

## Engineering Data

### Design Advantages of Linear UniSlide Assemblies

- Compact design yields long travel in a short work space
- A simple, reliable design easily adaptable
- Modular components facilitate multiple axis system
- A broad variety of lengths, sizes and feature
- Customizing to accommodate special circumstances or uses

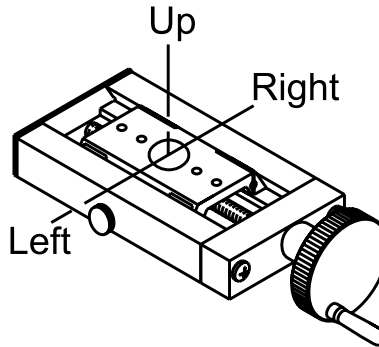
### Load Capacity

The size of the slide selected for a given application will depend on user requirements. The chart below provides maximum dynamic load capacities for each model for three different load positions.

*\*A25 Series with W1 or P10 lead screws: LT = 30 lbs./13.5 kg. Static loads are twice the dynamic load values given above.*

### Orientation: Up, Down, Left and Right

The reference position for linear UniSlide Assemblies is with the base down, the slider up, and the knob, if any, facing the user.



### Construction

We begin as an extrusion of aluminum alloy with a straightness tolerance of half the normal commercial tolerance. Subsequent machining and lapping operations produce a very high degree of straightness and parallelism in the dovetail ways.

### Base Stiffness

For increased base stiffness, three of our A-series bases — A25, A40 and A60 — are also available in the deeper B-series style. This extra stiffness is useful when the full length of the base cannot be adequately supported. Typical stiffness of the B-series base is two to four times greater than the A-series. See B-series bases on page 1.54.

### Deviations from Straightness

There are three types of deviations from straightness than can occur: X, Y and Z. Picture a UniSlide Assembly resting base down on a flat surface, with its linear motion in the X or longitudinal direction. A departure from straightness in the upward direction — the Z axis — is designated as the bow error. A deviation in the horizontal direction — the Y axis — is horizontal run out, often referred to simply as run out. And a twist in the direction of the slide — the X axis — is called twist. The upper limits for these deviations from straightness, as determined by our manufacturing processes, are:

- Bow\* 0.002" per foot
- Run Out 0.001" per foot
- Twist 1 milliradian per foot

*\* As installed, bow can be affected by the degree of flatness of the supporting surface and the relative tension of the mounting screws.*

### Load Capacities

Series	Horizontal Central	Cantilevered Load	Vertical Central
A15	15 lbs. or 6.8 kgs.	20 lbs.-in. or 23 kgs.-cm.	10 lbs. or 4.5 kgs.
A25	30 lbs. or 13.6 kgs.	40 lbs.-in. or 46 kgs.-cm.	10* lbs. or 4.5* kgs.
A40	100 lbs. or 45.5 kgs.	130 lbs.-in. or 150kgs.-cm.	50 lbs. or 22.7 kgs.
A60	240 lbs. or kgs.	320 lbs.-in. or 369 kgs.-cm.	100 lbs. or 45 kgs.
B90	400 lbs. or 182 kgs.	480 lbs.-in. or 550 kgs.-cm.	100 lbs. or 45 kgs.

*\* A25 Vertical Central Load Capacity with a 10 pitch (W1 and P10) screw is 30 lbs./15.5 kg. to due to a stronger thrust bearing design.*

*Also, for greater base stiffness, Series A25, A40 and A60 are available in deeper cross sections. See the B Series Bases on page 1.54 for more information.*

**Keyword: engineering**

### **Enhanced Straightness Tolerances**

If your application requires improved straightness tolerances, we can supply Models with straightness tolerances approximately one-half of the nominal values given previously. We individually select, measure and certify UniSlide Assemblies.

### **Wear Resistance**

The standard aluminum alloy dovetail base and low friction polymer pads of the slider provide excellent performance as a bearing material combination. Unlike ball screw slide mechanisms, no lubrication is required. Under light to moderate loads, sideways play caused by wear during the first 30,000 cycles of operation will be approximately 0.00015 inches. Wear after that is reduced, to approximately 0.00005 inches over the next 50,000 cycles. Sliders are equipped with adjustment screws to compensate for wear, if necessary. For harsh environments and/or a higher number of cycles, UniSlide Assemblies with hard coat anodized ways are available. For clean room environments we recommend electroless nickel plating.

### **Magnetic Properties**

We can make linear positioners with very low or no ferric (iron) content. UniSlide base and slider assemblies are made from aluminum alloy. Most lead screws are 303 stainless steel. The exceptions are the double and quad lead screws which are electroless nickel-plated cold rolled steel.

We can also substitute brass lead screws for some models. Brass lead screws are only offered in standard grade accuracy. In a few models with small steel parts, nonmagnetic replacements are available.

For further information please contact the factory.

### **Base and Slider Lengths**

Standard and maximum base lengths for all models are listed in the specifications for each model. Custom base lengths are available on special order. Slider lengths available are only those listed in the model specifications.

### **Vacuum Applications**

UniSlide Assembly's patented dovetail bearings give it certain advantages over other designs. They have been used in a myriad number of environments from outer space to vacuum chambers. The necessity for modification depends upon the so-called hardness of the vacuum and other specific requirements. Velmex can supply assemblies that are free of grease and oils. However, for critical applications the assemblies should be cycled in an out-gassing chamber to remove residual contamination. Search web site for "vacuum" for more details.

### **Backdriving the Lead Screw**

Models with 5 or 2.5 pitch lead screws (codes W2, W4, P5 or P2.5) can be backdriven by the payload. See Lead Screws for additional details.

### **Scale and Control Lever Position**

The control lever for Rapid Advance units is on the right hand side. Printed and engraved scales are on the left side as shown in the drawings and photos in this catalog. Scale numbering always progresses toward the knob end of the unit — i.e., the largest numbers on the scale are closest to the knob. Control levers, top plates, thumbscrew locks and

verniers can be mounted on the alternate side on special request. If requested, the scale can be mounted on the right side of the unit, with the largest numbers going away from the operator. For models with the base mounting holes located off the center line, holes begin at the bearing block end with the first hole to the right of the lead screw. See Dimensional Drawing for series of choice for details.

### **Material Substitutions**

Material substitutions for drive nuts, lead screws and thrust bearing are possible. Drive nuts are available in brass, oil-impregnated bronze, and, for high temperature or radiation applications, in Vespel. Bearings can be manufactured from Delrin or Vespel. Brass lead screws are available in a limited pitch selection.

## Lead Screws

### A Few Words About Lead Screws

The lead screws in our UniSlide Assemblies are formed by rolling through precision dies, rather than cut on a screw machine. This results in higher quality and accuracy. Our lead screws are 303 stainless steel except W2, W4 and P5 lead screws which are electroless nickel plated cold rolled steel. Nonmagnetic brass lead screws are available—please refer to the Engineering Data on page 1.36.

### Lead Screw Diameters

Series	Type Code	Diameter
A15 & A25	C, B, P40, P20	1/4 "
A15 & A25	K1, K2, Q1, Q2	7 mm
A25	W1, P10, W2, W4, P5	3/8"
A40	C, B, W1, W2, W4, P40, P20, P10, P5	3/8"
A40	K1, K2, Q1, Q2	10 mm
A60 & B90	C, B, W1, W2, W4, P40, P20, P10, P5	1/2"
A60 & B90	K1, K2, Q1, Q2	14 mm

### Lead Screw Code Letters for Series Numbers

Use these code letters when constructing model numbers. Lead screw code letter(s) follow base length value.

Series English Thread	Turns per Inch English Tread	Advance per Revolution	Screw Motion Type Code Letter for Standard Accuracy	Scale and Vernier Type Code Letter	Graduated Knob Code Letter for Precision Accuracy	Divisions on Graduated Knob
A15, A25, A40, A60, B90	40	0.025"	C	CE*	P40	25
A15, A25, A40, A60, B90	20	0.050"	B	BE*	P20	50
A25, A40, A60, B90	10	0.100"	W1	W1E*	P10	100
A40, A60, B90	5	0.200"	W2	W2E*	P5	200
A40, A60, B90	2.5	0.400"	W4	—	—	—
Series Metric Thread	Turns per cm Metric Thread					
A15, A25, A40, A60, B90	10	1 mm	K1	K1M*	Q1	100
A15, A25, A40, A60, B90	5	2 mm	K2	K2M*	Q2	200

\* Not available in B90. Delrin® is a trademark of E. I. duPont Co.

### Accuracy

The accuracy of standard lead screws is 0.007"/10" or better. The accuracy of Graduated Knob Model screws is 0.0015"/10" or 0.033 mm/20 cm or better, and is checked to not exceed this value.

### Thrust Bearings Design

A15 and A25 lead screws use pre-loaded Delrin® thrust bearings except A25 W1, and P10, which have pre-loaded ball bearings. A40, A60 and B90 lead screws have pre-loaded ball bearings.

### Backdriving

Because of the steep helix angle of the threads in W2, W4 and P5 lead screws, they may backdrive (coast back down) when supporting a vertical load or, if horizontal and a linear thrust load is applied, the slider will move away until the thrust has been equalized. If you want the slide to stay where you put it, be aware of this characteristic and design accordingly.

**Keyword: lead**

See Input Your Specifications on web site for UniSlide model number selection.