

Ball Screw Product Guide



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Since 1883, Duff-Norton has manufactured quality industrial lifting, positioning and material handling equipment. Today Duff-Norton continues this tradition through its dedication to the ISO 9001 standard of excellence.



Products Manufactured



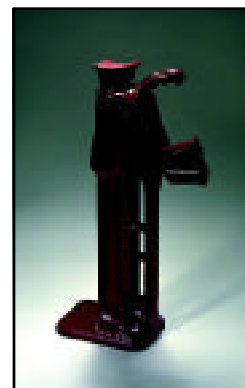
Rotary Unions®



Electromechanical Actuators



Mechanical Actuators



Jacks

Ball Screw Systems

New, highly efficient ball screw systems provide long, predictable accurate performance for a variety of linear and rotary motion applications.

Duff-Norton Ball Screw Systems provide quiet, precise rotary-to-linear and/or linear-to-rotary motion for machine tools and other applications with negligible transmission loss. They can be used with smaller, more economical motors than Acme screw systems, and can be used in synchronized multiple configurations easily.

The ball bearing design is 90% efficient, more efficient than Acme screws. The high efficiency virtually eliminates friction-induced heat. Rolled thread ball screws provide accurate positioning with maximum lead error only ± 0.009 inch per foot cumulative.

Life of the system can be predicted accurately once operating conditions are known. The system will perform like new for its entire operating life, never needing adjustment. Its simple design is virtually maintenance-free, requiring only lubrication.

Standard ball screw ends and end journals are also available and can be used for either fixed or supported end bearing arrangements.

Specially suited for applications requiring:

- Accurate positioning
- High efficiency
- Back-driving
- Synchronization
- Simple design



Performance Specifications

Compression Loads

1. Determine the maximum compression load the ball screw will see.
2. Determine the type of end fixity to be used (see Bearing Support Arrangement).
3. Determine the maximum length between the bearing support and the load.
4. Locate the point where a vertical line (representing length between bearing support and load) intersects a horizontal line (representing compression load). Select the proper screw size on or to the right of his point.



Fixed-Free



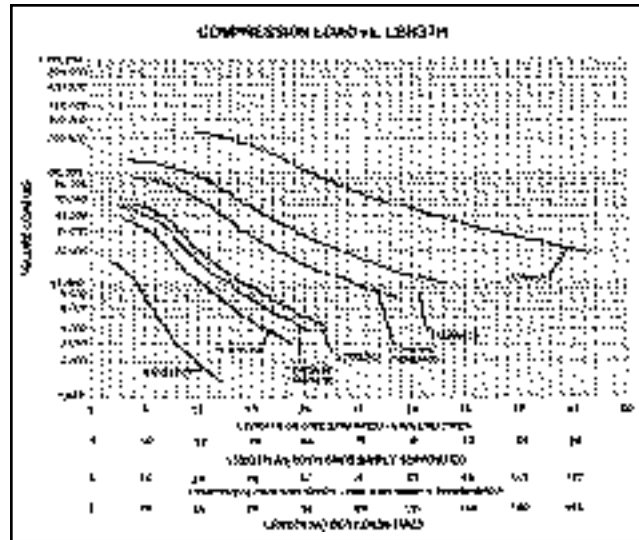
Simple-Simple



Fixed-Simple

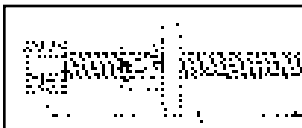


Fixed-Fixed



Critical Speed

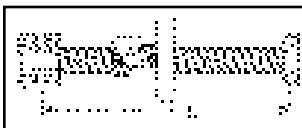
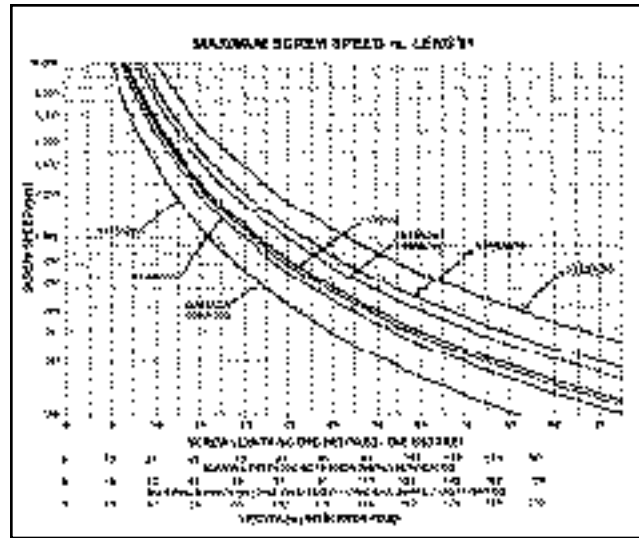
1. Determine the maximum rpm the ball screw will see.
2. Determine the type of end fixity to be used (see Bearing Support Arrangement).
3. Determine the length between bearing supports.
4. Locate the point where a vertical line (representing length between bearing supports) intersects a horizontal line (maximum rpm). Select the proper screw size on or above this point.



Fixed-Free



Simple-Simple



Fixed-Simple



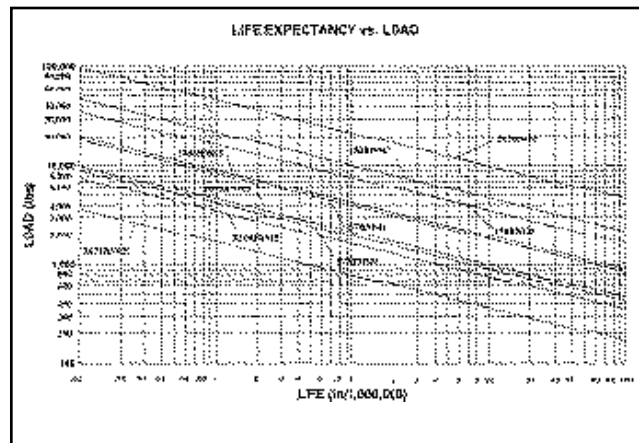
Fixed-Fixed

Load Life

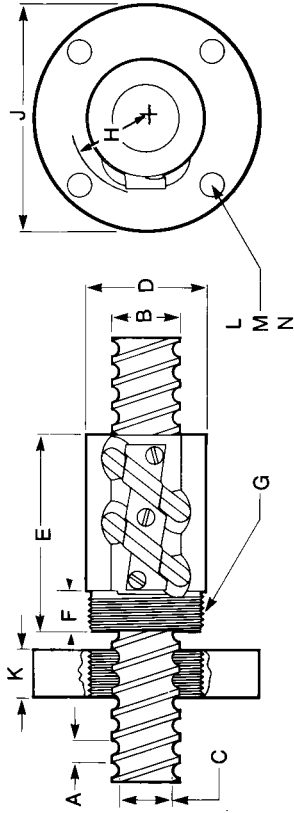
1. Determine the operating load the ball screw and nut will see.
2. Determine the desired life.
3. Locate the point where a vertical line (representing desired life) intersects a horizontal line (operating load). Select the proper screw size on or to the right of this point.

The graph at right illustrates the relationship between the operating load and the operating life that can be expected from a ball screw. Operating life is considered to end at the first sign of surface fatigue.

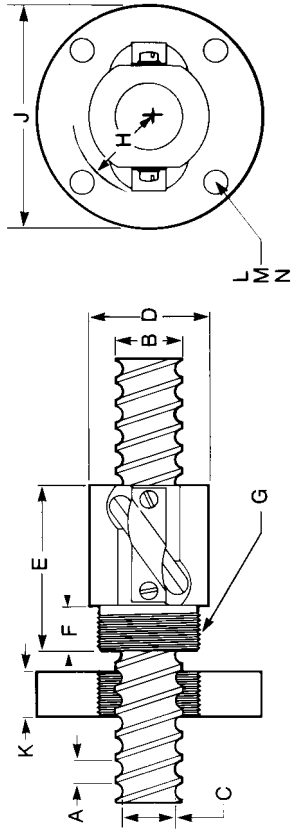
The relationship between load and life is a cubic equation. For example, halving the load increases operating life by a factor of eight.



Dimensional Specifications - Ball Screws and Ball Nuts



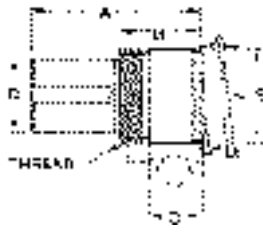
Type A Single-Thread



Type B Multiple-Thread

Ball Screw Part No. Ball Circle Dia. (in) Thread Hand A - Thread Lead (in) B - Screw Major Dia. (in) C - Screw Root Dia. (in) Max. Screw Length (in) Screw Weight/Foot (lb) Ball Nut Part Number Ball Nut Type Number of Ball Circuits Ball Dia. (in) Number of Balls Dynamic Load Rating (lb) Static Load Rating (lb) D - Nut Body Diameter (in) E - Nut Length (in) F - Nut Thread Length (in) G - Nut Thread H - Max. Nut Radius (in) Ball Nut Weight (lb) Flange Part Number J - Flange Dia. (in) K - Flange Thickness (in) L - Flange B. C. Dia. (in) M - No. Flange Holes N - Hole Dia. (in) Flange Weight (lb) Wiper Kit Part Number	.631x.200		.875x.200		1.000x.250		1.000x1.000		1.117x.413		1.500x.250		1.500x.474		1.500x1.000		2.250x.500	
	631BS020 0.631 RH 0.200 0.620 0.480 13' 4" 0.85 R631BN020 A 1 0.12500 67 6,384 1.250 1.710 0.500 0.800 0.3 SK2630-5 2.600 0.530 2.090 4 0.266 0.7	875BS020 0.875 RH 0.200 0.855 0.735 13' 4" 1.73 875BN020 A 2 0.12500 184 1942 18,063 1.625 2.700 0.500 0.880 0.5 875BN020-5 2.760 0.520 2.260 4 0.266 0.6	100BS025 1.000 RH 0.250 0.970 0.820 13' 4" 2.22 R100BN025 A 1 0.15625 85 1,612 13,913 1.875 2.347 0.600 1.150 1 SK2803-3 3.250 0.630 2.750 4 0.266 1.1	100BS100 1.000 RH 1.000 0.980 13' 4" 2.22 R100BN100 B 2 0.15625 98 2,142 11,925 2.125 3.000 0.600 1.060 1.6 SK2803-3 3.250 0.630 2.750 4 0.266 1.1	117BS041 1.117 RH 0.413 1.160 0.870 13' 4" 2.78 117BN041 A 2 0.28125 60 3,894 22,917 2.127 3.380 0.810 1.386 2.4 SK28004-6 4.200 0.832 3.440 4 0.397 2.4	150BS025 1.500 RH 0.474 1.480 1.320 13' 4" 5.35 150BN025 A 2 0.34375 230 4,198 44,020 2.088 2.990 0.500 1.340 1.3 150BN025-5 4.200 0.520 3.440 4 0.397 1.5	150BS047 1.500 RH 1.000 1.470 1.140 13' 4" 4.50 150BN047 A 2 0.34375 86 10,050 57,770 2.627 4.317 0.880 1.613 3.4 SK2807-1 4.937 0.895 4.062 4 0.531 3.4	150BS100 1.500 RH 0.250 1.480 1.140 13' 4" 4.57 150BN100 B 2 0.15625 64 7,560 34,662 2.627 3.633 1.005 1.720 4.2 SK3806-8 4.937 1.020 4.125 4 0.531 4.2	225BS050 2.250 RH 0.500 2.230 1.850 19' 8" 10.88 225BN050 A 2 0.37500 154 21,306 142,660 3.377 6.693 1.572 2.272 5.9 SK2821-3 5.375 1.582 4.375 6 0.656 5.9									

Standard End Journals – Ball Screws



**Type 1
Simple Support**



**Type 2
Simple Support**



**Type 3
Fixed Support**



**Type 4
Simple Support**

Model Number	Common Dimensions Type 1, Type 2, and Type 3				Type 1 Simple Support			Type 2 Simple Support			Type 3 Fixed Support			Type 4 Simple Support		KEYWAY (in X in)
	D (in)	E (in)	Thread (in-thds/in)	Keyway (in X in)	A (in)	B (in)	C (in)	A (in)	B (in)	C (in)	A (in)	B (in)	C (in)	A (in)	D (in)	
631BS020	.406/.405	.4726/.4723	.469-32NS-3A	1/8 X 1/16	2.110	0.810	0.394	2.504	1.204	0.788	3.292	1.992	1.576	2.625	.5000/.4995	1/8 X 1/16
875BS020	.562/.561	.6696/.6692	.664-32NS-3A	1/8 X 1/16	2.233	0.918	0.472	2.705	1.390	0.944	3.649	2.334	1.888	2.625	.6250/.6245	3/16 X 3/32
100BS025	.625/.624	.7877/.7873	.781-32NS-3A	3/16 X 3/32	2.375	1.060	0.551	2.926	1.611	1.102	4.028	2.713	2.204	2.719	.7500/.7495	3/16 X 3/32
100BS100	.625/.624	.7877/.7873	.781-32NS-3A	3/16 X 3/32	2.375	1.060	0.551	2.926	1.611	1.102	4.028	2.713	2.204	2.719	.7500/.7495	3/16 X 3/32
117BS041	.625/.624	.7877/.7873	.781-32NS-3A	3/16 X 3/32	2.375	1.060	0.551	2.926	1.611	1.102	4.028	2.713	2.204	2.844	.8750/.8745	3/16 X 3/32
150BS025	1.000/.999	1.1814/1.1810	1.173-18NS-3A	1/4 X 1/8	2.970	1.160	0.630	3.600	1.790	1.260	4.860	3.050	2.520	3.438	1.3125/1.3120	5/16 X 5/32
150BS047	.750/.749	.9846/.9842	.969-32NS-3A	3/16 X 3/32	2.680	1.120	0.591	3.271	1.711	1.182	4.453	2.893	2.364	3.250	1.1250/1.1245	1/4 X 1/8
150BS100	.750/.749	.9846/.9842	.969-32NS-3A	3/16 X 3/32	2.680	1.120	0.591	3.271	1.711	1.182	4.453	2.893	2.364	3.250	1.1250/1.1245	1/4 X 1/8
225BS050	1.375/1.374	1.7721/1.7716	1.767-18NS-3A	5/16 X 5/32	3.730	1.540	0.984	4.714	2.524	1.968	6.682	4.492	3.936	4.938	1.7500/1.7495	3/8 X 3/16

All dimensions are in inches unless otherwise stated.

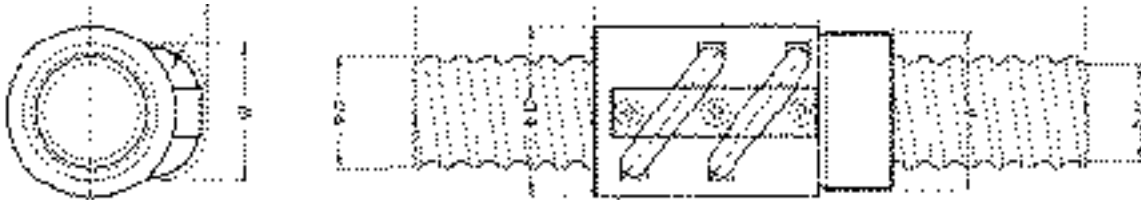
Accessory Items – Ball Screws & Ball Nuts

Model Number	Bearing O. D. (in)	Standard Bearings by End Journal Type				Lock Nut		Lock Washer	Type 1,2,3 (in sq X in lg)	Type 4 (in sq X in lg)
		Type 1 Angular Contact	Type 2 Angular Contact	Type 3 Angular Contact	Type 4 Pillow Block	Type	Thread			
		631BS020	1.2598	201	201	201	008	N-01	.469-32NS-3B	W-01
875BS020	1.5748	203	203	203	010	N-03	.664-32NS-3B	W-03	1/8 X 1/2	3/16 X 1 1/2
100BS025	1.8504	204	204	204	012	N-04	.781-32NS-3B	W-04	3/16 X 5/8	3/16 X 1 1/2
100BS100	1.8504	204	204	204	012	N-04	.781-32NS-3B	W-04	3/16 X 5/8	3/16 X 1 1/2
117BS041	1.8504	204	204	204	014	N-04	.781-32NS-3B	W-04	3/16 X 5/8	3/16 X 1 1/2
150BS025	2.4409	206	206	206	105	N-06	1.173-18NS-3B	W-06	1/4 X 1	5/16 X 1 3/4
150BS041	2.0472	205	205	205	102	N-05	.969-32NS-3B	W-05	3/16 X 1	1/4 X 1 3/4
150BS100	2.0472	205	205	205	102	N-05	.969-32NS-3B	W-05	3/16 X 1	1/4 X 1 3/4
225BS050	3.937	309	309	309	112	N-09	1.767-18NS-3B	W-09	5/16 X 1 1/2	3/8 X 3

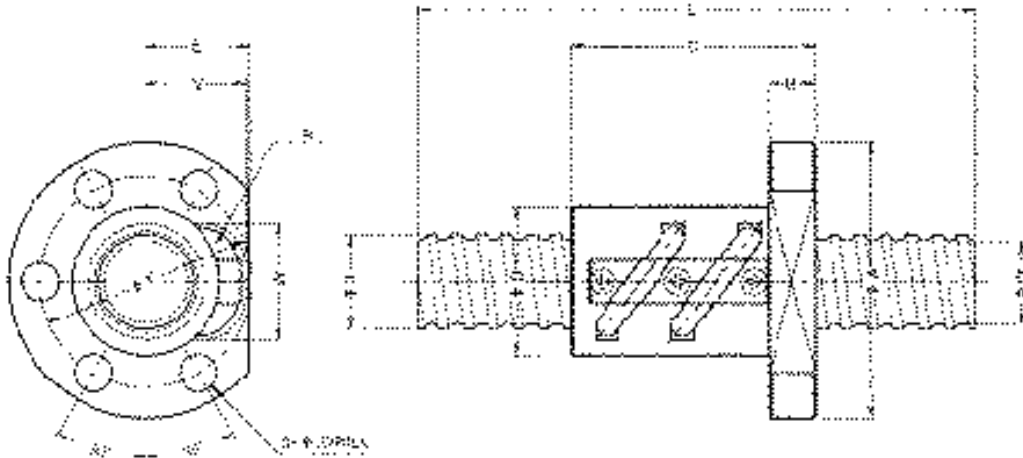
Duff-Norton Metric Ball Screws and Ball Nuts

Duff-Norton also offers a complete line of metric ball screws, flanges and nuts. Rolled thread ball screws, favorable for large quantities and low costs, are available in diameters from 20mm through 90mm, screw lengths through 10m. Machine cut thread ball screw, favorable for large diameter, large lead, or double or triple threaded screws, are available in diameters from 45mm through 300mm, screw lengths through 14m.

Rolled Thread Ball Screw - Threaded Ball Nut



Rolled Thread Ball Screw - Flange Ball Nut



Rolled Thread Ball Screws

Ball Screw Major Dia. (mm) x Lead (mm) x No. Of Ball Circuits										
	20x5x1	25x10x2	32x10x2	36x10x2	45x12x2	50x16x2	60x16x2	70x20x2	80x24x2	90x24x2
Ball Screw Part No.	20BS05	25BS10	32BS10	36BS10	45BS12	50BS16	60BS16	70BS20	80BS24	90BS24
Thread Hand	RH	RH	RH	RH	RH	RH	RH	RH	RH	RH
Thread Lead (mm)	5	10	10	10	12	16	16	20	24	24
Screw Major Dia. (mm)	20	25	32	36	45	50	60	70	80	90
Screw Root Dia. (mm)	17	19	27	30	39	42	52	59	69	79
Max. Screw Length (mm)	3000	3000	3000	3000	4000	4000	4000	4000	4000	4000

For additional specifications, as well as specifications on machine cut thread ball screws, please contact Duff-Norton.

For additional information including specifications and dimensions, please contact Duff-Norton application engineering at (800) 477-5002.



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