FEATURES

Reliance precision leadscrew assemblies are designed specifically for motion control applications where accuracy must be maintained. Rather than being adaptations of general purpose screw or nuts they have a precision rolled screw thread which has been designed for maximum life and quiet operation.
A further enhancement available on stainless steel leadscrews up to 2.4 metres long is a specially formulated TFE coating which can extend normal nut life by up to 300%.

Innovative anti-backlash nut designs provide assemblies which are wear compensating with low frictional drag torques and excellent positional repeatability.

Reliance stainless steel leadscrews offer the following:

1. High Accuracy
Precision thread rolling process provides a standard lead accuracy of 0.0006mm/mm.
Higher accuracies up to 0.0001mm/mm can be provided.
The unloaded repeatability of anti-backlash assemblies is within 0.0013mm.

2. Long Life
More than 7.5 million metres of travel can be expected.

3. Low Drag Torque
An anti-backlash nut design which does not require high spring forces to maintain bidirectional anti-backlash characteristics gives a very low nut to screw friction.

4. Low Maintenance
Self lubricating and wear compensating nuts eliminate the need for repeated lubrication or adjustment.

5. Wide Range
Diameters from 3.2mm to 16mm.
Leads from 0.30mm to 25mm.
Lengths up to 1 metre.

6. Custom Thread Design
Unique thread form designed specifically for leadscrews in anti-backlash applications.

7. Smooth Quiet Operation
No recirculating ball noise or metal to metal contact.

8. Lower Cost
Less then comparable ball screws or ground leadscrews, while still providing high accuracy and long life.

9. Modifications
Special leadscrew ends, aluminium alloy shafts and other leads are available on the stainless steel leadscrew range in selected sizes. Please contact Reliance Technical Sales or refer to the leadscrews modification section of this brochure.

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ENGINEERING DATA

1. Lead

The lead of the screw is the amount of linear movement of the nut for one revolution of the leadscrew.

2. Drive Torque

The required motor torque to drive a leadscrew assembly is the sum of three components: inertial torque, static friction torque and torque to move the load. Additional torque associated with driving and supporting the leadscrew must also be considered.

Inertial torque: $T = I\alpha$

I = Inertia of leadscrew (kgm^2)
α = Angular acceleration ($rads/s^2$)

Static friction Torque: Anti-backlash leadscrews are typically supplied with a static frictional torque of 0.007 - 0.05Nm. Higher pre-load forces lead to higher frictional drag torques but better anti-backlash characteristics.

Torque to move load: The torque to move a certain load is a function of the lead and efficiency of the leadscrew assembly.

$$\text{Torque} = \frac{\text{Load x Lead}}{2\pi \text{ x Efficiency}}$$

Torque = Newton metres
Load = Newtons
Lead = Metres

(Note - efficiency of 70% would require 0.7 in these equations)

4. Backdriving

In general when the screw pitch is less than 1/3 its diameter, backdriving will not occur. For higher leads where backdriving is likely, the torque required for holding a load is as follows:

$$\text{Backdrive torque} = \frac{\text{Load x Lead x Efficiency}}{2\pi}$$

Torque = Newton metres
Load = Newtons
Lead = Metres

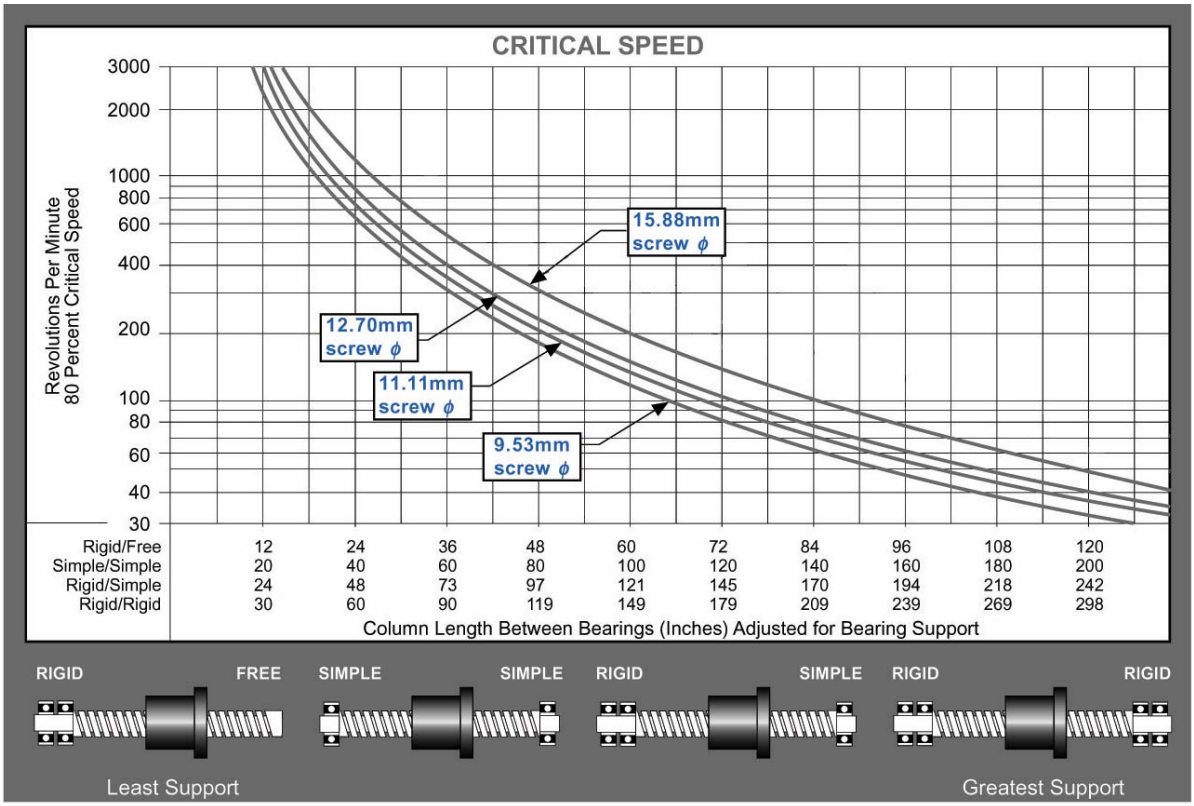
5. Traverse Speed

The Polyacetal nut materials provide long wear-life over a wide variety of conditions, but very high loads and/or high speeds will accelerate nut wear. We recommend the following maximum linear traversing speeds for optimum life:

Lead	Maximum traverse speed
2.5mm - 12mm	100mm/sec
12mm - 25mm	250mm/sec

6. Critical Speed

This is the rotational speed at which a leadscrew will experience vibration or other dynamic problems. See the critical speed chart below to determine if the application parameters result in speeds approaching critical.
To minimise critical speed problems use a longer lead, choose a larger diameter screw or increase the bearing mount support.



7. Maximum Load

Although the leadscrew assemblies are able to withstand relatively high loads without catastrophic failure, these units have been designed to operate with the loads shown on the product pages.

8. Efficiency

The efficiency of a leadscrew varies with the lead angle of the screw. The theoretical maximum efficiencies of all our leadscrews are given in the part number tables on the product pages. These have been calculated using the static coefficient of friction 0.08. For applications where the dynamic efficiency is critical please contact Reliance Technical Sales.

9. Leadscrew Inertia

Values of leadscrew inertia are given in the Typical Mechanical Properties chart on the next page.

10. Screw Straightness

Typical screw straightness is 0.25mm/metre.

11. Leadscrew Interfacing

A table of leadscrew minor diameters and examples of options for machined ends can be found on pages 14 and 15 .

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Physical Properties					
Leadscrew		**Nuts**		**Assembly**	
Material	**Surface Finish**	**Material**	**Tensile Strength**	**Operating Temp. Range**	**Coefficient of Friction Nut to Screw**
Stainless steel 303 series	Better than 0.4 µm	Polyacetal with lubricating Additive	67N/mm² 9,700psi	0 - 93°C	Static = 0.08 0.08# Dynamic = 0.15 0.09# # - with TFE coating

Typical Mechanical Properties				
Leadscrew Series	**Static Frictional Drag Torque (Nm)**	**Screw Inertia Kg m²/m**	**Anti-backlash life +**	
			Plain Screw	**TFE Coated Screw**
LPX6 LPX10 LPX11 LPX13 LPX16	Free Wheeling	8.341E-07 4.171E-06 9.731E-06 1.446E-05 3.948E-05	N/A Typical Backlash 0.076-0.25mm	N/A Typical Backlash 0.076-0.25mm
LAF6 LAF10 LAF11 LAF13 LAF16	0.007-0.03 0.01-0.03 0.02-0.04 0.02-0.04 0.03-0.05	8.341E-07 4.171E-06 9.731E-06 1.446E-05 3.948E-05	1.0 - 1.5 million metres	3.8 - 5.0 million metres
LAK10	0.007-0.02	4.171E-06	2.0 - 2.5 million metres	4.5 - 5.8 million metres
LAX13 LAX16	0.01-0.04 0.01-0.04	1.446E-05 3.948E-05	5.0 - 5.7 million metres	7.6 - 8.8 million metres

+ Life will vary with loading, operating environment and duty cycle. Longer screw leads generally give longer life.

TFE Coated Leadscrew Assemblies

The TFE coating is designed to supply a more even distribution of lubricant than is normally achieved when using standard self lubricating plastics on steel. The entire screw surface is coated which gives an extremely even lubrication distribution, and an expected increase in normal nut life of up to 300%. Lubrication to the screw/nut interface occurs by the nut picking up TFE particles from the coating as well as from migration of the internal lubricant from within the plastic nut.

Although care should be taken to ensure that chips and voids do not occur in the coating, small voids have been shown to have little effect on the system performance. The lubricant, although solid, has some of the “spreading” ability of fluid lubricants.

When machining for bearing ends, soft fixtures are recommended.

TFE coated screws provide the maximum level of self-lubrication and should not be additionally lubricated or used in environments where oils or other lubricant contamination is possible.