

Toll Free Phone: 877-378-0240 Toll Free Fax: 877-378-0249 sales@servo2go.com www.servo2go.com

# SLS RODLESS SCREW DRIVE ACTUATOR

**○ENDURANCE TECHNOLOGY** 

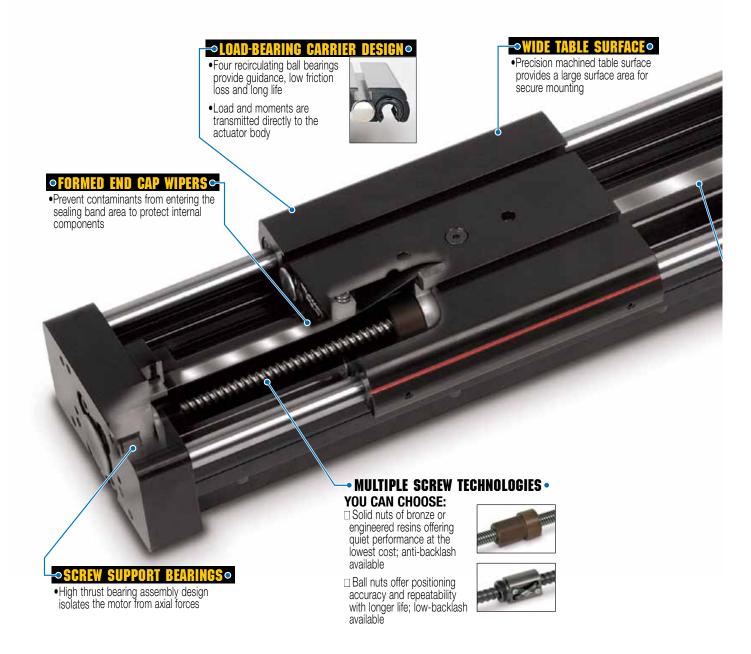


# **SLS RODLESS SCREW DRIVE ACTUATOR**

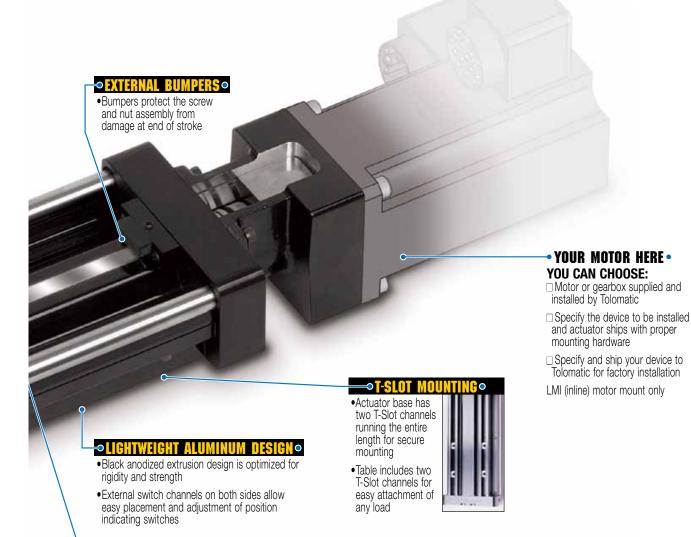
## **○ENDURANCE TECHNOLOGY**

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.



## **TOLOMATIC...LINEAR SOLUTIONS MADE EASY**



#### STAINLESS STEEL SEALING

- •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



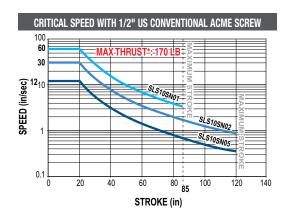
#### SWITCHES

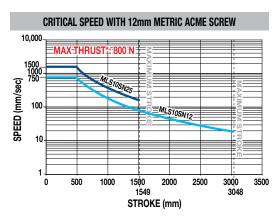
Styles include: reed, hall-effect or triac. Select either 15ft potted cable with flying leads or 6in to quick-disconnect coupler with mating 15ft cable

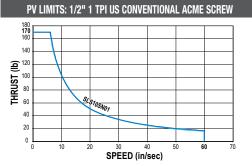


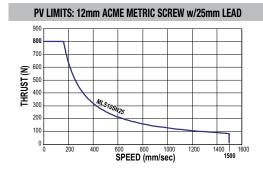
#### ACME SCREW SPECIFICATIONS

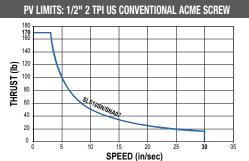
#### SLS/MLS10 ACME SCREW CRITICAL SPEED AND PV LIMITS

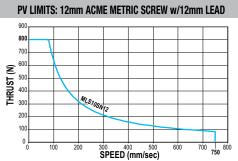




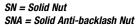


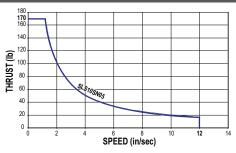












\* Maximum thrust is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.

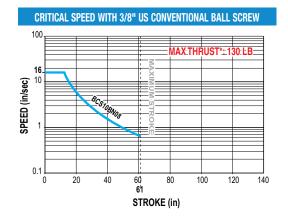
PV LIMITS: Any material which carries a sliding load is limited by heat buildup. The factors that affect heat generation rate in an application are the pressure on the nut in pounds per square inch and the surface velocity in feet per minute. The product of these factors provides a measure of the severity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

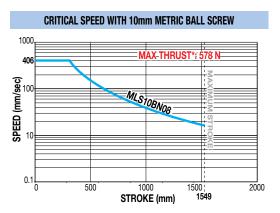
$$\begin{array}{c|c} P & x & V & \leq 0.1 \\ \hline \frac{Thrust}{(\text{Max. Thrust Rating})} \end{pmatrix} x & \left( \frac{Speed}{(\text{Max. Speed Rating})} \right) & \leq 0.1 \end{array}$$

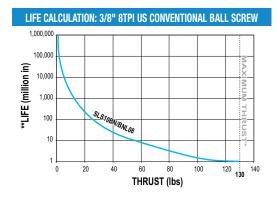
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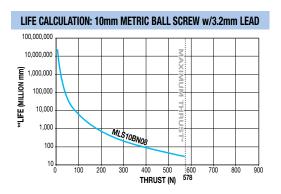
#### **BALL SCREW SPECIFICATIONS**

#### **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 CONVENTIONAL LEAD SCREWS									
ACTUATOR SCREV		SCREW TPI		LEAD	BACKLASH	MAXIMUM	MAXIMUM	INERTIA	BREAKAWAY	
SERIES	DIA.	TYPE	(turns/	ACCURACY	DAGILLAGII	THRUST*	STROKE	BASE ACTUATOR	PER/in	TORQUE
OLINEO	(in)	11112	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

	METRIC LEAD SCREWS									
ACTUATOR	SCREW	SCREW	LEAD	LEAD BACKLASH		MAXIMUM MAXIMUM		INERTIA (k	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
INILO10	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 CONVENTIONAL 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			

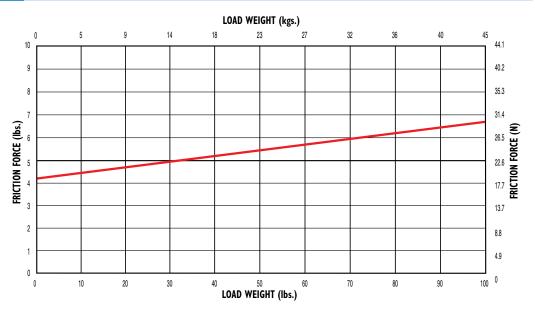


- \* Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time. For applications that require operation outside of the recommended temperature range, contact Tolomatic.
- \*\* Protected against ingress of solid particles greater than .039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

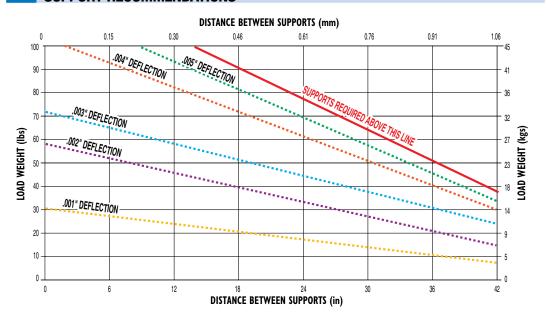
LARGE FRAME MOTORS AND SMALLER SIZE ACTUATORS: Cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

## **SPECIFICATIONS**





#### **SUPPORT RECOMMENDATIONS**



#### **SPECIFICATIONS**

#### DYNAMIC BENDING MOMENTS AND LOADS

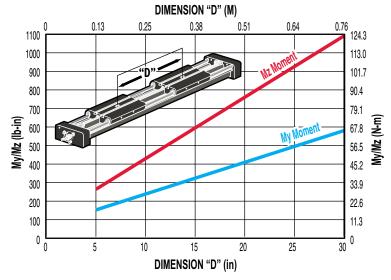
	MAXIMUM BENDING MOME	NTS AND LOADS	US CONVENTIONAL	METRIC
STANDARD CARRIER			SLS10	MLS10
Fz 1	Mx Moment (Roll)	(lb-in : N-m)	80	9.0
Mz	My Moment (Pitch)	(lb-in : N-m)	80	9.0
Mx	Mz Moment (Yaw)	(lb-in : N-m)	125	14.1
	Fz Load (Lateral)	(lb : N)	100	445
AUXILIARY CARRIER: Increases rigidity, lo	ad-carrying capacity and mo	ments	SLS10	MLS10
Fz	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

A

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.

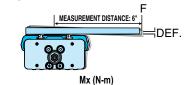
## **SPECIFICATIONS**

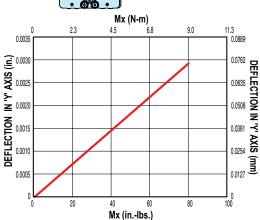
#### LOAD DEFLECTION

#### Y-AXIS DEFLECTION

#### Figures calculated with the following considerations:

- 1.) Tube supports spaced at minimum distances for each bore size  $\,$
- 2.) Measurement distance from F to center of carrier is 6 inches

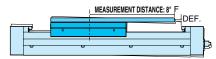


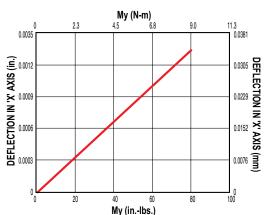


#### X-AXIS DEFLECTION

#### Figures calculated with the following considerations:

- 1.) Tube supports spaced at minimum distances for each bore size
- 2.) Measurement distance from F to center of carrier is 8 inches

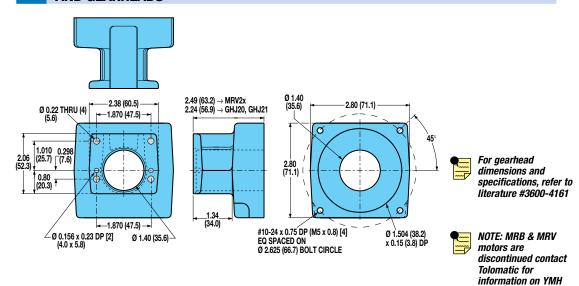




(Your Motor Here)

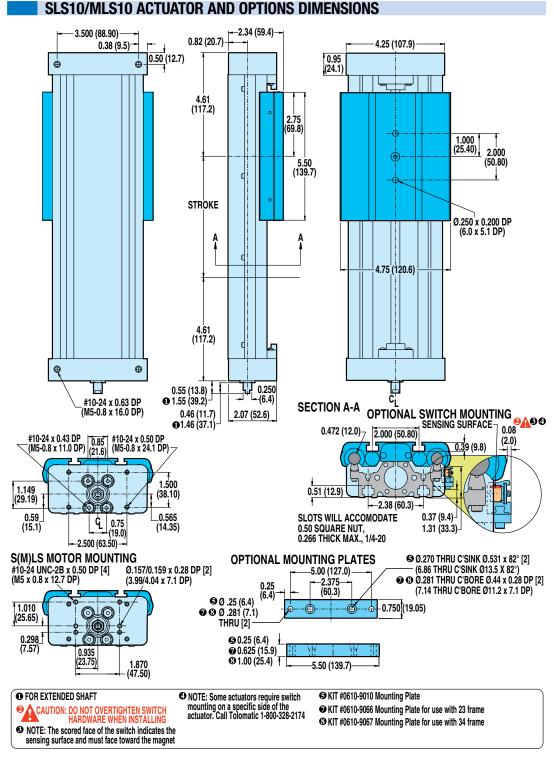
## **DIMENSIONS**

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



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#### **DIMENSIONS**



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

#### **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**

SPECIFICATION	113					,					
			REE	D DC		REED AC		HALL-EFFECT DC			
ORDER	CODE	RT	RM	BT	BM	CT	CM	TT	TM	KT	KM
PART NU	IMBER	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 SHIE	LDING	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†	Unshielded	Shielded†
SWITCHING	LOGIC	"A" Norm	ally Open	"C" Normally (	Open or Closed	Triac Norn	nally Open	PNP (Sourcii Op		NPN (Sinking)	Normally Open
MECHANICAL CON	TACTS	Single-Pole S	Single-Throw	Single-Pole [	Oouble-Throw	Single-Pole S	Single-Throw	NO,	These Are Solid	d State Compon	ents
COIL D	IRECT	Ye	es	Y	es	Ye	es			_	
POWE	R LED	None	OL-O-MATIC	Nc	nno	No	nα	None None		None	L-O-MATTIC
SIGNA	SIGNAL LED Red			None		None		Red Red			
OPERATING VO	OPERATING VOLTAGE 200 Vdc max.		120 Vdc max.		120 Vac max.		5 - 25 Vdc				
OUTPUT R	ATING	TING -		_		_		25 Vdc, 200mA dc			
OPERATING	TING TIME 0.6 msec max. (including bounce)		0.7 msec max. (including bounce)		_			< 10 micro sec.			
OPERATING TEMPERA	ATURE			-40°F [-40°C] to 158°F [70°C]				0°F [-18°C] to 150°F [66°C]			
RELEASE	TIME		1.0 ms	ec. max. —		_	_				
ON TRIP	POINT			_		_		150 Gauss maximum			
OFF TRIP	POINT		_	-		_		40 Gauss minimum			
**POWER RATING (W	/ATTS)	10.0 § 3.0 §§		) § §	10.0		5.0				
VOLTAGE DROP		2.6 V typical at 100 mA			NA —		_	_			
RESISTANCE		0.1 Ω Initial (Max.)				_					
CURRENT CONSUMPTION		_			1 Amp at 86°F [30°C]	0.5 Amp at 140°F [60°C]	200 mA at 25 Vdc				
FREQUENCY		_				47 - 63 Hz —					
	STATIC					0.630" <i>[16mm]</i>					
RADIUS DYN	NAMIC					Not Recommended					

#### 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.

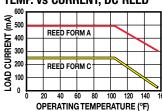
<sup>§§</sup> Maximum current 250mA (not to exceed 3VA) Refer to Temperature vs. Current graph and Voltage Derating graph



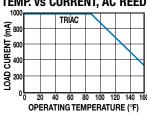
<sup>§</sup> Maximum current 500mA (not to exceed 10VA) Refer to Temperature vs. Current graph and Voltage Derating graph

#### **PERFORMANCE**

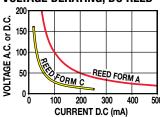
TEMP. vs CURRENT, DC REED



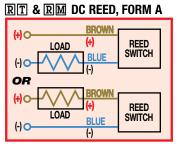




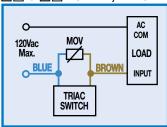
#### **VOLTAGE DERATING, DC REED**



#### **WIRING DIAGRAMS**



#### CT & CM AC REED, TRIAC

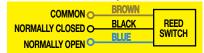


#### INSTALLATION INFORMATION

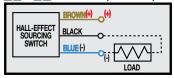


THE NOTCHED FACE OF THE SWITCH INDICATES THE SENSING SURFACE AND MUST FACE TOWARD THE MAGNET.

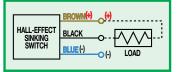
BT & BM DC REED, FORM C



#### TT & TM HALL-EFFECT, SOURCING, PNP



KIT & KIM HALL-EFFECT, SINKING, NPN



COMPILE APPLICATION ORIENTATION	N REQUIREMENTS	APPLICATION DATA WORKSHEET Fill in known data. Not all information is required for all applications
☐ Horizontal ☐ Side	Horizontal Down Vertical CENTER CENTE	Angled ° $\alpha$ $\beta$ $Z$
DISTANCE FROM dx dy dy dz	Fz Mz My MX	BENDING MOMENTS Mx My My My 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 Indicated the second sec	OPERATING ENVIRONMENT Temperature, Contamination, etc.
MOVE PROFILE  Move Distance	MOTION PROFILE  +  Speed( )	Graph your most demanding cycle, including accel/decl, including accel/decl, including accel/decl, velocity and dwell times. You may also want to indicate load variations and I/O changes during the cycle. Label axes with proper scale and units.
INFORMATION 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 vou contact Tolomatic or a Tolomatic Distributor for assistance in selecting the best actuator for your application. The following overview of the selection quidelines 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

### **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 (LF) must not exceed the value of 1.

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

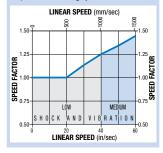
If LF does exceed the value of 1, consider the four choices listed in step #2.

#### ♠ 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.

#### 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.

#### **■** 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 / <u>Series</u> BN08 SLS10 BNL08 SLS10 METRIC MODELS SOLID NUT / SERIES LEAD (mm/turn) SN12 MLS10 SN25 MLS10 BALL NUT / LEAD (mm/turn) SERIES BN08 MLS10

#### **STROKE LENGTH**

MLS10

BNL08

Stroke, then enter desired stroke length in decimal inches

#### **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)

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