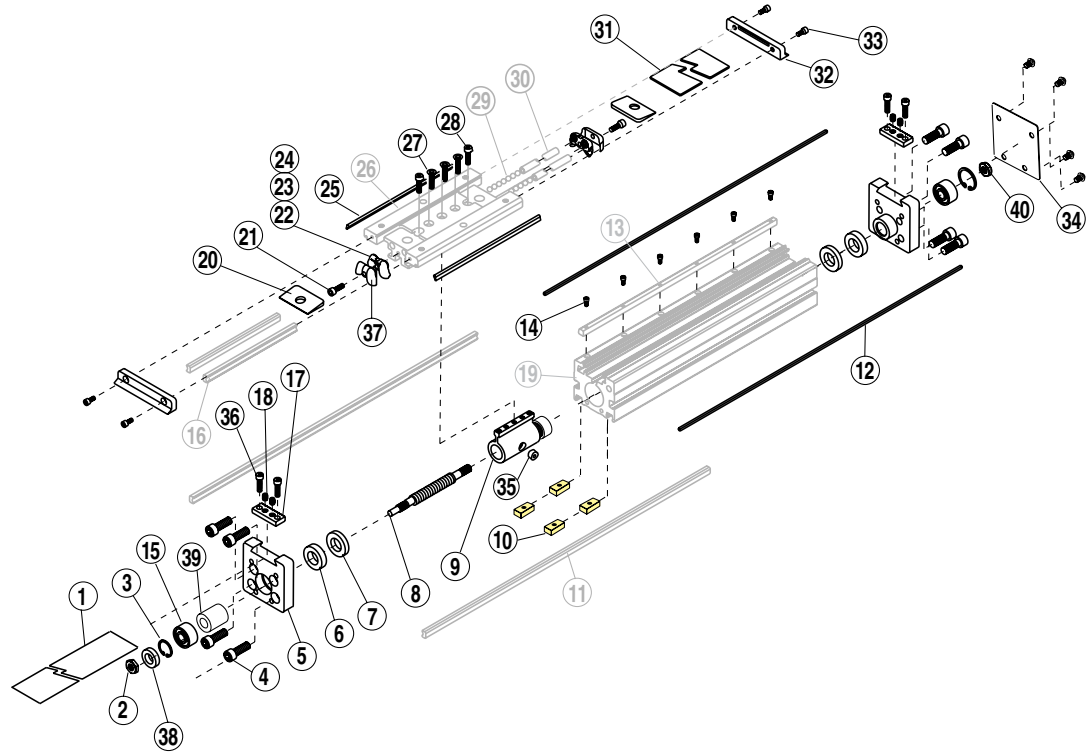


Drawing repeated for reference

NOTE: Items shaded cannot be field installed without proper assembly fixtures. For repair, return cylinder to Tolomatic.



ITEM	PART NO. OR CONFIG. CODE	DESCRIPTION	US CONV (SK)					METRIC (SM)				
			BN08	BNL08	SN01	SN02	SNA02	SN05	SN25*	SN12	BN08	BNL08
11.	3410-1241	RAIL WAY	2	2	2	2		2	2	2	2	2
	3410-1264	RAIL WAY					2					
512.	NMBB3S10_SK_	MAGNET BAND (US CONV)	2	2	2	2		2				
	NMBB3S10_SM_	MAGNET BAND (METRIC)					2	2	2	2	2	
13.	3410-1495	MACHINED WEDGE	1	1	1	1	1	1	1	1	1	
14.	0605-1079	SOCKET HEAD CAP SCREW	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	
15.	4510-1060	CONTACT BEARING	2	2	2	2	2	2	2	2	2	
16.	3410-1024	CARRIER WAY	2	2	2	2	2	2	2	2	2	
17.	3410-1219	UPPER CLAMP	2	2	2	2	2	2	2	2	2	
	4410-1219	UPPER CLAMP						2	2	2	2	
18.	3410-1343	SET SCREW (US CONV)	4	4	4	4	4	4				
	4410-1017	SET SCREW (MERIC)						4	4	4	4	
19.	3410-1472	MACHINED TUBE	1	1	1	1		1				
	3410-1474	MACHINED TUBE					1					
	4410-1472	MACHINED TUBE						1	1	1	1	
20.	3410-1047	UPPER BAND RAMP	2	2	2	2	2	2	2	2	2	
21.	0910-1357	SHCS (US CONV)	2	2	2	2	2	2				
	4905-1012	SHCS (METRIC)						2	2	2	2	
22.	3410-1014	BALL RETURN	2	2	2	2	2	2	2	2	2	
23.	3410-1015	RIGHT BALL RACE	2	2	2	2	2	2	2	2	2	
24.	3410-1032	LEFT BALL RACE	2	2	2	2	2	2	2	2	2	

ITEM	PART NO. OR CONFIG. CODE	DESCRIPTION	US CONV (SK)					METRIC (SM)				
			BN08	BNL08	SN01	SN02	SNA02	SN05	SN25*	SN12	BN08	BNL08
25.	3410-1510	WIPER	2	2	2	2	2	2	2	2	2	
26.	3410-2021	MACHINED CARRIER (US CONV)	1	1	1	1	1					
	4410-1235	MACHINED CARRIER (METRIC)						1	1	1	1	
27.	0515-1198	FLATHEAD CAP SCREW	3	3	3	3	3	3				
	44101018	FLATHEAD CAP SCREW							3	3	3	
28.	0605-1046	SHCS (US CONV)	2	2	2	2	2	2				
	4415-1001	SHCS (METRIC)							2	2	2	
29.	3410-1009	BALL BEARING	112	112	112	112	112	112	112	112	112	
30.	3410-1019	BALL RETURN TUBE	2	2	2	2	2	2	2	2	2	
31.	3410-2022	CARRIER COVER	1	1	1	1	1	1	1	1	1	
32.	3410-2024	END CAP	2	2	2	2	2	2	2	2	2	
33.	0605-1079	SHCS (US CONV)	4	4	4	4	4	4				
	4905-1005	SHCS (METRIC)							4	4	4	
34.	3410-9052	HEAD END KIT (US CONV)	1	1	1	1	1	1				
	4410-9052	HEAD END KIT (METRIC)							1	1	1	
35.	2403-1008	MAGNET	2	2	2	2	2	2	2	2	2	
36.	0610-1077	SHCS (US CONV)	4	4	4	4	4	4				
	4905-1012	SHCS (METRIC)							4	4	4	
37.	3410-1079	PLT, BALL RETURN	2	2	2	2	2	2	2	2	2	
38.	3410-2014	WASHER, SPHERICAL	1	1	1	1	1	1	1	1	1	
39.	3410-2041	SLEEVE, TAPERED	1	1	1	1	1	1	1	1	1	
40.	0701-1059	NUT, HEX, 5/16-24	1	1	1	1	1	1	1	1	1	

²Available in Repair Kit No. 3410-9049

³Also included in nut bracket assembly (Item 9)

A/R = As Required

⁵ Replacement Magnet Band Kit ordering method: **NMB B3S10 D SK** (includes 2 magnet bands)

Dual 180

EXAMPLE: **NMB B3S10 D SK 21-25 DC7**

Lead Screw Model & Size Stroke Length Aux. Carrier

Auxiliary Carrier Option Note: If replacing a Lead Screw (8.), Band Magnet (12.), or Dust Band (1.) on an actuator that has an Auxiliary Carrier, be sure to add "DC ___" to the end of the configuration string when ordering. "DC" indicates the need for additional length and "___" indicates the measurement of space between carriers (in inches [SK] or millimeters [SM]) as indicated earlier in the configuration string.

Dual 180 Carrier Option Note: If equipped with the optional dual 180 carrier, add the letter "D" between the Model & Size and Stroke Length.

GENERAL CYLINDER DISASSEMBLY INSTRUCTIONS

Begin with a clean work area. Be sure all replacement parts are present and have no visual damage or defects. The following tools are recommended for proper disassembly and assembly (exact wrench sizes will vary depending upon cylinder size).

- Tin Snips
- Allen Wrench Set
- Open-end or Box Wrench Set and/or Sockets
- Retaining Ring Pliers

Main Unit Disassembly Instructions**1. Remove Motor Hardware and Dust Band.**

Remove any motor, RP, or gearhead hardware from the drive end of actuator. Loosen band clamp fasteners(36) and remove band both band clamps(17). Remove the carrier end cap fasteners(33) and end caps(32) from the carrier(26). Slide out the carrier cover(31) and remove the dust band(1).

2. Remove the Non-Drive end Head and Bearing.

Remove the non-drive end cap(34). Remove the non-drive end leadscrew nut(40), while holding the leadscrew from turning at the drive end. Do not allow the actuator carrier to bottom out on end of stroke. Remove head fasteners(4) from the non-drive end of actuator, remove that head(5). It is a slip fit between the bearing and leadscrew journal, but it may be necessary to 'pull' the head off w/ a puller tool as there may be some residual loctite holding the bearing on the leadscrew. Remove the bearing(15) from head by removing the snap ring(3).

3. Remove Leads Screw Assembly.

Remove carrier fasteners(27,28). Remove drive-end head fasteners(4), and remove leadscrew/head sub-assembly from actuator. Ballnut Style:

*Caution is required if removal of the nut or leadscrew is required. Contact the factory for available parts and procedures. Plastic/Bronze Nut Style: The leadscrew may be threaded out of the nut assembly at this point. The nut and nut coupler are pinned and secured w/ Loctite at the factory. If nut is worn, and new nut assembly must be ordered.

4. Remove Lead Screw and Bearing from Head.

Secure the body of the leadscrew in a machinist vice or equivalent smooth jaw vice, then remove the locknut(2). Support the taper bushing (39) if possible and press the leadscrew out of bearing and bushing. The bearing is a press fit on screw journal, and the bushing locked on by means of a mating tapered interface. The snap ring(3) and the bearing(15) can now be removed from the head.

Main Unit Assembly Instructions**1. Sub Assemble Head and Bearing to Lead Screw Assembly.**

Install the bearing(15) into the head(5) and install snap ring(3). Position over the lead-screw and nearest the drive end, the longer spacer(6) and the bumper(7). Position taper bushing(39), then bearing/head over lead-screw. It is necessary to press the bearing onto the leadscrew, ensure that the load is only applied to the inner race of the bearing. If not equipped to perform this it will be necessary to purchase this pre-assembled from the factory. Apply loctite 242 to the exposed threads of the leadscrew and install the spherical washer(38) and locknut(2) onto the threads of the leadscrew. Torque the locknut to 110 in-lbs, while leadscrew is secured in a machinist vice, or other smooth jaw vice.

2. Assemble Non-Drive end Head.

Slip bearing into the head, and install the snap ring, flat side of ring toward the bearing.

3. Assemble Lead Screw Assembly into the Tube.

Grease Leadscrew on both sides of Nut Assembly with a thin film of appropriate grease: either CHRISTOLUBE MCG 303, for solid nut actuators; or MOBIL HP MULTIPURPOSE PREMIUM GREASE for Ball Nut actuators. Install Leadscrew/Nut assembly in the tube such that as viewed from the motor end, the wedge side of tube is to the left.

4. Install Idle Head and Tighten Heads to Tube.

Attach and tighten the carrier(26) to the nut bracket(9). *On Auxiliary Carrier units, attach the nut bracket to the carrier nearest the motor end of the actuator. Attach the drive end Head to the end of Tube with four SHCS fasteners. Leave loose.

Position bumper and short spacer(if applicable) over the leadscrew and into the tube at the non-motor end. Attach the idle end head to the tube with 4 SHCS sliding the bearing over the journal of the leadscrew. Leave loose.

Move Carrier Assembly to motor-end of tube and tighten head bolts to 50-60 in-lbs. Support the actuator on the tube such that the head is free to float while tightening the head fasteners.

Move Carrier Assembly to non-motor end of tube and torque to 50-60 in-lbs. Support the actuator on the tube, such that the head is free to float while tightening the head fasteners.

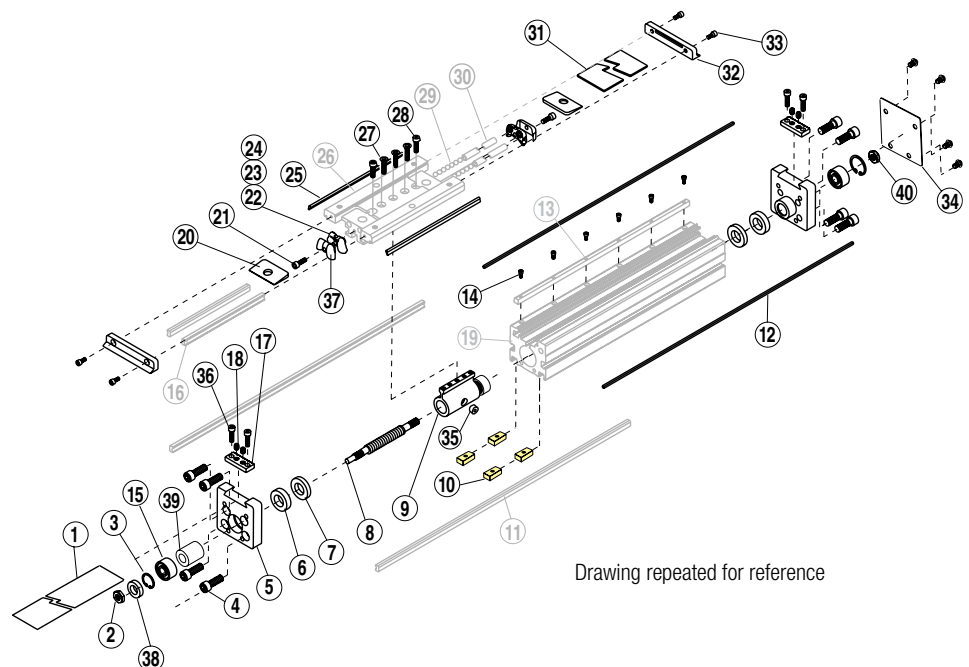
5. Secure non-motor end of leadscrew. Apply loctite 242 to the threads on the leadscrew and install the hexnut. Torque nut to 6-8 in-lbs.**6. Lubricate Ballways and install Dust Band.**

Lubricate full length of the ballways(11) with Mobil HP grease. Install Dust Band(1) over Carrier(26) centering it along the length of the actuator. Slide the carrier cover(31) into slots of the carrier, and secure end caps(32) to the carrier. With tin snips cut ends as need such that dust band is 1/16" in from ends of heads. Install the band clamps(17) to the heads, and tighten down the set screws(18) locking the band in place.

RAIL BEARING LUBRICATION

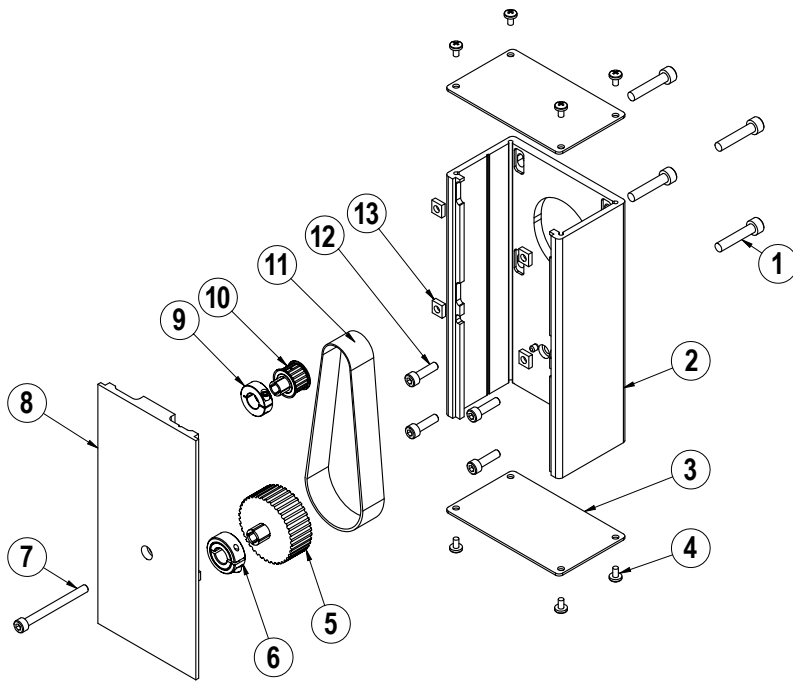
The bearing system is prelubricated at the factory with a high quality Mobil HP grease. Relubrication is recommended every .5-1 million cycles using Mobil HP grease for optimal bearing performance. To relubricate, remove Set Screws (18) and Upper Clamp (17). Lift back Dust Band (1) and apply grease directly to the stationary ball ways.

For special lubrication option grease, email help@tolomatic.com



Drawing repeated for reference

Reverse Parallel (RP) Mounting Option



ITEM	PART NO.	DESCRIPTION	QTY.
◊1.	CONFIGURED	MOTOR FASTENER	4
◊2.	CONFIGURED	RP HOUSING	1
◊3.	CONFIGURED	RP HOUSING END CAP	2
◊4.	CONFIGURED	END CAP SCREW	8
◊5.	CONFIGURED	DRIVE SHAFT PULLEY	1
◊6.	CONFIGURED	COLLAR CLAMP, DRIVE SHAFT	1
◊7.	CONFIGURED	RP COVER FASTENER	1
◊8.	CONFIGURED	RP COVER	1
◊9.	CONFIGURED	COLLAR CLAMP, MOTOR	1
◊10.	CONFIGURED	MOTOR PULLEY	1
◊11.	CONFIGURED	BELT	1
◊12.	CONFIGURED	RP PLATE FASTENER	4
◊13.	CONFIGURED	SQUARE NUT	4

◊ Part numbers varies depending on YMH (Your Motor Here). Contact help@tolomatic.com for replacement part numbers.

Disassembly Instructions

1. Remove End Caps (3), and release the tension on the Belt (11) by breaking loose the motor fasteners (1).
2. Remove the RP Cover (8).
3. The Belt (11) can now be removed along with the Motor.
4. Remove both Pulleys (10) and (5) from their respective shafts.
5. Remove the RP Housing (2) from the actuator head by removing the Fasteners (12).

Assembly Instructions

Note: Apply Loctite #242 to all fasteners upon installation

1. Install RP Housing (2) onto the actuator Head with Fasteners (12).
2. Install the Motor to the RP Housing with Fasteners (1) and Square Nuts (13). Do not tighten the fasteners at this time.
3. Locate the Belt (11) over the Pulleys (10) and (5) and slide both pulleys over their respective shafts. Tighten each pulley to its shaft with the Collar Clamps (9) and (6).
4. Position the Cover (8) in the mating slot of the RP case and install the Fasteners (7) to hold it in place. Take care not to overtighten. If the cover is deflected, it can interfere with the leadscrew.

5. Tension the Belt (11) by pulling the motor away from the drive shaft with the appropriate tension force shown in the chart below. While tensioning, the actuator should be positioned so the weight of the motor does not affect the belt tension. Tighten the Motor Fasteners (1) while the tensioning force is applied to the motor.

SMALLEST SHAFT DIAMETER (Motor or Actuator)		TOTAL WEIGHT TO APPLY	
Inches	mm	lbs	kgs
0.18 to 0.259	4.572 to 6.579	13	5.902
0.260 to 0.499	6.604 to 12.675	22	9.988
0.500 to 0.625	12.7 to 15.875	31	14.074
0.625 and larger	15.875 and larger	40	18.160

Additional tips are found in Tolomatic [Electric Actuator Motor Mounts Technical Note # 3600-4203](#).

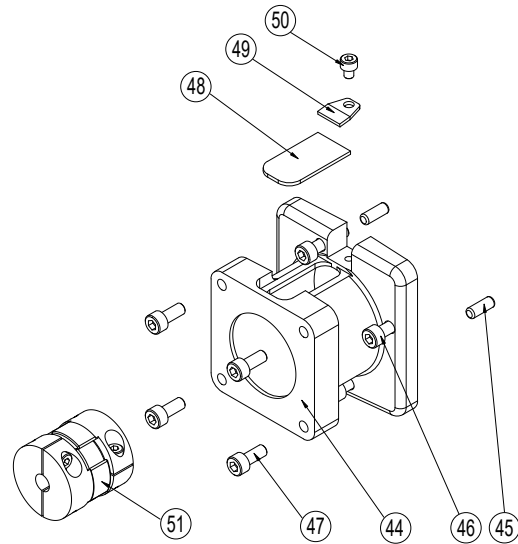
6. Verify that there is clearance between the inside of the RP case and each pulley. Verify the pulleys are aligned to each other.
7. Install both End Caps (3) with the Screws (4) to finalize the assembly.

In-Line (LMI) Mounting Options

ITEM	PART NO.	DESCRIPTION	QTY
◊44.	CONFIGURED	MOTOR SPACER	1
◊45.	CONFIGURED	DOWEL PIN	2
◊46.	CONFIGURED	SCREW	4
◊47.	CONFIGURED	SCREW	4
◊48.	CONFIGURED	COVER	1
◊49.	CONFIGURED	CLAMP	1
◊50.	CONFIGURED	SCREW	1
◊51.	CONFIGURED	COUPLER	1

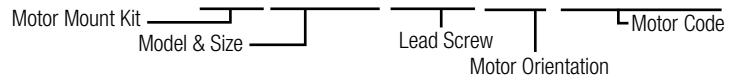
◊ Part number varies depending on YMH (Your Motor Here).
Contact help@tolomatic.com for replacement part number.

A replacement Motor Mount Kit contains all parts listed above.



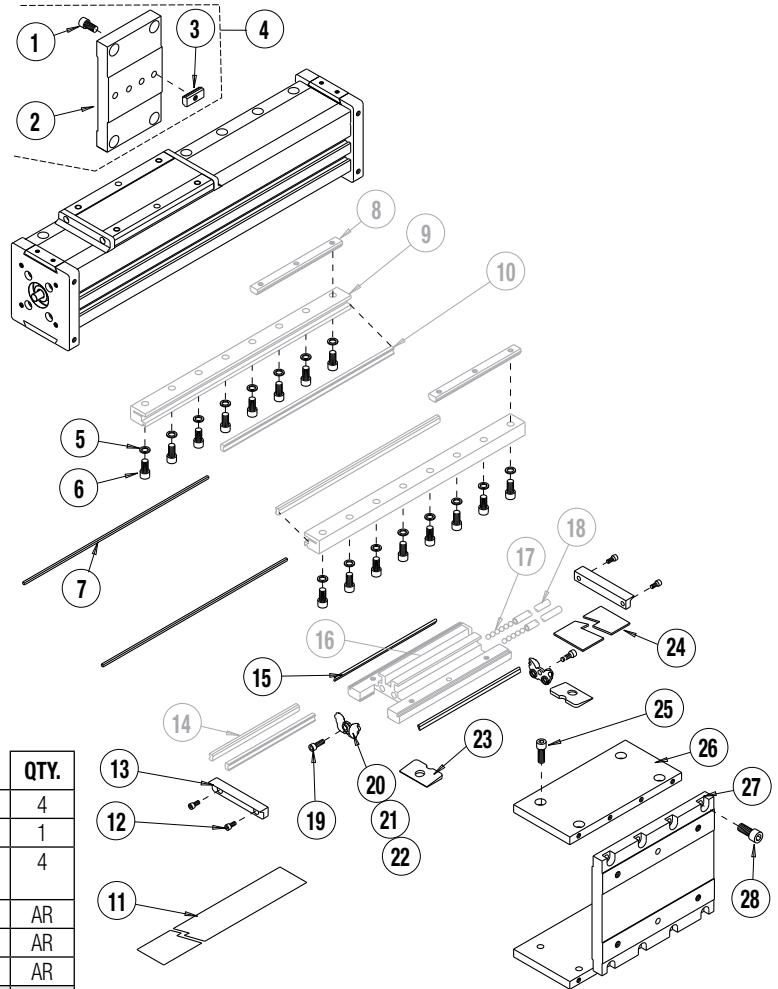
Replacement Motor Mount Kits ordering method: **MMK B3S10** **LMI YM**

EXAMPLE: MMK B3S10 BN08 LMI YM00TBDO



Dual 180° Option

NOTE: Items shaded cannot be field installed without proper assembly fixtures. For repair, return cylinder to Tolomatic.



ITEM	US CONV (SK)	METRIC (SM)	DESCRIPTION	QTY.
⁴ 1.	0915-1016	4415-1022	SOCKET HEAD CAP SCREW	4
⁴ 2.	3410-1053	3410-1053	TUBE SUPPORT	1
⁴ 3.	3410-1013	4410-1013	T-NUT FOR SLOTS 90° FROM CARRIER	4
4.	3410-9026	4410-9026	DUAL 180 TUBE SUPPORT KIT	AR
5.	3410-1048	3410-1048	WASHER	AR
6.	3410-1012	4410-1077	SOCKET HEAD CAP SCREW	AR
7.	3410-1240	3410-1263 ³	BAND MAGNET	AR
8.	3410-1008	3410-1008	RAIL NUT	AR
9.	3410-1242	3410-1265 ³	MACHINED RAIL	2
10.	3410-1241	3410-1264 ³	RAIL WAY	2
^{1,2} 11.	NDBB3S10_SK_	NDBB3S10_SM_	DUST BAND	AR
12.	0605-1079	4905-1005	SOCKET HEAD CAP SCREW	4
² 13.	3410-2024	3410-2024	END CAP	2
14.	3410-1023	3410-1023	CARRIER WAY	2
² 15.	3410-1510	3410-1510	WIPER	2
16.			MACHINED CARRIER	1
17.	3410-1009	3410-1009	BALL BEARING	112
18.	3410-1019	3410-1019	BALL RETURN TUBE	2
19.	0910-1357	7906-1067	SOCKET HEAD CAP SCREW	2
20.	3410-1014	3410-1014	BALL RETURN	2
21.	3410-1015	3410-1015	RIGHT BALL RACE	2
22.	3410-1032	3410-1032	LEFT BALL RACE	2
23.	3410-1047	3410-1047	UPPER BAND RAMP	2
24.	3410-2022	3410-2022	CARRIER COVER	1
25.	2317-1014	4415-1000	SOCKET HEAD CAP SCREW	8
26.	3410-1049	4410-1049	PLATE, CONN., DUAL CARRIER	2
27.	3410-1054	4410-1054	PLATE, DUAL CARRIER	1
⁴ 28.	2317-1014	4415-1000	SOCKET HEAD CAP SCREW	8

² Available in Repair Kit No. 3410-9049

³ For B3SSNA02 Only

⁴ Included in Tube Support Kit 3410-9026 or metric 4410-9026

AR = As Required

Auxiliary Carrier Option Note: If replacing a Dust Band (11.) on an actuator that has an Auxiliary Carrier, be sure to add "DC ___" to the end of the configuration string when ordering. "DC" indicates the need for additional length and "___" indicates the measurement of space between carriers (in inches [SK] or millimeters [SM] as indicated earlier in the configuration string).

Dual 180 Carrier Option Note: If equipped with the optional dual 180 carrier, add the letter "D" between the Model & Size and Stroke Length.

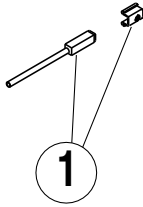
Dual 180

¹ Replacement Dust Band ordering method: **NDBB3S10** **D** **SK21.25** **DC7**

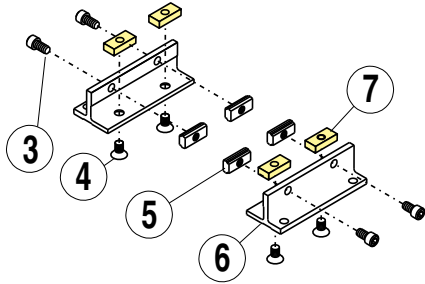
EXAMPLE: **NDBB3S10** **D** **SK21.25** **DC7**

Dust Band Model & Size Stroke Length Aux. Carrier

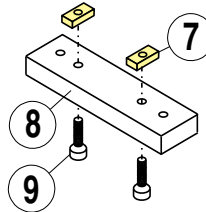
SWITCH KIT



TUBE SUPPORT KIT



MOUNTING PLATE KIT



Optional Accessories Parts Listing

ITEM	
SWITCH KIT	
CONFIG. CODE ORDERING	
CODE	DESCRIPTION
BT	SWITCH KIT, REED, FORM C, 5M
BM	SWITCH KIT REED, FORM C, QUICK DISCONNECT
RT	SWITCH KIT, REED, FORM A, 5M
RM	SWITCH KIT, REED, FORM A, QUICK DISCONNECT
1. CT	SWITCH KIT, TRIAC, 5M
CM	SWITCH KIT, TRIAC, QUICK DISCONNECT
KT	SWITCH KIT, HALL-EFFECT, SINKING, 5M
KM	SWITCH KIT, HALL-EFFECT, SINKING, QUICK DISCONNECT
TT	SWITCH KIT, HALL-EFFECT, SOURCING, 5M
TM	SWITCH KIT, HALL-EFFECT, SOURCING, QUICK DISCONNECT
NOTE: SWITCH BRACKET, SET SCREW, & MATING QD CABLE IS INCLUDED	

ITEM	US CONV	METRIC	DESCRIPTION	QTY.	
TUBE SUPPORT KIT					
	3410-9006	4410-9006	KIT INCLUDES ALL PARTS LISTED BELOW		
	3	0801-1251	4410-1005	SHCS, 10-24 X .44/ M5 X 10	4
	4	3410-1046	4410-1014	SFHCS, 10-24 X .38/ M5 X 10	4
	5	3410-1013	4410-1013	T-NUT	4
	6	3410-1044	3410-1044	TUBE SUPPORT	2
	7	3410-1775	4410-1708	T-NUT	4
MOUNTING PLATE KIT					
	3410-9057	4410-9031	KIT INCLUDES ALL PARTS LISTED BELOW (1" THICK)		
	7	3410-1775	4410-1708	T-NUT	2
	8	3410-1233	3410-1233	MOUNTING PLATE	1
	9	0801-1201	4415-1022	SOCKET HEAD CAP SCREW	2
	3410-9056	4410-9030	KIT INCLUDES ALL PARTS LISTED BELOW (1/2")		
	7	3410-1775	4410-1708	T-NUT	2
	8	3410-1232	3410-1232	MOUNTING PLATE	1
	9	0915-1016	4910-1004	SOCKET HEAD CAP SCREW	2

Switch Ordering NOTES

To order field retrofit switch and hardware kits for all Tolomatic actuators: SW (Then the model and bore size, and type of switch required)



REPLACEMENT SWITCH MODEL SWITCH CODE
 (Hardware and Form A Reed switch with 5 meter lead for 1" size B3S actuator)

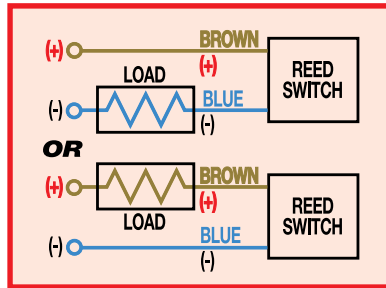
Mounting hardware is required if replacing switch for any actuator manufactured before 7/1/97

OPTIONAL ACCESSORY ASSEMBLY INSTRUCTIONS

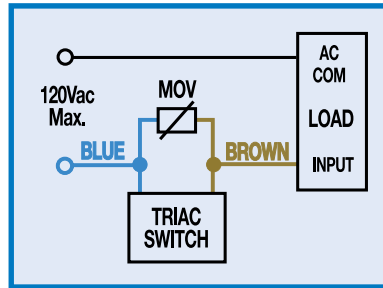
- TUBE SUPPORTS.** Four T-Nuts (5, 7) are required on each side of the Tube, two T-Nuts on bottom of Tube and two in lower slots on tube sides. Tube Supports should be secured at the required distances determined for the application to prevent Tube deflection. Apply Loctite #242 to Screws (3, 4) and secure Tube Supports (6) to Tube aligning holes in T-Nuts with holes in Tube Supports.
- Switches.** Secure Switch (1) to magnet side of Tube with Switch Clamp (2) and Set Screw.
- SWITCHES**
NOTE: Form A Reed Switches should not be used in TTL logic circuits. A voltage drop caused by the L.E.D. indicator will result. For applications where TTL circuits are used, please contact the factory.
WARNING: An ohmmeter is recommended for testing Reed Switches. NEVER use an incandescent light bulb as a high current rush may damage the switch.
 Reed and TRIAC switches are only recommended for signalling position, not directly powering solenoids. For shifting a solenoid, a relay or resistor is recommended between it and the Reed Switch. Switch ratings must not be exceeded at any time.
NOTE: For Hall Effect Switch Magnet, be sure the S pole of the magnet (indicated with black dot) is facing toward the switch (down).

WIRING DIAGRAMS

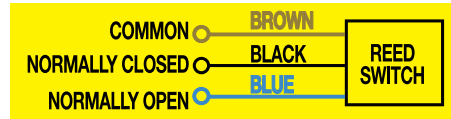
R T & R M DC REED, FORM A



C T & C M AC REED, TRIAC

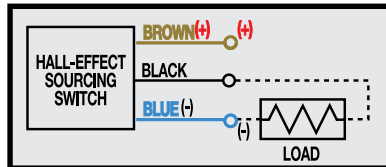


B T & B M DC REED, FORM C

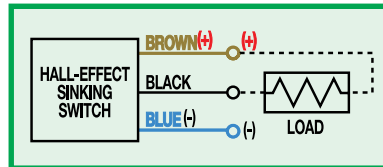


Some actuators may require switch mounting on a specific side of the assembly. Contact help@tolomatic.com for details.

T T & T M HALL-EFFECT, SOURCING, PNP



K T & K M HALL-EFFECT, SINKING, NPN



INSTALLATION INFORMATION



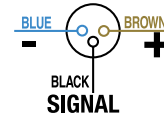
⚠
THE NOTCHED FACE OF THE SWITCH INDICATES THE SENSING SURFACE AND MUST FACE TOWARD THE MAGNET.

REPLACEMENT OF QD SWITCHES MANUFACTURED BEFORE JULY 1, 1997:

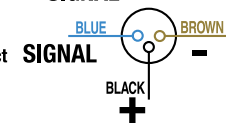
It will be necessary to replace or rewire the female end coupler.



CURRENT Quick disconnect Wiring



OLD Quick disconnect Wiring



Female Connector 5M

Christo-Lube® is a registered trademark of Lubrication Technology, Inc., www.lubricationtechnology.com
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