Screw System Selection Guide

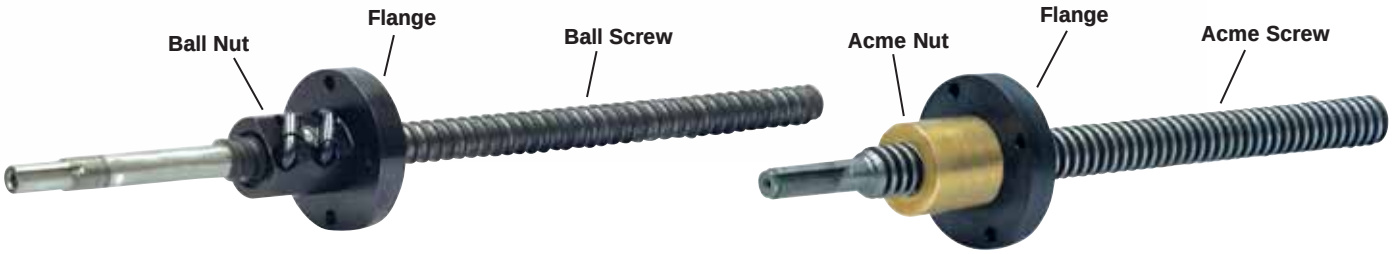
Users guide for selecting a Screw & Nut System

1. Define the application's operating parameters:

- Total load
- Load per screw & nut assembly (if more than one is required)
- Desired lifting speed
- Stroke (distance to move the load)
- Load type (tension, compression, guided, unguided)
- Ambient temperatures (-20° to 120° F, -29° to 50° C)

2. Consider which screw system best suits the application:

Ball Screw or Acme Screw? There are a wide variety of factors which influence the type of screw system selected. Ball Screw systems are more efficient than Acme Screw systems. When comparing the two screw types at the same capacity level; Ball Screw systems require less motor horsepower to move the same load than do the equivalent Acme Screw systems. However, many Acme Screw systems are inherently load holding eliminating the need for a braking system, and also provide a broader selection of leads for precise positioning benefits.



Ball Screw Systems

- Excellent load ratings
- 90% efficient for low power requirements
- Long and predictable life ratings
- Excellent lead accuracy

Acme Screw Systems

- Centralizing class screw & nut assemblies
- Excellent load ratings
- Excellent lead accuracy
- Large selections of diameters & leads

2a. If an Acme Screw system is the best solution, determine which Acme Nut material type best suits the application:

Bronze – provides strong load ratings and excellent wear properties.

Plastic – operates much more efficiently and quietly than their bronze acme nut counterparts, but do have lower load ratings.

Duff-Norton offers Ball Nuts, and also Bronze or Plastic Acme Nuts. Flanges must be requested.

2b. Verify the screw selection and nut configuration:

Double check your applications' travel requirements, and the screw lead. Verify the screw's capacity and speed. Determine which of the following screw journal ends best meet your application's requirements. Also, consider which nut configuration best suits your attachment needs – with or without a flange.

3. Once the initial selection has been made, the user should verify his performance requirements and the capabilities of selected screw & nut assembly.

Please note in catalog pages 56 - 75 we have already matched screw and nut performance to the most common motor horsepowers and gear ratios. The charts are easy to read and the user can quickly determine each screw's actual load ratings and speeds per horsepower and gear ratio.

Performance factors where speed and capacity have already been specified and for motor horsepowers, voltage and hertz ratings, or gear ratios not already shown can be determined by using the following:

- Screw RPM = Turns of the Screw for 1" travel x desired speed
- Starting Input HP = RPM X screw torque / 63025
- Critical Speed – shown on catalog pages 112 (Acme) and 114 (Ball) given the inverse relationship between RPM and stroke length, the application should be designed to fall below a given screw's curved line.
- PV Value – do not exceed an Acme nut's calculated PV Value (catalog page 111). If the desired speed requirements exceed the PV speed rating, the load should be decreased or a larger size screw & nut assembly should be considered.
- Column Strength (compression loads) – shown on catalog pages 113 (Acme) and 116 (Ball), given the inverse relationship between compressive strength and stroke length, the application should be designed to fall below a given screw's curved line. Tension load applications are typically preferred as they are generally not limited to a given stroke length.
- Life expectancy (ball applications) – shown on catalog pages 115. As load increases, the life expectancy will decrease. To ensure long life, the application should be designed to fall below a given screw's curved line.

NOTE

Input RPM's should not exceed 1800 RPM's.

NOTE

Never exceed the screw system's static and dynamic load, or the maximum RPM rating determined using the Critical Speed tables on pages 112 and 114.

NOTE

Please refer to our "Column Strength Charts" if the screw is loaded in compression. It may be necessary to select a larger diameter screw if the maximum recommended length, regardless of load, or maximum load has been exceeded. (Pages 113 and 116)

⚠ WARNING

Ball Screw Systems are inherently self-lowering. Should one of these models be the best fit for an application a brake motor with sufficient torque is required. Integral motors and brakes are already appropriately sized. For motors which will require external brake kits, the brake kit should have torque ratings equal to the motor torque. The following formula can be used to properly size your brake requirement:

Required brake torque (inch/pounds) = .215 x application load x screw lead