

# SELECTION GUIDE

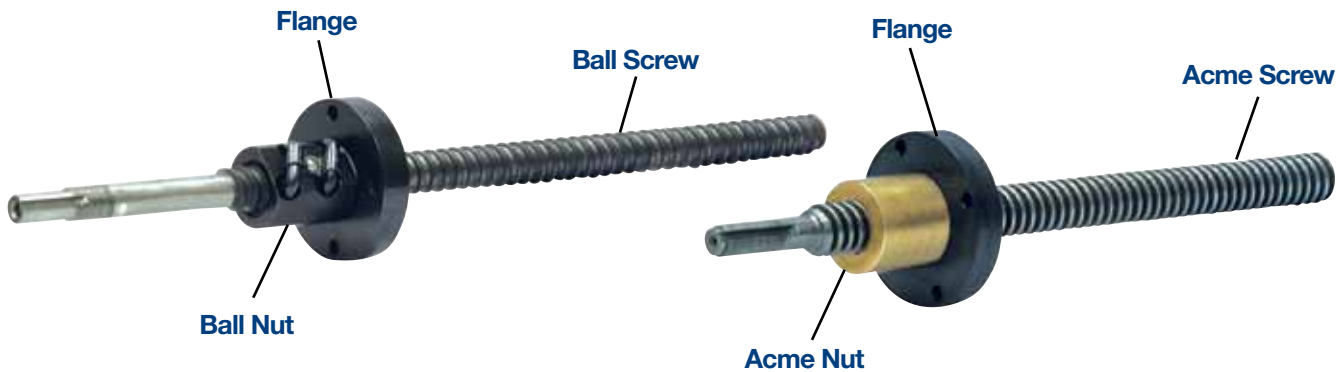
## USERS GUIDE

### FOR SELECTING A SCREW 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)

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 System

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

#### Acme Screw System

- Centralizing class screw & nut assemblies
- Excellent load rating
- 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 its bronze acme nut counterparts, but does 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 application's 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 78-89 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 / 63,025
- Critical Speed – shown on catalog pages 135 (Acme) and 137 (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 134). 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 136 (Acme) and 139 (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 138. 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 should not exceed 1800 RPM

### NOTE

Never exceed the screw system's static and dynamic load, or the maximum RPM rating determined using the Critical Speed tables on pages 135 and 137.

### 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 136 to 139)

### 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**

# SCREWS & NUTS

## APPLICATION ANALYSIS FORM

*Duff-Norton engineers will be pleased to make recommendations for your specific requirements. Complete this form and mail or fax it to Duff-Norton. There is no obligation for this service. Use a separate sheet to sketch your application, or send us your design drawings in complete confidence.*

**Name:** \_\_\_\_\_ **Company:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Email Address:** \_\_\_\_\_

**Phone Number:** \_\_\_\_\_ **Ext:** \_\_\_\_\_ **Fax:** \_\_\_\_\_

**1. Quantity:** \_\_\_\_\_

**2. Required Capacity:**

Dynamic (moving):    Compression \_\_\_\_\_ lbs;    Tension \_\_\_\_\_ lbs

Static (holding):    Compression \_\_\_\_\_ lbs;    Tension \_\_\_\_\_ lbs

**3. Speed:** \_\_\_\_\_ in/min (with \_\_\_\_\_ Hz power)

**4. Stroke:** \_\_\_\_\_ in (actual use)

**5. Duty:** \_\_\_\_\_ in/hour of total travel

**6. Required Life:** \_\_\_\_\_ inches of travel (inches/hour x hours/day x days/year x years of service)

**7. Screw Position:**     Vertical             Horizontal

**8. End Fixity:**         Fixed-Free     Simple-Simple     Fixed-Simple     Fixed-Fixed

**9. Power:**            VAC     1 /  3 (choose one)     50 /  60 (choose one)

**10. Environment:**     Inside             Outside covered     Outside exposed     Washdown

Service temperature: \_\_\_\_\_ °F (low) to \_\_\_\_\_ °F (high)

Exposure to: (Caustics, gases, dusts/abrasives, etc.) \_\_\_\_\_

**11. Motor Mounting Position Code** \_\_\_\_\_

(See codes & diagrams on catalog pg. 94. This is necessary to ensure for proper oil filling and plug locations on the gear box. Please choose the option which most closely matches the actual installed position. Unless we are informed otherwise we will assume our standard positions are desired.)

**12. Special Requirements:** Repeatability, quick stop, etc. \_\_\_\_\_

**13. Accessories:** Limit switch (standard), digital encoder, mounting blocks, etc. \_\_\_\_\_



**To mail please send completed sheet to:**  
 Duff-Norton  
 Application Engineers  
 P.O. Box 7010, Charlotte, NC 28241

**To Fax or Email please send to:**  
 704-588-1994 • duffnorton@cmworks.com



### WARNING

Improper use can result in personal injury. To avoid injury:

- Do not use actuators to lift, support, or transport people, without written approval from Duff-Norton.
- Read all product warnings and operating instructions.

# SCREWS & NUTS

## CONTROLS GUIDE

Duff-Norton engineers will be pleased to make recommendations for your specific requirements.  
Complete this form and mail or fax it to Duff-Norton. There is no obligation for this service.  
Use a separate sheet to sketch your application, or send us your design drawings in complete confidence.

Name: \_\_\_\_\_ Company: \_\_\_\_\_  
Address: \_\_\_\_\_  
Email Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_ Ext: \_\_\_\_\_ Fax: \_\_\_\_\_

### SUPPLY VOLTAGE:

**DC**                      **AC Single Phase**                      **AC Three Phase**                      **Frequency**                      **Other**  
 12V                       110/115/120                       208                       460/480                       60 Hz                       \_\_\_\_\_ Hz  
 24V                       220/230/240                       230/240                       575                       \_\_\_\_\_ Voltage

### CONTROLS ENCLOSURE:

NEMA 1                       NEMA 3R                       NEMA 4                       NEMA 12                       Other \_\_\_\_\_

### ENCLOSURE MOUNTING:

Wall  
 Free Standing  
 Pedestal  
 Console  
 Other \_\_\_\_\_

### CONTROLS ENVIRONMENT:

Indoor  
 Outdoor  
 Wash Down  
 Hazardous  
 Other \_\_\_\_\_

### CONTROLS CERTIFICATION:

None  
 UL  
 cUL  
 Other \_\_\_\_\_

### # OF MOTORS:

1  
 2  
 3  
 4  
 Other \_\_\_\_\_

### CONTROLS OPERATION:

#### Jog

Momentary  
 Maintained

#### Positioning

Positioning Accuracy  
\_\_\_\_\_ ±  inch  mm  
 Programmable Positions  
\_\_\_\_\_ Number of Positions

#### Synchronous

Synchronous Accuracy  
\_\_\_\_\_ ±  inch  mm

#### Variable Speed

Speed Pot  
 Numeric Speed Entry  
 Preset Speeds  
\_\_\_\_\_ Number of Speeds

### CONTROLS OPTIONS:

Pushbutton Pendant  
 HMI Pendant  
 Feedback Cable(s)  
\_\_\_\_\_ Length  ft  mm  
 Other \_\_\_\_\_

Digital Display  
 Touch Screen HMI  
 Motor Cable(s)  
\_\_\_\_\_ Length  ft  mm

Stack Light  
 Alarm  
 Limit Switch Cable(s)  
\_\_\_\_\_ Length  ft  mm

### FEEDBACK:

Incremental  
 Absolute

### CONTROLS FUNCTIONALITY:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### ADDITIONAL INSTRUCTIONS:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Upon completion of this controls guide please Email or Fax to Duff-Norton.

P.O. Box 7010 • Charlotte NC • Phone: 800-477-5002 • Fax: 704-588-1994 • Email: duffnorton@cmworks.com