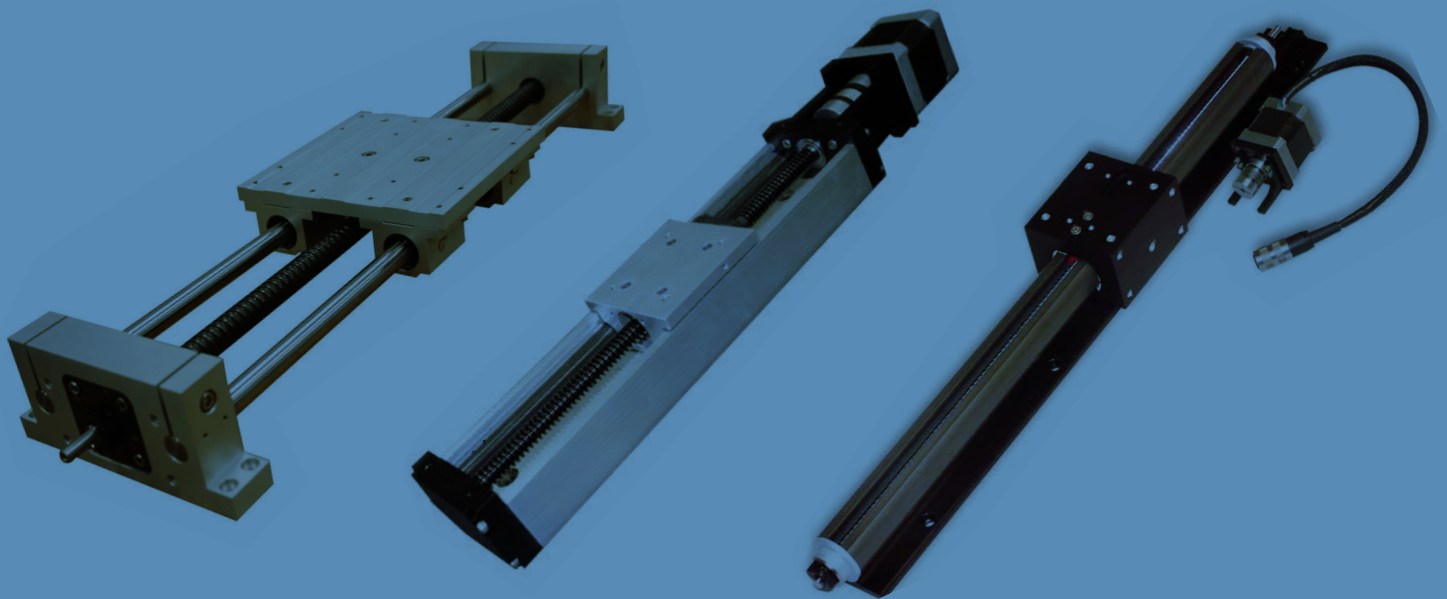




BISHOP

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Expertly Designed, Delivered to Perform



Signature Motion **SteadyRail Systems**

Mechanical Automation Solutions

Positioning Stages & Tables

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Part Number System 4

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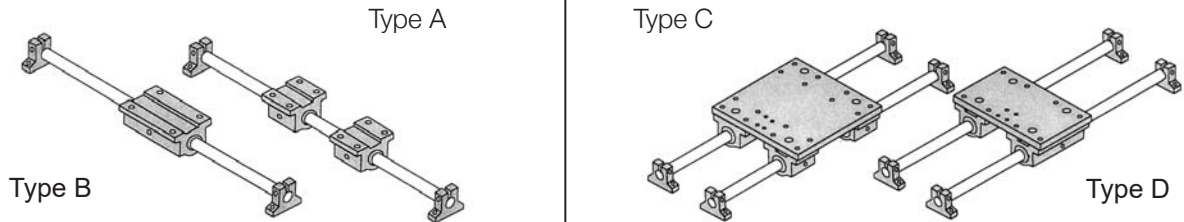
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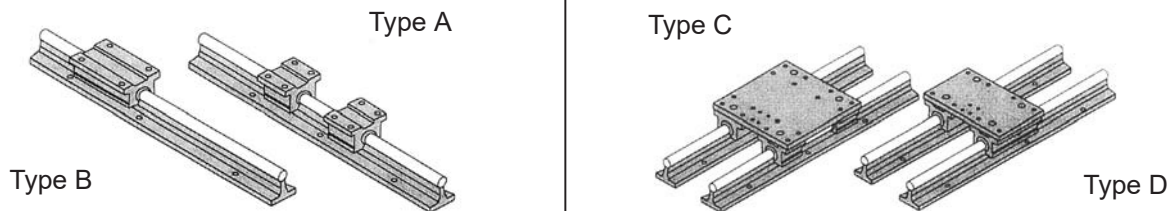
System Overview

BWC Signature Motion SteadyRail™ is constructed of high quality aluminum alloy components and is protected with a clear anodized surface finish.

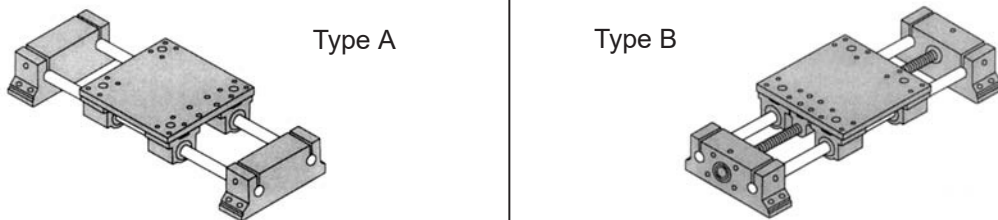
Stage 1 - End Supported Systems



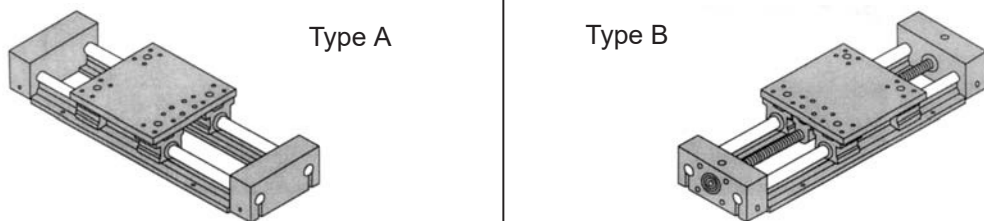
Stage 2 - Continuously Supported Systems



Stage 3 - Double End Supported Systems



Stage 4 - Double Continuously Supported Systems



Part Number System

SteadyRail™ Linear Motion Systems

(Formerly: LM Systems)

1	A	04	A	J	CS	Txx	S	P	HL	Mxxx
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪

Notes:

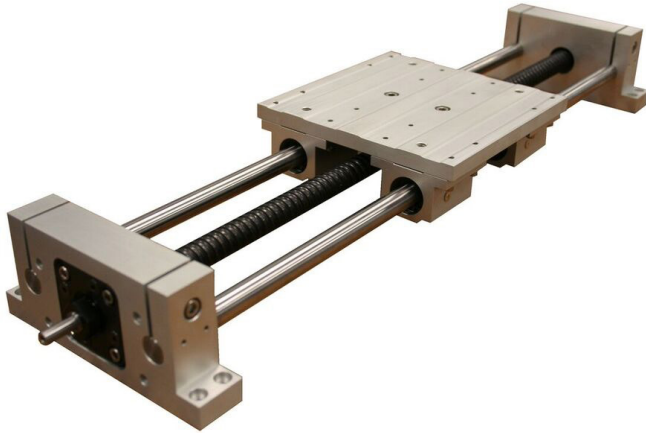
Standard Travel Lengths: 06, 12, 18, 24, 30, 36, 42, 48

Type 1 and 2 use System Length (LXX), Type 3 and 4 use Travel Length (TXX)

Type A systems use travel length based on the two pillow blocks butted together.

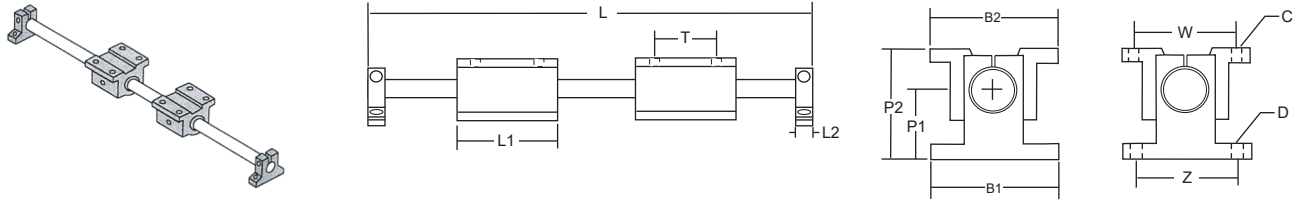
* 0.500" lead ball screw is available only on size 3B12, 3B16, 4B12, 4B16.

①	Part ID:	Stage Number
②	Type Designations:	A = 2 Short Blocks, B = 1 Long Block, C = Short Block Carriage, D = Long Block Carriage
③	Shaft Diameter:	(in 1/16") Specify e.g. 04 = 0.25", 08 = 0.50", 10 = 0.63", 16 = 1" (available shaft sizes dependent on system size)
④	Version:	A
⑤	Pillow Block Type:	Blank = Standard Pillow Blocks, J = Adjustable (J only for stages 2 and 4)
⑥	Shafting Material:	CS = Carbon Steel, SS = Stainless Steel
⑦	Travel or System Length (in inches):	Specify Length in inches; LXX for Type 1 & 2, TXX for Type 3 & 4
⑧	Screw Lead:	Blank (Types 1, 2, 3A, and 4A only), S = Ball Screw (0.631" for size 08 & 10, 3/4" for size 12 & 16)
⑨	Screw Lead:	Blank (Types 1, 2, 3A, and 4A only), P = 0.200", U = 0.500" *
⑩	Home & Limit Switches:	Blank (Types 1, 2, 3A, and 4A only), NN = None; HL = Home & Limit
⑪	Motor Option:	Blank (Types 1, 2, 3A, and 4A only), Number or letter designation (Contact BW for detailed options).



STAGE 1 TYPE A & B - End Supported System

Type A / Single Pillow Blocks



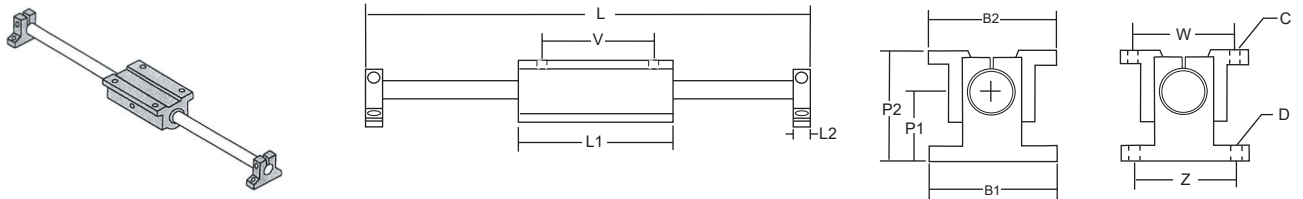
Unit: inch

Part No.	Shaft Dia.	Max. Load * (lbs.)	L	L1	L2	B1	B2	P1	P2	W	T	Z	C Thru Hole / Bolt Size	D Thru Hole / Bolt Size
1A-04	0.250	120	See Below	1.19	0.50	1.50	1.63	0.688	1.125	1.312	0.750	1.12	0.156 / #6	0.156 / #6
1A-06	0.375	190		1.31	0.56	1.63	1.75	0.750	1.250	1.437	0.875	1.25	0.156 / #6	0.156 / #6
1A-08	0.500	460		1.69	0.63	2.00	2.00	1.000	1.687	1.688	1.000	1.50	0.156 / #6	0.188 / #8
1A-10	0.625	800		1.94	0.69	2.50	2.50	1.000	1.875	2.125	1.125	1.88	0.188 / #8	0.218 / #10
1A-12	0.750	940		2.06	0.75	2.50	2.75	1.250	2.187	2.375	1.250	2.00	0.188 / #8	0.218 / #10
1A-16	1.000	1700		2.81	1.00	3.06	3.25	1.500	2.687	2.875	1.750	2.50	0.219 / #10	0.281 / 1/4

* Based on a travel of 2 million inches.

System Type	Standard System Lengths (L)						
Stage 1 - A	12"	18"	24"	30"	36"	42"	48"

Type B / Double Wide Pillow Blocks



Unit: inch

Part No.	Shaft Dia.	Max. Load * (lbs.)	L	L1	L2	B1	B2	P1	P2	W	V	Z	C Thru Hole / Bolt Size	D Thru Hole / Bolt Size
1B-04	0.250	96	See Below	2.50	0.50	1.50	1.630	0.688	1.125	1.312	2.000	1.12	0.156 / #6	0.156 / #6
1B-06	0.375	150		2.75	0.56	1.63	1.750	0.750	1.250	1.437	2.250	1.25	0.156 / #6	0.156 / #6
1B-08	0.500	370		3.50	0.63	2.00	2.000	1.000	1.687	1.688	2.500	1.50	0.156 / #6	0.188 / #8
1B-10	0.625	640		4.00	0.69	2.50	2.500	1.000	1.875	2.125	3.000	1.88	0.188 / #8	0.218 / #10
1B-12	0.750	750		4.50	0.75	2.50	2.750	1.250	2.187	2.375	3.500	2.00	0.188 / #8	0.218 / #10
1B-16	1.000	1360		6.00	1.00	3.06	3.250	1.500	2.687	2.875	4.500	2.50	0.219 / #10	0.281 / 1/4

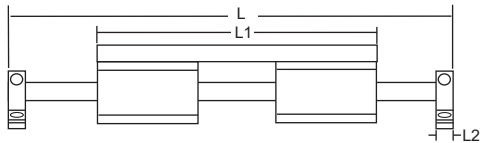
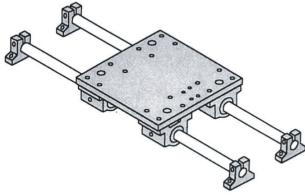
* Based on a travel of 2 million inches.

System Type	Standard System Lengths (L)						
Stage 1 - B	12"	18"	24"	30"	36"	42"	48"

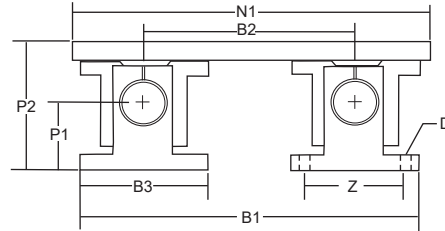
Travel length is calculated by subtracting the pillow block length (L1) and both the end support block length (L2) from the total system length (L).

STAGE 1 TYPE C - End Supported System

Type C / Single Pillow Blocks



Travel length is calculated by subtracting the carriage length (L1) and both the end support block length (L2) from the total system length (L).



Unit: inch

Part No.	Shaft Dia.	Max. Load * (lbs.)	L	L1	L2	B1	B2	B3	N1	P1	P2	Z	D Thru Hole / Bolt Size
1C-04	0.250	240	See Below	4.00	0.50	3.75	2.25	1.50	4.00	0.688	1.375	1.12	0.156 / #6
1C-06	0.375	380		4.50	0.56	4.13	2.50	1.63	4.50	0.750	1.500	1.25	0.156 / #6
1C-08	0.500	920		5.50	0.63	5.25	3.25	2.00	5.50	1.000	2.063	1.50	0.188 / #8
1C-10	0.625	1600		6.50	0.69	6.25	3.75	2.50	6.50	1.000	2.250	1.88	0.218 / #10
1C-12	0.750	1880		7.50	0.75	7.00	4.50	2.50	7.50	1.250	2.688	2.00	0.218 / #10
1C-16	1.000	3400		9.00	1.00	8.56	5.50	3.06	9.00	1.500	3.188	2.50	0.281 / 1/4

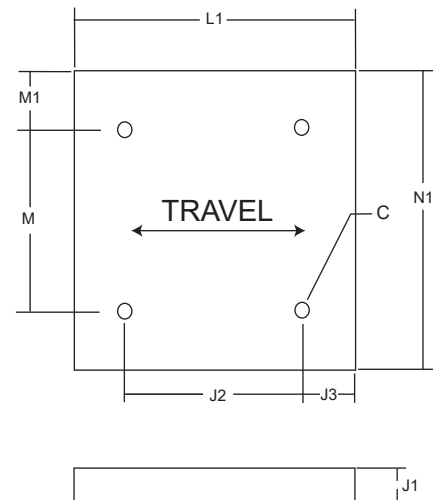
* Based on a travel of 2 million inches.

System Type	Standard System Lengths (L)						
Stage 1 - C	12"	18"	24"	30"	36"	42"	48"

Stage 1 Type C Carriage Dimensions

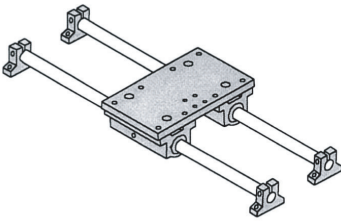
Unit: inch

Part No.	Dia.	M	M1	J1	C	J2	J3	L1	N1
1C-04	0.250	2.25	0.88	0.25	#8-32	3.50	0.25	4.00	4.00
1C-06	0.375	2.50	1.00	0.25	#10-32	3.75	0.38	4.50	4.50
1C-08	0.500	3.25	1.13	0.37	1/4-20	4.50	0.50	5.50	5.50
1C-10	0.625	3.75	1.38	0.37	1/4-20	5.25	0.63	6.50	6.50
1C-12	0.750	4.50	1.50	0.50	5/16-18	6.00	0.75	7.50	7.50
1C-16	1.000	5.50	1.75	0.50	3/8-16	7.00	1.00	9.00	9.00

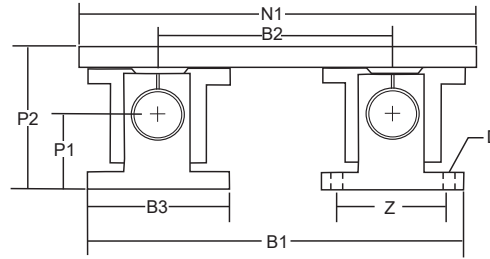
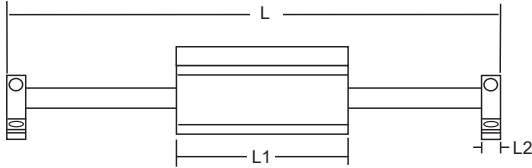


STAGE 1 TYPE D - End Supported System

Type D / Double Wide Pillow Blocks



Travel length is calculated by subtracting the carriage length (L1) and both the end support block length (L2) from the total system length (L).



Unit: inch

Part No.	Shaft Dia.	Max. Load * (lbs.)	L	L1	L2	B1	B2	B3	N1	P1	P2	Z	D Thru Hole / Bolt Size
1D-04	0.250	192	See Below	2.50	0.50	3.75	2.25	1.50	4.00	0.688	1.375	1.12	0.156 / #6
1D-06	0.375	300		2.75	0.56	4.13	2.50	1.63	4.50	0.750	1.500	1.25	0.156 / #6
1D-08	0.500	740		3.50	0.63	5.25	3.25	2.00	5.50	1.000	2.063	1.50	0.188 / #8
1D-10	0.625	1280		4.00	0.69	6.25	3.75	2.50	6.50	1.000	2.250	1.88	0.218 / #8
1D-12	0.750	1500		4.50	0.75	7.00	4.50	2.50	7.50	1.250	2.688	2.00	0.218 / #8
1D-16	1.000	2720		6.00	1.00	8.56	5.50	3.06	9.00	1.500	3.188	2.50	0.281 / 1/4

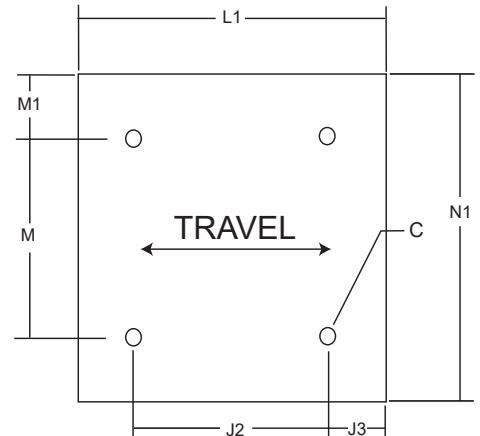
* Based on a travel of 2 million inches.

System Type	Standard System Lengths (L)						
Stage 1 - D	12"	18"	24"	30"	36"	42"	48"

Stage 1 Type D Carriage Dimensions

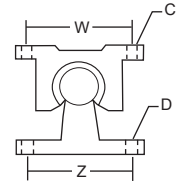
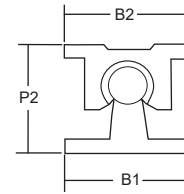
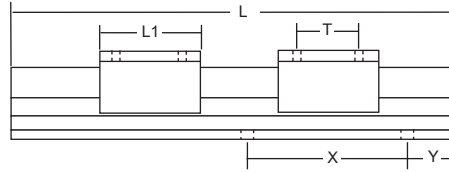
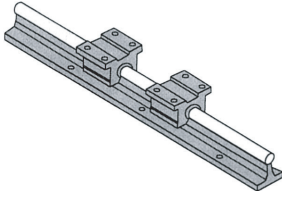
Unit: inch

Part No.	Dia.	M	M1	J1	C	J2	J3	L1	N1
1D-04	0.250	2.25	0.88	0.25	#8-32	2.00	0.25	2.50	4.00
1D-06	0.375	2.50	1.00	0.25	#10-32	2.00	0.38	2.75	4.50
1D-08	0.500	3.25	1.13	0.37	1/4-20	2.50	0.50	3.50	5.50
1D-10	0.625	3.75	1.38	0.37	1/4-20	3.00	0.50	4.00	6.50
1D-12	0.750	4.50	1.50	0.50	5/16-18	3.50	0.50	4.50	7.50
1D-16	1.000	5.50	1.75	0.50	3/8-16	4.50	0.75	6.00	9.00



STAGE 2 TYPE A & B - Continuously Supported System

Type A / Single Pillow Blocks



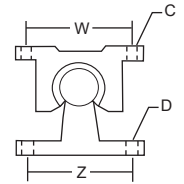
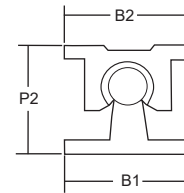
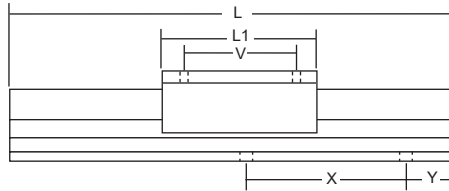
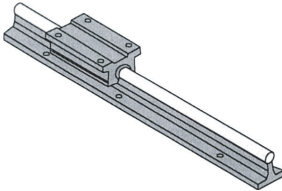
Unit: inch

Part No.	Shaft Dia.	Max. Load * (lbs.)	L	L1	B1	B2	P2	W	T	X	Y	Z	C Thru Hole / Bolt Size	D Thru Hole / Bolt Size
2A-08	0.500	460	See Below	1.50	1.50	2.00	1.812	1.688	1.00	4.00	2.00	1.000	0.156 / #6	0.169 / #6
2A-10	0.625	800		1.75	1.63	2.50	2.000	2.125	1.13	4.00	2.00	1.125	0.188 / #8	0.193 / #8
2A-12	0.750	940		1.88	1.75	2.75	2.437	2.375	1.25	6.00	3.00	1.250	0.188 / #8	0.221 / #10
2A-16	1.000	1700		2.63	2.13	3.25	2.937	2.875	1.75	6.00	3.00	1.500	0.219 / #10	0.281 / 1/4

* Based on a travel of 2 million inches.

System Type	Standard System Lengths (L)						
Stage 2 - A	12"	18"	24"	30"	36"	42"	48"

Type B / Double Wide Pillow Blocks



Unit: inch

Part No.	Shaft Dia.	Max. Load * (lbs.)	L	L1	B1	B2	P2	W	V	X	Y	Z	C Thru Hole / Bolt Size	D Thru Hole / Bolt Size
2B-08	0.500	370	See Below	3.50	1.50	2.00	1.812	1.688	2.50	4.00	2.00	1.000	0.156 / #6	0.169 / #6
2B-10	0.625	640		4.00	1.63	2.50	2.000	2.125	3.00	4.00	2.00	1.125	0.188 / #8	0.193 / #8
2B-12	0.750	750		4.50	1.75	2.75	2.437	2.375	3.50	6.00	3.00	1.250	0.188 / #8	0.221 / #10
2B-16	1.000	1360		6.00	2.13	3.25	2.937	2.875	4.50	6.00	3.00	1.500	0.219 / #10	0.281 / 1/4

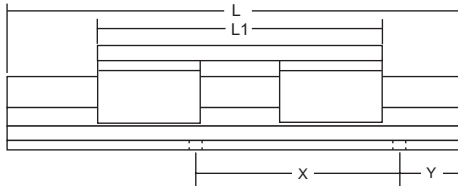
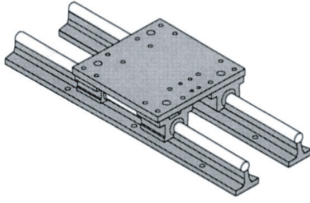
* Based on a travel of 2 million inches.

System Type	Standard System Lengths (L)						
Stage 2 - B	12"	18"	24"	30"	36"	42"	48"

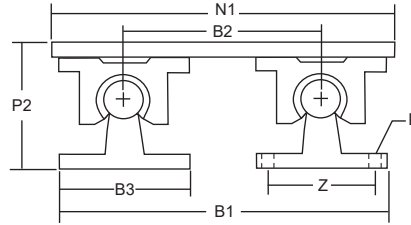
Travel length is calculated by subtracting the pillow block length (L1) from the total system length (L).

STAGE 2 TYPE C - Continuously Supported System

Type C / Single Pillow Blocks



Travel length is calculated by subtracting the carriage length (L1) from the total system length (L).



Unit: inch

Part No.	Shaft Dia.	Max. Load * (lbs.)	L	L1	B1	B2	B3	N1	P2	X	Y	Z	D Thru Hole / Bolt Size
2C-08	0.500	920	See Below	5.50	4.75	3.25	1.50	5.50	2.187	4.00	2.00**	1.000	0.177 / #6
2C-10	0.625	1600		6.50	5.38	3.75	1.63	6.50	2.375	4.00	2.00**	1.125	0.193 / #8
2C-12	0.750	1880		7.50	6.25	4.50	1.75	7.50	2.937	6.00	3.00	1.250	0.221 / #10
2C-16	1.000	3400		9.00	7.63	5.50	2.13	9.00	3.437	6.00	3.00	1.500	0.281 / 1/4

* Based on a travel of 2 million inches.

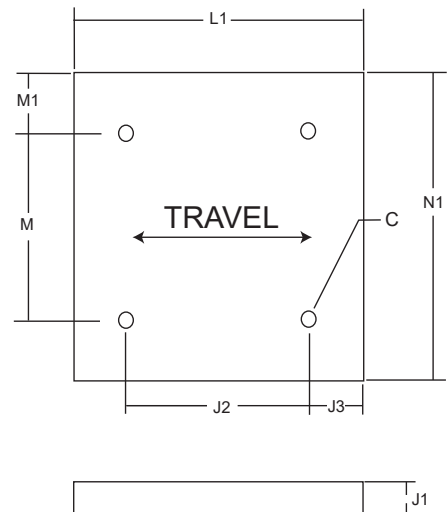
** For 18", 30", and 42" system lengths subtract 1" of "Y" dimension.

System Type	Standard System Lengths (L)						
Stage 2 - C	12"	18"	24"	30"	36"	42"	48"

Stage 2 Type C Carriage Dimensions

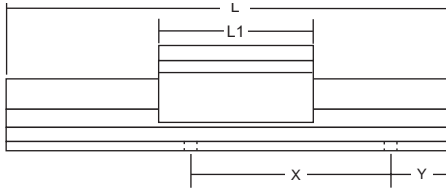
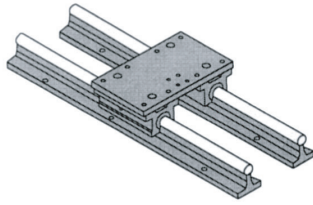
Unit: inch

Part No.	Dia.	M	M1	J1	C	J2	J3	L1	N1
2C-08	0.500	3.25	1.13	0.37	1/4-20	4.50	0.50	5.50	5.50
2C-10	0.625	3.75	1.38	0.37	1/4-20	5.25	0.63	6.50	6.50
2C-12	0.750	4.50	1.50	0.50	5/16-18	6.00	0.75	7.50	7.50
2C-16	1.000	5.50	1.75	0.50	3/8-16	7.00	1.00	9.00	9.00

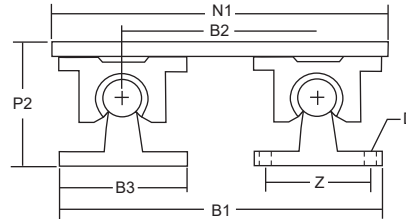


STAGE 2 TYPE D - Continuously Supported System

Type D / Double Wide Pillow Blocks



Travel length is calculated by subtracting the carriage length (L1) from the total system length (L).



Unit: inch

Part No.	Shaft Dia.	Max. Load *	L	L1	B1	B2	B3	N1	P2	X	Y	Z	D Thru Hole / Bolt Size
2D-08	0.500	740	See Below	3.50	4.75	3.25	1.50	5.50	2.187	4.00	2.00**	1.000	0.177 / #6
2D-10	0.625	1280		4.00	5.38	3.75	1.63	6.50	2.375	4.00	2.00**	1.125	0.193 / #8
2D-12	0.750	1500		4.50	6.25	4.50	1.75	7.50	2.937	6.00	3.00	1.250	0.221 / #10
2D-16	1.000	2720		6.00	7.63	5.50	2.13	9.00	3.437	6.00	3.00	1.500	0.281 / 1/4

* Based on a travel of 2 million inches.

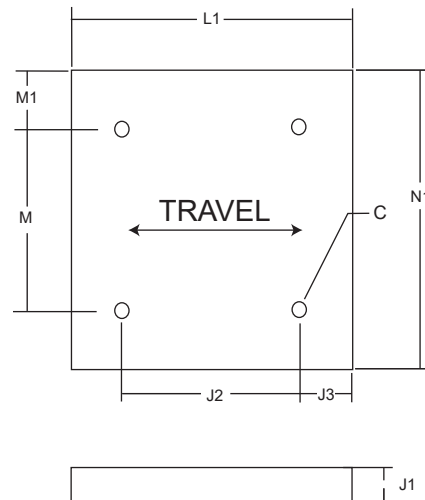
** For 18", 30", and 42" system lengths subtract 1" of "Y" dimension.

System Type	Standard System Lengths (L)						
Stage 2 - D	12"	18"	24"	30"	36"	42"	48"

Stage 2 Type D Carriage Dimensions

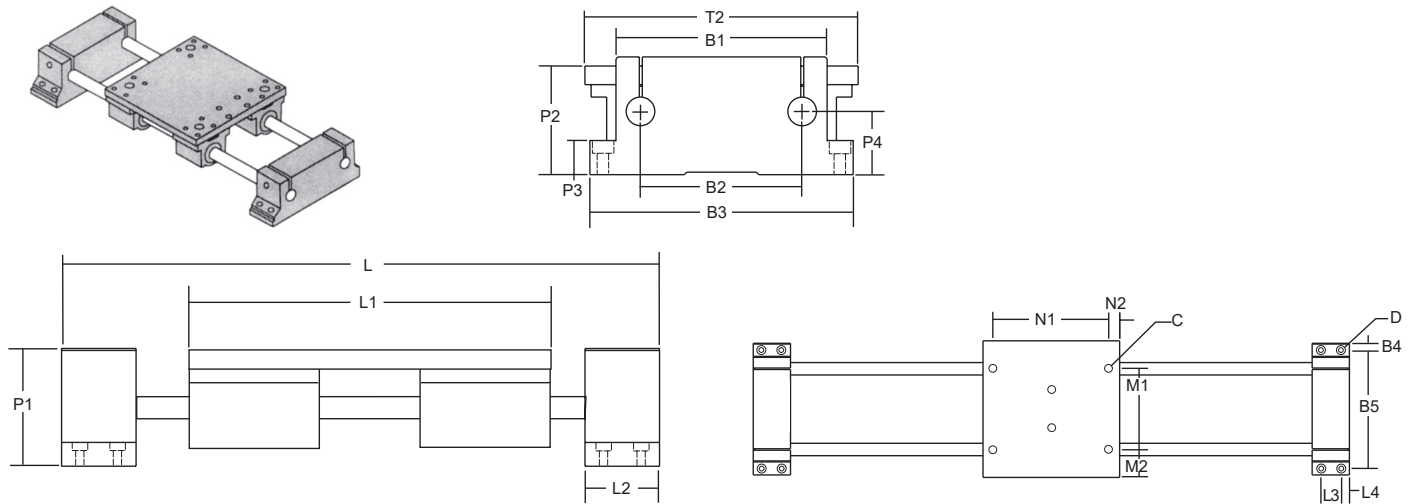
Unit: inch

Part No.	Dia.	M	M1	J1	C	J2	J3	L1	N1
2D-08	0.500	3.25	1.13	0.37	1/4-20	2.50	0.50	3.50	5.50
2D-10	0.625	3.75	1.38	0.37	1/4-20	3.00	0.50	4.00	6.50
2D-12	0.750	4.50	1.50	0.50	5/16-18	3.50	0.50	4.50	7.50
2D-16	1.000	5.50	1.75	0.50	3/8-16	4.50	0.75	6.00	9.00



STAGE 3 TYPE A - End Supported System

Type A / Single Pillow Blocks



Unit: inch

Part No.	Shaft Dia.	Max Load * (lbs.)	L	L1	L2	L3	L4	B1	B2	B3	B4	B5	M1	M2	N1	N2	P1	P2	P3	P4	T2	C	D	
																							Bolt	Hole
3A-08	0.500	920	See Below	5.50	1.00	0.56	0.22	4.25	3.25	5.30	0.25	4.80	3.25	1.125	4.50	0.50	2.38	2.187	0.50	1.125	5.50	1/4-20	#8	0.19
3A-10	0.625	1600		6.50	1.00	0.56	0.22	5.00	3.75	6.25	0.25	5.75	3.75	1.375	5.25	0.63	2.38	2.375	0.60	1.313	6.50	1/4-20	#8	0.19
3A-12	0.750	1880		7.50	1.30	0.80	0.25	6.00	4.50	7.20	0.25	6.70	4.50	1.500	6.00	0.75	2.75	2.937	0.75	1.500	7.50	5/16-18	#10	0.22
3A-16	1.000	3400		9.00	1.30	0.74	0.28	7.25	5.50	8.70	0.35	8.00	5.50	1.750	7.00	1.00	3.37	3.437	0.75	1.750	9.00	3/8-16	1/4	0.28

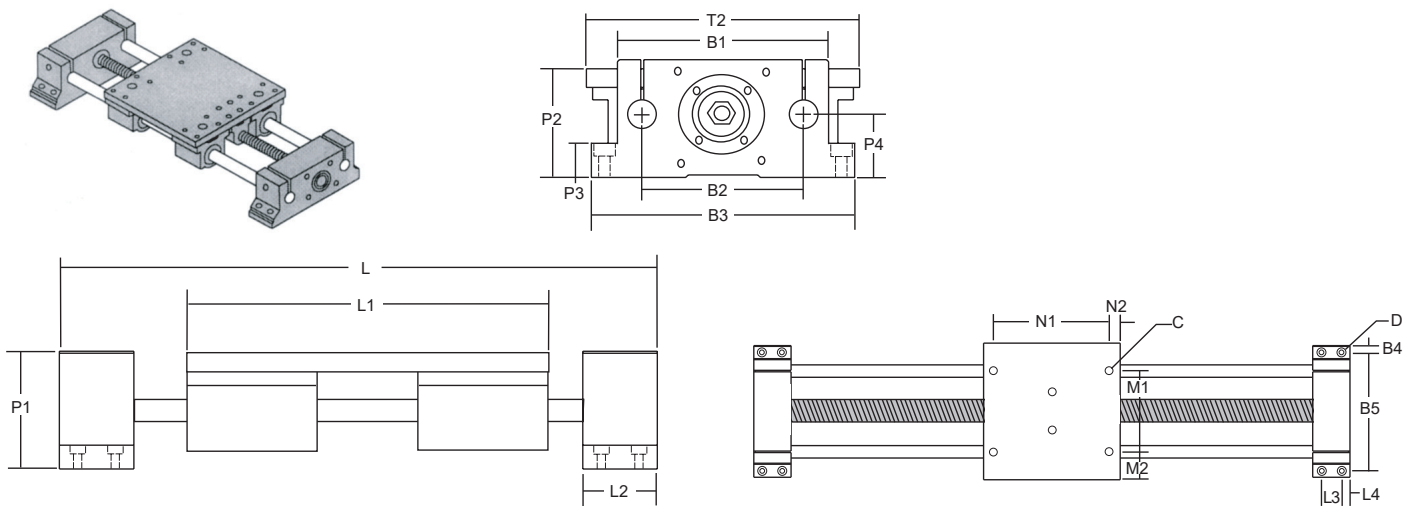
* Based on a travel of 2 million inches.

Unit: inch

Travel	Overall System Length (L)			
	3A-08	3A-10	3A-12	3A-16
6	13.5	14.5	16.1	17.6
12	19.5	20.5	22.1	23.6
18	25.5	26.5	28.1	29.6
24	31.5	32.5	34.1	35.6
30	37.5	38.5	40.1	41.6
36	43.5	44.5	46.1	47.6
42	49.5	50.5	52.1	53.6

STAGE 3 TYPE B - End Supported System with Ball Screw

Type B / Single Pillow Blocks



Unit: inch

Part No.	Shaft Dia.	Max Load * (lbs.)	L	L1	L2	L3	L4	B1	B2	B3	B4	B5	M1	M2	N1	N2	P1	P2	P3	P4	T2	C	D	
																							Bolt	Hole
3B-08	0.500	920	See Below	5.50	1.00	0.56	0.22	4.25	3.25	5.30	0.25	4.80	3.25	1.125	4.50	0.50	2.38	2.187	0.50	1.125	5.50	1/4-20	#8	0.19
3B-10	0.625	1600		6.50	1.00	0.56	0.22	5.00	3.75	6.25	0.25	5.75	3.75	1.375	5.25	0.63	2.38	2.375	0.60	1.313	6.50	1/4-20	#8	0.19
3B-12	0.750	1880		7.50	1.30	0.80	0.25	6.00	4.50	7.20	0.25	6.70	4.50	1.500	6.00	0.75	2.75	2.937	0.75	1.500	7.50	5/16-18	#10	0.22
3B-16	1.000	3400		9.00	1.30	0.74	0.28	7.25	5.50	8.70	0.35	8.00	5.50	1.750	7.00	1.00	3.37	3.437	0.75	1.750	9.00	3/8-16	1/4	0.28

* Based on a travel of 2 million inches.

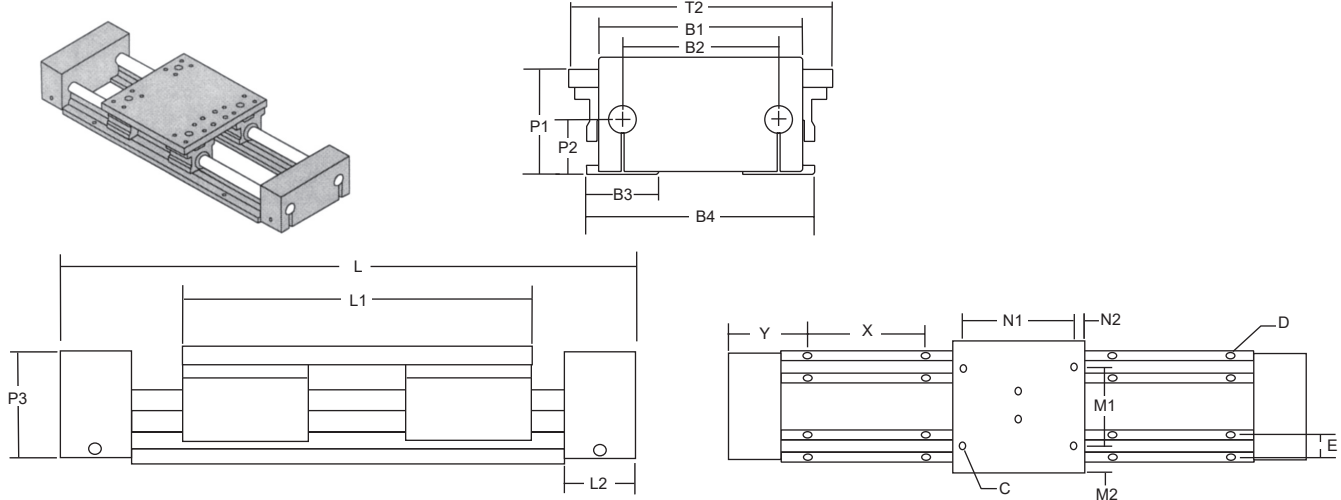
Unit: inch

Travel	Overall System Length (L)			
	3B-08	3B-10	3B-12	3B-16
6	13.5	14.5	16.1	17.6
12	19.5	20.5	22.1	23.6
18	25.5	26.5	28.1	29.6
24	31.5	32.5	34.1	35.6
30	37.5	38.5	40.1	41.6
36	43.5	44.5	46.1	47.6
42	49.5	50.5	52.1	53.6

Various ball screw & lead screw options available. See page 4 for standard options
Please specify screw lead when ordering or call BWC for available options.

STAGE 4 TYPE A - Continuously Supported System

Type A / Single Pillow Blocks



Unit: inch

Part No.	Shaft Dia.	Max Load * (lbs.)	L	L1	L2	B1	B2	B3	B4	M1	M2	N1	N2	P1	P2	P3	T2	C	D		E	X	Y
																			Bolt	Hole			
4A-08	0.500	920	See Below	5.50	1.00	4.25	3.25	1.50	4.75	3.25	1.125	4.50	0.50	2.187	1.125	2.38	5.50	1/4-20	#6	0.17	1	4.00	2.75**
4A-10	0.625	1600		6.50	1.00	5.00	3.75	1.63	5.38	3.75	1.375	5.25	0.63	2.375	1.125	2.38	6.50	1/4-20	#8	0.19	1-1/8	4.00	3.25**
4A-12	0.750	1880		7.50	1.30	6.00	4.50	1.75	6.25	4.50	1.500	6.00	0.75	2.937	1.500	2.75	7.50	5/16-18	#10	0.22	1-1/4	6.00	2.05
4A-16	1.000	3400		9.00	1.30	7.25	5.50	2.13	7.63	5.50	1.750	7.00	1.00	3.437	1.750	3.37	9.00	3/8-16	1/4	0.28	1-1/2	6.00	2.80

* Based on a travel of 2 million inches.

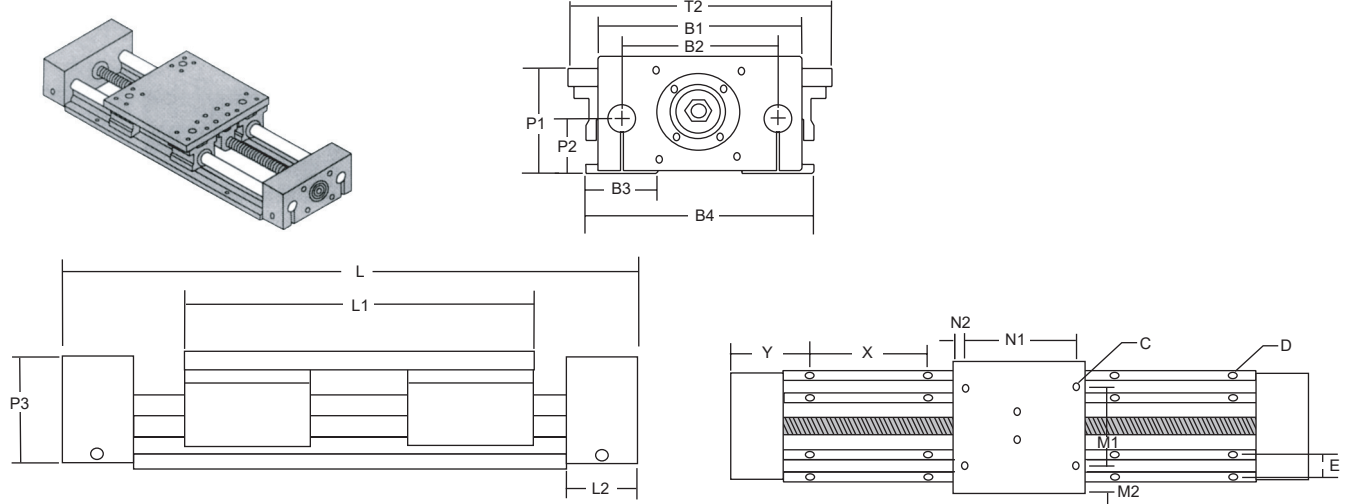
** For 12", 24", and 36" travel lengths subtract 1" of "Y" dimension.

Unit: inch

Travel	Overall System Length (L)			
	4A-08	4A-10	4A-12	4A-16
6	13.5	14.5	16.1	17.6
12	19.5	20.5	22.1	23.6
18	25.5	26.5	28.1	29.6
24	31.5	32.5	34.1	35.6
30	37.5	38.5	40.1	41.6
36	43.5	44.5	46.1	47.6
42	49.5	50.5	52.1	53.6

STAGE 4 TYPE B - Continuously Supported System with Ball Screw

Type B / Single Pillow Blocks



Unit: inch

Part No.	Shaft Dia.	Max Load * (lbs.)	L	L1	L2	B1	B2	B3	B4	M1	M2	N1	N2	P1	P2	P3	T2	C	D		E	X	Y
																			Bolt	Hole			
4B-08	0.500	920	See Below	5.50	1.00	4.25	3.25	1.50	4.75	3.25	1.125	4.50	0.50	2.187	1.125	2.38	5.50	1/4-20	#6	0.17	1	4.00	2.75**
4B-10	0.625	1600		6.50	1.00	5.00	3.75	1.63	5.38	3.75	1.375	5.25	0.63	2.375	1.125	2.38	6.50	1/4-20	#8	0.19	1-1/8	4.00	3.25**
4B-12	0.750	1880		7.50	1.30	6.00	4.50	1.75	6.25	4.50	1.500	6.00	0.75	2.937	1.500	2.75	7.50	5/16-18	#10	0.22	1-1/4	6.00	2.05
4B-16	1.000	3400		9.00	1.30	7.25	5.50	2.13	7.63	5.50	1.750	7.00	1.00	3.437	1.750	3.37	9.00	3/8-16	1/4	0.28	1-1/2	6.00	2.80

* Based on a travel of 2 million inches.

** For 12", 24", and 36" travel lengths subtract 1" of "Y" dimension.

Unit: inch

Travel	Overall System Length (L)			
	4B-08	4B-10	4B-12	4B-16
6	13.5	14.5	16.1	17.6
12	19.5	20.5	22.1	23.6
18	25.5	26.5	28.1	29.6
24	31.5	32.5	34.1	35.6
30	37.5	38.5	40.1	41.6
36	43.5	44.5	46.1	47.6
42	49.5	50.5	52.1	53.6

Various ball screw & lead screw options available. See page 4 for standard options
Please specify screw lead when ordering or call BWC for available options.

BASIC DYNAMIC LOAD (C)

This term is arrived at based upon evaluation of a number of identical linear systems individually run in the same conditions. 90% of them can run with the load (with a constant value in the constant direction) for a distance of 2,000,000 inches without damage caused by rolling fatigue. This is the basis of this rating.

BASIC STATIC LOAD RATING (CO)

This term defines a static load such that at the contracting position where the maximum stress is exercised, the sum of the permanent deformation of the rolling elements and that of the rolling plane is 0.0001 times the diameter of the rolling element.

AMBIENT WORKING TEMPERATURE

The ambient working temperature range for each linear system depends on the model. Consult BWC on use outside the recommended temperature range.

Notice that the ambient working temperature range for sealed linear systems made of stainless steel is from -20° C to 120° C. Temperature conversion equation:

$$C = \frac{5}{9} (F - 32) \quad F = 32 + \frac{9}{5} C$$

Linear System Type	Ambient Working Temperature
Linear Motion Bushing	-20 to 70°C
Pillow Blocks	-20 to 70°C

FRICTIONAL RESISTANCE

The frictional resistance is expressed by the following equation:

$$F = \mu \times W + f$$

F: Frictional resistance μ : Coefficient of friction

W: Load weight f: Sealing resistance

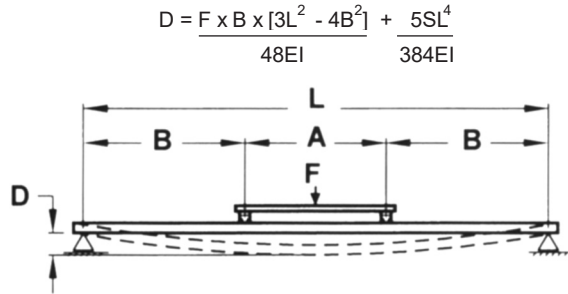
The frictional resistance of each linear system depends upon the model, load weight, speed, and lubricant. The sealing resistance depends on the lip of interference and lubricant, regardless of the load weight. The sealing resistance of one linear system is about 200 to 500gf. The coefficient of friction depends on the load weight, moment load, and preload. The chart below shows the coefficient of kinetic friction of each type of linear system which has been installed and lubricated properly and applied with normal load is: ($P/C = 0.2$). P = Applied Load, C = Rated Load.

Coefficient of Friction (μ)

Linear System Type	Coefficient of Friction
Recirculating Bushing	0.002 to 0.003
Linear Motion Bushing	0.002 to 0.003

SHAFT DEFLECTION

The function and the service life of a system can be greatly reduced and even cause premature failures if shaft deflection is not observed. We have provided an equation to help calculate the maximum shaft deflection for your selected condition.



D = Deflection (in)
 L = Distance between shaft and support (in)
 E = Modulus of elasticity (lbf / in²)
 I = Shafts moment of inertia (in⁴)
 S = Shaft unit weight (lbf / in)
 F = Load (including carriage weight) (lbf)
 A = Distance between carriage bearings (in)
 B = (L - A) / 2 (in)

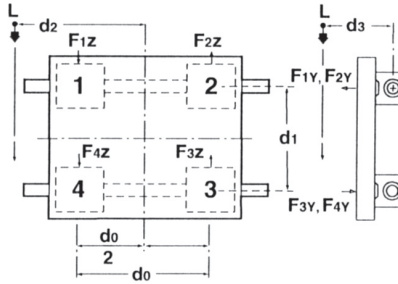
Solid Shaft			Metric Shaft		
Shaft Dia.	EI	S	Shaft Dia.	EI	S
(inch)	(lbf x in ²)	(lbf / in)	(mm)	(lbf x in ²)	(lbf / in)
0.250	5.75 x 10 ³	0.014	8	1.45 x 10 ⁴	0.022
0.375	2.97 x 10 ⁴	0.031	12	7.34 x 10 ⁴	0.050
0.500	9.20 x 10 ⁴	0.055	16	2.32 x 10 ⁵	0.088
0.625	2.25 x 10 ⁵	0.086	20	5.66 x 10 ⁵	0.138
0.750	4.66 x 10 ⁵	0.125	25	1.38 x 10 ⁶	0.216
0.875	8.63 x 10 ⁵	0.170	30	2.87 x 10 ⁶	0.311
1.000	1.47 x 10 ⁶	0.222	40	9.06 x 10 ⁶	0.552
1.125	2.36 x 10 ⁶	0.281	50	2.21 x 10 ⁷	0.863
1.250	3.60 x 10 ⁶	0.348			

LOAD CONSIDERATIONS

The loads acting upon a bearing of a linear motion system are important for the proper system selection. When designing a linear motion system it is necessary to consider these loads and the variables of operation and what affect they will have on performance. The following equations demonstrate how the position of the load and center of gravity can influence the system selection. When evaluating your application, review each of the forces acting on your system and determine the system best for your needs.

Vertical Load

At the time of movement with uniform velocity or at the time of stop. At the time of acceleration, the load varies because of inertia.



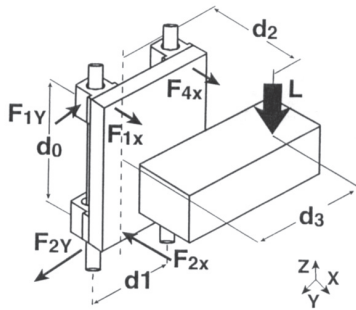
$$F_{1Y} \sim F_{4Y} = \frac{L}{2} \times \frac{d_3}{d_1}$$

$$F_{1Z} \sim F_{4Z} = \frac{L}{4} + \frac{L}{2} \times \frac{d_2}{d_0}$$

$$F_{2Z} \sim F_{3Z} = \frac{L}{4} - \frac{L}{2} \times \frac{d_2}{d_0}$$

Side Mounted Load

At the time of movement with uniform velocity or at the time of stop.



$$F_{1X} \sim F_{4X} = \frac{L}{2} \times \frac{d_2}{d_0}$$

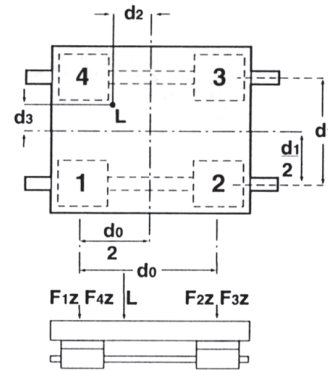
$$F_{1Y} \sim F_{4Y} = \frac{L}{2} \times \frac{d_3}{d_1}$$

$$F_{1X} + F_{4X} \sim F_{2X} + F_{3X}$$

$$F_{1Y} + F_{4Y} \sim F_{2Y} + F_{3Y}$$

Horizontal Load

At the time of movement with uniform velocity or at the time of stop.



$$F_{1Z} = \frac{L}{4} + \left(\frac{L}{2} \times \frac{d_2}{d_0} \right) - \left(\frac{L}{2} \times \frac{d_3}{d_1} \right)$$

$$F_{2Z} = \frac{L}{4} + \left(\frac{L}{2} \times \frac{d_2}{d_0} \right) - \frac{L}{2} \times \frac{d_3}{d_1}$$

$$F_{3Z} = \frac{L}{4} + \left(\frac{L}{2} \times \frac{d_2}{d_0} \right) - \frac{L}{2} \times \frac{d_3}{d_1}$$

$$F_{4Z} = \frac{L}{4} + \left(\frac{L}{2} \times \frac{d_2}{d_0} \right) - \frac{L}{2} \times \frac{d_3}{d_1}$$

Equation Terms:

d_0 = Distance between centerlines of pillowblocks (in)

d_1 = Distance between centerlines of shafts (in)

d_2 = Distance from centerline of carriage to load action point (in)

d_3 = Distance from centerline of carriage to load action point (in)

F_{NX} = force in the X=axis direction (lbf)

F_{NY} = Force in the Y-axis direction (lbf)

F_{NZ} = Force in the Z-axis direction (lbf)

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