

CONTROLLERS, DRIVES, MOTORS, INTERFACES

RODLESS, ROD, GUIDED SCREW ACTUATORS:

NEW! AXIOM[®]PLUS CONTROLLER/DRIVE

INCLUDES ALL TRUTRACK ACTUATORS



5
DAYS
BUILT-TO-ORDER

All catalog products are manufactured to fit your application requirements and are shipped in 5-days or less from our in-house manufacturing facility.

3600-4609-01

ELECTRIC LINEAR MOTION PRODUCTS FROM  TOL-O-MATIC

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ORDERING

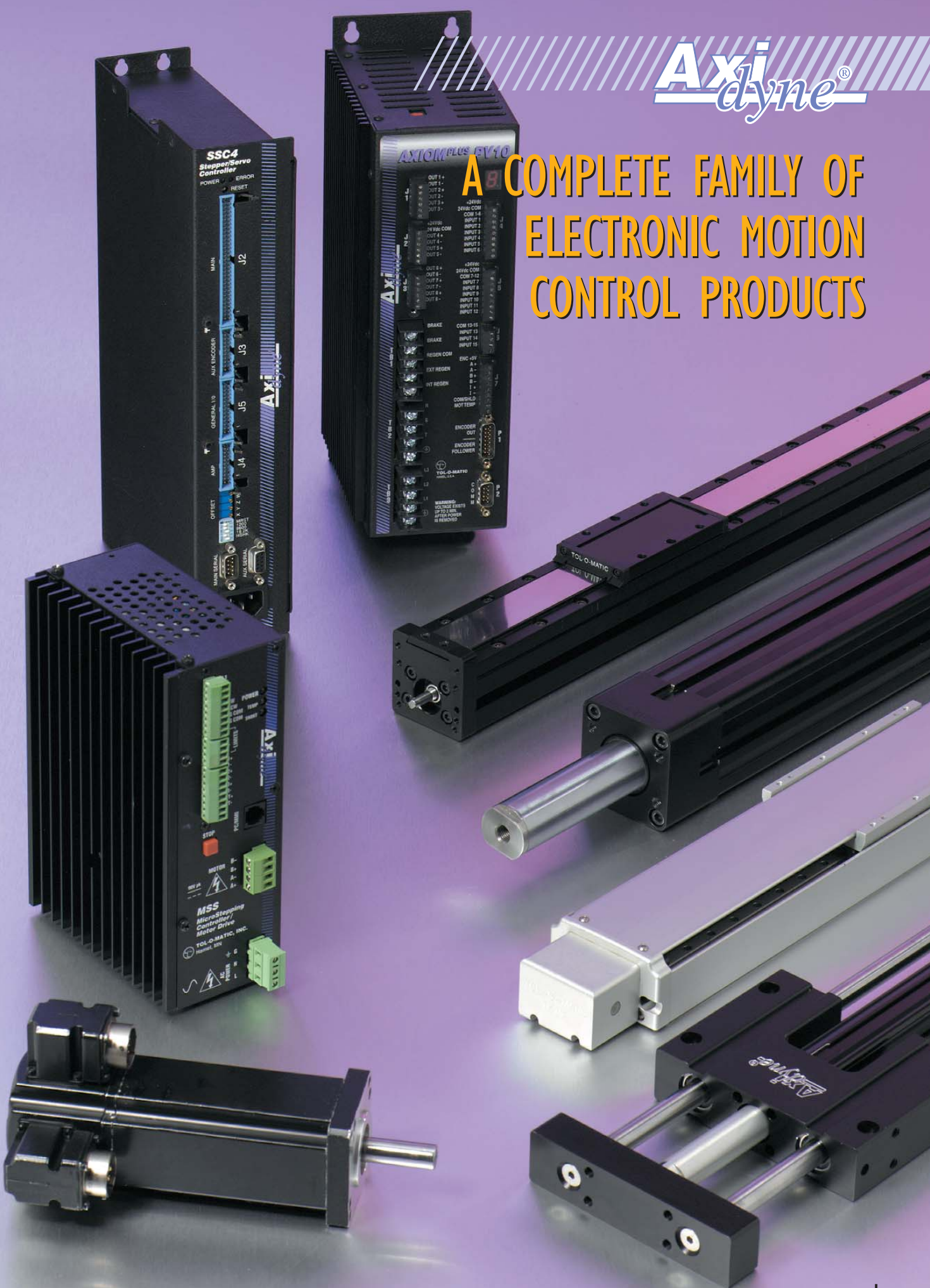
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Axi
dyne[®]

A COMPLETE FAMILY OF ELECTRONIC MOTION CONTROL PRODUCTS



DELIVERING OUR BEST TO YOU, FOR OVER 40 YEARS

OUR AUTOMATION SOLUTIONS ARE DRIVEN TO IMPROVE YOUR COMPETITIVE ADVANTAGE
BY INCREASING YOUR MACHINE PRODUCTIVITY AND ENHANCING MACHINE SAFETY.

OUR "TOTAL" SOLUTION APPROACH INCLUDES:

Proven Products



Tol-O-Matic created an industry with the introduction of the rodless cylinder over 40 years ago. The invention of the band cylinder and continuing innovations make us a leader in linear motion.

Fast Delivery



Our manufacturing speed leads the industry. Standard catalog products are ready to be shipped within 5 days. The right product, in days, not weeks – that's Tol-O-Matic's delivery promise.

Highest Quality



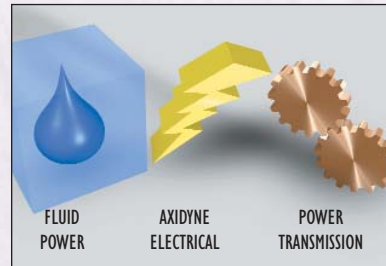
ISO 9001 certified quality system provides assurance that our products are built within a system to assure quality.

Applied Knowledge



Our sales and engineering staff is **YOUR** resource, only a phone call away. Combine our factory resources with our expert distributor network to get your project on track. Our commitment to training includes on site classroom, lab, travelling programs that come to your location.

Multiple Technologies



We offer fluid power, electro-mechanical linear and power transmission technology. You get the right technology for your accuracy and price needs.

Most Flexibility



If we do not have a standard catalog product to meet your unique needs we will modify a standard product or create a custom product for your application.

Give us a call and put our
"Total" Solution Approach to
work for you.

Toll Free (U.S. and Canada)

1-800-328-2174

or
763-478-8000 FAX: 763-478-8080

Email: help@tolomatic.com

TOL-O-MATIC'S "TOTAL" SOLUTION APPROACH

CORE
COMPETENCY

OUR COMMITMENT TO DESIGN SOLUTIONS ENCOMPASSES ALL WE DO AT TOL-O-MATIC. THE SPECTRUM OF OUR DESIGN SOLUTIONS CONTAINS OUR STANDARD PRODUCT LINE, SPECIAL PRODUCTS AND CUSTOM PRODUCTS.

STANDARD PRODUCT LINE

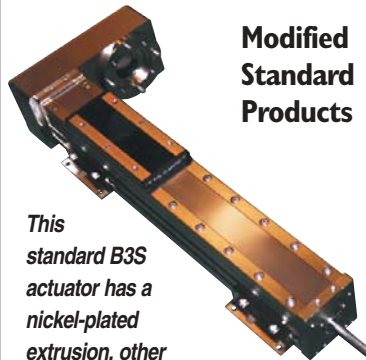
MODIFIED STANDARD PRODUCTS

CUSTOM PRODUCTS



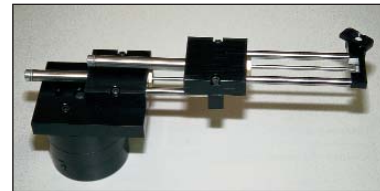
Standard Products

High accuracy motion systems complete with motors, drives, controllers and software.



Modified Standard Products

This standard B3S actuator has a nickel-plated extrusion, other components were made of stainless-steel. A special mounting bracket was created to use a nonstandard motor.



Custom Products

This multi-axis actuator doesn't resemble any of Tol-O-Matic's standard catalog products. It was built to fit a manufacturer's motion, space, load and accuracy requirements.

- Tol-O-Matic's standard product line is detailed in over 400 catalog pages. Our best values with products built to order in five days.
- Our extensive standard product line, built to your specified length, is often altered with different tapped holes, materials, coating, and mounting brackets.
- Custom products are a blank page. They can be revisions of existing products or completely new actuators. Let us know your unique needs and Tol-O-Matic will design a product for your application.

The Custom Product Creation Process

Once we have determined that you require a product that doesn't yet exist or can't be modified from existing products, we begin creating a custom actuator for you.

- Tol-O-Matic sales people meet with customer and distributor to determine the scope of the project, challenges, pricing concerns, and timelines.
- Tol-O-Matic engineering staff meet with customer, evaluate preliminary design.
- Tol-O-Matic model shop creates prototype of actuator.
- Prototype is evaluated by customer, meanwhile Tol-O-Matic tests prototype and begins to procure needed materials.
- As needed, new prototypes are created and evaluation continues. Upon approval, actuator is put into production.

Custom design is familiar to everyone at Tol-O-Matic, from the sales force to the assembly line. Custom products and "specials" are just one of the things we do each day.

Axline®

CONTROLS AND MOTORS

SYSTEM SOLUTIONS

Axi
dyne[®]

Seven different actuator body types combine with eleven different motion control configurations for the widest variety of application solutions from one source—

TOL-O-MATIC

Tol-O-Matic offers a complete motion system —

Motors are available in brushless, brushed dc and stepper. Drivers provide a range of operation from high performance brushless servos to low-cost, open loop microsteppers. Controls are offered stand alone or integral to the drive and range from the most basic functionality to multi-tasking with separate sequential motion and scanned plc threads. All controls offer easy-to-use, icon based programming.



Axidyne Tol-O-Motion™ Sizing and Selection Software

makes it easy to choose the right components for your applications. User friendly Windows based software guides you through the selection process, offering several options to choose from.

Tol-O-Matic's Axi-dyne Rodless Actuators offer a choice of four load carrier support and guidance systems. A wide selection of screw-drive actuators offer a range of solutions for low-profile, space-sensitive applications to those that require high load-carrying capacities. Two styles of belt-drive actuators accommodate applications with longer strokes and higher speeds. **Our newest line of TruTrack Actuators** offer high thrust and velocity with the lowest deflection rate of any Tol-O-Matic actuator.

Rod Type Actuators are available as cylinder style (RSA) Rod Screw Actuators and rod slide style (GSA) Guided Screw Actuators. These two configurations provide a full range of sizes and options, all designed with high performance and flexibility in mind.



No need to mix-and-match components

With Axi-dyne, you don't need to mix-and-match components and cross your fingers. All our system components are designed to work together — controls, drives, motors and actuators — complete with all cables and accessories for easy setup and installation. You get a single-source solution engineered specifically for your application, built-to-order in 5 days or less.



BRUSHLESS SERVO SYSTEMS

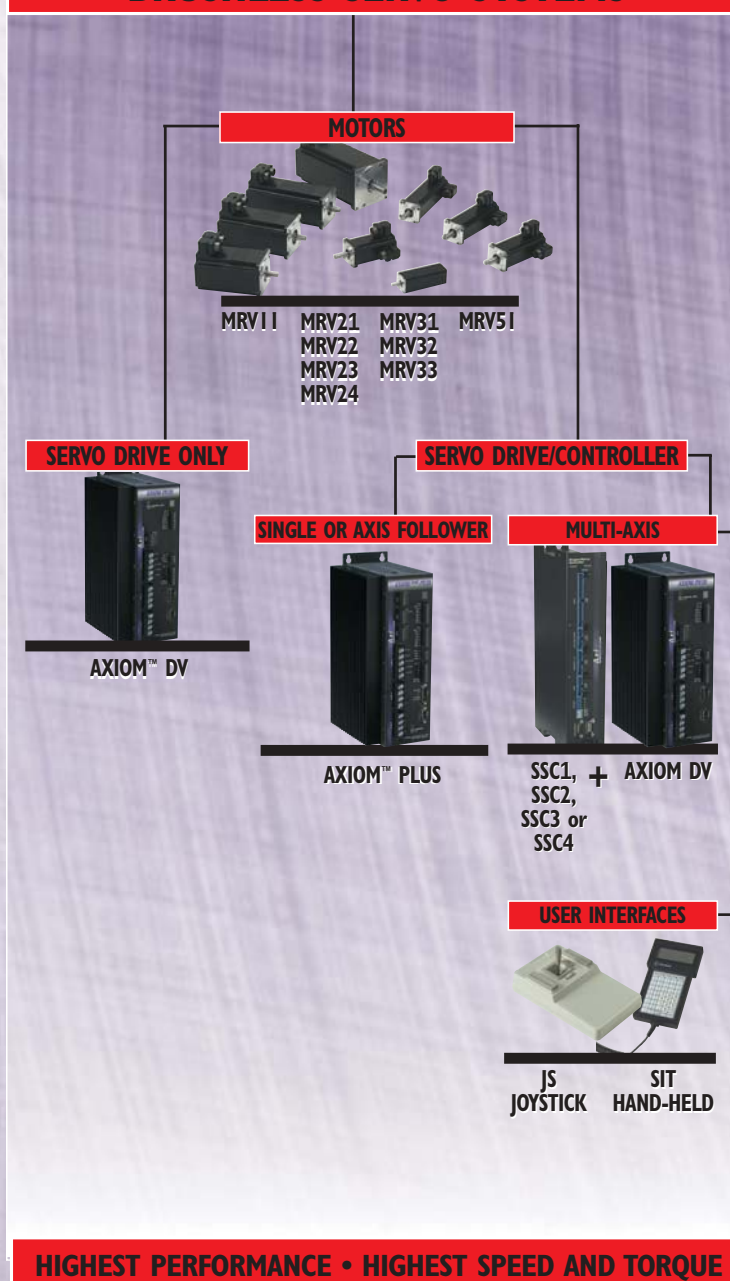
- Extremely smooth, quiet operation
- High torque (up to 75 in-lbs continuous, 150 in-lbs peak)
- High speeds (up to 6000 rpm)
- Torque, velocity or position control
- Maintenance free

MICROSTEPPING SYSTEMS

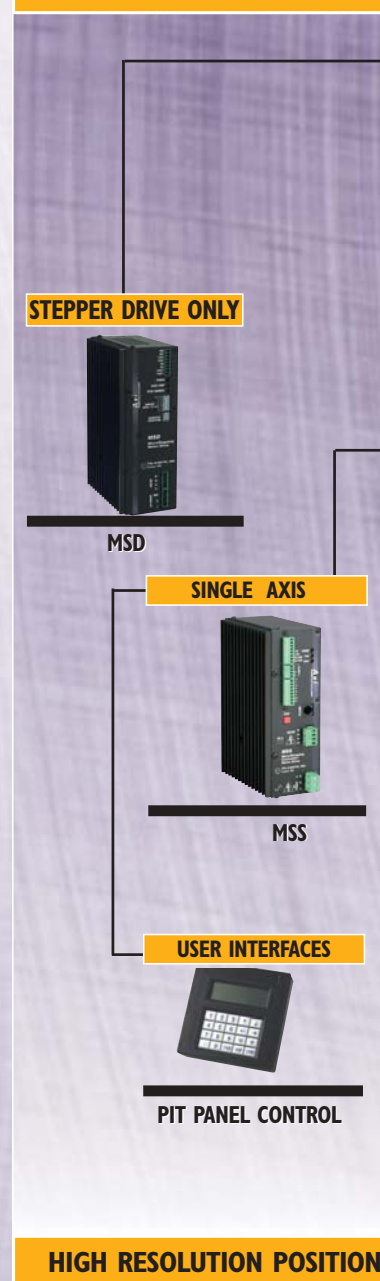
- Lowest cost for precise positioning
- Highest resolution without feedback device
- Good for speeds less than 2000 rpm, torque requirements less than 35 in-lbs
- Maintenance free



BRUSHLESS SERVO SYSTEMS



MICROSTEPPING



AND MOTION CONTROLS



SYSTEMS

MOTORS



STEPPER DRIVE/CONTROLLER

MULTI-AXIS



USER INTERFACES



AND REPEATABILITY

BRUSHED DC SYSTEMS

MOTORS



SERVO DRIVE ONLY



SERVO DRIVE/CONTROLLER

BASIC SINGLE AXIS



MULTI-AXIS



USER INTERFACES



USER INTERFACES



LOW-COST, MATURE TECHNOLOGY • SMOOTH AND QUIET OPERATION

BRUSHED DC SYSTEMS

- Low to medium cost
- Smooth, quiet operation
- Good for speeds up to 4000 rpm, torques up to 40 in-lbs continuous (64 in-lbs peak) and resolutions of 4000 counts per revolution

MECHANICAL ACTUATORS SCREW-DRIVES

- Four load-carrying designs (TKS, B3S, SLS and BCS Series)
- Flexible load acceleration, deceleration, speed and stroke

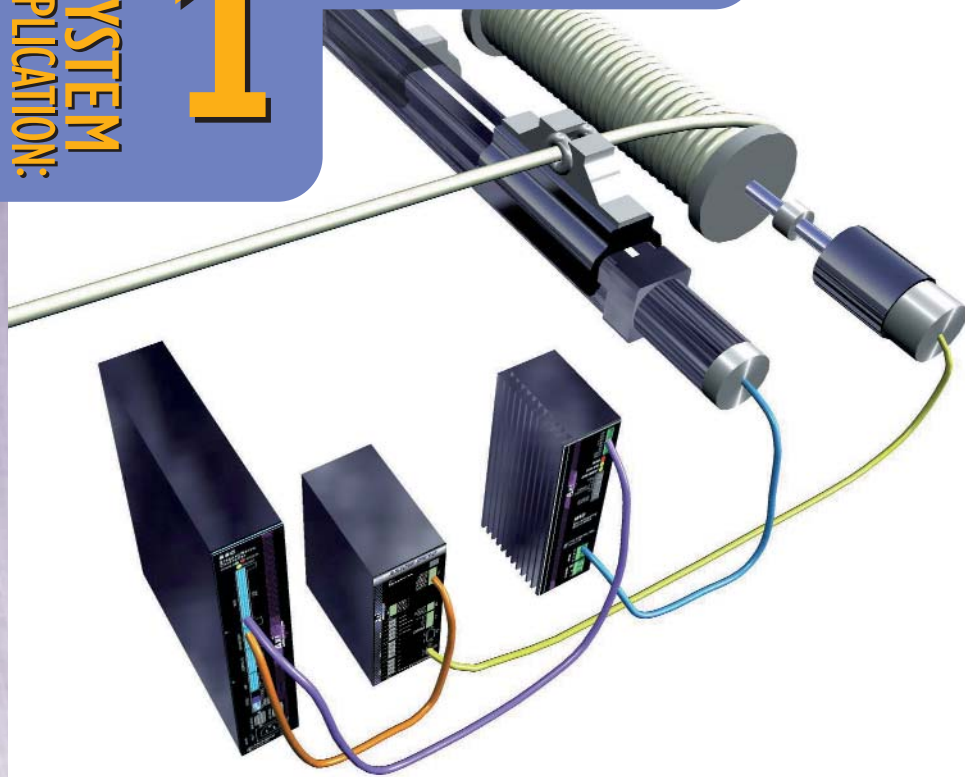
BELT-DRIVES

- Two load-carrying designs (TKB and B3B Series)
- Higher speeds
- Longer strokes

ROD-SCREW

- Two types of designs (RSA and GSA Series)
- Higher thrust capacities

A complete family of motion control products that are easy to order, install and use.



TYPICAL APPLICATION SOLUTIONS

From
lower cost,
brushed dc
technologies
to higher

performance

brushless servo

systems, Axidyne

control and actuator

combinations

will get your design

up and running.

Tol-O-Matic System Components:

- SSC2 two axis controller
- AXIOM™ DV10 digital brushless servo drive/MRV brushless servo motor
- MSD microstepping drive/MRS stepper motor
- BCS screw drive rod bearing actuator
- Motor couplings, motor adapters and cabling automatically selected using the Tol-O-Motion™ sizing software configuration generator

APPLICATION DESCRIPTION:

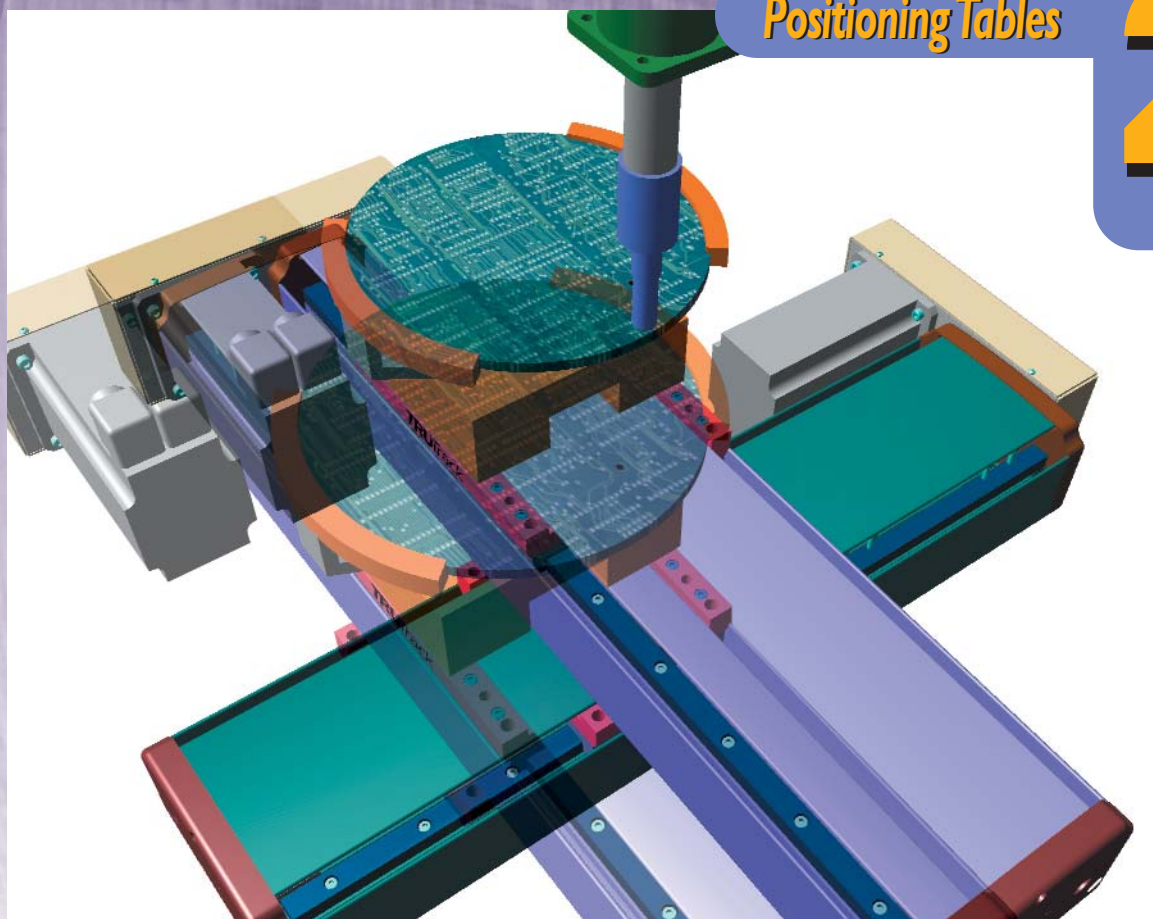
A manufacturer of surgical tubing winds the tubing on a spool with a constant tension, which is critical so as not to deform the tubing shape or size.

APPLICATION REQUIREMENTS:

- Constant tension provided by winding spool
- Reciprocating tube position guide
- Tube guide and tensioning must compensate for process speed variations

TOL-O-MATIC SOLUTION:

For precise tension control, the AXIOM DV10 drive operates in torque mode, with a MRV brushless servo motor and provides an optimal solution. The controller must be able to provide torque adjustment that is inversely proportional to the spool diameter. This adjustment will be made each time the tube position guide changes direction. The controller must also be able to provide linear interpolation between the spool motor position and the reciprocating tube guide position. A low-cost solution for the reciprocating guide is a BCS Series screw-drive actuator driven by the MSD microstepping drive and an MRS series stepper motor. Therefore, the controller must be able to provide an analog torque signal for the servo drive as well as a step-and-direction signal for the microstepping drive. Also, the controller must be able to supply a correction algorithm for tension control with linear interpolation between the two axes. The controller for this application is the SSC2 two axis/multi-function controller.



APPLICATION DESCRIPTION:

A manufacturer is making positioning tables which move under a sensor used to measure the solder levels on a printed circuit board. A two-axis motion controller with a PLC is part of their existing set-up.

APPLICATION REQUIREMENTS:

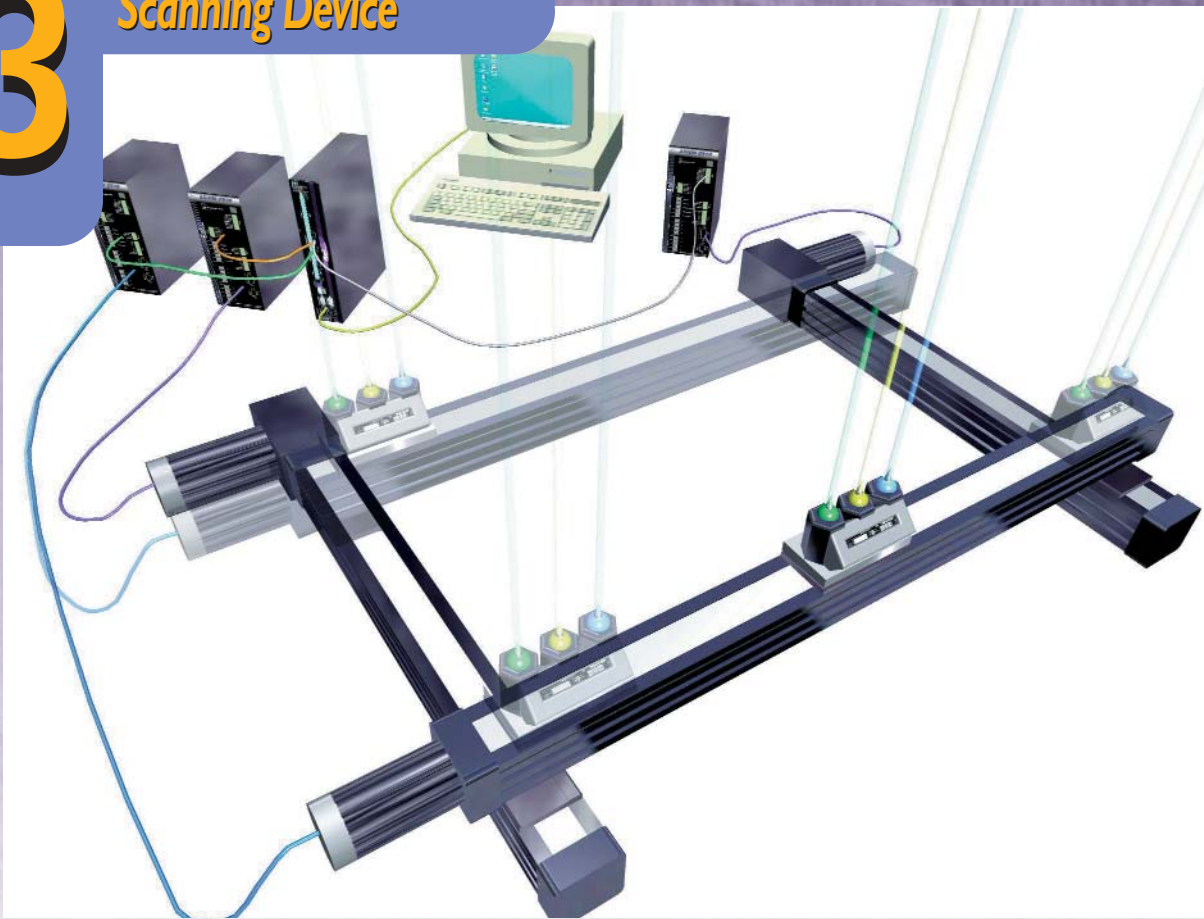
- Two actuators mounted carrier-to-base
- Minimized vibration
- Attractive Package
- Motor and Drive for each axis
- Speed requirement of 4 inches per second for each axis
- Space is limited
- Cost-effective drive/motor/actuator package
- Maximum load deflection: .0001"

TOL-O-MATIC SOLUTION:

Space is a concern in this application, so the TKS10 screw-drive actuator with a reverse parallel option was selected to reduce length. Two 23-frame stepper motors were selected for the most cost-effective solution since high speeds and torque were not required. An MSD micro-stepping drive was chosen to accept standard step-and-direction signals.

Tol-O-Matic System Components:

- Two TruTrack TKS10 screw-drive actuators with reverse parallel mounting configuration
- Two MSD microstepping drives
- Two MRS231 stepper motors
- All motor couplings, motor adapters and cabling automatically selected using the Tol-O-Motion sizing software configuration generator

**Tol-O-Matic System Components:**

- SSC3 three-axis multifunction controller
- Two AXIOM™ DV20 digital servo drives
- Two MRV31 brushless servo motors
- AXIOM™ DV10 digital servo drive
- Two B3B15 belt-drive actuators
- B3S10 screw-drive actuator
- Motor couplings, motor adapters and cabling automatically selected using the Tol-O-Motion sizing and selection software configuration generator

APPLICATION DESCRIPTION:

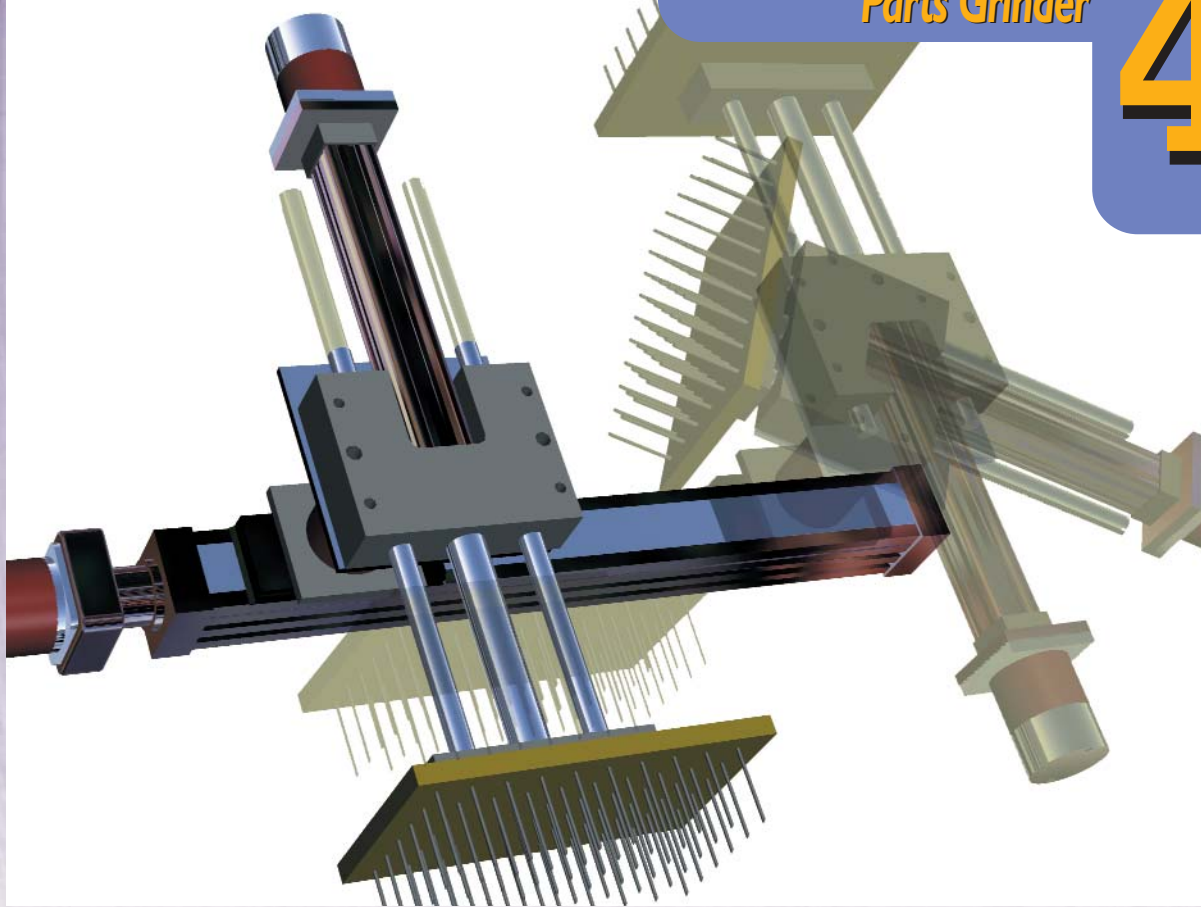
The developer of a new scanning device requires a method of traversing 48 inches on the X axis in less than 1 second and then indexing along the Y axis over a distance of 72 inches following each X axis scan.

APPLICATION REQUIREMENTS:

- X-Y positioning of a 50 lb scanning head
- 48-inch X axis move in less than 1 second
- 72-inch Y travel distance
- Better than 0.010-inch repeatability

TOL-O-MATIC SOLUTION:

Speed and stroke requirements in the X axis do not allow the use of a screw actuator. The moment load generated by the scanning head and 72-inch Y axis does not allow a single actuator to be used for the X-axis. Therefore, two B3B15 belt-drive actuators were used in the gantry configuration shown. The speed requirements also do not allow the use of stepper or brushed dc systems. MRV brushless servo motors, driven by the AXIOM DV drives were used in this system and controlled by a 3-axis SSC3 controller. The two X-axis motors/drives were electronically geared together while operating the third axis independently. Programming was done over RS232 from a PC using the user friendly Tol-O-Motion™ SSC programming software.



APPLICATION DESCRIPTION:

A manufacturer wants to design a machine that will grind 500 small parts at a time to the the same length within 0.0005" repeatability.

APPLICATION REQUIREMENTS:

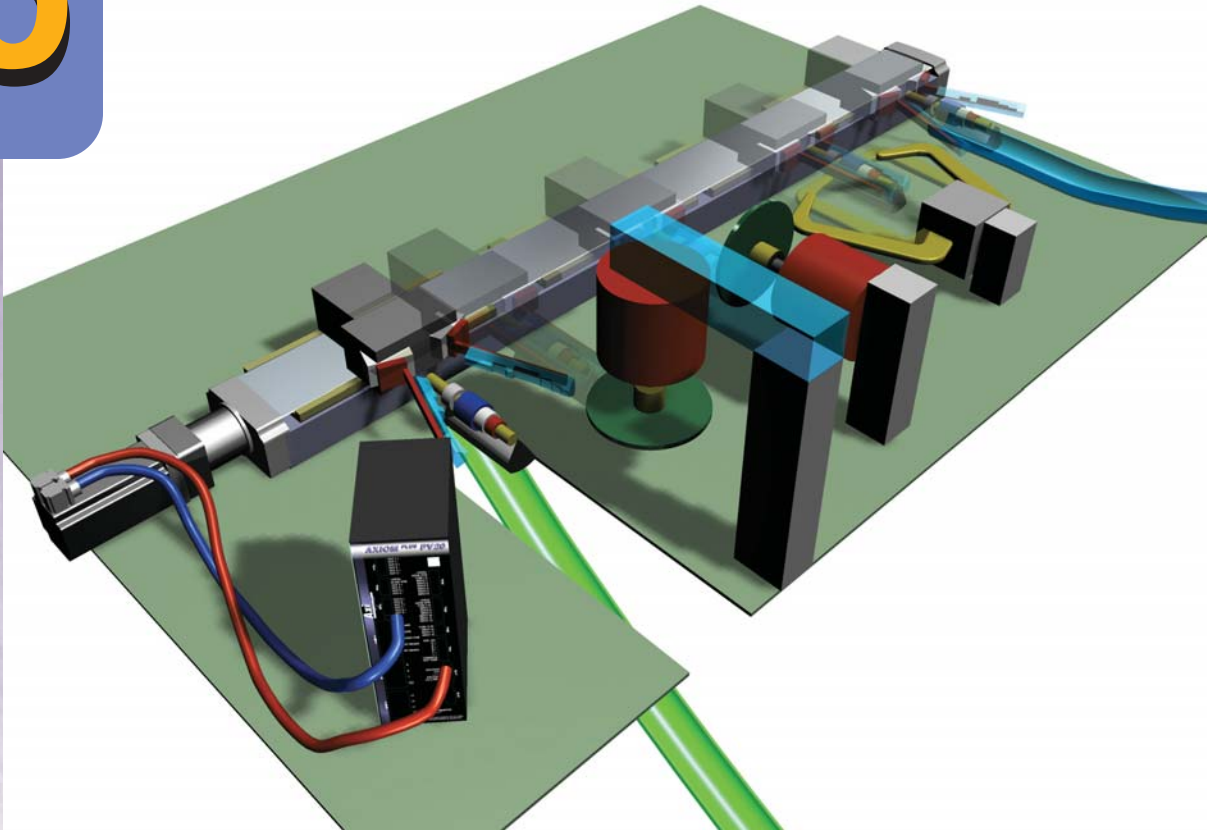
- Three axes: Main axis to move the parts back and forth, rotating axis to rotate the parts 180° before grinding, and a Guide Screw Actuator to compensate for wear on the grinder.
- User interface to allow operator to select part numbers, batch sizes and move distances for grinding compensation.
- 18" stroke on main actuator, and 4" stroke on the grinder indexer.

TOL-O-MATIC SOLUTION:

Selected for the main axis is a B3S15 with 2TPI low backlash ball nut, driven by a MRS233 stepper motor. Rotation is supplied by a 23 frame stepper motor and gearhead reduction. A GSA24 guided screw actuator indexes the parts to the grinder forward and backward. The operator can input a "Delta" value based on periodic quality checks during the process.

Tol-O-Matic System Components:

- SSC3 multi-axis controller
- Three MSD microstepping drives
- Three MRS stepper motors
- B3S15 screw-drive actuator
- GSA24 guided screw actuator
- Motor couplings, motor adapters and cabling automatically selected using the Tol-O-Motion™ sizing and selection software configuration generator



Tol-O-Matic System Components:

- Axiom® Plus PV20 Brushless controller/drive
- MRV31Z brushless motor
- TKS50 screw-drive rodless actuator
- Motor couplings, motor adapters and cabling automatically selected using the Tol-O-Motion sizing and selection configuration generation.

APPLICATION DESCRIPTION:

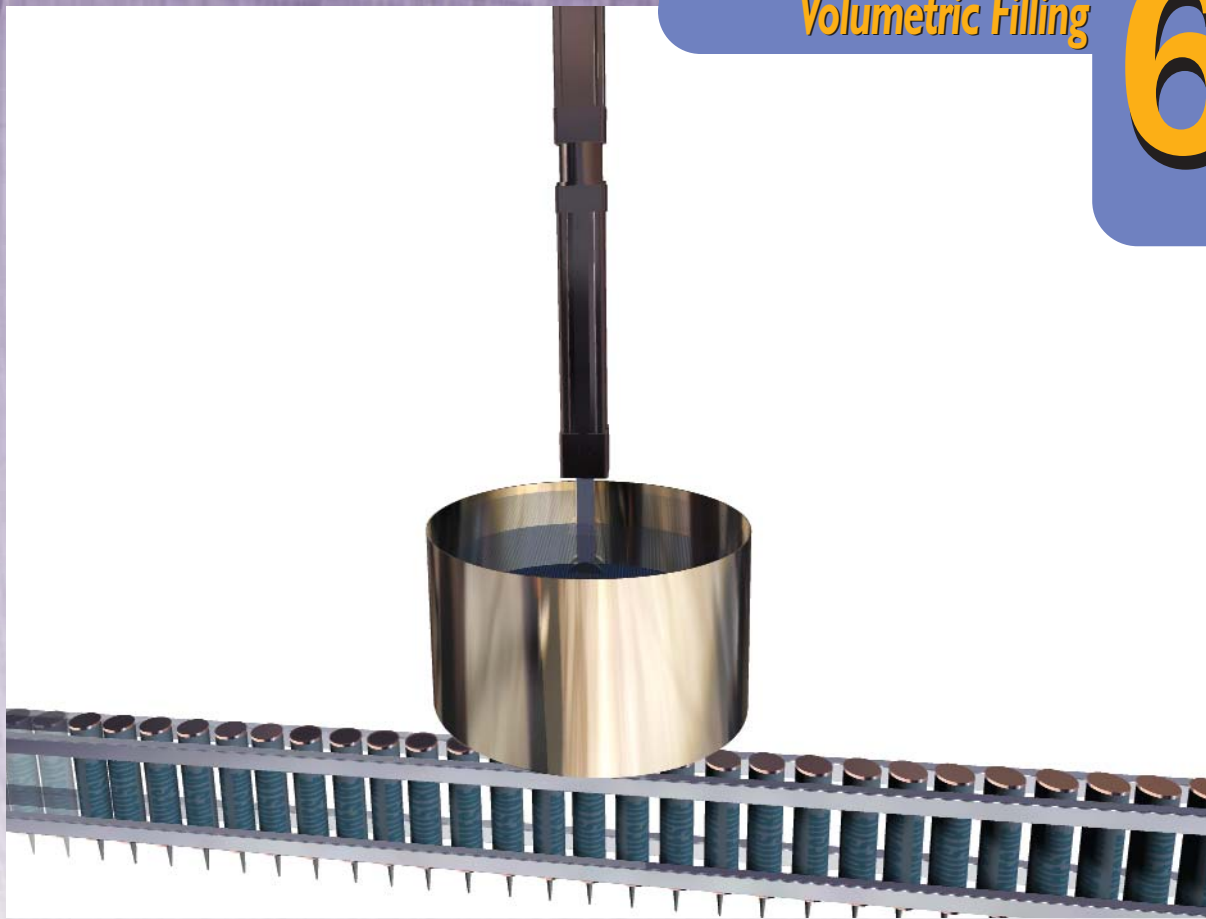
A manufacturer needed to automate the welding of two parts which undergo two separate grinding operations after the welding process.

APPLICATION REQUIREMENTS:

- Single-axis system
- Rigid carrier design
- 27 inches per second
- Fixture weight of 25 lbs
- Motion must resume and complete part processing if procedure is stopped during normal operation
- Position to 5 locations, repeatable to 0.002"

TOL-O-MATIC SOLUTION:

Since this application required a high speed rigid carrier design, a TruTrack TKS75 was selected. The Axiom Plus brushless servo drive/controller was chosen because of the requirement to home from an encoder index pulse and the ability to pause the motion in response to an input and resume motion when input cleared without restarting the program. The AxiomPlus can use the encoder index pulse in conjunction with the home switch to achieve repeatable startup positioning. The 1TPI ball screw in the TKS75 allows for the required move speed of 27 in/sec and offers very low deflection during the process.



APPLICATION DESCRIPTION:

A volumetric filler machine currently uses a pneumatic cylinder to operate a piston pump. Product is being wasted as a result, due to lack of precision.

APPLICATION REQUIREMENTS:

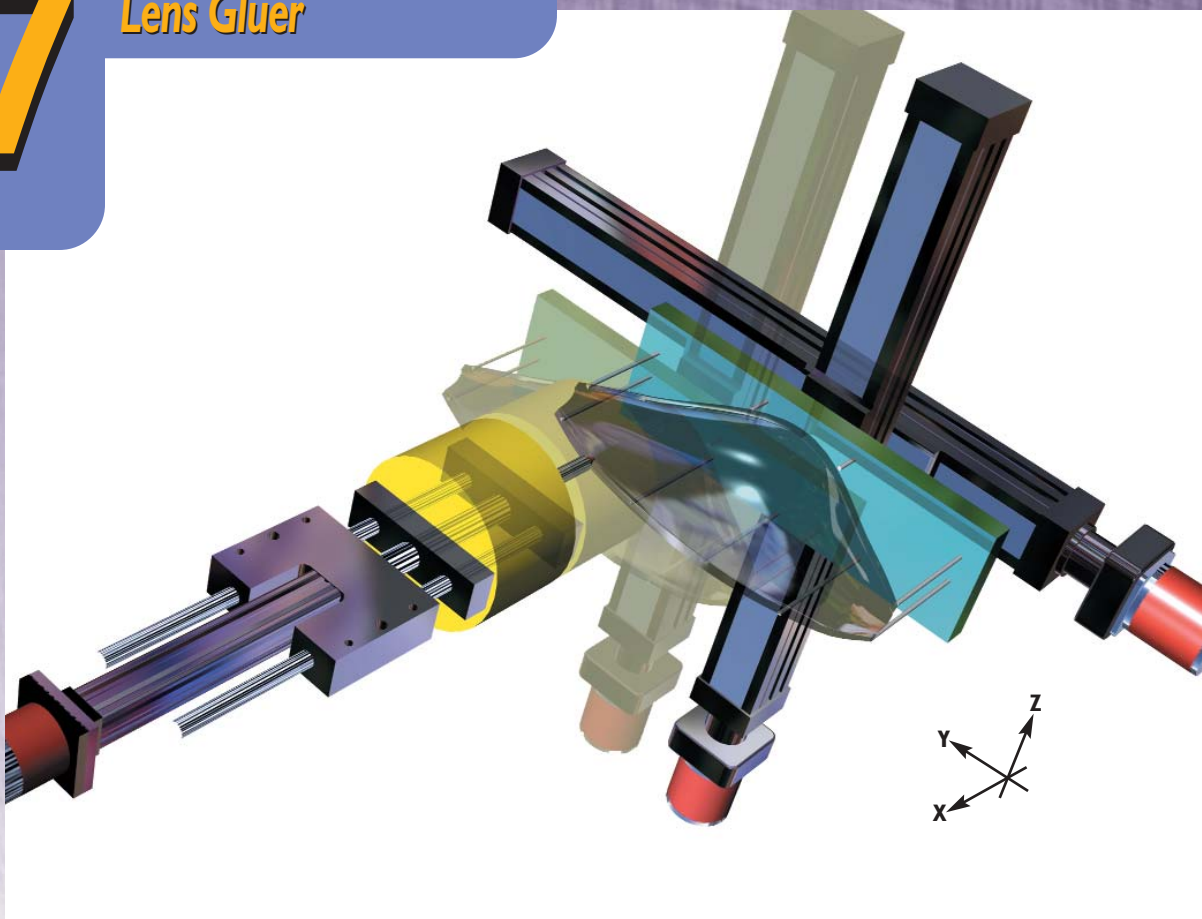
- Precise volume control, accurate fill rate
- Quick change between products
- Stroke: 8 inches
- Force: approximately 200 lbs
- Easy to set up and program

TOL-O-MATIC SOLUTION:

Due to the torque demand of this application, a brushless servo system was the best choice. For this basic single-axis application, the Axiom®Plus PV10 controller/drive was selected along with an MRV23 servo motor. The RSA50 actuator with the 1" diameter ACME screw, was the best selection for the given thrust requirement.

Tol-O-Matic System Components:

- Axiom®Plus PV10 controller/drive
- MRV23 brushless servo motor
- RSA50 rod screw actuator
- Motor couplings, motor adapters and cabling automatically selected using the Tol-O-Motion™ sizing and selection configuration generator.



Tol-O-Matic System Components:

- SSC3 three-axis servo controller
- MRB23 brush motors
- GSA16 guided screw actuator
- 2-B3S15 screw-drive actuators
- Motor couplings, motor adapters and cabling automatically selected using the Tol-O-Motion™ sizing and selection software configuration generator

APPLICATION DESCRIPTION:

A snowmobile lens manufacturer wants to put a bead of adhesive in the groove on the edge of a lens. Cycle time per lens is 20 seconds. The weight of the lens and nest is no more than 10 pounds. The weight of the glue gun is 4 pounds maximum.

APPLICATION REQUIREMENTS:

- Velocity control
- Interface to joystick
- Stroke requirements: x axis- 12", y axis-24", z axis-40"
- Less than 10 pound load for lens and nest
- Less than 4 pound load for glue gun
- 3" per second maximum speed for movement of lens and nest (B3S axes). Glue gun (GSA axis) to follow the curvature of the lens

TOL-O-MATIC SOLUTION:

Two B3S15s are used to supply motion to the lens and nest. A B3S15 with 40" stroke and a 2TPI ball screw is selected for the Z axis. The Y axis uses a B3S15 with 24" stroke and a 5TPI ball screw. A GSA16 with a stroke of 12" moves the glue gun on the X axis. It uses a 1TPI ACME screw. All three actuators use a MRB21 brush motor. The SSC31 controller completes the system, along with a joystick utilizing teach mode to make the required moves.

Axi
dyne[®]

LINEAR ACTUATORS



RODLESS ACTUATORS

Screw actuators in
four load-
carrying designs
for accurate
positioning of
heavy, offset loads.
Belt actuators in
two load-carrying
designs for higher
speeds and longer
strokes.



TRUTrack™ TKS Screw and TKB Belt Drive Series

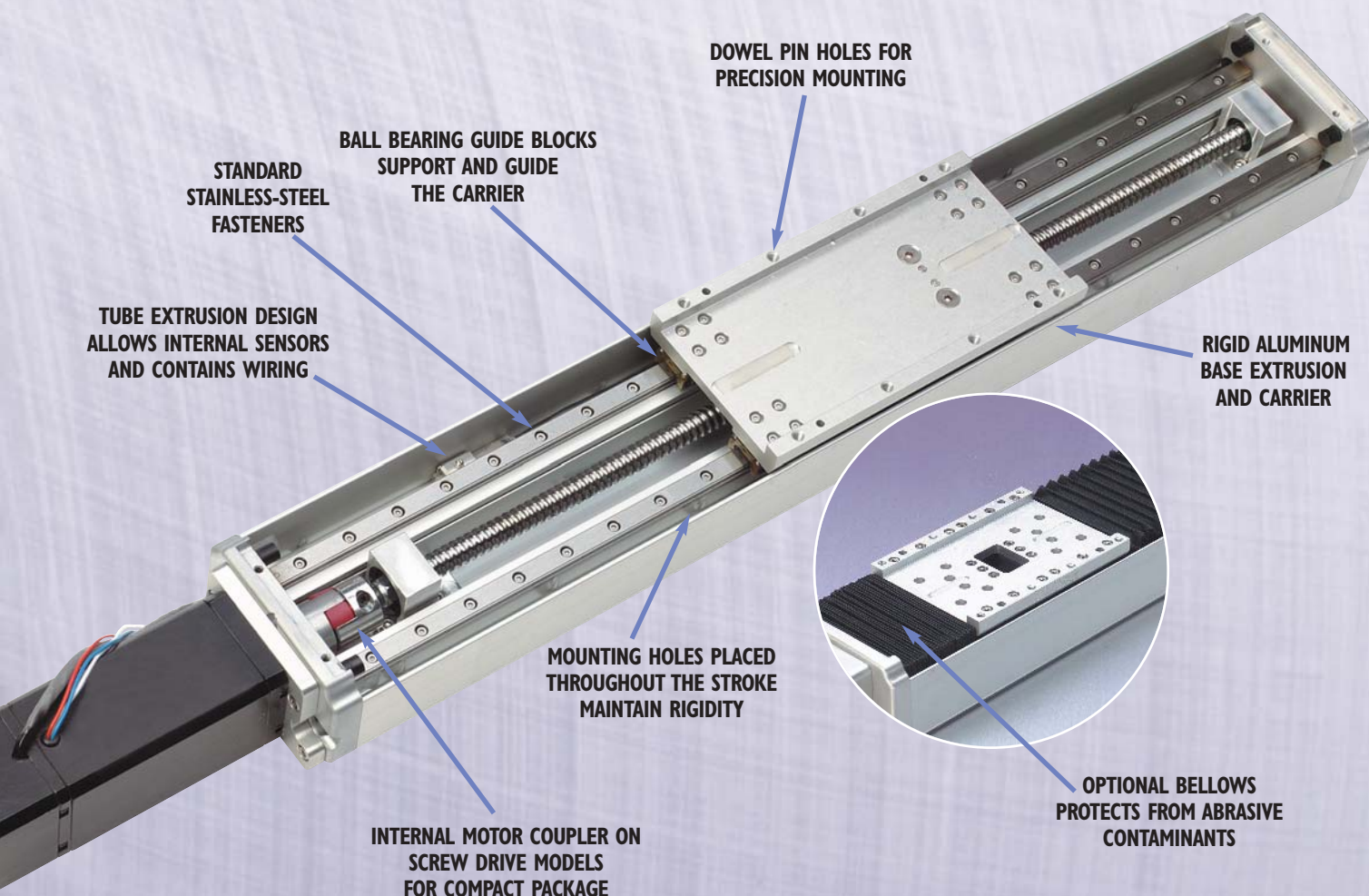
The TRUTrack line of Axidyne actuators provides straighter, truer, linear motion (within 0.0002 inches per inch) than any Tol-O-Matic actuator. The TruTrack guidance system uses ground linear rails (and ball bearing blocks) to decrease deflection and guide the carrier and its linear load. Choice of either lead screw or timing belt drive systems makes these actuators versatile enough to accommodate low/high thrust and speed applications where repeatability and low deflection are important.

- **4 compact overall envelope sizes** ranging from 1.74 x 3 inches (44.2 x 76.2 mm) to 3.42 x 6.13 inches (86.9 x 155.6 mm)
- Screw-drive models available in **4 different screw sizes** with ACME or ball nut configurations
- **Linear rails** guide carrier for lowest deflection
- **Ball screw or timing belt drive options** for maximum flexibility
- **Heavy-duty drive belts** provide for greater thrusts and velocities
- **System payloads ranging from 100 lbs (445 N)** for the TK10 Series **to 750 lbs (3338 N)** for the TK75 Series.
- **Multiple gearhead selections** in gear ratios of 5.5:1 and 10:1
- **Stroke lengths available in any incremental length** ranging from 0 to 96 inches (2438 mm) depending on actuator type and body size
- **Removable cover** for rapid access to internal components and easy maintenance
- **Internal sensing capability** keeps wiring contained for clean, easy management
- **Easy, secure mounting** allows two axis configuration with adapter plates
- **Internal motor coupling** keeps package size compact
- **Optional bellows** cover keeps contaminants out
- Matched with **8 different brushless servo motor selections** in 17, 23, and 34 frame sizes.
- Matched with **5 different stepper motor selections** in 17, 23 and 34 frame sizes.

TRUTRACK VS AXIDYNE B3S/B AND BCS SERIES ACTUATORS



FEATURES AND SPECIFICATIONS	TKS/TKB SERIES		B3S/B3B SERIES		BCS SERIES	
Straightness (inches/per inch)	.0002		UNSPECIFIED		UNSPECIFIED	
Flatness (inches/per inch)	.0002		UNSPECIFIED		UNSPECIFIED	
Maximum Load (lb/kg)	100-750	45.4-340.1	591-2008	268.0-910.8	60-300	27.2-136.0
Dynamic Moment Loads (in-lb/N-m)						
Mx	85-1151	9.6-130.0	250-1662	28.2-187.7	55-300	6.2-33.8
My	234-1477	26.4-166.9	269-1472	30.3-166.3	100-1100	11.2-124.2
Mz	234-1332	26.4-150.5	156-850	17.6-96.0	30-325	3.3-36.7
Maximum Speed (in/sec; mm/sec)						
Screw	60	1524	60	1524	60	1524
Belt	100	2540	100	2540	100	2540
Sizes Available	4		3		3	
Stroke (in/mm)						
Screw	36-96	914-2438	80-120	2032-3048	80-120	2032-3048
Belt	96	2438	216	5486	216	5486
Brake Option	YES		CONTACT THE FACTORY		CONTACT THE FACTORY	
Built to Order and Shipped	5 days or less		5 days or less		5 days or less	



RODLESS ACTUATORS

Screw actuators in
four load-
carrying designs
for accurate
positioning of
heavy, offset loads.
Belt actuators in
two load-carrying
designs for higher
speeds and longer
strokes.

B3B



PATENTED SEALED RECIRCULATING
BEARINGS FOR LONG LIFE

B3S



B3S/M3S Screw- and B3B/M3B Belt-Drives

For high load and moment load capacity with consistent tracking, this series of actuators features a patented* heavy duty recirculating bearing system in gothic arch rail guides. This system offers wear resistance with repeated accuracy. Bearings are sealed for long wear and extended performance.

The B3S and B3B Series provide high load (over 2000 lbs) and moment load capacity with consistent tracking for full actuator life.

B3S Screw-Drive

- 3 body sizes
- Same envelope size as BCS actuators with higher load capacities
- 20 standard (inch) models
Three body sizes and 20 different screw/nut combinations.
- 12 metric models
Three body sizes and 12 screw/nut combinations.
- Custom order strokes in any incremental length

B3B Belt-Drive

- 3 body sizes
- Neoprene belt material for higher speeds.
- 3:1 Reduction drive
Available for matching motor speed and inertia.
- Custom-order stroke lengths
Custom strokes up to 18 feet in any incremental length. (For longer strokes, consult the factory.)



SLS/MLS Screw-Drives

These pre-engineered, load-supporting and fully enclosed slide-style actuators use a guidance system of recirculating bearings on ground steel shafts providing consistent carrier tracking and long actuator life. Using the same patented band retention system as the BCS style actuators, SLS actuators are available in one body size and offer a rigid, low-profile design, ideal for space-sensitive applications.

- **Extruded work table**
Fully extruded anodized-aluminum work table has two parallel "T" slots for mounting flexibility and stability.
- **Single-piece housing**
Fully extruded anodized aluminum housing increases stability and provides continuous bearing rod support along full stroke.
- **6 standard (inch) models**
One-inch body size and two different screw sizes with anti-backlash option.
- **4 metric models**
One body size and two screw sizes in ACME or Ball selections.
- **Custom-order strokes in any incremental length**

BCS/MCS Screw-Drives

This group of actuators utilizes a guidance system consisting of a patented* adjustable carrier bracket designed to transmit the load to the cylinder body instead of the screw or belt for true tracking, superior load support and controlled minimum friction load. The load-bearing carrier system uses two self-lubricating Delrin bearing rods to pass force directly to the cylinder tube. A patented** band retention system uses a T-shaped elastomer strip bonded to a stainless steel band inserted directly into the body housing forming a tight metal-to-metal seal.

BCS Screw-Drive

- **20 standard (inch) models**
Three body sizes combined with 20 different screw/nut combinations.
- **12 metric models**
Three body sizes and 9 different screw sizes also with anti-backlash option.
- **Custom-order strokes in any incremental length**

* U.S. Patent No. 4724744
** U.S. Patent No. 4545290

ROD SCREW ACTUATORS

Tol-O-Matic's
line of rod screw
actuators offer the
widest selection of
sizes with the
highest thrust
capabilities and
broadest range of
motor choices.



RSA/RSM Series Rod Screw Actuators

The Axi-dyne family of rod screw actuators offers the most complete selection of sizes, options and system components. Designed with high performance, dependability and mounting flexibility in mind, these actuators easily combine with our other motion control components in brushless servo, microstepping or brushed dc system configurations. Together, they offer a cost-competitive solution for a multitude of motion control applications.

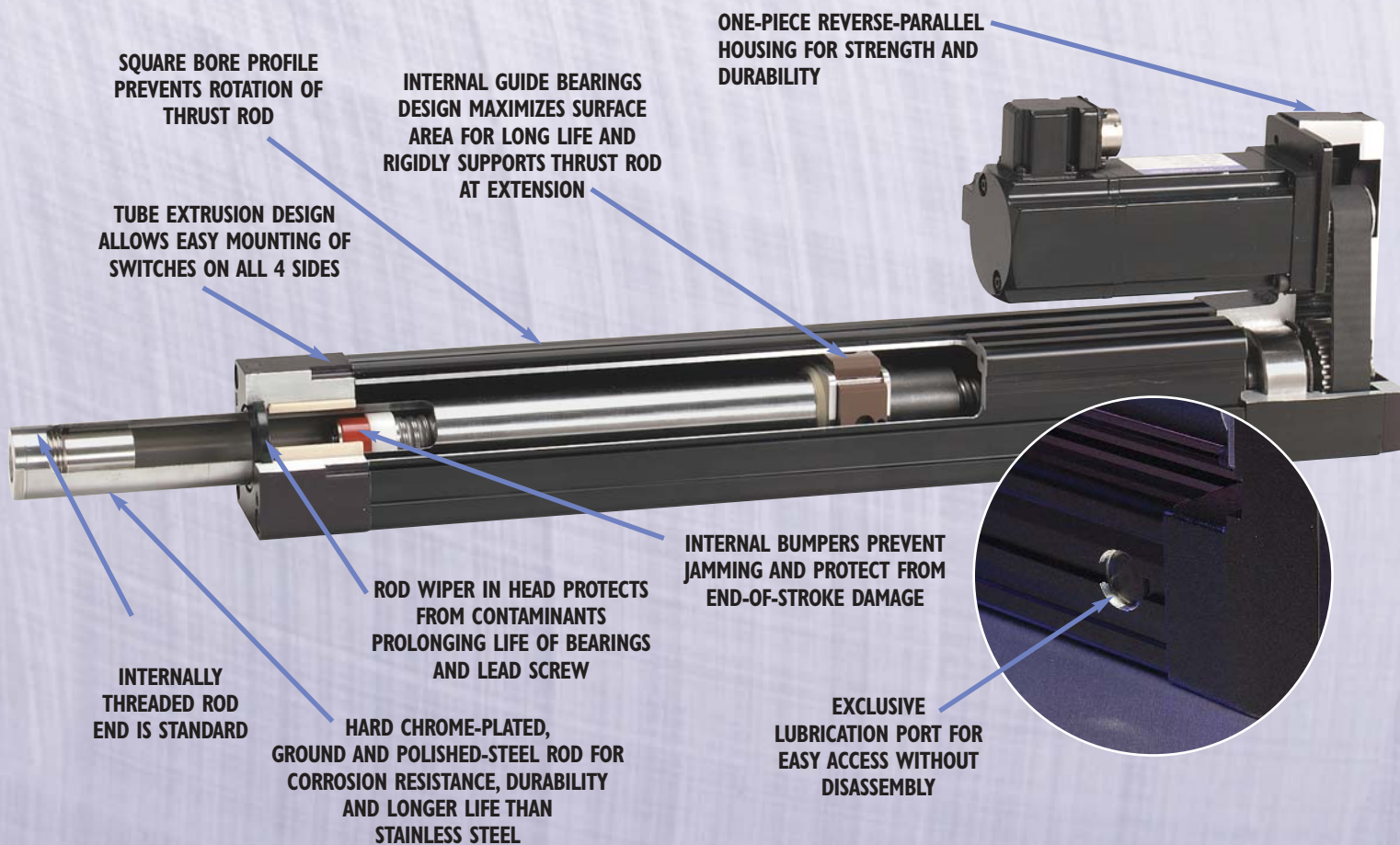
- 6 different body sizes ranging from .75-inch (19mm) to 4-inch (100mm) body sizes.
- 5 different screw sizes ranging from .375-inch to 1.5-inches with either solid or ball nut configuration.
- System thrust capabilities ranging from 70 lbs (311.4N) for the RSA/RSM12 Series to 4700 lbs (20,907N) for the RSA/RSM64 Series.
- 8 different brushless servo motor selections in 17, 23 and 34 frame sizes.
- 6 different stepper motor selections in 17, 23 and 34 frame sizes.
- 5 different brushed dc motor selections in 23, 34 and 4-inch frame sizes.
- 7 different gearhead selections in gear ratios of 5.5:1 or 10:1.
- Stroke lengths available in any incremental length ranging from 0 to 60 inches depending on actuator body size.
- Magnets (for use with either dc reed, Hall-effect or ac Triac switches) come standard on all four sides of the actuator for greater mounting flexibility.
- Conforms to both NFPA and ISO industry mounting standards.



	Max. Dynamic Thrust		Max. Dynamic Thrust
RSA12	125 lbs.	RSM12	556 N
RSA16	125 lbs.	RSM16	556 N
RSA24	750 lbs.	RSM24	3336 N
RSA32	2,400 lbs.	RSM32	10,676 N
RSA50	3,400 lbs.	RSM50	15,124 N
RSA64	4,700 lbs.	RSM64	20,907 N

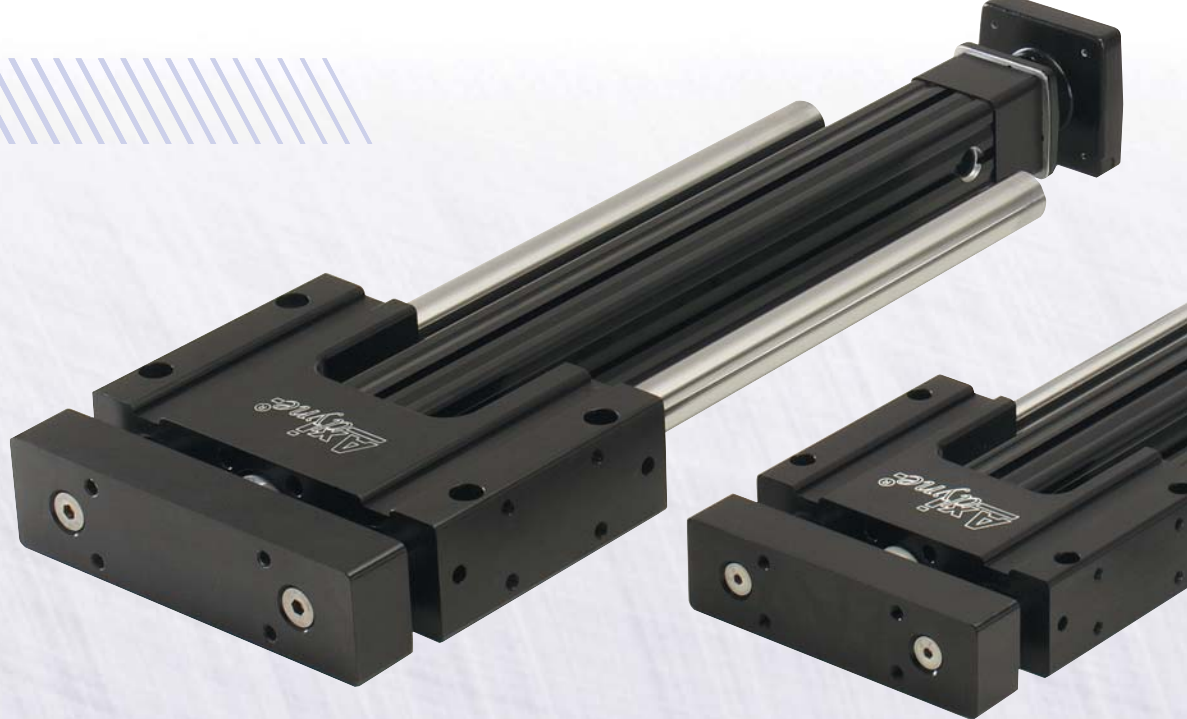
NOTE: See page 195 for Thrust vs. Life Factors

ROD TYPE ACTUATOR FEATURES



GUIDED SCREW ACTUATORS

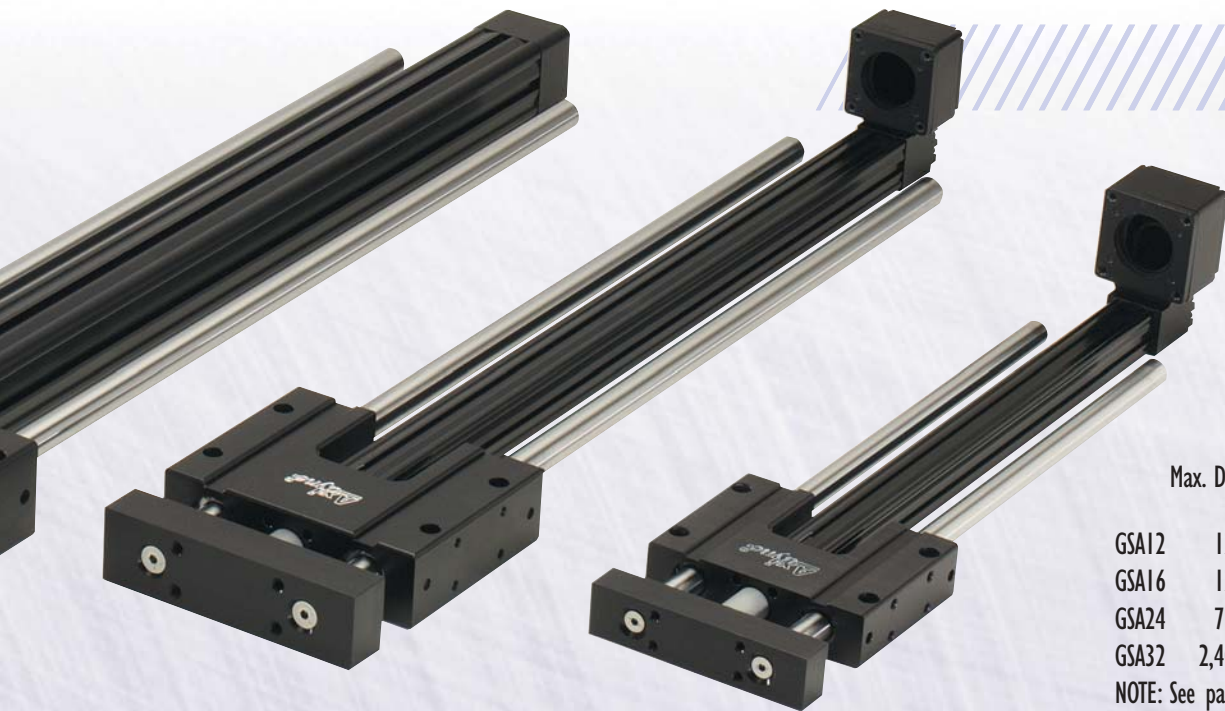
Tol-O-Matic's
line of
guided screw
actuators offer a
wide selection of
sizes with high
thrust capabilities
and a broad range
of motor choices.



GSA/GSM Series Guided Rod Screw Actuators

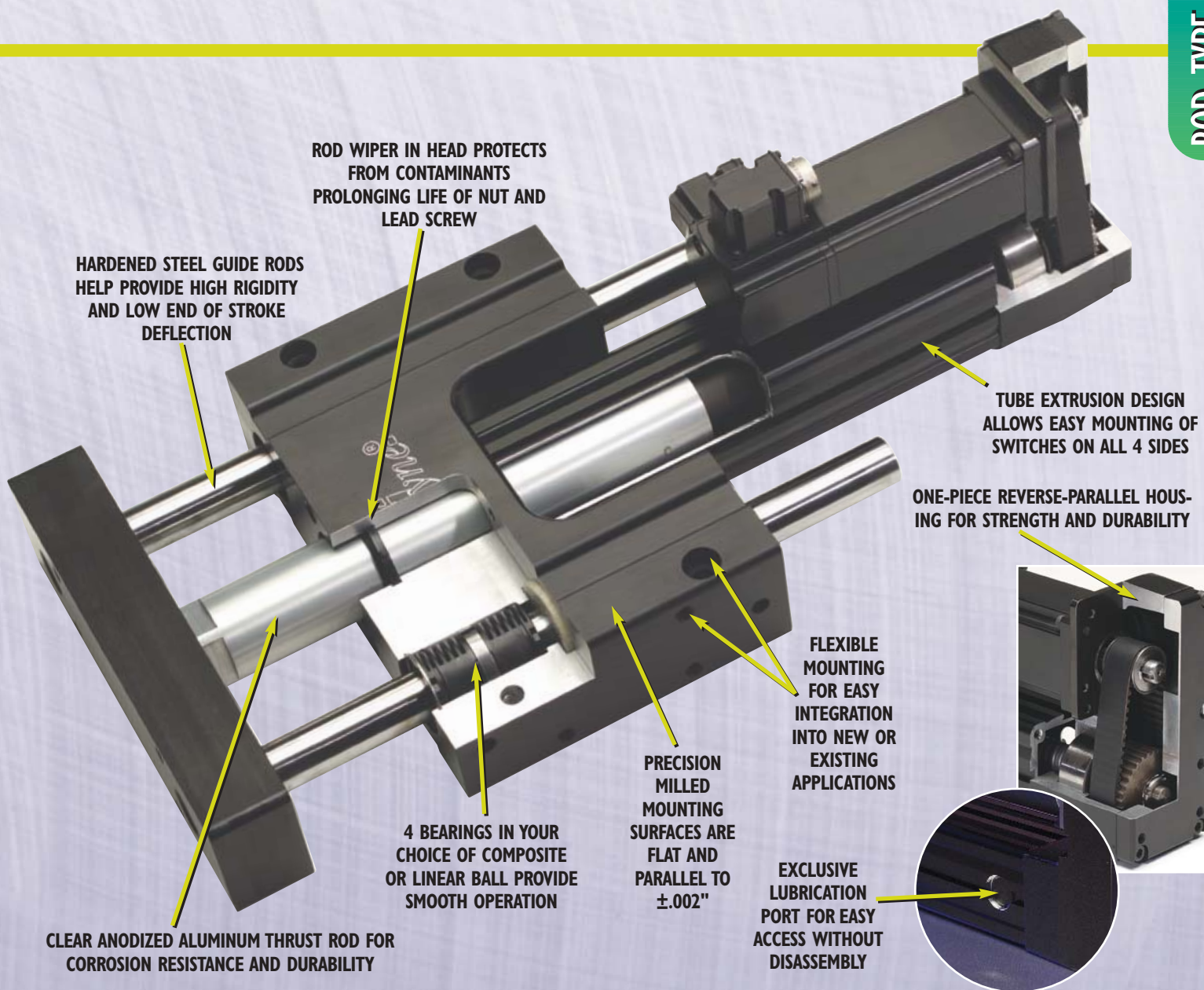
The Axi-dyne family of Guided Screw Actuators combines Rod Screw Actuators with mounting block, guide rods and bearings based on Tol-O-Matic's extensive experience with pneumatically guided actuators. The GSA offers a complete selection of sizes, options and system components. Designed with high performance, dependability and mounting flexibility in mind, these actuators easily combine with any of our motion control system components in brushless servo, microstepping or brushed dc system configurations. Together, they offer a cost-competitive solution for a multitude of motion control applications.

- 4 different body sizes ranging from .75-inch (19mm) to 2-inch (50mm) with in line or reverse parallel motor configuration.
- 3 different screw sizes ranging from .375-inch to .750 -inches with either solid ACME (plastic or bronze) or ball nut configuration.
- System thrust capabilities ranging from 70 lbs (311.4N) for the GSA/GSM12 Series to 2400 lbs (10,676N) for the GSA/GSM32 Series.
- Available with your choice of linear ball or composite bearings with internal lubrication of guide rods for increased life of bearings.
- Available with standard or oversize guide rod diameter for increased rigidity and lower deflection
- 8 different brushless servo motor selections in 17, 23 and 34 frame sizes.
- 6 different stepper motor selections in 17, 23 and 34 frame sizes.
- 5 different brushed dc motor selections in 23, 34 and 4-inch frame sizes.
- 6 different gearhead selections in gear ratios of 5.5:1 or 10:1.
- Stroke lengths available in any incremental length ranging from 0 to 36" (914mm) depending on actuator body size.
- Available with the widest range of options including stop collars, stainless-steel guide rods, adapter plates and switches: dc Reed, Hall-effect or ac Triac.



	Max. Dynamic Thrust		Max. Dynamic Thrust
GSA12	125 lbs.	GSM12	556 N
GSA16	125 lbs.	GSM16	556 N
GSA24	750 lbs.	GSM24	3336 N
GSA32	2,400 lbs.	GSM32	10,676 N

NOTE: See page 195 for Thrust vs Life Factors



ACTUATOR SELECTION

Choosing an Axidyne System is simple with our



Just List Your Application's Key Requirements, call your Tol-O-Matic Distributor
or use our Tol-O-Motion Sizing Software

SELECTION KEY REQUIREMENTS

- STROKE LENGTH (in) [mm] ☐
- LOAD WEIGHT (lb) [kg] ☐
- LOAD SPEED (in/sec) [mm/sec] ☐
- THRUST FORCE (lb) [kg] ☐
- RESOLUTION/REPEATABILITY (in) [mm] ☐
- ACTUATOR ORIENTATION ☐
- MOMENT LOADS (in-lb) [N-m] ☐
- DUTY CYCLE ☐

STOP

Your local Tol-O-Matic Distributor
or the factory
can take it from here!

*Just call with the key requirements
or use the Tol-O-Motion™ sizing
software developed by Tol-O-Matic
available on CD-ROM or on our
web site at www.tolomatic.com.*

Our easy-to-use sizing software leads you through the selection process step-by-step, making it easy to choose the right combination of products in a user-friendly Windows format. You can be sure that the components selected are 100% compatible and backed by Tol-O-Matic's satisfaction guarantee.

Available on CD or on our web site at www.tolomatic.com, Tol-O-Motion sizing software makes your job easier. Once your selection is made the software will generate a report page that you can fax to your Tol-O-Matic distributor or use the "print to PDF" function in Windows® to send your selection via email for a RFQ. Either way you will have the answers you need without delay!



RODLESS SCREW-DRIVE ACTUATORS



Axidyne Rodless Screw-Drive Actuators are available in four body styles each employing a different load-carrying bearing system for the widest number of solutions to your application requirements

RODLESS SCREW-DRIVE ACTUATORS

TKS Actuators

Compact packages that offer space savings along with superior rigidity, high moment load resistance and the lowest deflection rate of any Axidyne actuator

B3S Actuators

Heavy duty recirculating bearing system for high load-carrying and moment capacity available in three body sizes.

BCS Actuators

Moderate load-carrying capacity cylinders are available in three body sizes

SLS Actuators

Rigid, low-profile design ideal for space-sensitive applications.

U.S. STANDARD RODLESS SCREW-DRIVE ACTUATORS

MODEL AVAILABILITY AND LEADSCREW THRUST/SPEED CAPACITY

BCS CYLINDER-STYLE Model Number	Screw Dia. (in)	Screw Form	Pitch (turns per in)	Nut Style
BCS10 SN01	1/2	ACME	1	Solid
BCS10 SN02	1/2	ACME	2	Solid
BCS10 SNA02	1/2	ACME	2	Solid
BCS10 SN05	1/2	ACME	5	Solid
BCS10 BN08	3/8	PREC	8	Ball
BCS10 BNL08	3/8	PREC	8	Ball
BCS15 SN01	3/4	ACME	1	Solid
BCS15 SN02	5/8	ACME	2	Solid
BCS15 SNA02	5/8	ACME	2	Solid
BCS15 BN02	1/2	PREC	2	Ball
BCS15 BNL02	1/2	PREC	2	Ball
BCS15 BN05	5/8	PREC	5	Ball
BCS15 BNL05	5/8	PREC	5	Ball
BCS20 SN01	3/4	ACME	1	Solid
BCS20 SN02	3/4	ACME	2	Solid
BCS20 BN02	3/4	PREC	2	Ball
BCS20 BNL02	3/4	PREC	2	Ball
BCS20 BN05	3/4	PREC	5	Ball
BCS20 BNL05	3/4	PREC	5	Ball

SLS SLIDE-STYLE Model Number	Screw Dia. (in)	Screw Form	Pitch (turns per in)	Nut Style
SLS10 SN01	1/2	ACME	1	Solid
SLS10 SN02	1/2	ACME	2	Solid
SLS10 SNA02	1/2	ACME	2	Solid
SLS10 SN05	1/2	ACME	5	Solid
SLS10 BN08	3/8	PREC	8	Ball
SLS10 BNL08	3/8	PREC	8	Ball

B3S CYLINDER-STYLE Model Number	Screw Dia. (in)	Screw Form	Pitch (turns per in)	Nut Style
B3S10 SN01	1/2	ACME	1	Solid
B3S10 SN02	1/2	ACME	2	Solid
B3S10 SNA02	1/2	ACME	2	Solid
B3S10 SN05	1/2	ACME	5	Solid
B3S10 BN08	3/8	PREC	8	Ball
B3S10 BNL08	3/8	PREC	8	Ball
B3S15 SN01	3/4	ACME	1	Solid
B3S15 SN02	5/8	ACME	2	Solid
B3S15 SNA02	5/8	ACME	2	Solid
B3S15 BN02	1/2	PREC	2	Ball
B3S15 BNL02	1/2	PREC	2	Ball
B3S15 BN05	5/8	PREC	5	Ball
B3S15 BNL05	5/8	PREC	5	Ball
B3S20 SN01	3/4	ACME	1	Solid
B3S20 SN02	3/4	ACME	2	Solid
B3S20 BN02	3/4	PREC	2	Ball
B3S20 BNL02	3/4	PREC	2	Ball
B3S20 BN05	3/4	PREC	5	Ball
B3S20 BNL05	3/4	PREC	5	Ball

NUT	SOLID		BALL		
	Single ALL SERIES	Anti-Backlash BCS, B3S, SLS	Single BCS, B3S, SLS	Single TKS	Low-Backlash BCS, B3S, SLS
Backlash (in)	.007	.003	.015	.003	.002
Backlash (mm)	.18	—	0.38	.08	0.05
Designation	SN	SNA	BN	BN	BNL

TKS SCREW-DRIVE Model Number	Screw Dia. (in)	Screw Form†	Pitch (turns per in)	Nut Style
TKS10 BN08	0.375	PREC	8	BALL
TKS10 SN02	0.500	ACME	2	SOLID
TKS25 BN05	0.500	PREC	5	BALL
TKS25 BN02	0.500	PREC	2	BALL
TKS25 SN02	0.500	ACME	2	SOLID
TKS50 BN05	0.750	PREC	5	BALL
TKS50 BN02	0.750	PREC	2	BALL
TKS50 SN01	0.750	ACME	1	SOLID
TKS75 BN04	1.000	PREC	4	BALL
TKS75 BN02	1.000	PREC	2	BALL
TKS75 BN01	1.000	PREC	1	BALL
TKS75 SN04	1.000	ACME	4	SOLID

†NOTE: TruTrack actuators are available with U.S. Standard (English) screws only. All other fasteners, mounting holes, etc. are metric.

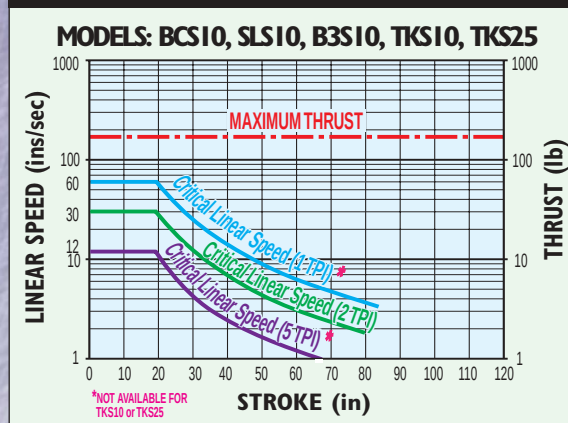
ACME= Standard Rolled (Acme screw) PREC= Precision Rolled (Ball screw)

NOTE: See page 186 for configurator code descriptions.

U.S. STANDARD LEADSCREW THRUST/SPEED CAPACITIES

NOTE: Charts shown represent the thrust capacity of the screw/nut combinations used in indicated models, NOT thrust capacity limits of the actuator.

1/2" DIAMETER ACME SCREW*

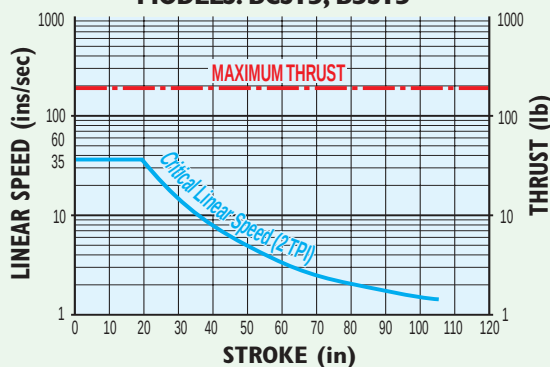


* For ACME Screws "Maximum Thrust" is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.

** For Ball Screws "Maximum Thrust" is the thrust for 90% reliability for 1,000,000 inches (25.4x10⁶mm) of travel. See page 195 for complete sizing and selection limiting factors. For operation at less than rated thrust, see page 197 for life calculations of ball screw.

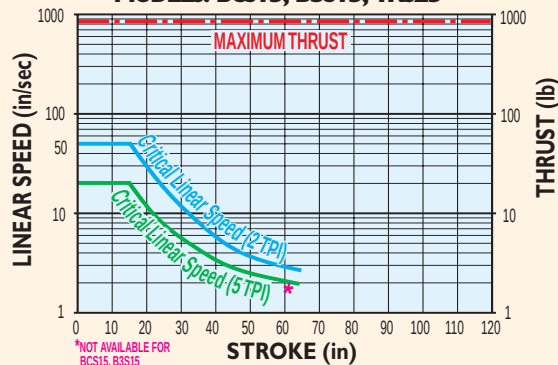
5/8" DIAMETER ACME SCREW*

MODELS: BCS15, B3S15



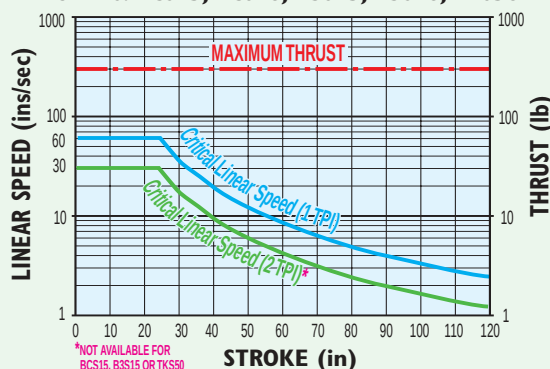
1/2" DIAMETER BALL SCREW**

MODELS: BCS15, B3S15, TKS25



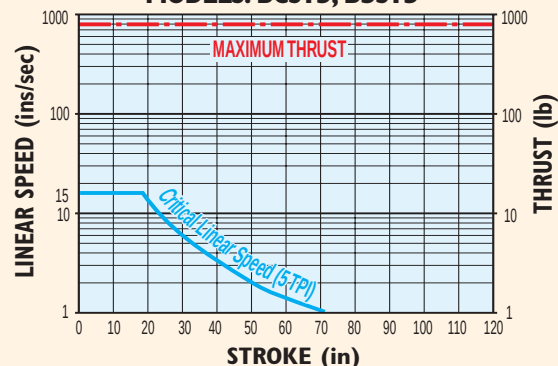
3/4" DIAMETER ACME SCREW*

MODELS: BCS15, BCS20, B3S15, B3S20, TKS50



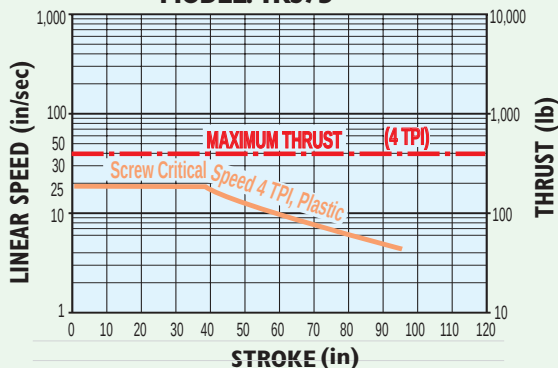
5/8" DIAMETER BALL SCREW**

MODELS: BCS15, B3S15



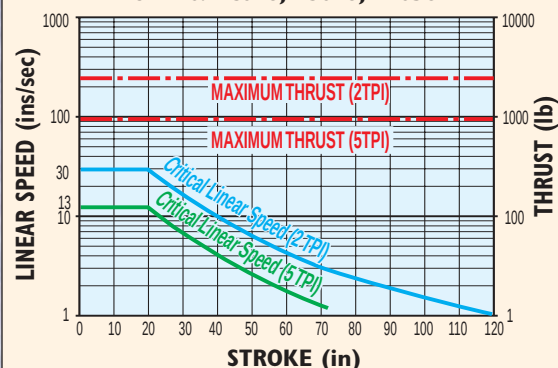
1" DIAMETER ACME SCREW*

MODEL: TKS75



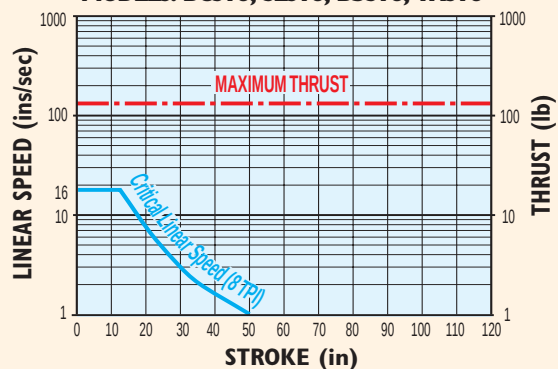
3/4" DIAMETER BALL SCREW**

MODELS: BCS20, B3S20, TKS50



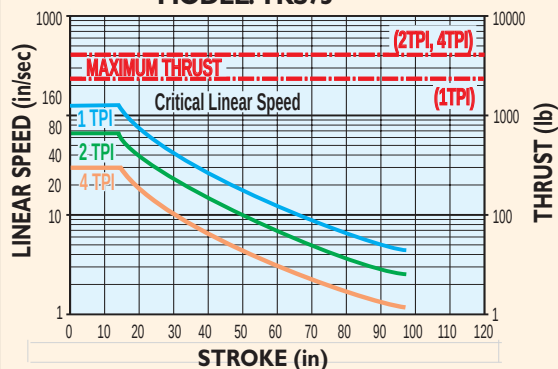
3/8" DIAMETER BALL SCREW**

MODELS: BCS10, SLS10, B3S10, TKS10



1" DIAMETER BALL SCREW**

MODEL: TKS75



METRIC RODLESS SCREW-DRIVE ACTUATORS

MODEL AVAILABILITY AND LEADSCREW THRUST/SPEED CAPACITY

MCS CYLINDER-STYLE Model Number	Screw Dia. (mm)	Screw Form	Lead (mm per turn)	Nut Style
MCS10 SN25	12	ACME	25	Solid
MCS10 SN12	12	ACME	12	Solid
MCS10 BN02	10	PREC	2.5	Ball
MCS10 BNL02	10	PREC	2.5	Ball
MCS15 SN25	19	ACME	25	Solid
MCS15 SN12	15	ACME	12	Solid
MCS15 BN05	16	PREC	5	Ball
MCS15 BNL05	16	PREC	5	Ball
MCS20 SN25	19	ACME	25	Solid
MCS20 SN12	19	ACME	12	Solid
MCS20 BN05	20	PREC	5	Ball
MCS20 BNL05	20	PREC	5	Ball

MLS SLIDE-STYLE Model Number	Screw Dia. (mm)	Screw Form	Lead (mm per turn)	Nut Style
MLS10 SN25	12	ACME	25	Solid
MLS10 SN12	12	ACME	12	Solid
MLS10 BN02	10	PREC	2.5	Ball
MLS10 BNL02	10	PREC	2.5	Ball

M3S CYLINDER-STYLE Model Number	Screw Dia. (mm)	Screw Form	Lead (mm per turn)	Nut Style
M3S10 SN25	12	ACME	25	Solid
M3S10 SN12	12	ACME	12	Solid
M3S10 BN02	10	PREC	2.5	Ball
M3S10 BNL02	10	PREC	2.5	Ball
M3S15 SN25	19	ACME	25	Solid
M3S15 SN12	15	ACME	12	Solid
M3S15 BN05	16	PREC	5	Ball
M3S15 BNL05	16	PREC	5	Ball
M3S20 SN25	19	ACME	25	Solid
M3S20 SN12	19	ACME	12	Solid
M3S20 BN05	20	PREC	5	Ball
M3S20 BNL05	20	PREC	5	Ball

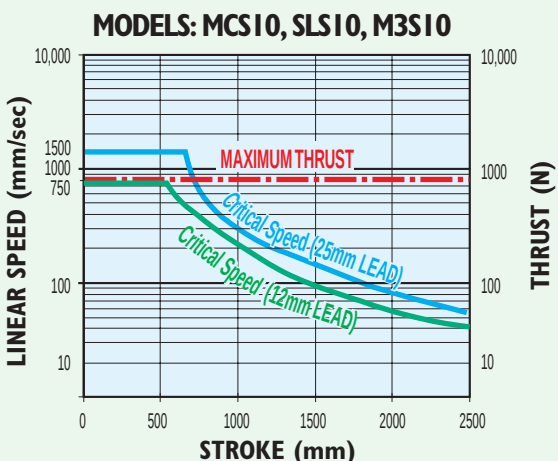
ACME= Standard Rolled (Acme screw)

PREC= Precision Rolled (Ball screw)

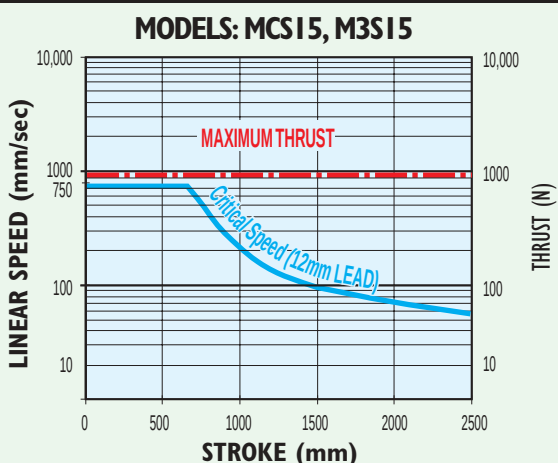
NOTE: See page 186 for configurator code descriptions.

NUT	SOLID	BALL	
	Single	Single	Low-Backlash
Backlash (in)	.007	.015	.002
Backlash (mm)	.18	0.38	0.05
Designation	SN	BN	BNL

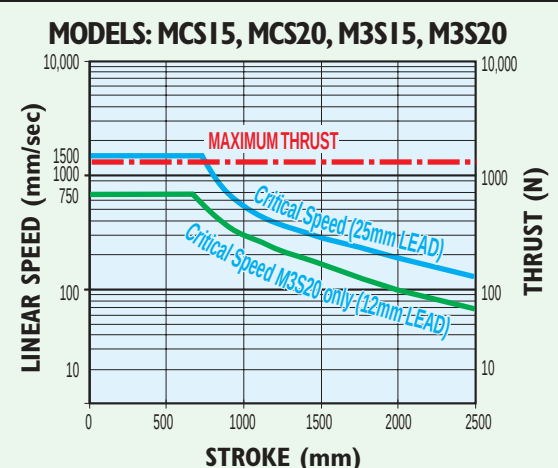
12mm DIAMETER ACME SCREW*



15mm DIAMETER ACME SCREW*



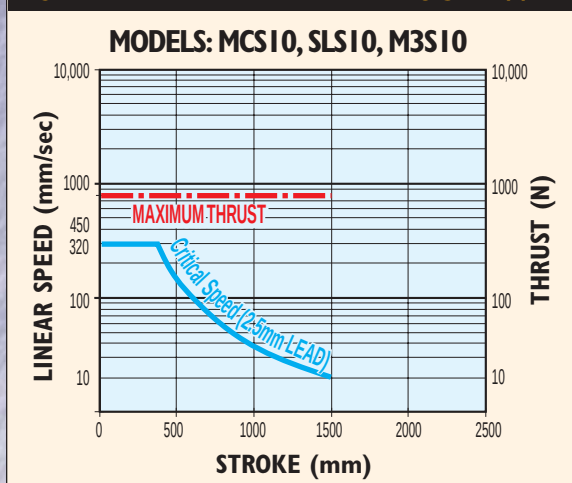
19mm DIAMETER ACME SCREW*



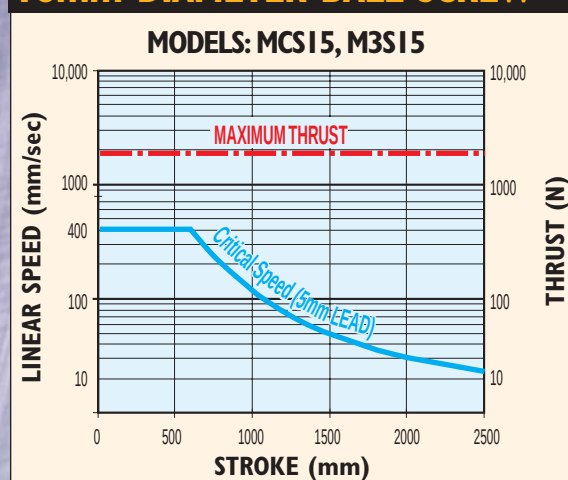
METRIC LEADSCREW THRUST / SPEED CAPACITIES

NOTE: Charts shown represent the thrust capacity of the screw/nut combinations used in indicated models, NOT thrust capacity limits of the actuator.

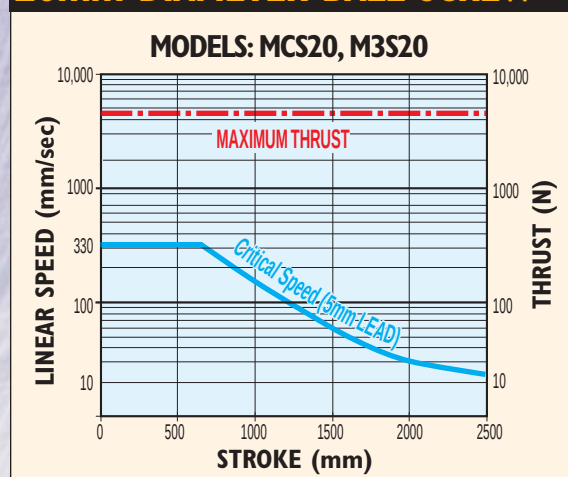
10mm DIAMETER BALL SCREW**



16mm DIAMETER BALL SCREW**



20mm DIAMETER BALL SCREW**



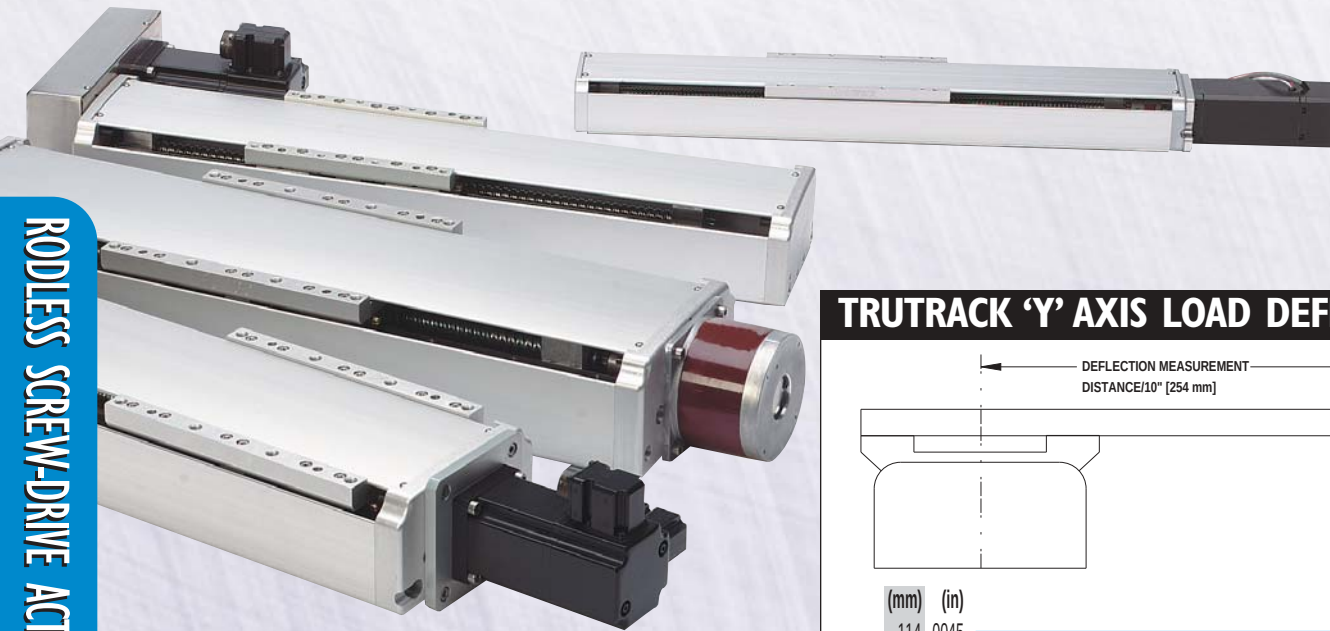
* For ACME Screws "Maximum Thrust" is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.

** For Ball Screws "Maximum Thrust" is the thrust for 90% reliability for 1,000,000 inches (25.4x106mm) of travel. See page 195 for complete sizing and selection limiting factors. For operation at less than rated thrust, see page 197 for life calculations of ball screw.

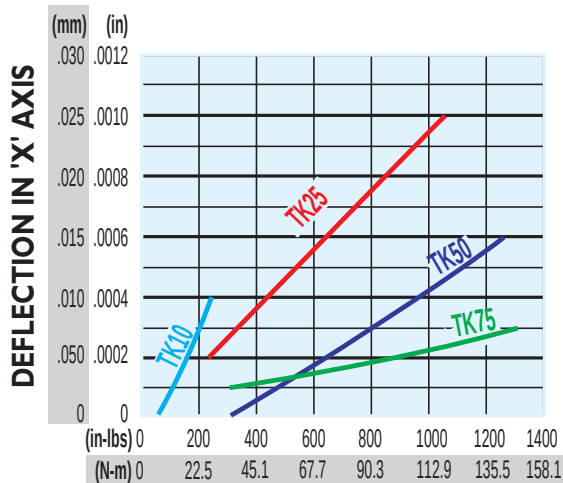
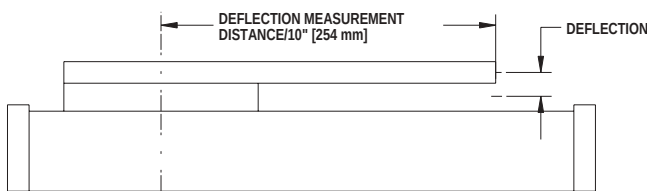
TKS SERIES SCREW-DRIVE ACTUATORS

PERFORMANCE DATA

RODLESS SCREW-DRIVE ACTUATORS



TRUTRACK 'X' AXIS LOAD DEFLECTION

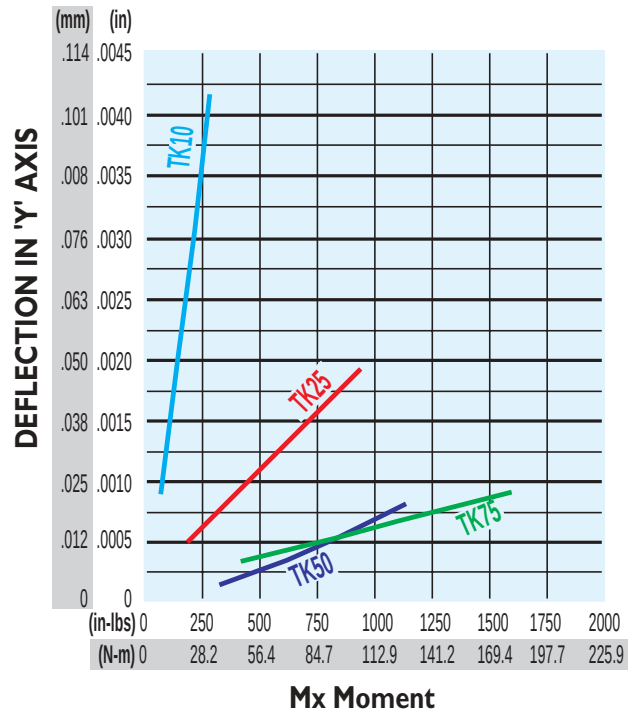
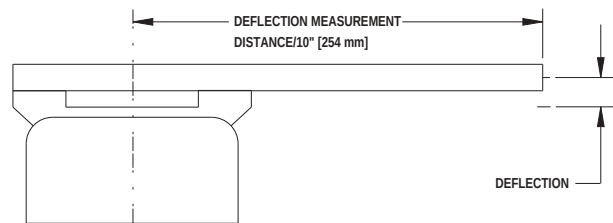


My Moment

LUBRICATION REQUIREMENTS:

Proper and adequate lubrication is essential for normal operation of TruTrack actuators. Poor lubrication will cause quicker wear and decrease service life of the actuator. For general use, lubrication should be performed at intervals of 4,000,000 linear inches of travel (100 km). However the operating conditions of certain applications may require more frequent lubrication. Please consult Tol-O-Matic for recommendations.

TRUTRACK 'Y' AXIS LOAD DEFLECTION



Mx Moment

Recommended greases:

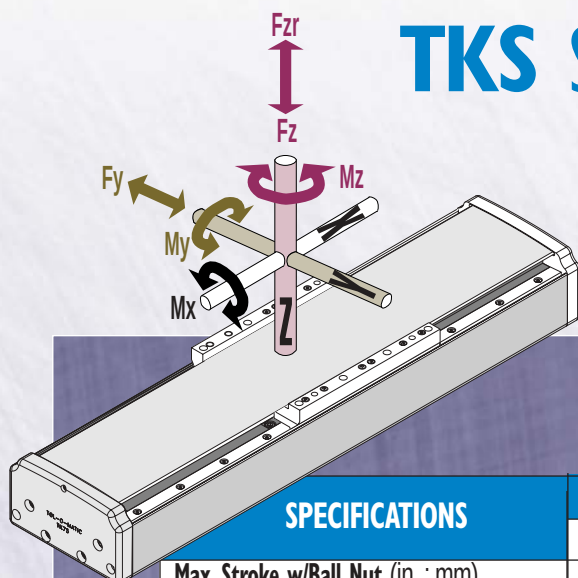
- Multi-purpose grease based on refined mineral oil containing lithium thickening agent (excellent at high pressures, excellent viscosity stability)
- Grease based on a high grade synthetic oil containing a urea thickening agent (long life, wide temperature range).

OPERATION TEMPERATURE RANGE:

TruTrack actuators should be used in temperatures from 40° to 130°F (4° to 54°C). Please contact Tol-O-Matic for applications with temperatures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.

TKS SERIES SCREW-DRIVE ACTUATORS

SPECIFICATIONS



TKS SERIES SPECIFICATIONS

SPECIFICATIONS	U.S. STANDARD				METRIC CONVERSIONS			
	TKS10	TKS25	TKS50	TKS75	TKS10	TKS25	TKS50	TKS75
Max. Stroke w/Ball Nut (in. : mm)	36	66	84	96	914	1676	2134	2438
Max. Stroke w/Solid Nut (in. : mm)	96	96	96	96	2438	2438	2438	2438
Max. Dynamic Bending Moments: Values are based on 200,000,000 linear inches of travel (5000 km)								
Mx (Roll) (lb-in: N-m)	85	721	971	1151	9.6	81.5	109.7	130.0
My (Pitch) (lb-in: N-m)	234	1014	1442	1477	26.4	114.6	162.9	166.9
Mz (Yaw) (lb-in: N-m)	234	915	1301	1332	26.4	103.4	147.0	150.5
Max. Static Bending Moments								
Mx (Roll) (lb-in: N-m)	170	1251	1685	1997	19.2	141.3	190.3	225.6
My (Pitch) (lb-in: N-m)	468	1759	2502	2563	52.9	198.8	282.7	289.5
Mz (Yaw) (lb-in: N-m)	468	1588	2257	2311	52.9	179.4	255.0	261.1
Max Dynamic Load: Values are based on 200,000,000 linear inches of travel (5000 km)								
Fz (Radial Load) (lb: N)	100	250	500	750	445	1113	2225	3338
Fy (Lateral Load) (lb: N)	100	250	500	500	445	1113	2225	2225
Fzr (Reverse Radial Load) (lb: N)	100	250	500	500	445	1113	2225	2225
Max Static Load								
Fz (Radial Load) (lb: N)	200	434	868	1301	890	1931	3863	5789
Fy (Lateral Load) (lb: N)	200	434	868	868	890	1931	3863	3863
Fzr (Reverse Radial Load) (lb: N)	200	434	868	868	890	1931	3863	3863
Lead Screw Positional Accuracy								
Solid Nut (in/ft: mm/m)	0.003	0.003	0.003	0.003	0.25	0.25	0.25	0.25
Ball Nut (in/ft: mm/m)	0.004	0.004	0.004	0.004	0.33	0.33	0.33	0.33
Backlash								
Solid Nut (in: mm)	0.007	0.007	0.007	0.007	0.18	0.18	0.18	0.18
Ball Nut (in: mm)	0.002	0.002	0.003	0.003	0.05	0.05	0.08	0.08
Flatness (inches/in: mm/mm)*	.0002	.0002	.0002	.0002	.005	.005	.005	.005
Straightness (inches/in: mm/mm)*	.0002	.0002	.0002	.0002	.005	.005	.005	.005
Screw Uni-directional Repeatability ** (in/mm)	±.0004	±.0004	±.0004	±.0004	±.010	±.010	±.010	±.010
Carrier Unit Weight (lb: kg)	0.56	2.31	3.18	3.54	0.25	1.05	1.44	1.61
Base Wt. of Inline Model (lb: kg)								
(Including Carrier, Without Motor)	3.22	9.46	14.56	17.95	1.46	4.29	6.60	8.14
Base Wt. of Reverse Parallel Model (lb: kg)								
(Including Carrier, Without Motor)	5.37	13.16	18.98	22.58	2.44	5.97	8.61	10.24
Weight Per Inch of Stroke (lb: kg)	0.229	0.527	0.728	0.932	0.10	0.24	0.33	0.42
Preload Torque (oz-in: N-m)	25	30	50	75	0.18	0.21	0.35	0.53
Dead Length (in: mm)	6.63	8.03	9.87	10.32	168	204	251	262
Friction Force (lbf: N): =	= .0003 x LOAD (lb) + 3.96				= .003 x LOAD (kg) + 17.6			

* Actuator mounted on a flat surface and fully restrained. (See dimensional drawing on page 20)

** Ball Screw; not including backlash

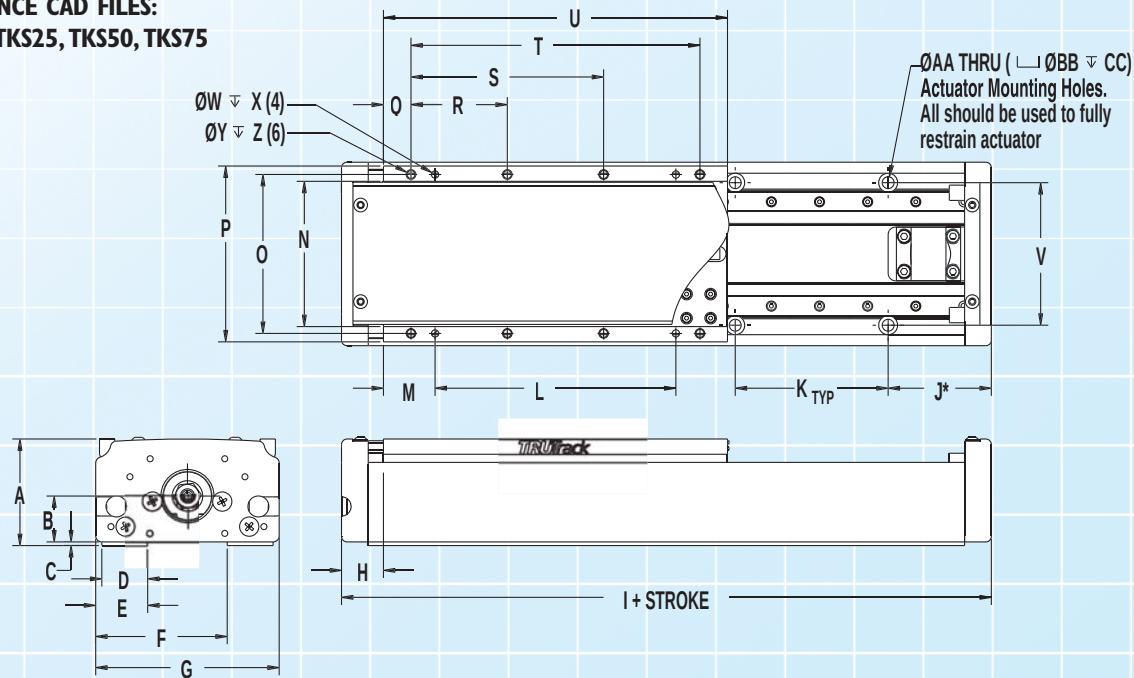
TKS SERIES SCREW-DRIVE ACTUATORS

DIMENSIONS

DIMENSIONS TKS SERIES ACTUATORS

REFERENCE CAD FILES:

TKS10, TKS25, TKS50, TKS75



Dimensions in inches

MODELS	A	B	C	D	E	F	G	H	I	J*	K	L	M	N	O	P	Q	R	S	T	U
TKS10	1.74	.750	.06	.75	.85	2.15	3.00	.69*	7.000*	1.437	2.500	3.937	.844	2.598	2.598	2.875	.450	1.575	3.150	4.724	5.63
TKS25	2.72	1.250	.06	1.00	1.22	3.28	4.50	1.00	8.920	1.625	2.500	3.937	1.494	3.353	3.937	4.353	.707	1.968	3.543	5.512	6.93
TKS50	3.14	1.530	.06	1.75	2.00	3.50	5.50	1.12	9.870	1.750	5.000	5.118	1.251	4.100	4.724	5.350	.267	2.362	4.724	7.086	7.62
TKS75	3.42	1.620	.06	1.75	2.00	4.13	6.13	1.12	10.310	1.750	5.000	5.512	1.119	4.724	5.315	5.974	.253	2.362	4.882	7.244	7.75

MODELS	V	W	X	Y	Z	AA	BB	CC
TKS10	2.330	.119	.50	M4	.32	.19	.31	.17
TKS25	3.580	.237	THRU	M6	.50	.26	.50	.92
TKS50	2.270	.237	THRU	M8	.63	.26	.44	.28
TKS75	2.939	.237	THRU	M8	THRU	.34	.53	.34

IF USED WITH	H* (MOTOR END ONLY)	I**
23-FRAME MOTOR	.75	7.063

Dimensions in millimeters

MODELS	A	B	C	D	E	F	G	H	I	J*	K	L	M	N	O	P	Q	R	S	T	U
TKS10	44.2	19.05	1.5	19.1	21.6	54.6	76.2	17.5*	177.77**	36.50	63.50	100.00	21.44	65.99	65.99	73.03	11.43	40.01	80.01	119.99	142.9
TKS25	69.1	31.75	1.5	25.4	31.0	83.3	114.3	25.3	226.57	41.28	63.50	100.00	37.95	85.17	100.00	110.57	17.96	49.99	89.99	140.00	175.9
TKS50	79.8	38.86	1.5	44.5	50.8	88.9	139.7	28.4	250.70	44.45	127.00	130.00	31.78	104.14	119.99	135.89	6.78	59.99	119.99	179.98	193.5
TKS75	86.9	41.15	1.5	44.5	50.8	104.9	155.6	28.4	261.87	44.45	127.00	140.00	28.42	119.99	135.00	151.74	6.43	59.99	124.00	184.00	196.9

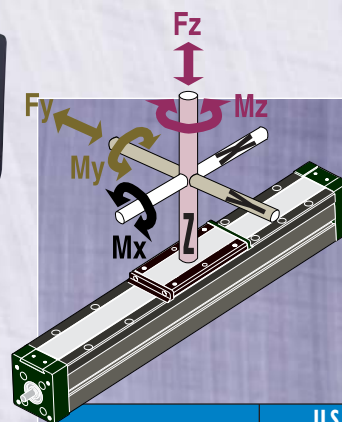
MODELS	V	W	X	Y	Z	AA	BB	CC
TKS10	59.18	3.02	12.7	M4	8.1	4.8	7.9	4.3
TKS25	90.93	6.02	THRU	M6	12.7	6.6	12.7	23.4
TKS50	57.66	6.02	THRU	M8	16.0	6.6	11.2	7.1
TKS75	74.65	6.02	THRU	M8	THRU	8.7	13.5	8.6

IF USED WITH	H* (MOTOR END ONLY)	I**
23-FRAME MOTOR	19.1	179.40

*NOTE: Dimension "J" is from idle end of actuator for reverse-parallel motor mounting and drive end of actuator for in-line motor mounting.

B3S & M3S SERIES SCREW-DRIVE ACTUATORS

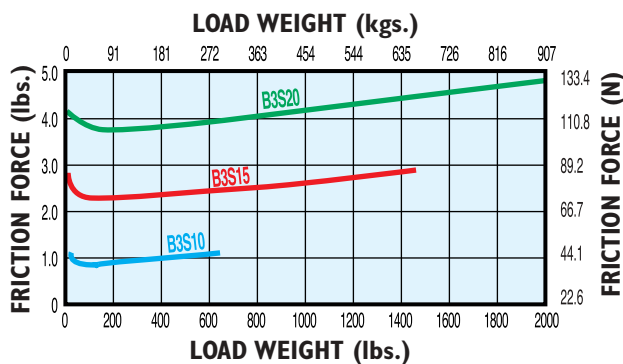
PERFORMANCE DATA • SPECIFICATIONS



B3S/M3S SERIES SPECIFICATIONS

RODLESS SCREW-DRIVE ACTUATORS

CARRIER FRICTION FORCE



OPERATION TEMPERATURE RANGE

B3S/M3S series actuators should be used in temperatures from **40° to 130°F** (4° to 54°C). Please contact Tol-O-Matic for applications with temperatures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.

LARGE FRAME MOTORS & SMALL ACTUATORS

Cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

SPECIFICATION	U.S. STANDARD			METRIC		
	B3S10	B3S15	B3S20	M3S10	M3S15	M3S20
Max. Bending Moment*						
Mx	250 in-lb	859 in-lb	1662 in-lb	28.2 N-m	97.1 N-m	187.8 N-m
My	269 in-lb	1033 in-lb	1472 in-lb	30.4 N-m	116.7 N-m	166.3 N-m
Mz	156 in-lb	596 in-lb	850 in-lb	17.9 N-m	67.3 N-m	96.0 N-m
Max. Load						
Fy	341 lb	840 lb	1159 lb	1517 N	3738 N	5158 N
Fz	591 lb	1454 lb	2008 lb	2630 N	6470 N	8936 N
Weights						
Carrier Weight	.85 lb	1.56 lb	2.14 lb	.4 kg	.70 kg	.97 kg
Base Weight (incl. carrier)	2.15 lb	8.75 lb	14.38 lb	1.0 kg	3.96 kg	6.52 kg
Weight per length of stroke	.30 lb/in	.570 lb/in	.880 lb/in	5.4 g/mm	10.18 g/mm	15.73g/mm
Pre-Load Torque	25 oz-in	30 oz-in	50 oz-in	.177 N-m	.212 N-m	.353 N-m
Dead Length (2 x S dim)	5.62 in	8.376 in	10.52 in	142.8 mm	212.7 mm	267.2 mm

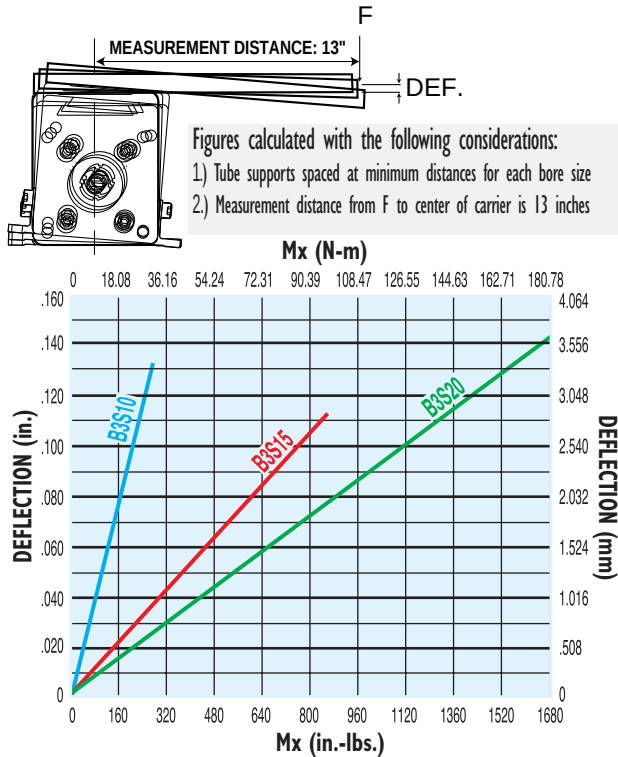
* For Dual Carrier option, refer to bending moment chart on page 49

* For Dual 180° Carrier option, refer to bending moment chart on page 51

B3S & M3S SERIES SCREW-DRIVE ACTUATORS

PERFORMANCE DATA

B3S CYLINDER LOAD DEFLECTION

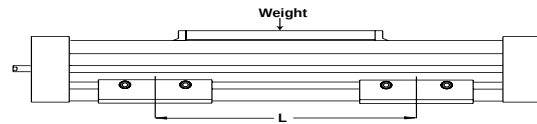
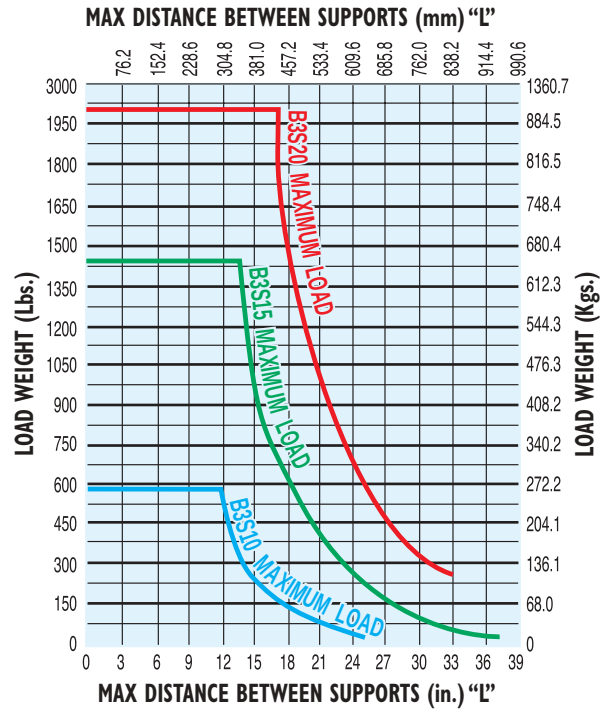


B3S DEFLECTION CONSIDERATIONS:

In applications where substantial Mx moments come into play, deflection of the cylinder tube, carrier and supports must be considered. The deflection factors shown in the chart above, are based on a cylinder mounted with tube supports at minimum recommended spacing.

If more rigidity is desired, refer to Dual Carrier option on pages 49-50 or consider the TKS Series actuators.

TUBE SUPPORT REQUIREMENTS

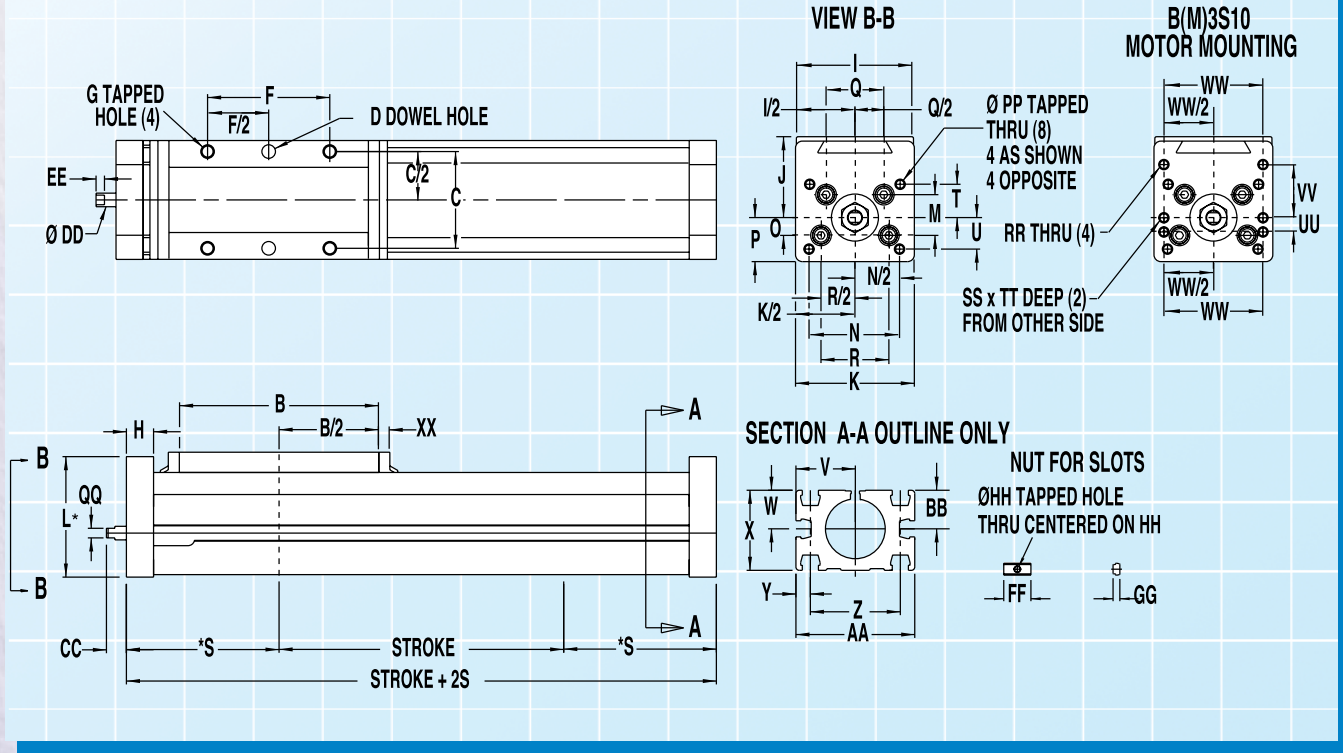


B3S & M3S SERIES SCREW-DRIVE ACTUATORS

DIMENSIONS

DIMENSIONS B3S/M3S SERIES ACTUATORS

REFERENCE CAD FILES: B3S10



B3S 10

Dimensions in inches

B	C	D**		F	G	H	I	J	K	L	M	N	O	P				
3.672	1.781	.252/.251 x .25		2.250	1/4-20	0.50	2.16	1.54	2.25	2.22	.750	1.775	.328	.81				
Q	R	S	S*	T	U	V	W	X	Y	Z	AA	BB	CC	CC†				
1.063	1.250	2.81	3.81	.557	.557	1.094	.710	1.47	.266	1.656	2.19	.710	.550	1.75				
DD	EE	FF	GG	HH	QQ	PP	RR	SS	TT	UU	VV	WW	WW/2	XX				
.250	.156	.75	.25	#10-24	.177	#10-24	#10-24 UNC-2B	Ø.157/.159	.30	.298	1.010	1.870	.935	.203				
† For EXTENDED SHAFT Style Only												* For B3S10 "SNA02" Style Only		**DOWEL PINS			.003, .08mm	

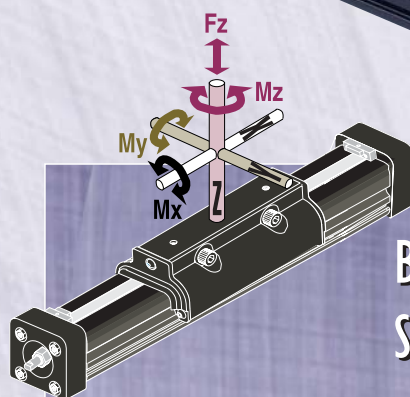
M3S 10

Dimensions in millimeters

Dimensions in millimeters														
B	C	D**		F	G	H	I	J	K	L	M	N	O	P
93.27	45.24	6.05/6.02 X 64.		57.15	M6-1.0	12.7	54.8	39.1	57.2	56.4	19.05	45.085	8.33	20.57
Q	R	S	S*	T	U	V	W	X	Y	Z	AA	BB	CC	CC†
27.0	31.75	71.4	96.8	14.15	14.15	27.79	18.03	37.3	6.76	42.06	55.6	18.03	13.97	44.5
DD	EE	FF	GG	HH	QQ	PP	RR	SS	TT	UU	VV	WW	WW/2	XX
6.35	39.37	19.1	6.4	M5-0.8	4.50	M5 x .8	M5 x .8	3.99/4.04	7.6	7.57	25.65	47.50	23.75	5.16
† For EXTENDED SHAFT Style Only														

BCS & MCS SERIES SCREW-DRIVE ACTUATORS

PERFORMANCE DATA • SPECIFICATIONS



BCS/MCS SERIES SPECIFICATIONS

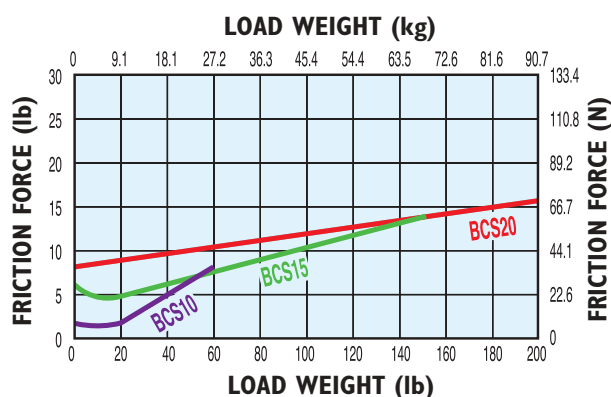
SPECIFICATION	U.S. STANDARD			METRIC		
	BCS10	BCS15	BCS20	MCS10	MCS15	MCS20
Max. Bending Moment*						
Mx	55 in-lb	275 in-lb	300 in-lb	6.2 N-m	31.1 N-m	33.9 N-m
My	100 in-lb	500 in-lb	1100 in-lb	11.3 N-m	56.5 N-m	124.3 N-m
Mz	30 in-lb	200 in-lb	325 in-lb	3.4 N-m	22.6 N-m	36.7 N-m
Max. Load						
Fz	60 lb	180 lb	300 lb	267 N	801 N	1335 N
Weights						
Carrier Weight	.69 lb	1.94 lb	2.81 lb	.31 kg	.88 kg	1.27 kg
Base Weight (incl. carrier)	2.91 lb	6.61 lb	14.59 lb	1.32 kg	2.9 kg	6.62 kg
Weight per length of stroke	.176 lb/in	.392 lb/in	.666 lb/in	3.1 g/mm	7.0 g/mm	11.9 g/mm
Pre-Load Torque	25 oz-in	30 oz-in	45 oz-in	.18 N-m	.21 N-m	.318 N-m
Dead Length (2 x S dim)	8.16 in	9.92 in	11.76 in	207.2 mm	252.0 mm	298.8 mm

* For Dual Carrier option, refer to bending moment chart on page 49

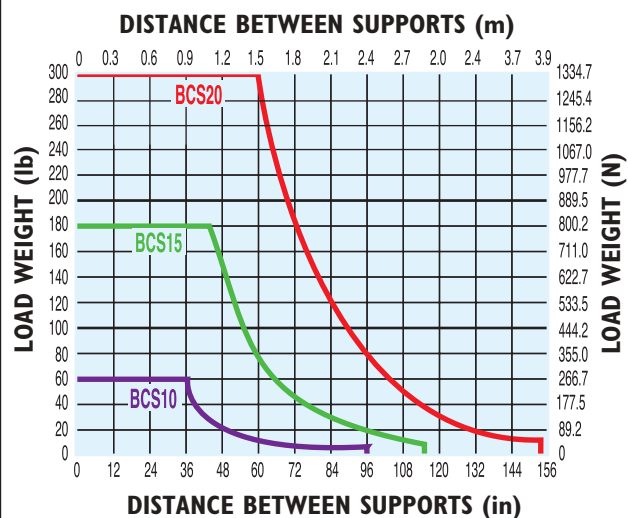
OPERATION TEMPERATURE RANGE

BCS/MCS series actuators should be used in temperatures from **40° to 130°F** (4° to 54°C). Please contact Tol-O-Matic for applications with temperatures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.

CARRIER FRICTION FORCE



TUBE SUPPORT REQUIREMENTS

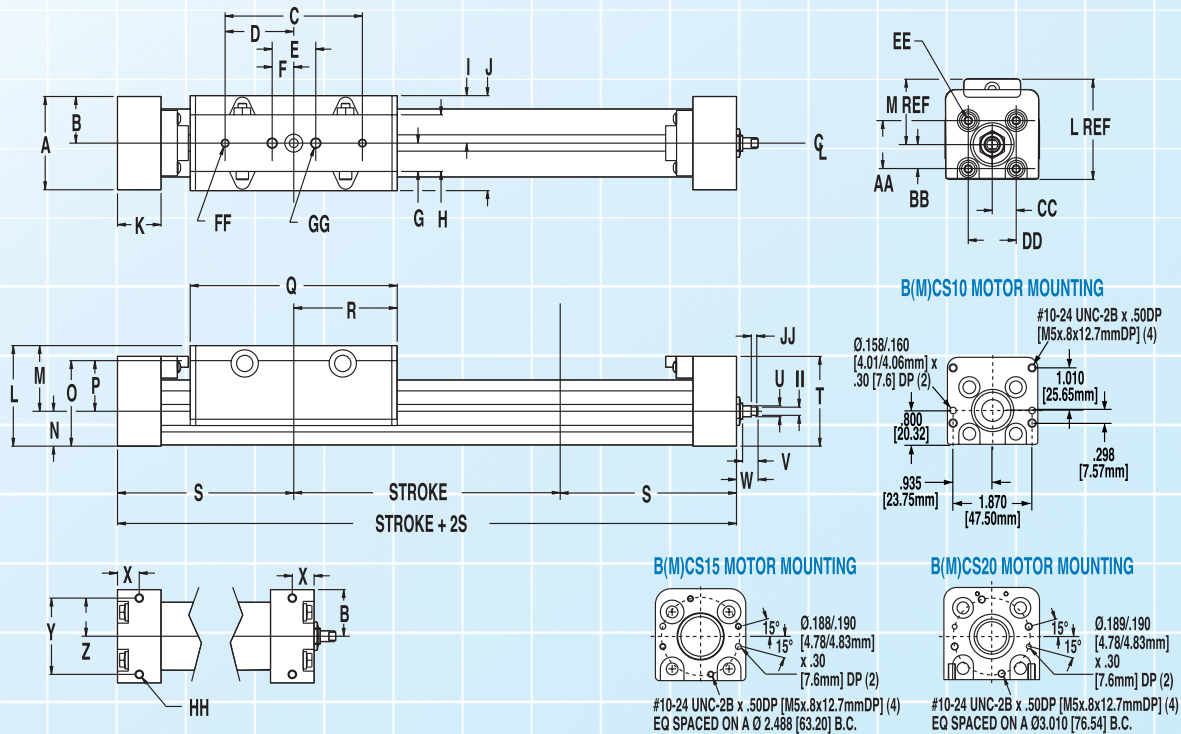


LARGE FRAME MOTORS & SMALL ACTUATORS

Canlevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

DIMENSIONS BCS/MCS SERIES ACTUATORS

REFERENCE CAD FILES: BCS10, BCS15, BCS20



BCS

Dimensions in inches

MODELS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
BCS10	2.14	1.07	3.150	1.575	1.000	0.50	0.65	1.31	1.09	2.18	0.95	2.30	1.50	0.80	1.96	1.16	4.75
BCS15	2.88	1.44	4.250	2.125	1.000	0.500	0.90	1.80	1.75	3.50	1.25	3.54	2.13	1.41	2.91	1.50	5.91
BCS20	3.75	1.88	5.000	2.500	2.500	1.250	1.16	2.31	2.22	4.44	1.44	4.44	2.75	1.691	3.85	2.00	7.37

MODELS	R	S	T	U	U*	V	V†	W	W†	X	Y	Z	AA	BB	CC	DD
BCS10	2.38	4.08	2.06	0.250	—	0.46	1.46	0.55	1.55	0.500	1.750	0.875	1.100	0.550	0.550	1.100
BCS15	2.96	4.96	2.93	0.375	0.25	0.62	1.87	0.66	1.91	0.625	2.500	1.250	1.812	1.032	0.907	1.812
BCS20	3.68	5.88	3.62	0.438	—	0.81	2.31	0.81	2.31	0.720	3.120	1.560	2.250	1.250	1.125	2.250

MODELS	EE	FF	GG	HH	II	JJ
BCS10	10-24 X 0.43 DP	10-32 X 0.25 DP	1/4-20 X 0.25 DP	10-24 X 0.62 DP	0.19	0.15
BCS15	1/4-20 X 0.50 DP	5/16-18 X 0.37 DP	1/4-20 X 0.40 DP	1/4-20 X 0.62 DP	0.25	0.15
BCS20	5/16-18 X .875 DP	3/8-16 X .44 DP	3/8-16 X .44 DP	1/4-20 X .62 DP	0.25	0.19

*For 1/2" 2TPI BALL-SCREW style only.
† For EXTENDED SHAFT style only.

MCS

Dimensions in millimeters

MODELS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
MCS10	54.4	27.2	80.0	39.9	25.4	12.7	16.5	33.3	27.7	55.4	24.1	58.4	38.1	20.3	49.8	29.5	120.7
MCS15	73.2	36.6	180.0	54.1	25.4	12.7	22.9	45.7	44.5	88.9	31.8	89.9	54.1	35.8	73.9	38.1	150.1
MCS20	95.3	47.8	127.0	63.5	63.5	31.8	29.5	58.7	56.4	112.8	36.6	112.8	69.9	42.9	97.8	54.0	187.2

MODELS	R	S	T	U	V	V†	W	W†	X	Y	Z	AA	BB	CC	DD
MCS10	60.5	103.6	52.3	6.0	11.7	37.1	14.0	39.4	12.7	44.5	22.4	27.9	14.0	14.0	27.9
MCS15	75.2	126.0	74.4	8.0	15.8	47.5	16.8	48.5	15.9	63.5	31.8	46.0	26.2	23.1	46.0
MCS20	93.5	149.4	92.0	11.0	20.6	58.7	20.6	58.7	18.3	79.3	39.6	57.2	31.8	28.7	57.2

MODELS	EE	FF	GG	HH	II	JJ
MCS10	M5-0.8 X 11.0mm DP	M6-1.0 X 6mm DP	M6-1.0 X 6mm DP	M5-0.8 X 16mm DP	4.8	3.8
MCS15	M6-1.0 X 12mm DP	M8-1.25 X 10mm DP	M6-1.0 X 12mm DP	M6-1.0 X 16mm DP	6.0	3.8
MCS20	M8-1.25 X 22.2mm DP	M10-1.5 X 11mm DP	M10-1.5 X 11mm DP	M6-1.0 X 16mm DP	6.0	4.8

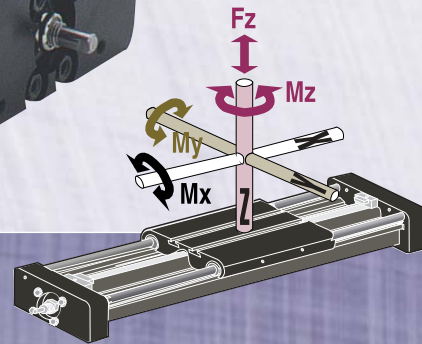
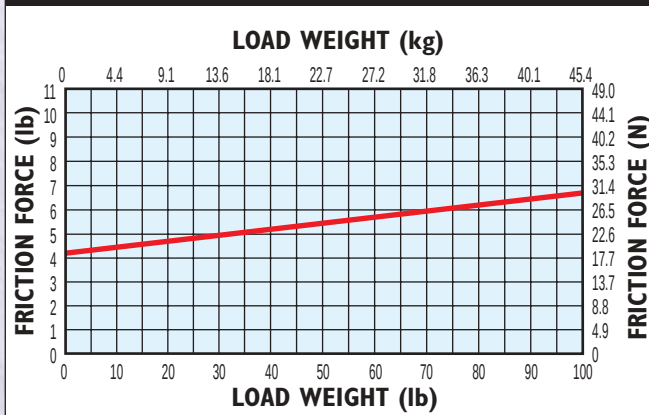
† For EXTENDED SHAFT style only.

SLS & MLS SERIES SCREW-DRIVE ACTUATORS

PERFORMANCE DATA • SPECIFICATIONS



CARRIER FRICTION FORCE

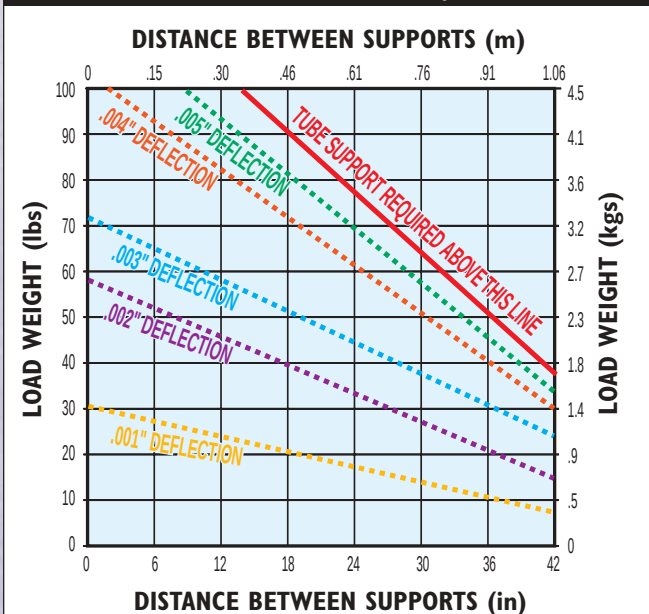


SLS/MLS SERIES SPECIFICATIONS

SPECIFICATION	U.S. STANDARD	METRIC
	SLS10	MLS10
Max. Bending Moment*		
Mx	80 in-lb	9.0 N-m
My	80 in-lb	9.0 N-m
Mz	125 in-lb	14.1 N-m
Max. Load		
Fz	100 lb	445 N
Weights		
Carrier Weight	1.54 lb	69 kg
Base Weight (incl. carrier)	6.05 lb	2.74 kg
Weight per length of stroke	.404 lb/in	7.23 g/mm
Pre-Load Torque	25 oz-in	.177 N-m
Dead Length (2 x S dim)	9.22 in	234.4 mm

* For Dual Carrier option, refer to bending moment chart on page 49

MOUNTING SUPPORT REQUIREMENTS



OPERATION TEMPERATURE RANGE

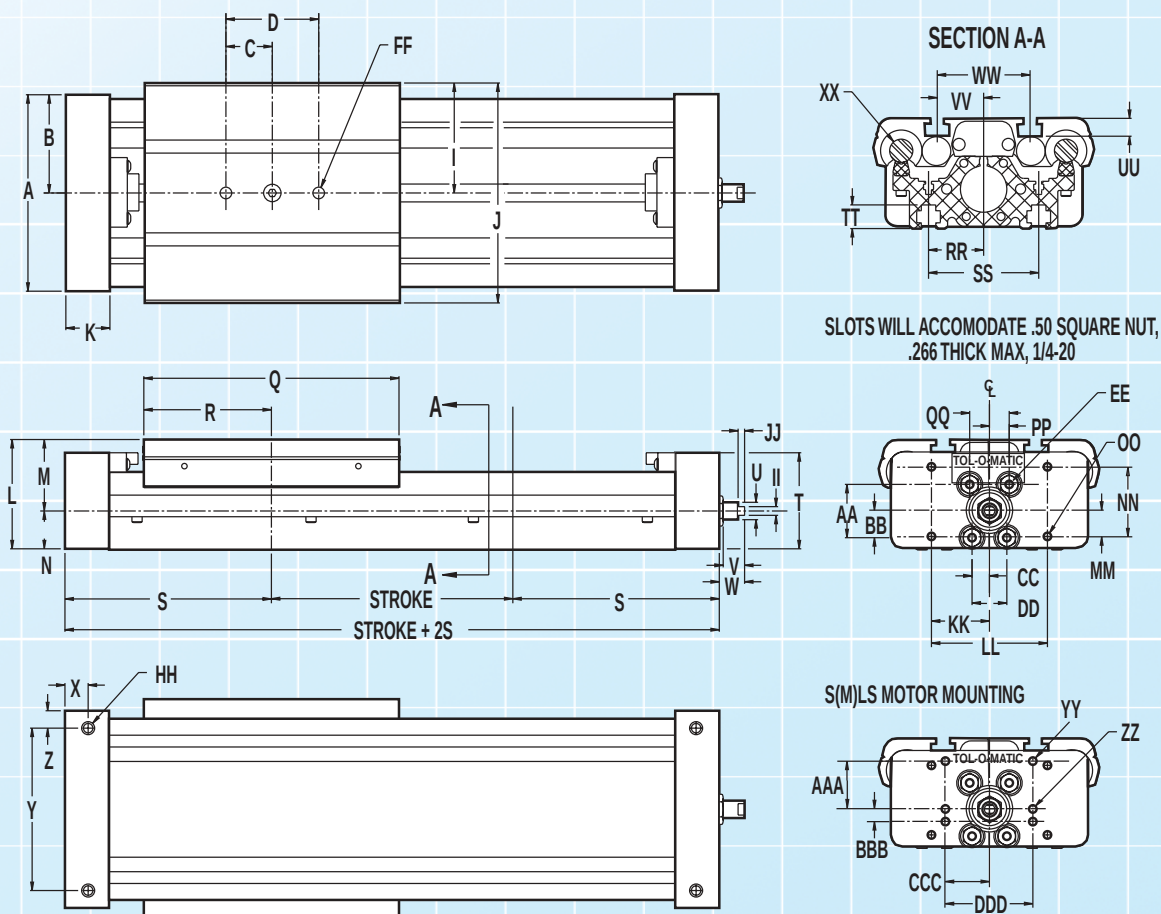
SLS/MLS series actuators should be used in temperatures from 40° to 130°F (4° to 54°C). Please contact Tol-O-Matic for applications with temperatures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.

LARGE FRAME MOTORS & SMALL ACTUATORS

Cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

DIMENSIONS SLS/MLS SERIES ACTUATORS

REFERENCE CAD FILES: SLS10



SLS 10

Dimensions in inches

A	B	C	D	I	J	K	L	M	N	Q	R	S	T	U	V	V†	W		
4.25	2.13	1.000	2.000	2.38	4.75	0.95	2.34	1.52	0.82	5.50	2.75	4.61	2.07	0.250	0.461	1.461	0.545		
W†	X	Y	Z	AA	BB	CC	DD	EE		FF		HH		II	JJ	KK	LL	MM	
1.545	0.500	3.500	0.375	1.149	0.59	0.375	0.75	#10-24 X 0.43 DP		Ø.250 X 0.200 DP		#10-24 X 0.63 DP		0.188	0.155	1.250	2.500	0.565	
NN	OO		PP	QQ	RR	SS	TT	UU	VV	WW	XX	YY		ZZ		AAA	BBB	CCC	DDD
1.500	#10-24 X 0.50 DP		0.426	0.85	1.19	2.38	0.51	0.39	1.000	2.000	0.472	#10-24 UNC-2B X .50 DP (4)		Ø.157/159 X .28 DP (2)		1.010	.298	.935	1.870

† For EXTENDED SHAFT style only.

MLS 10

Dimensions in millimeters

A	B	C	D	I	J	K	L	M	N	Q	R	S	T	U	V	V†	W		
107.9	54.0	25.40	50.80	60.3	120.6	24.1	59.4	38.7	20.7	139.7	69.8	117.2	52.6	6.4	11.7	37.1	13.8		
W†	X	Y	Z	AA	BB	CC	DD	EE		FF		HH		II	JJ	KK	LL	MM	
39.2	12.70	88.90	9.53	29.19	15.1	9.5	19.0	M5-0.8 X 11.0mm DP		Ø6.0 X 5.1mm DP		M5-0.8 X 16.0mm DP		5.0	3.9	31.75	63.50	14.35	
NN	OO		PP	QQ	RR	SS	TT	UU	VV	WW	XX	YY		ZZ		AAA	BBB	CCC	DDD
38.10	M5-0.8 X 24.1mm DP		10.8	21.6	30.2	60.3	12.9	9.8	25.40	50.80	12.0	M5 x .8 x 12.7mmDP		Ø3.99/4.04 X 7.1 DP (2)		25.65	7.57	23.75	47.50

† For EXTENDED SHAFT style only.

RODLESS BELT-DRIVE ACTUATORS



Axidyne Belt-Drive Actuators are available in two different body styles and bearing systems for applications requiring longer strokes and faster speeds.

RODLESS BELT-DRIVE ACTUATORS

TruTrack Series Actuators

These belt driven actuators are ideal for longer stroke applications that require high velocities and low carrier deflection.

B3B Series Actuators

Heavy duty recirculating bearing system for high load-carrying and moment capacity, available in three body sizes.

RODLESS BELT-DRIVE ACTUATORS

MODEL AVAILABILITY • BELT LOAD CAPACITIES • BELT CONSTRUCTION

U.S. STANDARD MODELS

B3B BELT-STYLE Model Number	Drive Reduction	Belt Width	Tooth Pitch	Belt Material
B3B10	Direct	BW05 (1/2")	5 mm	Neoprene Fiberglass
B3B10	3:1 Reduction	BW05 (1/2")	5 mm	Neoprene Fiberglass
B3B15	Direct	BW10 (1")	5 mm	Neoprene Fiberglass
B3B15	3:1 Reduction	BW10 (1")	5 mm	Neoprene Fiberglass
B3B20	Direct	BW15 (1.18")	5 mm	Neoprene Fiberglass
B3B20	3:1 Reduction	BW15 (1.18")	5 mm	Neoprene Fiberglass

TKB BELT-DRIVE Model Number	Drive Reduction	Belt Width (in/mm)	Tooth Pitch	Belt Material
TKB10 DD	1:1	.59 (15.0)	5 mm	Neoprene Fiberglass
TKB10 RD	2:1	.59 (15.0)	5 mm	Neoprene Fiberglass
TKB25 DD	1:1	1.00 (25.4)	5 mm	Neoprene Fiberglass
TKB25 RD	2:1	1.00 (25.4)	5 mm	Neoprene Fiberglass
TKB50 DD	1:1	1.58 (40.0)	5 mm	Neoprene Fiberglass
TKB50 RD	2:1	1.58 (40.0)	5 mm	Neoprene Fiberglass
TKB75 DD	1:1	1.97 (50.0)	5 mm	Neoprene Fiberglass
TKB75 RD	2:1	1.97 (50.0)	5 mm	Neoprene Fiberglass

METRIC MODELS

M3B BELT-STYLE Model Number	Drive Reduction	Belt Width	Tooth Pitch	Belt Material
M3B10	Direct	BW05 (12.7mm)	5 mm	Neoprene Fiberglass
M3B10	3:1 Reduction	BW05 (12.7mm)	5 mm	Neoprene Fiberglass
M3B15	Direct	BW10 (25.4mm)	5 mm	Neoprene Fiberglass
M3B15	3:1 Reduction	BW10 (25.4mm)	5 mm	Neoprene Fiberglass
M3B20	Direct	BW18 (30mm)	5 mm	Neoprene Fiberglass
M3B20	3:1 Reduction	BW18 (30mm)	5 mm	Neoprene Fiberglass

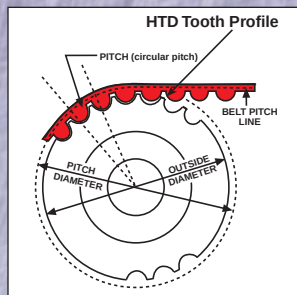
NOTE: See page 185 for configurator code descriptions.

BELT LOAD/SPEED CAPACITIES AND BELT CONSTRUCTION

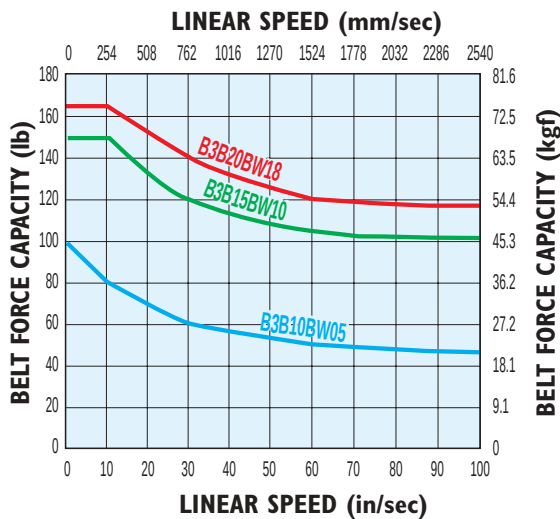
HTD TOOTH:

Offered in neoprene body with fiberglass tension members.

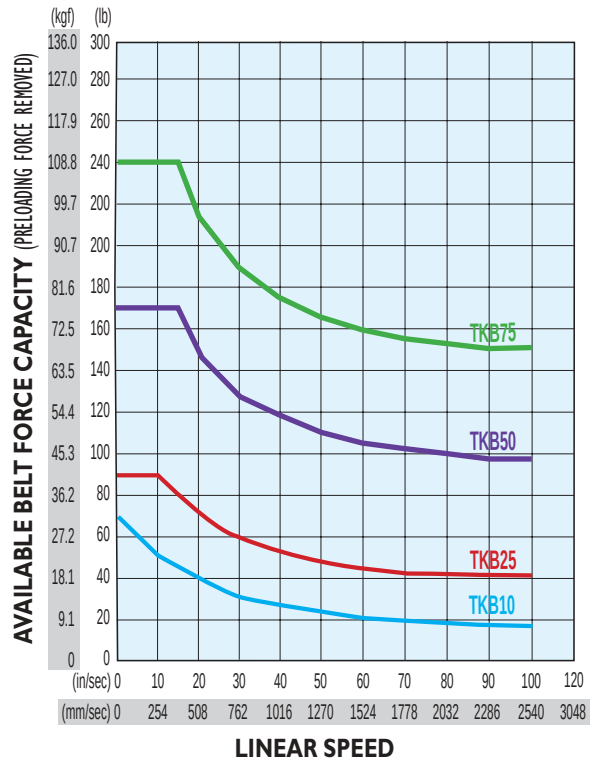
The HTD belt is selected for higher speed, higher load applications. Heavy duty drive and idler pulley bearings are used.



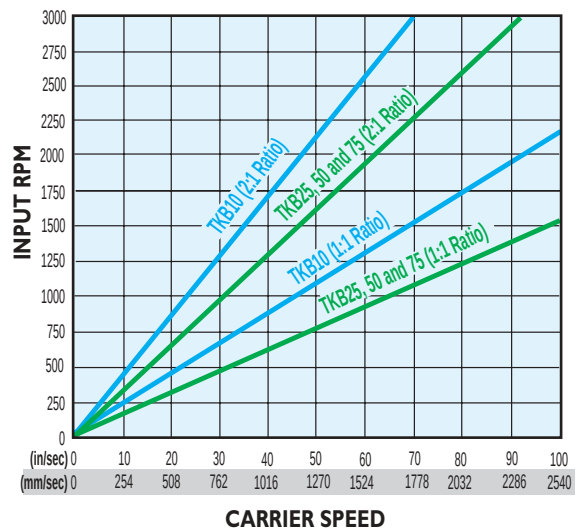
BELT LOAD FOR B3B ACTUATORS



BELT LOAD: TRuTRACK ACTUATORS



BELT SPEED: TRuTRACK ACTUATORS



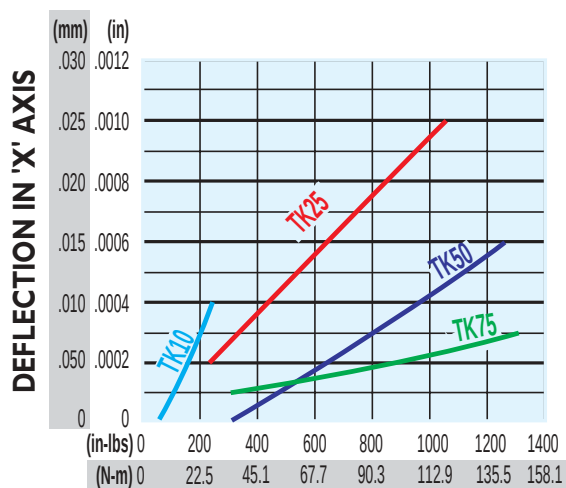
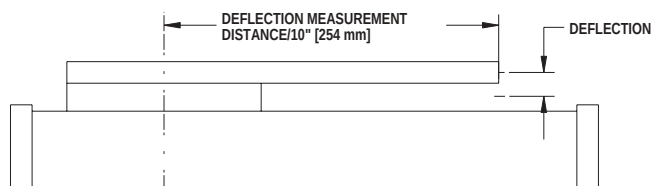
TKB SERIES BELT-DRIVE ACTUATORS

SPECIFICATIONS • PERFORMANCE DATA



RODLESS
BELT-DRIVE
ACTUATORS

TRUTRACK 'X' AXIS LOAD DEFLECTION

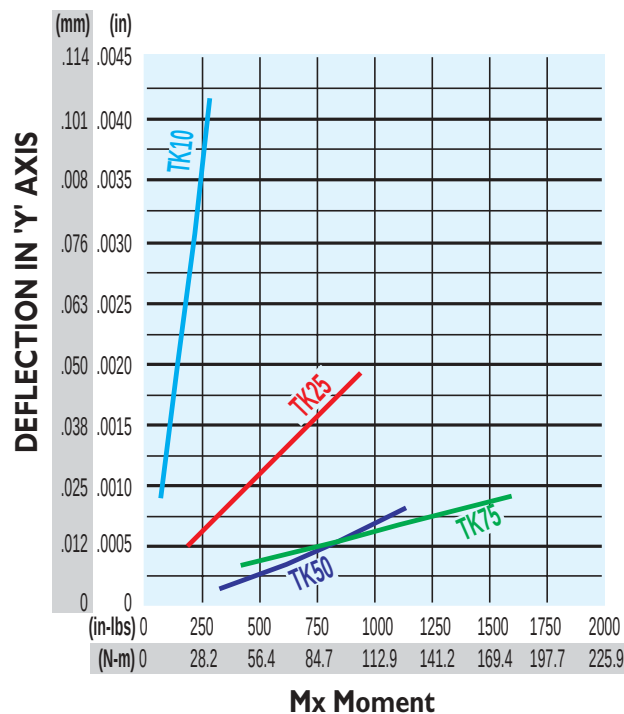
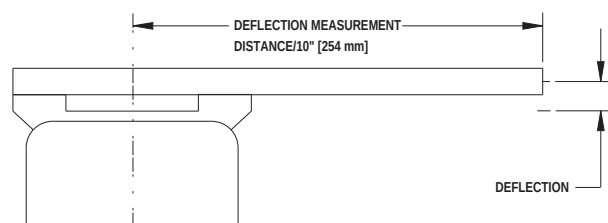


My Moment

LUBRICATION REQUIREMENTS:

Proper and adequate lubrication is essential for normal operation of TruTrack actuators. Poor lubrication will cause quicker wear and decrease service life of the actuator. For general use, lubrication should be performed at intervals of 4,000,000 linear inches of travel (100 km). However the operating conditions of certain applications may require more frequent lubrication. Please consult Tol-O-Matic for recommendations.

TRUTRACK 'Y' AXIS LOAD DEFLECTION



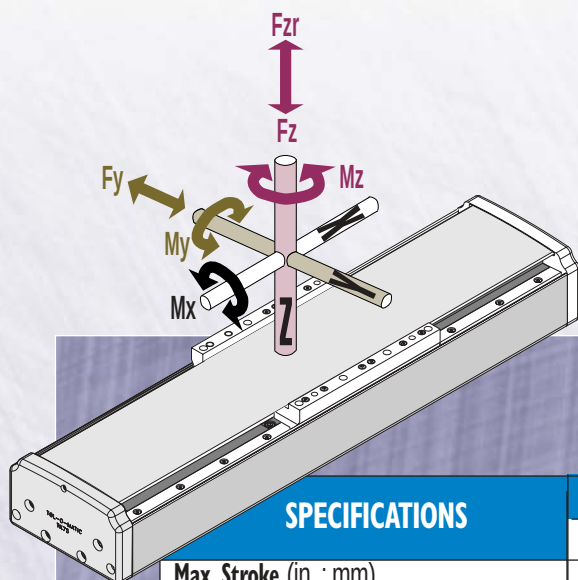
Mx Moment

Recommended greases:

- Multi-purpose grease based on refined mineral oil containing lithium thickening agent (excellent at high pressures, excellent viscosity stability)
- Grease based on a high grade synthetic oil containing a urea thickening agent (long life, wide temperature range).

OPERATION TEMPERATURE RANGE:

TruTrack actuators should be used in temperatures from 40° to 130°F (4° to 54°C). Please contact Tol-O-Matic for applications with temperatures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.



TKB SERIES SPECIFICATIONS

SPECIFICATIONS	U.S. STANDARD				METRIC CONVERSIONS			
	TKB10	TKB25	TKB50	TKB75	TKB10	TKB25	TKB50	TKB75
Max. Stroke (in. : mm)	96	96	96	96	2438	2438	2438	2438
Max. Dynamic Bending Moments: Values are based on 200,000,000 linear inches of carrier travel (5000 km)								
Mx (Roll) (lb-in: N-m)	85	721	971	1151	9.6	81.5	109.7	130.0
My (Pitch) (lb-in: N-m)	234	1014	1442	1477	26.4	114.6	162.9	166.9
Mz (Yaw) (lb-in: N-m)	234	915	1301	1332	26.4	103.4	147.0	150.5
Max. Static Bending Moments								
Mx (Roll) (lb-in: N-m)	170	1251	1685	1997	19.2	141.3	190.3	225.6
My (Pitch) (lb-in: N-m)	468	1759	2502	2563	52.9	198.8	282.7	289.5
Mz (Yaw) (lb-in: N-m)	468	1588	2257	2311	52.9	179.4	255.0	261.1
Max Dynamic Load: Values are based on 200,000,000 linear inches of carrier travel (5000 km)								
Fz (Radial Load) (lb: N)	100	250	500	750	445	1113	2225	3338
Fy (Lateral Load) (lb: N)	100	250	500	500	445	1113	2225	2225
Fzr (Reverse Radial Load) (lb: N)	100	250	500	500	445	1113	2225	2225
Max Static Load								
Fz (Radial Load) (lb: N)	200	434	868	1301	890	1931	3863	5789
Fy (Lateral Load) (lb: N)	200	434	868	868	890	1931	3863	3863
Fzr (Reverse Radial Load) (lb: N)	200	434	868	868	890	1931	3863	3863
Flatness (inches/in: mm/mm)*	.0002	.0002	.0002	.0002	.005	.005	.005	.005
Straightness (inches/in: mm/mm)*	.0002	.0002	.0002	.0002	.005	.005	.005	.005
Belt Repeatability	±.005	±.005	±.005	±.005	±.127	±.127	±.127	±.127
Carrier Unit Weight (lb: kg)	0.64	2.41	3.38	4.42	0.29	1.09	1.53	2.00
Base Wt. of Direct Drive Model (lb: kg) (Including Carrier, Without Motor)	3.23	10.69	14.99	18.34	1.53	4.85	6.80	8.32
Base Wt. of Reduction Drive Model (lb: kg) (Including Carrier, Without Motor)	5.57	14.11	18.95	22.28	2.53	6.40	8.59	10.10
Weight Per Inch of Stroke (lb: kg)	0.20	0.46	0.61	0.72	0.09	0.21	0.28	0.32
Inertia: Drive Shaft + Idler Wheel (oz-sq in: g-sq cm)	50	150	150	150	0.35	1.06	1.06	1.06
Preload Torque (oz-in: N-m)	50	150	150	150	0.35	1.06	1.06	1.06
Drive Wheel Pitch Ø (in: mm)	0.877	1.191	1.191	1.191	22.3	30.3	30.3	30.3
Dead Length (in: mm)	6.63	8.03	9.87	10.32	168	204	251	262
Carrier Movement/Revolution (in: mm)	2.755	3.742	3.742	3.742	70.0	95.0	95.0	95.0
Friction Force (lb: N):=	= .0003 x LOAD (lb) + 3.96				= .003 x LOAD (kg) + 17.6			

* Actuator mounted on a flat surface and fully restrained. (See dimensional drawing on page 46)

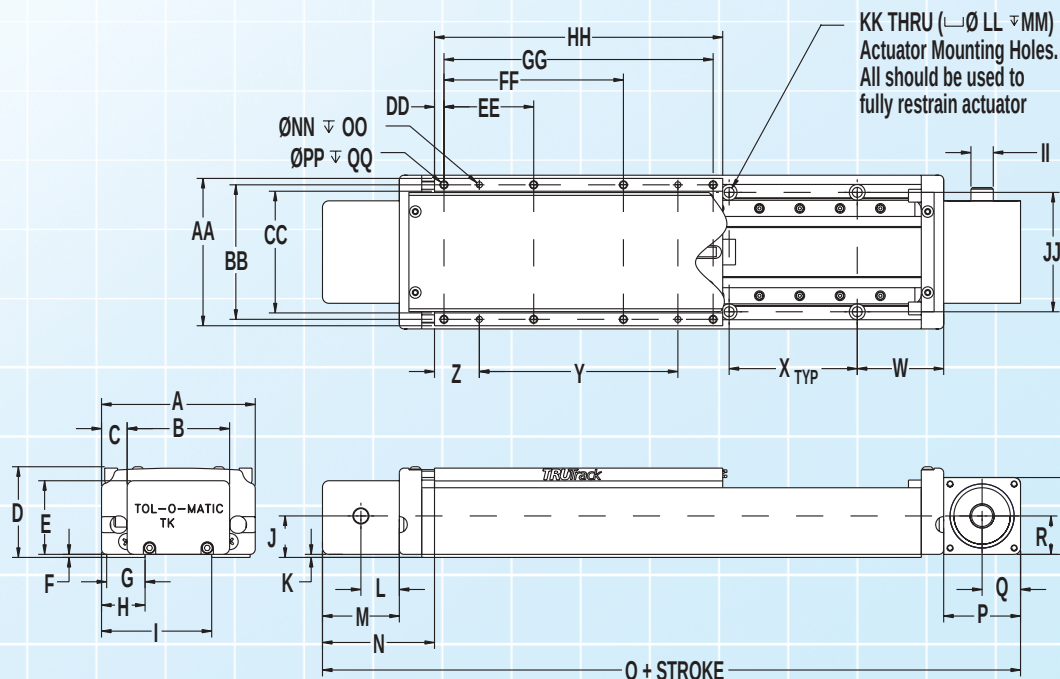
TKB SERIES BELT-DRIVE ACTUATORS

DIMENSIONS

DIMENSIONS TKB SERIES ACTUATORS

REFERENCE CAD FILES:

TKB10, TKB25, TKB50,
TKB75



Dimensions in inches

MODELS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
TKB10	3.00	2.00	.50	1.74	1.44	.06	.75	.85	2.15	.810	.06	.75	1.50	2.18	9.999	1.50	.750	.75	1.500	1.50	.50	2.00
TKB25	4.50	2.88	.81	2.72	2.50	.06	1.00	1.22	3.28	1.435	.31	1.13	2.25	3.25	13.420	2.25	1.125	1.13	2.250	2.50	.70	3.13
TKB50	5.50	3.71	.89	3.14	2.90	.06	1.75	2.00	3.50	1.830	.71	1.13	2.25	3.37	14.370	2.25	1.125	1.13	2.250	2.90	.90	3.71
TKB75	6.13	3.94	1.09	3.42	2.93	.06	1.75	2.00	4.13	1.860	.74	1.13	2.25	3.37	14.810	2.25	1.125	1.13	2.250	2.93	1.10	3.94

MODELS	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	LL	MM	NN	OO	PP	QQ
TKB10	1.437	2.500	3.937	.844	2.875	2.598	2.598	.450	1.575	3.150	4.724	5.63	.436	2.330	.19	.31	.17	.119	.50	M4	.32
TKB25	1.625	2.500	3.937	1.494	4.353	3.937	3.353	.707	1.968	3.543	5.512	6.93	.500	3.580	.26	.50	.92	.237	THRU	M6	.50
TKB50	1.750	5.000	5.118	1.251	5.350	4.724	4.100	.267	2.362	4.724	7.086	7.62	.500	2.270	.26	.44	.28	.237	THRU	M8	.63
TKB75	1.750	5.000	5.512	1.119	5.974	5.315	4.724	.253	2.362	4.882	7.244	7.75	.500	2.939	.34	.53	.34	.237	THRU	M8	THRU

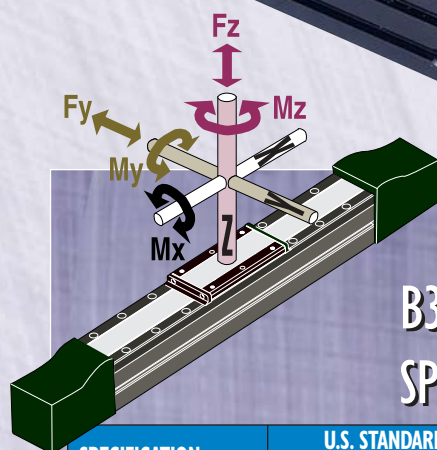
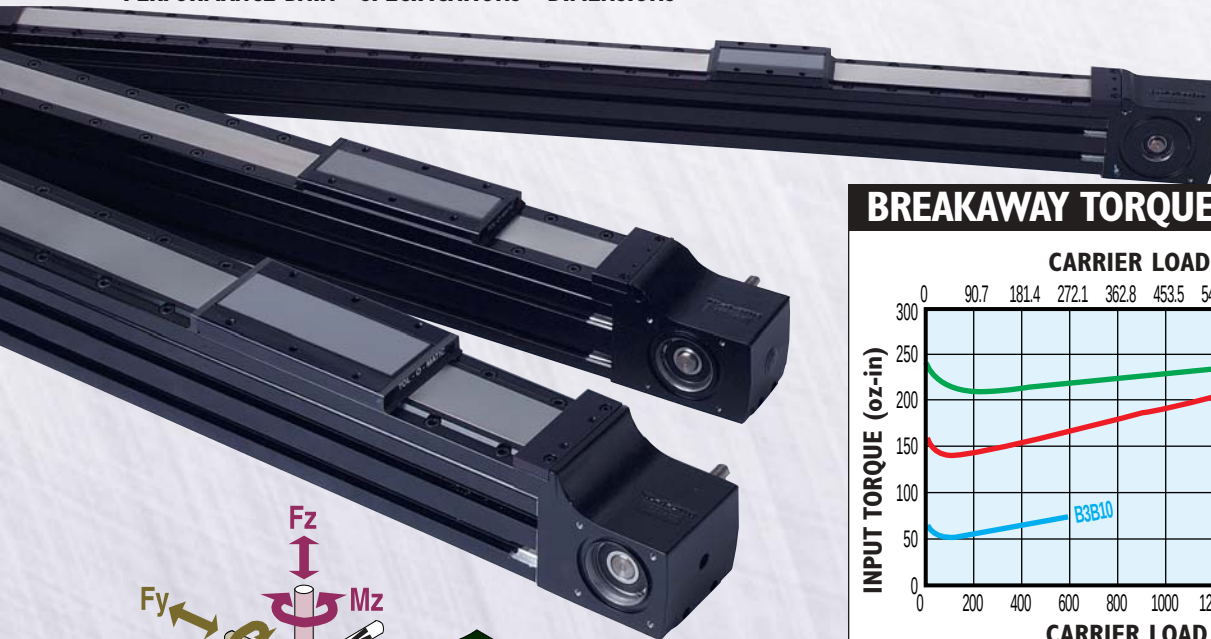
Dimensions in millimeters

MODELS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
TKB10	76.2	50.8	12.7	44.2	36.5	1.5	19.1	21.6	54.6	20.57	1.5	19.1	38.1	55.5	253.97	38.1	19.05	19.05	38.1	38.1	12.7	50.8
TKB25	114.3	73.0	20.7	69.1	63.5	1.5	25.4	31.0	83.3	36.45	7.9	28.6	57.2	82.4	340.87	57.2	28.58	28.58	57.2	63.5	17.8	79.4
TKB50	139.7	94.3	22.7	79.8	73.5	1.5	44.5	50.8	88.9	46.48	17.9	28.6	57.2	85.7	365.00	57.2	28.58	28.58	57.2	73.5	22.9	94.3
TKB75	155.60	100.0	27.8	86.9	74.3	1.5	44.5	50.8	104.9	47.24	18.7	28.6	57.2	85.6	376.17	57.2	28.58	28.58	57.2	74.3	27.9	100.0

MODELS	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	LL	MM	NN	OO	PP	QQ
TKB10	36.50	63.50	100.00	21.44	73.03	65.99	65.99	11.43	40.01	80.01	119.99	142.88	11.07	59.18	4.8	7.9	4.3	3.0	12.7	M4	8.1
TKB25	41.28	63.50	100.00	37.95	110.57	100.00	85.17	17.96	49.99	89.99	140.00	175.90	12.70	90.93	6.6	12.7	23.4	6.0	THRU	M6	12.7
TKB50	44.45	127.00	130.00	31.78	135.89	119.99	104.14	6.78	59.99	119.99	179.98	193.55	12.70	57.66	6.6	11.2	7.1	6.0	THRU	M8	16.0
TKB75	44.45	127.00	140.00	28.42	151.74	135.00	119.99	6.43	59.99	124.00	184.00	196.85	12.70	74.65	8.7	13.5	8.6	6.0	THRU	M8	THRU

B3B & M3B SERIES BELT-DRIVE ACTUATORS

PERFORMANCE DATA • SPECIFICATIONS • DIMENSIONS



B3B/M3B SERIES SPECIFICATIONS

SPECIFICATION	U.S. STANDARD			METRIC		
	B3B10	B3B15	B3B20	M3B10	M3B15	M3B20
Max. Bending Moment*						
Mx	250 in-lb	859 in-lb	1662 in-lb	28.2 N-m	97.1 N-m	187.8 N-m
My	269 in-lb	1033 in-lb	1472 in-lb	30.4 N-m	116.7 N-m	166.3 N-m
Mz	156 in-lb	596 in-lb	850 in-lb	17.9 N-m	67.3 N-m	96.0 N-m
Max. Load						
Fy	341 lb	840 lb	1159 lb	1517 N	3738 N	5158 N
Fz	591 lb	1454 lb	2008 lb	2630 N	6470 N	8936 N
Weights						
Carrier Weight	.85 lb	1.56 lb	2.14 lb	.4 kg	.70 kg	.97 kg
Base Weight (incl. carrier)	7.54 lb	25.12 lb	35.4 lb	3.4 kg	11.4 kg	6.52 kg
Weight per length of stroke	.388 lb/in	.394 lb/in	.714 lb/in	6.43 g/mm	7.04 g/mm	12.75 g/mm
Inertia:						
Drive + Idler Wheel	.501 oz-in ²	4.84oz-in ²	10.41oz-in ²	91.6 g-cm ²	185.2 g-cm ²	1903.9 g-cm ²
Pre-Load Torque	60 oz-in	160 oz-in	240 oz-in	.423 N-m	1.300 N-m	1.694 N-m
Drive Wheel Pitch Dia.	1.003 in.	1.504 in.	1.754 in.	25.48mm	38.20mm	44.25mm
Dead Length (2 x A dim)	13.56 in	18.84 in	18.66 in	344.4 mm	478.5 mm	473.9 mm
Carrier Movement/Rev.	3.151 in	4.725 in	5.510 in	80.04 mm	120.02 mm	139.95 mm

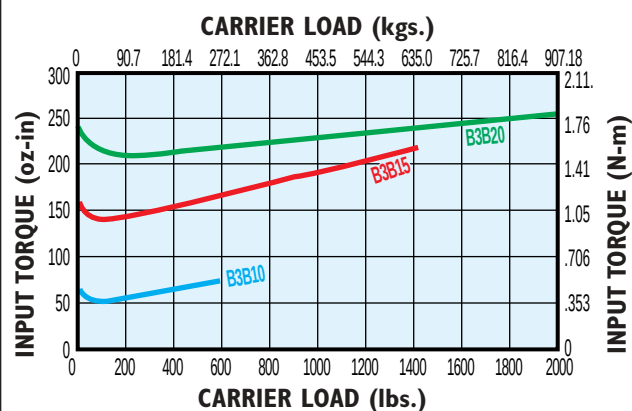
* For Dual Carrier option, refer to bending moment chart on page 52

* For Dual 180° Carrier option, refer to bending moment chart on page 54

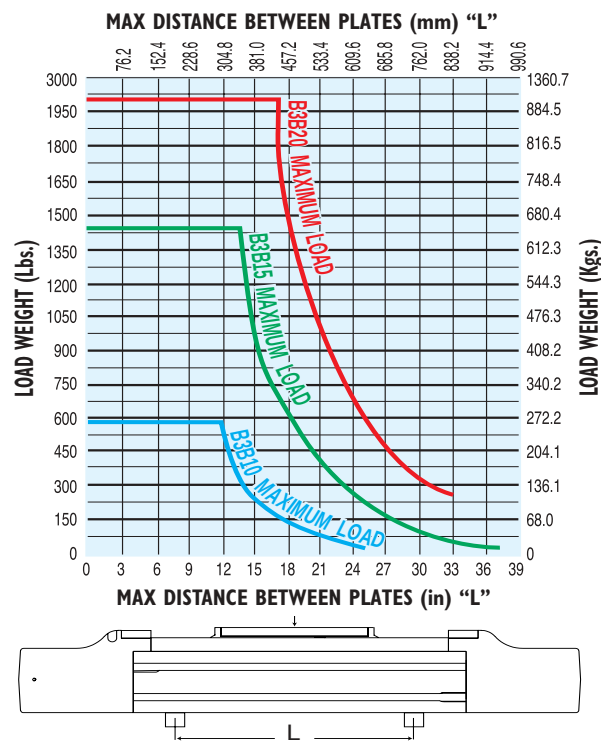
OPERATION TEMPERATURE RANGE

B3B/M3B series actuators should be used in temperatures from 40° to 130°F (4° to 54°C). Please contact Tol-O-Matic for applications with temperatures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.

BREAKAWAY TORQUE/CARRIER LOAD



MOUNTING PLATE REQUIREMENTS



B3B DEFLECTION CONSIDERATIONS:

In applications where substantial Mx moments come into play, deflection of the cylinder tube, carrier and supports must be considered. Refer to B3S deflection chart on page 34. Deflection factors are based on a cylinder mounted with tube supports at minimum recommended spacing. If more rigidity is desired, refer to Dual Carrier option on pages 49-50 or consider the TKB Series actuator.

LARGE FRAME MOTORS & SMALL ACTUATORS

Cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

DIMENSIONS

REFERENCE CAD FILES: B3B10, B3B15, B3B20



Dimensions in inches

*DOWEL PINS		.003, 08mm	
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Dimensions in millimeters

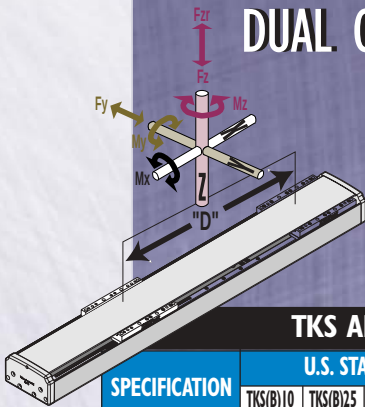
MODELS	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE
B3B10	47.50	64.5	84.6	66.93	57.2	3.2	55.63	14.2	39.50	58.93	6.86	48.82	47.5	M6 X 1.0	4.85
B3B15	38.1	87.6	104.6	66.93	57.2	3.2	73.2	19.35	56.00	75.44	8.74	64.29	47.5	M6 X 1.0	—
B3B20	31.24	108.2	117.4	66.93	57.2	3.2	100.1	21.10	59.03	84.8	12.7	87.33	47.5	M6 X 1.0	03

DUAL CARRIER OPTION

BCS, SLS, B3S, B3B, TKS AND TKB ACTUATORS

DUAL CARRIER MAXIMUM BENDING MOMENTS AND LOADS

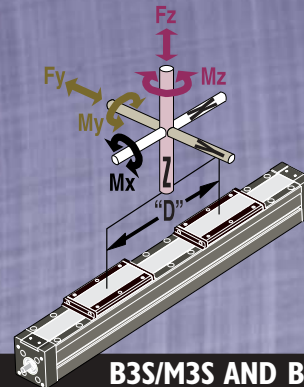
DUAL CARRIER OPTION INCREASES RIGIDITY,
LOAD-CARRYING CAPACITY AND BENDING MOMENTS



TKS AND TKB ACTUATORS*

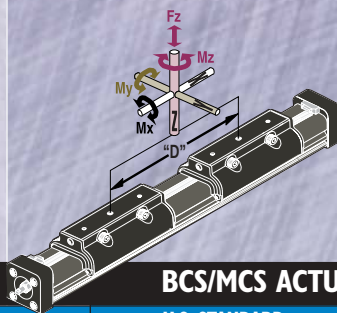
SPECIFICATION	U.S. STANDARD				METRIC CONVERSIONS			
	TKS(B)10	TKS(B)25	TKS(B)50	TKS(B)75	TKS(B)10	TKS(B)25	TKS(B)50	TKS(B)75
Dynamic Moment								
Mx (lb-in: N-m)	170	1442	1942	2302	19.2	162.9	219.4	260.1
My (lb-in: N-m)	563	603	763	772	63.6	68.1	86.2	87.2
Mz (lb-in: N-m)	563	603	763	772	63.6	68.1	86.2	87.2
Static Moment								
Mx (lb-in: N-m)	340	2502	3369	3994	38	283	381	451
My (lb-in: N-m)	1126	1046	1324	1339	127	118	150	151
Mz (lb-in: N-m)	1126	1046	1324	1339	127	118	150	151
Dynamic Load								
Fz (lb: N)	200	500	1000	1500	890	2225	4450	6675
Fy (lb: N)	200	500	1000	1000	890	2225	4450	4450
Fzr (lb: N)	200	500	1000	1000	890	2225	4450	4450
Static Load								
Fz (lb: N)	400	868	1735	2603	1780	3863	7721	11583
Fy (lb: N)	400	868	1735	1735	1780	3863	7721	7721
Fzr (lb: N)	400	868	1735	1735	1780	3863	7721	7721
Dimension "D" (Minimum) (in: mm)	5.63	6.03	7.63	7.72	142.9	153.0	193.8	196.1

*BENDING MOMENTS ARE BASED ON 200,000,000 LINEAR INCHES OF CARRIER TRAVEL (5,000 KM)



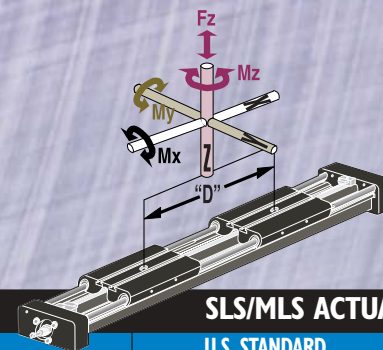
B3S/M3S AND B3B/M3B ACTUATORS

SPECIFICATION	U.S. STANDARD			METRIC		
	B3S(B)10	B3S(B)15	B3S(B)20	M3S(B)10	M3S(B)15	M3S(B)20
Moment						
Mx (lb-in: N-m)	500	1718	3324	56.5	194.1	375.6
My (lb-in: N-m)	2825	11,734	16,265	319.2	1325.8	1837.8
Mz (lb-in: N-m)	1630	6779	9388	184.2	765.9	1060.8
Load						
Fy (lb: N)	682	1680	2318	3035	7476	10315
Fz (lb: N)	1182	2908	4016	5260	1294	17871
Dimension "D" (Minimum) (in: mm)	4.88	8.07	8.10	124.0	205.0	205.7



BCS/MCS ACTUATORS

SPECIFICATION	U.S. STANDARD			METRIC		
	BCS10	BCS15	BCS20	MCS10	MCS15	MCS20
Moment						
Mx (lb-in: N-m)	110	550	600	12.40	62.10	67.80
My (lb-in: N-m)	287	1453	2430	32.40	164.10	274.60
Mz (lb-in: N-m)	287	1453	2430	32.40	164.10	274.60
Load						
Fz (lb: N)	1201	360	600	534	1602	2670
Dimension "D" (Minimum) (in: mm)	5.10	6.5	8.10	129.5	165	206



SLS/MLS ACTUATORS

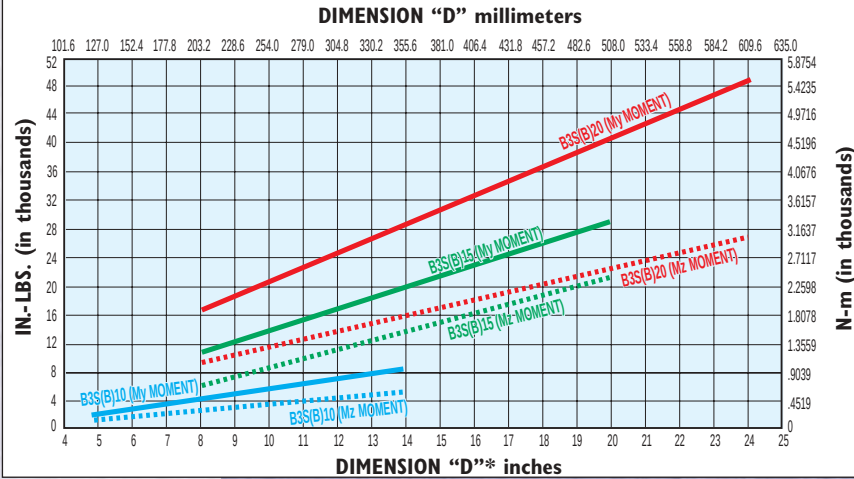
SPECIFICATION	U.S. STANDARD	METRIC
	SLS10	MLS10
Moment		
My (lb-in: N-m)	177.80	20.09
Mx (lb-in: N-m)	160.00	18.08
Mz (lb-in: N-m)	277.80	31.30
Load		
Fz (lb: N)	200	890
Dimension “D” (Minimum) (in: mm)	5.5	139.7

DUAL CARRIER OPTION

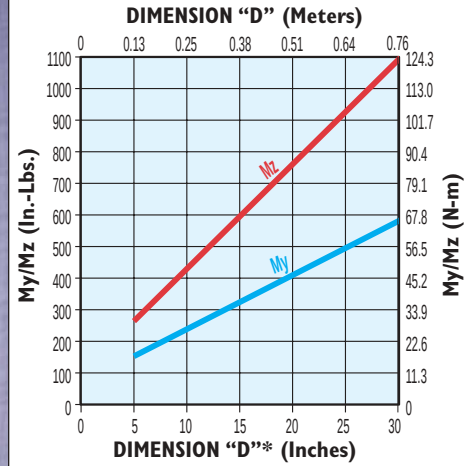
BCS, SLS, B3S, B3B, TKS AND TKB ACTUATORS

DUAL CARRIER LOAD vs. DISTANCE

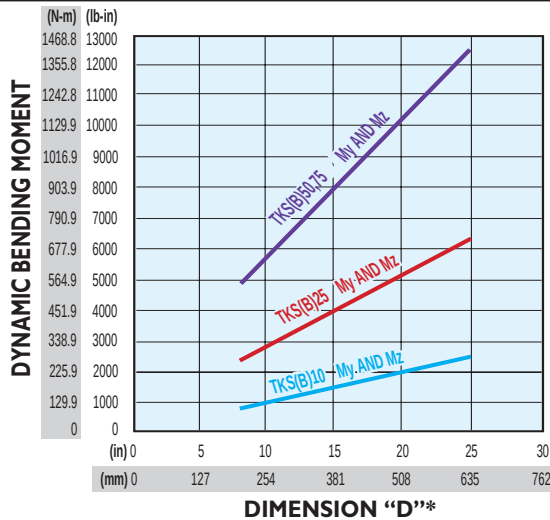
B3S/M3S AND B3B/M3B ACTUATORS



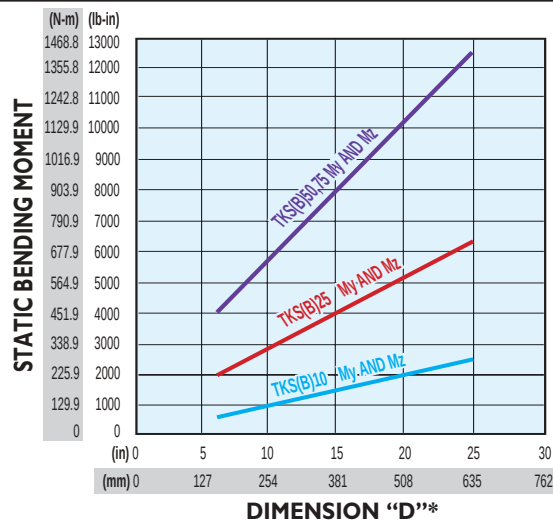
SLS/MLS ACTUATORS



DYNAMIC MOMENT TKS/TKB ACTUATORS



STATIC MOMENT TKS/TKB ACTUATORS



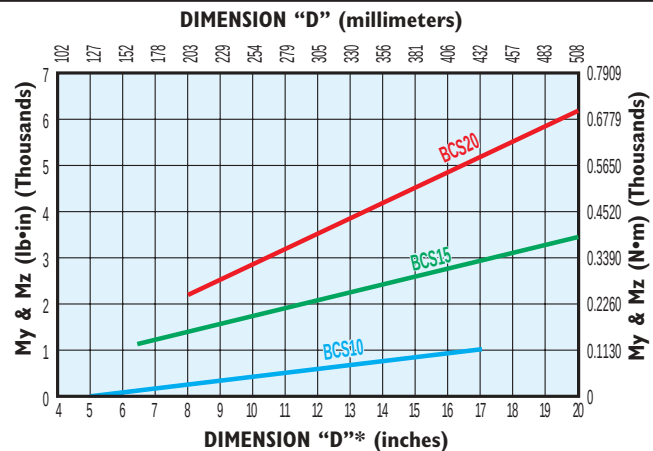
NOTE: Rates shown on charts were calculated with

the following assumptions:

- 1.) Coupling between carriers is rigid.
- 2.) Load is equally distributed between carriers.
- 3.) Coupling device applies no misalignment loads to carriers.

*CUSTOMER MUST SPECIFY DIMENSION "D"
(DISTANCE BETWEEN CARRIER CENTER LINES)
IN CONFIGURATION STRING

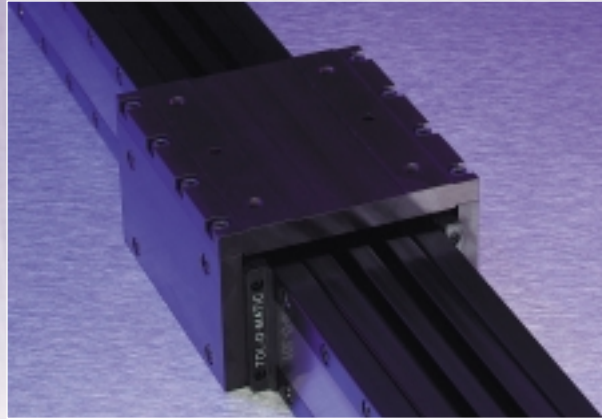
BCS/MCS ACTUATORS



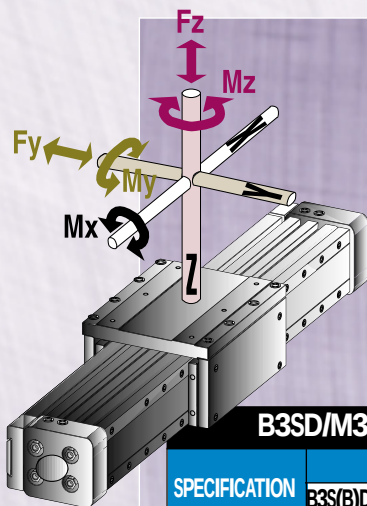
DUAL 180° CARRIER OPTION

B3SD AND B3BD ACTUATORS

NOTE: The Dual 180° Carrier option requires its own proprietary tube supports and foot mounts. See dimensional information. Breakaway torque will increase when using the Dual 180° Carrier option.



The Dual 180° Carrier option may be used when load or deflection factors exceed those of a single carrier actuator. This option allows the load to be rotated 90° from the cylinder's carrier providing an additional load bearing surface.



MAXIMUM BENDING MOMENTS AND LOADS

B3SD/M3SD AND B3BD/M3BD ACTUATORS

SPECIFICATION	U.S. STANDARD			METRIC		
	B3S(B)D10	B3S(B)D15	B3S(B)D20	M3S(B)D10	M3S(B)D15	M3S(B)D20
Moment						
Mx	657 in-lb	2468 in-lb	4527 in-lb	74.2 N-m	278.9 N-m	511.2 N-m
My	312 in-lb	1192 in-lb	1700 in-lb	35.3 N-m	134.7 N-m	192.1 N-m
Mz	538 in-lb	2066 in-lb	2944 in-lb	60.8 N-m	233.4 N-m	332.6 N-m
Load						
Fy	1182 lb	2908 lb	4016 lb	5260 N	1294 N	17871 N
Fz	682 lb	1680 lb	2318 lb	3035 N	7476 N	10315 N

DUAL 180° WEIGHTS

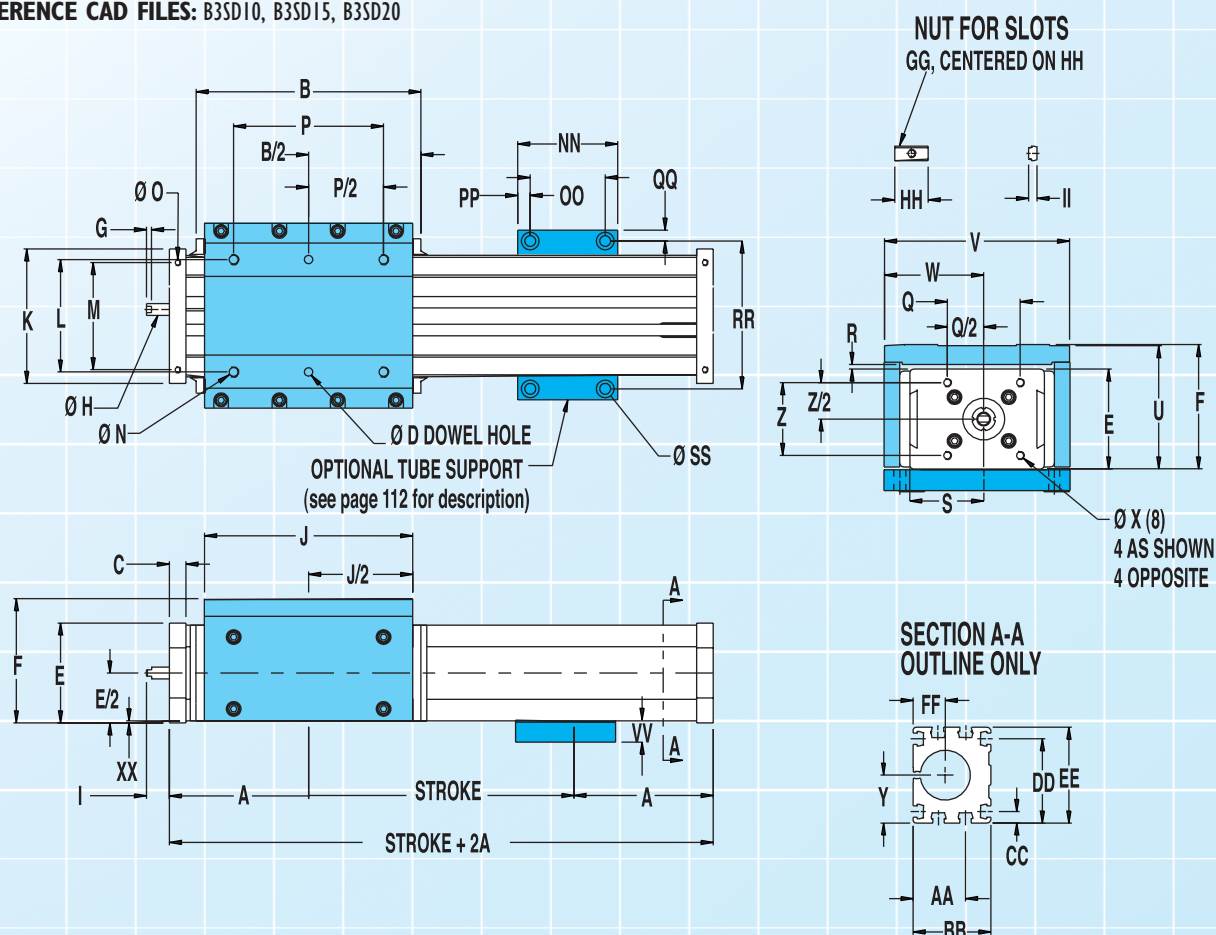
SPECIFICATION	U.S. STANDARD			METRIC		
	B3S(B)D10	B3S(B)D15	B3S(B)D20	M3S(B)D10	M3S(B)D15	M3S(B)D20
Base Weight	2.66lb	6.26lb	11.88lb	1.2 kgs	2.8 kgs	5.4 kgs
Weight per/in of stroke	.087 lb	.16 lb	.26 lb	.04 kgs	.07 kgs	.12 kgs

DUAL 180° CARRIER

B3SD ACTUATORS

DIMENSIONS B3SD SERIES ACTUATORS

REFERENCE CAD FILES: B3SD10, B3SD15, B3SD20



B3SD 10/15/20

Dimensions in inches

MODELS	A	B	C	D*	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	V	W
B3SD10	2.81	3.67	0.50	.252/.251 x .25	2.25	2.86	0.155	0.250	0.550	3.67	2.87	2.438	1.607	1/4-20 THRU	#10-24 x .375 DP	3.062	1.114	0.14	1.462	2.826	4.31	2.183
B3SD15	4.180	6.75	.500	.252/.251 x .25	3.000	3.735	.155	.315 OR .394**	.688	6.25	4.038	3.375	3.218	5/16-18 THRU	#10-24 x .375 DP	4.500	2.188	.14	2.219	3.703	5.566	2.978
B3SD20	5.26	7.25	1.312	.252/.251 x .25	4.25	4.83	0.190	0.500	1.360	6.75	5.25	5.125	3.845	3/8-16 THRU	1/4-20 x .50 DP	6.000	2.668	0.13	2.422	4.80	7.41	3.498

MODELS	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	NN	OO	PP	QQ	RR	SS	VV	WW	XX
B3SD10	#10-24 THRU	1.09	1.775	NA	1.47	0.266	1.922	2.19	0.710	#10-24 THRU	0.500	0.125	3.125	2.563	0.281	0.281	2.938	.266 Thru, CBoRe .44 x .28 Dp	0.516	—	0.03
B3SD15	1/4-20 THRU	1.438	2.188	1.575	2.34	.344	2.188	2.88	.969	1/4-20 THRU	.94	.25	3.000	2.250	.375	.328	4.438	.328 Thru, CBoRe .53 x .34 Dp	0.656	4.328	.062
B3SD20	1/4-20 x .75 DP	1.969	2.668	2.14	3.16	0.500	3.438	3.94	1.375	5/16-18 THRU	0.94	.41	3.00	2.250	0.375	0.375	5.25	.391 Thru, CBoRe .63 x .41 Dp	0.624	—	0.16

** .315 (8.0mm) for models B3SD15 BN02 and BNR02

*DOWEL PINS



.003, .08mm



M3SD 10/15/20

Dimensions in millimeters

MODELS	A	B	C	D*	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	V	W
M3SD10	71.4	93.2	12.70	6.05/6.02 x 6.4	57.2	72.6	3.94	6.35	13.97	93.2	72.9	61.93	40.82	M6 x 1.0 THRU	M5 x .8 x 10 DP	77.80	28.30	3.6	37.13	71.78	109.5	55.45
M3SD15	106.4	171.5	12.70	6.05/6.02 x 6.4	76.20	94.87	3.94	8.0 OR 10.0**	17.48	158.75	102.56	85.73	81.74	M8 x 1.25 THRU	M6 x 1.0 x 9.5 DP	114.3	55.58	3.6	56.36	102.57	94.06	141.12
M3SD20	133.6	184.2	33.32	6.05/6.02 x 6.4	108.0	122.7	4.83	12.70	34.54	171.5	133.4	130.18	97.66	8 x 1.25 THRU	6 x 1.0 12 DP	152.40	67.77	3.2	61.52	121.9	188.2	88.85

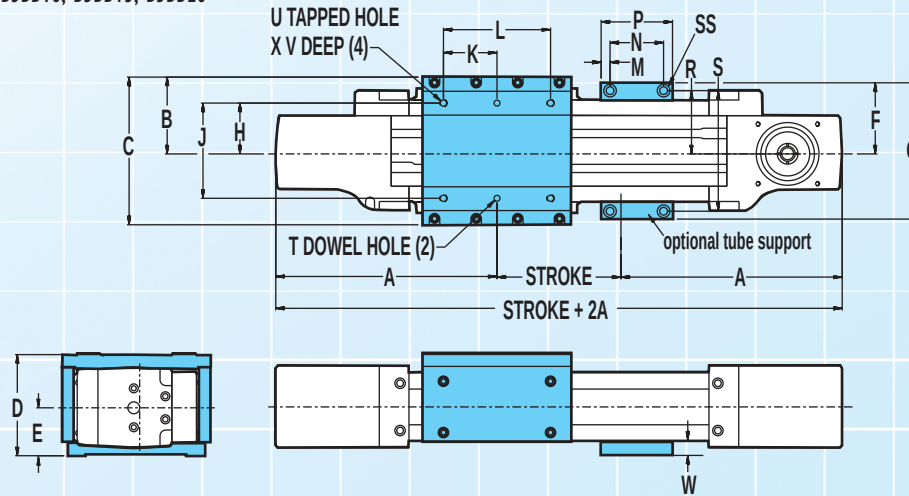
MODELS	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	NN	OO	PP	QQ	RR	SS	VV	WW	XX
M3SD10	M5 x .8 THRU	27.7	45.09	—	37.3	6.76	48.82	55.6	18.03	M5 x .8 THRU	12.70	3.18	79.38	65.10	7.14	7.14	74.63	7.76 Thru, CBoRe 11.2 x 7.1 Dp	13.11	—	0.8
M3SD15	M6 x 1.0 THRU	36.53	55.58	40.00	59.4	8.74	55.58	73.0	24.16	M6 x 1.0 THRU	23.9	6.4	76.20	57.15	8.89	8.33	112.73	8.33 Thru, CBoRe 13.5 x 8.6 Dp	16.66	109.93	1.57
M3SD20	M6 x 1.0 x 19 DP	50.01	67.77	54.4	80.26	12.70	87.33	100.1	34.93	8 x 1.25 THRU	23.9	10.4	76.2	57.15	9.53	9.53	133.4	9.93 Thru, CBoRe 16.0 x 10.4 Dp	15.85	—	4.1

DUAL 180° CARRIER

FOR B3BD ACTUATORS

DIMENSIONS B3BD SERIES ACTUATORS

REFERENCE CAD FILES: B3BD10, B3BD15, B3BD20



B3BD 10/15/20

Dimensions in inches

MODELS	A	B	C	D	E	F	G	H	J	K	L	M	N
B3BD10	6.78	2.739	5.158	3.266	1.547	2.341	4.38	1.784	3.250	1.531	3.062	.28	1.438
B3BD15	9.42	3.225	6.203	4.250	2.016	2.987	5.72	2.114	4.000	2.250	4.500	.38	2.250
B3BD20	9.33	3.877	7.598	5.297	2.594	3.171	6.25	2.766	5.375	3.000	6.000	.38	2.250

MODELS	P	R	S	T	U	V	W	SS
B3BD10	2.00	2.062	3.813	.252/.251 X .25	1/4-20	.47	0.52	.266 Thru, CBore .44 x .28 Dp
B3BD15	3.00	2.657	5.062	.252/.251 X .25	5/16-18	.59	0.66	.328 Thru, CBore .53 x .34 Dp
B3BD20	3.00	2.796	5.500	.252/.251 X .25	3/8-16	.66	0.63	.391 Thru, CBore .63 x .41 Dp

M3BD 10/15/20

Dimensions in millimeters

MODELS	A	B	C	D	E	F	G	H	J	K	L	M	N
M3BD10	172.2	69.5	131.0	82.9	39.2	59.4	111.2	45.3	82.5	38.8	77.7	7.1	36.5
M3BD15	239.2	81.9	157.5	107.9	50.4	75.8	145.2	53.6	101.6	57.1	114.3	9.6	57.1
M3BD20	236.9	98.4	192.9	134.5	65.8	80.5	158.7	70.2	136.5	76.2	152.4	9.6	57.15

MODELS	P	R	S	T	U	V	W	SS
M3BD10	50.8	52.3	96.8	6.4/6.3 X 6.4	1/4-20	11.9	13.2	7.76 Thru, CBore 11.2 x 7.1 Dp
M3BD15	76.2	67.49	128.57	6.4/6.3 X 6.4	5/16-18	15.0	16.8	8.33 Thru, CBore 13.5 x 8.6 Dp
M3BD20	76.2	71.02	139.70	6.40/6.38 x 6.4	3/8-16	16.8	16.0	9.93 Thru, CBore 16.0 x 10.4 Dp

Note: Before machining any parts listed in a Tol-O-Matic catalog, please contact your Tol-O-Matic representative to get the most current dimensional print for specifications.

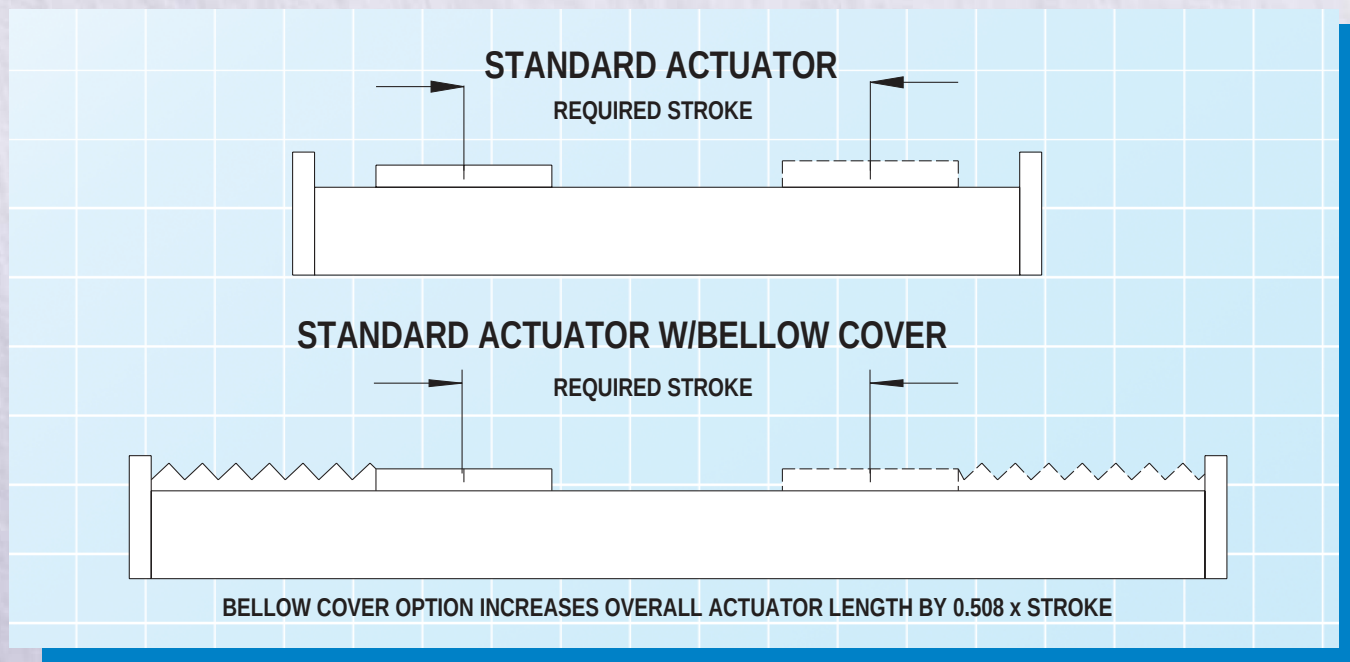
BELLOWS OPTION

TKS AND TKB ACTUATORS

A Bellows cover is available on all screw- and belt-drive TruTrack actuators to aid in protection from dust and dirt environments.



STROKE REQUIREMENTS BELLOWS



MAXIMUM AVAILABLE STROKE FOR BELLOWS OPTION

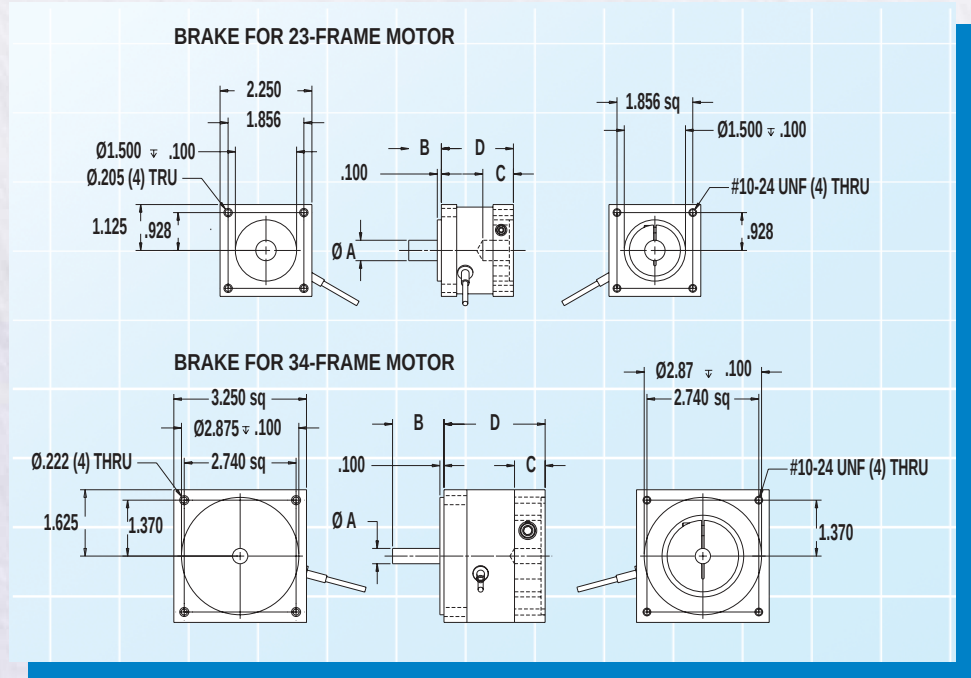
ACTUATOR TYPE	Dimensions in inches				Dimensions in millimeters			
	U.S. STANDARD				METRIC			
	TK10	TK25	TK50	TK75	TK10	TK25	TK50	TK75
Screw-driven (TKS) w/Ball Nut	24	44	56	64	610	1118	1422	1626
Screw-driven (TKS) w/Solid Nut	64	64	64	64	1626	1626	1626	1626
Belt-Driven (TKB)	64	64	64	64	1626	1626	1626	1626

BRAKE OPTION

TKS ACTUATORS

DIMENSIONS BRAKE OPTION

Tol-O-Matic offers a double C-face brake option* on TKS screw-drive actuators with inline motor mounting configurations only. For braking solutions on reverse-parallel mounting configurations, please contact Tol-O-Matic.



MOTOR TYPE AND SIZE	PART NUMBER	FRAME SIZE	INPUT/OUTPUT SHAFT DIA. "A"		OUTPUT SHAFT LENGTH "B"		MAX INPUT SHAFT LENGTH "C"		OVERALL LENGTH "D"		STATIC TORQUE		REFLECTED INERTIA		WEIGHT		VOLTAGE	CURRENT	RESISTANCE	CABLE LENGTH	
			inches	mm	inches	mm	inches	mm	inches	mm	in-lb	N-m	oz-sq/in	kg-sq/cm	lb	kg				in	mm
MRS231 / 232	3600-6285	23	.250	6.4	0.800	20.32	0.875	22.23	1.765	44.83	10	1.130	.20	1.08	1.06	.48	24	0.182	132.0	16.75	425
MRV21 / 22 / 23 / 24	3600-6286	23	.500	12.7	1.400	35.56	1.500	38.10	3.180	80.77	10	1.130	.20	1.08	1.06	.48	24	.182	132.0	16.75	425
MRS341 / 342 / 343	3600-6287	34	.375	9.5	1.260	32.00	1.375	34.93	2.478	62.94	25	2.825	1.74	9.52	2.88	1.31	24	.369	65.1	18.0	457
MRV31 / 32 / 33	3600-6288	34	.500	12.7	1.260	32.00	1.375	34.93	2.478	62.94	25	2.825	1.74	9.52	2.88	1.31	24	.369	65.1	18.0	457

*This brake can be used with other Tol-O-Matic systems. Consult the factory for availability.

MAXIMUM BRAKE HOLDING LOADS

LEADSCREW/NUT REDUCTION	23 FRAME BRAKE						34 FRAME BRAKE					
	INLINE		5.5:1		10:1		INLINE		5.5:1		10:1	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
BN01	70	31.7	452	205.0	821	372.3	175	79.3	1129	512.1	2053	931.2
SN01	105	47.6	300	136.0	300	136.0	262	118.8	300	136.0	300	136.0
BN02 (TK25,50,75)	140	63.5	903	409.5	1643	745.2	349	158.3	2259	1024.6	4107	1862.8
SN02	180	81.6	180	81.6	180	81.6	180	81.6	180	81.6	180	81.6
BN04	NA	NA	NA	NA	NA	NA	698	316.6	4517	2048.8	8213	3725.3
SN04	NA	NA	NA	NA	NA	NA	419	190.0	419	190.0	419	190.0
BN05 (TK25)	349	158.3	2259	1024.6	4008	1817.9	873	395.9	4008	1817.9	4008	1817.9
BN05 (TK50)	349	158.3	2259	1024.6	4107	1862.8	873	395.9	5647	2561.4	10055	4560.8
BN08	559	253.5	1874	850.0	1874	850.0	NA	NA	NA	NA	NA	NA

Double C-face brakes are used for static holding (back driving prevention) and are not designed for dynamic stopping. Please contact Tol-O-Matic if your application requires dynamic stopping.

Toll Free (U.S. and Canada)
1-800-328-2174
 763-478-8000 FAX: 763-478-8080
 or visit our website at
WWW.TOLOMATIC.COM

TUBE SUPPORTS

BCS AND B3S ACTUATORS

Designed to fit into dovetail grooves running the entire length of the cylinder tube, these black-anodized aluminum brackets are available for intermediate support of the actuator body.

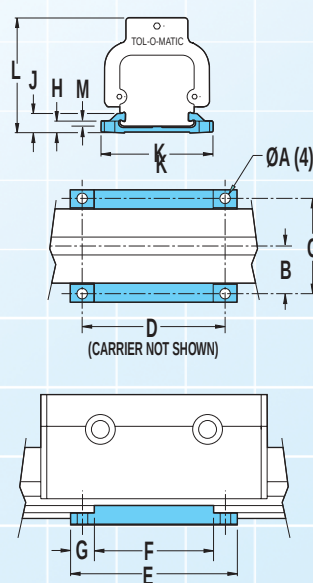


The number of tube support brackets required and their placement depends on the overall length of the cylinder and the load weight being moved and supported (see actuator product pages for specific information).

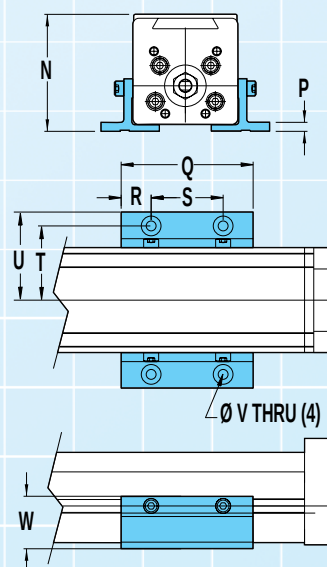
Tube support brackets for BCS actuators must be ordered with the cylinder, as they are mounted to the unit during assembly. Some Axidyne actuators require mounting plates to provide proper clearance for motor mounting. See page 59.

DIMENSIONS

BCS SERIES



B3S/B3B SERIES



FOR DUAL 180° TUBE SUPPORT DIMENSIONS SEE PAGE 53

BCS Series

Dimensions in inches

BODY SIZE	PART NO.	(METRIC)	A	B	C	D	E	F	G	H	J	K	L	M
10	4510-1010	4410-9006	0.22	1.00	2.00	3.00	3.50	2.50	0.50	0.25	0.41	2.36	2.43	0.14
15	4515-1010	4415-9006	0.27	1.50	3.00	4.50	5.00	4.00	0.50	0.31	0.70	3.50	3.62	0.24
20	4520-1010	4420-9006	0.41	1.88	3.75	5.75	6.38	5.00	0.69	0.38	0.87	4.44	4.53	0.15

B3S AND B3B Series

Dimensions in inches

BODY SIZE	PART NO.	(METRIC)	N	N*	P	Q	R	S	T	U	V	W
10	3410-9006	4410-9006	2.438	3.27	.188	2.75	.25	2.250	1.53	1.76	.206	1.09
15	3415-9006	4415-9006	3.624	4.26	.188	3.75	.38	3.000	1.97	2.19	.266	1.16
20	3420-9006	4420-9006	4.53	4.72	.188	4.00	.31	3.375	2.56	2.84	.328	1.50

* B3B BELT STYLE

NOTE: a shim may be required on a B3B10, see page 48 dimension "EE"

FLOATING MOUNT BRACKET

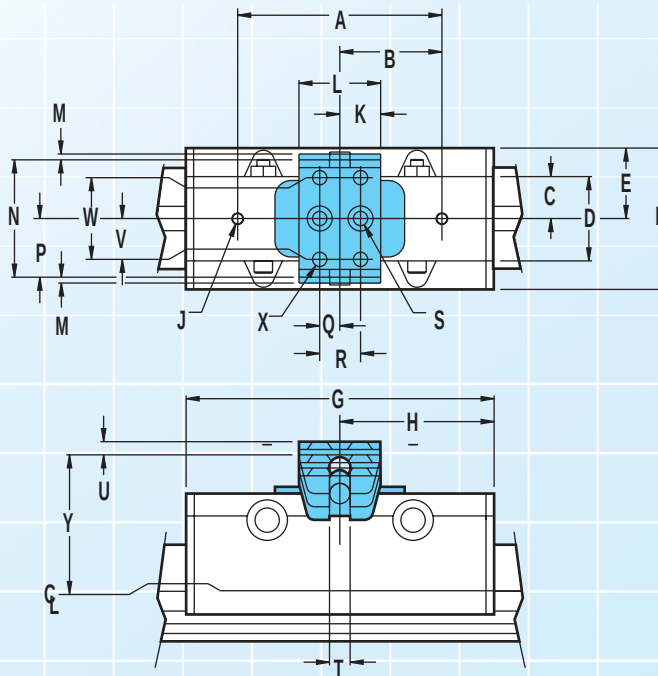
FOR BCS ACTUATORS

Available on BCS screw-drive actuators, floating mount brackets should be used independently-guided loads to eliminate actuator binding. Use of the floating mount bracket option adds .014" (0.36 mm) to backlash.



These bracket kits compensate for non-parallelism between the actuator and an external support/guidance system.

DIMENSIONS



BCS Series

Dimensions in inches

MODELS	PART NO.	(METRIC)	A	B	C	D	E	F	G	H	J	K	L	M
B(M)CS10	0510-9007	4510-9007	3.15	1.57	0.65	1.30	1.09	2.18	4.75	2.37	#10-32	0.63	1.26	0.13
B(M)CS15	0515-9007	4515-9007	4.25	2.12	0.90	1.80	1.75	3.50	5.85	2.92	5/16"-18	1.77	3.54	0.27
B(M)CS20	0520-9007	4520-9007	5.00	2.50	1.16	2.31	2.22	4.44	7.37	3.68	3/8"-16	1.97	3.94	0.28

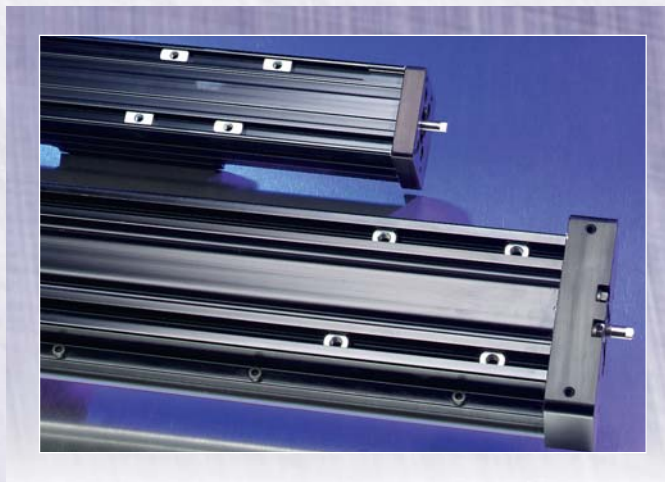
MODELS	PART NO.	(METRIC)	N	P	Q	R	S	T	U	V	W	X	Y
B(M)CS10	0510-9007	4510-9007	1.81	0.90	0.31	0.62	0.22	0.31	0.15	—	—	—	1.99
B(M)CS15	0515-9007	4515-9007	2.95	1.48	1.48	2.95	—	0.44	0.23	1.08	2.17	0.28	2.95
B(M)CS20	0520-9007	4520-9007	3.24	1.63	1.58	3.15	0.34	0.63	0.25	—	—	—	3.77

NOTE DIMENSIONS ARE THE SAME FOR METRIC AND STANDARD.

STANDARD MOUNTING AND MOUNTING PLATES

Standard Mounting Configurations

Axidyne actuators can be base mounted with standard mounting holes provided or by using base mounting plates.

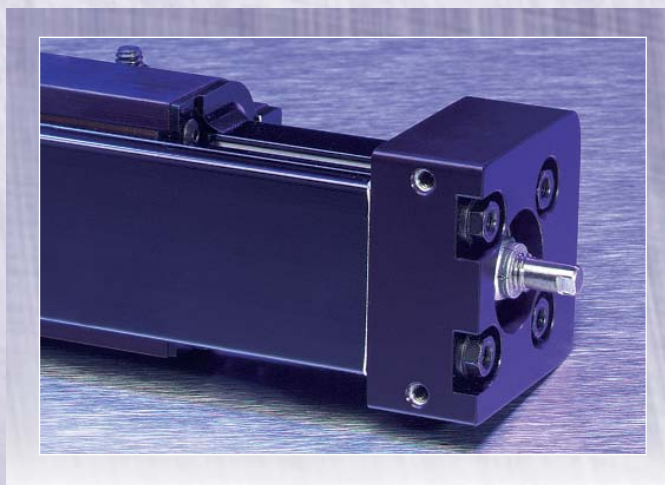


“T-Slot” Nuts

All SLS, B3S and B3B actuators are provided with T-nuts in the base of the cylinder body.

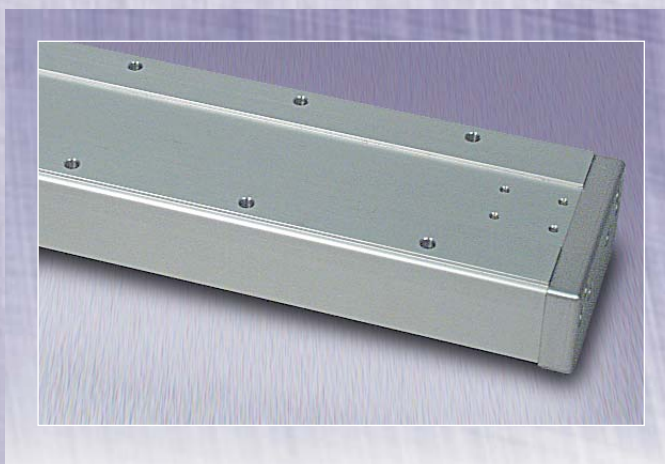
Four T-nuts for the first 24 inches of stroke are standard. Two nuts are provided for each additional 20 inches of stroke.

NOTE: SLS10 tube and work table accept 1/4" threaded square nuts. MLS10 tube and work table accept M6 threaded square nuts.



Tapped mounting holes

All BCS actuators are provided with mounting holes on the underside of the cylinder heads. To mount, transfer location of holes to the receiving surface. Drill mounting holes 1/32" larger than diameter of the mounting screws and attach securely with appropriate screws.

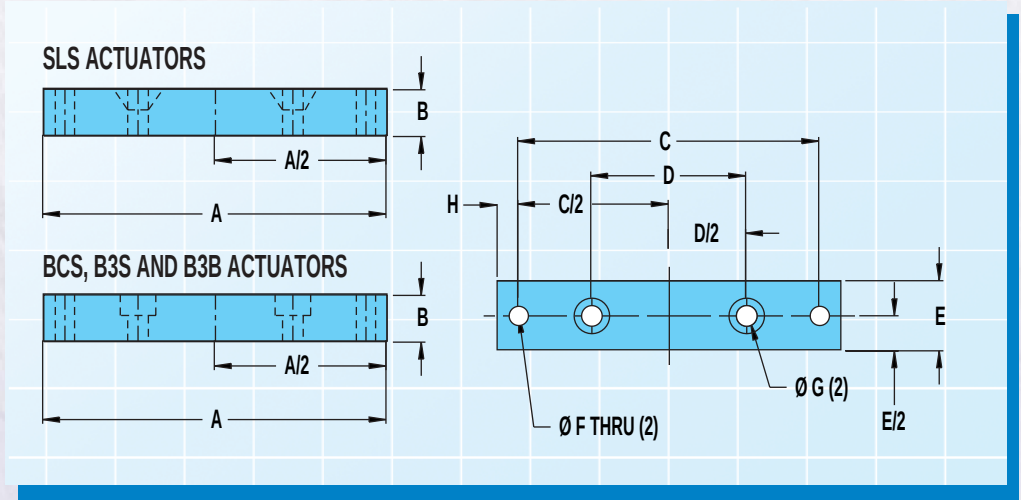


All TruTrack actuators have mounting holes spaced the length of the actuator for mounting directly to a flat surface.

Mounting Plates

Mounting Plates provide clearance height for motors and motor mounts when mounting an actuator on a flush surface. Designed to mount to either tapped mounting holes on cylinder heads or to T-Nuts, these plates provide the means for top mounting access. Kits include plates and mounting screws.

DIMENSIONS



SLS, BCS, B3S and B3B Series

Dimensions in inches

MODELS	PART NO.	A	B	C	D	E	F	G	H
SLS10	0610-9010	5.50	0.25	5.00	2.375	0.75	Ø 0.25	Ø.270 THRU, C'SINK Ø.531 X 82°	0.25
SLS10	0610-9045	5.50	0.50	5.00	2.375	0.75	Ø 0.281	Ø.281 THRU, C'BORE Ø.44 X .28 DP	0.25
BCS10	0910-9133	3.75	1.00	2.940	1.750	0.75	Ø .22 (2)	Ø.22 THRU, C'BORE Ø.38 X .22 DP	0.41
BCS15	0915-9135	4.37	0.50	3.675	2.500	1.25	Ø.28 (2)	Ø.28 THRU, C'BORE Ø.43 X .28 DP	0.35
BCS20	0920-9038	5.25	1.00	4.550	3.125	0.35	Ø.28 (2)	Ø.28 THRU, C'BORE Ø.43 X .22 DP	0.35
B3S(B)10	3410-9056	3.52	0.50	3.060	1.656	.750	.206	Ø.221 THRU, C'BORE Ø.38 X .22 DP	.023
B3S(B)10	3410-9057	3.52	1.00	3.060	1.656	.750	.206	Ø.221 THRU, C'BORE Ø.38 X .22 DP	0.23
B3S(B)15	3415-9056	4.380	0.50	3.942	2.188	.750	.266	Ø.281 THRU, C'BORE Ø.44 X .22 DP	0.22
B3S(B)15	3415-9057	4.380	1.00	3.942	2.188	.750	.266	Ø.281 THRU, C'BORE Ø.44 X .22 DP	0.22
B3S(B)20	3420-9056	5.688	.50	5.125	2.938	.750	.328	Ø.344 THRU, C'BORE Ø.53 X .34 DP	0.28

MOUNTING KIT/MOTOR COMPATIBILITY

MODELS	PART NO.	BRUSHED DC MOTORS	STEPPER MOTORS	BRUSHLESS SERVO
SLS10	0610-9045	MRB 231, 232	MRS 231, 232	—
• SLS10	0610-9066	—	—	MRV 231, 232, 233, 234
• SLS10	0610-9067	MRB 341, 342, 343	MRS 341, 342, 343	MRV 341, 342, 343
• BCS10	0910-9133	MRB 231, 232, 341, 342, 343	MRS all frame sizes	MRV all frame sizes
• BCS10	0510-9126	—	—	MRV 231, 232, 233, 234
BCS15	0915-9135	MRB all frame sizes	MRS 341, 342, 343	MRV all frame sizes
BCS20	0920-9038	MRB 341, 342, 343, 401, 402	MRS 341, 342, 343	MRV 341, 342, 343
B3S10	3410-9056	MRB 231, 232	MRS 231, 232	MRV 231, 232, 233, 234
B3S10	3410-9057	MRB 341, 342, 343	MRS 341, 342, 343	MRV all frame sizes
B3S15	3415-9056	MRB 231, 232	MRS 231, 232	MRV 231, 232, 233, 234
B3S15	3415-9057	MRB 341, 342, 343, 401, 402	MRS 341, 342, 343	MRV 341, 342, 343
B3S20	3420-9056	MRB all frame sizes	MRS all frame sizes	MRV all frame sizes
B3B10	3410-9056	MRB all frame sizes	MRS all frame sizes	MRV all frame sizes
B3B15	3415-9056	MRB all frame sizes	MRS all frame sizes	MRV all frame sizes
B3B20	3420-9056	MRB all frame sizes	MRS all frame sizes	MRV all frame sizes

• Kit includes 2 plates + FSTNRS (fasteners)

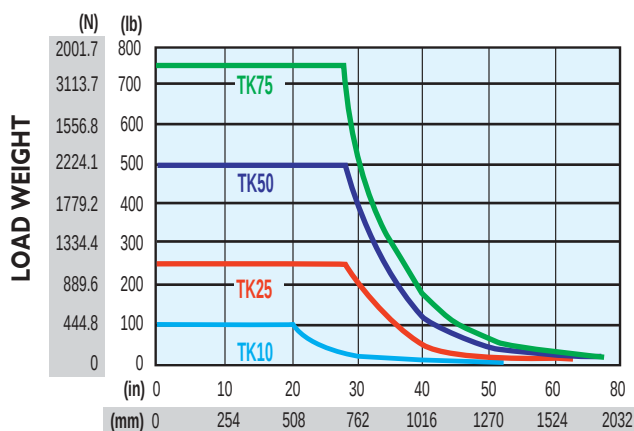
MOUNTING PLATES

FOR TKS AND TKB ACTUATORS



Mounting Plates provide clearance height for motors and motor mounts when mounting an actuator on a flush surface. They are recommended on all TruTrack actuators to prevent actuator body deflections over .015 in (3.8 mm). Refer to the Mounting Plate Requirement chart below to determine the appropriate quantity for the actuator stroke.

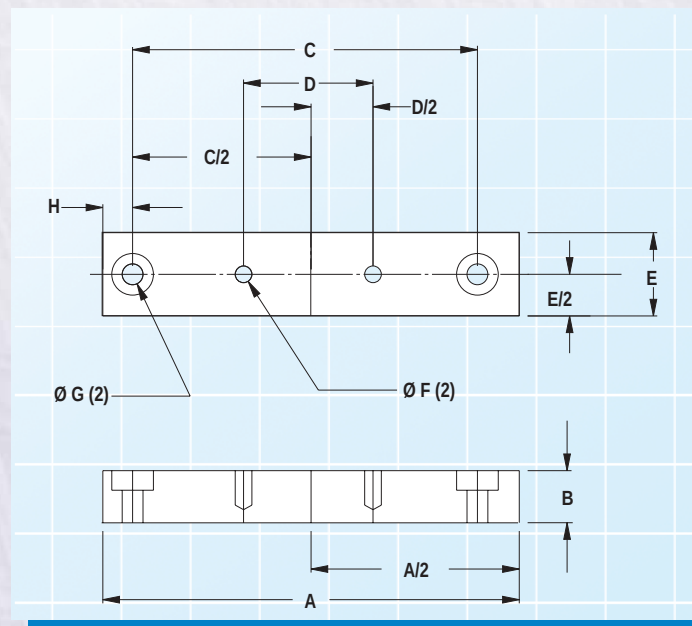
MOUNTING PLATE REQUIREMENTS



MAX DISTANCE BETWEEN PLATES

Actuator body theoretical axial deflection will not exceed .015 in (0.38 mm)

DIMENSIONS MOUNTING PLATES



Dimensions in inches

MODELS	PART NO.*	A	B	C	D	E
TKS(B)10	0601-9803	4.00	0.75	3.500	2.330	0.75
TKS(B)25	0602-9803	5.75	0.88	5.125	3.580	1.00
TKS(B)50	0603-9803	7.00	0.63	6.250	2.270	1.00
TKS(B)75	0604-9803	8.00	0.50	7.000	2.939	1.00

MODELS	PART NO.*	F	G	H
TKS(B)10	0601-9803	M4 x .7 x .31 DP	Ø.19 THRU, C'BORE Ø.31x.17 DP	0.250
TKS(B)25	0602-9803	M6 x1 x .50 DP	Ø.26 THRU, C'BORE Ø.44x.28 DP	0.313
TKS(B)50	0603-9803	M6 x1 x .50 DP	Ø.26 THRU, C'BORE Ø.44x.28 DP	0.375
TKS(B)75	0604-9803	M6 x 1 x .31 DP	Ø.34 THRU, C'BORE Ø.53x.31 DP	0.500

Dimensions in millimeters

MODELS	PART NO.*	A	B	C	D	E
TKS(B)10	0601-9803	101.6	19.0	88.9	59.1	19.0
TKS(B)25	0602-9803	146.0	22.3	130.1	90.9	25.4
TKS(B)50	0603-9803	177.8	16.0	160.3	57.6	25.4
TKS(B)75	0604-9803	203.2	12.7	177.8	74.6	25.4

MODELS	PART NO.*	F	G	H
TKS(B)10	0601-9803	M4 x .7 x 7.8 DP	Ø4.8 THRU, C'BORE Ø7.8 x 4.3 DP	6.3
TKS(B)25	0602-9803	M6 x1 x 12.7 DP	Ø6.6 THRU, C'BORE Ø11.1x7.1DP	7.8
TKS(B)50	0603-9803	M6 x1 x 12.7 DP	Ø6.6 THRU, C'BORE Ø11.1x7.1DP	9.5
TKS(B)75	0604-9803	M6 x 1 x 7.8 DP	Ø8.6 THRU, C'BORE Ø13.4x7.8 DP	12.7

* Includes plate and mounting hardware.

ROD SCREW ACTUATORS



Axidyne Rod Screw Actuator (RSA) is designed to be used in applications where the load is externally guided and supported.

RSA/RSM Actuators

Mounting flexibility allows use in a variety of applications requiring high thrust, variable speed, programmability and long life. Available in six body sizes.

U.S. STANDARD/METRIC LEADSCREWS

MODEL AVAILABILITY AND LEADSCREW THRUST/SPEED CAPACITY

GSA/GSM, RSA/RSM CYLINDER-STYLE Model Number	Screw Dia. (in)	Screw Form	Pitch (turns per in.)	Pitch (in. per turn)	Nut Style	Low Backlash Nut
GSA/GSM, RSA/RSM 12 SN01	3/8	ACME	1	1.000	Plastic	-
GSA/GSM, RSA/RSM 12 SN02	3/8	ACME	2	.500	Plastic	-
GSA/GSM, RSA/RSM 12 SN05	3/8	ACME	5	.200	Plastic	-
GSA/GSM, RSA/RSM 12 BZ10	3/8	ACME	10	.100	Bronze	-
GSA/GSM, RSA/RSM 12 BN08	3/8	PREC	8	.125	Ball	-
GSA/GSM, RSA/RSM 12 BNL08	3/8	PREC	8	.125	Ball	✓
GSA/GSM, RSA/RSM 16 SN01	3/8	ACME	1	1.000	Plastic	-
GSA/GSM, RSA/RSM 16 SN02	3/8	ACME	2	.500	Plastic	-
GSA/GSM, RSA/RSM 16 SN05	3/8	ACME	5	.200	Plastic	-
GSA/GSM, RSA/RSM 16 BZ10	3/8	ACME	10	.100	Bronze	-
GSA/GSM, RSA/RSM 16 BN08	3/8	PREC	8	.125	Ball	-
GSA/GSM, RSA/RSM 16 BNL08	3/8	PREC	8	.125	Ball	✓
GSA/GSM, RSA/RSM 24 SN02	5/8	ACME	2	.500	Plastic	-
GSA/GSM, RSA/RSM 24 SN04	5/8	ACME	4	.250	Plastic	-
GSA/GSM, RSA/RSM 24 SN08	5/8	ACME	8	.125	Plastic	-
GSA/GSM, RSA/RSM 24 BZ10	5/8	ACME	10	.100	Bronze	-
GSA/GSM, RSA/RSM 24 BN05	5/8	PREC	5	.200	Ball	-
GSA/GSM, RSA/RSM 24 BNL05	5/8	PREC	5	.200	Ball	✓
GSA/GSM, RSA/RSM 32 SN01	3/4	ACME	1	1.000	Plastic	-
GSA/GSM, RSA/RSM 32 SN02	3/4	ACME	2	.500	Plastic	-
GSA/GSM, RSA/RSM 32 BZ10	3/4	ACME	10	.100	Bronze	-
GSA/GSM, RSA/RSM 32 BN02	3/4	PREC	2	.500	Ball	-
GSA/GSM, RSA/RSM 32 BN05	3/4	PREC	5	.200	Ball	-
GSA/GSM, RSA/RSM 32 BNL02	3/4	PREC	2	.500	Ball	✓
GSA/GSM, RSA/RSM 32 BNL05	3/4	PREC	5	.200	Ball	✓
RSA/RSM 50 SN04	1.0	ACME	4	.250	Plastic	-
RSA/RSM 50 BZ10	1.0	ACME	10	.100	Bronze	-
RSA/RSM 50 BN01	1.0	PREC	1	1.000	Ball	-
RSA/RSM 50 BNL01	1.0	PREC	1	1.000	Ball	✓
RSA/RSM 50 BN02	1.0	PREC	2	.500	Ball	-
RSA/RSM 50 BNL02	1.0	PREC	2	.500	Ball	✓
RSA/RSM 50 BN04	1.0	PREC	4	.250	Ball	-
RSA/RSM 50 BNL04	1.0	PREC	4	.250	Ball	✓
RSA/RSM 64 SN04	1-1/2	ACME	4	.250	Plastic	-
RSA/RSM 64 BZ10	1-1/2	ACME	10	.100	Bronze	-
RSA/RSM 64 BN53	1-1/2	PREC	.53	1.887	Ball	-
RSA/RSM 64 BNL53	1-1/2	PREC	.53	1.887	Ball	✓
RSA/RSM 64 BN02	1-1/2	PREC	2	.500	Ball	-
RSA/RSM 64 BNL02	1-1/2	PREC	2	.500	Ball	✓
RSA/RSM 64 BN04	1-1/2	PREC	4	.250	Ball	-
RSA/RSM 64 BNL04	1-1/2	PREC	4	.250	Ball	✓

ACME= Standard Rolled (Acme screw) PREC= Precision Rolled (Ball screw)

See page 185 for configurator code descriptions.

NOTE: All RSM and GSM series of metric actuators use the same leadscrew as U.S.

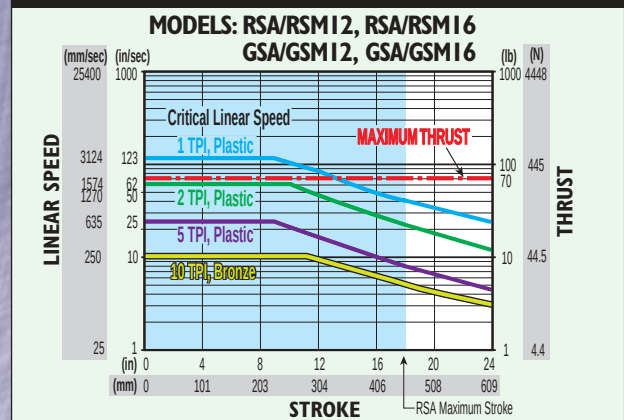
Standard RSA and GSA series actuators. Mounting threaded and dowel pin holes on RSM and GSM Series actuators are metric.

NUT	SOLID		BALL	
	Plastic	Bronze	Single	Low-Backlash
Backlash (in)	0.007	0.008	0.015	0.002
Backlash (mm)	0.18	0.20	0.38	0.05
Designation	SN	BZ	BN	BNL

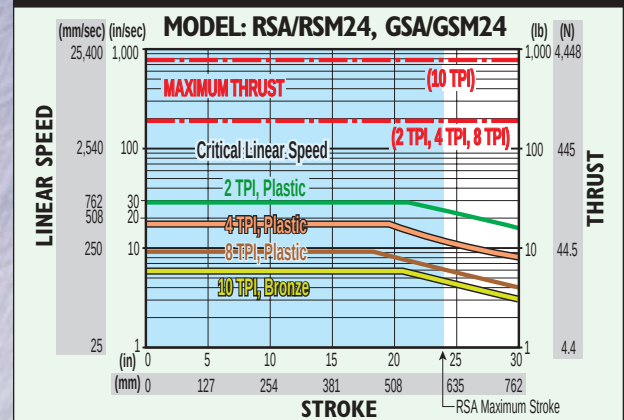
LEADSCREW THRUST / SPEED CAPACITIES

NOTE: Charts shown represent the thrust capacity of the screw/nut combinations used in indicated models, NOT thrust capacity limits of the actuator.

3/8" DIAMETER ACME SCREW*



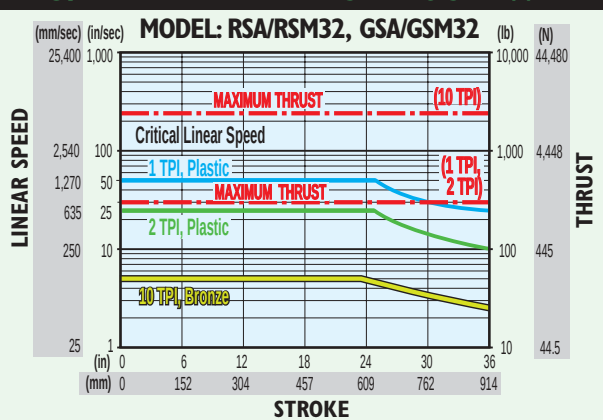
5/8" DIAMETER ACME SCREW*



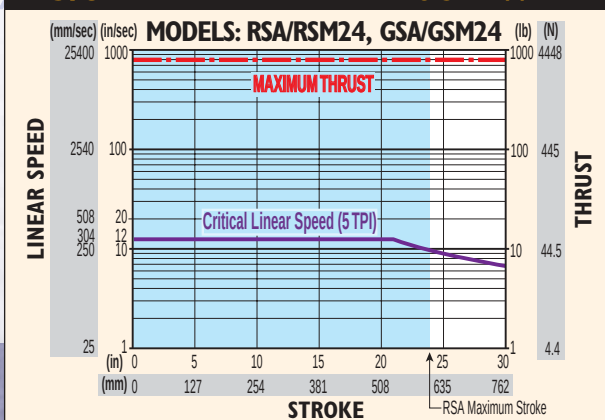
* For ACME Screws "Maximum Thrust" is the maximum continuous dynamic thrust subject to Thrust x Velocity limitation.

** For Ball Screws "Maximum Thrust" is the thrust for 90% reliability for 1,000,000 inches (25.4x106mm) of travel. See page 195 for complete sizing and selection limiting factors. For operation at less than rated thrust, see page 197 for life calculations of ball screw.

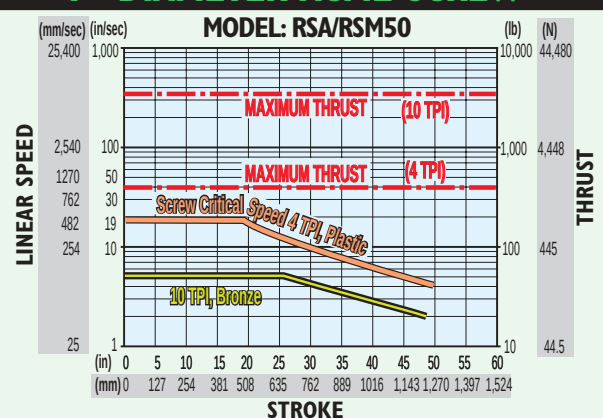
3/4" DIAMETER ACME SCREW*



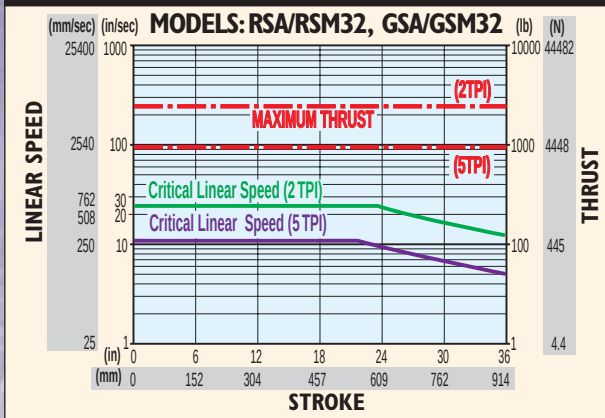
5/8" DIAMETER BALL SCREW**



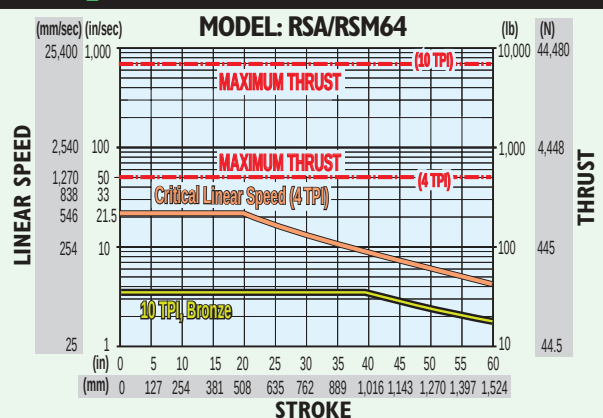
1" DIAMETER ACME SCREW*



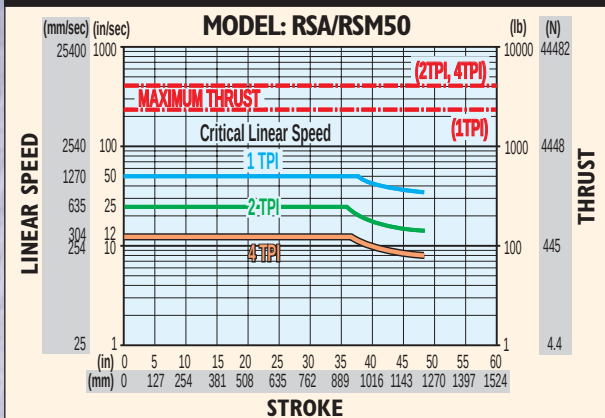
3/4" DIAMETER BALL SCREW**



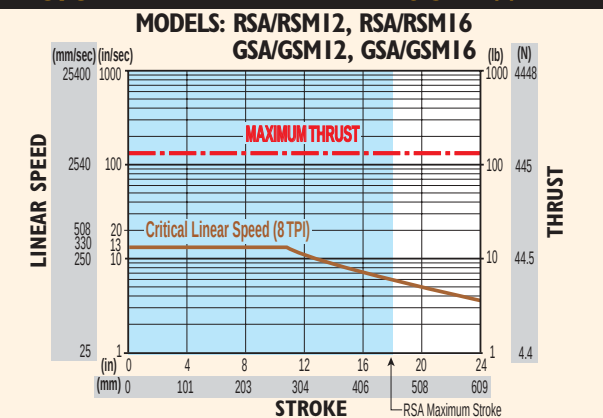
1 1/2" DIAMETER ACME SCREW*



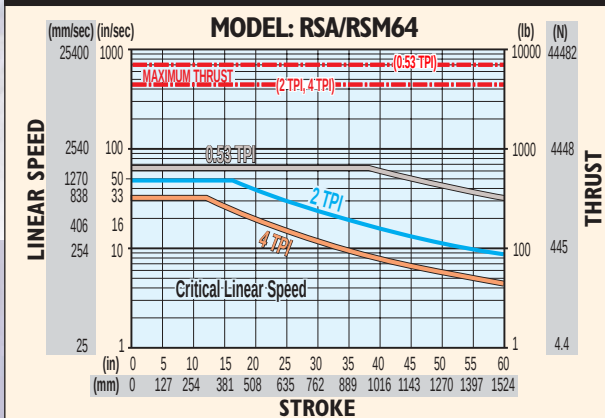
1" DIAMETER BALL SCREW**



3/8" DIAMETER BALL SCREW**



1 1/2" DIAMETER BALL SCREW**



RSA/RSM SERIES ROD SCREW ACTUATORS

SPECIFICATIONS



RSA/RSM SERIES

SPECIFICATION	U.S. STANDARD							METRIC						
	RSA12		RSA16	RSA24	RSA32	RSA50	RSA64	RSM12		RSM16	RSM24	RSM32	RSM50	RSM64
	17 frame	23 frame						17 frame	23 frame					
Max. Dynamic Thrust	125 lb	125 lb	125 lb	750 lb	2400 lb	3400 lb	4700 lb	556 N	556 N	556 N	3336 N	10,676 N	15,124 N	20,907 N
Weights														
In Line Base Model	1.73 lb	1.73 lb	3.73 lb	3.98 lb	6.11 lb	14.21 lb	23.01 lb	.78 kg	.78 kg	1.69 kg	1.80 kg	2.77 kg	6.44 kg	10.43 kg
Reverse Parallel Base Model	2.28 lb	2.42 lb	4.00 lb	5.68 lb	9.76 lb	20.10 lb	28.51 lb	1.03 kg	1.10 kg	1.81 kg	2.57 kg	4.42 kg	9.11 kg	12.93 kg
Weight per/in (mm) of stroke	.013 lb	.128 lb	.30 lb	.33 lb	.46 lb	.86 lb	1.38 lb	.0023 kg	.00229 kg	.00536 kg	.00589 kg	.00821 kg	.01536 kg	.02464 kg
Maximum Stroke	12 in	12 in	18 in	24 in	36 in	48 in	60 in	304 mm	304 mm	457 mm	609 mm	914 mm	1219 mm	1524 mm
Maximum Breakaway Torque (no side load)	20 oz-in	20 oz-in	25 oz-in	31 oz-in	34 oz-in	41 oz-in	48 oz-in	.141 N-m	.141 N-m	.177 N-m	.218 N-m	.240 N-m	.289 N-m	.338 N-m
Dead Length (dimension J)														
In Line Base Model/ACME Nut	3.50 in	3.50 in	3.72 in	5.25 in	6.87 in	8.56 in	12.14 in	88.9 mm	88.9 mm	94.5 mm	133.3 mm	174.4 mm	217.4 mm	308.3 mm
In Line Base Model/Ball Nut	3.50 in	3.50 in	3.72 in	5.71 in	8.05 in	9.56 in	14.07 in	88.9 mm	88.9 mm	94.5 mm	145.0 mm	204.4 mm	242.8 mm	357.3 mm
Reverse Parallel Base Model/ACME Nut	4.44 in	4.72 in	4.78 in	6.09 in	8.27 in	10.03 in	13.65 in	112.8 mm	119.9 mm	121.4 mm	154.6 mm	210.0 mm	254.7 mm	346.7 mm
Reverse Parallel Base Model/Ball Nut	4.44 in	4.72 in	4.78 in	6.55 in	9.45 in	11.21 in	15.58 in	112.8 mm	119.9 mm	121.4 mm	166.3 mm	240.0 mm	284.7 mm	395.7 mm

OPERATION TEMPERATURE RANGE

RSA/RSM series actuators should be used in temperatures from **40° to 130°F** (4° to 54°C). Please contact Tol-O-Matic for applications with temperatures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.

SIDE LOADING CONSIDERATIONS:

Rod screw actuators are designed to push guided and supported loads and are not meant for applications that require substantial side loading. Please contact the factory for details regarding side loading capabilities.

LARGE FRAME MOTORS & SMALL ACTUATORS

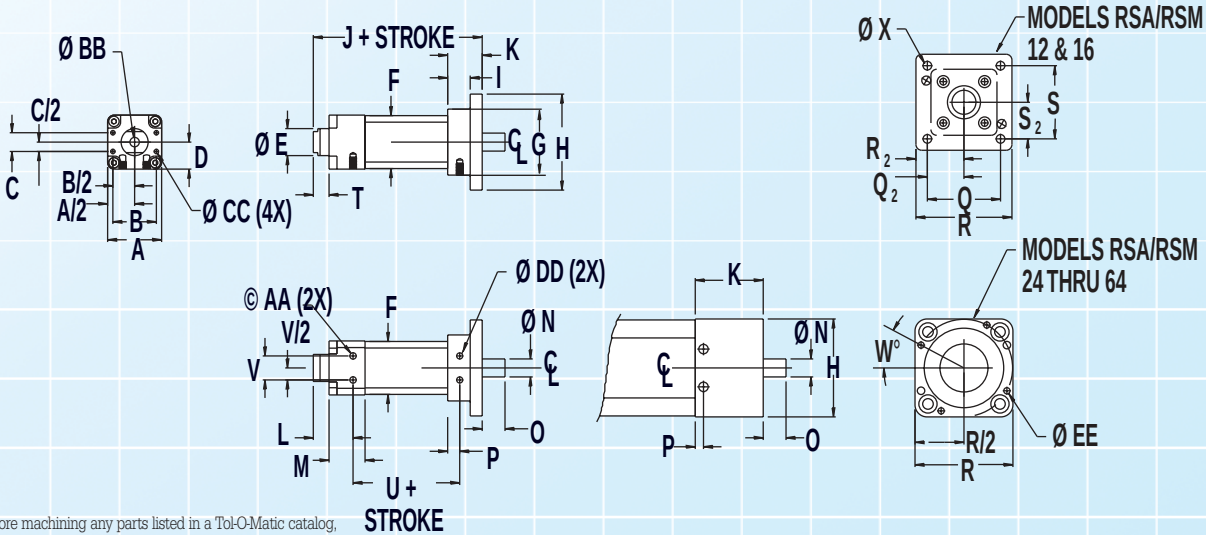
Cantilevered motors need to be supported, if subjected to continuous rapid reversing duty and/or under dynamic conditions.

RSA/RSM SERIES ROD SCREW ACTUATORS

DIMENSIONS

DIMENSIONS IN LINE BASE MODEL

REFERENCE CAD FILES: RSA12LMI, RSA16LMI, RSA24LMI, RSA32LMI, RSA50LMI, RSA64LMI



Note: Before machining any parts listed in a Tol-O-Matic catalog, please contact your Tol-O-Matic representative to get the most current dimensional print for specifications.

RSA Series

Dimensions in inches

MODELS	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	V	AA	BB
RSA12	1.125	.391	.906	.563	.56	1.10	*	*	.469	.716	.810	.750	.188	*	.200	1.22	*	*	.31	.50	8-32 UNC x .25	1/4-28 UNF x .75
RSA16	1.376	1.063	.500	.688	.69	1.31	1.375	2.000	.469	.719	1.065	.969	.188	.610	.200	1.52	2.00	1.52	.44	.50	8-32 UNC x .25	5/16-18 UNF x .56
RSA24	2.040	1.603	.875	1.020	1.18	2.00	2.040	2.040	1.416	1.416	1.080	1.359	.315	.550	.171	-	2.04	1.50	.40	.78	1/4-20 UNC x .33	7/16-20 UNF x 1.00
RSA32	2.580	1.969	1.181	1.180	1.25	2.50	2.580	2.580	1.789	1.789	1.457	1.875	.394	.688	.255	-	2.58	2.00	.52	.95	5/16-18 UNC x .47	7/16-20 UNF x 1.00
RSA50	3.705	3.000	1.958	1.853	1.75	3.63	3.705	3.705	2.127	2.127	1.940	2.500	.500	1.360	.293	-	3.70	3.00	.69	1.18	3/8-16 UNC x .75	3/4-16 UNF x 1.50
RSA64	4.580	3.500	1.968	2.290	2.25	4.50	4.580	4.580	3.470	3.470	2.378	3.375	.750	1.360	.401	-	4.50	3.50	.69	1.97	7/16-14 UNC x .88	3/4-16 UNF x 1.50

MODELS	CC	DD	EE**	W°	X
RSA12	5-40 UNC x .50	8-32 UNC x .25	M4-7 x 6.3	NA	Ø141
RSA16	8-32 UNC x .50	8-32 UNC x .25	M4-7 x 6.3	NA	Ø180
RSA24	10-24 UNC x .79	1/4-20 UNC x .44	M4 x 14.2 Dp, @51.46 B.C.	28°	—
RSA32	1/4-20 UNC x .70	5/16-18 UNC x .47	M5-8 x 12.7 Dp, @63.20 B.C.	30°	—
RSA50	5/16-18 UNC x 1.0	3/8-16 UNC x .68	M5-8 x 12.7 Dp, @76.45 B.C.	75°	—
RSA64	7/16-14 UNC x 1.5	7/16-17 UNC x .90	M5-8 x 12.7 Dp, @76.45 B.C.	75°	—

**Thread available in metric only

MODELS	ACME NUT		BALL NUT	
	U	J	U	J
RSA12	2.17	3.499	2.17	3.499
RSA16	2.184	3.718	2.184	3.718
RSA24	2.901	5.225	3.361	5.685
RSA32	3.872	6.864	5.052	8.044
RSA50	4.783	8.557	5.783	9.557
RSA64	6.938	12.392	8.938	14.392

* RSA12 ONLY						
MOTOR	G	H	O	Q	R	S
17 FRAME	1.125	1.656	.603	1.313	1.65	1.313
23 FRAME	1.375	2.000	.609	1.525	2.00	1.525

RSM Series

Dimensions in millimeters

MODELS	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	V	AA	BB
RSM12	28.58	9.93	23.01	14.30	14.22	27.94	*	*	11.91	18.19	20.57	19.05	4.78	*	5.08	*	*	*	7.9	12.7	M4-7 X 6.3	M6-1.0 X 19
RSM16	34.95	27.00	12.70	17.48	17.53	33.27	34.93	50.80	11.91	18.26	27.05	24.61	4.78	15.49	5.08	38.74	50.8	38.74	11.2	12.7	M4-7 X 6.3	M8-1.125 X 14.2
RSM24	51.82	40.72	22.23	25.91	29.97	50.80	51.82	51.82	35.97	35.97	27.43	34.52	8.00	13.97	4.34	-	19.98	38.1	10.1	19.8	M6-1 X 8.6	M10-1.250 X 25.0
RSM32	65.53	50.01	30.00	29.97	31.75	63.50	65.53	65.53	45.44	45.44	37.01	47.63	10.01	17.48	6.48	-	24.13	50.8	13.2	24.1	M8-1.12 X 12.0	M16-1.500 X 29.0
RSM50	94.11	76.20	49.73	47.07	44.45	92.20	94.11	94.11	54.03	54.03	49.28	63.50	12.70	34.54	7.44	-	29.97	76.2	17.5	30.0	M10-1.5 X 19.0	M20-1.500 X 38.0
RSM64	116.33	88.90	49.99	58.17	57.15	114.30	116.33	116.33	88.14	88.14	60.40	85.73	19.05	34.54	10.19	-	50.83	88.9	17.5	50.0	M12-1.75 X 22.2	M27-2.00 X 38.0

MODELS	CC	DD	EE	W°	X
RSM12	M3-5 X 12.7	M4-7 X 6.3	M4-7 X 6.3	N/A	Ø3.58
RSM16	M4-7 X 12.7	M4-7 X 6.3	M4-7 X 6.3	N/A	Ø4.57
RSM24	M5-8 X 20.0	M6-1 X 11.2	M4-7 X 14.2 Dp, @51.46 B.C.	28°	—
RSM32	M6-1 X 18.0	M8-1.25 X 12.0	M5-8 X 12.7 Dp, @63.20 B.C.	30°	—
RSM50	M8-1.25 X 25.4	M10-1.5 X 17.5	M5-8 X 12.7 Dp, @76.45 B.C.	75°	—
RSM64	M12-1.75 X 38.1	M12-1.75 X 22.9	M5-8 X 12.7 Dp, @76.45 B.C.	75°	—

MODELS	ACME NUT		BALL NUT	
	U	J	U	J
RSM12	55.12	88.87	55.12	88.87
RSM16	55.47	94.44	55.47	94.44
RSM24	73.69	132.72	85.37	144.44
RSM32	98.35	174.35	128.32	204.32
RSM50	121.49	217.35	146.89	242.75
RSM64	176.23	314.8	227.03	365.5

* RSA12 ONLY						
MOTOR	G	H	O	Q	R	S
17 FRAME	28.5	42.0	15.32	33.35	41.95	33.35
23 FRAME	34.9	50.8	15.47	38.74	50.80	38.74

RSA DIMENSIONS

REFERENCE CAD FILES: RSA12RP, RSA16RP, RSA24RP, RSA32RP, RSA50RP, RSA64RP

REFERENCE CAD FILES: RSA12RP, RSA16RP, RSA24RP, RSA32RP, RSA50RP, RSA64RP



MODEL		A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	V	W	AA	BB
RSA12	1.13	.391	.91	.56	.56	1.10	.31	*	*	*	*	*	*	1.016	.109	—	.500	.81	.75	.250	.391	8 - 32 UNC x .25	1/4 - 28 UNF x 0.75	
RSA16	1.38	1.063	.50	.69	.69	1.31	.44	1.781	1.406	3.774	1.47	1.344	2.250	1.141	.235	—	.500	1.07	.97	.250	.391	8 - 32 UNC x .25	5/16 - 24 UNF x 0.56	
RSA24	2.04	1.603	.87	1.02	1.18	2.00	.40	2.255	1.139	4.972	2.06	2.097	2.367	1.447	.573	—	.787	1.08	1.35	.173	1.603	1/4 - 20 UNC x .33	7/16 - 20 UNF x 1.00	
RSA32	2.58	1.969	1.18	1.29	1.25	2.50	.52	3.187	1.723	5.993	2.68	2.740	2.710	1.841	.659	2.74	.950	1.46	1.87	.255	1.969	5/16 - 18 UNC x .47	7/16 - 20 UNF x 1.00	
RSA50	3.70	3.000	1.96	1.85	1.75	3.63	.69	3.595	1.861	7.895	3.74	3.808	3.808	2.837	.868	3.81	1.180	1.94	2.50	.293	3.000	3/8 - 16 UNC x .75	3/4 - 16 UNF x 1.50	
RSA64	4.58	3.500	1.96	2.29	2.25	4.50	.69	4.753	2.350	8.908	4.84	4.734	4.734	3.234	1.266	4.73	1.970	2.35	3.37	.401	3.500	7/16 - 14 UNC x .88	1 - 14 UNF x 1.50	

MODEL	CC	DD	EE
RSA12	5 - 40 UNC x 0.50	8 - 32 UNC x .25	5 - 40 x .21
RSA16	8 - 32 UNC x 0.50	8 - 32 UNC x .25	5 - 40 x .21
RSA24	10 - 24 UNC x 0.79	1/4 - 20 UNC x .44	10 - 24 x .21
RSA32	1/4 - 20 UNC x 0.70	5/16 - 18 UNC x .47	1/4 - 20 x .31
RSA50	5/16 - 18 UNC x 1.0	3/8 - 16 UNC x .68	5/16 - 18 x .40
RSA64	7/16 - 14 UNC x 1.5	7/16 - 14 UNC x .90	7/16 - 14 x .50

MODEL	ACME NUT		BALL NUT	
	U	J	U	J
RSA12	*	*	*	*
RSA16	2.184	4.780	2.184	4.780
RSA24	2.902	6.064	3.362	6.524
RSA32	3.873	8.262	5.053	9.442
RSA50	4.783	10.025	5.783	11.025
RSA64	6.938	13.648	8.938	15.648

Dimensions in millimeters

RSM Series																							Dimensions in millimeters	
MODEL	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	V	W	AA	BB	
RSM12	28.70	9.93	23.01	14.20	14.20	27.90	7.90	*	*	*	*	*	*	25.81	2.77	—	12.70	20.60	19.00	6.35	9.93	M4 - 7 x 6.3	M6 - 1.0 x 19	
RSM16	35.10	27.00	12.70	17.50	17.50	33.30	11.20	45.24	35.71	95.86	37.30	34.14	57.15	28.98	5.97	—	12.70	27.20	24.60	6.35	9.93	M4 - 7 x 6.3	M8 - 1.125 x 14.2	
RSM24	51.80	40.72	22.00	25.90	30.00	50.80	10.20	57.28	28.93	126.29	52.30	53.26	60.12	36.75	14.55	—	19.98	27.40	34.50	4.39	40.72	M6 - 1 x 8.6	M10 - 1.250 x 25.0	
RSM32	65.50	50.01	29.90	32.70	31.70	63.50	13.20	80.95	43.76	152.22	68.10	69.59	68.83	46.76	16.74	69.80	24.13	37.08	47.60	6.48	50.01	M8 - 1.12 x 12.0	M16 - 1.500 x 29.0	
RSM50	94.10	76.20	49.70	46.90	44.40	92.20	17.50	91.31	47.27	200.53	94.90	96.72	96.72	72.06	22.05	96.52	29.97	49.20	63.50	7.44	76.20	M10 - 1.5 x 19.0	M20 - 1.500 x 38.0	
RSM64	116.30	88.90	49.70	58.10	57.10	114.30	17.50	120.73	59.69	226.26	122.90	120.24	120.24	82.14	32.16	120.20	50.83	59.60	85.70	10.19	88.90	M12 - 1.75 x 22.2	M27 - 2.00 x 38.0	

MODEL	CC	DD	EE
RSM12	M3 - 5x 12.7	M4 - 7x 6.3	M3 - 5x 5.0
RSM16	M4 - 7x 12.7	M4 - 7x 6.3	M3 - 5x 5.0
RSM24	M5 - 8x 20.0	M6 - 1x 11.2	M5 - 8x 5.0
RSM32	M6 - 1x 18.0	M8 - 1.25x 12.0	M6 - 1x 8.0
RSM50	M8 - 1.25x 25.4	M10 - 1.5x 17.5	M8 - 1.25x 10.6
RSM64	M12 - 1.75x 38.1	M12 - 1.75x 22.9	M12 - 1.75x 12.0

MODEL	ACME NUT		BALL NUT	
	U	J	U	J
RSM12	*	*	*	*
RSM16	55.47	121.41	55.47	121.41
RSM24	73.71	154.03	85.39	165.71
RSM32	98.37	209.85	128.35	239.83
RSM50	121.49	254.64	146.89	280.04
RSM64	176.23	346.66	227.03	397.46

RSA/RSM ROD SCREW ACTUATOR OPTIONS

LMI IN LINE MODEL AVAILABLE OPTIONS

IN LINE MODEL OPTIONS	RSA12	RSA16	RSA24	RSA32	RSA50	RSA64	RSM12	RSM16	RSM24	RSM32	RSM50	RSA64
FM2 Foot Mounts	—	—	—	—	—	—	—	—	—	—	—	—
MP2 Mounting Plates	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
FFG Front Flange Mount	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
BFG Back Flange Mount	—	—	—	—	—	—	—	—	—	—	—	—
TRN Trunnion Mount	—	—	OP	OP	OP	OP	—	—	OP	OP	OP	OP
PCS Eye Mount	—	—	—	—	—	—	—	—	—	—	—	—
PCD Clevis Mount	—	—	—	—	—	—	—	—	—	—	—	—
MET External Threaded Rod End	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
SRE Spherical Rod Eye End	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
CLV Clevis Rod End	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
ALC Alignment Coupler Rod End	OP	OP	OP	OP	OP	OP	—	—	OP	OP	OP	OP
GH Gearhead Reduction	—	—	OP	OP	OP	OP	—	—	OP	OP	OP	OP
MRV Brushless Servo Motors	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	23, 34 & 56 Frame	34 and 56 Frame	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	23, 34 & 56 Frame	34 and 56 Frame
MRS Stepper Motors	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	34 Frame	34 Frame	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	34 Frame	34 Frame
MRB Brushed Dc Motors	23 Frame	23 Frame	23 Frame	23, 34 and 40 Frame	34 and 40 Frame	34 and 40 Frame	23 Frame	23 Frame	23 Frame	34 and 40 Frame	34 and 40 Frame	34 and 40 Frame
Switches (Hall-effect, dc Reed, ac Triac)	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP

— Not Available OP Optional

RP REVERSE PARALLEL MODEL AVAILABLE OPTIONS

REVERSE PARALLEL MODEL OPTIONS	RSA12	RSA16	RSA24	RSA32	RSA50	RSA64	RSM12	RSM16	RSM24	RSM32	RSM50	RSA64
RP1 1:1 Reduction	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
RP2 2:1 Reduction	—	—	OP	OP	OP	OP	—	—	OP	OP	OP	OP
FM2 Foot Mount	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
MP2 Mounting Plate	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
FFG Front Flange	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
BFG Back Flange	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
TRN Trunnion Mount	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
PCS Eye Mount	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
PCD Clevis Mount	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
MET External Threaded Rod End	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
SRE Spherical Rod Eye End	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
CLV Clevis Rod End	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
ALC Alignment Coupler Rod End	OP	OP	OP	OP	OP	OP	—	—	OP	OP	OP	OP
MRV Brushless Servo Motors	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	23, 34 & 56 Frame	34 & 56 Frame	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	23, 34 & 56 Frame	34 and 56 Frame
MRS Stepper Motors	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	34 Frame	34 Frame	17 and 23 Frame	23 Frame	23 Frame	23 and 34 Frame	34 Frame	34 Frame
MRB Brushed Dc Motors	23 Frame	23 Frame	23 Frame	23, 34 and 40 Frame	34 and 40 Frame	34 and 40 Frame	23 Frame	23 Frame	23 Frame	23, 34 and 40 Frame	34 and 40 Frame	34 and 40 Frame
Switches Hall-effect, dc Reed, ac Triac	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP

— Not Available OP Optional

FRONT FLANGE MOUNT OPTION

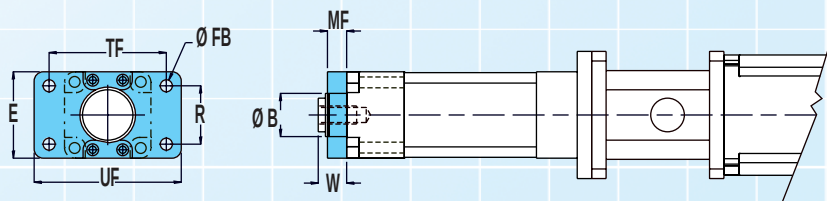
RSA AND RSM ACTUATORS

Seven different mounting options are available for Axidyne rod screw actuators, conforming to both ISO and NFPA industry standards



For applications where a bottom-tapped mounting is not an option, the front flange can be used to mount the actuator directly to framework or bulkhead. It can also be used in situations where bottom support mechanisms are not feasible.

DIMENSIONS FFG FRONT FLANGE (MF1)



RSA Series

Dimensions in inches

CYLINDER	KIT NUMBER	UF	E	TF	Ø FB	R	W	MF	Ø B
RSA12	1107-9013	2.00	1.12	1.50	0.15	0.50	0.31	0.25	0.56
RSA16	1112-9013	2.39	1.37	1.89	0.18	0.94	0.44	0.37	0.68
RSA24	1124-9022	3.37	2.00	2.750	0.31	1.43	0.40	0.37	1.18
RSA32	1132-9022	4.12	2.50	3.375	0.37	1.83	0.52	0.37	1.25
RSA50	1150-9022	5.50	3.75	4.687	0.43	2.75	0.69	0.62	1.75
RSA64	1164-9022	6.25	4.50	5.437	0.43	3.31	0.69	0.62	2.25

RSM Series

Dimensions in millimeters

CYLINDER	KIT NUMBER	UF	E	TF	Ø FB	R	W	MF	Ø B
RSM12	2107-9013	50.8	28.5	38.1	3.9	12	7.8	6.3	14
RSM16	2112-9013	60.7	34.7	48.0	4.5	24	11.1	9.3	17
RSM24	2124-9032	80.0	47.0	64.0	7.2	32	10.2	10	30
RSM32	2132-9042	113.0	65.0	90.0	9.2	45	13.2	12	40
RSM50	2150-9042	153.0	97.0	126.0	12.2	63	17.5	16	50
RSM64	2164-9022	186.0	111.0	150.0	14.2	75	17.5	16	65

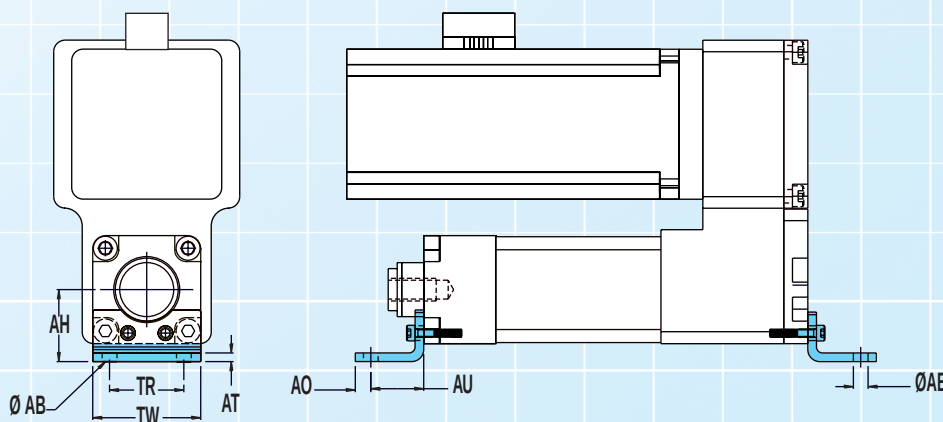
FOOT MOUNT MOUNTING OPTION

RSA AND RSM ACTUATORS

Foot mounts are an option on all body sizes of Axidyne rod screw actuators when an application requires the mounting to be other than flush.



DIMENSIONS FM2 FOOT MOUNT (MS1)



RSA Series

Dimensions in inches

CYLINDER	KIT NUMBER	AH	AT	TR (CRS)	Ø AB	AO	AU	TW
RSA12	1107-9010	.75	.09	.77	.15	.16	.55	1.12
RSA16	1112-9010	.77	.09	.77	.19	.16	.55	1.34
RSA24	1124-9020	1.18	.12	1.25	.31	.37	1.00	2.04
RSA32	1132-9020	1.43	.12	1.75	.38	.37	1.00	2.58
RSA50	1150-9020	1.93	.12	2.75	.44	.50	1.25	3.70
RSA64	1164-9020	2.25	.12	3.50	.44	.50	1.25	4.58

RSM Series

Dimensions in millimeters

CYLINDER	KIT NUMBER	AH	AT	TR (CRS)	Ø AB	AO	AU	TW
RSM12	2107-9009	19.0	2.2	19.5	3.8	4.0	13.9	28.4
RSM16	2112-9010	19.5	2.2	19.5	4.8	4.0	13.9	34.0
RSM24	2124-9030	30.0	3.0	32	7.0	7.2	24.0	46.5
RSM32	2132-9040	36.3	3.0	45	9.0	9.5	32.0	64.0
RSM50	2150-9040	49.1	4.0	63	12.0	16.5	41.0	96.0
RSM64	2164-9020	57.0	4.0	75	14.0	19.0	41.0	113.0

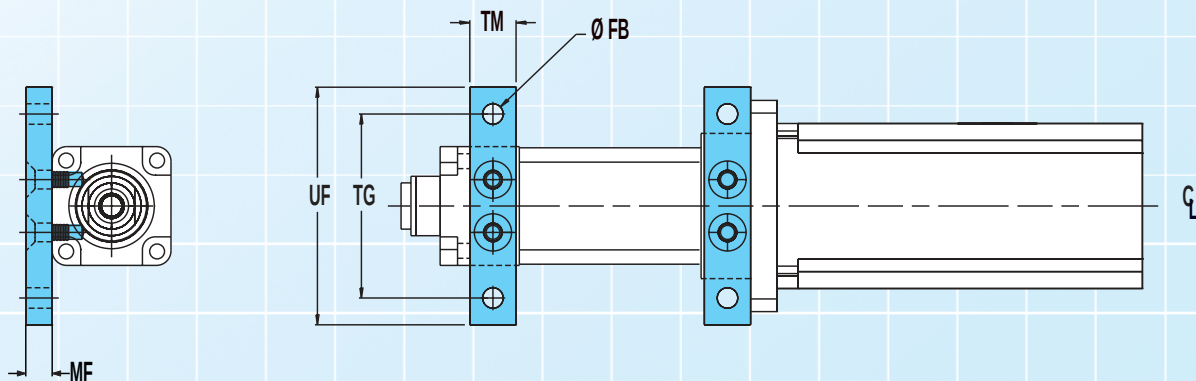
MOUNTING PLATE OPTION

RSA AND RSM ACTUATORS



The mounting plate option is used in situations where the mounting holes on bottom of actuator are not accessible, making the actuator easier to mount and maintain.

DIMENSIONS MP2 MOUNTING PLATE (MS2)



RSA Series

Dimensions in inches

CYLINDER	KIT NUMBER	TG	UF	Ø FB	TM	MF
RSA12 w/17 FRAME MOTOR	1107-9015	1.75	2.25	.19	.40	.50
RSA12 w/23 FRAME MOTOR	1112-9014	2.00	2.50	.19	.40	.63
RSA16	1112-9014	2.00	2.50	.19	.40	.63
RSA24	1124-9023	2.75	3.50	.437	1.50	.50
RSA32	1132-9023	3.25	4.00	.437	1.50	.50
RSA50	1150-9023	4.75	5.75	.562	1.75	.75
RSA64	1164-9023	5.50	6.50	.562	1.75	.75

RSM Series

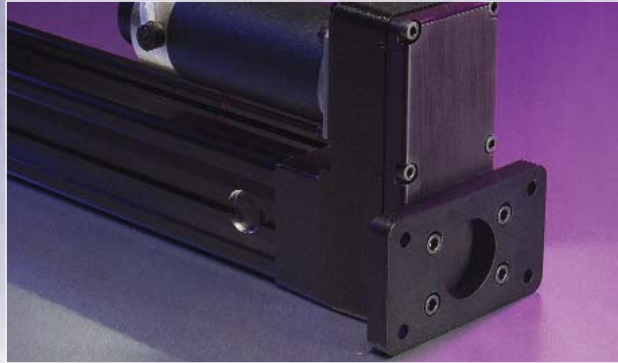
Dimensions in millimeters

CYLINDER	KIT NUMBER	TG	UF	Ø FB	TM	MF
RSM12 w/17 FRAME MOTOR	2107-9015	44.4	57.2	4.8	10.2	12.7
RSM12 w/23 FRAME MOTOR	2112-9014	50.8	63.5	4.8	10.2	16.0
RSM16	2112-9014	50.8	63.5	4.8	10.2	16.0
RSM24	2124-9033	62.0	78.0	6.7	25.4	12.0
RSM32	2132-9043	84.0	104.0	8.7	31.8	12.0
RSM50	2150-9043	120.0	144.0	11.0	30.5	20.0
RSM64	2164-9023	150.0	180.0	12.8	57.2	20.0

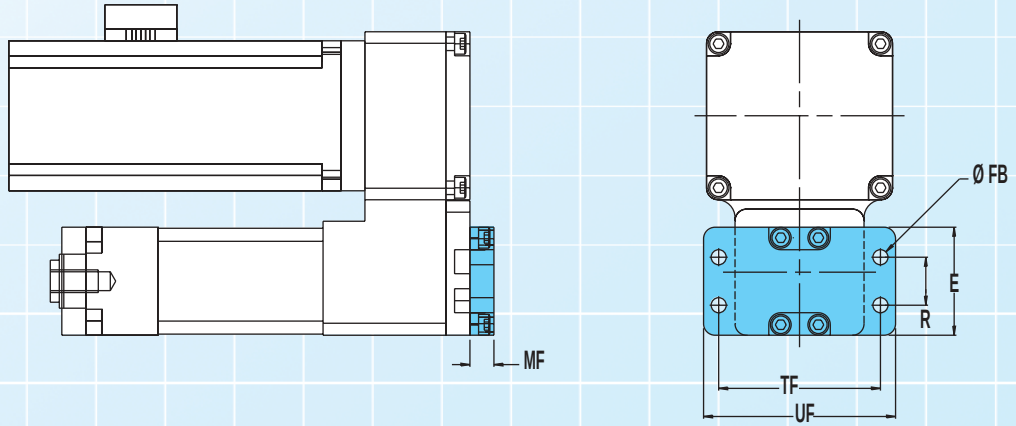
BACK FLANGE MOUNT OPTION

RSA AND RSM ACTUATORS

For applications where a bottom-tapped mounting is not an option, the back flange can be used to mount the actuator directly to framework or bulkhead. It can also be used in situations where bottom support mechanisms are not feasible.



DIMENSIONS BFG BACK FLANGE (MF2)



RSA Series

Dimensions in inches

CYLINDER	KIT NUMBER	UF	E	TF	Ø FB	R	MF
RSA12	1107-9014	2.00	1.12	1.68	0.14/0.15	0.49/0.50	.25
RSA16	1112-9025	2.39	1.37	1.89	0.17/0.18	0.93/0.94	.37
RSA24	1124-9022	3.37	2.00	2.750	0.30/0.31	1.42/1.43	.37
RSA32	1132-9022	4.12	2.50	3.375	0.36/0.37	1.83/1.84	.37
RSA50	1150-9022	5.50	3.75	4.687	0.42/0.43	2.75/2.76	.62
RSA64	1164-9022	6.25	4.50	5.437	0.42/0.43	3.31/3.32	.62

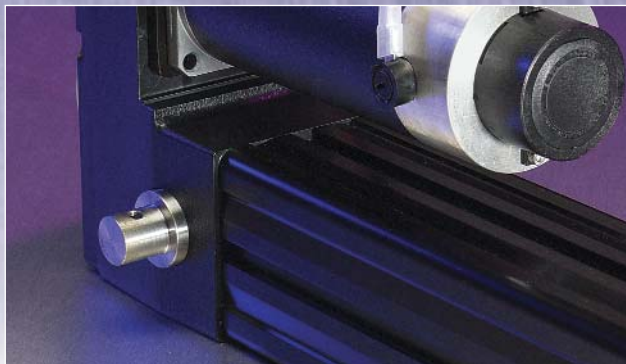
RSM Series

Dimensions in millimeters

CYLINDER	KIT NUMBER	UF	E	TF	Ø FB	R	MF
RSM12	2107-9014	50.8	28.4	42	3.7/3.9	12.2/12.7	6.3
RSM16	2112-9025	60.7	34.7	48	4.3/4.5	23.5/24.0	9.4
RSM24	2124-9032	80.0	47.0	64	7.0/7.2	31.7/32.2	10.0
RSM32	2132-9042	113.0	65.0	90	9.0/9.2	44.7/45.3	12.0
RSM50	2150-9042	153.0	97.0	126	12.0/12.2	62.7/63.3	16.0
RSM64	2164-9022	186.0	111.0	150	14.0/14.2	74.7/75.3	16.0

TRUNNION MOUNT OPTION

RSA/RSMRP12, 16 AND RSA/RSM24, 32, 50 AND 64 ACTUATORS

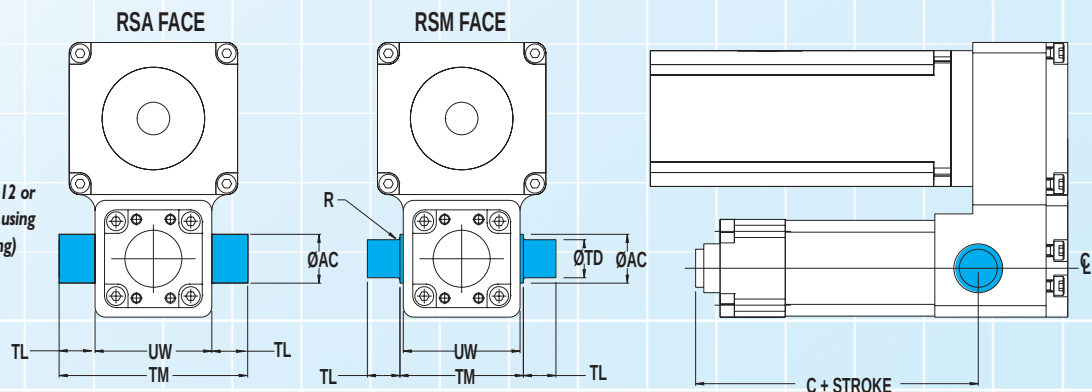


Trunnion mounts are used in applications where space is limited in the rear of the actuator but pivoting about an access is required.

NOTE: Trunnion mounts are not field retrofittable and must be configured with the actuator. Contact the factory for additional information.

DIMENSIONS TRN TRUNNION* MOUNT (MT2)

* Not available on RSA/RSM12 or RSA/RSM16 actuators when using a LMI (in line motor mounting) configuration.



RSA Series

MODELS	UW	TL	TM	Ø AC
RSA12 W/17	1.34	.45	2.24	.44
RSA12 W/23	1.38	.45	2.28	.44
RSA16	1.34	.45	2.24	.44
RSA24	2.09	1.00	4.09	1.00
RSA32	2.70	1.00	4.70	1.00
RSA50	13.80	1.00	5.80	1.00
RSA64	4.73	1.00	6.73	1.00

Dimensions in inches

MODELS	C + STROKE	
	ACME NUT C	BALL NUT C
RSA12	3.64	3.64
RSA16	3.85	3.85
RSA24	4.68	5.14
RSA32	6.08	7.26
RSA50	7.34	8.34
RSA64	9.92	11.92

RSM Series

MODELS	UW	Ø TD	R	TL	TM	Ø AC
RSM12 W/17	34.1	12.0	0.7	9.5	38.1	14.2
RSM12 W/23	34.9	12.0	0.7	9.5	38.9	14.2
RSM16	34.1	12.0	0.7	9.5	38.1	14.2
RSM24	53.3	12.0	0.7	8.7	56.6	18.0
RSM32	68.6	16.0	0.7	16.0	78.0	25.0
RSM50	96.5	20.0	1.0	20.0	110.0	30.0
RSM64	120.1	25.0	1.0	25.0	132.0	40.0

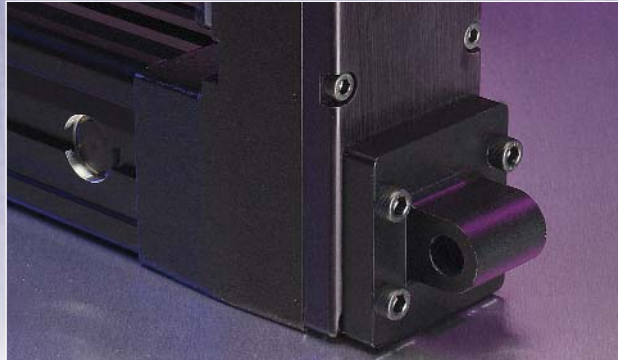
Dimensions in millimeters

MODELS	C + STROKE	
	ACME NUT C	BALL NUT C
RSM12	92.3	92.3
RSM16	97.8	97.8
RSM24	118.9	130.6
RSM32	154.4	184.4
RSM50	186.4	211.8
RSM64	252.0	302.8

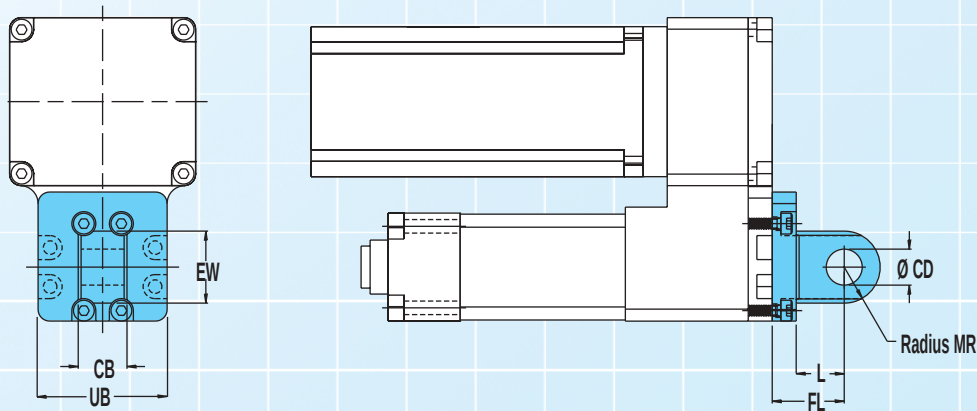
EYE MOUNT OPTION

RSA AND RSM ACTUATORS

Eye mounts are used in applications where the actuator has to compensate for misalignment or pivot about an access and there is ample room for movement in back of the actuator.



DIMENSIONS PCS EYE MOUNT (MP4)



RSA Series

Dimensions in inches

CYLINDER	KIT NUMBER	EW	Ø MR	FL	Ø CD	CB	UB	L
RSA12	1107-9016	.75	.375	.750	.375	.443/.448	1.32/1.34	.500
RSA16	1107-9016	.75	.375	.750	.375	.443/.448	1.32/1.34	.500
RSA24	1124-9024	1.00	.50	1.06	.500	.748/.750	1.96/1.98	.687
RSA32	1132-9024	1.00	.50	1.05	.500	.748/.750	2.56/2.58	.687
RSA50	1150-9024	1.50	.75	1.88	.750	1.248/1.250	3.58/3.60	1.375
RSA64	1164-9024	1.50	.75	1.88	.750	1.248/1.250	4.46/4.48	1.375

RSM Series

Dimensions in millimeters

CYLINDER	KIT NUMBER	EW	Ø MR	FL	Ø CD	CB	UB	L
RSM12	2107-9016	19	19.0	19.0	10.0	10.8/11.3	33.4/34.0	12.7
RSM16	2107-9016	19	19.0	19.0	10.0	10.8/11.3	33.4/34.0	12.7
RSM24	2124-9034	20.0	10.0	22.0	10.0	25.3/25.8	44.4/45.0	12.0
RSM32	2132-9044	26.0	13.0	27.0	12.0	31.3/31.8	59.2/60.0	15.0
RSM50	2150-9044	40.0	20.0	36.0	16.0	49.7/49.8	89.4/90.0	20.0
RSM64	2164-9024	44.0	22.0	44.0	20.0	59.3/59.8	109.0/110.0	23.0

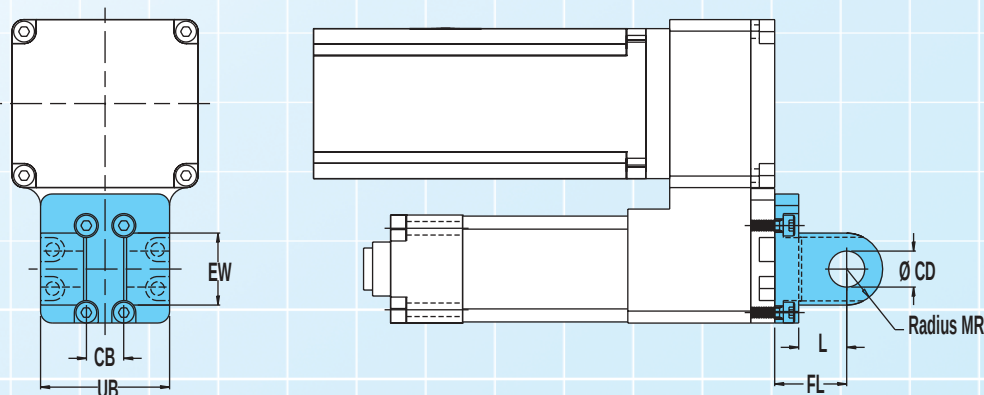
CLEVIS MOUNT OPTION

RSA AND RSM ACTUATORS



Clevis mounts are used in applications where the actuator has to compensate for misalignment or pivot about an axis and there is ample room for movement in back of the actuator.

DIMENSIONS PCD CLEVIS MOUNT (MP3)



RSA Series

Dimensions in inches

CYLINDER	KIT NUMBER	UB	CB	MR	FL	Ø CD	L	EW
RSA12	1107-9017	1.32/1.34	.448	.375	.750	.375	.500	.75
RSA16	1107-9017	1.32/1.34	.448	.375	.750	.375	.500	.75
RSA24	1124-9025	1.96/1.98	.750	.500	1.06	.500	.687	1.00
RSA32	1132-9025	2.56/2.58	.750	.500	1.06	.500	.687	1.00
RSA50	1150-9025	3.58/3.60	1.250	.750	1.88	.750	1.375	1.50
RSA64	1164-9025	4.46/4.48	1.250	.750	1.88	.750	1.375	1.50

RSM Series

Dimensions in millimeters

CYLINDER	KIT NUMBER	UB	CB	MR	FL	Ø CD	L	EW
RSM12	2107-9017	33.4/34.0	11.3	9.0	19.0	10.0	12.7	19.0
RSM16	2107-9017	33.4/34.0	11.3	9.0	19.0	10.0	12.7	19.0
RSM24	2124-9035	49.7/50.2	26.0	10.0	22.0	10.0	12.0	20.0
RSM32	2132-9045	65.0/65.5	32.0	13.0	27.0	12.0	15.0	26.0
RSM50	2150-9045	90.9/91.4	50.0	20.0	36.0	16.0	20.0	40.0
RSM64	2164-9025	113.2/113.7	60.0	22.0	41.0	20.0	23.0	44.0

EXTERNAL THREADED ROD END OPTION

RSA AND RSM ACTUATORS

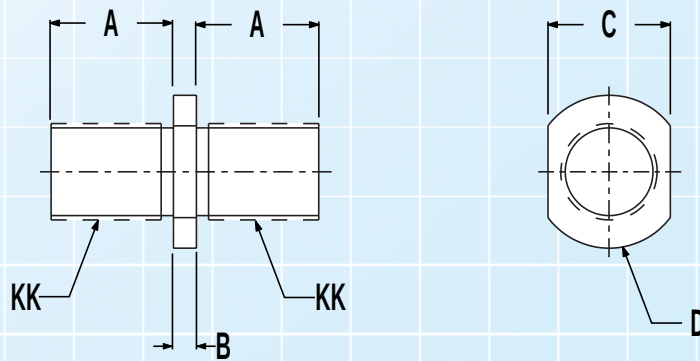
In addition to the standard internally threaded rod end, an external threaded rod end is also available for mounting loads.



Four different rod ends can be combined together with our mounting options to create a wide range of solutions.

DIMENSIONS MET EXTERNAL THREADED ROD

(Stainless-steel)



RSA Series

Dimensions in inches

MODEL	KIT NUMBER	KK	A	B	C	D
RSA12	1107-1073	1/4-28-2A	.50	.10	0.315	0.42
RSA16	1112-1058	5-16-24-2A	.50	.1	0.375	0.48
RSA24	1124-1057	7/16-20-2A	.87	.15	.750	0.97
RSA32	1124-1057	7/16-20-2A	.87	.15	.750	0.97
RSA50	1150-1057	3/4-16-2A	1.50	.19	1.250	1.48
RSA64	1150-1057	3/4-16-2A	1.50	.19	1.250	1.48

RSM Series

Dimensions in millimeters

CYLINDER	KIT NUMBER	KK	A	B	C	D
RSM12	2107-1073	M6-1-6g	12.7	2.5	8	10.7
RSM16	2112-1058	M8-1.25-6g	12.7	2.5	10	12.2
RSM24	2124-1067	M10-1.25-6g	22.1	3.8	19	24.6
RSM32	2132-1057	M16-1.5-6g	32.0	4.8	19	24.6
RSM50	2150-1057	M20-1.5-6g	38.1	4.8	32	37.6
RSM64	2164-1057	M27-2-6g	38.1	6.4	32	38.1

SPHERICAL ROD EYE END OPTION

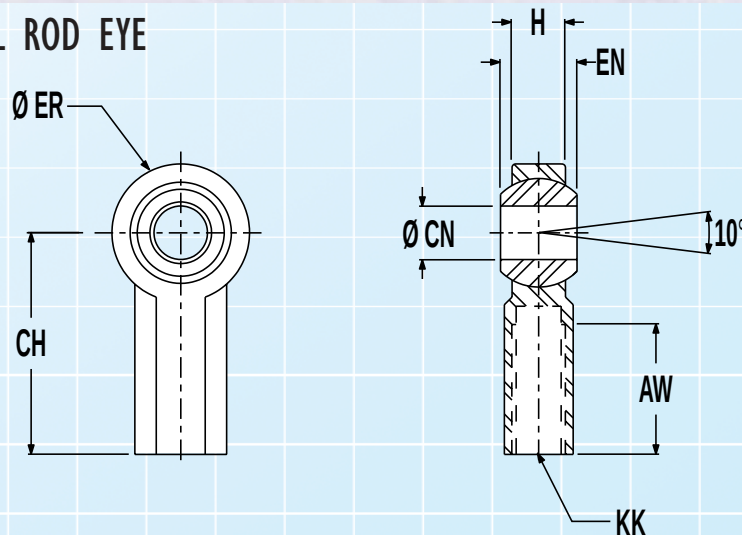
RSA AND RSM ACTUATORS



The spherical rod eye end allows slight misalignment between the load and the actuator (radial and angular), and uses an accepted industry-standard bearing.

DIMENSIONS SRE SPHERICAL ROD EYE

(Zinc-plated Steel)



RSA Series

Dimensions in inches

MODEL	KIT NUMBER	KK	AW	CH	CN	EN	ER	H
RSA12	1107-9020	1/4-28	.750	1.312	.250	0.375	.750	.281
RSA16	1112-9019	5-16-24	.750	1.375	.312	0.437	.875	.344
RSA24	1124-9028	7/16-20	1.062	1.812	.438	0.562	1.125	.437
RSA32	1124-9028	7/16-20	1.062	1.812	.437	0.562	1.125	.437
RSA50	1150-9028	3/4-16	1.750	2.875	.750	0.875	1.750	.687
RSA64	1150-9028	3/4-16	1.750	2.875	.750	0.875	1.750	.687

RSM Series

Dimensions in millimeters

MODEL	KIT NUMBER	KK	AW	CH	CN	EN	ER	H
RSM12	2107-9020	M6-1	12	30	6	9	18	6.8
RSM16	2112-9019	M8-1.25	16	36	8	12	24	9
RSM24	2124-9038	M10-1.25	20	43	10	14	28	10.5
RSM32	2132-9048	M16-1.5	28	64	16	21	42	15
RSM50	2150-9048	M20-1.5	33	77	20	25	50	18
RSM64	2150-90A8	M27-2.6	51	110	30	37	70	25

CLEVIS ROD END OPTION

RSA AND RSM ACTUATORS

Like clevis mounts, clevis rod ends are used in applications where the actuator has to compensate for misalignment or pivot about an access.



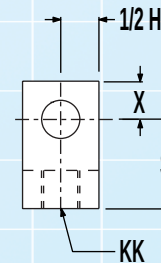
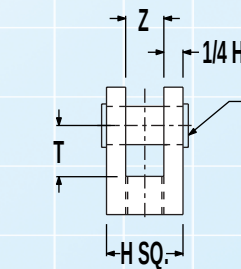
NOTE: The clevis rod end option requires the use of the MET external rod end option as shown in the photo at left. For the MET external rod end option, see page 75.

DIMENSIONS CLV CLEVIS END

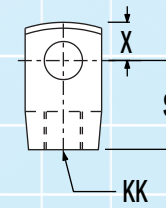
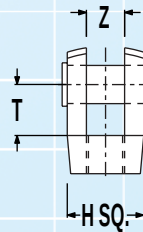
(Zinc-plated Steel)

Metric clevis conforms to ISO 1840

FOR RSA24,
32, 50, 64
AND
RSM12, 18



FOR RSA12,
18
AND
RSM24, 32,
50, 64



RSA Series

Dimensions in inches

MODEL	KIT NUMBER	KK	H	S	T	X	Z	CD
RSA12	1107-9021	1/4-28	.500	.812	.500	.250	.250	.250
RSA16	1112-9020	5-16-24	.750	.875	.500	.375	.375	.375
RSA24	1124-9029	7/16-20	1.00	1.375	.75	.50	.50	.50
RSA32	1124-9029	7/16-20	1.00	1.375	.75	.50	.50	.50
RSA50	1150-9029	3/4-16	1.50	1.750	1.00	.75	.75	.75
RSA64	1150-9029	3/4-16	1.50	1.750	1.00	.75	.75	.75

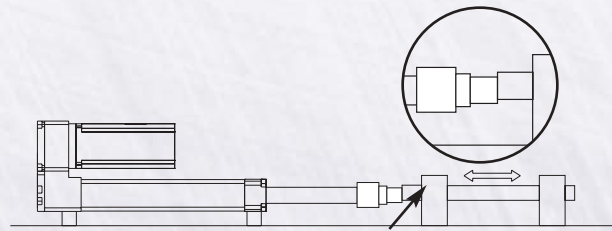
RSM Series

Dimensions in millimeters

MODEL	KIT NUMBER	KK	H	S	T	X	Z	CD
RSM12	2107-9021	M6-1-6H	12	20	12	6	6.01/6.14	6.10/6.07
RSM16	2112-9020	M8-1.25-6H	16	32	16	13	6.01/6.14	8.10/8.07
RSM24	2124-9039	M10-1.25	20	40	20	16	10	10
RSM32	2132-9049	M16-1.5	32	60	32	25	16	16
RSM50	2150-9049	M20-1.5	40	80	40	32	20	20
RSM64	2164-9029	M27-2-6	55	110	54	45	30	30

ALIGNMENT COUPLER ROD END OPTION

RSA AND RSM ACTUATORS

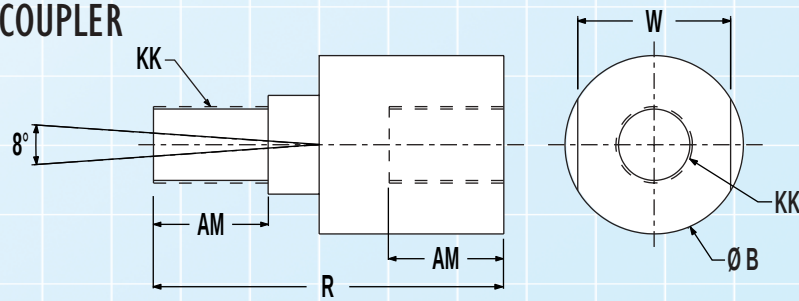


Alignment couplers provide smooth motion and extend actuator life by preventing binding caused by angular or axial misalignment. They cannot be used in combination with clevis or trunnion mounts and must be rigidly mounted.

NOTE: The alignment coupler option requires the use of the MET external rod end option as shown in the photo at left. For the MET external rod end option, see page 75.

DIMENSIONS ALC ALIGNMENT COUPLER

(Steel)



RSA Series

Dimensions in inches

MODEL	KIT NUMBER	KK	AM	B	R	W
RSA12	1107-1076	1/4-28	.63	.88	1.88	0.75
RSA16	1112-1061	5-16-24	.63	.88	1.88	0.75
RSA24	1124-1060	7/16-20	.75	1.25	2.75	1.00
RSA32	1124-1060	7/16-20	.75	1.25	2.75	1.00
RSA50	1150-1060	3/4-16	1.13	1.75	3.44	1.50
RSA64	1150-1060	3/4-16	1.13	1.75	3.44	1.50

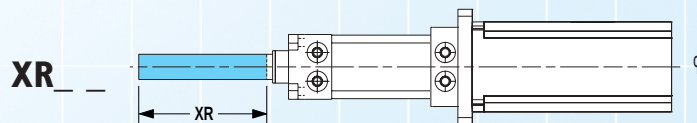
RSM Series

Dimensions in millimeters

MODEL	KIT NUMBER	KK	AM	B	R	W
RSM12	N/A	—	—	—	—	—
RSM16	N/A	—	—	—	—	—
RSM24	2124-1070	M10-1.25	24	30	77	19
RSM32	2132-1060	M16-1.5	32	42	106	30
RSM50	2150-1060	M20-1.5	40	42	122	30
RSM64	2164-1060	M27-2-6g	40	42	122	30

ROD EXTENSION OPTION

FOR RSA AND RSM ACTUATORS



In vertical applications, the rod screw actuator reach can be extended by specifying the rod extension option. This does not extend the stroke length, only the rod length. *Extension + Stroke should not exceed maximum stroke.*
For extensions greater than the maximum stroke length for the model, consult the factory.

MODEL	Max Stroke
RSA12	18"
RSA16	18"
RSA24	24"
RSA32	36"
RSA50	60"
RSA64	60"

MODEL	Max Stroke
RSM12	457mm
RSM16	457mm
RSM24	610mm
RSM32	914mm
RSM50	1,524mm
RSM64	1,524mm

GUIDED SCREW ACTUATORS

FOR SCREW INFORMATION, SEE PAGE 62

GSA ACTUATOR SELECTION



Axidyne Guided Screw Actuator (GSA) is a linear actuator that combines the precise, repeatable positioning, high thrust capacity and flexibility of the Rod Screw Actuator with a self-contained load guidance and support system.

GSA/GSM Actuators

Four body styles and great features make the GSA a perfect building block for many multi-axis applications.

GSA/GSM SERIES GUIDED SCREW ACTUATOR

PERFORMANCE DATA • SPECIFICATIONS



SIDE LOADING CONSIDERATIONS:

Guided screw actuators are designed to push loads that are not separately guided and supported and may be used for applications that require substantial side loading. Use the following graphs to help in determining if the GSA you have chosen will accommodate the side loading your application will have.

These graphs assume the GSA is mounted horizontally, as shown in the sketch on the next page. We recommend you use Tol-O-Motion Sizing and Selection software to choose the correct GSA for your application. If you need any assistance, please contact Tol-O-Matic at 1-800-328-2174 for any questions regarding side loading capabilities or choosing any actuator.

GSA PERFORMANCE

GSA/GSM SERIES SPECIFICATIONS

SPECIFICATION	GSA12				GSA16		GSA24		GSA32	
	With 17 FRAME Motor		With 23 FRAME Motor							
	GUIDE RODS		GUIDE RODS		GUIDE RODS		GUIDE RODS		GUIDE RODS	
	STANDARD	OVERSIZE	STANDARD	OVERSIZE	STANDARD	OVERSIZE	STANDARD	OVERSIZE	STANDARD	OVERSIZE
MAX. THRUST (lbs.)	125	125	125	125	125	125	750	750	2400	2400
GUIDE ROD DIAMETER (in.)	0.50	0.63	0.50	0.63	0.63	0.75	0.75	1.00	1.00	1.25
WEIGHTS										
In Line Base Model (lbs.)	3.65	4.44	3.68	4.47	7.25	7.54	16.48	17.35	27.34	28.65
Reverse Parallel Base Model (lbs.)	3.92	4.72	4.05	4.85	7.59	7.88	17.09	17.96	28.81	30.12
Weight per/in. of stroke (lbs.)	.021	0.27	0.21	0.27	0.30	0.38	0.54	0.74	0.93	1.19
MAXIMUM STROKE	18	18	18	18	24	24	30	30	36	36
DEAD LENGTH* (dimension V)										
In Line Base Model (in.)	6.39	6.39	6.39	6.39	7.14	7.14	9.54	9.54	11.59	11.59
Reverse Parallel Base Model (in.)	7.33	7.33	7.61	7.61	8.20	8.20	10.39	10.39	12.99	12.99

*Without motor and motor adapter

SPECIFICATION	GSM12				GSM16		GSM24		GSM32	
	With 17 FRAME Motor		With 23 FRAME Motor							
	GUIDE RODS		GUIDE RODS		GUIDE RODS		GUIDE RODS		GUIDE RODS	
	STANDARD	OVERSIZE	STANDARD	OVERSIZE	STANDARD	OVERSIZE	STANDARD	OVERSIZE	STANDARD	OVERSIZE
MAX. THRUST (N)	556	556	556	556	556	556	3336	3336	10676	10676
GUIDE ROD DIAMETER (mm)	12.7	15.9	12.7	15.9	15.9	19.1	19.1	25.4	25.4	31.8
WEIGHTS										
In Line Base Model (kgs.)	1.65	2.01	1.67	2.03	3.29	3.42	7.48	7.87	12.40	13.00
Reverse Parallel Base Model (kgs.)	1.78	2.14	1.84	2.20	3.44	3.57	7.75	8.15	13.07	13.66
Weight per/mm of stroke (kgs.)	0.004	0.005	0.004	0.005	0.005	0.007	0.010	0.013	0.017	0.021
MAXIMUM STROKE	457	457	457	457	610	610	762	762	914	914
DEAD LENGTH* (dimension V)										
In Line Base Model (mm)	162.3	162.3	162.3	162.3	181.3	181.3	242.3	242.3	294.4	294.4
Reverse Parallel Base Model (mm)	186.2	186.2	193.3	193.3	208.3	208.3	263.9	263.9	329.9	329.9

*Without motor and motor adapter

OPERATION TEMPERATURE RANGE

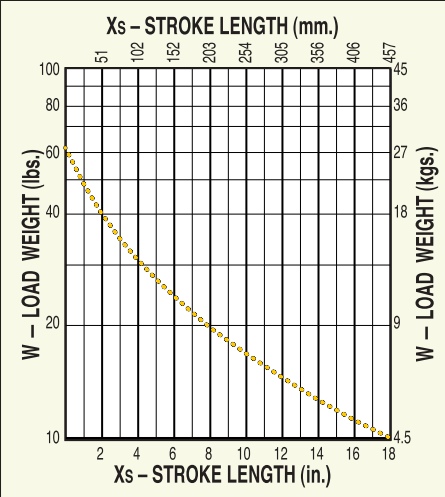
RSA/RSM series actuators should be used in temperatures from 40° to 130°F (4° to 54°C). Please contact Tol-O-Matic for applications with tem-

peratures out of this range. Heat generated by the motor and drive should be taken into consideration as well as linear velocity and work cycle time.

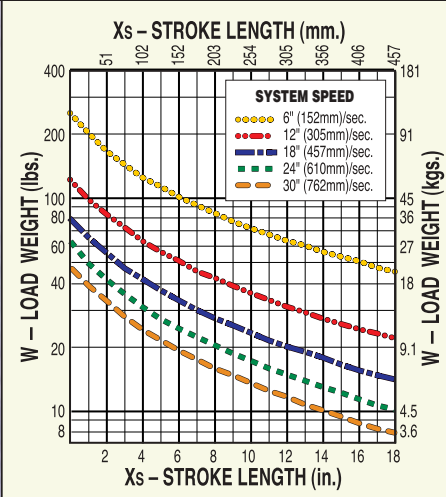
GSA/GSM SERIES GUIDED SCREW ACTUATOR

GSA12,GSM12 PERFORMANCE DATA

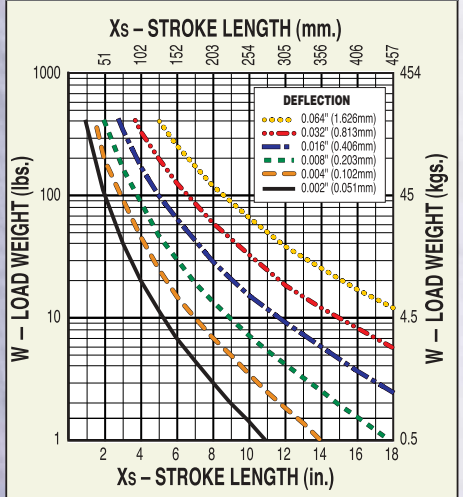
MAXIMUM LOAD WEIGHT vs STROKE LENGTH
LINEAR BALL BEARING, STANDARD GUIDE RODS



MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, STANDARD GUIDE RODS



MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, OVERSIZE GUIDE RODS



Note: Linear Ball Bearings are not available with stainless-steel guide rods option.

MAXIMUM LOAD WEIGHT vs. STROKE LENGTH

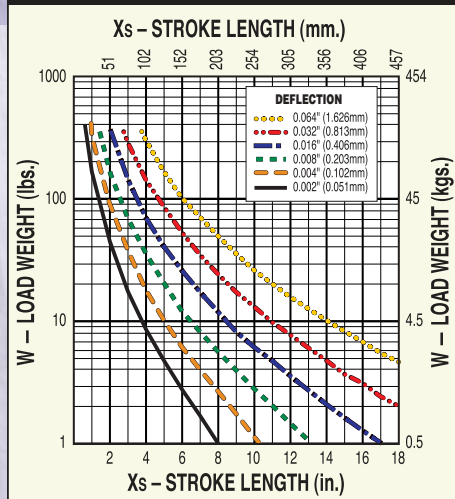
Do not exceed Maximum Load curve

Maximum Load values are based on 200 million linear inches of travel (see page 204)

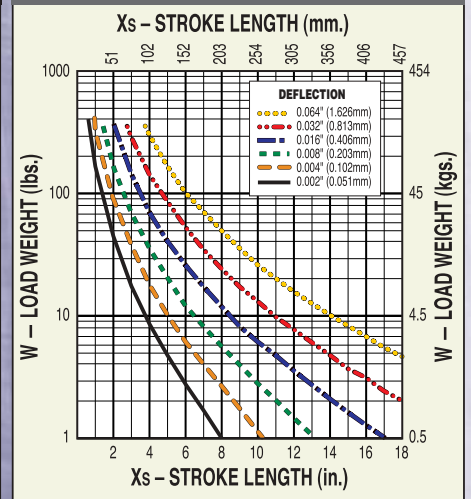
- To obtain most accurate results, stroke length should be adjusted by the distance between the center of mass of the load and the tooling plate.
(see diagram) $X_{adj} = X_s + X_{cm}$
Then use X_{adj} instead of X_s on Maximum Load Weight vs. Stroke Length graph.
- For the off-center loads, calculate adjusted load weight using the following formula:
(see diagram) $W_{adj} = W (1 + 0.67Y_{cm})$,
where Y_{cm} is distance between center of mass of off-center load and center of the tooling plate.
Then use W_{adj} instead of W on Maximum Load Weight vs. Stroke Length graph.
- Using your stroke length and load weight evaluate guide rod deflection. If the intersection point is above the highest curve (.064") contact Tol-O-Matic for assistance.

SEE IMPORTANT NOTES ON PAGE 82

GUIDE ROD DEFLECTION
STANDARD GUIDE RODS



GUIDE ROD DEFLECTION
OVERSIZE GUIDE RODS



W_{adj}
OFF-CENTER LOAD

W
LOAD

Y_{cm}
Y AXIS:
DISTANCE TO LOAD'S
CENTER OF MASS

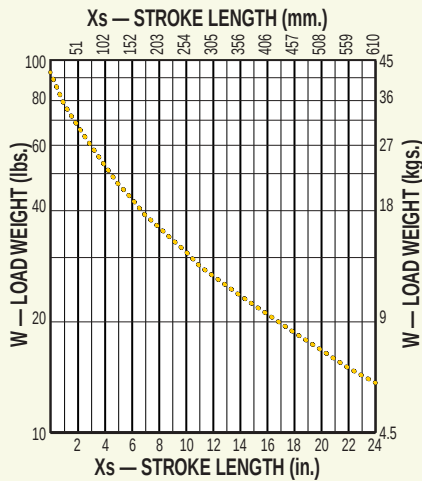
X_{cm}
X-AXIS:
DISTANCE TO LOAD'S
CENTER OF MASS

X_s
STROKE LENGTH

GSA/GSM SERIES GUIDED SCREW ACTUATOR

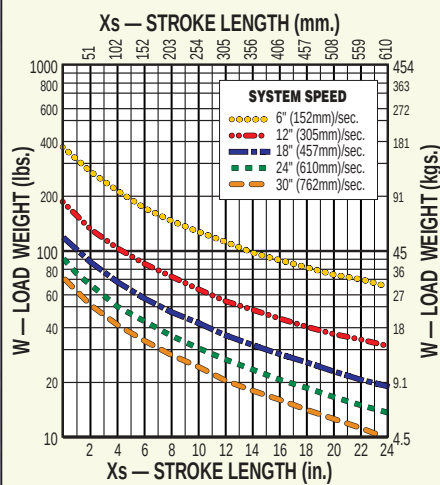
GSA16, GSM16 PERFORMANCE DATA

MAXIMUM LOAD WEIGHT vs STROKE LENGTH
LINEAR BALL BEARING, STANDARD GUIDE RODS

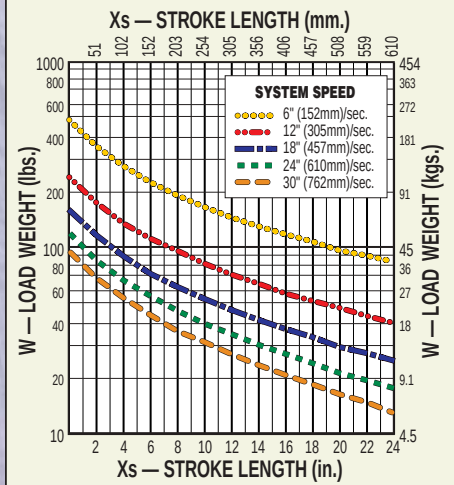


Note: Linear Ball Bearings are not available with stainless-steel guide rods option.

MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, STANDARD GUIDE RODS



MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, OVERSIZE GUIDE RODS



MAXIMUM LOAD WEIGHT vs. STROKE LENGTH

Do not exceed Maximum Load curve

Maximum Load values are based on 200 million linear inches of travel (see page 204)

- To obtain most accurate results, stroke length should be adjusted by the distance between the center of mass of the load and the tooling plate.

(see diagram) $X_{adj} = X_s + X_{cm}$

Then use X_{adj} instead of X_s on Maximum Load Weight vs. Stroke Length graph.

- For the off-center loads, calculate adjusted load weight using the following formula:

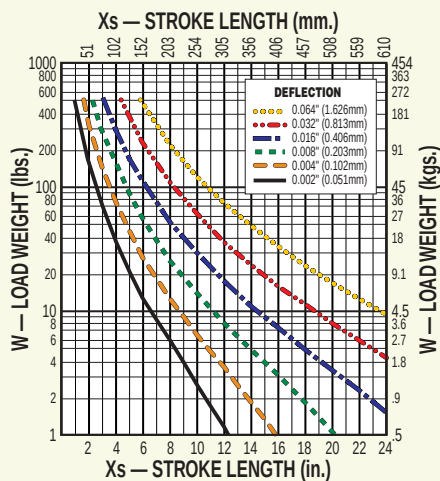
(see diagram) For GSA 16: $W_{adj} = W (1 + 0.53Y_{cm})$

where Y_{cm} is distance between center of mass of off-center load and center of the tooling plate.

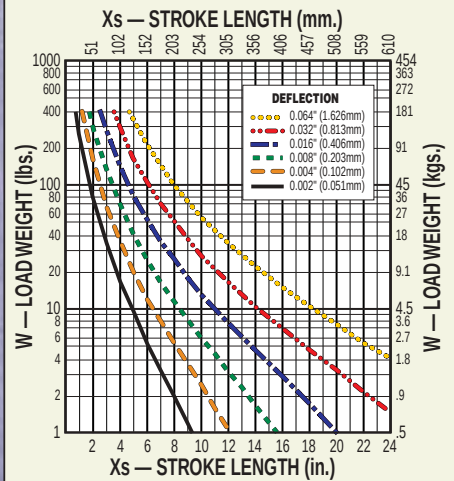
Then use W_{adj} instead of W on Maximum Load Weight vs. Stroke Length graph.

- Using your stroke length and load weight evaluate guide rod deflection. If the intersection point is above the highest curve (.064") contact Tol-O-Matic for assistance.

GUIDE ROD DEFLECTION
STANDARD GUIDE RODS



GUIDE ROD DEFLECTION
OVERSIZE GUIDE RODS



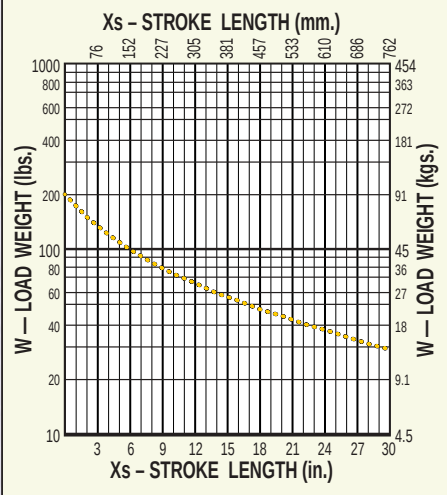
IMPORTANT NOTES:

- Impact loading is not recommended for GSA/GSM series actuators. If your application involves such loading please contact Tol-O-Matic.
- Motor brakes may be required on vertically positioned actuators with plastic or ball nuts in applications with risk of load backdriving. (Actuators with bronze nuts will not backdrive for loads, thrusts within catalog specifications.) Please contact Tol-O-Matic for recommendations.

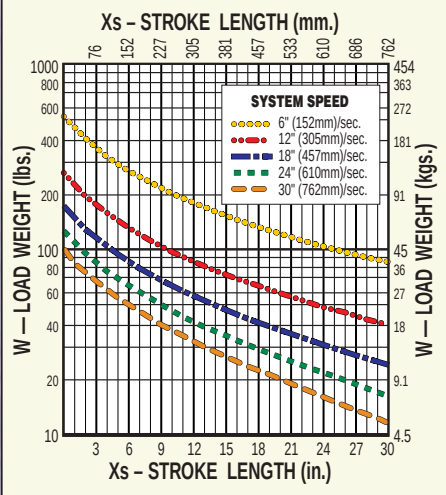
GSA/GSM SERIES GUIDED SCREW ACTUATOR

GSA24,GSM24 PERFORMANCE DATA

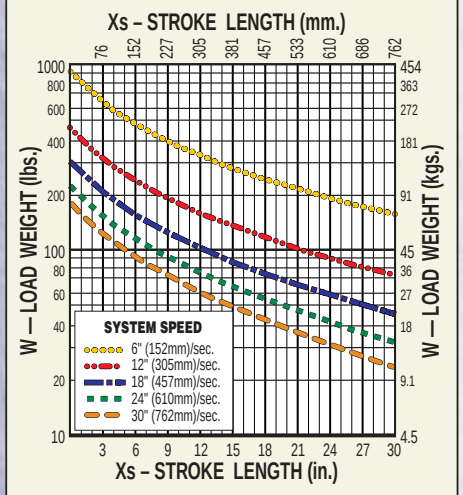
MAXIMUM LOAD WEIGHT vs STROKE LENGTH
LINEAR BALL BEARING, STANDARD GUIDE RODS



MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, STANDARD GUIDE RODS



MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, OVERSIZE GUIDE RODS



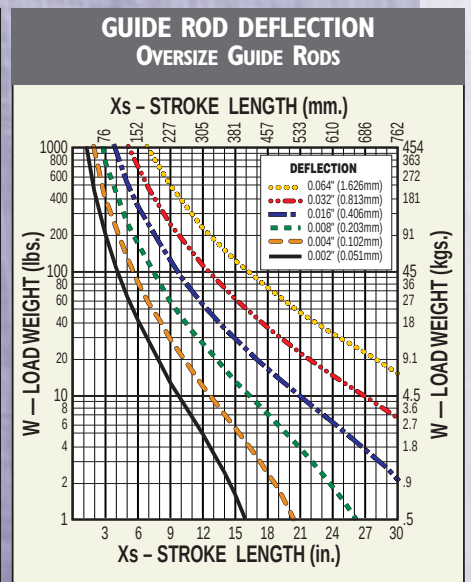
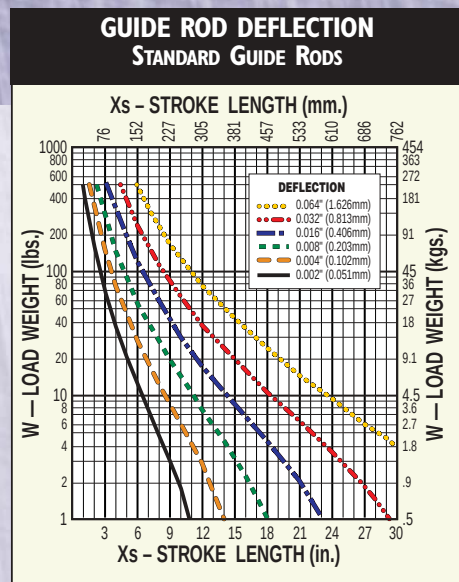
Note: Linear Ball Bearings are not available with stainless-steel guide rods option.

MAXIMUM LOAD WEIGHT vs. STROKE LENGTH

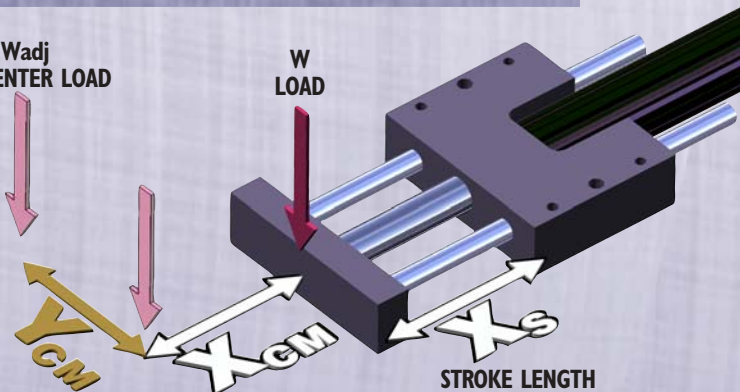
Do not exceed Maximum Load curve

Maximum Load values are based on 200 million linear inches of travel (see page 204)

- To obtain most accurate results, stroke length should be adjusted by the distance between the center of mass of the load and the tooling plate.
(see diagram) $X_{adj} = X_s + X_{cm}$
Then use X_{adj} instead of X_s on Maximum Load Weight vs. Stroke Length graph.
- For the off-center loads, calculate adjusted load weight using the following formula:
(see diagram) For GSA 24: $W_{adj} = W (1 + 0.40Y_{cm})$
where Y_{cm} is distance between center of mass of off-center load and center of the tooling plate. Then use W_{adj} instead of W on Maximum Load Weight vs. Stroke Length graph.
- Using your stroke length and load weight evaluate guide rod deflection. If the intersection point is above the highest curve (.064") contact Tol-O-Matic for assistance.



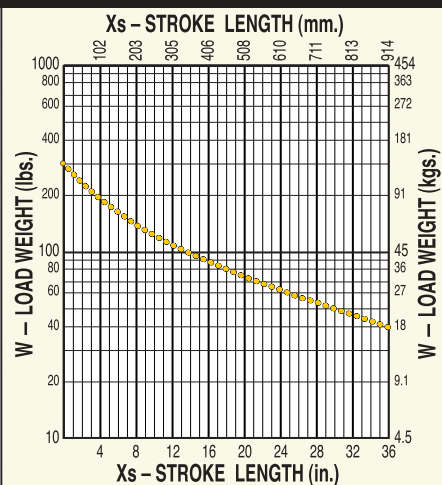
W_{adj}
OFF-CENTER LOAD



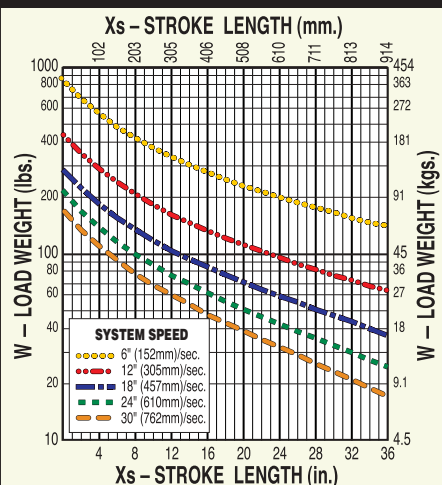
GSA/GSM SERIES GUIDED SCREW ACTUATOR

GSA32,GSM32 PERFORMANCE DATA

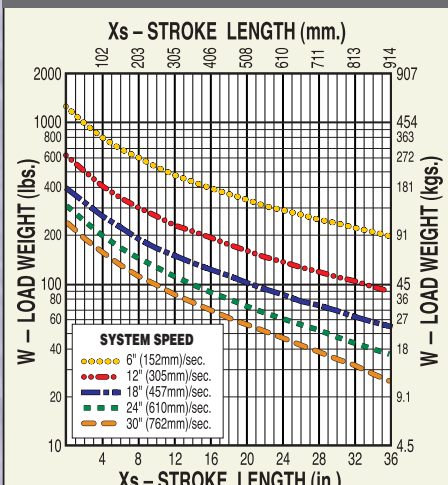
**MAXIMUM LOAD WEIGHT vs STROKE LENGTH
LINEAR BALL BEARING, STANDARD GUIDE RODS**



**MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, STANDARD GUIDE RODS**



**MAXIMUM LOAD WEIGHT vs STROKE LENGTH
COMPOSITE BEARING, OVERSIZE GUIDE RODS**



Note: Linear Ball Bearings are not available with stainless-steel guide rods option.

MAXIMUM LOAD WEIGHT vs. STROKE LENGTH

Do not exceed Maximum Load curve

Maximum Load values are based on 200 million linear inches of travel (see page 204)

1. To obtain most accurate results, stroke length should be adjusted by the distance between the center of mass of the load and the tooling plate.

(see diagram) $X_{adj} = X_s + X_{cm}$

Then use X_{adj} instead of X_s on Maximum Load Weight vs. Stroke Length graph.

2. For the off-center loads, calculate adjusted load weight using the following formula:

(see diagram) $W_{adj} = W (1 + 0.30Y_{cm})$,

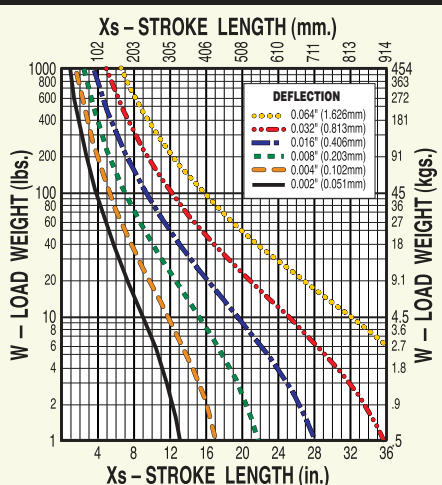
where Y_{cm} is distance between center of mass of off-center load and center of the tooling plate.

Then use W_{adj} instead of W on Maximum Load Weight vs. Stroke Length graph.

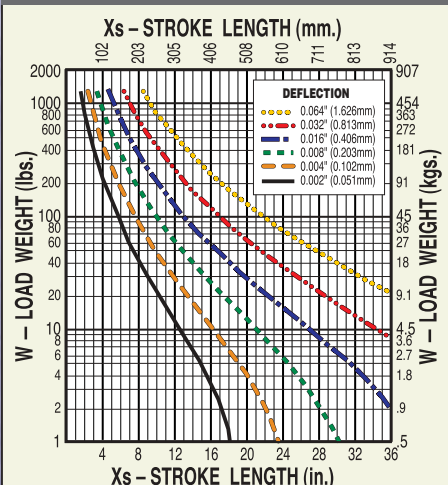
3. Using your stroke length and load weight evaluate guide rod deflection. If the intersection point is above the highest curve (.064") contact To-O-Matic for assistance.

SEE IMPORTANT NOTES ON PAGE 82

**GUIDE ROD DEFLECTION
STANDARD GUIDE RODS**



**GUIDE ROD DEFLECTION
OVERSIZE GUIDE RODS**



W_{adj}
OFF-CENTER LOAD

W
LOAD

Y AXIS:
DISTANCE TO LOAD'S
CENTER OF MASS

X-AXIS:
DISTANCE TO LOAD'S
CENTER OF MASS

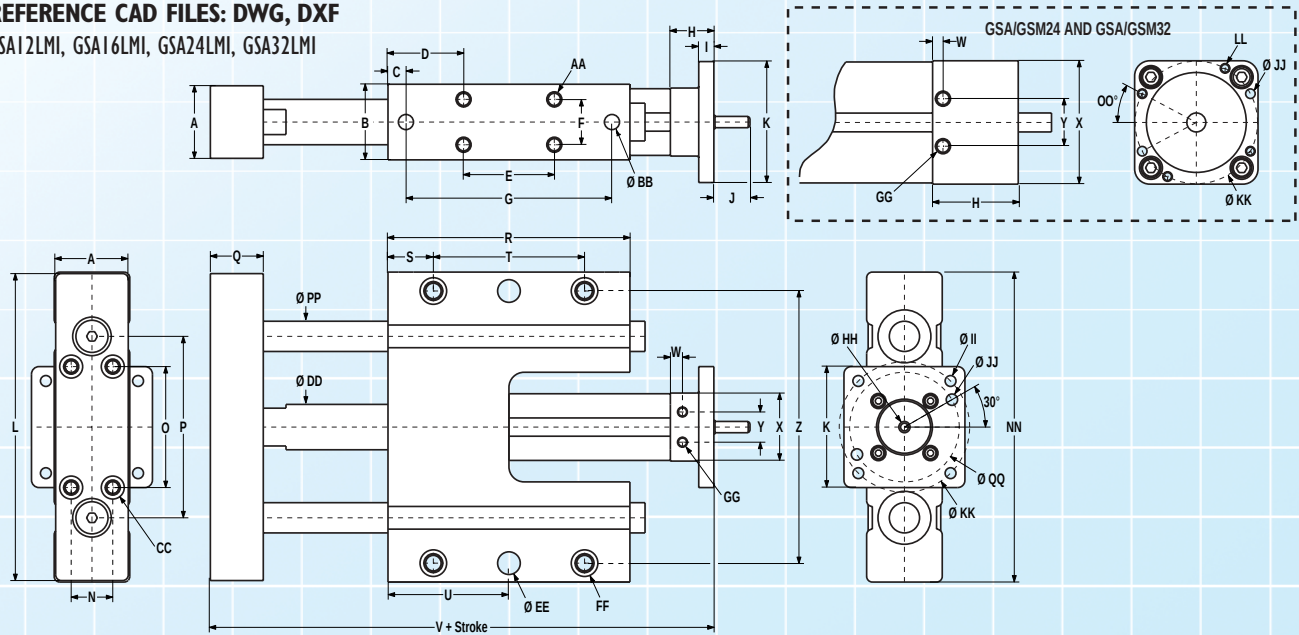
STROKE LENGTH

GSA/GSM SERIES GUIDED SCREW ACTUATOR

DIMENSIONS LMI INLINE MOUNTING BASE MODEL

REFERENCE CAD FILES: DWG, DXF

GSA12LMI, GSA16LMI, GSA24LMI, GSA32LMI



GSA Series

Dimensions in inches

MODEL	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
GSA12	1.20	1.25	0.297	1.250	1.500	0.750	3.406	0.72	0.25	0.60	—	5.08	0.688	2.000	3.000	0.88	4.00	0.750	2.500	2.000	6.39	0.20	1.13	0.50	4.500
GSA16	1.70	1.75	0.516	1.625	1.750	1.000	3.969	0.72	0.25	0.60	2.00	6.20	1.000	2.500	3.750	1.13	5.00	1.188	2.625	2.500	7.14	0.20	1.13	0.50	5.438
GSA24	2.15	2.25	0.438	1.625	2.750	1.250	5.125	1.42	—	0.55	—	7.65	1.375	3.500	5.000	1.38	6.00	1.063	3.875	3.000	9.54	0.17	2.04	0.79	7.000
GSA32	2.65	2.75	0.594	2.125	2.750	1.750	5.812	1.79	—	0.69	—	9.90	1.750	5.000	6.625	1.63	7.00	1.438	4.125	3.500	11.59	0.26	2.58	0.95	9.000

MODEL	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ
GSA12	1/4-20 UNC-2B x .50	.250 x .38	1/4-20 UNC-2B, Ø.38 CB x .22 OPP SIDE	0.75	.375 x .50	.266 THRU, Ø.44 CB x .28, 5/16-18 UNC-2B x .75 OPP SIDE	8-32 UNC-2B x .25	0.187	—	0.188
GSA16	1/4-20 UNC-2B x .50	.250 x .38	5/16-18 UNC-2B, Ø.44 CB x .28 OPP SIDE	0.88	.375 x .50	.266 THRU, Ø.44 CB x .28, 5/16-18 UNC-2B x .75 OPP SIDE	8-32 UNC-2B x .25	0.187	0.180	0.188
GSA24	5/16-18 UNC-2B x .63	.313 x .50	5/16-18 UNC-2B, Ø.44 CB x .28 OPP SIDE	1.25	.500 x .50	.328 THRU, Ø.53 CB x .34, 3/8-16 UNC-2B x 1.00 OPP SIDE	1/4-20 UNC-2B x .31	0.315	—	0.157
GSA32	3/8-16 UNC-2B x .75	.375 x .50	3/8-16 UNC-2B, Ø.53 CB x .50 OPP SIDE	1.75	.500 x .50	.453 THRU, Ø.72 CB x .47, 1/2-13 UNC-2B x 1.50 OPP SIDE	5/16-18 UNC-2B x .50	0.394	—	0.188

MODEL	KK	LL	NN	OO	PP STD	PP OVS	QQ
GSA12	—	—	5.13	—	0.50	0.63	—
GSA16	2.156	—	6.25	—	0.63	0.75	1.813
GSA24	2.026	M4 x 0.7-6H x .56	7.75	28	0.75	1.00	—
GSA32	2.541	M5 x 0.8-6H x .50	10.00	30	1.00	1.25	—

GSA12 ONLY / MOTOR	K	II	QQ	KK
17 FRAME	1.66	0.141	1.514	1.857
23 FRAME	2.00	0.180	1.813	2.156

GSM12 ONLY / MOTOR	K	II	QQ	KK
17 FRAME	42.2	3.58	38.46	47.17
23 FRAME	50.8	4.57	46.05	54.76

Dimensions in millimeters

MODEL	KK	LL	NN	OO	PP STD	PP OVS	QQ
GSM12	—	—	130.3	—	12.7	15.9	—
GSM16	54.76	—	158.8	—	15.9	19.1	46.05
GSM24	51.46	M4 x 0.7-6H x 14	196.9	28	19.1	25.4	—
GSM32	64.54	M5 x 0.8-6H x 12	254	30	25.4	31.8	—

GSM Series

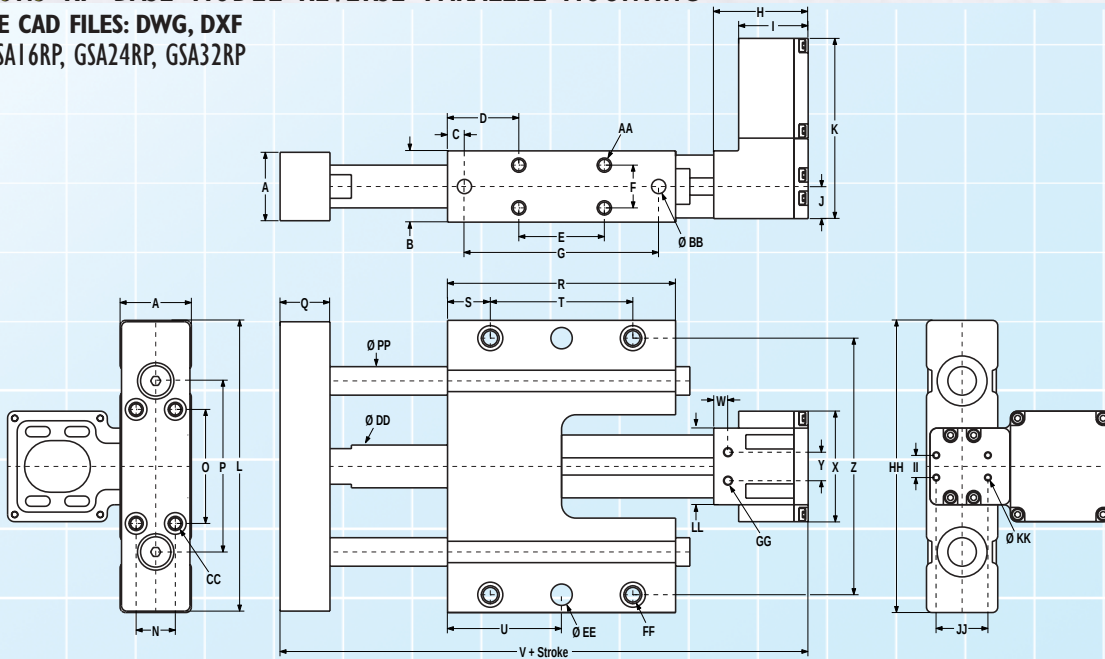
MODEL	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
GSM12	30.5	31.8	7.54	31.75	38.10	19.05	86.51	18.3	6.4	15.2	—	129.0	17.48	50.80	76.20	22.2	101.6	19.05	63.50	50.80	162.26	5.1	28.6	12.7	114.30
GSM16	43.2	44.5	13.11	41.28	44.45	25.40	100.81	18.3	6.4	15.2	50.8	157.5	25.40	63.50	95.25	28.6	127.0	30.18	66.68	63.50	181.31	5.1	28.6	12.7	138.13
GSM24	54.6	57.2	11.13	41.28	69.85	31.75	130.18	36.0	—	14.0	—	194.3	34.93	88.90	127.00	34.9	152.4	27.00	98.43	76.20	242.34	4.3	51.8	20.0	177.80
GSM32	67.3	69.9	15.09	53.98	69.85	44.45	147.62	45.4	—	17.5	—	251.5	44.45	127.00	168.28	41.3	177.8	36.53	104.78	88.90	294.41	6.5	65.5	24.1	228.60

MODEL	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ
GSM12	M6*1.0-6H x 12	6 x 10	M6*1.0-6H, 9.5 CB x 5.6 OPP SIDE	19.1	10 x 12	6.76 THRU, Ø 11.1 CB x 7.1, M8*1.25-6H OPP SIDE	M4*0.7-6H x 6	4.75	—	4.78
GSM16	M6*1.0-6H x 12	6 x 10	M8*1.25-6H, 11.1 CB x 7.1 OPP SIDE	22.4	10 x 12	6.76 THRU, Ø 11.1 CB x 7.1, M8*1.25-6H OPP SIDE	M4*0.7-6H x 6	4.75	4.6	4.78
GSM24	M8*1.25-6H x 16	8 x 12	M8*1.25-6H, 11.1 CB x 7.1 OPP SIDE	31.8	12 x 12	8.33 THRU, Ø 13.5 CB x 8.6, M10*1.5-6H OPP SIDE	M6*1.0-6H x 9	8	—	4
GSM32	M10*1.5-6H x 19	10 x 12	M10*1.5-6H, 13.5 CB x 12.7 OPP SIDE	44.5	12 x 12	10.49 THRU, Ø 18.2 CB x 11.9, M12*1.75-6H OPP SIDE	M8*1.25-6H x 13	10	—	4.78

GSA/GSM SERIES GUIDED SCREW ACTUATOR

DIMENSIONS RP BASE MODEL REVERSE PARALLEL MOUNTING

REFERENCE CAD FILES: DWG, DXF
GSA12RP, GSA16RP, GSA24RP, GSA32RP



GSA Series

Dimensions in inches

MODEL	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
GSA12	1.20	1.25	0.297	1.250	1.500	0.750	3.406	—	—	0.56	—	5.08	0.688	2.000	3.000	0.88	4.00	0.750	2.500	2.000	—	0.250	—	0.500	4.500
GSA16	1.70	1.75	0.516	1.625	1.750	1.000	3.969	1.78	1.41	0.69	3.77	6.20	1.000	2.500	3.750	1.13	5.00	1.188	2.625	2.500	8.20	0.250	2.25	0.500	5.438
GSA24	2.15	2.25	0.438	1.625	2.750	1.250	5.125	2.26	1.14	1.01	4.91	7.65	1.375	3.500	5.000	1.38	6.00	1.063	3.875	3.000	10.39	0.173	2.35	0.787	7.000
GSA32	2.65	2.75	0.594	2.125	2.750	1.750	5.812	3.19	1.72	1.23	5.85	9.90	1.750	5.000	6.625	1.63	7.00	1.438	4.125	3.500	12.99	0.255	2.75	0.950	9.000

MODEL	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ
GSA12	1/4-20 UNC-2B x .50	250 x .38	1/4-20 UNC-2B, Ø.38 CB x .22 OPP SIDE	0.75	.375 x .50	.266 THRU, Ø.44 CB x .28, 5/16-18 UNC-2B x .75 OPP SIDE	8-32 UNC-2B x .25	5.13	0.391	0.906
GSA16	1/4-20 UNC-2B x .50	250 x .38	5/16-18 UNC-2B, Ø.44 CB x .28 OPP SIDE	0.88	.375 x .50	.266 THRU, Ø.44 CB x .28, 5/16-18 UNC-2B x .75 OPP SIDE	8-32 UNC-2B x .25	6.25	0.391	0.906
GSA24	5/16-18 UNC-2B x .63	.313 x .50	5/16-18 UNC-2B, Ø.44 CB x .28 OPP SIDE	1.25	.500 x .50	.328 THRU, Ø.53 CB x .34, 3/8-16 UNC-2B x 1.00 OPP SIDE	1/4-20 UNC-2B x .44	7.75	1.603	0.875
GSA32	3/8-16 UNC-2B x .75	.375 x .50	3/8-16 UNC-2B, Ø.53 CB x .50 OPP SIDE	1.75	.500 x .50	.453 THRU, Ø.72 CB x .47, 1/2-13 UNC-2B x 1.50 OPP SIDE	5/16-18 UNC-2B x .47	10.00	1.969	1.182

MODEL	KK	LL	PP STD	OVS
GSA12	5-40 UNC-2B THRU	—	0.50	0.63
GSA16	5-40 UNC-2B THRU	1.34	0.63	0.75
GSA24	10-24 UNC-2B x .21	2.11	0.75	1.00
GSA32	1/4-20 UNC-2B x .32	2.75	1.00	1.25

GSA12 ONLY / MOTOR	H	I	K	V	X	LL
17 FRAME	1.66	1.22	3.16	7.33	1.94	1.34
23 FRAME	1.94	1.56	3.65	7.61	2.25	1.38

GSM12 ONLY / MOTOR	H	I	K	V	X	LL
17 FRAME	42.2	31.0	80.3	186.2	49.3	34.0
23 FRAME	49.3	39.6	92.7	193.3	57.2	35.1

Dimensions in millimeters

MODEL	KK	LL	PP STD	OVS
GSM12	M3x0.5-6H THRU	—	12.7	15.9
GSM16	M3x0.5-6H THRU	34.0	15.9	19.1
GSM24	M5x0.8-6H x 5	53.6	19.1	25.4
GSM32	M6x1.0-6H x 8	69.9	25.4	31.8

GSM Series

MODEL	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
GSM12	30.5	31.8	7.54	31.75	38.10	19.05	86.51	—	—	14.3	—	129.0	17.48	50.80	76.20	22.2	101.6	19.05	63.50	50.80	—	6.35	—	12.70	114.30
GSM16	43.2	44.5	13.11	41.28	44.45	25.40	100.81	45.2	35.8	17.4	95.8	157.5	25.40	63.50	95.25	28.6	127.0	30.18	66.68	63.50	208.3	6.35	57.2	12.70	138.13
GSM24	54.6	57.2	11.13	41.28	69.85	31.75	130.18	57.4	29.0	25.7	124.7	194.3	34.93	88.90	127.00	34.9	152.4	27.00	98.43	76.20	263.9	4.39	59.7	19.99	177.80
GSM32	67.3	69.9	15.09	53.98	69.85	44.45	147.62	81.0	43.7	31.2	148.6	251.5	44.45	127.00	168.28	41.3	177.8	36.53	104.78	88.90	329.9	6.48	69.9	24.13	228.60

MODEL	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ
GSM12	M6 x 1.0-6H x 12	6 x 10	M6 x 1.0-6H, 9.5 CB x 5.6 OPP SIDE	19.1	10 x 12	6.76 THRU, Ø 11.1 CB x 7.1, M8 x 1.25-6H OPP SIDE	M4 x 0.7-6H x 6	130.3	9.93	23.01
GSM16	M6 x 1.0-6H x 12	6 x 10	M8 x 1.25-6H, 11.1 CB x 7.1 OPP SIDE	22.4	10 x 12	6.76 THRU, Ø 11.1 CB x 7.1, M8 x 1.25-6H OPP SIDE	M4 x 0.7-6H x 6	158.8	9.93	23.01
GSM24	M8 x 1.25-6H x 16	8 x 12	M8 x 1.25-6H, 11.1 CB x 7.1 OPP SIDE	31.8	12 x 12	8.33 THRU, Ø 13.5 CB x 8.6, M10 x 1.5-6H OPP SIDE	M6 x 1.0-6H x 11	196.9	40.72	22.23
GSM32	M10 x 1.5-6H x 19	10 x 12	M10 x 1.5-6H, 13.5 CB x 12.7 OPP SIDE	44.5	12 x 12	10.49 THRU, Ø 18.2 CB x 11.9, M12 x 1.75-6H OPP SIDE	M8 x 1.25-6H x 12	254.0	50.01	30.02

GSA/GSM SERIES GUIDED SCREW ACTUATOR

OPTIONS AND ACCESSORIES

STOP COLLARS



Available for both standard and oversize guide rods, these stop collars are an extra safety factor when applications have heavy loads.

STAINLESS STEEL GUIDE RODS



Available for both standard and oversize guide rods, stainless steel guide rods and fasteners are available. Use in applications where protection from corrosives is required. Linear Bearings are not available with stainless steel guide rod option.

AVAILABLE OPTIONS – LMI, IN-LINE MODEL

CODE	OPTION	GSA12	GSA16	GSA24	GSA32	GSM12	GSM16	GSM24	GSM32
GH	GEARHEAD REDUCTION	–	–	OP	OP	–	–	OP	OP
MRV	BRUSHLESS SERVO MOTORS, FRAME SIZE =	17, 23	23	23	23, 34	17, 23	23	23	23, 34
MRS	STEPPER MOTORS, FRAME SIZE =	17, 23	23	23	23, 34	17, 23	23	23	23, 34
MRB	BRUSH DC MOTORS, FRAME SIZE =	23	23	23	23, 34, 40	23	23	23	23, 34, 40
pg. 59	SWITCHES (HALL EFFECT, DC REED, AC TRIAC)	OP	OP	OP	OP	OP	OP	OP	OP
S	STAINLESS STEEL GUIDE RODS	OP	OP	OP	OP	OP	OP	OP	OP
	DOUBLE C-FACE BRAKES (AVAILABLE FOR 23 AND 34 FRAME MOTORS)	OP	OP	OP	OP	OP	OP	OP	OP
CK	STOP COLLARS	OP*	OP	OP	OP	OP*	OP	OP	OP

– Not Available OP Optional

AVAILABLE OPTIONS – RP, REVERSE PARALLEL MODEL

CODE	OPTION	GSA12	GSA16	GSA24	GSA32	GSM12	GSM16	GSM24	GSM32
RP1	1:1 REDUCTION	OP	OP	OP	OP	OP	OP	OP	OP
RP2	2:1 REDUCTION	–	–	OP	OP	–	–	OP	OP
GH	GEARHEAD REDUCTION	–	–	–	–	–	–	–	–
MRV	BRUSHLESS SERVO MOTORS, FRAME SIZE =	17, 23	23	23	23, 34	17, 23	23	23	23, 34
MRS	STEPPER MOTORS, FRAME SIZE =	17, 23	23	23	23, 34	17, 23	23	23	23, 34
MRB	BRUSH DC MOTORS, FRAME SIZE =	23	23	23	23, 34, 40	23	23	23	23, 34, 40
pg. 59	SWITCHES (HALL EFFECT, DC REED, AC TRIAC)	OP	OP	OP	OP	OP	OP	OP	OP
S	STAINLESS STEEL GUIDE RODS	OP	OP	OP	OP	OP	OP	OP	OP
	DOUBLE C-FACE BRAKES (AVAILABLE FOR 23 AND 34 FRAME MOTORS)	OP	OP	OP	OP	OP	OP	OP	OP
CK	STOP COLLARS	OP*	OP	OP	OP	OP*	OP	OP	OP

– Not Available OP Optional

* Stop collar option on GSA(M)12 actuators is not available if switches are mounted on the actuator sides.



SINGLE SOURCE SUPPLIER

We know actuation and we know motion control. For years, Tol-O-Matic has been providing high-quality, top performing mechanical actuators that have withstood the test of time. All our motion control components—brushless servo, microstepping and brushed dc—are designed to work *with* our actuators for easy integration, low-maintenance and flawless performance. And, because all components (from actuator to connecting cables) are pre-engineered to work together, your system is up and running faster without compatibility conflicts.

ENGINEERING EXPERTISE

Tol-O-Matic employs a complete staff of highly trained mechanical, electrical and application engineers, and skilled technicians to support you every step of the way. Working together with our sales team and our distributors, we will provide you with responsive, timely system solutions.



**5
DAYS
BUILT-TO-ORDER**

EASY-TO-USE SIZING SOFTWARE

Our Tol-O-Motion™ Windows-based sizing and selection software, makes selecting the right Axidyne actuator and motion controls a snap. With Tol-O-Motion, our complete arsenal of mix and match components is available at your fingertips, categorized from the most cost-effective system solution to the most sophisticated.



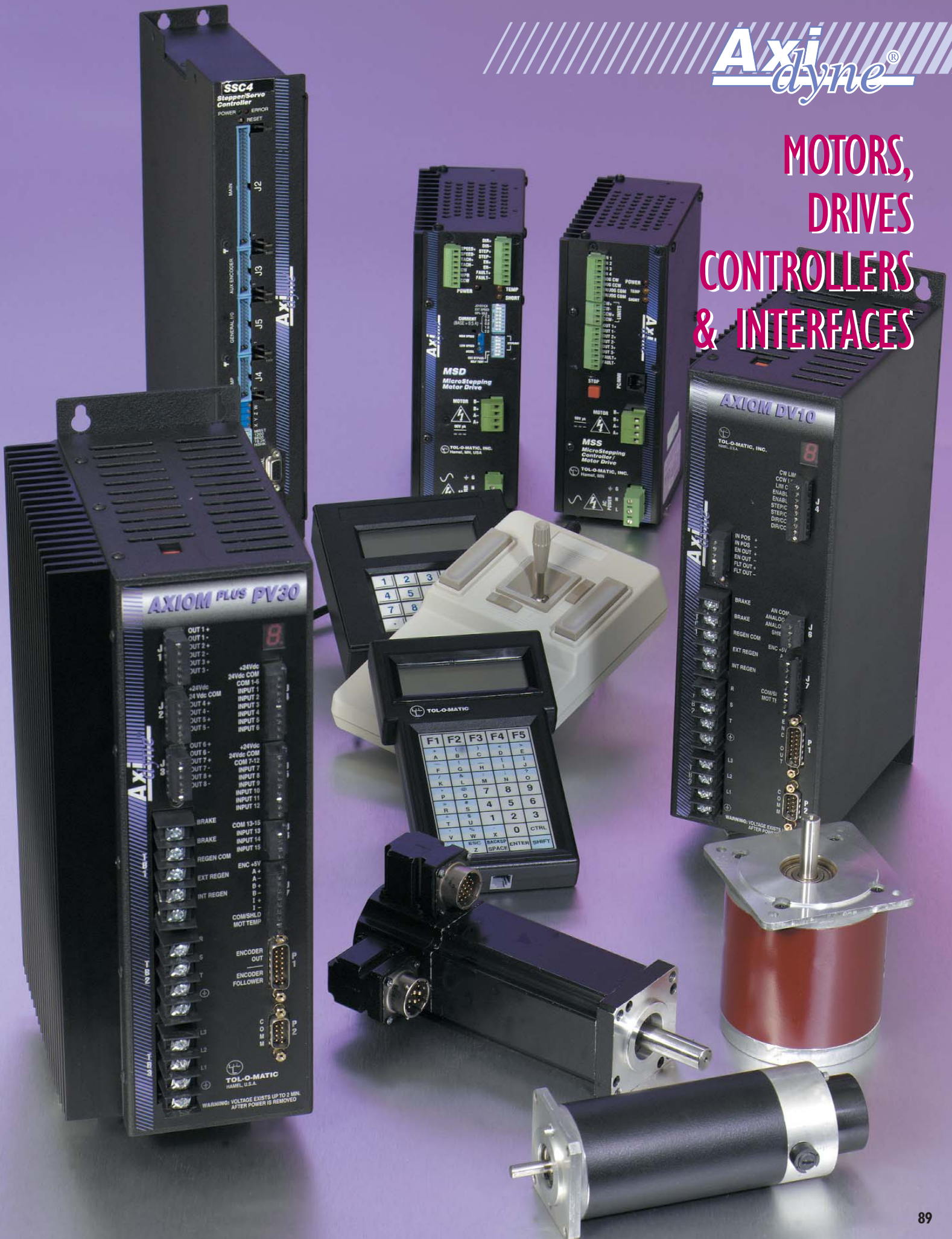
INDUSTRY LEADING SHIPPING

Tol-O-Matic leads the industry with our "5-day standard" shipping. We take pride in our on-time delivery schedule and are consistently looking for ways to improve it.

ACTUATION, CONTROLS AND FLAWLESS PERFORMANCE

Axi-dyne®

MOTORS, DRIVES CONTROLLERS & INTERFACES



AXIDYNE MOTION CONTROL SYSTEMS OVERVIEW

AN AXIDYNE ELECTRONIC LINEAR MOTION CONTROL SYSTEM IS COMPRISED OF:

- A mechanical actuator to convert motor rotary motion to linear motion.
- A motor to convert electrical energy to mechanical energy in the form of rotary motion.
- A drive to interpret the incoming command and motor position signal, and provide a corresponding conversion of line voltage to appropriately phased voltage for the motor.
- A controller to store and/or interpret high level commands received from a computer or operator interface, and to generate the necessary signals to control motor velocity, acceleration, position, and direction based on program and discrete inputs.
- An operator interface to allow system operators to program or signal the controller remotely.

This modular approach provides flexibility in control system design and helps provide the most cost-effective solution to a range of linear motion control requirements.



MECHANICAL ACTUATORS

TKS, TKB, B3S, M3S, BCS, MCS, SLS, MLS, B3B, M3B, RSA, RSM, GSA, GSM

MOTORS

MRV (Brushless Servo)
MRS (Stepper)
MRB (Brushed dc)

DRIVES

AXIOM™ DV, AXIOM™ DB
MSD

CONTROLLER/DRIVE COMBINATIONS

MSS, AXIOM™ PLUS PV

CONTROLLERS

MSC, SSC

OPERATOR INTERFACES

PIT, JS, SIT



General Requirements:

- The motor must provide the torque and speed necessary for the actuator to meet the application requirements.
- The drive must convert the local power source to the power input required by the motor.
- The motor and the drive power ratings (watts) must match the peak and the RMS requirements of the application.
- The controller allows inputs from the operator or supervisory system (PLC or computer) to properly control the motor and achieve the required motion profile(s).

Axidyne Motion Control Systems

Axidyne systems include brushless servos, brushed dc servos, and microsteppers.

• Brushless Servo System

- ▲ Extremely smooth and quiet operation
- ▲ Good for high torques [up to 75 in-lbs. (8.55 N-m) continuous, 150 in-lbs. (17.1 N-m) peak]
- ▲ Good for high speeds, up to 6,000 RPM
- ▲ High resolution, 4,000 encoder counts per revolution
- ▲ Torque control
- ▲ Good for long or short multi-step moves
- ▲ Maintenance free

• Brushed DC System

- ▲ Low to medium cost
- ▲ Smooth and quiet operation
- ▲ Good for speeds up to 4,000 RPM
- ▲ Good for torques up to 40 in-lbs. (4.56 N-m) continuous, 64 in-lbs. (7.30 N-m) peak
- ▲ High resolutions of 4,000 encoder counts per revolution

• Microstepping System

- ▲ Low-cost for precise positioning
- ▲ Highest resolution [up to 50,800 steps- rev] without feedback device
- ▲ Good for speeds less than 2,000 RPM
- ▲ Good for torque requirements less than 35 in-lbs. (3.95 N-m)
- ▲ Smoothness better than full or half step, but not as good as servos
- ▲ Good for long or short multi-step moves
- ▲ Maintenance free



Easier

Or call your Tol-O-Matic distributor or the factory. Use our expertise to help you select the best system for your application.



All Software is available for downloading at www.tolomatic.com

MOTORS



MRV11 MRV21 MRV31 MRV51
 MRV22 MRV32
 MRV23 MRV33
 MRV24

SERVO DRIVE ONLY



AXIOM™ DV

SINGLE OR AXIS FOLLOWER



AXIOM™ PLUS PV

Brushless Servo Motors (MRV)

- Rugged industrial enclosures
- Large shafts and bearings for longer life with high radial and axial loads
- Convenient MS connectors to simplify motor termination and provide excellent noise immunity
- Common industrial mechanical flanges (NEMA 17, 23, 34 and 56)
- Integral temperature sensor
- Integral 1000 line encoder with differential line driver outputs
- Ideally suited for use with AXIOM drives (motor parameters are stored in drive)
- Standard motors are IP65

Brushless Servo Drives (AXIOM® DV)

- Drive MRV series brushless servo motors
- Available in 3 different peak current ratings of 10A, 20A and 30A
- State-of-the-art vector commutation and current control for efficient high-bandwidth servo performance
- Simple Windows-based software speeds set-up and installation, using 2 main programming screens for drive configuration
- Standard pluggable screw terminal connectors eliminate need for secondary breakout terminal strips and auxiliary cabling
- Short circuit, over current and over voltage protection
- Optically isolated I/O
- CW/CCW travel limit inputs

Controllers for Brushless Servos 1.5 Axis (AXIOM® PLUS PV) (SSC) Multifunction, 1-4 Axis

AXIOM® PLUS PV

Controller/Drive:

- Combines a PLC, Motion Controller and AXIOM drive into one unit. Includes Tol-O-Motion™ AXIOM Motion Control Software and intuitive point and click sequential program and PLC ladder logic editors

PLC

- Real-time scan (typical program scan of 2-4 msec) supervisory function continuous from power-up
- Ladder logic allows 175 rungs plus 64 character descriptor downloaded and uploaded with program

MOTION CONTROLLER

- 1 to 1.5 axis (gearing to auxiliary axis)
- Event triggering based on intermediate positions
- Motion pause and resume
- Comment lines and labels down loaded and uploaded with program
- Point and click editor for easy command selection

DRIVE

- Same drive technology and features as the AXIOM® DV Series Drives



SERVO DRIVE/CONTROLLER

MULTI-AXIS

USER INTERFACES



SSC1, SSC2, SSC3 or SSC4 + AXIOM DV

BRUSHLESS SERVO SYSTEMS

Offering the
highest
performance
in motion
control
systems.

SSC Controller:

- Tol-O-Motion SSC Motion Control Software allows setup & programming with easy-to-use Windows® interface
- Joystick teach mode
- Industrial enclosure
- Uses a 32-bit specialized microcomputer and custom, submicron gate array for highest performance and speed
- Up to 4 axes per unit – up to 4 units can be daisy-chained
- 8,000,000 counts/sec encoder feedback for servos
- 2,000,000 steps/sec for stepper control
- 4M non-volatile EEPROM memory for executing custom application programs – permits stand-alone operation
- Multitasking feature permits simultaneous execution of four independent applications programs
- Performs any motion task including jogging, point-to-point positioning, linear and circular interpolation, electronic gearing, camming and contouring
- Relative and absolute positioning with more than $\pm 2,000,000,000$ counts per move
- Dedicated opto-isolated inputs for home, abort, forward and reverse limits
- 8 uncommitted, opto-isolated inputs and 8 programmable outputs
- 7 analog inputs with 12-bit ADC for interface to joysticks, sensors, pressure transducers, potentiometers (16-bit ADC optional)

Brushless Servo User Interfaces (Host PC, SIT, PIT, JS)

Tol-O-Matic offers three types of user friendly interfaces: PIT panel mount, JS joystick or SIT hand-held controller.

MOTORS



MRS17I

MRS231
MRS232

MRS341
MRS342
MRS343

MICROSTEPPING DRIVE ONLY



MSD

BASIC SINGLE AXIS



MSS

Stepper Motors (MRS)

- Long life bearings
- High temperature insulation
- Exceptional thermal dissipation properties
- NEMA 17, 23 and 34 mounting
- High torque to inertia ratio

Microstepping Drive (MSD)

- Motor current from 0.5 to 5.5 peak amps/phase (switch selectable, 51 settings)
- Step, direction, amplifier enable inputs, fault output, optically isolated
- 16 switch selectable microstepping resolutions: 200, 400, 1000, 2000, 5000, 10000, 12800, 18000, 20000, 21600, 25000, 25400, 25600, 36000, 50000, 50800, steps/rev
- Over-temperature protection
- Idle current reduction (50% switch selectable)
- Pluggable screw terminal connectors, mating connectors included

Controllers for Steppers (MSS) Basic Single Axis (SSC) Multifunction, 1-4 Axis

MSS Controller/Drive:

- Combines basic single axis controller and drive
- Tol-O-Motion MS Motion Control Software allows setup & programming with intuitive icons
- Software selectable motor current: 0.5 to 5.5 peak amps/phase
- Drive Voltage: 80 Vdc
- Input Voltage: 110 or 220 Vac (50/60 hz)
- Microstep Resolution: 13 software selectable resolutions, 2000 to 50800 steps/revolution
- Automatic idle current reduction: 0%, 25%, 50% or 100% software selectable

- Two dedicated, optically isolated limit switch inputs, 5 - 24 Vdc
- CW and CCW jog inputs
- Four general purpose, opto-isolated inputs
- Drive fault output
- 3 general purpose, optically isolated outputs for interfacing to other equipment



MICRO-STEPPING SYSTEMS

Low cost systems providing high resolution. These systems offer ease of set up and programming.

SERVO DRIVE/CONTROLLER

USER INTERFACES



PIT PANEL CONTROL

USER INTERFACES



JS
JOYSTICK

SIT
HAND-HELD

MULTI-AXIS



SSC1, SSC2, SSC3 or SSC4 + MSD

SSC Controller:

- Tol-O-Motion SSC Motion Control Software allows setup & programming with easy-to-use Windows® interface
- Joystick teach mode
- Up to 4 axes per unit – up to 4 units can be daisy-chained
- Industrial enclosure
- Uses a 32-bit specialized microcomputer and custom, submicron gate array for highest performance and speed
- 8,000,000 counts/sec encoder feedback for servos
- 2,000,000 steps/sec for stepper control
- 4M non-volatile EEPROM memory for executing custom applications programs –permits stand-alone operation
- Multitasking feature permits simultaneous execution of four independent applications programs
- Performs any motion task including jogging, point-to-point positioning, linear and circular interpolation, electronic gearing, camming and contouring
- Relative and absolute positioning with more than $\pm 2,000,000,000$ counts per move
- Dedicated opto-isolated inputs for home, abort, forward and reverse limits
- 8 uncommitted, opto-isolated inputs and 8 programmable outputs
- 7 analog inputs with 12-bit ADC for interface to joysticks, sensors, pressure transducers, potentiometers (16-bit ADC optional)

Stepper User Interfaces (Host PC, SIT, PIT, JS)

Tol-O-Matic offers three types of user friendly interfaces: PIT panel mount, JS joystick or SIT hand-held controller.

MOTORS



MRB21

MRB31
MRB32
MRB41

MRB42

SERVO DRIVE ONLY



AXIOM™ DB

BASIC SINGLE AXIS



MSC + AXIOM™ DB

Brushed DC Motors (MRB)

- Rugged industrial enclosures
- Available with 1,000 line optical encoder for servo operation
- Ideal for operation with AXIOM® DB brushed servo drives

Brushed Dc Servo Drive (AXIOM® DB)

- Drive MRB series brush servo motors
- Peak current ratings of 20A
- Simple Windows-based software speeds set-up and installation, using 2 main programming screens for drive configuration
- Standard pluggable screw terminal connectors eliminate need for secondary breakout terminal strips and auxiliary cabling
- Short circuit, over-current and over-voltage correction
- Excellent performance and accuracy at high speeds
- Optically isolated I/O
- Dedicated CW/CCW travel limit inputs
- Drive enable, step/direction and step CW/step CCW input

Controllers for Brushed DC

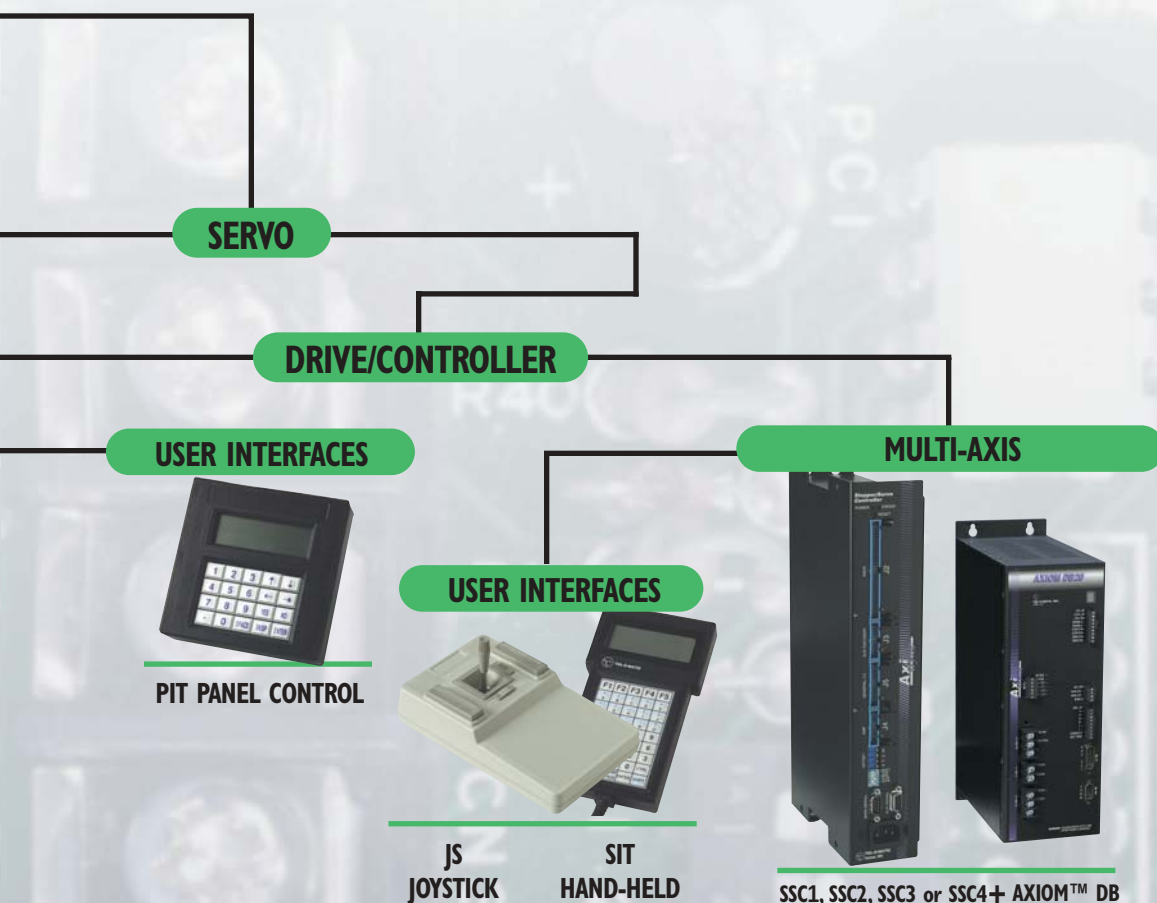
MSC Controller:

- Tol-O-Motion MS Motion Control Software allows setup & programming with intuitive icons
- Built-in power supplies: 24 Vdc, 100mA is provided for the user for sensors and I/O circuits.
- Differential step and direction outputs
- Accepts 115 or 230 volt AC power (50/60 hz)
- 4 dedicated, optically isolated inputs: CW and CCW jog, 2 limits
- 4 general purpose, optically isolated inputs
- Drive fault output
- 3 general purpose, optically isolated outputs
- Pluggable screw terminal connectors for I/O, drive



BRUSHED DC SYSTEMS

A low cost technology to meet basic linear motion needs with smooth quiet motion.



Systems (MSC) Basic Single Axis and (SSC) Multi-function 1-4 Axis

- AC power (all mating connectors included)
- Programmable resolution to match encoder (quadrature 4,000 counts per rev.)

SSC Controller:

- Tol-O-Motion SSC Motion Control Software allows setup & programming with easy-to-use Windows® interface
- Joystick teach mode
- 8,000,000 counts/sec encoder feedback for servos
- 2,000,000 steps/sec for stepper control
- Industrial enclosure
- Uses a 32-bit specialized microcomputer and custom, submicron gate array for highest performance and speed

- 4M non-volatile EEPROM memory for executing custom applications programs —permits stand-alone operation
- Up to 4 axes per unit — up to 4 units can be daisy-chained
- Multitasking feature permits simultaneous execution of four independent applications programs
- Performs any motion task including jogging, point-to-point positioning, linear and circular interpolation, electronic gearing, camming and contouring
- Relative and absolute positioning with more than $\pm 2,000,000,000$ counts per move
- Dedicated opto-isolated inputs for home, abort, forward and reverse limits
- 7 analog inputs with 12-bit ADC for interface to joysticks, sensors, pressure transducers, potentiometers (16-bit ADC optional)
- 8 uncommitted, opto-isolated inputs and 8 programmable outputs

Brushed DC User Interfaces (Host PC, SIT, PIT, JS)

Tol-O-Matic offers three types of user friendly interfaces: PIT panel mount, JS joystick or SIT hand-held controller.

MOTORS

Axidyne motors are available for brushless servo, microstepping and brushed dc systems. These motors combine flexibility and superior performance in compact packages

MRB Brushed DC Motors

Axidyne's MRB brushed dc motors come with a 1000 line encoder. They are the perfect choice for cost-sensitive applications requiring smooth and quiet low speed operation.

MRV Brushless Servo Motors

Designed for maximum power density, these motors come with an internally mounted 1000 line encoder.

MRS Stepper Motors

Axidyne's MRS stepper motors are the best cost/performance value available, with high torque-to-inertia ratios and exceptional thermal dissipation properties.



STEPPER



MRV BRUSHLESS SERVO MOTORS

FEATURES • SPECIFICATIONS • PERFORMANCE DATA • DIMENSIONS • ORDERING

Tol-O-Matic's MRV series brushless servo motors provide a wide range of rated torques and speeds for applications requiring long life under continuous, difficult environment operation. These motors are designed for maximum power density. The MRV series motor come with an internally mounted 1000 line encoder.

Features

- **Rugged industrial enclosures**
- **Large shafts and bearings** for longer life with high radial and axial loads
- **Dual convenient MS connectors** to simplify motor termination and provide excellent noise immunity
- **Common industrial mechanical flanges** (NEMA 17, 23, 34, 56)
- **Integral 1000 line TTL encoder** with differential line driver outputs
- **Ideally suited for use with AXIOM DV drives** (motor parameters are stored with drive) – torque/speed curves shown on the following pages reflect MRV motors with Axiom drive performance.
- **Internal thermal circuit breaker**
- **IP65 rated (except MRV11)**



SPECIFICATIONS

Model	KE (1)	KT (2)		Resistance (3)		Rotor Inertia		Thermal Resistance	Cont. Stall Torque		Peak Stall Torque		Max. Speed	Inductance (4)	Weight	
	Volts/1000RPM	lb.-in./amp.	N-m/amp.	Ohms	oz.-in.2	gr.-cm.2	°C/W		oz.-in.	N-m	oz.-in.	N-m	RPM	mH	lbs.	kgs.
MRV11	6.06	0.893	0.100	2.24	0.313	57.2	—		40	0.28	200	1.41	5000	1.63	1.16	0.53
MRV21	8.8	1.29	0.144	2.22	0.852	156	1.8		60	0.42	181	1.28	6000	1.81	2.2	1.0
MRV22	14.5	2.12	0.237	2.04	1.58	289	1.3		120	0.85	360	2.54	6000	2.10	3.1	1.4
MRV23	21.8	3.19	0.357	2.73	2.28	417	1.23		180	1.27	541	3.82	6000	2.95	4	1.8
MRV24	29.0	4.25	0.476	3.36	3.08	563	1.16		250	1.77	750	5.30	6000	3.81	5	2.3
MRV31	14.8	2.17	0.243	1.1	6.17	1130	0.72		272	1.92	1360	9.6	6000	2.6	8	3.6
MRV32	22.2	3.25	0.364	0.8	11.1	2030	0.58		480	3.39	2400	16.9	6000	2.5	11.5	5.2
MRV33	25.9	3.79	0.424	0.60	16.1	2940	0.56		704	4.97	3520	24.9	6000	2.1	14	6.35
MRV51	48.9	7.15	0.801	0.54	40.5	7410	0.72		1280	9.04	3840	27.1	3000	3.06	26	11.8

All ratings typical and at 77°F (25°C) unless otherwise noted. Winding temperature at 257°F (125°C).

(1) L-L, RMS (±10%)

(2) Per Phase, RMS (±10%)

(3) L-L dc Resistance (±10%)

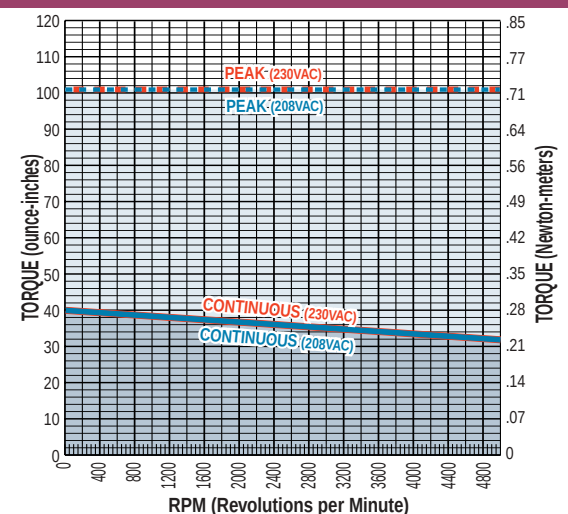
(4) L-L (±15%)

MOTORS

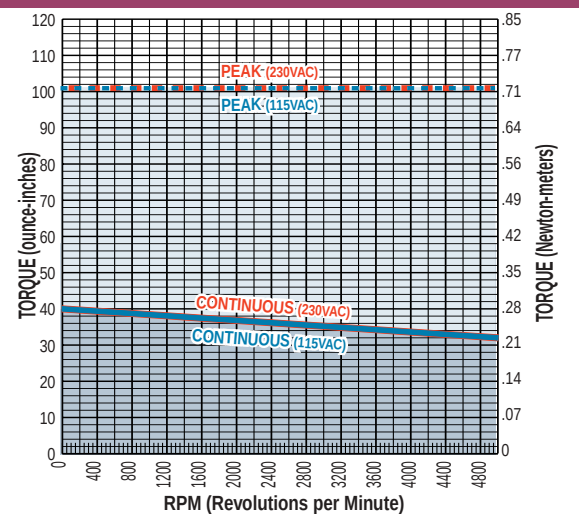


PERFORMANCE DATA WITH AXIOM[®] DV/PV DRIVES

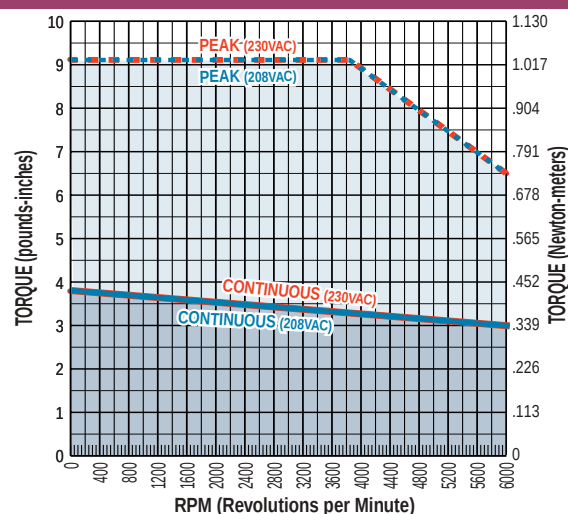
MRV11Y • DV/PV10 DRIVE • THREE-PHASE



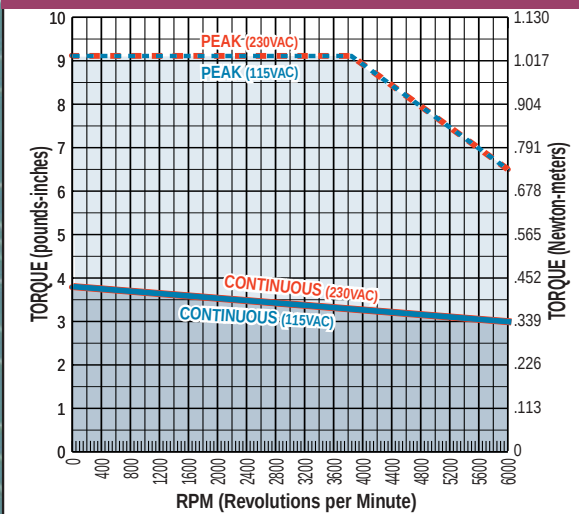
MRV11Y • DV/PV10 DRIVE • SINGLE-PHASE



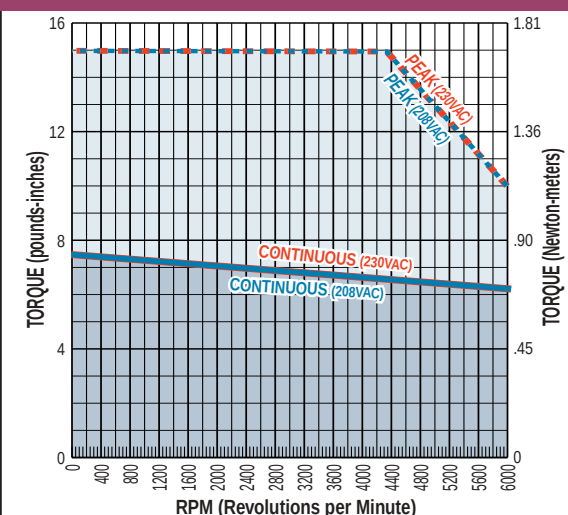
MRV21Y • DV/PV10 DRIVE • THREE-PHASE



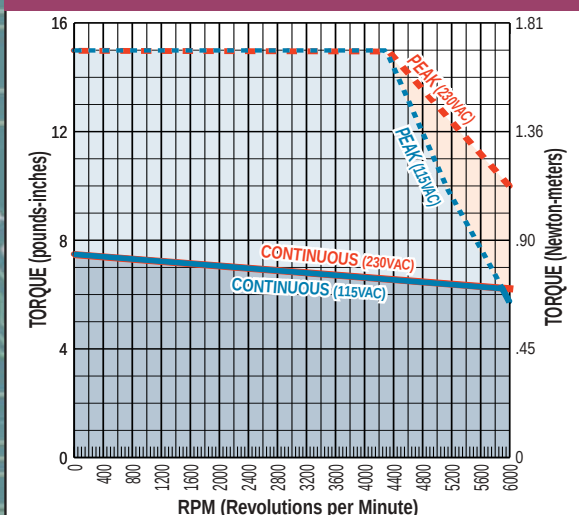
MRV21Y • DV/PV10 DRIVE • SINGLE-PHASE



MRV22Y • DV/PV10 DRIVE • THREE-PHASE

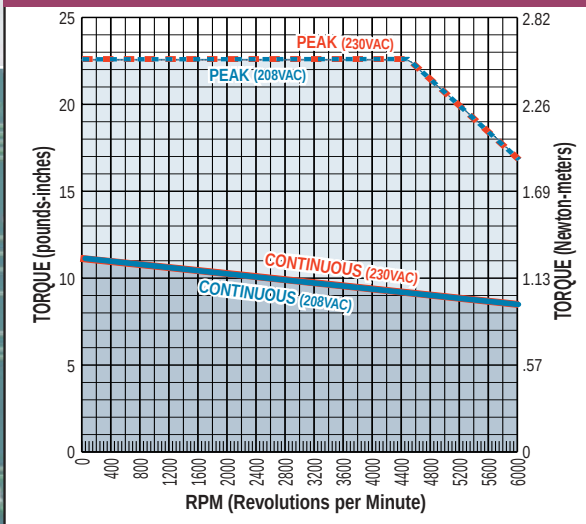


MRV22Y • DV/PV10 DRIVE • SINGLE-PHASE

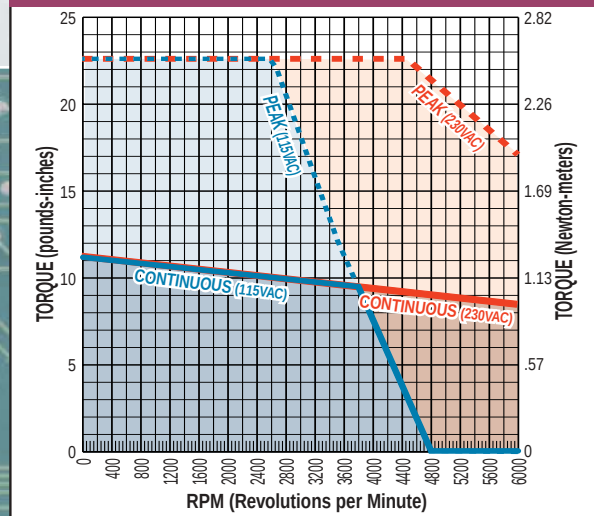


PERFORMANCE DATA WITH AXIOM[®] DV/PV DRIVES

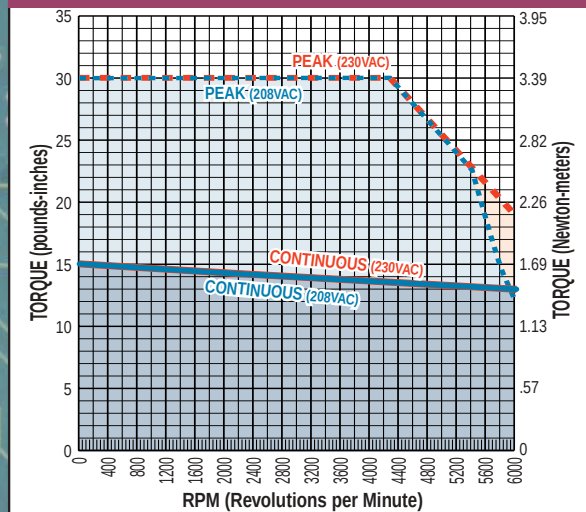
MRV23Y • DV/PV10 DRIVE • THREE-PHASE



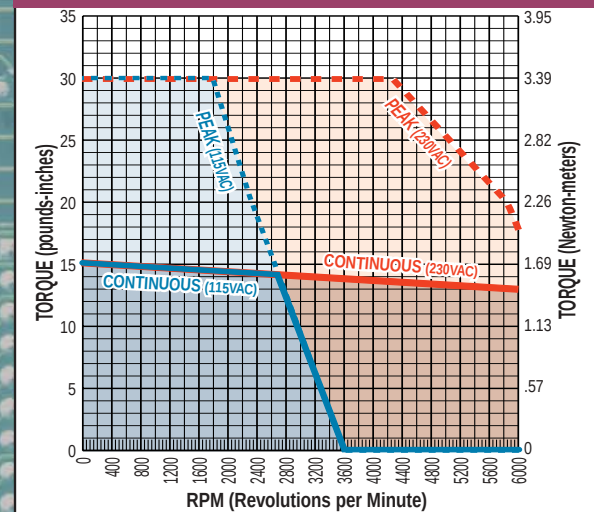
MRV23Y • DV/PV10 DRIVE • SINGLE-PHASE



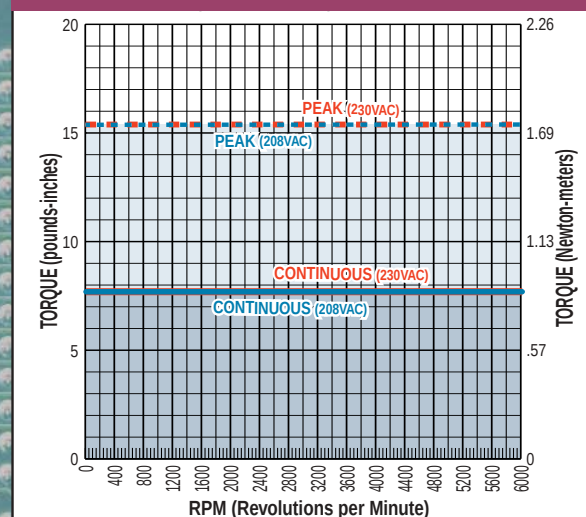
MRV24Y • DV/PV10 DRIVE • THREE-PHASE



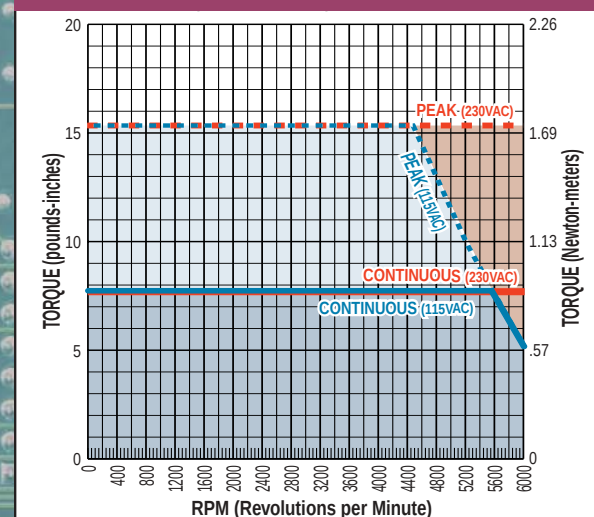
MRV24Y • DV/PV10 DRIVE • SINGLE-PHASE



MRV31Y • DV/PV10 DRIVE • THREE-PHASE



MRV31Y • DV/PV10 DRIVE • SINGLE-PHASE

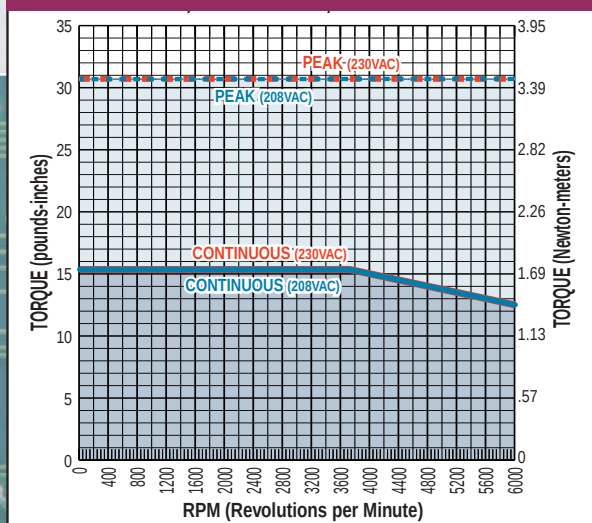


MOTORS

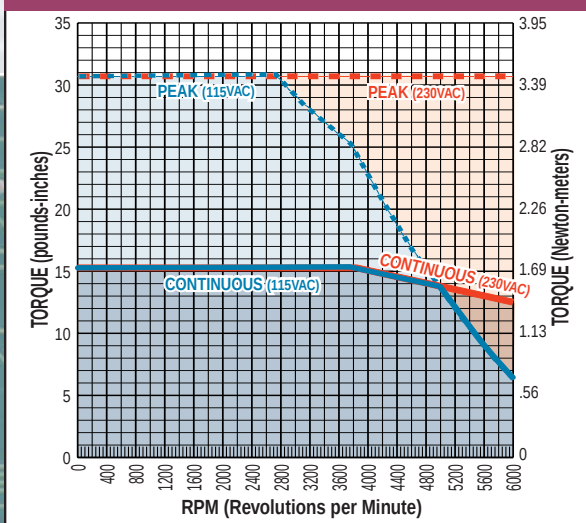


PERFORMANCE DATA WITH AXIOM® DV/PV DRIVES

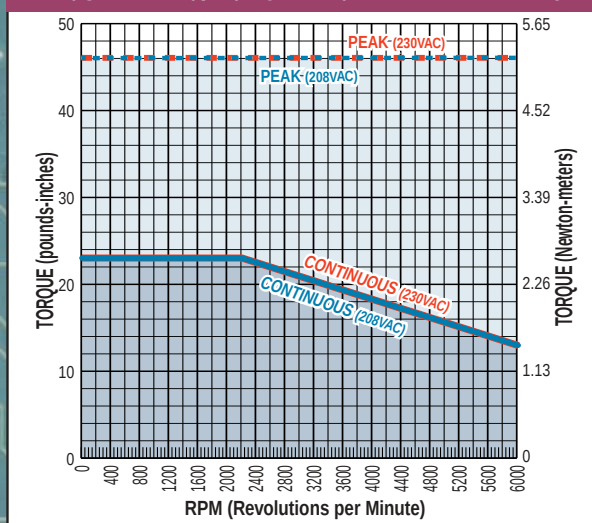
MRV31Z • DV/PV20 DRIVE • THREE-PHASE



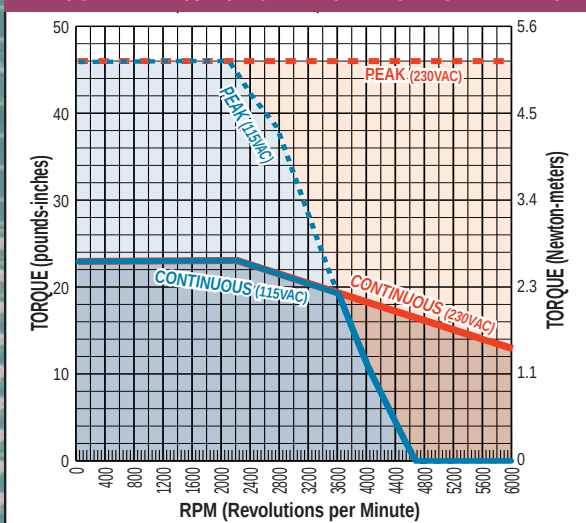
MRV31Z • DV/PV20 DRIVE • SINGLE-PHASE



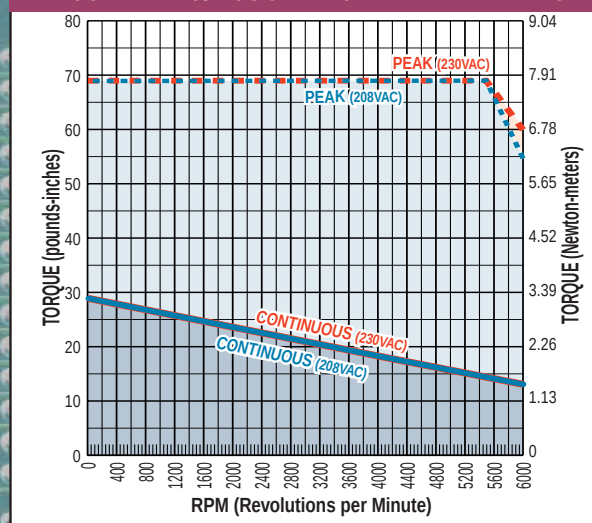
MRV32Y • DV/PV20 DRIVE • THREE-PHASE



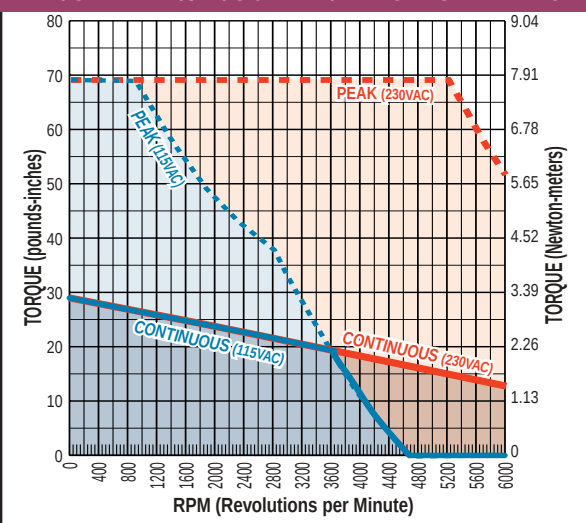
MRV32Y • DV/PV20 DRIVE • SINGLE-PHASE



MRV32Z • DV/PV30 DRIVE • THREE-PHASE

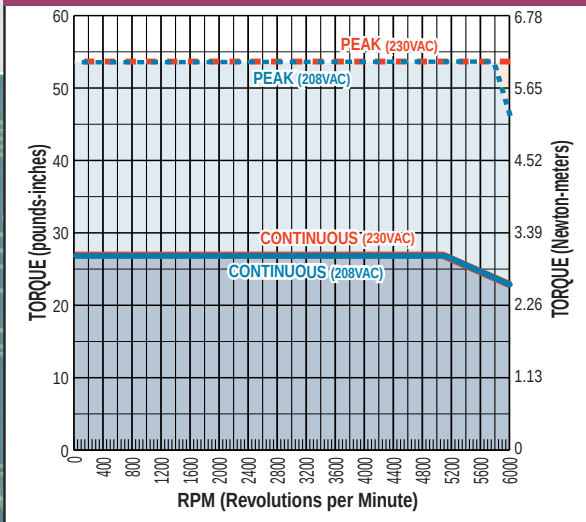


MRV32Z • DV/PV30 DRIVE • SINGLE-PHASE

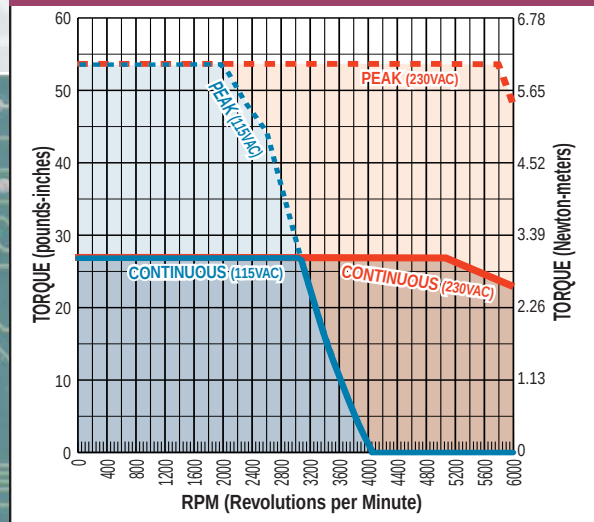


PERFORMANCE DATA WITH AXIOM[®] DV/PV DRIVES

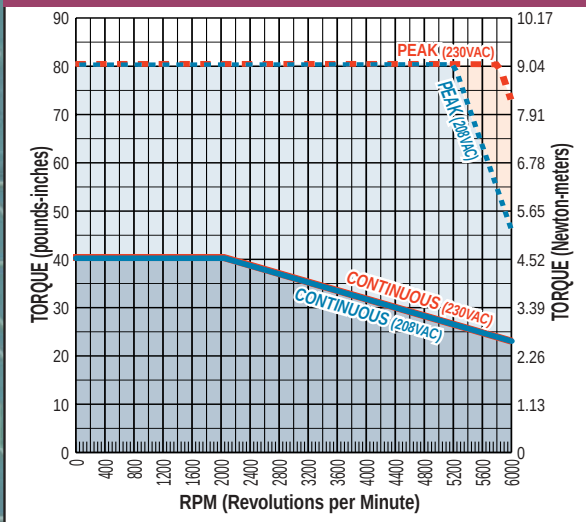
MRV33Y • DV/PV20 DRIVE • THREE-PHASE



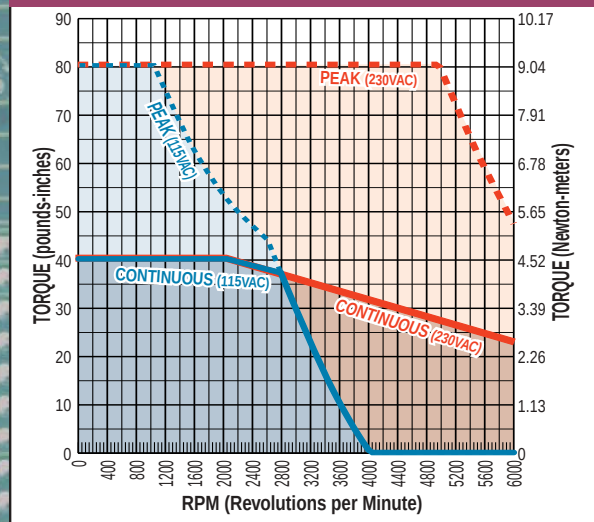
MRV33Y • DV/PV20 DRIVE • SINGLE-PHASE



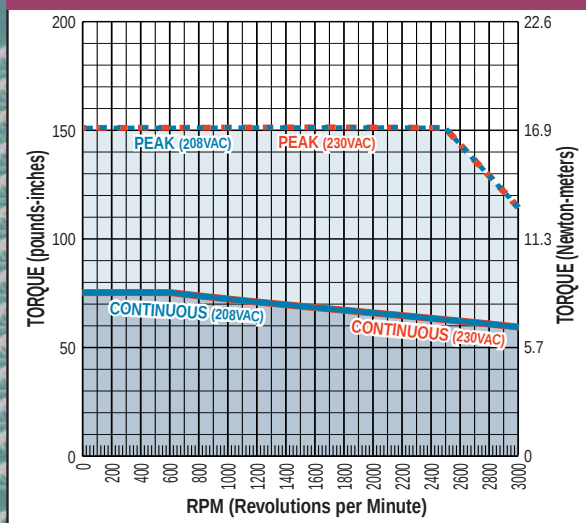
MRV33Z • DV/PV30 DRIVE • THREE-PHASE



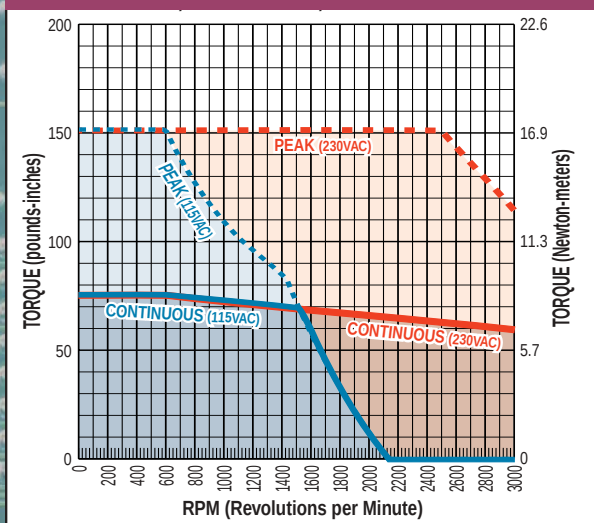
MRV33Z • DV/PV30 DRIVE • SINGLE-PHASE



MRV51Y • DV/PV30 DRIVE • THREE-PHASE



MRV51Y • DV/PV30 DRIVE • SINGLE-PHASE



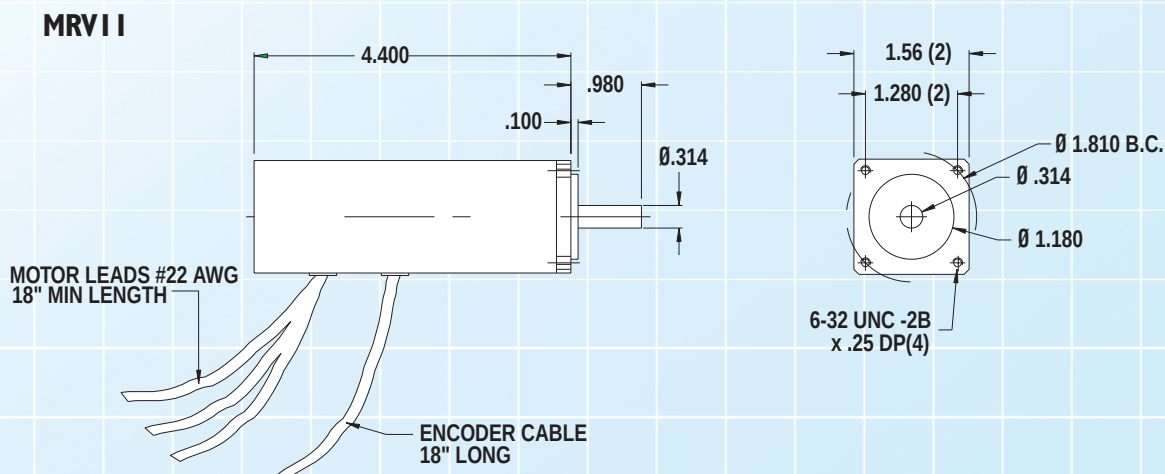
MOTORS



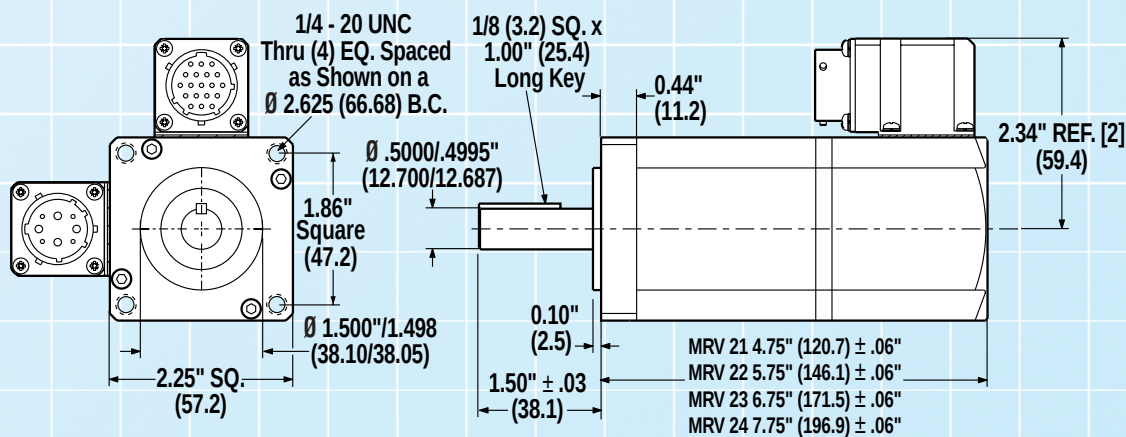
MRV BRUSHLESS SERVO MOTORS

DIMENSIONS • ORDERING

DIMENSIONS MRV11, 21, 22, 23, 24



MRV21, 22, 23, 24



Dimensions shown in inches and (Millimeters).



MOUNTING INFO

SCREW-DRIVES

Couplers/Motor Mounting Kits Page 149
 Gearhead Mounting Page 149
 In-line Motor/Gearhead Combination Mounts Page 150
 In-line Motor Mounts Page 160
 Reverse-Parallel Mounting Page 163

BELT-DRIVES

Direct Drive Mounting Page 170
 Reduction Drive Mounting Page 173

Ordering

Configuration Code	Tol-O-Matic Part #	NEMA Frame
MRV11	3600-6239	17
MRV21	3600-6240	23
MRV22	3600-6241	23
MRV23	3600-6242	23
MRV24	3600-6243	23

Cables

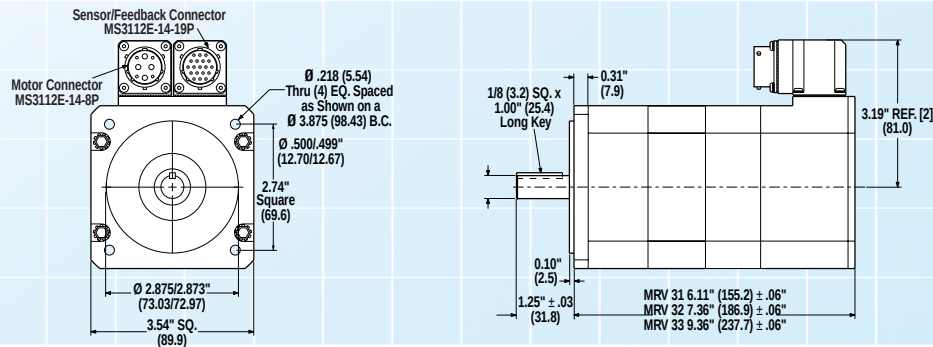
All cables are included when ordering AXIOM™ drives. (see page 145)

* Shafts not per NEMA standard

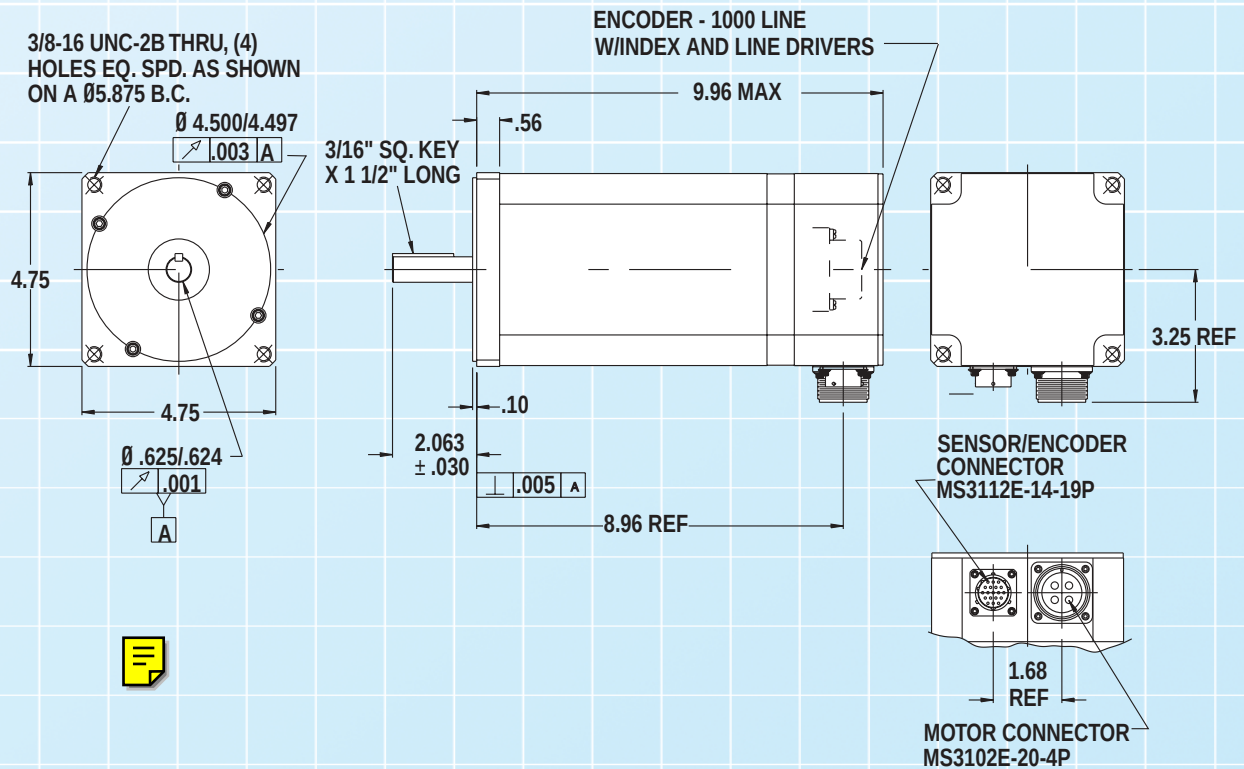
MRV BRUSHLESS SERVO MOTORS

DIMENSIONS • ORDERING

DIMENSIONS MRV31, 32, 33



DIMENSIONS MRV51



Dimensions shown in inches and (Millimeters).

Cables

All cables are included when ordering AXIOM™ drives.

(see page 145)

Ordering

Configuration Code	Tol-O-Matic Part #	NEMA Frame
MRV31	3600-6244	34
MRV32	3600-6245	34
MRV33	3600-6246	34
MRV51	3600-6247	56

MOUNTING INFO

SCREW-DRIVES

Couplers/Motor Mounting Kits Page 149
Gearhead Mounting Page 149
In-line Motor/Gearhead Combination Mounts Page 150
In-line Motor Mounts Page 160
Reverse-Parallel Mounting Page 163

BELT-DRIVES

Direct Drive Mounting Page 170
Reduction Drive Mounting Page 173

MOTORS



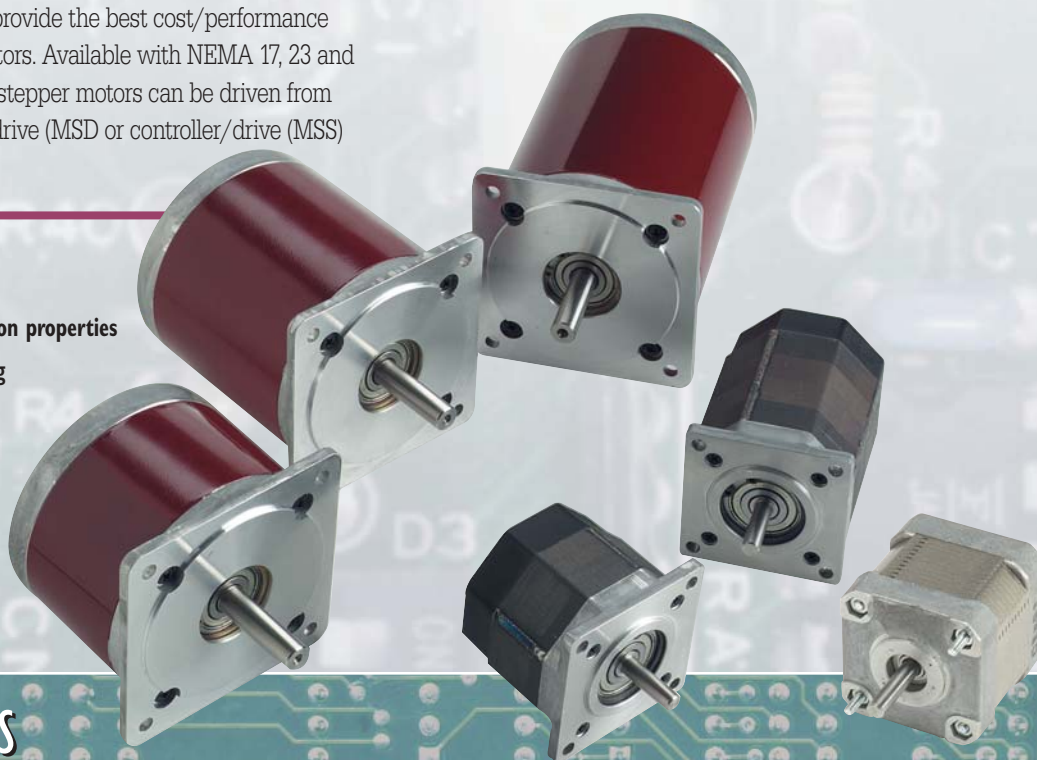
MRS STEPPER MOTORS

FEATURES • SPECIFICATIONS • PERFORMANCE DATA

The MRS series motors provide the best cost/performance value available in stepper motors. Available with NEMA 17, 23 and 34 mounting, the MRS series stepper motors can be driven from one common microstepping drive (MSD or controller/drive (MSS)

Features

- Long life bearings
- High temperature insulation
- Exceptional thermal dissipation properties
- NEMA 17,23 and 34 mounting
- High torque to inertia ratio



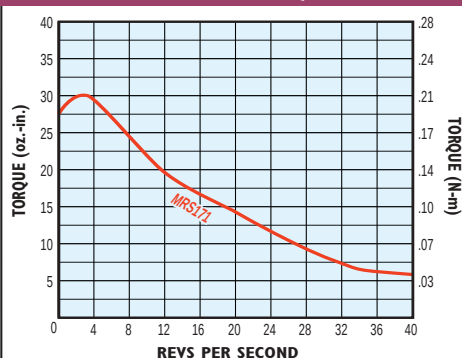
SPECIFICATIONS

MODEL	HOLDING TORQUE* 2 PHASES ON		RATED CURRENT/PHASE**	DRIVE SETTING*** MAX CURRENT/PHASE	PHASE RESISTANCE	PHASE INDUCTANCE†	THERMAL RESISTANCE††	ROTOR INERTIA		WEIGHT	
	OZ-IN (±10%)	N•M	AMPS (dc)	AMPS (PEAK)	OHMS ±10%	MH	°C/WATT	OZ-IN²	GM•CM²	LBS	KGS.
MRS171	35	0.24	1.0	1.4	4.6	8.9	NA	0.17	31.0	.66	.29
MRS231	109	0.77	1.5	2.2	2.61	10.3	5.5	0.66	120.7	1.5	0.68
MRS232	203	1.43	2.5	3.6	1.22	6.2	4.5	1.39	254.2	2.5	1.13
MRS341	337	2.37	5.4	5.5	0.29	2.5	3.9	3.21	587.1	3.2	1.45
MRS342	627	4.43	5.6	5.5	0.39	3.7	2.7	6.57	1201.7	5.3	2.40
MRS343	995	7.03	7.9	5.5	0.26	3.1	2.0	9.66	1766.8	7.6	3.45

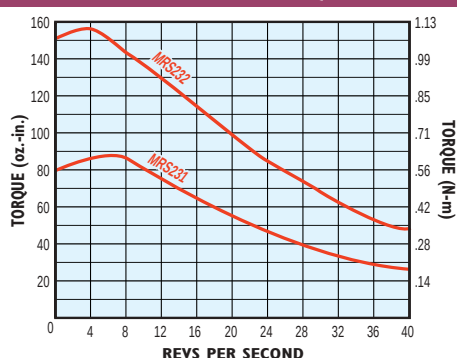
PERFORMANCE DATA

WITH MSS CONTROLLER/DRIVE OR MSD DRIVE

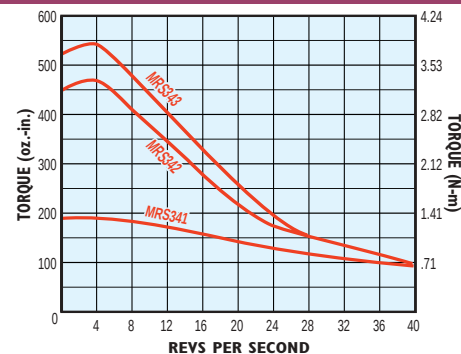
MRS171 SPEED TORQUE CURVE



MRS231/232 SPEED TORQUE CURVE



MRS341/342/343 SPEED TORQUE CURVE



* With rated current applied. Windings at 130°C and motor unmounted and in still air at 40°C (without heat sink).

** Windings at 130°C and motor in still air at 40°C (without heat sink). Operation of these motors above rated current may cause demagnetization. Contact factory.

*** When used with the MSS or MSD.

† Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.

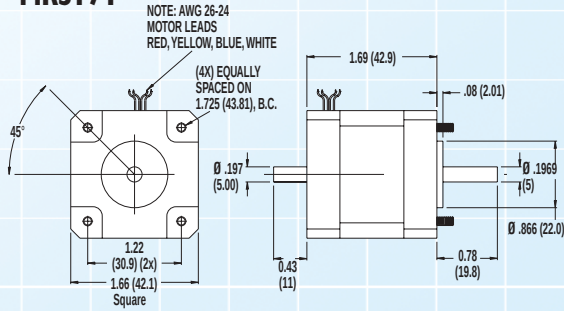
†† Thermal resistance measured with motor hanging in still air (unmounted).

MRS STEPPER MOTORS

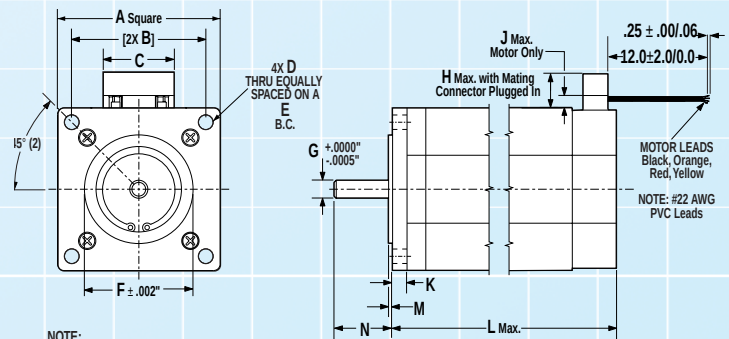
DIMENSIONS • ORDERING

DIMENSIONS MRS171, 231, 232, 341, 342, 343

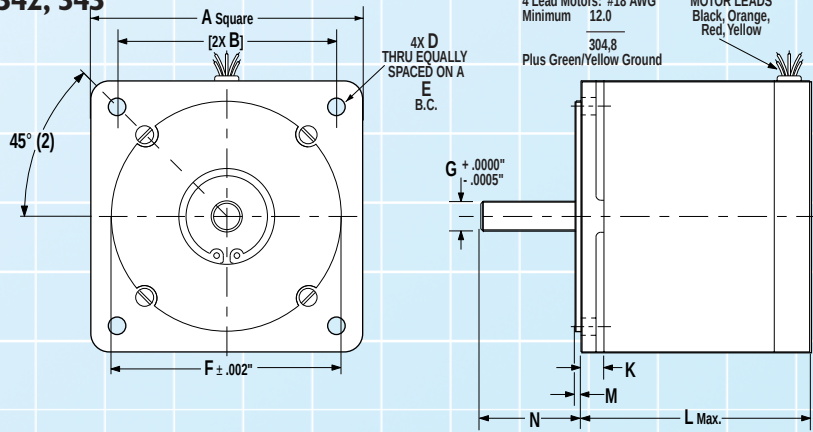
MRS171



MRS231, 232



MRS341, 342, 343



Dimensions in inches

MRS Motors Dimensions

	A	B	C	D	E	F	G	H	J	K	L	M	N
MRS 231	2.25	1.85	0.99	Ø .200	Ø 2.625	1.500	Ø 0.2500	0.48	0.18	0.20	2.06	0.055	0.81
MRS 232	2.25	1.85	0.99	Ø .200	Ø 2.625	1.500	Ø 0.2500	0.48	0.18	0.20	3.10	0.055	0.81
MRS 341	3.38	2.735	NA	Ø .218	Ø 3.875	2.875	Ø 0.3750	NA	NA	0.18	2.58	0.060	1.25
MRS 342	3.38	2.735	NA	Ø .218	Ø 3.875	2.875	Ø 0.3750	NA	NA	0.18	3.76	0.060	1.25
MRS 343	3.38	2.735	NA	Ø .218	Ø 3.875	2.875	Ø 0.3750	NA	NA	0.18	5.06	0.060	1.25

Dimensions in millimeters

MRS Motors Dimensions

	A	B	C	D	E	F	G	H	J	K	L	M	N
MRS 231	57.2	47.0	25.1	Ø 5.08	Ø 66.68	38.10	Ø 6.35	12.2	4.6	5.1	52.3	1.4	20.6
MRS 232	57.2	47.0	25.1	Ø 5.08	Ø 66.68	38.10	Ø 6.35	12.2	4.6	5.1	78.7	1.4	20.6
MRS 341	85.9	69.4	NA	Ø 5.54	Ø 98.43	73.03	Ø 9.53	NA	NA	4.6	65.5	1.5	31.8
MRS 342	85.9	69.4	NA	Ø 5.54	Ø 98.43	73.03	Ø 9.53	NA	NA	4.6	95.5	1.5	31.8
MRS 343	85.9	69.4	NA	Ø 5.54	Ø 98.43	73.03	Ø 9.53	NA	NA	4.6	128.5	1.5	31.8

Ordering

Configuration Code	MRS171	MRS231	MRS232	MRS341	MRS342	MRS343
Tol-O-Matic Part #	3600-6129	3600-6130	3600-6131	3600-6132	3600-6133	3600-6134

MOUNTING INFO

SCREW-DRIVES

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Gearhead Mounting	Page 149
In-line Motor/Gearhead	
Combination Mounts	Page 150
In-line Motor Mounts	Page 160
Reverse-Parallel Mounting	Page 163

BELT-DRIVES

Direct Drive Mounting	Page 170
Reduction Drive Mounting	Page 173

MOTORS

STEPPER



MRB BRUSHED DC MOTORS

FEATURES • SPECIFICATIONS

For cost sensitive applications requiring smooth and quiet operation, Tol-O-Matic provides the MRB series brushed DC motors. Available with a wide range of torque/speed characteristics, the MRB motors are ideal for operation in a servo system (AXIOM™ DB).

Features

- Rugged industrial enclosures
- 1000 line encoder for servo operation
- Ideal for operation with AXIOM™ DB brushed servo drives



SPECIFICATIONS (MRB WITH 1000 LINE ENCODER)

Model	KE (1)	KT (2)		Resistance (3)	Rotor Inertia		Thermal Resistance	Cont. Stall Torque		Peak Stall Torque		Max. Speed	Inductance (4)	Weight	
	Volts/1000RPM	oz-in/Amp	N-m/Amp	Ohms	oz-in²	g-cm²	°C/W	oz-in	N-m	oz-in	N-m	RPM	mH	lbs	kgs
MRB21	12.7	17.2	0.121	2.20	2.89	529	4	57	0.402	400	2.82	4000	6.40	3.5	1.6
MRB31	8.6	11.6	0.082	0.60	6.55	1200	2.7	100	0.706	480	3.39	4000	0.42	5.11	2.3
MRB32	13.4	18.1	0.128	0.46	13.1	2400	1.9	210	1.48	960	6.78	4000	0.64	8.6	3.9
MRB41	20	27.2	0.192	0.6	101	18500	1.09	376	2.65	2496	17.6	4000	2.2	17	7.7
MRB42	38	51.4	0.363	8.6	122	23000	0.90	496	3.50	3296	23.3	3500	4.4	20.0	9.1

(1) ± 10% (2) ± 10% (3) ± 10% @ 25° (4) ± 15%

Ordering Info

Configuration Code	Tol-O-Matic Part #
MRB21	3600-6248
MRB31	3600-6249
MRB32	3600-6250
MRB41	3600-6251
MRB42	3600-6252

Wire Colors

PIN*	CA FUNCTION	WIRE COLOR
1	+VCC	Red
2	GND	Black
3	A+	White
4	A-	Yellow
5	B+	Green
6	B-	Blue
7	I+	Orange
8	I-	Brown
	Shield	Drain

MOUNTING INFO

SCREW-DRIVES

Couplers/Motor Mounting Kits	Page 149
Gearhead Mounting	Page 149
In-line Motor/Gearhead	Page 150
Combination Mounts	Page 160
In-line Motor Mounts	Page 163
Reverse-Parallel Mounting	Page 163

BELT-DRIVES

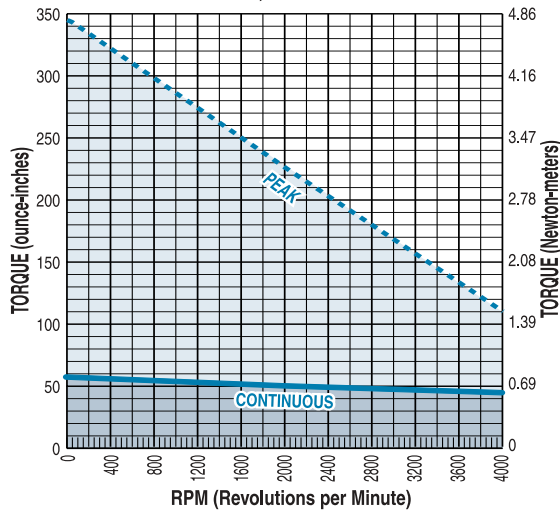
Direct Drive Mounting	Page 170
Reduction Drive Mounting	Page 173



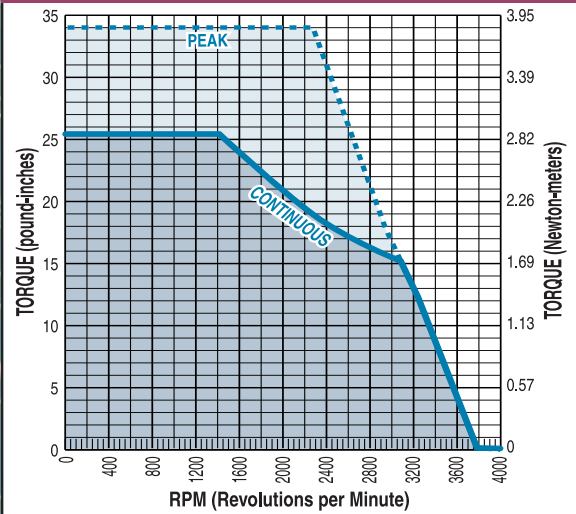
BRUSHED SERVO

PERFORMANCE DATA WITH AXIOM® DB SERIES DRIVE

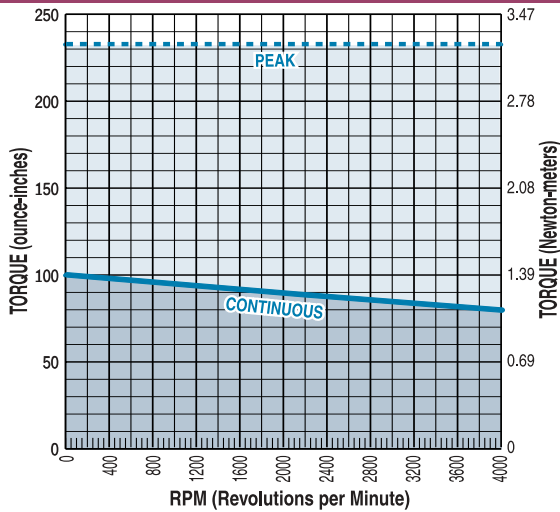
MRB21Y • DB20 DRIVE



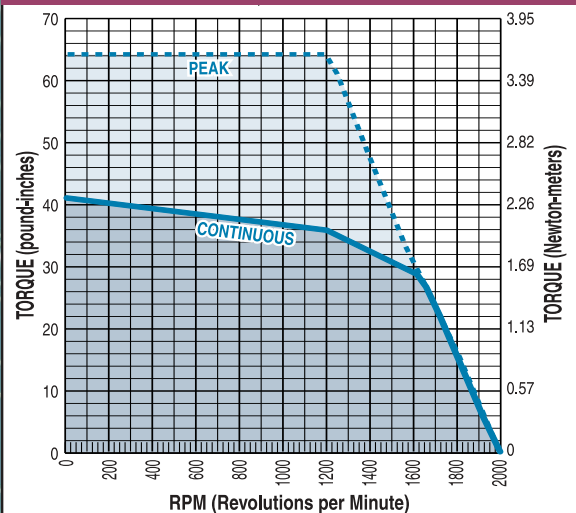
MRB41Y • DB20 DRIVE



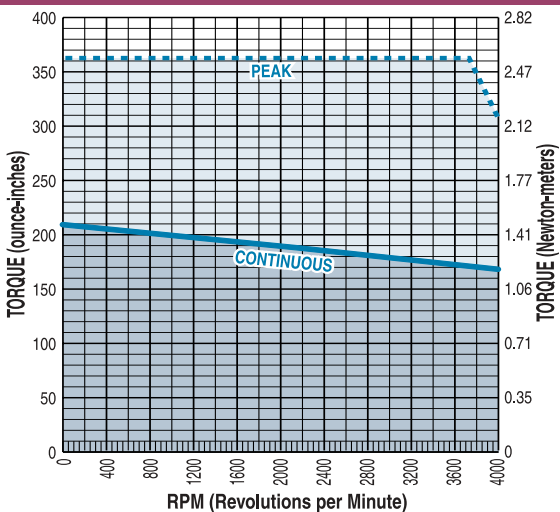
MRB31Y • DB20 DRIVE



MRB42Y • DB20 DRIVE



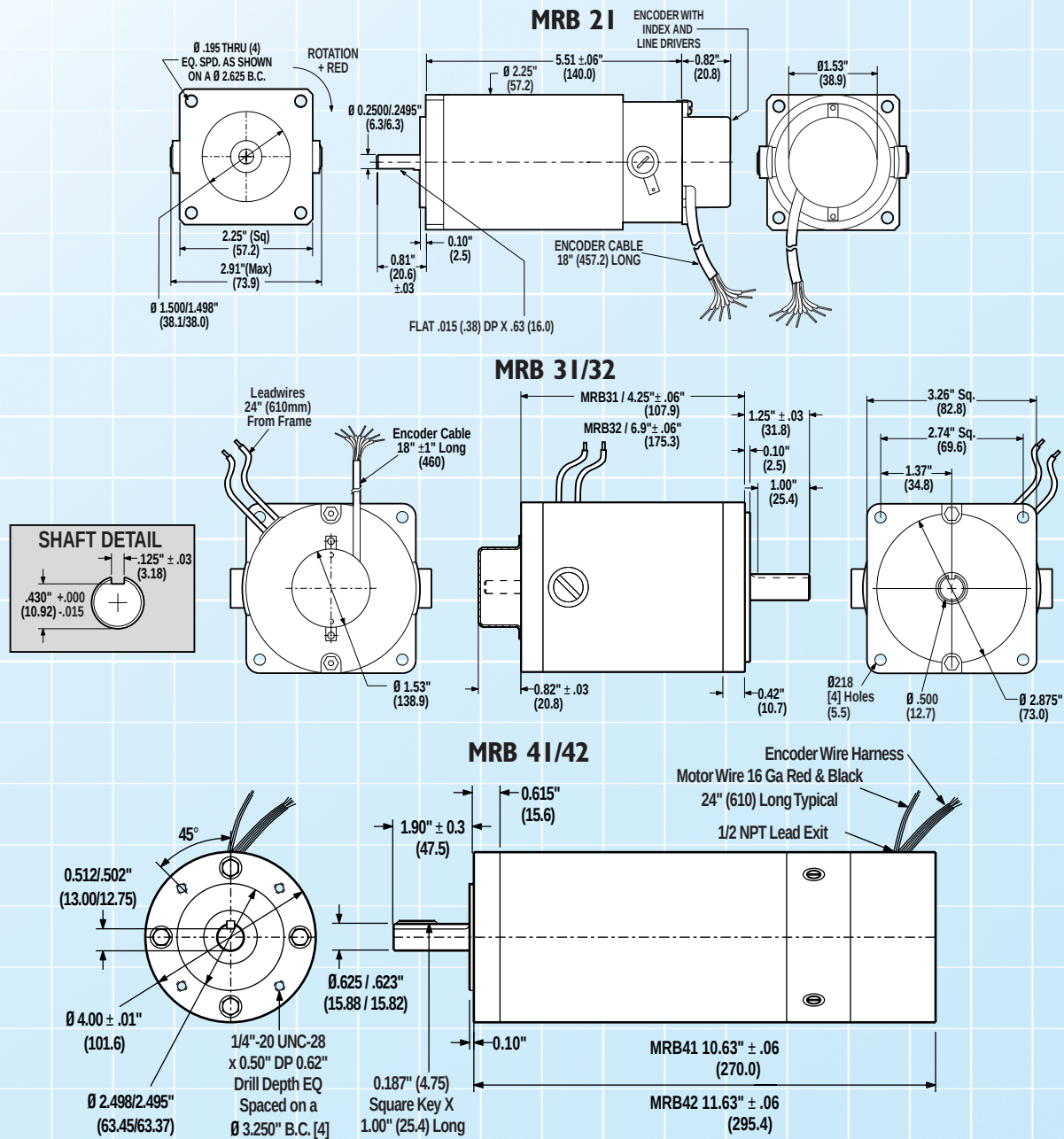
MRB32Y • DB20 DRIVE



MRB BRUSHED DC MOTORS

DIMENSIONS

DIMENSIONS MRB21, 31, 32, 41 and 42



Dimensions shown in inches and (Millimeters)

Ordering Info

Configuration	Code	Tol-O-Matic Part #
MRB21		3600-6248
MRB31		3600-6249
MRB32		3600-6250
MRB41		3600-6251

Wire Colors

PIN*	CA FUNCTION	WIRE COLOR
1	+VCC	Red
2	GND	Black
3	A+	White
4	A-	Yellow
5	B+	Green

PIN*	CA FUNCTION	WIRE COLOR
6	B-	Blue
7	I+	Orange
8	I-	Brown
	Shield	Drain

MOUNTING INFO

SCREW-DRIVES

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 Gearhead Mounting Page 149
 In-line Motor/Gearhead Combination Mounts Page 150
 In-line Motor Mounts Page 160
 Reverse-Parallel Mounting Page 163

BELT-DRIVES

Direct Drive Mounting Page 170
 Reduction Drive Mounting Page 173



DRIVES

Axidyne drives are available for brushless servo, microstepping and brushed dc systems. These drives combine flexibility and superior performance in compact packages

AXIOM® Brushless and Brushed Servo Drives

These DSP digital servo drives (available in three sizes for use with MRV motors and one size for use with MRB motors) offer quick, easy drive configuration with high-speed accuracy.



MSD Microstepping Motor Drive

For use with Axidyne MRS motors, this stand-alone microstepping drive is an economical solution for use within multi-axis stepper applications.

DRIVES



BRUSH
LESS



AXIOM® DV/DB BRUSHLESS/BRUSHED SERVO DRIVES

FEATURES • SPECIFICATIONS • DIMENSIONS • ORDERING

The AXIOM™ series of brushless and brushed servo drives combine high-speed accuracy with user friendly set-up and diagnostics. The AXIOM® DV series provides state-of-the-art DSP controlled digital vector commutated drives for a full range of brushless servo motors. DV Series drives are available in 10, 20 and 30 Amp peak ratings (3 sec) and the DB Series brushed servo drive is available in a 20 Amp peak rating. All come with convenient pluggable screw terminal connectors and offer fast, easy set-up and installation for use in a wide variety of applications.

Drive Features:

- DV series drives use **space vector commutation** providing better bus voltage utilization than traditional sine drives for improved speed/torque curves
- **Flux vector current control** provides more accurate high bandwidth control of **torque producing current** for better efficiency and more torque over the full speed range than with traditional sine drives
- Drives MRV series brushless servo motors or can be configured for customer-specified linear or rotary 3-phase brushless servo motors
- Three brushless drive sizes with peak current ratings of 10A (DV10), 20A (DV20) and 30A (DV30)
- One brushed drive size with peak current rating of 20A (DB20)
- **Autophasing** eliminates the need for hall sensors in motors
- **Pluggable screw terminal connectors** eliminate the need for special connectors and secondary breakout terminal strips
- 115/208-230Vac input, single or 3-phase (DV Series)
- 115Vac single-phase (DB Series)
- Short circuit, over current and over voltage protection prevents drive damage
- 25W or 50W internal regeneration
- External regeneration connections on DV Series drives
- Analog torque and velocity command ($\pm 10V$)
- Step/direction and Step CW/step CCW command (5V)
- Feedback from differential A+B and index channel optical encoder (5V)
- Maximum 4 MHz quadrature rate
- Maximum line count of 500,000/motor commutation cycle
- Optically isolated I/O
- CW/CCW travel limit inputs
- Drive enable input
- Fault, enabled, and in-position outputs
- 3A brake relay
- 3 second peak ratings



For controllers integral to the Axiom DV, see page 123 for the NEW AxiomPlus PV Series of Controller/Drives



AXIOM® DV/DB

CONNECTORS

Connectors

AXIOM® DV SERIES DRIVES

TB1 - BRAKE/REGEN

1 - Brake	4 - External Regen
2 - Brake	5 - Internal Regen
3 - Regen Common	

TB2 - MOTOR

1 - Motor R	3 - Motor T
2 - Motor S	4 - Motor Ground

TB3 - AC POWER

1 - L3	3 - L1
2 - L2	4 - Ground

J3 - OUTPUTS

1 - In Position +	4 - Enabled Out -
2 - In Position -	5 - Fault Out +
3 - Enabled Out +	6 - Fault Out -

J4 - INPUTS

1 - CW Limit	6 - Step/Step CW +
2 - CCW Limit	7 - Step/Step CW -
3 - Limit Common	8 - Direction/Step CCW +
4 - Enable +	9 - Direction/Step CCW -
5 - Enable -	

J6 - ANALOG INPUT COMMAND

1 - Analog Common	3 - Analog -
2 - Analog +	4 - Shield

J7 - MOTOR ENCODER

1 - Encoder +5V	6 - I+
2 - A+	7 - I-
3 - A-	8 - Common/Shield
4 - B+	9 - Motor Temp
5 - B-	

P1 - BUFFERED ENCODER OUTPUT

1 - Reserved	8 - Common
2 - Reserved	9 - Encoder Out A+
3 - Reserved	10 - Encoder Out A-
4 - Reserved	11 - Encoder Out B+
5 - Reserved	12 - Encoder Out B-
6 - Reserved	13 - Encoder Out I+
7 - Reserved	14 - Encoder Out I-

P2 - COMMUNICATIONS

1 - Reserved	6 - Reserved
2 - RS-232 TX	7 - Reserved
3 - RS-232 RX	8 - Reserved
4 - Reserved	9 - +5Vdc (30ma MAX.)
5 - Common	

AXIOM® DB SERIES DRIVES

TB1 - BRAKE

1 - Brake
2 - Brake

TB2 - MOTOR

1 - Motor +
2 - Motor -
3 - Motor Ground

TB3 - AC POWER

1 - 120Vac
2 - Neutral
3 - Ground

J3 - OUTPUTS

1 - In Position +	4 - Enabled Out -
2 - In Position -	5 - Fault Out +
3 - Enabled Out +	6 - Fault Out -

J4 - INPUTS

1 - CW Limit	6 - Step/Step CW +
2 - CCW Limit	7 - Step/Step CW -
3 - Limit Common	8 - Direction/Step CCW +
4 - Enable +	9 - Direction/Step CCW -
5 - Enable -	

ANALOG INPUT COMMAND

1 - Analog Common	3 - Analog -
2 - Analog +	4 - Shield

J7 - MOTOR ENCODER

1 - Encoder +5V	6 - I+
2 - A+	7 - I-
3 - A-	8 - Common/Shield
4 - B+	9 - Motor Temp
5 - B-	

P1 - BUFFERED ENCODER OUTPUT

1 - Reserved	8 - Common
2 - Reserved	9 - Encoder Out A+
3 - Reserved	10 - Encoder Out A-
4 - Reserved	11 - Encoder Out B+
5 - Reserved	12 - Encoder Out B-
6 - Reserved	13 - Encoder Out I+
7 - Reserved	14 - Encoder Out I-

P2 - COMMUNICATIONS

1 - Reserved	6 - Reserved
2 - RS-232 TX	7 - Reserved
3 - RS-232 RX	8 - Reserved
4 - Reserved	9 - +5Vdc (30ma MAX.)
5 - Common	

DRIVES



Tol-O-Matic System Compatibility

- Drives MRV series brushless servo motors or MRB series brush motors to provide motor/drive system performance shown in the motor section (see pages 99-105 and 108-110)
- Easily integrated to the MSC single axis basic controller or the SSC multi-axis/multi-function controller.

AXIOM® DV/DB SET-UP/CONFIGURATION

AXIOM™ series drive set-up and configuration is accomplished via Windows-based PC software and an RS-232 serial link. The set-up software employs a straightforward "control-panel" approach, making it easy to get up and running fast.

All set-up and configuration functions are performed using two main control-panel screens. Simple mouse-click commands automatically configure the control functions, eliminating layers of screens and menus. This approach also allows more relevant diagnostic information to be displayed simultaneously. All control screens include a command menu at the upper left to permit convenient selection of high-level functions and options.

The software communicates with the drive using a standard RS-232 connection operating at 19,200 baud, using either comm port 1 or 2 of the PC. It can be installed and executed from any PC running Windows 95, 98 or NT. A main menu is provided which allows selection of the main control panel functions, active comm port, etc. Tutorial selections are provided which emulate the main control-panel functions in an off-line manner and provide "help" text and function definitions/descriptions so that users can actively familiarize themselves with the software without actually connecting a drive.

The AXIOM™ Set-up and Configuration control screen allows the user to upload and download configuration parameters with a single mouse click.

Set-up Configuration

The Set-up and Configuration control-panel (shown above) allows the user to quickly select the appropriate configuration parameters for the motor being used. Drive operating mode and other options can all be selected/enabled from this screen. All set-up parameters can be uploaded and downloaded with a single click of the mouse. Likewise, the parameter set can be saved to or retrieved from a disk file. Once downloaded to the drive, all parameters are stored in non-volatile EEPROM memory.

Tuning and Diagnosis

A 4-channel oscilloscope display is provided for analysis of motion response as a diagnostic and tuning aid. The scaling and format of the displayed traces can be easily modified, and values can be read directly off the traces at any point. Continuously updated bar graph displays are provided to allow important data to be viewed while motion is occurring. These displays are configured automatically based on drive operating mode and include peak detection functions and numeric displays. A status section of this control screen displays the current state of I/O and fault information. Selection of the "Drive-Tuning" function from the command menu activates and displays the control functions for manual and automatic drive tuning. These controls allow the user to set-up and start actuation of an appropriate unit-step motion command and then enable automatic tuning parameter adjustment. If desired, manual adjustments to tuning parameters can be easily accomplished. The oscilloscope functions are intended to be used in conjunction with tuning to ensure that desired response goals are achieved. All tuning parameters are updated and activated immediately in the drive when modified (and also stored in EEPROM memory).



Automatic Tuning and Response Click for Manual Tuning

Start **STOP**

Warning!
Activation of a tuning cycle with the "start" button will cause machine movement. Take precautions to

Unit-Step Set-Up

Step (Pulse) Signal
Position Err (enc cnts)

Step Value
1700

Gains Click for Feed-Forward

Position P-gain	Velocity P-gain	Velocity I-gain	Velocity D-gain
Pp	Pv	Iv	Dv
120	200	75	350

Tuning controls allow user configurable unit-step actuation. Automatic and manual tuning functions are provided. Optional values for feed forward gains and analog offsets can also be entered.

All software screens include separate menus of high-level functions in the upper left corner to facilitate quick transitions between screens and functions.

4-channel oscilloscope display for set-up/tuning and subsequent diagnosis. Flexible display configuration and sliding value indicator, make analysis quick and easy. Includes user controlled trigger functions.

On-Line Tuning and Diagnosis

Commands, On-Line Tuning and Diagnosis

Drive Enabled?
Enabled / Halt Halt

Drive Tuning Select

Exit Tuning and Diagnosis Select

Drive Status, Faults

Status: Enabled
Mode: Step / Dir
Fault: None

Inputs:

- Enable / Reset ☒ ON
- CW Limit ☐ OFF
- CCW Limit ☐ OFF
- Motor Therm. OL ☐ OFF

Outputs:

- Drive Enabled ☒ ON
- Drive Fault ☐ OFF
- Brake Output ☐ OFF
- In-Position ☒ ON

Oscilloscope - Command, Torque, Acceleration, Velocity

Oscilloscope Settings

Sweep Time
0.4 seconds

Trigger
Position Err

Trigger Level
10%

Trigger Slope
Rising

Display Selections

☒ Position
☒ Torque
☒ Acceleration
☒ Velocity

Scaling and Values/Units

Xres= 0.04 sec/div
Yres= 2.9 in-lb/div
Ymin= -14.6 in-lb
Ymax= 14.6 in-lb
Xval= 0.114 seconds
Yval= 10.9 in-lb

Position Error (enc cnts)

Position Error Active

Peak Error Reset

33,131 89,822

Drive Current (amps)

Current Active

Scale Scaled to Motor Current Ratings

Peak Current Reset

29.85 29.85

Motor Velocity (rpm)

Motor Velocity Active

Peak Motor Velocity Reset

2,625.1 3,000.0

The Tuning and Diagnosis control-panel provides the user with all the features and data-display functions necessary for easy and accurate drive tuning adjustments and performance monitoring.

Continuous display of critical drive status information as well as physical state of I/O.

Diagnostic bar graph displays of critical system values, updated continuously. Includes peak detection and numeric display.



AXIOM® DV/DB

SPECIFICATIONS • ORDERING

SPECIFICATIONS

SPECIFICATIONS	AXIOM™ DV and DB Series Drives			
Power	DV10	DV20	DV30	DB20
Continuous Current Rating:	5 Amps	10 Amps	15 Amps	10 Amps
Peak Current Rating (3 sec):	10 Amps	20 Amps	30 Amps	20 Amps
Max Input Current (single phase):	12.5 Amps	25 Amps	37.5 Amps	10 Amps
Input Voltage (single/3-phase):	95Vac -130Vac / 190Vac - 250Vac (voltage range is switch selectable)			95Vac -130Vac Single-Phase
Input Frequency:	47Hz - 63Hz			47Hz - 63Hz
Command Sources				
Analog Torque/Velocity Input:	± 10V, 16.4K ohm impedance			
Step and Direction or Step CW/Step CCW	1 MHz maximum, 5V differential or single ended drivers			
Serial Communication Port				
Type:	RS232			
Baud Rate:	19,200 baud			
Control Loops				
Type:	All digital			
Loop Modes:	Torque, Velocity and Position Control			
Torque Update Rate:	10KHz			
Velocity Update Rate:	5KHz			
Position Update Rate:	2.5KHz			
Approvals	UL, CUL, CE			

SPECIFICATIONS	AXIOM™ DV and DB Series Drives			
Inputs and Outputs				
Dedicated Optically Isolated Inputs:	5Vdc - 25Vdc, 2.7ma - 15ma ENABLE, CW LIMIT and CCW LIMIT. Can be configured to source or sink current.			
Dedicated Optically Isolated Outputs:	3 optically isolated, 25Vdc max., 50ma max. IN POSITION, ENABLED and FAULT. Can be configured to source or sink current.			
1 Dedicated Brake Relay Output:	N.O. contact, 24Vdc, 115/230Vac, 3A max.			
Motor Feedback:	Incremental encoder, 5Vdc, differential 4Mhz max., A/B/I channels 250 line min. with a 4 pole motor 125 line min. with a 2 pole motor			
Encoder Output:	Differential, 5Vdc, A/B/I channels			
Connectors				
Serial:	9 pin D-Sub.			
Control and Feedback:	15 pin D-Sub.			
Power, Motor, Brake Relay, Regen:	Screw terminal block			
All Others:	Pluggable screw terminal blocks			
Environmental				
Storage Temperature:	-40°C to 70°C			
Operating Temperature:	0°C to 50°C			
Humidity:	5% to 95%, non-condensing			
Weight:	DV10 8 lbs) (3.7 Kg	DV20 12 lbs (5.5 Kg)	DV30 12 lbs (5.5 Kg)	DB20 26 lbs (12 Kg)

Ordering Information

Configuration Code	Description	Cable Length	Tol-O-Matic Part #
DV10 ^{1,2}	10A Peak Brushless Drive	-	3604-0000
DV20 ^{1,2}	20A Peak Brushless Drive	-	3604-0001
DV30 ^{1,2}	30A Peak Brushless Drive	-	3604-0002
DB20 ^{1,2}	20A Peak Brushed Drive	-	3604-0003
CR6 ³	Encoder Cable	6m	3604-1196
	Motor Power Cable for DV10	6m	3604-1190
	Motor Power Cable for DV20	6m	3604-1192
	Motor Power Cable for DV30	6m	3604-1194

¹ Includes user manual and Tol-O-Motion AXIOM® Software

² AXIOM® series drives do not include RS232 cables. If desired, specify CRZ in configuration. (see page 212)
The RJ11 style RS232 cable supplied with the MSC controller is not an alternative to the DB9 style cable used with the AXIOM™ drive

Configuration Code	Description	Cable Length	Tol-O-Matic Part #
CR15 ³	Encoder Cable	15m	3604-1197
	Motor Power Cable for DV10	15m	3604-1191
	Motor Power Cable for DV20	15m	3604-1193
	Motor Power Cable for DV30	15m	3604-1195
—	Controller Encoder Cable ⁴	3m	3604-1213

³ When ordering AXIOM® DV series drives with all MRV series motors except the MRV11 (which has flying leads), specify either CR6 (6m cables) or CR15 (15m cables). Configurator will include encoder cable and one corresponding motor power cable for DV drive specified. MRB motors are supplied with flying leads and do not require special cables (see page 145 for cable details).

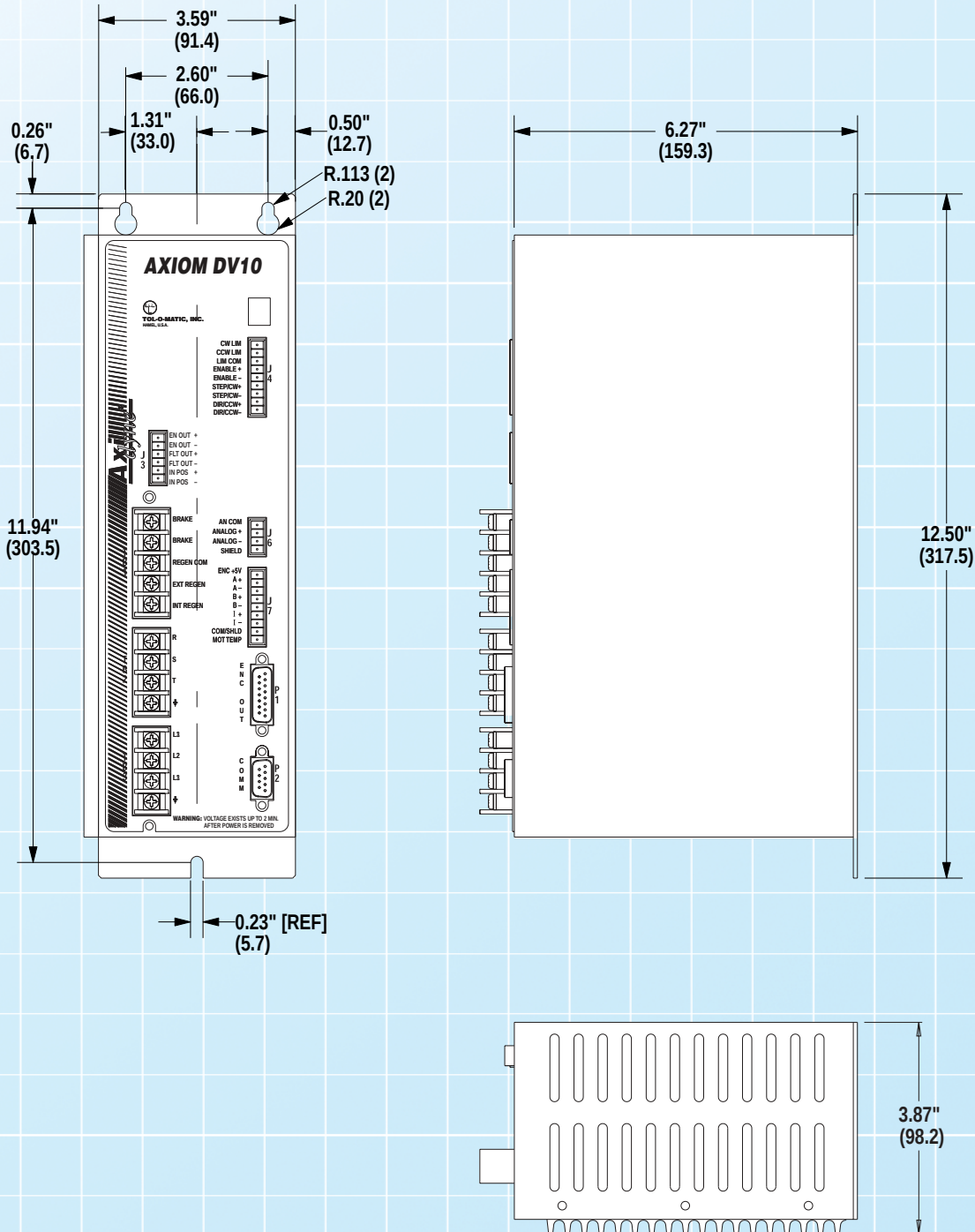
⁴ The AXIOM® Encoder output cable is included with the SCC controller for all axis configured as servo (SV). Refer to table on page 145.



AXIOM[®] DV10

DIMENSIONS

DIMENSIONS AXIOM[™] DV10 BRUSHLESS SERVO DRIVE



Dimensions shown in inches and (Millimeters).

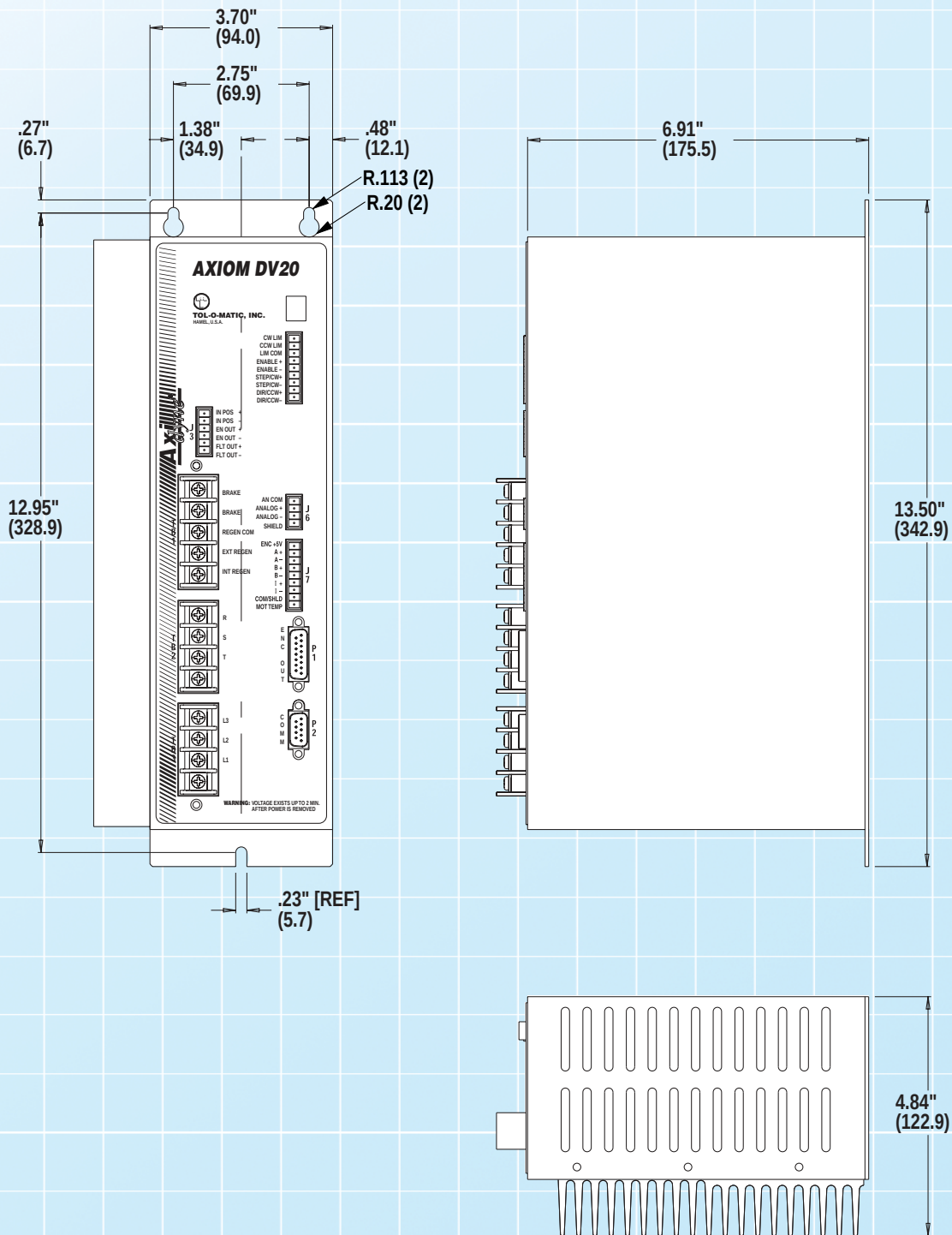
DRIVES



AXIOM® DV20/30

DIMENSIONS

DIMENSIONS AXIOM™ DV20/30 BRUSHLESS SERVO DRIVE

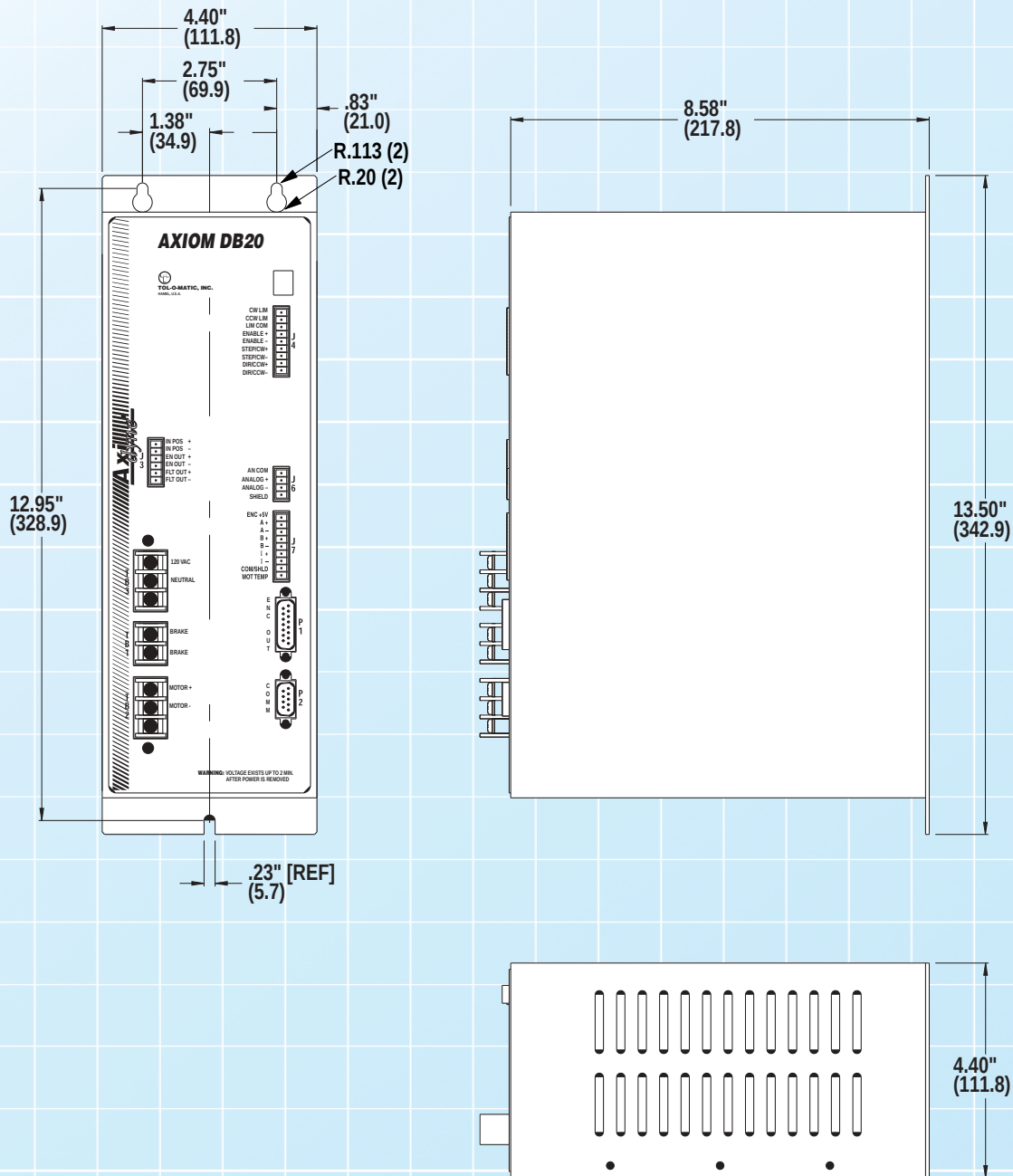


Dimensions shown in inches and (Millimeters).

AXIOM[®] DB20

DIMENSIONS

DIMENSIONS AXIOM[™] DB20 BRUSHED SERVO DRIVE



Dimensions shown in inches and (Millimeters).

DRIVES



MSD MICROSTEPPING MOTOR DRIVE

FEATURES • SPECIFICATIONS • DIMENSIONS • ORDERING

SPECIFICATIONS

SPECIFICATIONS	MSD Microstepping Motor Drive
Power	
Input Voltages (AC line):	110 or 220 Vac, 60Hz (switch selected) 400 W max (a 50/60Hz version can be special ordered)
Dc Bus Voltage):	75 Vdc full load, 90 Vdc no load
Amplifiers	
Pulse Width Modulated Switching:	Dual, MOSFET H-bridge, 3 state at 20 kHz
Phase Peak Output Current:	0.5 - 5.5 Amps
Output Power:	400 watts max
Protection:	Overcurrent and over-temperature
Automatic Idle Current Reduction:	Reduces current to 50% of setting after one second (can be disabled)
Inputs	
Step, Direction & Enable:	Optically isolated differential 5-12V logic
Input Current:	5 mA minimum, 20 mA maximum
Motor Steps	on falling edge of step input
Minimum Pulse	1 µsec
Maximum Step Rate	2 MHz
Minimum Set Up Time:	1 µsec
Directional Signal Minimum Hold Time:	50 µs
Fault Output	
Photo Transistor:	Optically isolated, uncommitted (open collector, open emitter)
Voltage:	30V max.
Current	20 mA max.
Environment	
Max Case Temperature:	158° F (70° C)

Features:

- **Motor current from 0.5 to 5.5 amps/phase** (switch selectable, 51 settings)
- **Built-in 80 V power supply** (accepts 110 or 220 Vac power)
- **MOSFET pulse width modulation switching amplifiers** (3 state)
- **Step, direction, amplifier enable inputs, fault output, optically isolated**
- **2 MHz max input frequency**

The MSD, a stand alone microstepping drive, is a low cost solution for use within multi-axis stepper applications. With switch-selectable current settings the MSD is the perfect drive for all of Tol-O-Matic's MRS high torque stepper motors.



- **16 switch selectable microstepping resolutions:** 200, 400, 1000, 2000, 5000, 10000, 12800, 18000, 20000, 21600, 25000, 25400, 25600, 36000, 50000, 50800, steps/rev
- **Over-temperature protection**
- **Short circuit protection**
- **Surge protection**
- **Idle current reduction** (50% switch selectable)
- **Pluggable screw terminal connectors**, mating connectors included
- **Integral heat sink**
- **Digital oscillator provides smooth accel/decel ramps and precise speed control**
- **Oscillator Mode** operates from internal pots, external pots, 0-5V dc analog signal, or analog joystick
- **Two speed ranges**, can be selected "on-the-fly" by a digital signal with automatic ramping between speeds
- **Tach Out signal** allows easy measurement of speed
- **Enable input** allows motor current to be shut off on command
- **Built-in self test** for troubleshooting
- **CE and TUV compliant**

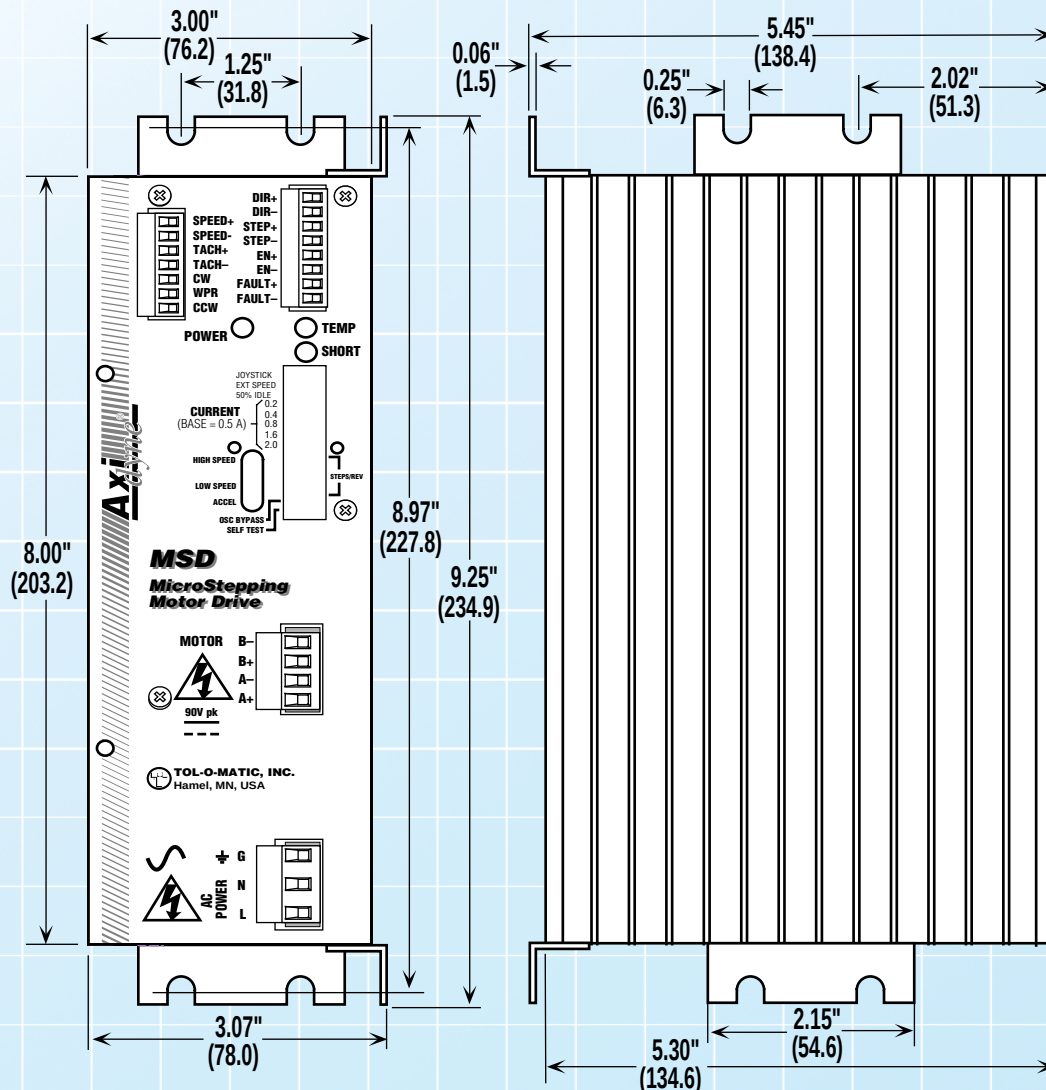
STEPPER



MSD MICROSTEPPING MOTOR DRIVE

DIMENSIONS • ORDERING

DIMENSIONS MSD MICROSTEPPING MOTOR DRIVE



Dimensions shown in inches and (Millimeters).

Tol-O-Matic System Compatibility

- Drives MRS series stepper motors to provide motor/drive system performance shown in the MRS motor section (see pages 106-107)
- Easily integrated to the SSC 1-4 multi-axis/multi-function controller (see pages 133-138). When ordering with controller all interconnecting cabling is automatically configured and included.
- Integral to single axis controller - (MSS see pages 129-131)

- Dip switch covers included
- Two (2) mounting brackets included

Ordering Information

Configuration Code	Includes	Tol-O-Matic Part #
MSD	• Microstepping Drive • User Manual	3600-0039

DRIVES



CONTROLLER/DRIVE COMBINATIONS

Axidyne controller/drive combinations are available for microstepper and brushless servo systems. The AXIOM[®] Plus combines flexibility and superior performance in a compact package

CONTROLLER / DRIVES

MSS Microstepping Controller/ Driver

For use with Axidyne MRS motors, this stand alone unit is the simplest and most cost effective way to provide high resolution single axis motion to Tol-O-Matic's actuator systems.



NEW! AXIOM[™] PLUS PV Controller/ Driver

Completely designed and engineered by Tol-O-Matic, the AXIOM PLUS combines a PLC, motion controller and AXIOM drive into one cost-effective package.



AXIOM® PLUS PV SERIES BRUSHLESS SERVO CONTROLLER/DRIVE

FEATURES • SPECIFICATIONS • DIMENSIONS • ORDERING

Now if you require a PLC for supervisory functions, you don't need to spend time and money wiring and cabling separate components. The AXIOM Plus sequential motion controller—engineered and designed by Tol-O-Matic—offers intuitive yet sophisticated functionality. The PLC performs real-time scans on a separate thread and communicates with the controller through software rather than physical wiring. Easy-to-use Windows®-based Tol-O-Motion™ Programming Software utilizes a point and click

sequential program and PLC ladder logic editor for effortless programming without the hassle of learning new code. The AXIOM Plus PV Series incorporates the same vector drive technology used in our DV Series drives. Competitively priced with integrated motion controllers/drives that do not offer PLC capability, the PV controller/drive is an economical choice for nearly any motion application.

Features:

PLC:

- **Real-time scan supervisory function** continuous from power-up
- **Typical scan time of 2-4 milliseconds**
- **Ladder logic** allows 175 rungs, 4 lines deep, 5 input operations, and an output coil
- **Intuitive point and click editor**
- **Operations include:** normally-open, normally-closed, logical invert, one-shot, output coil, latch, unlatch, timers and counters
- **64 character rung descriptor** downloaded and uploaded with program
- **Internal bit-flags for information transfer** between controller and PLC

MOTION CONTROLLER:

- **1 to 1.5 axis (gearing to auxiliary axis)**
- **Intuitive point and click editor**
- **Commands include:** absolute, incremental and velocity moves, branch to labels, subroutine calls, repeat loops, time delays, wait on conditions/inputs, output/flag control and parameter value changes including torque limit, following error, position band, follower gear ratio, and maximum velocity
- **Event triggering based on intermediate positions**
- **Motion pause and resume**
- **Comment lines and labels** downloaded and uploaded with program

DRIVE:

- **PV series drives use space vector commutation** providing better bus voltage utilization than traditional sine drives for improved speed/torque curves
- **Flux vector current control** provides accurate high bandwidth control of **torque producing** current for better efficiency and more torque over the full speed range than with traditional sine drives
- **Drives MRV series brushless servo motors** or can be configured for customer specified linear or rotary 3-phase brushless servo motors
- **Three brushless drive sizes with peak current ratings of 10A (PV10), 20A (PV20) and 30A (PV30)**
- **Autophasing** eliminates the need for Hall sensors in motors
- **Maximum 4 MHz quadrature rate**
- **Drive enable input**

GENERAL:

- **Pluggable screw terminal connectors** eliminate the need for special connectors and secondary breakout terminal strips
- **115/208-230Vac input, single or 3-phase**
- **Short circuit, over current and over voltage protection** prevents drive damage

- **25W or 50W internal regeneration**
- **External regeneration connections**
- **15 optically isolated inputs**
- **8 optically isolated outputs**
- **CW/CCW travel limit inputs**

- **Fault, enabled, and in-position outputs**
- **3A brake relay**
- **3 second peak ratings**



CONTROLLER / DRIVES



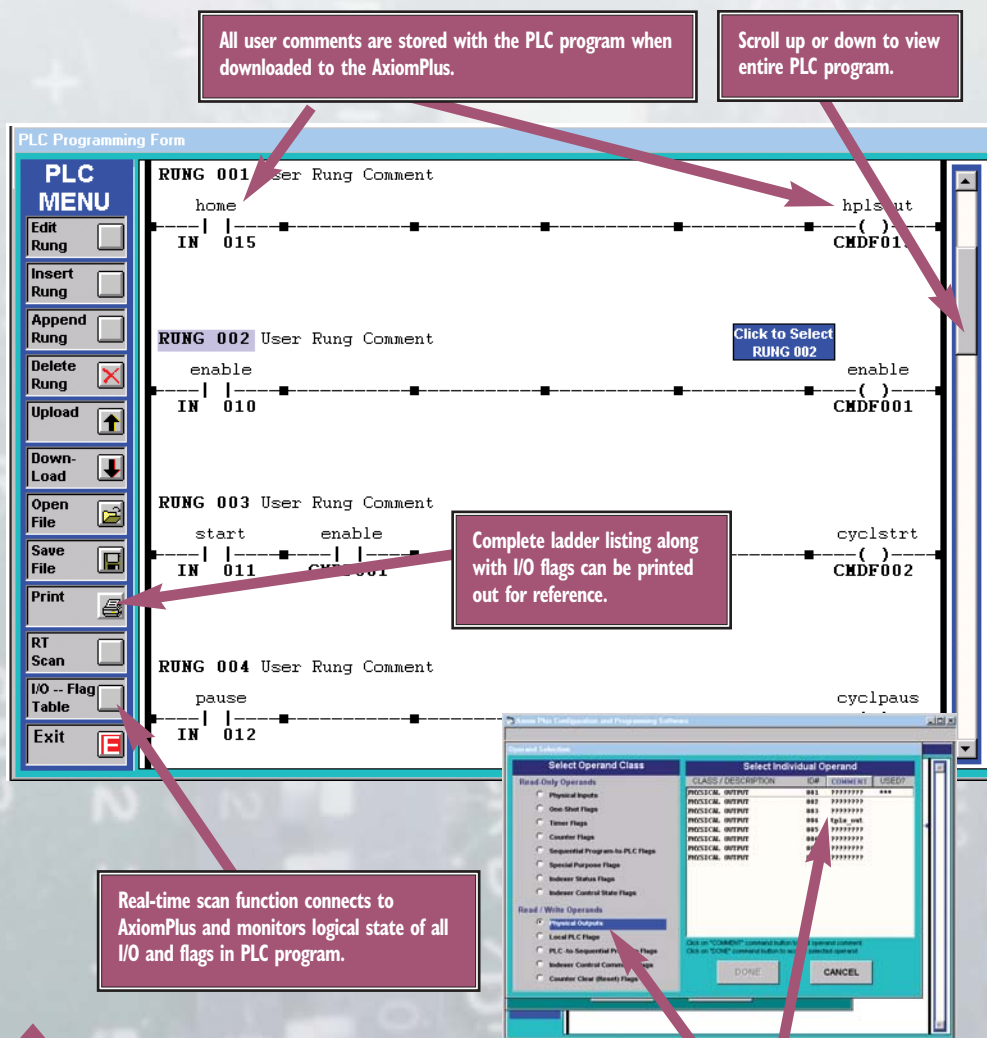
AXIOM® PLUS PLC/SEQUENTIAL PROGRAM EDITORS

PROGRAMMING

AXIOM® PLUS PV series set-up and configuration software utilizes a similar look and feel to the AXIOM DV series drive. (See pages 112-119). Included is a configuration option for motor selection and related parameters, along with a tuning and diagnostic mode. Help menus and control loop description information can be accessed from the main menu.

Unique to the AXIOM PLUS Series are point and click sequential program and PLC ladder logic editors. Up to 500 lines of graphic-based, high-level sequential motion and control instructions can be entered, with unlimited subroutine calls. Instructions include incremental and absolute motion commands, branching (conditional and unconditional), subroutine calls, repeat loops, I/O control, time delays, etc. The PLC editor allow users to enter and edit PLC programs (which run using an independent scan), and can accommodate up to 175 rungs of ladder logic. The PLC program accesses all 15 inputs and 8 outputs of the AxiomPlus, including general purpose and dedicated internal flags.

Both of these editors utilize easy icon/text driven selections, making the creation of motion profiles a snap (no code memorization required).



PLC Editor

The PLC Editor main menu allows user access to all editing functions along with a 175 rung ladder display. Each rung can be 4 lines deep and 5 input operations in width, plus the output coil. Users can specify up to 64 characters to describe each rung function and 8 characters for operand comments. Rungs can be inserted at any point in the program and are easily edited by simply double-clicking with the mouse and selecting the desired functions from subsequent menus. All user comments are stored with the PLC program and downloaded to the AxiomPlus. A complete listing of ladder rungs and I/O flags can be printed out at any time for reference. Operations supported include: normally-open, normally-closed, logical invert, one-shot, output coil, latch, unlatch, timers, and counters. The PLC program's real-time scan is continuous upon power-up and ranges from 2-4 milliseconds for a typical application, with 10-12 milliseconds for a maximum-length program.

Sequential Program Editor

The Sequential Editor main menu provides easy access to all essential program and display functions. Each instruction includes an 8 character label used for branching, subroutine call destinations and a 32 character user comment. Like the PLC editor, all user comments and labels are stored with the program when downloaded to the AxiomPlus. A series of menus walks the user through instruction selections with a few clicks of the mouse. The Incremental Position Move window allows two separate trigger moves to be defined based on incremental position reached, physical input transition or flag from the PLC. Two actions can be commanded for each trigger event including torque limit or velocity change, output control or flag passing to PLC. This functionality allows an almost limitless combination of functions associated with a single move, while the PLC facilitates real-time control.



Drive Set-Up Software, Mode Selection

MAIN MENU

Axiom+ Indexer Setup / Config

On-Line Tuning and Diagnosis

Sequential Motion Program

PLC Scan Program

Control Loops Description
Process Units Definition

Exit Setup Software (Quit)

Decimal precision user units and two jog speeds.

TOLO-MOTION

Entered motion parameters instantly update motion profile to show move trajectory

Axiom Plus Configuration and Programming Software

Incremental Position Move

Program Line #: 0005 (Click on Label or Comment to Edit)

Instruction Label: move02

Instruction Comment: incremental move

Motion Parameter Values

Position (Final)	15.000	inch
Speed	40.00	inch/second
Acceleration	500.0	inch/sec ²
Deceleration	500.0	inch/sec ²

Motion Analysis

Representative Move Profile

Peak Speed = 40.0 Move Distance = 15.0
Accel Time = 0.08 sec Accel Distance = 1.6
Decel Time = 0.08 sec Decel Distance = 1.6

Event Triggers and Corresponding Actions

Trigger#1 No Trigger Event
Action#1 No Action
Action#2 No Action

Trigger#2 No Trigger Event
Action#1 No Action
Action#2 No Action

Click desired area of display to edit.

CEL

PRG MENU

Upload from Indexer

Download to Indexer

Open File

Save File

Print

I/O -- Flag Table

User Units

inch

Encoder Pulses/Unit

-2000.0

Jog /Default Parameters

EDIT

Fast Jog Speed

=10.0

(inch/second)

Fast Jog Acc /Dec

Sequential Program Listing

label: start

Call subroutine based on input#1

Line#001 Conditional Subroutine Call: testsub4

label:

user comment for line #0002

Line#002 Absolute Position Move -- Position = -10.000 inch

label:

user comment for line #0003

Line#003 Set/Clear Output -- SET Physical Output # 008

label:

delay before move

Line#004 Time Delay: 1 seconds

label:

user comment for line #0005

Line#005 Absolute Position Move -- Position = 30.000 inch

label:

user comment for line #0006

Line#006 Set/Clear Output -- CLEAR Physical Output # 008

label:

user comment for line #0007

Line#007 Time Delay: 1 seconds

label:

call test subroutine

Line#008 Call Subroutine with Start Label: testsub

label:

user comment for line #0009

Line#009 Branch to Label: start

Series of instruction menus make easy selection of program control, motion commands, etc.

AXIOM[®] PLUS PV CONTROLLER/DRIVER

SPECIFICATIONS

SPECIFICATIONS

SPECIFICATIONS	AXIOM [®] PLUS PV Series Drives		
Current/Power	PV10	PV20	PV30
Peak Output Current:	10 Amps	20 Amps	30 Amps
Continuous Output Current:	5 Amps	10 Amps	15 Amps
Continuous Output Power:	1.4 kW	2.8 kW	4.2 kW
Input Voltage:	95 Vac -250 Vac 1Ø; 95 Vac - 250 Vac 3Ø (voltage range is switch selectable)		
Input Frequency:	47Hz - 63Hz		
User Programming			
Language/Programming Environment:	Tol-O-Motion™ windows-based software with point and click sequential program and PLC ladder logic editors		
Firmware Field Upgradeable User Program Storage Capacity	YES 500 lines of graphic-based, high-level sequential motion and control instructions with unlimited subroutine calls. Separate "soft" PLC with up to 175 rungs of ladder logic. 1MB of flash memory		
PLC			
Connection/Capabilities:	Internal PLC with typical real-time scan of 2-4 msec, 10-12 msec for programs of maximum capacity; 15 inputs and 8 outputs		
Inputs/Outputs			
General-Purpose Digital Inputs:	15 optically isolated 5-25 Vdc		
Inputs/Outputs:	Sinking/sourcing selectable		
General-Purpose Digital Outputs:	8 optically isolated, 5-25 Vdc, 20 mA maximum		
Communications	Serial: RS-232, 19,200 baud rate		
Motor Feedback			
Input Modes:	Incremental with index		
Maximum Input Frequency:	4 MHz (post-quadrature)		
Commutation Startup:	Auto-phase - no Hall sensors required		
Connectors			
Auxiliary Feedback, I/O, Analog I/O:	Wire trap screw terminals		
Motor Feedback:	Wire trap screw terminals		
Serial Port:	9-pin D-sub		
Main AC, Motor Power and DC Bus:	Screw terminal block		
Environmental			
Storage Temperature:	-40°C to 70°C (-40°F to 158°F)		
Operating Temperature:	0°C to 50°C (32°F to 126°F)		
Humidity:	5% to 95% noncondensing		
Weight	PV10	PV20	PV30
	8.5 lbs (3.85 kg)	12.5 lbs (5.66 kg)	

Connectors

AXIOM [®] PLUS PV Series Drives		
TB1 - BRAKE/REGEN	3 - Output 7 +	4 - B +
1 - Brake	4 - Output 7 -	5 - B -
2 - Brake	5 - Output 8 +	6 - I +
3 - Regen Com	6 - Output 8 -	7 - I -
4 - External Regen	J4 - INPUTS	8 - Com/Shld
5 - Internal Regen	1 - +24Vdc	9 - Motor Temp
TB2 - MOTOR	2 - 24Vdc Return	P1 - BUFFERED ENCODER OUT/AUXILIARY ENCODER
1 - Motor R	3 - Com 1 - 6	1 - +5V Encoder
2 - Motor S	4 - Input 1	2 - Aux Encoder A +
3 - Motor T	5 - Input 2	3 - Aux Encoder A -
4 - Motor Ground	6 - Input 3	4 - Aux Encoder B +
TB3 - AC POWER	7 - Input 4	5 - Aux Encoder B -
1 - L3	8 - Input 5	6 - Aux Encoder I +
2 - L2	9 - Input 6	7 - Aux Encoder I -
3 - L1	J5 - INPUTS	8 - Encoder Common
4 - Ground	1 - +24Vdc	9 - Motor Encoder Out A +
J1 - OUTPUTS	2 - 24Vdc Return	10 - Motor Encoder Out A -
1 - Output 1 +	3 - Com 7 - 12	11 - Motor Encoder Out B +
2 - Output 1 -	4 - Input 7	12 - Motor Encoder Out B -
3 - Output 2 +	5 - Input 8	13 - Motor Encoder Out I +
4 - Output 2 -	6 - Input 9	14 - Motor Encoder Out I -
5 - Output 3 +	7 - Input 10	15 - Reserved
6 - Output 3 -	8 - Input 11	P2 - COMMUNICATIONS
J2 - OUTPUTS	9 - Input 12	1 - Reserved
1 - +24Vdc	J6 - INPUTS	2 - RS-232 TX
2 - 24Vdc Return	1 - Com 13 - 15	3 - RS-232 RX
3 - Output 4 +	2 - Input 13	4 - Reserved
4 - Output 4 -	3 - Input 14	5 - Common
5 - Output 5 +	4 - Input 15	6 - Reserved
6 - Output 5 -	J7 - MOTOR ENCODER	7 - Reserved
J3 - OUTPUTS	1 - Encoder +5V	8 - Reserved
1 - Output 6 +	2 - A +	9 - +5Vdc (30mA Max.)
2 - Output 6 -	3 - A -	

Ordering Information

Description	Part Number	Description	Part Number
PV10 ^{1,2} : 10A Peak Brushless Drive	3604-9612	CR15 ³ : Encoder Cable — 15m	3604-1197
PV20 ^{1,2} : 20A Peak Brushless Drive	3604-9613	Motor Power Cable for PV10 — 15m	3604-1191
PV30 ^{1,2} : 30A Peak Brushless Drive	3604-9614	Motor Power Cable for PV20 — 15m	3604-1193
CR6 ³ : Encoder Cable — 6m	3604-1196	Motor Power Cable for PV30 — 15m	3604-1195
Motor Power Cable for PV10 — 6m	3604-1190	Controller Encoder Cable — 3m	3604-1213
Motor Power Cable for PV20 — 6m	3604-1192		
Motor Power Cable for PV30 — 6m	3604-1194		

- ¹ Includes user manual and Tol-O-Motion AXIOM™ Software
- ² AXIOM™ PLUS series drives do not include RS232 cables. If desired, specify CRZ in configuration. (see page 186)
- ³ When ordering AXIOM™ PV series drives with all MRV series motors except the MRV11 (which has flying leads), specify either CR6 (6m cables) or CR15 (15m cables). Configurator will include encoder cable and one corresponding motor power cable for PV drive specified.

DIMENSIONS

Technical drawing of the AXIOM PLUS PV10 control unit, showing front and side views with dimensions in inches and millimeters.

Front View Dimensions:

- Overall width: 3.59" (91.4)
- Distance between mounting holes: 2.60" (66.0)
- Mounting hole diameter: 0.26" (6.7)
- Distance from mounting hole to terminal block: 1.31" (33.0)
- Terminal block width: 0.50" (12.7)
- Terminal block height: R.113 (2) and R.20 (2)
- Overall height: 11.94" (303.5)
- Bottom mounting hole diameter: 0.23" [REF] (5.7)

Side View Dimensions:

- Overall width: 6.27" (159.3)
- Overall height: 12.50" (317.5)

Front View Details:

- Unit name: AXIOM PLUS PV10
- Terminal blocks: J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20, J21, J22, J23, J24, J25, J26, J27, J28, J29, J30, J31, J32, J33, J34, J35, J36, J37, J38, J39, J40, J41, J42, J43, J44, J45, J46, J47, J48, J49, J50, J51, J52, J53, J54, J55, J56, J57, J58, J59, J60, J61, J62, J63, J64, J65, J66, J67, J68, J69, J70, J71, J72, J73, J74, J75, J76, J77, J78, J79, J80, J81, J82, J83, J84, J85, J86, J87, J88, J89, J90, J91, J92, J93, J94, J95, J96, J97, J98, J99, J100, J101, J102, J103, J104, J105, J106, J107, J108, J109, J110, J111, J112, J113, J114, J115, J116, J117, J118, J119, J120, J121, J122, J123, J124, J125, J126, J127, J128, J129, J130, J131, J132, J133, J134, J135, J136, J137, J138, J139, J140, J141, J142, J143, J144, J145, J146, J147, J148, J149, J150, J151, J152, J153, J154, J155, J156, J157, J158, J159, J160, J161, J162, J163, J164, J165, J166, J167, J168, J169, J170, J171, J172, J173, J174, J175, J176, J177, J178, J179, J180, J181, J182, J183, J184, J185, J186, J187, J188, J189, J190, J191, J192, J193, J194, J195, J196, J197, J198, J199, J200, J201, J202, J203, J204, J205, J206, J207, J208, J209, J210, J211, J212, J213, J214, J215, J216, J217, J218, J219, J220, J221, J222, J223, J224, J225, J226, J227, J228, J229, J230, J231, J232, J233, J234, J235, J236, J237, J238, J239, J240, J241, J242, J243, J244, J245, J246, J247, J248, J249, J250, J251, J252, J253, J254, J255, J256, J257, J258, J259, J260, J261, J262, J263, J264, J265, J266, J267, J268, J269, J270, J271, J272, J273, J274, J275, J276, J277, J278, J279, J280, J281, J282, J283, J284, J285, J286, J287, J288, J289, J290, J291, J292, J293, J294, J295, J296, J297, J298, J299, J300, J301, J302, J303, J304, J305, J306, J307, J308, J309, J310, J311, J312, J313, J314, J315, J316, J317, J318, J319, J320, J321, J322, J323, J324, J325, J326, J327, J328, J329, J330, J331, J332, J333, J334, J335, J336, J337, J338, J339, J340, J341, J342, J343, J344, J345, J346, J347, J348, J349, J350, J351, J352, J353, J354, J355, J356, J357, J358, J359, J360, J361, J362, J363, J364, J365, J366, J367, J368, J369, J370, J371, J372, J373, J374, J375, J376, J377, J378, J379, J380, J381, J382, J383, J384, J385, J386, J387, J388, J389, J390, J391, J392, J393, J394, J395, J396, J397, J398, J399, J400, J401, J402, J403, J404, J405, J406, J407, J408, J409, J410, J411, J412, J413, J414, J415, J416, J417, J418, J419, J420, J421, J422, J423, J424, J425, J426, J427, J428, J429, J430, J431, J432, J433, J434, J435, J436, J437, J438, J439, J440, J441, J442, J443, J444, J445, J446, J447, J448, J449, J450, J451, J452, J453, J454, J455, J456, J457, J458, J459, J460, J461, J462, J463, J464, J465, J466, J467, J468, J469, J470, J471, J472, J473, J474, J475, J476, J477, J478, J479, J480, J481, J482, J483, J484, J485, J486, J487, J488, J489, J490, J491, J492, J493, J494, J495, J496, J497, J498, J499, J500, J501, J502, J503, J504, J505, J506, J507, J508, J509, J510, J511, J512, J513, J514, J515, J516, J517, J518, J519, J520, J521, J522, J523, J524, J525, J526, J527, J528, J529, J530, J531, J532, J533, J534, J535, J536, J537, J538, J539, J540, J541, J542, J543, J544, J545, J546, J547, J548, J549, J550, J551, J552, J553, J554, J555, J556, J557, J558, J559, J560, J561, J562, J563, J564, J565, J566, J567, J568, J569, J570, J571, J572, J573, J574, J575, J576, J577, J578, J579, J580, J581, J582, J583, J584, J585, J586, J587, J588, J589, J590, J591, J592, J593, J594, J595, J596, J597, J598, J599, J600, J601, J602, J603, J604, J605, J606, J607, J608, J609, J610, J611, J612, J613, J614, J615, J616, J617, J618, J619, J620, J621, J622, J623, J624, J625, J626, J627, J628, J629, J630, J631, J632, J633, J634, J635, J636, J637, J638, J639, J640, J641, J642, J643, J644, J645, J646, J647, J648, J649, J650, J651, J652, J653, J654, J655, J656, J657, J658, J659, J660, J661, J662, J663, J664, J665, J666, J667, J668, J669, J670, J671, J672, J673, J674, J675, J676, J677, J678, J679, J680, J681, J682, J683, J684, J685, J686, J687, J688, J689, J690, J691, J692, J693, J694, J695, J696, J697, J698, J699, J700, J701, J702, J703, J704, J705, J706, J707, J708, J709, J710, J711, J712, J713, J714, J715, J716, J717, J718, J719, J720, J721, J722, J723, J724, J725, J726, J727, J728, J729, J730, J731, J732, J733, J734, J735, J736, J737, J738, J739, J740, J741, J742, J743, J744, J745, J746, J747, J748, J749, J750, J751, J752, J753, J754, J755, J756, J757, J758, J759, J760, J761, J762, J763, J764, J765, J766, J767, J768, J

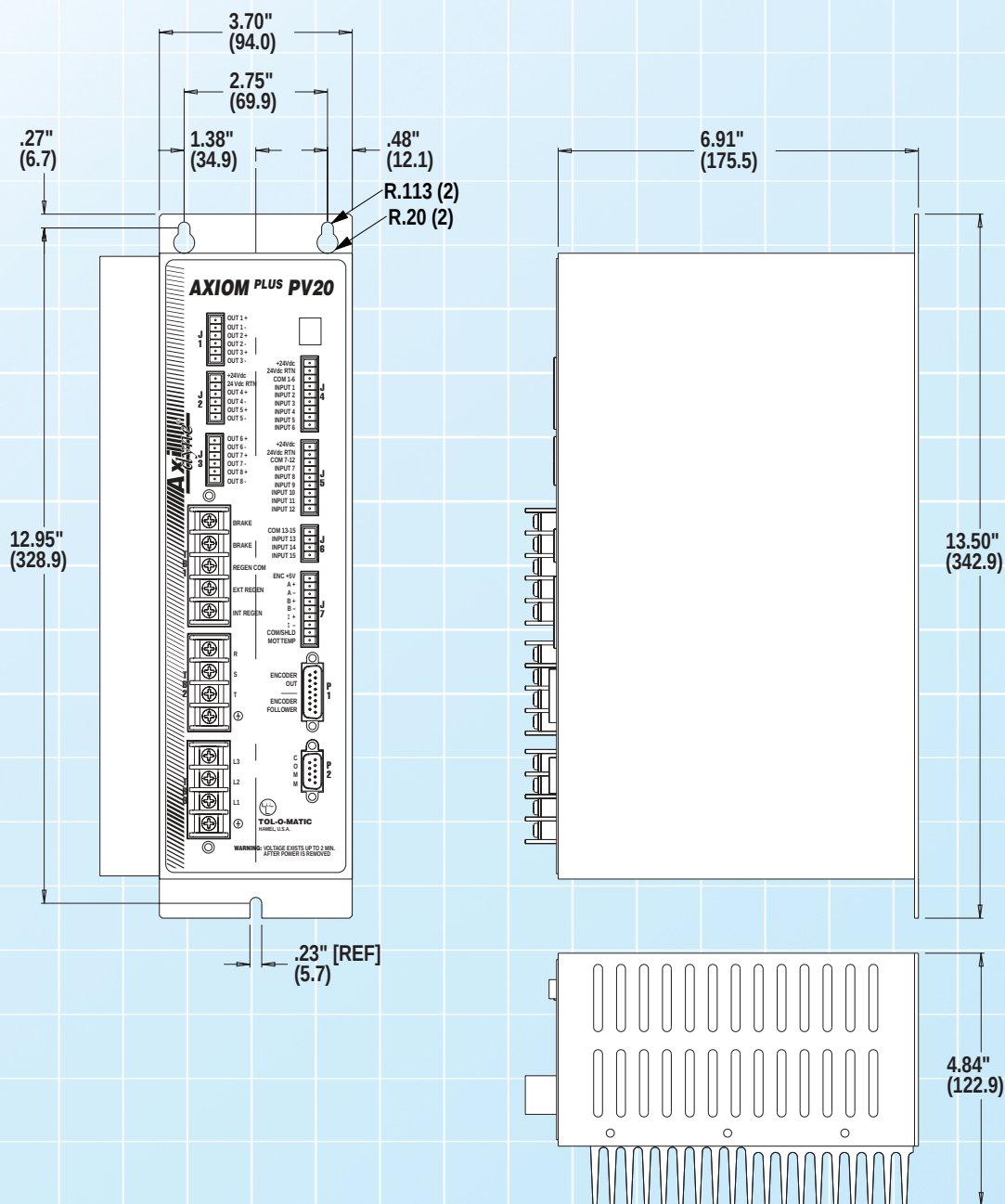
CONTROLLER / DRIVES



AXIOM™ PLUS PV20/30 CONTROLLER/DRIVER

DIMENSIONS

DIMENSIONS AXIOM® PV20/30 BRUSHLESS SERVO DRIVE



MSS MICROSTEPPING CONTROLLER/DRIVER

FEATURES • SPECIFICATIONS • PROGRAMMING • DIMENSIONS • ORDERING



Features:

- **Motor Current: 0.5 to 5.5 amps/phase**, (software selectable)
- **Drive Voltage: 80 Vdc** (from internal linear, toroidal power supply)
- **Input Voltage: 115 or 230 Vac** (switch selectable)
- **Microstep Resolution: 13 resolutions**, 2000 to 50800 steps/revolution (software selectable)
- **Automatic idle current reduction: 0%, 25%, 50% or 100%** (software selectable)
- **Connectors:** pluggable, screw terminal connectors are included.
- **Two optically isolated limit switch inputs** can be used as inputs, (7 - 8)
- **CW and CCW jog inputs** can be used as inputs, (5 - 6)
- **Four general purpose, opto-isolated inputs**
- **Drive fault output** (activated by overcurrent or over-temperature condition)
- **3 general purpose, optically isolated outputs** for interfacing to other equipment
- **Uses Tol-O-Motion MSS Software** with absolute positioning, single-step program execution

Tol-O-Matic's MSS stand-alone microstepping controller/drive system is absolutely the simplest and most cost-effective way to provide single axis motion to Tol-O-Matic's stepper motor/actuator systems. The Tol-O-Motion™ MSS software allows sophisticated programming to be achieved by

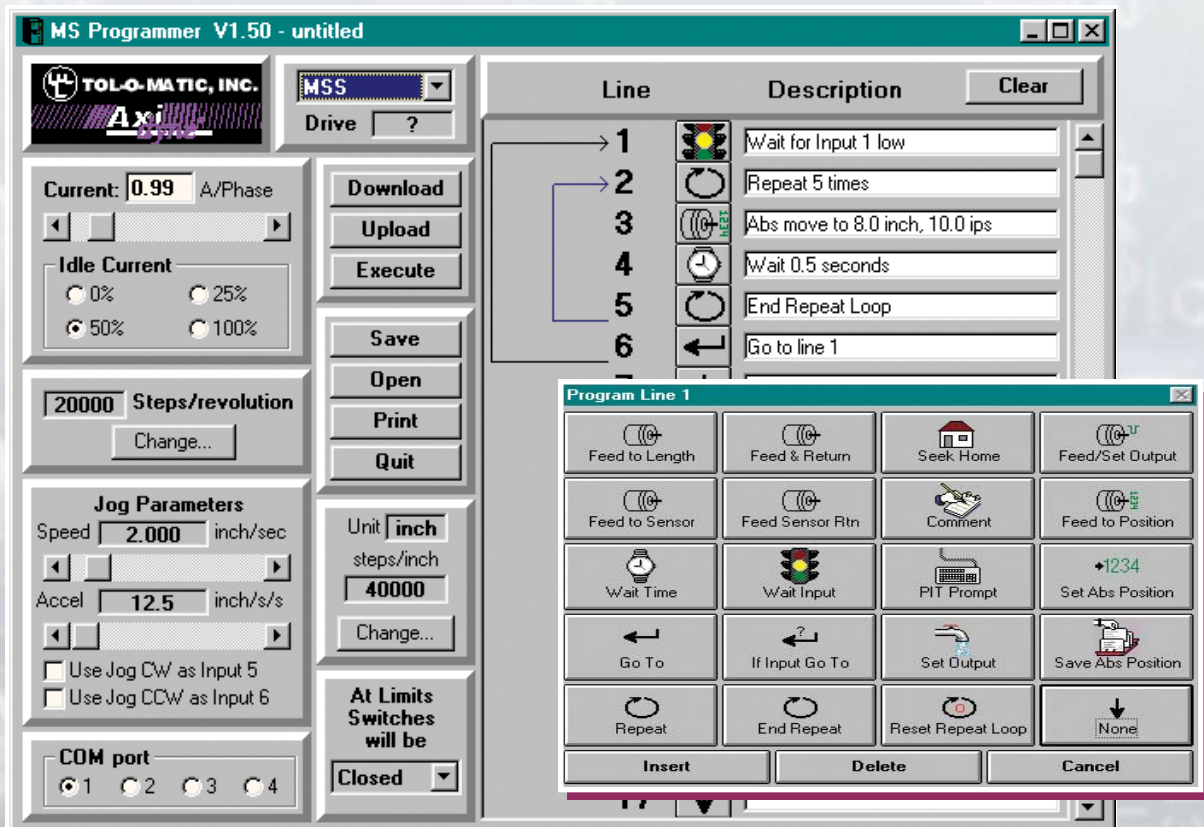
even the most novice user, through icons arranged in a simple, easy to follow format. Once programmed over the RS232 the PC may be removed and program interaction achieved through I/O or the PIT (Panel Mount Interface).

SPECIFICATIONS

SPECIFICATIONS	MSS Microstepping Controller/Driver
Power	
Input Current (AC line):	Varies with motor & load 6.0A max. at 115 Vac
Input Voltages (AC line):	115 or 230 Vac, 50-60Hz (switch selected)
Input Fuses (AC line):	6.3A time lag, TR5 style
Motor Current Output:	0.5 - 5.5 A / phase peak
Internal Bus Voltage:	80 Vdc (unregulated)
Parameter Ranges	
Distance:	1 to 16,000,000 steps
Speed:	.025 to 50 revolutions per second (in any microstep resolution)
Acceleration:	1 to 3000 rev/sec/sec (limited by accel torque)
Deceleration:	1 to 3000 rev/sec/sec (set independently from acceleration) (limited by decel torque)
Time Delays:	0.1 to 25.5 seconds
Microstep Resolution:	2000-50800 steps/rev
Inputs*	
Input 1-4, CW Jog, CCW Jog: CW Limit, CCW Limit:	Optically isolated, 5 - 24 Vdc, 20 mA max 2200 Ohms internal resistance can be configured for sinking (NPN) or sourcing (PNP) signals.
Outputs*	
Outputs 1-3:	Optically isolated, 24 Vdc max, 100mA
Environment	
Maximum Case Temp.:	167° F (75° C)
Ambient Temp. Range:	32° to 113° F (0 to 45° C)

* NOTE: External 5-24 Vdc power supply required for operation.

MSS PROGRAMMING



MAIN PROGRAMMING SCREEN

Programmable by RS232 connection to a PC running Windows 3.1, Windows 95, 98 or Windows NT. Programming software and cable included. Programming is very easy to learn and requires no previous programming experience.

Programs can be up to 100 lines long. Instructions are powerful, so 100 lines can provide the user with a sophisticated program. For example, in one program line the motor can be moved until a sensor changes state, then fed a precise distance to stop, delayed and returned to the starting point. Distances, delays, feed and return speeds, acceleration and deceleration parameters are all included in the single program instruction.

The same move can take 10 program lines or more on other indexers. There are a total of 16 different instructions, including input/output, branches, loops and motion commands. These instructions can be combined to make a nearly infinite variety of programs, meeting the demands of a wide range of applications.

The main programming screen is shown above. On the right of the screen are the 100 program lines. In the center are command buttons and on the left are global parameters such as microstep resolution and jog. Clicking on a program step icon brings up a sequence of dialog boxes, making program selection and parameter setting easy.

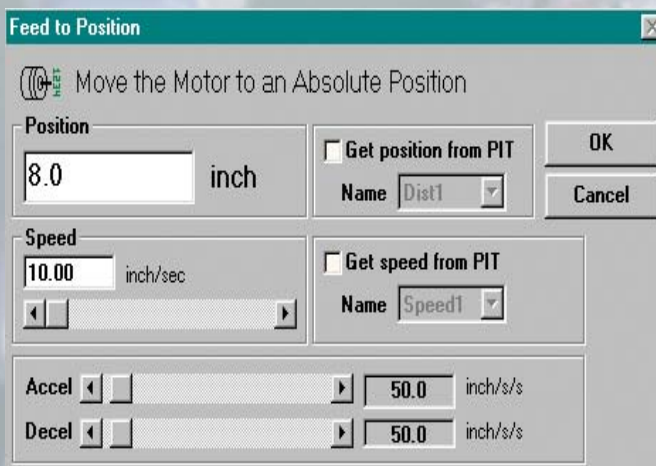
Once programmed, the

cable can be removed and the indexer-drive will run stand alone. Programs and parameters are stored internally in non-volatile memory. Upon power up, the drive automatically senses the connection to the Windows programming

software. If no connection is detected, the program is automatically executed starting on line 1.

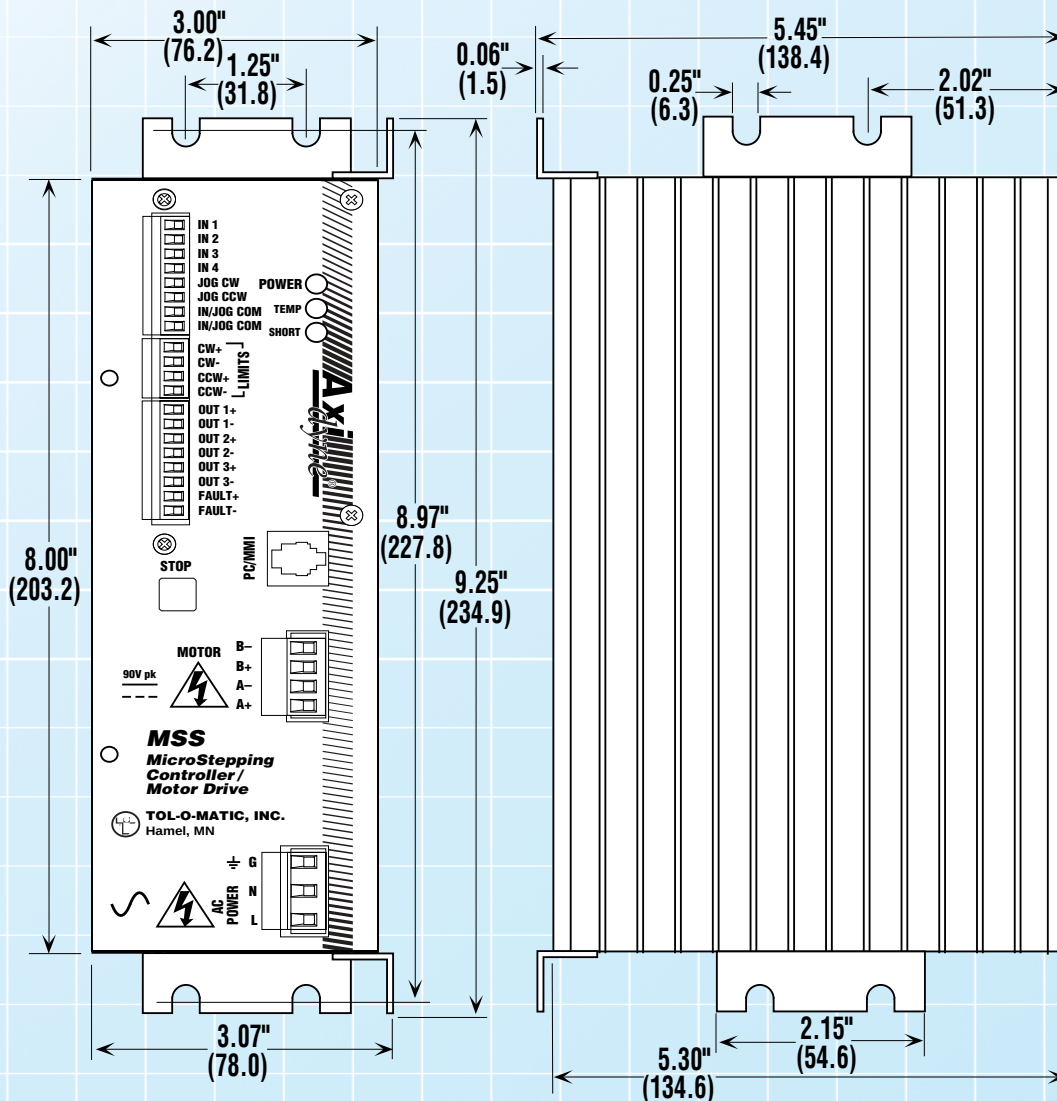
The MSS also allows program interaction to take place using the PIT user interface.

DIALOG BOX FOR SETTING FEED TO POSITION



MSS MICROSTEPPING CONTROLLER/DRIVER

DIMENSIONS MSS MICROSTEPPING CONTROLLER/DRIVER



Dimensions shown in inches and (Millimeters).

CONTROLLER / DRIVES

Tol-O-Matic System Compatibility

- Drives MRS series stepper motors to provide motor./drive system performance shown in the MRS motor section (pages 106-107)
- PTT (Panel Mount User Interface)(pages 143)

Ordering Information

Configuration Code	Includes	Tol-O-Matic Part #
MSS	• Microstepping Drive & Controller	3600-0038
	• 7ft. RS232 Cable (RJ11 ends)	3600-1187
	• 9-pin adapter	3600-1186
	• User Manual	
	• Tol-O-Motion MSS Software	



CONTROLLERS

Axidyne controllers are available for brushless, microstepping and brushed dc systems. Used with Tol-O-Motion motion control software, these controllers solve complex motion control problems with ease.



SSC Multi-Axis/ MultiFunction Servo /Stepper Controller

Axidyne's high performance, state-of-the-art motion controller for up to 4 axes of servo or stepper control

MSC Single-Axis Servo /Stepper Controller

This Axidyne motion controller provides the simplest, quickest way to get up and running in a single axis application

CONTROLLERS



SSC MULTI-AXIS SERVO/STEPPER CONTROLLER

FEATURES • SPECIFICATIONS • PROGRAMMING • DIMENSIONS • CONNECTORS • ORDERING



The SSC is a high-performance, state-of-the-art motion controller designed for stand-alone operation. Using a 32-bit specialized microprocessor, a custom sub-micron gate array, and the Tol-O-Motion SSC software, the controller provides DSP performance without sacrificing ease of use and cost effectiveness.

The SSC is available with up to 4 axes per unit allowing the user to purchase only the number of axes required. The SSC can also be used to control stepper and /or servo systems.

Designed to solve complex motion problems with superior precision, the SSC can be used for

applications requiring jogging, vector positioning of multi-axis, 2-D linear or circular interpolation, contouring and electronic gearing.

With the Tol-O-Motion SSC software there is no need to learn another new programming language. Complex motion control is made easy with the plain English programming that leads you through the entire programming process from setup to execution.

Features:

- **High performance motion control** packaged in an industrial enclosure
- **Uses a 32-bit specialized microcomputer** and custom, submicron gate array for highest performance and speed
- **Up to 4 axes per unit** — up to 8 units can be daisy-chained
- **125 μ sec per axis** servo update rate for high bandwidth
- **Controls servo motors and/or step motors**
- **Sophisticated PID filter** with velocity and acceleration feed forward for optimum precision
- **16 bit DAC** for fine resolution control
- **8,000,000 counts/sec encoder feedback** allows high-speed operation — 2 encoders per axis
- **256K RAM memory** for holding and running active program up to 1000 lines x 80 characters
- **4M EEPROM memory** for non volatile storage of custom application programs, parameters and arrays (8000 array elements x 30 arrays) — permits stand-alone operation
- **Multitasking feature** permits simultaneous execution of four independent applications programs
- **Programmable acceleration and deceleration** with profile smoothing to eliminate jerk
- **Continuous vector feed of infinite** number of linear and arc segments for smooth motion
- **Contour mode** for profiling along computer generated paths such as parabolic or spherical profiles
- **Selectable linear scale** simplifies linear motion programming
- **Performs any motion task** including jogging, point-to-point positioning, linear and circular interpolation, electronic gearing, cam and contouring
- **Relative and absolute positioning** with more than $\pm 2,000,000,000$ counts per move
- **Dedicated opto-isolated inputs** for home, abort, forward and reverse limits — noise immune
- **8 uncommitted, opto-isolated inputs and 8 programmable TTL outputs**
- **7 analog inputs with 12-bit ADC** for interface to joysticks, sensors, pressure transducers, potentiometers (16-bit ADC optional)
- **Position feedback** for each axis can be from analog signal or encoder
- **Auxiliary encoder inputs and dual-loop damping** — ideal for backlash compensation
- **Programmable event triggers** for monitoring elapsed time, position, speed, and motion complete
- **I/O functions, timers, and logic functions** for executing PLC tasks
- **254 symbolic variables** and 8000 element array space for data storage
- **Compact size:** 13" high x 2.5" wide x 6.6" deep
- **Internal, universal switching power supply** for direct connection to AC outlet (115V or 230V)
- **IDC connectors** on front panel connect to DIN rail mounted screw terminal breakouts included
- **Additional I/O** available on request

CONTROLLERS



SSC MULTI-AXIS SERVO/STEPPER CONTROLLER

SPECIFICATIONS

SPECIFICATIONS	SSC Multi-Axis/Multi-Function Servo/Stepper Controller
Performance	
Servo Loop Cycle Time:	SSC 1: 250 μ sec; SSC 2: 375 μ sec SSC 3: 500 μ sec; SSC 4: 500 μ sec
Block Execution Time:	In contour mode, up to 1000 blocks (moves)/sec with full trajectory calculation
Position Accuracy:	± 1 quadrature count
Velocity Accuracy:	Long-term: phase-locked, better than .003% Short-term: system dependent
Synchronization:	All axes in the same unit are perfectly synchronized and share the same servo cycle.
Position Capture Accuracy:	25 μ sec with opto-isolation; 1 μ sec if by-pass opto-isolation.
Parameter Ranges	
Position Range:	$\pm 2,147,483,647$ counts/move; automatic rollover; no limit in jog or vector modes.
Velocity Range:	Up to 8,000,000 counts/sec
Acceleration/deceleration:	1,024 to 67,107,840 c/sec ²
Error Limit:	$\pm 32,767$ counts
Gear Ratio:	± 127.9999
Filter Constants:	Kp: 0 to 1023.875 Kd: 0 to 4095.875 Ki: 0 to 2047.875
Motor Command Resolution:	16-bits or .0003 V
Step Motor Control Mode:	Full, half or microstep
Step Pulse Frequency:	2,000,000 pulse/sec
Number of Variables:	254
Array Memory Size:	8000 elements in up to 30 arrays
Program Memory Size:	1000 lines x 80 characters
Mechanical	
Dimensions:	13" high x 2.5" wide x 6.6" deep
Weight:	6 lbs.
Inputs/Outputs	
Feedback:	Two channels of A/B quadrature per axis with third channel for index. In servo mode, includes auxiliary encoder inputs for each axis. Single ended or differential. Can be configured for quadrature, pulse and direction, or from analog inputs.
General Purpose Inputs:	8 opto-isolated inputs
General Purpose Outputs:	8 TTL outputs
General Purpose Analog Inputs:	7, ± 10 V; 12-bit resolution (16-bit optional)
Dedicated Inputs per Axis:	Forward and reverse limits, home.
Dedicated Outputs per Axis:	Analog motor command, pulse and direction, amplifier enable
Available Power to Drive External Devices	
+5 V	1.5 Amp
+12 V	750 mA
-12 V	200 mA

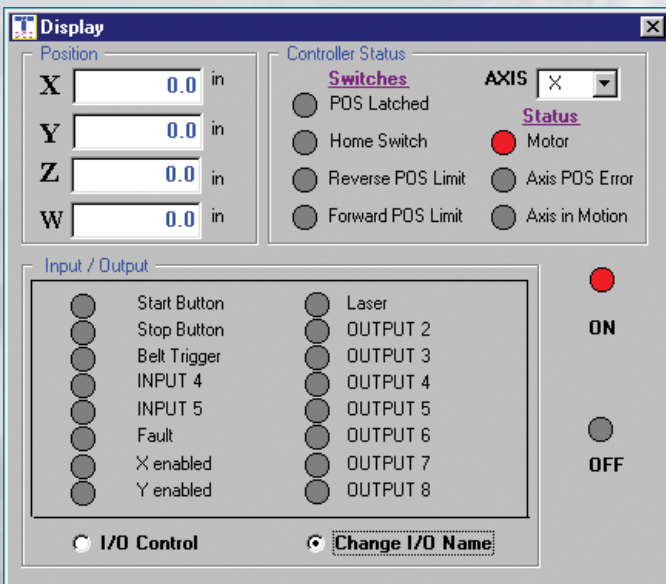
SPECIFICATIONS	SSC Multi-Axis/Multi-Function Servo/Stepper Controller
Environment	
Operating Temperature:	32° to 158° F (0° to 70° C)
Communication Interface	
Selectable Baud Rate:	300, 1200, 4800, 9600, 19200, 38400. Handshake mode available.
I/O Description (Inputs)	
Encoder, A+, B+:	Position feedback from incremental encoder with two channels in quadrature. The encoder can be (± 12 V) or TTL. Note: Encoders that produce output in a pulse and direction format can also be used.
Encoder Index I+:	Once-per-revolution encoder pulse; used in Homing sequence or Find Index command. Minimum index pulse width is 120 nsec.
Encoder, A-, B-, I-:	Optional differential inputs from encoder; used for enhanced noise immunity.
Auxiliary Encoder:	Inputs for additional encoder; used when encoders on both the motor and the load are required.
Abort #:	Stops commanded motion instantly and also aborts application program.
Reset #:	System reset.
Forward and Reverse Limit Switch #:	When active, inhibits motion in forward or reverse direction and also causes the limit switch subroutine #LIMSWI to execute.
Home Switch #:	Input for Homing (HM) and Find Edge (FE) instructions.
Input 1 - Input 8#:	Uncommitted inputs; can be defined by the user to trigger events or interrupt program.
Latch#:	High-speed position latch to capture axis position within 25 μ sec (bypass opto-isolation for .1 μ sec capture). AL command arms latch. Input 1, 2, 3, 4 latches X, Y, Z, W respectively.
Analog 1 - Analog 7:	Analog inputs that can be connected to external analog signals such as force or pressure transducers. Can also be used for position feedback. 12-bit resolution ADC for ± 10 V input.
I/O Description (Outputs)	
Analog Motor Command:	± 10 V range signal for driving servo amplifiers; 16-bit resolution or .0003 V; 3 mA.
Amp enable:	Signal to disable and enable an amplifier. Amp enable goes low when a motor-off condition occurs. For step motors, this pin provides for reduced current when low.
Step Out:	Pulses for input to a step motor driver. The pulses can be either active low or high. Upon Reset, the output will be low if the SM jumper is on, Tristate if off. The STEP OUT pin also provides the PWM signal for servo motors.
Direction:	Used with the STEP OUT signal to give direction to step motors or servo motors in the sign magnitude mode.
Error:	The signal goes low when the position error on any axis exceeds the limit specified by the error command, ER.
Output 1 - Output 8:	These 8 TTL outputs are uncommitted and can be designated by the user to toggle relays and trigger external events. The output lines are toggled by Set Bit (SB), Clear Bit (CB), Define Bit (OB), and OP instructions. Upon reset these signals will be low.

SSC PROGRAMMING

(Tol-O-Motion SS) Motion Software:

Programming is accomplished through RS232 connection to a PC running Windows 95, 98 or NT. Visual Basic panels guide the user through the complete setup process including communications and axis configuration. The user can then use other program options including Display, Jog, Teach, Programmer, Tune and Data Acquisition.

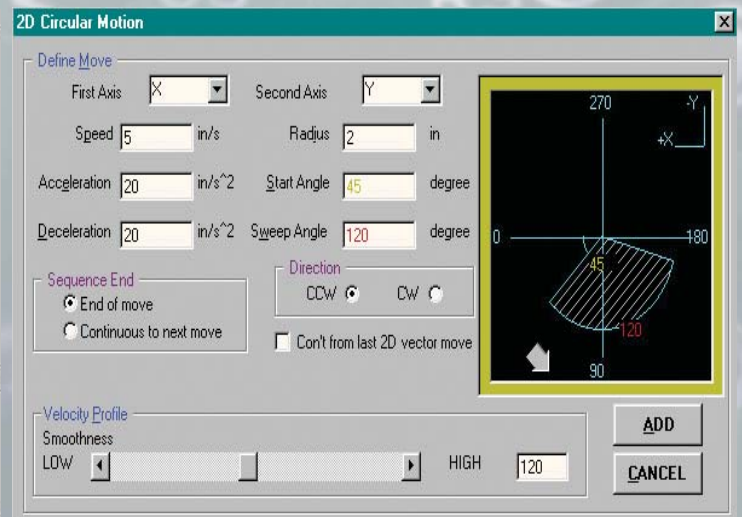
All Tol-O-Matic programming software is available on CD-ROM or downloaded at www.tolomatic.com



The Display panel (shown above) allows the user to identify axis locations and status faults, limits, and I/O.

The Jog panels allow the user to easily setup independent motion or coordinated motion.

The added feature of 2-dimensional circular programming, assists you in selecting start and sweep angles.

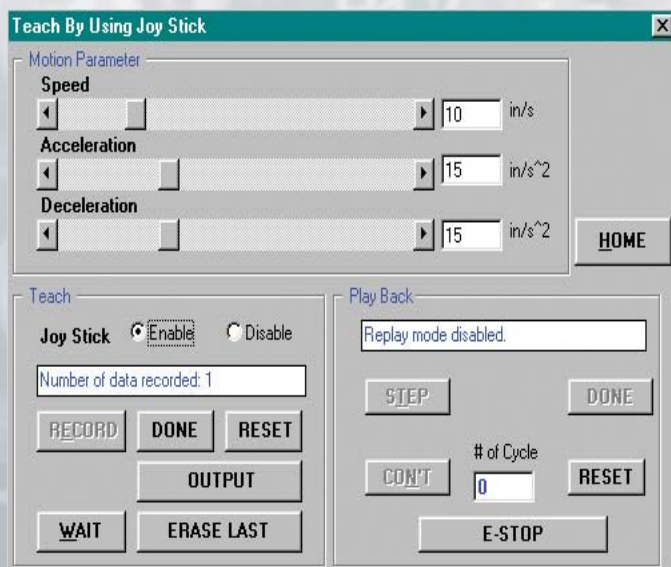


SSC PROGRAMMING

The easiest way to get up and running is by using the teach mode. This allows the user to write a program by using a joystick to move to the desired positions and pressing a button to record. For more complex coordinated moves, the Mouse Teach mode allows the user to define arcs and vectors on a scaled plot representation of the axis by positioning and clicking the mouse. The Joystick Teach and Mouse Teach modes are shown below.

Program mode allows the user to write programs in plain English commands, without having to pull out command listings and formats. The user clicks on a button for a given function and is guided through the function with various easy to follow panels.

Diagnostics and auto-tune panels are included to help get the complete system up and running with ease and confidence.



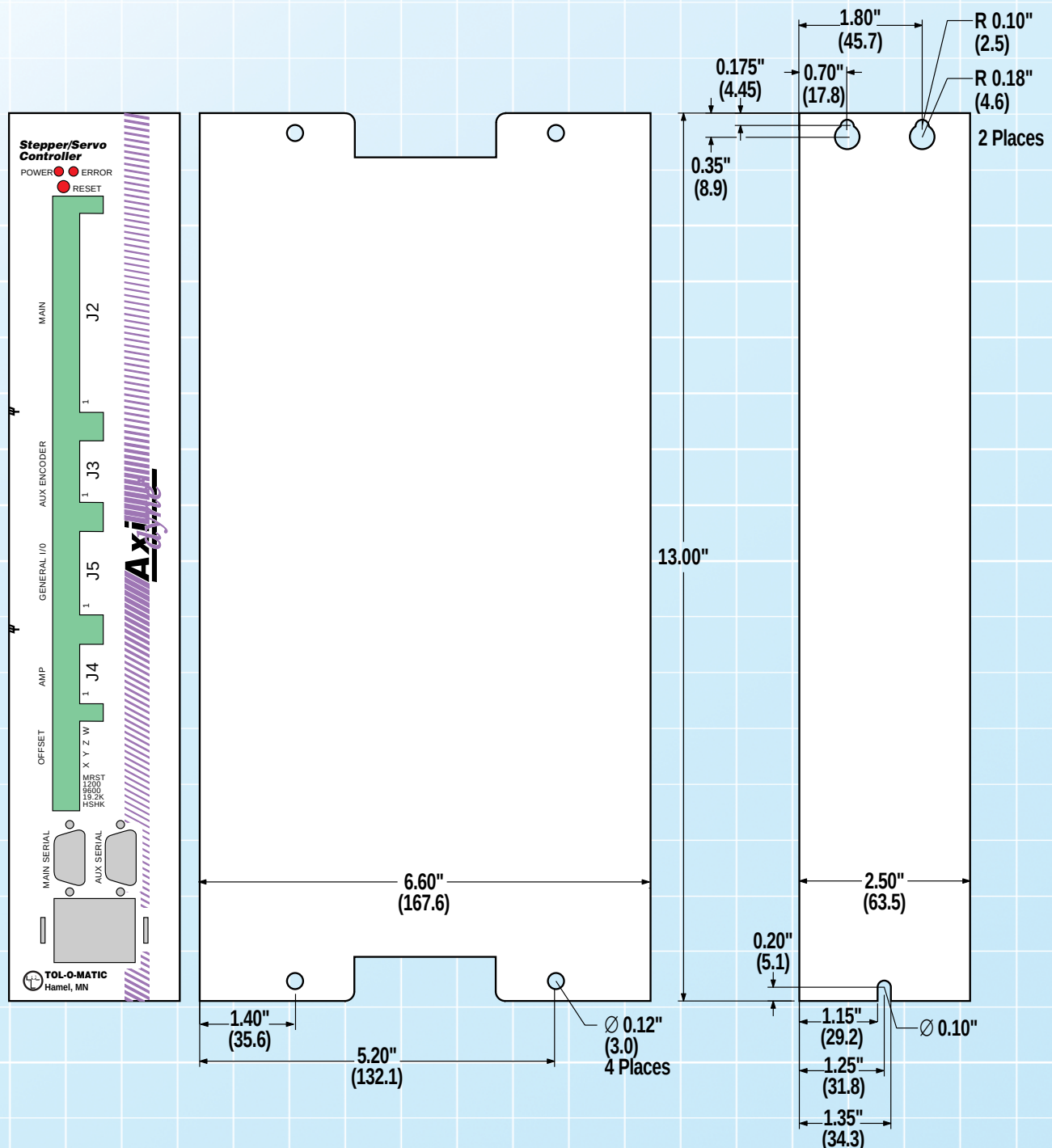
Tol-O-Matic System Compatibility

- Used to control any combination of brushless servo systems (AXIOM™ DV drives/MRV motors), stepper systems (MSD drives/MRS motors), or Brushed servo systems (MSC and AXIOM™ DB drives/MRB motors)
- Hand held (SIT) or joystick (JS) user interfaces

SSC MULTI-AXIS SERVO/STEPPER CONTROLLER

DIMENSIONS

DIMENSIONS SSC I-4 MULTI-AXIS/MULTI-FUNCTION SERVO/STEPPER CONTROLLER



Dimensions shown in inches and (Millimeters).

CONTROLLERS



SSC ORDERING INFORMATION AND CONNECTORS

Connectors

SSC J2 MAIN; 60-PIN IDC;

1 Ground	2 5V
3 Error	4 Reset
5 Switch Common	6 Forward Limit - X
7 Reverse Limit - X	8 Home - X
9 Forward Limit - Y	10 Reverse Limit - Y
11 Home - Y	12 Forward Limit - Z
13 Reverse Limit - Z	14 Home - Z
15 Forward Limit - W	16 Reverse Limit - W
17 Home - W	18 Output 1
19 Input Common	20 Latch X or Input 1
21 Latch Y or Input 2	22 Latch Z or Input 3
23 Latch W or Input 4	24 Abort Input
25 Motor Command X	26 Amp Enable X
27 Motor Command Y	28 Amp Enable Y
29 Motor Command Z	30 Amp Enable Z
31 Motor Command W	32 Amp Enable W
33 A+ X	34 A- X
35 B+ X	36 B- X
37 I+ X	38 I- X
39 A+ Y	40 A- Y
41 B+ Y	42 B- Y
43 I+ Y	44 I- Y
45 A+ Z	46 A- Z
47 B+ Z	48 B- Z
49 I+ Z	50 I- Z
51 A+ W	52 A- W
53 B+ W	54 B- W
55 I+ W	56 I- W
57 +12V	58 -12V
59 5V	60 Ground

SSC J5 GENERAL I/O; 26-PIN IDC;

1 Analog 1	2 Analog 2
3 Analog 3	4 Analog 4
5 Analog 5	6 Analog 6
7 Analog 7	8 Ground
9 5V	10 Output 1
11 Output 2	12 Output 3
13 Output 4	14 Output 5
15 Output 6	16 Output 7
17 Output 8	18 Input 8
19 Input 7	20 Input 6
21 Input 5	22 Input 4 (Latch W)
23 Input 3 (Latch W)	24 Input 2 (Latch W)
25 Input 1 (Latch W)	26 Input Common (Isolated 5V)

SSC J3 AUXILIARY ENCODER; 20-PIN IDC;

1 Sample Clock	2 Reserved
3 B- Aux W	4 B+ Aux W
5 A- Aux W	6 A+ Aux W
7 B- Aux Z	8 B+ Aux Z
9 A- Aux Z	10 A+ Aux Z
11 B- Aux Y	12 B+ Aux Y
13 A- Aux Y	14 A+ Aux Y
15 B- Aux X	16 B+ Aux X
17 A- Aux X	18 A+ Aux X
19 5V	20 Ground

SSC J4 DRIVER; 20-PIN IDC;

1 Motor Command X	2 Amp Enable X
3 PWM X/Step X	4 Sign X/Dir X
5	6 Motor Command Y
7 Amp Enable Y	8 PWM Y/Step Y
9 Sign Y/Dir Y	10
11 Motor Command Z	12 Amp Enable Z
13 PWM Z/Step Z	14 Sign Z/Dir Z
15 5V	16 Motor Command W
17 Amp Enable W	18 PWM W/Step W
19 Sign W/Dir W	20 Ground

AC POWER INPUTS; 4-PIN DETACHABLE SCREW TYPE:

Hot Connects to 110 or 220 AC	
NC	No Connect
Neutral	Return for AC
Earth	Chassis input

RS232 - MAIN PORT; 9-PIN:

1 CTS - output	2 Transmit data
3 Receive data	4 RTS - input
5 Ground	6 CTS - output
7 RTS - input	8 CTS - output
9 5V	

RS232 - AUXILIARY PORT; 9-PIN:

1 CTS - input	2 Receive data -
3 Transmit data	4 RTS - output
5 Ground	6 CTS - input
7 RTS - output	8 CTS - input
9 5V	

SSC INCLUDES

- 60 pin/18" (457mm) ribbon cable & 60 pin breakout*
- 26 pin/18" (457mm) ribbon cable & 26 pin breakout*
- If any axis configured w/ step & direction output — 20 pin/18" (457mm) ribbon cable & 20 pin breakout**
- User Manual
- Tol-O-Motion SSC Software
- If ordered with AXIOM® drives, includes a 15 pin D-sub 36" connector cable for each axis configured with SV output per table below

NOTE: SSC controllers do not include RS232 cables. If desired, specify CRZ in configuration string (see page 212).

SSC _ _ (MULTI-AXIS/MULTI-FUNCTION SERVO STEPPER CONTROLLER)					
Configurator Code	X-Axis	Y-Axis	Z-Axis	W-Axis	Part #
SSC10	ST	-	-	-	3600-0110
SSC10	SV	-	-	-	3600-0210
SSC21	ST	ST	-	-	3600-0121
SSC21	SV	ST	-	-	3600-0221
SSC22	ST	SV	-	-	3600-0122
SSC22	SV	SV	-	-	3600-0222
SSC31	ST	ST	ST	-	3600-0131
SSC31	SV	ST	ST	-	3600-0231
SSC32	ST	ST	SV	-	3600-0132
SSC32	SV	ST	SV	-	3600-0232
SSC33	ST	SV	ST	-	3600-0133
SSC33	SV	SV	ST	-	3600-0233
SSC34	ST	SV	SV	-	3600-0134
SSC34	SV	SV	SV	-	3600-0234
SSC41	ST	ST	ST	ST	3600-0141
SSC41	SV	ST	ST	ST	3600-0241
SSC42	ST	ST	ST	SV	3600-0142
SSC42	SV	ST	ST	SV	3600-0242
SSC43	ST	ST	SV	ST	3600-0143
SSC43	SV	ST	SV	ST	3600-0243
SSC44	ST	ST	SV	SV	3600-0144
SSC44	SV	ST	SV	SV	3600-0244
SSC45	ST	SV	ST	ST	3600-0145
SSC45	SV	SV	ST	ST	3600-0245
SSC46	ST	SV	ST	SV	3600-0146
SSC46	SV	SV	ST	SV	3600-0246
SSC47	ST	SV	SV	ST	3600-0147
SSC47	SV	SV	SV	ST	3600-0247
SSC48	ST	SV	SV	SV	3600-0148
SSC48	SV	SV	SV	SV	3600-0248

ST = STEP AND DIRECTION OUTPUT SV = ±10 V OUTPUT

Systems will be preconfigured at factory by using the appropriate 5th digit in configurator. The unit may be changed by the user at a later time by the insertion or removal of jumper.*

To avoid shipping with DIN rail mount break out terminals, add B0N to configurator

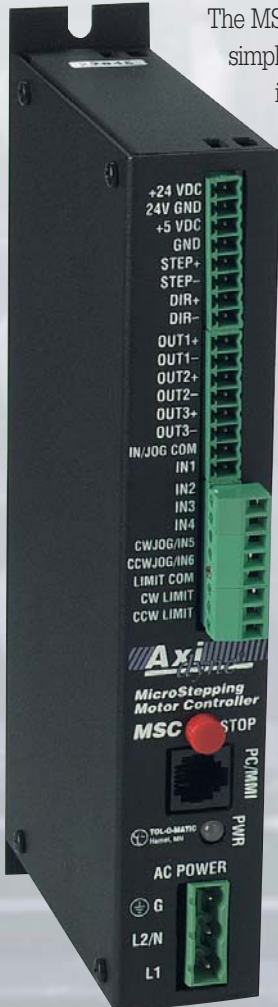
- ** X axis is configured according to drive ordered
 • If MSD configured for step and direction output
 • If AXIOM® DV configured for ±10 V output

FOR REPLACEMENT CABLES BY PART NUMBER

Description	Part No.	Description	Part No.
20 pin breakout	3600-1340	26 pin ribbon cable	3600-1346
26 pin breakout	3600-1341	60 pin ribbon cable	3600-1347
60 pin breakout	3600-1342	RS232 Cable	3600-1172
20 pin ribbon cable	3600-1345	D-sub Encoder Cable	3604-1213

MSC MICROSTEPPING CONTROLLER

FEATURES • SPECIFICATIONS • PROGRAMMING • DIMENSIONS • ORDERING



The MSC Microstepping Controller provides the simplest, quickest way to get up and running in a single-axis application. The Tol-O-Motion MS software allows sophisticated programming to be achieved by even the most novice user, through icons arranged in a simple, easy to follow format. Once programmed over the RS232 the PC may be removed and program interaction achieved through I/O, or by using the PIT panel mount interface. The MSC Microstepping controller comes as a stand-alone controller making it ideal for operation with the AXIOM™ DB brushed dc motor driver, or integral to the MSD micro-stepping drive.

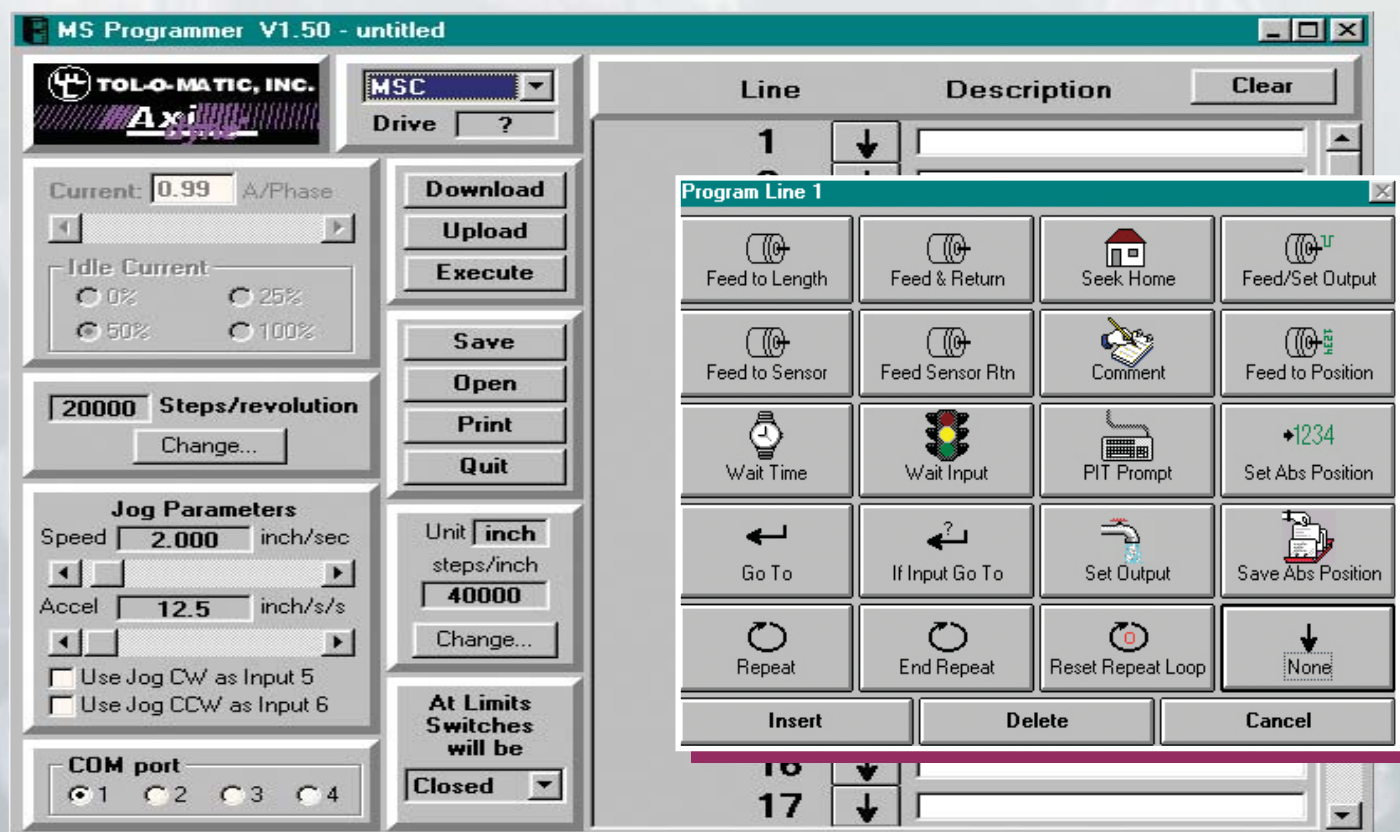
Features:

- **Built-in power supplies:** 24 Vdc, 100mA is provided for sensors and I/O circuits.
- **Accepts 115 or 230 volt AC power**
- **4 dedicated, optically isolated inputs:** CW and CCW jog, 2 limits
- **4 general purpose, optically isolated inputs**
- **Drive fault output**
- **3 general purpose, optically isolated outputs**
- **Pluggable screw terminal connectors** for I/O, motor, AC power (all mating connectors included)
- **Selectable linear scale simplifies linear motion programming**
- **Absolute positioning**
- **Single step program execution**

SPECIFICATIONS

SPECIFICATIONS	MSC Microstepping Controller
Power	
Input Voltages (AC line):	115 or 230 Vac, 50-60Hz (switch selected)
Input Current (AC line):	0.2A max. at 110 Vac
Input Fuses (AC line, L1 & L2/N):	0.25A fast acting TR5 style
Parameter Ranges	
Distance:	1 to 16,000,000 steps
Speed:	.025 to 100 revolutions per second (up to 25,400 steps/rev.)
Acceleration:	1 to 3000 rev/sec/sec (limited by accel torque)
Deceleration:	1 to 3000 rev/sec/sec (set independently from acceleration)
Time Delays:	0.1 to 25.5 seconds
Output Pulse Widths:	2 to 500 milliseconds
Iterations per loop:	1 to 255
Microstep Resolution:	200-50800 steps/rev
Outputs	
5V:	50 mA used by PIT (if connected) ±5%, 100 mA max, self resetting fuse, Not isolated from internal circuitry
24V:	±5%, 100 mA max, self resetting fuse, Not isolated from internal circuitry
STEP & Dir (logic high):	2.5V min, 3.4V typ, with 20mA load
STEP & Dir (logic low):	0.5V max, 0.3V typ, with 20mA load
STEP output frequency:	50 Hz to 2.54 MHz
STEP output duty cycle:	50%
I/O	
Inputs:	bidirectional, optically isolated, 5-24 Vdc
Input impedance - IN 1-4, CW Jog, CCW Jog, limits:	2200 Ohms
Outputs:	optically isolated, sourcing or sinking
output current (Out 1-3):	100mA max
output voltage (Out 1-3):	24Vdc max
Environment	
Ambient Temp. Range:	32° to 122° F (0 to 50° C)

MSC PROGRAMMING



MAIN PROGRAMMING SCREEN

Programmable by RS232 connection to a PC running Windows 3.1, 95, 98 or NT. Programming software and cable included. Programming is very easy to learn and requires no previous programming experience.

Programs can be up to 100 lines long. Instructions are powerful, so 100 lines can provide the user with a sophisticated program. For example, in one program line the motor can be moved until a sensor changes state, then fed a precise distance to stop, delayed and returned to the starting point. Distances, delays, feed and return speeds, acceleration and deceleration parameters are all

included in the single program instruction. The same move can take 10 program lines or more on other indexers. There are a total of 16 different instructions, including input/output, branches, loops and motion commands. These instructions can be combined to make a nearly infinite variety of programs, meeting the demands of a wide range of applications.

The main programming screen is shown above. On the right of the screen are the 100 program lines. In the center are command buttons and on the left are global parameters such as microstep resolution and jog. Clicking on a program step icon brings up a sequence of dialog boxes, making program selec-

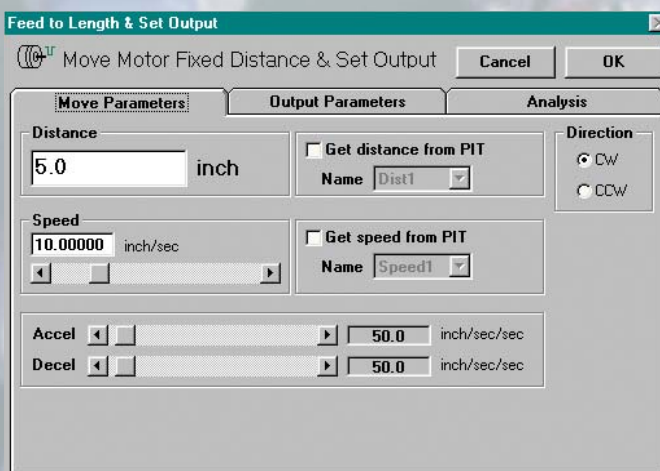
tion and parameter setting easy.

Once programmed, the cable can be removed and the indexer-drive will run stand alone. Programs and parameters are stored internally in non-volatile memory. Upon power up, the drive automatically

senses the connection to the Windows programming software. If no connection is detected, the program is automatically executed starting on line 1.

The MSC also allows program interaction to take place using the PIT user interface.

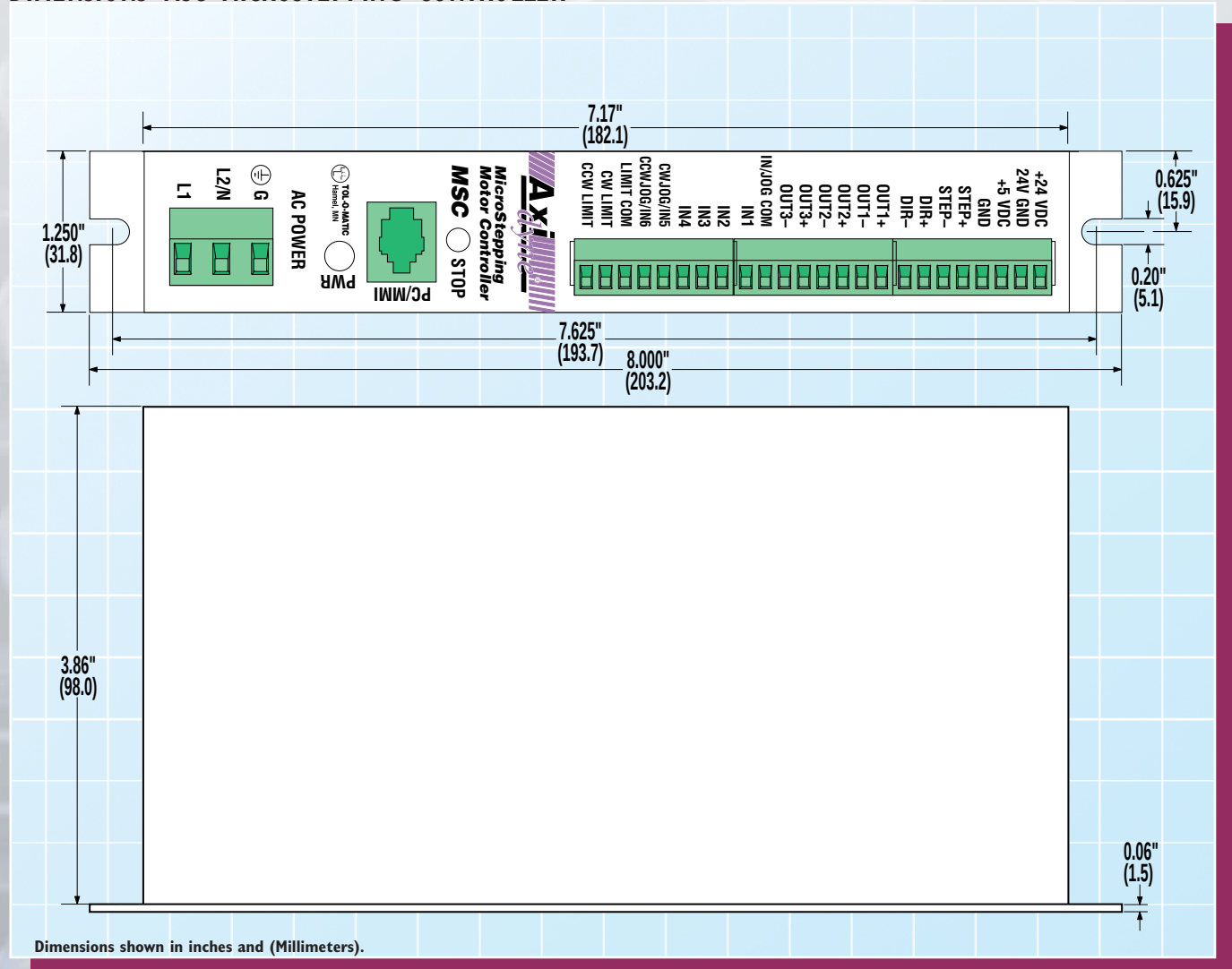
DIALOG BOX FOR SETTING FEED AND SET OUTPUT



MSC MICROSTEPPING CONTROLLER

DIMENSIONS • ORDERING

DIMENSIONS MSC MICROSTEPPING CONTROLLER



CONTROLLERS

Tol-O-Matic System Compatibility

- Provides control for AXIOM™ DB Drive (see pages 112-119)
- PIT (Panel Mount User Interface)(see page 143)

Ordering Information

Configuration Code	Includes	Tol-O-Matic Part #
MSC	• Microstepping Controller • 7ft. RS232 Cable (RJ11 ends) • 9-pin adapter • User Manual • Tol-O-Motion MSC Software	3600-0040 3600-1187 3600-1186



SIT HAND HELD USER INTERFACE

FEATURES • SPECIFICATIONS • DIMENSIONS



For user interaction with the SSC 1-4 axis multi-function controllers the SIT hand held user interface provides flexibility and setup simplicity. The Tol-O-Motion SS software (included with the SSC 1-4 controllers) has a setup page for use with the SIT to allow the controller to status the user, or to prompt the user for information, eliminating the need for a PC following setup.

Features:

- 45 key, alpha-numeric tactile keypad
- 4 row by 20 character LCD display
- Rugged, high impact ABS housing
- 7 foot (2.1m) RS232 cable with 9-pin "D" connector for connection to the SSC 1-4
- 5 Vdc power supplied from SSC 1-4 controller over RS232

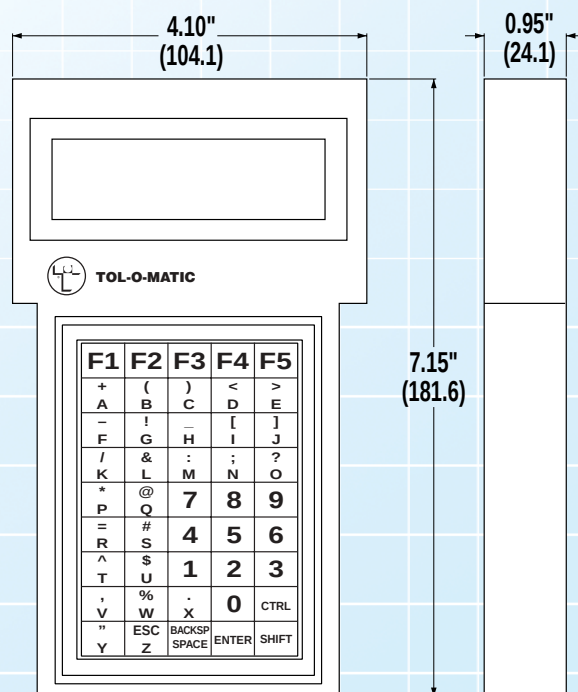
Ordering Information

Configuration Code	Tol-O-Matic Part #
SIT	3600-9161

SPECIFICATIONS

SPECIFICATIONS	SIT Hand Held User Interface
Weight	8.0 oz. (.23 Kg.)
Character Set	ASCII with upper case transmit, upper and lower case receive
Case	Molded, high impact ABS with retractable hanger
Keypad	15 user-programmable function keys
Display	Transreflective LCD with 5 by 7 character font
Power Requirements	30 mA maximum, regulated, 5 Vdc $\pm 5\%$ (Received through RS 232 cable)
Speaker	Audible key click, bell and alert
Storage Temperature	-4° F (-20° C) to 158° F (+70° C)
Operating Temperature	32° F (0° C) to 122° F (+50° C)
Relative Humidity	10% to 90% non-condensing

SIT



PIT PANEL MOUNT USER INTERFACE

FEATURES • SPECIFICATIONS • DIMENSIONS



User interaction with the MSS or the MSC is simple with the PIT panel mount user interface. The Tol-O-Motion MS software allows visual setup of the panel to status the user on a particular action taking place, or to prompt the user to make a decision or provide information such as move distance, move speed, repeat count.

Features

- Flush or surface mounting
- Four line by 20 character LCD display
- RS232 communication to MSC or MSS controllers
- Uses RS232 cable supplied with MSC or MSS controllers

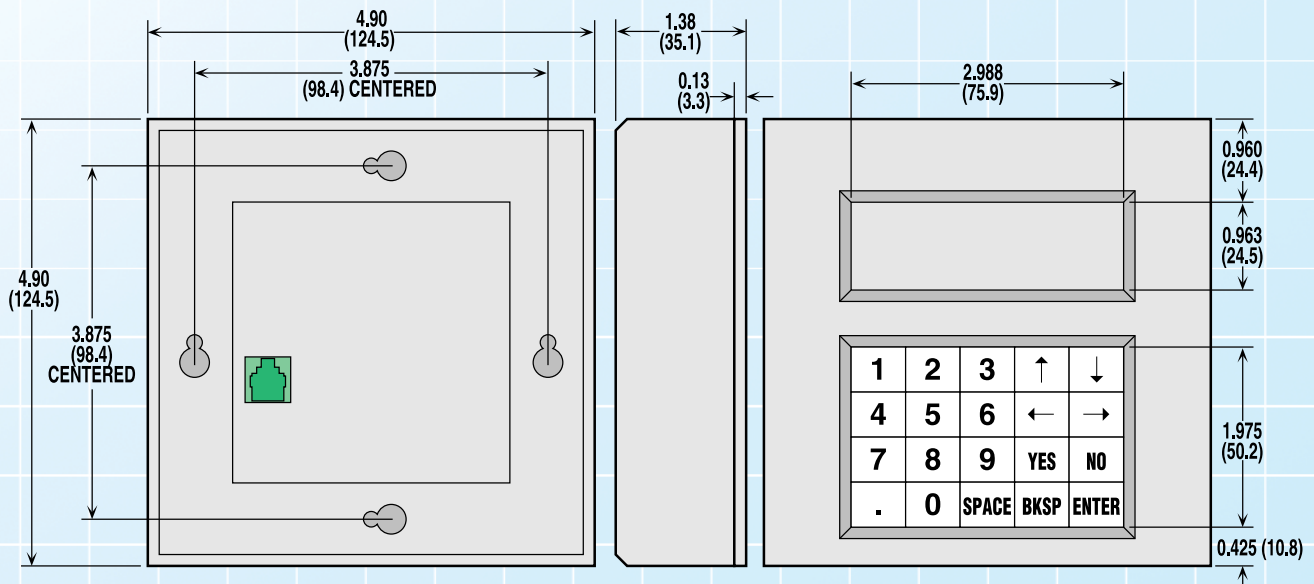
Cables

Motor cable and encoder cable are included when ordering MSC, or MSS controllers (see page 145)

Ordering Information

Configuration Code	Tol-O-Matic Part #
PIT	3600-9607

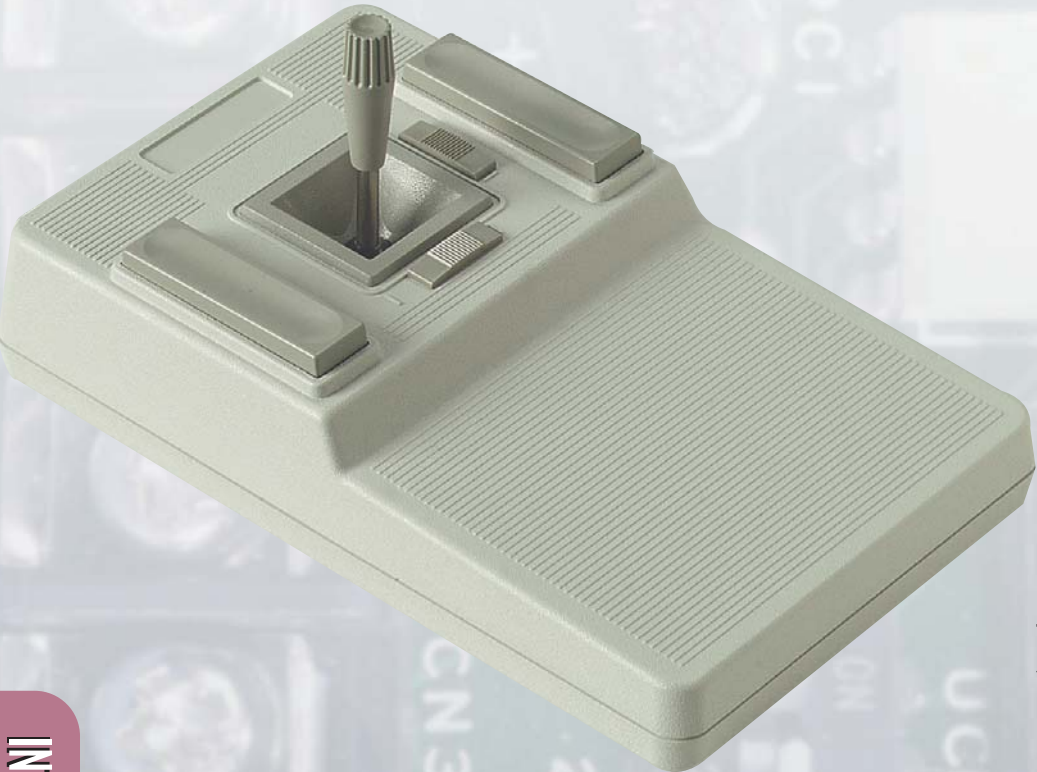
PIT



Dimensions shown in inches and (Millimeters).

JS JOYSTICK

SPECIFICATIONS • DIMENSIONS

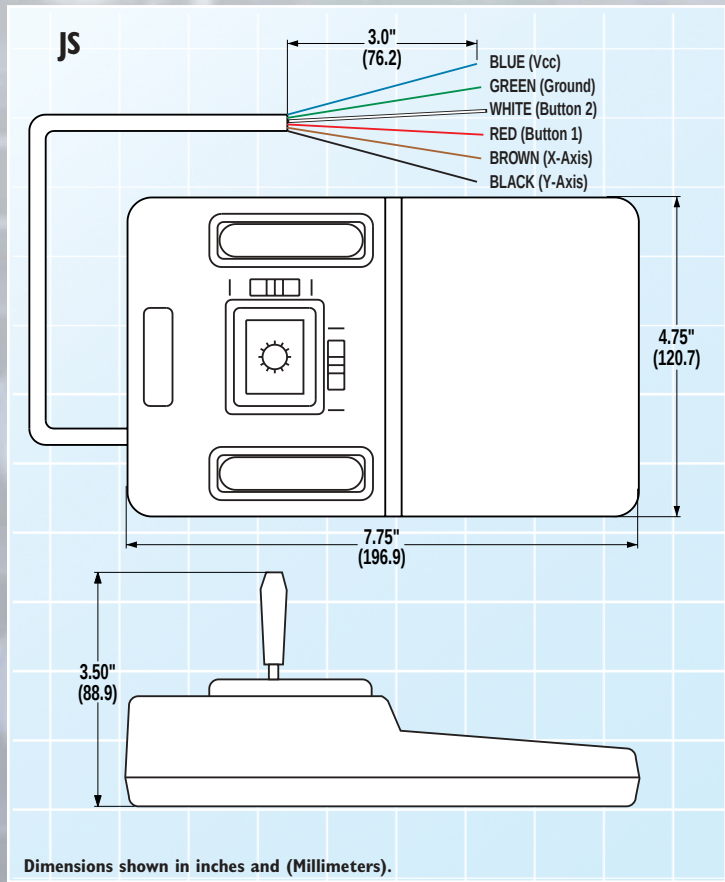


For simple setup of the SSC controller the JS joystick provides 2-axis manipulation. Used with the Joystick Teach mode of the ToI-O-Motion SSC software, moves can be made with velocity control, and then stored using a separate button integrated into the joystick housing.

Ordering Information

Configuration Code	Tol-O-Matic Part #
JS	3600-9162

INTERFACES



SPECIFICATIONS

SPECIFICATIONS	JS Joystick
Joystick Travel	27° from design center in all directions
Mechanical Life Cycle	5 million (minimum)
Trim Movement (Optional)	±7° (total trim 14°) for each axis
Main Ball Pivot	Precision ground stainless steel
Stick Shaft	3/16" brass plated
Potentiometers	Set at center of resistance
Potentiometer Calibration	Thumb tab provides up to 114° of potentiometer calibration
Return to Center Repeatability	±1%
Deflection Force	.14 lbs. at 27° at 2-7/8" from pivot point
Switches	2 elongated push-button switches
Cable	Integrated 7' (2.1m) cable with strain relief



CABLES

SPECIFICATIONS • DIMENSIONS

CABLES

Cables included for interconnection between motors, drives and controllers are summarized at right. For more specific information regarding cables and connectors, see the respective components section of this catalog.

AXIOM® to MRV Motor Cables

When ordering the AXIOM DV/DB or AXIOM Plus PV and MRV motors, encoder and power cables are included by ordering CR6 (6-meter) or CR15 (15-meter) for cable lengths.

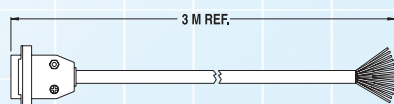
MRV Series Motor Cables

AXIOM DV/DB or AXIOM Plus PV to MRV motor cables are injection molded IP65 cables on the motor end, with the exception of the MRV11 which has flying leads.

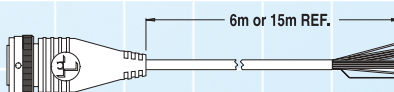
AXIOM® DV/DB to SSC or PV Encoder Cable

When ordering the AXIOM DV/DB with the SSC, one controller encoder cable is supplied per axes of SSC that is configured as servo (SV).

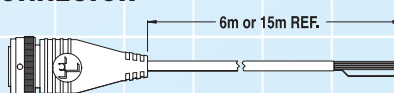
CONTROLLER OR FOLLOWER ENCODER CABLE



AXIOM DV/PV or AXIOM PLUS PV TO MRV ENCODER CONNECTOR



AXIOM DV/PV or AXIOM PLUS PV TO MRV MOTOR POWER CONNECTOR



	Tol-O-Matic Code	Cables	Config Code	Included	Cable Length	Connectors	Replacement Part Number
MOTOR	MRS	Motor Power	—	YES	12" (305mm)	Flying Lead	—
	MRB	Motor Power	—	YES	24" (610mm)	Flying Lead	—
		Encoder	—	YES	18" (457mm)	Flying Lead	—
	MRV*	Cables ordered as part of AXIOM Drive	—	NO	—	—	—
DRIVES AND CONTROLLER/DRIVES	AXIOM DV/PV	Encoder	CR6	YES	6m	MRV Motor to Flying Lead	3604-1196
			CR15	YES	15m	MRV Motor to Flying Lead	3604-1197
		Motor Power DV10	CR6	YES	6m	MRV Motor to Flying Lead	3604-1190
			CR15	YES	15m	MRV Motor to Flying Lead	3604-1191
		Motor Power DV/PV20	CR6	YES	6m	MRV Motor to Flying Lead	3604-1192
			CR15	YES	15m	MRV Motor to Flying Lead	3604-1193
		Motor Power DV/PV30**	CR6	YES	6m	MRV Motor to Flying Lead	3604-1194
			CR15	YES	15m	MRV Motor to Flying Lead	3604-1195
		RS232	CRZ	Optional	2m	Straight through DB9 female to DB9 female	3600-1172
	AXIOM PV	Follower Encoder	—	Optional	3m	P1 of AXIOM to Flying Lead	3604-1213
	AXIOM DB	RS232	CRZ	Optional	2m	Straight through DB9 female to DB9 female	3600-1172
	MSS	RS232	YES	YES	YES	RJ11 to RJ11 DB9 female adapter	3600-1187 3600-1186
	MSC	RS232	YES	YES	YES	RJ11 to RJ11 DB9 female adapter	3600-1187 3600-1186
CONTROLLER	SSC	RS232	CRZ	Optional	2m	Straight through DB9 female to DB9 female	3600-1172
		Main/Driver Signals		YES	3' (1m)	J2 of SSC to Screw Terminals	Ribbon 3600-1347 Breakout 3600-1342
		I/O		YES	3' (1m)	J5 of SSC to Screw Terminals	Ribbon 3600-1346 Breakout 3600-1341
		Step/Dir Signals (if using MSD Drive)		YES	3' (1m)	J4 of SSC to Screw Terminals	Ribbon 3600-1345 Breakout 3600-1340
		Controller Encoder	—	If AXIOM	3m	P1 of AXIOM to Flying Lead	3604-1213

*MRV11 motor does not require special cables as it has flying leads.

**For MRV51 motors only: CR6, 6M cable use Part Number 3604-1202 and for CR15, 15M cable use Part Number 3604-1203

CABLES



TOL-O-MATIC ON THE WEB...



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Automation solutions for improving your competitive edge

Tol-O-Matic's ability to provide creative, imaginative automation solutions for our customers has made us a world leader in manufacturing all types of motion components utilizing fluid power, electrical and power transmission technologies.

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- [Rodless Cylinders and Slides](#)
- [Rod Cylinder Slides](#)
- [Grippers and Rotary Actuators](#)
- [Axidyne® Electric Actuators and Controls](#)
- [Clutches and Brakes](#)
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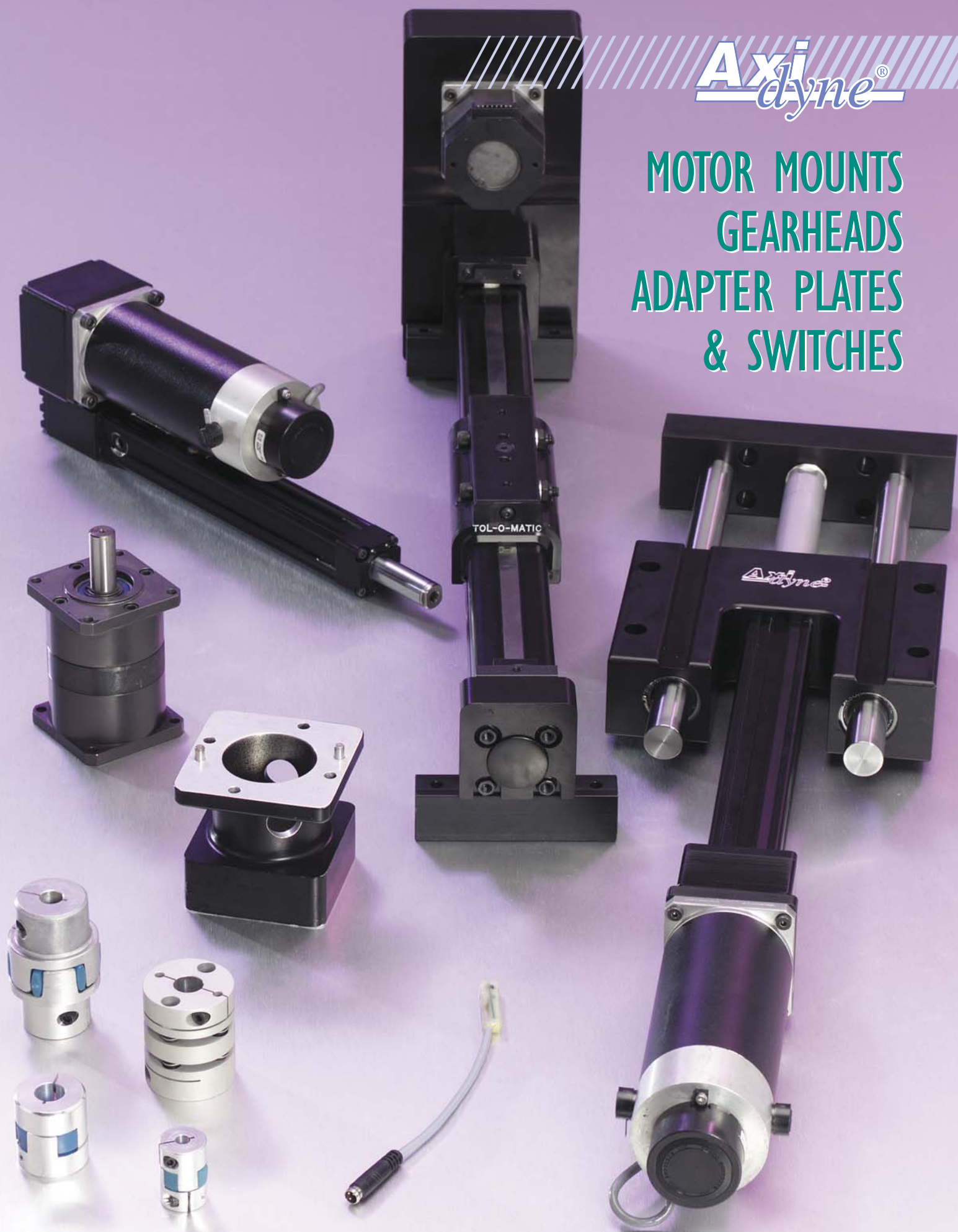
We at Tol-O-Matic believe that knowledge is the key to success...for you!

With all of activity of business and the popularity of the internet, we understand the importance to have an outstanding web presence to serve our clients. We will continue to find better methods to educate our distributors and their costumers about the best automation solutions available on the market today. Watch for a complete web site update at

www.tolomatic.com

Axi
dyne[®]

**MOTOR MOUNTS
GEARHEADS
ADAPTER PLATES
& SWITCHES**



SCREW-DRIVE MOTOR MOUNTING

MOUNTING KIT DIMENSIONS • COUPLER AND MOTOR MOUNT KIT SELECTION • GEARHEAD DIMENSIONS AND SELECTION



IN-LINE MOTOR MOUNTING

MOTOR MOUNTING KITS

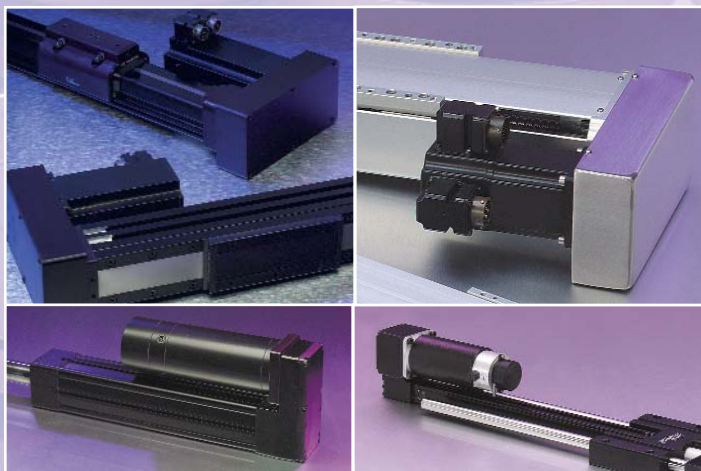
Designed for a variety of dc and stepper motors, kits include mounting bracket, spacers and mounting bolts.. Shaft couplers are not included. TruTrack motor mounts are internally coupled to actuator shaft

GEARHEAD REDUCTION

Used in applications requiring reduction for inertia matching or higher torque at lower speeds.

REVERSE-PARALLEL MOUNTING

When overall length is a design constraint, these standard factory-assembled configurations allow offset mounting of the motor to either side of, or below the actuator. Reverse-parallel motor mounting is available on TKS, BCS, MCS, B3S, M3S, GSA, GSM, RSA and RSM actuators. They can be selected with appropriately rated Tol-O-Matic motors and with 1:1 or 2:1 drive ratio. Reverse-parallel units use a rugged toothed belt for quiet, zero-backlash coupling of the motor to the actuator screw shaft. The 2:1 reduction provides further options in motor selection for torque, speed and inertia match considerations.



MOTOR MOUNTING



STEPPER



BRUSHED



DC

SCREW-DRIVE GEARHEAD MOUNTING

SELECTION • DIMENSIONS • ORDERING INFORMATION



For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

For those applications requiring reduction for inertia matching or higher torque at lower speeds, Tol-O-Matic offers high efficiency, single stage, true planetary gearheads. Two ratios are available as ideal reduction solutions with most Tol-O-Matic NEMA 23 and 34 face motors and actuators.

Specifications

Efficiency: 85%

Backlash: less than 10 arc minutes

Max. Input Speed: 5000 RPM

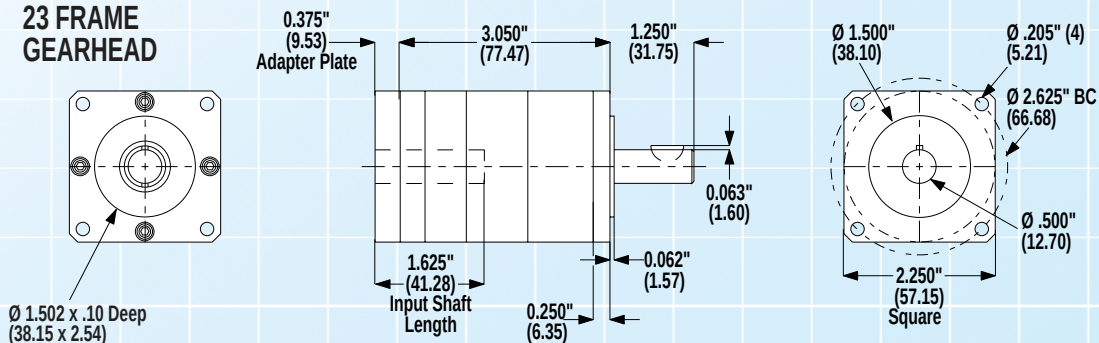
Config. Number	Part Number	Frame Size	Gear Ratio	Reflected Inertia*		Input Shaft Dia.	Weight	
				oz-in ²	N-m		Lbs.	Kgs.
GHK20	3600-6150	23	5.5:1	.34	.0024	.250"	1.78	0.81
GHJ20	3600-6151	23	5.5:1	.34	.0024	.500"	2.00	0.91
GHJ21	3600-6152	23	10:1	.29	.0020	.500"	1.98	0.90
GHK30	3600-6153	34	5.5:1	1.81	.0128	.375"	4.68	2.12
GHJ30	3600-6154	34	5.5:1	1.81	.0128	.500"	4.60	2.09
GHJ31	3600-6155	34	10:1	1.42	.0100	.500"	4.78	2.17
GHJ32 [†]	3600-6156	34	10:1	1.81	.0128	.500"	4.81	2.18

* Reflected Inertia is inertia at motor side of gearhead.

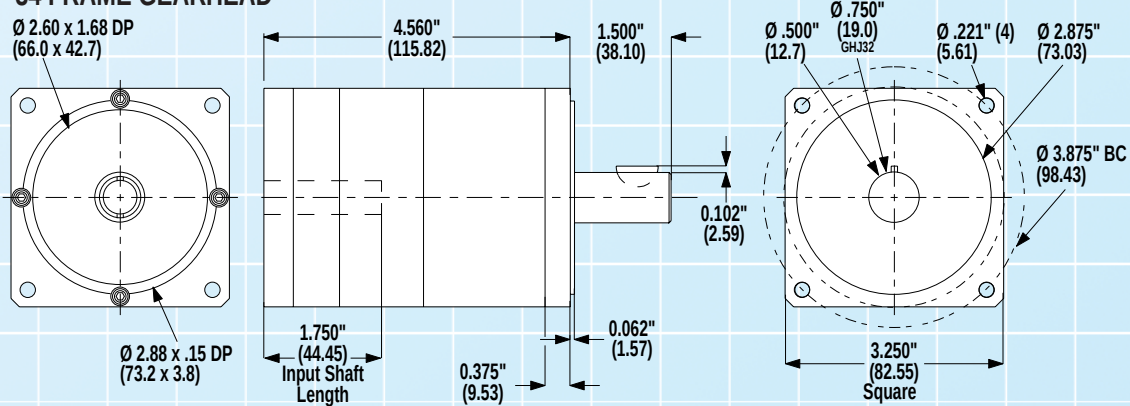
[†] Only available on RSA64 LMI

DIMENSIONS 23 & 34 FRAME GEARHEADS

23 FRAME GEARHEAD



34 FRAME GEARHEAD



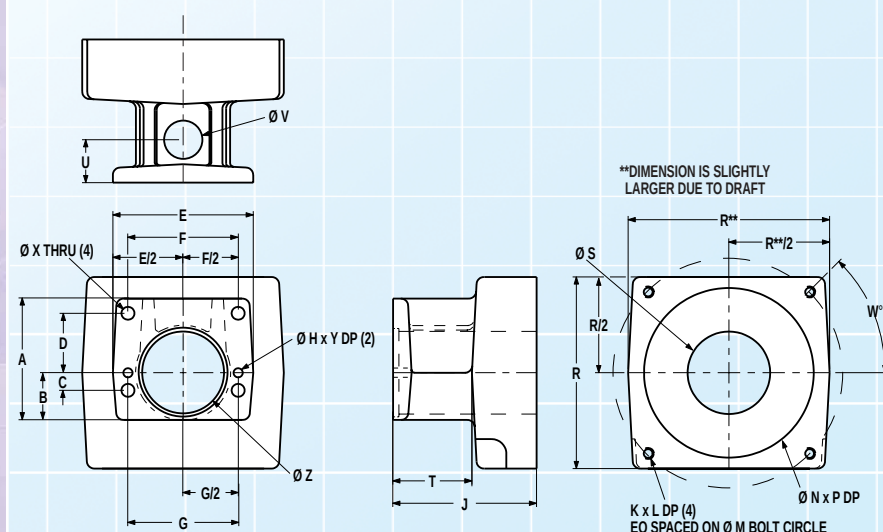
MOTOR MOUNTING

150

I/O SERIES SCREW-DRIVE IN-LINE MOTOR/GEARHEAD COMBINATION MOUNTS

DIMENSIONS I/O SERIES

B3S, M3S, BCS, MCS



These one-piece mounts are for use with the MRV brushless servo motors, or with gearheads combined with the indicated MRS or MRB motors.

NOTE: kits corresponding to MRS and MRB motors in the following table are only for motors attached to the same frame size gearhead.



Dimensions in inches

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
3410-9200	10	MRS34x, MRB3x	2.06	0.80	0.298	1.010	2.380	1.870	1.870	0.156	2.24	#10-24	0.75	3.875	2.879	0.15	3.25	1.40	1.340
3410-9201	10	MRV2x	2.06	0.80	0.298	1.010	2.380	1.870	1.870	0.156	2.49	#10-24	0.75	2.625	1.504	0.15	2.80	1.40	1.340
3410-9202	10	MRS23x, MRB2x	2.06	0.80	0.298	1.010	2.380	1.870	1.870	0.156	1.80	#10-24	0.75	2.625	1.504	0.15	2.80	1.40	1.340
3410-9203	10	GHK20x, 30x; GHJ 20x, 21x	2.06	0.80	0.298	1.010	2.380	1.870	1.870	0.156	2.24	#10-24	0.75	2.625	1.504	0.15	2.80	1.40	1.340

KIT #	SERIES	MOTOR/GEARHEAD	U	V	W	X	Y	Z
3410-9200	10	MRS34x, MRB3x	0.73	0.640	45°	0.221	0.23	1.40
3410-9201	10	MRV2x	0.73	0.640	45°	0.221	0.23	1.40
3410-9202	10	MRS23x, MRB2x	0.73	0.640	45°	0.221	0.23	1.40
3410-9203	10	GHK20x, 30x; GHJ 20x, 21x	0.73	0.640	45°	0.221	0.23	1.40

Above dimensions in millimeters

KIT #	SIZE	MOTOR/GEARHEAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
4410-9200	25mm	MRS34x, MRB3x	52.3	20.3	7.6	25.7	60.5	47.5	47.5	4.0	56.9	M5 x 8	19.1	98.4	73.1	3.8	82.6	35.6	34.0
4410-9201	25mm	MRV2x	52.3	20.3	7.6	25.7	60.5	47.5	47.5	4.0	63.2	M5 x 8	19.1	66.7	38.2	3.8	71.1	35.6	34.0
4410-9202	25mm	MRS23x, MRB2x	52.3	20.3	7.6	25.7	60.5	47.5	47.5	4.0	45.7	M5 x 8	19.1	66.7	38.2	3.8	71.1	35.6	34.0
4410-9203	25mm	GHK20x, 30x; GHJ 20x, 21x	52.3	20.3	7.6	25.7	60.5	47.5	47.5	4.0	56.9	M5 x 8	19.1	66.7	38.2	3.8	71.1	35.6	34.0

KIT #	SIZE	MOTOR/GEARHEAD	U	V	W	X	Y	Z
4410-9200	25mm	MRS34x, MRB3x	18.4	16.3	45°	5.6	5.8	35.6
4410-9201	25mm	MRV2x	18.4	16.3	45°	5.6	5.8	35.6
4410-9202	25mm	MRS23x, MRB2x	18.4	16.3	45°	5.6	5.8	35.6
4410-9203	25mm	GHK20x, 30x; GHJ 20x, 21x	18.4	16.3	45°	5.6	5.8	35.6

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

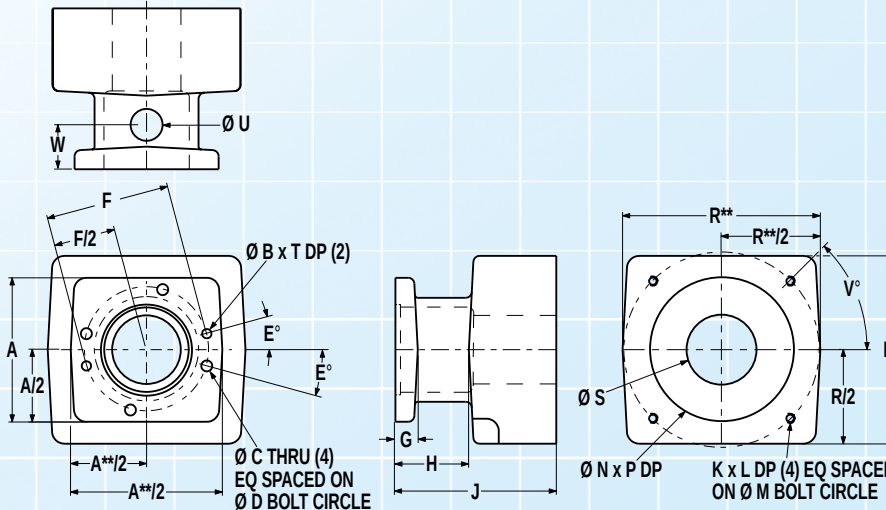
MOTOR MOUNTING



15 SERIES SCREW-DRIVE IN-LINE MOTOR/GEARHEAD COMBINATION MOUNTS

DIMENSIONS 15 SERIES

B3S, M3S, BCS, MCS



These one-piece mounts are for use with the MRV brushless servo motors, or with gearheads combined with the indicated MRS or MRB motors.

NOTE: kits corresponding to MRS and MRB motors in the following table are only for motors attached to the same frame size gearhead.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

Dimensions in inches

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
3415-9200	15	MRS34x, MRV3x, MRB3x	2.88	0.187	0.221	2.488	15°	2.488	0.45	1.47	2.38	#10-24	0.75	3.875	2.879	0.15	3.75	1.63	0.28	0.640	45°	0.78
3415-9201	15	MRV2x	2.88	0.187	0.221	2.488	15°	2.488	0.45	1.47	2.63	#10-24	0.75	2.625	1.504	0.15	2.63	1.50	0.28	0.640	45°	0.78
3415-9202	15	MRS23x, MRB2x	2.88	0.187	0.221	2.488	15°	2.488	0.45	1.47	1.94	#10-24	0.75	2.625	1.504	0.15	2.63	1.40	0.28	0.640	45°	0.78
3415-9203	15	GHK 20x, GHJ 20x, GHJ 21x	2.88	0.187	0.221	2.488	15°	2.488	0.45	1.47	2.38	#10-24	0.75	2.625	1.504	0.15	2.63	1.40	0.28	0.640	45°	0.78
3415-9204	15	MRB4x	2.88	0.187	0.221	2.488	15°	2.488	0.45	1.47	3.16	#10-24	0.75	4.596	2.879	0.15	3.75	1.63	0.28	0.640	45°	0.78

Dimensions in millimeters

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
4415-9200	15	MRS34x, MRV3x, MRB3x	73.2	4.7	5.6	63.2	15°	63.2	11.4	37.3	60.5	M5 x .8	19.1	98.4	73.1	3.8	95.3	41.4	7.1	16.3	45°	19.8
4415-9201	15	MRV2x	73.2	4.7	5.6	63.2	15°	63.2	11.4	37.3	66.8	M5 x .8	19.1	66.7	38.2	3.8	66.8	38.1	7.1	16.3	45°	19.8
4415-9202	15	MRS23x, MRB 23x	73.2	4.7	5.6	63.2	15°	63.2	11.4	37.3	49.3	M5 x .8	19.1	66.7	38.2	3.8	66.8	35.6	7.1	16.3	45°	19.8
4415-9203	15	GHK 20x, GHJ 20x, GHJ 21x	73.2	4.7	5.6	63.2	15°	63.2	11.4	37.3	60.5	M5 x .8	19.1	66.7	38.2	3.8	66.8	35.6	7.1	16.3	45°	19.8
4415-9204	15	MRB4x	73.2	4.7	5.6	63.2	15°	63.2	11.4	37.3	80.3	M5 x .8	19.1	116.7	73.1	3.8	95.3	41.4	7.1	16.3	45°	19.8

MOTOR MOUNTING



STEPPER



BRUSHED



DC

20 SERIES SCREW-DRIVE IN-LINE MOTOR/GEARHEAD COMBINATION MOUNTS

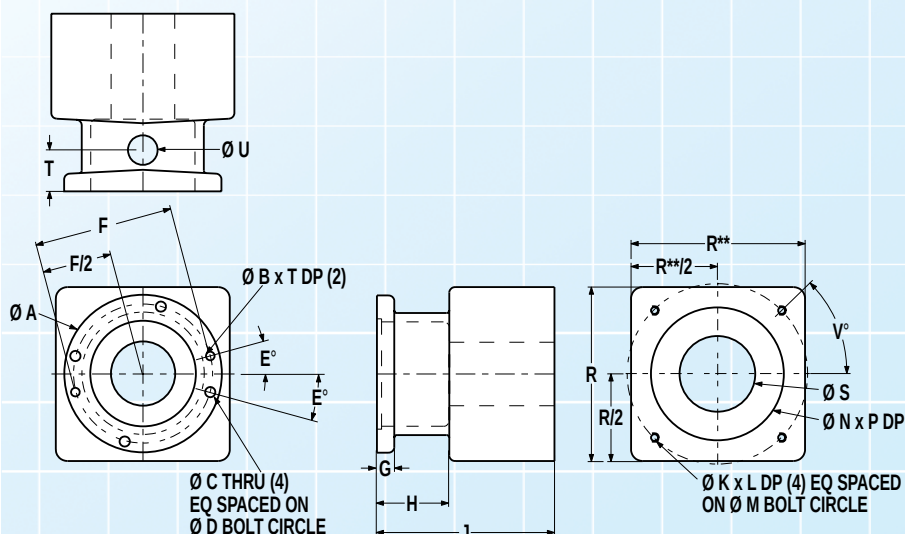
These one-piece mounts are for use with the MRV brushless servo motors, or with gearheads combined with the indicated MRS or MRB motors.

NOTE: kits corresponding to MRS and MRB motors in the following table are only for motors attached to the same frame size gearhead.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

DIMENSIONS 20 SERIES

B3S, M3S, BCS, MCS



Dimensions in inches

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
0520-9200	20	MRS34x, MRV3x, MRB3x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	2.50	#10-24	0.75	3.875	2.879	0.15	3.75	1.63	0.89	0.640	45°	0.23
0520-9201	20	MRV2x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	2.75	#10-24	0.75	2.625	1.504	0.15	3.00	1.50	0.89	0.640	45°	0.23
0520-9202	20	MRS23x, MRB2x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	2.06	#10-24	0.75	2.625	1.504	0.15	3.00	1.50	0.89	0.640	45°	0.23
0520-9203	20	GHK20x, GHJ20x, GHJ21x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	2.50	#10-24	0.75	2.625	1.504	0.15	3.00	1.50	0.89	0.640	45°	0.23
0520-9204	20	MRB4x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	3.28	#10-24	0.75	4.596	2.879	0.15	3.75	1.83	0.89	0.640	45°	0.23
3420-9200	20	MRS34x, MRV3x, MRB3x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	3.05	#10-24	0.75	3.875	2.879	0.15	3.75	1.63	0.89	0.640	45°	0.23
3420-9201	20	MRV2x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	3.30	#10-24	0.75	2.625	1.504	0.15	3.00	1.50	0.89	0.640	45°	0.23
3420-9202	20	MRS23x, MRB2x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	2.61	#10-24	0.75	2.625	1.504	0.15	3.00	1.50	0.89	0.640	45°	0.23
3420-9203	20	GHK 20x, GHJ 20x, GHJ 21x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	3.05	#10-24	0.75	2.625	1.504	0.15	3.00	1.50	0.89	0.640	45°	0.23
3420-9204	20	MRB4x	3.39	0.187	0.221	3.010	15°	3.010	0.38	1.56	3.83	#10-24	0.75	4.596	2.879	0.15	3.75	1.68	0.89	0.640	45°	0.23

Dimensions in millimeters

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
4520-9200	20	MRS34x, MRV3x, MRB3x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	63.5	#10-24	19.1	98.4	73.1	3.81	95.2	41.4	22.6	16.2	45°	5.8
4520-9201	20	MRV2x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	69.8	#10-24	19.1	66.6	38.2	3.81	76.2	38.1	22.6	16.2	45°	5.8
4520-9202	20	MRS23x, MRB2x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	52.3	#10-24	19.1	66.6	38.2	3.81	76.2	38.1	22.6	16.2	45°	5.8
4520-9203	20	GHK20x, GHJ20x, GHJ21x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	63.5	#10-24	19.1	66.6	38.2	3.81	76.2	38.1	22.6	16.2	45°	5.8
4520-9204	20	MRB4x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	83.3	#10-24	19.1	116.7	73.1	3.81	95.2	46.4	22.6	16.2	45°	5.8
4420-9200	20	MRS34x, MRV3x, MRB3x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	77.4	#10-24	19.1	98.4	73.1	3.81	95.2	41.4	22.6	16.2	45°	5.8
4420-9201	20	MRV2x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	83.8	#10-24	19.1	66.6	38.2	3.81	76.2	38.1	22.6	16.2	45°	5.8
4420-9202	20	MRS23x, MRB2x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	66.2	#10-24	19.1	66.6	38.2	3.81	76.2	38.1	22.6	16.2	45°	5.8
4420-9203	20	GHK 20x, GHJ 20x, GHJ 21x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	77.4	#10-24	19.1	66.6	38.2	3.81	76.2	38.1	22.6	16.2	45°	5.8
4420-9204	20	MRB4x	86.1	4.7	5.6	76.4	15°	76.4	9.6	39.6	97.2	#10-24	19.1	116.7	73.1	3.81	95.2	42.6	22.6	16.2	45°	5.8

MOTOR MOUNTING

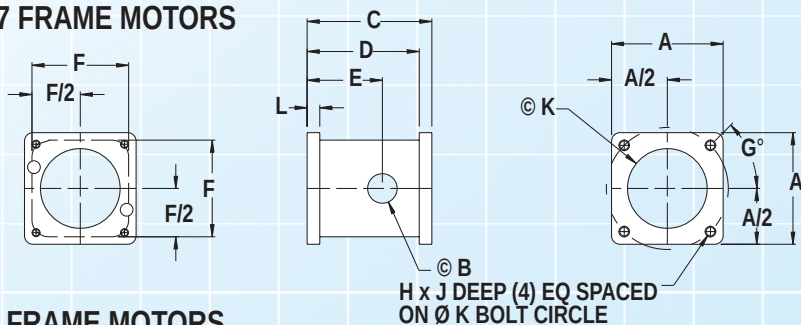


12 SERIES RSA/GSA IN-LINE MOTOR MOUNTS

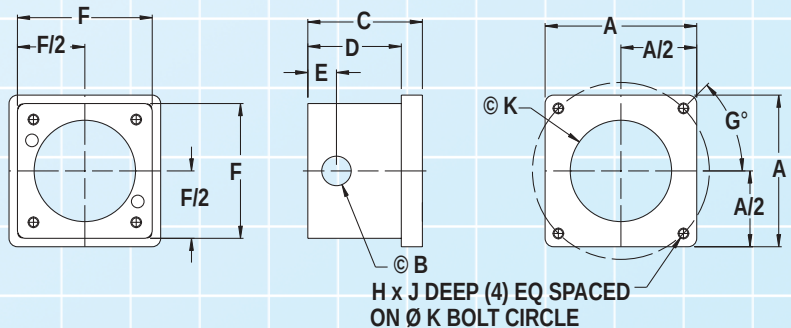
DIMENSIONS 17 & 23 FRAME MOTORS

GSA12, GSM12, RSA12, RSM12

FOR 17 FRAME MOTORS



FOR 23 FRAME MOTORS



These one-piece mounts are for use with MRV brushless servo, MRS stepper and MRB brushed dc motors.

NOTE: Gearheads are not available for the GSA12, RSA12 series actuator.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

Dimensions in inches

KIT #	SERIES	MOTOR	A	B	C	D	E	F	G	H	J	K	L
2107-9005	12	MRV11	1.65	.44	1.85	1.40	1.12	1.43	45°	M4 x 0.7	.31	1.19	.45
2107-9006	12	MRS171	1.65	.44	1.70	1.45	1.15	1.16	45°	M3 x 0.5	THRU	.87	.19
2107-9007	12	MRV2x	2.25	.44	2.39	1.76	1.26	2.00	45°	M5 x 0.8	.38	1.50	—
2107-9008	12	MRB21, MRS23x	2.25	.44	1.70	1.08	.43	2.00	45°	M4 x 0.7	.38	1.50	—

Dimensions in millimeters

KIT #	SERIES	MOTOR	A	B	C	D	E	F	G	H	J	K	L
1107-9005	12	MRV11	41.9	11.2	47.0	34.3	28.4	36.3	45°	M4 x 0.7	7.874	30.2	11.4
1107-9006	12	MRS171	41.9	11.2	43.2	36.8	29.2	29.5	45°	M3 x 0.5	THRU	22.1	4.8
1107-9007	12	MRV2x	57.2	11.2	60.7	44.7	32.0	50.8	45°	M5 x 0.8	9.7	38.1	—
1107-9008	12	MRB21, MRS23x	57.2	11.2	43.2	27.4	10.9	50.8	45°	M4 x 0.7	9.7	38.1	—



STEPPER



I 6 SERIES RSA/GSA IN-LINE MOTOR MOUNTS

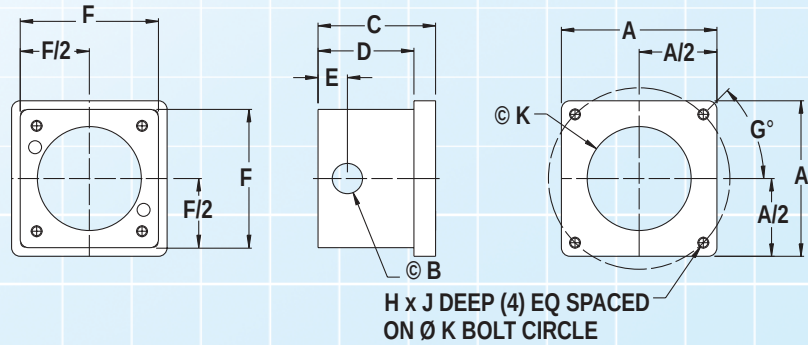
These one-piece mounts are for use with MRV brushless servo, MRS stepper and MRB brushed dc motors.

NOTE: Gearheads are not available for the GSA16, RSA16 series actuator.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

DIMENSIONS

GSA16, GSM16, RSA16, RSM16



Dimensions in inches

KIT #	SERIES	MOTOR	A	B	C	D	E	F	G	H	J	K
2112-9005	16	MRV2x	2.25	.44	2.39	1.45	1.26	2.00	45°	M5 x 0.8	.38	1.50
2112-9006	16	MRB21, MRS23x	2.25	.44	1.70	.76	.43	2.00	45°	M4 x 0.7	.38	1.50

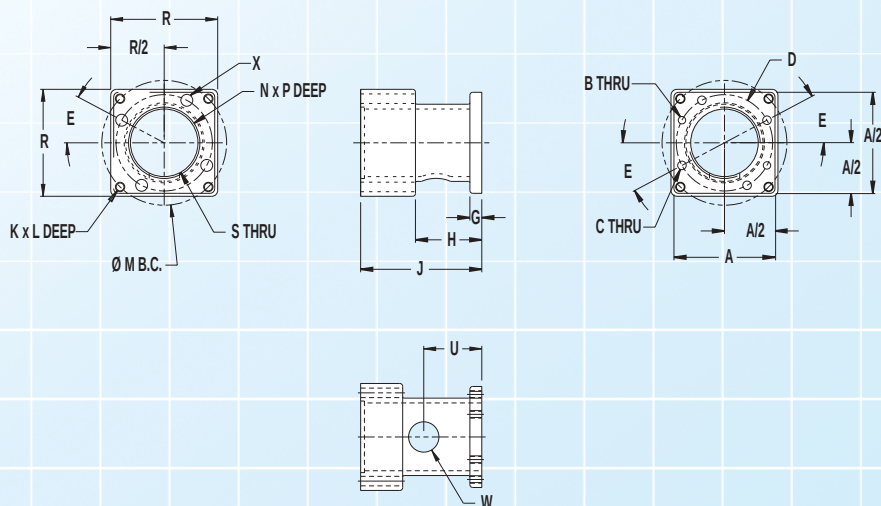
Dimensions in millimeters

KIT #	SERIES	MOTOR	A	B	C	D	E	F	G	H	J	K
2112-9005	16	MRV2x	57.2	11.2	60.7	52.8	32.0	50.8	45°	M5 x 0.8	9.7	38.1
2112-9006	16	MRB21, MRS23x	57.2	11.2	43.2	35.3	10.9	50.8	45°	M4 x 0.7	9.7	38.1

24 SERIES RSA/GSA IN-LINE MOTOR/GEARHEAD COMBINATION MOUNTS

DIMENSIONS

GSA24, GSM24, RSA24, RSM24



These one-piece mounts are for use with MRV brushless servo, MRS stepper and MRB brushed dc motors and with gearheads.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com



Dimensions in inches

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	U	W	X
2124-9021	24	MRB21, MRS 23x	2.13	Ø.156	.18	2.03	28°	.25	1.66	1.86	M5 x .8	.50	2.63	1.50	.08	2.25	1.42	1.22	.64	.25
2124-9023	24	MRV2x	2.13	Ø.156	.18	2.03	28°	.25	1.66	2.55	M5 x .8	.50	2.63	1.50	.08	2.25	1.42	1.22	.64	.25
2124-9024	24	GHJ20, GHK20 GHJ21	2.13	Ø.156	.18	2.03	28°	.25	1.66	2.30	M5 x .8	.50	2.63	1.50	.08	2.25	1.42	1.22	.64	.25

Dimensions in millimeters

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	U	W	X
2124-9021	24	MRB21, MRS 23x	54.1	4.0	4.6	51.5	28°	6.4	42.2	47.2	M5 X .8	12.7	66.8	38.1	2.03	57.1	36.1	30.9	16.3	6.3
2124-9023	24	MRV2x	54.1	4.0	4.6	51.5	28°	6.4	42.2	64.8	M5 X .8	12.7	66.8	38.1	2.03	57.1	36.1	30.9	16.3	6.3
2124-9024	24	GHJ20, GHK20, GHJ21	54.1	3.96	4.6	51.5	28°	6.4	42.2	58.4	M5 X .8	12.7	66.8	38.1	2.03	57.1	36.1	30.9	16.3	6.3



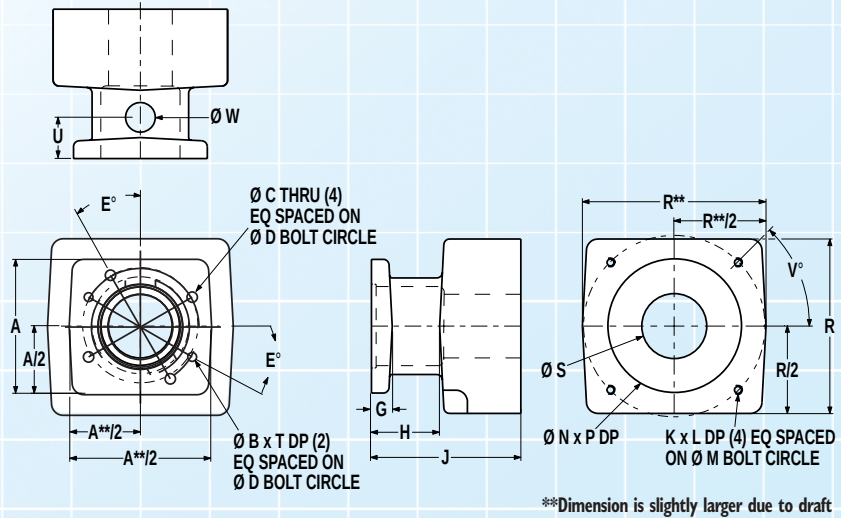
32 SERIES RSA/GSA IN-LINE MOTOR/GEARHEAD COMBINATION MOUNTS

These one-piece mounts are for use with MRV brushless servo, MRS stepper and MRB brushed dc motors and with gearheads.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

DIMENSIONS

GSA32, GSM32, RSA32, RSM32



Dimensions in inches

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	T	U	V	W
2132-9051	32	MRS34x, MRV3x, MRB3x MRV3x w/GHJ30/31, GHK30	2.88	0.187	0.221	2.49	30°	0.45	1.47	2.38	M5 x .8	0.75	3.875	2.879	0.15	3.75	1.63	THRU	0.78	45°	0.64
2132-9033	32	MRV2x	2.88	0.187	0.221	2.49	30°	0.45	1.47	3.05	M5 x .8	0.75	2.625	1.504	0.15	2.25	1.40	THRU	0.78	45°	0.64
2132-9031	32	MRS23x, MRB2x	2.88	0.187	0.221	2.49	30°	0.45	1.47	2.00	M5 x .8	0.75	2.625	1.504	0.15	2.25	1.40	THRU	0.78	45°	0.64
2132-9052	32	MRB4x	2.88	0.187	0.221	2.49	30°	0.45	1.47	3.16	M5 x .8	0.75	4.596	2.879	0.15	3.75	1.63	THRU	0.78	45°	0.64
2132-9053	32	MRB/MRV2x, GHK/GHJ20/21	2.88	0.187	0.221	2.49	30°	0.45	1.47	2.38	M5 x .8	0.75	2.625	1.504	0.15	2.25	1.40	THRU	0.78	45°	0.64

Dimensions in millimeters

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	T	U	V	W
2132-9051	32	MRS34x, MRV3x, MRB3x MRV3x w/GHJ30/31, GHK30	73.2	4.7	5.6	63.2	30°	11.4	37.3	60.5	M5 x .8	19.1	98.4	73.1	3.8	95.3	41.4	—	19.8	45°	16.3
2132-9033	32	MRV2x	73.2	4.7	5.6	63.2	30°	11.4	37.3	77.5	M5 x .8	19.1	66.7	38.2	3.8	57.2	35.6	—	19.8	45°	16.3
2132-9031	32	MRS23x, MRB2x	73.2	4.7	5.6	63.2	30°	11.4	37.3	50.8	M5 x .8	19.1	66.7	38.2	3.8	57.2	35.6	—	19.8	45°	16.3
2132-9052	32	MRB4x	73.2	4.7	5.6	63.2	30°	11.4	37.3	80.3	M5 x .8	19.1	116.7	73.1	3.8	95.3	41.4	—	19.8	45°	16.3
2132-9053	32	MRB/MRV2x, GHK/GHJ20/21	73.2	4.7	5.6	63.2	30°	11.4	37.3	60.5	M5 x .8	19.1	66.7	38.2	3.8	57.2	35.6	—	19.8	45°	16.3

MOTOR MOUNTING



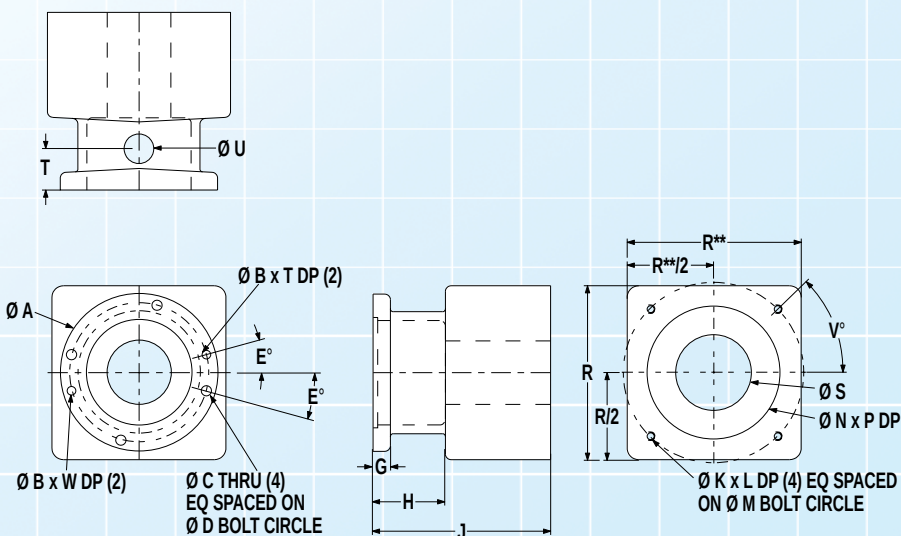
50 SERIES RSA IN-LINE MOTOR/GEARHEAD COMBINATION MOUNTS

These one-piece mounts are for use with MRV brushless servo, MRS stepper and MRB brushed dc motors and with gearheads.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

DIMENSIONS

RSA50, RSM50



Dimensions in inches

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	T	U	V	W
2150-9051	50	MRS34x, MRV3x, MRB3x MRV2x w/GHJ20, 21	3.39	0.187	0.22	3.01	15°	0.46	1.47	3.05	M5 x .8	0.75	3.875	2.879	0.15	3.75	2.25	0.89	0.640	45°	0.23
2150-9053	50	MRV 2x	3.39	0.187	0.22	3.01	15°	0.46	1.47	3.30	M5 x .8	0.75	2.625	1.504	0.15	3.00	1.40	0.89	0.640	45°	0.23
2150-9052	50	MRB4x	3.39	0.187	0.22	3.01	15°	0.46	1.47	3.83	M5 x .8	0.75	4.596	2.879	0.15	3.75	2.25	0.89	0.640	45°	0.23
2150-9200	50	MRV3 w GHJ30,31	3.39	0.187	0.22	3.01	15°	0.46	1.47	3.83	M5 x .8	0.75	3.875	2.879	0.15	3.75	2.38	0.89	0.640	45°	0.23
2150-9055	50	MRV2x w/GHJ20,21	3.39	0.187	0.22	3.01	15°	0.46	1.47	3.05	M5 x .8	0.75	2.625	1.504	0.15	3.00	1.40	0.89	0.640	45°	0.23
2150-9056	50	MRV51	3.39	0.187	0.22	3.01	15°	0.46	1.47	4.48	M5 x .8	0.75	2.625	2.879	0.15	3.75	2.25	0.89	0.640	45°	0.23

Dimensions in millimeters

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	T	U	V	W
2150-9051	50	MRS34x, MRV3x, MRB3x MRV2x w/GHJ20, 21	86.1	4.7	5.6	76.4	15°	11.6	37.3	77.4	M5 x .8	19.1	98.4	73.1	3.81	95.2	57.2	22.6	16.2	45°	5.8
2150-9053	50	MRV 2x	86.1	4.7	5.6	76.4	15°	711.6	37.3	83.8	M5 x .8	19.1	66.6	38.2	3.81	76.2	35.6	22.6	16.2	45°	5.8
2150-9052	50	MRB4x	86.1	4.7	5.6	76.4	15°	711.6	37.3	97.2	M5 x .8	19.1	116.7	73.1	3.81	95.2	57.2	22.6	16.2	45°	5.8
2150-9200	50	MRV3x w GHJ30,31	86.1	4.7	5.6	76.4	15°	711.6	37.3	97.2	M5 x .8	19.1	98.4	73.1	3.81	95.2	60.4	22.6	16.2	45°	5.8
2150-9055	50	MRV2x w/GHJ20,21	86.1	4.7	5.6	76.4	15°	11.6	37.3	63.5	M5 x .8	19.1	66.6	38.2	3.81	76.2	35.5	22.6	16.2	45°	5.8
2150-9056	50	MRV51	86.1	4.7	5.6	76.4	15°	11.6	37.3	113.8	M5 x .8	19.1	66.6	73.1	3.81	95.2	57.2	22.6	16.2	45°	5.8



STEPPER



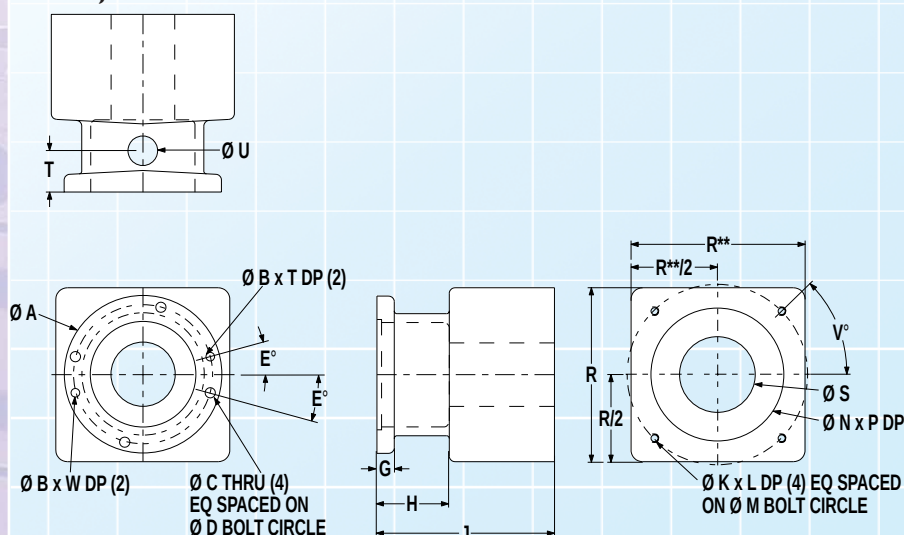
64 SERIES RSA IN-LINE MOTOR/GEARHEAD COMBINATION MOUNTS

These one-piece mounts are for use with MRV brushless servo, MRS stepper and MRB brushed dc motors and with gearheads.

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

DIMENSIONS

RSA64, RSM64



Dimensions in inches

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	T	U	V	W
2150-9051	64	MRS34x, MRV3x, MRB3x MRS34x/MRB3x w/GHJ/K30, 31	3.39	0.187	0.22	3.01	15°	0.46	1.47	3.05	M5 x .8	0.75	3.875	2.879	0.15	3.75	2.25	0.89	0.64	45°	0.23
2150-9052	64	MRB4x	3.39	0.187	0.22	3.01	15°	0.46	1.47	2.61	M5 x .8	0.75	4.596	2.879	0.15	3.75	2.38	0.89	0.64	45°	0.23
2150-9200	64	MRV3x w GHJ32	3.39	0.187	0.22	3.01	15°	0.46	3.83	3.83	M5 x .8	0.75	3.875	2.879	0.15	3.75	2.38	0.89	0.64	45°	0.23
2150-9200	64	MRV51	3.39	0.187	0.22	3.01	15°	0.46	3.83	4.48	M5 x .8	0.75	3.875	2.879	0.15	3.75	2.25	0.89	0.64	45°	0.23

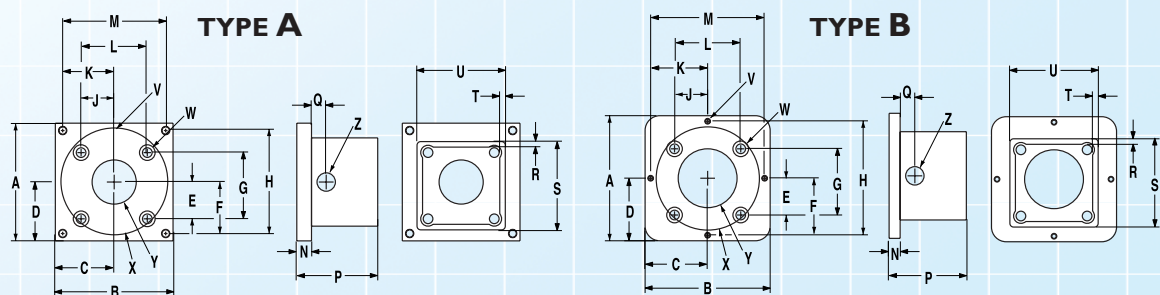
Dimensions in millimeters

KIT #	SERIES	MOTOR/GEARHEAD	A	B	C	D	E	G	H	J	K	L	M	N	P	R	S	T	U	V	W
2150-9051	64	MRS34x, MRV3x, MRB3x MRS34x/MRB3x w/GHJ/K30, 31	86.1	4.7	5.6	76.4	15°	11.6	37.3	77.4	M5 x .8	19.1	98.4	73.1	3.81	95.2	57.2	22.6	16.2	45°	5.8
2150-9052	64	MRB4x	86.1	4.7	5.6	76.4	15°	11.6	37.3	97.2	M5 x .8	19.1	116.7	73.1	3.81	95.2	57.2	22.6	16.2	45°	5.8
2150-9200	64	MRV3x w GHJ32	86.1	4.7	5.6	76.4	15°	11.6	37.3	97.3	M5 x .8	19.1	98.4	73.1	3.81	95.2	60.4	22.6	16.2	45°	5.8
2150-9200	64	MRV3x w GHJ32	86.1	4.7	5.6	76.4	15°	11.6	37.3	113.8	M5 x .8	19.1	98.4	73.1	3.81	95.2	57.2	22.6	16.2	45°	5.8

BCS, MCS SCREW-DRIVE IN-LINE MOTOR MOUNTS

DIMENSIONS

BCS, MCS



NOTE: These motor mounts are for use with MRS and MRB motors only and are not to be used with gearheads.

Dimensions in inches

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U
BCS10	MRS, MRB	23	0910-9129	Type A	2.22	2.22	1.11	1.1	0.550	0.928	1.100	1.856	0.550	0.928	1.100	1.856	0.375	1.770	0.5	0.125	1.75	0.125	1.75
BCS10	MRS, MRB	34	0910-9152	Type A	3.27	3.27	1.64	1.6	0.550	1.370	1.100	2.740	0.550	1.370	1.100	2.740	0.500	2.390	0.5	0.125	1.75	0.125	1.75
BCS15	MRS, MRB	23	0915-9156	Type B	3.00	3.00	1.50	1.5	1.032	1.312	1.812	2.625	0.906	1.312	1.812	2.625	0.750	2.000	0.5	0.250	2.50	0.250	2.50
BCS15	MRS, MRB	34	0915-9157	Type A	3.27	3.27	1.64	1.6	1.032	1.370	1.812	2.740	0.906	1.370	1.812	2.740	0.500	2.500	0.5	0.250	2.50	0.250	2.50
BCS20	MRS, MRB	23	0920-9113	Type B	3.25	3.25	1.63	1.7	1.250	1.312	2.250	2.625	1.125	1.312	2.25	2.625	0.875	2.155	0.5	0.188	3.00	0.188	3.00
BCS20	MRS, MRB	34	0920-9114	Type B	4.25	4.25	2.13	2.1	1.250	1.937	2.250	3.874	1.125	1.937	2.25	3.874	1.000	2.650	0.5	0.188	3.00	0.188	3.00

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	V	W	X	Y	Z
BCS10	MRS, MRB	23	0910-9129	Type A	10-24 UNC 2B THRU (4)	Ø.221 THRU C'BORE Ø.375 X .30 DP (4)	1.506/1.503 X .070 DP	Ø1.063 THRU	Ø.640 THRU 1 WALL ONLY
BCS10	MRS, MRB	34	0910-9152	Type A	10-24 UNC 2B THRU (4)	Ø.221 THRU C'BORE Ø.375 X .34 DP (4)	Ø2.878/2.882 X .080 DP	Ø1.063 THRU	Ø.640 THRU 1 WALL ONLY
BCS15	MRS, MRB	23	0915-9156	Type B	10-24 UNC 2B THRU (4)	Ø.281 THRU C'BORE Ø.437 X .28 DP (4)	1.506/1.503 THRU	—	Ø.640 THRU 1 WALL ONLY
BCS15	MRS, MRB	34	0915-9157	Type A	10-24 UNC 2B THRU (4)	Ø.281 THRU C'BORE Ø.437 X .40 DP (4)	Ø2.878/2.882 X .080 DP	Ø1.500 THRU	Ø.640 THRU 1 WALL ONLY
BCS20	MRS, MRB	23	0920-9113	Type B	10-24 UNC 2B THRU (4)	Ø.344 THRU C'BORE Ø.531 X .34 DP (4)	Ø1.506/1.503 X .12 DP	Ø1.063 THRU	Ø.640 THRU 1 WALL ONLY
BCS20	MRS, MRB	34	0920-9114	Type B	10-24 UNC 2B THRU (4)	Ø.344 THRU C'BORE Ø.531 X .42 DP (4)	Ø2.878/2.882 X .080 DEEP	Ø2.000 THRU	Ø.640 THRU 1 WALL ONLY

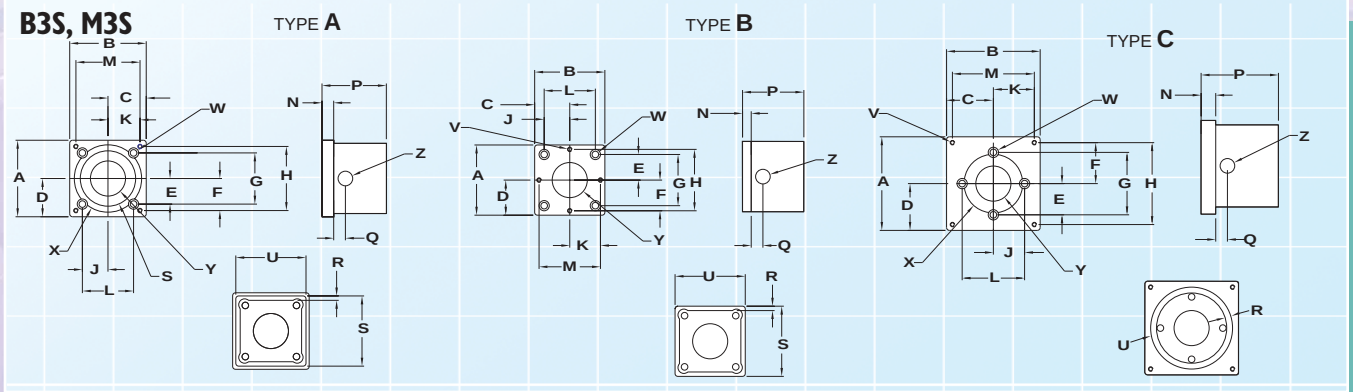
Dimensions in millimeters

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U
MCS10	MRS, MRB	23	0510-9101	Type A	56.4	56.4	28.2	28.2	14.0	23.6	27.9	47.1	14.0	23.6	27.9	47.1	12.7	48.2	12.7	3.2	44.5	3.2	44.5
MCS10	MRS, MRB	34	0510-9122	Type A	83.1	83.1	41.5	41.5	14.0	34.8	27.9	69.6	14.0	34.8	27.9	69.6	12.7	60.7	12.7	3.2	44.5	3.2	44.5
MCS15	MRS, MRB	23	0515-9188	Type B	76.2	76.2	38.1	38.1	26.2	33.3	46.0	66.7	23.0	33.3	46.0	66.7	19.1	50.8	12.7	6.4	63.5	6.4	63.5
MCS15	MRS, MRB	34	0515-9189	Type A	83.1	83.1	41.5	41.5	26.2	34.8	46.0	69.6	23.0	34.8	46.0	69.6	12.7	63.5	12.7	6.4	63.5	6.4	63.5
MCS20	MRS, MRB	23	0520-9060	Type B	82.6	82.6	41.3	42.8	31.8	33.3	57.2	66.7	28.6	33.3	57.2	66.7	22.2	54.7	12.7	4.8	76.2	4.8	76.2
MCS20	MRS, MRB	34	0520-9061	Type B	108.0	108.0	54.0	54.0	31.8	49.2	57.2	98.4	28.6	49.2	57.2	98.4	25.4	67.3	12.7	4.8	76.2	4.8	76.2

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	V	W	X	Y	Z
MCS10	MRS, MRB	23	0510-9101	Type A	M5 x 0.8 THRU (4)	Ø5.61 THRU C'BORE Ø9.53 X 5.1 DP (4)	38.25/38.18 X 1.78 DP	Ø27.00 THRU	Ø16.26 THRU 1 WALL ONLY
MCS10	MRS, MRB	34	0510-9122	Type A	M5 x 0.8 THRU (4)	Ø5.61 THRU C'BORE Ø9.53 X 8.6 DP (4)	Ø73.10/73.20 X 20.32 DP	Ø27.00 THRU	Ø16.26 THRU 1 WALL ONLY
MCS15	MRS, MRB	23	0515-9188	Type B	M5 x 0.8 THRU (4)	Ø7.14 THRU C'BORE Ø11.10 X 7.1 DP (4)	39.62/38.18 THRU	—	Ø16.26 THRU 1 WALL ONLY
MCS15	MRS, MRB	34	0515-9189	Type A	M5 x 0.8 THRU (4)	Ø7.14 THRU C'BORE Ø11.10 X 10.2 DP (4)	Ø73.10/73.20 X 20.32 DP	Ø38.10 THRU	Ø16.26 THRU 1 WALL ONLY
MCS20	MRS, MRB	23	0520-9060	Type B	M5 x 0.8 THRU (4)	Ø8.74 THRU C'BORE Ø13.49 X 8.6 DP (4)	39.62/38.18 X 3.05 DP	Ø27.00 THRU	Ø16.26 THRU 1 WALL ONLY
MCS20	MRS, MRB	34	0520-9061	Type B	M5 x 0.8 THRU (4)	Ø8.74 THRU C'BORE Ø13.49 X 10.7 DP (4)	Ø73.10/73.20 X 20.32 DP	Ø50.80 THRU	Ø16.26 THRU 1 WALL ONLY

B3S, M3S SCREW-DRIVE IN-LINE MOTOR MOUNTS

DIMENSIONS



NOTE: These motor mounts are for use with MRS and MRB motors only and are not to be used with gearheads.

Dimensions in inches

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	U
B3S10	MRS, MRB	23	3410-9050	Type A	2.25	2.25	1.125	1.125	0.557	0.928	1.114	1.856	0.888	0.928	1.775	1.856	.37	1.76	.500	.125	1.75	2.25
B3S10	MRS, MRB	34	3410-9078	Type A	3.75	3.75	1.875	1.875	0.557	1.370	1.114	2.740	0.888	1.370	1.775	2.740	.50	2.34	.500	.125	1.75	2.25
B3S15	MRS, MRB	23	3415-9087	Type B	3.00	3.00	1.5	1.5	1.312	0.928	2.625	1.856	1.313	0.928	2.625	1.856	.37	1.65	.500	.188	3.00	3.00
B3S15	MRS, MRB	34	3415-9088	Type A	3.75	3.75	1.88	1.875	1.094	1.370	2.188	2.740	1.094	1.370	2.188	2.740	.50	2.52	.500	.188	3.00	3.00
B3S20	MRS, MRB	23	3420-9050	Type C	3.50	3.50	1.75	1.75	1.334	0.928	2.668	1.856	1.334	0.928	2.668	1.856	.37	2.81	.500	.250	-	Ø3.50
B3S20	MRS, MRB	34	3420-9051	Type C	4.25	4.25	2.125	2.125	1.334	1.625	2.668	3.250	1.334	1.625	2.668	3.250	.63	3.18	.500	.250	-	Ø3.50

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	V	W	X	Y	Z
B3S10	MRS, MRB	23	3410-9050	Type A	10-24 UNC 2B THRU (4)	Ø.221 THRU C'BORE Ø.38 X .22 DP (4)	1.506/1.503 X .070 DP	Ø1.000 THRU	Ø.640 THRU 1 WALL ONLY
B3S10	MRS, MRB	34	3410-9078	Type A	10-24 UNC 2B THRU (4)	Ø.221 THRU C'BORE Ø.38 X .34 DP (4)	Ø2.878/2.882 X .080 DP	Ø1.350 THRU	Ø.640 THRU 1 WALL ONLY
B3S15	MRS, MRB	23	3415-9087	Type B	10-24 UNC 2B THRU (4)	Ø.206 THRU C'BORE Ø.36 X .22 DP (4)	1.506/1.503 THRU	Ø1.503/1.506 THRU	Ø.640 THRU 1 WALL ONLY
B3S15	MRS, MRB	34	3415-9088	Type A	10-24 UNC 2B THRU (4)	Ø.281 THRU C'BORE Ø.437 X .40 DP (4)	Ø2.878/2.882 X .080 DP	Ø2.000 THRU	Ø.640 THRU 1 WALL ONLY
B3S20	MRS, MRB	23	3420-9050	Type C	10-24 UNC 2B THRU (4)	Ø.344 THRU C'BORE Ø.437 X .28 DP (4)	Ø1.506/1.503 X .12 DP	Ø1.060 THRU	Ø.640 THRU 1 WALL ONLY
B3S20	MRS, MRB	34	3420-9051	Type C	10-24 UNC 2B THRU (4)	Ø.281 THRU C'BORE Ø.437 X .40 DP (4)	Ø2.878/2.882 X .080 DEEP	Ø2.000 THRU	Ø.640 THRU 1 WALL ONLY

Dimensions in millimeters

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	U
M3S10	MRS, MRB	23	0510-9101	Type A	57.2	57.2	28.6	28.6	14.1	23.6	28.3	47.1	22.6	23.6	45.1	47.1	9.4	44.7	12.7	3.2	44.4	57.2
M3S10	MRS, MRB	34	0510-9122	Type A	95.2	95.2	47.6	47.6	14.1	34.8	28.3	69.6	22.6	34.8	45.1	69.6	12.7	59.4	12.7	3.2	44.4	57.2
M3S15	MRS, MRB	23	0515-9188	Type B	76.2	76.2	38.1	38.1	33.3	23.6	66.7	47.1	33.4	23.6	66.7	47.1	9.4	41.9	12.7	4.8	76.2	76.2
M3S15	MRS, MRB	34	0515-9189	Type A	95.2	95.2	47.8	47.8	27.8	34.8	55.6	69.6	27.8	34.8	66.7	69.6	12.7	64.0	12.7	4.8	76.2	76.2
M3S20	MRS, MRB	23	0520-9060	Type C	88.9	88.9	44.4	44.4	33.9	23.6	67.8	47.1	33.9	23.6	67.8	47.1	9.4	71.4	12.7	6.3	-	Ø88.9
M3S20	MRS, MRB	34	0520-9061	Type C	107.9	107.9	54.0	54.0	33.9	41.3	67.8	82.6	33.9	41.3	67.8	82.6	16.0	80.8	12.7	6.3	-	Ø88.9

ACTUATOR	MOTOR	NEMA	KIT #	DRAWING	V	W	X	Y	Z
M3S10	MRS, MRB	23	0510-9101	Type A	M5 x 0.8 THRU (4)	Ø5.61 THRU C'BORE Ø9.53 X 7.6 DP (4)	38.25/38.18 X 1.78 DP	Ø27.00 THRU	Ø16.26 THRU 1 WALL ONLY
M3S10	MRS, MRB	34	0510-9122	Type A	M5 x 0.8 THRU (4)	Ø5.61 THRU C'BORE Ø9.53 X 8.6 DP (4)	Ø73.10/73.20 X 2.79 DP	Ø27.00 THRU	Ø16.26 THRU 1 WALL ONLY
M3S15	MRS, MRB	23	0515-9188	Type B	M5 x 0.8 THRU (4)	Ø7.14 THRU C'BORE Ø11.10 X 7.1 DP (4)	39.62/38.18 THRU	—	Ø16.26 THRU 1 WALL ONLY
M3S15	MRS, MRB	34	0515-9189	Type A	M5 x 0.8 THRU (4)	Ø7.14 THRU C'BORE Ø11.10 X 10.2 DP (4)	Ø73.10/73.20 X 2.79 DP	Ø38.10 THRU	Ø16.26 THRU 1 WALL ONLY
M3S20	MRS, MRB	23	0520-9060	Type C	M5 x 0.8 THRU (4)	Ø8.74 THRU C'BORE Ø13.49 X 8.6 DP (4)	39.62/38.18 X 3.05 DP	Ø27.00 THRU	Ø16.26 THRU 1 WALL ONLY
M3S20	MRS, MRB	34	0520-9061	Type C	M5 x 0.8 THRU (4)	Ø8.74 THRU C'BORE Ø13.49 X 10.7 DP (4)	Ø73.10/73.20 X 2.03 DP	Ø50.80 THRU	Ø16.26 THRU 1 WALL ONLY

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com

MOTOR MOUNTING



BRUSH
LESS

STEPPER



BRUSHED

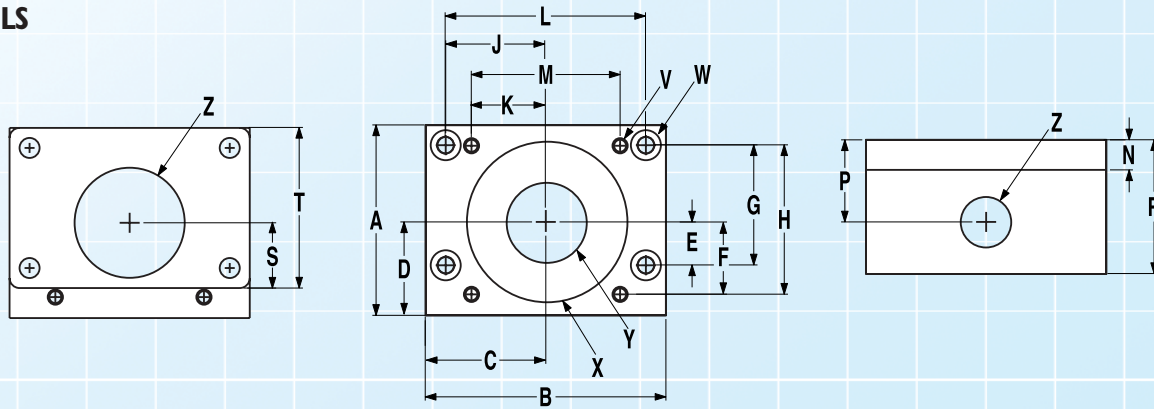


DC

SLS, MLS SCREW-DRIVE IN-LINE MOTOR MOUNTS

DIMENSIONS

SLS, MLS



NOTE: These motor mounts are for use with MRS and MRB motors only and are not to be used with gearheads.

SLS

Dimensions in inches

ACTUATOR	MOTOR	NEMA	KIT #	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
SLS10	MRB	23	0610-9016	2.38	3.00	1.50	1.19	0.565	0.928	1.50	1.856	1.250	0.928	2.50	1.856	0.375	1.025	1.77	0.815	2.00
SLS10	MRB	34	0610-9063	3.27	3.27	1.63	1.63	0.565	1.370	1.50	2.739	1.250	1.370	2.50	2.739	0.500	1.150	2.39	0.815	2.00
ACTUATOR	MOTOR	NEMA	KIT #	V		W		X				Y		Z						
SLS10	MRB	23	0610-9016	10-24 UNC 2B THRU (4)		Ø.221 THRU C'BORE Ø.357 X .22 DP (4)		Ø1.506/1.503 x .070 DP				Ø.750 THRU		Ø 1.375 THRU						
SLS10	MRB	34	0610-9063	10-24 UNC 2B THRU (4)		Ø.221 THRU C'BORE Ø.375 X .34 DP (4)		Ø2.878/2.882 X .080 DP				Ø1.125 THRU		Ø 1.375 THRU						

MLS

Dimensions in millimeters

ACTUATOR	MOTOR	NEMA	KIT #	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
MLS10	MRB	23	0610-9052	60.33	76.20	38.10	30.23	14.35	23.57	38.10	47.14	31.75	23.57	63.5	47.14	9.53	26.04	44.96	20.70	50.80
MLS10	MRB	34	0610-9064	83.06	83.06	41.40	41.40	14.35	34.80	38.10	69.57	31.75	34.80	63.50	69.57	12.70	29.21	60.71	20.70	50.80
ACTUATOR	MOTOR	NEMA	KIT #	V		W		X				Y		Z						
MLS10	MRB	23	0610-9052	10-24 UNC 2B THRU (4)		Ø.221 THRU C'BORE Ø.375 X .30 DP (4)		Ø1.506/1.503 x .070 DP				Ø 19.05 THRU		Ø 34.93 THRU						
MLS10	MRB	34	0610-9064	10-24 UNC 2B THRU (4)		Ø.221 THRU C'BORE Ø.375 X .34 DP (4)		Ø2.878/2.882 X .080 DP				Ø 28.58 THRU		Ø 34.93 THRU						

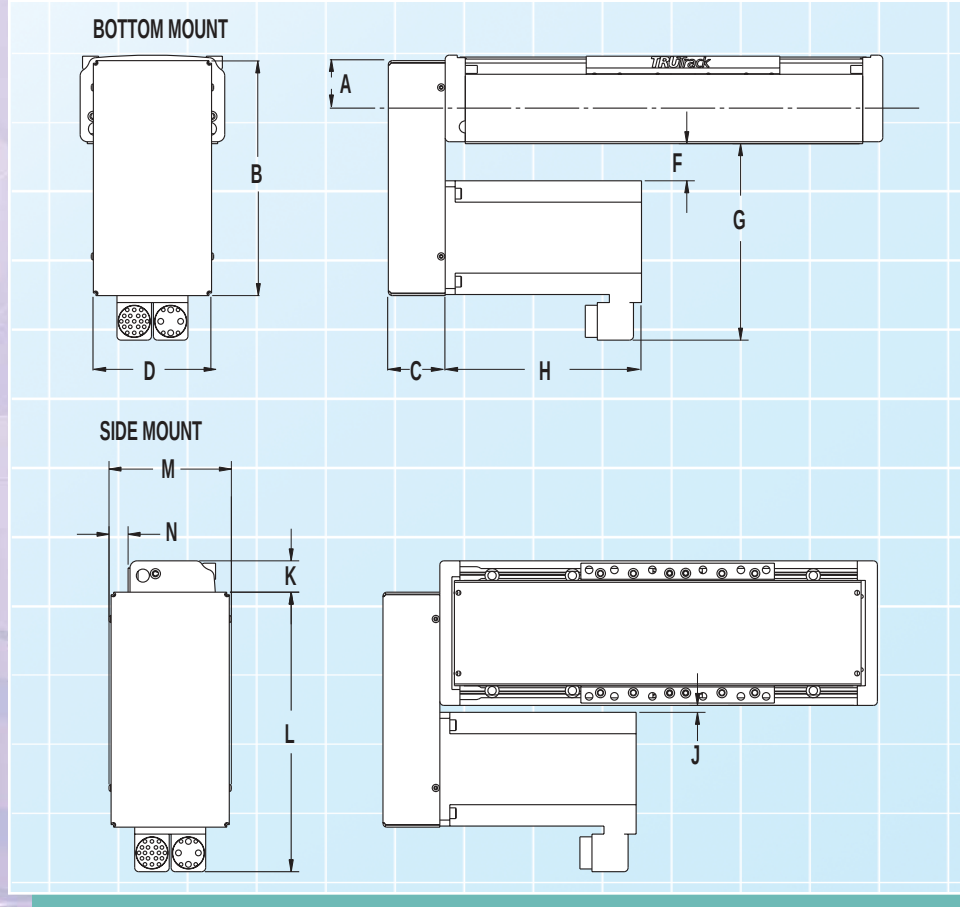
For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 on the catalog download section of our web site at www.tolomatic.com



TKS SCREW-DRIVE REVERSE PARALLEL MOUNTING

DIMENSIONS • SPECIFICATIONS

DIMENSIONS TKS SERIES



SPECIFICATIONS

Reduction Inertia at Motor Shaft		
TKS10	1:1	0.30oz•in ²
TKS10	2:1	0.84 oz•in ²
TKS25	1:1	0.73 oz•in ²
TKS25	2:1	6.26 oz•in ²
TKS50	1:1	0.73 oz•in ²
TKS50	2:1	6.26 oz•in ²
TKS75	1:1	0.73 oz•in ²
TKS75	2:1	6.26 oz•in ²
Reduction Efficiency		0.95

Dimensions in inches

ACTUATOR	A	B	C	D
TKS10	1.20	5.39	1.77	2.39
TKS25	1.26	7.28	1.77	3.64
TKS50	1.71	8.85	1.77	3.64
TKS75	1.71	8.85	1.77	3.64

TKS10

Dimensions in inches

MOTOR	F	G	H	J	K	L	M	N
MRV11	1.22	2.85	4.40	.53	.31	4.87	2.51	.51
MRV21	.91	4.38	4.75	.22	.31	6.39	2.51	.51
MRV22	.91	4.38	5.75	.22	.31	6.39	2.51	.51
MRV23	.91	4.38	6.75	.22	.31	6.39	2.51	.51
MRV24	.91	4.38	7.75	.22	.31	6.39	2.51	.51
MRS231	.91	3.64	2.06	.22	.31	5.66	2.51	.51
MRS232	.91	3.64	3.10	.22	.31	5.66	2.51	.51

TKS75

Dimensions in inches

MOTOR	F	G	H	J	K	L	M	N
MRV31	1.47	6.43	6.11	.09	1.36	9.82	3.76	.26
MRV32	1.47	6.43	7.36	.09	1.36	9.82	3.76	.26
MRV33	1.47	6.43	8.61	.09	1.36	9.82	3.76	.26
MRS341	1.55	4.93	2.58	.17	1.36	9.82	3.76	.26
MRS342	1.55	4.93	3.76	.17	1.36	9.82	3.76	.26
MRS343	1.55	4.93	5.06	.17	1.36	9.82	3.76	.26

TKS25

Dimensions in inches

MOTOR	F	G	H	J	K	L	M	N
MRV21	1.73	5.20	4.75	.79	.99	7.77	3.76	.63
MRV22	1.73	5.20	5.75	.79	.99	7.77	3.76	.63
MRV23	1.73	5.20	6.75	.79	.99	7.77	3.76	.63
MRV24	1.73	5.20	7.75	.79	.99	7.77	3.76	.63
MRV31	1.09	6.05	6.11	.15	.99	8.62	3.76	.63
MRV32	1.09	6.05	7.36	.15	.99	8.62	3.76	.63
MRV33	1.09	6.05	8.61	.15	.99	8.62	3.76	.63
MRS231	1.73	4.46	2.06	.79	.99	7.04	3.76	.63
MRS232	1.73	4.46	3.10	.79	.99	7.04	3.76	.63
MRS341	1.17	4.55	2.58	.23	.99	7.12	3.76	.63
MRS342	1.17	4.55	3.76	.23	.99	7.12	3.76	.63
MRS343	1.17	4.55	5.06	.23	.99	7.12	3.76	.63

TKS50

Dimensions in inches

MOTOR	F	G	H	J	K	L	M	N
MRV21	2.20	5.67	4.75	1.04	1.04	8.97	3.76	.35
MRV22	2.20	5.67	5.75	1.04	1.04	8.97	3.76	.35
MRV23	2.20	5.67	6.75	1.04	1.04	8.97	3.76	.35
MRV24	2.20	5.67	7.75	1.04	1.04	8.97	3.76	.35
MRV31	1.56	6.52	6.11	.40	1.04	9.82	3.76	.35
MRV32	1.56	6.52	7.36	.40	1.04	9.82	3.76	.35
MRV33	1.56	6.52	8.61	.40	1.04	9.82	3.76	.35
MRS231	2.20	4.93	2.06	1.04	1.04	8.24	3.76	.35
MRS232	2.20	4.93	3.10	1.04	1.04	8.24	3.76	.35
MRS341	1.64	5.02	2.58	.48	1.04	8.32	3.76	.35
MRS342	1.64	5.02	3.76	.48	1.04	8.32	3.76	.35
MRS343	1.64	5.02	5.06	.48	1.04	8.32	3.76	.35

MOTOR MOUNTING



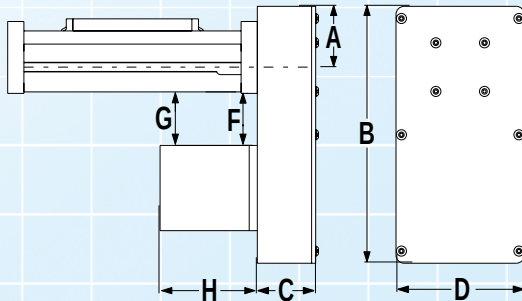
B3S SCREW-DRIVE REVERSE PARALLEL MOUNTING

DIMENSIONS • SPECIFICATIONS

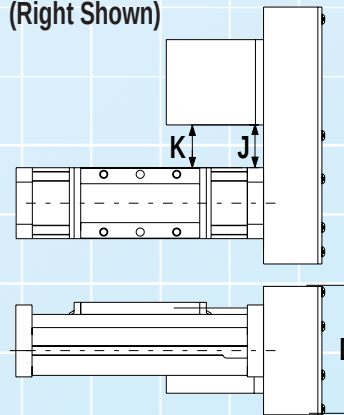
DIMENSIONS B3S

(US STANDARD)

BOTTOM MOUNT



**SIDE MOUNT
(Right Shown)**



ACTUATOR	A	B	C	D
BCS10	1.88	7.93	1.80	3.96
BCS15	1.88	8.43	2.13	3.96
BCS20	2.71	10.25	2.50	3.96

SPECIFICATIONS

Reduction Inertia at Motor Shaft

B3S10	1 : 1	0.28 oz•in ²
B3S10	2 : 1	0.78 oz•in ²
B3S15	1 : 1	0.28 oz•in ²
B3S15	2 : 1	0.78 oz•in ²
B3S20	1 : 1	0.50 oz•in ²
B3S20	2 : 1	5.61 oz•in ²

Reduction Efficiency

0.95

B3S10

Dimensions in inches

MOTOR	F	G	H	J	K
MRV21	1.79	1.84	4.75	1.51	1.51
MRV22	1.79	1.84	5.75	1.51	1.51
MRV23	1.79	1.84	6.75	1.51	1.51
MRV24	1.79	1.84	7.75	1.51	1.51
MRS231	1.79	1.84	2.06	1.51	1.51
MRS232	1.79	1.84	2.06	1.51	1.51
MRS341	1.23	1.28	2.58	0.94	0.94
MRS342	1.23	1.28	3.76	0.94	0.94
MRS343	1.23	1.28	3.76	0.94	0.94
MRB21	1.79	1.84	5.51	1.51	1.51
MRB31	1.29	1.34	5.80	1.00	1.00
MRB32	1.29	1.34	7.00	1.00	1.00

B3S15

Dimensions in inches

MOTOR	F	G	H	J	K
MRV21	1.74	1.74	4.75	1.61	1.67
MRV22	1.74	1.74	5.75	1.61	1.67
MRV23	1.74	1.74	6.75	1.61	1.67
MRV24	1.74	1.74	7.75	1.61	1.67
MRV31	1.09	1.09	6.11	0.96	1.02
MRV32	1.09	1.09	7.36	0.96	1.02
MRV33	1.09	1.09	8.61	0.96	1.02
MRS231	1.74	1.74	2.06	1.61	1.67
MRS232	1.74	1.74	2.06	1.61	1.67
MRS341	1.17	1.17	2.58	1.04	1.10
MRS342	1.17	1.17	3.76	1.04	1.10
MRS343	1.17	1.17	3.76	1.04	1.10
MRB21	1.17	1.17	5.51	1.04	1.10
MRB31	1.23	1.23	5.80	1.10	1.16
MRB32	1.23	1.23	7.00	1.10	1.16
MRB41	0.86	0.86	10.85	0.73	0.79
MRB42	0.86	0.86	10.85	0.73	0.79

B3S20

Dimensions in inches

MOTOR	F	G	H	J	K
MRV21	2.35	2.35	4.75	2.00	2.16
MRV22	2.35	2.35	5.75	2.00	2.16
MRV23	2.35	2.35	6.75	2.00	2.16
MRV24	2.35	2.35	7.75	2.00	2.16
MRV31	1.70	1.70	6.11	1.35	1.51
MRV32	1.70	1.70	7.36	1.35	1.51
MRV33	1.70	1.70	8.61	1.35	1.51
MRS341	1.78	1.78	2.58	1.43	1.59
MRS342	1.78	1.78	3.76	1.43	1.59
MRS343	1.78	1.78	3.76	1.43	1.59
MRB31	1.84	1.84	5.80	1.50	1.66
MRB32	1.84	1.84	7.00	1.50	1.66
MRB41	1.47	1.47	10.85	1.13	1.29
MRB42	1.47	1.47	10.85	1.13	1.29

MOTOR MOUNTING



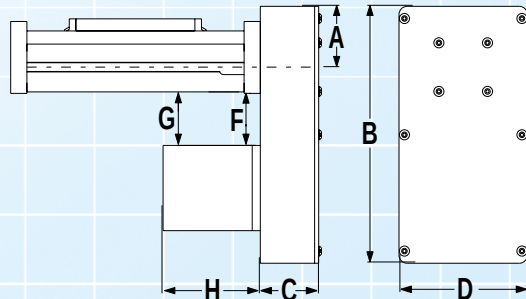
M3S SCREW-DRIVE REVERSE PARALLEL MOUNTING

DIMENSIONS • SPECIFICATIONS

DIMENSIONS M3S

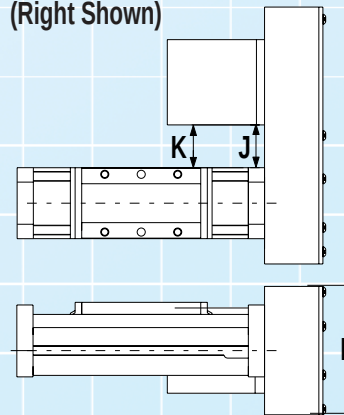
(METRIC)

BOTTOM MOUNT



ACTUATOR	A	B	C	D
M3S10	47.8	214.1	54.1	100.6
M3S15	47.8	201.4	45.7	100.6
M3S20	68.8	260.4	63.5	100.6

SIDE MOUNT (Right Shown)



SPECIFICATIONS

Reduction Inertia at Motor Shaft

M3S10	1 : 1	51.2 g·cm ²
M3S10	2 : 1	143.1 g·cm ²
M3S15	1 : 1	51.2 g·cm ²
M3S15	2 : 1	143.1 g·cm ²
M3S20	1 : 1	91.5 g·cm ²
M3S20	2 : 1	1025.6 g·cm ²

Reduction Efficiency

0.95

M3S10

Dimensions in millimeters

MOTOR	F	G	H	J	K
MRV21	45.6	46.9	121.0	38.5	38.5
MRV22	45.6	46.9	146.5	38.5	38.5
MRV23	45.6	46.9	172.0	38.5	38.5
MRV24	45.6	46.9	197.5	38.5	38.5
MRS231	45.6	46.9	52.5	38.5	38.5
MRS232	45.6	46.9	52.5	38.5	38.5
MRS341	31.3	32.6	65.7	24.0	24.0
MRS342	31.3	32.6	95.8	24.0	24.0
MRS343	31.3	32.6	95.8	24.0	24.0
MRB21	45.6	46.9	140.4	38.5	38.5
MRB31	32.9	34.1	147.8	25.5	25.5
MRB32	32.9	34.1	178.4	25.5	25.5

M3S15

Dimensions in millimeters

MOTOR	F	G	H	J	K
MRV21	44.3	44.3	121.0	41.0	42.6
MRV22	44.3	44.3	146.5	41.0	42.6
MRV23	44.3	44.3	172.0	41.0	42.6
MRV24	44.3	44.3	197.5	41.0	42.6
MRV31	27.8	27.8	155.7	24.5	26.0
MRV32	27.8	27.8	187.5	24.5	26.0
MRV33	27.8	27.8	219.4	24.5	26.0
MRS231	44.3	44.3	52.5	41.0	42.6
MRS232	44.3	44.3	52.5	41.0	42.6
MRS341	29.8	29.8	65.7	26.5	28.0
MRS342	29.8	29.8	95.8	26.5	28.0
MRS343	29.8	29.8	95.8	26.5	28.0
MRB21	29.8	29.8	140.4	26.5	28.0
MRB31	31.3	31.3	147.8	28.0	29.6
MRB32	31.3	31.3	178.4	28.0	29.6
MRB41	21.9	21.9	276.5	18.6	20.1
MRB42	21.9	21.9	276.5	18.6	20.1

M3S20

Dimensions in millimeters

MOTOR	F	G	H	J	K
MRV21	59.69	59.69	120.7	50.8	54.86
MRV22	59.69	59.69	146.1	50.8	54.86
MRV23	59.69	59.69	171.5	50.8	54.86
MRV24	59.69	59.69	195.9	50.8	54.86
MRV31	43.3	43.3	155.7	34.4	38.4
MRV32	43.3	43.3	187.5	34.4	38.4
MRV33	43.3	43.3	219.4	34.4	38.4
MRS341	45.4	45.4	65.7	36.4	40.4
MRS342	45.4	45.4	95.8	36.4	40.4
MRS343	45.4	45.4	95.8	36.4	40.4
MRB31	46.9	46.9	147.8	38.2	42.2
MRB32	46.9	46.9	178.4	38.2	42.2
MRB41	37.5	37.5	276.5	28.8	32.8
MRB42	37.5	37.5	276.5	28.8	32.8

MOTOR MOUNTING



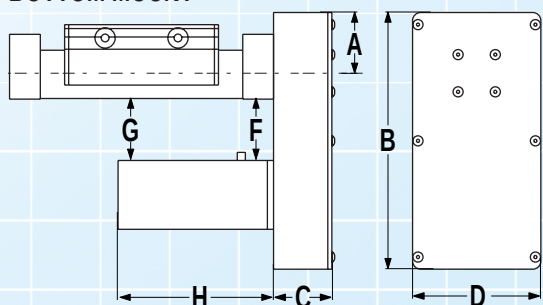
BCS SCREW-DRIVE REVERSE PARALLEL MOUNTING

DIMENSIONS • SPECIFICATIONS

DIMENSIONS BCS

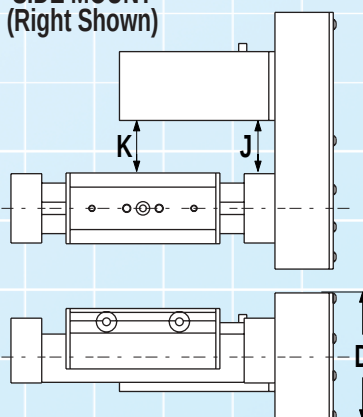
(US STANDARD)

BOTTOM MOUNT



ACTUATOR	A	B	C	D
BCS10	1.88	7.93	1.80	3.96
BCS15	1.88	8.43	2.13	3.96
BCS20	2.71	10.25	2.50	3.96

SIDE MOUNT (Right Shown)



SPECIFICATIONS

Reduction Inertia at Motor Shaft

BCS10	1 : 1	0.28 oz·in ²
BCS10	2 : 1	0.78 oz·in ²
BCS15	1 : 1	0.28 oz·in ²
BCS15	2 : 1	0.78 oz·in ²
BCS20	1 : 1	0.50 oz·in ²
BCS20	2 : 1	5.61 oz·in ²

Reduction Efficiency

0.95

BCS10

Dimensions in inches

MOTOR	F	G	H	J	K
MRV21	1.81	1.83	4.75	1.54	1.52
MRV22	1.81	1.83	5.75	1.54	1.52
MRV23	1.81	1.83	6.75	1.54	1.52
MRV24	1.81	1.83	7.75	1.54	1.52
MRS231	1.81	1.83	2.06	1.54	1.52
MRS232	1.81	1.83	2.06	1.54	1.52
MRS341	1.24	1.26	2.58	0.97	0.95
MRS342	1.24	1.26	3.76	0.97	0.95
MRS343	1.24	1.26	3.76	0.97	0.95
MRB21	1.81	1.83	5.51	1.54	1.52
MRB31	1.30	1.32	5.80	1.03	1.01
MRB32	1.30	1.32	7.00	1.03	1.01

BCS15

Dimensions in inches

MOTOR	F	G	H	J	K
MRV21	1.70	1.86	4.75	1.67	1.36
MRV22	1.70	1.86	5.75	1.67	1.36
MRV23	1.70	1.86	6.75	1.67	1.36
MRV24	1.70	1.86	7.75	1.67	1.36
MRV31	1.05	1.21	6.11	1.02	0.71
MRV32	1.05	1.21	7.36	1.02	0.71
MRV33	1.05	1.21	8.61	1.02	0.71
MRS231	1.70	1.86	2.06	1.67	1.36
MRS232	1.70	1.86	2.06	1.67	1.36
MRS341	1.13	1.29	2.58	1.10	0.79
MRS342	1.13	1.29	3.76	1.10	0.79
MRS343	1.13	1.29	3.76	1.10	0.79
MRB21	1.70	1.86	5.51	1.67	1.36
MRB31	1.19	1.35	5.80	1.16	0.85
MRB32	1.19	1.35	7.00	1.16	0.85
MRB41	0.82	0.98	10.85	0.79	0.48
MRB42	0.82	0.98	10.85	0.79	0.48

BCS20

Dimensions in inches

MOTOR	F	G	H	J	K
MRV21	2.44	2.50	4.75	2.25	1.91
MRV22	2.44	2.50	5.75	2.25	1.91
MRV23	2.44	2.50	6.75	2.25	1.91
MRV24	2.44	2.50	7.75	2.25	1.91
MRV31	1.79	1.86	6.11	1.60	1.26
MRV32	1.79	1.86	7.36	1.60	1.26
MRV33	1.79	1.86	8.61	1.60	1.26
MRS341	1.87	1.94	2.58	1.68	1.34
MRS342	1.87	1.94	3.76	1.68	1.34
MRS343	1.87	1.94	3.76	1.68	1.34
MRB31	1.93	2.00	5.80	1.75	1.41
MRB32	1.93	2.00	7.00	1.75	1.41
MRB41	1.56	1.63	10.85	1.38	1.04
MRB42	1.56	1.63	10.85	1.38	1.04

MOTOR MOUNTING



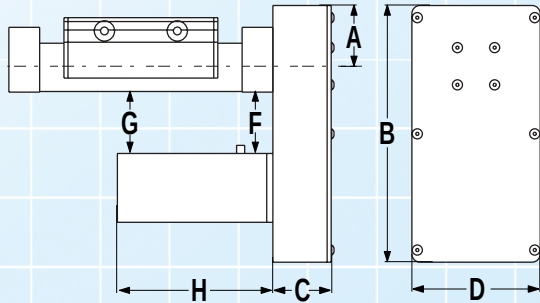
MCS SCREW-DRIVE REVERSE PARALLEL MOUNTING

DIMENSIONS • SPECIFICATIONS

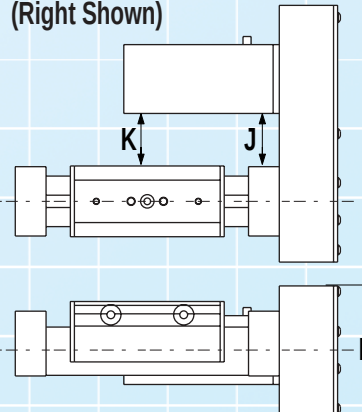
DIMENSIONS MCS

(METRIC)

BOTTOM MOUNT



SIDE MOUNT (Right Shown)



ACTUATOR	A	B	C	D
MCS10	47.8	201.4	45.7	100.6
MCS15	47.8	214.1	54.1	100.6
MCS20	68.8	260.4	63.5	100.6

SPECIFICATIONS

Reduction Inertia at Motor Shaft

MCS10	1 : 1	51.2 g·cm ²
MCS10	2 : 1	142.6 g·cm ²
MCS15	1 : 1	51.2 g·cm ²
MCS15	2 : 1	142.6 g·cm ²
MCS20	1 : 1	91.5 g·cm ²
MCS20	2 : 1	1026.0 g·cm ²

Reduction Efficiency

0.95

MCS10

Dimensions in millimeters

MOTOR	F	G	H	J	K
MRV21	46.1	46.6	121.0	39.2	38.7
MRV22	46.1	46.6	146.5	39.2	38.7
MRV23	46.1	46.6	172.0	39.2	38.7
MRV24	46.1	46.6	197.5	39.2	38.7
MRS231	46.1	46.6	52.5	39.2	38.7
MRS232	46.1	46.6	52.5	39.2	38.7
MRS341	31.6	32.1	65.7	24.7	24.2
MRS342	31.6	32.1	95.8	24.7	24.2
MRS343	31.6	32.1	95.8	24.7	24.2
MRB21	46.1	46.6	140.4	39.2	38.7
MRB31	33.1	33.6	147.8	26.2	25.7
MRB32	33.1	33.6	178.4	26.2	25.7

MCS15

Dimensions in millimeters

MOTOR	F	G	H	J	K
MRV21	43.3	47.4	121.0	42.6	34.7
MRV22	43.3	47.4	146.5	42.6	34.7
MRV23	43.3	47.4	172.0	42.6	34.7
MRV24	43.3	47.4	197.5	42.6	34.7
MRV31	26.8	30.8	155.7	26.0	18.1
MRV32	26.8	30.8	187.5	26.0	18.1
MRV33	26.8	30.8	219.4	26.0	18.1
MRS231	43.3	47.4	52.5	42.6	34.7
MRS232	43.3	47.4	52.5	42.6	34.7
MRS341	28.8	32.9	65.7	28.0	20.1
MRS342	28.8	32.9	95.8	28.0	20.1
MRS343	28.8	32.9	95.8	28.0	20.1
MRB21	43.3	47.4	140.4	42.6	34.7
MRB31	30.3	34.4	147.8	29.6	21.7
MRB32	30.3	34.4	178.4	29.6	21.7
MRB41	20.9	25.0	276.5	20.1	12.2
MRB42	20.9	25.0	276.5	20.1	12.2

MCS20

Dimensions in millimeters

MOTOR	F	G	H	J	K
MRV21	61.99	63.5	120.7	57.15	48.51
MRV22	61.99	63.5	120.7	57.15	48.51
MRV23	61.99	63.5	120.7	57.15	48.51
MRV24	61.99	63.5	120.7	57.15	48.51
MRV31	45.6	47.4	155.7	40.8	32.1
MRV32	45.6	47.4	187.5	40.8	32.1
MRV33	45.6	47.4	219.4	40.8	32.1
MRS341	47.6	49.4	65.7	42.8	34.1
MRS342	47.6	49.4	95.8	42.8	34.1
MRS343	47.6	49.4	95.8	42.8	34.1
MRB31	49.2	51.0	147.8	44.6	35.9
MRB32	49.2	51.0	178.4	44.6	35.9
MRB41	39.7	41.5	276.5	35.2	26.5
MRB42	39.7	41.5	276.5	35.2	26.5

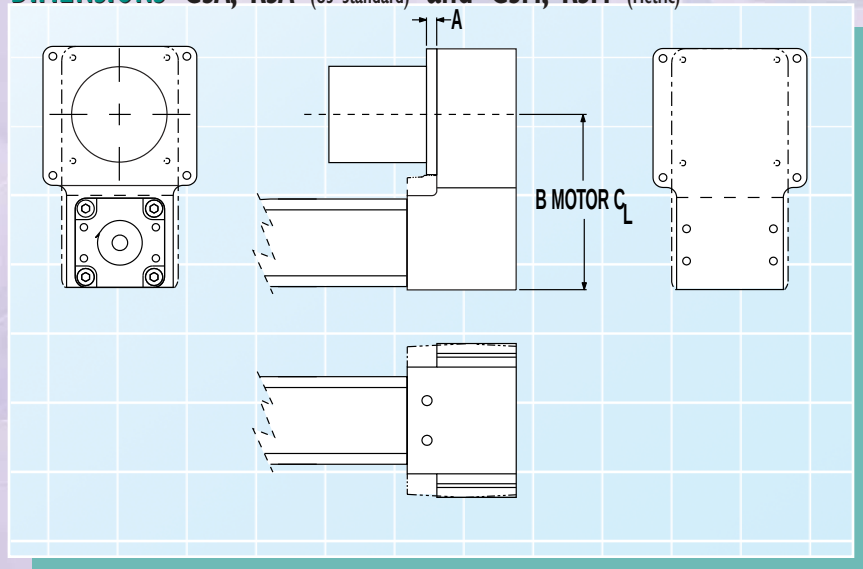
MOTOR MOUNTING



RSA/GSA REVERSE PARALLEL MOUNTING

DIMENSIONS • SPECIFICATIONS

DIMENSIONS GSA, RSA (US Standard) and GSM, RSM (Metric)



GSA, RSA SPECIFICATIONS

Reduction Inertia at Motor Shaft		
MODEL	1:1	2:1
GSA, RSA12	0.23 oz•in ²	NA
GSA, RSA16	0.23 oz•in ²	NA
GSA, RSA24	0.09 oz•in ²	0.36 oz•in ²
GSA, RSA32	0.28 oz•in ²	2.55 oz•in ²
RSA50	1.79 oz•in ²	9.68 oz•in ²
RSA64	2.20 oz•in ²	26.00 oz•in ²
Reduction Efficiency		
0.95		

GSM, RSM SPECIFICATIONS

Reduction Inertia at Motor Shaft		
MODEL	1:1	2:1
GSM, RSM12	42.1 gm•cm ²	NA
GSM, RSM16	42.1 gm•cm ²	NA
GSM, RSM24	16.5 gm•cm ²	65.8 gm•cm ²
GSM, RSM32	51.2 gm•cm ²	466.4 gm•cm ²
RSM50	327.4 gm•cm ²	1770.5 gm•cm ²
RSM64	402.4 gm•cm ²	4755.4 gm•cm ²
Reduction Efficiency		
0.95		

GSA, RSA

Dimensions in inches

MODEL	MOTOR	FRAME	A	B
GSA12	MRV	17	0.25	2.29
RSA12	MRV	23	0.25	2.52
	MRS	17	0.25	2.29
	MRS	23	0.25	2.52
	MRB	23	0.25	2.52
GSA16	MRV	23	0.25	2.64
RSA16	MRS	23	0.25	2.64
	MRB	23	0.25	2.64
GSA24	MRV	23	0.75	3.75
RSA24	MRS	23	0.19	3.75
	MRB	23	0.19	3.75
GSA32	MRV	23	0.19	4.22
RSA32	MRV	34	0.30	4.72
	MRS	23	0.19	4.22
	MRS	34	0.30	4.72
	MRB	23	0.19	4.22
	MRB	34	0.30	4.72
RSA50	MRV	23	0.30	5.98
	MRV	34	0.30	5.98
	MRV	56	0.50	6.38
	MRS	34	0.30	5.98
	MRB	34	0.30	5.98
	MRB	40	0.74	5.98
RSA64	MRV	34	0.30	6.74
	MRV	56	0.56	7.17
	MRS	34	0.30	6.74
	MRB	34	0.30	6.74
	MRB	40	0.49	6.74

GSM, RSM

Dimensions in millimeters

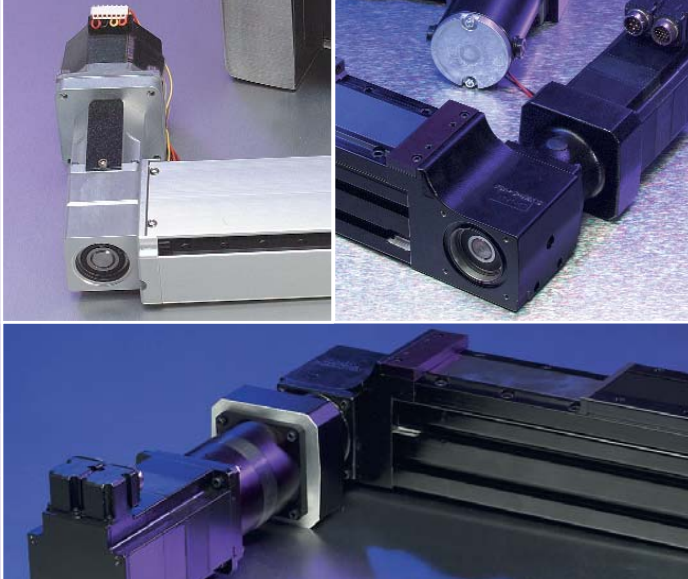
MODEL	MOTOR	FRAME	A	B
GSM12	MRV	17	6.3	58.3
RSM12	MRV	23	6.3	64.0
	MRS	17	6.3	58.3
	MRS	23	6.3	64.0
	MRB	23	6.3	64.0
GSM16	MRV	23	6.3	67.2
RSM16	MRS	23	6.3	67.2
	MRB	23	6.3	67.2
GSM24	MRV	23	19.0	95.2
RSM24	MRS	23	4.8	95.2
	MRB	23	4.8	95.2
GSM32	MRV	23	4.8	107.1
RSM32	MRV	34	7.6	119.8
	MRS	23	4.8	107.1
	MRS	34	7.6	119.8
	MRB	23	4.8	107.1
	MRB	34	7.6	119.8
RSM50	MRV	23	7.6	151.8
	MRV	34	7.6	151.8
	MRV	56	12.7	162.1
	MRS	34	7.6	151.8
	MRB	34	7.6	151.8
	MRB	40	18.7	151.8
RSM64	MRV	34	7.6	171.2
	MRV	56	14.2	182.2
	MRS	34	7.6	171.2
	MRB	34	7.6	171.2
	MRB	40	12.4	171.2

MOTOR MOUNTING



BELT-DRIVE MOTOR MOUNTING

DIMENSIONS • SPECIFICATIONS

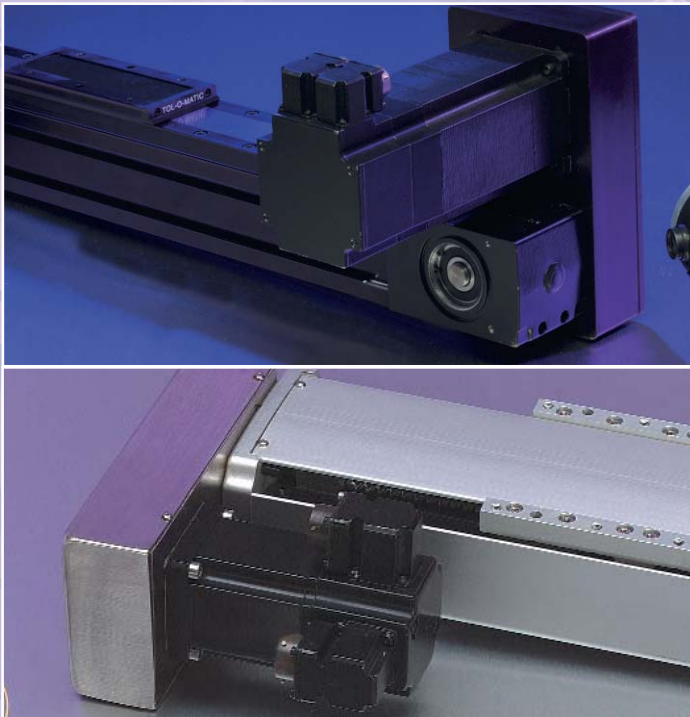


DIRECT-DRIVE MOTOR MOUNTING

Drive motor is mounted directly to the drive end assembly. Motor may be mounted directly on the left side, right side, bottom or top.

TKB, B3B GEARHEAD REDUCTION

Available on TKB and B3B/M3B actuators only, this mounting is used in applications requiring reduction for inertia matching or higher torque at lower speeds.



REDUCTION DRIVE MOUNTING

Motor is mounted to the reduction assembly, providing a speed reduction from the motor to the belt-drive wheel. B3B actuators are available with a 3:1 reduction and TKB actuators are available with a 1:1 or 2:1 reduction.



BELT-DRIVE DIRECT DRIVE MOUNTING

SPECIFICATIONS

MOUNTING KITS AND COUPLERS FOR MOTORS WITH GEARHEADS

B3B (US Standard) & M3B (Metric) All Sizes

GEAR HEAD		MOTORS Tol-O-Matic Configuration #	MOTOR MNTNG KIT Part #	COUPLER			
T-O-M Config. #	T-O-M Part #			JAW STYLE		FLEX DISC	
				T-O-M Part #	COUPLING	T-O-M Part #	COUPLING
GHJ20	3600-6151	MRV21, 22, 23, 24	3410-9075	—	—	3600-6177	ZOA55
GHJ21	3600-6152	MRV21, 22, 23, 24	3410-9075	—	—	3600-6177	ZOA55
GHJ30	3600-6154	MRV31, 32, 33, MRB31, 32	3410-9076	3420-9041	COD55	3600-6174	ZOD55
GHJ31	3600-6155	MRV31, 32, 33, MRB31, 32	3410-9076	3420-9041	COD55	3600-6174	ZOD55
GHK30	3600-6153	MRS341, & 342	3410-9076	3600-9236	COD55	—	—
GHK20	3600-6150	MRS231, 232	3410-9075	3600-9219	COD55	—	—

For Gearhead dimensional information, refer to page 156.

Config. Number	Part Number	Frame Size	Gear Ratio	Inertia		Input Shaft Dia.	Weight	
				oz-in	N-m		Lbs.	Kgs.
GHK20	3600-6150	23	5.5 : 1	.34	.0024	.250"	1.78	0.81
GHJ20	3600-6151	23	5.5 : 1	.34	.0024	.500"	2.00	0.91
GHJ21	3600-6152	23	10 : 1	.29	.0020	.500"	1.98	0.90
GHK30	3600-6153	34	5.5 : 1	1.81	.0128	.375"	4.68	2.12
GHJ30	3600-6154	34	5.5 : 1	1.81	.0128	.500"	4.60	2.09
GHJ31	3600-6155	34	10 : 1	1.42	.0100	.500"	4.78	2.17

SPECIFICATIONS

Efficiency: 85%
Backlash: less than 10 arc minutes
Max. Input Speed: 5000 RPM

MOUNTING KITS AND COUPLERS FOR MOTORS

B3B (US Standard) & M3B (Metric)

Tol-O-Matic MOTOR Config. #	Tol-O-Matic MOTOR Part #	MOTOR MNTNG KIT Part #	COUPLERS			
			JAW STYLE		FLEX DISC	
			T-O-M Part #	CODE	T-O-M Part #	CODE
MRB21	3600-6248	3410-9072	3600-9219	COC55	—	—
MRB31	3600-6249	3410-9073	3600-9219	COC55	—	—
MRB32	3600-6250	3410-9073	3600-9219	COC55	—	—
MRB41	3600-6251	3410-9074	3600-9218	COD65	—	—
MRB42	3600-6252	3410-9074	3600-9218	COD65	—	—
MRS341	3600-6132	3410-9077	3600-9216	COC52	—	—
MRS342	3600-6133	3410-9077	3600-9216	COC52	—	—
MRS343	3600-6134	3410-9077	3600-9216	COC52	—	—



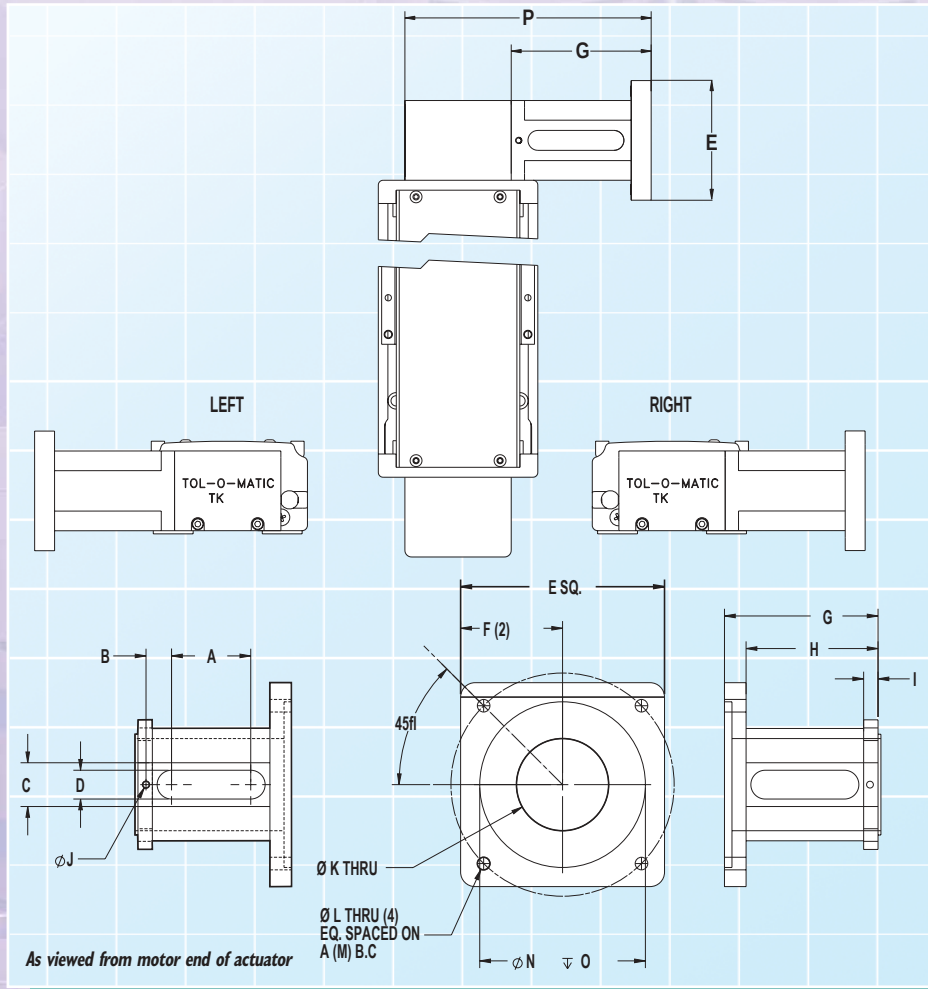
Tol-O-Matic MOTOR Config. #	Tol-O-Matic MOTOR Part #	MOTOR MNTNG KIT Part #	COUPLERS			
			JAW STYLE		FLEX DISC	
			T-O-M Part #	CODE	T-O-M Part #	CODE
MRV21	3600-6240	3410-9072	—	—	3600-6177	ZOA55
MRV22	3600-6241	3410-9072	—	—	3600-6177	ZOA55
MRV23	3600-6242	3410-9072	—	—	3600-6177	ZOA55
MRV24	3600-6243	3410-9072	—	—	3600-6174	ZOC55
MRV31	3600-6244	3410-9073	—	—	3600-6174	ZOC55
MRV32	3600-6245	3410-9073	—	—	3600-6174	ZOC55
MRV33	3600-6246	3410-9073	—	—	3600-6174	ZOC55



TKB BELT-DRIVE DIRECT DRIVE MOUNTING

DIMENSIONS

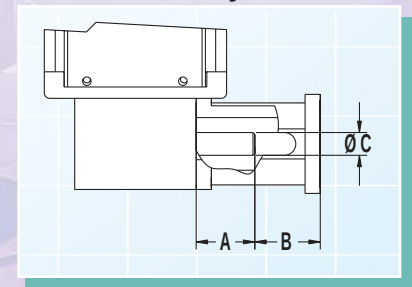
DIMENSIONS TKB10, 25, 50, 75 MOTOR ADAPTER



NOTES:

- **TKS XJ/XY MOTOR OPTION:** If a Tol-O-Matic motor is not specified in the configuration string, customer's motor must conform to the shaft dimensions shown for mounting compatibility. Please specify your motor type and frame size when ordering TruTrack actuators without Tol-O-Matic motors. (See System Ordering pages 184 and 186 and refer to Customer Supplied Motor Mounting Specifications — Document 3600-4632.

TKB SHAFT XY/XJ OPTION



Dimensions in inches

ACTUATOR	MOTOR	A	B	C
TKB10	MRV23	.965	1.667	.375
	MRS23	.715	1.917	.375
TKSB5	MRV23	.793	1.936	.500
	MRV34	.793	1.686	.500
TKB50	MRV23	.808	1.920	.500
	MRV34	.808	1.670	.500
TKB75	MRV34	.817	1.661	.500
	MRS34	.817	1.661	.500



MOTOR MOUNTING

Dimensions in inches

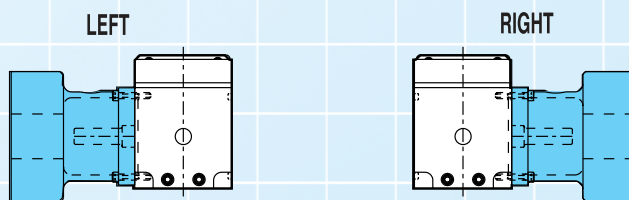
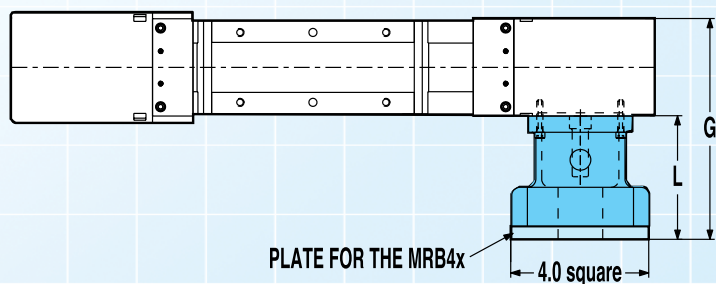
ACTUATOR	PART NO.	MOTOR/GEARHEAD	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
TKB10	0601-2061	MRV23/GHJ20, GHJ21	1.430	.362	.760	.375	2.250	1.125	2.632	2.257	.250	M3	.750	M5	2.625	1.503	.130	5.50
	0601-2061	MRS23/GHK20	1.430	.632	.760	.375	2.250	1.125	2.632	2.257	.250	M3	.750	M5	2.625	1.503	.130	5.50
TKB25	0602-2042	MRV23/GHJ20, GHJ21	1.375	.443	.760	.500	2.250	1.125	2.728	2.353	.250	M3	1.350	M5	2.625	1.502	.130	5.60
	0603-2033	MRV34/GHJ30, GHJ31	1.353	.360	.760	.500	3.540	1.770	2.478	2.103	.250	M3	1.600	M5	3.875	2.876	.130	5.35
	0603-2033	MRS34/GHK30	1.353	.360	.760	.500	3.540	1.770	2.478	2.103	.250	M3	1.600	M5	3.875	2.876	.130	5.35
TKB50	0602-2042	MRV23/GHJ20, GHJ21	1.375	.443	.760	.500	2.250	1.125	2.728	2.353	.250	M3	1.350	M5	2.625	1.502	.130	6.44
	0603-2033	MRV34/GHJ30, GHJ31	1.353	.360	.760	.500	3.540	1.770	2.478	2.103	.250	M3	1.600	M5	3.875	2.876	.130	6.19
	0603-2033	MRS34/GHK30	1.353	.360	.760	.500	3.540	1.770	2.478	2.103	.250	M3	1.600	M5	3.875	2.876	.130	6.19
TKB75	0603-2033	MRV34/GHJ30, GHJ31	1.375	.443	.760	.500	3.540	1.770	2.666	2.290	.250	M3	1.600	.219	3.875	2.876	.130	6.60
	0603-2033	MRS34/GHK30	1.375	.443	.760	.500	3.540	1.770	2.666	2.290	.250	M3	1.600	.219	3.875	2.876	.130	6.60



B3B BELT-DRIVE DIRECT-DRIVE MOUNTING

DIMENSIONS

DIMENSIONS B3B (US STANDARD) & M3B (METRIC)



Configurations are viewed from motor end of actuator with carrier up

B3B

Dimensions in inches

MOTOR	B3B10		B3B15		B3B20	
	L	G	L	G	L	G
MRV2	3.81	6.00	3.81	6.81	3.56	7.50
MRV3	3.77	5.96	3.77	6.77	3.77	7.71
MRV5I	—	—	—	—	4.48	8.42
MRS34	3.56	5.75	3.56	6.56	3.56	7.50
MRB2	3.12	5.31	3.12	6.12	3.81	7.75
MRB3	3.77	5.96	3.77	6.77	3.77	7.71
MRB4	4.42	6.66	4.42	7.42	4.42	8.36

M3B

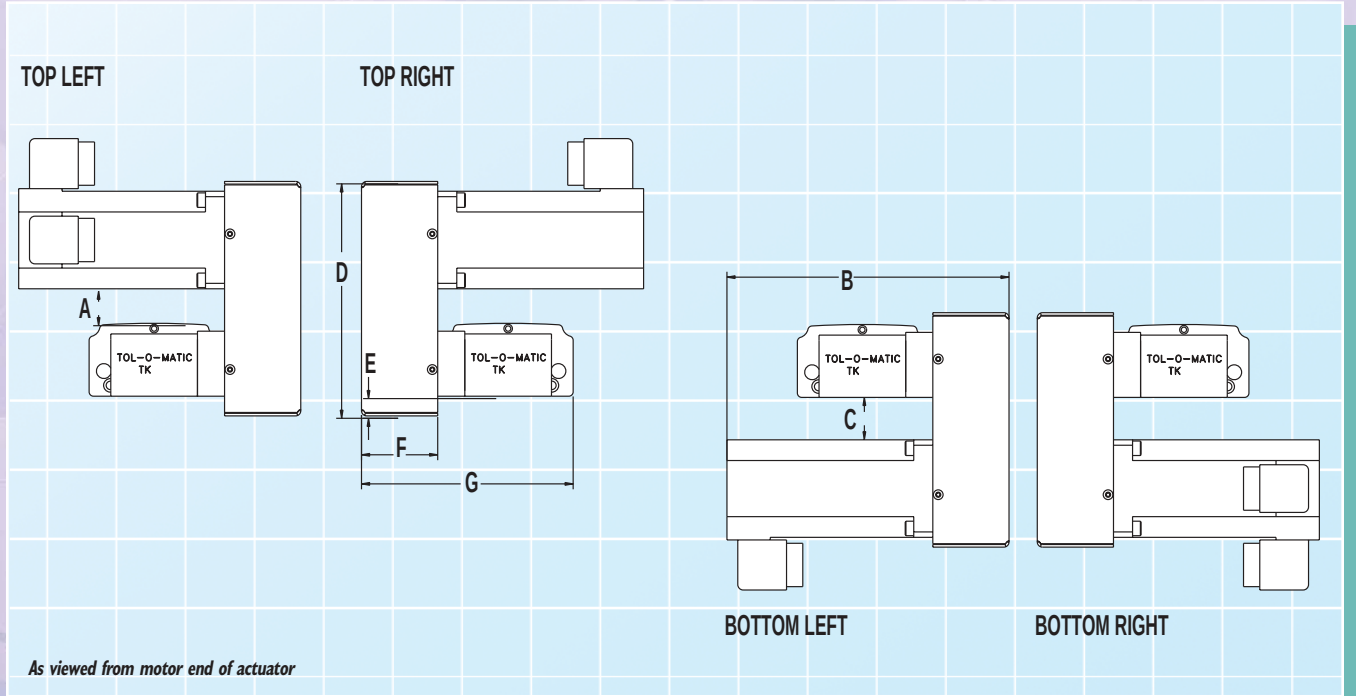
Dimensions in millimeters

MOTOR	M3B10		M3B15		M3B20	
	L	G	L	G	L	G
MRV2	96.7	152.4	96.7	172.4	90.4	190.5
MRV3	95.7	115.3	95.7	171.9	95.7	195.8
MRV5I	—	—	—	—	113.8	213.9
MRS34	90.4	147.7	90.4	166.6	90.4	190.5
MRB2	79.2	134.9	79.2	155.4	96.7	196.8
MRB3	95.7	115.3	95.7	171.9	95.7	195.8
MRB4	112.2	167.9	112.2	188.5	112.2	212.3

TKB BELT-DRIVE REDUCTION DRIVE MOUNTING

DIMENSIONS • SPECIFICATIONS

DIMENSIONS TKB REDUCTION DRIVE



TKB10

Dimensions in inches

MOTOR	A	B	C	D	E	F	G
MRV11	1.10	6.17	1.22	5.39	.45	1.77	4.90
MRV21	.79	6.52	.91	5.39	.45	1.77	4.90
MRV22	.79	7.52	.91	5.39	.45	1.77	4.90
MRV23	.79	8.52	.91	5.39	.45	1.77	4.90
MRV24	.79	9.52	.91	5.39	.45	1.77	4.90
MRS232	.79	4.87	.91	5.39	.45	1.77	4.90

TKB50

Dimensions in inches

MOTOR	A	B	C	D	E	F	G
MRV21	2.18	6.52	2.20	8.85	.17	1.77	7.50
MRV22	2.18	7.52	2.20	8.85	.17	1.77	7.50
MRV23	2.18	8.52	2.20	8.85	.17	1.77	7.50
MRV24	2.18	9.52	2.20	8.85	.17	1.77	7.50
MRV31	1.54	7.88	1.56	8.85	.17	1.77	7.50
MRV32	1.54	9.13	1.56	8.85	.17	1.77	7.50
MRV33	1.54	10.38	1.56	8.85	.17	1.77	7.50
MRS341	1.62	4.35	1.64	8.85	.17	1.77	7.50
MRS342	1.62	5.53	1.64	8.85	.17	1.77	7.50
MRS342	1.62	6.83	1.64	8.85	.17	1.77	7.50

TKB75

Dimensions in inches

MOTOR	A	B	C	D	E	F	G
MRV31	1.39	7.88	1.47	8.85	.80	1.77	7.93
MRV32	1.39	9.13	1.47	8.85	.80	1.77	7.93
MRV33	1.39	10.38	1.47	8.85	.80	1.77	7.93
MRS341	1.47	4.35	1.55	8.85	.80	1.77	7.93
MRS342	1.47	5.53	1.55	8.85	.80	1.77	7.93
MRS343	1.47	6.83	1.55	8.85	.80	1.77	7.93

TKB25

Dimensions in inches

MOTOR	A	B	C	D	E	F	G
MRV21	1.59	6.52	1.73	7.28	.00	1.77	6.39
MRV22	1.59	7.52	1.73	7.28	.00	1.77	6.39
MRV23	1.59	8.52	1.73	7.28	.00	1.77	6.39
MRV24	1.59	9.52	1.73	7.28	.00	1.77	6.39
MRV31	.95	7.88	1.09	7.28	.00	1.77	6.39
MRV32	.95	9.13	1.09	7.28	.00	1.77	6.39
MRV33	.95	10.38	1.09	7.28	.00	1.77	6.39
MRS341	1.03	4.35	1.17	7.28	.00	1.77	6.39
MRS342	1.03	5.53	1.17	7.28	.00	1.77	6.39
MRS342	1.03	6.83	1.17	7.28	.00	1.77	6.39

SPECIFICATIONS

Reduction Inertia at Motor Shaft

TKB10	1 : 1	.30 oz•in ²
TKB10	2 : 1	.84 oz•in ²
TKB25	1 : 1	.73 oz•in ²
TKB25	2 : 1	6.26 oz•in ²
TKB50	1 : 1	.73 oz•in ²

TKB50 2 : 1 6.26 oz•in²

TKB75 1 : 1 .73 oz•in²

TKB75 2 : 1 6.26 oz•in²

Reduction Efficiency .95

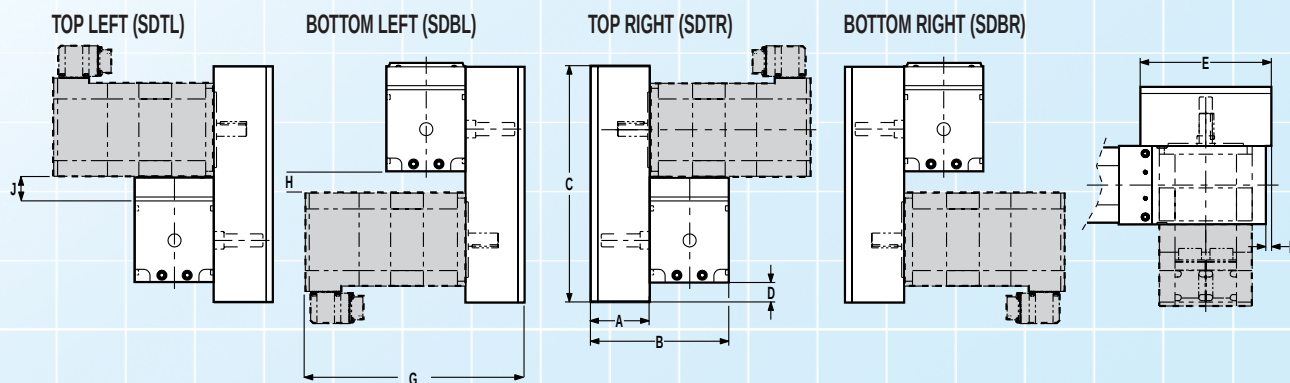
MOTOR MOUNTING



B3B BELT-DRIVE REDUCTION DRIVE MOUNTING

DIMENSIONS • SPECIFICATIONS

DIMENSIONS B3B (US STANDARD)



ACTUATOR	A	B	C	D	E	F
B3B10	2.25	4.44	9.00	.88	5.00	.43
B3B15	2.25	5.25	9.00	.78	5.00	.206
B3B20	2.25	6.19	9.00	.63	5.00	.71
B3B20 & MRV51	2.25	6.19	11.00	.63	5.00	.71

B3B10 Dimensions in inches

MOTOR	G	H	J
MRV21	6.82	1.60	1.35
MRV22	7.82	1.60	1.35
MRV23	8.82	1.60	1.35
MRV24	9.82	1.60	1.35
MRV31	8.36	1.07	.82
MRV32	9.61	1.07	.82
MRV33	10.86	1.07	.82
MRS341	4.66	1.03	.781
MRS342	5.89	1.03	.781
MRS343	5.84	1.03	.781
MRB21	8.41	1.60	1.35
MRB31	7.60	1.10	.85
MRB32	8.80	1.10	.85
MRB41	17.10	1.07	.82
MRB42	16.21	1.07	.82

B3B15 Dimensions in inches

MOTOR	G	H	J
MRV21	6.82	1.49	1.60
MRV22	7.82	1.49	1.60
MRV23	8.82	1.49	1.60
MRV24	9.82	1.49	1.60
MRV31	8.36	.85	.95
MRV32	9.61	.85	.95
MRV33	10.86	.85	.95
MRS341	4.66	.92	1.03
MRS342	5.84	.92	1.03
MRS343	5.84	.92	1.03
MRB21	8.41	1.50	1.60
MRB31	7.60	.99	1.09
MRB32	8.80	.99	1.09
MRB41	17.10	.61	.72
MRB42	17.54	.61	.72

B3B20 Dimensions in inches

MOTOR	G	H	J
MRV23	9.00	1.35	1.60
MRV24	10.00	1.35	1.60
MRV31	8.36	.70	.95
MRV32	9.61	.70	.95
MRV33	10.86	.70	.95
MRV51	12.68	2.22	2.47
MRS342	6.01	.70	.95
MRS343	7.31	.70	.95
MRB41	16.71	.47	.72
MRB42	18.05	.47	.72

SPECIFICATIONS

Reduction Inertia at Motor Shaft

B3B10	3:1	MRV23/34	2.77 oz-in ²
		MRV40	3.19 oz-in ²
B3B15	3:1	MRV34/40	4.85 oz-in ²
B3B20	3:1	MRV34/40	4.85 oz-in ²

Weight of Reduction Drive

B3B10	4.4 lbs
B3B15	4.8 lbs
B3B20	4.8 lbs

Reduction Efficiency

B3B10	0.95
B3B15	0.95
B3B20	0.95

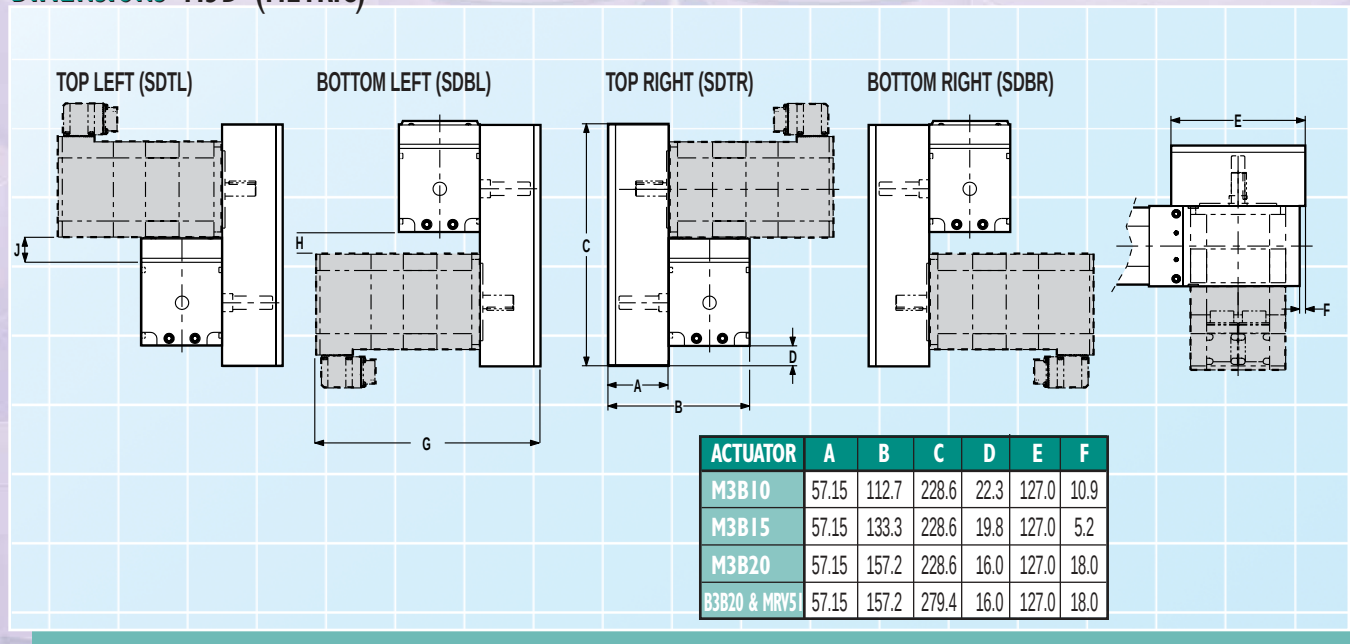
MOTOR MOUNTING



M3B BELT-DRIVE REDUCTION DRIVE MOUNTING

DIMENSIONS • SPECIFICATIONS

DIMENSIONS M3B (METRIC)



M3B10 Dimensions in millimeters

MOTOR	G	H	J
MRV21	173.2	40.6	34.2
MRV22	198.6	40.6	34.2
MRV23	224.0	40.6	34.2
MRV24	249.4	40.6	34.2
MRV31	212.3	27.1	20.8
MRV32	244.0	27.1	20.8
MRV33	275.8	27.1	20.8
MRS341	118.3	26.1	19.8
MRS342	149.6	26.1	19.8
MRS343	148.3	26.1	19.8
MRB21	213.6	40.6	34.2
MRB31	193.0	27.9	21.5
MRB32	223.5	27.9	21.5
MRB41	434.3	27.1	20.8
MRB42	411.7	27.1	20.8

M3B15 Dimensions in millimeters

MOTOR	G	H	J
MRV21	173.2	37.8	40.6
MRV22	198.6	37.8	40.6
MRV23	224.0	37.8	40.6
MRV24	249.4	37.8	40.6
MRV31	212.3	21.5	24.1
MRV32	244.0	21.5	24.1
MRV33	275.8	21.5	24.1
MRS341	118.3	23.3	26.1
MRS342	148.3	23.3	26.1
MRS343	148.3	23.3	26.1
MRB21	213.6	38.1	40.6
MRB31	193.0	25.1	27.6
MRB32	223.5	25.1	27.6
MRB41	434.3	15.4	18.2
MRB42	445.5	15.4	18.2

M3B20 Dimensions in millimeters

MOTOR	G	H	J
MRV23	228.6	34.3	40.6
MRV24	254.0	34.3	40.6
MRV31	212.3	17.8	24.1
MRV32	244.1	17.8	24.1
MRV33	275.8	17.8	24.1
MRV51	322.1	56.4	62.7
MRS342	152.6	17.8	24.13
MRS343	185.7	17.8	24.13
MRB41	424.4	11.9	18.2
MRB42	458.5	11.9	18.2

SPECIFICATIONS

Reduction Inertia at Motor Shaft

M3B10	3:1	MRV23/34	506.6 g·cm ²
		MRV40	583.4 g·cm ²

M3B15	3:1	MRV34/40	887.1 g·cm ²
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M3B20	3:1	MRV34/40	887.1 g·cm ²
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Weight of Reduction Drive

M3B10	1995.8 g
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M3B15	2177.2 g
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M3B20	2177.2 g
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Reduction Efficiency

M3B10	0.95
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M3B15	0.95
-------	------

M3B20	0.95
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MOTOR MOUNTING



ADAPTER PLATES

Tol-O-Matic adapter plates can be used in any application where it may be advantageous to combine two or more linear actuators in the same or different axes. With a wide variety of pre-designed adapter plates to choose from PLUS the ability to order custom-designed plates for special application needs, virtually every actuator configuration can be accommodated. Call the factory for standard adapter plate availability.

Designing Your Own Adapter Plate

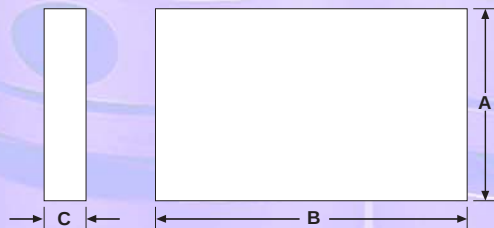
Adapter plates may be required to combine Tol-O-Matic products with your products or fixtures with other manufacturers' actuators.

Our exclusive "Design Your Own" feature comes in handy. To obtain a perfect match between Tol-O-Matic actuators and your existing equipment, simply make a sketch of your requirements. Then fax a copy of the sketch to your local Tol-O-Matic distributor. In a matter of just a few days, we'll ship the adapter plate you need.

IT'S AS SIMPLE AS 1-2-3...

1. Begin by consulting the chart of standard raw plate stock. Choose the rough dimensions closest to your needs. Include the plate number on your drawing. (If none of these sizes are appropriate, write 6000-NONE on your drawing.)
2. Sketch the plate on the grid (include dimensions if NOT using a standard plate). Be sure to include all hole sizes, threads and locations, as well as any notes you may have regarding your requirements. NOTE: Measure all holes from common reference or datum point to centerline of hole.
3. To request pricing information, place an order or discuss your application further, contact your local Tol-O-Matic distributor or call 1-800-328-2174.

"Raw" Plate Stock Dimensions/Part Numbers



Notes:

1. All dimensions are in inches.
2. Plates listed are anodized aluminum (non-anodized holes). Consult distributor or factory for availability of other materials.

Plate No.	Dim. "A"	Dim. "B"	Dim. "C"	Wt. (Oz.)
6000-1400	2.00	2.00	0.325	2.20
6000-1401	2.50	2.75	0.325	3.80
6000-1402	2.75	3.00	0.325	4.50
6000-1403	2.75	4.00	0.325	6.00
6000-1404	2.00	2.50	0.325	2.70
6000-1405	2.00	3.00	0.325	3.30
6000-1406	2.00	4.50	0.325	4.90
6000-1407	1.75	2.75	0.325	2.60
6000-1408	1.62	5.75	0.325	5.10
6000-1409	2.00	3.25	0.325	3.60
6000-1410	2.12	4.00	0.325	4.70
6000-1411	1.25	1.62	0.325	1.10
6000-1412	1.25	2.12	0.325	1.50
6000-1413	1.25	2.62	0.325	1.80
6000-1414	1.25	3.12	0.325	2.10
6000-1415	3.00	4.50	0.325	7.40
6000-1416	3.00	3.50	0.325	5.80
6000-1417	3.25	6.00	0.325	10.70
6000-1418	2.25	3.50	0.325	4.30

Plate No.	Dim. "A"	Dim. "B"	Dim. "C"	Wt. (Oz.)
6000-1419	3.00	3.25	0.325	5.40
6000-1421	1.75	1.75	0.325	1.70
6000-1422	1.25	4.75	0.325	3.30
6000-1423	1.25	4.25	0.325	2.90
6000-1424	2.00	2.75	0.325	3.00
6000-1425	2.50	2.50	0.325	3.40
6000-1427	4.00	4.50	0.325	9.90
6000-1428	1.50	2.75	0.325	2.30
6000-1429	2.25	2.50	0.325	3.10
6000-1430	3.25	4.00	0.325	7.10
6000-1431	2.50	3.25	0.325	4.50
6000-1432	2.50	4.25	0.450	8.50
6000-1433	1.62	4.00	0.325	3.60
6000-1436	4.00	5.00	0.450	16.00
6000-1437	4.50	4.50	0.450	16.20
6000-1438	3.00	5.00	0.450	12.00
6000-1439	3.00	4.00	0.450	9.60
6000-1440	5.00	7.75	0.575	38.70
6000-1441	2.00	6.25	0.575	12.50

Plate No.	Dim. "A"	Dim. "B"	Dim. "C"	Wt. (Oz.)
6000-1442	3.62	4.50	0.450	13.00
6000-1443	5.00	6.00	0.575	30.00
6000-1444	5.00	5.50	0.450	22.00
6000-1445	1.75	5.50	0.450	7.70
6000-1446	1.62	6.00	0.575	9.70
6000-1447	2.12	6.00	0.575	12.70
6000-1448	2.62	6.00	0.575	15.70
6000-1449	3.12	6.00	0.575	18.70
6000-1450	3.00	3.00	0.450	7.20
6000-1456	3.00	6.00	0.450	14.40
6000-1457	1.25	4.62	0.325	3.50
6000-1458	2.25	3.00	0.450	5.40
6000-1459	3.00	3.25	0.575	9.70
6000-1468	3.00	4.25	0.450	10.20
6000-1469	2.50	4.50	0.325	6.70
6000-1470	3.50	4.50	0.325	9.40
6000-1471	4.12	6.00	0.575	24.70
6000-1482	7.00	7.00	0.575	48.90
6000-1483	5.00	7.00	0.575	35.00

UNIVERSAL SWITCHES

PERFORMANCE DATA • SPECIFICATIONS

ELECTRIC SWITCHES

Available for use on all of Tol-O-Matic's Axidyne actuators, these switches are activated by the cylinder's internal magnet, or on some actuators, the carrier mounted magnet. DC Reed, Hall-effect and AC Triac switches contain reverse polarity protection.

DC REED SWITCHES

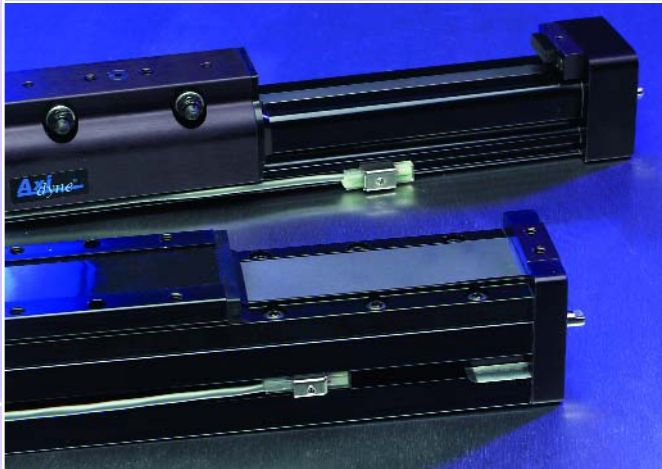
Designed for signalling end-of-stroke position to devices such as programmable controllers. They can be used to operate dc relays and solenoids if a protection circuit is used and if current and voltage limits are observed.

HALL-EFFECT SWITCHES

Available in either sinking type (NPN), or sourcing type (PNP). They are designed to signal devices such as programmable controllers, dc loads, and TTL or CMOS circuits.

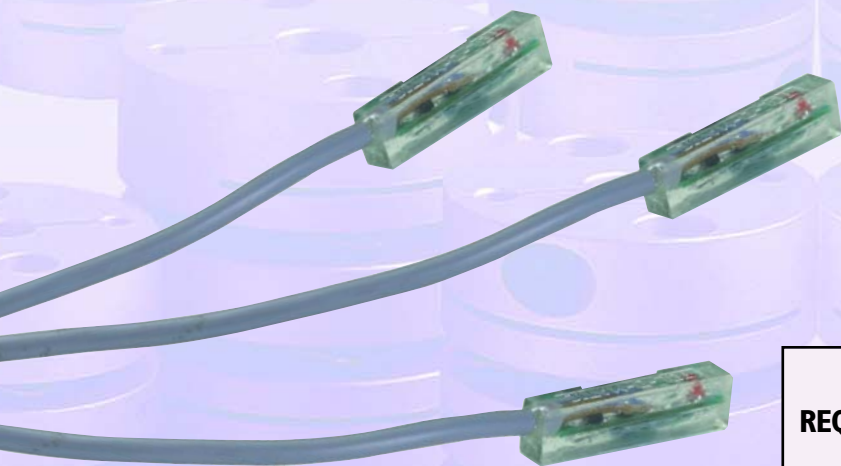
AC TRIAC REED SWITCHES

Designed for signalling end-of-stroke position to devices such as programmable controllers. They can be used to operate ac relays and solenoids if a protection circuit is used and if current and voltage limits are observed.



UNIVERSAL SWITCHES

PERFORMANCE DATA • SPECIFICATIONS



This chart is a quick reference to help select the correct Tol-O-Matic switch to use in your application. See the specifications for each switch to confirm your choice.

REQUIREMENTS	S W I T C H				
	DC Reed Form C	DC Reed Form A	AC Triac Reed	DC Hall-effect Sinking	DC Hall-effect Sourcing
AC			●		
DC	●	●		●	●
Mechanical Switch	●	●	●		
Solid State Switch (Zero Bounce)				●	●
Input-Programmable Controller	●	●	●	●	●
Coil Direct	●	●	●		
Longest Life				●	●
Reverse Polarity Protection	●	●	●	●	●

QUICK-DISCONNECT COUPLERS

Quick-disconnect couplers are available for all switches in 5m lengths and feature shielded cable from the female quick-disconnect coupler to the flying leads. Shield should be terminated at the flying lead end.. These couplers allow switches to be removed quickly and easily.

Switch includes one male-end coupler (hard wired to switch) and one female-end coupler with additional cable for in-line splice.

Replacement switch with hard-wired male-end connector is available as a service part.

Note: Quick-disconnect coupler is positioned 6" from the sensor.



UNIVERSAL SWITCHES



DC

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UNIVERSAL SWITCHES

PERFORMANCE DATA • SPECIFICATIONS

Reed Switches

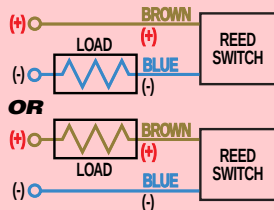
See the following pages for mounting dimensions.

Reed switches can be used to operate relays and solenoids if a protection circuit is used and if current, wattage and voltage limits are observed. (Call the factory for more information.)

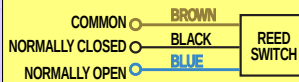
NOTE: Switch option codes that incorporate the **QUICK-DISCONNECT** coupler, feature shielded cable from the female coupler to the flying leads. Shield should be terminated at flying lead end.

Switch cable is **UNSHIELDED** for switch option codes that do **NOT** incorporate the quick-disconnect feature.

REED SWITCH, FORM A WIRING DIAGRAM



REED SWITCH, FORM C WIRING DIAGRAM



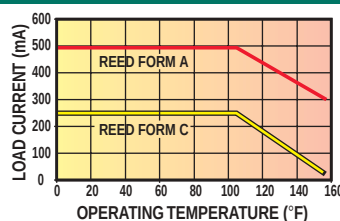
PERFORMANCE DATA

DC REED SWITCH SPECIFICATIONS

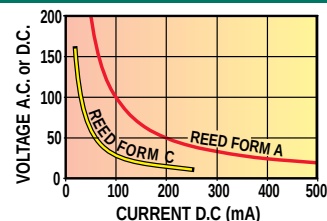
SPECIFICATIONS	REED SWITCH - FORM A	REED SWITCH - FORM C
CONTACTS	Single-pole, single-throw, normally-open	Single-pole, double-throw, normally-open / normally-closed
CONTACT RATING	10 Watts, maximum current 500mA (not to exceed 10VA) (Refer to Temperature vs. Current and Voltage Derating charts.)	3 Watts, maximum current 250mA (not to exceed 3VA) (Refer to Temperature vs. Current and Voltage Derating charts.)
INPUT VOLTAGE	200Vdc maximum	120Vdc maximum
RESISTANCE	0.1 Ω Initial (Maximum)	0.1 Ω Initial (Maximum)
RELEASE TIME	1.0 msec. maximum	1.0 msec. maximum
OPERATING TIME	0.6 msec. maximum (including bounce)	0.7 msec. maximum (including bounce)
OPERATING TEMP.	-40° F (-40° C) to 158° F (70° C)	-40° F (-40° C) to 158° F (70° C)
INDICATOR	Red LED lit when 4mA min. flows through contacts	None
*LIFE EXPECTANCY	Up to 200,000,000 cycles (depending on load current, duty cycle and environmental conditions)	Up to 200,000,000 cycles (depending on load current, duty cycle and environmental conditions)
CABLE	5 meter with PVC jacket 5m Quick-Disconnect, shielded Min. Bend Radius: QD style .630" static, 1.260 dynamic 5m lead static, dynamic not recommended	5 meter with PVC jacket 5m Quick-Disconnect, shielded Min. Bend Radius: QD style .630" static, 1.260 dynamic 5m lead static, dynamic not recommended
VOLTAGE DROP	2.6V typical @ 100mA	NA

* Data available from manufacturer.

TEMPERATURE VS CURRENT

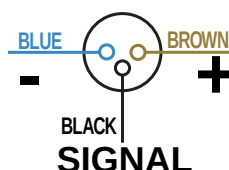


VOLTAGE DERATING

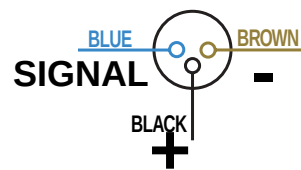


AN IMPORTANT NOTE Regarding Field Retrofit of Quick-Disconnect Couplers: If replacing a Quick-Disconnect switch manufactured before 7-1-97 it will also be necessary to replace or rewire the female-end coupler with the in-line splice.

CURRENT - Quick Disconnect Wiring



OLD - Quick-Disconnect Wiring



UNIVERSAL SWITCHES



UNIVERSAL SWITCHES

PERFORMANCE DATA • SPECIFICATIONS

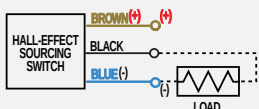
DC Hall-effect Switches

Refer to next pages for mounting data.

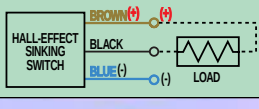
NOTE: Switch option codes that incorporate the QUICK-DISCONNECT coupler, feature shielded cable from the female coupler to the flying leads. Shield should be terminated at flying lead end.

Switch cable is **UNSHIELDED** for switch option codes that do **NOT** incorporate the quick-disconnect feature.

HALL-EFFECT SOURCING SWITCH WIRING DIAGRAM



HALL-EFFECT SINKING SWITCH WIRING DIAGRAM



PERFORMANCE DATA

DC HALL-EFFECT SWITCH SPECIFICATIONS

SPECIFICATIONS	HALL-EFFECT SOURCING	HALL-EFFECT SINKING
INPUT VOLTAGE	5 to 25Vdc	5 to 25Vdc
OUTPUT	Open collector transistor switch	Open collector transistor switch
OUTPUT RATING	25Vdc, 200mA dc	25Vdc, 200mA dc
ON TRIP POINT	150 Gauss maximum	150 Gauss maximum
OFF TRIP POINT	40 Gauss minimum	40 Gauss minimum
OPERATING TEMP.	0° F (-18 C) to 150° F (66° C)	0° F (-18 C) to 150° F (66° C)
OPERATING SPEED	<10 micro sec.	<10 micro sec.
INDICATOR	Red LED lit when sensor is activated	Red LED lit when sensor is activated
CABLE	5 meter with PVC jacket 5m Quick-Disconnect, shielded Min. Bend Radius: QD style .630" static, 1.260 dynamic 5m lead static, dynamic not recommended	5 meter with PVC jacket 5m Quick-Disconnect, shielded Min. Bend Radius: QD style .630" static, 1.260 dynamic 5m lead static, dynamic not recommended

NOTE: Switch option codes that incorporate the QUICK-DISCONNECT coupler, feature shielded cable from the female coupler to the flying leads. Shield should be terminated at flying lead end.

Switch cable is **UNSHIELDED** for switch option codes that do **NOT** incorporate the quick-disconnect feature.

AC Triac Reed Switches

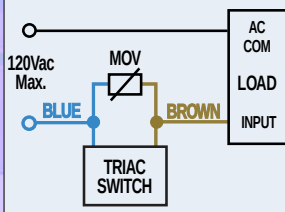
See next pages for mounting dimensions.

TRIAC Reed switches can be used to operate relays and solenoids if a protection circuit is used and if current, wattage and voltage limits are observed. (Call the factory for more information.)

NOTE: Switch option codes that incorporate the QUICK-DISCONNECT coupler, feature shielded cable from the female coupler to the flying leads. Shield should be terminated at flying lead end.

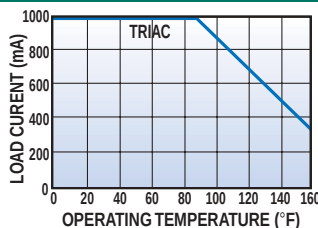
Switch cable is **UNSHIELDED** for switch option codes that do **NOT** incorporate the quick-disconnect feature.

TRIAC REED SWITCH WIRING DIAGRAM



PERFORMANCE DATA

TEMPERATURE vs CURRENT



AC TRIAC REED SWITCH SPECIFICATIONS

SPECIFICATIONS	TRIAC SWITCH
CONTACTS	Single-pole, single-throw, normally-open
INPUT VOLTAGE	120Vac maximum
FREQUENCY	47 - 63 Hz
CONTINUOUS CURRENT	1 Amp at 86° F (30° C) 0.5 Amp at 140° F (60° C)
PEAK SURGE CURRENT	10 Amp
OPERATING TEMP.	-40° F (-40 C) to 158° F (70° C)
INDICATOR	None
* LIFE EXPECTANCY	Up to 200,000,000 cycles (depending on load current, duty cycle and environmental conditions)
CABLE	5 meter with PVC jacket 5m Quick-Disconnect, shielded Min. Bend Radius: QD style .630" static, 1.260 dynamic 5m lead static, dynamic not recommended

* Data available from manufacturer.

UNIVERSAL SWITCHES

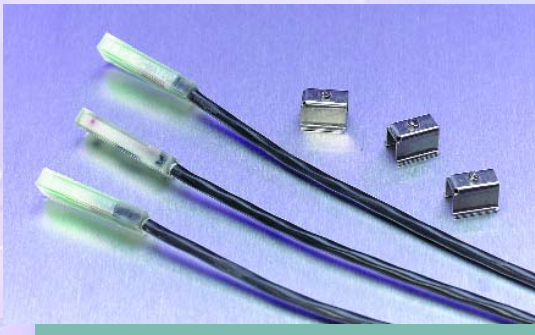
BRUSH
LESS

STEPPER

BRUSHED
DC
180

UNIVERSAL SWITCHES

PERFORMANCE DATA • SPECIFICATIONS



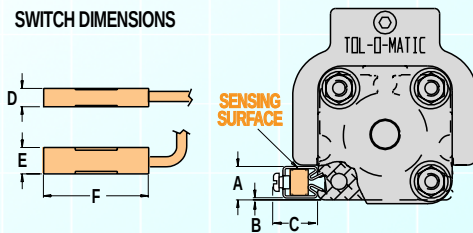
TRUTRACK SWITCH KITS

These kits contain two form C Reed and one Hall-effect sinking switch with 5M leads and necessary mounting hardware. Switches on TruTrack actuators are mounted internally on the tube extrusion, encasing both switch and wire lead for a neat, compact package.

NOTE: When configured with initial order, limit sensors (Form C) will be set at factory 1-inch from the end of stroke. The Home Sensor (Sinking Hall-effect) will be set 2 inches from end of stroke on motor end. Sensors may need to be adjusted for specific applications.

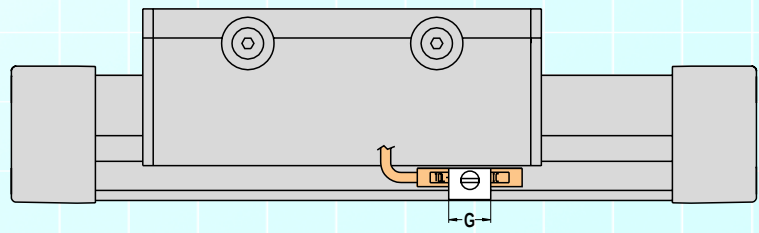
DIMENSIONS BCS AND MCS SWITCH DIMENSIONS

SWITCH DIMENSIONS



MODEL	A	B	C	D	E	F	G
BCS10	3.83	.011	.448	.219	.315	1.250	1.45
BCS15	.548	.161	.432	.219	.315	1.250	1.45
BCS20	.732	.344	.448	.219	.315	1.250	1.45

Dimensions in inches



MODEL	A	B	C	D	E	F	G
MCS10	9.73	0.28	11.38	5.56	8.00	31.75	12.70
MCS15	13.92	4.09	10.97	5.56	8.00	31.75	12.70
MCS20	18.59	8.74	11.38	5.56	8.00	31.75	12.70

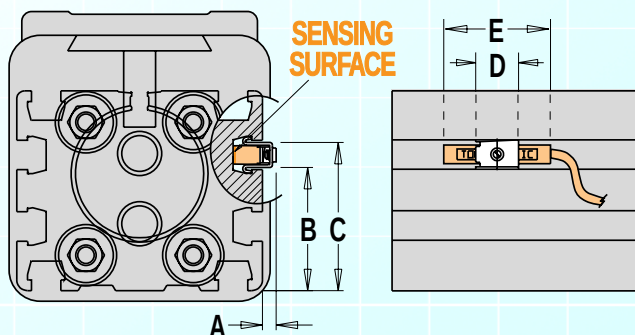
Dimensions in millimeters

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

Some actuators may require switch mounting on a specific side of the assembly. Call Tol-O-Matic 1-800-328-2174 for details.

DO NOT OVER TIGHTEN SWITCH HARDWARE WHEN INSTALLING!

DIMENSIONS B3S, M3S, B3B, M3B SWITCH DIMENSIONS



MODEL	A	B	C	D	E
B3S10 / B3B10	.194	.822	.906	.500	1.250
B3S15 / B3B15	.160	1.428	1.721	.500	1.250
B3S20 / B3B20	.036	1.994	2.287	.500	1.250

Dimensions in inches

MODEL	A	B	C	D	E
M3S10 / M3B10	4.93	20.88	23.01	12.70	31.75
M3S15 / M3B15	4.06	36.27	43.71	12.70	31.75
M3S20 / M3B20	0.91	50.65	58.09	12.70	31.75

Dimensions in millimeters

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

Some actuators may require switch mounting on a specific side of the assembly. Call Tol-O-Matic 1-800-328-2174 for details.

DO NOT OVER TIGHTEN SWITCH HARDWARE WHEN INSTALLING!

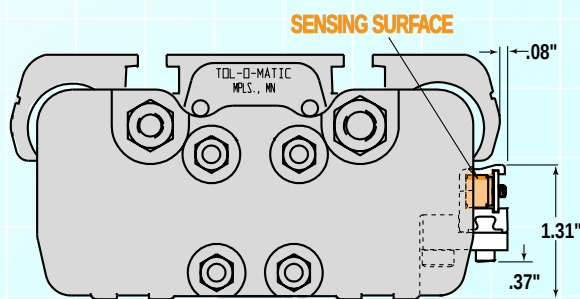
UNIVERSAL SWITCHES



UNIVERSAL SWITCHES

PERFORMANCE DATA • SPECIFICATIONS

DIMENSIONS SLS10, MLS10 SWITCH DIMENSIONS

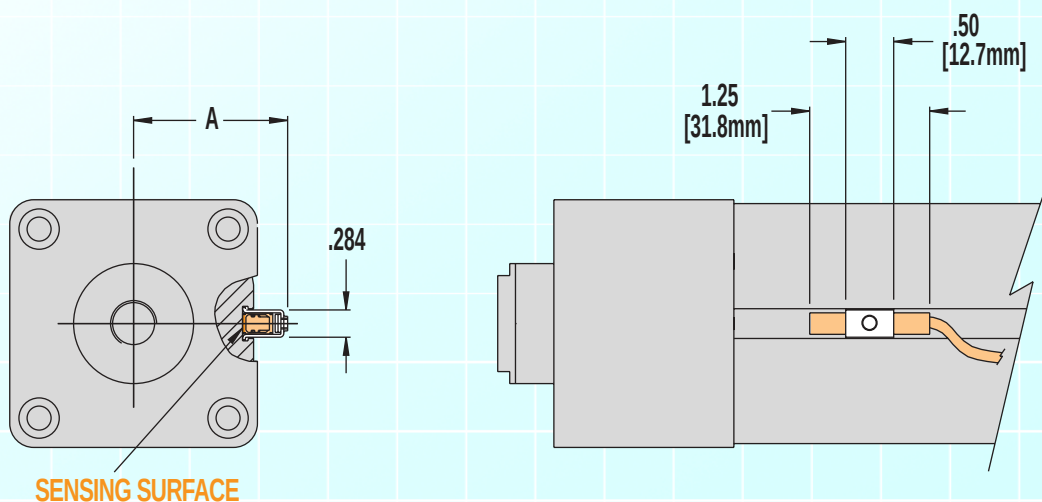


NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet.

Some actuators may require switch mounting on a specific side of the assembly. Call Tol-O-Matic 1-800-328-2174 for details.

DO NOT OVER TIGHTEN SWITCH HARDWARE WHEN INSTALLING!

DIMENSIONS RSA, RSM, GSA, GSM SWITCH DIMENSIONS



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

NOTE: All RSA, RSM, GSA, GSM actuators come with internal magnets standard on all four switch mounting locations.

Some reverse-parallel motor mounted actuators may require switch mounting on a specific side of the assembly due to motor clearance. Call Tol-O-Matic 1-800-328-2174 for details.

MODEL	A
RSA12, GSA12.951	
RSA16, GSA161.041	
RSA24, GSA241.355	
RSA32, GSA321.605	
RSA50	2.168
RSA64	2.605

Dimensions in inches

MODEL	A
RSM12, GSM1224.16	
RSM16, GSM1626.44	
RSM24, GSM2434.42	
RSM32, GSM3240.77	
RSM50	55.07
RSM64	66.17

Dimensions in millimeters

DO NOT OVER TIGHTEN SWITCH HARDWARE WHEN INSTALLING!

UNIVERSAL SWITCHES



Axi
dyne[®]

SYSTEM ORDERING

5
DAYS
BUILT-TO-ORDER

AXIDYNE RODLESS ACTUATORS

SELECT THE RODLESS ACTUATOR REQUIREMENTS

Not all codes listed below are compatible with all options. Use the Tol-O-Motion™ Sizing Software to determine available options and accessories based on your application requirements.

1. MODEL TYPE

TKS	TKS Series TruTrack Electric Screw Cylinder
BCS	BCS Series Standard Electric Screw Cylinder
MCS	BCS Series Metric Electric Screw Cylinder
SLS	Linear Slide Standard Electric Screw (available in 1-inch body size only)
MLS	Linear Slide Metric Electric Screw: available in 25 mm body size only)
B3S	B3S Series Standard Electric Screw Cylinder
B3SD	B3S Series Standard Electric Screw Cylinder with Dual 180° Carrier
M3S	B3S Series Metric Electric Screw Cylinder
M3SD	B3S Series Metric Electric Screw Cylinder with Dual 180° Carrier
TKB	TKB Series TruTrack Belt-Drive Cylinder
B3B	B3B Series Standard Belt-Drive Cylinder
B3BD	B3B Series Standard Belt-Drive Cylinder with Dual 180° Carrier
M3B	B3B Series Metric Belt-Drive Cylinder
M3BD	B3B Series Metric Belt-Drive Cylinder with Dual 180° Carrier

2. TUBE BORE DIAMETER

		TruTrack PAYLOAD LIMITS
10	1-inch (25 mm) bore	10 100 lbs
15	1½-inch (40 mm) bore	25 250 lbs
20	2-inch (50 mm) bore	50 500 lbs
		75 750 lbs

3. NUT/SCREW CONFIGURATION (Screw-Drive Models Only)

SN	Solid Nut, Standard Rolled
SNA	Solid Nut, Standard Rolled, Anti-backlash
BN	Ball Nut, Precision Rolled
BNL	Ball Nut, Precision Rolled, Low-backlash

4. LEAD SCREW PITCH (Screw-Drive Models Only)

STANDARD MODELS		METRIC MODELS	
01	1 Turn per Inch	02	2.5 mm per Turn
02	2 Turns per Inch	05	5 mm per Turn
04	4 Turns per Inch	12	12 mm per Turn
05	5 Turns per Inch	25	25 mm per Turn
08	8 Turns per Inch		
16	16 Turns per Inch		

5. BELT MATERIAL AND WIDTH (B3B Belt-Drive Actuators Only)

BWN05	½-inch Neoprene/Fiberglass Belt (B3B10)
BWN10	1-inch Neoprene/Fiberglass Belt (B3B15)
BWN15	1.18-inch Neoprene/Fiberglass Belt (B3B20)

6. STROKE LENGTH

SK Stroke, then enter desired stroke length in decimal inches

TK ACTUATOR SERIES	TruTrack Actuators Maximum Stroke in Inches		
	Screw-Drive		Belt-Drive
	Solid Nut	Ball Nut	
10	96	36	96
25	96	66	96
50	96	84	96
75	96	96	96

*TruTrack actuator cover has a maximum stroke of 48 inches

7. TUBE SUPPORTS AND MOUNTING PLATES (both may be selected)

TS	Tube Supports and the quantity desired
MP	Mounting Plates

8. FLOATING MOUNT BRACKET (BCS Series Only)

FL	If Floating Mount Bracket is desired
-----------	--------------------------------------

9. MOTOR MOUNTING / REDUCTIONS (must choose one)

BELT- DRIVE (B3B) Stub Shaft Orientation & DUAL STUB SHAFT OPTION

SDL, SDLB*	Direct Drive on left
SDR, SDRB*	Direct Drive on right
SDTL, SDTLB*	3:1 Reduction Drive on top left
SDTR, SDTRB*	3:1 Reduction Drive on top right
SDBL, SDBLB*	3:1 Reduction Drive on bottom left
SDBR, SDBRB*	3:1 Reduction Drive on bottom right

*For Dual Stub Shaft Option

BCS, B3S, SLS SCREW-DRIVE ACTUATORS

LMI	In-Line mounting
LMX	No motor, with extended shaft
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

NOTE: For TruTrack actuators the length of the leadscrew and coupling device is determined by motor selection. Motor type and frame size must be specified when ordering.

TKS SCREW-DRIVE ACTUATORS

LMI	In-Line mount
LMB	In-Line mount/with brake*
LMG	In-Line mount/with gearhead
RPL1	1:1 Reverse-Parallel/left
RPR1	1:1 Reverse-Parallel/right
RPB1	1:1 Reverse-Parallel/bottom
RPT1	1:1 Reverse-Parallel/top
RPL2	2:1 Reverse-Parallel/left
RPR2	2:1 Reverse-Parallel/right
RPB2	2:1 Reverse-Parallel/bottom
RPT2	2:1 Reverse-Parallel/top

TKB BELT- DRIVE ACTUATORS

SDL	Direct Drive/left
SDR	Direct Drive/right
SDTL1	1:1 Reduction Drive/top left
SDTR1	1:1 Reduction Drive/top right
SDBL1	1:1 Reduction Drive/bottom left
SDBR1	1:1 Reduction Drive/bottom right
SDTL2	2:1 Reduction Drive/top left
SDTR2	2:1 Reduction Drive/top right
SDBL2	2:1 Reduction Drive/bottom left
SDBR2	2:1 Reduction Drive/bottom right

*Configurator selects the appropriate brake based on final configuration string.

GEARHEADS (For Direct-Drive or In-Line mounting configurations only)

GHK20	Gearhead for ¼-inch shaft, 23 frame motor, reduction ratio of 5.5
GHK30	Gearhead for ⅜-inch shaft, 34 frame motor, reduction ratio of 5.5
GHJ20	Gearhead for ½-inch shaft, 23 frame motor, reduction ratio of 5.5
GHJ21	Gearhead for ½-inch shaft, 23 frame motor, reduction ratio of 10
GHJ30	Gearhead for ½-inch shaft, 34 frame motor, reduction ratio of 5.5
GHJ31	Gearhead for ½-inch shaft, 34 frame motor, reduction ratio of 10

10. DUAL (AUXILIARY) CARRIER

DC	Dual Carrier, then center-to-center spacing desired in decimal inches. (Center-to-center spacing will add to overall dead length and will not subtract from the stroke length.)
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11. SWITCHES

RM*	Reed Switch (Form A) with 5-meter lead/OD, and quantity desired
RT	Reed Switch (Form A) with 5-meter lead, and quantity desired
BM*	Reed Switch (Form C) with 5-meter lead/OD, and quantity desired
BT	Reed Switch (Form C) with 5-meter lead, and quantity desired
KM*	Hall-effect Sinking Switch with 5-meter lead/OD, and quantity desired
KT	Hall-effect Sinking Switch with 5-meter lead, and quantity desired
TM*	Hall-effect Sourcing Switch with 5-meter lead/OD, and quantity desired
TT	Hall-effect Sourcing Switch with 5-meter lead, and quantity desired
CM*	TRIAC Switch with 5-meter lead/OD, and quantity desired
CT	TRIAC Switch with 5-meter lead, and quantity desired

*Not available on TruTrack Series actuators

12. BELLOWS (TruTrack Actuators Only)

BL2	BelloWS Option increases the dead length of the actuator. Refer to page 54 for details.
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13. SPECIAL LUBRICATION (TruTrack Actuators Only)

LU	Low dust generating grease
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AXIDYNE ROD TYPE ACTUATORS

SELECT THE ROD TYPE ACTUATOR REQUIREMENTS

Not all codes listed below are compatible with all options. Use the Tol-O-Motion™ Sizing Software to determine available options and accessories based on your application requirements.

1. MODEL TYPE

GSA	Standard Guided Screw Cylinder	RSA	Standard Rod Screw Cylinder
GSM	Metric Guided Screw Cylinder	RSM	Metric Rod Screw Cylinder

2. BODY SIZE

12	32
16	50*
24	64*
*Not available for GSA	

3. NUT/SCREW CONFIGURATION

SN	Solid Nut, Standard Rolled	BN	Ball Nut, Precision Rolled
BZ	Bronze Nut (10 TPI only)	BNL	Ball Nut, Precision Rolled, Low-backlash

4. LEAD SCREW PITCH

STANDARD AND METRIC MODELS

Solid Nut	Ball Nut	Bronze Nut
01 1 Turn per Inch	02 2 Turns per Inch	10 10 Turns per Inch
02 2 Turns per Inch	05 5 Turns per Inch	
04 4 Turns per Inch	08 8 Turns per Inch	
05 5 Turns per Inch	53 .53 Turns per Inch	
08 8 Turns per Inch		

5. STROKE LENGTH

SK Stroke, then enter desired stroke length in decimal inches
(Refer to page 64 for RSA and page 80 for GSA actuators regarding recommended maximum stroke lengths.)

6. RSA ROD EXTENSION OPTION

XR Rod Extension (in inches)

NOTE OF CAUTION: This option may exceed the actuators bearing load capabilities and is recommended for vertical applications only.

7. RSA MOUNTING OPTIONS

FM2	Foot Mount (MS1)	MP2	Mounting Plate (MS2)
FFG	Front Flange Mount(MF1)	BFG	Back Flange Mount(MF2)
TRN	Trunnion Mount (MT2)	PCS	Eye Mount (MP4)
PCD	Clevis Mount(MP2)		

NOTE: Rod screw actuators with in-line (LMI) motor mounting, can only use the Mounting Plate, front flange and a front foot mount. Trunnion Mount is also available for RSA or RSM24, 32, 50 and 64 in-line motor mounted actuators.

8. RSA ROD END OPTIONS

Internal threaded rod end is standard.

MET	External Threaded Rod End	SRE	Spherical Rod End
CLV	Clevis Rod End	ALC	Alignment Coupler Rod End

MOTOR FRAME SIZES AVAILABLE						
Series Number	12	16	24	32	50	64
Frame Size	17, 23	23	23	23, 34, 40	23, 34, 40, 56	34, 40, 56

9. GSA BEARING / GUIDE ROD SELECTION (must choose one)

LB	Linear Ball Bearings (Not available with stainless-steel guide rods)
CB	Composite Bearings, Standard guide rods
COB	Composite Bearings, Over-sized guide rods
CBS	Composite Bearings, Stainless-steel guide rods
CBSO	Composite Bearings, Over-sized, Stainless-steel guide rods

10. STOP COLLAR OPTION

CK	Steel stop collar
CKS	Stainless-steel stop collar

(The configurator will determine the appropriate clamps to use based on the bearing and guide rod previously selected)

11. SWITCH OPTIONS

RM	Reed Switch (Form A) with 5-meter lead/OD, and quantity desired
RT	Reed Switch (Form A) with 5-meter lead, and quantity desired
BM	Reed Switch (Form C) with 5-meter lead/OD, and quantity desired
BT	Reed Switch (Form C) with 5-meter lead, and quantity desired
KM	Hall-effect Sinking Switch with 5-meter lead/OD, and quantity desired
KT	Hall-effect Sinking Switch with 5-meter lead, and quantity desired
TM	Hall-effect Sourcing Switch with 5-meter lead/OD, and quantity desired
TT	Hall-effect Sourcing Switch with 5-meter lead, and quantity desired
CM	TRIAC Switch with 5-meter lead/OD, and quantity desired
CT	TRIAC Switch with 5-meter lead, and quantity desired

12. MOTOR MOUNTING / REDUCTION OPTIONS (must choose one)

LMI	In-Line mounting		
RP1	1:1 Reverse-Parallel Mount	RP2	2:1 Reverse-Parallel Mount

NOTE: 2:1 Reverse-Parallel option is not available on GSA12, GSM12, RSA12, RSM12 or GSA16, GSM16, RSA16, RSM16 actuators.

GSA GEARHEADS AVAILABLE				
Series Number	12	16	24	32
Gearhead	NA	NA	GHJ20 GHJ21 GHK20	GHJ20, GHJ21 GHK20, GHJ30 GHJ31, GHK30

GEARHEADS (In-Line mounting configurations only*)

GHK20	Gearhead for .125-inch shaft, 23 frame motor, reduction ratio of 5.5
GHK30	Gearhead for .375-inch shaft, 34 frame motor, reduction ratio of 5.5
GHJ20	Gearhead for .5-inch shaft, 23 frame motor, reduction ratio of 5.5
GHJ21	Gearhead for .5-inch shaft, 23 frame motor, reduction ratio of 10
GHJ30	Gearhead for .5-inch shaft, 34 frame motor, reduction ratio of 5.5
GHJ31	Gearhead for .5-inch shaft, 34 frame motor, reduction ratio of 10

MAKE THE SELECTION PROCESS EASY WITH OUR

TOL-O-MOTION
SIZING AND SELECTION SOFTWARE

AXIDYNE MOTORS, DRIVES & CONTROLLERS

SELECT THE MOTOR, DRIVE & CONTROLLER REQUIREMENTS

Not all codes listed below are compatible with all options. Use the Tol-O-Motion™ Sizing Software to determine available options and accessories based on your application requirements.

13. MOTOR SIZE AND TYPE/ DRIVE

WHEN ORDERING TRUTRACK ACTUATORS THE LENGTH OF THE LEADSCREW AND COUPLING DEVICE IS DETERMINED BY MOTOR SELECTION. MOTOR TYPE AND FRAME SIZE MUST BE SPECIFIED. If motor only is desired, identify motor type and frame size and add "X" to indicate motor only. (do not put 'Y' or 'Z' in string)

- MRV** --- Brushless Servo Motor, then add motor frame/stack size and drive type (11Y, 21Y, 22Y, 23Y, 24Y, 31Y, 31Z, 32Y, 32Z, 33Y, 33Z or 51Y) with 'DV' style drive.
- MRS** --- Stepper Motor, then add motor frame size (171, 231, 232, 341, 342, or 343) with 'MSD' style drive.
- MRB** --- Dc Brush Motor, then add motor frame/stack size and drive type (21Y, 31Y, 32Y, 41Y or 42Y) with 'DB' style drive.

NO MOTOR DRIVE/MOTOR OPTION

- X** Add, if motor Drive is NOT required (do not put 'Y' or 'Z' in string)
- XY*** Motor(s) supplied by customer, Tol-O-Matic to mount using standard hardware and couplers
- XJ** Motor(s) supplied and mounted by customer, Tol-O-Matic to furnish standard hardware and couplers

* NOTE: For XY and XJ options, a full endface and shaft dimensional drawing must accompany the order for the actuator. Customer motors must be directly interchangeable with Tol-O-Matic motors. Once motor type and frame size is selected, the configurator picks the appropriate adapter and couplers required.

14. CONTROLLER AND CONTROLLER/DRIVE COMBINATIONS

SINGLE AXIS APPLICATIONS

- PV** Axiom@Plus Controller/Drive (Drive size is determined by "Y" or "Z" in motor code)
- MS** Code used to order the following:
MSS controller/drive if MRS motor is selected
MSC controller if MRV or MRB motor and AXIOM DV or DB drive is selected
- SSC10** Stepper/Servo Controller, 1 axis application

MULTI AXIS APPLICATIONS

2 Axis Application

- | | 2nd Axis | 1st Axis |
|--------------|----------|---------------------|
| SSC21 | Stepper | Determined by Drive |
| SSC22 | Servo | Determined by Drive |

3 Axis Application

- | | 3rd Axis | 2nd Axis | 1st Axis |
|--------------|----------|----------|---------------------|
| SSC31 | Stepper | Stepper | Determined by Drive |
| SSC32 | Stepper | Servo | Determined by Drive |
| SSC33 | Servo | Stepper | Determined by Drive |
| SSC34 | Servo | Servo | Determined by Drive |

4 Axis Application

- | | 4th Axis | 3rd Axis | 2nd Axis | 1st Axis |
|--------------|----------|----------|----------|---------------------|
| SSC41 | Stepper | Stepper | Stepper | Determined by Drive |
| SSC42 | Stepper | Stepper | Servo | Determined by Drive |
| SSC43 | Stepper | Servo | Stepper | Determined by Drive |
| SSC44 | Stepper | Servo | Servo | Determined by Drive |
| SSC45 | Servo | Stepper | Stepper | Determined by Drive |
| SSC46 | Servo | Stepper | Servo | Determined by Drive |
| SSC47 | Servo | Servo | Stepper | Determined by Drive |

CABLING

For MSC and MSS drive/controllers:

RS232 RJ11 cables are automatically included. If 9-pin RS232 is required, use CRZ option

For AXIOM DV/PV Series Drives only, enter: (note: AXIOM DB has CRZ only)

CRZ If a 2-meter 9-pin RS232 (DB9 female to female) cable is desired (select this option for MSC/Axiom drive Combination.)

Power Cable and Encoder Cable, specify cable length below:

CR6 6-meter encoder cable, power cable

CR15 15-meter encoder cable, power cable

NOTE: (If ordering an AXIOM drive with a MRV11 motor (which has flying leads), special cables are not required. If ordering AXIOM drive with SSC, controller encoder cable is provided for each servo axis.

For SSC Controllers, enter:

CRZ If a 2-meter 9-pin RS232 cable is desired

NOTE: If ordering with AXIOM drive, controller encoder cables are included for each axis. Indicate if breakout terminal and ribbon cables are needed.

BON No breakout terminals

BOY With breakout terminals

For Motors:

MRS motors: include 12-inch leads

MRB motors: include 24-inch power leads and 18-inch encoder leads

MRV motors: do not include cables (they are included with drive) need to be specified as either CR6 or CR15 (MRV11, flying leads only).

16. CONTROLLER INTERFACES

- PIT** Panel user interface
- SIT** Hand-held user interface
- JS** Joy Stick

CONFIGURATOR EXAMPLE



The following example describes a: U.S. standard B3S10 screw-drive actuator with a solid, standard rolled nut and a lead screw pitch of 2 turns per inch and a stroke of 30 inches. Actuator options include one set of tube supports, three Hall-effect sinking switches with 5-meter leads and a in-line motor mounting configuration.

Motor selected is an MRV22 brushless servo motor with drive type Y, the configurator will automatically select the AXIOM DV10 drive for this application. Controller selected is a SSC21 for a two axis application with the 2nd axis requiring a stepper drive. The AXIOM DV10 drive requires a specified length of the encoder cable and motor power cable. In this example, 6-meter cables have been selected along with a joystick operator interface.

FIELD RETROFIT KITS

Controllers See pages 132-141

Model	SSC	MSC
Part Number	See pg.34	3600-0040

Drives See pages 111-121

Item	AXIOM DV	AXIOM DB	MSD
Part Number	See pg.47	See pg.47	3600-0039

Controller/Drives See pages 122-131

Model	MSS	AXIOM PV	
Part Number	3600-0038	See pg. ?	

Interfaces See pages 142-144

Model	SIT	PIT	JS
Part Number	3600-9161	3600-9607	3600-9162

Motors See pages 98-110

BRUSHLESS SERVO	MRV11	MRV21	MRV22	MRV23	MRV24	MRV31	MRV32	MRV33	MRV51
	3600-6239	3600-6240	3600-6241	3600-6242	3600-6243	3600-6244	3600-6245	3600-6246	3600-6247
MICROSTEPPING	MRS171	MRS231	MRS232	MRS341	MRS342	MRS343			
	3600-6129	3600-6130	3600-6131	3600-6132	3600-6133	3600-6134			
BRUSHED SERVO	MRB21	MRB31	MRB32	MRB41	MRB42				
	3600-6248	3600-6249	3600-6250	3600-6251	3600-6252				

* If referencing motors or drives purchased prior to 7/1/99, please consult a factory representative.

Rodless Mounting Plates

See pages 58
for part number and motor compatibility

Rodless Floating Mount Bracket See page 57

Item	10 Series		15 Series		20 Series	
	BCS Kit	MCS Kit	BCS Kit	MCS Kit	BCS Kit	MCS Kit
Part Number	0510-9007	4510-9007	0515-9007	4515-9007	0520-9007	4520-9007

Rodless Tube Supports See page 56

Item	10 Series				15 Series				20 Series			
	BCS Kit	MCS Kit	B3S Kit	M3S Kit	BCS Kit	MCS Kit	B3S Kit	M3S Kit	BCS Kit	MCS Kit	B3S Kit	M3S Kit
Part Number	4510-1010	4515-1010	3410-9006	4410-9006	4515-1010	4515-1010	3415-9006	4415-9006	4520-1010	4520-1010	3420-9006	4420-9006

NOTE: a shim may be required on a B3B10, see page 105 dimension "EE"

Couplers & Motor Mount Kits

Please reference document 3600-4630 for a complete listing of coupler/motor/actuator motor mounting kits and compatibilities.

Gearheads

See page 149

Adapter plates

See page 176

FIELD RETROFIT KITS

RSA Mounting Kits See page 68-74

Item	12 Series		16 Series		24 Series		32 Series		50 Series		64 Series	
	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#
Front Flange Mount	1007-9013	2107-9013	1112-9013	2112-9013	1124-9022	2124-9032	1132-9022	2132-9042	1150-9022	2150-9042	1164-9022	2164-9022
Foot Mount	1107-9910	2107-9009	1112-9010	2112-9010	1124-9020	2124-9030	1132-9020	2132-9040	1150-9020	2150-9040	1164-9020	2164-9020
Mounting Plate	1107-9015	2107-9015	1112-9014	2112-9014	1124-9023	2124-9033	1132-9023	2132-9043	1150-9023	2150-9043	1164-9023	2164-9023
Back Flange Mount	1107-9014	2107-9014	1112-9013	2112-9025	1124-9022	2124-9032	1132-9022	2132-9042	1150-9022	2150-9042	1164-9022	2164-9022
Eg Mount	1107-9016	2107-9016	1107-9016	2107-9016	1124-9024	2124-9034	1132-9024	2132-9044	1150-9024	2150-9044	1164-9024	2164-9024
Clevis Mount	1107-9017	2107-9017	1107-9017	2107-9017	1124-9025	2124-9035	1132-9025	2132-9045	1150-9025	2150-9045	1164-9025	2164-9025

RSA Rod End Kits See page 75-78

Item	12 Series		16 Series		24 Series		32 Series		50 Series		64 Series	
	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#	RSA Kit#	RSM Kit#
External Threaded	1107-1013	2107-1013	1112-1058	2112-1058	1124-1057	2124-1067	1124-1057	2132-1057	1150-1057	2150-1057	1150-1057	2164-1057
Spherical Rod Eg	1107-9020	2107-9020	1112-9019	2112-9019	1124-9028	2124-9038	1124-9028	2132-9048	1150-9028	2150-9048	1150-9028	2150-9028
Clevis End	1107-9021	2107-9021	1112-9020	2112-9020	1124-9029	2124-9039	1124-9029	2132-9049	1150-9029	2150-9049	1150-9029	2164-9029
Alignment Coupler*	1107-1076	NA	1112-1065	NA	1124-1060	2124-1070	1124-1060	2132-1060	1150-1060	2150-1060	1150-1060	2164-1060

*If interfacing with the male threaded end of the Alignment Coupler, an External Threaded Rod End Kit is also required.

GSA Stop Collars See page 87

Item	12 Series		16 Series		24 Series		32 Series	
	GSA No.	GSM No.	GSA No.	GSM No.	GSA No.	GSM No.	GSA No.	GSM No.
Standard Stop Collar*	2312-1005	2312-1005	2317-1005	2317-1005	2324-1005	2324-1005	2332-1005	2332-1005
Stainless-Steel Stop Collar*	2312-1056	2312-1056	2317-1056	2317-1056	2324-1056	2324-1056	2332-1056	2332-1056
Oversize Stop Collar*	2317-1005	2317-1005	2324-1005	2324-1005	2332-1005	2332-1005	2348-1005	2348-1005
Oversize Stainless-Steel Stop Collar*	2317-1056	2317-1056	2324-1056	2324-1056	2332-1056	2332-1056	2348-1056	2348-1056

Universal Switches See page 178

Type	Config. No.***	Part No.**
Reed Switch (Form A), 5 meter lead with quick-disconnect	RM	3600-9083*
Reed Switch (Form A), 5 meter lead	RT	3600-9082
Reed Switch (Form C), 5 meter lead with quick-disconnect	BM	3600-9085*
Reed Switch (Form C), 5 meter lead	BT	3600-9084
Hall-effect Sinking Switch, 5 meter lead with quick-disconnect	KM	3600-9091*
Hall-effect Sinking Switch, 5 meter lead	KT	3600-9090
Hall-effect Sourcing Switch, 5 meter lead with quick-disconnect	TM	3600-9089*
Hall-effect Sourcing Switch, 5 meter lead	TT	3600-9088
TRIAC Switch, 5 meter lead with quick-disconnect	CM	3600-9087*
TRIAC Switch, 5 meter lead	CT	3600-9086
Connector (Female), 5 meter lead		2503-1025

* Sensor 6" from male coupler on Quick-disconnect units

**Switch Only

***Includes Switch and Hardware Kit

To order field retrofit switch and hardware kits for all Tol-O-Matic actuators:
SW (Then the model and bore size, and type of switch needed)

Example: SWRSA24RT (Hardware and Form A Reed switch, 5 meter lead for RSA24)

IMPORTANT NOTE:

Contact Tol-O-Matic regarding magnet requirements for actuators that did not previously have a switch or if replacing a Reed or Triac switch with a Hall-effect switch.

TERMS/CONDITIONS OF SALE

1. ORDER ACCEPTANCE. All orders or services are subject to acceptance in Minnesota by the written approval of an authorized official of Tol-O-Matic, Inc.. Any such order shall be subject to these Terms and Conditions of Sale, and acceptance shall be conditioned on Purchaser's assent to such conditions. Purchaser's assent shall be deemed given unless Purchaser shall expressly notify Tol-O-Matic, Inc. in writing to the contrary within five (5) days after receipt of acknowledgment to confirmation of an order.

2. CANCELLATION AND CHANGES. No order accepted by Tol-O-Matic, Inc. may be modified in any manner by Purchaser unless agreed to in writing, by an authorized official of Tol-O-Matic, Inc.. Order cancellations, including reductions to order quantities, and changes shall be governed by the following:

- a. Any standard product order scheduled for shipment within five (5) working days of purchaser's request to cancel or modify will be shipped as previously acknowledged and purchaser agrees to accept shipment and payment responsibility, in full, at the price agreed upon.
- b. "Customer Special" orders scheduled for shipment within twenty (20) working days of purchaser's request to cancel or modify will be shipped as previously acknowledged and purchaser agrees to accept shipment and payment responsibility, in full, at the price agreed upon.
- c. All work in connection with "Customer Special" orders, not covered under Paragraph b, will be stopped immediately upon notification, and purchaser agrees to reimburse Tol-O-Matic, Inc. for all work-in-process and any materials or supplies used, or for which commitments have been made by Tol-O-Matic, Inc. in connection therewith.

3. QUOTATIONS AND PRICES. Written quotations automatically expire 30 calendar days from the date issued unless terminated sooner by written notice. (Verbal quotations expire, unless accepted in writing, the same day.)

All published prices and discounts are subject to change without notice. In the event of a net price change, the price of product(s) on order will be the price in effect on the date of order acknowledgment. Any addition to an outstanding order will be accepted at prices in effect when the addition is made.

4. MINIMUM BILLING. Orders amounting to less than \$35.00 net will be billed at \$35.00

5. TAXES. Any Manufacturer's Tax, Retailers Occupation Tax, Use Tax, Sales Tax, Excise Tax, Duty, Customer, Inspection or Testing Fee, or any other tax, fee or charge of any nature whatsoever, imposed by any government authority, on or measured by any transactions between Tol-O-Matic, Inc. and Purchaser shall be paid by the Purchaser in addition to the prices quoted or involved. In the event Tol-O-Matic, Inc. shall be required to pay any such tax, fee or charge, Purchaser shall reimburse therefore.

6. TERMS OF PAYMENT. Net invoice amount is due within 30 days from date of invoice subject to credit approval. A 2% per month service charge shall apply to all invoices not paid within 30 days. All clerical errors are subject to correction. Any invoice in not paid within 60 days will subject that account to an immediate shipping hold.

7. F.O.B. POINT. All sales are F.O.B. Tol-O-Matic, Inc.'s facility in Hamel, Minnesota, unless quoted otherwise.

8. DELIVERY. Delivery of product(s) by Tol-O-Matic, Inc. to a carrier shall constitute delivery to Purchaser, and regardless of freight payment, title and all risk or loss or damage in transit shall pass to Purchaser at that time.

Should shipment be held beyond scheduled date, upon request of Purchaser, product will be billed and Purchaser agrees to accept any charges for warehousing, trucking and other expenses as may be incident to such delay.

Great care is taken by Tol-O-Matic, Inc. in crating its product. Tol-O-Matic, Inc. cannot be held responsible for breakage after having received "In Good Order" receipts from the transporting carrier. All claims for loss and damage must be made by Purchaser to the carrier within 14 days from receipt of goods. Tol-O-Matic, Inc. will assist insofar as practical in securing satisfactory adjustment of such claims wherever possible.

Claims for shortages or other errors must be made, in writing, within ten (10) days to Tol-O-Matic, Inc. and any additional expense of the method or route of shipment specified by Purchaser shall be borne by the Purchaser.

9. SHIPPING SCHEDULES. All quoted shipping schedules are approximate and will depend upon prompt receipt from Purchaser of confirming copy of Purchase Order. Dimensional drawings and specifications submitted by Tol-O-Matic, Inc. to Purchaser for approval must be returned to Tol-O-Matic, Inc. within 10 working days, with approval granted, and any exceptions noted, in order to avoid delay in manufacturing schedules.

Orders which include penalty clauses for failure to meet shipping schedules will not be acceptable, except in those cases specifically approved in writing by the General Manager of Tol-O-Matic, Inc..

Tol-O-Matic, Inc. shall not be liable for damage as a result of any delay due to any cause beyond Tol-O-Matic, Inc.'s reasonable control, including, without limitation, an Act of Nature; act of Purchaser; embargo, or other government act, regulation or request; fire; accident; strike; slow down; war; riot; flood; delay in transportation; and inability to obtain necessary labor, materials or manufacturing facilities. In the event of any such delay, the date of delivery shall be extended for a period equal to the time loss by reason of the delay. The acceptance of the product when delivered shall constitute a waiver of all claims for damages caused by any such delays.

10. RETURN OF PRODUCT. No product may be returned without first obtaining a Return Goods Authorization form and confirming memorandum from Tol-O-Matic, Inc.. Product, if accepted for credit, shall be subject to a minimum service charge of 35% of the invoice price and all transportation charges shall be prepaid by the Purchaser; however, assembled products classified as "special," such as Cable Cylinders and other products which have been modified or built as "Customer Specials," are not returnable to Tol-O-Matic, Inc..

11. WARRANTY. Tol-O-Matic, Inc., WARRANTS PRODUCT MANUFACTURED BY IT TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF SHIPMENT BY Tol-O-Matic, Inc.. IF WITHIN SUCH PERIOD ANY SUCH PRODUCT SHALL BE PROVED TO Tol-O-Matic, Inc.'S SATISFACTION TO BE SO DEFECTIVE, SUCH PRODUCT SHALL EITHER BE REPAIRED OR REPLACED AT Tol-O-Matic, Inc.'S OPTION.

THIS WARRANTY SHALL NOT APPLY:

- a. TO PRODUCT NOT MANUFACTURED BY Tol-O-Matic, Inc. WITH RESPECT TO PRODUCT NOT MANUFACTURED BY Tol-O-Matic, Inc.. THE WARRANTY OBLIGATIONS OF Tol-O-Matic, Inc. SHALL IN ALL RESPECTS CONFORM AND BE LIMITED TO THE WARRANTY ACTUALLY EXTENDED TO Tol-O-Matic, Inc. BY ITS SUPPLIER.
- b. TO PRODUCT WHICH SHALL HAVE BEEN REPAIRED OR ALTERED BY PARTIES OTHER THAN Tol-O-Matic, Inc. SO AS, IN Tol-O-Matic, Inc.'s JUDGMENT, TO AFFECT THE SAME ADVERSELY, OR
- c. TO PRODUCT WHICH SHALL HAVE BEEN SUBJECT TO NEGLIGENCE, ACCIDENT, OR DAMAGE BY CIRCUMSTANCES BEYOND THE CONTROL OF Tol-O-Matic, Inc. OR TO IMPROPER OPERATION MAINTENANCE OR STORAGE, OR TO OTHER THAN NORMAL USE AND SERVICE.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, Tol-O-Matic, Inc. SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES WHATSOEVER WITH RESPECT TO PRODUCT MANUFACTURED OR SUPPLIED BY Tol-O-Matic, Inc. OR SERVICE RENDERED BY IT.

12. CONSEQUENTIAL DAMAGE. Tol-O-Matic, Inc., shall not, under any circumstances be liable for consequential damages.

13. SERVICE CHARGES. Should the Purchaser request the service of any erector, demonstrator or service man (except as specifically provided for and included in the price of the product) such service will be rendered at the rate outlined in the schedule of field service charges in effect at the date of request.

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New! [PrecisionAir Controlled Pneumatic](#)

- [Rodless Cylinders and Slides](#)
- [Rod Cylinder Slides](#)
- [Grippers and Rotary Actuators](#)
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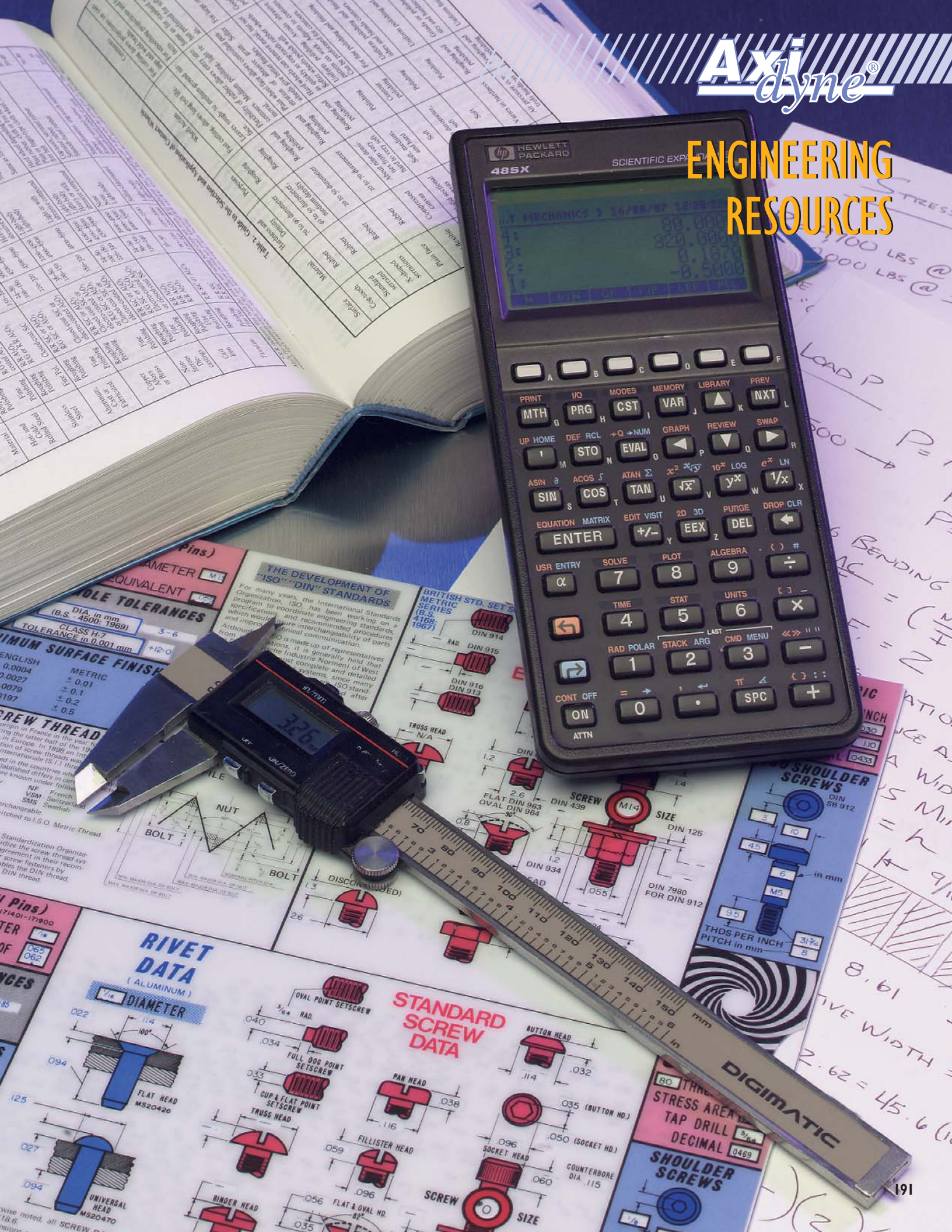
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With all of activity of business and the popularity of the internet, we understand the importance to have an outstanding web presence to serve our clients. We will continue to find better methods to educate our distributors and their costumers about the best automation solutions available on the market today. Watch for a complete web site update at

www.tolomatic.com

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ENGINEERING RESOURCES



GLOSSARY OF TERMS

Absolute Move: A move with reference to a fixed absolute zero location.

AC Servo: Motor/Drive that generates sinusoidal motor currents and sinusoidal back EMF in a brushless motor.

Accuracy: Measure of the difference between ideal predicted position and actual position of a motor or mechanical system.

Acme Screw/Nut: Threaded screw and nut design which utilizes sliding surfaces between the two. Typical efficiencies are between 60-70%.

Back EMF: Voltage produced across a motor winding due to the winding turns being cut by a magnetic field. This voltage is directly proportional to rotor velocity and is opposite in polarity to the applied voltage.

Backlash: Linear distance which is lost in positioning the nut or carrier when the screw direction of rotation changes.

Ball Screw/Nut: Screw and nut design utilizing a nut that contains one or more circuits of recirculating steel balls which roll between the screw and nut.

Baud Rate: Number of binary bits transmitted per second in a serial communication system.

Bending Moment: Equivalent torque produced by a force displaced by a known distance from the carriage. Ex. M_x , M_y , M_z , F_z (See illustration at top of page).

Breakaway Torque: Torque required to start an actuator in motion. In an electric actuator, this consists primarily of the torque to overcome the preload of the lead screw nut assembly and the static friction of the carrier bearings.

Brushless DC Servo: Motor/drive that generates trapezoidal motor currents and trapezoidal back EMF in a brushless motor.

Closed Loop (Feed Back): System where the output is measured and compared to the input. If this system is capable of making corrections to minimize the difference it is classified as a servo.

Critical Speed: Rotational speed of a lead screw at which the screw begins to oscillate or whip. This speed is dependent on the screw length and diameter.

Commutation: Switching of drive voltage to the motor windings necessary to provide continuous rotation. A brush motor uses mechanical switching through a brush-bar contact. Brushless motors use separate devices such as Hall Sensors to sense the rotor position. This information is then processed by the drive to determine the switching sequence.

Duty Cycle: Ratio of on time to total cycle time.

$$\text{Duty Cycle} = \frac{\text{On Time}}{(\text{On Time} + \text{Off Time})}$$

Efficiency: Ratio of power output to power input.

Encoder: Device used to provide relative position and velocity information to a drive or controller by sensing mechanical motion and providing a corresponding pulse rate as output.

Flatness: When traveling in a straight horizontal line, the vertical deviation above or below the horizontal plane of travel of the carrier.

Holding Torque: Maximum external torque that can be applied to a stopped, energized motor without causing the rotor to rotate.

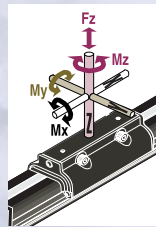
Inertia: Measure of an object's resistance to change in motion that is a function of the object's mass and shape.

Inertia Match: If the reflected inertia of the load is equal to the rotor inertia of the motor, the system will operate optimally for efficiency and dynamic performance.

Lead: Linear travel of a lead screw nut or carriage for every one full rotation of the lead screw expressed in inches per rev.

Load: A mass or weight supported by the carrier (rodless cylinders) or tooling plate (rod type cylinders). Ex. F_z (See illustration at top of page).

Moment Load: Rotational forces applied to the carrier equal to the linear force applied (weight) multiplied by the distance between the location of the force (center of gravity) and the surface center of the carrier. Typically expressed as yaw (M_z), pitch (M_x) and Roll (M_y). (See Illustration at top of page).



Motion Profile: Definition of an object's position and velocity relationships in time during a move.

Microstepping: Type of drive that proportions the current in a step motor's windings to provide intermediate positions between full steps. Advantages over full and half stepping include smoothness of rotation and higher position resolution.

Open Loop: Motion control system where no position or velocity signals are provided for correction. Typically, stepper systems run as open loop systems.

Optically Isolated: Transmission of a signal from one device to another with a light source (emitted) and sensor (received), in order to avoid direct electrical contact.

Pitch: Number of revolutions required by a leadscrew to move the nut or carrier one inch, expressed in revs/per inch

PWM: Pulse Width Modulation is a method of controlling current in the windings of a motor by on-off switching of transistors to vary the duty cycle.

Repeatability: How accurately a positioning device can return to an exact location. This may be defined as unidirectional (does not include backlash), or bidirectional.

Resolution: The smallest position increment that can be achieved.

Resolver: A feedback device consisting of a stator and rotor that provides position and velocity information to the drive for commutation.

RMS Torque: In an intermittent application, this is the torque provided to generate equivalent motor heating to one operating in a steady state.

$$T_{rms} = \sqrt{\frac{\sum (T_i^2 \cdot t_i)}{\sum t_i}}$$

where: T_i = Torque during interval i
 t_i = Time of interval i

RS232: A standard for data communication that defines voltages and time requirements for information to be transferred on a single line in sequential format.

Servo: System that compares the output of a device (by monitoring position, velocity, and/or torque) with the desired outcome and makes corrections to minimize the difference.

Servo Motor: Motor used in closed loop systems where feedback is used to control motor position, velocity, and/or torque, usually expected to have high torque/inertia ratio.

Stepper Motor: Motor which translates electrical pulses into motion, where the pulse rate controls velocity and position.

Slew: Constant non-zero velocity portion of a motion profile.

Stall Torque: Maximum torque available at zero speed.

Stiffness: System ability to maintain accuracy when subject to disturbance.

Straightness: When traveling in a straight horizontal line, the side to side deviation within the horizontal plane of travel of the carrier.

Thrust: Measurement of linear force.

Torque: Measurement of force producing rotation.

Torque Constant: Torque generated in a DC motor per ampere applied to the windings.

$$K_t = \frac{T \text{ (oz.-in.)}}{A \text{ (amp)}}$$

Voltage Constant: Back EMF generated by a DC motor usually in units of volts per 1000 rpm.

$$K_E = \frac{\text{volts}}{1000 \text{ rpm}}$$

CONVERSION TABLES

(TO CONVERT FROM A TO B, MULTIPLY BY ENTRY IN TABLE)

LENGTH

A \ B	in	ft	yd	mm	cm	m
in	1	0.0833	.028	25.4	2.54	0.0254
ft	12	1	.333	304.8	30.48	0.3048
yd	36	3	1	914.4	91.44	.914
mm	0.03937	0.00328	1.09×10^{-3}	1	0.1	0.001
cm	0.3937	0.03281	1.09×10^{-2}	10	1	0.01
m	39.37	3.281	1.09	1000	100	1

MASS

A \ B	gm	kg	slug	lb(m)	oz(m)
gm	1	.001	6.852×10^{-5}	2.205×10^{-3}	.03527
kg	1000	1	6.852×10^{-2}	2.205	35.274
slug	14590	14.59	1	32.2	514.72
lb(m)	453.6	.45359	.0311	1	16
oz(m)	28.35	.02835	1.94×10^{-3}	.0625	1

FORCE

A \ B	lb(f)	N	dyne	oz(f)	kg(f)	gm(f)
lb(f)	1	4.4482	4.448×10^5	16	.45359	453.6
N	.22481	1	100.000	3.5967	.10197	---
dyne	2.248×10^{-6}	.00001	1	3.59×10^{-5}	---	980.6
oz(f)	.0625	.27801	2.78×10^4	1	.02835	28.35
kg(f)	2.205	9.80665	---	35.274	1	1000
gm(f)	2.205×10^{-3}	---	1.02×10^{-3}	.03527	.001	1

NOTE: lb(f) = 1 slug x 1 ft/s²

N = 1 kg x 1 m/s²

dyne = 1gm x 1 cm/s²

POWER

A \ B	Watts	KW	HP (English)	HP(Metric)	ft-lb/s	in-lb/s
Watts	1	1×10^{-3}	1.34×10^{-3}	1.36×10^{-3}	.74	8.88
kw	1000	1	1.34	1.36	738	8880
hp(English)	746	.746	1	1.01	550	6600
hp(Metric)	736	.736	.986	1	543	6516
ft-lb/s	1.35	1.36×10^{-3}	1.82×10^{-3}	1.84×10^{-3}	1	12
in-lb/s	.113	1.13×10^{-4}	1.52×10^{-4}	1.53×10^{-4}	8.3×10^{-2}	1

TEMPERATURE

$^{\circ}\text{F} = (1.8^{\circ}\text{C}) + 32$
$^{\circ}\text{C} = .555 (^{\circ}\text{F} - 32)$

GRAVITY

(Acceleration Constant)
$g = 386 \text{ in/s}^2 = 32.2 \text{ ft/s}^2 = 9.8 \text{ m/s}^2$

INERTIA (ROTARY) NOTE: Mass inertia = $\frac{\text{wt. inertia}}{g}$

A \ B	gm-cm ²	oz-in ²	gm-cm-s ²	kg-cm ²	lb-in ²	oz-in-s ²	lb-ft ²	kg-cm-s ²	lb-in-s ²	lb-ft-s ² or slug-ft-s ²
gm-cm ²	1	5.46×10^{-2}	1.01×10^{-3}	10^{-3}	3.417×10^{-4}	1.41×10^{-5}	2.37×10^{-6}	1.01×10^{-4}	8.85×10^{-7}	7.37×10^{-4}
oz-in ²	182.9	1	.186	.182	.0625	2.59×10^{-3}	4.34×10^{-4}	1.86×10^{-4}	1.61×10^{-4}	1.34×10^{-5}
gm-cm-s ²	980.6	5.36	1	.9806	.335	1.38×10^{-2}	2.32×10^{-3}	10^{-3}	8.67×10^{-4}	7.23×10^{-5}
kg-cm ²	1000	5.46	1.019	1	.3417	1.41×10^{-2}	2.37×10^{-3}	1.019×10^{-3}	8.85×10^{-4}	7.37×10^{-5}
lb-in ²	2.92×10^3	16	2.984	2.925	1	4.14×10^{-2}	6.94×10^{-3}	2.96×10^{-3}	2.59×10^{-3}	2.15×10^{-4}
oz-in-s ²	7.06×10^4	386	72.0	70.615	24.13	1	.1675	7.20×10^{-2}	6.25×10^{-2}	5.20×10^{-3}
lb-ft ²	4.21×10^5	2304	429.71	421.40	144	5.967	1	.4297	.3729	3.10×10^{-2}
kg-cm-s ²	9.8×10^5	5.36×10^3	1000	980.66	335.1	13.887	2.327	1	.8679	7.23×10^{-2}
lb-in-s ²	1.129×10^4	6.177×10^3	1.152×10^3	1.129×10^3	386.08	16	2.681	1.152	1	8.33×10^{-2}
lb-ft-s ²	1.355×10^7	7.41×10^4	1.38×10^4	1.35×10^4	4.63×10^3	192	32.17	13.825	12	1

TORQUE

A \ B	dyne-cm	gm-cm	oz-in	kg-cm	lb-in	N-m	lb/ft	kg/m
dyne-cm	1	1.019×10^{-2}	1.416×10^{-5}	1.0197×10^{-6}	8.850×10^{-7}	10^{-7}	7.375×10^{-6}	1.019×10^{-6}
gm-cm	980.665	1	1.388×10^{-2}	10^{-3}	8.679×10^{-4}	9.806×10^{-5}	7.233×10^{-5}	10^{-5}
oz-in	7.061×10^4	72.007	1	7.200×10^{-2}	6.25×10^{-2}	7.061×10^{-3}	5.208×10^{-3}	7.200×10^{-4}
kg-cm	9.806×10^5	1000	13.877	1	.8679	9.806×10^{-2}	7.233×10^{-2}	10^{-2}
lb-in	1.129×10^6	1.152×10^3	16	1.152	1	.112	8.333×10^{-2}	1.152×10^{-2}
N-m	10^7	1.019×10^4	141.612	10.197	8.850	1	.737	.102
lb-ft	1.355×10^7	1.382×10^4	192	13.825	12	1.355	1	.138
kg-m	9.806×10^7	10^5	1.388×10^3	100	86.796	9.806	7.233	1

LINEAR VELOCITY

A \ B	in/min	ft/min	in/sec	ft/sec	mm/sec	m/sec
in/min	1	.0833	.0167	1.39×10^{-3}	0.42	4.2×10^{-4}
ft/min	12	1	.2	.0167	5.08	5.08×10^{-3}
in/sec	60	5	1	.083	25.4	.0254
ft/sec	720	60	12	1	304.8	.3048
cm/sec	23.62	1.97	.3937	.0328	10	0.01
m	2362.2	196.9	39.37	3.281	1000	1

ANGULAR VELOCITY

A \ B	deg/s	rad/s	rpm	rps
deg/s	1	1.75×10^{-2}	.167	2.78×10^{-3}
rad/s	57.3	1	9.55	.159
rpm	6	.105	1	1.67×10^{-2}
rps	360	6.28	60	1

ABBREVIATED TERMS

C = Celsius	gm(f) = gram force	lb(f) = pound force	oz(f) = ounce force
cm = centimeter	hp = horse power	lb(m) = pound mass	oz(m) = ounce mass
F = Fahrenheit	in = inch	min = minute	rad = radians
ft = foot	kg = kilogram	mm = millimeter	rpm = revs per minute
g = gravity	kg(f) = kilogram force	m = meter	rps = revs per second
gm = gram	kw = Kilowatt	N = Newton	s = seconds

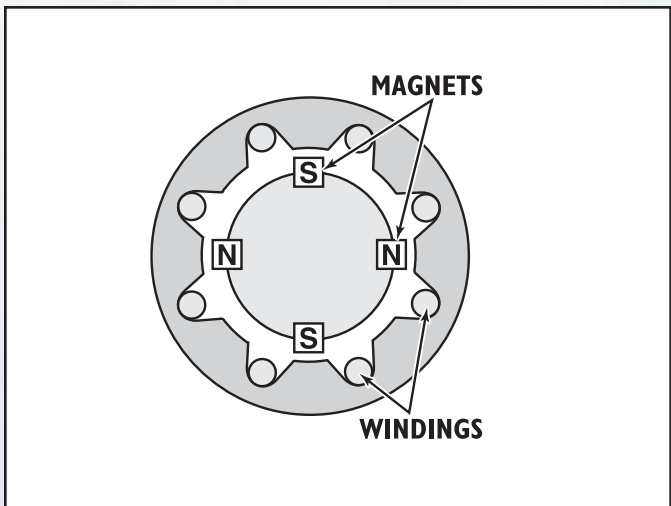
SELECTING A MOTOR/DRIVE TECHNOLOGY

BASIC SELECTION CRITERIA

ADVANTAGES OF A:

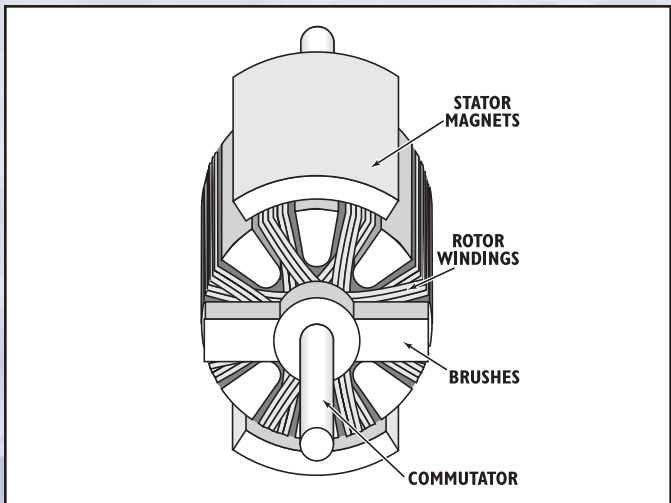
• Brushless Servo System

- ▲ Extremely smooth and quiet operation
- ▲ Good for high torques [up to 45 in-lbs. (5.08 N-m) continuous, 140 in-lbs. (15.82 N-m) peak]
- ▲ Good for high speeds, up to 6,000 RPM
- ▲ High resolution, 4,000 counts per revolution
- ▲ Provide torque control
- ▲ Good for short, repetitive moves
- ▲ Maintenance free
- ▲ No moving contacts



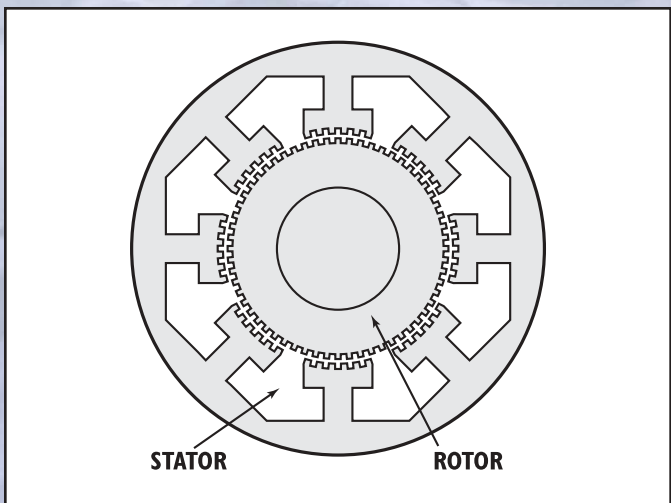
• Brushed DC System

- ▲ Low to medium cost
- ▲ Smooth and quiet operation
- ▲ Good for speeds generally less than 2500 rpm
- ▲ Good for torques up to 32 in-lbs. (3.62 N-m) continuous, 48 in-lbs. (5.42 N-m) peak
- ▲ Good for resolutions of 1,000 counts per revolution



• Microstepping System

- ▲ Lowest cost for precise positioning
- ▲ Highest resolution [up to 50,800 steps- rev] without feedback device
- ▲ Good for speeds less than 2,000 rpm
- ▲ Good for torque requirements less than 35 in-lbs. (3.95 N-m)
- ▲ Smoothness better than full or half step, but not as good as servos
- ▲ Good for short, repetitive moves
- ▲ Maintenance free
- ▲ No moving contacts



BASIC SIZING EQUATIONS

NOTE: USE TOL-O-MOTION SIZING & SELECTION SOFTWARE AND AVOID THE NEED FOR THESE EQUATIONS

SCREW-DRIVE TORQUE: REQUIRED FROM MOTOR:

RODLESS SCREW-DRIVE ACTUATORS

$$T_{TOTAL} = T_{ACC} + T_{FRICTION} + T_{PRELOAD} + T_{GRAVITY} + T_{EXT.} \quad (\text{oz.-in.})$$

RSA ROD SCREW ACTUATORS

$$T_{TOTAL} = T_{ACC} + T_{FRICTION} + T_{BREAKAWAY} + T_{GRAVITY} + T_{EXT.} \quad (\text{oz.-in.})$$

GSA ROD SCREW ACTUATORS

$$T_{TOTAL} = T_{ACC} + T_{FRICTION} + T_{BREAKAWAY} + T_{GRAVITY} + T_{EXT.} \quad (\text{oz.-in.})$$

$$T_{ACC} = \frac{\alpha}{386} \left[\frac{J_{LOAD}}{e} \left(\frac{m}{e'} \right) + \frac{J_{LS}}{e'} + \frac{J_{RD}}{e'} + \frac{J_{MOTOR}}{e'} \right] \quad (\text{oz.-in.})$$

$$\frac{J_{LOAD}}{e} = \frac{W_{LOAD} + W_{OTHER}}{(2\pi p)^2} \left(\frac{16 \text{ oz.}}{\text{lb.}} \right) \left(\frac{1}{m^2} \right) \quad (\text{oz.-in.}^2)$$

LEAD SCREW INERTIA VS. LENGTH
(for 1/4", 3/8", 1/2", 5/8" and 3/4" Dia. Screws)

SCREW DIA.	INERTIA
3/8"	0.0087 oz·in ² per inch of screw
1/2"	0.0275 oz·in ² per inch of screw
5/8"	0.0671 oz·in ² per inch of screw
3/4"	0.139 oz·in ² per inch of screw
1"	0.4398 oz·in ² per inch of screw
1-1/2"	2.2266 oz·in ² per inch of screw

$J_{LS} = \left(\frac{1}{m^2} \right) (\text{oz.-in.}^2)$

NOTE: Be sure to use TOTAL screw length, including dead length.

$$J_{MOTOR} = \text{SEE INERTIA IN MOTOR SECTION} \quad (\text{oz.-in.}^2)$$

(This will be an iterative process since the actual motor torque is unknown at this point)

$$J_{RD} = \text{SEE INERTIA FOR REDUCTION DEVICE} \quad (\text{oz.-in.}^2)$$

(reflected)

$$\omega = 2\pi p V_M \quad (\text{rad/sec})$$

$$\alpha = \frac{\omega}{t_a} \quad (\text{rad/sec}^2)$$

RODLESS SCREW-DRIVE ACTUATORS

$$T_{FRICTION} = \frac{F_T}{2\pi p e} \left(\frac{16 \text{ oz.}}{\text{lb.}} \right) \left(\frac{1}{m e'} \right) \quad (\text{oz.-in.})$$

$$F_T = \text{See Friction Table in Actuator Sections OR } \mu(W_{LOAD} + W_{OTHER}) \quad (\text{lbs.})$$

RSA ROD SCREW ACTUATORS

$$T_{FRICTION} = \text{Add only if side load is present.} \quad (\text{oz.-in.})$$

(Consult Sizing Software or Tol-O-Matic if side load is present.)

GSA ROD SCREW ACTUATORS

$$T_{FRICTION} = \frac{F_{BREAKAWAY}}{2\pi p e} \left(\frac{16 \text{ oz.}}{\text{lb.}} \right) \left(\frac{1}{m e'} \right) \quad (\text{oz.-in.})$$

Add only if side load is present.

Friction (Linear Ball Bearings) = 0.008 R_{BEARING}
Friction (Composite Bearings) = 0.72 R_{BEARING}

Maximum guide rod bearing reaction R_{BEARING} can be calculated from equations of static equilibrium of the system.

MODEL	DISTANCE BETWEEN BEARINGS IN INCHES	DISTANCE BETWEEN GUIDE RODS IN INCHES
GSA12	2.47	3.00
GSA16	3.19	3.75
GSA24	4.08	5.00
GSA32	4.33	6.63

RODLESS SCREW-DRIVE ACTUATORS

$$T_{PRELOAD} = \text{See Preload Torque in Actuator Sections} \times \left(\frac{1}{m e'} \right) \quad (\text{oz.-in.})$$

RSA ROD SCREW ACTUATORS

$$T_{BREAKAWAY} = \text{See Preload Torque in Actuator Sections} \times \left(\frac{1}{m e'} \right) \quad (\text{oz.-in.})$$

GSA ROD SCREW ACTUATORS

$$T_{BREAKAWAY} = \frac{F_{BREAKAWAY}}{2\pi p e} \left(\frac{16 \text{ oz.}}{\text{lb.}} \right) \left(\frac{1}{m e'} \right) \quad (\text{oz.-in.})$$

MAXIMUM BREAKAWAY THRUST FOR GSA F _{BREAKAWAY} (lb)			
MODEL	LINEAR BEARINGS	COMPOSITE BEARINGS	
		Standard Guide Rods	Oversize Guide Rods
GSA12	11.05	21.11	22.99
GSA16	11.08	23.19	25.07
GSA24	11.12	25.42	29.36
GSA32	11.18	32.68	37.68

$$T_{GRAVITY} = \frac{(W_{LOAD} + W_{OTHER}) \sin \theta}{2\pi p e} \left(\frac{16 \text{ oz.}}{\text{lb.}} \right) \left(\frac{1}{m e'} \right) \quad (\text{oz.-in.})$$

$$T_{EXT.} = \frac{F_{EXT.}}{2\pi p e} \left(\frac{16 \text{ oz.}}{\text{lb.}} \right) \left(\frac{1}{m e'} \right) \quad (\text{oz.-in.})$$

SCREW-DRIVE THRUST: DELIVERED BY NUT:

$$\text{Thrust} = 2\pi p e \left(\frac{\text{lb.}}{16 \text{ oz.}} \right) \left\{ T_{TOTAL} - \left[\frac{J_{LS}}{e} \left(\frac{m}{e'} \right) + \frac{J_{RD}}{e'} + \frac{J_{MOTOR}}{e'} \right] \frac{\alpha}{386} - T_{BREAKAWAY} - T_{FRICTION} \right\} \quad (\text{lbs.})$$

SCREW-REFLECTED INERTIA:

$$J_{REFL} = J_{LOAD} + J_{LS} + J_{RD} \quad (\text{oz.-in.}^2)$$

BASIC SIZING EQUATIONS

NOTE: USE TOL-O-MOTION SIZING & SELECTION SOFTWARE AND AVOID THE NEED FOR THESE EQUATIONS

BELT-DRIVE TORQUE:

$$T_{TOTAL} = T_{ACC} + T_{FRICTION} + T_{PRELOAD} + T_{GRAVITY} + T_{EXT.} \quad (oz.-in.)$$

$$T_{ACC} = \frac{\alpha}{386} \left[\frac{J_{LOAD}}{e} \left(\frac{m}{e'} \right) + J_{WHEELS} \left(\frac{m}{e'} \right) + J_{RD} + J_{MOTOR} \right] \quad (oz.-in.)$$

$$J_{LOAD} = [W_{LOAD} + W_{BELT} + W_{OTHER}] r^2 \left(\frac{16 \text{ oz}}{\text{lb.}} \right) \left(\frac{1}{m^2} \right) \quad (oz.-in.^2)$$

(reflected)

$$W_{BELT} = \text{See Belt Weight in Actuator Section} \quad (\text{lbs.})$$

$$J_{WHEELS} = \text{See Drive \& Idler Wheel Inertia in Actuator Section} \times \left(\frac{1}{m^2} \right) \quad (oz.-in.^2)$$

(reflected)

$$J_{MOTOR} = \text{See Inertia in Motor Section} \quad (oz.-in.^2)$$

(This will be an iterative process since the actual motor torque is unknown at this point)

$$J_{RD} = \text{See Inertia for Reduction Device} \quad (oz.-in.^2)$$

(reflected)

$$\alpha = \frac{V_M}{r \times t_a} \quad (\text{rad/sec}^2)$$

$$T_{FRICTION} = \frac{F_T r}{e} \left(\frac{16 \text{ oz}}{\text{lb.}} \right) \left(\frac{1}{me'} \right) \quad (oz.-in.)$$

$$F_T = \text{See Friction Table in Actuator Sections} \quad (\text{lbs.})$$

OR

$$\mu(W_{LOAD} + W_{OTHER})$$

$$T_{PRELOAD} = \text{See Preload Torque in Actuator Sections} \times \left(\frac{1}{me'} \right) \quad (oz.-in.)$$

$$T_{GRAVITY} = \frac{(W_{LOAD} + W_{BELT} + W_{OTHER}) r \sin \phi}{e} \left(\frac{16 \text{ oz}}{\text{lb.}} \right) \left(\frac{1}{m^2} \right) \quad (oz.-in.)$$

$$T_{EXT.} = \frac{F_{EXT.} r}{e} \left(\frac{16 \text{ oz}}{\text{lb.}} \right) \left(\frac{1}{m^2} \right) \quad (oz.-in.)$$

BELT-DRIVE THRUST:

$$\text{Thrust} = \frac{e}{r} \left(\frac{\text{lb.}}{16 \text{ oz}} \right) \left\{ T_{TOTAL} - \left[J_{WHEELS} \left(\frac{m}{e'} \right) - J_{RD} - J_{MOTOR} \right] \frac{\alpha}{386} - T_{PRELOAD} \right\} \quad (\text{lbs.})$$

BELT REFLECTED INERTIA:

$$J_{REFL} = J_{LOAD} + J_{WHEELS} + J_{RD} \quad (oz.-in.^2)$$

SYMBOLS:

e = lead screw or belt efficiency	T_{TOTAL} = required torque to move the load (oz.-in.)
e_c = reduction efficiency	m = coefficient of static friction linear bearing system
F_T = total friction force (lbs.)	V_M = maximum linear velocity (in./sec.)
$F_{BREAKAWAY}$ = breakaway force (lbs.)	w = angular velocity (rad./sec.)
$F_{EXT.}$ = force to do external work (lbs.)	a = rotary acceleration (rad./sec. ²)
$F_{FRICTION}$ = friction force in bearings (lbs.)	W_{OTHER} = weight of carriage or weight of top axis (lbs.)
J_{LOAD} = load inertia (oz.-in. ²)	W_{LOAD} = weight of load (lbs.)
J_{LS} = lead screw inertia (oz.-in. ²)	
J_{MOTOR} = motor inertia (oz.-in. ²)	
J_{RD} = reduction device inertia (oz.-in. ²)	
ϕ = angle of load from horizontal (degrees)	
m = reduction ratio = $\frac{\text{input motor rpm}}{\text{output screw shaft rpm}}$	
p = pitch of screw (rev./in.)	
r = radius of belt drive wheel (in.)	
$R_{BEARING}$ = bearing reaction (lbs.)	
t_a = acceleration time (sec.)	
T_{ACC} = required torque to accelerate the load (oz.-in.)	
$T_{BREAKAWAY}$ = breakaway torque (oz.-in.)	
$T_{EXT.}$ = required torque to overcome push or pull, friction, etc. (i.e. Tpreload) external force (oz.-in.)	
$T_{FRICTION}$ = required torque to overcome friction (oz.-in.)	
$T_{GRAVITY}$ = required torque to overcome gravity (oz.-in.)	
T_{MOTOR} = motor output torque at desired speed (oz.-in.)	
$T_{PRELOAD}$ = breakaway torque required to initiate motion without load at inertia	

SCREW FORM	EFFICIENCY (e)	
	Single Nut	L Nut*
Plastic	0.60	
Acme	0.60	0.50
Ball	0.90	0.85
Bronze	3/8"	0.40
	5/8"	0.30
	3/4"	0.25
	1"	0.20
	1 1/2"	0.15

*L is Low Backlash Ball

SIZING AND SELECTION LIMITING FACTORS

TORQUE MARGIN

The following minimum torque margins are recommended:

Stepper	=	2.0
Brushless Servo	=	1.15
Brushed DC Servo	=	1.15

INERTIA MATCH

For best efficiency and dynamic performance:

$$1 \leq \frac{J_{REF}}{J_{MOTOR}} \leq 10$$

CRITICAL SPEED

Critical speed for a given length of a given diameter screw in a given bearing system is that rotational speed at which the screw will have a natural frequency of oscillation about its own axis. Curves of critical speed versus length are provided for each screw diameter in the screw drive actuator section of this catalog.

SCREW/NUT THRUST CAPACITY

Screw nut thrust capacity is the axial load which the screw and nut can deliver to the carrier. This force is limited by the interaction of the screw and nut threads for a solid nut and by the rolling ball/thread system of the ball screw/nut.

For solid nut actuators, maximum dynamic thrust and speed ratings are shown on the critical speed charts. Because of thermal considerations, the axial thrust to be provided by a solid nut at any operating speed must be limited such that:

$$\frac{\text{Thrust}}{\text{Max. Thrust Rating}} \times \frac{\text{Speed}}{\text{Max. Speed Rating}} \leq 0.1$$

Higher ratios can be used if the duty cycle is modest. Consult the factory for guidance.

For ball screw/nut actuators, the maximum thrust ratings shown on the critical speed charts represent the thrust at which a screw/nut life of 10^6 inches (25×10^6 millimeters) can be expected with 90% reliability. For other loads, life is given by:

$$\text{Life} = \left(\frac{\text{Rated Thrust}}{\text{Nut Load Thrust}} \right)^{\frac{10}{3}} \times 10^6 \text{ inches}$$

BELT RATING

For belt actuators, the required thrust must be less than the belt force rating at the operating speed. These limits are shown in the belt actuator section of this catalog.

COLUMN LOAD STRENGTH

When using rod screw actuators in applications, it is recommended when possible to design for tension loads to eliminate buckling and reduce screw size.

$$P_{cr} = \frac{14.03 \times 10^6 d^4}{L^2}$$

P_{cr} = maximum load (lbs)

d = root diameter of screw

L = distance between nut and load carrying bearing

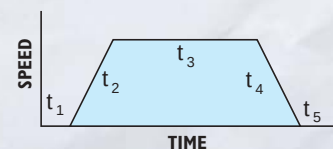
BACKLASH

Defined as the linear distance which is lost in positioning the nut when the screw direction of rotation changes. Backlash is directly related to the closeness of fit between the nut and screw.

NUT	SOLID		BALL	
	Single	Anti-Backlash	Single	Low Backlash
Backlash (in.)	0.007	.003	0.015	0.002
Backlash (mm)	0.18	—	0.38	0.05
Designation	SN	SNA	BN	BNL

RMS TORQUE

The RMS torque must be less than the motor's continuous torque rating.

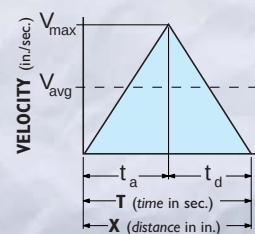


Torques are: T_1, T_2, T_3, T_4, T_5

$$\text{RMS Torque} = \sqrt{\frac{T_1^2 t_1 + T_2^2 t_2 + T_3^2 t_3 + T_4^2 t_4 + T_5^2 t_5}{t_1 + t_2 + t_3 + t_4 + t_5}}$$

MOTION PROFILE EQUATIONS

TRIANGLE MOVE PROFILE

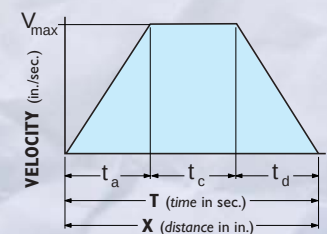


$$V_{max} = 2 V_{avg} = 2 \frac{X}{T}$$

$$t_a = t_d = \frac{T}{3}$$

$$A = D = \frac{2V_{max}}{T} = \frac{4X}{T^2}$$

TRAPEZOIDAL MOVE PROFILE



$$\text{Assume: } t_a = t_c = t_d = \frac{T}{3}$$

$$\text{Then: } V_{max} = \frac{1.5 X}{T}$$

$$A = D = \frac{4.5X}{T^2}$$

SYMBOLS

T = total move time (sec.)	t_d = deceleration time (sec.)
X = total move distance (in.)	t_c = constant velocity time (sec.)
A = acceleration rate (in./sec. ²)	V_{avg} = average velocity (in./sec.)
D = deceleration rate (in./sec. ²)	V_{max} = maximum velocity (in./sec.)
t_a = acceleration time (sec.)	

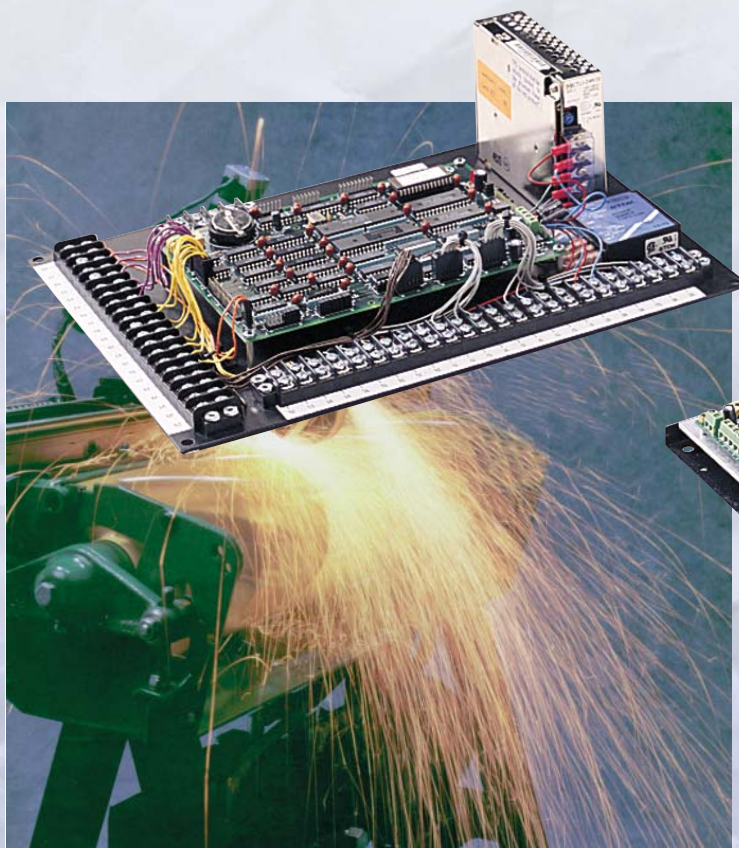
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AXIDYNE ELECTRIC



BCS Screw-Drive Linear Actuator
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC



B3S Screw-Drive Linear Actuator
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BC3 Band Cylinder
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MG Mag. Coupled Cylinder
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AXIDYNE ELECTRIC



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PNEUMATIC



MGS Mag. Coupled Slide
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