B3S & B3W ELECTRIC
RODLESS ACTUATORS

ENDURANCE TECHNOLOGY™
B3S SCREW-DRIVE
B3W BELT-DRIVE

LINEAR SOLUTIONS MADE EASY

OFFICIAL UK & IRELAND DISTRIBUTOR
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Tolomatic B3S & B3W Electric Rodless Actuators

The Power to Move Heavy Loads
The B3S and B3W electric rodless actuators have very large moment and load carrying capacities. The sealed recirculating ball bearing design makes it an excellent choice for challenging environments. For even higher capacity (loads up to 3,629 kg) choose the Dual 180° Carrier and add an auxiliary carrier. Both actuators utilize a patented internal re-circulating ball bearing guidance system that provides extremely long life. These actuators are capable of carrying loads up to 3,629 kg [8,000 lbs].

A COMPARISON OF SCREW DRIVE ACTUATORS

<table>
<thead>
<tr>
<th>B3S</th>
<th>MXE-S</th>
<th>MXE-P</th>
<th>TKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features:</td>
<td>High load and bending moment capacities</td>
<td>Basic guidance and support</td>
<td>High load and bending moment capacities</td>
</tr>
<tr>
<td>Load up to: (with options)</td>
<td>35.6 kN [8,000 lbf]</td>
<td>4.6 kN [1,040 lbf]</td>
<td>11.5 kN [2,584 lbf]</td>
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<tr>
<td>Speed up to:</td>
<td>1.5 m/sec [60 in/sec]</td>
<td>1.5 m/sec [60 in/sec]</td>
<td>1.5 m/sec [60 in/sec]</td>
</tr>
<tr>
<td>Stroke Length up to:</td>
<td>4.5 m [179 in]</td>
<td>4.5 m [179 in]</td>
<td>4.5 m [179 in]</td>
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<tr>
<td>Screw/Nut Type</td>
<td>Solid &amp; Ball</td>
<td>Solid &amp; Ball</td>
<td>Solid &amp; Ball</td>
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</table>

www.tolomatic.com for complete information, search by literature number:

Literature Number: 3600-4176 8300-4000 8300-4000 3600-4609

A COMPARISON OF BELT DRIVE ACTUATORS

<table>
<thead>
<tr>
<th>B3W</th>
<th>MXB-U</th>
<th>MXB-P</th>
<th>TKB</th>
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</thead>
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<tr>
<td>Features:</td>
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<td>Basic thrust, requires external guidance and support</td>
<td>High load and bending moment capacities</td>
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<tr>
<td>Load up to: (with options)</td>
<td>35.6 kN [8,000 lbf]</td>
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<td>11.5 kN [2,584 lbf]</td>
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<td>Thrust up to:</td>
<td>1.4 kN [325 lbf]</td>
<td>1.9 kN [418 lbf]</td>
<td>1.9 kN [418 lbf]</td>
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<td>Speed up to:</td>
<td>5.1 m/sec [200 in/sec]</td>
<td>5.1 m/sec [200 in/sec]</td>
<td>3.8 m/sec [150 in/sec]</td>
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<tr>
<td>Stroke Length up to:</td>
<td>5.3 m [207 in]</td>
<td>5.8 m [230 in]</td>
<td>5.8 m [230 in]</td>
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</tbody>
</table>

www.tolomatic.com for complete information, search by literature number:

Literature Number: 3600-4176 8500-4000 8500-4000 3600-4609

(Not all models deliver ALL maximum values listed, i.e.: Maximum thrust may not be available with maximum speed)
B3S & B3W Applications

Applying, Dispensing
- Spraying
- Cutting
- Slitting
- Test Fixtures
- Inspection

Storage & Retrieval
- Parts Transfer
- Pick & Place
- Stacking
- Sorting

X-Y Gantry/Multi Axis
- Laser marking
- Material cutting
- Adhesive dispensing

High Speed Flying Cut Off
- Test stations
- Product handling
- Camera positioning

CONTENTS
Rodless Comparisons........B3_2
B3S & B3W Applications ....B3_3
B3S Features.................B3_4
B3W Features...............B3_6
B3S & B3W Performance.....B3_8
B3S Specifications..........B3_9
  Critical Speed (Acme)......B3_13
  PV Limits (Acme)..........B3_14
  Critical Speed (Ball).....B3_15
  Ball Screw Life............B3_16
B3S Dimensions ..........B3_17-24
B3W Performance..........B3_25
B3W Specifications........B3_26
B3W Dimensions ..........B3_28-34
Switches....................B3_34
Application Data
  Worksheet..................B3_36
  Selection Guidelines.....B3_37
B3s Ordering.............B3_39
B3W Ordering.............B3_39
Other Tolomatic
  Products..................B3_40

Tolomatic
EXCELLENCE IN MOTION
The B3S rodless screw-drive electric actuator is designed for carrying moderate to heavy loads with large bending moment capacity. The B3S utilizes an integral recirculating ball bearing guidance system that provides durable performance and extremely long life. Choose from multiple screw technologies for thrust up 12 kN [2,700 lbf]. Built-to-order in stroke lengths up to 4.5 m [179 inches].

**LOAD-BEARING CARRIER DESIGN**
- Load and moments are transmitted directly to the actuator body

**FORMED END CAP WIPERS**
- Prevent contaminants from entering the sealing band area to protect internal components

**INTERNAL BUMPER**
- Bumpers protect the screw and nut assembly from damage at end of stroke

**STAINLESS STEEL SEALING BAND**
- Prevents contaminants from entering the screw and nut 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 screw nut

**MULTIPLE SCREW TECHNOLOGIES**
- Solid nuts of bronze or engineered resins offer quiet performance at the lowest cost; anti-backlash available
- Ball nuts offer positioning accuracy and repeatability with longer life; low-backlash available

Endurance Technology features are designed for maximum durability to provide extended service life.
YOU CAN CHOOSE:
• Specify the device to be installed and actuator ships with proper mounting hardware
• Specify and ship your device to Tolomatic for factory installation
• Motor or gearbox supplied and installed by Tolomatic

YOU CAN CHOOSE:
• Inline option directly couples the driving shaft and is typically a one-piece housing construction for optimum alignment and support of the motor
• Reverse-parallel option minimizes the overall length and offers a belt reduction drive with a 1:1 or 2:1 ratio

OPTIONS
CARRIER OPTIONS
• AUXILIARY CARRIER doubles the load capacity and increases pitch and yaw bending moment capacities
• DUAL 180° CARRIER doubles 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
• MOUNTING PLATES provide intermediate support of the actuator body throughout long stroke lengths

METRIC OPTION
Provides metric tapped holes for mounting of load to carrier and of actuator to mating surfaces

SWITCHES
Styles include: reed, hall-effect or triac. Select either 5 m potted cable with flying leads or 150 mm to quick-disconnect coupler with mating 5 m cable
The B3W rodless belt-drive electric actuator is designed for carrying moderate to heavy loads at moderate to high speeds with large bending moment capacity. The B3W utilizes an integral recirculating ball bearing guidance system that provides durable performance and extremely long life. The B3W belt-driven actuator features speeds up to 5.1 m/sec [200 in/sec]. Built-to-order in stroke lengths up to 5.3 m [207 inches].

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

YOU CAN CHOOSE:
• Direct drive option directly couples the driving shaft and is typically a one-piece housing construction for optimum alignment and support of the motor
• Reduction drive option minimizes the overall length and offers a belt reduction drive with a 1:1 or 2:1 ratio

YOU CAN CHOOSE:
• Polyurethane steel-cord reinforced HTD style belt (standard)
• Polyurethane Kevlar reinforced HTD style belt

Endurance Technology features are designed for maximum durability to provide extended service life.

Endurance Technology features are designed for maximum durability to provide extended service life.

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

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

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

MOTOR ORIENTATION
YOU CAN CHOOSE:
• Direct drive option directly couples the driving shaft and is typically a one-piece housing construction for optimum alignment and support of the motor
• Reduction drive option minimizes the overall length and offers a belt reduction drive with a 1:1 or 2:1 ratio

OVERSIZED PULLEY BEARINGS
• Drive shaft assembly incorporates sealed ball bearings for complete support of the increased belt tension at high speeds
Tolomatic™...MAXIMUM DURABILITY

EXCELLENCE IN MOTION

RECIRCULATING BALL BEARING SYSTEM
- Unique design incorporates hardened steel raceways integral to the aluminum extrusion
- Bearing surfaces are adjusted at the factory for optimum preload and smooth performance
- Recirculating ball bearing system provides guidance, high efficiency and durability

FORMED END CAP WIPERS
- Prevent contaminants from entering the sealing band area to protect internal components

LOAD-BEARING CARRIER DESIGN
- Load and moments are transmitted directly to the actuator body

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 belt and pulley 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 interior components

OPTIONS

CARRIER OPTIONS
- AUXILIARY CARRIER doubles the load capacity and increases pitch and yaw bending moment capacities
- DUAL 180° CARRIER doubles 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
- MOUNTING PLATES provide intermediate support of the actuator body throughout long stroke lengths
- METRIC OPTION Provides metric tapped holes for mounting of load to carrier and of actuator to mating surfaces
- SWITCHES Styles include: reed, hall-effect or triac. Select either 5 m potted cable with flying leads or 150 mm to quick-disconnect coupler with mating 5 m cable
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 18.

**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 1.5 (see formula at right). Exceeding a load factor of 1.5 will diminish the actuator’s rated life.**

\[
L_F = \frac{M_x}{M_{x\max}} + \frac{M_y}{M_{y\max}} + \frac{M_z}{M_{z\max}} + \frac{F_y}{F_{y\max}} + \frac{F_z}{F_{z\max}} \leq 1.5
\]

With combined loads, L_F must not exceed the value 1.5.
B3S & B3W Electric Rodless Actuators

SPECIFICATIONS both Screw & Belt Drive

**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 = 330mm, My = 203mm)

**DEFLECTION ABOUT Y AXIS**

**SUPPORT RECOMMENDATIONS**

**FRICTION FORCE**
AUXILIARY 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 1.5 (see formula at right). Exceeding a load factor of 1.5 will diminish the actuator’s rated life.

\[ L_f = \frac{M_x}{M_{x_{\text{max}}}} + \frac{M_y}{M_{y_{\text{max}}}} + \frac{M_z}{M_{z_{\text{max}}}} + \frac{F_y}{F_{y_{\text{max}}}} + \frac{F_z}{F_{z_{\text{max}}}} \leq 1.5 \]
# B3S Electric Screw Drive Rodless Actuators

## SPECIFICATIONS Related to Actuator Size and Screw Selection

### METRIC LEAD SCREWS

<table>
<thead>
<tr>
<th>SCREW DIA. (mm)</th>
<th>SCREW TYPE</th>
<th>LEAD TYPE</th>
<th>LEAD ACCURACY (mm/300)</th>
<th>LEAD BACKLASH (mm)</th>
<th>MAX THRUST* (N)</th>
<th>MAX STROKE (mm)</th>
<th>INERTIA (kg·m² x 10⁵)</th>
<th>BREAKAWAY TORQUE (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3S10</td>
<td>10 BNM</td>
<td>10</td>
<td>0.10</td>
<td>0.06</td>
<td>1832</td>
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<td>12 SN</td>
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<td>3459</td>
<td>3.03</td>
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<td>3388</td>
<td>11.35</td>
<td>0.96</td>
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<td>0.13</td>
<td>0.38</td>
<td>7300</td>
<td>3388</td>
<td>11.93</td>
<td>1.25</td>
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<tr>
<td></td>
<td>16 BNL</td>
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<td>0.05</td>
<td>7300</td>
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<td>11.93</td>
<td>1.25</td>
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<td>19 SN</td>
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<td>3388</td>
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<td>11700</td>
<td>3388</td>
<td>36.97</td>
<td>3.10</td>
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### INCH (US Conventional) LEAD SCREWS

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<tr>
<th>SCREW DIA. (in)</th>
<th>SCREW TYPE</th>
<th>TPI</th>
<th>LEAD ACCURACY (in/ft)</th>
<th>LEAD BACKLASH (in/ft)</th>
<th>MAX THRUST* (lb)</th>
<th>MAX STROKE (in)</th>
<th>INERTIA (lb-in²)</th>
<th>BREAKAWAY TORQUE (lb-in)</th>
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</thead>
<tbody>
<tr>
<td>B3S10</td>
<td>0.375 BN</td>
<td>08</td>
<td>0.004</td>
<td>0.015</td>
<td>130</td>
<td>64.2</td>
<td>0.0034</td>
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<tr>
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<td>0.375 BNL</td>
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<td>64.2</td>
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<td>950</td>
<td>131.4</td>
<td>0.1045</td>
<td>2.188</td>
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</tbody>
</table>

**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 25 million linear millimeters of travel.
B3S Electric Screw Drive Rodless Actuators

SPECIFICATIONS

<table>
<thead>
<tr>
<th>METRIC</th>
<th>CARRIER</th>
<th>BASE</th>
<th>WEIGHT PER UNIT OF STROKE</th>
<th>¹ STRAIGHTNESS &amp; FLATNESS (supported)</th>
<th>² TEMPERATURE RANGE</th>
<th>³ IP RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kg)</td>
<td>(kg)</td>
<td>(g/mm)</td>
<td>(mm)</td>
<td>(°C)</td>
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<tr>
<td>B3S10</td>
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<td>44</td>
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<table>
<thead>
<tr>
<th>INCH (US Conventional)</th>
<th>CARRIER</th>
<th>BASE</th>
<th>WEIGHT PER UNIT OF STROKE</th>
<th>¹ STRAIGHTNESS &amp; FLATNESS (supported)</th>
<th>² TEMPERATURE RANGE</th>
<th>³ IP RATING</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(lbs)</td>
<td>(lbs)</td>
<td>(lbs/in)</td>
<td>(in)</td>
<td>(°F)</td>
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<td>0.88</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 the support recommendation graph on page B3_9.

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.

LEAD SCREW EFFICIENCY

<table>
<thead>
<tr>
<th>SCREW/NUT STYLE</th>
<th>SIZE</th>
<th>SIZE</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Composite (ACME)</td>
<td>0.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ball</td>
<td>0.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ball Low Backlash</td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACME SCREW CRITICAL SPEED CAPACITIES

**METRIC ACME SCREW**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>LEAD (mm)</th>
<th>MAX THRUST* (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3S20 SN12</td>
<td>12</td>
<td>900</td>
</tr>
<tr>
<td>M3S20 SN25</td>
<td>25</td>
<td>1400</td>
</tr>
<tr>
<td>M3S15 SN12</td>
<td>12</td>
<td>800</td>
</tr>
<tr>
<td>M3S15 SN25</td>
<td>25</td>
<td>1400</td>
</tr>
<tr>
<td>M3S10 SN12</td>
<td>12</td>
<td>800</td>
</tr>
<tr>
<td>M3S10 SN25</td>
<td>25</td>
<td>800</td>
</tr>
</tbody>
</table>

**INCH (US Conventional) ACME SCREW**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>LEAD (tum)</th>
<th>MAX THRUST* (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3S20 SN01</td>
<td>1</td>
<td>300</td>
</tr>
<tr>
<td>B3S20 SN02</td>
<td>2</td>
<td>300</td>
</tr>
<tr>
<td>B3S15 SN01</td>
<td>1</td>
<td>300</td>
</tr>
<tr>
<td>B3S15 SN02</td>
<td>2</td>
<td>200</td>
</tr>
<tr>
<td>B3S10 SN01</td>
<td>1</td>
<td>170</td>
</tr>
<tr>
<td>B3S10 SN(A)02</td>
<td>2</td>
<td>170</td>
</tr>
<tr>
<td>B3S10 SN05</td>
<td>5</td>
<td>170</td>
</tr>
</tbody>
</table>

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

Dotted lines represent maximum stroke for screw selections.

For Screw PV limits, refer to the individual charts located in the technical section for each actuator body size.
B3S Electric Screw Drive Rodless Actuators

**ACME SCREW/NUT COMBINATIONS**

---

### ACME SCREW PV LIMITS

#### METRIC ACME SCREW

- **Model** | **Nut/Screw** | **Lead (mm/turn)** | **Max Thrust** (N) | **Max Thrust** (LBS) |
- | | | | |
- | | | | |
- | | | | |
- | | | | |
- | | | | |
- | | | | |
- | | | | |

#### INCH (US Conventional) ACME SCREW

- **Model** | **Nut/Screw** | **TPI** | **Max Thrust** (LBS) |
- | | | |
- | | | |
- | | | |
- | | | |
- | | | |
- | | | |
- | | | |
- | | | |

---

*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.

\[
P \times V \leq 0.1
\]

**PV LIMITS:**

1. **P** x **V** \(\leq 0.1\)

---

sizeit.tolomatic.com for fast, accurate actuator selection

---

Tolomatic EXCELLENCE IN MOTION

www.tolomatic.com 1-800-328-2174
* Maximum thrust reflects 90% reliability for 25 million linear millimeters of travel.

Dotted lines represent maximum stroke for screw selections.
**BALL SCREW LIFE CAPACITIES**

### METRIC BALL SCREW

- **Model:** M3S20
  - **Nut:** BNO5
  - **Lead:** 5
  - **Max Thrust:** 11,700 N

- **Model:** M3S15
  - **Nut:** BNO5
  - **Lead:** 5
  - **Max Thrust:** 7,300 N

- **Model:** M3S10
  - **Nut:** BNM10
  - **Lead:** 10
  - **Max Thrust:** 1,832 N

### INCH (US Conventional) BALL SCREW

- **Model:** B3S20
  - **Nut:** BNL02
  - **TPI:** 2
  - **Max Thrust:** 2,700 lbs

- **Model:** B3S20
  - **Nut:** BNL05
  - **TPI:** 5
  - **Max Thrust:** 950 lbs

- **Model:** B3S15
  - **Nut:** BNL02
  - **TPI:** 2
  - **Max Thrust:** 800 lbs

- **Model:** B3S15
  - **Nut:** BNL05
  - **TPI:** 5
  - **Max Thrust:** 800 lbs

- **Model:** B3S10
  - **Nut:** BN08
  - **TPI:** 8
  - **Max Thrust:** 130 lbs

---

*Maximum thrust reflects 90% reliability for 25 million linear millimeters of travel.*

*Life indicates theoretical maximum life of screw only, under ideal conditions and does not indicate expected life of actuator.*
### B3S10 Electric Screw Drive Rodless Actuators

**DIMENSIONS Actuator & Options**

#### MOTOR MOUNTING

- **In-line mounting**: 0.55" (13.8mm)
- **Extended shaft for RP & 23-frame motor**: 1.99" (50.5mm)
- **Extended shaft for RP & 34-frame motor**: 2.20" (55.9mm)
- **Extended shaft for purchases prior to 6/24/02**: 1.63" (41.4mm)

LMI with MRS is 1" (25.4mm) thick
LMI with all others is 0.50" (12.7mm) thick

#### OPTIONAL MOUNTING PLATES

- **C BORE Ø .38 X .22 DP [2]**
- **Ø .22 THRU**
- **C BORE Ø .60 X .58 DP [2]**

#### OPTIONAL TUBE SUPPORTS

- **Ø .157/.159 x .30 [4]**
- **Ø .206 (5.23) THRU [4]**

#### SILVER NUTS FOR SLOTS 90° FROM CARRIER

- **#3410-1013 [4410-1013]**
  - Ø10-24 (M5-0.8)
  - TAPPED HOLE (CENTERED)

#### YELLOW NUTS FOR SLOTS OPPOSITE CARRIER

- **#3410-1775 [4410-1708]**
  - Ø10-24 (M5-0.8)
  - TAPPED HOLE (CENTERED)

#### OPTIONAL SWITCH MOUNTING

- **BORE CENTER LINE**: 0.76" (19.3mm)
- **SENSING SURFACE**: 0.27" (6.8mm)
- **1.93 (49.0) THRU (2) Jason 0.66 (16.8) 0.25 (6.4)

**CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING**

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

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

**NOTE:** LMI with MRS is 1" (25.4mm) thick
LMI with all others is 1/2" (12.7mm) thick
RP (YMH) all motors is 1/2" (12.7mm) thick

### B3W

- **DIMENSIONS Actuator & Options**

#### Optional Switch Mounting

- **In-line mounting**: 0.55 (13.8)
- **Extended shaft for RP & 23-frame motor**: 1.99 (50.5)
- **Extended shaft for RP & 34-frame motor**: 2.20 (55.9)
- **Extended shaft for purchases prior to 6/24/02**: 1.63 (41.4)

### B3S

- **1-800-328-2174**
- **www.tolomatic.com**
B3S10 Electric Screw Drive Rodless Actuators

DIMENSIONS Dual 180° Option

3D CAD available at www.tolomatic.com
Always use configurated CAD solid model to determine critical dimensions

In-line mounting 0.35 (8.9)
Extended shaft for HP & 23-frame motor 0.99 (25.1)
Extended shaft for HP & 34-frame motor 2.20 (55.9)
Extended shaft for purchases prior to 6/24/02 1.83 (46.5)

Dowel Pins [30] (8mm)
For SNA02 Style Only
Shaf Length

CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

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

NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet
B3S15 Electric Screw Drive Rodless Actuators

DIMENSIONS Actuator & Options

- **Motor Mounting**:
  - Ø 0.38 (9.7)
  - 3.75 (95.3)
  - Ø 0.25 (6.4)

- **Dowel Holes [2]**:
  - Ø 0.252/0.251
  - X 0.25
  - X 6.4 ±

- **Optional Tube Supports**:
  - Ø 0.266 (6.76) Thru [4]
  - Ø 0.430 (10.92)

- **Nuts for Slots**:
  - Ø 1/4-20 (M6-1.0) Tapped Hole (Centered)
  - 0.75 (19.1)
  - 0.25 (6.4)

- **Optional Switch Mounting**:
  - Bore Center Line
  - 1.44 (36.6)
  - 0.160 (4.06)

- **Section A-A**:
  - 1.250 (31.75)
  - 0.500 (12.70)

- **Stoke**:
  - 1.16 (29.5)
  - 0.25 (6.4)

- **Bore Center Line**:
  - 1.37 (34.8)
  - 0.35 (8.9)

- **Sensing Surface**:
  - 1.58 (40.1)
  - 2.53 (64.3)
  - 2.88 (70.3)

- **Optional Mounting Plates**:
  - Ø 0.27 (6.8) Thru [2]
  - Ø 0.28 Thru,
  - C Bore Ø 0.44 X 0.22 DP [2]
  - Ø (7.1) Thru,
  - C Bore Ø (11.2) X (5.8) DP [2]

- **1.37 (34.8)**
  - 1.44 (36.6)
  - 2.53 (64.3)
  - 2.88 (70.3)

- **2.19 (56.4)**
  - 3.62 (92.1)

- **3.80 (96.5)**
  - 4.38 (111.3)

- **4.10 (104.1)**

- **CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING**

- **NOTE**: The scored face of the switch indicates the sensing surface and must face toward the magnet.

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

- **LMI with MRS3 is 1" (25.4mm) thick**
  - LMI with all others is 1/2" (12.7mm) thick

- **RP, (YMH) all motors is 1/2" (12.7mm) thick**

- **unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)**
B3S20 Electric Screw Drive Rodless Actuators

DIMENSIONS Actuator & Options

**Strobe**: 5.26 (133.6)

**Optional Tube Supports**

**Nuts**

- Ø 0.50 (12.7)
- 5/16 - 18 (M6-1.0)
- Tapped Hole [4]

**Optional Switch Mounting**

- Bore Center Line: 1.97 (50.0)
- 0.036 (0.91)
- Sensing Surface: 1.78 (45.2)
- 0.50 (12.7)

**Motor Mounting**

- Ø .188/.190 x 0.30 (4.78/4.83 x 7.6)
- Deep [2]
- Ø 1/4-20 [4]
- Tapped Holes Both Ends

**Optional Mounting Plates**

- Ø .34 (8.3) THRU [2]
- C Bore Ø .53 x .34 DP [2]
- Ø 0.750 (19.05)

**Optional Tube Supports**

- Ø .31 (7.9)
- 3.375 (85.73)
- 4.00 (101.6)
- EQUALLY SPACED ON A Ø 3.010 (Ø 76.45) B.C.

**CAUTION:** DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

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

**NOTE:** Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details
B3S Electric Screw Drive Rodless Actuators

DIMENSIONS Actuator & Options

B3S10: IN-LINE MOUNT FOR MOTORS OR GEARBOXES

B3S15: IN-LINE MOUNT FOR MOTORS OR GEARBOXES

B3S20: IN-LINE MOUNT FOR MOTORS OR GEARBOXES

KEY
A → GHJ30, GHJ31
B → GHJ20, GHJ21
C → MRS2
D → MRS3
**B3S Electric Screw Drive Rodless Actuators**

**DIMENSIONS Reverse Parallel Mounting**

### STANDARD CARRIER

- **REVERSE-PARALLEL BOTTOM (RPB)**
  - Mounting surface shown up
- **REVERSE-PARALLEL TOP (RPT)**
  - Mounting surface shown up
- **REVERSE-PARALLEL LEFT (RPL)**
  - Mounting surface shown up
- **REVERSE-PARALLEL RIGHT (RPR)**
  - Mounting surface shown up

### DUAL 180° CARRIER

- **REVERSE-PARALLEL BOTTOM (RPB)**
  - Mounting surface shown up
- **REVERSE-PARALLEL TOP (RPT)**
  - Mounting surface shown up
- **REVERSE-PARALLEL LEFT (RPL)**
  - Mounting surface shown up
- **REVERSE-PARALLEL RIGHT (RPR)**
  - Mounting surface shown up

### Reduction Drive Weight

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>1:1 &amp; 2:1 Ratio</th>
<th>1:1 Ratio</th>
<th>2:1 Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.93 kg</td>
<td>2.06 lb</td>
<td>0.98 kg</td>
</tr>
<tr>
<td>15</td>
<td>1.39 kg</td>
<td>3.07 lb</td>
<td>1.09 kg</td>
</tr>
<tr>
<td>20</td>
<td>1.42 kg</td>
<td>3.13 lb</td>
<td>1.47 kg</td>
</tr>
</tbody>
</table>

### Reduction Inertia at Motor Shaft

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>1:1 Ratio</th>
<th>2:1 Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.2559 kg·cm²</td>
<td>0.0875 lb·in²</td>
</tr>
<tr>
<td>15</td>
<td>0.3447 kg·cm²</td>
<td>0.1180 lb·in²</td>
</tr>
</tbody>
</table>

### Reduction Efficiency: 0.95

**NOTE:** RPT is generally not recommended because the load may interfere with the motor. Stops or spacers may be required.

### Dimensions in millimeters

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>23</td>
<td>42.6</td>
<td>178.6</td>
<td>54.0</td>
<td>82.6</td>
<td>45.6</td>
<td>37.6</td>
<td>38.4</td>
<td>26.9</td>
</tr>
<tr>
<td>15</td>
<td>23</td>
<td>53.8</td>
<td>208.6</td>
<td>60.3</td>
<td>101.6</td>
<td>59.5</td>
<td>79.5</td>
<td>78.7</td>
<td>89.7</td>
</tr>
<tr>
<td>20</td>
<td>34</td>
<td>63.8</td>
<td>238.4</td>
<td>60.3</td>
<td>101.6</td>
<td>59.5</td>
<td>79.5</td>
<td>78.7</td>
<td>89.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>23</td>
<td>36.6</td>
<td>191.3</td>
<td>54.0</td>
<td>82.6</td>
<td>44.1</td>
<td>44.1</td>
<td>42.3</td>
<td>25.3</td>
</tr>
<tr>
<td>15</td>
<td>34</td>
<td>53.8</td>
<td>208.6</td>
<td>60.3</td>
<td>101.6</td>
<td>59.5</td>
<td>79.5</td>
<td>78.7</td>
<td>89.7</td>
</tr>
<tr>
<td>20</td>
<td>23</td>
<td>63.8</td>
<td>238.4</td>
<td>60.3</td>
<td>101.6</td>
<td>59.5</td>
<td>79.5</td>
<td>78.7</td>
<td>89.7</td>
</tr>
</tbody>
</table>

### Dimensions in inches

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>23</td>
<td>1.68</td>
<td>7.03</td>
<td>2.13</td>
<td>3.25</td>
<td>1.80</td>
<td>1.84</td>
<td>1.48</td>
<td>1.51</td>
</tr>
<tr>
<td>15</td>
<td>23</td>
<td>1.44</td>
<td>7.53</td>
<td>2.13</td>
<td>3.25</td>
<td>1.74</td>
<td>1.74</td>
<td>1.61</td>
<td>1.67</td>
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<tr>
<td>20</td>
<td>34</td>
<td>2.12</td>
<td>8.21</td>
<td>2.38</td>
<td>4.00</td>
<td>2.34</td>
<td>2.34</td>
<td>2.00</td>
<td>2.16</td>
</tr>
</tbody>
</table>

3D CAD available at www.tolomatic.com
Always use configured CAD solid model to determine critical dimensions.
B3W Electric Belt Drive Rodless Actuators

PERFORMANCE

CARRIER SPEED CAPABILITIES

<table>
<thead>
<tr>
<th>MAXIMUM BELT THRUST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-800-328-2174</td>
</tr>
<tr>
<td><a href="http://www.tolomatic.com">www.tolomatic.com</a></td>
</tr>
</tbody>
</table>

MAXIMUM ACCELERATION AS A FUNCTION OF LOAD WEIGHT

MAXIMUM BELT THRUST (lbf.)

MAXIMUM BELT THRUST (kN)

INPUT RPM

LINEAR VELOCITY (in/sec)

LINEAR VELOCITY (mm/sec)

WEIGHT (lb.)

WEIGHT (kg.)

ACCELERATION (in./sec.²)

ACCELERATION (m/sec.²)

B3W10 / M3W10

B3W15 / M3W15

B3W20 / M3W20

sizeit.tolomatic.com for fast, accurate actuator selection

Tolomatic Excellence in Motion
# B3W Electric Belt Drive Rodless Actuators

## SPECIFICATIONS

### METRIC

<table>
<thead>
<tr>
<th></th>
<th>M3W10</th>
<th>M3W15</th>
<th>M3W20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Stroke</td>
<td>mm</td>
<td>5,258</td>
<td>5,182</td>
</tr>
<tr>
<td>Max. Velocity</td>
<td>m/sec</td>
<td>5.08</td>
<td>5.08</td>
</tr>
<tr>
<td>Max. Acceleration</td>
<td>m/sec²</td>
<td>30.48</td>
<td>30.48</td>
</tr>
<tr>
<td>Max. Input Torque</td>
<td>N-m</td>
<td>8.5</td>
<td>21.2</td>
</tr>
<tr>
<td>Breakaway Torque</td>
<td>Standard (single) Carrier</td>
<td>N-m</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>Dual 180° or Aux. Carrier</td>
<td>N-m</td>
<td>1.34</td>
</tr>
<tr>
<td></td>
<td>Dual 180 &amp; Aux Carrier</td>
<td>N-m</td>
<td>1.91</td>
</tr>
</tbody>
</table>

|                | mm | 25.48 | 38.2 | 44.55 |
| Stroke per Rev. | mm/rev | 80.04 | 120.02 | 139.95 |

|                | mm | +/- 0.05 | +/- 0.05 | +/- 0.05 |
| Repeatability  | in | +/- 0.002 | +/- 0.002 | +/- 0.002 |

|                | mm | 0.017 x L* | 0.017 x L* | 0.017 x L* |
| Straightness & Flatness | in | 0.00067 x L* | 0.00067 x L* | 0.00067 x L* |

|                | °C | 4 - 54 | 4 - 54 | 4 - 54 |
| Temp. Range    | °F | 40 - 130 | 40 - 130 | 40 - 130 |

| IP Rating      | IP | 44 | 44 | 44 |

|                | kg | 3.42 | 11.39 | 16.06 |
| Weight (zero stroke) | lb | 7.54 | 25.12 | 35.4 |

|                | kg/mm | 0.0069 | 0.0071 | 0.0128 |
| Weight (per unit of stroke) | lb/in | 0.389 | 0.395 | 0.716 |

|                | kg | 0.0068 | 0.0244 | 0.047 |
| Weight of pulley | lb | 0.015 | 0.054 | 0.1036 |

|                | kg | 0.39 | 0.71 | 0.97 |
| Weight of carrier | lb | 0.85 | 1.56 | 2.14 |

|                | kg-cm² | 0.833 | 4.073 | 7.786 |
| Inertia (zero stroke) | lb-in² | 0.2846 | 1.3917 | 2.6607 |

|                | kg-cm²/mm | 0.00018 | 0.0002 | 0.00131 |
| Inertia (per unit of stroke) | lb-in/mm | 0.0016 | 0.0017 | 0.0114 |

|                | kg-cm² | 0.027 | 0.219 | 0.422 |
| Inertia of pulley | lb-in² | 0.0093 | 0.0748 | 0.1441 |

|                | kg-cm² | 0.305 | 1.489 | 2.847 |
| Inertia of carrier | lb-in² | 0.1041 | 0.5089 | 0.9728 |

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. *L* is maximum distance between supports - See Support Recommendations graph pg B3.9.

### PERFORMANCE

- **Max. Torque:**
  - M3W10: 8.5 N-m
  - M3W15: 21.2 N-m
  - M3W20: 32.2 N-m

- **Max. Velocity:**
  - M3W10: 5.08 m/sec²
  - M3W15: 5.08 m/sec²
  - M3W20: 5.08 m/sec²

- **Max. Acceleration:**
  - M3W10: 30.48 m/sec²
  - M3W15: 30.48 m/sec²
  - M3W20: 30.48 m/sec²

- **Max. Input Torque:**
  - M3W10: 8.5 N-m
  - M3W15: 21.2 N-m
  - M3W20: 32.2 N-m

- **Breakaway Torque:**
  - Standard (single) Carrier: 1.06 N-m
  - Dual 180° or Aux. Carrier: 1.34 N-m
  - Dual 180 & Aux Carrier: 1.91 N-m

### MOUNTING

- **Pulley Pitch Dia.:**
  - M3W10: 25.48 mm
  - M3W15: 38.2 mm
  - M3W20: 44.55 mm

- **Stoke per Rev.:**
  - M3W10: 80.04 mm/rev
  - M3W15: 120.02 mm/rev
  - M3W20: 139.95 mm/rev

### REPEATABILTY

- **Repeatability:**
  - M3W10: +/- 0.05 mm
  - M3W15: +/- 0.05 mm
  - M3W20: +/- 0.05 mm

### TOLERANCES

- **Straightness & Flatness:**
  - M3W10: 0.017 x L* mm
  - M3W15: 0.017 x L* mm
  - M3W20: 0.017 x L* mm

### TEMPERATURE RANGES

- **Temp. Range:**
  - M3W10: 4°C - 54°C
  - M3W15: 4°C - 54°C
  - M3W20: 4°C - 54°C

### IP-RATING

- **IP Rating:**
  - M3W10: IP 44
  - M3W15: IP 44
  - M3W20: IP 44

### ACTUATOR SIZING

[www.tolomatic.com for fast, accurate actuator selection](http://www.tolomatic.com)

---

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 1 mm (.039 in) and splashing water.

**L** is maximum distance between supports - See Support Recommendations graph pg B3.9.

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:

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

For weight calculation substitute inertia with weight in the above formula.
B3W10 Electric Belt Drive Rodless Actuators

DIMENSIONS Dual 180° Option

SHOWN SDL

TAPPED HOLE (4)
1/4-20 x 0.25
[6.0x1.0 x 6.4]

Dowel Pins
.003 (.08mm)

CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

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

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

Silver Nuts for SLOTS 90° FROM CARRIER
H10-24 (M5-0.8)
Tapped Hole (Centered)
0.65 (16.8)
0.25 (6.4)

Optional Switch Mounting

3D CAD available at www.tolomatic.com
Always use configurated CAD solid model to determine critical dimensions
B3W15 Electric Belt Drive Rodless Actuators

DIMENSIONS Actuator & Options

**Shown SDL**

**Viewed from Motor End**

**Optional Mounting Plates**

**Optional Tube Supports**

**Optional Switch Mounting**

**Optional Stub Shaft**

**Optional Tube Supports**

**Optional Mounting Plates**

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

1. *ONE STUB SHAFT IS STANDARD ON ALL B3W ACTUATORS*
2. *Dowel Pins* (.003 [.08mm])
3. *CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING*
4. *NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet*
5. *NOTE: Some actuators require switch mounting on a specific side of the actuator. Call Tolomatic 1-800-328-2174 for details*
6. *WHEN USED WITH 23-FRAME MOTORS*
7. *WHEN USED WITH 34-FRAME MOTORS*

Tolomatic
EXCELLENCE IN MOTION

1-800-328-2174
www.tolomatic.com
B3W15 Electric Belt Drive Rodless Actuators

DIMENSIONS Dual 180° Option

Dowel Pins

CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING

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

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

3D CAD available at www.tolomatic.com

Always use configured CAD solid model to determine critical dimensions

0.328 THRU C BORE 0.53 x 0.34 DP

[Ø 8.33 THRU C BORE 13.5 x 8.6 DP]

Nuts for slots

1/4-20 (M6-1.0)

TAPPED HOLE (CENTERED)

0.25 [6.4]

0.94 [23.8]

0.43 (10.9)

Bore center line

Sensing surface

CARRIER

OPTIONAL TUBE SUPPORT

OPTIONAL STUB SHAFT

STROKE

CARRIER

OPTIONAL TUBE SUPPORT

3D CAD available at www.tolomatic.com

Always use configured CAD solid model to determine critical dimensions

CALL TOLOMATIC 1-800-328-2174 FOR DETAILS
B3W20 Electric Belt Drive Rodless Actuators

DIMENSIONS Actuator & Options

SHOWN SDL

VIEWED FROM MOTOR END

STROKE

PILOT LOCATOR

CARRIER

OPTIONAL MOUNTING PLATES

OPTIONAL TUBE SUPPORTS

NUTS FOR SLOTS

OPTIONAL STUB SHAFT

OPTIONAL TUBE SUPPORTS

OPTIONAL MOUNTING PLATES

UNLESS OTHERWISE NOTED, ALL DIMENSIONS SHOWN ARE IN INCHES [DIMENSIONS IN BRACKETS ARE IN MILLIMETERS]
B3W20 Electric Belt Drive Rodless Actuators

DIMENSIONS Dual 180° Option

SHOWN SDL

TAPPED HOLE (4)
3/8-16 x 0.86
[M6x1.5 x 16.8]

TAPPED HOLE (4)
0.325/0.325 x 0.25
[8.05/8.05 x 6.4]
DOWEL HOLE (2)
0.38
[9.7]

NUTS FOR SLOTS
5/16 - 18
[M6-1.0]
TAPPED HOLE
(CENTERED)
0.61
[15.5]

0.94
[23.8]
0.41
[10.4]

OPTIONAL SWITCH MOUNTING

0.500
[12.70]
1.250
[31.75]

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

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

CAUTION: DO NOT OVERTIGHTEN SWITCH HARDWARE WHEN INSTALLING
B3W Electric Belt Drive Rodless Actuators

MOTOR MOUNTING

B3W DIRECT DRIVE MOTOR MOUNTING

LEFT (SDL) | (TOP VIEW) | RIGHT (SDR)

VIEWED FROM MOTOR END

B3W(D) REDUCTION DRIVE MOTOR MOUNTING

STANDARD CARRIER

TOP LEFT (SDTL)* | BOTTOM LEFT (SDBL) | TOP RIGHT (SDTR)* | BOTTOM RIGHT (SDBR)

DUAL 180° CARRIER

TOP LEFT (SDTL) | BOTTOM LEFT (SDBL) | TOP RIGHT (SDTR) | BOTTOM RIGHT (SDBR)

*NOTE: SDTL & SDTR are generally not recommended because the load may interfere with the motor. Stops or spacers may be required.
B3S & B3W Electric Rodless Actuators

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

<table>
<thead>
<tr>
<th>ORDER CODE</th>
<th>REED DC</th>
<th>REED AC</th>
<th>HALL-EFFECT DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAD</td>
<td>RT</td>
<td>RM</td>
<td>CT</td>
</tr>
<tr>
<td>5m</td>
<td>QD*</td>
<td>5m</td>
<td>QD*</td>
</tr>
<tr>
<td>5m</td>
<td>QD*</td>
<td>5m</td>
<td>QD*</td>
</tr>
<tr>
<td>CABLE SHIELDING</td>
<td>Unshielded</td>
<td>Shielded†</td>
<td>Unshielded</td>
</tr>
<tr>
<td>SWITCHING LOGIC</td>
<td>“A” Normally Open</td>
<td>“C” Normally Open or Closed</td>
<td>Triac Normally Open</td>
</tr>
<tr>
<td>COIL DIRECT</td>
<td>Yes</td>
<td>Yes</td>
<td>—</td>
</tr>
<tr>
<td>POWER LED</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>SIGNAL LED</td>
<td>Red</td>
<td>None</td>
<td>Red</td>
</tr>
<tr>
<td>OPERATING VOLTAGE</td>
<td>200 Vdc max.</td>
<td>120 Vdc max.</td>
<td>120 Vac max.</td>
</tr>
<tr>
<td>OUTPUT RATING</td>
<td>—</td>
<td>—</td>
<td>25 Vdc, 200mA dc</td>
</tr>
<tr>
<td>OPERATING TIME</td>
<td>0.6 msec max.</td>
<td>0.7 msec max.</td>
<td>—</td>
</tr>
<tr>
<td>OPERATING TEMPERATURE</td>
<td>-40°F [-40°C] to 158°F [70°C]</td>
<td>—</td>
<td>0°F [-18°C] to 150°F [66°C]</td>
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<tr>
<td>RELEASE TIME</td>
<td>1.0 msec. max.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>ON TRIP POINT</td>
<td>—</td>
<td>—</td>
<td>150 Gauss maximum</td>
</tr>
<tr>
<td>OFF TRIP POINT</td>
<td>—</td>
<td>—</td>
<td>40 Gauss minimum</td>
</tr>
<tr>
<td><strong>POWER RATING (WATTS)</strong></td>
<td>10.0 ⁵</td>
<td>3.0 ⁵</td>
<td>10.0</td>
</tr>
<tr>
<td>VOLTAGE DROP</td>
<td>2.6 V typical at 100 mA</td>
<td>NA</td>
<td>—</td>
</tr>
<tr>
<td>RESISTANCE</td>
<td>0.1 Ω Initial (Max.)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>CURRENT CONSUMPTION</td>
<td>—</td>
<td>1 Amp at 86°F [30°C]</td>
<td>0.5 Amp at 140°F [60°C]</td>
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<tr>
<td>FREQUENCY</td>
<td>47 - 63 Hz</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>CABLE MIN. BEND RADIUS</td>
<td>STATIC</td>
<td>0.630” [16mm]</td>
<td>DYNAMIC</td>
</tr>
<tr>
<td>DYNAMIC</td>
<td>Not Recommended</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

CAUTION: DO NOT OVERTIGHTEN 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 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
**B3S & B3W Electric Rodless Actuators**

**SWITCH PERFORMANCE**

**TEMP. vs CURRENT, DC REED**

- REED FORM A
- REED FORM C

**TEMP. vs CURRENT, AC REED**

- TRIAC

**VOLTAGE DERATING, DC REED**

- REED FORM C
- REED FORM A

---

**WIRING DIAGRAMS**

**RT & RM** DC REED, FORM A

<table>
<thead>
<tr>
<th>LOAD</th>
<th>BLUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-)</td>
<td>(+)</td>
</tr>
</tbody>
</table>

**CT & CM** AC REED, TRIAC

<table>
<thead>
<tr>
<th>MOV</th>
<th>BLUE</th>
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<tbody>
<tr>
<td>(-)</td>
<td>(+)</td>
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</tbody>
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**BT & BM** DC REED, FORM C

<table>
<thead>
<tr>
<th>COMMON</th>
<th>BROWN</th>
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</thead>
<tbody>
<tr>
<td>LOAD</td>
<td>BLUE</td>
</tr>
<tr>
<td>(-)</td>
<td>(+)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>HALL-EFFECT SOURCING SWITCH</th>
<th>BROWN (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOAD</td>
<td>BLUE (-)</td>
</tr>
</tbody>
</table>

**KT & KM** HALL-EFFECT, SINKING, NPN

<table>
<thead>
<tr>
<th>HALL-EFFECT SINKING SWITCH</th>
<th>BROWN (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOAD</td>
<td>BLUE (-)</td>
</tr>
</tbody>
</table>

---

**INSTALLATION INFORMATION**

⚠️ 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.
COMPILE APPLICATION REQUIREMENTS

ORIENTATION

☐ Horizontal  ☐ Side  ☐ Horizontal Down  ☐ Vertical

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

DISTANCE FROM CENTER OF CARRIER TO LOAD CENTER OF GRAVITY

$dx$  $dy$  $dz$

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

STROKE LENGTH

☐ inch (SK)  ☐ millimeters (Metric)

BENDING MOMENTS

$M_x$  $M_y$  $M_z$

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

PRECISION

Repeatability

☐ inch  ☐ millimeters

OPERATING ENVIRONMENT

Temperature, Contamination, etc.

Use the Tolomatic Sizing and Selection Software available on-line at www.tolomatic.com or... Call Tolomatic 1-800-328-2174 with the above information. We will provide any assistance needed to determine the proper MX actuator for the job.

FAX 1-763-478-8080

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.

USE THE TOLOMATIC SIZING AND SELECTION SOFTWARE AVAILABLE ON-LINE AT www.tolomatic.com

FAX 1-763-478-8080

CONTACT 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 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 (A) thrust, (B) speed and (C) moment load capacity to move the load.
   - A. Max Thrust: B3S see page B3_11; B3W see page B3_25
   - B. Max. Speed: B3S see critical speed graphs page B3_13 to B3_15; All B3W sizes = 200 in/sec (5m/sec).
   - C. Moment & Load B3S & B3W see page B3_8

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 extended actuator performance and application safety. If either load or any of your moments exceed figures indicated in the Moment and Load Capacity table (page B3_8) for the actuator consider:
     1) Higher capacity bearing style
     2) A larger actuator size
     3) Auxiliary carrier
     4) External guide system

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 (LF) must not exceed the value of 1.5.
     \[ LF = \frac{M_x}{M_{x\text{max}}} + \frac{M_y}{M_{y\text{max}}} + \frac{M_z}{M_{z\text{max}}} + \frac{F_y}{F_{y\text{max}}} + \frac{F_z}{F_{z\text{max}}} \leq 1.5 \]
   - If LF does exceed the value of 1.5, consider the four 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.
   - **For the B3S** Acceleration/deceleration should not exceed critical speed (page B3_13) for the screw/nut combination chosen.
   - **For the B3W** 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 THE LEAD SCREW (B3S ONLY)**
   - 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.

6. **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_] 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.

7. **DETERMINE TUBE SUPPORT/MOUNTING PLATE/T-NUT REQUIREMENTS**
   - Consult the Tube Support Requirements graph for the model selected (page B3_9)
   - Cross reference the application load and maximum distance between supports
   - Select the appropriate number of tube supports, T-nuts or mounting plates and requirements for motor and adapter clearance.

8. **CONSIDER OPTIONS**
   - Choose metric or inch (US Conventional) load mounting. (When ordering use \(\text{SK}\) for inch)
   - Switches - Reed, Solid State PNP or NPN, all available normally open or normally closed

Use the Tolomatic Sizing & Selection Software or call Tolomatic at 1-800-328-2174
B3S Electric Screw Drive Rodless Actuators

**BASE MODEL**

**B3S 20 D BNL02 SK36 LMI**

**MODEL TYPE**

B3S - B3S Screw Drive Rodless Actuator

**SIZE**

10, 15, 20

**DUAL 180° CARRIER**

D - Dual 180° Carrier

**NUT/SCREW CONFIGURATION**

| INCH MODELS (US Conventional) | METRIC MODELS†
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLID NUT / PITCH (turn/in)</td>
<td>SOLID NUT / LEAD (mm/turn)</td>
</tr>
<tr>
<td>SN01</td>
<td>SN25</td>
</tr>
<tr>
<td>SN02</td>
<td>SN12</td>
</tr>
<tr>
<td>SNA02</td>
<td></td>
</tr>
<tr>
<td>SN05</td>
<td></td>
</tr>
<tr>
<td>BALL NUT / PITCH (turn/in)</td>
<td>BALL NUT / LEAD (mm/turn)</td>
</tr>
<tr>
<td>BNL02</td>
<td>BNM10</td>
</tr>
<tr>
<td>BNL02</td>
<td></td>
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<tr>
<td>BNL05</td>
<td>BNL05</td>
</tr>
<tr>
<td>BNL06</td>
<td>BNL06</td>
</tr>
</tbody>
</table>

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

**STROKE LENGTH & MOUNTING TYPE**

| SK _____ _____ | Stroke, enter desired stroke length in inches |
| SM† _____ _____ | Stroke, enter desired stroke length in millimeters |

**NOTE:** Actuator mounting threads and mounting fasteners will be either inch or metric; depending on how stroke length is indicated.

SK = inch mounting

SM = metric mounting

**OPTIONS**

**MOTOR MOUNTING / REDUCTIONS**

(must choose one)

| LMI | In-Line mounting |
| LME23 | Ext. shaft for 23 frame motor |
| LME34 | Ext. shaft for 34 frame motor |
| *LX | Extended shaft - old style (see note) |

*For replacement actuators with extended motor shafts purchased prior to 6/24/02, use the LX configuration code.

A motor size and code must be selected when specifying a reverse-parallel mounting configuration.

RPL1 - 1:1 Reverse-Parallel mount left

RPR1 - 1:1 Reverse-Parallel mount right

RPB1 - 1:1 Reverse-Parallel mount bottom

RPT1 - 1:1 Reverse-Parallel mount top

RPL2 - 2:1 Reverse-Parallel mount left

RPR2 - 2:1 Reverse-Parallel mount right

RPB2 - 2:1 Reverse-Parallel mount bottom

RPT2 - 2:1 Reverse-Parallel mount top

**AUXILIARY CARRIER**

DC - Auxiliary Carrier, then center-to-center spacing desired in inches (SK) or millimeters (SM).

(Same unit of measure as stroke length is required)

Center-to-center spacing between carriers adds to overall length of the actuator, this distance will not be subtracted from stroke length specified in the previous step.

**SUPPORTS AND MOUNTING PLATES**

(both may be selected)

| TS _____ | Tube Supports plus quantity desired |
| **MP** _____ | Mounting Plates plus quantity desired |

**FIELD RETROFIT KITS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>B3S10 SK</th>
<th>B3S15 SK</th>
<th>B3S20 SK</th>
<th>B3S10 SM</th>
<th>B3S15 SM</th>
<th>B3S20 SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube Supports</td>
<td>4410-9006</td>
<td>4415-9006</td>
<td>4420-9006</td>
<td>3410-9006</td>
<td>3415-9006</td>
<td>3420-9006</td>
</tr>
<tr>
<td>Tube Supports (B3SD Dual 180° models)</td>
<td>4410-9026</td>
<td>4415-9026</td>
<td>4420-9026</td>
<td>3410-9026</td>
<td>3415-9026</td>
<td>3420-9026</td>
</tr>
<tr>
<td>1/2&quot; Mounting Plates</td>
<td>4410-9030</td>
<td>4415-9030</td>
<td>4420-9030</td>
<td>3410-9142</td>
<td>3415-9056</td>
<td>3420-9056</td>
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<tr>
<td>1&quot; Mounting Plates</td>
<td>4410-9031</td>
<td>4415-9031</td>
<td></td>
<td>3410-9057</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SWITCHES**

| (Quantity desired follows product code) |
|---|---|
| RM | Reed Switch (Form A) with 5-meter lead/QD (Quick-disconnect) |
| RT | Reed Switch (Form A) with 5-m lead |
| BM | Reed Switch (Form C) with 5-meter lead/QD |
| BT | Reed Switch (Form C) with 5-m lead |
| KM | Hall-effect Sinking Switch with 5-meter lead/QD |
| KT | Hall-effect Sinking Switch w/ 5-m lead |
| TM | Hall-effect Sourcing Switch with 5-meter lead/QD |
| TT | Hall-effect Sourcing Switch with 5-meter lead |
| CM | TRIAC Switch with 5-meter lead/QD |
| CT | TRIAC Switch with 5-meter lead |

**T-NUTS**

| TN _____ | Additional T-Nuts and quantity |

**FOOD GRADE LUBRICATION**

| LUB | Grease, Food/Drug |

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Select a high-performance Tolomatic electric actuator and we'll provide a motor-specific interface for your motor. With our online database, you can select from over 60 motor manufacturers and hundreds of models.

Visit www.tolomatic.com/ymh to find your motor/actuator match!

† Not all codes listed are compatible with all options.

Use Tolomatic Sizing Software to determine available options and accessories based on your application requirements.
B3W Electric Belt Drive Rodless Actuators

ORDERING

MODEL TYPE

**B3W**  B3W Series Belt Drive

SIZE

10, 15, 20

DUAL 180° CARRIER

**D**  Dual 180° Carrier

BELT MATERIAL AND WIDTH

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

STROKE LENGTH & MOUNTING TYPE

**SK**  Stroke, enter desired stroke length in inches

**SM**  Stroke, enter desired stroke length in millimeters

**NOTE:** Actuator mounting threads and mounting fasteners will be either inch or metric; depending on how stroke length is indicated

**SK** = inch mounting

**SM** = metric mounting

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

**FIELD RETROFIT KITS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th><strong>B3W10_SM</strong></th>
<th><strong>B3W15_SM</strong></th>
<th><strong>B3W20_SM</strong></th>
<th><strong>B3W10.SK</strong></th>
<th><strong>B3W15.SK</strong></th>
<th><strong>B3W20.SK</strong></th>
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<tbody>
<tr>
<td>Tube Supports</td>
<td>4410-9006</td>
<td>4415-9006</td>
<td>4420-9006</td>
<td>3410-9006</td>
<td>3415-9006</td>
<td>3420-9006</td>
</tr>
<tr>
<td>Tube Supports (B3WD Dual 180° models)</td>
<td>4410-9170</td>
<td>4415-9170</td>
<td>4420-9170</td>
<td>3410-9170</td>
<td>3415-9170</td>
<td>3420-9170</td>
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<tr>
<td>1/2” Mounting Plates (MRV 23-frame motors)</td>
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<td>4415-9030</td>
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<td>3410-9056</td>
<td>3415-9056</td>
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<tr>
<td>1/2” Mounting Plates (MRV all frame motors)</td>
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<td>4420-9030</td>
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<td>1” Mounting Plates (MRV all frame motors)</td>
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<tr>
<td>1” Mounting Plates (MRV 34-frame motors)</td>
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</table>

**FAST DELIVERY**

**BUILT-TO-ORDER**

**OPTIONS**

**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."

**SDTL, SDLTB**  3:1 Reduction on top left
**SDTR, SDRTR**  3:1 Reduction on top right
**SDBL, SDBL**  3:1 Reduction on bottom left
**SDRR, SDBRR**  3:1 Reduction on bottom right

* For Dual Stub Shaft option

**SUPPORTS AND MOUNTING PLATES**

*(both may be selected)*

**TS**  Tube Supports, enter quantity desired

**MP**  Mounting Plates, enter quantity desired

**SWITCHES**

<table>
<thead>
<tr>
<th>CODE</th>
<th>TYPE</th>
<th>QUICK-DISCONNECT</th>
<th>LEAD LENGTH</th>
<th>QUANTITY</th>
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<tbody>
<tr>
<td>RM</td>
<td>Form A</td>
<td>QD</td>
<td>5 meters</td>
<td>After code enter quantity desired</td>
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<tr>
<td>RT</td>
<td>Form C</td>
<td>QD</td>
<td>no</td>
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<tr>
<td>BM</td>
<td>Sinking</td>
<td>QD</td>
<td>no</td>
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<tr>
<td>BT</td>
<td>Sourcing</td>
<td>QD</td>
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<tr>
<td>KM</td>
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<tr>
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</tr>
<tr>
<td>CM</td>
<td>TRIAC</td>
<td>QD</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>CT</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
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**T-NUTS**

**TN**  Additional T-Nuts, enter quantity

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FAST DELIVERY
The fastest delivery of catalog products... Built-to-order with configurable stroke lengths and flexible mounting options.

ACTUATOR SIZING
Online sizing that is easy to use, accurate and always up-to-date. Find a Tolomatic electric actuator to meet your requirements.

YOUR MOTOR HERE
Match your motor with compatible mounting plates that ship with any Tolomatic electric actuator.

LIBRARY
Easy to access CAD files available in the most popular formats to place directly into your assembly.

TECHNICAL SUPPORT
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“Foldout” Brochure #9900-9075

Power Transmission Products
Gearboxes: Float-A-Shaft®, Slide-Rite®, Caliper Disc Brakes; Planetary Roller Screws
“Foldout” Brochure #9900-9076

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