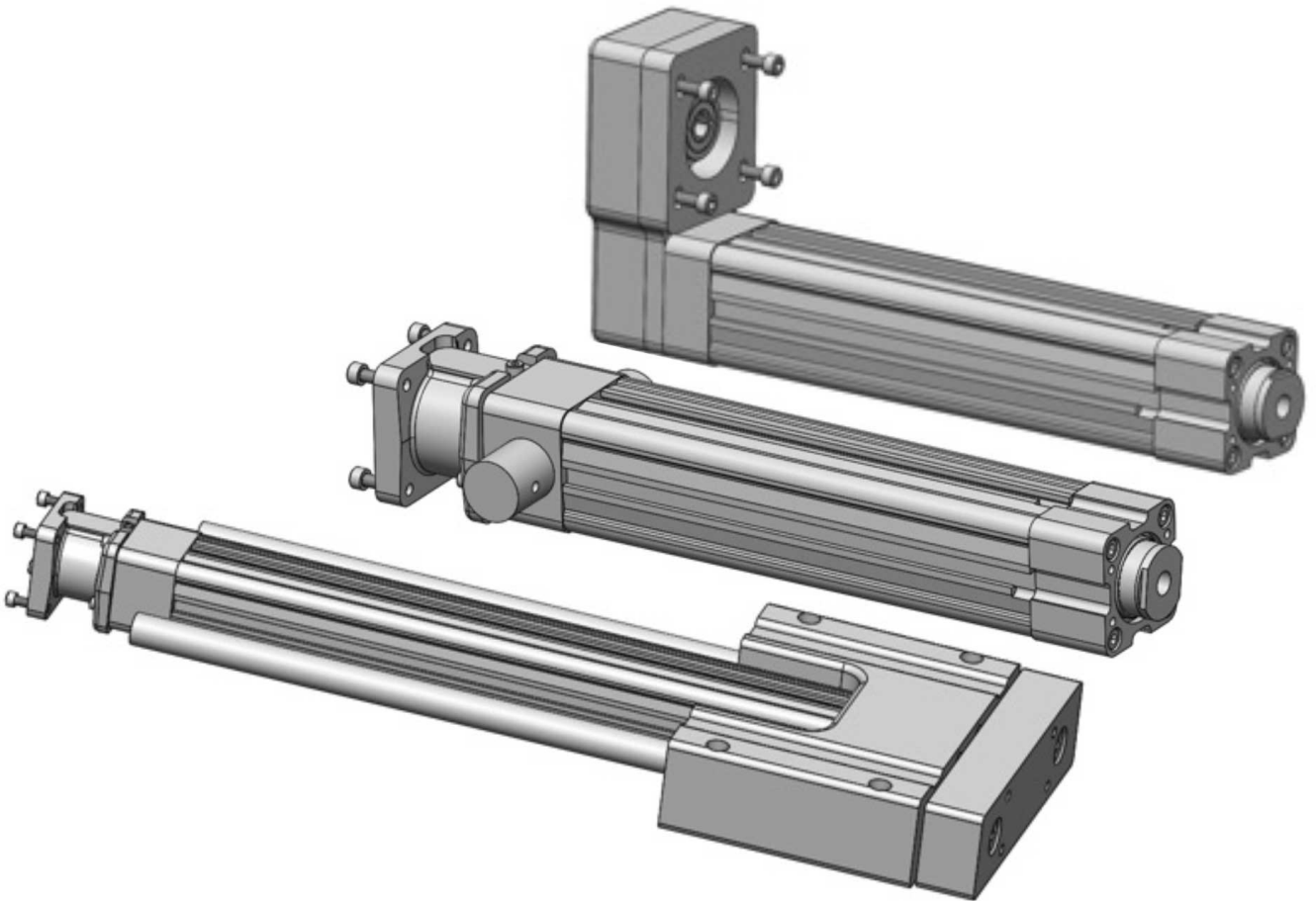


# MANUAL

## FOR INSTALLATION, MAINTENANCE AND OPERATION

### RSA-ST, RSA-HT & GSA Series Actuators

[Link to: Motor Installation \(page 20\)](#)



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Tolomatic reserves the right to change the design or operation of the equipment described herein and any associated motion products without notice. Information in this document is subject to change without notice.

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Original Instructions - English

Translations will be supplied in other community languages as required by customers

# Table of Contents

<b>TABLE OF CONTENTS.....</b>	<b>3</b>
LIST OF TABLES AND FIGURES:.....	5
● <b>1.0 SAFETY.....</b>	<b>6</b>
<b>1.1 SAFETY SYMBOLS.....</b>	<b>6</b>
GENERAL.....	6
SAFETY SYMBOLS.....	6
<b>1.2 SAFETY CONSIDERATIONS.....</b>	<b>6</b>
PROPER AND SAFE USE OF PRODUCT.....	6
FAIL SAFE E-STOP RECOMMENDATIONS.....	6
DEVICE DAMAGE PREVENTION.....	6
PERSONAL SAFETY.....	7
HANDLING AND UNPACKING.....	7
PACKING AND TRANSPORT.....	7
MODIFICATIONS TO THE EQUIPMENT.....	7
REQUIREMENT REGARDING PERSONNEL.....	7
RISK AREA AND PERSONNEL.....	7
● <b>1.3 GENERAL INFORMATION.....</b>	<b>8</b>
● <b>2.0 GENERAL PRODUCT DESCRIPTION:.....</b>	<b>9</b>
● 2.1 GENERAL DESCRIPTION.....	9
● 2.2 INTENDED USE.....	10
● 2.3 IDENTIFICATION LABEL.....	10
● 2.4 CERTIFICATION.....	11
● 2.5 MANUFACTURER.....	11
● <b>3.0 RSA-ST, RSA-HT &amp; GSA CONFIGURATION OVERVIEW:.....</b>	<b>12</b>
● <b>3.1 MODELS.....</b>	<b>12</b>
● 3.1.1 RSA-ST SERIES CONFIGURATION.....	12
● 3.1.2 RSA-HT SERIES CONFIGURATION.....	12
● 3.1.3 GSA SERIES CONFIGURATION.....	12
● <b>3.2 STANDARD CONFIGURATIONS AND OPTIONS.....</b>	<b>12</b>
● <b>3.3 PRODUCT OPTIONS AND FEATURES:.....</b>	<b>15</b>
● 3.3.1 STANDARD RSA ACTUATOR MOUNTING.....	15
● 3.3.2 ROD END OPTIONS.....	15
● 3.3.3 RSA RP (REVERSE PARALLEL) ACTUATOR MOUNTING OPTIONS.....	16
● 3.3.4 RSA LMI (INLINE MOTOR MOUNT) ACTUATOR MOUNTING OPTIONS.....	16
● 3.3.5 GSA MOUNTING.....	16
● <b>3.4 SCREW OPTIONS.....</b>	<b>17</b>
● <b>4.0 MECHANICAL INSTALLATION OF RSA &amp; GSA ACTUATORS.....</b>	<b>18</b>
● <b>4.1 GENERAL OPERATION.....</b>	<b>18</b>
● <b>4.2 ALIGNMENT AND SIDE LOADING:.....</b>	<b>18</b>
● <b>4.3 MECHANICAL INSTALLATION INSTRUCTIONS.....</b>	<b>18</b>
● <b>4.4 LIFTING AND MOVING.....</b>	<b>19</b>
● <b>4.5 MOTOR INSTALLATION.....</b>	<b>20</b>
IN-LINE (LMI) MOTOR INSTALLATION INSTRUCTIONS:.....	20
REVERSE PARALLEL (RP) MOTOR INSTALLATION INSTRUCTIONS:.....	20
● <b>4.6 STANDARD RSA ACTUATOR MOUNTING.....</b>	<b>23</b>
FRONT FACE MOUNTING:.....	23
BOTTOM MOUNTING:.....	24
● <b>4.7 OPTIONS.....</b>	<b>24</b>
● 4.7.1 FFG, BFG (FRONT/BACK FLANGE MOUNT).....	24

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- 4.7.2 FM2, MP2 (FOOT MOUNT AND MOUNTING PLATES) ..... 25
- 4.7.3 MET, ALC (ROD END: EXTERNAL THREADED OPTION, ALIGNEMENT COUPLER) ..... 26
- 4.7.5 GSA MOUNTING SPECIFICATIONS ..... 29
- **5.0 RSA/GSA OPERATION AND START UP CONSIDERATIONS ..... 30**
- **5.1 BACK DRIVING ..... 30**
- **5.2 HOMING ..... 30**
- **5.3 BREATHER/PURGE PORTS ..... 30**
- **6.0 MAINTENANCE ..... 31**
- **6.1 MAINTENANCE CHECK AND INTERVALS ..... 31**
- **6.2 LUBRICATION PROCEDURE AND INTERVAL ..... 31**
  - 6.2.1 RSA-ST, GSA LUBRICATION ..... 31
  - 6.2.2 RSA HT LUBRICATION ..... 31
- RE-LUBRICATE WITH TOLOMATIC GREASE INTO THE GREASE ZERK LOCATED ON THE ROD END: ..... 31
- **6.3 STORAGE RECOMMENDATIONS ..... 32**
- **APPENDIX A: SPECIFICATIONS ..... 33**
- **A.1 SPECIFICATIONS ..... 33**
  - A.1.1 PERFORMANCE AND MECHANICAL SPECIFICATIONS ..... 33
  - A.1.2 ACTUATOR SIZING ..... 33
  - A.1.3 CRITICAL SPEED ..... 33
  - A.1.4 ROLLER SCREW LIFE ..... 33
- **APPENDIX B: TROUBLESHOOTING ..... 34**
- **B1: TROUBLESHOOTING PROCEDURE ..... 34**
- **APPENDIX C: WARRANTY ..... 35**
- **C.1 WARRANTY ..... 35**
  - LIMITED WARRANTY ..... 35
  - LIMITATION OF LIABILITY ..... 36
  - PRODUCT RETURN PROCEDURE ..... 36
  - END OF LIFE ..... 36
- **APPENDIX D: CERTIFICATIONS ..... 37**
- **D.1 DECLARATION OF INCORPORATION ..... 37**

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**List of Tables and Figures:**

FIGURE 2.1: RSA-ST ACTUATORS (12,16,24,32,50,64 SIZES) .....	9
FIGURE 2.2: RSA-HT ACTUATORS (24,32,50,64 SIZES) .....	9
FIGURE 2.3: GSA ACTUATORS (12,16,24,32 SIZES) .....	10
FIGURE 2.4: RSA ACTUATOR IDENTIFICATION LABEL FOR ACTUATORS MADE IN THE U.S.A. ....	10
FIGURE 3.1: RSA-ST & RSA-HT ORDERING.....	13
FIGURE 3.2: GSA ORDERING .....	14
FIGURE 3.3: RSA STANDARD FRONT FACE MOUNTING HOLES .....	15
FIGURE 3.4: RSA (RP) BOTTOM VIEW .....	15
FIGURE 3.5: RSA MOUNTING AND ROD END OPTIONS.....	15
FIGURE 3.6: RSA RP (REVERSE PARALLEL) REAR MOUNTING OPTIONS .....	16
FIGURE 3.8: GSA ACTUATOR AND TOOLING PLATE MOUNTING.....	16
TABLE 4.1: RSA-ST, RSA-HT, GSA WEIGHTS .....	19
FIGURE 4.1: REVERSE PARALLEL TENSIONING TOOL .....	21
FIGURE 4.2: REVERSE PARALLEL BELT TENSIONING DIAGRAM .....	21
TABLE 4.2: REVERSE PARALLEL TENSION AND TORQUE SPECIFICATIONS.....	22
FIGURE 4.3: FOR RSA HOLD THRUST ROD STATIONARY USING A WRENCH ON THE FLATS AT THE END OF THE THRUST ROD WHEN ATTACHING ACCESSORIES, LINKAGES OR LOAD TO THE ACTUATOR.....	26
TABLE 6.1: GREASE RELUBRICATION QUANTITY FOR RSA-HT ACTUATORS.....	31

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## 1.0 Safety

### 1.1 Safety Symbols

#### General

Read completely through the applicable sections of the manual before the equipment/unit is unpacked, installed or operated. Pay careful attention to all of the dangers, warnings, cautions and notes stated in the manual.

Serious injury to persons or damage to the equipment may result if the information in the manual is not followed.

#### Safety Symbols

Items that are specifically marked DANGER, WARNING, CAUTION, PROHIBITIVE, MANDATORY ACTION, or NOTE! are arranged in a hierarchical system and have the following meaning:

 **DANGER!**

Indicates a very hazardous situation which, if not avoided, could result in death or serious injury. This signal word is limited to the most extreme situations.

 **WARNING!**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION!**

Indicates a potentially hazardous situation which, if not avoided, may result in property damage, minor or moderate injury.

 **PROHIBITED ACTION**

Indicates Prohibited Action

 **MANDATORY ACTION**

Indicates Mandatory Action

 **NOTE!**

Information that requires special attention is stated here.

### 1.2 Safety Considerations

#### Proper and Safe Use of Product

##### Fail Safe e-Stop Recommendations

When motor is attached, a means for a fail safe e-stop is highly recommended to ensure equipment and personal safety. The e-stop should provide a means to remove main power from the actuator to cease and prevent any unwanted motion.

##### Device Damage Prevention

If so equipt, to prevent permanent damage to the device, proper care should be taken not to exceed published voltage, current, temperature, and load/force ratings. In addition, proper mechanical assembly and proper wiring should be verified and safety measures checked before applying power to the complete equipment package.

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## Personal Safety

During normal operation the motor can become hot, especially the motor housing. In addition, the case ground should be tied to an earth ground to prevent the presence of case voltage.

During normal operation, the actuator rod travels in and out creating a possible pinch point.

Proper guarding and signage must be used prevent entry into possible pinch zones and contact with hot surfaces. It is highly recommended to display proper safety notices and implement proper safety measures to prevent contact with hot surfaces.

## Handling and Unpacking

When unpacking and handling the actuator, care should be taken not to drop the actuator as this can damage the connectors, internal electronics, or cause misalignment of the actuator feedback device. Damage the internal mechanical components may cause poor performance or render the actuator non-functional. Since this is an electromechanical device, proper ESD measures should be taken to avoid static electricity from contacting the signal and power lines of the device. as this can damage the internal mechanical components rendering the actuator damaged or non-functional.

## Packing and Transport



### NOTE!

Package actuator to prevent damage during transport. It is recommended that the actuator be returned in its original packaging. If the original packaging is not available, the follow these recommendations.

1. Foam in place if possible.
2. Reinforce ends of box with multiple layers of cardboard or wood to prevent the actuator from breaking through the packaging during shipment.
3. If so equipt, support the connectors or cables so that enough packaging or foam is in place to prevent shipping damage.
4. It is best to ship one unit per container because individual items that are not isolated with stable packaging (foam in place) from each other often get damaged during shipment.
5. When shipping more than one unit in a single container, it is recommended to foam in place to prevent damage during shipping to both the units and the packaging.
6. Add the RMA number on the outside of the packaging. Failure to do so will delay processing.

## Modifications to the Equipment



### WARNING! WARNING!

The manufacturer takes no responsibility whatsoever if the equipment is modified or if the equipment is used in any way beyond performance specifications. Unauthorized modifications or changes to the equipment are strictly forbidden and void all warranties.

## Requirement Regarding Personnel



### NOTE!

All personnel must be completely informed regarding all safety regulations and the function of the equipment.

## Risk Area and Personnel

When installed, pinch points are generated capable of damaging forces. The risk area surrounding the actuator

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must either be guarded or clearly marked, including display signage in accordance with all applicable national and international legal requirements. The risk area must be protected by a safety system that stops the equipment if anyone enters the risk area. Personnel who enter the risk area must be authorized, trained and qualified for the different tasks inside the risk area.



### 1.3 General Information

This documentation applies to the RSA and GSA family of products supplied by Tolomatic. This documentation shall be made available to the market and end customers.

This document contains information on safe use parameters, installation, operation, maintenance, and end of life.



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## 2.0 General Product Description:

### 2.1 General Description



Figure 2.1: RSA-ST Actuators (12,16,24,32,50,64 sizes)



Figure 2.2: RSA-HT Actuators (24,32,50,64 sizes)

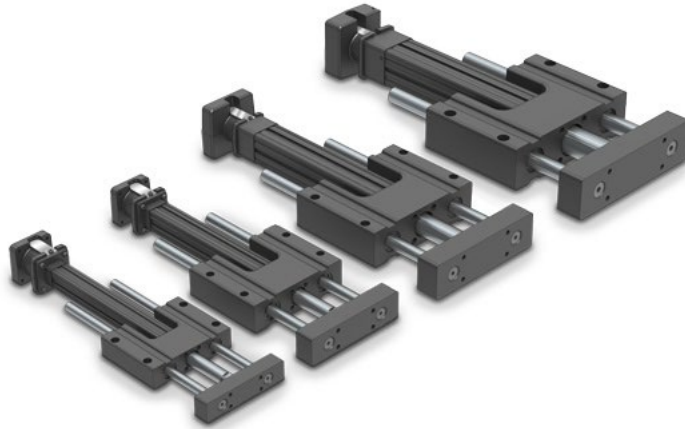


Figure 2.3: GSA Actuators (12,16,24,32 sizes)

The RSA and GSA family of screw driven mechanical linear actuators, manufactured and sold by Tolomatic Inc., are intended for general purpose industrial use. This product family includes the following models available in standard inch interface or metric interface: RSA12 ST, RSA16 ST, RSA24 ST, RSA24 HT, RSA32 ST, RSA32 HT, RSA50 ST, RSA50 HT, RSA64 ST, and RSA64 HT, GSA 12, GSA 16, GSA 24 and GSA 32. Tolomatic RSA and GSA electric rod style actuators are mechanical assemblies that provide linear travel up to 60 inches/1524mm, with load capacities up to 13,039lbf/58kN. An appropriately marked electric motor is coupled to this mechanical device to create linear motion. The electric motor may be installed by the customer at their facility, or by Tolomatic.

## 2.2 Intended Use

Commonly used in industrial automation and other applications, these actuators are relatively compact and are capable of high force.

### **WARNING!**

Before installation and commissioning of the equipment, this manual and all accompanying manufacturer documents and manuals MUST be completely read by the appropriate personnel. All warning texts must be given special attention.

### **WARNING!**

RSA and GSA linear actuators equipped with ball screws, roller screws and resin nut lead screws are not self braking and will not hold position under load. When there is no current/torque input to the drive motor, the thrust rod can move freely. A motor brake option should be purchased and installed if the motion system/axis requires the actuator to hold position when the actuator is not powered.

## 2.3 Identification Label



Figure 2.4: RSA actuator identification label for actuators made in the U.S.A.

## ■ 2.4 Certification



IP67 Option Available for RSA HT LMI & RP (Sizes 32 through 64) and RSA ST RP (Sizes 32 through 64). Standard RSA actuators are rated at IP54.

Standard GSA actuators are not IP rated due to the shaft bearings. The main GSA body (excluding shaft bearings) is rated at IP54.

## ■ 2.5 Manufacturer

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ServoWeldChina@tolomatic.com

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## 3.0 RSA-ST, RSA-HT & GSA Configuration Overview:

### 3.1 Models

#### 3.1.1 RSA-ST Series Configuration

6 Frame Sizes: RSA-ST12, RSA-ST16, RSA-ST24, RSA-ST32, RSA-ST50, RSA-ST64

Screw and Nut options: Resin Nut Lead Screws, Bronze Nut Lead Screw, and Ball Screws.

Rod End Options: Female Thread (standard), Male Thread, Clevis Rod with Pin, Spherical Rod Eye, and Alignment Coupler (Male or Female).

Actuator Mount Options: Front Face Tapped Holes, Bottom Face Tapped Hole, Mounting Plates (2), Front Flange Mount, Trunnion Mount, Foot Mounts, Rear Flange Mount, Rear Clevis Mount with Pin, and Rear Eye Mount.

#### 3.1.2 RSA-HT Series Configuration

4 Frame Sizes: RSA-HT24, RSA-HT32, RSA-HT50, RSA-HT64 (See options above) with the inclusion of roller screws.

#### 3.1.3 GSA Series Configuration

4 Frame sizes: GSA12, GSA16, GSA24, GSA32

Screw and Nut Options: Resin Nut Lead Screws, Bronze Nut Lead Screws, and Ball Screws.

Guide Rod Bearing Options: Standard Linear, Standard Composite, and Oversized Composite.



#### NOTE!

For performance data and specifications please refer to the [Tolomatic RSA/GSA catalog #3600-4166](#)

### 3.2 Standard Configurations and Options



#### NOTE!

Please see the [Tolomatic RSA/GSA catalog #3600-4166](#) for complete information on ordering codes. Use 3D CAD files (available at [www.tolomatic.com](http://www.tolomatic.com)) for critical dimensions.

# RSA ST & HT Electric Rod-Style Actuator

## ORDERING

**ACTUATOR**

R S A 5 0 B N 0 2 S K 3 5 R P 1 S T 1 F F G X R 6 A L C M E T K K 2 Y M

**OPTIONS**

**MODEL & MOUNTING**

RSA Rod-Style Screw-Drive Actuator

**SIZE**

12, 16, 24, 32, 50, 64

**NUT/SCREW**

SIZE	CODE	CODE NUMBER
12	SN	01,02,05
	BZ	10
	BN, BNL	08
16	SN	01,02,05
	BZ	10
	BN, BNL	08
24	SN	02,04,08
	BZ	10
	BN, BNL	02,05
	BNM	05,10
	RN	04,05,10
32	BZ	10
	BN, BNL	02,05
	BNM	05,10,20
	RN	04,05,10
50	BZ	10
	BN, BNL	01,02,04
	BNM	05,10,25
	RN	05,10
64	BZ	10
	BN, BNL	02,04,53
	BNM	05,10,20
	RN	02

**MOTOR MOUNTING**

LMI In-line motor mount

RP1 1:1 ratio, reverse parallel motor mount

RPL1 1:1 ratio, reverse parallel motor mount, left or right see page 18 for details

RPR1 1:1 ratio, reverse parallel motor mount

RP2 2:1 ratio, reverse parallel motor mount

RPL2 2:1 ratio, reverse parallel motor mount, left or right see page 18 for details

⊗ RP2 not available on 12 or 16 size

**RP BELT TENSIONING**

TEN Belt tensioning tool for RP motor mounting

**STANDARD OR HIGH TORQUE**

ST1 Standard RS Actuator

HT\* High Torque Option  
\*requires keyed motor

⊗ HT not available on 12 or 16 size  
NOTE: RN always requires HT option

**TRUNNION MOUNT**

TRR Trunnion mount

⊗ Not available on 12 or 16 size with LMI motor mount

NOTE: Trunnion mount is not available for field retrofit, contact Tolomatic for details

**ACTUATOR MOUNTING**

For all motor mounts:

FFG Front Flange Mount

FFGR Front Flange Mount rotated 90° (see pg. 22)

MP2 Mounting Plates (2 required)

For RP motor mounting only:

PCD Clevis Mount

PCDR Clevis Mount rotated 90° (see pg. 25)

PCS Eye Mount

PCSR Eye Mount rotated 90° (see pg. 25)

BFG Back Flange Mount

**ROD EXTENSION**

XR.... Enter desired rod extension in inches (SM) or millimeters (SM)  
(Same unit of measure as stroke length is required)

▲ For vertical applications only.

NOTE: The XR extension + stroke should not exceed the max. stroke of the specified actuator. (See MAX. STROKE table) Consult Tolomatic for extensions greater than the max. stroke length.

**ROD END**

Internally threaded rod end is standard

CLV Clevis Rod End

SRE Spherical Rod End

MET Externally Threaded Rod End

ALC Alignment Coupler Rod End\*

Z12 Grease Zerk at 12 O'clock position (see page 43)

NOTE: Alignment coupler is internally threaded, if external thread is desired order MET also

**ENVIRONMENTAL PROTECTION**

Standard actuator IP54

IP67 Basic ingress protection (RSA32, 50, 64 only)

LUB Grease, Food/Drug

**SWITCHES**

TYPE	LOGIC	NORMALLY	QUICK-DISCONNECT	CODE	QUANTITY	LEAD LENGTH
REED	SPST	Open	no	RY	After code enter quantity desired	5 meters (16.4 feet)
		Closed	yes	RK		
SOLID STATE	PNP	Open	no	TY		
		Closed	yes	TK		
	NPN	Open	no	KY		
		Closed	yes	KK		
NPN	Closed	no	no	PY		
		yes	yes	PK		
NPN	Closed	no	yes	HY		
		yes	yes	HK		

**STROKE LENGTH**

SK.... Enter desired stroke length in decimal inches

SM†.... (Metric Mounting)  
Enter desired stroke length in millimeters

† The metric version provides metric tapped rod end, actuator mounting and dowel pins

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

**MAXIMUM STROKE**

SIZE	BN, BZ, SN		RN	
	in	mm	in	mm
12	12	304.8	12	304.8
16	18	457.2	18	457.2
24	24	609.6	24	609.6
32	36	914.4	36	914.4
50	48	1,219.2	36 <sup>S</sup>	914.4 <sup>S</sup>
64	60	1,524.0	36 <sup>S</sup>	914.4 <sup>S</sup>

§ RSA50 & RSA64 extended stroke length 48" (1219 mm) available for roller screws, contact Tolomatic for production time

**YOUR MOTOR HERE**

YM..... Motor mount for non-Tolomatic motor. [www.tolomatic.com](http://www.tolomatic.com)

Brakes mounted on reverse parallel motor mounts (especially in vertically positioned actuators) will not prevent back driving of the screw and the load falling under gravity in the event of a timing belt failure. An inline motor mount with a fail-safe brake mounted directly to the actuator shaft or a special geared or thru-shaft reverse parallel construction should be considered if a brake is required in a safety critical application. Contact Tolomatic for alternate reverse parallel brake mounting options.

Gearheads may be used with RSA ST or GSA ST reverse parallel motor mounts. However, the torque on the belt and internal ST RP components must remain below the capabilities of the assembly to prevent belt slipping or premature failure. Contact Tolomatic for additional information if required.

Not all codes listed are compatible with all options. Contact Tolomatic with any questions.

Figure 3.1: RSA-ST & RSA-HT Ordering

# GSA Guided Electric Rod-Style Actuator

## ORDERING

**ACTUATOR**

GSA 24 BN02 SK23 RP1

**OPTIONS**

CBSO CKS KK2 YM

**MODEL & MOUNTING**

GSA Guided Screw-Drive Actuator

**MOTOR MOUNTING**

LMI In-line motor mount  
 RP1 1:1 ratio, reverse parallel motor mount  
 RP2 2:1 ratio, reverse parallel motor mount  
 ❌ RP2 not available on 12 or 16 size

**SWITCHES**

TYPE	LOGIC	NORMALLY	QUICK-DISCONNECT	CODE	QUANTITY	LEAD LENGTH
REED	SPST	Open	no	RY	After code enter quantity desired	5 meters (16.4 feet)
		Closed	yes	NK		
SOLID STATE	PNP	Open	no	TY		
		Closed	yes	TK		
	NPN	Open	no	KY		
		Closed	yes	KK		
PNP	Closed	no	PY			
	Closed	yes	PK			
NPN	Closed	no	HY			
	Closed	yes	HK			

**SIZE**

12, 16, 24, 32

**NUT/SCREW COMBINATIONS**

SIZE	CODE	CODE NUMBER
12	SN	01,02,05
	BZ	10
	BN, BNL	08
16	SN	01,02,05
	BZ	10
	BN, BNL	08
24	BZ	10
	BN, BNL	02,05
	BZ	10
32	BN, BNL	02,05
	BZ	10
	BNM	20

**BEARINGS & GUIDE RODS (GSA ONLY)**

LB Linear Bearings\*  
 CB Composite Bearings, Standard Size Rods  
 COB Composite Bearings, Over Sized Rods  
 CBS Composite Bearings, Standard Size Stainless Steel Rods  
 CBSO Composite Bearings, Over-Sized Stainless Steel Rods  
 ❌ \*Stainless steel guide rods not available with Linear Bearings

**STROKE LENGTH**

SK \_\_\_\_ Enter desired stroke length in decimal inches

SM† \_\_\_\_ (Metric Mounting)  
 Enter desired stroke length in millimeters

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

SIZE	MAXIMUM STROKE	
	GSA	
	in	mm
12	18	457.2
16	24	609.6
24	30	762.0
32	36	914.4

† The metric version provides metric tapped tooling plate, actuator mounting and dowel pins

**STOP COLLAR (GSA ONLY)**

CK Steel Stop Collar  
 CKS Stainless Steel Stop Collar

📌 **NOTE:** The correct Stop Collar will be automatically chosen based on the bearing and guide rod previously selected.

📌 **Not all codes listed are compatible with all options. Contact Tolomatic with any questions.**

**YOUR MOTOR HERE**

YM \_\_\_\_ Motor mount for non-Tolomatic motor.  
[www.tolomatic.com](http://www.tolomatic.com)

Brakes mounted on reverse parallel motor mounts (especially in vertically positioned actuators) will not prevent back driving of the screw and the load falling under gravity in the event of a timing belt failure. An inline motor mount with a fail-safe brake mounted directly to the actuator shaft or a special geared or thru-shaft reverse parallel construction should be considered if a brake is required in a safety critical application. Contact Tolomatic for alternate reverse parallel brake mounting options.

Gearheads may be used with RSA ST or GSA ST reverse parallel motor mounts. However, the torque on the belt and internal ST RP components must remain below the capabilities of the assembly to prevent belt slipping or premature failure. Contact Tolomatic for additional information if required.

**FOOD GRADE LUBRICATION**

LUB Grease, Food/Drug

Figure 3.2: GSA Ordering

### 3.3 Product Options and Features:

#### 3.3.1 Standard RSA Actuator Mounting

Standard mounting for the RSA is through four (4) tapped holes on the front face (rod end) of the actuator.

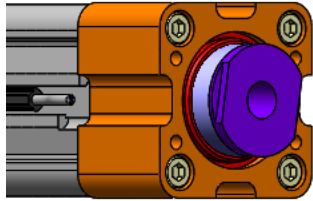


Figure 3.3: RSA Standard front face mounting holes

Standard mounting for the RSA can also be accomplished with the four (4) tapped holes on the bottom of the actuator.



Figure 3.4: RSA (RP) Bottom view

#### 3.3.2 Rod End Options

The standard rod end for the RSA and GSA is an internally threaded rod end.

Options pictured below include both actuator mounting and rod connector options (top to bottom): FFG [Front Flange Mount, actuator mounting]; ALC [Alignment Coupler Rod End]; CLV [Clevis Rod End]; SRE [Spherical Rod End]; MET [Externally Threaded Rod End] Externally threaded rod end option that threads into the standard internal rod end threads. FM2 [Foot Mount, actuator mounting, pink]

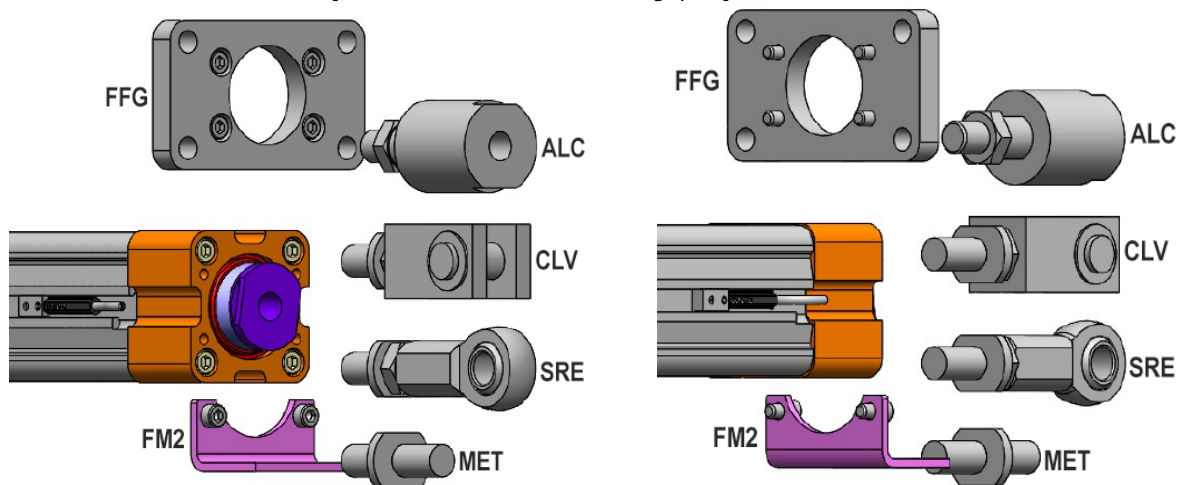


Figure 3.5: RSA Mounting and Rod End Options

### 3.3.3 RSA RP (Reverse Parallel) Actuator Mounting Options

Optional RSA RP actuator mounting options include: BFG [Back Flange Mount]; PCS [Rear Eye Mount]; PCD [Rear Clevis Mount], TRR [Trunnion Mount]; FM2 [Foot Mount]

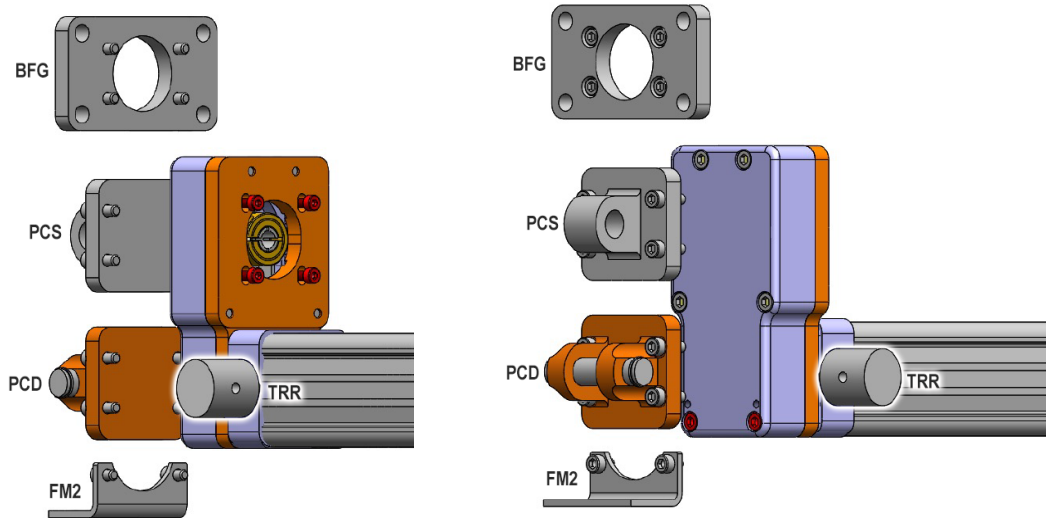


Figure 3.6: RSA RP (Reverse Parallel) Rear Mounting Options

### 3.3.4 RSA LMI (Inline Motor Mount) Actuator Mounting Options

Optional RSA LMI actuator mounting options include: TRR [Trunnion Mount]; MP2 [Mounting Plates]

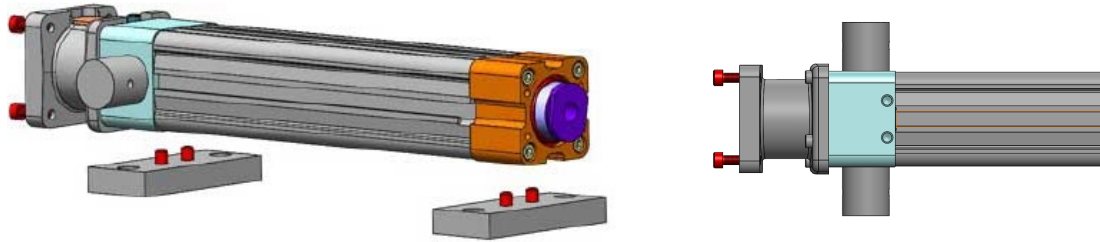


Figure 3.7: RSA LMI (Inline Motor Mount) Actuator mounting options

### 3.3.5 GSA Mounting

Standard actuator mounting for GSA is accomplished with the 4 thru holes in the body of the GSA. Standard tooling plate mounting is 4 threaded holes on the front face of the tooling plate. Tolomatic does not offer optional actuator mounting or tooling plate mounts without an engineering change order.

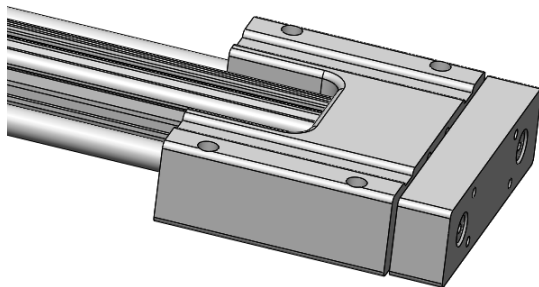


Figure 3.8: GSA actuator and tooling plate mounting



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### ■ 3.4 Screw Options

Acme, ball and roller screw technologies are offered as drive options. Contact Tolomatic for application review and assistance in selecting a screw technology option.

## 4.0 Mechanical Installation of RSA & GSA Actuators

### **WARNING!**

Before installation and commissioning the equipment, this manual and all accompanying manufacturer documents and manuals MUST be completely read by the appropriate personnel. All warning texts must be given special attention.

## 4.1 General Operation

RSA & GSA series linear actuators function by translating the rotary motion of externally mounted electric motor into linear motion of the thrust rod using a screw driven mechanism. The travel coordinates, linear speed, acceleration and force are typically controlled by a servo drive.

The relationship between the rotary motion of the motor and the linear motion of the actuator corresponds to the following relationships:

---

Linear distance traveled = (screw revolutions) \* (screw lead)

Linear Speed = ([screw RPM]/60) \* (screw lead)

Linear Thrust for inline or 1:1 RP(kN) = Motor torque (Nm) \* 2 \*  $\pi$  \* pitch (rev/mm) \* screw efficiency  
or

Linear Thrust for inline or 1:1 RP (lbf) = Motor torque (in•lb) \* 2 \*  $\pi$  \* pitch (rev/in) \* screw efficiency

Linear Thrust for a 2:1 RP(kN) = Motor torque (Nm) \* 4 \*  $\pi$  \* pitch (rev/mm) \* screw efficiency

or

Linear Thrust for a 2:1 RP (lbf) = Motor torque (in•lb) \* 4 \*  $\pi$  \* pitch (rev/in) \* screw efficiency

---

### **CAUTION!**

Care should be taken not to exceed the physical travel limits of the actuator. Exceeding the specified stroke will cause the actuator to reach mechanical end of stroke internally. Although protected by the end of stroke bumpers, reaching internal end of stroke at speeds and torque greater than those used to home (less than 1in/sec or 25mm/sec) and low torque (actuator dependent consult factory) will physically damage the screw and the internal components of the actuator.

## 4.2 Alignment and Side Loading:

Alignment of the actuator with respect to the application load and axis of motion is essential to minimize side loading. The actuator is not meant to be used in applications where side loading occurs as side loading will reduce the the life of the actuator and seals.

## 4.3 Mechanical Installation Instructions

1. Remove packaging
2. Carefully remove linear actuator from package. \*Consider the weight of the actuator.
3. Visually inspect the actuator for damage
4. Notify the carrier of any shipping damage immediately
5. If the actuator is mounted in a vertical or inclined (sloping) position, include safety measures that control the work load in case of a screw failure.
6. It is recommended to install the actuator with rod-end down or at a downward inclination to achieve best seal ingress protection.
7. Ensure sufficient clearance around the actuatuor to allow for airflow and cooling.
8. Mount RSA using standard front, bottom or optional mounting as needed for your individual application.

## 4.4 Lifting and Moving

### **⚠ CAUTION** CAUTION!

Special care must be taken when lifting this device. Depending on the size and configuration RSA and GSA actuators can represent heavy and awkward loads. Lifting equipment with appropriate capacity often should be used, and safe hoisting practices must be employed. Note the weights in the table below.

### RSA ST

		RSA SIZE		12	16	24	32	50	64
WEIGHT	BASE MODEL	IN-LINE	lb	1.73	3.73	3.98	6.11	14.21	23.01
		REVERSE PARALLEL	lb	2.40	4.00	6.25	10.40	19.66	29.69
		PER in OF STROKE	lb/in	0.128	0.300	0.330	0.460	0.860	1.380
MOVING PARTS WEIGHT		BASE WT. BZ & SN	lb	0.11	0.19	0.75	0.97	2.62	5.01
		BASE WT. BN	lb	0.19	0.27	1.01	1.44	3.55	7.59
		PER in OF STROKE	lb/in	0.04	0.06	0.14	0.15	0.33	0.45

		RSA SIZE		12	16	24	32	50	64
WEIGHT	BASE MODEL	IN-LINE	kg	0.78	1.68	1.79	2.75	6.39	10.35
		REVERSE PARALLEL	kg	1.08	1.80	2.81	4.68	8.85	13.36
		PER mm OF STROKE	g/mm	2.3	5.3	5.8	8.1	15.2	24.4
MOVING PARTS WEIGHT		BASE WT. BZ & SN	kg	0.05	0.09	0.34	0.44	1.19	2.27
		BASE WT. BN	kg	0.09	0.12	0.46	0.65	1.61	3.44
		PER mm OF STROKE	g/mm	0.71	1.07	2.50	2.68	5.89	8.04

### RSA HT

		RSA SIZE		24		32			50			64		
				RN	BZ	BN	RN	BZ	BN	RN	BZ	BN	RN	
WEIGHT	BASE MODEL	IN-LINE	lb	3.98	12.76	12.76	17.29	20.58	20.58	22.08	38.10	38.10	40.06	
		REVERSE PARALLEL	lb	6.25	12.01	12.01	20.36	25.32	25.32	26.82	44.43	44.43	46.39	
		PER in OF STROKE	lb/in	0.330	0.460	0.460	0.473	0.860	0.860	0.950	1.380	1.380	1.325	
MOVING PARTS WEIGHT		BASE WT.	lb	1.64	0.97	1.44	3.15	2.62	3.55	6.77	5.01	7.59	12.88	
		PER in OF STROKE	lb/in	0.14	0.15	0.15	0.15	0.3	0.3	0.3	0.45	0.45	0.45	

		RSA SIZE		24		32			50			64		
				RN	BZ	BN	RN	BZ	BN	RN	BZ	BN	RN	
WEIGHT	BASE MODEL	IN-LINE	kg	1.79	5.79	5.79	7.84	9.33	9.33	10.01	17.28	17.28	18.17	
		REVERSE PARALLEL	kg	2.81	5.45	5.45	9.17	11.40	11.40	12.08	20.15	20.15	21.04	
		PER mm OF STROKE	g/mm	5.8	8.1	8.1	8.4	15.2	15.2	16.8	24.4	24.4	23.4	
MOVING PARTS WEIGHT		BASE WT.	kg	0.74	0.44	0.65	1.43	1.19	1.61	3.07	2.27	3.44	5.84	
		PER mm OF STROKE	g/mm	2.50	2.68	2.68	2.68	5.36	5.36	5.36	8.04	8.04	8.04	

### GSA

		GSA SIZE		12		16		24		32			
				17 frame		23 frame							
		Guide Rod		STD	OVR	STD	OVR	STD	OVR	STD	OVR		
WEIGHT	BASE MODEL	IN-LINE	lb	3.65	4.44	3.68	4.47	7.25	7.54	16.48	17.35	27.34	28.65
		REVERSE PARALLEL	lb	3.92	4.72	4.05	4.85	7.59	7.88	17.09	17.96	28.81	30.12
		PER in OF STROKE	lb/in	0.21	0.27	0.21	0.27	0.30	0.38	0.54	0.74	0.93	1.19

		GSA SIZE		12		16		24		32			
				17 frame		23 frame							
		Guide Rod		STD	OVR	STD	OVR	STD	OVR	STD	OVR		
WEIGHT	BASE MODEL	IN-LINE	kg	1.65	2.01	1.67	2.03	3.29	3.42	7.48	7.87	12.40	13.00
		REVERSE PARALLEL	kg	1.78	2.14	1.84	2.20	3.44	3.57	7.75	8.15	13.07	13.66
		PER in OF STROKE	g/mm	3.75	4.82	3.75	4.82	5.36	6.79	9.64	13.21	16.61	21.25

Table 4.1: RSA-ST, RSA-HT, GSA Weights

## 4.5 Motor Installation

### CAUTION CAUTION!

**Caution:** Failure to properly install the motor or over-tensioning of the drive belt can result in damage and/or a significant reduction in product life.

#### **In-line (LMI) motor installation instructions:**

1. Insert the motor shaft into the motor coupler located inside the motor spacer on the backside of the actuator
2. Firmly secure the motor spacer with the 4 fasteners provided
3. Secure the coupler to the motor shaft by tightening the coupler
  - a. On standard torque (ST1) units remove the cover on the motor spacer to provide access to the fastener on the motor shaft coupler
  - b. On high torque (HT1) units there is an access hole in the spacer to allow access with a hex key wrench

#### **Reverse Parallel (RP) motor installation instructions:**

1. Hand tighten the motor onto the mounting plate with the 4 fasteners and square nuts provided. Do not fully tighten at this point.
2. Position the belt on the pulleys and slide the drive pulley over the motor shaft. Secure the pulley to the shaft via the set screw or collar clamp on the pulley.
3. Verify that there is clearance between the inside of the RP case and each pulley. Verify that the pulleys are aligned with each other.
4. If using the Reverse Parallel Tensioning tool (Fig. 4.1) follow the steps below, otherwise, go to step 5.

RSA Reverse-Parallel Tensioning Tool Kit	24ST	24HT / 32 all	50 all & 64 all
order by part number	1124-9430	1132-9430	1150-9430

- a. Hold the tensioning tool by the locking screw and place it between the pulleys, making sure that the adjustment screw is in line with the timing belt. Adjust the tension of the belt by rotating the adjustment nut.
    - i. To measure the tension of the belt either use a sonic tension meter or measure the deflection force required to deflect the belt in the center of its span (Fig 4.2) by the distance called out in the “deflection” column in Table 4.2.
  - b. Tighten the fasteners for the motor and remove the tensioning tool. Install the RP cover
5. Standard belt tensioning method:
    - a. Install the RP cover.
    - b. Tension the belt by pulling the motor away from the drive shaft with the appropriate force, or by hanging a weight from the motor (See Table 4.2 for tension force). Tighten the motor fasteners while this force/weight is applied to the motor.



#### **NOTE!**

NOTE: Torque specs for fasteners can be found in table 4.2.

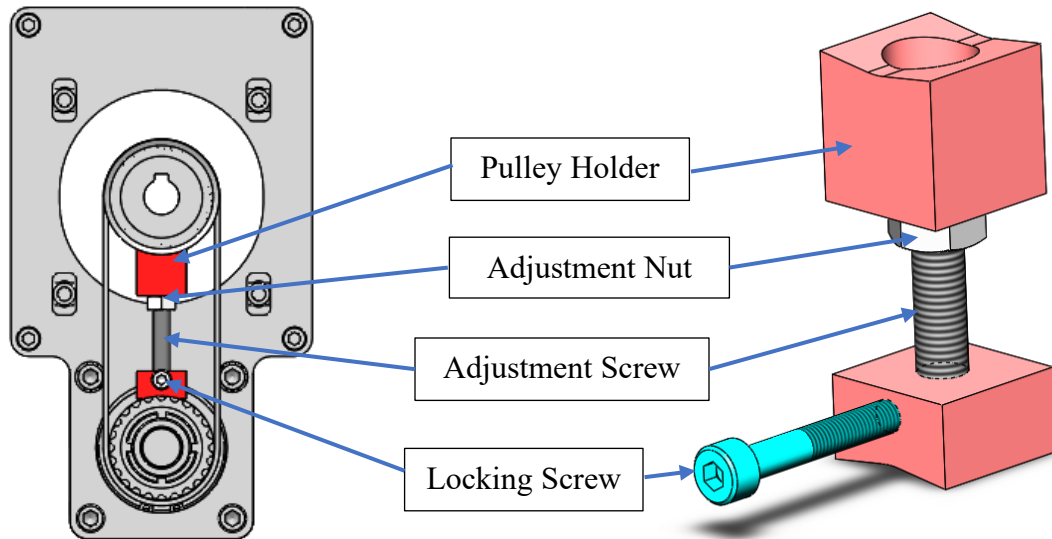


Figure 4.1: Reverse parallel tensioning tool

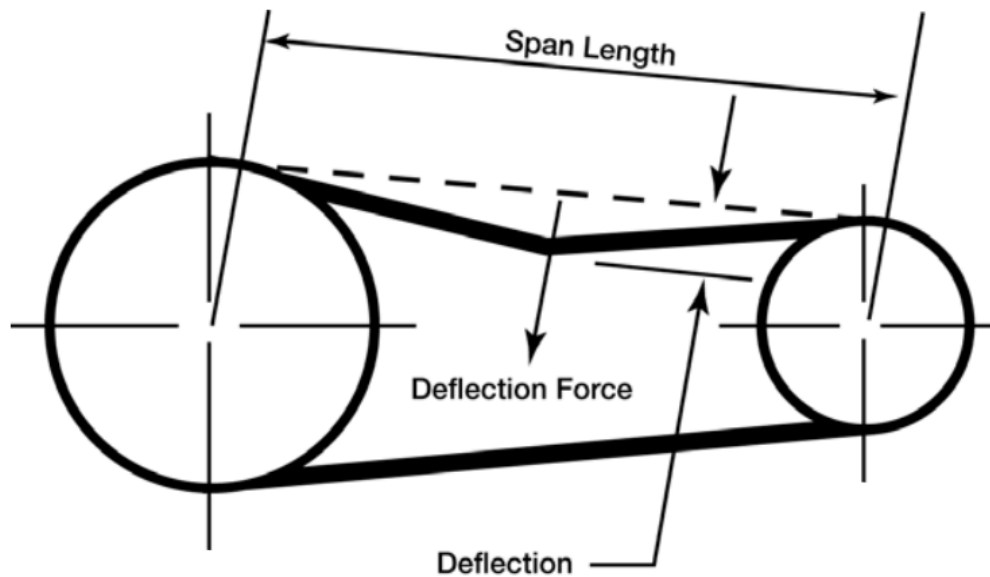


Figure 4.2: Reverse parallel belt tensioning diagram

Actuator size and torque callout		Smallest Shaft Diameter		Tension Force/weight		Sonic Tension Method						Force Deflection Method			
						Span Tension Force		Mass		Width		Deflection		Deflection Force	
						lbf	N	lb/in	g/m	in	mm	in	mm	lbf	N
in	mm	lbf	N	lbf	N	lb/in	g/m	in	mm	in	mm	lbf	N		
Standard Torque	R/GSA12 & 16 ST1	.180-.259	4.57-6.58	13	58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	R/GSA24 ST1	.180-.259	4.57-6.58	13	58	7	29	0.21	2.4	0.354	9	0.08	2	1.7	8
		.260-.499	6.60-12.68	22	98	11	49	0.21	2.4	0.354	9	0.08	2	2.3	10
	R/GSA32 ST1	.180-.259	4.57-6.58	13	58	7	29	0.34	3.9	0.748	19	0.12	3	1	4
		.260-.499	6.60-12.68	22	98	11	49	0.34	3.9	0.748	19	0.12	3	1.5	7
	RSA50 ST1	.260-.499	6.60-12.68	22	98	11	49	0.34	3.9	0.748	19	0.12	3	2.3	10
		.500-.625	12.70-15.88	31	138	16	69	0.34	3.9	0.748	19	0.12	3	3	13
		.625 and larger	15.88 and larger	40	178	20	89	0.34	3.9	0.748	19	0.12	3	4.5	20
	RSA64 ST1	.500-.625	12.70-15.88	31	138	16	69	0.34	3.9	0.748	19	0.12	3	3	13
		.625 and larger	15.88 and larger	40	178	20	89	0.34	3.9	0.748	19	0.12	3	4.5	20
High Torque	RSA24 HT1	All	All	40	178	20	178	0.34	3.9	0.984	25	0.08	2	3	13
	RSA32 HT1	Up to .470	Up to 12.00	40	178	20	178	0.3	3.5	0.984	25	0.12	3	3	13
		Over .470	Over 12.00	60	267	30	267	0.3	3.5	0.984	25	0.12	3	5	22
	RSA50 HT1	All	All	60	267	30	267	0.3	3.5	0.984	25	0.12	3	3	13
	RSA64 HT1	Up to .980	Up to 25.00	60	267	30	267	0.3	3.5	0.984	25	0.12	3	3.5	16
		Over .980	Over 25.00	80	356	40	356	0.3	3.5	0.984	25	0.12	3	4	18

Fastener Size		Torque Spec	
Thread Size	Allen Key Size	in-lbs	N-m
#5-40	3/32	20	2.3
#6-32	7/64	25	2.8
#8-32	9/64	46	5.2
#10-24	5/32	67	7.6
5/16-18	1/4	135	15.3
3/8-16	5/16	200	22.6
M3	2.5	13	1.5
M4	3.0	40	4.5
M5	4.0	67	7.6
M6	5.0	135	15.3

Table 4.2: Reverse parallel tension and torque specifications

## 4.6 Standard RSA Actuator Mounting

Mechanical Installation Bolt and Torque Table.

### Front Face Mounting:

RSA Model		Front Face Threaded Holes	Min Fastener Grade	Torque in-lbf	Torque N-m
RSA12 ST	Standard	4 - 5-40 ↓ 0.50"	SAE Grade 5	10	1.1
RSA12 ST	Metric	4 - M3 x 0.5 ↓ 12.0mm	8.8	8.7	1.0
RSA16 ST	Standard	4 - 8-32 ↓ 0.50"	SAE Grade 5	22	2.5
RSA16 ST	Metric	4 - M4 x 0.7 ↓ 8.0mm	8.8	20	2.3
RSA24 ST	Standard	4 - 10-24 ↓ 0.79"	SAE Grade 5	32	3.6
RSA24 ST	Metric	4 - M5 x 0.8 ↓ 20.0mm	8.8	41	4.6
RSA32 ST	Standard	4 - 1/4-20 ↓ 0.71"	SAE Grade 5	76	8.6
RSA32 ST	Metric	4 - M6 x 1.0 ↓ 18.0mm	8.8	71	8.0
RSA50 ST	Standard	4 - 5/16-18 ↓ 1.00"	SAE Grade 5	155	17.5
RSA50 ST	Metric	4 - M8 x 1.25 ↓ 20.0mm	8.8	173	19.5
RSA64 ST	Standard	4 - 7/16-14 ↓ 1.50"	SAE Grade 5	445	50.3
RSA64 ST	Metric	4 - M12 x 1.75 ↓ 38.1mm	8.8	593	67.0
RSA24 HT	Standard	4 - 10-24 ↓ 0.79"	SAE Grade 8	45	5.1
RSA24 HT	Metric	4 - M5 x 0.8 ↓ 20.0mm	10.9	58	6.5
RSA32 HT	Standard	4 - 1/4-20 ↓ 0.71"	SAE Grade 8	107	12.1
RSA32 HT	Metric	4 - M6 x 1.0 ↓ 18.0mm	10.9	97	11.0
RSA50 HT	Standard	6- 5/16-18 ↓ 0.47"	SAE Grade 8	220	24.9
RSA50 HT	Metric	6- M8 x 1.25 ↓ 12.0mm	10.9	239	27.0
RSA64 HT	Standard	6 - 1/2-13 ↓ 0.75"	SAE Grade 8	955	107.9
RSA64 HT	Metric	6 - M12 x 1.75 ↓ 18.0mm	10.9	832	94.0

**Bottom Mounting:**  
Mechanical Installation Bolt and Torque Table.

RSA Model		Bottom Mounting Threaded Holes	Min Fastener Grade	Torque in-lbf	Torque N-m
RSA12 ST	Standard	4 - 8-32 ↓ 0.25"	Grade 5	22	2.5
RSA12 ST	Metric	4 - M4 x 0.6 ↓ 6.4mm	8.8	20.3	2.3
RSA16 ST	Standard	4 - 8-32 ↓ 0.25"	Grade 5	22	2.5
RSA16 ST	Metric	4 - M4 x 0.7 ↓ 6.4mm	8.8	20.3	2.3
RSA24 ST	Standard	4 - 1/4-20 ↓ 0.31"	Grade 5	76	8.6
RSA24 ST	Metric	4 - M6 x 1.0 ↓ 8.6mm	8.8	70	7.9
RSA32 ST	Standard	4 - 5/16-18 ↓ 0.47"	Grade 5	156	17.6
RSA32 ST	Metric	4 - M8 x 1.25 ↓ 11.9mm	8.8	168	19.0
RSA50 ST	Standard	4 - 3/8-16 ↓ 0.68"	Grade 5	300	33.9
RSA50 ST	Metric	4 - M10 x 1.5 ↓ 17.3mm	8.8	350	39.5
RSA64 ST	Standard	4 - 7/16-14 ↓ 0.88"	Grade 5	445	50.3
RSA64 ST	Metric	4 - M12 x 1.75 ↓ 22.2mm	8.8	584	66.0
RSA24 HT	Standard	4 - 1/4-20 ↓ .34"	Grade 8	107	12.1
RSA24 HT	Metric	4 - M6 x 1.0 ↓ 8.6mm	10.9	97	11.0
RSA32 HT	Standard	4 - 5/16-18 ↓ 0.47"	Grade 8	220	24.9
RSA32 HT	Metric	4 - M8 x 1.25 ↓ 11.9mm	10.9	239	27.0
RSA50 HT	Standard	4 - 3/8-16 ↓ 0.75"	Grade 8	395	44.6
RSA50 HT	Metric	4 - M10 x 1.5 ↓ 15.0mm	10.9	478	54.0
RSA64 HT	Standard	4 - 7/16-14 ↓ 0.88"	Grade 8	625	70.6
RSA64 HT	Metric	4 - M12 x 1.75 ↓ 18.0mm	10.9	832	94.0

## 4.7 Options

### 4.7.1 FFG, BFG (Front/Back Flange Mount)

FFG, BFG may be aligned to the axis of motion of the application (machine) with 2 dowel pins, and secured with fasteners (dowel pins and fasteners are not included) tightened to the torque values given below. Please see Tolomatic RSA Catalog [3600-4166](#) for dimensional drawings. Use 3D CAD files (available at [www.tolomatic.com](http://www.tolomatic.com)) for critical dimensions.

Mechanical Installation Bolt and Torque Table.

RSA Model		Front/Back Flange Mount	Min Fastener Grade	Torque in-lbf	Torque N-m
RSA12 ST	Standard	6-32	Grade 5	11	1.2
RSA12 ST	Metric	M3X0.5	8.8	8.7	1.0
RSA16 ST	Standard	8-32	Grade 5	22	2.5
RSA16 ST	Metric	M4	8.8	20	2.3
RSA24 ST	Standard	1/4-20	Grade 5	76	8.6
RSA24 ST	Metric	M6	8.8	70	7.9
RSA32 ST	Standard	5/16-18	Grade 5	155	17.5
RSA32 ST	Metric	M8x1.25	8.8	168	19.0
RSA50 ST	Standard	3/8-16	Grade 5	300	33.9
RSA50 ST	Metric	M10	8.8	350	39.5
RSA64 ST	Standard	3/8-16	Grade 5	300	33.9
RSA64 ST	Metric	M12	8.8	584	66.0
RSA24 HT	Standard	1/4-20	Grade 8	107	12.1
RSA24 HT	Metric	M6	10.9	97	11.0
RSA32 HT	Standard	5/16-18	Grade 8	220	24.9
RSA32 HT	Metric	M8x1.25	10.9	239	27.0
RSA50 HT	Standard	3/8-16	Grade 8	395	44.6
RSA50 HT	Metric	M10	10.9	478	54.0
RSA64 HT	Standard	1/2-13	Grade 8	955	107.9
RSA64 HT	Metric	M12	10.9	832	94.0



#### 4.7.2 FM2, MP2 (Foot Mount and Mounting Plates)

RSA series actuators may be mounted to a surface parallel to the line of motion using mounting plates located under the bearing block and the front head of the actuator (Option FM2, MP2). Each of the two mounting plates is secured with 4 fasteners (not included) tightened to the torque values given below. Please see Tolomatic RSA Catalog [3600-4166](#) for dimensional drawings. Use 3D CAD files (available at [www.tolomatic.com](http://www.tolomatic.com)) for critical dimensions.

Mechanical Installation Bolt and Torque Table.

RSA Model		Foot Mount	Min Fastener Grade	Torque in-lbf	Torque N-m
RSA12 ST	Standard	6-32	Grade 5	11	1.2
RSA12 ST	Metric	M3X0.5	8.8	8.7	1.0
RSA16 ST	Standard	6-32	Grade 5	11	1.2
RSA16 ST	Metric	M3X0.5	8.8	8.7	1.0
RSA24 ST	Standard	5/16-18	Grade 5	155	17.5
RSA24 ST	Metric	M6	8.8	70	7.9
RSA32 ST	Standard	3/8-16	Grade 5	300	33.9
RSA32 ST	Metric	M8x1.25	8.8	168	19.0
RSA50 ST	Standard	7/16-14	Grade 5	445	50.3
RSA50 ST	Metric	M10	8.8	350	39.5
RSA64 ST	Standard	7/16-14	Grade 5	445	50.3
RSA64 ST	Metric	M12	8.8	584	66.0

RSA Model		Mounting Plates	Min Fastener Grade	Torque in-lbf	Torque N-m
RSA12 ST	Standard	8-32	Grade 5	22	2.5
RSA12 ST	Metric	M4	8.8	20.3	2.3
RSA16 ST	Standard	8-32	Grade 5	22	2.5
RSA16 ST	Metric	M4	8.8	20.3	2.3
RSA24 ST	Standard	3/8-16	Grade 5	300	33.9
RSA24 ST	Metric	M6	8.8	70	7.9
RSA32 ST	Standard	3/8-16	Grade 5	300	33.9
RSA32 ST	Metric	M8x1.25	8.8	168	19.0
RSA50 ST	Standard	1/2-13	Grade 5	600	67.8
RSA50 ST	Metric	M10	8.8	335	37.8
RSA64 ST	Standard	1/2-13	Grade 5	600	67.8
RSA64 ST	Metric	M12	8.8	593	67.0
RSA24 HT	Standard	3/8-16	Grade 5	300	33.9
RSA24 HT	Metric	M6	10.9	97	11.0
RSA32 HT	Standard	3/8-16	Grade 8	395	44.6
RSA32 HT	Metric	M10	10.9	478	54.0
RSA50 HT	Standard	1/2-13	Grade 8	955	107.9
RSA50 HT	Metric	M10	10.9	478	54.0
RSA64 HT	Standard	1/2-13	Grade 8	955	107.9
RSA64 HT	Metric	M12	10.9	832	94.0

### 4.7.3 MET, ALC (Rod End: External Threaded Option, Alignment Coupler)

The design of the RSA actuator has internal anti-rotate as a standard feature that prevents the thrust rod from rotating. However, when attaching accessories, linkages or load to the thrust rod end it is critical to protect the internal components. Use a wrench on the flats at the end of the thrust rod to prevent rotation. Use a torque wrench to tighten the interfacing rod end to the actuator threaded connection point. Torque values provided in the following table.

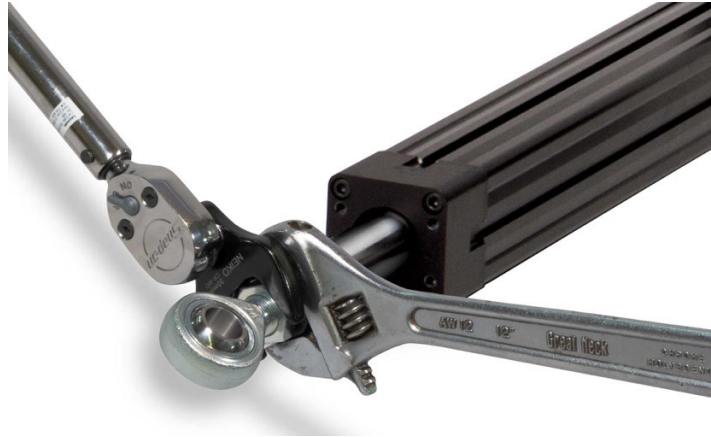


Figure 4.3: For RSA hold thrust rod stationary using a wrench on the flats at the end of the thrust rod when attaching accessories, linkages or load to the actuator.

Please see Tolomatic RSA Catalog [3600-4166](http://3600-4166) for dimensional drawings. Use 3D CAD files (available at [www.tolomatic.com](http://www.tolomatic.com)) for critical dimensions.

Mechanical Installation Bolt and Torque Table.

RSA Model		Female Rod End Thread	Max Torque in-lbf	Max Torque N-m
RSA12 ST	Standard	1/4-28 ↓ 0.75"	40	4.5
RSA12 ST	Metric	M6 x 1.0 ↓ 15.0mm	31	3.5
RSA16 ST	Standard	5/16-24 ↓ 0.75"	75	8.5
RSA16 ST	Metric	M8 x 1.25 ↓ 16.0mm	80	9.0
RSA24 ST	Standard	7/16-20 ↓ 1.00"	235	26.6
RSA24 ST	Metric	M10 x 1.25 ↓ 25.4mm	168	19.0
RSA32 ST	Standard	7/16-20 ↓ 1.33"	235	26.6
RSA32 ST	Metric	M16 x 1.5 ↓ 26.6mm	708	80.0
RSA50 ST	Standard	3/4-16 ↓ 1.50"	1250	141.2
RSA50 ST	Metric	M20 x 1.5 ↓ 40.0mm	1328	150.0
RSA64 ST	Standard	3/4-16 ↓ 1.50"	1250	141.2
RSA64 ST	Metric	M27 x 2.0 ↓ 38.1mm	3540	400.0

\*ST Torque Value Assumes Mating Male Thread has Min UTS = 60ksi [413MPa]

Mechanical Installation Bolt and Torque Table.

RSA Model		Female Rod End Thread	Max Torque in-lbf	Max Torque N-m
RSA24 HT	Standard	7/16-20 ↓ 1.00"	450	50.8
RSA24 HT	Metric	M10 x 1.25 ↓ 25.4mm	310	35.0
RSA32 HT	Standard	7/16-20 ↓ 1.13"	465	52.5
RSA32 HT	Metric	M16 x 1.5 ↓ 28.6mm	1416	160.0
RSA50 HT	Standard	3/4-16 ↓ 1.50"	2400	271.2
RSA50 HT	Metric	M20 x 1.5 ↓ 38.1mm	2921	330.0
RSA64 HT	Standard	1-1/4-12 ↓ 2.50"	5000	564.9
RSA64 HT	Metric	M27 x 2.0 ↓ 63.5mm	4868	550.0

\*HT Torque Value Assumes Mating Male Thread has Min UTS =120ksi [827MPa]

RSA Model		Male Rod End Thread	Torque in-lbf	Torque N-m
RSA12 ST	Standard	1/4-28 ↓ 0.50"	40	4.5
RSA12 ST	Metric	M6 x 1.0 ↓ 12.7mm	31	3.5
RSA16 ST	Standard	5/16-24 ↓ 0.50"	75	8.5
RSA16 ST	Metric	M8 x 1.25 ↓ 12.7mm	80	9.0
RSA24 ST	Standard	7/16-20 ↓ 0.87"	235	26.6
RSA24 ST	Metric	M10 x 1.25 ↓ 22.1mm	168	19.0
RSA32 ST	Standard	7/16-20 ↓ 0.87"	235	26.6
RSA32 ST	Metric	M16 x 1.5 ↓ 26.6mm	708	80.0
RSA50 ST	Standard	3/4-16 ↓ 1.50"	1250	141.2
RSA50 ST	Metric	M20 x 1.5 ↓ 38.1mm	1328	150.0
RSA64 ST	Standard	3/4-16 ↓ 1.50"	1250	141.2
RSA64 ST	Metric	M27 x 2.0 ↓ 38.1mm	3540	400.0
RSA24 HT	Standard	7/16-20 ↓ 0.87"	450	50.8
RSA24 HT	Metric	M10 x 1.25 ↓ 22.1mm	310	35.0
RSA32 HT	Standard	7/16-20 ↓ 0.87"	465	52.5
RSA32 HT	Metric	M16 x 1.5 ↓ 28.0mm	1416	160.0
RSA50 HT	Standard	3/4-16 ↓ 1.50"	2400	271.2
RSA50 HT	Metric	M20 x 1.5 ↓ 38.1mm	2921	330.0
RSA64 HT	Standard	1-1/4-12 ↓ 2.13"	5000	564.9
RSA64 HT	Metric	M27 x 2.0 ↓ 50.8mm	4868	550.0

Mechanical Installation Bolt and Torque Table.

RSA Model		Alignment Coupler Thread (Male/Female)	Torque in-lbf	Torque N-m
RSA12 ST	Standard	1/4-28 ↓ 0.625"	60	6.8
RSA12 ST	Metric	NA		
RSA16 ST	Standard	5/16-24 ↓ 0.625"	110	12.4
RSA16 ST	Metric	NA		
RSA24 ST	Standard	7/16-20 ↓ 0.75"	350	39.5
RSA24 ST	Metric	M10 x 1.25 ↓ 24.0mm	248	28.0
RSA32 ST	Standard	7/16-20 ↓ 0.75"	350	39.5
RSA32 ST	Metric	M16 x 1.5 ↓ 32.0mm	1106	125.0
RSA50 ST	Standard	3/4-16 ↓ 1.125"	1900	214.7
RSA50 ST	Metric	M20 x 1.5 ↓ 42.0mm	2213	250.0
RSA64 ST	Standard	3/4-16 ↓ 1.125"	1900	214.7
RSA64 ST	Metric	M27 x 2.0 ↓ 54.0mm	3009	340.0

RSA24 HT	Standard	7/16-20 ↓ 0.75"	300	33.9
RSA24 HT	Metric	M10 x 1.25 ↓ 24.0mm	221	25.0
RSA32 HT	Standard	7/16-20 ↓ 0.75"	350	39.5
RSA32 HT	Metric	M16 x 1.5 ↓ 32.0mm	885	100.0
RSA50 HT	Standard	3/4-16 ↓ 1.125"	1800	203.4
RSA50 HT	Metric	M20 x 1.5 ↓ 42.0mm	1991	225.0
RSA64 HT	Standard	1-1/4-12 ↓ 1.625"	5000	564.9
RSA64 HT	Metric	M27 x 2.0 ↓ 54.0mm	4868	550.0

#### 4.7.5 GSA Mounting Specifications

Please see Tolomatic RSA/GSA Catalog [3600-4166](https://www.tolomatic.com) for dimensional drawings. Use 3D CAD files (available at [www.tolomatic.com](https://www.tolomatic.com)) for critical dimensions.

##### Mechanical Installation Bolt and Torque Table.

GSA Model		Top Face Threaded Holes	Minimum Fastener Grade	Torque in-lbf	Torque N-m
GSA12 ST	Standard	4 - 5/16-18 ↓ 0.75"	SAE Grade 2	100	11.3
GSA12 ST	Metric	4 - M8 x 1.25 ↓ 19.1mm	5.8	106	12.0
GSA16 ST	Standard	4 - 5/16-18 ↓ 0.75"	SAE Grade 2	100	11.3
GSA16 ST	Metric	4 - M8 x 1.25 ↓ 19.1mm	5.8	106	12.0
GSA24 ST	Standard	4 - 3/8-16 ↓ 1.00"	SAE Grade 2	175	19.8
GSA24 ST	Metric	4 - M10 x 1.5 ↓ 25.4mm	5.8	177	20.0
GSA32 ST	Standard	4 - 1/2-13 ↓ 1.50"	SAE Grade 2	250	28.2
GSA32 ST	Metric	4 - M12 x 1.75 ↓ 38.1mm	5.8	265.5	30.0

GSA Model		Top Through Hole Fastener Size	Minimum Fastener Grade	Torque in-lbf	Torque N-m
GSA12 ST	Standard	1/4-20	SAE Grade 2	45	5.1
GSA12 ST	Metric	M6x1.0	5.8	44	5.0
GSA16 ST	Standard	1/4-20	SAE Grade 2	45	5.1
GSA16 ST	Metric	M6x1.0	5.8	44	5.0
GSA24 ST	Standard	5/16-18	SAE Grade 2	100	11.3
GSA24 ST	Metric	M8x1.25	5.8	106	12.0
GSA32 ST	Standard	7/16-14	SAE Grade 2	225	25.4
GSA32 ST	Metric	M10x1.5	5.8	177	20.0

GSA Model		Side Threaded Holes	Minimum Fastener Grade	Torque in-lbf	Torque N-m
GSA12 ST	Standard	4 - 1/4-20 ↓ 0.50"	SAE Grade 2	45	5.1
GSA12 ST	Metric	4 - M6 x 1.0 ↓ 12.7mm	5.8	44	5.0
GSA16 ST	Standard	4 - 1/4-20 ↓ 0.50"	SAE Grade 2	45	5.1
GSA16 ST	Metric	4 - M6 x 1.0 ↓ 12.7mm	5.8	44	5.0
GSA24 ST	Standard	4 - 5/16-18 ↓ 0.63"	SAE Grade 2	100	11.3
GSA24 ST	Metric	4 - M8 x 1.25 ↓ 16.0mm	5.8	106	12.0
GSA32 ST	Standard	4 - 3/8-16 ↓ 0.75"	SAE Grade 2	175	19.8
GSA32 ST	Metric	4 - M10 x 1.5 ↓ 19.1mm	5.8	177	20.0

GSA Model		Tooling Plate Threaded Holes	Minimum Fastener Grade	Torque in-lbf	Torque N-m
GSA12 ST	Standard	4 - 1/4-20 ↓ 0.66"	SAE Grade 2	45	5.1
GSA12 ST	Metric	4 - M6 x 1.0 ↓ 16.8mm	5.8	44	5.0
GSA16 ST	Standard	4 - 5/16-18 ↓ 0.85"	SAE Grade 2	100	11.3
GSA16 ST	Metric	4 - M8 x 1.25 ↓ 21.9mm	5.8	106	12.0
GSA24 ST	Standard	4 - 5/16-18 ↓ 1.10"	SAE Grade 2	100	11.3
GSA24 ST	Metric	4 - M8 x 1.25 ↓ 27.9mm	5.8	106	12.0
GSA32 ST	Standard	4 - 3/8-16 ↓ 1.13"	SAE Grade 2	175	19.8
GSA32 ST	Metric	4 - M10 x 1.5 ↓ 28.7mm	5.8	177	20.0

GSA Model		Tooling Plate Through Hole Fastener Size	Minimum Fastener Grade	Torque in-lbf	Torque N-m
GSA12 ST	Standard	10-24	SAE Grade 2	20	2.3
GSA12 ST	Metric	M5x0.8	5.8	26.5	3.0
GSA16 ST	Standard	1/4-20	SAE Grade 2	45	5.1
GSA16 ST	Metric	M6x1.0	5.8	44	5.0
GSA24 ST	Standard	1/4-20	SAE Grade 2	45	5.1
GSA24 ST	Metric	M6x1.0	5.8	44	5.0
GSA32 ST	Standard	5/16-18	SAE Grade 2	100	11.3
GSA32 ST	Metric	M8x1.25	5.8	106	12.0

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## ■ 5.0 RSA/GSA Operation and Start Up Considerations

### ■ 5.1 Back Driving

#### **WARNING!**

RSA & GSA actuators are equipped with screws that are not self-braking and will not hold position under load. When there is no current/torque input to the drive motor, the screw will rotate and the thrust rod can move freely. A motor brake option should be used if the motion system/axis requires the actuator to hold position when it is not powered, or as a safety measure if the actuator is mounted in a vertical orientation to prevent the payload from free falling in the event of unintended power loss.

#### **NOTE!**

Motor brakes are not recommended for RP (Reverse Parallel) motor mounts.

### ■ 5.2 Homing

To establish full open and close position of the actuator, set the drive torque limits to the lowest values possible for motion (10-20% to begin with) and use a slow velocity jog command (<1mm/s) to search for the hard limits. If 10-20% of the continuous current is not sufficient to drive both the actuator installed on the equipment, slowly increase the current limit until the unit is able to move to both the fully open and fully closed positions. Proper care must be taken when finding hard limits after installation to the equipment. Applying a load in excess of the continuous rated force at the end of travel may cause internal damage and could render the assembly inoperable.

Once the full open and closed positions are determined, these values can be stored in the drive/controller as travel limits.

### ■ 5.3 Breather/Purge Ports

Standard feature on RSA 32,50,64 size actuators. Located on both the bottom and the side of the actuator. When using as a Breather Port: allows air flow into the interior of the actuator. Prevents additional load on the motor caused by air buildup due to fast cycling of the RSA. When using as a Purge Port: positive pressure with air lines and filters insure contaminants (which could potentially shorten the actuator life) do not enter the interior of the actuator.

## 6.0 Maintenance

### **WARNING!**

All power and supply media must be shut OFF before any work is performed on any equipment that is associated with the actuator. It is recommended that actuator repairs be performed at Tolomatic or by a Tolomatic service center.

### **NOTE!**

Replacement parts for RSA-HT actuators are not available for sale and RSA-HT must be returned to Tolomatic or a Tolomatic service center for repairs.

Tolomatic recommends returning the RSA and GSA for most repairs. Contact Tolomatic for RMA (Return Merchandise Authorization) instructions.

## 6.1 Maintenance Check and Intervals

RSA and GSA actuators should be visually inspected on a regular basis, at least once per quarter. Visually inspect the thrust rod, belts and pulley's if equipped, and any mounting features for wear.

## 6.2 Lubrication procedure and interval.

### 6.2.1 RSA-ST, GSA Lubrication

RSA-ST and GSA actuators are lubricated at the factory and are considered lubricated for the life of the actuator.

### 6.2.2 RSA HT Lubrication

RSA HT actuators include a rod end grease zerk to allow the end user the option of re-greasing the roller screw and roller nut. Lubrication requirements depend on the motion cycle (velocity, force and frequency of operation), type of application, ambient temperature, environmental and other factors.

In general purpose applications to maximize service life Tolomatic recommends to re-lubricate the actuator at least every 1,000,000 cycles or once every year whichever comes first. For more demanding applications such as pressing, high frequency motion or other cases where the screw is highly stressed, the re-lubrication interval will need to be more frequent. In such applications it is recommended to execute at least 5 full length stroke moves every 5,000 cycles of operation to redistribute the lubricant within the actuator.

**Re-lubricate with Tolomatic Grease into the grease zerk located on the rod end:**

	RSA24	RSA32	RSA50	RSA64
<b>Qty.</b>	2.5 g + (0.010 x § mm)	4.8 g + (0.010 x § mm)	5.3 g + (0.018 x § mm)	6.6 g + (0.018 x § mm)
<b>Qty.</b>	0.09 oz + (0.009 x § in)	0.17 oz + (0.009 x § in)	0.19 oz + (0.016 x § in)	0.23 oz + (0.016 x § in)
§ = Stroke length (mm or in)				

Table 6.1: Grease relubrication quantity for RSA-HT actuators

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## 6.3 Storage Recommendations

Pay attention to the following when storing the actuator:

- Perform repairs, maintenance and inspections before storing equipment to ensure that the equipment is in good working order.
- Make sure the equipment is placed in a suitable storage position (horizontal) to prevent damage to the connectors and electronics.
- Protect the feedback device, which is located at the blind (non-rod end) of servo motors (if used).
- Store in clean and dry environment.
- After six (6) months of storage it is recommended to cycle two complete strokes of the actuator to redistribute the internal lubricants.

It is also recommended to cycle the actuator two complete strokes before placing in service.

- If stored for a period longer than 2 years without use it may be necessary to replace the lubricants. Return to Tolomatic for this maintenance.
- Storage temperature is  $-25^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$  to  $+140^{\circ}\text{F}$ ).




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## ■ Appendix A: Specifications

### ■ A.1 Specifications

#### ■ A.1.1 Performance and Mechanical Specifications


 **NOTE!**

For performance data and specifications please refer to the [Tolomatic RSA/GSA catalog #3600-4166](#)

#### ■ A.1.2 Actuator Sizing

 **NOTE!**

For performance data and specifications please refer to the [Tolomatic RSA/GSA catalog #3600-4166](#)

 **NOTE!**

For fast, accurate actuator sizing please use the Tolomatic online sizing application: [Sizeit.Tolomatic.com](http://Sizeit.Tolomatic.com)

#### ■ A.1.3 Critical Speed

 **NOTE!**

For performance data and specifications please refer to the [Tolomatic RSA/GSA catalog #3600-4166](#)

#### ■ A.1.4 Roller Screw Life

 **NOTE!**

For performance data and specifications please refer to the [Tolomatic RSA/GSA catalog #3600-4166](#)

■ **Appendix B: Troubleshooting**  
 ■ **B1: Troubleshooting Procedure**

Symptom	CAUSE	SOLUTION
Actuator cannot move	Force is too large for the capacity of the actuator or too much friction is present	Verify force requirements
	Excessive side load	Verify correct operation
	Misalignment of output rod to application	Verify correct alignment
	Actuator has crashed into hard stop	Disconnect from load and manually move away from hard stop. If problem persists, contact Tolomatic for service.
Actuator housing moves or vibrates when shaft is in motion	Loose mounting	Check actuator mounting
Actuator is overheating	Duty cycle is higher than actuator ratings	Verify duty cycle is within continuous ratings
	Actuator low or out of grease	Re-lubricate

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## ■ Appendix C: Warranty

### ■ C.1 Warranty

#### Warranty and Limitation of Liability

Tolomatic's complete terms and conditions can be found here <https://www.tolomatic.com/info-center/resource-details/terms-and-conditions>

#### ■ Limited Warranty

Tolomatic warrants that at the time of delivery, Products shall be in good condition, free from defects in material and workmanship and that Products made to order shall conform to applicable drawings or specifications as referenced in the quotation or accepted purchase order ("Product Warranty"). The Product Warranty shall expire one year from date of shipment (the "Warranty Period"). Tolomatic warrants that Buyer shall acquire good title to the Products free from third party rights. These warranties are given only to Buyer and not to any third party.

The Product Warranty excludes any defects or non-conformance resulting (wholly or in part) from: (i) accidental damage, mishandling, incorrect installation, negligence or other circumstances arising after delivery; (ii) the repair or alteration of the Product by any party other than Tolomatic or its authorized representative; (iii) the failure by Buyer to provide a suitable storage, use, or operating environment for the Products; (iv) Buyer's use of the Products for a purpose or in a manner other than that for which they were designed; and (v) other abuse, misuse or neglect of the Products by Buyer or any third party.

The Product Warranty excludes any Products not manufactured by Tolomatic. Insofar as any Products are manufactured by third parties, Tolomatic shall, insofar as it can, pass to the Buyer the benefit of all warranties given by the supplier of such Products.

The Product Warranty shall be limited to defects of which Tolomatic is notified within twenty-one (21) days from the date of shipment to Buyer or, in the event of latent defects, within twenty-one (21) days of the defect being discovered and provided that such notice is received within the Warranty Period. As sole remedy for the breach of the warranty in paragraph (a) above, provided that (if required by Tolomatic) all non-conforming Products are returned to Tolomatic at Buyer's cost, and provided that Tolomatic confirms the defect or non-conformance, Tolomatic shall at its option

(i) replace or repair the defective or non-conforming items, or correct any defective work or non-conformance, or (ii) refund to Buyer the original purchase price of the defective or non-conforming item and reimburse to Buyer any transportation and insurance charges incurred by Buyer.

Any claim by Buyer against Tolomatic alleging the breach of the Product Warranty must be commenced within twelve (12) months following the date of the alleged breach.

In the event the parties disagree whether or not a breach of the Product Warranty has occurred, Tolomatic may (but shall not be obliged to) undertake any repairs or replacement requested by Buyer pending final settlement of the matter. If it is determined that no such breach has occurred, Buyer shall pay Tolomatic upon demand the reasonable price of the repairs, corrections, or replacements made by Tolomatic including allowances for overheads and a reasonable profit margin.

THE WARRANTIES EXPRESSLY MADE UNDER THESE TERMS ARE EXCLUSIVE AND GIVEN IN LIEU OF ALL OTHER REPRESENTATIONS, WARRANTIES AND COVENANTS THAT MAY BE IMPLIED BY LAW, BY CUSTOM OF TRADE, BY THESE TERMS, BY THE PURCHASE ORDER OR OTHERWISE WITH RESPECT TO THE PRODUCTS. TO THE FULL EXTENT PERMITTED BY LAW, TOLOMATIC DISCLAIMS AND BUYER WAIVES ALL SUCH REPRESENTATIONS, WARRANTIES AND COVENANTS INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS. BUYER'S SOLE REMEDY FOR BREACH OF WARRANTY IS STATED IN PARAGRAPH (d) ABOVE.

No Products shall be returned without Tolomatic's prior written consent. Products which Tolomatic consents to have returned shall be shipped by Buyer at Buyer's risk and expense, freight prepaid, to such location as Tolomatic designates.

## ■ Limitation of Liability

Tolomatic shall in no event be liable to Buyer or any third party, whether in contract, tort (including negligence), misrepresentation, strict liability or otherwise, for any incidental, punitive, consequential, indirect or special damages, including any loss of profits or savings or anticipated profits or savings, loss of data, loss of opportunity, loss of reputation, loss of goodwill or business or potential business, however caused, even if Tolomatic has been advised of the possibility of such damages in advance.

Under no circumstances shall Tolomatic's liability to Buyer in connection with any purchase order or Products supplied to Buyer exceed an amount equal to the amount paid by Buyer for such Products.

Buyer agrees and understands that it is solely Buyer's responsibility to ensure that Products are suitable for Buyer's requirements and for the environment, facilities or machinery for which they are intended by Buyer or by its end-customer to be fitted or used. Even if Tolomatic is advised of Buyer's intended use, Tolomatic makes no representation or warranty that the Product will be suitable for that purpose. Any technical advice furnished by Tolomatic relating to the intended use of the Products

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Insofar as any liability or warranty of Tolomatic cannot be limited or excluded under applicable law, including any laws that do not permit limitations on liability relating to death or personal injury, the provisions of these terms and conditions shall be construed as being subject to such legal limitations, but only if those legal provisions have effect in relation to Tolomatic's liability notwithstanding the governing law provision in Section 18

## ■ Product Return Procedure

1. Before initiating the RMA process and obtaining an RMA number, please contact the Tolomatic Technical Support team to determine if it is possible to correct the issue in the field.
2. If an RMA is needed your Tolomatic Technical support team will initiate the RMA process and set up an RMA number. If possible, please contact your local distributor from which the actuator was originally purchased to begin the RMA process.

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## ■ End of Life

Your RSA/GSA actuator has been designed to provide years of reliable and trouble-free service, but at some point in time it may be necessary to retire the unit from service. To protect our environment specific guidelines and requirements should be followed. The RSA/GSA actuator is primarily constructed from steel and aluminum and contains no hazardous materials.

- Appendix D: Certifications
- D.1 Declaration of Incorporation



## EU Declaration of Incorporation

No: 36004715\_00

We the manufacturer,

**Tolomatic**  
**3800 County Road 116**  
**Hamel, MN 55340**  
**USA**

Declare under our sole responsibility that the product(s),

**RSA and GSA Actuators**

**All Models other than the BZ NUT/SCREW option**

Fulfills the essential requirements of partly completed machinery in the following directives:

**EC Machinery Directive 2006/42/EC**

**RoHS Directive (2011/65/EU, as amended by (EU) 2015/863)**

**REACH (Regulation (EC) No 1907/2006)**

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.

Gary Rosengren  
Director of Engineering

13.05.2021

Date (MM.DD.YYYY)

# Tolomatic™

EXCELLENCE IN MOTION

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QUALITY SYSTEM  
CERTIFIED BY DNV GL  
= ISO 9001 =  
Certified site: Hamel, MN

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