Tolomatic
EXCELLENCE *IN MOTION*®

B3W RODLESS BELT DRIVEN ACTUATOR

ENDURANCE TECHNOLOGY℠

MAXIMUM DURABILITY

B3W Rodless Belt Driven Actuator

The B3W rodless style actuator is designed for carrying moderate to heavy loads at moderate to high speeds with large bending moment capacities. Based upon the BC3 pneumatic band cylinder, with our exclusive ENDURANCE TECHNOLOGY℠ features, it utilizes a patented integral recirculating ball bearing guidance system that provides consistent and durable performance. Each B3W is built-to-order in stroke lengths up to 292 inches. Nobody knows rodless like Tolomatic, and the B3W proves it.

- Low profile to fit your application
- High precision bearings feature smooth, low breakaway motion
- Highest load and bending moment capacities

A COMPARISON OF BELT DRIVE ACTUATORS

All Tolomatic belt drive actuators feature:

• High linear velocity • High acceleration rate • Long stroke lengths
• Excellent repeatability • High duty cycles • Low profile

Unique features include:

MXB-U *Electric Belt Drive*	***MXB-P*** *Electric Belt Drive*	***B3W*** *Electric Belt Drive*	***TKB*** *Electric Belt Drive*
			
• Requires external guidance and support	• High load and bending moment capacities		• Superior rigidity, high moment loads
	• High precision bearings feature smooth, low breakaway motion		• Straightness and flatness within 0.0002 inches per inch of stroke
	• Durable profiled rail design uses THK® Caged Ball® technology to reduce friction and extend actuator life		• Wide stable platform for XY applications
			• Lowest carrier deflection of any Tolomatic actuator
www.tolomatic.com *for complete information, search by literature number:*			
#8500-4000	*#8500-4000*	*#3600-4148*	*#3600-4609*

A Comparison of Tolomatic Belt Drive Actuators

APPLICATIONS

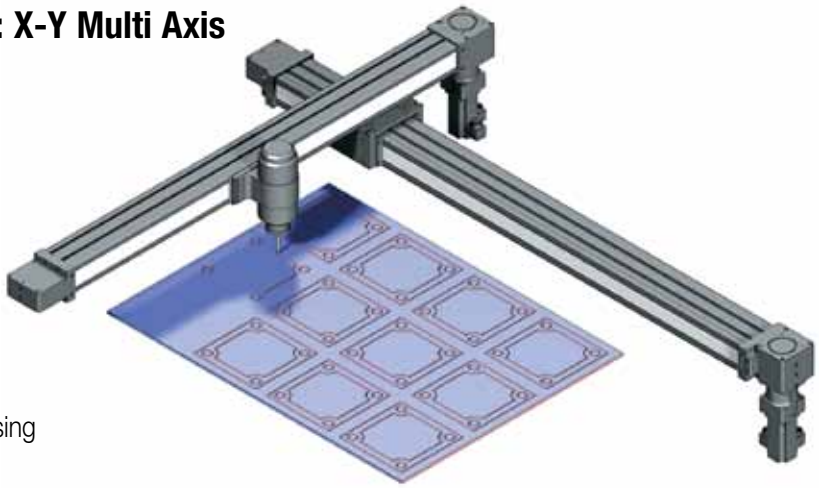
A rodless belt actuator integrates the advantages of a linear belt solution with a load support and guidance system. This combination allows you to install a pre-assembled and compact solution, often without the need of external guide rails or load support systems. Available in multiple frame sizes with options such as dual carriers and dual support systems, you can choose the proper level of load and moment support required for your application. The result of this combination is a belt actuator that is:

- Easy to size, design and order
- Quick to install and maintain
- Simple to integrate and control
- Provides a lower installed cost

APPLICATION: High Speed Flying Cut Off

+Test stations
+Product handling
+Camera positioning

APPLICATION: X-Y Multi Axis



+Laser marking
+Material cutting
+Adhesive dispensing

FREE downloads at www.tolomatic.com:

• Sizing & Selection Software

• 3D Solid Models

CONTENTS

B3W Rodless Belt Driven Actuator

FEATURES

ADVANTAGES OF BELT SOLUTIONS

The use of synchronous belts, often referred to as timing belts, have become a standard in the automated motion industry as an alternate to screw drive mechanisms for producing linear motion.

This design for linear motion provides an excellent solution for applications that require:

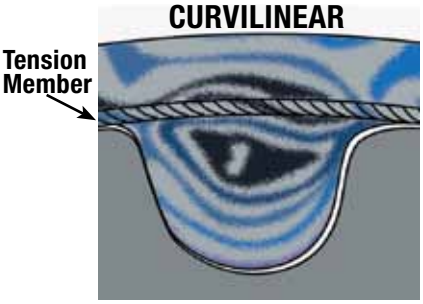
- High-speed linear velocities
- High acceleration rates
- Long length strokes
- High repeatability
- High duty cycles

A belt solution is ideal for linear positioning and gantry applications. Linear velocities can now reach up to 200 in/sec with acceleration rates at 1200 in/sec^2. Belting material is available in lengths that allow stroke lengths over 24 feet, two to three times longer than screw actuators.

BELT CONSTRUCTION

Tolomatic installs an HTD synchronous belt in the B3W product line that features a curvilinear tooth profile. This type of tooth profile distributes tooth load more evenly and provides greater tooth shear strength, allowing for higher thrust loading. The deep teeth of the HTD profile are more cogging-resistant at a given tension, preventing potentially damaging positioning errors.

Tolomatic's standard belt is a polyurethane material reinforced with steel tension members to produce high carrier thrusts without belt stretch. A Kevlar® reinforced belt featuring equal thrust capability is also available for applications that may experience high shock loading.



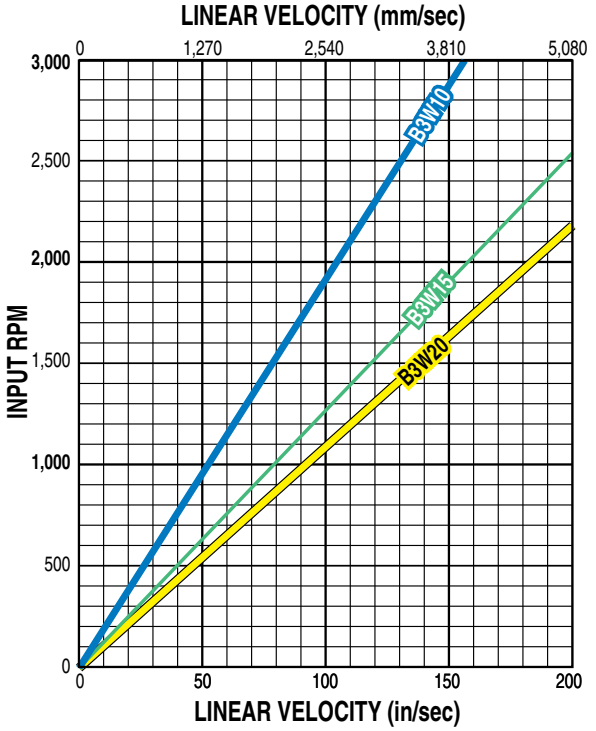
Tolomatic's tooth belt profile distributes load evenly.

B3W Rodless Belt Driven Actuator

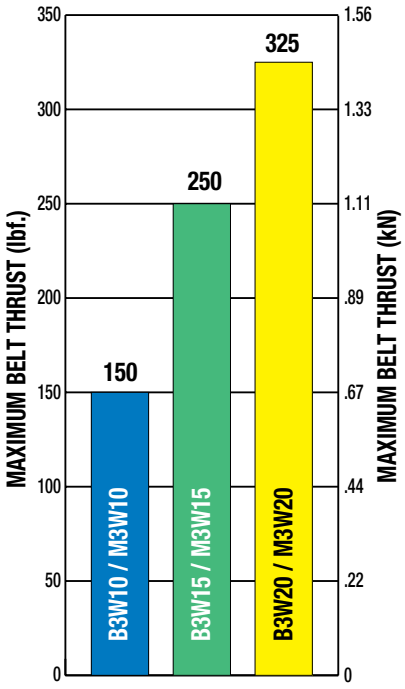
PERFORMANCE

SIZING SOFTWARE AVAILABLE AT WWW.TOLOMATIC.COM

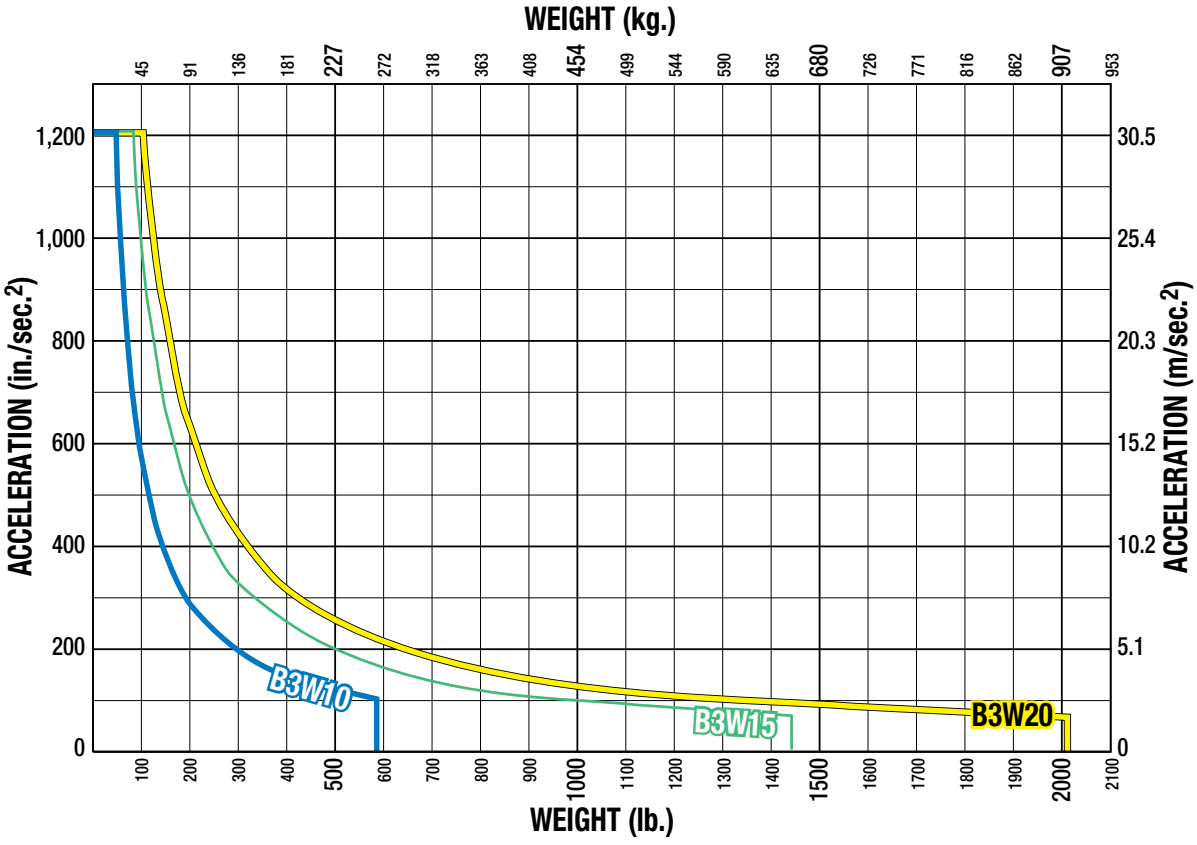
CARRIER SPEED CAPABILITIES



MAXIMUM BELT THRUST



MAXIMUM ACCELERATION AS A FUNCTION OF LOAD WEIGHT



B3W Rodless Belt Driven Actuator

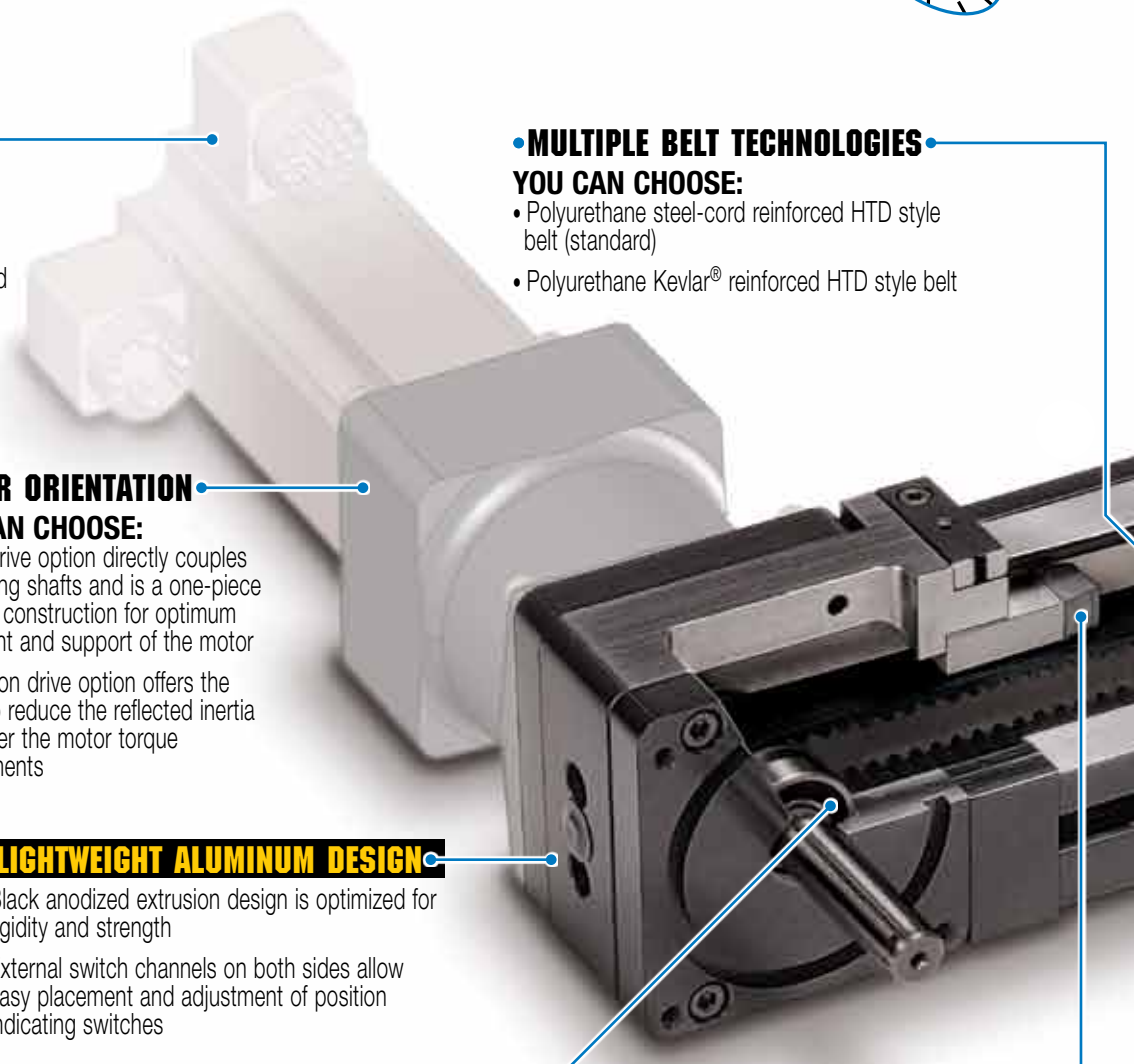
ENDURANCE TECHNOLOGY℠

Look for this endurance technology symbol indicating our durability design features

5 DAYS
BUILT-TO-ORDER

YOUR MOTOR HERE
YOU CAN CHOOSE:
- Motor or gearbox supplied and installed by Tolomatic
- Specify the device to be installed and actuator ships with proper mounting hardware
- Specify and ship your device to Tolomatic for factory installation

MULTIPLE BELT TECHNOLOGIES
YOU CAN CHOOSE:
- Polyurethane steel-cord reinforced HTD style belt (standard)
- Polyurethane Kevlar® reinforced HTD style belt



MOTOR ORIENTATION
YOU CAN CHOOSE:
- Direct drive option directly couples the driving shafts and is a one-piece housing construction for optimum alignment and support of the motor
- Reduction drive option offers the ability to reduce the reflected inertia and lower the motor torque requirements

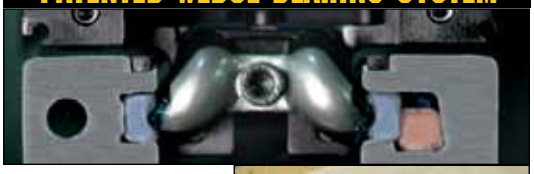
LIGHTWEIGHT ALUMINUM DESIGN
- Black anodized extrusion design is optimized for rigidity and strength
- External switch channels on both sides allow easy placement and adjustment of position indicating switches

OVERSIZED PULLEY BEARINGS
- Drive shaft assembly incorporates sealed ball bearings for complete support of the increased belt tension at high speeds

INTERNAL BUMPERS
- Bumpers protect the belt and clamp assembly from damage at end of stroke

TOLOMATIC…MAXIMUM DURABILITY

PATENTED WEDGE BEARING SYSTEM



- Unique design incorporates hardened steel race-ways integral to the aluminum extrusion
- Bearing surfaces are adjusted at the factory for optimum preload and smooth performance

FORMED END CAP WIPERS

- Prevents contaminants from entering the sealing band area to protect internal components

BELT TENSIONING SYSTEM

- Full access to the idle pulley allows ease of adjustment for alignment and tensioning
- Dual adjustment screws and field tensioning kit provide simple maintenance

STAINLESS STEEL SEALING BAND

- Prevents contaminants from entering the bearing area for extended performance
- Fatigue resistant stainless steel bands are specifically made to offer long life and will not elongate
- Provides IP44 protection for bearings and belt

LOAD-BEARING CARRIER DESIGN

- Recirculating ball bearing system provides guidance, high efficiency and long life
- Load and moments are transmitted directly to the actuator body

OPTIONS

CARRIER OPTIONS

AUXILIARY CARRIER doubles the load capacity and increases pitch and yaw bending moment capacities

DUAL 180° CARRIER increases the load capacity, increases roll and yaw bending moment capacities and offers a wide mounting platform

MOUNTING OPTIONS

SURFACE MOUNT two t-slots are integral on the entire underside of the actuator body for direct mounting

TUBE SUPPORTS provide intermediate support of the actuator body throughout long stroke lengths

METRIC OPTION

Metric tapped holes for mounting of load to carrier and of actuator to mating surfaces

SWITCHES

Styles include: reed, Hall-effect or triac

B3W Rodless Belt Driven Actuator

SPECIFICATIONS

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B3W SPECIFICATIONS

		STANDARD				METRIC		
		B3W10	B3W15	B3W20		M3W10	M3W15	M3W20
Max. Stroke	in	204	204	156	mm	5,182	5,182	3,962
Max. Velocity	in/sec	200	200	200	m/sec	5.08	5.08	5.08
Max. Acceleration	in/sec^2	1,200	1,200	1,200	m/sec^2	30.48	30.48	30.48
Max. Input Torque	lb-in	75.23	112.80	244.40	N-m	8.50	12.75	27.61
Breakaway Torque	lb-in	9.38	12.50	28.13	N-m	1.06	1.41	3.18
Dual 180 or Aux Carrier	lb-in	11.88	15.00	31.25	N-m	1.34	1.69	3.53
Dual 180 & Aux Carrier	lb-in	16.88	25.00	47.50	N-m	1.91	2.82	5.37
Pulley Pitch Dia.	in	1.003	1.504	1.754	mm	25.48	38.20	44.55
Stoke per Rev.	in/rev	3.151	4.725	5.510	mm/rev	80.04	120.02	139.95
Repeatability	in	+/- 0.002	+/- 0.002	+/- 0.002	mm	+/- 0.05	+/- 0.05	+/- 0.05
Straightness & Flatness[1]	in	0.00067 x L*	0.00067 x L*	0.00067 x L*	mm	0.017 x L*	0.017 x L*	0.017 x L*
Temp. Range[2]	°F	40 - 130	40 - 130	40 - 130	°C	4 - 54	4 - 54	4 - 54
IP Rating[3]	IP	44	44	44	IP	44	44	44
Weight (zero stroke)	lb	7.54	25.12	35.40	kg	3.42	11.39	16.06
Weight (per unit of stroke)	lb/in	0.389	0.395	0.716	kg/mm	0.0069	0.0071	0.0128
Weight of pulley	lb	0.015	0.054	0.1036	kg	0.0068	0.0244	0.0470
Weight of carrier	lb	0.85	1.56	2.14	kg	0.39	0.71	0.97
Inertia (zero stroke)	lb-in^2	0.2846	1.3917	2.6607	kg-cm^2	0.833	4.073	7.786
Inertia (per unit of stroke)	lb-in^2/in	0.0016	0.0017	0.0114	kg-cm^2/mm	0.00018	0.00020	0.00131
Inertia of pulley	lb-in^2	0.0093	0.0748	0.1441	kg-cm^2	0.027	0.219	0.422
Inertia of carrier	lb-in^2	0.1041	0.5089	0.9728	kg-cm^2	0.305	1.489	2.847

[1] *The listed values relating to straightness/flatness are intended for reference purposes only, and not as an engineering standard of absolute tolerance for a given actuator. Appropriate installation is the single most important factor in reducing such deviation, so good engineering practices such as measurement, mapping, etc. must be employed in applications with stringent straightness/flatness requirements.*

[2] *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 the factory.*

[3] *Protected against ingress of solid particles greater than .039 in (1mm) and splashing water.*

**"L" is maximum distance between supports - See Support Recommendations graph pg 10.*

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.

NOTE: Zero stroke inertia and weight are for an assembled actuator (including carrier, pulley and belt material) that has zero stroke length. To calculate system inertia use the formula below:

$$\text{System Inertia} = \text{Inertia}_{(\text{zero stroke})} + \left[\text{Inertia}_{(\text{per unit of stroke})} \times \text{number of units}\right]$$

(For weight calculation substitute inertia with weight in the above formula)

B3W Rodless Belt Driven Actuator

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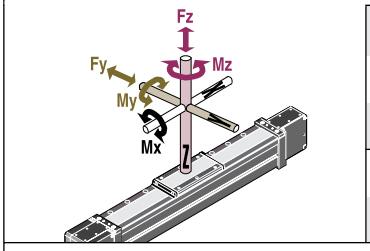
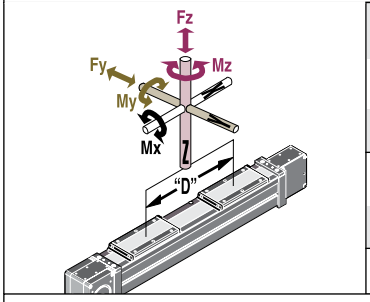
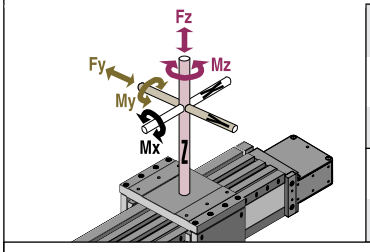
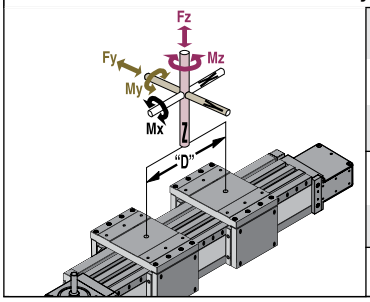
DYNAMIC BENDING MOMENTS AND LOADS

			STANDARD			METRIC		
STANDARD CARRIER			**B3W10**	**B3W15**	**B3W20**	**M3W10**	**M3W15**	**M3W20**
	**Mx Moment** (Roll)	(lb-in : N-m)	250	859	1,662	28.2	97.1	187.8
	My Moment (Pitch)	(lb-in : N-m)	269	1,033	1,472	30.4	116.7	166.3
	Mz Moment (Yaw)	(lb-in : N-m)	156	596	850	17.6	67.3	96.0
	Fy Load (Radial)	(lb : N)	341	840	1,159	1,517	3,737	5,155
	Fz Load (Lateral)	(lb : N)	591	1454	2008	2,629	6,468	8,932
AUXILIARY CARRIER: Increases rigidity, load-carrying capacity and moments			**B3W10**	**B3W15**	**B3W20**	**M3W10**	**M3W15**	**M3W20**
	**Mx Moment** (Roll)	*(lb-in : N-m)	500	1,718	3,324	56.5	194.1	375.6
	My Moment (Pitch)	*(lb-in : N-m)	2,825	11,734	16,265	319.2	1,325.8	1,837.7
	Mz Moment (Yaw)	*(lb-in : N-m)	1,630	6,779	9,388	184.2	765.9	1,060.7
	Fy Load (Radial)	(lb : N)	682	1,680	2,318	3,034	7,473	10,311
	Fz Load (Lateral)	(lb : N)	1,182	2,908	4,016	5,258	12,935	17,864
	Minimum Dimension 'D'	(in : mm)	4.88	8.07	8.10	124.0	205.2	205. 7
DUAL 180° CARRIER: Allows 90° rotation of load, adds load bearing surface			**B3WD10**	**B3WD15**	**B3WD20**	**M3WD10**	**M3WD15**	**M3WD20**
	**Mx Moment** (Roll)	(lb-in : N-m)	657	2,468	4,527	74.2	278.8	511.5
	My Moment (Pitch)	(lb-in : N-m)	312	1,192	1,700	35.3	134.7	192.1
	Mz Moment (Yaw)	(lb-in : N-m)	538	2,066	2,944	60.8	233.4	332.6
	Fy Load (Radial)	(lb : N)	1,182	2,908	4,016	5,258	12,935	17,864
	Fz Load (Lateral)	(lb : N)	682	1,680	2,318	3,034	7,473	10,311
AUXILIARY DUAL 180° CARRIER: Substantially increases moment and loads			**B3WD10**	**B3WD15**	**B3WD20**	**M3WD10**	**M3WD15**	**M3WD20**
	**Mx Moment** (Roll)	*(lb-in : N-m)	1,314	4,936	9,054	148.5	557.7	1,023.0
	My Moment (Pitch)	*(lb-in : N-m)	3,328	13,558	18,776	376.0	1,531.9	2,121.4
	Mz Moment (Yaw)	*(lb-in : N-m)	5,768	23,468	32,530	651.7	2,651.5	3,675.4
	Fy Load (Radial)	(lb : N)	2,364	5,816	8,032	10,516	25,871	35,728
	Fz Load (Lateral)	(lb : N)	1,364	3,360	4,636	6,067	14,946	20,622
	Minimum Dimension 'D'	(in : mm)	4.88	8.07	8.10	124.0	205.0	205.7

The Dual 180° carrier requires its own proprietary tube supports and foot mounts. See dimensional information. Breakaway torque will also increase when using the Auxiliary carrier or the Dual 180° carrier options. When ordering, determine working stroke and enter this value into the configuration string. Overall actuator length will automatically be calculated.

Deflection Considerations: In applications where substantial Mx or My moments come into play, deflection of the cylinder tube, carrier and supports must be considered. The deflection factors shown in the Load Deflection charts on the following page are based on cylinder mounted with tube supports at minimum recommended spacing. If more rigidity is desired, refer to the Auxiliary or Dual Carrier options.

****Loads shown in table are at minimum "D" dimension, for ratings with longer "D" dimension see graphs on page 11.***

Life of the actuator will vary for each application depending on the combined loads, motion parameters and operating conditions. The load factor (L_F) ratios for each application must not exceed a value of 1 (see formula at right). Exceeding a load factor of 1 will diminish the actuator's rated life.

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

With combined loads, L_F must not exceed the value 1.

B3W Rodless Belt Driven Actuator

SPECIFICATIONS

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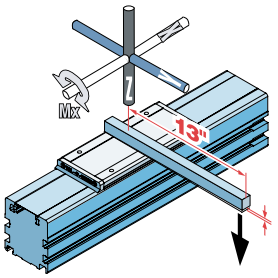
LOAD DEFLECTION

DEFLECTION ABOUT X AXIS

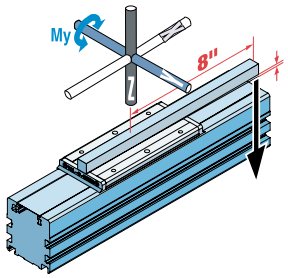


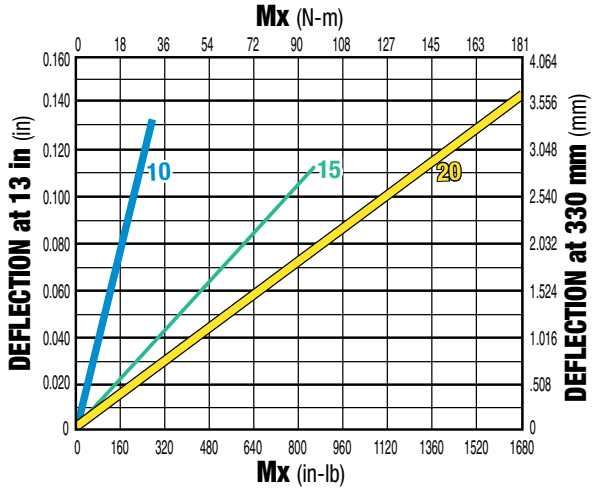
DEFLECTION TESTING WAS DONE UNDER THESE CRITERIA:

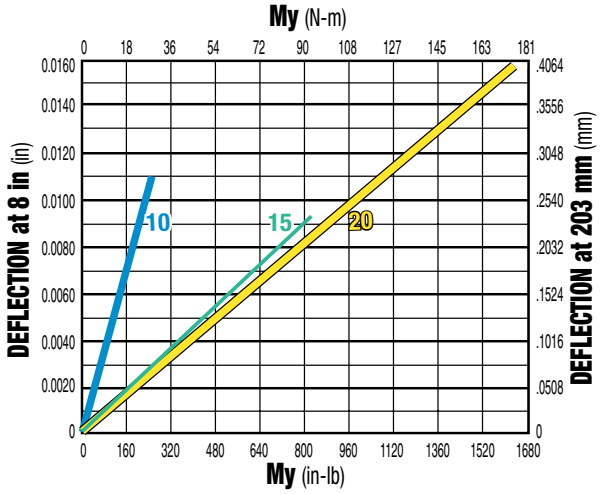
1.) Actuator was properly mounted with distance between supports within recommendations (see Support Recommendations below)

2.) Deflection was measured from center of carrier as shown (Mx = 13", My = 8")

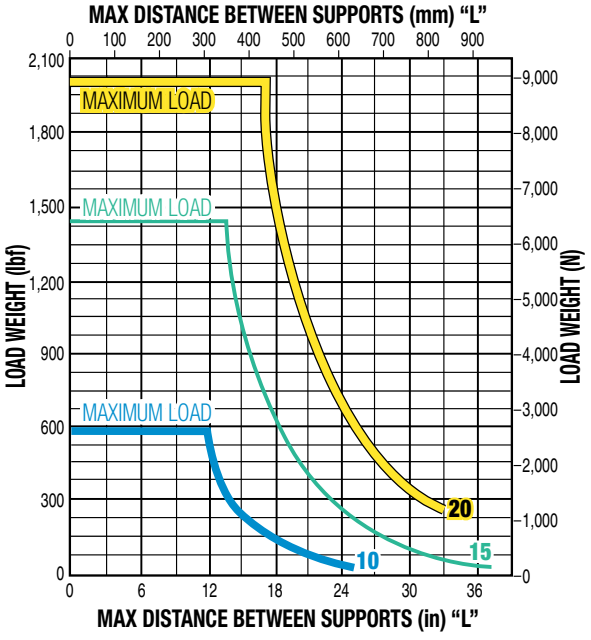
DEFLECTION ABOUT Y AXIS

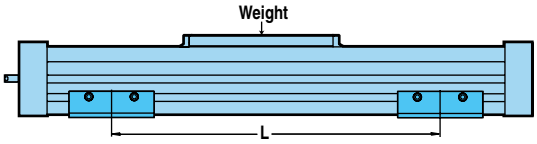




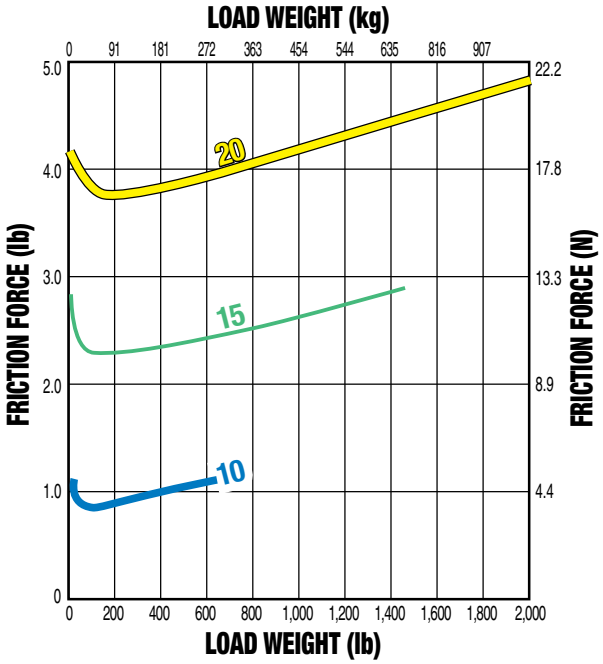


SUPPORT RECOMMENDATIONS





FRICTION FORCE



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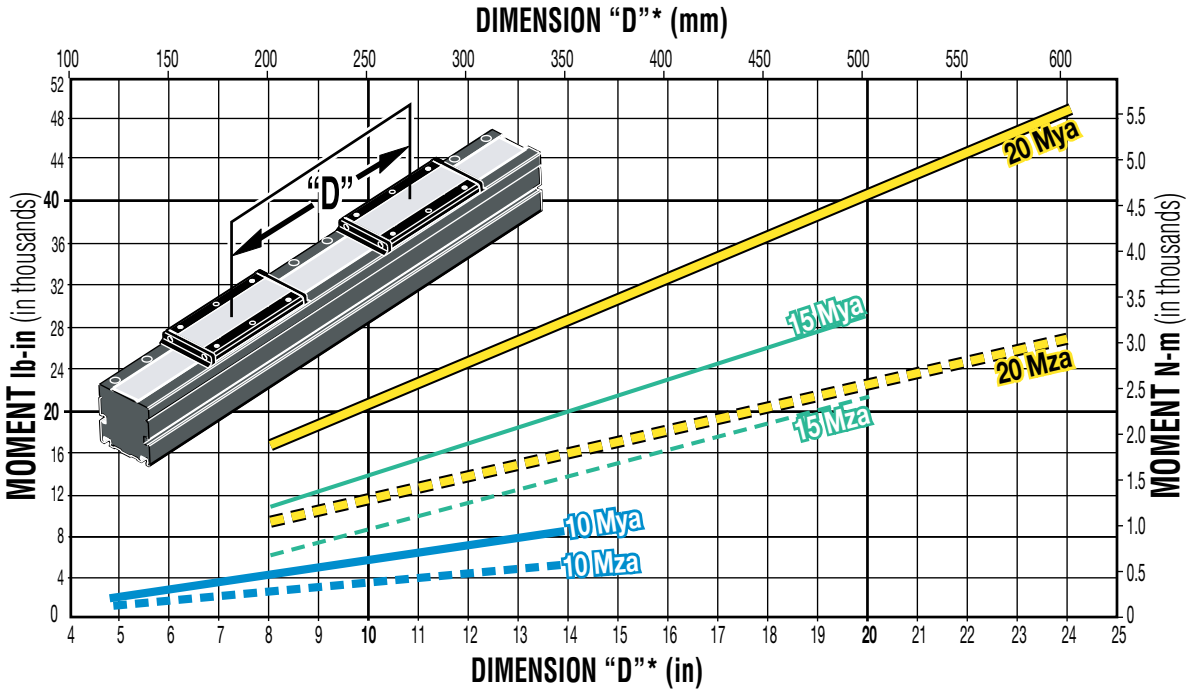
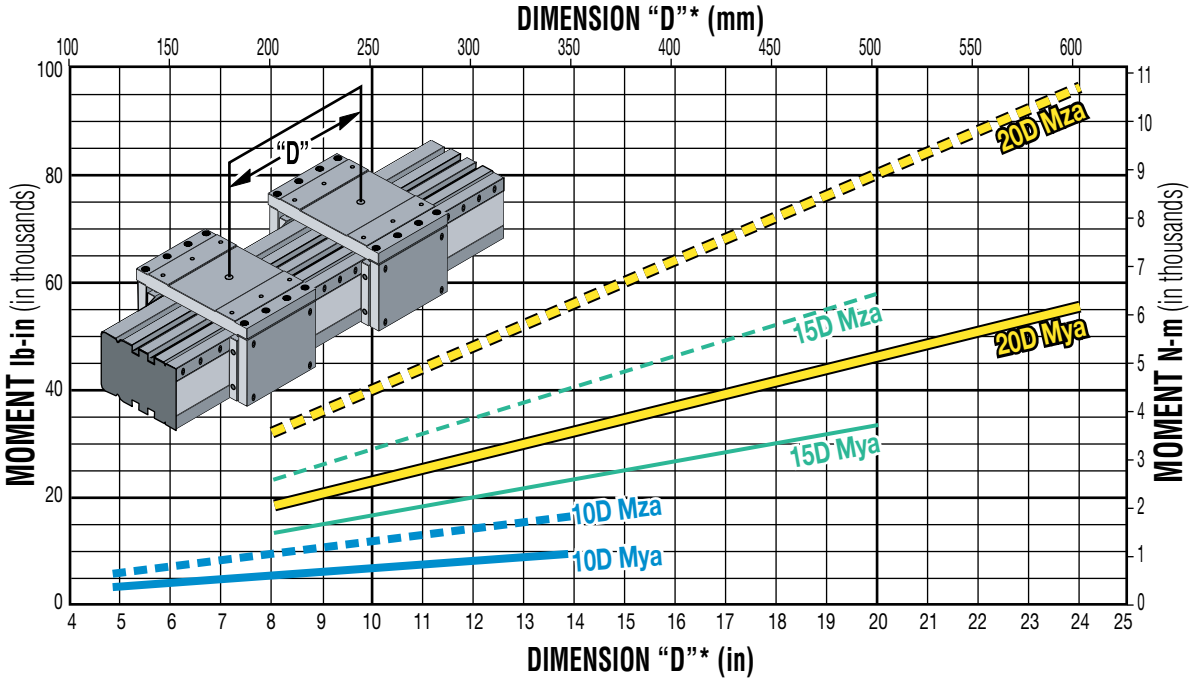
AUXILIARY CARRIER: BENDING MOMENT AT 'D' DISTANCE



AUXILIARY DUAL 180° CARRIER: BENDING MOMENT AT 'D' DISTANCE



Rates shown on both graphs 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) when ordering.

Life of the actuator will vary for each application depending on the combined loads, motion parameters and operating conditions. The load factor (L_F) ratios for each application must not exceed a value of 1 (see formula at right). Exceeding a load factor of 1 will diminish the actuator's rated life.

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

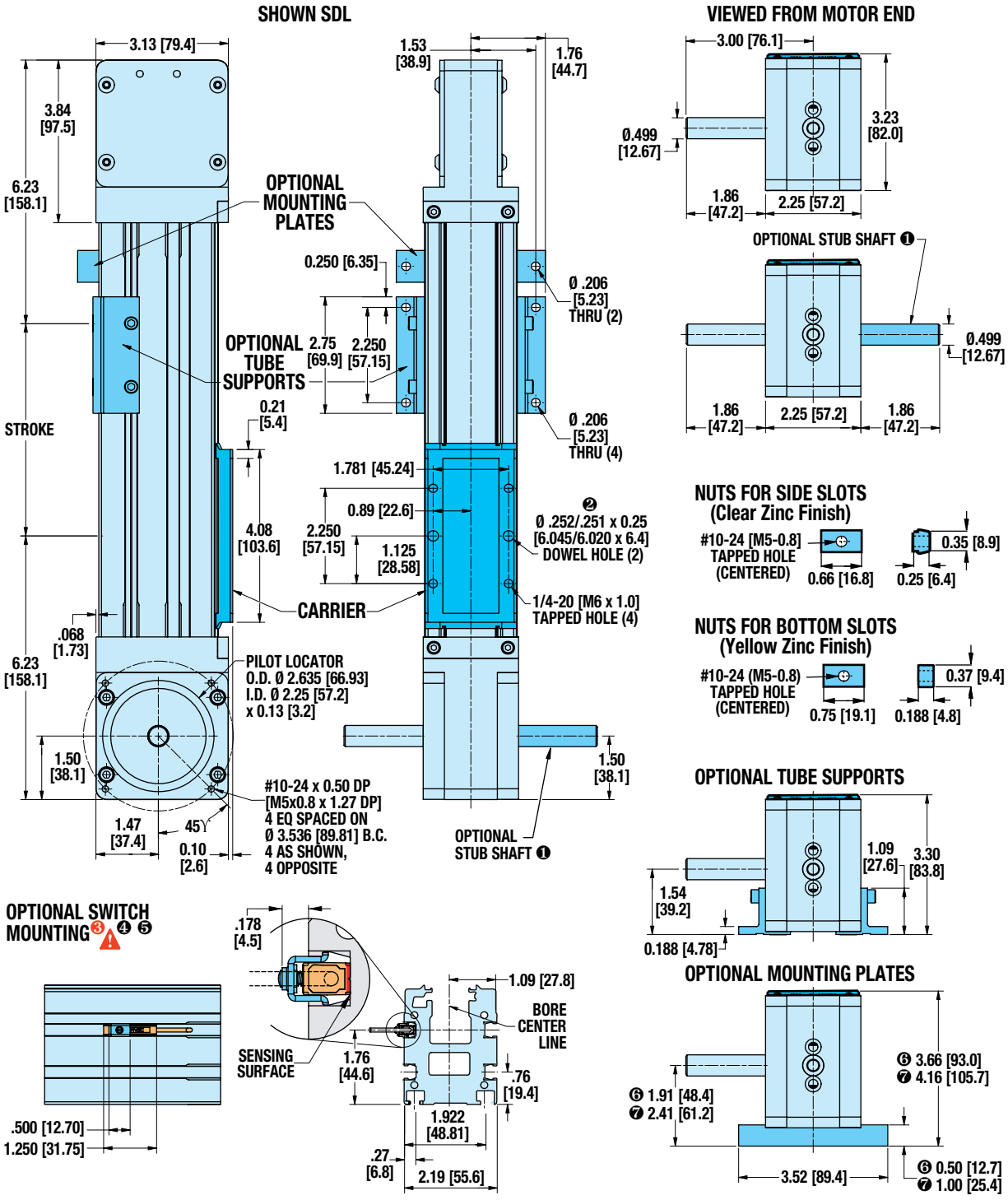
With combined loads, L_F must not exceed the value 1.

B3W10 Rodless Belt Driven Actuator

DIMENSIONS

3D CAD AVAILABLE AT WWW.TOLOMATIC.COM

B3W10 ACTUATOR AND OPTIONS



❶ ONE STUB SHAFT IS STANDARD ON ALL B3W ACTUATORS

❷ DOWEL PINS ⌖ .003 (.08mm) Ⓜ

❸ ⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

❹ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

❺ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details

❻ WHEN USED WITH 23-FRAME MOTORS

❼ WHEN USED WITH 34-FRAME MOTORS

Unless otherwise noted, all dimensions shown are in inches [Dimensions in brackets are in millimeters]

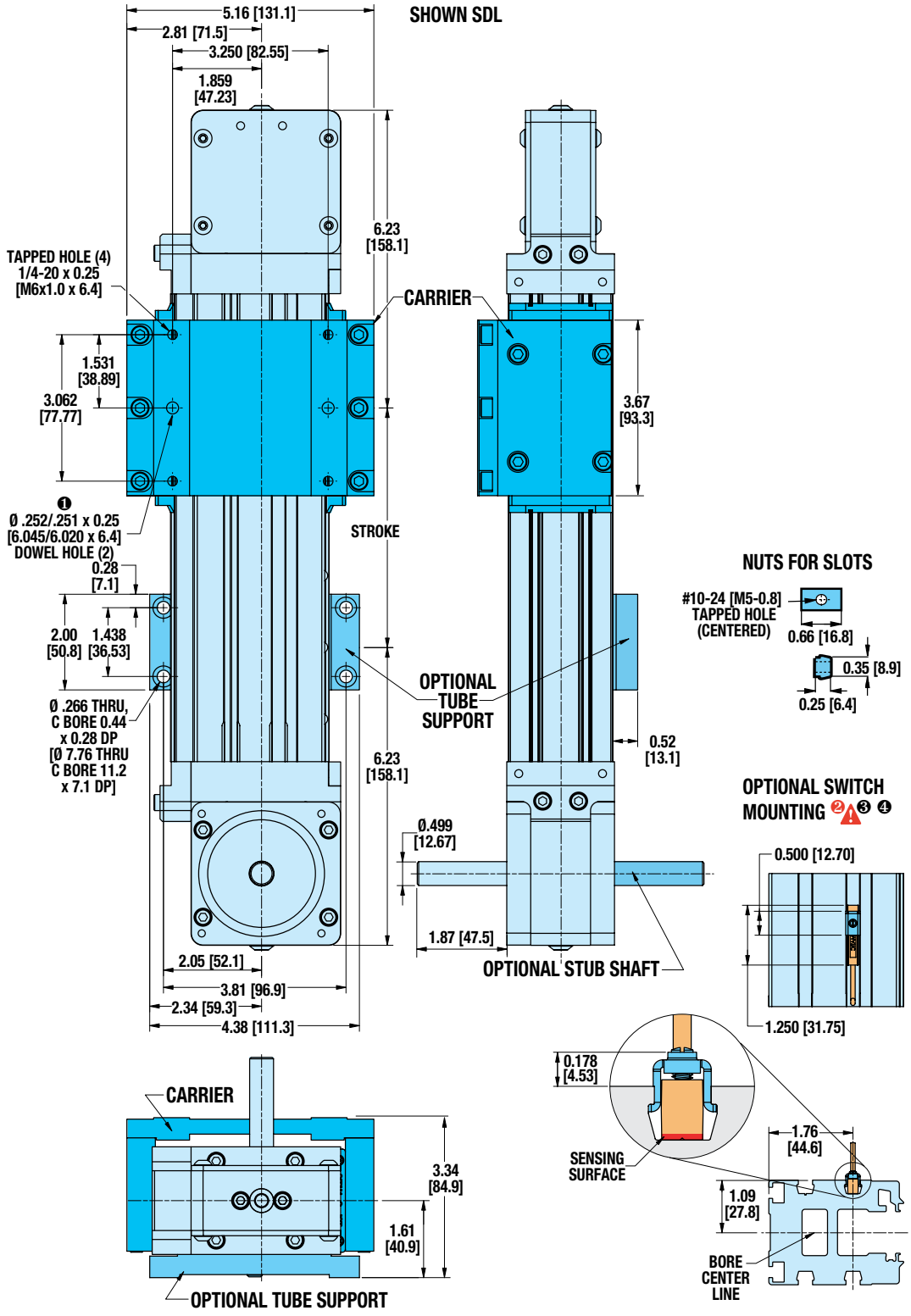
B3W10 Rodless Belt Driven Actuator

DIMENSIONS

3D CAD AVAILABLE AT WWW.TOLOMATIC.COM

WWW.3DCONTENTCENTRAL.COM

B3WD10 DUAL 180° OPTION



❶ DOWEL PINS ⌖ .003 (.08mm) Ⓜ

❷⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

❸ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

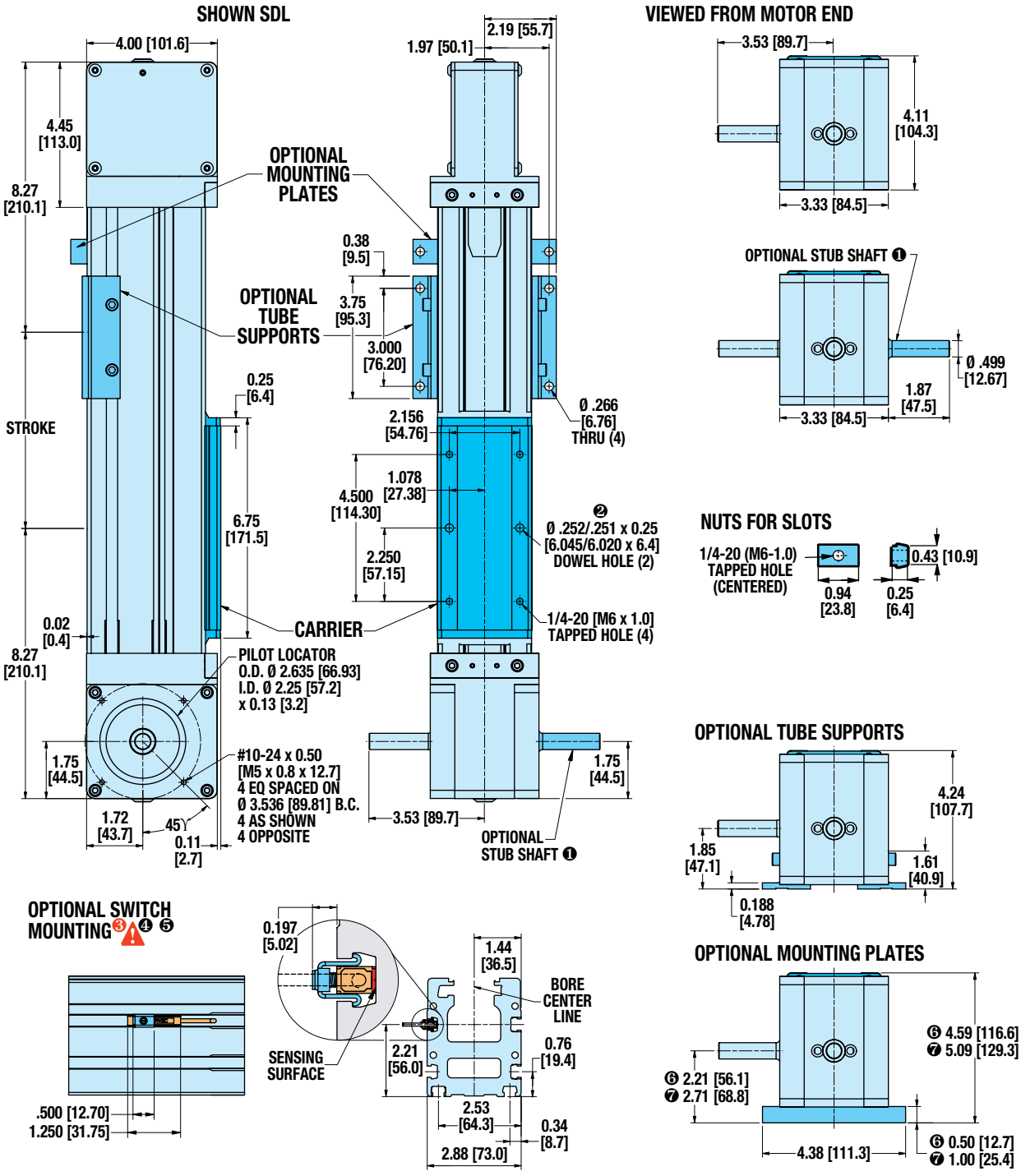
❹ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details

B3W15 Rodless Belt Driven Actuator

DIMENSIONS

3D CAD AVAILABLE AT WWW.TOLOMATIC.COM

B3W15 ACTUATOR AND OPTIONS



❶ ONE STUB SHAFT IS STANDARD ON ALL B3W ACTUATORS

❷ DOWEL PINS ⌖ .003 (.08mm) Ⓜ

❸ ⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

❹ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

❺ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details

❻ WHEN USED WITH 23-FRAME MOTORS

❼ WHEN USED WITH 34-FRAME MOTORS

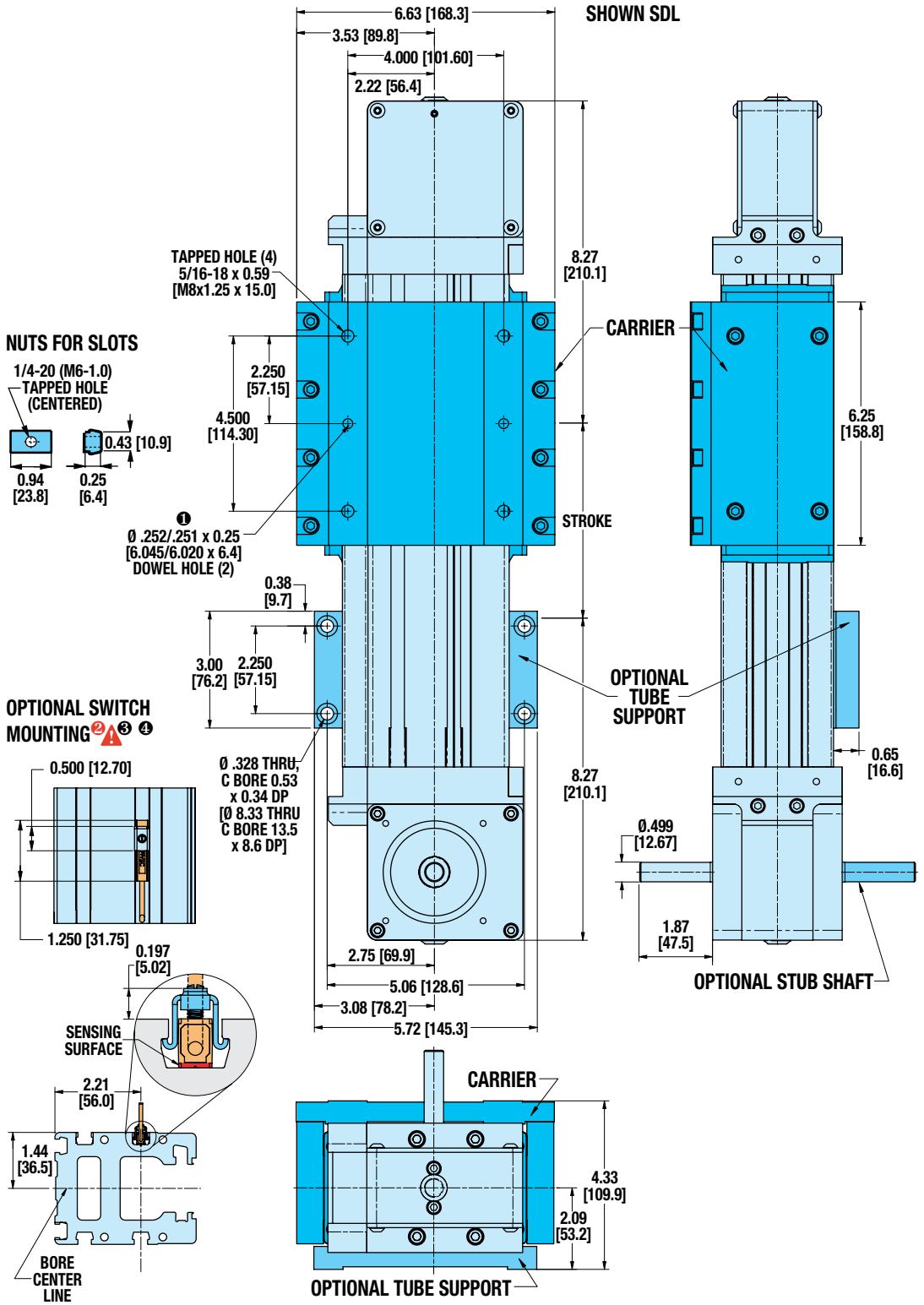
Unless otherwise noted, all dimensions shown are in inches [Dimensions in brackets are in millimeters]

DIMENSIONS

3D CAD AVAILABLE AT WWW.TOLOMATIC.COM

WWW.3DCONTENTCENTRAL.COM

B3WD15 DUAL 180° OPTION



❶ DOWEL PINS ⌖ .003 (.08mm) Ⓜ

❷ ⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

❸ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

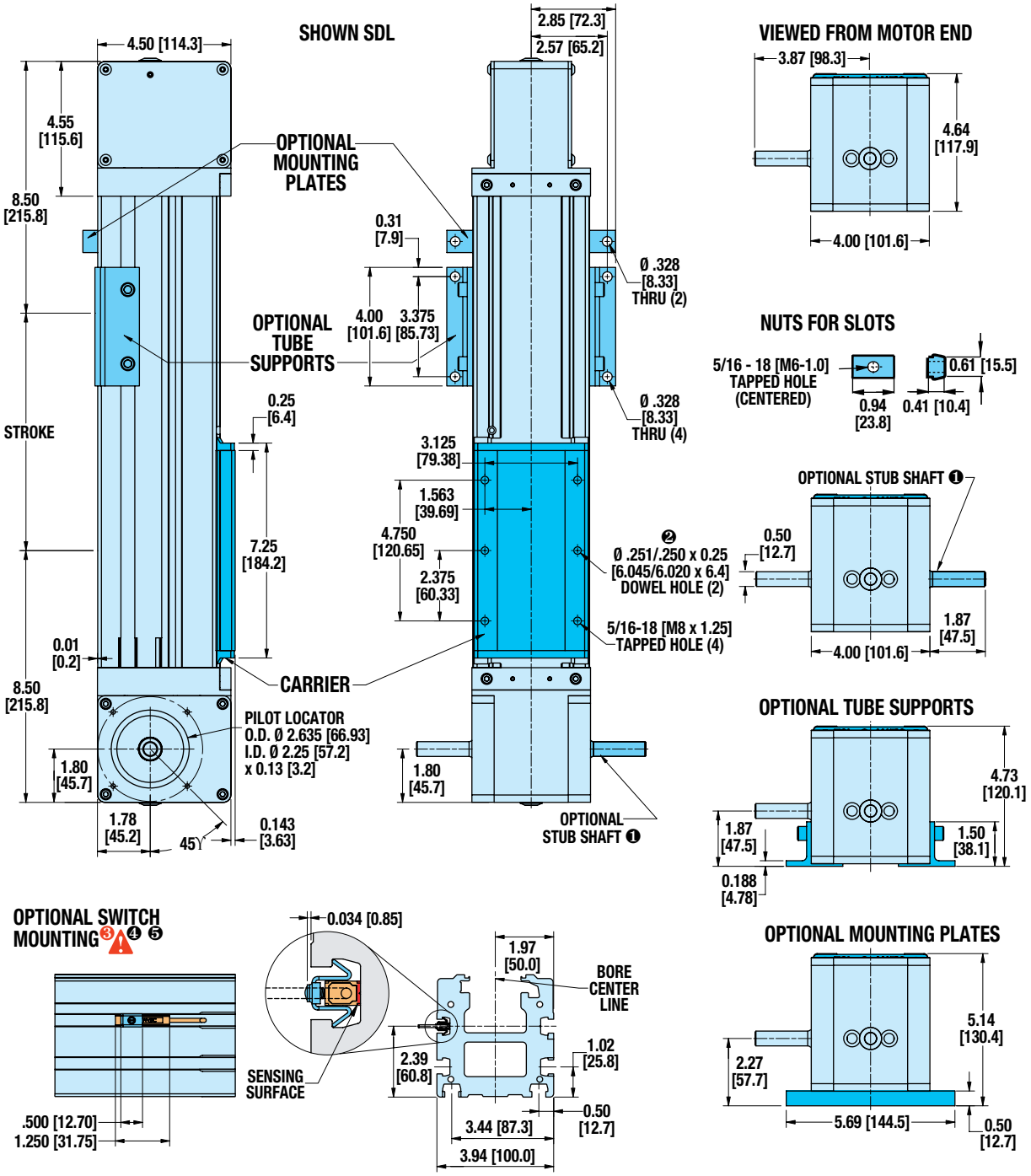
❹ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details

B3W20 Rodless Belt Driven Actuator

DIMENSIONS

3D CAD AVAILABLE AT WWW.TOLOMATIC.COM

B3W20 ACTUATOR AND OPTIONS



❶ ONE STUB SHAFT IS STANDARD ON ALL B3W ACTUATORS

❷ DOWEL PINS ⌖ | .003 (.08mm) | Ⓜ

❸ ⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

❹ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

❺ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details

Unless otherwise noted, all dimensions shown are in inches [Dimensions in brackets are in millimeters]

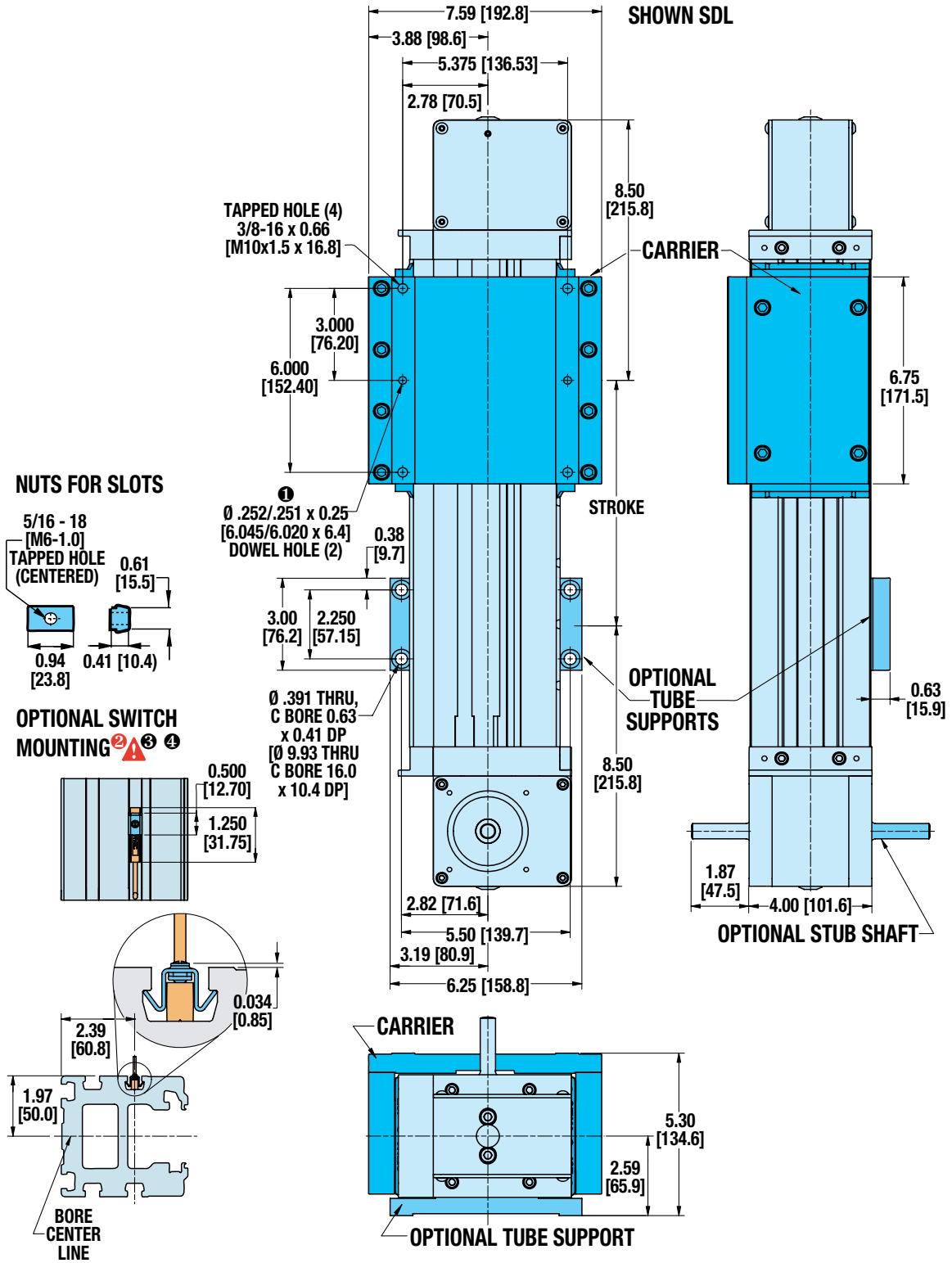
B3W20 Rodless Belt Driven Actuator

DIMENSIONS

3D CAD AVAILABLE AT WWW.TOLOMATIC.COM

WWW.3DCONTENTCENTRAL.COM

B3WD20 DUAL 180° OPTION



❶ DOWEL PINS ⌖ .003 (.08mm) Ⓜ

❷ ⚠ CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

❸ NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet

❹ NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details

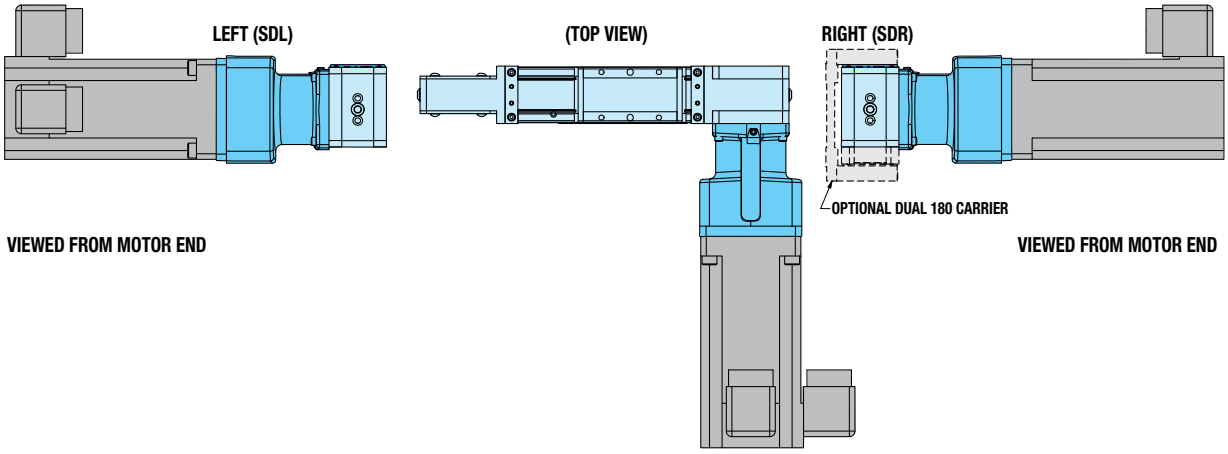
B3W Rodless Belt Driven Actuator

MOTOR ORIENTATION

3D CAD AVAILABLE AT WWW.TOLOMATIC.COM

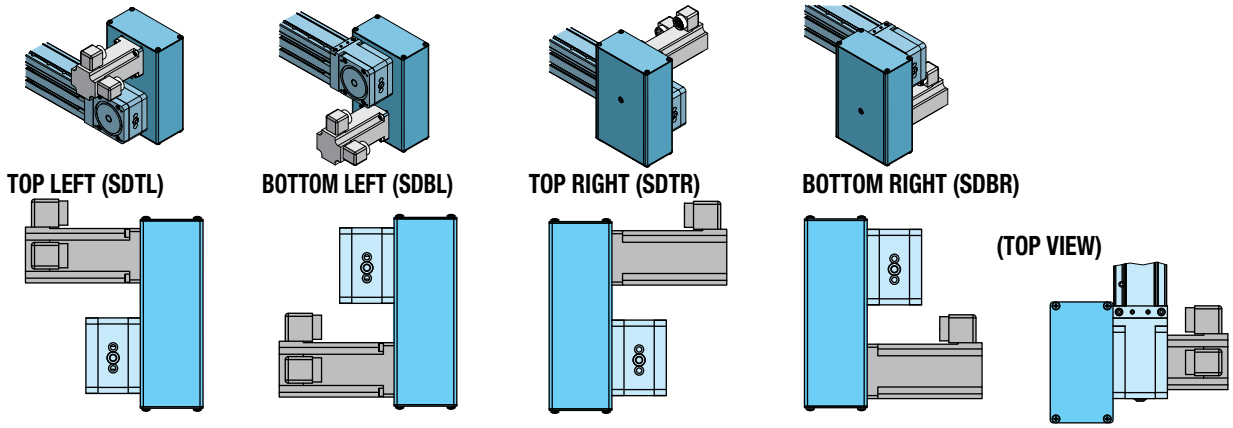
WWW.3DCONTENTCENTRAL.COM

B3W DIRECT DRIVE MOTOR MOUNTING

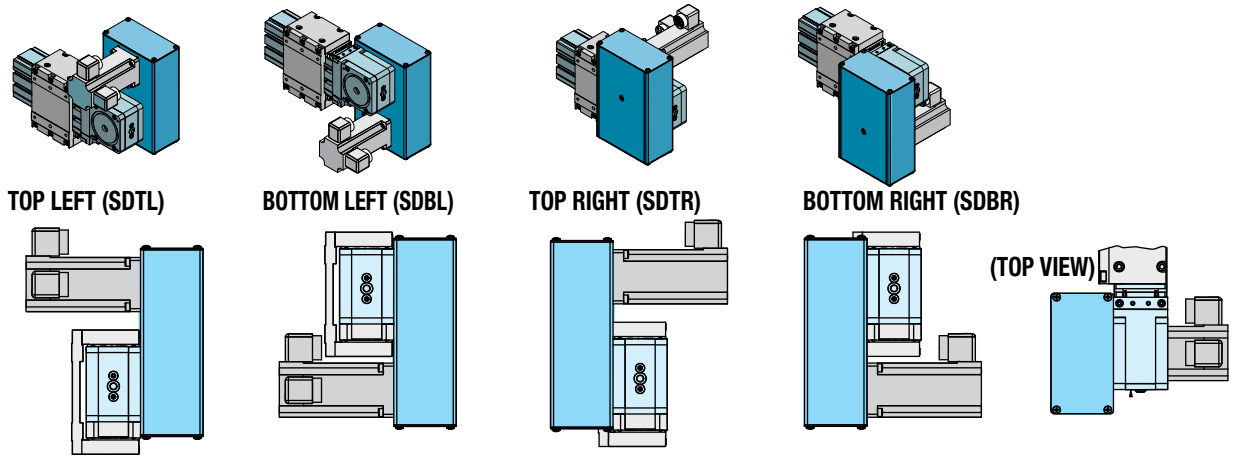


B3W(D)10 REDUCTION DRIVE MOTOR MOUNTING

STANDARD CARRIER



DUAL 180° CARRIER

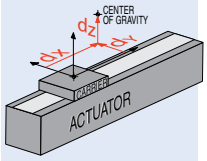


APPLICATION DATA WORKSHEET

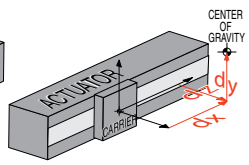
Fill in known data. Not all information is required for all applications

ORIENTATION

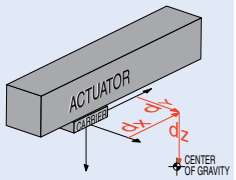
☐ Horizontal



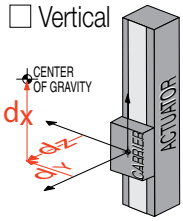
☐ Side



☐ Horizontal Down

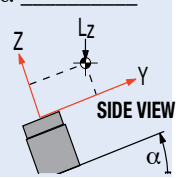


☐ Vertical

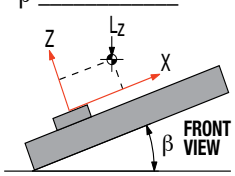


☐ Angled °

α _____



β _____



☐ Load attached to carrier OR ☐ Load supported by other mechanism

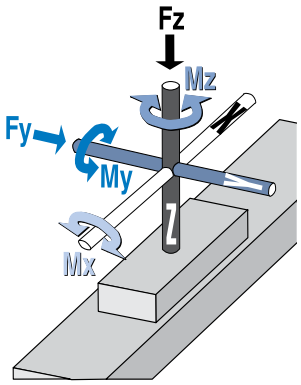
DISTANCE FROM CENTER OF CARRIER TO LOAD CENTER OF GRAVITY

d_x _____
d_y _____
d_z _____

☐ inch (U.S. Standard) ☐ millimeters (Metric)

STROKE LENGTH _____

☐ inch (SK) (U.S. Standard)



BENDING MOMENTS APPLIED TO CARRIER

M_x _____
M_y _____
M_z _____

☐ in.-lbs. (U.S. Standard) ☐ N-m (Metric)

PRECISION

Repeatability _____

☐ inch ☐ millimeters

OPERATING ENVIRONMENT

Temperature, Contamination, etc.

_____

_____

_____

NOTE: If load or force on carrier changes during cycle use the highest numbers for calculations

LOAD _____

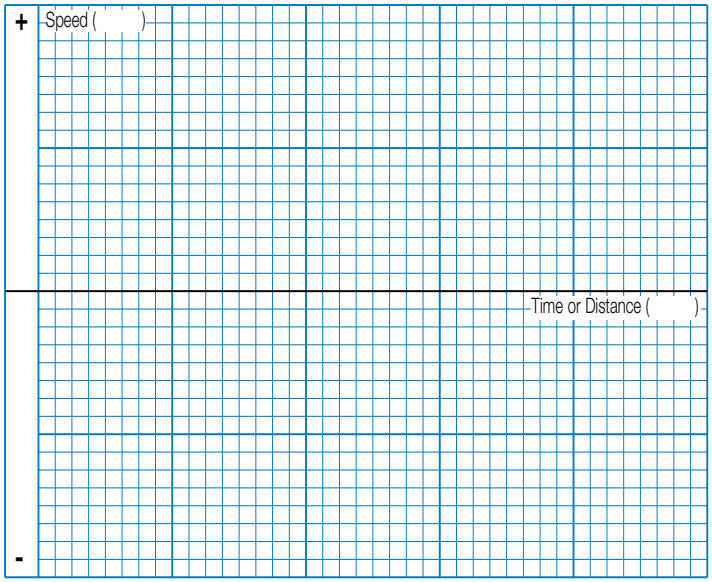
☐ lb. (U.S. Standard) ☐ kg. (Metric)

FORCES APPLIED TO CARRIER

F_z _____
F_y _____

☐ lbf. (U.S. Standard) ☐ N (Metric)

MOTION PROFILE



Graph your most demanding cycle, including accel/decel, 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.

MOVE PROFILE

Move Distance _____

☐ inch ☐ millimeters

Dwell Time After Move _____

Max. Speed _____

☐ in/sec ☐ mm/sec

MOVE TIME _____

☐ sec

NO. OF CYCLES _____

☐ per minute ☐ per hour

CONTACT INFORMATION

Name, Phone, Email _____

Co. Name, Etc. _____

_____

STOP **USE THE TOLOMATIC SIZING AND SELECTION SOFTWARE AVAILABLE ON-LINE AT www.tolomatic.com OR... CALL TOLOMATIC AT 1-800-328-2174.** We will provide any assistance needed to determine the proper actuator for the job.

FAX 1-763-478-8080 **EMAIL help@tolomatic.com**

SELECTION GUIDELINES

The process of selecting a belt driven 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.

1 CHOOSE ACTUATOR SIZE

Choose an actuator that has the thrust, speed and moment load capacity to move the load.

A) For maximum thrust use the table below.

B) Maximum speed of B3W 200 in/sec (5 m/sec).

C) For B3W moment and load capacities see tables on page 9.

SIZE	MAXIMUM THRUST	
	lbf	N
10	150	*667*
15	250	*1112*
20	325	*1445*

2 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 improved actuator performance and application safety. If either load or any of the moments exceed figures indicated in the Moment and Load Capacity tables (page 9) for the actuator consider:

1) A larger actuator size

2) Auxiliary carrier

3) Dual 180° carrier

3 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.

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

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

4 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 deceleration rates of the move. Acceleration/deceleration should not exceed 1200 in/sec^2 (30.48 m/sec^2). Also, do not exceed safe rates of dynamic inertia moments determined in step #3.

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 of the Tolomatic Electric Products Catalog (#3600-4609) to calculate the application thrust and torque requirements. Refer to Motor sections to determine the motor and drive.

6 DETERMINE MOUNTING PLATE REQUIREMENTS

- Consult the Mounting Plate Requirements graph for the model selected (page 10)
- Cross reference the application load and maximum distance between supports
- Select the appropriate number of mounting plates

7 CONSIDER OPTIONS

- Choose metric or inch (U.S. standard) mounting. When ordering use S K and indicate stroke length in inches.
- Switches - Reed, Hall-effect PNP or NPN and Triac

USE THE TOLOMATIC SIZING AND SELECTION SOFTWARE AVAILABLE ON-LINE AT www.tolomatic.com OR... CALL TOLOMATIC AT 1-800-328-2174. We will provide any assistance needed to determine the proper MX actuator for the job.

B3W Rodless Belt Driven Actuator

SWITCHES

There are 10 sensing choices for this actuator: 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 eiter 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 internal 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

	Order Code	Part Number	Lead	Switching Logic	Cable Shielding	Cable Minimum Bend Radius Static	Cable Minimum Bend Radius Dynamic	Power LED	Signal LED	Operating Voltage	**Power Rating (Watts)	Voltage Drop	Current Consumption	Temp. Range
REED DC	RT	3600-9082	5m	"A" Normally Open	Unshielded	0.630" [16mm]	not recommended	None	Red	200 Vdc max.	10.0§	2.6 V typical at 100 mA	—	-40° to 158° F [-40° to 70° C]
	RM	3600-9083	QD*		Shielded†	0.630" [16mm]	1.260" [32mm]	TOL-O-MATIC						
	BT	3600-9084	5m	"C" Normally Open or Closed	Unshielded	0.630" [16mm]	not recommended	None	None	120 Vdc max.	3.0§§	NA		
	BM	3600-9085	QD*		Shielded†	0.630" [16mm]	1.260" [32mm]							
REED AC	CT	3600-9086	5m	Triac Normally Open	Unshielded	0.630" [16mm]	not recommended	None	None	120 Vac max.	10.0	—	1 Amp at 86° F [30°C]	
	CM	3600-9087	QD*		Shielded†	0.630" [16mm]	1.260" [32mm]						0.5 Amp at 140° F [60°C]	
HALL - EFFECT DC	TT	3600-9088	5m	PNP (Sourcing) Normally Open	Unshielded	0.630" [16mm]	not recommended	None	Red	5 - 25 Vdc	5.0	—	200mA @25Vdc	
	TM	3600-9089	QD*		Shielded†	0.630" [16mm]	1.260" [32mm]	TOL-O-MATIC						
	KT	3600-9090	5m	NPN (Sinking) Normally Open	Unshielded	0.630" [16mm]	not recommended	None	Red					
	KM	3600-9091	QD*		Shielded†	0.630" [16mm]	1.260" [32mm]	TOL-O-MATIC						

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.

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

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

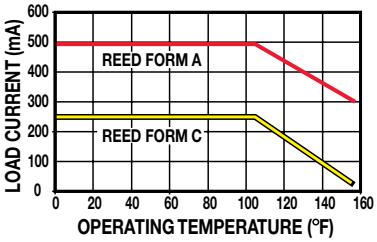
§§ Maximum current 250mA (not to exceed 3VA) Refer to Temperature vs. Current graph and Voltage Derating graph

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

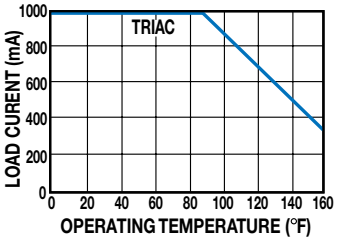
B3W Rodless Belt Driven Actuator

SWITCHES

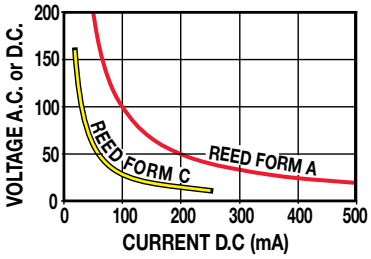
TEMP. vs CURRENT, DC REED



TEMP. vs CURRENT, AC REED

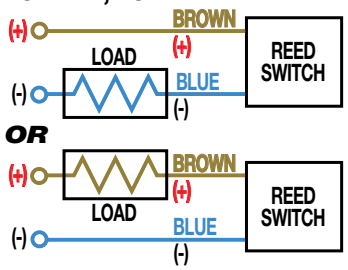


VOLTAGE DERATING, DC REED

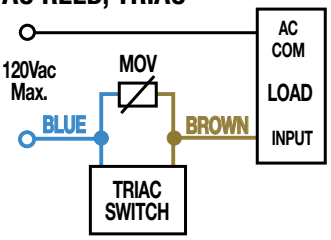


WIRING DIAGRAMS

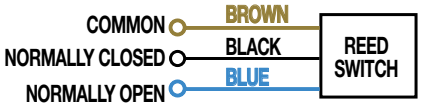
DC REED, FORM A



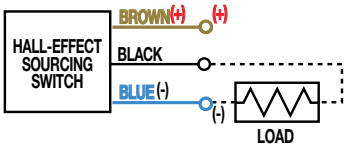
AC REED, TRIAC



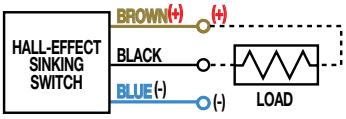
DC REED, FORM C



HALL-EFFECT, SOURCING, PNP



HALL-EFFECT, SINKING, NPN



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

⚠ **THE NOTCHED GROOVE IN THE ACTUATOR INDICATES THE GROOVE TO INSTALL THE SWITCH.** CONTACT TOLOMATIC IF SWITCHES ARE REQUIRED ON ANOTHER SIDE OF ACTUATOR.

B3W Rodless Belt Driven Actuator

ORDERING

5 DAYS BUILT-TO-ORDER

BASE MODEL SPECIFICATIONS **OPTIONS SPECIFICATIONS**

B3WD 20 BWS40 SK56 SDTR DC18 TS2 BM2 TN16

MODEL TYPE

B3W	B3W Series Belt Drive
B3WD	B3W Series Belt Drive with Dual 180˚ Carrier
M3W*	B3W Series Metric Belt Drive
M3WD*	B3W Series Metric Belt Drive with Dual 180˚ Carrier

**** The M3W metric version provides metric tapped holes for mounting of the load to the carrier and of the actuator to mounting surfaces***

TUBE BORE DIAMETER

10	1-inch (25 mm) bore
15	1 1/2-inch (40 mm) bore
20	2-inch (50 mm) bore

BELT MATERIAL AND WIDTH

BWS18	18mm Polyurethane Steel belt (B3W10)
BWS30	30mm Polyurethane Steel belt (B3W15)
BWS40	40mm Polyurethane Steel belt (B3W20)

STROKE LENGTH

SK_ _ _._ _ _ Stroke, enter desired stroke length in decimal inches

MOTOR MOUNTING / REDUCTIONS

(must choose one)

SDL, SDLB*	Direct Drive on left
SDR, SDRB*	Direct Drive on right

⚠ ***A motor size and code must be selected when specifying a 3:1 reduction. Reference the ordering pages* in sections F, G and H for the motor types and selections.***

SDTL, SDTLB*	3:1 Reduction on top left
SDTR, SDTRB*	3:1 Reduction on top right
SDBL, SDBLB*	3:1 Reduction on bottom left
SDBR, SDBRB*	3:1 Reduction on bottom right

**** For Dual Stub Shaft option***

AUXILIARY CARRIER

DC_ _ _._ _ _ Auxiliary Carrier, enter 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

GEARBOX, CONTROLS, MOTORS

Brushless Servo	Motors & Controls: 3600-4609, see F Section
Stepper	Motors & Controls: see Literature #3600-4160
Gearbox	See Literature #3600-4161

SUPPORTS AND MOUNTING PLATES

(both may be selected)

TS _	Tube Supports, enter quantity desired
MP_	Mounting Plates, enter quantity desired

SWITCHES

CODE	TYPE		QUICK-DISCONNECT	LEAD LENGTH	QUANTITY
RM	REED	Form A	QD	5 meters	After code enter quantity desired
RT			no		
BM		Form C	QD		
BT			no		
KM	HALL-EFFECT	Sinking	QD		
KT			no		
TM		Sourcing	QD		
TT			no		
CM	TRIAC		QD		
CT			no		

T-NUTS

TN _ Additional T-Nuts, enter quantity

⚠ ***Not all codes listed are compatible with all options.***

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

FIELD RETROFIT KITS

ITEM	B3W10	B3W15	B3W20	M3W10	M3W15	M3W20
Tube Supports	3410-9006	3415-9006	3420-9006	4410-9006	4415-9006	4420-9006
Tube Supports (B3WD Dual 180˚ models)	3410-9170	3415-9170	3420-9170	4410-9170	4415-9170	4420-9170
1/2" Mounting Plates (MRV 23-frame motors)	3410-9056	3415-9056	—	4410-9030	4415-9030	—
1/2" Mounting Plates (MRV all frame motors)	—	—	3420-9056	—	—	4420-9030
1" Mounting Plates (MRV all frame motors)	3410-9057	—	—	4410-9031	—	—
1" Mounting Plates (MRV 34-frame motors)	—	3415-9057	—	—	4415-9031	—

THE TOLOMATIC DIFFERENCE What you expect from the industry leader:

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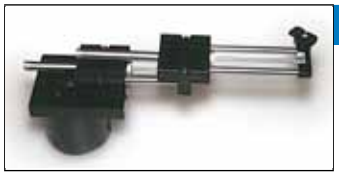
INDUSTRY LEADING DELIVERIES

Standard catalog products are built to order and ready-to-ship in 5 days or less. Modified and custom products ship weeks ahead of the competition.



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From standard catalog products... to modified products... to completely unique custom products, Tolomatic designs and builds the best solutions for your challenging applications.

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