

LACPACC Linear Actuator Assembly Repair Kit Instructions For SureMotion™ LACP Series Compact-Slide Linear Actuator Assemblies

REPAIR KITS COVERED BY THESE INSTRUCTIONS

Repair Kit Product Compatibility	
Repair Kit #	Linear Actuator Assembly #
LACPACC-002	LACP-16TxxLP5 (0.5-in lead screw pitch)
LACPACC-003	LACP-16TxxL1 (1-in lead screw pitch)

COMPONENT PARTS INCLUDED IN THE REPAIR KIT

- 4 ea Flanged Bearings 6mm ID, 15mm OD
- 2 ea Spacer Washers
- 4 ea Sliding Bearing Elements
- 1 ea Coupler
- 1 ea Lead Screw Nut
- 2 ea Bellville Washer Springs
- 1 ea Lubrication Pen Applicator
- 2 ea Lock Nuts



TOOLS

REQUIRED TOOLS

- Metric hex key set
- Imperial hex key set

OPTIONAL TOOLS

- Open ended 12mm wrench, pliers, or equivalent tool for lock nut removal



WARNING: BEFORE REPAIR IS PERFORMED, ALL ELECTRICAL POWER TO THE SYSTEM COMPONENTS SHOULD BE REMOVED, AND THE PAYLOAD MUST BE REMOVED FROM THE CARRIAGE. FOR EASE OF REPAIR, THE SYSTEM SHOULD IDEALLY BE DETACHED FROM ITS MOUNTING SUBSTRATE.

TORQUE SPECIFICATIONS

Standard Steel Bolt/Screw Torque Specifications				
Bolt/Screw			Torque*	
Size	Pitch	Type	lb·in	lb·ft
6	32	Low Carbon Steel	8.7	-
8	32		17.8	
10	24		20.8	
1/4	20	SAE Grade 5 Med. Carbon Steel	-	10
5/16	18			19
3/8	16			33
7/16	14			54
1/2	13			78

* It is recommended to use 50% of listed torque when using steel threads into aluminum material.

Metric Steel Bolt/Screw Torque Specifications			
Bolt/Screw			Torque*
Size	Pitch	Type	N·m
M3	0.5	Standard 5D Med. Carbon Steel	0.6
M4	0.7		1.5
M5	0.8		3.0
M6	1.0		5.2
M8	1.0		12.5

* It is recommended to use 50% of listed torque when using steel threads into aluminum material.

ACTUATOR DISASSEMBLY

- 1) Loosen the drive coupler collar lock with a 2mm hex key.



- 2) Loosen the 4 mounting fasteners at the motor base using a 3/32-in hex key. Remove the motor assembly including the coupler.



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- 3) Loosen the set screw holding the sensor bracket with a 0.050-in hex key and remove the bracket, and remove the bracket on the opposite end of the actuator.



- 9) Remove the lead screw drive nut from the carriage using a 7/64-in hex key. Loosen and remove the two 6-32 x 1/2-in screws holding the drive nut. Discard the lead screw nut and Bellville washers.



- 4) Loosen the lock nut set screw using a 1.5mm hex key. Do not remove the set screw completely. Just loosen the set screw 1 or 2 complete turns.



- 10) Clean all components and remove any debris or accumulated contaminants. Inspect and clean the carriage block, drive screw, and slide tube. All anodized aluminum parts can be cleaned with alcohol or acetone. Avoid contact of cleaning fluid on the slide bushing liners and lead screw drive nut.

ACTUATOR ASSEMBLY

- 5) Using finger grip, or a 1/2-in open end wrench, unscrew and remove the lock nut from the lead screw. Hold the carriage steady while turning the nut. Repeat the lock nut removal on the opposite end of the actuator.



- 11) Install the drive screw nut on the lead screw. Note the proper orientation. The lead screw nut has a turned diameter which should be oriented toward the motor coupler side of the lead screw. The motor coupler side of the lead screw can be identified by the two turned diameters.



- 6) Remove all bearings from the lead screw ends and discard. Keep the bearing holders for the rebuild steps.
 7) Unscrew the lead screw from the carriage and remove it completely from the actuator base.
 8) Remove the carriage from the rail tube. Remove the sliding bushing liners from the carriage and discard them.

- 12) Locate the Bellville washer springs (2ea). Use a small amount of grease to hold the washers in place over the holes on the lead screw nut during assembly. See image above.
 13) Use the lead screw as a handle to guide and locate the drive nut under the carriage so as to align the mounting holes.



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14) Locate the 6-32 x 1/2-in cap screws (2ea). Apply Loctite 247 or equivalent and attach the drive nut to the carriage. Loosely install the fasteners to a point of light contact. Do not tighten at this point. Loose fasteners will make aligning the new slide bushing liners easier. Once the nut is secured, remove the lead screw from the nut.

15) With a 0.050-in hex key, loosen the four top adjusting screws. Loosen one full turn each.



16) With a 1/16-in hex key, loosen the two side adjusting screws. Loosen one full turn each. Repeat for the other two side adjusting screws on the opposite side.



17) Prepare the carriage for installation onto the slide tube. There are four slide bushing bearings in each repair kit. The two large bushings are for the side walls and are symmetrical to each other. The two smaller bushings are for the top walls and they are also identical to each other. Note that each bushing has a tab on the back side for alignment and correct placement.



18) Lay the carriage on its side and insert one of the two larger slide bushings into the housing. You will feel a positive snap when it falls into correct placement. Now place the second large slide bushing into the carriage so that it snaps into place. A little grease on the back side of the bushings will help to hold it in place until the slide tube is engaged.



19) Carefully slide the carriage onto the slide tube while holding the slide bushings in place. Ensure that the lead screw drive nut portion of the carriage is away from the drive end of the screw to allow for easier engagement and proper nut positioning.



20) Once the carriage is on the slide tube, vigorously move the carriage to seat the slide bushings and insure alignment. Slide the carriage to the drive end of the tube and expose as much of the inside of the carriage as possible. Do not slide the carriage off the end of the tube.

21) Insert one of the small slide bushings into the top of the carriage and position it as deep as possible. Push the bushing into place until it snaps into position.



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22) Insert the second small slide bushing into the top of the carriage and snap into place.



23) Once installed, move the carriage vigorously on the slide tube to insure proper seating of the sliding bearing elements.

24) Using a 1/16-in hex key, select a side mount pre-load fastener and tighten it until contact is made, then add an additional 1/16 of a turn more. Move on to the next pre-load fastener and repeat. This adjustment makes conforming contact with the entire slide of the slide tube. Anything more than slight contact is unnecessary and counterproductive unless you are seeking high rigidity. Over-tightening is not recommended.



ADJUSTING THE SLIDE BUSHING BEARINGS.

At this point, the carriage should move freely along the full length of the actuator tube. If not, review the procedure and re-install the sliding bearing bushings. If a few tight spots are encountered, we will adjust these as we progress.

The slide bushings are very sensitive to pre-load so adjustments must be made in very small increments. Finesse and feel are important in this process. There are no hard and fast numbers to adjust to and the type of pre-load you introduce should be based upon your application needs.

For extremely fast operations where efficiency is critical, a loose fit is appropriate. For applications where rigidity is more important, a tighter fit and feel is appropriate. For applications in the middle range your subjective feel comes into play to achieve the ultimate performance. Remember, the tighter the pre-load, the more rapid the wear.

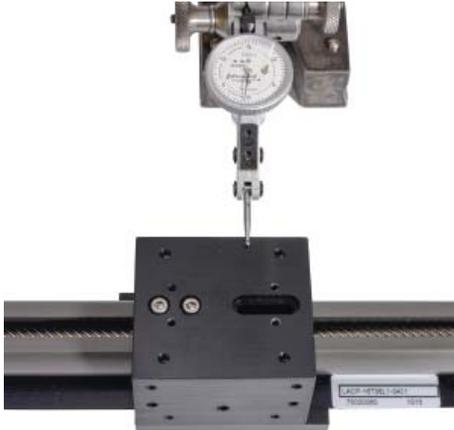
25) The top sliding bushing to rail adjustment is the most sensitive and critical. Very small movement here is required. Use a 0.050-in hex key and tighten one of the adjusting screws one full turn. Move the carriage and test for feel. If the assembly is still loose, keep tightening until the carriage does not move then loosen until the carriage slides smoothly. Next, adjust the fastener directly across the carriage and repeat. Continue the process until all four fasteners have been adjusted.



26) Vigorously move the carriage on the slide tube to seat the bearings again. Repeat step #25 if necessary to achieve your desired fit and feel.

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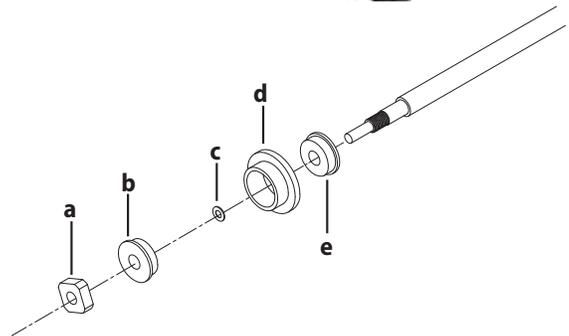
27) Check that the carriage is aligned to the slide tube. Place the actuator assembly under a height indicator and move the carriage under the indicator. Measure the flatness and level alignment to the actuator base. A good adjustment can be as tight as 0.002-in across the carriage top and from side to side.



If you need to make adjustments at this point, remember that slight adjustments to the top sliding bushing fasteners have a big impact on the feel and assembly height. Side to side rock is inherent in the round shaft design but is less pronounced when completely assembled.

28) Install the lead screw into the slide tube and through the lead screw drive nut. Be certain to orient the lead screw properly with the drive end located at the motor mounting side of the actuator base.

29) Assemble the end support flanged bearings, washer and nuts at both ends of the drive screw. Install the first flange bearing onto the drive screw oriented so that the flange butts against the machined shoulder. Next, add the washer and then the bearing holder with the flange oriented toward the carriage. Install the second bearing into the bearing holder, and then screw the lock nut onto the lead screw. Note that the lock nut has a small shoulder on one side which should face the bearing and will contact only the inner race for proper pre-load. Repeat these steps on the opposite end of the actuator lead screw.



- a) Lock Nut
- b) Outer Bearing
- c) Washer
- d) Bearing Holder
- e) Inner Bearing

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30) Use finger force to tighten the lock nuts onto the lead screw. Move the carriage to test for ease of motion and re-adjust to eliminate any clearance. Introduce only a slight pre-load. Make certain the bearings are seated properly against the shoulders. If a lock nut is over-tightened it will reduce the efficiency and can cause premature bearing failure. When tightened to satisfaction, remove the set screws from the lock nuts and apply Loctite 247 or equivalent. Install the set screws and tighten to a snug fit.

31) Rotate the drive screw so that the carriage reaches both travel extremes. Ensure full motion in both directions. Move the carriage to the left extreme. Use a 7/64-in hex key to loosely tighten the fasteners on the lead screw drive nut. Move the carriage to the right extreme and tighten both fasteners. Move the carriage through full travel extremes, and check for binding.



32) Install the sensor mount brackets at both ends. Note the orientation of the sensor flags on the carriage bottom. Secure using a 0.050-in hex key on the set screws.



33) Install the new coupler onto the lead screw using a 2mm hex key.



34) Install the motor bracket and motor flange to the base using a 3/32-in hex key. If a motor is present, secure the motor shaft to the coupler using a 2mm hex key.



35) Use a lubrication pen to apply a liberal amount of lubricant to the top rail of the slide tube. Apply lubricant to all outside surfaces of the slide tube. Apply a liberal amount of lubricant directly onto the lead screw. Move the carriage through the full travel stroke to ensure an even coating of lubricant. Wipe away any excess lubrication.