

SLS RODLESS SCREW DRIVE ACTUATOR

○ENDURANCE TECHNOLOGY



SOLUTION STATES OF THE STATES

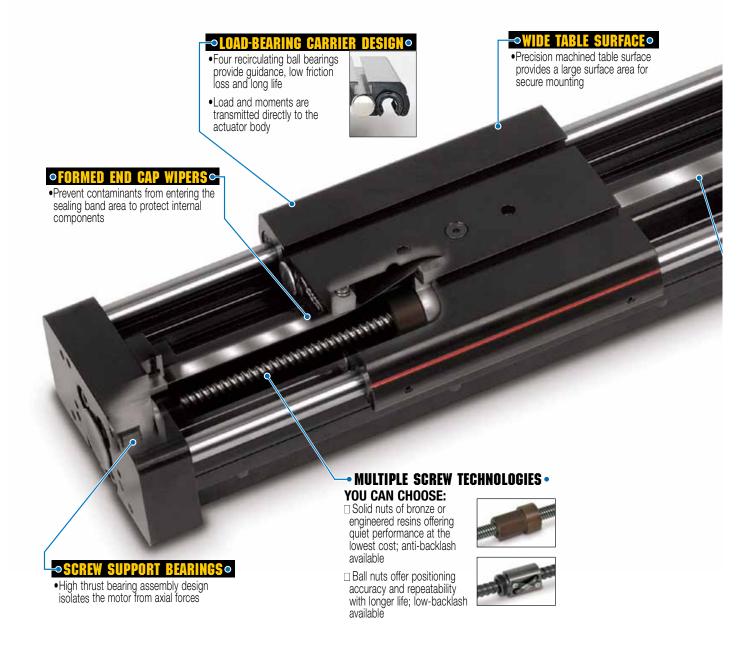
Toll Free Phone (877) SERV098
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www.electromate.com
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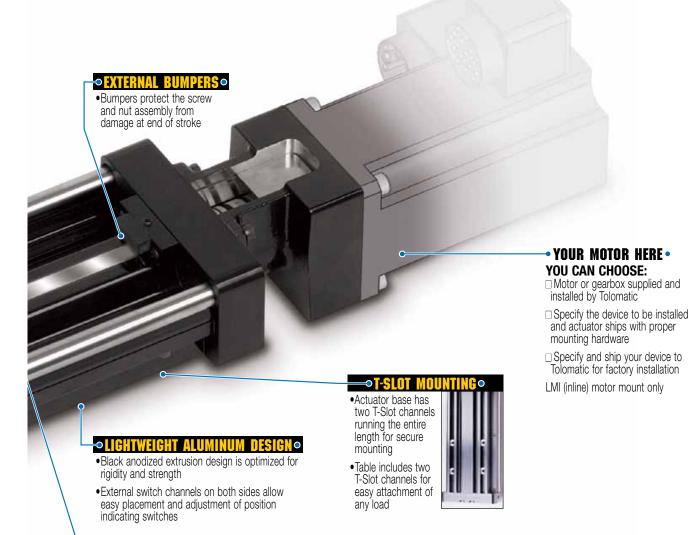
Look for this endurance technology symbol indicating our durability design features

This rodless style actuator is designed for carrying light to moderate loads on a wide, rigid base. Based upon our LS pneumatic linear slide, it utilizes a guidance system consisting of two linear guide rods with recirculating ball bearings for stable, smooth and low friction operation. Built-to-order in stroke lengths up to 120 inches with multiple screw options available.



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TOLOMATIC...LINEAR SOLUTIONS MADE EASY



⇒STAINLESS STEEL SEALING BAND⊙

- •Prevents contaminants from entering the screw and nut area for prolonged life
- Fatigue resistant stainless steel bands are specifically made to offer long life and will not elongate



OPTIONS



CARRIER OPTIONS

□ AUXILIARY CARRIER Doubles the load capacity and increases bending moments capacity significantly

■ METRIC OPTION

Provides metric tapped holes for mounting of load to carrier and of actuator

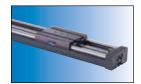


SWITCHES

Styles include: reed, hall-effect or triac. Select either 15ft potted cable with flying leads or 6in to quick-disconnect coupler with mating 15ft cable

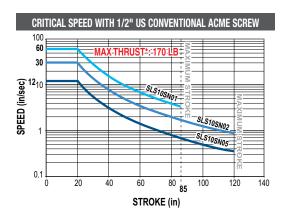


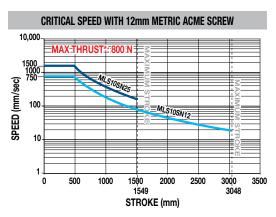
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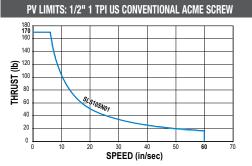


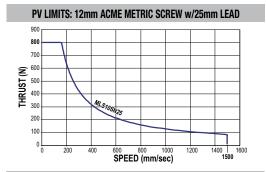
ACME SCREW SPECIFICATIONS

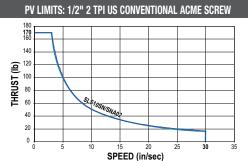
SLS/MLS10 ACME SCREW CRITICAL SPEED AND PV LIMITS

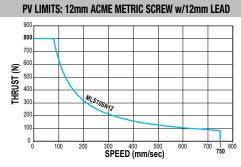


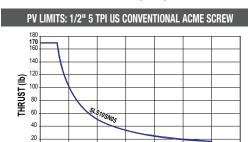












SPEED (in/sec)

SN = Solid Nut SNA = Solid Anti-backlash Nut

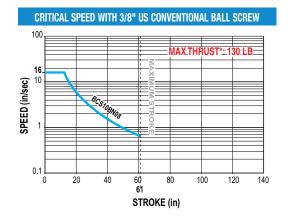
* Maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.

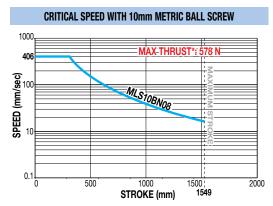
PV LIMITS: Any material which carries a sliding load is limited by heat buildup. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch and the surface velocity in feet per minute. The product of these factors provides a measure of the severity of an application.

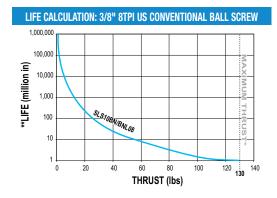
$$\begin{array}{ccc} P & x & V & \leq 0.1 \\ \left(\frac{Thrust}{(Max. \ Thrust \ Rating)}\right) x & \left(\frac{Speed}{(Max. \ Speed \ Rating)}\right) & \leq 0.1 \end{array}$$

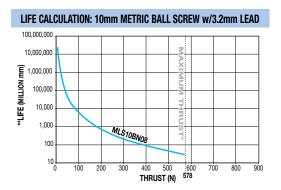
BALL SCREW SPECIFICATIONS

SLS/MLS10 BALL SCREW SPECIFICATIONS









BN = Ball Nut



* Maximum thrust reflects 90% reliability for 1 million linear inches of travel.

**Life indicates theoretical maximum life of screw only, under ideal conditions and does not indicate expected life of actuator.

SPECIFICATIONS

SPECIFICATIONS RELATED TO ACTUATOR SIZE AND SCREW SELECTION

					US CON	IVENTIONAL	LEAD SCRE	WS		
ACTUATOR	SCREW	SCREW	TPI	LEAD	BACKLASH	MAXIMUM	MAXIMUM	INERTIA	A (lb-in²)	BREAKAWAY
SERIES	DIA.	TYPE	(turns/	ACCURACY	DAGILLAGII	THRUST*	STROKE	BASE ACTUATOR	PER/in	TORQUE
OLINEO	(in)		in)	(in/ft)	(in)	(lb)	(in)	In Line	OF STROKE	(lb-in)
	0.375	BN	08	0.004	0.015	130	61	0.0054	0.0005	1.063
	0.375	BNL	08	0.004	0.002	130	61	0.0054	0.0005	1.063
SLS10	0.500	SN	01	0.006	0.007	170	85	0.0554	0.0017	1.875
02010	0.500	SN	02	0.005	0.007	170	120	0.0262	0.0017	1.438
	0.500	SNA	02	0.005	0.003	170	120	0.0262	0.0017	1.438
	0.500	SN	05	0.006	0.007	170	120	0.0180	0.0017	1.250

					M	ETRIC LEAI	SCREWS			
ACTUATOR	SCREW	SCREW	LEAD	LEAD	BACKLASH	MAXIMUM	MAXIMUM	INERTIA (k	g-m² x 10 ⁻⁶)	BREAKAWAY
SERIES	DIA.	TYPE	(mm/	ACCURACY	DAUKLASII	THRUST	STROKE	BASE ACTUATOR	PER/mm	TORQUE
JENILO	(mm)	1117	turn)	(mm/300)	(mm)	(N)	(mm)	In Line	OF STROKE	(N-m)
	10	BN	3.2	0.13	0.38	578	1549	37.50	3.47	0.12
MLS10	10	BNL	3.2	0.13	0.05	578	1549	37.50	3.47	0.12
INILO 10	12	SN	12	0.13	0.18	800	3048	6.49	0.41	0.17
	12	SN	25	0.13	0.18	800	1626	15.01	0.41	0.17

SCREW CODE DESCRIPTION SN Solid Nut

SNA Anti-backlash Solid Nut

BN Ball Nut

BNL Low-Backlash Ball Nut



Contact Tolomatic for higher accuracy and lower backlash options.

* For Acme screws, maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation. For ball screws, maximum thrust reflects 90% reliability for 1 million linear inches of travel.

GENERAL ACTUATOR SPECIFICATIONS

		SLS US CONVENTI	ONAL ACTUATORS		
ACTUATOR SERIES	CARRIER Weight (Ib)	BASE WEIGHT (lb) (Including Carrier)	WEIGHT PER/IN Of Stroke (Ib)	TEMPERATURE Range* (f^)	IP RATING*
SLS10	1.54	6.05	0.404	40 - 130	44

		MLS METRIC	ACTUATORS		
ACTUATOR SERIES	CARRIER Weight (kg)	BASE WEIGHT (kg) (Including Carrier)	WEIGHT PER/mm OF STROKE (g)	TEMPERATURE Range* (C°)	IP RATING**
MLS10	0.69	2.74	7.23	4 - 54	44

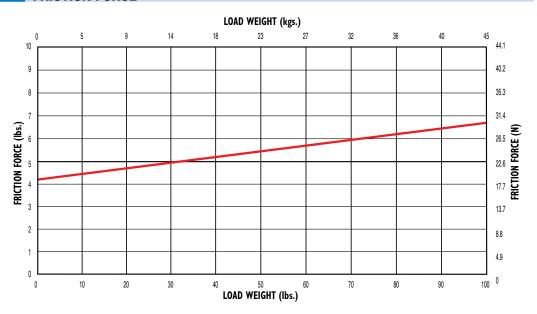


- * Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time. For applications that require operation outside of the recommended temperature range, contact Tolomatic.
- ** Protected against ingress of solid particles greater than .039 in (1mm) and splashing water.

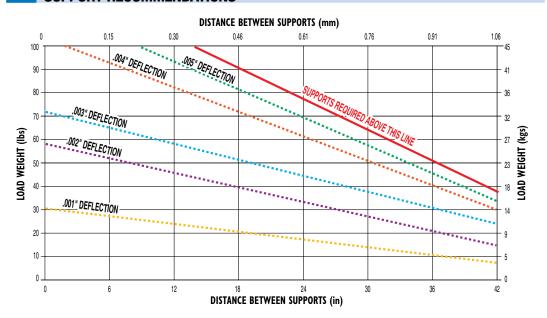
LARGE FRAME MOTORS AND SMALLER SIZE ACTUATORS: Cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

SPECIFICATIONS





SUPPORT RECOMMENDATIONS



SPECIFICATIONS

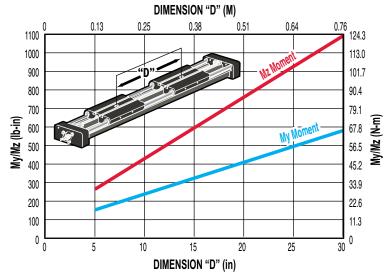
DYNAMIC BENDING MOMENTS AND LOADS

	MAXIMUM BENDING MOME	NTS AND LOADS	US CONVENTIONAL	METRIC
STANDARD CARRIER			SLS10	MLS10
Fz 1	Mx Moment (Roll)	(lb-in : N-m)	80	9.0
Mz	My Moment (Pitch)	(lb-in : N-m)	80	9.0
Mx	Mz Moment (Yaw)	(lb-in : N-m)	125	14.1
	Fz Load (Lateral)	(lb : N)	100	445
AUXILIARY CARRIER: Increases rigidity, lo	pad-carrying capacity and mo	ments	SLS10	MLS10
Fz T THAT MZ	Mx Moment (Roll)	*(lb-in : N-m)	160	18.1
NIZ NIZ	My Moment (Pitch)	*(lb-in : N-m)	178	20.1
Mx "D"	Mz Moment (Yaw)	*(lb-in : N-m)	278	31.3
	Fz Load (Lateral)	(lb : N)	200	890
	Minimum Dimension 'D'	(in : mm)	5.5	169.7

Breakaway torque will increase when using the Auxiliary carrier option. When ordering, determine your working stroke and enter this value into the configuration string. Overall actuator length will automatically be calculated.

Loads shown in table are at minimum "D" dimension, for ratings with longer "D" dimension see graph below*

AUXILIARY CARRIER: BENDING MOMENT AT 'D' DISTANCE



Rates shown on charts were calculated with these assumptions:

- 1.) Coupling between carriers is rigid.
- 2.) Load is equally distributed between carriers.

- 3.) Coupling device applies no misalignment loads to carriers.
- * Customer must specify Dimension "D" (Distance between carrier center lines) in configuration string.



SPECIFICATIONS

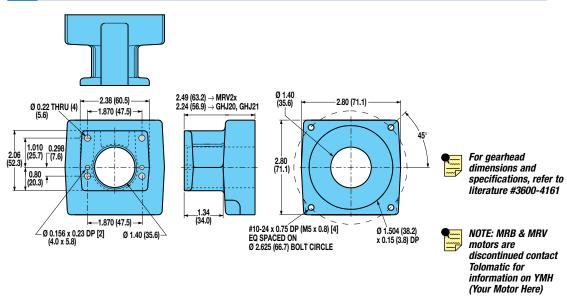
LOAD DEFLECTION Y-AXIS DEFLECTION X-AXIS DEFLECTION Figures calculated with the following considerations: Figures calculated with the following considerations: 1.) Tube supports spaced at minimum distances for each bore size 1.) Tube supports spaced at minimum distances for each bore size 2.) Measurement distance from F to center of carrier is 6 inches 2.) Measurement distance from F to center of carrier is 8 inches MEASUREMENT DISTANCE: 6" MEASUREMENT DISTANCE: 8" F DEF DEF. Mx (N-m) My (N-m) 11.3 9.0 0.0039 0.0381 0.0035 IN 'Y' AXIS (in.) 0.0030 0.0762 0.0762 DEFLECTION IN 'Y' AXIS 0.0381 Y AXIS DEFLECTION IN 'X' AXIS (in.) 8000'0 8000'0 8000'0 0.0305 DEFLECTION IN 'X' AXIS 0.0152 DEFLECTION I 1 0.0076 0.0005 80

My (in.-lbs.)

DIMENSIONS

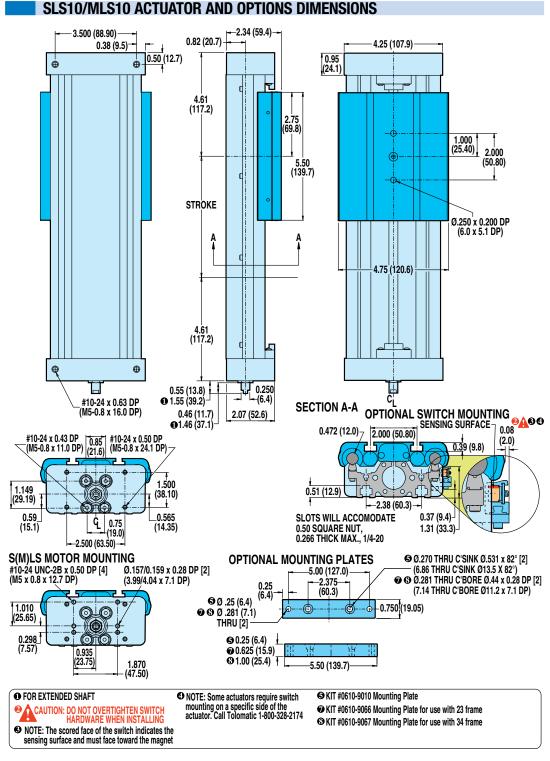
SLS/MLS10: IN-LINE MOUNT FOR BRUSHLESS MOTORS AND GEARHEADS

Mx (in.-lbs.)



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DIMENSIONS



Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

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SWITCHES



There are 10 sensing choices: DC reed, form A (open) or form C (open or closed); AC reed (Triac, open); Hall-effect, sourcing, PNP (open); Hall-effect, sinking, NPN (open); each with either flying leads or QD (quick disconnect). Commonly used to send analog signals to PLC (programmable logic controllers), TLL, CMOS circuit or other controller device. These switches are activated by the actuator's magnet.

Switches contain reverse polarity protection. QD cables are shielded; shield should be terminated at flying lead end.

If necessary to remove factory installed switches, be sure to reinstall on the same of side of actuator with scored face of switch toward internal magnet.

SPECIFICATIONS

SPECIFICA	110110										
			REE	D DC		REE	O AC		HALL-EF	FECT DC	
0	RDER CODE	RT	RM	BT	BM	CT	CM	TT TM KT KI		KM	
PAI	RT NUMBER	3600-9082	3600-9083	3600-9084	3600-9085	3600-9086	3600-9087	3600-9088	3600-9089	3600-9090	3600-9091
	LEAD	5m	QD*	5m	QD*	5m	QD*	5m	QD*	5m	QD*
CABLE	SHIELDING	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†
SWITC	HING LOGIC	"A" Norm	ally Open	"C" Normally (Open or Closed	Triac Norn	nally Open	PNP (Sourcii Op		NPN (Sinking)	Normally Open
MECHANICAL	L CONTACTS	Single-Pole S	Single-Throw	Single-Pole [Oouble-Throw	Single-Pole S	Single-Throw	NO, These Are Solid State Components		ents	
С	COIL DIRECT	Y€	es	Y	es	Ye	es	_			
	POWER LED	None	DL-O-MATIC	No	nne	No	ne	None None None TOL-O-MATIC		L-O-MATIC	
	SIGNAL LED	Red		1100	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	140		Red Red			
OPERATIN	NG VOLTAGE	200 Vo	lc max.	120 Vo	lc max.	120 Va	c max.	5 - 25 Vdc			
OUTI	PUT RATING			_		_	_	25 Vdc, 200mA dc			
OPER	ATING TIME	0.6 ms (including			ec max. g bounce)	_	_	< 10 micro sec.			
OPERATING TEN	MPERATURE			-40°F [-40°C] 1	to 158°F [70°C]			0°F [-18°C] to 150°F [66°C]			
REI	LEASE TIME		1.0 ms	ec. max.		_	_		_	_	
ON	TRIP POINT			_		_	_		150 Gauss	maximum	
0FF	TRIP POINT					-	_		40 Gauss	minimum	
**POWER RATII	NG (WATTS)	10.	0 §	3.0) § §	10	0.0		5	.0	
VOL	LTAGE DROP	2.6 V typica	l at 100 mA	N	IA .	-	_		_	_	
F	RESISTANCE	0.1 Ω Initial (Max.)			_		_				
CURRENT COI	NSUMPTION		-	_		1 Amp at 86°F [30°C]	0.5 Amp at 140°F [60°C]	200 mA at 25 Vdc			
	FREQUENCY			_		47 -	63 Hz	-			
CABLE MIN.	STATIC					0.630"	[16mm]				
BEND Radius	DYNAMIC					Not Reco	mmended				

A CAUTION: DO NOT OVER TIGHTEN SWITCH HARDWARE WHEN INSTALLING!

** WARNING: Do not exceed power rating (Watt = Voltage X Amperage). Permanent damage to sensor will occur.

*QD = Quick Disconnect; Male coupler is located 6" [152mm] from sensor, Female coupler to flying lead (part #2503-1025) distance is 197" [5m] also see Cable Shielding specification above

REPLACEMENT OF QD SWITCHES MANUFACTURED BEFORE JULY 1, 1997: It will be necessary to replace or rewire the female end coupler.







Reed Switch Life Expectancy: Up to 200,000,000 cycles (depending on load current, duty cycle and environmental conditions)

†Shielded from the female quick disconnect coupler to the flying leads. Shield should be terminated at flying lead end.

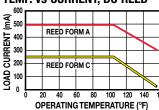
^{§§} Maximum current 250mA (not to exceed 3VA) Refer to Temperature vs. Current graph and Voltage Derating graph

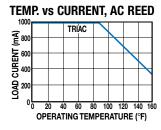


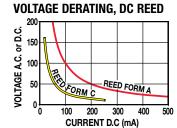
[§] Maximum current 500mA (not to exceed 10VA) Refer to Temperature vs. Current graph and Voltage Derating graph

PERFORMANCE

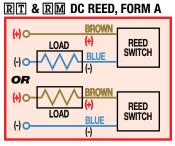
TEMP. vs CURRENT, DC REED

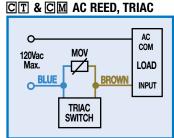






WIRING DIAGRAMS



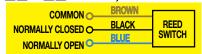


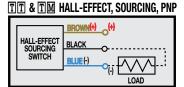
INSTALLATION INFORMATION

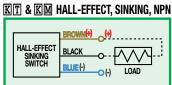


THE NOTCHED FACE OF THE SWITCH INDICATES THE SENSING SURFACE AND MUST FACE TOWARD THE MAGNET.

BT & BM DC REED, FORM C







COMPILE APPLICATION ORIENTATION	REQUIREMENTS	APPLICATION DATA WORKSHEET Fill in known data. Not all information is required for all applications
☐ Horizontal ☐ Side	Horizontal Down Vertical ACTUATOR ACTUATOR ACTUATOR ACTUATOR CENTER OF GRANITY ACTUATOR ACTUATOR	Angled ° β Z Lz X SIDE VIEW α FRONT
DISTANCE FROM dx CENTER OF CARRIER dy TO LOAD CENTER dz OF GRAVITY inch	Fy Mz	BENDING MOMENTS Mx My My My Mz inlbs. N-m Mz Mz Metric) PRECISION Repeatability millimeters
NOTE: If load or force on carrier changes during cycle use the highest numbers for calculations LOAD Ib,	THRUST FZ Fy Standard) Ibf. (Metric)	OPERATING ENVIRONMENT Temperature, Contamination, etc.
MOVE PROFILE Move Distance	MOTION PROFILE + Speed (Graph your most demanding cycle, including accel/decle, including accel/decle, including accel/decle, including accel/decle, including accel/decle, including accel/decle, including accel/decled velocity and dwell times. You may also want to indicate load variations and I/O changes during the cycle. Label awas with proper scale and units.
Name, Phone, Email Co. Name, Etc.		

SELECTION GUIDELINES

The process of selecting a load bearing actuator for a given application can be complex. It is highly recommended that you contact Tolomatic or a Tolomatic Distributor for assistance in selecting the best actuator for your application. The following overview of the selection guidelines are for educational purposes only.

COMPARE LOAD TO MAXIMUM LOAD CAPACITIES

Calculate the application load (combination of load mass and forces applied to the carrier) and application bending moments (sum of all moments Mx, My, and Mz applied to the carrier). Be sure to evaluate the magnitude of dynamic inertia moments. When a rigidly attached load mass is accelerated or decelerated, its inertia induces bending moments on the carrier. Careful attention to how the load is decelerated at the end of the stroke is required for extended actuator performance and application safety. If either load or any of your moments exceed figures indicated in the Moment and Load Capacity table (pg. sls_8) for the actuator consider:

1) Higher capacity bearing style

- 2) A different actuator style (B3S, MXE, etc.)
- 3) Auxiliary carrier
- 4) External guide system

2 CALCULATE LOAD FACTOR LF

For loads with a center of gravity offset from the carrier account for both applied (static) and dynamic loads. The load factor (L_F) must not exceed the value of 1.

$$L_{\text{F}} = \frac{Mx}{Mx_{\text{max}}} + \frac{My}{My_{\text{max}}} + \frac{Mz}{Mz_{\text{max}}} + \frac{Fy}{Fy_{\text{max}}} + \frac{Fz}{Fz_{\text{max}}} \leq 1$$

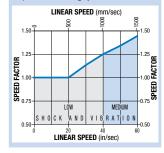
If LF does exceed the value of 1, consider the four choices listed in step #2.

3 ESTABLISH YOUR MOTION PROFILE AND CALCULATE ACCELERATION RATE

Using the application stroke length and maximum carrier velocity (or time to complete the linear motion), establish the motion profile. Select either triangular (accel-decel) or trapezoidal (accel-constant speed-decel) profile. Now calculate the maximum acceleration and de-

SPEED FACTOR

FOR APPLICATIONS WITH HIGH SPEED OR SIGNIFICANT SHOCK AND VIBRATION: Calculated values of loads and bending moments must be increased by speed factor from the graph below to obtain full rated life of profiled rail bearing system.



celeration rates of the move. Speed should not exceed critical speed value as shown in graph (page SLS_4-5) for the screw/nut combination chosen. Also, do not exceed safe rates of dynamic inertia moments determined in step #3.

SELECT THE LEAD SCREW

Based on the application requirements for accuracy, backlash, quiet operation, life, etc. select the appropriate lead screw type (Acme screw with a solid nut or ball screw with a standard or anti-backlash nut) and the pitch (lead). For additional information on screw selection, consult "Which Screw? Picking the Right Technology" (#9900-4644) available at www.tolomatic.com.

5 SELECT MOTOR (GEARHEAD IF NECESSARY) AND DRIVE

To help select a motor and drive, use the sizing equations located in the Engineering Resources section [ENGR] to calculate the application thrust and torque requirements. Refer to Motor sections [MRV] & [MRS] to determine the motor and drive.

6 DETERMINE T-NUTS/ MOUNTING PLATE REQUIREMENTS

- Consult the Support Recommendations graph for the model selected (page SLS_7)
- Cross reference the application load and maximum distance between supports
- Select the appropriate number of T-nuts, and mounting plates if required for motor and adapter clearance.

CONSIDER OPTIONS

- Choose metric or inch (US Conventional) load mounting.
- Switches Reed, Solid State PNP or NPN, all available normally open or normally closed



ORDERING



OPTIONS SPECIFICATIONS

DC18 KT2 TN4 MP2

MODEL TYPE

SLS SLS Series US Conventional Screw Drive MLS Series Metric Screw Drive

TUBE BORE DIAMETER

1-inch (25 mm) bore

NUT/SCREW CONFIGURATION

INCH (US Conventional) MODELS

SOLID NUT /		
PITCH (turn/in)	SERIES	
SN01	SLS10	
SN02	SLS10	
SNA02	SLS10	
SN05	SLS10	
BALL NUT /		
PITCH (turn/in)	<u>SERIES</u>	
BN08	SLS10	
BNL08	SLS10	
METRIC MOD	<u>DELS</u>	
SOLID NUT /		
LEAD (mm/turn)	SERIES	
SN12	MLS10	
SN25	MLS10	
BALL NUT /	OFFICE	
LEAD (mm/turn)	<u>SERIES</u>	
BN08	MLS10	
BNL08	MLS10	
	IVILOTO	

STROKE LENGTH

Stroke, then enter desired stroke length

MOTOR MOUNTING / REDUCTIONS

(must choose one)

LMI In-Line mounting

**LMX Extended shaft - old style (see note)

** For replacement actuators with extended motor shafts purchased prior to 6/24/02 use LMX

AUXILIARY CARRIER

DC__ Auxiliary Carrier, then center-to-center spacing desired in decimal inches. (Center-to-Center spacing will add to overall dead length and will not subtract from the stroke length

Your Motor Here

CUSTOM MOTOR

MOUNTS. 15 DAYS.

Tolomatic electric actuators are

compatible with over 60 motor

manufacturers and hundreds of

motor models.

SWITCHES

- RM_ Reed Switch (Form A) with 5-meter lead/QD (quick-disconnect), & quantity Reed Switch (Form A) with 5-meter lead, and quantity desired
- **BM**_ Reed Switch (Form C) with 5-meter lead/QD, and quantity desired
- **BT**_ Reed Switch (Form C) with 5-meter lead, and quantity desired
- KM_ Hall-effect Sinking Switch with 5-meter lead/QD, and quantity desired
- Hall-effect Sinking Switch with 5-meter lead, and quantity desired
- TM_ Hall-effect Sourcing Switch with 5-meter lead/QD, and quantity desired
- TT_ Hall-effect Sourcing Switch with 5-meter lead, and quantity desired
- **CM**_ TRIAC Switch with 5-meter lead/QD, and quantity desired
- CT_ TRIAC Switch with 5-meter lead, and quantity desired

T-NUT OPTION

TN_ Additional T-nuts and quantity

MOUNTING PLATES

MP_ Mounting Plates plus quantity desired



Not all codes listed are compatible with all options.

Use the Sizing Software to determine available options and accessories based on your application requirements.



NOTE: MRB & MRV motors are discontinued contact Tolomatic for information on YMH (Your Motor Here)

in decimal inches

FIELD RETROFIT KITS ITEM SLS10 MLS10 1/4" Mounting Plates 0610-9010 0610-9010 1/2" Mounting Plates 0610-9045 0610-9045