# Precision Linear Motion product guide





### **Our Mission**

Del-Tron Precision was founded in order to serve the needs of automated equipment manufacturers for innovative, high quality and reasonably priced anti-friction linear bearings.

### **Our Company**

The originator of the sub miniature ball bearing slide assembly; Del-Tron Precision Inc. began operations in 1974 supplying original equipment manufacturers with the world's first commercially available sub miniature ball slide, model D-1.

Since then, thousands of Del-Tron<sup>®</sup> slides have been incorporated into automated equipment throughout the world. Manufacturers of medical analyzing and testing machines, semiconductor and electronic chip processing equipment, printers, plotters, peripherals, assembly systems, lasers and many more have found that Del-Tron<sup>®</sup> slides provide a cost effective anti-friction interface between moving parts in today's increasingly automated equipment.

Del-Tron's modern corporate campus, home to world headquarters, and its principal manufacturing facility, located in the foothills of the Berkshires in Western Connecticut, boasts highly automated computer controlled manufacturing and assembly operations.

Highly skilled workers monitor each manufacturing step, ensuring that consistent and repeatable high quality bearings conform to the published specifications or the customer's particular requirements where applicable. Since its inception, Del-Tron has performed final inspection of 100% of its products.

Del-Tron's operations staff works to assure "just in time" deliveries, if needed, and maintains adequate stock levels of all products at authorized distributor locations in major markets across the U.S.A. and Canada. MHK serves as Del-Tron's European distribution hub in Amberg, Germany. The firm also has locations in Japan and throughout Southeast Asia stand ready to serve the needs of both local and indigenous industries and those of multinational assembly and manufacturing operations worldwide.

### **Our Quality Policy**

We are dedicated to providing our customers with a product of consistent quality that conforms to our specifications and meets or exceeds customer expectations while making on-time delivery at a competitive price.



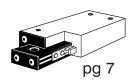


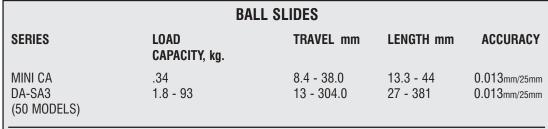


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## Selection Guide



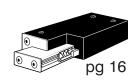




ANTI-CREEP BALL SLIDE ASSEMBLIES				
SERIES	LOAD CAPACITY, kg.	TRAVEL mm	LENGTH mm	ACCURACY
DA-AC-SA3-AC	1.8 - 93	13 - 304.0	27 - 381	0.013 mm/25 mm



NON-MAGNETIC BALL SLIDES				
SERIES	LOAD Capacity, kg.	TRAVEL	LENGTH	ACCURACY
DA-NMS-SA3-NMS (47 MODELS)	.54 - 28	13 - 304.0	27 - 381	0.013mm/25mm



CROSSED ROLLER SLIDES					
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY	
RDA REA-RSA3 (47 MODELS)	14 - 41 22 - 354	13.0 - 127.0 13 - 305	27.0 - 154.0 27 - 381	0.003mm/25mm 0.003mm/25mm	



PRECISION BALL SLIDE SERIES				
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY
MA-2SS-SA5-7SS (17 MODELS)	5.4 - 77	25 - 175.0	65 - 228.6	0.003mm/25mm



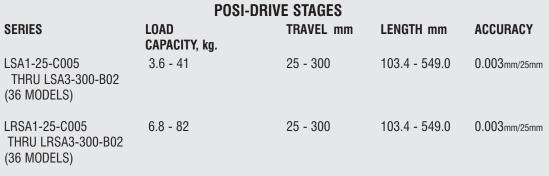
PRECISION CROSSED ROLLER SLIDE SERIES				
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY
RSA2SS-RSA5SS (12 MODELS)	36 - 118	25 - 175	50.8 - 228.6	0.003mm/25mm



HIGH PRECISION SERIES BALL SLIDES (LOW PROFILE & FLANGE BASE)					
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY	
HPMA-HPSA5 (42 MODELS)	3.6 - 102	13 - 250	25.4 - 381.0	0.001 mm/25mm	

HIGH PRECISION SERIES CROSSED ROLLER SLIDES (LOW PROFILE & FLANGE BASE)						
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY		
HPRSA2-HPRSA5 0.010mm/25mm (34 MODI	41 - 204 ELS)	25 - 250	50.8 - 381.0			
POSI-DRIVE STAGES						
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY		





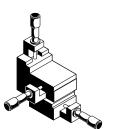


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### BALL SLIDE POSITIONING STAGES (MICROMETER DRIVEN)

Available in X, XY, and XYZ configurations.

SERIES	LOAD CAPACITY, kg. X, XY, Z	TRAVEL mm	WORK Surface	ACCURACY
MINI 99MM	2.3, 2.3, .6	6	19.1 X 19.1	0.013mm/25mm
101MM-3204MM (25 MODELS, with microm	1.8-27, 1.8-27, .6-14 neters)	13 - 50	31.8 x 31.8 to 130.2 x 130.2	0.013mm/25mm
101PMM-3206-PMM (11 MODELS, X and XY ON	1.8 - 27 NLY, no micrometers)	13 - 100	31.8 x 31.8 to 130.2 x 130.2	0.013mm/25mm

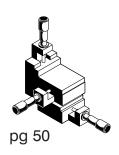


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### CROSSED ROLLER POSITIONING STAGES (MICROMETER DRIVEN)

Available in X, XY, and XYZ configurations.

SERIES	LOAD CAPACITY, kg. X, XY, Z	TRAVEL mm	WORK Surface	ACCURACY
R99MM	18, 18, .57	6	19.1 x 19.1	0.003mm/25mm
R101MM-R3204MM (25 MODELS, with micron	10-73, 10-73, .6-14 neters)	13 - 50	31.8 x 31.8 to 130.2 x 130.2	0.003mm/25mm
R101PMM-R3204PMM (11 MODELS, X and XY OI	10 - 73 NLY, no micrometers)	13 - 100	31.8 x 31.8 to 130.2 x 130.2	0.003mm/25mm



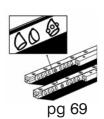
# Selection Guide



LOW PROFILE CROSSED ROLLER TABLES					
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY	
LPTA-1025-3205 (21 MODELS) Stainless ste	23 - 375 eel available.	.2 - 130	25 - 205	.003mm/25mm	



CROSSED ROLLER RAIL SETS					
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY	
MINI NB1 NB2-NB6 (49 MODELS) Stainless steel available.	20 - 84 30 - 1280	12 - 50 18 - 295	20 - 80 30 - 400	.002mm/25mm .002mm/25mm to .005mm/25mm	

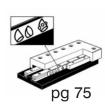


	ANTI-CREEP CROSSED ROLLER RAIL SETS											
SERIES	LOAD Capacity, Kg.	TRAVEL	LENGTH	ACCURACY								
NB2-AC / NB6-AC	30-1280	18-275	30-400	.002mm/25mm .005mm/25mm								
(32 MODELS)				.000111111/20111111								



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CROSSED ROLLER SLIDE TABLES (ALUMINUM)									
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY					
MINI NBT-1AM NBT-2AM-NBT-6AM (72 MODELS) Stainless steel available.	44 - 90 30 - 923	25 - 76 18 - 229	50 - 125 35 - 360	.003mm/25mm .003mm/25mm					



ANTI-	CREEP CROSSED	ROLLER SLIDE TA	BLES (ALUMIN	IUM)
SERIES	LOAD Capacity, LB.	TRAVEL	LENGTH	ACCURACY
MINI NBTA1-AC NBT2A-AC / NBT6A-AC (31 MODELS)	43-89 30-924	25-70 18-230	50-125 35-360	.003mm/25mm .003mm/25mm



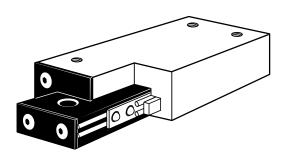
	CKO22FD KOTTEK	2 LIDE IABLES	(STEEL)	
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY
MINI NBT-1 NBT-2-NBT-6 (41 MODELS)	12 - 40 40 - 1199	12 - 50 18 - 230	25 - 85 35 - 325	.002mm .002mm to .004mm



	BALL SLI	DE GUIDES		
SERIES	LOAD Capacity, kg.	TRAVEL mm	LENGTH mm	ACCURACY
BSGS5-BSG25 BSGS9W-BSG16W (10 MODELS) Stainless sta	44 - 1001 250 - 720 eel available.	3 - 813 51 - 610	38 - 889 76 - 660	.002mm .013mm

# **Ball Slides**

# 6 Reasons to choose Del-Tron® Ball Slides



- 1. Factory preload adjustment prevents sideplay and backlash.
- 2. Lightweight aluminum carriage and base with high load capacity.
- 3. Built-in holes simplify installation and component mounting.
- 4. Steel shafts, ground over the entire length, reduce coefficient of friction to 0.003.
- 5. Long life, self cleaning ball bearing needs no lubrication.
- 6. Mounting surfaces, parallel to the line of motion, provide straight line accuracy to .013mm/25mm of travel.



### Del-Tron® Ball Slides

### Load Ratings and Life Estimates

The rated load capacity of Del-Tron® ball slides may be a mass load on a horizontal slide, or a force load normal to the mounting surface in any position. The rated load must be centered and distributed over the slide, and the base must be fully supported on a flat mounting surface so that the ball slide does not act as a beam subject to concentrated or distributed bending forces. Loads supported by protruding arms reduce accuracy and load capacity by acting as levers or ratio arms, and should be avoided even when load forces are small.

When used at the rated load capacity and moderate speeds, a life of 25 million cm of travel can be expected. The expected life at one half the rated load is 250 million cm.

#### Friction and Lubrication

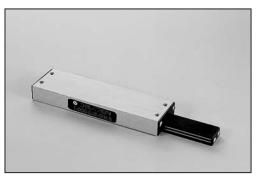
The coefficient of friction is lower for linear ball bearings than for rotary bearings, where the peripheral track is shorter on the inner race than on the outer race, causing the ball to skid on one or the other. The balls run exactly equal distances on the pair of tracks in linear bearings, permitting the ball to run without friction, wear, or skidding at any preload. The typical coefficient of friction for Del-Tron® ball slides is 0.003.

Del-Tron® ball slides are self cleaning in normal service. Lubrication is recommended for speeds above 4500 cm/min, and is advisable at lower speeds where high loads are applied in continuous duty applications.

### **Mounting and Accuracy**

The mounting surfaces of the ball slide are machined flat and smooth, and parallel to each other and the line of motion. They must be mounted on smooth, flat supports that will not deflect under load. Especially with long slides of small cross section, binding may be caused by distortion of the bottom member when mounted on irregular surfaces. If so, round shims or spacers may be placed over the mounting screws to raise the slide above the surface asperities. Bedding in epoxy resin is also recommended.

The specified accuracy for all standard Del-Tron® ball slides is .013mm/25mm of travel. This is measured by comparison of the line of travel to a master straight edge, using a gage or indicator mounted on the slide.

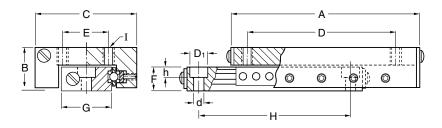


# Ball Slide Assemblies

moment load ratings + load / life formulas. pg.91

* Minimu	ım Centere	d around Mo	ean Positio	on		CARRIAGE BASE DIMENSIONS					
MODEL	TRAVEL*	LOAD Capacity (kg)	WEIGHT (g)	LENGTH A	HEIGHT B	WIDTH C		CING	HEIGHT F	WIDTH G	HOLE ' Spacing H
CA5	8.4	.34	2	13.3	5.8	9.7	6.0	4.0	3.4	4.0	6.0
CA-1	13	.68	3	19.0	5.8	9.7	13.0	4.0	3.4	4.0	10.0
CA-2	25	.68	4	32.0	5.8	9.7	26.0	4.0	3.4	4.0	20.0
CA-3	38	.68	7	44.0	5.8	9.7	37.0	4.0	3.4	4.0	30.0
DA-1	13	2	9	27.0	8.0	14.2	15.0	6.0	4.7	6.4	19.0
DA-2	25	4	14	52.0	8.0	14.2	41.0	6.0	4.7	6.4	35.0
DA-3	50	5	23	78.0	8.0	14.2	66.0	6.0	4.7	6.4	60.0
DA-4	75	6	31	103.0	8.0	14.2	92.0	6.0	4.7	6.4	86.0
DA-5	100	8	34	128.0	8.0	14.2	117.0	6.0	4.7	6.4	89.0
DA-6	127	8	43	154.0	8.0	14.2	142.0	6.0	4.7	6.4	114.0
EA-1	13	4	11	27.0	10.4	19.0	15.0	9.0	6.3	9.5	19.0
EA-2	25	5	26	52.0	10.4	19.0	41.0	9.0	6.3	9.5	35.0
EA-3	50	5	37	78.0	10.4	19.0	66.0	9.0	6.3	9.5	60.0
EA-4	75	6	48	103.0	10.4	19.0	92.0	9.0	6.3	9.5	86.0
EA-5	100	7	60	128.0	10.4	19.0	117.0	9.0	6.3	9.5	89.0
EA-6	127	8	71	154.0	10.4	19.0	142.0	9.0	6.3	9.5	114.0
MA-1	13	5	34	40.0	12.7	25.4	32.0	10.0	6.3	12.7	32.0
MA-2	25	5	48	65.0	12.7	25.4	57.0	10.0	6.3	12.7	57.0
MA-2.5	38	6	54	78.0	12.7	25.4	65.0	10.0	6.3	12.7	65.0
MA-3	50	7	62	90.0	12.7	25.4	82.0	10.0	6.3	12.7	82.0
MA-4	75	8	142	116.0	12.7	25.4	108.0	10.0	6.3	12.7	108.0

SERIES	CA	DA	EA	MA	NA	SA1	SA2	SA3
CARRIAGE 4 HOLES (I)	M2 THREAD	M2 THREAD	M3 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M5 THREAD
BASE HOLE d	M2 THREAD	2.2	3.5	3.5	4.6	4.6	4.6	5.8
BASE HOLE D <sub>1</sub>	-	4.0	6.1	6.1	8.1	8.1	8.1	10
BASE HOLE h	-	2.2	3.4	3.4	4.4	4.4	4.4	5.3
COUNTER BORE SCREW SIZE	N/A	M2	M3	M3	M4	M4	M4	M5



MODEL SA3-6 SA3-9 SA3-12 # OF HOLES

\*\* 6

\*\* 8

\*\* 10

### SPECIFICATIONS:

Straight Line Accuracy .013mm/25mm of travel

Positional Repeatability .005mm

### **Finish**

Clear anodize standard Black anodize available at no extra cost. Coefficient of Friction

0.003 typical

### Construction

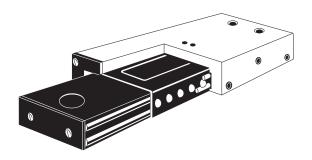
Aluminum carriage and base, hardened steel shafts and balls, mild steel end caps.

### moment load ratings + load / life formulas. pg.91

*Minimum	Centered	around Mea	an Position	)	CARRIAGE BASE DIMENSIONS						
MODEL	TRAVEL	LOAD CAPACITY (kg)	WEIGHT (g)	LENGTH A	HEIGHT B	WIDTH C	н	OLE ACING E	HEIGHT F	WIDTH G	HOLE SPACING H
NA-1	19	7	37	40.0	13.4	26.9	32.0	10.0	7.9	12.7	28.0
NA-2	38	8	65	65.0	13.4	26.9	57.0	10.0	7.9	12.7	54.0
NA-3	50	9	85	90.0	13.4	26.9	82.0	10.0	7.9	12.7	79.0
NA-4	75	11	147	116.0	13.4	26.9	102.0	10.0	7.9	12.7	82.0
NA-6	100	14	170	152.0	13.4	26.9	140.0	10.0	7.9	12.7	102.0
NA-8	150	16	198	203.0	13.4	26.9	190.0	10.0	7.9	12.7	127.0
NA-10	200	18	227	254.0	13.4	26.9	240.0	10.0	7.9	12.7	178.0
SA1-1	25	7	82	51.0	15.8	38.0	35.0	16.0	8.6	19.0	37.0
SA1-2	50	9	122	76.0	15.8	38.0	60.0	16.0	8.6	19.0	60.0
SA1-3	75	11	170	102.0	15.8	38.0	85.0	16.0	8.6	19.0	85.0
SA1-3.5	88	14	190	127.0	15.8	38.0	110.0	16.0	8.6	19.0	85.0
SA1-4	100	16	232	152.0	15.8	38.0	136.0	16.0	8.6	19.0	100.0
SA1-6	150	20	261	203.0	15.8	38.0	186.0	16.0	8.6	19.0	128.0
SA1-8	200	25	326	254.0	15.8	38.0	238.0	16.0	8.6	19.0	178.0
SA2-1	25	9	113	51.0	19.0	44.0	35.0	20.0	10.2	22.2	38.0
SA2-1.5	38	14	170	70.0	19.0	44.0	55.0	20.0	10.2	22.2	55.0
SA2-2	50	19	184	83.0	19.0	44.0	65.0	20.0	10.2	22.2	65.0
SA2-3	75	24	227	102.0	19.0	44.0	85.0	20.0	10.2	22.2	85.0
SA2-4	100	27	335	152.0	19.0	44.0	140.0	20.0	10.2	22.2	100.0
SA2-6	150	34	445	203.0	19.0	44.0	190.0	20.0	10.2	22.2	126.0
SA2-8	200	41	553	254.0	19.0	44.0	240.0	20.0	10.2	22.2	178.0
SA3-1	25	14	283	67.0	25.4	66.5	54.0	35.0	15.9	38.1	54.0
SA3-1.5	38	16	283	67.0	25.4	66.5	42.0	35.0	15.9	38.1	42.0
SA3-2	50	28	425	102.0	25.4	66.5	75.0	35.0	15.9	38.1	75.0
SA3-3	75	40	590	127.0	25.4	66.5	100.0	35.0	15.9	38.1	100.0
SA3-4	100	54	771	152.0	25.4	66.5	125.0	35.0	15.9	38.1	125.0
SA3-5	127	61	879	203.0	25.4	66.5	175.0	35.0	15.9	38.1	187.0
SA3-6	150	68	498	229.0	25.4	66.5	**75.0	35.0	15.9	38.1	178.0
SA3-9	228	84	1318	305.0	25.4	66.5	**75.0	35.0	15.9	38.1	254.0
SA3-12	304	93	1644	381.0	25.4	66.5	**75.0	35.0	15.9	38.1	330.0

# **Anti-Creep Linear Slides**

## 6 Reasons to choose Del-Tron<sup>®</sup> Anti-Creep<sup>™</sup> Ball Slides



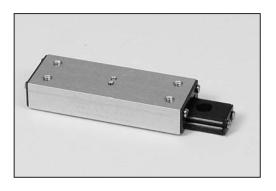
- 1. Ideal for vertical applications.
- 2. Increased life with overhanging loads.
- 3. Positive internal stops.
- 4. Low friction, straight line design.
- 5. Factory preload controls side play and backlash.
- 6. .013mm/25m" straight line accuracy.

## Del-Tron<sup>®</sup> Anti-Creep<sup>™</sup> Slides

In certain applications, uneven loads, improper preload, vertical mounting, or offset forces may cause the ball retainers to become misaligned relative to each other. The misalignment ("creep") can ultimately cause a reduction in overall travel, the need for increased force to achieve full travel and even failure of the assembly.

Del-Tron's® Anti-Creep™ retainer design prevents these problems. The single piece retainer and integral positive end stops prevent ball retainer misalignment and help keep the rolling elements centered in the assembly. The retainer is molded of engineering plastic and slotted in the center. Dowel pins mounted in the base and carriage limit the travel of the retainer and help to keep it centered in the slide for full travel and extended life. In applications in which retainer misalignment is a concern, Del-Tron® Anti-Creep™ slides demonstrate greatly increased life and improved performance. Anti-Creep™ slides have been extensively tested in Del-Tron's internal testing facility and successfully used in the field for over seven years. If you are concerned that your application may induce uneven loads or forces or if the need for a slide operating vertically exists, consider Del-Tron's® Anti-Creep™ retainer design.



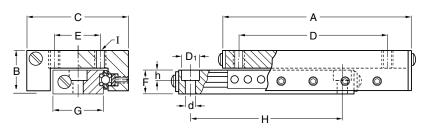


# Anti-Creep Linear Slides

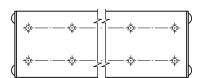
moment load ratings + load / life formulas. pg.91

* Minimur	n Centere	d around M	ean Positio	CARRIAGE BASE DIMENSIONS				SIONS			
		LOAD Capacity	WEIGHT	LENGTH	HEIGHT	WIDTH		CING	HEIGHT	WIDTH	HOLE ' Spacing
MODEL	TRAVEL*	(kg)	(g)	A	В	C	D	E	F	G	H
CA-1AC	13	.68	3	19.0	5.8	9.7	13.0	4.0	3.4	4.0	10.0
CA-2AC	25	.68	4	32.0	5.8	9.7	26.0	4.0	3.4	4.0	20.0
CA-3AC	38	.68	7	44.0	5.8	9.7	37.0	4.0	3.4	4.0	30.0
DA-1AC	13	2	9	27.0	8.0	14.2	15.0	6.0	4.7	6.4	19.0
DA-2AC	25	4	14	52.0	8.0	14.2	41.0	6.0	4.7	6.4	35.0
DA-3AC	50	5	23	78.0	8.0	14.2	66.0	6.0	4.7	6.4	60.0
DA-4AC	75	6	31	103.0	8.0	14.2	92.0	6.0	4.7	6.4	86.0
DA-5AC	100	8	34	128.0	8.0	14.2	117.0	6.0	4.7	6.4	89.0
DA-6AC	127	8	43	154.0	8.0	14.2	142.0	6.0	4.7	6.4	114.0
EA-1AC	13	4	11	27.0	10.4	19.0	15.0	9.0	6.3	9.5	19.0
EA-2AC	25	5	26	52.0	10.4	19.0	41.0	9.0	6.3	9.5	35.0
EA-3AC	50	5	37	78.0	10.4	19.0	66.0	9.0	6.3	9.5	60.0
EA-4AC	75	6	48	103.0	10.4	19.0	92.0	9.0	6.3	9.5	86.0
EA-5AC	100	7	60	128.0	10.4	19.0	117.0	9.0	6.3	9.5	89.0
EA-6AC	127	8	71	154.0	10.4	19.0	142.0	9.0	6.3	9.5	114.0
MA-1AC	13	5	34	40.0	12.7	25.4	32.0	10.0	6.3	12.7	32.0
MA-2AC	25	5	48	65.0	12.7	25.4	57.0	10.0	6.3	12.7	57.0
MA-2.5A0	38	6	54	78.0	12.7	25.4	65.0	10.0	6.3	12.7	65.0
MA-3AC	50	7	62	90.0	12.7	25.4	82.0	10.0	6.3	12.7	82.0
MA-4AC	75	8	142	116.0	12.7	25.4	108.0	10.0	6.3	12.7	108.0

SERIES	CA	DA	EA	MA	NA	SA1	SA2	SA3
CARRIAGE 4 HOLES (I)	M2 THREAD	M2 THREAD	M3 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M5 THREAD
BASE HOLE d	M2 THREAD	2.2	3.5	3.5	4.6	4.6	4.6	5.8
BASE HOLE D <sub>1</sub>	-	4.0	6.1	6.1	8.1	8.1	8.1	10
BASE HOLE h	-	2.2	3.4	3.4	4.4	4.4	4.4	5.3
COUNTER BORE SCREW SIZE	N/A	M2	M3	M3	M4	M4	M4	M5



### SPECIFICATIONS:



MODEL SA3-6AC SA3-9AC SA3-12AC

Straight Line Accuracy 0.13mm/25mm of travel

**Positional Repeatability** .005mm

### **Finish**

Clear anodize standard black anodize available at no extra cost.

Coefficient of Friction 0.003 typical

### Construction

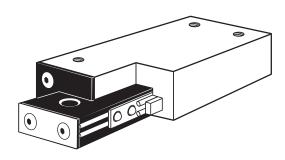
Aluminum carriage and base, hardened steel shafts and balls, mild steel end caps.

### moment load ratings + load / life formulas. pg.91

*Minimum Cei	ntered are	ound Mean	Position				CAR	RIAGE	ВА	SE DIMENS	IONS —
MODEL	TRAVEL	LOAD CAPACITY (kg)	WEIGHT (g)	LENGTH A	HEIGHT B	WIDTH C	— н	OLE CING E	HEIGHT F	WIDTH G	HOLE Spacing H
NA-1AC	19	7	37	40.0	13.4	26.9	32.0	10.0	7.9	12.7	28.0
NA-2AC	38	8	65	65.0	13.4	26.9	57.0	10.0	7.9	12.7	54.0
NA-3AC	50	9	85	90.0	13.4	26.9	82.0	10.0	7.9	12.7	79.0
NA-4AC	75	11	147	116.0	13.4	26.9	102.0	10.0	7.9	12.7	82.0
NA-6AC	100	14	170	152.0	13.4	26.9	140.0	10.0	7.9	12.7	102.0
NA-8AC	150	16	198	203.0	13.4	26.9	190.0	10.0	7.9	12.7	127.0
NA-10AC	200	18	227	254.0	13.4	26.9	240.0	10.0	7.9	12.7	178.0
SA1-1AC	25	7	82	51.0	15.8	38.0	35.0	16.0	8.6	19.0	37.0
SA1-2AC	50	9	122	76.0	15.8	38.0	60.0	16.0	8.6	19.0	60.0
SA1-3AC	75	11	170	102.0	15.8	38.0	85.0	16.0	8.6	19.0	85.0
SA1-3.5AC	88	14	190	127.0	15.8	38.0	110.0	16.0	8.6	19.0	85.0
SA1-4AC	100	16	232	152.0	15.8	38.0	136.0	16.0	8.6	19.0	100.0
SA1-6AC	150	20	261	203.0	15.8	38.0	186.0	16.0	8.6	19.0	128.0
SA1-8AC	200	25	326	254.0	15.8	38.0	238.0	16.0	8.6	19.0	178.0
SA2-1AC	25	9	113	51.0	19.0	44.0	35.0	20.0	10.2	22.2	38.0
SA2-1.5AC	38	14	170	70.0	19.0	44.0	55.0	20.0	10.2	22.2	55.0
SA2-2AC	50	19	184	83.0	19.0	44.0	65.0	20.0	10.2	22.2	65.0
SA2-3AC	75	24	227	102.0	19.0	44.0	85.0	20.0	10.2	22.2	85.0
SA2-4AC	100	27	335	152.0	19.0	44.0	140.0	20.0	10.2	22.2	100.0
SA2-6AC	150	34	445	203.0	19.0	44.0	190.0	20.0	10.2	22.2	126.0
SA2-8AC	200	41	553	254.0	19.0	44.0	240.0	20.0	10.2	22.2	178.0
SA3-1AC	25	14	283	67.0	25.4	66.5	54.0	35.0	15.9	38.1	54.0
SA3-1.5AC	38	16	283	67.0	25.4	66.5	42.0	35.0	15.9	38.1	42.0
SA3-2AC	50	28	425	102.0	25.4	66.5	75.0	35.0	15.9	38.1	75.0
SA3-3AC	75	40	590	127.0	25.4	66.5	100.0	35.0	15.9	38.1	100.0
SA3-4AC	100	54	771	152.0	25.4	66.5	125.0	35.0	15.9	38.1	125.0
SA3-5AC	127	61	879	203.0	25.4	66.5	175.0	35.0	15.9	38.1	187.0
SA3-6AC	150	68	498	229.0	25.4	66.5	*75.0	35.0	15.9	38.1	178.0
SA3-9AC	228	84	1318	305.0	25.4	66.5	*75.0	35.0	15.9	38.1	254.0
SA3-12AC	304	93	1644	381.0	25.4	66.5	*75.0	35.0	15.9	38.1	330.0

# Non-Magnetic Linear Slides

## 6 Reasons to choose Del-Tron® Non-Magnetic Ball Slides



- 1. Non-Magnetic lightweight design.
- 2. Silicon nitride ceramic ball bearings, titanium shafts, aluminum carriage and base, brass fasteners.
- 3. Factory preload minimizes side play and provides low friction.
- 4. Self cleaning ball bearing design offers long life and requires no lubrication.
- 5. Standard mounting holes simplify installation.
- Mounting surfaces, parallel to the line of motion, provide straight line accuracy to 0.013mm/25mm of travel.



## Del-Tron® Ball Slides

### Load Ratings and Life Estimates

The rated load capacity of Del-Tron ball slides may be a mass load on a horizontal slide, or a force load normal to the mounting surface in any position. The rated load must be centered and distributed over the slide, and the base must be fully supported on a flat mounting surface so that the ball slide does not act as a beam subject to concentrated or distributed bending forces. Loads supported by protruding arms reduce accuracy and load capacity by acting as levers or ratio arms, and should be avoided even when load forces are small.

When used at the rated load capacity and moderate speeds, a life of 10 million inches of travel can be expected. The expected life at one half the rated load is 100 million inches.

#### Friction and Lubrication

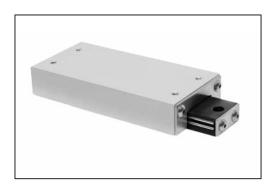
The coefficient of friction is lower for linear ball bearings than for rotary bearings, where the peripheral track is shorter on the inner race than on the outer race, causing the ball to skid on one or the other. The balls run exactly equal distances on the pair of tracks in linear bearings, permitting the ball to run without friction, wear, or skidding at any preload. The typical coefficient of friction for Del-Tron<sup>®</sup> ball slides is 0.003.

Lubrication is recommended for speeds above 1800 inches/min, and is advisable at lower speeds where high loads are applied in continuous duty applications.

### **Mounting and Accuracy**

The mounting surfaces of the ball slide are machined flat and smooth, and parallel to each other and the line of motion. They must be mounted on smooth, flat supports that will not deflect under load. Especially with long slides of small cross section, binding may be caused by distortion of the bottom member when mounted on irregular surfaces. If so, round shims or spacers may be placed over the mounting screws to raise the slide above the surface asperities. Bedding in epoxy resin is also recommended.

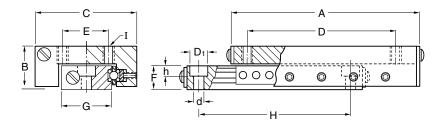
The specified accuracy for all standard Del-Tron ball slides is .0005inch/inch of travel. This is measured by comparison of the line of travel to a master straight edge, using a gage or indicator mounted on the slide.



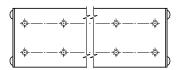
# Non-Magnetic Linear Ball Slides

* Minimum	Centered	d around M	ean Positio	on				RIAGE	BA:	SE DIMENS	
MODEL	TRAVEL*	LOAD CAPACITY (kg)	WEIGHT (g)	LENGTH A	HEIGHT B	WIDTH C		CING E	HEIGHT F	WIDTH G	HOLE SPACING
DA-1-NMS	13	.5	9	27.0	8.0	14.2	15.0	6.0	4.7	6.4	19.0
DA-2-NMS	25	1.1	14	52.0	8.0	14.2	41.0	6.0	4.7	6.4	35.0
DA-3-NMS	50	1.6	23	78.0	8.0	14.2	66.0	6.0	4.7	6.4	60.0
DA-4-NMS	75	1.9	31	103.0	8.0	14.2	92.0	6.0	4.7	6.4	86.0
DA-5-NMS	100	2.2	34	128.0	8.0	14.2	117.0	6.0	4.7	6.4	89.0
DA-6-NMS	127	2.5	43	154.0	8.0	14.2	142.0	6.0	4.7	6.4	114.0
EA-1-NMS	13	1.1	11	27.0	10.4	19.0	15.0	9.0	6.3	9.5	19.0
EA-2-NMS	25	1.4	26	52.0	10.4	19.0	41.0	9.0	6.3	9.5	35.0
EA-3-NMS	50	1.6	37	78.0	10.4	19.0	66.0	9.0	6.3	9.5	60.0
EA-4-NMS	75	1.9	48	103.0	10.4	19.0	92.0	9.0	6.3	9.5	86.0
EA-5-NMS	100	2.2	60	128.0	10.4	19.0	117.0	9.0	6.3	9.5	89.0
EA-6-NMS	127	2.5	71	154.0	10.4	19.0	142.0	9.0	6.3	9.5	114.0
MA-1-NMS	13	1.4	34	40.0	12.7	25.4	32.0	10.0	6.3	12.7	32.0
MA-2-NMS	25	1.6	48	65.0	12.7	25.4	57.0	10.0	6.3	12.7	57.0
MA-2.5-NM	S 38	1.8	54	78.0	12.7	25.4	65.0	10.0	6.3	12.7	65.0
MA-3-NMS	50	2.1	62	90.0	12.7	25.4	82.0	10.0	6.3	12.7	82.0
MA-4-NMS	75	2.5	142	116.0	12.7	25.4	108.0	10.0	6.3	12.7	108.0

SERIES	DA	EA	MA	NA	SA1	SA2	SA3
CARRIAGE 4 HOLES (I)	M2 THREAD	M3 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M5 THREAD
BASE HOLE d	2.2	3.5	3.5	4.6	4.6	4.6	5.8
BASE HOLE D <sub>1</sub>	4.0	6.1	6.1	8.1	8.1	8.1	10
BASE HOLE h	2.2	3.4	3.4	4.4	4.4	4.4	5.3
COUNTER BORE SCREW SIZE	M2	M3	M3	M4	M4	M4	M5



### SPECIFICATIONS:



MODEL SA3-6 SA3-9 SA3-12 # OF HOLES

\*\* 6

\*\* 8

\*\* 10

Straight Line Accuracy .013mm/25mm of travel

Positional Repeatability .005mm

### **Finish**

Clear anodize standard Black anodize available at no extra cost. Coefficient of Friction 0.003 typical

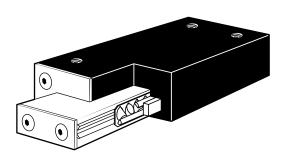
Construction

Silicon nitride ceramic ball bearings, titanium shafts, aluminum carriage base and end caps, brass fasteners.

*Minimum Ce	entered	around Me	an Position	1			CAI	RRIAGE	ВА	SE DIMENS	IONS —
MODEL T	RAVEL	LOAD CAPACITY (kg)	WEIGHT (g)	LENGTH A	HEIGHT B	WIDTH C	н	ACING E	HEIGHT F	WIDTH G	HOLE SPACING H
NA-1-NMS	19	2.1	37	40.0	13.4	26.9	32.0	10.0	7.9	12.7	28.0
NA-2-NMS	38	2.5	65	65.0	13.4	26.9	57.0	10.0	7.9	12.7	54.0
NA-3-NMS	50	2.7	85	90.0	13.4	26.9	82.0	10.0	7.9	12.7	79.0
NA-4-NMS	75	3.4	147	116.0	13.4	26.9	102.0	10.0	7.9	12.7	82.0
NA-6-NMS	100	4.1	170	152.0	13.4	26.9	140.0	10.0	7.9	12.7	102.0
NA-8-NMS	150	4.8	198	203.0	13.4	26.9	190.0	10.0	7.9	12.7	127.0
NA-10-NMS	200	5.4	227	254.0	13.4	26.9	240.0	10.0	7.9	12.7	178.0
SA1-1-NMS	25	2.1	82	51.0	15.8	38.0	35.0	16.0	8.6	19.0	37.0
SA1-2-NMS	50	2.7	122	76.0	15.8	38.0	60.0	16.0	8.6	19.0	60.0
SA1-3-NMS	75	3.4	170	102.0	15.8	38.0	85.0	16.0	8.6	19.0	85.0
SA1-3.5-NM	S 88	4.1	190	127.0	15.8	38.0	110.0	16.0	8.6	19.0	85.0
SA1-4-NMS	100	4.8	232	152.0	15.8	38.0	136.0	16.0	8.6	19.0	100.0
SA1-6-NMS	150	6.1	261	203.0	15.8	38.0	186.0	16.0	8.6	19.0	128.0
SA1-8-NMS	200	7.5	326	254.0	15.8	38.0	238.0	16.0	8.6	19.0	178.0
SA2-1-NMS	25	2.7	113	51.0	19.0	44.0	35.0	20.0	10.2	22.2	38.0
SA2-1.5-NM	S 38	4.1	170	70.0	19.0	44.0	55.0	20.0	10.2	22.2	55.0
SA2-2-NMS	50	5.7	184	83.0	19.0	44.0	65.0	20.0	10.2	22.2	65.0
SA2-3-NMS	75	7.0	227	102.0	19.0	44.0	85.0	20.0	10.2	22.2	85.0
SA2-4-NMS	100	8.2	335	152.0	19.0	44.0	140.0	20.0	10.2	22.2	100.0
SA2-6-NMS	150	10.2	445	203.0	19.0	44.0	190.0	20.0	10.2	22.2	126.0
SA2-8-NMS	200	12.3	553	254.0	19.0	44.0	240.0	20.0	10.2	22.2	178.0
SA3-1-NMS	25	4.1	283	67.0	25.4	66.5	54.0	35.0	15.9	38.1	54.0
SA3-1.5-NM	S 38	4.8	283	67.0	25.4	66.5	42.0	35.0	15.9	38.1	42.0
SA3-2-NMS	50	8.5	425	102.0	25.4	66.5	75.0	35.0	15.9	38.1	75.0
SA3-3-NMS	75	12.0	590	127.0	25.4	66.5	100.0	35.0	15.9	38.1	100.0
SA3-4-NMS	100	16.1	771	152.0	25.4	66.5	125.0	35.0	15.9	38.1	125.0
SA3-5-NMS	127	18.4	879	203.0	25.4	66.5	175.0	35.0	15.9	38.1	187.0
SA3-6-NMS	150	20.5	498	229.0	25.4	66.5	**75.0	35.0	15.9	38.1	178.0
SA3-9-NMS	228	25.2	1318	305.0	25.4	66.5	**75.0	35.0	15.9	38.1	254.0
SA3-12-NMS	304	28.0	1644	381.0	25.4	66.5	**75.0	35.0	15.9	38.1	330.0

# **Crossed Roller Slides**

## 6 Reasons to choose Del-Tron® Crossed Roller Slides



- 1. Positive stops prevent overtravel.
- 2. Rollers improve load capacity 8-10 times that of balls.
- 3. Precision ground shafts provide straight line accuracy of .003mm per 25mm of travel.
- 4. Alternately crossed rollers handle force in any direction.
- 5. Lightweight aluminum carriage and base.
- 6. Interchangeable with many types of ball slides.



### Del-Tron® Crossed Roller Slides

Del-Tron's new series of crossed roller slides, offer designers additional flexibility in their choice of ready to install components for precision linear transfer.

Our crossed roller slides, when compared to our ball slide products of equal size, offer higher load carrying capacity and, when operating at high cycling rates or with shock and overhanging loads, improved performance. Most importantly, our crossed roller slides provide high accuracy, .003mm/25mm of travel, and repeatability, .003mm, exceeding our precision ball slides. Although crossed roller slides cost more than equivalent size ball slides, their overall performance, especially in applications where heavy loads must be moved in compact assemblies, often justifies selection.

### Operation

Crossed roller slides physically resemble ball slides except for the bearing design. Specifically, each slide is comprised of an aluminum carriage straddling an aluminum base. Using a bearing system containing cylindrical steel rollers, the carriage glides, almost friction free, over the base.

The rollers, alternately crisscrossed with each other, move between a set of 4, partially flat, parallel, smooth rods on each side of the base. The rollers share a larger contact surface with the rods as compared to the point contact of steel balls. This bearing design allows crossed roller slides to carry larger loads and absorb greater load impacts than equivalent size ball slides.

Crossed roller slides are not as naturally self-cleaning in operation as ball slides. In operating environments, with little or no protection against dust and when heavy loads are not a consideration, consider Del-Tron® ball slides.

### Wide Selection

Del-Tron offers over 47 models of crossed roller slides. Load capacities range from 14 kg to 354 kg, with travel from 13mm to 300mm. Installation into your system is simple. Counterbored holes in the base permit quick attachment to your assembly. Components attach to the carriage in the existing threaded mounting holes.



## **Crossed Roller** Slide Assemblies

# LOAD RATINGS AND LIFE ESTIMATES

Crossed roller slide rated load capacities may be a mass load on a horizontal slide, or a force load normal to the mounting surface in any position. The rated load must be centered and distributed over the slide, and the base must be supported on a flat mounting surface. Avoid concentrated or distributed bending forces.

At rated load capacity and moderate speeds, expected life is 25 million cm of travel. The expected life at one

half the rated load is 250 million cm.

**LUBRICATION**The crossed roller slides are lightly lubricated during assembly.
Additional lubrication is required for speeds above 30,000 mm/min. and is advisable at lower speeds where high loads are applied in continuous duty applications.

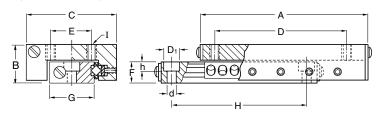
#### **MOUNTING**

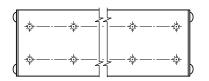
Mount the crossed roller slides on flat surfaces to provide full support to the

moment load ratings + load / life formulas. pg.92

* Minimu	m Centered	Around Me	an Positio	n			CAR	RIAGE	ВА	SE DIMENS	IONS —
MODEL	TRAVEL*	LOAD CAPACITY (kg)	WEIGHT (g)	LENGTH A	HEIGHT B	WIDTH C	н	OLE ACING E	HEIGHT F	WIDTH G	HOLE Spacing H
RDA-1	13	14	11	27.0	8.0	14.2	15.0	6.0	4.7	6.4	19.0
RDA-2	25	25	17	52.0	8.0	14.2	41.0	6.0	4.7	6.4	35.0
RDA-3	50	30	26	78.0	8.0	14.2	66.0	6.0	4.7	6.4	60.0
RDA-4	75	32	34	103.0	8.0	14.2	92.0	6.0	4.7	6.4	86.0
RDA-5	100	36	37	129.0	8.0	14.2	117.0	6.0	4.7	6.4	89.0
RDA-6	127	41	45	154.0	8.0	14.2	143.0	6.0	4.7	6.4	114.0
REA-1	13	22	14	27.0	10.4	19.0	15.0	9.0	6.3	9.5	19.0
REA-2	25	35	28	52.0	10.4	19.0	41.0	9.0	6.3	9.5	35.0
REA-3	50	42	40	78.0	10.4	19.0	66.0	9.0	6.3	9.5	60.0
REA-4	75	44	51	103.0	10.4	19.0	92.0	9.0	6.3	9.5	86.0
REA-5	100	47	62	129.0	10.4	19.0	117.0	9.0	6.3	9.5	89.0
REA-6	127	49	74	154.0	10.4	19.0	142.0	9.0	6.3	9.5	114.0
RMA-1	13	32	37	40.0	12.7	25.4	32.0	10.0	6.3	12.7	32.0
RMA-2	25	35	51	65.0	12.7	25.4	57.0	10.0	6.3	12.7	57.0
RMA-2.5	38	35	57	78.0	12.7	25.4	65.0	10.0	6.3	12.7	65.0
RMA-3	50	38	65	90.0	12.7	25.4	82.0	10.0	6.3	12.7	82.0
RMA-4	75	41	79	116.0	12.7	25.4	108.0	10.0	6.3	12.7	108.0

SERIES	RDA	REA	RMA	RNA	RSA1	RSA2	RSA3
CARRIAGE 4 HOLES (I)	M2 THREAD	M3 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M4 THREAD	M5 THREAD
BASE HOLE d	2.2	3.5	3.5	4.6	4.6	4.6	5.8
BASE HOLE D1	4.0	6.1	6.1	8.1	8.1	8.1	10
BASE HOLE h	2.2	3.4	3.4	4.4	4.4	4.4	5.3
COUNTER BORE SCREW SIZE	M2	М3	M3	M4	M4	M4	M5





MODEL RSA3-6 RSA3-9 RSA3-12

# OF HOLES

\*\* 6

\*\* 8

\*\* 10

### **SPECIFICATIONS:**

Straight line accuracy Positional repeatability Coefficient of friction

Construction

.003mm/25mm of travel

.003mm .003 typical

Aluminum carriage and base, hardened steel rods and

hardened steel rods and rollers, stainless steel end

caps.

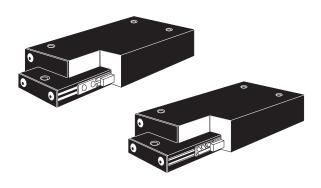
Finish Black anodize

### moment load ratings + load / life formulas. pg.92

* Minimur	m Centered	d Around Me	an Position	1			— CARE	RIAGE —	BAS	SE DIMENS	IONS —
MODEL	TRAVEL*	LOAD CAPACITY (kg)	WEIGHT (g)	LENGTH A	HEIGHT B	WIDTH C		LE	HEIGHT F	WIDTH G	HOLE SPACING
RNA-1	19	50	40	40.0	13.4	26.9	32.0	10.0	7.9	12.7	28.0
RNA-2	38	60	68	65.0	13.4	26.9	57.0	10.0	7.9	12.7	54.0
RNA-3	50	100	88	90.0	13.4	26.9	82.0	10.0	7.9	12.7	79.0
RNA-4	75	120	150	116.0	13.4	26.9	102.0	10.0	7.9	12.7	82.0
RNA-6	100	129	173	152.0	13.4	26.9	140.0	10.0	7.9	12.7	102.0
RNA-8	150	135	204	203.0	13.4	26.9	190.0	10.0	7.9	12.7	127.0
RNA-10	200	145	232	254.0	13.4	26.9	240.0	10.0	7.9	12.7	178.0
RSA1-1	25	59	85	51.0	15.8	38.0	35.0	16.0	8.6	19.0	37.0
RSA1-2	50	79	128	76.0	15.8	38.0	60.0	16.0	8.6	19.0	60.0
RSA1-3	75	79	176	102.0	15.8	38.0	85.0	16.0	8.6	19.0	85.0
RSA1-3.5	5 89	95	196	127.0	15.8	38.0	111.0	16.0	8.6	19.0	85.0
RSA1-4	100	139	238	152.0	15.8	38.0	136.0	16.0	8.6	19.0	100.0
RSA1-6	150	163	266	203.0	15.8	38.0	186.0	16.0	8.6	19.0	127.0
RSA1-8	200	187	332	254.0	15.8	38.0	238.0	16.0	8.6	19.0	178.0
RSA2-1	25	59	116	51.0	19.0	44.0	35.0	20.0	10.2	22.2	38.0
RSA2-1.5	38	68	173	70.0	19.0	44.0	55.0	20.0	10.2	22.2	55.0
RSA2-2	50	79	187	83.0	19.0	44.0	65.0	20.0	10.2	22.2	65.0
RSA2-3	75	79	232	102.0	19.0	44.0	85.0	20.0	10.2	22.2	85.0
RSA2-4	100	139	343	152.0	19.0	44.0	140.0	20.0	10.2	22.2	100.0
RSA2-6	150	170	454	203.0	19.0	44.0	190.0	20.0	10.2	22.2	127.0
RSA2-8	200	204	561	254.0	19.0	44.0	240.0	20.0	10.2	22.2	178.0
RSA3-1	25	102	292	67.0	25.4	66.6	54.0	35.0	15.9	38.1	54.0
RSA3-1.5	38	119	292	67.0	25.4	66.6	42.0	35.0	15.9	38.1	42.0
RSA3-2	50	158	454	102.0	25.4	66.6	75.0	35.0	15.9	38.1	75.0
RSA3-3	75	198	635	127.0	25.4	66.6	100.0	35.0	15.9	38.1	100.0
RSA3-4	100	198	816	152.0	25.4	66.6	125.0	35.0	15.9	38.1	125.0
RSA3-5	127	215	936	203.0	25.4	66.6	175.0	35.0	15.9	38.1	187.0
RSA3-6	150	317	1089	229.0	25.4	66.6	**75.0	35.0	15.9	38.1	178.0
RSA3-9	228	336	1366	305.0	25.4	66.6	**75.0	35.0	15.9	38.1	254.0
RSA3-12	304	354	1729	381.0	25.4	66.6	**75.0	35.0	15.9	38.1	330.0

# **Precision Series**

6 Reasons to choose Del-Tron® Precision Series (Ball or Crossed Roller Slides)



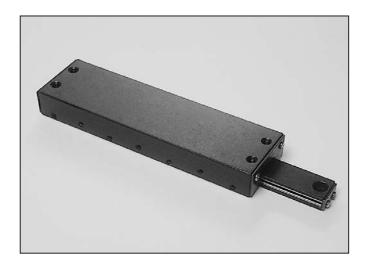
- 1. Corrosion resistant hardened stainless steel internal components.
- 2. Up to 127mm wide cross section.
- 3. Interchangeable with other manufacturer's products.
- 4. Low friction straight line design.
- 5. Adjustable preload.
- 6. Straight line design with 0.001mm repeatability

# Precision Series (Ball or Crossed Roller Slides)

Del-Tron® Precision Series Ball and Roller Slides offer the designer an aluminum base and carriage with hardened stainless components for superior corrosion resistance and less chance of particulate contamination. Available in standard low profile mounting, the designer can choose a style of bearing and type of rolling element specifically to meet the needs of the most particular applications.

Preload can be adjusted to change the friction and axial play characteristics therefore customizing the slide to its intended use. A new 127mm wide cross section allows the movement of bulky devices without the necessity of constructing tables with more than one unit.





# **Precision Series Ball Slides**

### SPECIFICATIONS:

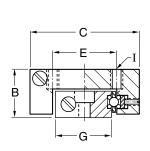
Straight Line Accuracy .003mm/25mm of travel.

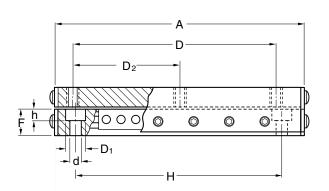
Repeatability 0.001mm

**Coefficient of Friction** 0.002

### Construction

Aluminum carriage and base. Hardened stainless steel balls, shafts, pre-load gibs. Interchangeable with other manufacturers. Economical Ball Slide design.





moment load ratings + load / life formulas. pg.92

*Minimum Ce	ntered A	round Mean Pos	ition													
Model	Travel*	Load Capacity (kg)	Weight (g)	A	В	C	D	d	<b>D</b> 1	D <sub>2</sub>	E	F	G	Н	h	I
MA-2SS MA-3SS MA-4SS	25 50 75	5.4 9.1 10	57 79 102	65.0 90.4 115.8	12.7	25.4	57 83 108	3.5	6.1	- - -	10	6.4	10.2	57 83 108	3.4	M4
SA2-1SS SA2-1.5SS SA2-2SS SA2-3SS SA2-4SS	25 38 50 75 100	9.1 15 20 25 28	113 154 186 227 286	50.8 69.9 82.6 101.6 127.0	19.1	44.5	35 54 65 85 115	4.6	8.1	-	20	10.2	22.1	38 54 65 85 115	4.4	M4
SA3-1SS SA3-2SS SA3-3SS SA3-4SS SA3-5SS SA3-6SS	25 50 75 100 125 150	16 29 42 55 63 70	295 453 567 680 794 1021	66.5 101.6 127.0 152.4 203.2 228.6	25.4	66.5	54 75 100 125 175 150	5.8	10	- - - - - 75	35	15.5	38.1	54 75 100 125 187 178	5.3	M5
SA5-3SS SA5-5SS SA5-7SS	75 125 175	42 64 77	1021 1474 1928	127.0 177.8 228.6	25.4	127.0	100 150 200	7.1	11	50 75 100	100	15.5	98.3	100 150 200	6.2	M6



# **Precision Series Crossed Roller Slides**

### SPECIFICATIONS:

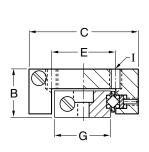
Straight Line Accuracy 0.003mm/25mm of travel.

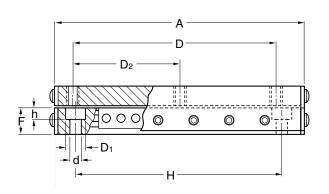
Repeatability 0.001mm

Coefficient of Friction 0.002.

### Construction

Aluminum carriage and base. Hardened stainless steel rollers, shafts, pre-load gibs. Interchangeable with other manufacturers. Load capacities up to 186 kg. Crossed Roller design offers self-aligning ways and greater load capacity.



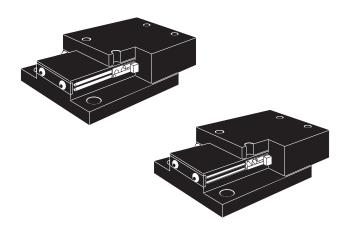


### moment load ratings + load / life formulas. pg.92

*Minimum Co	entered Ar	ound Mean Posit	ion													
Model	Travel*	Load Capacity (kg)	Weight (g)	A	В	C	D	d	<b>D</b> 1	D <sub>2</sub>	E	F	G	Н	h	I
RSA2-1SS RSA2-2SS RSA2-3SS RSA2-4SS	25 50 75 100	36 54 59 64	127 209 254 286	50.8 82.6 101.6 127.0	19.0	44.5	35 65 85 115	4.6	8.1	-	20	10.2	22.1	38 65 85 115	4.6	M4
RSA3-1SS RSA3-2SS RSA3-3SS RSA3-4SS RSA3-5SS	25 50 75 100 125	95 109 154 173 186	299 454 567 680 907	66.5 101.6 127.0 152.4 203.2	25.4	67	54 75 100 125 175	5.8	10	- - - -	35	15.5	38.1	54 75 100 125 187	5.3	M5
RSA5-3SS RSA5-5SS RSA5-7SS	75 125 175	100 109 118	1021 1474 1928	127.0 177.8 228.6	25.4	127	100 150 200	7.1	11	50 75 100	100	15.5	98.3	100 150 200	6.2	M6

# **High Precision Series**

6 Reasons to choose Del-Tron® High Precision Series (Ball or Crossed Roller Slides)



- 1. Stable flanged base style available
- 2. Superior accuracy and repeatability.
- 3. Precision ground carriage and base.
- 4. Corrosion resistant hardened stainless steel internal components.
- 5. Bigger cross sections and lengths for heavy loads and large moving parts.
- 6. Smooth low friction motion.



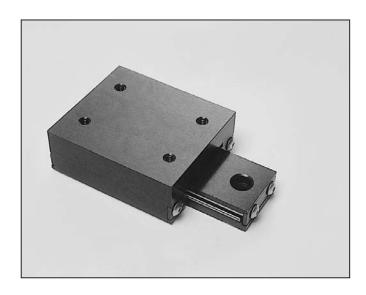
# High Precision Series (Ball or Crossed Roller Slides)

Del-Tron® High Precision Series Ball and Crossed Roller Slides offer the designer highly accurate travel characteristics. .001mm/25mm of travel with superior repeatability of 0.0005mm. The base and carriage inner surfaces are ground to submicron tolerances while the mounting surfaces are flat to within .003mm/25mm.

The standard low profile style incorporates a base which is surrounded by the carriage leaving little surface to attract and hold contaminants. A flanged base style is offered to allow robust mounting at 4 points to assure stability in high impact or rough duty environments.

These slides utilize Del-Tron's straight line design which allows lower friction characteristics along with the option to manipulate the preload to adjust to the needs of the application.

New larger widths and lengths up to 146mm wide and 381mm long increase the versatility of this design.



# **High Precision Series Ball Slides**

(Low Profile)

### SPECIFICATIONS:

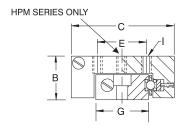
Straight Line Accuracy .001mm/25mm of travel.

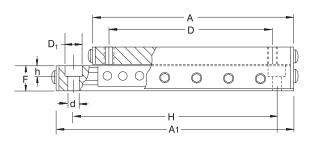
Repeatability 0.0005mm

**Coefficient of Friction** 0.002

### Construction

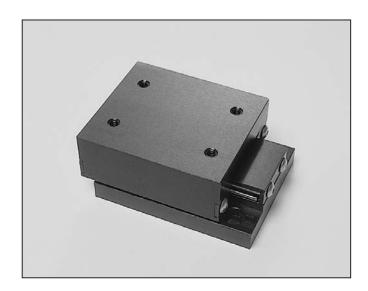
Aluminum carriage and base. Hardened stainless steel balls, shafts, pre-load gibs. Interchangeable with other manufacturers. Carriage and base ground to optical flatness. Bearing way surfaces held to submicron tolerances. Carriage surface flat to .003mm/25mm. Ball Slide design offers low rolling resistance and economical price.





moment load ratings + load / life formulas. pg.93

Minimum Ce	ntered Arc	ound Mean Posit	ion													
Model	Travel*	Load Capacity (kg)	Weight (g)	A	<b>A</b> 1	В	C	D	d	<b>D</b> 1	E	F	G	Н	h	I
HPMA-1 HPMA-2 HPMA-2.5 HPMA-3	13 25 38 50	3.6 6.8 11 14	27 50 73 91	25.4 44.5 63.5 82.6	31.8 50.8 69.9 88.8	12.7	25.4	15 35 54 70	3.5	6.1	CL	6.1	10.2	20 40 57 75	3.4	M
HPSA2-1 HPSA2-1.5 HPSA2-2 HPSA2-3	25 38 50 75	11 14 19 23	127 172 209 254	50.8 69.9 82.6 101.6	57.2 76.2 88.9 108.0	19.0	44.5	35 54 65 85	4.6	8.1	20	10.2	22.1	40 57 70 90	4.6	M
HPSA3-1 HPSA3-2 HPSA3-3 HPSA3-4 HPSA3-5	25 50 75 100 125	33 38 46 60 66	299 454 567 680 907	66.5 101.6 127.0 152.4 203.2	66.5 111.0 136.4 161.8 212.6	25.4	66.5	54 75 100 125 178	5.8	10	35	15.7	38.1	54 85 110 135 190	5.3	M
HPSA4-2 HPSA4-3 HPSA4-5 HPSA4-6.5 HPSA4-9	50 75 125 165 225	59 64 73 79 91	907 1306 1814 2327 3175	101.6 146.1 203.2 260.4 355.6	114.3 158.8 215.9 273.1 368.3	34.9	88.9	50 95 150 210 305	5.8	10	50	15.7	50.3	65 110 175 225 320	5.3	M
HPSA5-5 HPSA5-7 HPSA5-10	125 175 250	68 82 102	4536 6586 8233	209.6 304.8 381.0	222.3 317.5 393.7	50.8	146.1	150 250 330	7.1	11	100	24.9	94.0	175 275 350	6.2	М



# **High Precision Series Ball Slides**

(Flange Base)

### SPECIFICATIONS:

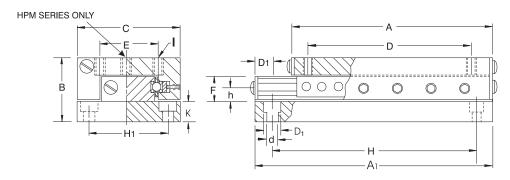
Straight Line Accuracy .001mm/25mm of travel.

Repeatability 0.0005mm

Coefficient of Friction 0.002

### Construction

Aluminum carriage and base. Hardened stainless steel balls, shafts, pre-load gibs. Interchangeable with other manufacturers. Carriage and base ground to optical flatness. Bearing way surfaces held to submicron tolerances. Carriage surface flat to .003mm/25mm. Flange Base design allows ease of mounting and stability.



moment load ratings + load / life formulas. pg.93

*Minimum Ce	ntered A	round Mean Po	sition														
Model	Travel*	Load Capacity (kg)	Weight (g)	A	<b>A</b> 1	В	C	D	d	<b>D</b> 1	E	F	H <sub>1</sub>	Н	h	I	K
HPMA-1FB HPMA-2FB HPMA-2.5FB HPMA-3FB	13 25 38 50	3.6 6.8 11 14	36 64 91 118	25.4 44.5 63.5 82.6	31.8 50.8 69.9 88.9	19.1	25.4	15 35 54 70	3.5	6.1	CL	12.7	19	20 40 57 75	3.4	M3	6.4
HPSA2-1FB HPSA2-1.5FB HPSA2-2FB HPSA2-3FB	25 38 50 75	11 14 19 23	172 236 277 340	50.8 69.9 82.6 101.6	57.2 76.2 88.9 108.0	26.2	44.5	35 54 65 85	4.6	8.1	20	17.3	33	40 57 70 90	4.6	M4	7.1
HPSA3-1FB HPSA3-2FB HPSA3-3FB HPSA3-4FB HPSA3-5FB	25 50 75 100 125	33 38 46 60 66	413 635 794 953 1270	66.5 101.6 127.0 152.4 203.2	66.5 111.0 136.4 161.8 212.6	34.9	66.5	54 75 100 125 178	5.8	10	35	25.4	52	54 85 110 135 190	5.3	M5	9.4
HPSA4-2FB HPSA4-3FB HPSA4-5FB HPSA4-6.5FB HPSA4-9FB	50 75 125 165 225	59 64 73 79 91	1134 1628 2268 2908 3969	101.6 146.1 203.2 260.4 355.6	114.3 158.8 215.9 273.1 368.3	44.5	88.9	50 95 150 210 305	5.8	10	50	25.0	70	65 110 175 225 320	5.3	M5	9.4
HPSA5-5FB HPSA5-7FB HPSA5-10FB	125 175 250	68 82 102	5443 7893 9870	207.6 304.8 381.0	222.3 317.5 393.7	60.3	146.1	150 250 330	7.1	11	100	34.3	127	175 275 350	6.2	M6	9.4



# High Precision Series Crossed Roller Slides (Low Profile)

### **SPECIFICATIONS:**

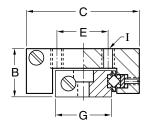
Straight Line Accuracy .001mm/25mm of travel.

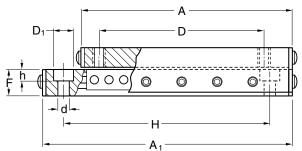
Repeatability 0.0005mm

**Coefficient of Friction** 0.002

### Construction

Aluminum carriage and base. Hardened stainless steel rollers, shafts, pre-load gibs. Interchangeable with other manufacturers. Carriage and base ground to optical flatness. Bearing way surfaces held to submicron tolerances. Carriage surface flat to .003mm/25mm. Crossed Roller design greatly increases load capacity and overhung load capability.





moment load ratings + load / life formulas. pg.93

*Minimum C	entered A	Around Mean Po	sition													
Model	Travel*	Load Capacity (kg)	Weight (g)	A	<b>A</b> 1	В	С	D	d	<b>D</b> 1	E	F	G	Н	h	I
HPRSA2-1 HPRSA2-1.5 HPRSA2-2 HPRSA2-3	25 38 50 75	41 68 59 64	127 172 209 254	50.8 69.9 82.6 101.6	57.2 76.2 88.9 108.0	19.1	44.5	35 54 65 85	4.6	8.1	20	10.2	22.1	40 57 70 90	4.6	M4
HPRSA3-1 HPRSA3-2 HPRSA3-3 HPRSA3-4 HPRSA3-5	25 50 75 100 125	100 114 159 177 191	299 454 567 680 907	66.5 101.6 127.0 152.4 203.2	66.5 111.0 136.4 161.8 212.6	25.4	66.5	54 75 100 125 178	5.8	10	35	15.7	38.1	54 85 110 135 190	5.3	M5
HPRSA4-2 HPRSA4-3 HPRSA4-5 HPRSA4-6.5 HPRSA4-9	50 75 125 165 225	118 127 145 159 182	907 1306 1814 2327 3175	101.6 146.1 203.2 260.4 355.6	114.3 158.8 215.9 273.1 368.3	34.9	88.9	50 95 150 210 305	5.8	10	50	15.7	50.3	65 110 175 225 320	5.3	M5
HPRSA5-5 HPRSA5-7 HPRSA5-10	125 175 250	136 163 204	4536 6586 8232	209.6 304.8 381.0	222.3 317.5 393.7	50.8	146.1	150 250 330	7.1	11	100	24.9	94.0	175 275 350	6.2	M6



# **High Precision Series Crossed Roller Slides**

(Flange Base)

### SPECIFICATIONS:

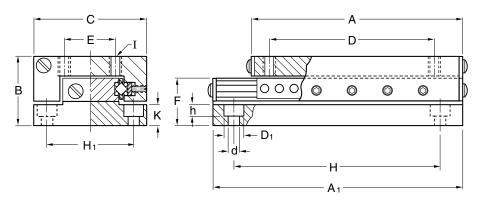
Straight Line Accuracy .001mm/25mm of travel.

Repeatability 0.0005mm

**Coefficient of Friction** 0.002

### Construction

Aluminum carriage and base. Hardened stainless steel rollers, shafts, pre-load gibs. Interchangeable with other manufacturers. Carriage and base ground to optical flatness. Bearing way surfaces held to submicron tolerances. Carriage surface flat to .003mm/25mm. Flange Base with crossed roller design offers the ultimate in accuracy, capacity and stability.

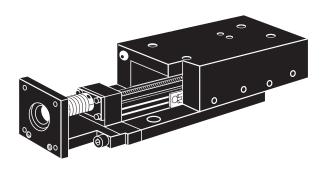


moment load ratings + load / life formulas. pg.93

*Minimum Cen	tered Aroun	d Mean Pos	ition														
Model	Travel* Loa	ad Capacity (kg)	Weight (g)	A	<b>A</b> 1	В	C	D	d	<b>D</b> 1	E	F	<b>H</b> 1	Н	h	I	K
HPRSA2-1FB HPRSA2-1.5FB HPRSA2-2FB HPRSA2-3FB	25 38 50 75	41 52 59 64	172 236 277 340	50.8 69.9 82.6 101.6	57.2 76.2 88.9 108.0	26.2	44.5	35 54 65 85	4.6	8.1	20	17.3	33	40 57 70 90	4.6	M4	7.1
HPRSA3-1FB HPRSA3-2FB HPRSA3-3FB HPRSA3-4FB HPRSA3-5FB	25 50 75 100 125	100 114 159 177 191	413 635 794 953 1270	66.9 101.6 127.0 152.4 203.2	66.5 111.0 136.4 161.8 212.6	34.9	66.5	54 75 100 125 178	5.8	10	35	25.4	52	54 85 110 135 190	5.3	M5	9.4
HPRSA4-2FB HPRSA4-3FB HPRSA4-5FB HPRSA4-6.5FB HPRSA4-9FB	50 75 125 165 225	118 127 145 159 182	1134 1628 2268 2908 3969	101.6 146.1 203.2 260.4 355.6	114.3 158.8 215.9 273.1 368.3	44.5	88.9	50 95 150 210 305	5.8	10	50	25.0	70	65 110 175 225 320	5.3	M5	9.4
HPRSA5-5FB HPRSA5-7FB HPRSA5-10FB	125 175 250	136 163 204	5443 7893 9870	209.6 304.8 381.0	222.3 317.5 393.7	60.3	146.1	150 250 330	7.1	11	100	34.3	127	175 275 350	6.2	M6	9.4

# Mini Posi-Drive™ Stages

6 Reasons to choose Del-Tron® Mini Posi-Drive™ Stages (LSA1, LRSA1 Series)



- 1. Positive lead screw drive.
- 2. Zero backlash.
- 3. Friction-free linear ball or roller slides.
- 4. Accurate, repeatable linear travel.
- 5. Compact adaptable configuration.
- 6. Adaptable to standard Nema Configurations.

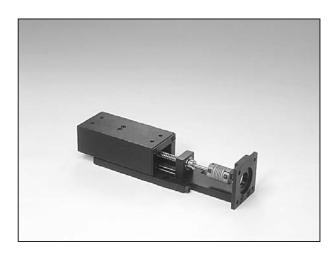


### Del-Tron® Mini Posi-Drive™ Stages

Compact Posi-Drive™ series LSA1 and LRSA1 stages have a height of only 32mm and a width of only 35mm. These stages provide the same outstanding .003mm straight line accuracy per 25mm of travel and .003mm repeatability as the larger LSA3 series Posi-Drive™ line. The new smaller stages also offer a compact, flexible configuration and are adaptable to standard Nema configurations.

The LSA1 Posi-Drive™ stages offer a .168" diameter .5mm lead screw, an anti-backlash nut and a flexible zero backlash coupling that accepts a Nema 14 motor. They provide a load-carrying capacity of up to 18.1 kg. The stages are available in travel lengths ranging from 25mm to 100mm. Del-Tron also provides special configurations, motor mounts, hand crank actuation and a variety of leads and pitches.

The new positioners are available with either linear ball or crossed roller slides and can be configured for one, two, or three-axis positioning. In the ball slide version, precision steel balls roll in the raceway grooves with contact at four points, enabling load and moment to be carried on all directions. Rolling resistance is extremely low, ensuring smooth and stable operation. Crossed roller slides physically resemble ball slides except for the bearing design. The rollers share a larger contact surface with the rods as compared to the point contact of steel balls. This bearing design allows crossed roller slides to carry larger loads and absorb greater load impacts than equivalent size ball slides.



## **Del-Tron® Mini Posi-Drive™ Stages**

**Specifications** 

.168" diameter .5mm lead screw with anti-backlash nut. Drive:

Coupling: Flexible zero backlash coupling.

**Motor Mount:** Accepts Nema 14 motor

Travel: 25mm - 100mm

**Anti-Friction Slide:** Linear ball or crossed roller slide.

**Load Capacity:** Up to 18.1 kg Configuration: 1, 2 or 3 axis.

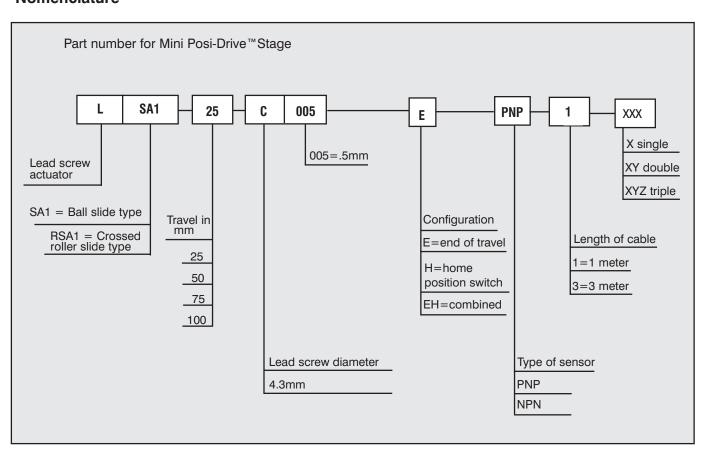
Straight line, up to .003mm/25mm **Accuracy:** 

Repeatability: .003mm

Also available are special configurations, motor mounts, hand crank actuation, and a variety of leads and pitches.

Motor/controller available.

### **Nomenclature**



### moment load ratings + load / life formulas. pg.93

Ball Slide Mini Posi-Drive™	Travel*	A	В	C	D	L	S	Н	Load Capacity kg
LSA1-25-C005	25	103.4	50.8	52.6	35	.310	1.190	37	3.6
LSA1-50-C005	50	128.8	76.2	52.6	60	.810	.690	60	4.5
LSA1-75-C005	75	154.2	101.6	52.6	85	1.310	.990	85	6.8
LSA1-100-C005	100	211.3	152.4	58.9	135	2.310	.990	100	9.1

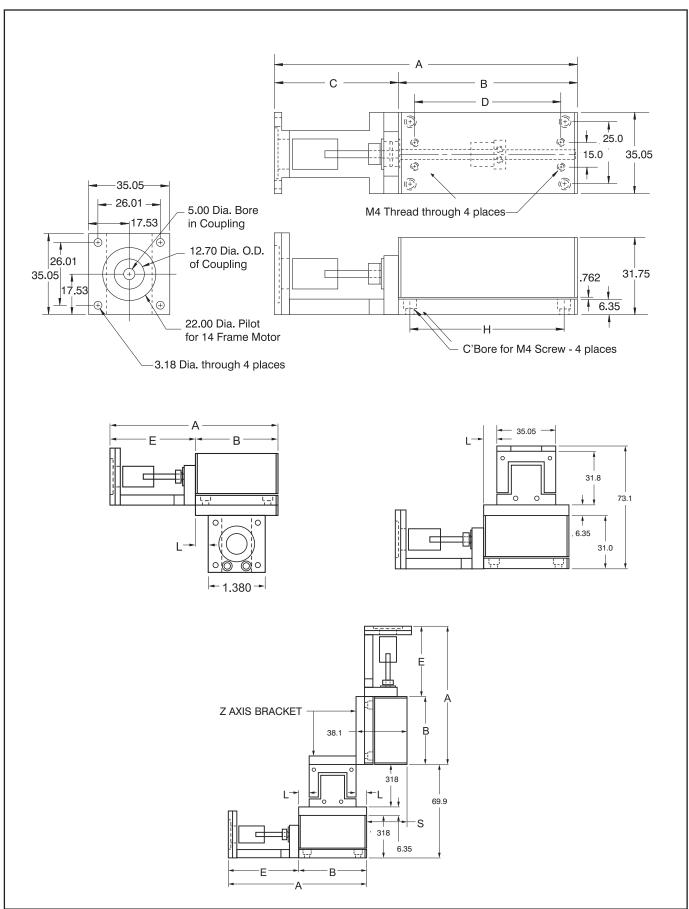
Dimensions in mm

### moment load ratings + load / life formulas. pg.93

	Roller Slide Mini Posi-Drive™	Travel*	A	В	С	D	Н	L	s	Load Capacity kg
Γ	LRSA1-25-C005	25	103.4	50.8	52.6	35	37	.310	1.190	6.8
ı	LRSA1-50-C005	50	128.8	76.2	52.6	60	60	.810	.690	9.1
	LRSA1-75-C005	75	154.2	101.6	52.6	85	85	1.310	.990	13.6
	LRSA1-100-C005	100	211.3	152.4	58.9	135	100	2.310	.990	18.1

### Mini Posi-Drive™ Series LSA1, LRSA1

Designed for NEMA 14 motor frame, other motor adaptors available. Supplied with coupling for 5mm motor shaft. Couplings with inch and metric bore available. Standard travels of 25mm, 50mm, 75mm and 100mm



### LIMIT AND POSITION SWITCHES

### EOT (End Of Travel) and HPS (Home Position Switches)

Del-Tron Precision offers the addition of EOT and HPS to all 3 sizes of the Posi-Drive series. The EOT kit and the HPS kit could be used together or independently. The stand alone kits can be added to any of the 3 sizes of the Posi-Drive series. The EOT kit comes with 2 switches mounted to the base at each end. There are 2 flags that are mounted to the carriage. These flags are adjustable for either the full range of travel or for limited amount of travel if the application requires such. The Home Position Switch kit comes with 1 switch mounted to the base in the center. There is an adjustable flag mounted to the carriage. The adjustable flag will allow the Home Position to be set anywhere along the entire range of travel. The EOT and HPS are easily mounted to brackets, which are then attached to the base. The flags are easily assembled to a bracket that is then attached to the carriage. The base and carriage have the threaded mounting holes available for easy assembly of the brackets. The switches are photoelectric sensors that operate on a supply voltage of 5 to 24 VDC. The repeatability is .0002" and the response time is 100µseconds. The sensors are available in both NPN and PNP outputs. The sensors are equipped with a quick fitting Hook-Up Connector with cable lengths in 1m or 3m.

### Part Numbering System for EOT and HPS

E-PNP-1 X-XXX-X

X-Configuration- E=EOT, H=HPS, EH=Combined XXX=Type of Sensor, PNP or NPN

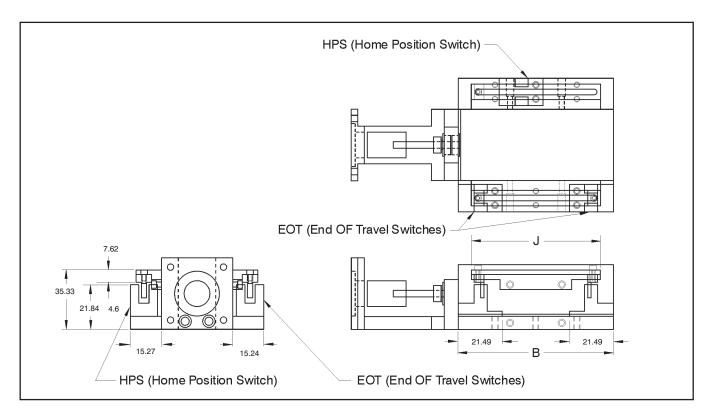
X=Length of Cable, 1=1meter, 3= 3 meter

#### Part Number and Price List

E-PNP-1	\$119
E-NPN-1	\$119
H-PNP-1	\$59
H-NPN-1	\$59
EH-PNP-1	\$179
EH-NPN-1	\$179

LSA1 and LRSA1 SERIES						
TRAVEL	В	J				
25 50 75 110	50.8 76.2 101.6 152.4	38.1 63.5 88.9 139.7				

Prices are the same for the 3 meter length cable and connector.

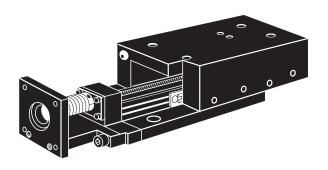


Maximum Recommended Revolutions Per Second

Lead: .5mm	20 RPS

# Mini Posi-Drive™ Stages

6 Reasons to choose Del-Tron® Mini Posi-Drive™ Stages (LSA2, LRSA2 Series)



- 1. Positive lead screw drive.
- 2. Zero backlash.
- 3. Friction-free linear ball or roller slides.
- 4. Accurate, repeatable linear travel.
- 5. Compact adaptable configuration.
- 6. Adaptable to standard Nema Configurations.

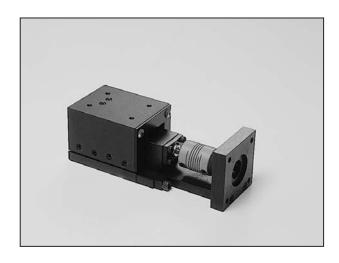


### Del-Tron® Mini Posi-Drive™ Stages

Compact Posi-Drive™ series LSA2 and LRSA2 stages have a height of only 41.9mm and a width of only 44.4mm. These stages provide the same outstanding .003mm straight line accuracy per 25mm of travel and .003mm repeatability as the larger LSA3 series Posi-Drive™ line. The new smaller stages also offer a compact, flexible configuration and are adaptable to standard Nema configurations.

The LSA2 Posi-Drive™ stages offer a .250" diameter 2mm lead screw, an anti-backlash nut and a flexible zero backlash coupling that accepts a Nema 17 motor. They provide a load-carrying capacity of up to 27.2 kg. The stages are available in travel lengths ranging from 25mm - 100mm. Del-Tron also provides special configurations, motor mounts, hand crank actuation and a variety of leads and pitches.

The new positioners are available with either linear ball or crossed roller slides and can be configured for one, two, or three-axis positioning. In the ball slide version, precision steel balls roll in the raceway grooves with contact at four points, enabling load and moment to be carried on all directions. Rolling resistance is extremely low, ensuring smooth and stable operation. Crossed roller slides physically resemble ball slides except for the bearing design. The rollers share a larger contact surface with the rods as compared to the point contact of steel balls. This bearing design allows crossed roller slides to carry larger loads and absorb greater load impacts than equivalent size ball slides.



## **Del-Tron® Mini Posi-Drive™ Stages**

**Specifications** 

.250" diameter 2mm lead screw with anti-backlash nut. Drive:

Coupling: Flexible zero backlash coupling.

**Motor Mount:** Accepts Nema 17 motor

Travel: 25 - 100mm

**Anti-Friction Slide:** Linear ball or crossed roller slide.

**Load Capacity:** Up to 27.2 kg Configuration: 1, 2 or 3 axis.

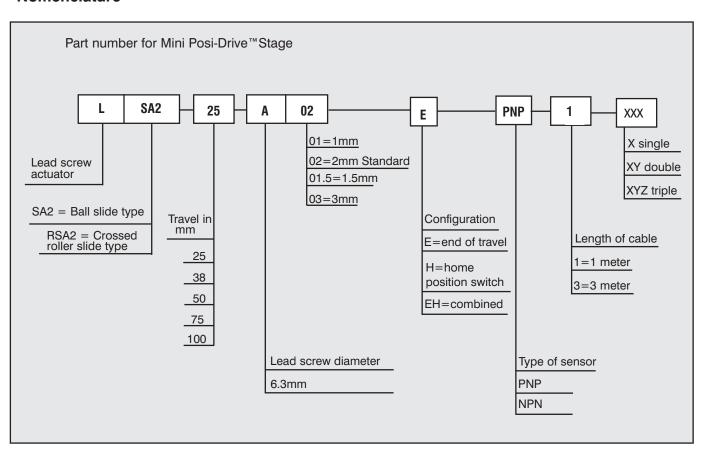
Straight line, up to .003mm/25mm of Accuracy:

Repeatability: .003mm

Also available are special configurations, motor mounts, hand crank actuation, and a variety of leads and pitches.

Motor/controller available.

### **Nomenclature**



moment load ratings + load / life formulas. pg.93

Ball Slide Mini Posi-Drive	Travel	A	В	D	Н	L	S	Load Capacity kg
LSA2-25-A02	25	124.0	57.2	35	38	.250	1.650	4.5
LSA2-38-A02	38	143.0	76.2	55	55	.625	1.275	6.8
LSA2-50-A02	50	155.7	88.9	65	65	.875	1.025	9.1
LSA2-75-A02	75	174.8	108.0	85	85	1.250	.650	11
LSA2-100-A02	100	219.2	152.4	140	100	2.125	1.775	14

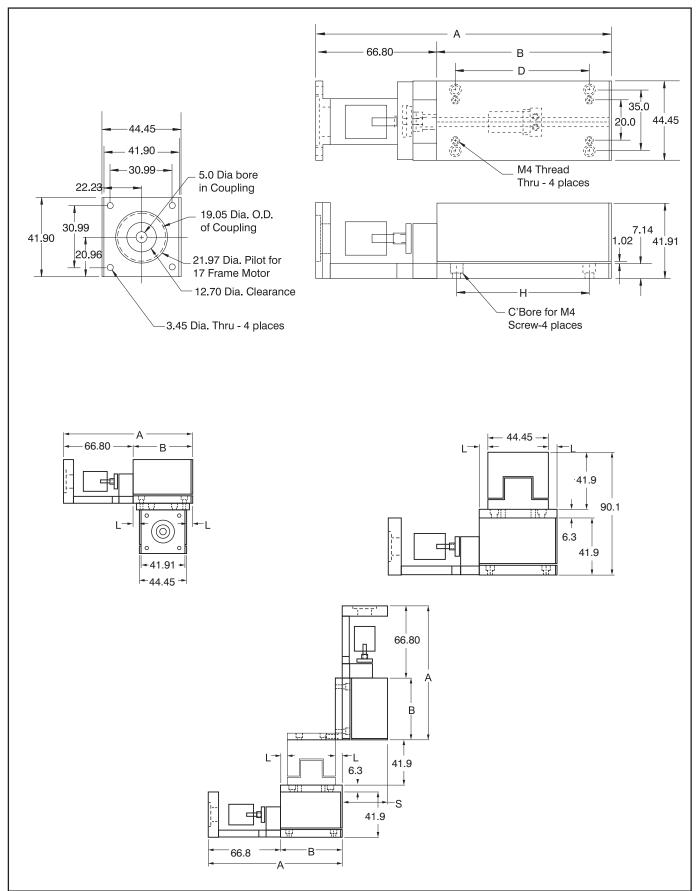
Dimensions in mm

moment load ratings + load / life formulas. pg.93

Roller Slide Mini Posi-Drive	Travel	A	В	D	Н	L	S	Load Capacity kg
LRSA2-25-A02	25	124.0	57.2	35	38	.250	1.650	9.1
LRSA2-38-A02	38	143.0	76.2	55	55	.625	1.275	14
LRSA2-50-A02	50	155.7	88.9	65	65	.875	1.025	18
LRSA2-75-A02	75	174.8	108.0	85	85	1.250	.650	23
LRSA2-100-A02	100	219.2	152.4	140	100	2.125	1.775	27

### Mini Posi-Drive Series LSA2, LRSA2

Designed for NEMA 17 motor frame, other motor adaptors available. Supplied with coupling for 5mm motor shaft. Couplings with inch and metric bore available. Uses a leadscrew with anti-backlash nut. Standard lead is 2mm. Leads available at no additional cost 1mm, 1.5mm, 2mm, 3mm and 4mm. Standard travels of 25, 38, 50, 75, and 100mm



### **LIMIT AND POSITION SWITCHES**

### EOT (End Of Travel) and HPS (Home Position Switches)

Del-Tron Precision offers the addition of EOT and HPS to all 3 sizes of the Posi-Drive series. The EOT kit and the HPS kit could be used together or independently. The stand alone kits can be added to any of the 3 sizes of the Posi-Drive series. The EOT kit comes with 2 switches mounted to the base at each end. There are 2 flags that are mounted to the carriage. These flags are adjustable for either the full range of travel or for limited amount of travel if the application requires such. The Home Position Switch kit comes with 1 switch mounted to the base in the center. There is an adjustable flag mounted to the carriage. The adjustable flag will allow the Home Position to be set anywhere along the entire range of travel. The EOT and HPS are easily mounted to brackets, which are then attached to the base. The flags are easily assembled to a bracket that is then attached to the carriage. The base and carriage have the threaded mounting holes available for easy assembly of the brackets. The switches are photoelectric sensors that operate on a supply voltage of 5 to 24 VDC. The repeatability is .005mm and the response time is 100µseconds. The sensors are available in both NPN and PNP outputs. The sensors are equipped with a quick fitting Hook-Up Connector with cable lengths in 1m or 3m.

### Part Numbering System for EOT and HPS

E-PNP-1 X-XXX-X

X-Configuration- E=EOT, H=HPS, EH=Combined XXX=Type of Sensor, PNP or NPN

XXX - Type of Gelison, Fine of New Y

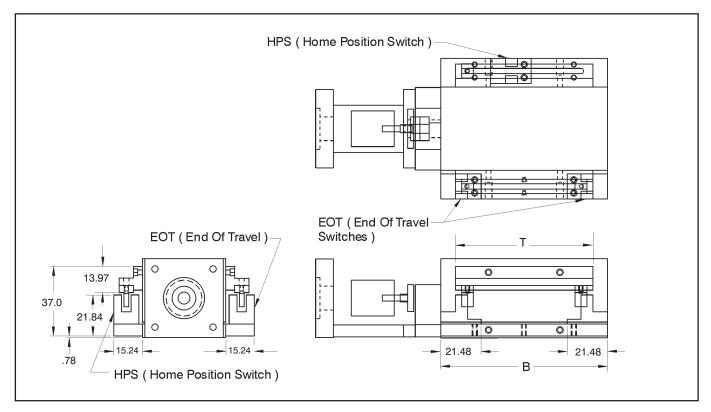
X=Length of Cable, 1=1meter, 3= 3 meter

#### Part Number and Price List

E-PNP-1	\$119
E-NPN-1	\$119
H-PNP-1	\$59
H-NPN-1	\$59
EH-PNP-1	\$179
EH-NPN-1	\$179

LSA2 and LRSA2 SERIES							
TRAVEL	В	Т					
25 38 50 75 100	57.15 76.20 88.90 107.95 152.40	41.27 60.32 73.02 92.07 136.52					

Prices are the same for the 3 meter length cable and connector.

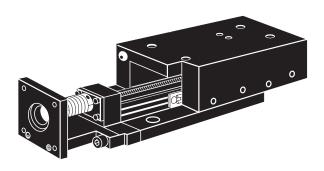


Maximum Recommended Revolutions Per Second

Lead: .2mm	20 RPS

## Posi-Drive™ Stages

## 6 Reasons to choose Del-Tron® Posi-Drive™ Stages



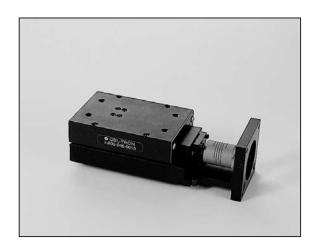
- 1. Positive lead screw drive.
- 2. Zero backlash.
- 3. Friction-free linear ball or roller slides.
- 4. Accurate, repeatable linear travel.
- 5. Compact adaptable configuration.
- 6. Adaptable to standard Nema Configurations.

#### Del-Tron® Posi-Drive™ Stages

Compact, economical Posi-Drive™ stages from Del-Tron take the work out of designing motion control systems. Our stages require no alignment of components, install with only four standard fasteners, are fitted with antibacklash lead screws, multi-beam couplings with high speed misalignment capability and standard NEMA motor mounts.

Available in one, two or three axis configurations with either ball or crossed roller slides, these stages travel up to 300mm. The crossed roller slide option increases load capacity up to 82 kg and 2500 million mm of travel is possible at 1/2 rated load. Motor/controller packages can be provided.





#### **Del-Tron**® Posi-Drive™ **Stages**

#### **Specifications**

10mm diameter 2mm lead screw with anti-backlash nut. Drive:

Leads Available: 3mm and 20mm

Coupling: Flexible zero backlash coupling.

**Motor Mount:** Accepts Nema 23 motor

Travel: 25 - 300mm

**Anti-Friction Slide:** Linear ball or crossed roller slide.

**Load Capacity:** Up to 82 kg Configuration: 1, 2 or 3 axis.

Accuracy: Straight line, up to .003mm/25mm

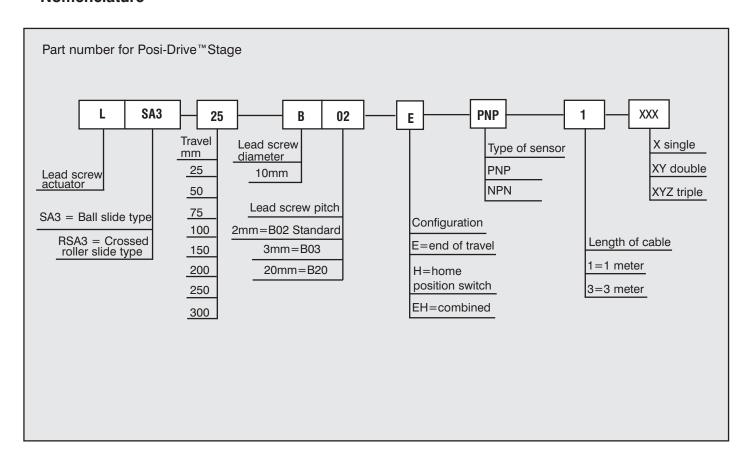
of travel.

Repeatability: .003mm

Also available are special configurations, motor mounts, hand crank actuation, and a variety of leads and pitches.

Motor/controller available.

#### **Nomenclature**



Designed for NEMA 23 motor frame. Supplied with coupling for 8mm motor shaft. Uses 10mm diameter lead-screw with anti-backlash nut. Standard lead is 2mm. Standard travels of 25-300mm

Other motor adapters and coupling with inch and metric bore available as special order. Leads available in 3mm and 20mm

moment load ratings + load / life formulas. pg.93

								Posi	-Drive	М								
MODEL	Α	<b>A</b> 1	В	B1	D	Р	Ε	F	G	н	H1	J	K	L	М	N	R	s
LSA3-25-B02	143		76		55		67	10.5	13.0	60	0	0	8.0	5	0	95	8	52
LSA3-50-B02	168		102		75		67	13.5	26.0	60	85	8.5	21.0	17	0	95	8	40
LSA3-75-B02	194		127		100		67	13.5	38.5	60	110	8.5	33.5	30	0	95	8	27
LSA3-100-B02	219		152		125		67	13.5	51.0	60	135	8.5	46.0	43	0	95	19	14
LSA3-150-B02	321	329	229	237		10	92	39.5	89.5	100	175	27.0	64.5	81	10	104	44	-24
LSA3-200-B02	397	405	279	287		12	118	27.0	114.5	150	225	27.0	64.5	106	10	104	70	-49
LSA3-250-B02	473	482	330	338		14	143	15.0	140.0	200	275	27.5	65.0	132	10	104	95	-75
LSA3-300-B02	549	558	381	389		14	168	40.5	165.5	250	325	28.0	65.5	157	10	104	121	-100
LRSA3-25-B02	143		76		55		67	10.5	13.0	60	0	0	8.0	5	0	95	8	52
LRSA3-50-B02	168		102		75		67	13.5	26.0	60	85	8.5	21.0	17	0	95	8	40
LRSA3-75-B02	194		127		100		67	13.5	38.5	60	110	8.5	33.5	30	0	95	8	27
LRSA3-100-B02	219		152		125		67	13.5	51.0	60	135	8.5	46.0	43	0	95	19	14
LRSA3-150-B02	321	329	229	237		10	92	39.5	89.5	100	175	27.0	64.5	81	10	104	44	-24
LRSA3-200-B02	397	405	279	287		12	118	27.0	114.5	150	225	27.0	64.5	106	10	104	70	-49
LRSA3-250-B02	473	482	330	338		14	143	15.0	140.0	200	275	27.5	65.0	132	10	104	95	-75
LRSA3-300-B02	549	558	381	389		14	168	40.5	165.5	250	325	28.0	65.5	157	10	104	121	-100

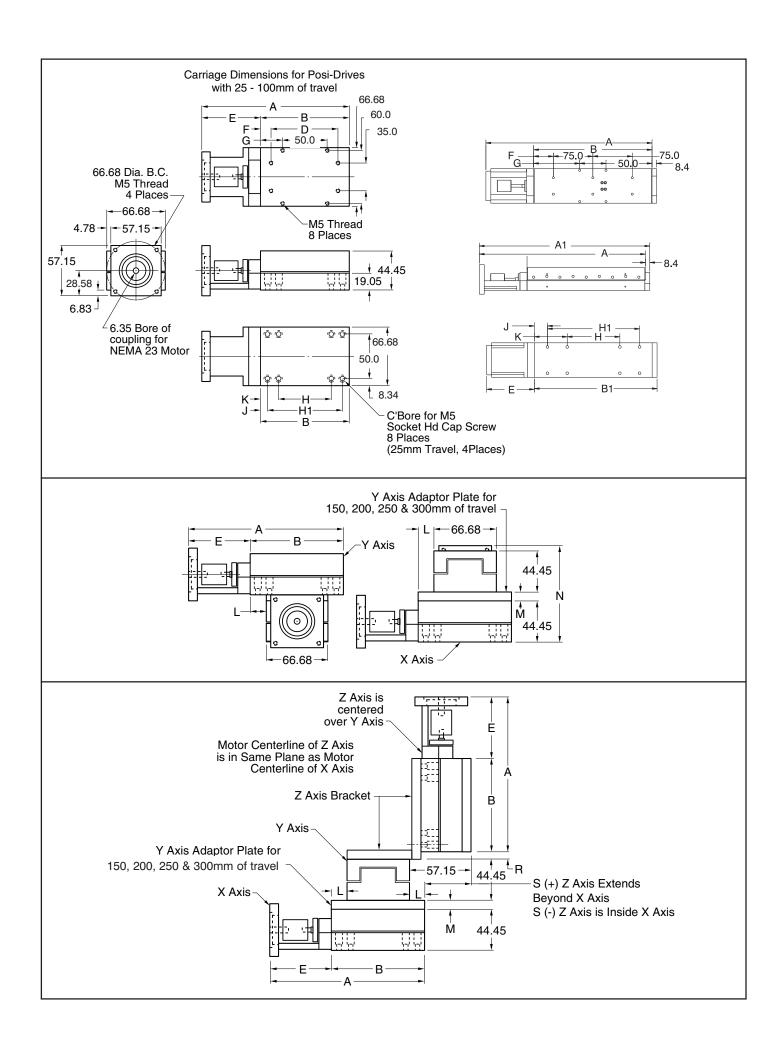
Dimensions in mm

moment load ratings + load / life formulas.
\*Travel is 1/2 distance from center in either direction.

Maximum Recommended Revolutions Per Second

Lead: 2mm	20 RPS
Lead: 3mm	10 RPS
Lead: 20mm	10 RPS

Pos	si-Drive	
		LOAD
	TRAVEL	CAPACITY
MODEL	mm	kg
LSA3-25-B02	25	14
LSA3-50-B02	50	16
LSA3-75-B02	75	18
LSA3-100-B02	100	20
LSA3-150-B02	150	25
LSA3-200-B02	200	27
LSA3-250-B02	250	34
LSA3-300-B02	300	41
LRSA3-25-B02	25	27
LRSA3-50-B02	50	32
LRSA3-75-B02	75	36
LRSA3-100-B02	100	41
LRSA3-150-B02	150	50
LRSA3-200-B02	200	54
LRSA3-250-B02	250	68
LRSA3-300-B02	300	82



#### **LIMIT AND POSITION SWITCHES**

#### EOT (End Of Travel) and HPS (Home Position Switches)

Del-Tron Precision offers the addition of EOT and HPS to all 3 sizes of the Posi-Drive series. The EOT kit and the HPS kit could be used together or independently. The stand alone kits can be added to any of the 3 sizes of the Posi-Drive series. The EOT kit comes with 2 switches mounted to the base at each end. There are 2 flags that are mounted to the carriage. These flags are adjustable for either the full range of travel or for limited amount of travel if the application requires such. The Home Position Switch kit comes with 1 switch mounted to the base in the center. There is an adjustable flag mounted to the carriage. The adjustable flag will allow the Home Position to be set anywhere along the entire range of travel. The EOT and HPS are easily mounted to brackets, which are then attached to the base. The flags are easily assembled to a bracket that is then attached to the carriage. The base and carriage have the threaded mounting holes available for easy assembly of the brackets. The switches are photoelectric sensors that operate on a supply voltage of 5 to 24 VDC. The repeatability is .005mm and the response time is 100µseconds. The sensors are available in both NPN and PNP outputs. The sensors are equipped with a quick fitting Hook-Up Connector with cable lengths in 1m or 3m.

#### Part Numbering System for EOT and HPS

E-PNP-1 X-XXX-X

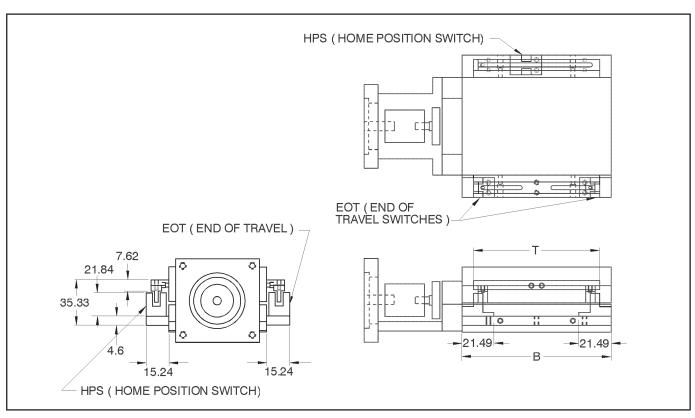
X-Configuration- E=EOT, H=HPS, EH=Combined XXX=Type of Sensor, PNP or NPN X=Length of Cable, 1=1meter, 3= 3 meter

#### Part Number and Price List

E-PNP-1	\$119
E-NPN-1	\$119
H-PNP-1	\$59
H-NPN-1	\$59
EH-PNP-1	\$179
EH-NPN-1	\$179

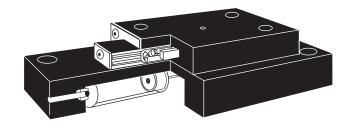
Prices are the same for the 3 meter length cable and connector.

LSA3	LSA3 and LRSA3 SERIES											
TRAVEL	В	Т										
25 50 75 100 150 200 250 300	76.2 101.6 127.0 152.4 228.6 279.4 330.2 381.0	60.33 85.73 111.13 136.53 212.73 263.53 314.33 365.13										



## **Friction Free Air Actuator**

## 6 Reasons to choose Del-Tron® Air Actuators



- 1. Low Pressure operation: <10 PSI
- 2. Low Friction: <1gm
- 3. Wide range variable speed: smooth, slow and high speed capabilities.
- 4. Precise, gentle handling of wafers, chips and surface mount devices.
- 5. Ideal for fluid sample handling and adhesive deposition.
- 6. Del-TronCrossed Roller Slide, driven by 2 Air Actuated Dashpots, provides a frictionless interface for up to 50mm travel in a compact package.

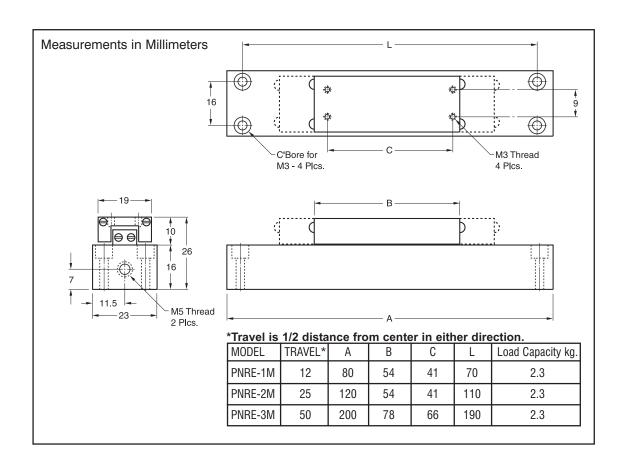
#### Del-Tron® Air Actuators

Pneumatically actuated crossed roller slide assemblies controlled by a pair of Airpot™ actuators, provide extremely low friction and stiction characteristics. A light touch or physical obstruction will stop the unit's movement to prevent damage to delicate and expensive equipment and parts. Low pressure operation is possible. The PNRE series requires less than 10 psi to operate.

Each slide is comprised of an aluminum carriage straddling an aluminum base. Using a bearing system containing cylindrical steel rollers, the carriage glides, almost friction-free, over the base. The rollers, alternately crisscrossed with each other, move between a set of four, partially flat, parallel, smooth rods on each side of the base. The Del-Tron Straight Line Design™ makes possible the low stiction and friction characteristics Del-Trons are known for, unlike recirculating designs in which the rolling elements must turn corners and often slide against each other as they travel.

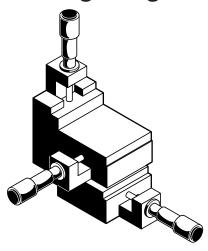
Airpot Pneumatic Actuators are ultra low friction devices designed to provide precise, repeatable motion at very high or low speeds without seals or lubrication. They run clean and operate over a wide temperature range with no change in performance. The basic construction consists of a graphitized carbon piston, precision ground to millionths of an inch TIR, inside an annealed, borosilicate glass cylinder with a precision fire polished bore.





# Ball Slide Positioning Stages (Micrometer Driven)

## 6 Reasons to choose Del-Tron® Ball Slide Positioning Stages



- 1. Versatile- Smooth, accurate travel for intermittent motion applications.
- 2. Positive Locking- Side mounted lock feature prevents movement of carriage.
- 3. Accurate Measurements- Carriages are spring loaded against micrometer heads with 0.01mm graduations.
- 4. Adaptable- One, two or three axis models can be used in any orientation.
- 5. Easy To Use- Standard counterbored holes in base and threaded holes in carriage.
- 6. Wide Selection- Subminiature and low profile models.



#### Del-Tron® Ball Slide Positioning Stages

## Del-Tron® offers over 60 models of positioning slides.

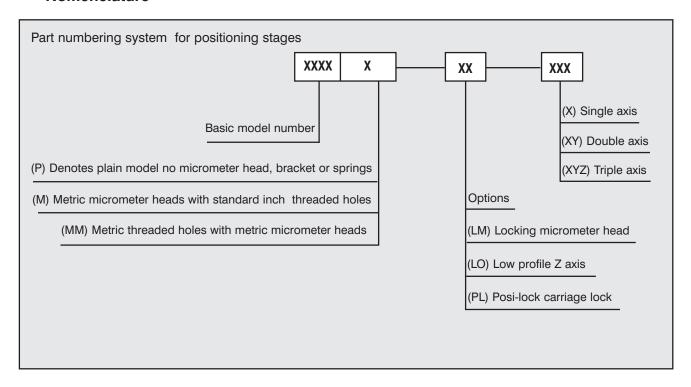
Used for gaging and positioning light and medium loads, applications include measuring instruments and optical assemblies. Del-Tron® positioners, built with the same rigorous manufacturing demands as our ball slide assemblies, offer the benefits of quality construction.

Spring loaded micrometer drives allow precise repeatable adjustments with low friction and zero backlash. (Micrometers available in inch or metric units.) Slides provide accuracy to .013mm/25mm of travel and repeatability of .003mm. Over 60 models support load capacities to 27.2 kg. Our full line includes the subminiature series with the smallest commercially available positioner, the standard series, ideal for most gaging and positioning applications, and our heavy duty series providing high load capacities with the same high accuracy and repeatability.

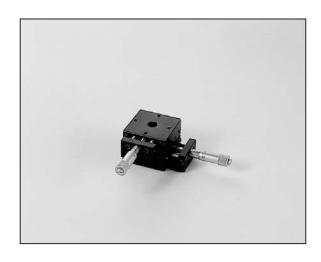
Positioning slides can be stacked for multi-axis applications. Standard stacked units are available in XY and XYZ configurations. Preloaded positioning slides, fully assembled, arrive ready for your use.

Positioners are available in black anodized finish or other finishes on request.

#### **Nomenclature**



- Posi-Lock™ feature consists of steel shim and extended micrometer bracket secured by a screw mounted to the side of the stage carriage. This allows the user to positively lock the position of the carriage during use. Posi-Lock™ is standard on the model 99MM and optional on all others.
- Locking micrometer heads are available to positively lock the micrometer setting. Not available for models 99MM, 101MM, 201MM, 301MM.
- Space saving side mount micrometer head style available. Please inquire.
- Loads in Z axis will extend springs if too heavy. Series 400MM, 500MM, 700MM, 1200MM, 2200MM and 3200MM have micrometer bracket reversed to prevent this and increase Z axis capacity
- · Custom designs quoted on request.
- Inch threaded mounting holes optional at no cost.
- P style (plain) are free floating slides without micrometer head, brackets or springs.
- (P-PL) Plain with Posi-Lock™ available, only on 1200MM, 2200MM, & 3200MM series.



## Ball Slide Positioning Stages

#### **SPECIFICATIONS:**

Coefficient

Straight Line Accuracy .013mm/25mm of travel

Repeatability .003mm

**Construction** Aluminum carriage and base,

hardened steel shafts and balls,

mild steel end caps.

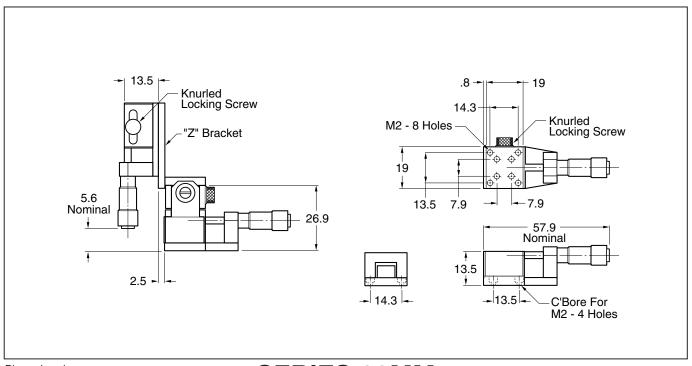
**Finish** Black anodize standard.

Other finishes on request.

#### moment load ratings + load / life formulas. pg.94

.003 typical

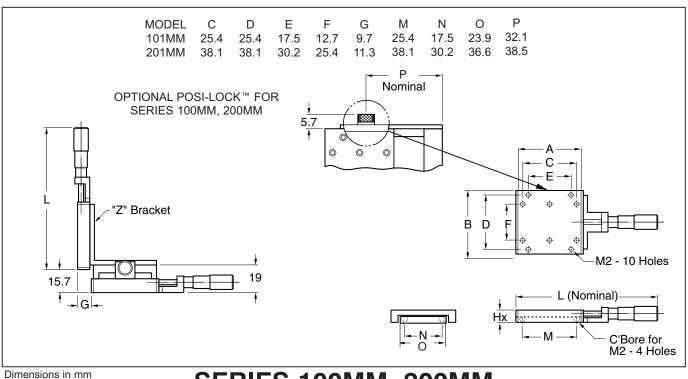
MODEL	TRAVEL	WORK Surface		RALL ISIONS	LO/ CAPACI	AD ITY, kg	THROUGH HOLE
MODEL	THAVEE	AXB	L	Нх	X, XY	Z	
99MM 101MM 201MM 301MM	6 13 13 13	19.1 x 19.1 31.8 x 31.8 44.5 x 44.5 38.1 x 38.1	57.9 82.6 95.3 88.9	13.5 9.7 9.7 15.7	2.3 1.8 1.8 5.4	.7 .7 .7 .9	NO NO NO 8 DIA.
450MM 451MM 453MM 750MM 751MM 753MM	13 25 13 13 25 13	44.5 x 44.5 44.5 x 44.5 44.5 x 44.5 66.5 x 66.5 66.5 x 66.5 66.5 x 66.5	111.3 149.4 111.3 133.4 171.5 133.4	19.1 19.1 19.1 25.4 25.4 25.4	9.1 9.1 9.1 27.2 27.2 27.2	.9 .9 .9 .9	NO NO 13 DIA. NO NO 25 DIA.
401MM 501MM 502MM 701MM 702MM	13 13 25 13 25	50.8 x 44.5 82.6 x 44.5 82.6 x 44.5 101.6 x 66.5 101.6 x 66.5	117.3 148.8 188.2 168.1 209.6	19.1 19.1 19.1 25.4 25.4	9.1 19.0 19.0 27.2 27.2	9.0 9.0 9.0 9.0 9.0	NO NO NO NO
1201MM 1203MM 2201MM 2202MM 2203MM 2204MM 3201MM 3202MM 3203MM 3204MM	25 25 25 50 25 50 25 50 25 50	79.2 x 79.2 79.2 x 79.2 104.6 x 104.6 104.6 x 104.6 104.6 x 104.6 104.6 x 104.6 130.2 x 130.2 130.2 x 130.2 130.2 x 130.2 130.2 x 130.2	184.2 184.2 208.6 260.4 209.6 260.4 235.0 285.8 235.0 285.8	23.1 23.1 23.1 23.1 23.1 23.1 23.1 23.1	13.6 13.6 13.6 13.6 13.6 13.6 13.6 13.6	13.6 13.6 13.6 13.6 13.6 13.6 13.6 13.6	NO 25 DIA. NO NO 38 DIA. 38 DIA. NO NO 51 DIA. 51 DIA.
PLAIN MODEL	S (WITHOUT MI	CROMETER, BRACKETS	OR SPRINGS).	X AND XY CONFIG	URATIONS ONLY.		
101PMM 201PMM 301PMM 451PMM 452PMM 751PMM 752PMM	13 13 13 25 25 25 25	31.8 x 31.8 44.5 x 44.5 38.1 x 38.1 44.5 x 44.5 44.5 x 44.5 66.5 x 66.5 66.5 x 66.5	= = = = = = = = = = = = = = = = = = = =	9.7 9.7 15.7 19.1 19.1 25.4 25.4	1.8 1.8 5.4 9.1 9.1 27.2 27.2		NO NO 8 DIA. NO 13 DIA. NO 25 DIA.
1202PMM 1204PMM 2205PMM 2206PMM 3205PMM 3206PMM	50 50 75 75 100 100	79.2 x 79.2 79.2 x 79.2 104.6 x 104.6 104.6 x 104.6 130.2 x 130.2 130.2 x 130.2		23.1 23.1 23.1 23.1 23.1 23.1	13.6 13.6 13.6 13.6 13.6	_ _ _ _	NO 25 DIA. NO 38 DIA. NO 51 DIA.



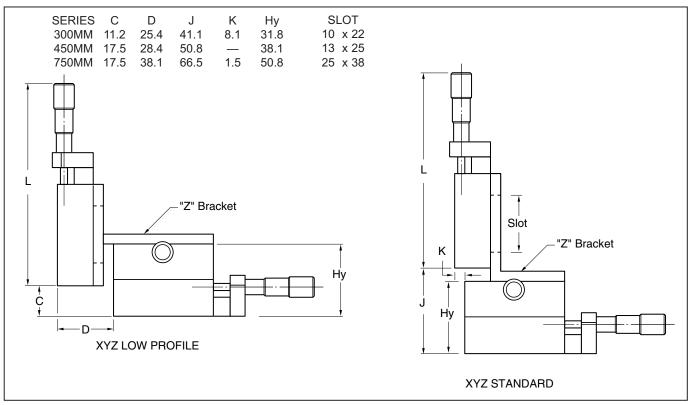
Dimensions in mm

## **SERIES 99MM**

Space saving side mount micrometer head style is available. Please inquire.



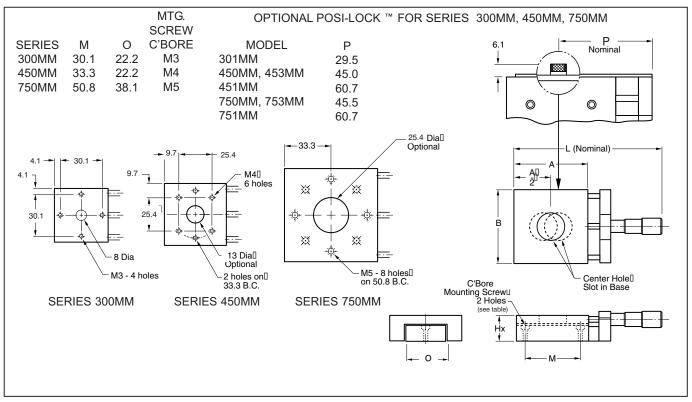
SERIES 100MM, 200MM



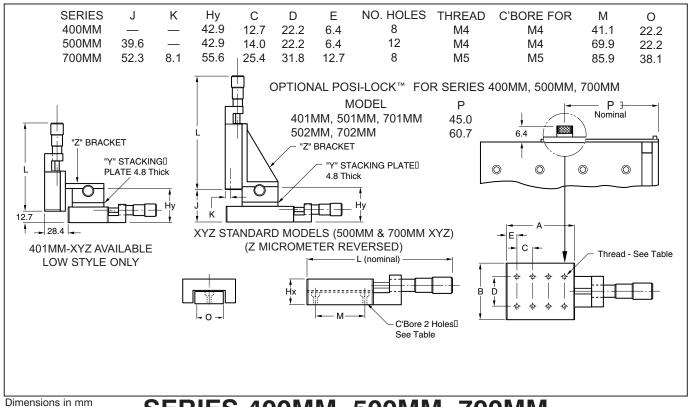
Dimensions in mm

## **SERIES 300MM, 450MM, 750MM**

Space saving side mount micrometer head style is available. Please inquire.

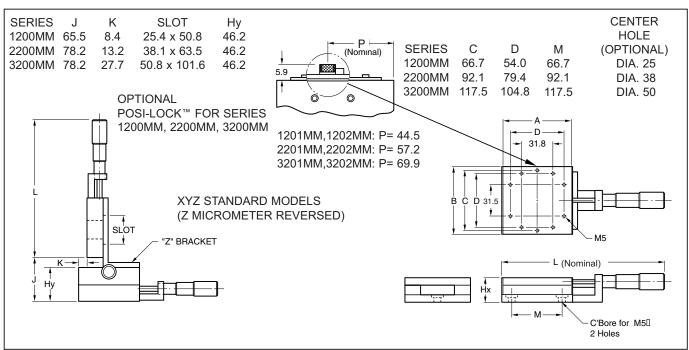


**SERIES 300MM, 450MM, 750MM** 



**SERIES 400MM, 500MM, 700MM** 

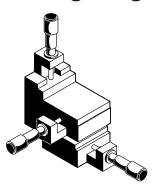
Space saving side mount micrometer head style is available. Please inquire.



Dimensions in mm SERIES 1200MM, 2200MM, 3200MM

# **Crossed Roller Positioning Stages (Micrometer Driven)**

### 6 Reasons to choose Del-Tron® Crossed Roller Positioning Stages



- High Capacity- Greater load bearing capacity than ball types.
   Better for impacts and overhanging loads.
- 2. Straight Line Accuracy- Runout of .003mm/25mm of travel.
- 3. Wide Range- Carriages up to 130mm square with 50mm of travel.
- 4. Smooth Accurate Movement-Spring forces hold carriage against micrometer head. Factory adjusted preload offers friction free running.
- Subminiature Sizes: R99MM among the smallest commercially available roller stages 19mm square.
- 6. Positive Locking- Posi-Lock™ feature guards against movement caused by vibration or impact.



#### Del-Tron® Crossed Roller Positioning Stages

Del-Tron offers over 60 models of positioning slides.

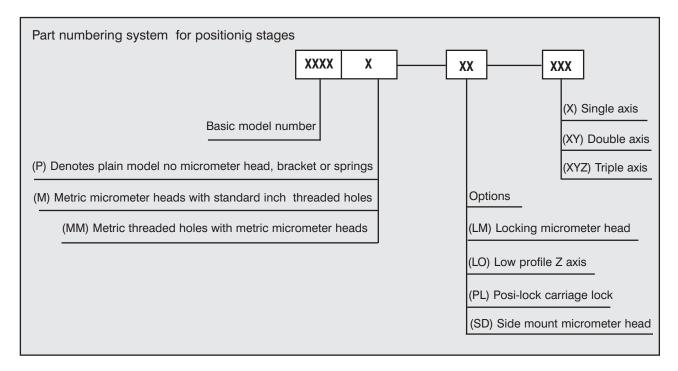
Used for gaging and positioning light and medium loads, applications include measuring instruments and optical assemblies. Del-Tron<sup>®</sup> positioners, built with the same rigorous manufacturing demands as our crossed roller slide assemblies, offer the benefits of quality construction.

Spring loaded micrometer drives allow precise repeatable adjustments with low friction and zero backlash. (Micrometers available in inch or metric units.) Slides provide accuracy to .003mm/25mm of travel and repeatability of .003mm. Over 60 models, support load capacities to 73 kg. Our full line includes the subminiature series with the smallest commercially available positioner, the standard series, ideal for most gaging and positioning applications, and our heavy duty series providing high load capacities with the same high accuracy and repeatability.

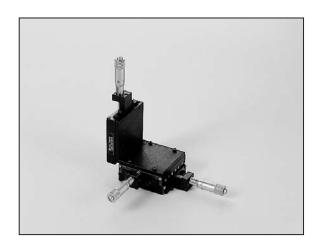
Positioning slides can be stacked for multiaxis applications. Standard stacked units are available in XY and XYZ configurations. Preloaded positioning slides, fully assembled, arrive ready for your use.

Positioners are available in black anodized finish or other finishes on request.

#### **Nomenclature**



- Posi-Lock<sup>™</sup> feature consists of a steel shim and extended micrometer bracket secured by a screw
  mounted to the side of the stage carriage. This allows the user to positively lock the position of the
  carriage during use. Posi-Lock<sup>™</sup> is standard optional on all stages.
- Locking micrometer heads are available to positively lock the micrometer setting. Not available for models R101MM, R201MM, R301MM.
- Space saving side mount micrometer head style available. Please inquire.
- Loads in Z axis will extend springs if too heavy. Series R400MM, R500MM, R700MM, R1200MM, R2200MM and R3200MM have micrometer bracket reversed to prevent this and increase Z axis capacity.
- · Custom designs quoted on request.
- Inch threaded mounting holes optional at no cost.
- P style (plain) are free floating slides without micrometer head, brackets or springs.
- P-PL Plain with Posi-Lock™ available. Only on R1200MM, R2200MM, & R3200MM series.



## Crossed Roller Positioning Stages

#### Specifications:

Straight line accuracy .003mm/25mm of travel

Repeatability .003mm

Coefficient of friction 0.003 typical

**Drive** Micrometer, .01 mm graduations

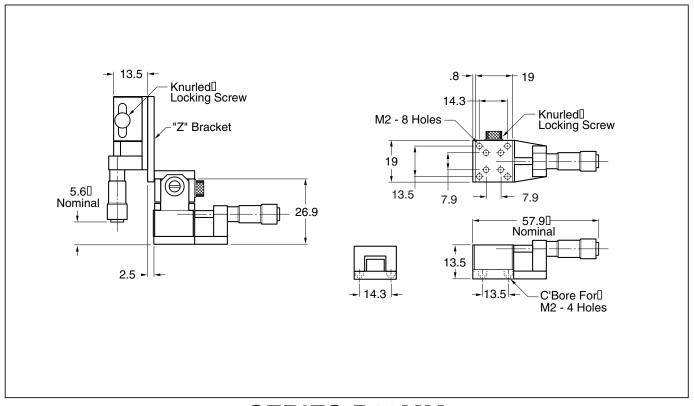
**Construction** Aluminum carriage and base, hardened steel shafts and balls, mild steel endcaps

Finish Black anodize standard;

other finishes on request

#### moment load ratings + load / life formulas. pg.94

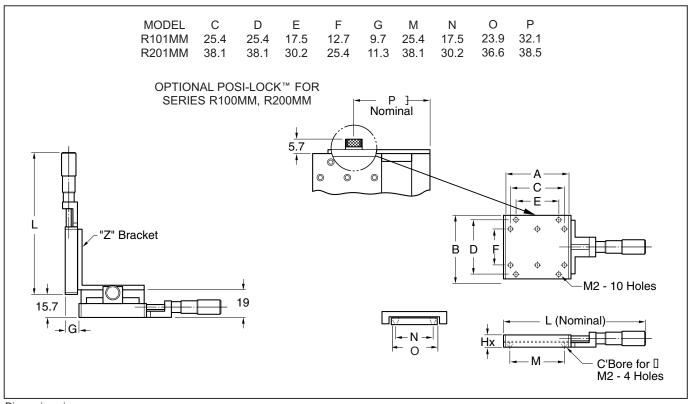
		WORK Surface		RALL NSIONS	LO/ CAPACI		THROUGH HOLE
MODEL	TRAVEL	АХВ	L	Нх	X, XY	Z	
R99MM R101MM R201MM R301MM	6 13 13 13	19.1 x 19.1 31.8 x 31.8 44.5 x 44.5 38.1 x 38.1	57.9 82.6 95.3 88.9	13.5 9.7 9.7 15.7	18.1 10.4 10.4 18.1	.7 .7 .7 .9	NO NO NO 8 DIA.
R450MM R451MM R453MM R750MM R751MM R753MM	13 25 13 13 25 13	44.5 x 44.5 44.5 x 44.5 44.5 x 44.5 66.5 x 66.5 66.5 x 66.5 66.5 x 66.5	111.3 149.4 111.3 133.4 171.5 133.4	19.1 19.1 19.1 25.4 25.4 25.4	18.1 18.1 18.1 54.4 54.4 54.4	.9 .9 .9 .9	NO NO 13 DIA. NO NO 25 DIA.
R401MM R501MM R502MM R701MM R702MM	13 13 25 13 25	50.8 x 44.5 82.6 x 44.5 82.6 x 44.5 101.6 x 66.5 101.6 x 66.5	117.3 148.8 188.2 168.1 209.6	19.1 19.1 19.1 25.4 25.4	18.1 36.3 36.3 72.5 72.5	9.0 9.0 9.0 9.0 9.0	NO NO NO NO
R1201MM R1203MM R2201MM R2202MM R2203MM R2204MM R3201MM R3202MM R3203MM R3203MM	25 25 25 50 25 50 25 50 25 50	79.2 x 79.2 79.2 x 79.2 104.6 x 104.6 104.6 x 104.6 104.6 x 104.6 104.6 x 104.6 130.2 x 130.2 130.2 x 130.2 130.2 x 130.2 130.2 x 130.2	184.2 184.2 209.6 260.4 209.6 260.4 235.0 285.8 235.0 285.8	23.1 23.1 23.1 23.1 23.1 23.1 23.1 23.1	38.5 38.5 38.5 38.5 38.5 38.5 38.5 38.5	13.6 13.6 13.6 13.6 13.6 13.6 13.6 13.6	NO 25 DIA. NO NO 38 DIA. 38 DIA. NO NO 51 DIA. 51 DIA.
PLAIN MODE R101PMM R201PMM R301PMM R451PMM R452PMM R751PMM R752PMM	ELS (WITHO) 13 13 13 25 25 25 25	UT MICROMETER, BRAC 31.8 x 31.8 44.5 x 44.5 38.1 x 38.1 44.5 x 44.5 44.5 x 44.5 66.5 x 66.5 66.5 x 66.5	EKETS OR SPRIN	9.7 9.7 9.7 15.7 19.1 19.1 25.4 25.4	ONFIGURATION 10.4 10.4 18.1 18.1 18.1 54.4 54.4	S ONLY	NO NO 8 DIA. NO 13 DIA. NO 25 DIA.
R1202PMM R1204PMM R2205PMM R2206PMM R3205PMM R3206PMM	50 50 75 75 100 100	79.2 x 79.2 79.2 x 79.2 104.6 x 104.6 104.6 x 104.6 130.2 x 130.2 130.2 x 130.2	_ _ _ _	23.1 23.1 23.1 23.1 23.1 23.1	38.5 38.5 38.5 38.5 38.5 38.5	_ _ _ _	NO 25 DIA. NO 38 DIA. NO 51 DIA.



Dimensions in mm

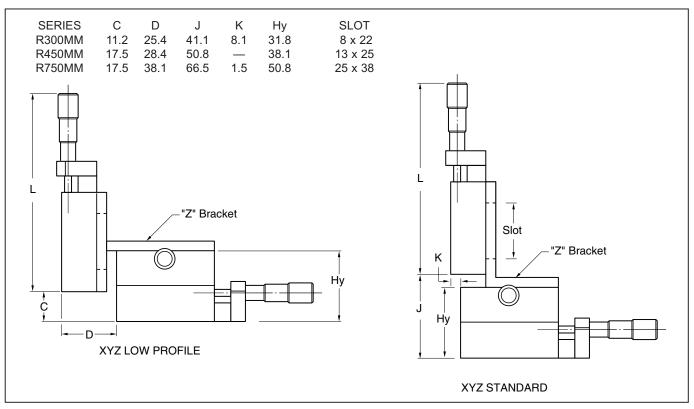
## **SERIES R99MM**

Space saving side mount micrometer head style is available. Please inquire.



Dimensions in mm

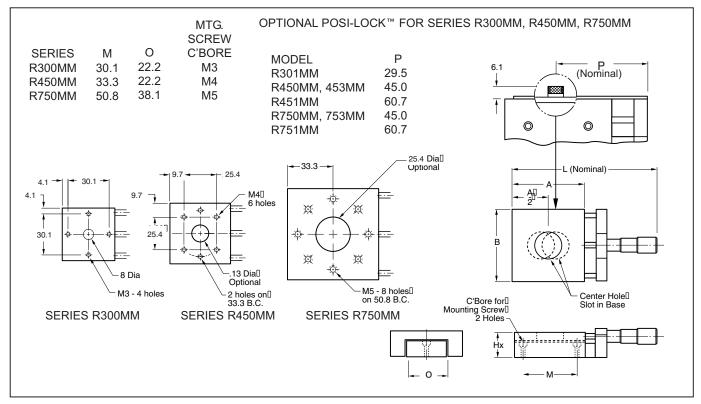
## SERIES R100MM, R200MM



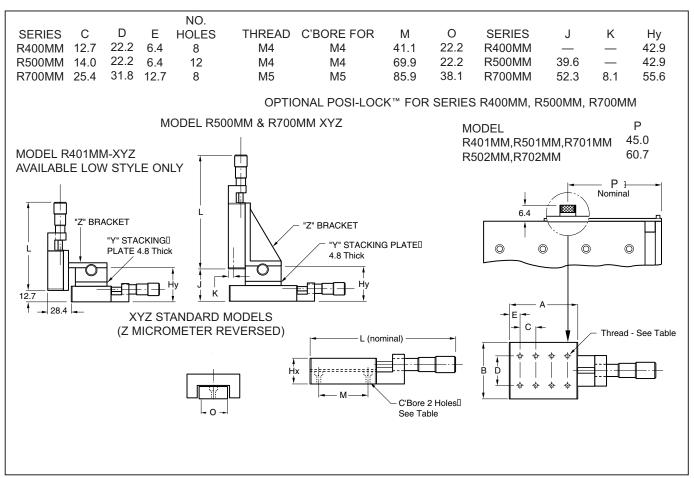
Dimensions in mm

## SERIES R300MM, R450MM, R750MM

Space saving side mount micrometer head style is available. Please inquire.

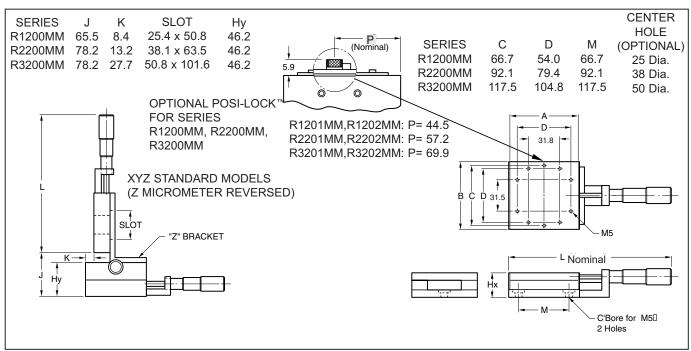


SERIES R300MM, R450MM, R750MM



Dimensions in mm SERIES R400MM, R500MM, R700MM

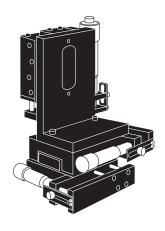
Space saving side mount micrometer head style is available. Please inquire.



Dimensions in mm SERIES R1200MM, R2200MM, R3200MM

# Compact Side Drive Positioners

## 6 Reasons to choose Del-Tron® Side Drive Positioning Stages



- 1. Versatile- Reduced overall length makes Del-Tron® Side Drive stages ideal for restricted space applications.
- Posi- Lock<sup>™</sup> Optional positive locking feature prevents movement of carriage.
- Accurate Measurements: Carriages are spring loaded against micrometer heads with 0.01mm graduations.
- 4. Adaptable- One, two or three axis models can be used in any orientation.
- Easy To Use- Metric counterbored holes in base and metric threaded holes in carriage.
- 6. Wide Selection- Subminiature and low profile models.

#### Del-Tron® Side Drive Positioning Stages

Del-Tron offers over 50 models of positioning slides. (Available in either ball bearing or crossed roller type.)

Used for gauging and positioning light and medium loads, applications include measuring instruments and optical assemblies. Del-Tron®positioners, built with the same rigorous manufacturing demands as our ball slide assemblies, offer the benefits of quality construction.

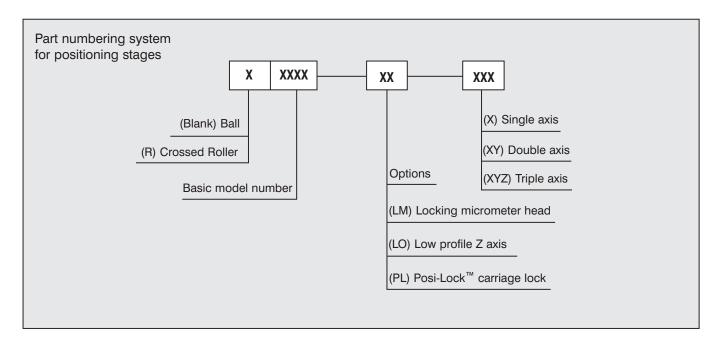
Spring loaded micrometer drives allow precise repeatable adjustments with low friction and zero backlash. (Micrometers available in inch or metric units.) Slides provide accuracy to .003mm/25mm of travel and repeatability of .003mm. Models can support load capacities to 73kg. Our full line includes the subminiature series with the smallest commercially available positioner, the standard series, ideal for most gauging and positioning applications, and our heavy duty series providing high load capacities with the same high accuracy and repeatability.

Positioning slides can be stacked for multiaxis applications. Standard stacked units are available in XY and XYZ configurations. Preloaded positioning slides, fully assembled, arrive ready for your use.

Positioners are available in black anodized finish or other finishes on request.



#### Nomenclature



- Posi-Lock<sup>™</sup> feature consists of steel shim and extended micrometer bracket secured by a screw mounted to the side of the micrometer bracket. This allows the user to positively lock the position of the carriage during use. Posi-Lock<sup>™</sup> is standard on the model 99SDMM, R99SDMM and optional on all others.
- Locking micrometer heads are available to positively lock the micrometer setting. Not available for models 99SDMM, 101SDMM, 201SDMM, 301SDMM, R99SDMM, R101SDMM, R201SDMM, R301SDMM
- Custom designs quoted on request.
- Metric threaded mounting holes optional at no additional cost.



## Side Drive Positioning Stages

#### **Specifications:**

Straight Line Accuracy Ball: .013mm/25mm of travel Roller: .003mm/25mm of travel

**Repeatability**Ball: .005mm
Roller: .003mm

Coefficient of Friction 0.003 typical

**Drive** Micrometer, .01 mm graduations standard

**Construction** Aluminum carriage and base, hardened steel shafts and balls or rollers, mild steel

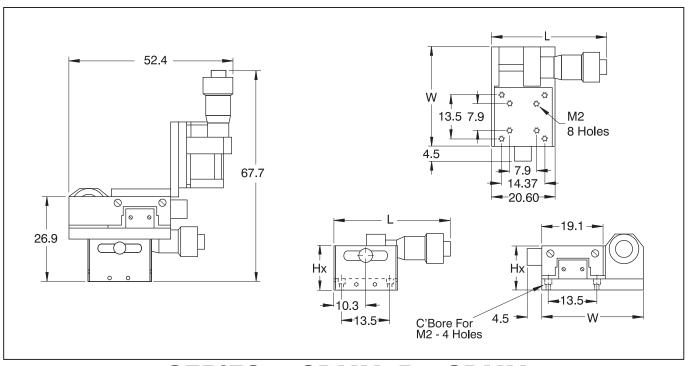
endcaps

Finish Black anodize standard;

other finishes on request

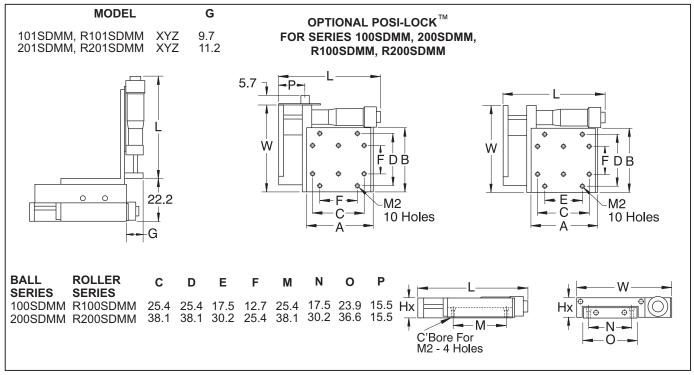
moment load ratings + load / life formulas. pg. 94

*Travel is	s 1/2 distance	from cente	r in either direc	tion.							
MOD	EL	TRAVEL*	WORK Surface		OVERAI				OAD City, Kg		THROUGH HOLE
Ball Slide	Crossed Roller Slide							all ide	Ro	ssed ller ide	
			AXB	L	Нх	W	X, XY	Z	X, XY	Z	
99SDMM 101SDMM 201SDMM 301SDMM	R99SDMM R101SDMM R201SDMM R301SDMM	6.4 13 13 13	19.1 x 19.1 31.8 x 31.8 44.5 x 44.5 38.1 x 38.1	37.6 54.9 61.5 55.4	13.5 9.7 9.7 15.7	32.7 44.5 57.4 51.1	2.3 1.8 1.8 5.4	.7 .7 .7 .9	18.1 10.4 10.4 18.1	.6 .6 .6	NO NO NO 8 DIA.
450SDMM 451SDMM 453SDMM 750SDMM 751SDMM 753SDMM	R450SDMM R451SDMM R453SDMM R750SDMM R751SDMM R753SDMM	13 25 13 13 25 13	44.5 x 44.5 44.5 x 44.5 44.5 x 44.5 66.5 x 66.5 66.5 x 66.5 66.5 x 66.5	74.9 114.5 74.9 89.4 113.8 89.4	19.1 19.1 19.1 25.4 25.4 25.4	61.0 64.8 61.0 83.1 87.1 83.1	9.1 9.1 9.1 27.2 27.2 27.2	.9 .9 .9 .9	18.1 18.1 18.1 54.4 54.4 54.4	.9 .9 .9 .9	NO NO 13 DIA. NO NO 25 DIA.
401SDMM 501SDMM 502SDMM 701SDMM 702SDMM	R401SDMM R501SDMM R502SDMM R701SDMM R702SDMM	13 13 25 13 25	50.8 x 44.5 82.6 x 44.5 82.6 x 44.5 101.6 x 66.5 101.6 x 66.5	74.9 105.4 114.5 124.5 131.6	19.1 19.1 19.1 25.4 25.4	61.0 61.0 64.8 84.1 87.1	9.1 19.0 19.0 27.2 27.2	9.0 9.0 9.0 9.0 9.0	18.1 36.3 36.3 72.5 72.5	9.0 9.0 9.0 9.0 9.0	NO NO NO NO NO
1201SDMM 1203SDMM 2201SDMM 2202SDMM 2203SDMM 2204SDMM 3201SDMM 3202SDMM 3203SDMM 3203SDMM 3204SDMM	R1201SDMM R1203SDMM R2201SDMM R2202SDMM R2203SDMM R2204SDMM R3201SDMM R3202SDMM R3202SDMM R3204SDMM	25 25 25 50 25 50 25 50 25 50	79.2 x 79.2 79.2 x 79.2 104.6 x 104.6 104.6 x 104.6 104.6 x 104.6 104.6 x 104.6 130.0 x 130.0 130.0 x 130.0 130.0 x 130.0 130.0 x 130.0	120.7 120.7 120.7 171.7 120.7 171.7 130.0 171.7 130.0 171.7	23.1 23.1 23.1 23.1 23.1 23.1 23.1 23.1	102.6 102.6 128.0 128.0 128.0 128.0 153.4 153.4 153.4	13.6 13.6 13.6 13.6 13.6 13.6 13.6 13.6	13.6 13.6 13.6 13.6 13.6 13.6 13.6 13.6	38.5 38.5 38.5 38.5 38.5 38.5 38.5 38.5	13.6 13.6 13.6 13.6 13.6 13.6 13.6 13.6	NO 25 DIA. NO NO 38 DIA. 38 DIA. NO NO 51 DIA. 51 DIA.



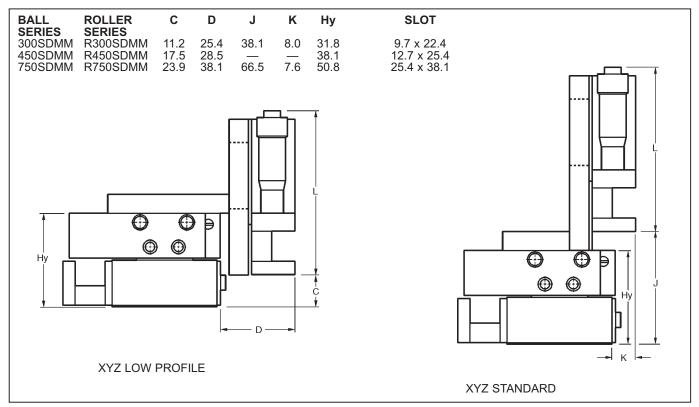
Dimensions in mm

SERIES 99SDMM, R99SDMM

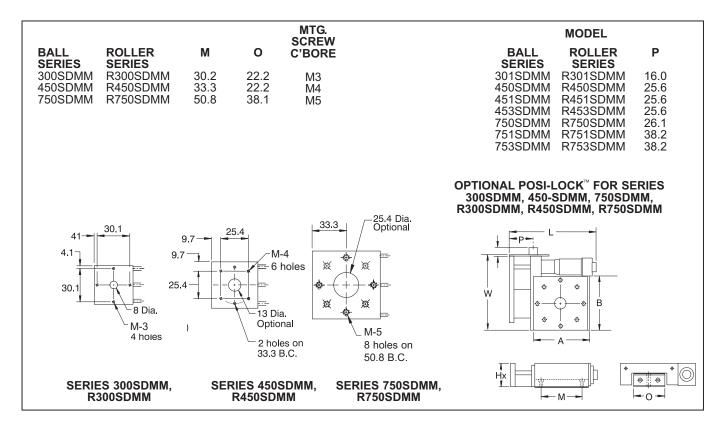


Dimensions in mm

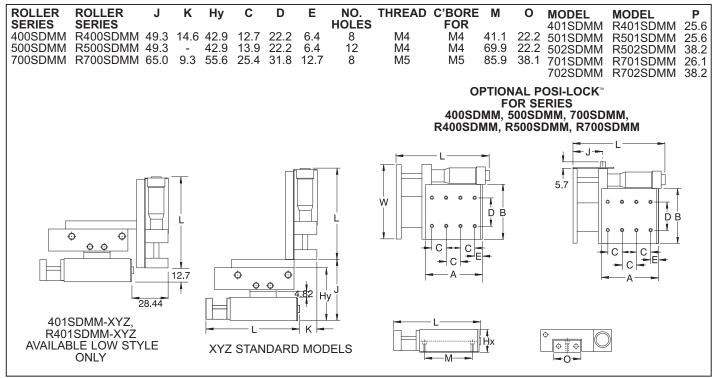
SERIES 100SDMM, 200SDMM, R100SDMM, R200SDMM



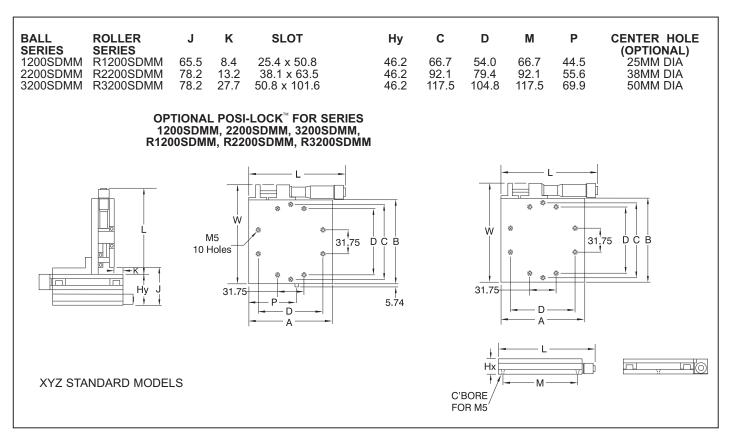
## SERIES 300SDMM, 450SDMM, 750SDMM, R300SDMM, R450SDMM, R750SDMM



SERIES 300SDMM, 450SDMM, 750SDMM, R300SDMM, R450SDMM, R750SDMM



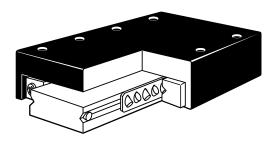
## SERIES 400SDMM, 500SDMM, 700SDMM, R400SDMM, R500SDMM, R700SDMM



SERIES 1200SDMM, 2200SDMM, 3200SDMM, R1200SDMM, R2200SDMM, R3200SDMM

# Low Profile Crossed Roller Slide Tables

6 Reasons to choose Del-Tron® Low Profile Crossed Roller Slide Tables



- 1. Compact & Low Profile.
- 2. High Accuracy (.003mm/25mm)
  Travel.
- 3. Metric Type Mounting Holes.
- 4. Light Weight Aluminum Carriage.
- 5. Stainless Steel Models Available.
- 6. 21 Size & Travel Combinations.



## Low Profile Slide Tables

Del-Tron® LPTA slides are low profile, high accuracy slide tables featuring easily adjustable preload and light weight aluminum carriage. Standard metric type threaded holes allow easy mounting and installation. The bearing base consists of a two sided single inner rail flanked by two precision V grooved outer rails. High precision rollers captive in a stainless steel cage and positive internal travel stops assure smooth accurate reciprocating motion.

Stainless steel models (ss) offer aluminum carriage with stainless steel rails, rollers, cages and fasteners.

LPTA slides are ideal anywhere low friction reciprocating mechanisms are used in automated equipment.



### Low Profile Crossed Roller Tables

#### Specifications:

**Straight Line Accuracy** .003mm/25mm of travel.

Positional Repeatability .003mm

Coefficient of Friction 0.003 typical

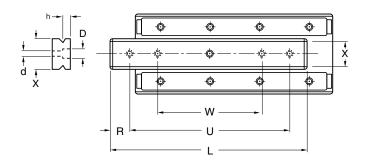
**Construction**Aluminum carriage, hardened steel crossed roller rail set with

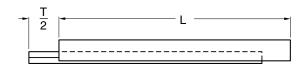
double v-grooved inner rail.

Finish Black anodized carriage,

hardened steel base.

#### BASE MOUNTING DIMENSIONS





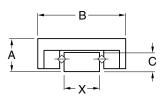
#### Length, Travel, and Load Selection

moment load ratings + load / life formulas. pg.95

				LOAD	BA	SE MOUNTING HO	CARRIAGE — MOUNTING HOLES (THREADED)			
MODEL	STAINLESS STEEL	TRAVEL T	LENGTH L	CAPACITY kgf	NO. Holes	U SPACIN	G W	NO. HOLES	SPACING M	
LPTA-1025	SS	12	25	23	2	18	_	4	18	
LPTA-1035	SS	18	35	32	2	25	_	4	1 x 28	
LPTA-1045	SS	25	45	47	4	38	25	4	1 x 20	
LPTA-1055	SS	32	55	54	4	48	29	4	1 x 30	
LPTA-1065	SS	40	65	60	4	55	31	6	2 x 20	
LPTA-1075	SS	45	75	73	4	65	35	4	1 x 30	
LPTA-1085	SS	50	85	79	4	75	40	6	2 x 30	
LPTA-2035	SS	18	35	40	2	25	_	4	1 x 28	
LPTA-2050	SS	30	50	63	2	35	_	4	1 x 43	
LPTA-2065	SS	40	65	75	4	55	33	4	1 x 30	
LPTA-2080	SS	50	80	95	4	70	40	4	1 x 45	
LPTA-2095	SS	60	95	105	4	85	45	6	2 x 30	
LPTA-2110	SS	70	110	120	4	95	50	4	1 x 45	
LPTA-2125	SS	80	125	130	4	110	55	6	2 x 45	
LPTA-3055	SS	30	55	126	2	40	_	4	1 x 40	
LPTA-3080	SS	45	80	183	4	68	43	4	1 x 65	
LPTA-3105	SS	60	105	220	4	90	55	4	1 x 50	
LPTA-3130	SS	75	130	275	4	115	65	4	1 x 75	
LPTA-3155	SS	90	155	310	4	140	95	6	2 x 50	
LPTA-3180	SS	105	180	355	4	165	85	4	1 x 75	
LPTA-3205	SS	130	205	375	4	190	90	6	2 x 75	

				nting Dimen	sions				
SERIES	SPA N	CING P	GE ———— THREAD J	DEPTH K	SPACING R	BASE		TERBORE d	h
LPTA-1025	3.5	14	M2	3.5	3.5	3.9		2.6	2.5
LPTA-1035	3.5	_	_	_	5	_		_	2.5
LPTA-1045	12.5	_	_	_	3.5	_		_	2.5
LPTA-1055	12.5	_	_	_	3.5	_	C'BORE FOR	_	2.5
LPTA-1065	12.5	_	_	_	5	_	M2	_	2.5
LPTA-1075	22.5	_	_	_	5	_		_	2.5
LPTA-1085	12.5	_	_	_	5	_		_	2.5
LPTA-2035	3.5	22	M4	5.5	5	6.1		4	3.8
LPTA-2050	3.5	_	_	_	7.5	_		_	3.8
LPTA-2065	17.5	_	_	_	5	_	C'BORE	_	3.8
LPTA-2080	17.5	_	_	_	5	_	FOR M3	_	3.8
LPTA-2095	17.5	_	_	_	5	_		_	3.8
LPTA-2110	32.5	_	_	_	7.5	_		_	3.8
LPTA-2125	17.5	_	_	_	7.5	_		_	3.8
LPTA-3055	7.5	30	M5	7.5	7.5	8.3		5.2	5.2
LPTA-3080	7.5	_	_	_	6	_		_	5.2
LPTA-3105	27.5	_	_	_	7.5	_	C'BORE	_	5.2
LPTA-3130	27.5	_	_	_	7.5	_	FOR M4	_	5.2
LPTA-3155	27.5	_	_	_	7.5	_		_	5.2
LPTA-3180	52.5	_	_	_	7.5	_		_	5.2
LPTA-3205	27.5	_	_	_	7.5	_		_	5.2

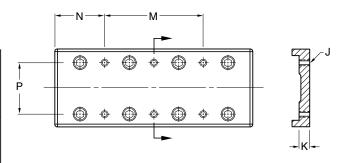
Dimensions in mm



	Р	rofile Dimens	ions	
SERIES	HEIGHT A ±0.1	WIDTH B ±0.1	BASE THICKNESS C	BASE WIDTH X
LPTA-1000	8	20	4	6.6
LPTA-2000	12	30	6	12
LPTA-3000	16	40	8	16

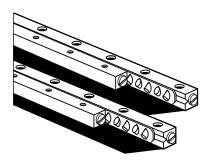
Dimensions in mm

#### **CARRIAGE MOUNTING DIMENSIONS**



## **Crossed Roller Rail Sets**

### 6 Reasons to choose Del-Tron® Crossed Roller Rail Sets



- 1. Versatile- May be adapted to your own base and carriage design.
- 2. Rugged- Hardened steel v-grooved rails and rollers withstand heavy loads and impacts.
- 3. Corrosion Resistant- Stainless steel available from stock.
- 4. High Accuracy- Parallelism of 0.002mm over 100mm.
- Easy To Use- Standard threaded and counterbored mounting holes allow access from either side.
- 6. Interchangeable- Form, fit and functional replacement for other manufacturer's rails.

## **S**Del-Tron Precision, Inc.

#### Del-Tron® Crossed Roller Rail Sets

Crossed Roller Linear Bearings are compact, precision bearings that can support and guide high loads with high accuracy and repeatability, low friction, and low starting force. A complete range of sizes is supplied for use in precision machine tools, measuring instruments, assembly fixtures, medical instruments, and anywhere linear or reciprocating motion with high reliability and long life is required.

#### Construction

Each bearing consists of a pair of hardened steel ways containing 90° vee grooves, and a row of alternately crossed cylindrical rollers. The hardened steel rollers are captive in a stainless steel cage for easy handling and assembly and permanent alignment. The ways are installed face to face by the user, with the rollers between the vee grooves.

Stainless Steel also available.

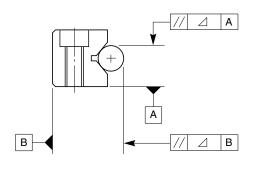
#### Application

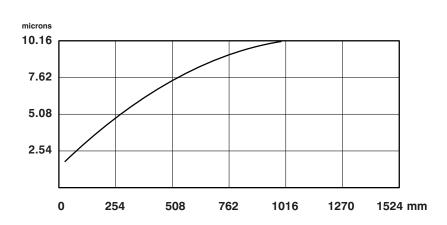
Bearings are normally supplied and installed in sets of two to form an assembly that can support their rated load in any direction or orientation, and can be preloaded to eliminate side play.

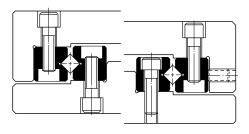
Mounting and banking surfaces must be smooth and flat, and accurately parallel, coplanar, or perpendicular respectively to achieve maximum accuracy. Preload forces must be evenly distributed. Dirt and dust must be excluded. Lubrication required depends on the application, ranging from light grease or oil at the time of installation for low speeds (less that 1270mm/min.) and occasional movement to continuous oil bath or mist at 30,000mm/min.

#### **Ratings and Specifications**

Load ratings in the tables are dynamic ratings for each set. Ratings are based on theoretical data, proper installation, appropriate lubrication, and a predicted life of 250 million mm. Ratings are suggested only, based on standard and typical industry practice, and cannot be guaranteed. Life can be increased approximately 10 times by operating a given bearing at 1/2 its rated load, other factors being constant. Temperature of bearings must not exceed 100°C, even for short periods, since this will reduce hardness and result in significantly reduced load capacity and working life.







Mounting holes in the way bars are threaded, and also counterbored to alternatively permit using the next smaller size screw with threaded mounting holes in the user's components.

Maximum deviation from parallelism between the vee groove face and datum faces of each way bar is shown in the graph. Actual accuracy achieved depends on proper installation.

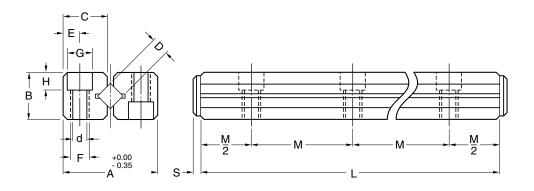
#### Ordering

Order standard bearing sets from table by model number according to load and travel required.

Each set consists of two complete bearings (4 way bars, 2 roller cages, and end stops). Delivery stock to 6 weeks.



## **Crossed Roller Rail Sets**



Length, Travel, and Load Selection

moment load ratings + load / life formulas. pg.95

MODEL	NO. OF Rollers in Each Retainer	LENGTH L	TRAVEL T	NO. HOLES	RAIL SET LOAD CAPACITY kg	MODEL	NO. OF ROLLERS IN EACH RETAINER	LENGTH L	TRAVEL T	NO. HOLES	RAIL SET LOAD Capacity kg
NB-1020 NB-1030 NB-1040 NB-1050 NB-1060 NB-1070 NB-1080	5 7 10 13 16 19 21	20 30 40 50 60 70 80	12 20 27 32 37 42 50	2 3 4 5 6 7 8	20 28 40 52 64 76 84	NB-3225 NB-3250 NB-3275 NB-3300 NB-3325 NB-3350	31 35 38 42 45 49	225 250 275 300 325 350	135 145 165 175 195 205	9 10 11 12 13 14	310 350 380 419 449 489
NB-2030 NB-2045 NB-2060 NB-2075 NB-2090 NB-2105 NB-2120 NB-2135 NB-2150 NB-2165 NB-2180	5 8 11 13 16 18 21 23 26 29 32	30 45 60 75 90 105 120 135 150 165	18 24 30 44 50 64 70 84 90 95	2 3 4 5 6 7 8 9 10 11 12	30 48 66 78 96 108 126 138 156 173 192	NB-4080 NB-4120 NB-4160 NB-4200 NB-4240 NB-4280 NB-4320 NB-4360 NB-4400 NB-4440 NB-4440	7 11 15 19 23 27 31 35 39 43	80 120 160 200 240 280 320 360 400 440 480	58 82 105 130 150 175 200 225 250 270 295	2 3 4 5 6 7 8 9 10 11 12	140 220 300 380 459 539 619 699 779 859 939
NB-3050 NB-3075 NB-3100 NB-3125 NB-3150 NB-3175 NB-3200	7 10 14 17 21 24 28 <b>specify</b> (	50 75 100 125 150 175 200	28 48 58 78 88 105 115	2 3 4 5 6 7 8	70 100 140 170 210 240 280	NB-6100 NB-6150 NB-6200 NB-6250 NB-6300 NB-6350 NB-6400	8 12 16 20 24 28 32	100 150 200 250 300 350 400	55 85 120 150 185 215 245	2 3 4 5 6 7 8	320 479 639 799 959 1119 1278

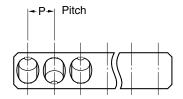
		— Profi	le Dime	nsions		Mounting Dimensions							
SERIES	A	В	C	D	S	M	E	F*	J**	d	G	н '	
NB-1	8.5	4.0	3.9	1.5	1.5	10	1.8	M2	M1	1.65	3.0	1.4	
NB-2	12	6.0	5.5	2.0	2.0	15	2.5	М3	M2	2.54	4.4	2.0	
NB-3	18	8.0	8.3	3.0	2.0	25	3.5	M4	М3	3.30	6.0	3.1	
NB-4	22	11	10.2	4.0	2.0	40	4.5	M5	M4	4.3	8.0	4.2	
NB-6	31	15	14.2	6.0	3.0	50	6.0	M6	M5	5.2	9.5	5.2	
*Thread Siz	е							**Hol	e F clears	cap screw	for through	mounting.	

Dimensions in mm

#### **Modifying Length of Travel**

For a given length of bearing way, since there is no slip at any load, both length of travel and load capacity depend on the number of rollers and their pitch. The number of rollers supplied with each standard bearing set provides a travel distance of approximately 60% of the way length (see page 48). In some cases (e.g., when mounting space is restricted)

it may be practical to increase travel at the expense of load capacity by removing one or more rollers instead of selecting a longer bearing. Since travel extends symmetrically around the mean position, the travel increase is twice the pitch for each roller removed. Similarly, the load capacity for the set (page 48) is reduced by twice the load capacity per roller.

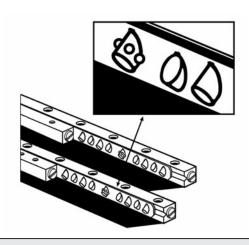




ROLLER SIZE	ROLLER DIAMETER (D) mm	ROLLER DISTANCE (P) mm	INCREASE OF TRAVEL FOR EACH ROLLER CUT-OFF mm	ROLLER LOAD Carrying Cap. Per Roller kg
NB-1	1.5	2.5	5	4
NB-2	2.0	4	8	6
NB-3	3	5	10	10
NB-4	4	7	14	20
NB-6	6	8.5	17	40

# Anti-Creep Crossed Roller Rail Sets

### 6 Reasons to choose Del-Tron<sup>®</sup> Anti-Creep Crossed Roller Rail Sets



- 1. Designed for vertical applications and cantilevered loads.
- 2. Rugged- Hardened steel V-grooved rails and rollers withstand heavy loads.
- 3. Versatile- May be integrated into your own design.
- 4. High Accuracy- Parallelism of 0.002mm over 100mm
- 5. Easy to use- Standard threaded and counterbored mounting holes allow access from either side.
- 6. Interchangeable- Form, fit and functional replacement for other manufacturer's Rail sets.

## Del-Tron<sup>®</sup> Anti-Creep Crossed Roller Rail Sets

The Anti-Creep crossed roller rail system is based on a new concept to prevent roller cage slippage during operation. This system allows you to mount the rail set in any orientation while maintaining direct roller contact to the rail surface eliminating roller cage creep. This system is ideal for vertical applications and where high acceleration and deceleration forces are present.

#### Construction

Each bearing set contains four V-grooved Rails, eight end screws, and two Anti-Creep crossed roller retainers. The Anti-Creep crossed roller retainers utilize a studded roller and detented rail to prevent the migration of the retainer due to vertical and cantilevered load applications.

#### **Application**

Bearings are normally supplied and installed in sets of two to form an assembly that can support their rated load in any direction or orientation, and can be preloaded to eliminate side play.

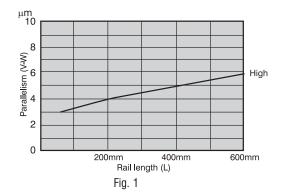
Mounting and banking surfaces must be smooth and flat, and accurately parallel, coplanar, or perpendicular respectively to achieve maximum accuracy. Preload forces must be evenly

distributed. Dirt and dust must be excluded. Lubrication required depends on the application, ranging from light grease or oil at the time of installation for low speeds 1270mm/min. and occasional movement to continuous oil bath or mist at 30000 mm/min.



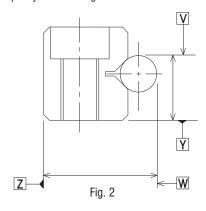
#### **RATINGS AND SPECIFICATIONS**

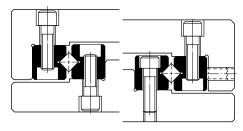
Load ratings in the tables are dynamic ratings for each set. Ratings are based on theoretical data, proper installation, appropriate lubrication, and a predicted life of 254 million mm. Ratings are suggested only, based on standard and typical industry practice, and cannot be guaranteed. Life can be increased approximately 10 times by operating a given bearing at 1/2 its rated load, other factors being constant. Temperature of bearings must not exceed 82°C, even for short periods, since this will reduce hardness and result in significantly reduced load capacity and working life.



#### **ACCURACY**

The accuracy of a slide is measured along it's entire length, as illustrated in Fig 2, and expressed in terms of parallelism (Fig 1.)
Actual accuracy achieved depends on proper installation



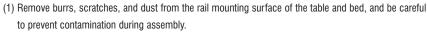


Mounting holes in the way bars are threaded, and also counterbored to alternatively permit using the next smaller size screw with threaded mounting holes in the user's components.

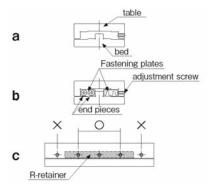
#### **INSTALLATION PROCEDURE**

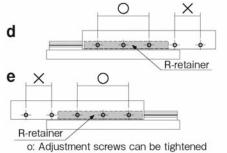
Note:

- \* Provide external mechanical stoppers.
- \* Set the movement to be less than the specified stroke.

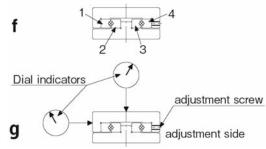


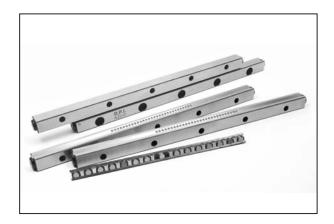
- (2) Apply low-viscosity oil to the contact surfaces, and align the table and the bed. (Figure 10a)
- (3) Set the reference surface shown in Figure 4 onto the mounting surface with the rails assembled. Set the table in the center position, and tighten the adjustment screws lightly so that almost no gap remains. (Figure 10b)
- (4) Keep the table in the center, tighten the rail mounting bolts lightly, loosen the end pieces of both end faces, and remove the fastening plate. Following this, firmly retighten the end pieces.
- (5) While maintaining the conditions of (4), gently move the assembly through its stroke being certain to check that the speci.ed stroke length has been secured, and that there is no problem with the operation, or any other irregularity.
- (6) Move the table to the center and tighten only the adjustment screws on the R-retainer with the recommended tightening torque as shown in Table 3. (Figure 10c)
- (7) Gently move the table to one stroke end, and check that the table has surely come into contact with the external mechanical stopper. Following this, tighten the adjustment screws on the R-retainer in the same manner as (6). (Figure 10d)
- (8) Move the table to the opposite stroke end, and tighten in the same manner as (6). (Figure 10e)
- (9) Fasten the mounting bolts on rails 1, 2, and 3 by tightening with the recommended torque shown in Table 4. (Figure 10f)
- (10) Set the dial indicators to the center of the table and to the side (reference surface) of the table. (Figure 10g)
- (11) Perform the final preload adjustment. While moving the table back and forth, repeat steps (6) and (7) until the dial indicators show a minimum deviation.
- (12) Finally, securely fasten rail 4, which has been provisionally mounted, using the recommended torque. As with the adjustment screws, successively tighten the mounting bolts on the R-retainer while moving the table.





x: Adjustment screws can be tightened





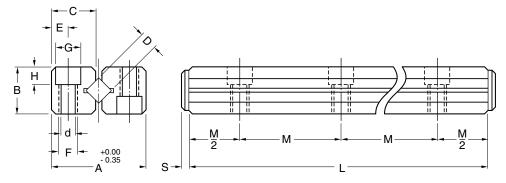
## Anti-Creep Crossed Roller Rail Sets

#### Ordering

Order standard bearing sets from table by model number according to load and travel required

Each set consists of two complete bearings (4 rails, 2 roller cages, and end stops).

Delivery stock to 8 weeks.



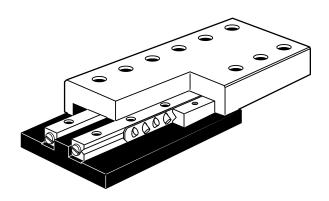
moment load ratings + load / life formulas. pg. 96

*Travel is 1/2	2 distance fron	RAIL SET							RAIL SET			
MODEL	NO. OF ROLLERS IN EACH RETAINER	LENGTH L	TRAVEL*	NO. Holes	LOAD Capacity LB	MODEL	ROLL	). OF .ers in retainer	LENGTH L	TRAVEL*	NO. Holes	LOAD Capacity LB
NB-2030-A		30	18	2	30	NB-3225-	AC ·	43	225	150	9	310
NB-2045-A		45	25	3	48							
NB-2060-A		60	30	4	66	NB-4080-		9	80	60	2	140
NB-2075-A		75	40	5	78	NB-4120-		17	120	75	3	220
NB-2090-A		90	50	6	96	NB-4160-		23	160	105	4	300
NB-2105-A		105	65	7	108	NB-4200-		29	200	130	5	380
NB-2120-A		120	70	8	126	NB-4240-	-	37	240	143	6 7	459
NB-2135-A		135	80	9	138	NB-4280-	AC ·	43	280	170	7	539
NB-2150-A	-	150	90	10	156							
NB-2165-A		165	95	11	173	NB-6100-		9	100	63	2	320
NB-2180-A	AC 51	180	100	12	192	NB-6150-		15	150	85	3	479
			_	_		NB-6200-		19	200	135	4	639
NB-3050-A		50	25	2 3	70	NB-6250-		25	250	158	5	799
NB-3075-A		75	48		100	NB-6300-		31	300	180	6 7	959
NB-3100-A		100	60	4	140	NB-6350-	-	35	350	230		1119
NB-3125-A		125	83	5	170	NB-6400-	AC :	39	400	275	8	1280
NB-3150-A		150	90	6 7	210							
NB-3175-A		175	103		240							
NB-3200-A	AC 41	200	113	8	280							

	Profile Dimensions —						Mounting Dimensions —					
SERIES	A	В	C	D	s	M	E	F*	J**	d	G	н'
NB-2-AC	12	6.0	5.5	2.0	2.0	15	2.5	M3	M2	2.55	4.4	2.0
NB-3-AC	18	8.0	8.3	3.0	2.0	25	3.5	M4	M3	3.30	6.0	3.1
NB-4-AC	22	11	10.2	4.0	2.0	40	4.5	M5	M4	4.3	8.0	4.2
NB-6-AC	31	15	14.2	6.0	3.0	6.0	6.0	M6	M5	5.2	9.5	5.2
*Thread S	*Thread Size											

# Crossed Roller Slide Tables (Aluminum)

### 6 Reasons to choose Del-Tron® Crossed Roller Slide Tables (Aluminum)



- High accuracy and load capacity. (Precision ground V grooved ways and rollers.)
- 2. Withstands force in any direction. (Alternately crossed rollers 45° angle.)
- 3. Easy installation. (Metric threaded mounting holes in standard pattern.)
- 4. Corrosion Resistant-Non Contaminating (Stainless steel models available.)
- 5. Lightweight. (Aluminum base and carriage.)
- 6. Interchangeable (with other manufacturer's slides.)

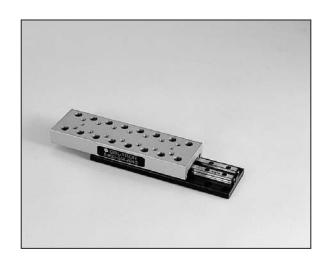


#### Del-Tron® Crossed Roller Slide Tables

Our Gold Motion Series crossed roller slide tables offer low cost and lightweight aluminum body construction to support heavy loads with low friction and precision linear motion. Select from over 40 standard sizes for use in a wide range of applications - precision instruments, office and communications equipment, surface grinders, tool grinders, and assembly fixtures, as examples.

Factory assembled and ready to install, each positioning table consists of an aluminum base and an aluminum carriage, both precision milled, and a pair of hardened steel linear bearings. Counterbored clearance holes, in base, permit easy mounting. Threaded holes, closely spaced in carriage, permit attaching your components without additional machining. Factory preloaded bearings eliminate side play. Internal stops, in the form of projecting screw heads between the underside of the carriage and base, protect bearings from overtravel during handling.

Mount on flat surfaces to provide full support to the base. Loads stated, may be applied in any direction. Load values are calculated for weights evenly distributed on your positioning table. For full life of tables, we recommend careful calculation of moments and cantilevered loads.



## Crossed Roller Slide Tables (Aluminum)

moment load ratings + load / life formulas. pg.96

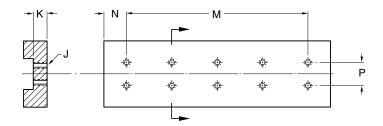
MODEL	STAINLESS STEEL	TRAVEL T	LENGTH L	LOAD Capacity kgf		SE MOUNTING (COUNTERBOI SPAC	RED)	□ MOUNT	RRIAGE ING HOLES IEADED) SPACING M
NBT-1050AM NBT-1065AM NBT-1080AM NBT-1095AM NBT-1125AM	SS SS SS SS	25 38 50 64 75	50 65 80 95 125	43 51 66 73 89	4 4 8 8 8	40 55 70 85 115	 40 55 85	4 6 8 10 14	1 x 15 2 x 15 3 x 15 4 x 15 6 x 15
NBT-2035A-18M NBT-2050AM NBT-2050A-30M NBT-2065AM NBT-2065A-40M NBT-2080A-50M NBT-2095A-60M NBT-2095AM NBT-2110A-70M NBT-2125AM NBT-2125A-80M NBT-2155A-100 NBT-2185A-120	SS SS SS SS SS SS SS SS SS SS SS SS SS	18 25 30 38 40 50 50 60 64 70 75 80 100 120	35 50 50 65 65 80 80 95 95 110 125 125 155	30 44 44 52 52 66 66 74 74 85 90 90 144 174	4 4 4 4 8 8 8 8 8 8 8 8 8 8	25 40 40 55 55 70 70 85 85 100 115 115 145		2 4 4 6 8 8 10 10 12 14 14 18 22	1 x 15 1 x 15 2 x 15 2 x 15 3 x 15 3 x 15 4 x 15 4 x 15 5 x 15 6 x 15 6 x 15 8 x 15
NBT-3055AM NBT-3055A-30M NBT-3050A-45M NBT-3105AM NBT-3105A-60M NBT-3130A-75M NBT-3155A-90M NBT-3180AM NBT-3180A-105 NBT-3205A-130 NBT-3205A-130 NBT-3230A-155 NBT-325A-180 NBT-3280A-205 NBT-3280A-205	1	25 30 45 50 60 75 75 90 100 105 125 130 155 180 205 230	55 55 80 105 105 130 155 180 180 205 205 230 255 280 305	88 88 100 154 154 170 217 217 248 248 262 290 310 340 360	4 4 4 4 4 4 4 4 8 8 8 8 8 8	35 35 60 85 85 110 135 160 160 185 210 235 260 285		2 4 6 6 8 10 10 12 12 14 14 16 18 20 22	
NBT-4085AM NBT-4125AM NBT-4165AM NBT-4205AM NBT-4245AM	SS SS SS SS	50 75 100 125 150	85 125 165 205 245	196 273 329 395 462	4 4 4 4	65 105 145 185 225	_ _ _ _	2 4 6 8 10	1 x 40 2 x 40 3 x 40 4 x 40
NBT-6110AM NBT-6160AM NBT-6260AM NBT-6360AM	SS SS SS	75 100 150 225	110 160 260 360	280 483 728 924	4 4 4 8	90 140 240 340	  140	2 4 8 12	1 x 50 3 x 50 5 x 50

Dimensions in mm

		Mounting Dimensions							
	SPAC	CARRI	AGE —— THREAD	DEPTH	CDACI	SPACING COUNTERBOR			
SERIES	N	INU P	J	K	R	NG S	D	d	
NBT-1000AM	17.5	10	M3	4.5	5	22	6.1	3.5	
NBT-2000AM	17.5	15	M4	8	5	30	8.1	4.6	
NBT-3000AM	27.5	25	M5	10.5	10	40	10.1	5.8	
NBT-4000AM	42.5	40	M5	13	10	55	10.1	5.8	
NBT-6000AM	55	50	M6	16	10	60	11.0	7.1	

 ${\bf Dimensions\ in\ mm}$ 

### **CARRIAGE MOUNTING DIMENSIONS**



#### Specifications:

Straight Line Accuracy 0.0025mm/25mm of travel

#### **Finish**

Carriage: Gold anodize, Base: Black anodize

## Positional Repeatability 0.0025mm

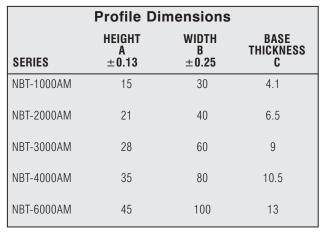
## Coefficient of Friction 0.003 typical

**Construction**Aluminum carriage and base, hardened steel crossed roller rail sets.

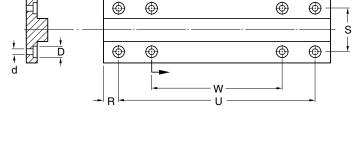
Order standard positioning tables from table by model number according to load and travel required.

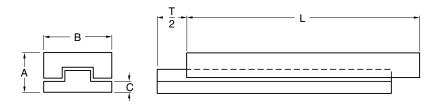
Delivery stock to 6 weeks.

### **BASE MOUNTING DIMENSIONS**



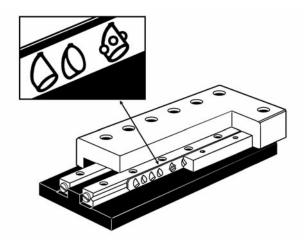
Dimensions in mm





# Anti-Creep Crossed Roller Slide Tables (Aluminum)

## 6 Reasons to choose Del-Tron<sup>®</sup> Anti-CreepCrossed Roller Slide Tables (Aluminum)



- 1. Anti-Creep Crossed Roller Technology. Ideal for vertical and cantilevered load applications.
- 2. High accuracy and load capacity.

  Precision V grooved rails and rollers.
- 3. Lightweight aluminum carriage and base design.
- 4. Withstands force in any direction.

  Alternately crossed roller cage design.
- Easy installation. Threaded and counterbored mounting holes in standard pattern.
- 6. Interchangeable with other manufacturer's slides.

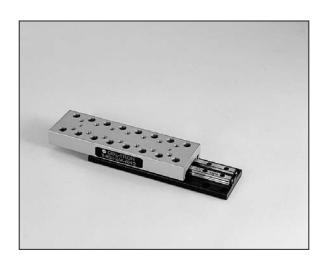
# Del-Tron<sup>®</sup> Anti-Creep Crossed Roller Slide Tables

The Anti-Creep crossed roller slide tables utilize our Anti-Creep crossed roller rail systems to prevent roller cage slippage during operation. This system allows you to mount the table in any orientation while maintaining direct roller contact to the rail surface eliminating roller cage creep. These tables are ideal for vertical applications and where high acceleration and deceleration forces are present.

Factory assembled and ready to install, each positioning table consists of an aluminum base and an aluminum carriage, both precision milled, and a pair of hardened steel linear bearings. Counterbored clearance holes, in base, permit easy mounting. Threaded holes, closely spaced in carriage, permit attaching your components without additional machining. Factory preloaded bearings eliminate side play. Internal stops, in the form of projecting screw heads between the underside of the carriage and base, protect bearings from over travel during handling.

Mount on flat surfaces to provide full support to the base. Loads stated, may be applied in any direction. Load values are calculated for weights evenly distributed on your positioning table. For full life of tables, we recommend careful calculation of moments and cantilevered loads.





## Anti-Creep Crossed Roller Slide Tables (Aluminum)

### Stainless Steel Models Available

For applications where particulate contamination caused by corrosion must be reduced, Del-Tron offers Gold Motion crossed roller positioning tables equipped with corrosion-resistant, stainless steel, crossed roller linear bearings.

#### TO ORDER:

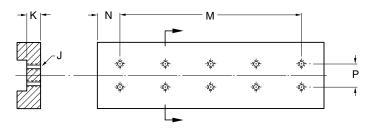
Add SS to model number before "AM". For example: NBT-4085SSAM-AC

moment load ratings + load / life formulas. pg. 97

					moment	ioau raungs + io	Jau / IIIE IU	illiulas. pg. 31	
*Travel is 1/2 distan	ce from cei		r direction. LOAD	BASE MOUNTING HOLES (COUNTERBORED)			MOUNT	CARRIAGE MOUNTING HOLES (THREADED)	
MODEL	TRAVEL* T	LENGTH L	CAPACITY LBF (kgf)	NO. HOLES	U	SPACING W	NO. HOLES	SPACING M	
NBT-1050AM-AC NBT-1065AM-AC NBT-1080AM-AC NBT-1095AM-AC NBT-1125AM-AC	25 30 40 50 70	50 65 80 95 125	43 51 65 73 89	4 4 8 8 8	40 55 70 85 115	 40 55 85	4 6 8 10 14	15 15 15 15 15	
NBT-2035AM-18-AC NBT-2050AM-AC NBT-2065AM-AC NBT-2080AM-AC NBT-2095AM-AC NBT-2110AM-70-AC NBT-2125AM-AC NBT-2155AM-100-AC NBT-2185AM-120-AC	18 25 30 40 50 65 70 90 100	35 50 65 80 95 110 125 155	30 44 52 66 74 85 90 144	4 4 4 8 8 8 8 8	25 40 55 70 85 100 115 145		2 4 6 8 10 12 14 18 22	15 15 15 15 15 15 15	
NBT-3055AM-AC NBT-3080AM-45-AC NBT-3105AM-AC NBT-3130AM-75-AC NBT-3155AM-AC NBT-3180AM-AC NBT-3205AM-AC NBT-3230AM-155-AC	25 48 60 83 90 103 113	55 80 105 130 155 180 205 230	88 100 154 170 217 248 262 290	4 4 4 4 4 8 8	35 60 85 110 135 160 185 210		2 4 6 8 10 12 14	25 25 25 25 25 25 25 25 25	
NBT-4085AM-AC NBT-4125AM-AC NBT-4165AM-AC NBT-4205AM-AC NBT-4245AM-AC	60 75 105 130 143	85 125 165 205 245	196 273 329 395 462	4 4 4 4 4	65 105 145 185 225	= =	2 4 6 8 10	40 40 40 40 40	
NBT-6110AM-AC NBT-6160AM-AC NBT-6260AM-AC NBT-6360AM-AC	63 85 158 230	110 160 260 360	280 483 728 924	4 4 4 8	90 140 240 340	   140	2 4 8 12	50 50 50 50	

		Mounting Dimensions								
	SPACING	CARRIAGE			SPACING	SPACING COUNTERBORE				
SERIES	N	P	J	K	R	S	D	d	h	
NBT-1000AM-AC	17.5	10	M-3	4.5	5	22	5	3.1	3.2	
NBT-2000AM-AC	17.5	15	M-4	8	5	30	6.1	3.7	3.7	
NBT-3000AM-AC	27.5	25	M-5	10.5	10	40	8.3	5	5.2	
NBT-4000AM-AC	42.5	40	M-5	13	10	55	8.3	5	5.2	
NBT-6000AM-AC	55	50	M-6	16	10	60	10.3	6.7	8.0	
Dimensions in m	m									

## **CARRIAGE MOUNTING DIMENSIONS**



#### **Specifications:**

**Straight Line Accuracy** 0.0025mm/25mm of travel

**Positional Repeatability** 0.0025mm

**Coefficient of Friction** 0.003 typical

Construction

Aluminum carriage and base, hardened steel crossed roller rail sets.

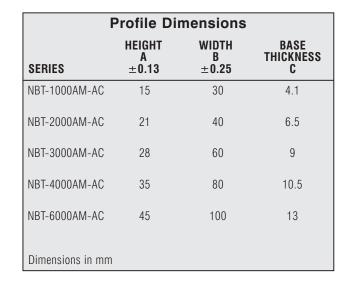
#### **Finish**

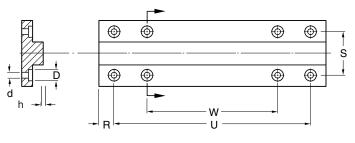
Carriage: Gold anodize, Base: Black anodize

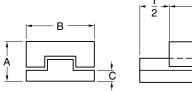
Ordering
Order standard slide tables from table by model number according to load and travel required.

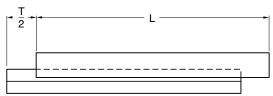
Delivery stock to 6 weeks.

#### BASE MOUNTING DIMENSIONS



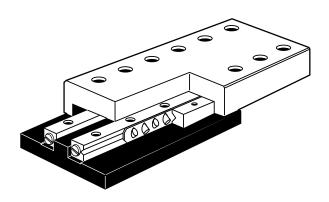






# Crossed Roller Slide Tables (Steel)

## 6 Reasons to choose Del-Tron® Crossed Roller Slide Tables (Steel)



- 1. High Accuracy .002mm parallelism.
- High Load Capacity Crossed roller way construction handles loads up to 1200 kg.
- 3. Interchangeable with other manufacturer's tables.
- 4. Low Friction 0.003 coefficient of friction for smooth operation.
- 5. Standard Mounting Holes provided.
- Backlash Free Factory preloaded for minimum axial play.



## Del-Tron® Crossed Roller Slide Tables

Crossed Roller Slide Tables are factory assembled, and ready to install. They use Del-Tron crossed roller bearings to provide very precise linear motion with low friction and high support stiffness for the load. A selection of more than 40 standard sizes is available for applications including precision instruments, office and communications equipment, surface grinders, tool grinders, assembly fixtures, and anywhere precise linear positioning is required.

#### Construction

Each positioning table consists of a one piece base, a one piece carriage, and a pair of linear bearings. The bearings are factory preloaded to eliminate side play.

Counterbored clearance holes in the base permit easy mounting in your structure. Threaded holes in the carriage are closely spaced to permit attaching your components without additional machining in most cases.

Standard material for base and carriage is cold rolled steel, with black oxide finish.

#### Application

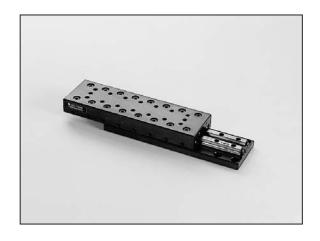
Mount on a flat surface to provide full support to the base.

Although it is seldom needed, the carriage surface can be machined or additional mounting holes can be added if the following precautions are observed:

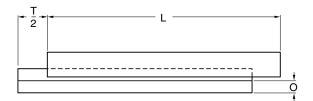
- Do not disassemble the table since reassembly and readjustment of the preloading require special procedures.
- Protect the ways against entry of chips and debris.
- 3. Drill only blind holes through the carriage to avoid depositing chips inside the unit.
- Avoid intersection with internal mounting or preloading screws.
- Avoid clamping forces in excess of the rated load capacity.

Internal stops, in the form of projecting screw heads between the under side of the carriage and the base, are intended only to protect the bearings from overtravel during handling. Provide separate stops appropriate for your load if needed.

The ends of the carriage contain tapped holes that permit easy attachment of way covers, bellows, or other shields to exclude dust and keep the ways clean.



## Crossed Roller Slide Tables (Steel)



moment load ratings + load / life formulas. pg.97

			Le	ngth, T	ravel a	nd Load	Selection	n			
MODEL	TRAVEL T	LENGTH L	LOAD CAPACITY kgf	NO. HOLES	U		OUNTING HORBORED) SF			MOUNT	RRIAGE FING HOLES READED) — SPACING M
NBT-1025 NBT-1035 NBT-1045 NBT-1055 NBT-1065 NBT-1075 NBT-1085	12 18 25 32 40 45 50	25 35 45 55 65 75 85	12 16 20 26 32 36 40	4 4 4 8 8 8	18 28 38 48 58 68 78	= = = = = = = = = = = = = = = = = = = =		= = = = = = = = = = = = = = = = = = = =	- - - - - -	2 4 6 8 10 12 14	1 × 10 2 × 10 3 × 10 4 × 10 5 × 10 6 × 10
NBT-2035 NBT-2050 NBT-2065 NBT-2080 NBT-2095 NBT-2110 NBT-2125 NBT-2140 NBT-2155 NBT-2170 NBT-2185	18 30 40 50 60 70 80 90 100 110	35 50 65 80 95 110 125 140 155 170 185	40 63 75 95 105 120 130 145 155 170	4 4 4 8 8 8 8 12 12 12 12 16	25 40 55 70 85 100 115 130 145 160 175				     70 85 100	2 4 6 8 10 12 14 16 18 20 22	1 × 15 2 × 15 3 × 15 4 × 15 5 × 15 6 × 15 7 × 15 8 × 15 9 × 15 10 × 15
NBT-3055 NBT-3080 NBT-3105 NBT-3130 NBT-3155 NBT-3180 NBT-3205 NBT-3230 NBT-3255 NBT-3280 NBT-3305	30 45 60 75 90 105 130 155 180 205 230	55 80 105 130 155 180 205 230 255 280 305	126 184 220 275 310 355 375 420 450 490 520	4 4 4 6 6 10 10 10 12 12	35 60 85 110 135 159 185 210 235 260 285				- - - - - - - - -	2 4 6 8 10 12 14 16 18 20 22	1 × 25 2 × 25 3 × 25 4 × 25 5 × 25 6 × 25 7 × 25 8 × 25 9 × 25 10 × 25
NBT-4085 NBT-4125 NBT-4165 NBT-4205 NBT-4245 NBT-4285 NBT-4325	50 75 105 130 155 185 210	85 125 165 205 245 285 325	280 390 470 565 660 745 830	4 4 4 6 6 10	65 105 145 185 225 265 305	105 145 185 225		= = = = = = = = = = = = = = = = = = = =		2 4 6 8 10 12 14	1 × 40 2 × 40 3 × 40 4 × 40 5 × 40 6 × 40
NBT-6110 NBT-6160 NBT-6210 NBT-6260 NBT-6310	60 95 130 165 200	110 160 210 260 310	400 690 870 1040 1200	4 4 6 6 6	90 140 190 240 290	90 140 190	=	=	_ _ _ _	2 4 6 8 10	1 × 50 2 × 50 3 × 50 4 × 50

Dimensions in mm

## **Crossed Roller Slide Tables (Steel)**

#### **Load Ratings**

See "Ratings and Specifications" page 54

The load capacities stated in the tables may be applied in any direction, and are assumed to be centered and evenly distributed over the table. Calculate moments and cantilevered loads carefully since inadvertent overloading will reduce service life.

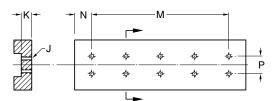
#### Ordering

Order standard positioning tables from table by model number according to load and travel required.

Delivery stock to 6 weeks.

		(	Mount CARRIAGE	ns	BASE				
	SPA	CING	THREAD	DEPTH	SPA	CING	C'BORE		
SERIES	N	Р	J	K	R	S	D	d	
NBT-1000	12.5	10	M2	7	3.5	22	4.5	2.5	
NBT-2000	17.5	15	M3	8	5	30	6.5	3.5	
NBT-3000	27.5	25	M4	10.5	10	40	8.0	4.5	
NBT-4000	42.5	40	M5	13	10	55	10.0	5.5	
NBT-6000	55	50	M6	16	10	60	11.5	7	

Dimensions in mm

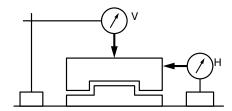


#### CARRIAGE MOUNTING DIMENSIONS

#### **Accuracy**

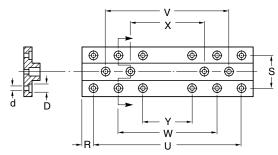
Top and bottom mounting surfaces and carriage side surfaces are ground flat and parallel to the line of motion. Accuracy of movement (V) is measured as a deflection over the center line of the carriage as shown. Accuracies, measured without load, depend primarily on overall length as listed.

Deflections (H), measured at either side of the carriage under the same conditions.



MODEL	Deflection		MODEL	Defle	ction	MODEL	Defle	ction
	V	Н		V	Н		V	Н
NBT 1025	2	4	NBT 2140	3	6	NBT 3305	3	7
NBT 1035	2	4	NBT 2155	3	6			
NBT 1045	2	4	NBT 2170	3	7	NBT 4085	2	5
NBT 1055	2	5	NBT 2185	3	7	NBT 4125	3	6
NBT 1065	2	5				NBT 4165	3	7
NBT 1075	2	5	NBT 3055	2	5	NBT 4205	3	7
NBT 1085	2	5	NBT 3080	2	5	NBT 4245	3	7
			NBT 3105	3	6	NBT 4285	3	7
NBT 2035	2	4	NBT 3130	3	6	NBT 4325	4	8
NBT 2050	2	4	NBT 3155	3	6			
NBT 2065	2	5	NBT 3180	3	7	NBT 6110	3	6
NBT 2080	2	5	NBT 3205	3	7	NBT 6160	3	6
NBT 2095	2	5	NBT 3230	3	7	NBT 6210	3	7
NBT 2110	3	6	NBT 3255	3	7	NBT 6260	3	7
NBT 2125	3	6	NBT 3280	3	7	NBT 6310	3	7

Dimensions in  $\mu\text{m}$ 



**BASE MOUNTING DIMENSIONS** 

		B		
		G		
	ţ	<del>                                  </del>		
1	C	<del> </del>  -••-		<u></u>
<b>A</b>	'			<del>-</del>
<u>,                                     </u>	4		0	
	H		Ť	

\* Series NBT-1000 Tables use series NB-1 bearings etc.

SERIES *	HEIGHT A	WIDTH B**	Profile Di	imensi		OVER ATT		T———
	± 0.1	± 0.1	0	C	E	F	G	Н
NBT-1000	17	30	5.5	2.5	_	12	_	M2
NBT-2000	21	40	6.5	3.4	_	16	_	M2
NBT-3000	28	60	9	5.5	_	40	_	M3
NBT-4000	35	80	10.5	6.5	_	55	_	M3
NBT-6000	45	100	13	8	15	60	92	M4

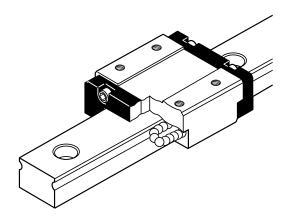
Dimensions in mm

<sup>\*\*</sup> Except Series NBT-1000 and NBT-2000 +0.2mm -0.4mm

# Recirculating Ball Slide Guides (BSG)

## 6 Reasons to choose Del-Tron® Recirculating Ball Slide Guides

(BSG)



- 1. Smooth and stable operation.
- 2. Compact, lightweight and low price.
- 3. High load capacity due to R-shaped groove.
- 4. Four-point contact to carry load and moment in all directions.
- 5. Stainless steel type available.
- 6. Extra wide type available.

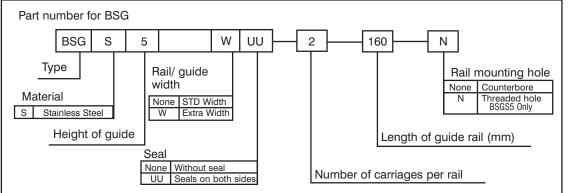


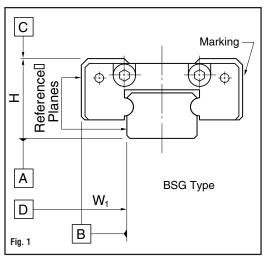
## Del-Tron® Recirculating Ball Slide Guides (BSG)

The BSG type consists of a block and a guide rail, both having two R-shape raceway grooves machined by precision grinding. The block consists of a main body having raceway grooves and a resin return cap ensuring smooth circulation of balls. These precision steel balls roll in the respective raceway groove with contact at four points.

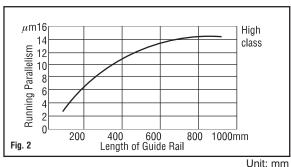
- Smooth and Stable operation. Since precision steel balls are used as rolling elements, the rolling resistance is extremely small, ensuring smooth and stable operation.
- Compact, lightweight, and low price. The block is a simple structure, so the slide guide is compact and inexpensive. Its compactness and light weight also make this product optimum for linear operation at high speed.
- High load capacity utilizing the R-shaped groove. The raceway surface over which the balls roll is an R-shaped groove, offering a large contact area. Therefore, the product features a large load capacity and a long effective life.
- Four-point contact to carry load and moment in all directions. The Gothic arch groove, where the balls contact the raceway surface at four points, enables the load and moment to be carried in all directions.
- Stainless steel type (BSGS) is available.
   The BSGS type uses stainless steel for the block and guide rail, thus having superior corrosion resistance.
- Extra wide type (BSGW) is also available.
  With its increased number of rolling
  elements and increased width, this unit
  can replace the use of two linear guides.
  Stiffness in regard to moment load is
  increased, thus creating an effective
  compact linear motion mechanism.
- Slide guides are supplied with temporary ends stops. They are not to be used as positive stops.

# Nomenclature





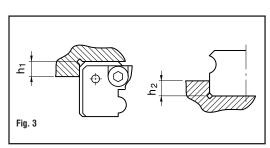
Height (H) tolerance	±0.041
Difference of heights (H) between paired ones	0.015
Width (W <sub>1</sub> ) tolerance	±0.041
Difference of widths (W <sub>1</sub> ) between paired ones	0.020
Running parallelism of C plane with respect to A plane	See Fig. 2
Running parallelism of D plane with respect to B plane	See Fig. 2



## **Accuracy**

Unit: mm

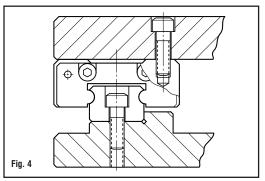
# Travel Accuracy



Nominal No.	Height of shoulder of carriage section h <sub>1</sub>	rail section h <sub>2</sub>
BSGS5	2	1
BSGS8	2.5	1
BSGS9W • BSG10	3	1.5
BSGS12W	3	2.5
BSG13	4	2
BSGS14W	4	2.5
BSG16	5	3.5
BSGS16W	5	2.5
BSG25	8.5	4

# Mounting Requirements

The corners of the reference planes should be finished with undercuts as shown in Figure 3. The recommended heights of the shoulders of the mounting planes are as shown in the table. To attain high accuracy, it is recommended to finish the mounting planes of the bed and table to an accuracy the same as or better than that of the guide rail and block.



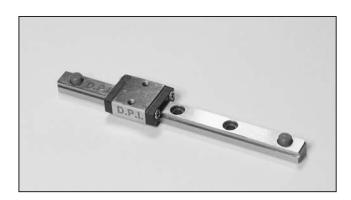
**Recommended Tightening Torques:** The recommended tightening torques for the mounting bolts (hex socket head bolts) are shown here.

Unit: N·m

Nominal Bolt Size	Tightening Torques
M2	0.4
M3	1.0
M4	2.5
M5	4.9

To install a BSG Slide Guide (Fig. 4), confirm the reference planes as shown in Figure 1, then let the reference planes of the bed and table make close contact with the reference planes of the object and fix them. When using two guide rails, fix the reference side in a state in which it is closely contacted with the reference plane. Fix the adjustment side after adjusting the traveling state with either the guide rails or the block in a free state.

## **Fixing Method**

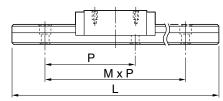


## **Ball Slide Guide**

BSG

BSGS (Stainless Steel)

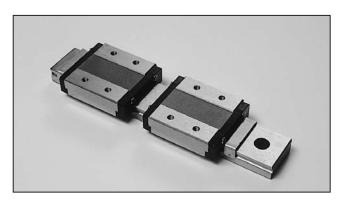
Dimension - mm



Maximum length is available for special order.

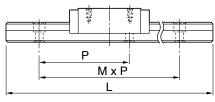
MC	DDEL			GUIDE	RAIL LE	NGTHS / [N	IUMBER O	F HOLES]			MAX	LENGTH
		Lmm	[M]	Lmm	[M]	Lmm	[M]	Lmm	[M]	Р	STEEL	STAINLESS
	BSGS5 BSGS5UU	40 130	[2] [8]	55 160	[3] [10]	70	[4]	100	[6]	15	N/A	340
	BSGS8 BSGS8UU	40 100	[2] [6]	55 130	[3] [8]	70	[4]	85	[5]	15	N/A	700
BSG10 BSG10UU	BSGS10 BSGS10UU	55 155	[2] [7]	75 195	[3] [9]	95 275	[4] [13]	115	[5]	20	500	1000
BSG13 BSG13UU	BSGS13 BSGS13UU	120 320	[4] [12]	170 370	[6] [14]	220 470	[8] [18]	270	[10]	25	500	1000
BSG16 BSG16UU	BSGS16 BSGS16UU	150 550	[3] [13]	230 670	[5] [16]	310	[7]	430	[10]	40	1900	1000
BSG25 BSG25UU	BSGS25 BSGS25UU	220 640	[3] [10]	280 880	[4] [14]	340	[5]	460	[7]	60	1900	1000

See page 84 for Carriage information.



## **Ball Slide Guide Extra Wide**

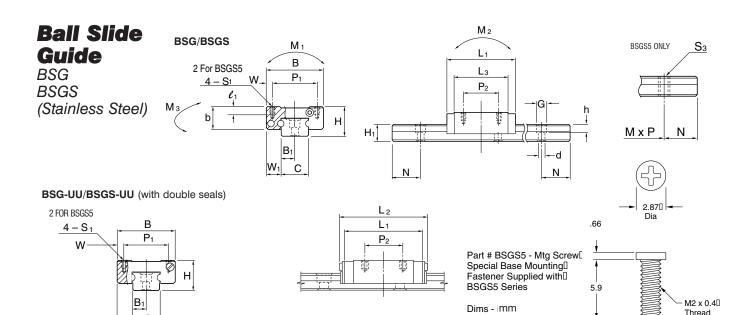
BSG-W BSGS-W (Stainless Steel)



Maximum length is available for special order.

MO	DEL			GUIDE RA	AIL LENGT	THS / [NUI	MBER OF	HOLES]			MAX LENGTH	
		Lmm	[M]	Lmm	[M]	Lmm	[M]	Lmm	[M]	Р	STEEL	STAINLESS
	BSGS9W BSGS9WUU	80 200	[2] [6]	110 230	[3] [7]	140 260	[4] [8]	170 290	[5] [9]	30	N/A	700
BSG12W BSG12WUU	BSGS12W BSGS12WUU	80 200	[2] [6]	110 230	[3] [7]	140 260	[4] [8]	170 290	[5] [9]	30	1000	1000
BSG14W BSG14WUU	BSGS14W BSGS14WUU	110 310	[2] [7]	150 390	[3] [9]	190 470	[4] [11]	230	[5]	40	1900	1000
BSG16W BSG16WUU	BSGS16W BSGS16WUU	150 550	[3] [13]	230 670	[5] [16]	310	[7]	430	[10]	40	1900	1000

See page 85 for Carriage information.



MC	DDEL					DIMEN	SIONS (	)F CARI	RIAGE				BASIC LOAD Rating	
STEEL	STAINLESS STEEL	Н	В	L <sub>2</sub>	L <sub>1</sub>	W	P <sub>1</sub>	P <sub>2</sub>	S <sub>1</sub>	ℓ <sub>1</sub>	L <sub>3</sub>	b	C kgf	Co kgf
	BSGS5 BSGS5UU	6	12	17	15.6	2	8	_	M2	1.5	9.8	4.5	44	73
	BSGS8 BSGS8UU	8	17	23.5	21.9	2.5	12	8	M2	2.5	15.1	6.5	110	170
BSG10 BSG10UU	BSGS10 BSGS10UU	10	20	30.5	28.1	2.5	15	10	M3	3	20.4	7.8	170	250
BSG13 BSG13UU	BSGS13 BSGS13UU	13	27	34	30	3.5	20	15	M3	3.5	23	10	220	320
BSG16 BSG16UU	BSGS16 BSGS16UU	16	32	42.5	38.5	3.5	25	20	M3	4	29.5	12	370	550
BSG25 BSG25UU	BSGS25 BSGS25UU	]25	46	62	55.7	4	38	38	M4	6	45.7	17.5	701	1001

Dimensions in mm

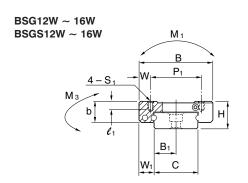
М	ODEL			D	IMENSIO	NS OF GUIDE RAIL			WEIGHT	
STEEL	STAINLESS STEEL	Н1	С	B <sub>1</sub>	W <sub>1</sub>	d x G x h	S3 N Type	N	Carriage kg	Guide Rail kg/m
	BSGS5 BSGS5UU	4	5	2.5	3.5	2.4x 3.5 x 1	M2.6	5	.003	.43
	BSGS8 BSGS8UU	4.7	7	3.5	5	2.4 x 4.2 x 2.3	_	5	0.01	0.19
BSG10 BSG10UU	BSGS10 BSGS10UU	5.5	9	4.5	5.5	3.5 x 6 x 3.5	_	7.5	0.02	0.31
BSG13 BSG13UU	BSGS13 BSGS13UU	7.2	12	6	7.5	3.5 x 6 x 4.5	_	10	0.04	0.61
BSG16 BSG16UU	BSGS16 BSGS16UU	9.5	15	7.5	8.5	3.5 x 6 x 4.5	_	15	0.06	1.02
BSG25 BSG25UU	BSGS25 BSGS25UU	15	20	10	13	6 x 9.5 x 8.5	_	20	0.23	2.15

Dimensions in mm

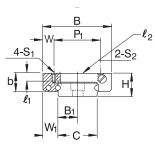
moment load ratings + load / life formulas. pg.98

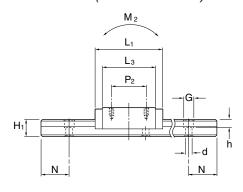
## **Ball Slide Guide Extra Wide**

BSG-W BSGS-W (Stainless Steel)

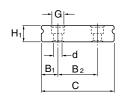


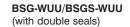
## BSGS9W

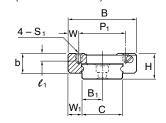


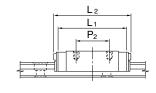


For BSG16W/BSGS16W Guide Rails









M	MODEL DIMENSIONS							ONS O	IS OF CARRIAGE							BASIC LOAD RATING	
STEEL	STAINLESS STEEL	Н	В	L <sub>2</sub>	L <sub>1</sub>	W	P <sub>1</sub>	P <sub>2</sub>	S <sub>1</sub>	ℓ <sub>1</sub>	L <sub>3</sub>	W <sub>2</sub>	S <sub>2</sub>	ℓ <sub>2</sub>	b	C kgf	Co kgf
	BSGS9W BSGS9WUU	9	25	31.5	30.1	3.5	18	12	M2.6	2.5	22.1	12.5	M4	3.5	7	160	250
BSG12W BSG12WUU	BSGS12W BSGS12WUU	12	30	39	35.3	4.5	21	12	M2.6	3	28.4	_	_	_	9	230	340
BSG14W BSG14WUU	BSGS14W BSGS14WUU	14	40	44.5	40.7	6	28	15	M3	3	33.5	_	_	_	11	300	440
BSG16W BSG16WUU	BSGS16W BSGS16WUU	16	60	55.5	51.2	7.5	45	20	M4	4.5	42	_	_	_	13	500	720

Dimensions in mm

MOD	EL			DII	VIENSIO	NS OF (	GUIDE RAIL		WEIGHT	
STEEL	STAINLESS STEEL	H <sub>1</sub>	С	B <sub>1</sub>	В2	W <sub>1</sub>	d x G x h		Carriage kg	Guide Rail kg/m
	BSGS9W BSGS9WUU	5.2	14	7	_	5.5	3.5 x 6 x 3.2	10	0.02	0.5
BSG12W BSG12WUU	BSGS12W BSGS12WUU	7.5	18	9	_	6	3.5 x 6 x 4.5	10	0.04	0.96
BSG14W BSG14WUU	BSGS14W BSGS14WUU	8	24	12	_	8	4.5 x 8 x 4.5	15	0.08	1.4
BSG16W BSG16WUU	BSGS16W BSGS16WUU	9.5	42	9.5	23	9	4.5 x 8 x 4.5	15	0.15	2.96

Dimensions in mm

moment load ratings + load / life formulas. pg.98

NOTE: Models BSGS9W and BSGS9WUU are available in Stainless Steel only.

## Technical Section Index

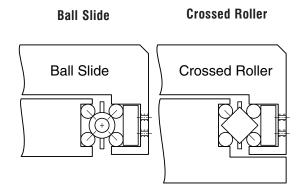
General Information		ye 83
Life Formulas		je 85
Moment Load Formulas &	Ratings pac	ae 87

## **General Information**

### 1. Ball Slides or Roller Slides

A. Ball slide design offers the following advantages:

- Self cleaning (point contact of balls and shafts does not allow foreign material to interfere.
- Low cost (Ball and shaft materials are common and easily manufactured).
- B. Crossed roller slide design offers the following advantages:
- Line contact of roller to shafts offer 8 x 10 times the load capacity of balls.
- · Higher over hanging load capacity and low axial play.

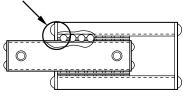


## 2. Straight Line Design or Recirculating Type

Straight line, or non-recirculating slides, have rolling elements which move on a straight track and are separated by a retainer. The slide reaches the end of its travel when the retainer or rolling element contacts a limiting component, (either a screw head or end cap). This travel limitation is determined by the relationship of the retainer length to the carriage length. Standard slides usually have travel equal to 1/3 the carriage length. Maximum total travel can be as much a 1x the carriage length. Therefore, for more travel, you must specify a longer slide. This design offers extremely low friction and stiction characteristics.

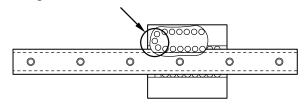
Recirculating slide designs offer travel which is not limited by carriage size. In this design the rolling elements revolve within an oval track inside the carriage. See the Del-Tron® BSG series.

Travel ends when ball or roller retainer contacts the end cap.



Straight Line Type

Balls recirculate around an oval track. Travel is limited by the length of the base rail.



**Recirculating Type** 

#### 3. Standard Tolerances

# Dimensions in Millimeters Unless otherwise specified, tolerances are as follows: One (1) place decimals ±0.25 Two (2) place decimals ±0.13

### 4. Custom Slides

Del-Tron's engineering staff will be pleased to assist you in developing custom versions of our linear slides. Our proprietary manufacturing processes allow us to offer completely customized slides built to your requirements even in small quantities in less than eight weeks.

Minor modifications can be provided. Some of the more common modifications we can provide:

- · Changes in height, width, or length
- · More or less travel
- Increased load capacity
- · Light, medium, or heavy preload
- · Different holes, threads or hole locations
- · Dowel holes and pins

- · Reduced or increased axial play
- · Multiple carriages on a single base
- · Non-standard retainer material
- · No anodize or non-standard anodize color
- · Corrosion resistant stainless steel components

## 5. High Temperature Applications

Del-Tron slides can be modified to operate in elevated temperature areas by the substitution of teflon, aluminum, or brass retainers.

## 6. Static Sensitive Applications

Del-Tron now offers precision linear motion devices that meet low electrostatic discharge requirements common in the semiconductor and electronics industries. The new slides are coated with electroless nickel, an alloy of nickel and phosphorous produced by autocatalytic chemical reduction with hypophosphite. The plating allows static charges to dissipate, helping the slides to meet requirements for automated equipment. Del-Tron® "ESD" electroless nickel plated slides are plated to ASTM standard B 733-97. This process is available for Del-Tron® line of ball slides, crossed roller slides and both ball and crossed roller multi-axis positioning stages.

## 7. Vacuum Applications

Outgassing of slide components can be reduced or eliminated for vacuum applications by eliminating anodized and oxided finishes, labels, lubricants, and non-metallic retainers.

## 8. Preload vs. Axial Play

Many of our slides allow the preload to be set to a specific amount to accommodate the needs of the application. A light, medium, or heavy preload may be ordered. The amount of preload can expressed as grams of force needed to move either the base or carriage. Please contact our engineering staff to discuss your special preload requirements.

Slide preload and axial play are related.

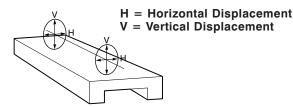
- Increased preload = less axial play
- Decreased preload = more axial play

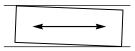
# AXIAL PLAY PRELOAD

## 9. Straight Line Accuracy

Straight Line Accuracy = possible runout in any plane

Measured by comparison of the line of travel to a master straight edge, using a gage or indicator mounted on the slides.





## Life Formulas

## Linear Ball and Roller Slides

## Rated Life

The rated life "L" of a linear slide is the length of travel endured by the slide under a specified condition. Since in reality, life varies from one slide to another, industry normally uses the L10 life rating which is defined as the length of travel that 90% of apparently identical slides will complete before the first evidence of failure.

## Speed Factor

The effect of speed on the load rating of a slide can be accounted for by a speed factor:

#### Formula 1

$$fs = \sqrt{\frac{760}{V}}$$

where: V = speed of the slide movement in mm/min (when the speed varies during the cycle, the peak value should be used)

m = 3 for ball slides, or m = 10/3 for roller slides

**Note:** When the speed is less than 760 mm/min, fs = 1.

## Temperature Factor

When the temperature of the slide exceeds certain limits, it reduces the hardness of contacting elements and consequently affects the load rating of the slide. Therefore, its load rating shall be adjusted by a temperature factor "ft". The values of this factor are presented in Table 1.

	Table 1	
	Temp. Fact	or, "ft"
Temp. Degree Celsius	Regular Bearing Steel Contacting Elements	Stainless Steel Contacting Elements
104	1	1
149	0.9	1
204	0.75	0.9
260	not recommended	0.75

**Note:** When specifying slides for elevated temperature service, it should be kept in mind that the delrin retainers found in many slides are not recommended for temperatures above 82 deg. C.

## Load Type Factor

In reality, the load endured by a slide can never be absolutely smooth, but rather is a sum of variable forces that include working load, inertial forces, vibrations, impacts, occasional loads, etc. In order to have their influence taken into account, the load rating of the slide shall be adjusted by a load type factor "fw".

The values of "fw" for calculations per formula (2) and (3) are presented in Table 2.

Table 2	
Condition of Load	Value of "fw"
Relatively smooth motion Motion with impacts	1 to 1.5 2 to 3

## Life Formula for Ball and Roller Slides

Based on the above definitions and role of different factors, the real life of linear slides can be obtained from the following formula:

### Formula 2

L10= 
$$\left(\frac{C \times fs \times ft}{Pc \times fw}\right)^{m} x (25.4 \times 10^{6} \text{ mm})$$

#### where:

L10 = life of the slide at 90% of reliability as defined above (in millimeters).

C= catalog "load capacity" of the slide in kg. (which is a load that corresponds to an L10 life of 250 million mm, provided the factors fs, ft and fw are equal to 1.

Pc= calculated effective load the slide is subjected to in kg. (fs, ft and fw are factors as described above.)

m= 3 for ball slides, or 10/3 for roller slides.

When other than 90% reliability is required (for instance, "K"% reliability), the known value of L10 shall be multiplied by a reliability factor "fr" so that:

$$Ln = fr \times L10$$

where:

Ln = rated life at the reliability of K% (n = 100-K).

The values of the factor "fr" are presented in Table 3.

RELIABILITY	Table 3	"fr", reliability
K%	"Ln" rated life	factor
50	L50	5.00
90	L10	1.00
95	L5	0.62
97	L3	0.44
99	L1	0.21
		J.21

The general formula for the life of Del-Tron linear slides is expressed as following:

## Example

### Formula 3

Ln=fr 
$$x \left( \frac{C \times fs \times ft}{Pc \times fw} \right)^m x$$
 (25.4 x 106 mm)

Design considerations lead to the selection of a ball slide. The available space accommodates the Del-Tron SA2-4 slide. Find the life at 95% reliability (L5 life) under the following conditions:

- Peak speed during the cycle:
   V=3810 mm/min
- Working temperature of slide = 66 deg. C.
- Calculated effective load the slide is subjected to: Pc = 9.1 kg
- Type of load: Moderate vibration, no impacts.

#### Solution:

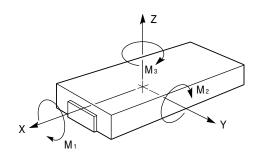
(1) With the formula (1) the speed factor "fs" is found as:

$$fs = \sqrt[3]{\frac{760}{3810}} = 0.58$$

- (2) The value of the temperature factor "ft" is found in Table 1 as: ft = 1.
- (3) Using Table 2, the value of the type of load factor can be estimated as: fw = 1.25.
- (4) The value of reliability factor "fr" is found in Table 3 as: fr = 0.62.
- (5) The value of the load capacity for the Del-Tron SA2-4 slide is found in the Del-Tron Catalog as: C = 27.2 kg
- (6) The required life of the slide can then be calculated using formula (3):

$$L5 = 0.62 \times \left(\frac{27.2 \times .58 \times 1}{9.1 \times 1.25}\right)^3 \times \left(25.4 \times 10^6\right) = 42 \times 10^6 \text{ mm}$$

Need motor/controller for your Posi-Drive? Call us. We can supply the complete package.



A = Distance (mm) from slide centerline to line of acting force.

F = Acting force (kg).

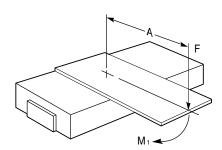
L = Published load capacity (kg).

M1, M2, M3 = Moment load rating (kg - mm).

m1 - m2 - m3 = Acting moment load (kg - mm).

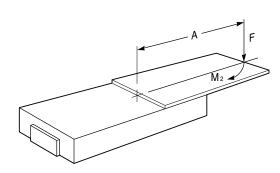
Unit Conversion:

 $(N \cdot m) \times (102) = kg - mm$ 



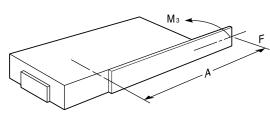
$$m1 = [F \times A]$$

$$\left[ \frac{F}{L} + \frac{m1}{M_1} \right] \le 1$$



$$m2 = [F \times A]$$

$$\left[ \frac{F}{L} + \frac{m2}{M2} \right] \le 1$$



$$m3 = [F \times A]$$

$$\left[\frac{F}{L} + \frac{m3}{M3}\right] \le 1$$

## Ball Slide Assemblies and Anti-Creep Ball Slide Assemblies

Refer to Page 7 and 10

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙ m	MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m
CA5	.01	.01	.02	C-1AC	.124	.216	.227
CA-1	.01	.02	.03	C-2AC	.124	.324	.340
CA-2	.01	.04	.04	C-3AC	.124	.486	.510
CA-3	.01	.05	.06	D-1AC	.51	.96	1.01
DA-1	.06	.11	.11	D-2AC	1.22	4.48	4.70
DA-2	.14	.51	.53	D-3AC D-4AC	1.53 1.79	8.64 13.44	9.07 14.11
DA-3	.17	.98	1.02	D-5AC	2.04	17.92	18.81
DA-4	.20	1.52	1.59	D-6AC	2.30	23.04	24.19
DA-5	.23	2.02	2.13	L 140	4 55	1.00	0.01
DA-6	.26	2.60	2.73	E-1AC E-2AC	1.55 1.94	1.92 4.80	2.01 5.04
EA-1	.18	.22	.23	E-3AC	2.33	8.64	9.07
EA-2	.22	.54	.57	E-4AC	2.72	13.44	14.11
EA-3	.26	.98	1.02	E-5AC E-6AC	3.10 3.49	17.92 23.04	18.81 24.19
EA-4	.31	1.52	1.59	L-0A0	0.40	20.04	24.15
EA-5 EA-6	.35 .39	2.02 2.60	2.13 2.73	M-1AC	2.50	3.33	3.50
EA-0	.39	2.00	2.73	M-2AC M-2.5AC	3.00	8.64	9.07 10.92
MA-1	.28	.38	.40	M-3AC	3.25 3.75	10.40 13.20	13.86
MA-2	.34	.98	1.02	M-4AC	4.50	20.16	21.17
MA-2.5	.37	1.17	1.23				
MA-3	.42	1.49	1.57	N-1AC	3.85	4.50	4.73
MA-4	.51	2.27	2.39	N-2AC	4.62	10.80	11.34
NA-1	.43	.51	.53	N-3AC	5.13	18.00	18.90
NA-2	.52	1.22	1.28	N-4AC N-6AC	6.41 7.70	27.50 45.00	28.88 47.25
NA-3	.58	2.03	2.14	N-8AC	8.98	66.50	69.83
NA-4	.72	3.11	3.26	N-10AC	10.26	92.00	96.60
NA-6	.37	5.08 7.51	5.34	01.140	E	6.00	6.00
NA-8 NA-10	1.01 1.16	10.39	7.89 10.91	S1-1AC S1-2AC	5.56 7.38	6.00 12.00	6.30 12.60
10,110	11.10	10.00	10.01	S1-3AC	9.23	20.00	21.00
SA1-1	.63	.68	.71	S1-3.5AC	11.07	33.00	34.65
SA1-2	.83	1.36	1.42	S1-4AC S1-6AC	12.92 16.61	49.00 81.00	51.45 85.05
SA1-3 SA1-3.5	1.04 1.25	2.26	2.37 3.91	S1-8AC	20.30	121.00	127.05
SA1-3.5	1.46	3.73 5.54	5.81	00.140	0.54	0.00	0.40
SA1-6	1.88	9.15	9.61	S2-1AC S2-1.5AC	8.51 12.76	8.00 18.00	8.40 18.90
SA1-8	2.29	13.67	14.35	S2-2AC	17.86	29.40	30.87
				S2-3AC	22.11	41.60	43.68
SA2-1	.96	.90	.95	S2-4AC S2-6AC	25.52 31.89	84.00 135.00	88.20 141.75
SA2-1.5 SA2-2	1.44 2.02	2.03 3.32	2.14 3.49	S2-8AC	38.27	198.00	207.90
SA2-3	2.50	4.70	4.94	00.410			
SA2-4	2.88	9.49	9.97	S3-1AC S3-1.5AC	21.87 25.52	16.80 16.80	17.64 17.64
SA2-6	3.60	15.25	16.02	S3-2AC	45.20	60.76	63.80
SA2-8	4.32	22.37	23.49	S3-3AC	64.15	110.88	116.42
SA3-1	2.47	1.90	1.99	S3-4AC S3-5AC	86.02 98.42	181.72 283.50	190.81 297.68
SA3-1.5	2.47	1.90	1.99	S3-5AC S3-6AC	109.35	283.50 357.00	374.85
SA3-2	5.11	6.86	7.21	S3-9AC	134.87	543.90	571.10
SA3-3	7.25	12.53	13.15	S3-12AC	149.45	717.50	753.38
SA3-4	9.72	20.53	21.56				
SA3-5 SA3-6	11.12 12.35	32.03 40.34	33.63 42.35				
SA3-9	15.24	61.45	64.53				
SA3-12	16.89	81.07	85.12				

## **Crossed Roller Slide Assemblies**

Refer to Page 16

MODEL	M1	M2	М3	MODEL	M1	M2	М3
#	N∙m	N⋅m	N⋅m	#	N∙m	N∙m	N⋅m
RDA-1	0.43	0.81	.85	RSA1-1	5.50	6.68	7.02
RDA-2	0.71	2.66	2.79	RSA1-2	6.29	9.55	10.03
RDA-3	0.95	4.92	5.17	RSA1-3	7.34	15.59	16.37
RDA-4	1.01	7.59	7.97	RSA1-3.5	8.76	26.10	27.40
RDA-5	1.15	10.12	10.63	RSA1-4	12.84	46.77	49.11
RDA-6	1.30	13.02	13.67	RSA1-6	15.01	73.21	76.87
				RSA1-8	17.20	102.53	107.66
REA-1	1.05	1.30	1.37				
REA-2	1.53	3.80	3.99	RSA2-1	6.34	6.68	7.02
REA-3	2.06	7.05	7.36	RSA2-1.5	7.21	10.17	10.68
REA-4	2.15	10.63	11.16	RSA2-2	8.46	13.36	14.03
REA-5	2.28	13.16	13.81	RSA2-3	8.46	15.59	16.29
REA-6	2.37	15.62	16.40	RSA2-4	14.80	46.77	49.11
				RSA2-6	18.02	76.26	80.05
RMA-1	1.98	2.63	2.77	RSA2-8	21.62	111.85	117.45
RMA-2	2.20	6.35	6.66				
RMA-2.5	2.20	7.05	7.40	RSA3-1	18.53	14.24	14.95
RMA-3	2.33	8.20	8.61	RSA3-1.5	21.54	17.90	18.79
RMA-4	2.54	11.39	11.96	RSA3-2	28.72	35.79	37.58
				RSA3-3	35.91	59.66	62.64
RNA-1	3.18	3.71	3.55	RSA3-4	35.91	74.57	78.30
RNA-2	3.83	8.35	8.77	RSA3-5	38.92	112.11	117.72
RNA-3	5.68	17.36	18.23	RSA3-6	57.45	167.04	175.39
RNA-4	6.96	27.33	28.70	RSA3-9	60.95	245.81	258.10
RNA-6	8.26	48.30	50.72	RSA3-12	64.17	308.05	323.46
RNA-8	8.62	63.86	67.06				
RNA-10	9.27	83.16	87.31				

## **Precision Series Ball Slides**

Refer to Page 19

MODEL #	<b>M1</b> N·m	<b>M2</b> N∙m	<b>M3</b> N∙m
MA-2SS	.34	.98	1.02
MA-3SS	.60	2.03	2.67
MA-4SS	.78	3.19	3.69
SA2-1SS	.96	.90	.95
SA2-1.5SS	1.44	2.03	2.14
SA2-2SS	2.02	3.32	3.49
SA2-3SS	2.50	4.70	4.94
SA2-4SS	2.88	9.49	9.97
SA3-1SS	2.47	1.90	1.99
SA3-2SS	5.11	6.86	7.21
SA3-3SS	7.25	12.53	13.15
SA3-4SS	9.72	20.53	21.56
SA3-5SS	11.12	32.03	33.63
SA3-6SS	12.35	40.34	42.35
SA5-3SS	8.33	14.41	15.13
SA5-5SS	16.42	60.95	61.84
SA5-7SS	17.78	70.95	74.47

## Precision Series Crossed Roller Slides

MODEL	<b>M1</b>	<b>M2</b>	<b>M3</b>
#	N∙m	N∙m	N∙m
RSA2-1SS	4.44	4.68	4.91
RSA2-2SS	5.92	9.35	9.82
RSA2-3SS	6.91	10.91	11.40
RSA2-4SS	7.66	12.11	12.66
RSA3-1SS	18.10	15.03	15.79
RSA3-2SS	24.13	30.07	31.57
RSA3-3SS	30.16	50.11	52.62
RSA3-4SS	35.91	62.64	65.77
RSA3-5SS	41.30	72.03	75.64
RSA5-3SS	19.30	72.21	73.75
RSA5-5SS	21.21	79.36	81.05
RSA5-7SS	23.00	92.75	97.39

## High Precision Ball Slides

Refer to Page 22

MODEL	<b>M1</b>	<b>M2</b>	<b>M3</b>
#	N∙m	N∙m	N∙m
HPMA-1	.28	.38	.40
HPMA-2	.40	1.03	1.08
HPMA-2.5	.55	1.76	1.85
HPMA-3	.74	2.61	3.72
HPSA2-1	.96	.90	.95
HPSA2-1.5	1.44	2.03	2.14
HPSA2-2	2.02	3.32	3.49
HPSA2-3	2.50	4.70	4.94
HPSA3-1	4.56	3.76	3.98
HPSA3-2	6.92	9.30	9.77
HPSA3-3	8.40	14.52	15.25
HPSA3-4	10.87	22.97	24.12
HPSA3-5	11.94	34.40	36.12
HPSA4-2	11.12	32.03	33.63
HPSA4-3	12.35	40.34	42.35
HPSA4-5	14.05	52.58	53.70
HPSA4-6.5	15.24	61.45	64.53
HPSA4-9	16.89	81.07	85.12
HPSA5-5	16.16	60.46	61.75
HPSA5-7	17.52	70.67	74.21
HPSA5-10	19.42	93.23	97.89

NOTE: Ratings for FB (Flanged Base) type are the same.

## High Precision Crossed Roller Slides

Refer to Page 22

MODEL	<b>M1</b>	<b>M2</b>	<b>M3</b>
#	N∙m	N∙m	N·m
HPRSA2-1	5.04	5.31	5.58
HPRSA2-1.5	5.61	8.29	8.58
HPRSA2-2	6.73	10.63	11.16
HPRSA2-3	7.85	12.40	12.96
HPRSA3-1	17.88	14.85	15.60
HPRSA3-2	20.39	25.41	26.68
HPRSA3-3	28.37	47.13	49.49
HPRSA3-4	37.62	65.62	68.90
HPRSA3-5	43.27	75.46	79.24
HPRSA4-2	19.46	56.06	58.86
HPRSA4-3	21.62	70.59	74.12
HPRSA4-5	24.59	92.01	93.97
HPRSA4-6.5	26.67	107.54	112.92
HPRSA4-9	29.55	141.87	148.96
HPRSA5-5	28.27	105.81	108.06
HPRSA5-7	30.67	123.67	129.86
HPRSA5-10	33.98	163.15	171.31

NOTE: Ratings for FB (Flanged Base) type are the same.

## **Posi-Drive Stages**

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m	MODEL #	<b>M1</b> N·m	<b>M2</b> N∙m	<b>M3</b> N∙m
LSA1-25	.63	.68	.71	LRSA1-25	5.50	6.68	7.02
LSA1-50	.83	1.36	1.42	LRSA1-50	6.29	9.55	10.03
LSA1-75	1.04	2.26	2.37	LRSA1-75	7.34	15.59	16.37
LSA1-100	1.46	5.54	5.81	LRSA1-100	12.84	46.77	49.11
LSA2-25	.96	.90	.95	LRSA2-25	6.34	6.68	7.02
LSA2-38	1.44	2.03	2.14	LRSA2-38	7.06	10.42	11.12
LSA2-50	2.02	3.32	3.49	LRSA2-50	8.46	13.36	14.03
LSA2-75	2.50	4.70	4.94	LRSA2-75	9.86	15.59	16.29
LSA2-100	2.88	9.49	9.97	LRSA2-100	14.80	46.77	49.11
LSA3-25	2.47	1.90	1.99	LRSA3-25	21.54	17.90	18.79
LSA3-50	5.11	6.86	7.21	LRSA3-50	28.72	35.79	37.58
LSA3-75	7.25	12.53	13.15	LRSA3-75	35.91	59.66	62.64
LSA3-100	9.72	20.53	21.56	LRSA3-100	42.75	74.57	78.30
LSA3-150	12.35	40.34	42.35	LRSA3-150	57.45	167.04	175.39
LSA3-200	13.84	49.94	53.92	LRSA3-200	64.35	206.81	223.29
LSA3-250	16.03	71.14	75.16	LRSA3-250	74.54	294.61	311.25
LSA3-300	16.89	81.07	85.12	LRSA3-300	78.78	324.41	352.70

## **Ball Slide Positioning Stages & Side Drive Stages**

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MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m	MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m
99MM	.11	.11	.11	502MM	2.02	2.02	2.02
101MM	.19	.18	.18	701MM	4.94	4.94	4.94
201MM	.28	.27	.27	702MM	4.94	4.94	4.94
301MM	.50	.50	.50				
				1201MM	2.05	1.95	1.95
450MM	.96	.96	.96	1203MM	2.05	1.95	1.95
451MM	.96	.96	.96	2201MM	3.21	3.04	3.04
453MM	.96	.96	.96	2202MM	3.21	3.04	3.04
750MM	4.94	4.94	4.94	2203MM	3.21	3.04	3.04
751MM	4.94	4.94	4.94	2204MM	3.21	3.04	3.04
753MM	4.94	4.94	4.94	3201MM	4.25	4.05	4.05
				3202MM	4.25	4.05	4.05
301PMM	.50	.68	.71	3203MM	4.25	4.05	4.05
451PMM	.96	1.13	1.19	3204MM	4.25	4.05	4.05
452PMM	.96	1.13	1.19				
751PMM	4.94	5.75	6.04	1202PMM	2.89	1.95	2.05
752PMM	4.94	5.75	6.04	1204PMM	2.89	1.95	2.05
				2205PMM	4.80	3.04	3.21
401MM	.96	.96	.96	2206PMM	4.80	3.04	3.21
501MM	2.02	2.02	2.02	3205PMM	4.80	3.04	3.21
				3206PMM	7.11	4.05	4.25

## **Crossed Roller Positioning Stages & Side Drive Stages**

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N·m	MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙ m	<b>M3</b> N∙m
R101MM	1.09	1.04	1.04	R701MM	13.18	13.18	13.18
R201MM	1.64	1.56	1.56	R702MM	13.18	13.18	13.18
R301MM	2.88	2.88	2.88				
				R1201MM	5.81	5.53	5.53
R450MM	1.92	1.92	1.92	R1203MM	5.81	5.53	5.53
R451MM	1.92	1.92	1.92	R2201MM	9.10	8.60	8.60
R453MM	1.92	1.92	1.92	R2202MM	9.10	8.60	8.60
R750MM	9.88	9.88	9.88	R2203MM	9.10	8.60	8.60
R751MM	9.88	9.88	9.88	R2204MM	9.10	8.60	8.60
R753MM	9.88	9.88	9.88	R3201MM	12.05	11.47	11.47
				R3202MM	12.05	11.47	11.47
R301PMM	1.67	2.26	2.37	R3203MM	12.05	11.47	11.47
R451PMM	1.92	2.26	2.37	R3204MM	12.05	11.47	11.47
R452PMM	1.92	2.26	2.37				
R751PMM	9.88	11.50	12.07	R1202PMM	8.19	5.53	5.81
R752PMM	9.88	11.50	12.07	R1204PMM	8.19	5.53	5.81
				R2205PMM	13.60	8.60	9.10
R401MM	1.92	1.92	1.92	R2206PMM	13.60	8.60	9.10
R501MM	3.84	3.84	3.84	R3205PMM	13.60	8.60	9.10
R502MM	3.84	3.84	3.84	R3206PMM	20.15	11.47	12.05

## Low Profile Crossed Roller Slide Tables

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MODEL	<b>M1</b>	<b>M2</b>	<b>M3</b>	MODEL	<b>M1</b>	<b>M2</b>	<b>M3</b>
#	N∙m	N∙ m	N∙m	#	N∙m	N∙m	N· m
LPTA-1025 LPTA-1035 LPTA-1045 LPTA-1055 LPTA-1065 LPTA-1075 LPTA-1085 LPTA-2035 LPTA-2035 LPTA-2050 LPTA-2065 LPTA-2080	.80 1.04 1.51 1.74 1.94 2.27 2.55 2.35 3.71 4.41 5.58	1.29 2.59 4.55 5.36 8.16 11.58 13.93 3.06 6.49 9.92 15.35	1.33 2.71 4.79 5.63 8.33 12.17 14.63 3.21 6.80 10.42 16.12	LPTA-2095 LPTA-2110 LPTA-2125 LPTA-3055 LPTA-3080 LPTA-3105 LPTA-3130 LPTA-3155 LPTA-3180 LPTA-3205	6.17 7.05 7.64 9.87 14.42 17.24 21.55 24.29 27.82 29.46	20.05 26.45 32.47 14.81 31.09 48.56 74.75 100.22 135.58 157.61	21.06 27.77 34.10 15.55 32.64 50.91 78.49 105.19 142.36 165.52

## **Crossed Roller Rail Sets**

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m	MODEL #	<b>M1</b> N∙ m	<b>M2</b> N∙m	<b>M3</b> N∙m
NB1-020	0	1.10	1.15	NB3-200	0	156.18	163.99
NB1-030	0	2.17	2.27	NB3-225	0	191.11	200.67
NB1-040	0	4.15	4.36	NB3-250	0	243.20	255.36
NB1-050	0	6.90	7.24	NB3-275	0	286.35	300.66
NB1-060	0	10.34	10.85	NB3-300	0	349.36	366.83
NB1-070	0	14.56	15.29	NB3-325	0	400.73	420.77
NB1-080	0	18.01	18.90	NB3-350	0	474.74	498.48
NB2-030	0	2.46	2.59	NB4-080	0	27.95	29.35
NB2-045	0	6.17	6.47	NB4-120	0	68.05	71.45
NB2-060	0	11.60	12.19	NB4-160	0	126.23	132.54
NB2-075	0	16.13	16.94	NB4-200	0	200.81	210.85
NB2-090	0	24.40	25.62	NB4-240	0	297.13	311.98
NB2-105	0	30.79	32.32	NB4-280	0	406.91	427.26
NB2-120	0	41.89	44.00	NB4-320	0	533.90	560.60
NB2-135	0	50.14	52.65	NB4-360	0	678.17	712.08
NB2-150	0	64.08	67.28	NB4-400	0	839.62	881.61
NB2-165	0	79.87	83.86	NB4-440	0	1026.77	1078.10
NB2-180	0	97.62	102.50	NB4-480	0	1223.50	1284.67
NB3-050	0	9.86	10.36	NB6-100	0	90.82	95.36
NB3-075	0	19.96	20.96	NB6-150	0	202.02	212.12
NB3-100	0	38.91	40.86	NB6-200	0	350.75	368.29
NB3-125	0	57.23	60.09	NB6-250	0	548.04	575.44
NB3-150	0	87.16	91.51	NB6-300	0	779.78	818.77
NB3-175	0	115.09	120.84	NB6-350	0	1063.19	1116.35
				NB6-400	0	1390.38	1459.90

## Anti-Creep Crossed Roller Rail Sets

Refer to Page 69

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙ m	MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N· m
NB2-030-AC	0	2.46	2.59	NB3-200-AC	0	156.18	163.99
NB2-045-AC	0	6.17	6.47	NB3-225-AC	0	191.11	200.67
NB2-060-AC	0	11.60	12.19				
NB2-075-AC	0	16.13	16.94	NB4-080-AC	0	27.95	29.35
NB2-090-AC	0	24.40	25.62	NB4-120-AC	0	68.05	71.45
NB2-105-AC	0	30.79	32.32	NB4-160-AC	0	126.23	132.54
NB2-120-AC	0	41.89	44.00	NB4-200-AC	0	200.81	210.85
NB2-135-AC	0	50.14	52.65	NB4-240-AC	0	297.13	311.98
NB2-150-AC	0	64.08	67.28	NB4-280-AC	0	406.91	427.26
NB2-165-AC	0	79.87	83.86				
NB2-180-AC	0	97.62	102.50	NB6-100-AC	0	90.82	95.36
				NB6-150-AC	0	202.02	212.12
NB3-050-AC	0	9.86	10.36	NB6-200-AC	0	350.75	368.29
NB3-075-AC	0	19.96	20.96	NB6-250-AC	0	548.04	575.44
NB3-100-AC	0	38.91	40.86	NB6-300-AC	0	779.78	818.77
NB3-125-AC	0	57.23	60.09	NB6-350-AC	0	1063.19	1116.35
NB3-150-AC	0	87.16	91.51	NB6-400-AC	0	1390.38	1459.90
NB3-175-AC	0	115.09	120.84				

## **Crossed Roller Slide Tables** (Aluminum)

	·m N·m N·m
NBT-1065AM         SS         2.98         9.32         9.78         NBT-3105A-60M         SS         18           NBT-1080AM         SS         3.80         14.09         14.79         NBT-3130A-75M         SS         20           NBT-1095AM         SS         4.24         18.24         19.14         NBT-3155AM         SS         24           NBT-1125AM         SS         5.17         30.61         32.14         NBT-3155A-90M         SS         24           NBT-2035A-18M         SS         2.60         4.78         5.02         NBT-3180AM         SS         30           NBT-2050AM         SS         3.47         6.37         6.69         NBT-3180A-105M         SS         30           NBT-2050A-30M         SS         3.47         6.37         6.69         NBT-3205AM         SS         32           NBT-2065A-40M         SS         4.11         9.32         9.78         NBT-3230A-155M         SS         35           NBT-2080A-50M         SS         5.23         14.09         14.79         NBT-3255A-180M         SS         38           NBT-2095A-60M         SS         5.84         18.24         19.14         NBT-3085A-230M         SS         34	

## Anti-Creep Crossed Roller Slide Tables (Aluminum)

Refer to Page 75

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙ m	MODEL #	<b>M1</b> N·m	<b>M2</b> N∙m	<b>M3</b> N∙m
NBT-1050AM NBT-1065AM NBT-1080AM NBT-1095AM NBT-1125AM	2.51 2.98 3.80 4.24 5.17	6.37 9.32 14.09 18.24 30.61	6.69 9.78 14.79 19.14 32.14	NBT-3105AM NBT-3130A-75M NBT-3155AM NBT-3155A-90M NBT-3180AM NBT-3205AM	18.94 20.83 24.70 24.70 30.54 32.28	47.87 52.66 99.21 99.21 125.30 145.03	50.27 55.29 104.17 104.17 131.56 152.27
NBT-2035A-18M NBT-2050AM	2.60 3.47	4.78 6.37	5.02 6.69	NBT-3230A-155M	35.51	159.53	167.50
NBT-2065AM NBT-2080AM NBT-2095AM NBT-2110A-70M NBT-2125AM NBT-2155A-100M	4.11 5.23 5.84 6.64 7.14 10.71	9.32 14.09 18.24 24.36 30.61 45.92	9.78 14.79 19.14 25.62 32.14 48.22	NBT-4085AM NBT-4125AM NBT-4165AM NBT-4205AM NBT-4245AM	34.44 48.05 57.90 69.67 81.36	45.59 92.76 160.80 219.04 305.16	47.87 97.40 168.83 229.99 320.42
NBT-2185A-120M NBT-3055AM NBT-3080A-45M	12.86 10.81 12.97	55.09 14.52 17.42	57.86 15.25 18.30	NBT-6110AM NBT-6160AM NBT-6260AM NBT-6360AM	55.53 95.73 144.24 183.18	78.82 206.38 523.53 888.04	82.75 216.70 549.70 932.44

## Crossed Roller Slide Tables (Steel)

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m	MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m
NBT-1025	.68	.88	.93	NBT-3105	27.12	64.59	67.82
NBT-1035	.92	1.62	1.69	NBT-3130	33.90	99.56	104.54
NBT-1045	1.15	2.54	2.68	NBT-3155	38.21	133.48	140.15
NBT-1055	1.49	3.95	4.15	NBT-3180	43.76	177.18	186.05
NBT-1065	1.83	5.60	5.89	NBT-3205	46.22	205.52	215.80
NBT-1075	2.07	7.38	7.75	NBT-3230	51.77	250.72	263.25
NBT-1085	2.30	9.39	9.86	NBT-3255	55.46	290.66	305.19
				NBT-3280	60.40	340.28	357.30
NBT-2035	3.17	4.07	4.27	NBT-3305	64.10	386.86	406.20
NBT-2050	4.94	8.53	8.96				
NBT-2065	5.94	13.21	13.87	NBT-4085	49.33	65.75	69.03
NBT-2080	7.54	20.45	21.48	NBT-4125	68.71	133.57	140.25
NBT-2095	8.33	26.72	28.05	NBT-4165	82.80	206.97	217.31
NBT-2110	9.51	35.23	36.99	NBT-4205	99.54	309.65	325.13
NBT-2125	10.30	43.25	45.41	NBT-4245	116.27	432.78	454.41
NBT-2140	11.50	53.93	56.62	NBT-4285	131.24	561.36	589.43
NBT-2155	12.29	63.70	66.89	NBT-4325	146.22	715.15	750.91
NBT-2170	13.48	76.52	80.35				
NBT-2185	14.27	88.07	92.48	NBT-6110	79.33	125.28	131.54
				NBT-6160	136.84	303.92	319.11
NBT-3055	15.52	19.72	20.70	NBT-6210	172.54	493.83	518.53
NBT-3080	22.69	41.44	43.51	NBT-6260	206.25	723.00	759.14
				NBT-6310	237.98	985.87	1035.17

## Recirculating Ball Slide Guides

MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m	MODEL #	<b>M1</b> N∙m	<b>M2</b> N∙m	<b>M3</b> N∙m
BSGS5 BSGS5UU	1.90	1.20	1.50	BSGS9W BSGS9WUU	15.69	10.79	12.76
BSGS8 BSGS8UU	5.20	4.12	4.90	BSG12W BSG12WUU BSGS12W	30.40	13.73	16.68
BSG10 BSG10UU	11.77	6.87	7.85	BSGS12WUU			
BSGS10UU BSGS10UU				BSG14W BSG14WUU BSGS14W	51.98	37.27	21.57
BSG13 BSG13UU	18.63	8.82	10.79	BSGS14WUU			
BSGS13 BSGS13UU				BSG16W BSG16WUU BSGS16W	148.11	40.21	48.06
BSG16 BSG16UU BSGS16 BSGS16UU	40.21	21.57	25.50	BSGS16UU			
BSG25 BSG25UU BSGS25 BSGS25UU	98.09	51.00	60.82				

#### PRICE AND ENGINEERING CHANGES:

Prices, specifications, and engineering information are subject to change without notice. All prices, dimensions, and engineering information in previous catalogs, bulletins, and price lists are superseded.

#### **TERMS OF SALE:**

All prices are FOB our factory, Bethel, CT. Terms are net 30 days. Purchase orders are accepted subject only to the conditions and warranty on this page despite conditions or statements to the contrary contained in any purchase order. Risk of loss and title is with purchaser upon delivery to carrier.

Load ratings listed are based on symmetrical loading, theoretical data, and standard definitions of the bearing industry. Maximum load ratings and all other information in this catalog are suggested only, and cannot be guaranteed or warranted by Del-Tron Precision, Inc.. Suitability of the products for the intended use shall be solely determined by the user, and the user shall assume all risk and liability therewith.

#### **DELIVERY:**

Shipping dates, not delivery dates are acknowledged because we have no control over the performance of the carrier. Any extension of delivery dates beyond those specified in the original order must be approved by Del-Tron Precision, Inc.

#### **DELAY:**

Del-Tron Precision, Inc. shall not be held responsible for any delay or failure to manufacture or make delivery of all or any part of the material ordered due to strikes or other labor disputes or labor troubles, fires, floods, droughts, accidents, insurrections, breakdowns of machinery or manufacturing plant, lack of or inability to obtain raw materials, labor, power or supplies. Federal, State, County or Municipal laws, acts, rules or regulations or any other causes, contingencies or circumstances within or without the United States not subject to the control of Del-Tron Precision, Inc. which prevent or hinder the manufacture or delivery of the material ordered.

#### **QUANTITY REDUCTION/CANCELLATION**

No returns if shipment is completed. Charges will be 100% P.O. Value. If order is complete (in-house), charges will be 100% P.O. Value less shipping charges. If order is incomplete (in-house), charges will be based on Actuals: Engineering time spent, Production labor utilized, Material ordered (if special), Material used (if standard), and a 25% Administrative charge over calculated costs.

#### **RESTOCKING CHARGE:**

A 15% re-stocking charge based on value being returned, and the customer will be responsible to pay the new adjusted quantity price.

#### **ORDER HOLDS (INITIATED BY CUSTOMER):**

Time delays in shipments will require new delivery schedules to be generated, and additional set-up charges or administrative charges will be passed on to the customer.

## WARRANTY, EXCLUSIVE REMEDIES & LIMITS OF LIABILITY:

Del-Tron Precision, Inc.'s ("Del-Tron") sole warranty for products is to repair and replace at no charge, products which are defective in workmanship or materials. provided written notice of such defect is supplied to Del-Tron within the warranty period and product is returned to factory without tampering or misuse. No material may be returned under warranty without prior written authorization from Del-Tron. Del-Tron shall prepay the return to purchaser of such authorized products. The warranty period is thirty (30) days after acceptance of the products. Product is deemed accepted when received by purchaser unless Del-Tron is notified in writing within thirty (30) days setting forth in detail how product does not conform to its material specifications. Del-Tron will notify purchaser when such non conformities are corrected. If, by written notice received by Del-Tron within five (5) days following Del-Tron's notification, you identify remaining non-conformities, Del-Tron will correct such non conformities. When such non-conformities are corrected, the product shall be deemed accepted. Del-Tron's liability for its product is limited to such replacement and Del-Tron shall have no liability for products mishandled or misapplied by buyer or its customers.

# THE WARRANTIES SET FORTH HEREIN REPLACE ALL OTHER WARRANTIES, EXPRESS, STATUTORY OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In all instances in which damages are sought from Del-Tron regardless of the legal theory upon which the claim is based, Del-Tron shall only be liable for (1) a bodily injury (including death) and (2) damage to real property and tangible personal property for which Del-Tron is legally liable and the amount of any other actual loss or damage arising from Del-Tron's performance or nonperformance pursuant to any Purchase up to the purchase price of the product that caused any damage. Under no circumstances will Del-Tron be liable for losses or damages resulting from third party claims against you or damages by you based upon third party claims (other than those specified in (1) and (2) above or your economic consequential damages (including loss, profits or savings)), incidental damages or punitive damages even though Del-Tron knew of their possibility.

This section sets forth a maximum collective responsibility of Del-Tron, its suppliers, subcontractors and agents, and all sets of parties are intended beneficiaries of this section. The warranty and exclusive remedy and liability limit is governed by the laws of the State of Connecticut and can not be modified or varied except in a writing signed by the purchaser and Del-Tron.









"Simple — Smooth — Straight line design"

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