92	61.83	59.82	57.88	56	54.19	52.43	50.73	49.08	47.47	
TE-50	271.78	264.1	256.71	249.59	242.73	236.09	229.69	223.49	217.5	211.69	206.06	200.6	
TE-70	568.18	552.9	538.18	523.99	510.3	497.07	484.28	471.91	459.93	448.33	437.08	426.16	

Maximum Moments (in-lbs) (T-Series Models)

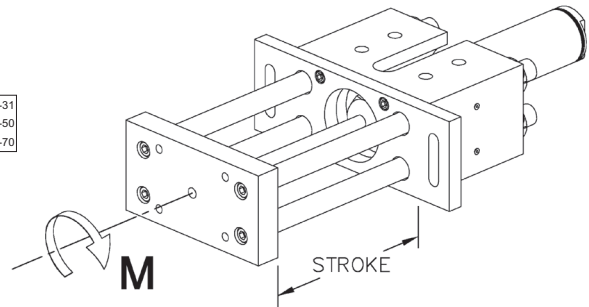
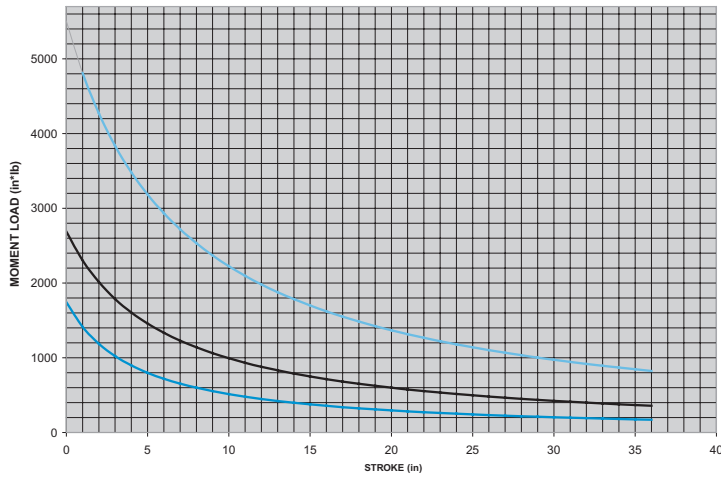


	0	1	2	3	4	5	6	7	8	9	10	11	12
T-02	17.80	12.35	9.42	7.59	6.33	5.42	4.72	4.17	3.73	3.36	3.05	2.78	2.55
T-04	39.83	28.86	22.56	18.46	15.58	13.44	11.78	10.46	9.38	8.48	7.72	7.06	6.49
T-09	125.78	94.70	75.72	62.90	53.66	46.67	41.20	36.79	33.16	30.11	27.51	25.27	23.31
T-17	303.23	245.46	205.76	176.78	154.68	137.26	123.16	111.51	101.71	93.36	86.14	79.84	74.28
T-31	428.25	351.56	297.28	256.83	225.48	200.46	180.01	162.96	148.53	136.15	125.39	115.96	107.61
T-50	1069.92	924.78	812.90	723.97	651.55	591.41	540.64	497.18	459.55	426.62	397.56	371.71	348.55
T-70	1862.69	1640.7	1463.66	1319.12	1198.81	1097.07	1009.86	934.23	868.00	809.47	757.37	710.65	668.51
	13	14	15	16	17	18	19	20	21	22	23	24	25
T-02	2.35	2.17	2.01	1.86	1.73	1.62	1.51	1.41	1.32	1.23	1.15	1.08	1.01
T-04	5.98	5.54	5.13	4.77	4.45	4.15	3.87	3.62	3.38	3.16	2.96	2.77	2.59
T-09	21.59	20.05	18.68	17.44	16.32	15.29	14.35	13.48	12.68	11.93	11.24	10.59	9.98
T-17	69.35	64.93	60.95	57.35	54.06	51.06	48.30	45.74	43.38	41.18	39.13	37.22	35.42
T-31	100.16	93.47	87.43	81.93	76.91	72.31	68.06	64.13	60.48	57.08	53.91	50.93	48.13
T-50	327.67	308.74	291.49	275.71	261.19	247.80	235.40	223.87	213.12	203.08	193.66	184.82	176.49
T-70	630.29	595.44	563.53	534.18	507.08	481.98	458.64	436.89	416.54	397.47	379.55	362.66	346.72
	26	27	28	29	30	31	32	33	34	35	36	37	38
T-02	-	-	-	-	-	-	-	-	-	-	-	-	-
T-04	2.42	2.26	2.10	1.96	1.82	1.69	1.56	1.44	1.33	1.21	1.11	1.00	-
T-09	9.40	8.86	8.35	7.86	7.40	6.96	6.54	6.14	5.75	5.38	5.03	4.69	4.36
T-17	33.72	32.13	30.62	29.19	27.84	26.55	25.33	24.16	23.04	21.97	20.94	19.96	19.01
T-31	45.49	43.00	40.64	38.40	36.27	34.25	32.31	30.47	28.70	27.00	25.37	23.81	22.30
T-50	168.62	161.18	154.13	147.44	141.07	135.01	129.22	123.69	118.39	113.32	108.45	103.77	99.27
T-70	331.64	317.35	303.78	290.87	278.56	266.83	255.61	244.87	234.58	224.70	215.22	206.09	197.30
	39	40	41	42	43	44	45	46	47	48	49	50	
T-02	-	-	-	-	-	-	-	-	-	-	-	-	
T-04	-	-	-	-	-	-	-	-	-	-	-	-	
T-09	4.04	3.74	3.44	3.15	2.87	2.60	2.34	2.08	1.83	1.59	1.36	1.13	
T-17	18.10	17.22	16.37	15.56	14.77	14.00	13.26	12.54	11.84	11.17	10.51	9.87	
T-31	20.85	19.45	18.10	16.79	15.52	14.29	13.10	11.95	10.82	9.73	8.66	7.63	
T-50	94.94	90.77	86.74	82.84	79.08	75.43	71.90	68.48	65.16	61.94	58.80	55.75	
T-70	188.83	180.65	172.76	165.12	157.73	150.57	143.63	136.90	130.36	124.00	117.82	111.81	

Frictional characteristics of TE Series Linear Thrusters deteriorate as stroke length increases.

NOTE: Static load data represented

Maximum Moment Loads (in-lbs) (T4 Models)



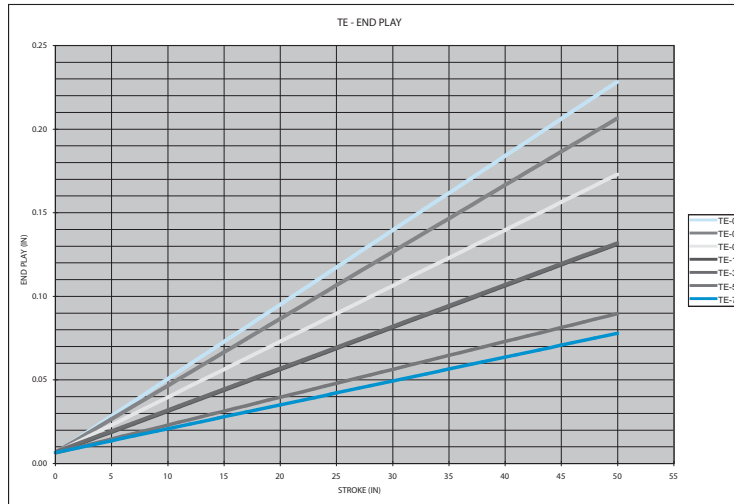
NOTE: Static load data represented.

	0	1	2	3	4	5	6	7	8	9	10	11	12
T4-31	1745.02	1413.35	1186.76	1022.14	897.12	798.95	719.81	654.66	600.09	553.72	513.83	479.14	448.70
T4-50	2687.72	2302.45	2012.74	1786.95	1606.03	1457.82	1334.17	1229.45	1139.62	1061.71	993.50	933.28	879.73
T4-70	5504.63	4810.54	4269.61	3836.17	3481.08	3184.85	2933.96	2718.74	2532.09	2368.66	2224.38	2096.06	1981.20

	13	14	15	16	17	18	19	20	21	22	23	24	25
T4-31	421.78	397.80	376.30	356.91	339.34	323.35	308.72	295.30	282.94	271.51	260.92	251.08	241.91
T4-50	831.79	788.63	749.56	714.03	681.58	651.83	624.44	599.16	575.74	553.99	533.74	514.83	497.13
T4-70	1877.78	1784.17	1699.04	1621.28	1549.98	1484.36	1423.77	1367.65	1315.53	1266.98	1221.66	1179.25	1139.48

	26	27	28	29	30	31	32	33	34	35	36
T4-31	233.34	225.32	217.79	210.71	204.05	197.76	191.82	186.19	180.86	175.80	170.99
T4-50	480.54	464.95	450.27	436.43	423.36	410.99	399.26	388.14	377.57	367.51	357.94
T4-70	1102.11	1066.93	1033.75	1002.40	972.75	944.64	917.97	892.63	868.51	845.54	823.63

Tooling Plate End Play (in) (TE Models)

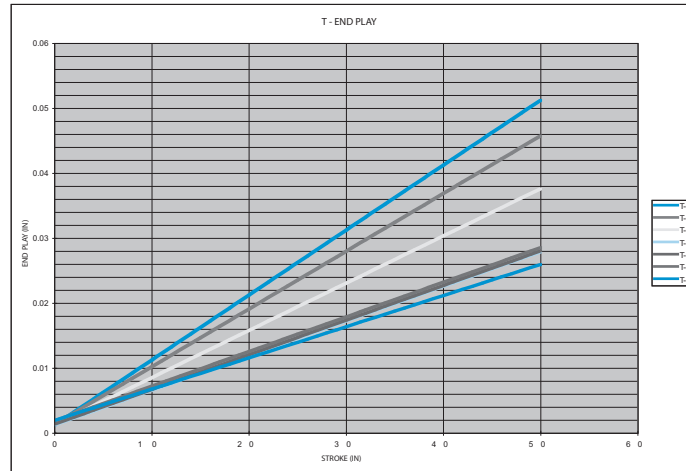


	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TE-02	0.006	0.011	0.015	0.019	0.024	0.028	0.033	0.037	0.042	0.046	0.051	0.055	0.059	0.064	0.068	0.073	0.077
TE-04	0.007	0.011	0.015	0.019	0.023	0.027	0.031	0.035	0.039	0.043	0.047	0.051	0.055	0.059	0.063	0.067	0.071
TE-09	0.006	0.010	0.013	0.016	0.020	0.023	0.026	0.030	0.033	0.036	0.040	0.043	0.046	0.050	0.053	0.056	0.060
TE-17	0.006	0.009	0.011	0.014	0.016	0.019	0.021	0.024	0.026	0.029	0.031	0.034	0.036	0.039	0.041	0.044	0.046
TE-31	0.007	0.009	0.012	0.014	0.017	0.019	0.022	0.024	0.027	0.029	0.032	0.034	0.037	0.039	0.042	0.044	0.047
TE-50	0.006	0.008	0.010	0.011	0.013	0.015	0.016	0.018	0.020	0.021	0.023	0.025	0.026	0.028	0.030	0.031	0.033
TE-70	0.006	0.008	0.009	0.011	0.012	0.014	0.015	0.016	0.018	0.019	0.021	0.022	0.024	0.025	0.026	0.028	0.029

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
TE-02	0.082	0.086	0.091	0.095	0.099	0.104	0.108	0.113	0.117	0.122	0.126	0.131	0.135	0.139	0.144	0.148	0.153
TE-04	0.075	0.079	0.083	0.087	0.091	0.095	0.099	0.103	0.107	0.111	0.115	0.119	0.123	0.127	0.131	0.135	0.139
TE-09	0.063	0.066	0.070	0.073	0.076	0.080	0.083	0.086	0.090	0.093	0.096	0.100	0.103	0.106	0.110	0.113	0.116
TE-17	0.049	0.051	0.054	0.056	0.059	0.061	0.064	0.066	0.069	0.071	0.074	0.076	0.079	0.081	0.084	0.086	0.089
TE-31	0.049	0.052	0.054	0.057	0.059	0.062	0.064	0.067	0.069	0.072	0.074	0.077	0.079	0.082	0.084	0.087	0.089
TE-50	0.035	0.036	0.038	0.040	0.041	0.043	0.045	0.046	0.048	0.050	0.051	0.053	0.055	0.056	0.058	0.060	0.061
TE-70	0.031	0.032	0.034	0.035	0.036	0.038	0.039	0.041	0.042	0.044	0.045	0.046	0.048	0.049	0.051	0.052	0.054

	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
TE-02	0.157	0.162	0.166	0.171	0.175	0.179	0.184	0.188	0.193	0.197	0.202	0.206	0.211	0.215	0.219	0.224	0.228
TE-04	0.143	0.147	0.151	0.155	0.159	0.163	0.167	0.171	0.175	0.179	0.183	0.187	0.191	0.195	0.199	0.203	0.207
TE-09	0.120	0.123	0.126	0.130	0.133	0.136	0.140	0.143	0.146	0.150	0.153	0.156	0.160	0.163	0.166	0.17	0.173
TE-17	0.091	0.094	0.096	0.099	0.101	0.104	0.106	0.109	0.111	0.114	0.116	0.119	0.121	0.124	0.126	0.129	0.131
TE-31	0.092	0.094	0.097	0.099	0.102	0.104	0.107	0.109	0.112	0.114	0.117	0.119	0.122	0.124	0.127	0.129	0.132
TE-50	0.063	0.065	0.066	0.068	0.070	0.071	0.073	0.075	0.076	0.078	0.080	0.081	0.083	0.085	0.086	0.088	0.09
TE-70	0.055	0.056	0.058	0.059	0.061	0.062	0.064	0.065	0.066	0.068	0.069	0.071	0.072	0.074	0.075	0.076	0.078

Tooling Plate End Play (in) (T-Series Models)

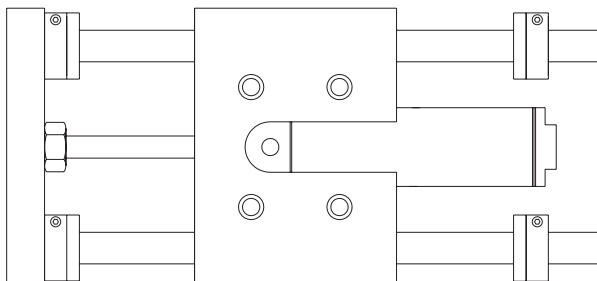


	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
T-02	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.01	0.011	0.012	0.013	0.014	0.015	0.016
T-04	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.008	0.009	0.01	0.011	0.012	0.013	0.014	0.015
T-09	0.001	0.002	0.003	0.003	0.004	0.005	0.006	0.006	0.007	0.008	0.009	0.009	0.01	0.011	0.011	0.012
T-17	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009
T-31	0.001	0.002	0.002	0.003	0.004	0.004	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009
T-50	0.002	0.002	0.003	0.004	0.004	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009	0.01
T-70	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
T-02	0.017	0.018	0.019	0.02	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.03	0.031	0.032
T-04	0.016	0.016	0.017	0.018	0.019	0.02	0.021	0.022	0.023	0.024	0.024	0.025	0.026	0.027	0.028	0.029
T-09	0.013	0.014	0.014	0.015	0.016	0.017	0.017	0.018	0.019	0.019	0.02	0.021	0.022	0.022	0.023	0.024
T-17	0.01	0.01	0.011	0.011	0.012	0.012	0.013	0.014	0.014	0.015	0.015	0.016	0.016	0.017	0.017	0.018
T-31	0.01	0.01	0.011	0.012	0.012	0.013	0.013	0.014	0.014	0.015	0.015	0.016	0.016	0.017	0.017	0.018
T-50	0.01	0.011	0.012	0.012	0.013	0.013	0.014	0.014	0.015	0.015	0.016	0.016	0.017	0.017	0.018	0.018
T-70	0.01	0.01	0.011	0.011	0.012	0.012	0.013	0.013	0.014	0.014	0.014	0.015	0.015	0.016	0.016	0.017
	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
T-02	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.04	0.041	0.042	0.043	0.044	0.045	0.046	0.047	0.048
T-04	0.03	0.031	0.032	0.032	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.04	0.04	0.041	0.042	0.043
T-09	0.025	0.025	0.026	0.027	0.027	0.028	0.029	0.03	0.03	0.031	0.032	0.033	0.033	0.034	0.035	0.035
T-17	0.018	0.019	0.019	0.02	0.02	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025	0.025	0.026	0.026
T-31	0.018	0.019	0.02	0.02	0.021	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025	0.025	0.026	0.026
T-50	0.019	0.02	0.02	0.021	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025	0.025	0.026	0.026	0.027
T-70	0.017	0.018	0.018	0.019	0.019	0.02	0.02	0.021	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025
	48	49	50													
T-02	0.049	0.05	0.051													
T-04	0.044	0.045	0.046													
T-09	0.036	0.037	0.038													
T-17	0.027	0.027	0.028													
T-31	0.027	0.028	0.028													
T-50	0.028	0.028	0.029													
T-70	0.025	0.026	0.026													

External Bumpers

The stroke can be adjusted with external urethane bumpers. These are available on one or both ends (-EB1 and -EB2 options). They are 1/4" thick through 2" bore, 1/2" for 2-1/2" bore, and 3/4" for 3" bore and fit over the guide shafts at the ends of the housing (see illustration). Shaft collars are supplied with each set of bumpers to eliminate movement possible with high loads and velocities. Thus, with -EB1 option, there will be a total of two collars; with -EB2 option, there will be four shaft collars. Guide shafts are lengthened so stroke on extension isn't affected; however, bumpers reduce the retraction stroke (see charts below). Higher loads and velocities may dictate the use of external means of deceleration such as shock absorbers.

Guide Shaft Extension with Bumpers (in.)	
Bore Size	Length Adder
9/16"	0.5
3/4"	0.5
1-1/16"	0.63
1-1/2"	0.75
2"	0.875
2-1/2"	1.38
3"	1.50



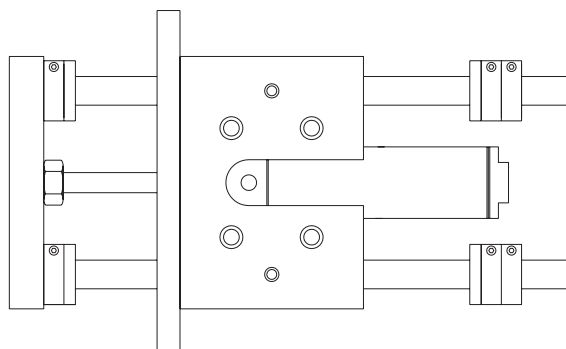
Retraction Stroke Reduction with Bumpers (in.)		
Bore Size	Reduction	
	Standard	With Mounting Plate Option
9/16"	0.34	0.59
3/4"	0.28	0.66
1-1/16"	0.31	0.69
1-1/2"	0.25	0.75
2"	0	0.75
2-1/2"	.25	1.06
3"	.31	1.31

External Bumpers (T Models)

The stroke can be adjusted with external urethane bumpers. These are available on one or both ends (-EB1 and -EB2 options). They are 1/4" thick through 2" bore, 1/2" for 2-1/2" bore, and 3/4" for 3" bore and fit over the guide shafts at the ends of the housing (see illustration). Shaft collars are supplied with each set of bumpers to eliminate movement possible with high loads and velocities. Thus, with -EB1 option, there will be a total of four collars; with -EB2 option, there will be six shaft collars.

Flat stainless steel washers are also installed to protect the shaft seals from impact damage. Guide shafts are lengthened so stroke on extension isn't affected; however, bumpers reduce the retraction stroke if the mounting plate is used in the shipped position (see charts below). Higher loads and velocities may dictate the use of external means of deceleration such as shock absorbers.

Guide Shaft Extension with Bumpers (in.)	
Bore Size	Length Adder
9/16"	0.5
3/4"	0.5
1-1/16"	0.63
1-1/2"	0.75
2"	0.875
2-1/2"	1.38
3"	1.50



Retraction Stroke Reduction with Bumpers (in.)		
Bore Size	With Mounting Plate	Without Mounting Plate
9/16"	0.56	0.31
3/4"	0.62	0.24
1-1/16"	0.70	N/A
1-1/2"	0.73	0.25
2"	0.81	N/A
2-1/2"	1.06	0.31
3"	1.31	0.31

NOTE: The single set of shaft collars supplied with each Linear Thruster are for setup only. DO NOT use them to limit the stroke or damage can occur. Thin washer included with EB Option to protect housing wipers from impact damage.

External Bumpers (T4 Models)

The stroke can be adjusted with external urethane bumpers. These are available on one or both ends (-EB1 and -EB2 options). They fit over the guide shafts at the ends of the housing. Shaft collars are supplied with each set of bumpers to eliminate movement possible with high loads and velocities. Thus, with -EB1 option, there will be a total of eight collars; with -EB2 option, there will be twelve shaft collars.

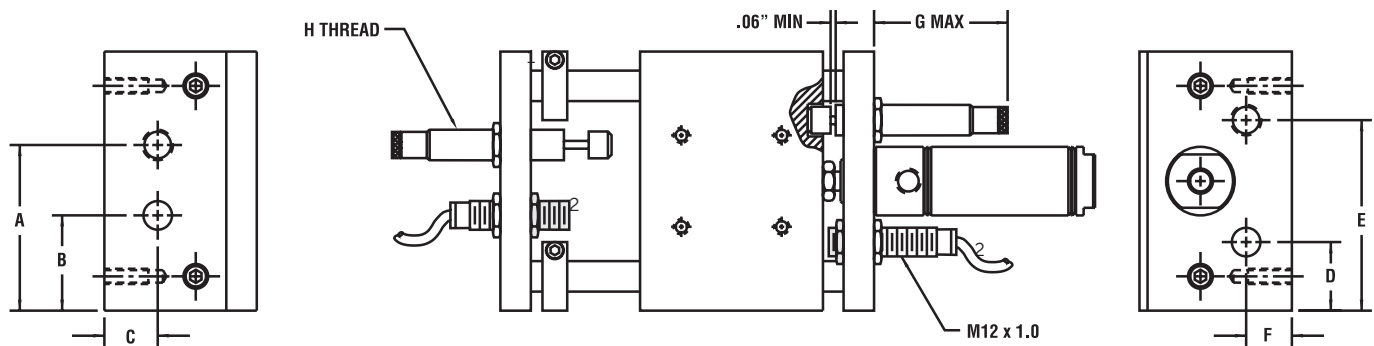
Flat stainless steel washers are also installed to protect the shaft seals from impact damage. Guide shafts are lengthened so stroke on extension isn't affected; however, bumpers reduce the retraction stroke if the mounting plate is used in the shipped position (see charts below). Higher loads and velocities may dictate the use of external means of deceleration such as shock absorbers.

Guide Shaft Extension with Bumpers (in)	
Bore Size	Length Adder
2"	0.875
2-1/2"	1.38
3"	1.50

Retraction Stroke Reduction with Bumpers (in)		
Bore Size	With Mounting Plate	Without Mounting Plate
2"	0.81	0.25
2-1/2"	1.06	0.50
3"	1.31	0.75

NOTE: The single set of shaft collars supplied with each Linear Thruster are for setup only. DO NOT use them to limit the stroke or damage can occur. Thin washer included with EB Option to protect housing wipers from impact damage.

Options



NOTE: Maintain the .06" clearance gap between the nylon cap and shock absorber housing to prevent damage to the shock absorber.

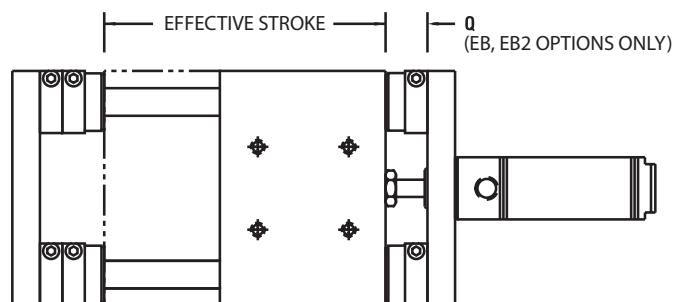
1 The single shaft collars supplied with each Linear Thruster are intended for setup purposes only. They must not be used to limit the stroke or serious damage to the Linear Thruster may occur!

2 Position sensing switch shown in drawing is sold separately.

Model	A	B	C	D	E	F	G	H
02	1.88	1.13	0.56	0.84	2.17	0.40	3.00	.500-20
04/09	2.65	1.60	1.50	1.13	3.13	0.75	3.75	.750-16
17	3.50	2.00	1.75	1.46	4.00	0.84	3.25	.750-16
31/50	3.50	2.25	2.00	1.75	5.31	0.90	4.75	1.00-12
70	5.50	3.50	2.75	1.75	9.25	4.19	4.80	1.00-12

Stroke Reduction Table

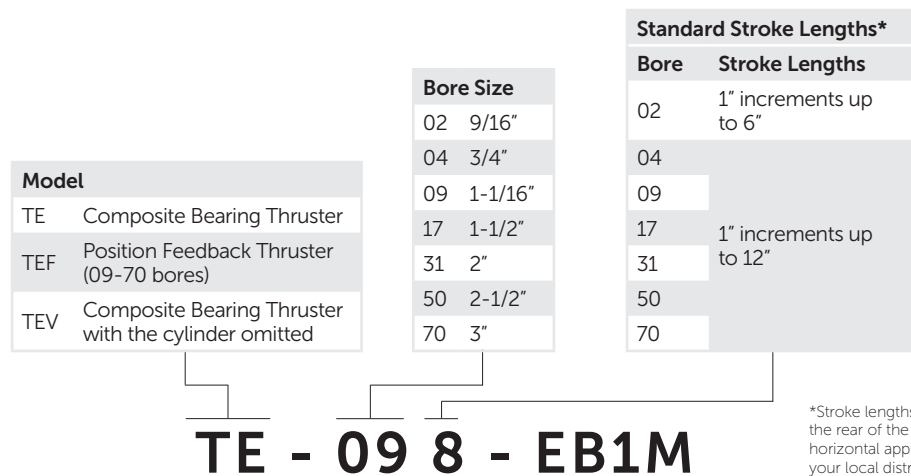
Bore	External Bumper Option			Q
	EB	EB1	EB2	
02	0.41	0.17	0.58	0.62
04/09	0.48	0.18	0.66	0.69
17	0.37	0.32	0.69	0.75
31	0.00	0.47	0.47	0.81
50	0.00	0.39	0.39	0.81
70	0.80	0.00	0.80	1.31



The model number of TE Series Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke lengths, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

All options listed below are to be alphabetically applied to the last part of your Thruster part number, except the EEx.xx option which is length sensitive and should be listed at the very end of all the options selected. Options are listed below in three categories for improved organization and understanding.

Please refer to the charts below for an example of model number TE-098-EB1M. This is a 1-1/16" bore, 8" stroke TE series Linear Thruster with extension external bumpers and a magnet for position sensing.



Thruster Housing Options	
D	Dowel pin holes for Transition Plates ¹
EB1	External Bumpers, Extend (one set) (see page 319)
EB2	External Bumpers, Both Ends (two sets) (see page 319)
Shock Absorbers ²	
K _ _	First _ will be 1 (Shock both ends)
	2 (Shock extend only)
	3 (Shock retract only)
Second _ will be	1 (Light shock)
	2 (Standard shock)
	3 (Heavy shock)
H	Tapped Holes
P	Mounting Plate (includes 12 tapped holes)
S	Stainless Steel Tooling Plate, Shafts, and Collars ²

Cylinder Options	
B	Cylinder option for internal bumpers ^{3,4}
C	Cylinder option for adjustable cushions ^{3,4}
M	MRS® magnetic position sensing ⁵
N	Cylinder option for low temperature service lubricant and seals ⁴
Q	Cylinder option for side ported read head ⁴
T1	Cylinder option for low profile switch track ⁴
V	Cylinder option for high temperature seals and lubricant ⁴
EEX.XX	Cylinder and thruster guide shaft option for extra rod and guide shaft extension ⁴
99	Cylinder option for oil pre-lubrication ⁴

PFC Cylinder options	
L	PFC cylinder option for low friction seals ⁶
PC	PFC cylinder option for M8 corded connector ⁶
PA	PFC cylinder option for M8 plug connector ⁶

¹ Transition Plate Applications: Option -D must be ordered if dowel pin holes are required. Not available in 2-1/2" and 3" bores with S option. Dowel pin hole locations shown in Appendix.

² Not available in 2-1/2" and 3" bores.

³ Internal bumpers and cushions cannot be ordered in combination. Adjustable cushions are not available for 9/16" bore size.

⁴ See Original Line catalog section for more details.

⁵ Hall Effect Switch not available for 9/16" bore size.

⁶ See PFC catalog section for more information.

NOTE: TE Series Linear Thruster includes shaft collars only when external bumpers are ordered as an option (see page 319). Shaft collars can also be ordered separately as a repair part.

Approximate Power Factors		
9/16"	=	0.2
3/4"	=	0.4
1-1/16"	=	0.9
1-1/2"	=	1.7
2"	=	3.1
2-1/2"	=	5.0
3"	=	7.0

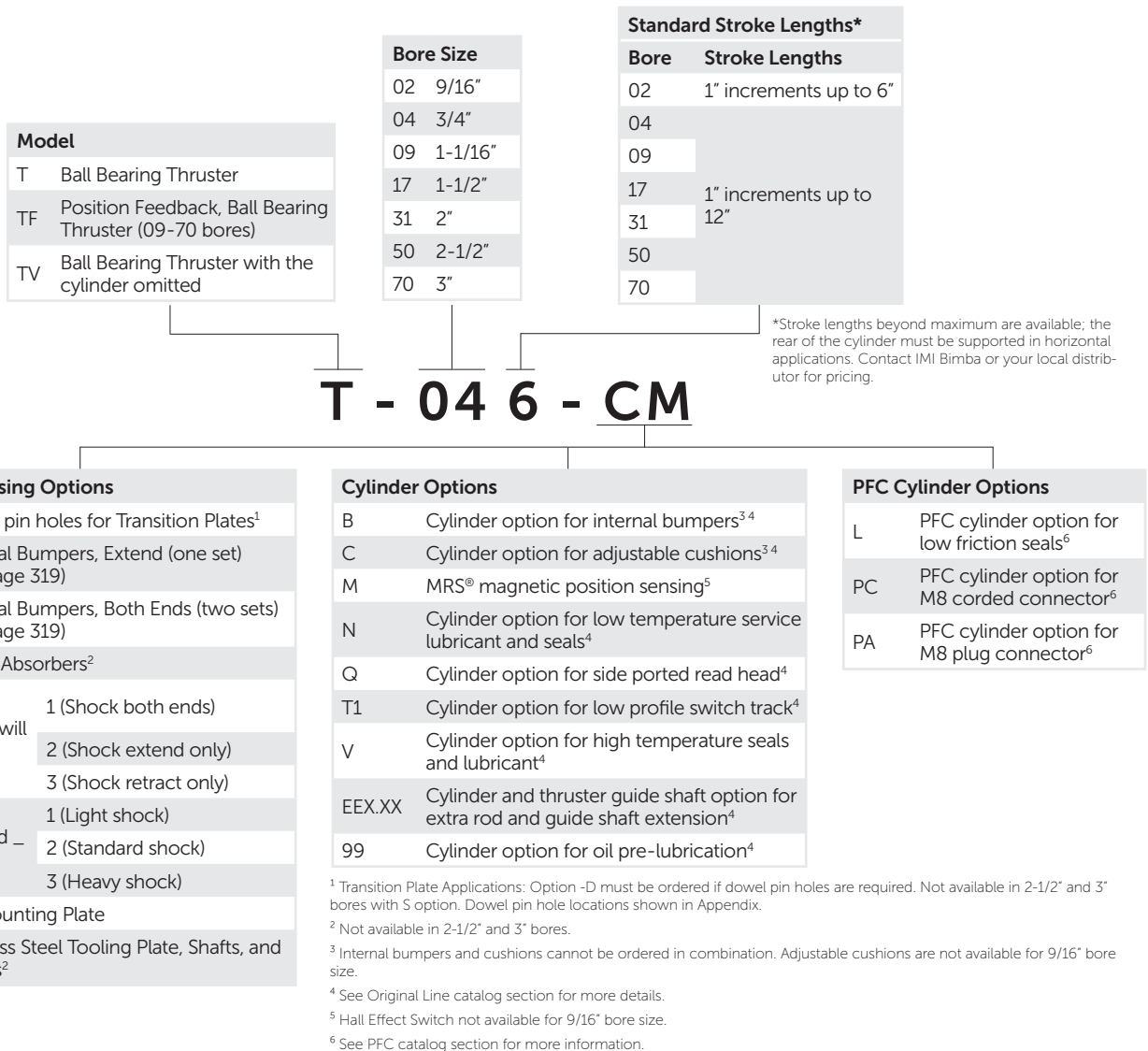
For example, a TE-046-CM will exert a force of 0.4 times the air line pressure; a TE-173-M will exert a force of 1.7 times the air pressure, etc.



The model number of T-Series Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke lengths, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number. **Please note that the following features are standard, and are included in all model numbers: E (inch series threading) and M (magnetic position sensing).**

All options listed below are to be alphabetically applied to the last part of your Thruster part number, except the EEx.xx option which is length sensitive and should be listed at the very end of all the options selected. Options are listed below in three categories for improved organization and understanding.

An example of a basic T Series unit with a 3/4" bore, 6" stroke, adjustable cushions, and a magnet for position sensing.

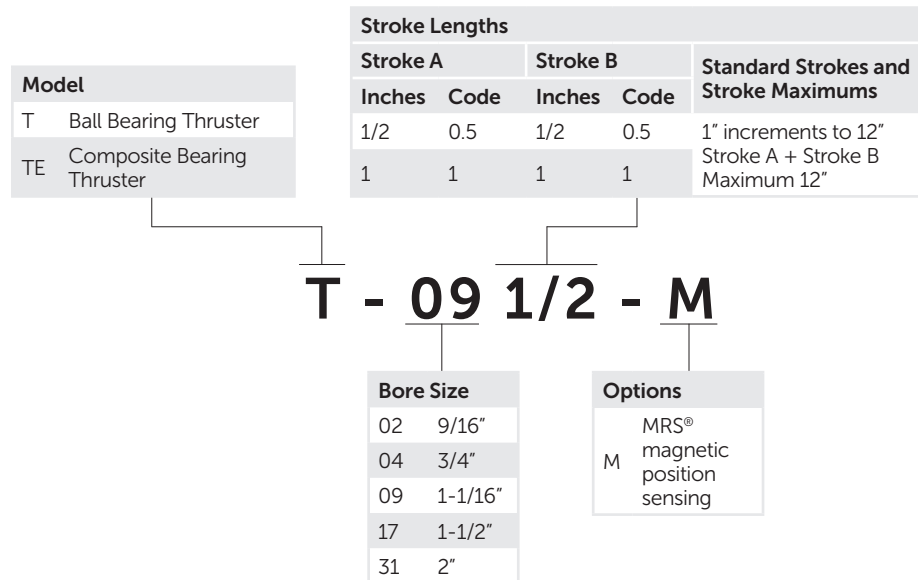


Approximate Power Factors		
9/16"	=	0.2
3/4"	=	0.4
1-1/16"	=	0.9
1-1/2"	=	1.7
2"	=	3.1
2-1/2"	=	5.0
3"	=	7.0

For example, a T-046-CM will exert a force of 0.4 times the air line pressure; a T-173-M will exert a force of 1.7 times the air pressure, etc.

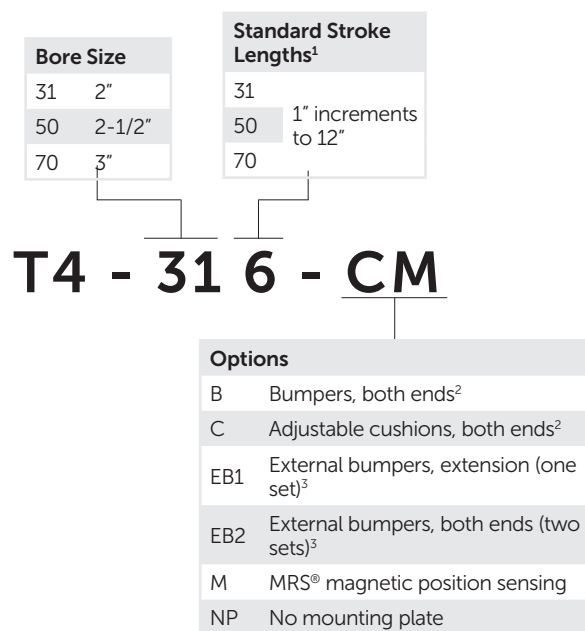
The model number of Multiple Position Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke lengths, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Multiple Position Linear Thruster model with a ball bearing 1-1/16" thruster, initial 1" stroke to the intermediate position, and a total stroke of 3" with a magnet for position sensing.



The model number of T4 Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic T4 unit with a 2" bore, 6" stroke, adjustable cushions, and a magnet for position sensing.



¹ Stroke lengths beyond maximum are available; the rear of the cylinder must be supported in horizontal applications.

² Internal bumpers and cushions cannot be ordered in combination.

³ Shock Absorbers available upon request.

NOTE: For Multiple Position, specify Stroke A/Stroke B.

Approximate Power Factors		
2"	=	3.1
2-1/2"	=	5.0
3"	=	7.0

For example, a T-31-CM will exert a force of 3.1 times the air line pressure.

The model number of Movable Housing Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Movable Housing Linear Thruster model with a 1-1/16" bore, 6" stroke movable housing, external bumpers, and a magnet for position sensing.

Model	
TMH	Ball Bearing Movable Housing Thruster
TEMH	Composite Bearing Movable Housing Thruster
TMHF/ TEMHF	Movable Housing Thruster with Position Feedback (09-70 bores only)
TMHV/ TEMHV	Movable Housing Thruster without the cylinder

Stroke Lengths
1" to 12"
1" increments standard
Any length available
Multiple Position: specify stroke A or stroke B
32" stroke maximum

TMH - 09 6 - EB2M

Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"

Options	
Enter in alphabetical order	
B	Internal bumpers
C	Cushions, both ends
E	Non-lube service seals and lubrication
EB	External bumpers, retract
EB1	External bumpers, extend
EB2	External bumpers, both ends
F	MolyCoated body
G	Grease lubricant
K _ _	Shock absorbers (specify as Thrusters)
L	PFC lip seal
M	Magnet
N	Low temperature service seals and lubrication
Q	Side ported rear head, ports kept in-line
S	Stainless steel shafts
T1, T2, T3	Switch track(s) used to accommodate miniature track mounting
V	High temperature seals and lubrication (bumpers stay)
Z	IMI Bimba 500 Hydraulic Cylinder replaces air cylinder

Repair Parts (TE Models)

Add the bore size to the basic model number shown below. For the Basic Shaft, specify the stroke length in inches and indicate options -EB1 or -EB2 as applicable. For example, shaft collars for a 1-1/16" bore Linear Thruster Series TE would be SCTE-09. The Basic Shaft for the same thruster with 8-1/2" stroke would be BSTE-09-8.5. Cylinder repair part number corresponds to number shown on cylinder shipped with Linear Thruster.

Part Number	Description	Quantity
BTE- _	Shaft Bearing	4
BSTE- _	-X.XX Basic Shaft	2
EBTE- _	External Bumper	2 or 4
LT-Bore Stroke-D	Cylinder	1
LT-Bore Stroke-DB	Cylinder	1
LT-Bore Stroke-DM*	Cylinder	1
LT-Bore Stroke-DBM*	Cylinder	1
LTC-Bore Stroke-D	Cylinder	1
LTC-Bore Stroke-DM	Cylinder	1
SCTE- _	Shaft Collars	2 or 4
TNTE- _	Cylinder Lock Nut	1

*For 1-1/16" bore use LTE prefix.

NOTE: Part numbers listed are individual components. Order the quantity needed to be replaced.

Repair Parts (T Models)

Add the bore size to the basic model number shown below. For the Basic Shaft, specify the stroke length in inches and indicate options -EB1 or -EB2 and -S as applicable. For example, shaft seals for a 1-1/16" bore Linear Thruster would be S-09. The Basic Shaft for the same thruster with 8-1/2" stroke would be BS-09-8.5. Cylinder repair part number corresponds to number shown on cylinder shipped with Linear Thruster.

Part Number	Description	Quantity
B-	Shaft Bearing	4
BS-	-X.XX Basic Shaft	2
EB-	External Bumper Assembly	2 or 4
LT-Bore Stroke-D	Cylinder	1
LT-Bore Stroke-DB	Cylinder	1
LT-Bore Stroke-DM*	Cylinder	1
LT-Bore Stroke-DBM*	Cylinder	1
LTC-Bore Stroke-D	Cylinder	1
LTC-Bore Stroke-DM	Cylinder	1
S-	Shaft Seal	4
SC-	Shaft Collars	2, 4 or 6
TN-	Cylinder Lock Nut	1

NOTE: We recommend that if bearings are replaced, seals be replaced at the same time. Part numbers listed are individual components. Order the quantity needed to be replaced.

*For 1-1/16" bore use LTE prefix.

Repair Parts (T4 Models)

Add the bore size to the basic model number shown below. For the Basic Shaft, specify the stroke length in inches and indicate options -EB1 or -EB2 as applicable. Cylinder repair part number corresponds to number shown on cylinder shipped with Linear Thruster.

Part Number	Description	Quantity
B-	Shaft Bearing	8
BS-	-X.XX Basic Shaft	4
EB-	External Bumper Assembly	4 or 8
LT-Bore Stroke-D	Cylinder	1
LT-Bore Stroke-DB	Cylinder	1
LT-Bore Stroke-DM	Cylinder	1
LT-Bore Stroke-DBM	Cylinder	1
LTC-Bore Stroke-D	Cylinder	1
LTC-Bore Stroke-DM	Cylinder	1
S-	Shaft Seal	8
SC-	Shaft Collars	4, 8 or 16
TN-	Cylinder Lock Nut	1

NOTE: We recommend that if bearings are replaced, seals be replaced at the same time.
Part numbers listed are individual components. Order the quantity needed to be replaced.