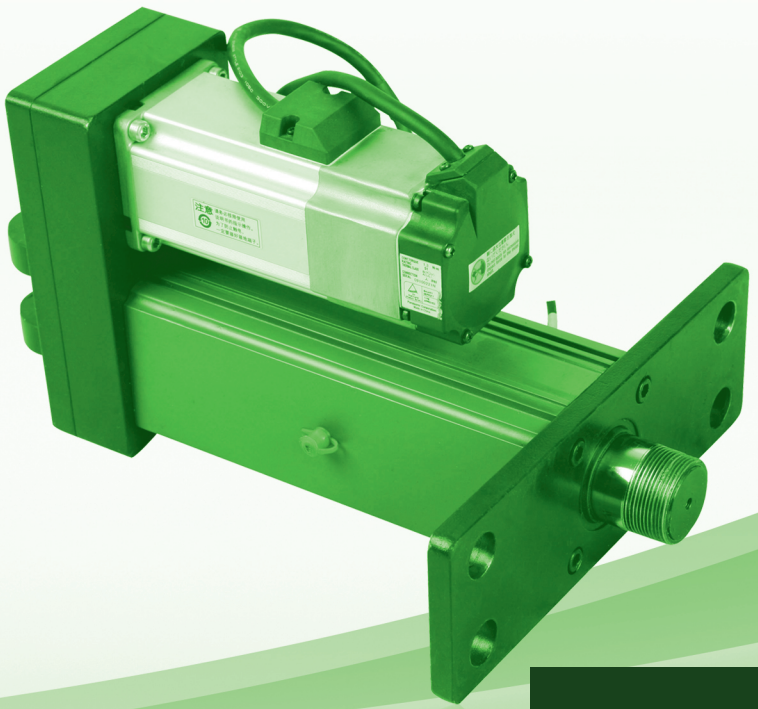
2024 Lim-Tec®

Instruction Manual



Servo linear actuator Installation Operation and Maintenance Manual

LIM-TEC (Beijing) Transmission Equipment CO., LTD.

Preface

Information furnished by Lim-Tec is believed to be accurate and reliable. However, no responsibility is assumed by Lim-Tec for its use. Lim-Tec reserves the right to change the design or operation of the equipment described herein and any associated motion products that may appear in this document. Information in this document pertaining to equipment not furnished by Lim-Tec should be confirmed by that equipment manufacturer. Lim-Tec assumes no responsibility for changes to information by other manufactures or errors in that information or the description of that information. Information in this document is subject to change without notice.

Safety Instruction

- Do not operate dilapidated unit
- Please read the manual before installation.
- Follow the relevant safety instructions below:

	Hazardous voltage	Live line work
	Mechanical hazards	The servo actuator may be damaged, posing a danger to the operator.
	Important instructions	
	Attention	

Introduction

IMB/DMB/FMR/EMB series servo linear actuators are integrated mechanisms that convert rotational motion into linear motion using ball screws and roller screws. The application is similar to widely used hydraulic and pneumatic actuators.

Ball screw actuator and roller screw actuator has compact structure, reliable performance, small size, light weight, low noise, convenient installation, use and maintenance easily, it has a longer life, higher rigidity and stronger impact resistance than trapezoidal screw actuator.

The servo linear actuator is equipped with a stroke adjustment mechanism. Users can adjust the working stroke arbitrarily within the rated stroke range.

Installation mode for servo linear actuator

Lim-Tec company provide users the below servo linear actuator installation methods.

1. Timing belt installation mode
2. Inline installation mode with coupling
3. Inline installation mode with planetary reducer

Selection for servo linear actuator

1. Selection for servo linear actuator's type of structure
2. Selection for servo linear actuator's installation mode
3. Selection for servo linear actuator's force
4. Selection for servo linear actuator's stroke
5. Selection for servo linear actuator's speed

■It depends on the user's demands, or consult with Lim-Tec engineer.

Principle and wiring diagram of servo linear actuator

1. For the wiring and usage instructions regarding the servo motor and driver paired with servo linear actuator, please refer to the instruction manual provided with the servo motor and driver, or consult the technical documentation from the manufacturer.

2. Circuit diagram of FCM magnetic induction limit switch (Figure 002)

The limit switch FCM stops the servo linear actuator when it reaches the limit position, thus protecting the servo linear actuator. The structure of the FCM limiting device is shown below (Figure 001). It is composed of NC/NO magnetic induction switches fixed on the outer side of the servo linear actuator and the ring magnet on the internal screw nut of the actuator body. The ring magnet forms a magnetic field zone around it, which induces the switches to change their states as the actuator moves. Multiple magnetic induction switches FCM can also be arranged between the front and rear limits to obtain position information of the servo linear actuator or stop at an intermediate position. Due to the width of the magnetic field zone, the minimum distance between two magnetic induction switches is 10mm. Additionally, the position information of servo linear actuator obtained by the same magnetic induction switch may differ due to the two directions of moving forward and backward. Moving the position of limit switch FCM can change the actual stroke of servo linear actuator.

FCM Specification		
Voltage	DC 24V	AC 220V
Power	20W	20VA
Current	300mA Resistance	
Inductive impedance	3W	

Note: FCM must be connected to the control circuit,it cannot be connected to the main circuit directly.

Matched with FCM :1m 2X0.25mm^2 cable

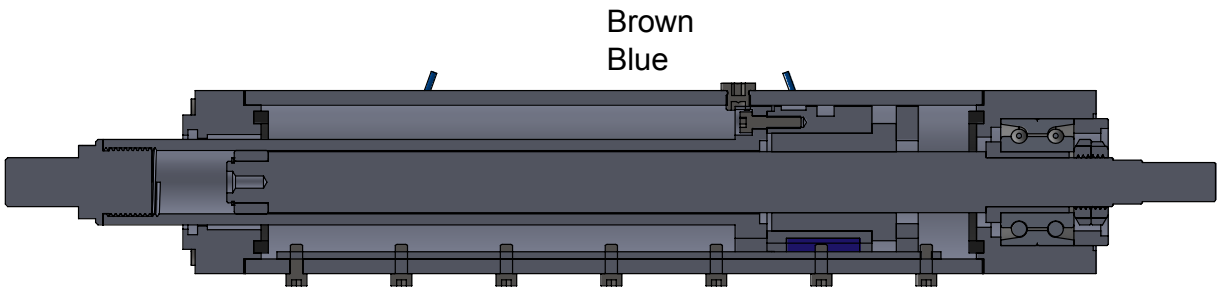


Figure 001

Servo linear actuator with magnetic induction limit switch

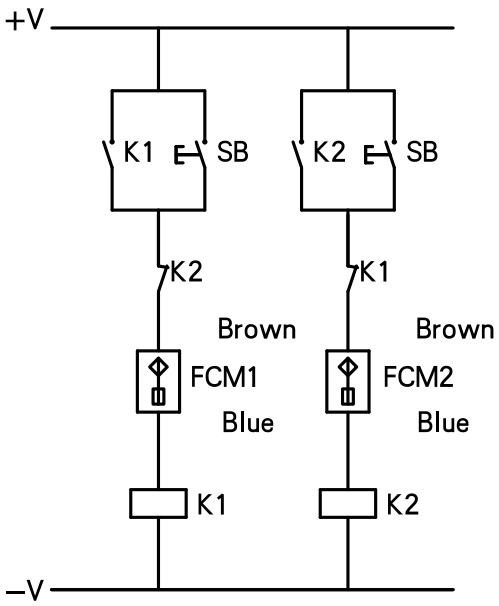


Figure 002
Magnetic induction limit switch FCM wiring diagram

3. Proximity switch FCP wiring diagram (Figure 004)
4. FCP limit switch structure is shown below (Figure 003)

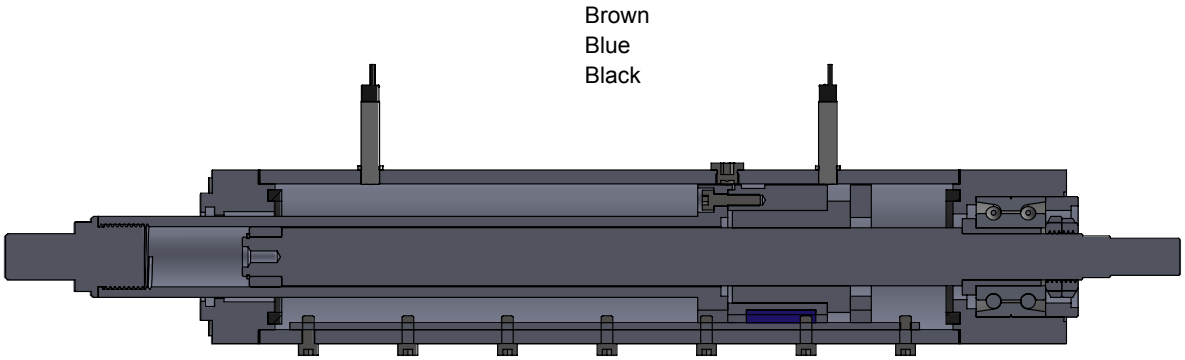


Figure 003

Servo linear actuator with proximity limit switch

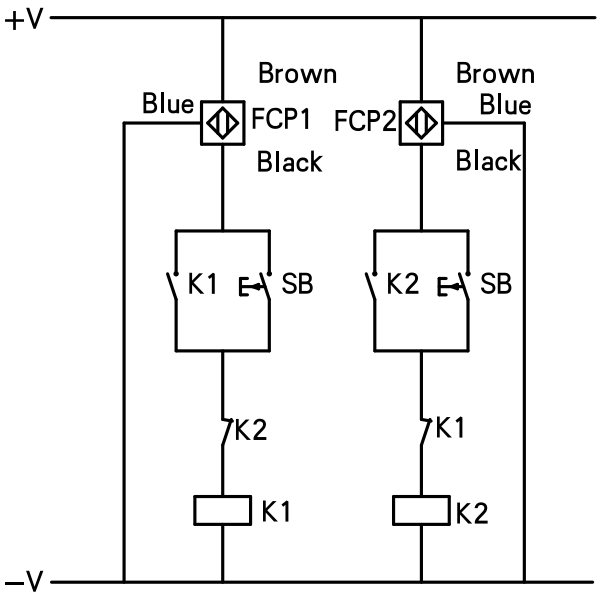


Figure 004

Proximity switch FCP wiring diagram

Installation and Commissioning

1. Installation and Test run

1.1. Positioning and installation

1.1.1. If the length of the servo linear actuator needs to be adjusted to facilitate installation (either extended or shortened),follow the steps below:

STOP	Set the length within the limits of the servo linear actuator (minimum value - Lc, maximum value - La, see Figure 005)

A) Servo linear actuator without anti-rotation device

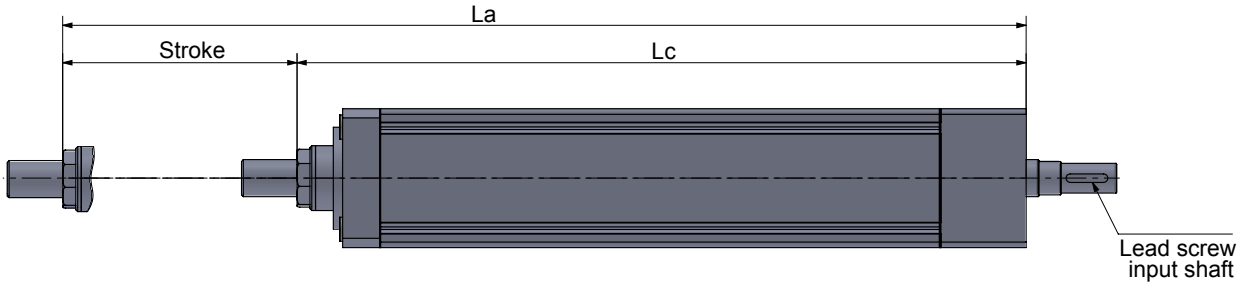
■ Rotate manually the piston rod direct or reverse until it reaches the desired length.

B) Servo linear actuator with anti-rotation device

■ Remove the motor

■ Rotate manually the lead screw input shaft direct or reverse to get the piston rod in place.

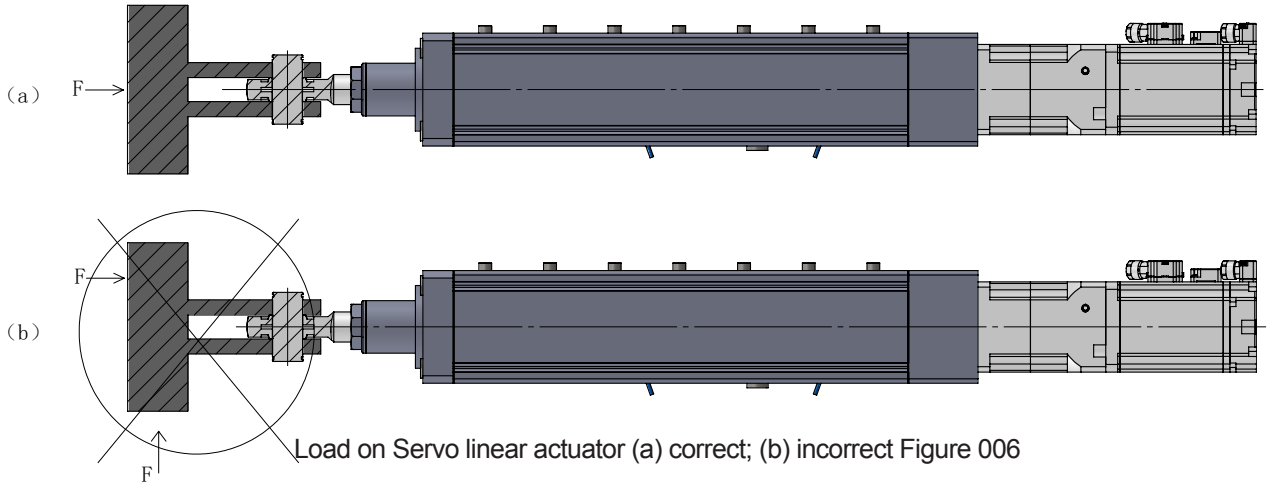
■ Alternatively, if retaining the motor, it is recommended to adjust the motor speed below 10 rpm and control the motor without load to position the piston rod in place.



Limit value of the Servo linear actuator length, minimum value Lc ,maximum value La, Figure 005

1.1.2. Check whether the installed parts are well machined and clean, and ensure that they match the dimensions of the parts to be installed on the servo linear actuator.

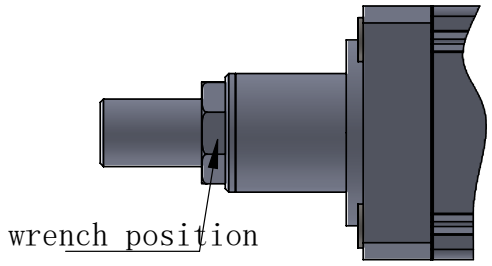
1.1.3. Install the servo linear actuator in the workshop, ensuring that it only bears axial loads (refer to Figure 006). If subjected to non-axial loads, the servo linear actuator will not function properly, severely impacting its lifespan.



Load on Servo linear actuator (a) correct; (b) incorrect Figure 006

Note: When there is a radical load on servo linear actuator, consider adding a linear guide module to ensure it with normal operation!

1.1.4 Try not to apply torque on the piston rod of the servo linear actuator, too much torque will damage the anti-rotation device inside it. When the piston rod of servo linear actuator is connected to external equipment, the wrench position for fixing the piston rod should be located outside the front-end joint of the servo linear actuator, as shown in the figure below.



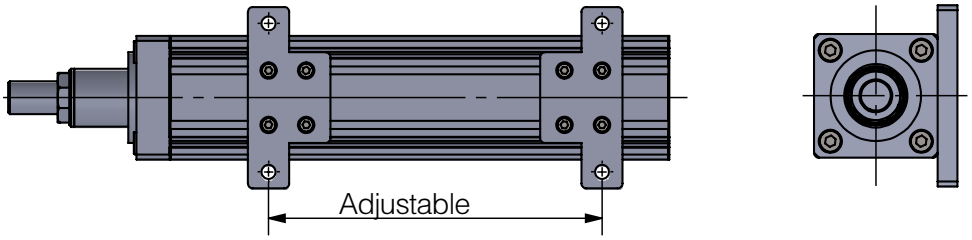
In order not to damage the anti-rotation device of the servo linear actuator, the torque applied to the piston rod shall not exceed the following values:

IMB/DMB/EMB10----3Nm
IMB/DMB/EMB30----11.4Nm
IMB/DMB40/FMR40----28Nm
IMB/DMB50/FMR50----40Nm
DMB70----76Nm
IMB/DMB100----152Nm
DMB500----214Nm

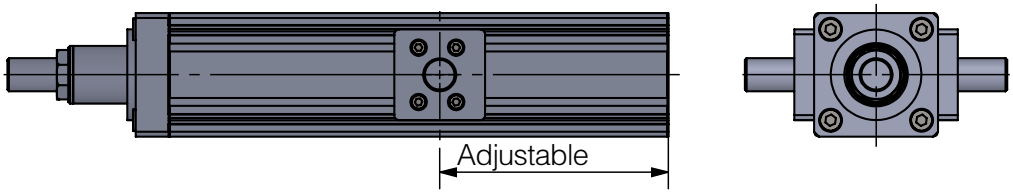
IMB/DMB/EMB20/FMR25----5.6Nm
IMB/DMB35/FMR35----14Nm
DMB45----28Nm
IMB/DMB60/FMR60----76Nm
IMB/DMB80/FMR80----136Nm
IMB/DMB200/FMR200----185Nm
Consult Lim-Tec engineers for the torque of multi-stage telescopic cylinders.

1.2. Servo linear actuator side plate and trunnion mounting mode and fixing bolt torque.
1.2.1. Installation methods of side plate and trunnion for different types of servo linear actuator are shown in the following figure (Figure 007).

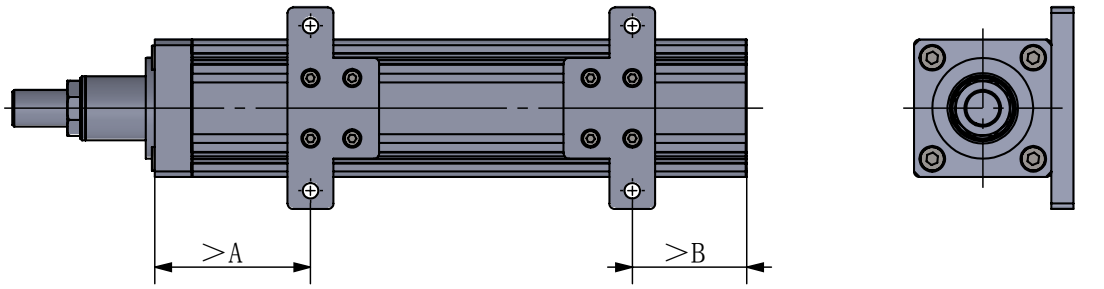
IMB10/20/30 Side plate mounting SF



IMB10/20/30 Trunnion mounting ST



IMB,DMB40/50/60 Side plate mounting SF



IMB,DMB40/50/60 Trunnion mounting ST

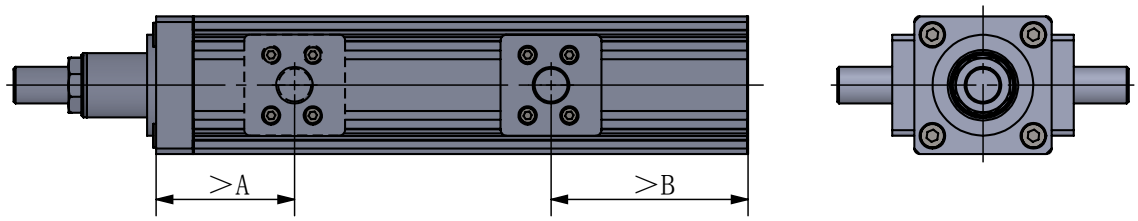


Figure 007

The side plate and trunnion mounting position for different types of servo linear actuator, DMB/EMB/FMR series cannot be adjusted.

1.2.2 IMB05/10/20/30 Servo linear actuator side plate and trunnion mounting mode is groove clamping screw installation, mounting plate and trunnion position can be adjusted in any position in the groove according to the needs of customer's equipment, DMB/EMB/FMR25/10/20/30 is a fixed position.
IMB/DMB/FMR40/50/60/70/80/100/200/500 Servo linear actuator side plate and trunnion mounting mode is screw fixed installation, the position of mounting plate and trunnion should be determined by the customer before ordering. Please refer to the product dimension drawing for the specific adjustment range in catalog.

Note: The mounting plate and trunnion must be ensured to be perpendicular to the direction of motion of the servo linear actuator, otherwise it will seriously affect the service life of actuator!

Screw torque values reference table for IMB/DMB/EMB/FMR series servo linear actuator with side plate and trunnion mounting as below:

Servo linear actuator model	Attachment materials	Torque value （N.m）
IMB/DMB/EMB/FMR25/10/20/30/40/50/60/80/100/200/500	Alloy Steel	28.5
IMB/DMB/EMB/FMR25/10/20/30/40/50/60/80/100/200/500	Stainless steel	19.1

1.3. Test Run

1.3.1. Run a working cycle without load

1.3.2. Gradually increase the load running duty cycle until reaching maximum load.

Lubrication

IMB/DMB/EMB/FMR series servo linear actuator has been filled with grease before delivery. The interval for regular lubrication of bearings and ball screws is as follows:

Average rotational speed of the ball screw(RPM)	Recommended interval time of filling grease (Hours)
250	10000
500	10000
1000	8000
1500	7000
2000	5800
2500	5000
3000	4000

Lim-Tec recommends the use of Mobil XHP222, a high-performance, ultra-strong pressure lubricating grease. This specialized synthetic grease reduces wear, rust, corrosion, and ensures normal operation in high and low temperature environments. Mobil XHP222 grease can achieve very low starting and running torques. Its operating temperature range is -20°C to +150°C. For temperatures beyond this range, consult Lim-Tec engineers.

Disassembly and Installation of IMB series servo linear actuator

STOP	Make sure the power supply must be cut off before disassembly and reassembly

When disassembling, replacing parts, and subsequently reassembling the servo linear actuator, the following conditions must be met:

■ Trained professionals
■ Relevant equipment
■ Basic knowledge of the composition
■ Follow the correct procedures
■ Compliance with current national and regional health and safety regulations.

If there are any uncertainties, please contact Lim-Tec or its authorized agents.

The following description concerns the specific locations of the parts, which are indicated on the corresponding drawings.

6.1 Disassembly of limit switch:

A) Magnetic induction type limit switch

1. Unscrew the fixed screw of the limit switch
2. Take down the limit switch

B) Proximity limit switch

1. Unscrew the fixed screws of the switch bracket
2. Remove the limit switch with the bracket

6.2 Disassembly of IMB servo linear actuator (Figure 008)

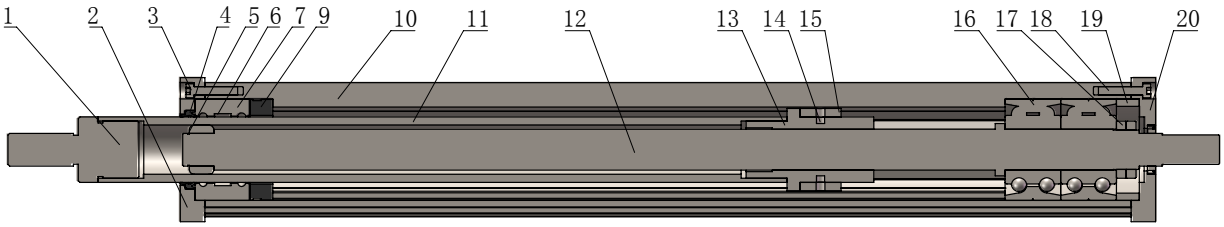


Figure 008

C) Disassembly of servo linear actuator:

1. Unscrew eight screws 3 and 18 on both ends of the fixed actuator body 2 and 20 counterclockwise;

2. Remove bearing retaining ring 19 and O-ring 5 from both ends of the actuator body;

3. Tap the front end joint 1 gently to disassemble the front end joint 1, piston rod 11, ball screw 12, ball nut 13, anti-rotating block15, bearing 16 and other parts along the axial direction.

4. Heat the threaded part connected between the front end joint 1 and the piston rod 11 to soften the thread sealant, then unscrew the front end joint, heat the threaded part connected between the piston rod 11 and ball nut 13, soften the thread sealant and then unscrew the piston rod 11.

5. Heat the thread of the lock nut, soften the thread sealant and then unscrew the two lock nuts.
6. Knock evenly along the outer ring of bearing 16 to remove the bearing 16.
7. Unscrew the two set screws 14 of anti-rotating block 15 and remove it from the ball nut.

DISPOSE LUBRICANT PROPERLY!

Disassembly of Inline series servo linear actuator (Figure 009)

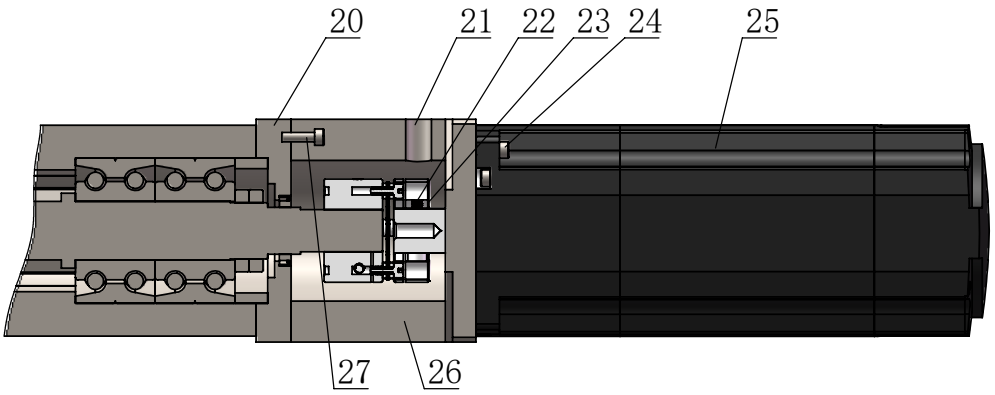


Figure 009

D) Disassembly of Inline servo linear actuator
1. Unscrew the screw plug 21 and loosen the clamping screw 22 on the coupling 23.
2. Unscrew the four fixed screws 24 of the servo motor 25 and remove them together with the coupling 23 and the servo motor 25
3. Unscrew the four screws 27 on the connecting flange 26 and remove the connecting flange 26
4. The remaining steps for disassembly are the same as those servo linear actuator disassembling.

6.4

Disassembly of Timing belt parallel series servo linear actuator (Figure 010)

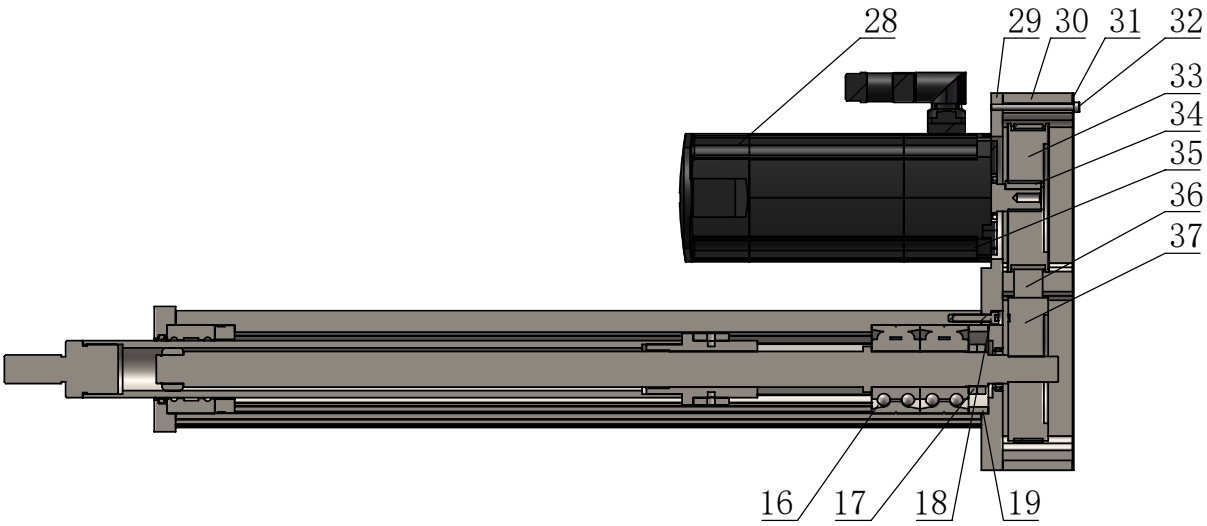


Figure 010

1. Unscrew the box cover screw 32, remove the box cover plate 31 and the box support plate 30.
2. Loosen the fixed screw 35 of the servo motor 28 and move the motor downward along the screw slot to make the timing belt 36 in relaxed state.

3. Screw out the tightening screws on taper lock bush of two timing pulleys 33 and 37, then screw into the screw hole of taper lock bush respectively, tighten the screws evenly to loosen the shaft sleeve on the hub, take off the two timing pulleys 33 and 37 and the timing belt 36 (A detailed instructions of the installation and removal of timing pulleys can be found in the section on the use and maintenance of timing belt and timing pulley).

4. Unscrew the fixing screw 35 of the servo motor 28 and remove the servo motor 28.
5. The remaining steps for disassembly are the same as those servo linear actuator disassembling.

6.5 Before reassembly

1. Before starting the assembly, attention should be paid to the following points:

1) Read the instructions carefully. Follow the steps in the instructions when and where to use these materials and assemble them.

2) NITRO-SOLVENT cleaning is required for all parts to be cemented with thread sealant.

3) All processed parts surfaces, threads, and areas where sealant is to be applied are prohibited from being touched by hand.

4) Apply thread sealant on the external threads evenly with a brush. and a small amount of sealant at the beginning of the internal threads.

5) Screw the internal thread into the external thread vertically.

6) Allow the thread sealant to polymerize for (3-5) minutes.

7) Loctite 263 lock sealant is recommended for use.

All threaded parts fixed by thread-lock must be tightened with the appropriate force.					
M5	6Nm	M6	11Nm	M8	26Nm
M10	52Nm	M12	60Nm	Note: Consult Lim-Tec engineers for other specifications not being listed.	

6.6 Assembly of Inline series servo linear actuator

1. Check all parts and components to make sure they are correct and complete.

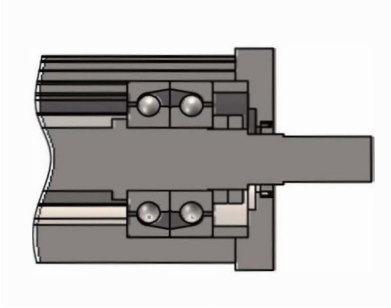
2. Blow and clean all parts such as lead screws, pulleys and sleeve parts to ensure there are no dust, iron filings or other debris.

3. Install the lead screw guide bearing on the ball screw, and install a shaft using elastic retaining ring.

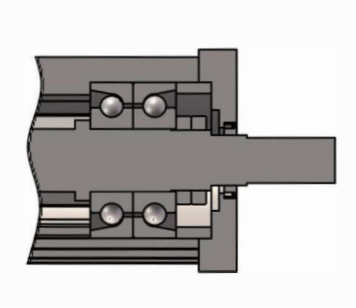
4. Lubricate ball screw pair appropriately and evenly. Use a special tiger clamp (with arc-shaped copper blocks on the jaws) to clamp the ball nut on the work-bench (which has through-holes for the ball screw to pass through). After applying thread sealant to the ball nut, screw it into the piston rod.

5. Assemble the anti-rotation block onto the ball screw nut and lock it with an internal hexagon tapered end screw.

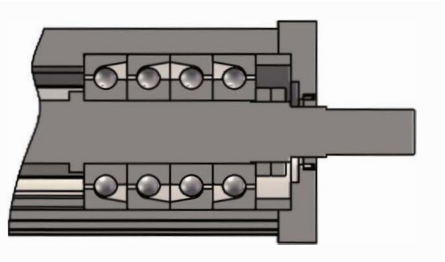
6. Using thermal mounting method (with a heat gun or oil heat), install the single-row angular contact ball bearing onto the ball screw in accordance with the specified method (see the picture below), and apply lubricating grease appropriately and evenly. Adjust the bearing clearance in place, install and tighten the bearing nut to secure the bearing.



IMB10 Bearing Installation Diagram



IMB20 Bearing Installation Diagram



IMB30--IMB200 Bearing Installation Diagram

7. Install the ball screw assembly into the outer tube of the servo linear actuator to ensure that the ball screw assembly operates smoothly within the outer tube of the servo linear actuator.

8. The buffer component is threaded through the piston rod and assembled into the hole at the front end of the outer tube of the servo linear actuator. Then the servo linear actuator guide bearing, guide bearing sleeve, and O-ring are assembled together and threaded through the piston rod into the hole at the front end of the outer tube of the servo linear actuator.

9. Install the O-ring in the groove at the front end of the outer tube of the servo linear actuator, and insert the front cover with double-lip dust seals through the piston rod into the front end of the outer tube of the actuator; (Note: If the servo linear actuator is installed with a front flange FF, install the front flange mounting plate on the front cover).

10. Install the bearing retainer into the rear hole of the servo linear actuator outer tube, pressing against the outer ring of the bearing. Then, place the O-ring into the groove at the rear end of the servo linear actuator outer tube. (Note: If the actuator is installed with a trunnion mount ST or a side mount SF, insert the square mounting nuts into the four long slots on the side of the actuator outer tube respectively.) Next, assemble the rear end cover of the actuator. Rotate the ball screw to ensure smooth rotation, and place the rotating oil seal into the corresponding groove on the rear end cover of the actuator.

11. Assemble the coupling housing onto the rear end cover of the servo linear actuator using hexagon socket cylindrical head screws, and simultaneously set the lead screw positioning sleeve onto the ball screw shaft.

12. Install the coupling and motor shaft coupling sleeve on the servo motor shaft. If there is a planetary gearbox, first assemble the planetary gearbox with the servo motor, then install the coupling and motor shaft coupling sleeve on the output shaft of the planetary gearbox. Ensure accurate positioning. Use a torque wrench to tighten the clamping screws on the coupling with the corresponding torque value to secure the coupling in place.
13. Next, assemble the coupling and servo motor together via the coupling housing and the ball screw. Use a torque wrench to tighten the clamping screws on the other end of the coupling to the appropriate torque value through the threaded holes on the coupling housing to secure the coupling.

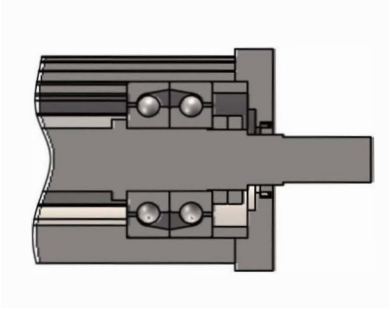
14. Tighten the mounting screws on the servo motor to assemble it with the coupling housing. Then, use the inner hexagon tapered end to tighten the screws and seal the threaded holes on the coupling housing.
15. Apply thread sealant to the threaded part of the front-end connector of the servo linear actuator, then install the front-end connector assembly and various mounting accessories.
16. Install the inductive proximity switch and ensure proper sealing between the FCP bracket, FCP seal plate, FCP large sealing gasket, and FCP small sealing gasket.
17. Check if the assembly of all parts is safe and correct.Conduct an electrical test run to ensure all indicators meet the standards.

6.7 Installation of parallel servo linear actuator

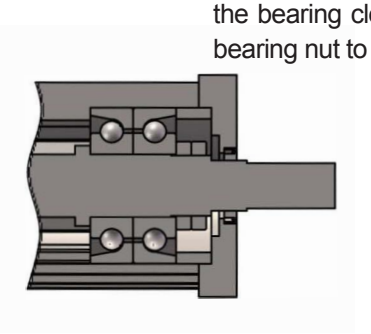
1. Check all parts and components to make sure they are correct and complete.
2. Blow and clean all parts such as lead screws, pulleys and sleeve parts to ensure there are no dust, iron filings or other debris.
3. Install the lead screw guide bearing on the ball screw, and install a shaft using elastic retaining ring.
4. Lubricate ball screw pair appropriately and evenly. Use a special tiger clamp (with arc-shaped copper blocks on the jaws) to clamp the ball nut on the workbench (which has through-holes for the ball screw to pass through). After applying thread sealant to the ball nut, screw it into the piston rod.

5. Assemble the anti-rotation block onto the ball screw nut and lock it with an internal hexagon tapered end screw.

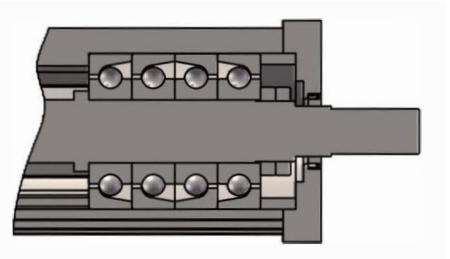
6. Using thermal mounting method (with a heat gun or oil heat), install the single-row angular contact ball bearing onto the ball screw in accordance with the specified method (see the picture below), and apply lubricating grease appropriately and evenly. Adjust the bearing clearance in place, install and tighten the bearing nut to secure the bearing.



IMB10 Bearing Installation Diagram



IMB20 Bearing Installation Diagram



IMB30--IMB200 Bearing Installation Diagram

7. Install the ball screw assembly into the outer tube of the servo linear actuator to ensure that the ball screw assembly operates smoothly within the outer tube of the servo linear actuator.

8. The buffer component is threaded through the piston rod and assembled into the hole at the front end of the outer tube of the servo linear actuator. Then the servo linear actuator guide bearing, guide bearing sleeve, and O-ring are assembled together and threaded through the piston rod into the hole at the front end of the outer tube of the servo linear actuator.

9. Install the O-ring in the groove at the front end of the outer tube of the servo linear actuator, and insert the front cover with double-lip dust seals through the piston rod into the front end of the outer tube of the actuator; (Note: If the servo linear actuator is installed with a front flange FF, install the front flange mounting plate on the front cover).

10. Install the bearing retainer into the rear hole of the servo linear actuator outer tube, pressing against the outer ring of the bearing. Then, place the O-ring into the groove at the rear end of the servo linear actuator outer tube. (Note: If the actuator is installed with a trunnion mount ST or a side mount SF, insert the square mounting nuts into the four long slots on the side of the actuator outer tube respectively.) Next, assemble the rear end cover of the actuator. Rotate the ball screw to ensure smooth rotation, and place the rotating oil seal into the corresponding groove on the rear end cover of the actuator.

11. Install the timing belt driven pulley onto the ball screw, and mount the servo motor onto the front cover of the timing belt housing (Note: If there is a planetary reducer, first assemble the planetary reducer with the servo motor, then install the planetary reducer and servo motor assembly onto the front cover of the timing belt housing).Note: Do not tighten the four screws of the servo motor to allow for adjustment of the center distance of the timing belt in the next step.

12. Install the timing belt pulley and the motor shaft sleeve onto the servo motor shaft. Install the timing belt and adjust it to achieve the appropriate frequency and tension to reach the correct center distance. Tighten the four screws of the servo motor to fix the center distance.

13. Install the support plate and the back cover of the timing belt housing, and fix them with screws. (Note: If the servo linear actuator is installed with mounting method RC, then assemble the rear clevis seat bolts, rear clevis seat and parts such as the copper sleeve onto the back cover of the timing belt housing.)
14. Apply thread sealant to the threaded part of the front-end connector of the servo linear actuator, then install the front-end connector assembly and various mounting accessories.
15. Install the inductive proximity switch and ensure proper sealing between the FCP bracket, FCP seal plate, FCP large sealing gasket and FCP small sealing gasket.
16. Check if the assembly of all parts is safe and correct.
17. Conduct an electrical test run to ensure all indicators meet the standards.

Disassemble and Installation of DMB/EMB/FMR series actuator

Make sure the power supply must be cut off before disassembly and reassembly

When disassembling, replacing parts, and subsequently reassembling the servo linear actuator, the following conditions must be met:

■ Trained professionals

■ Relevant equipment

■ Basic knowledge of the composition

■ Follow the correct procedures

■ Compliance with current national and regional health and safety regulations.

If there are any uncertainties, please contact Lim-Tec or its authorized agents.

The following description concerns the specific locations of the parts, which are indicated on the corresponding drawings.

7.1Disassembly of limit switch:

A) Magnetic induction type limit switch

1. Unscrew the fixed screw of the limit switch

2. Take down the limit switch

B） Proximity limit switch

1. Unscrew the fixed screws of the switch bracket

2. Remove the limit switch with the bracket

Disassembly of DMB/EMB/FMR servo linear actuator (Figure 011)

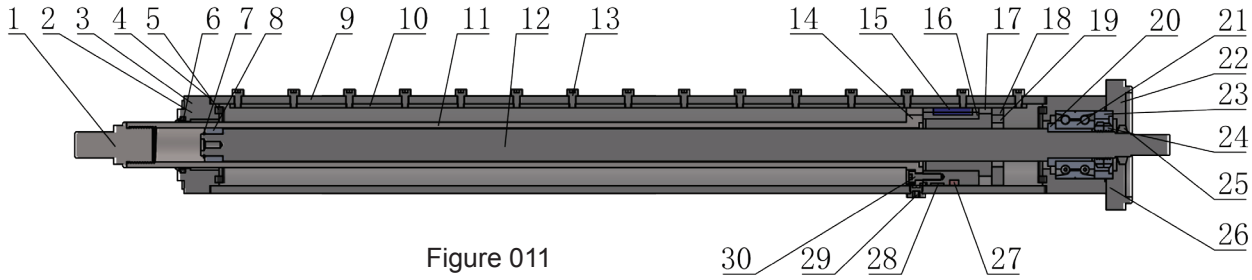


Figure 011

C） Disassembly of servo linear actuator:

1. Unscrew eight screws 3 and 22 on both ends of the fixed actuator body 2 and 26 counterclockwise;

2. Remove bearing retaining ring 23 and O-ring 6,25 from both ends of the actuator body;

3. Tap the front end joint 1 gently to disassemble the front end joint 1, piston rod 11, ball screw (roller screw)12, ball nut 17, anti-rotating block15, bearing 20 and other parts along the axial direction.

4. Heat the threaded part connected between the front end joint 1 and the piston rod 11 to soften the thread sealant, then unscrew the front end joint and screw 30 counterclockwise, heat the threaded part connected between the piston rod 11 and piston part connector 16, soften the thread sealant and then unscrew the piston rod 11.

5. Heat the thread of the lock nut, soften the thread sealant and then unscrew the two lock nuts.
6. Knock evenly along the outer ring of bearing 21 to remove the bearing 21.
7. Unscrew the two set screws 13 of anti-rotating block 15 and remove it from the ball nut.

DISPOSE LUBRICANT PROPERLY!

Disassembly of Inline series servo linear actuator (Figure 012)

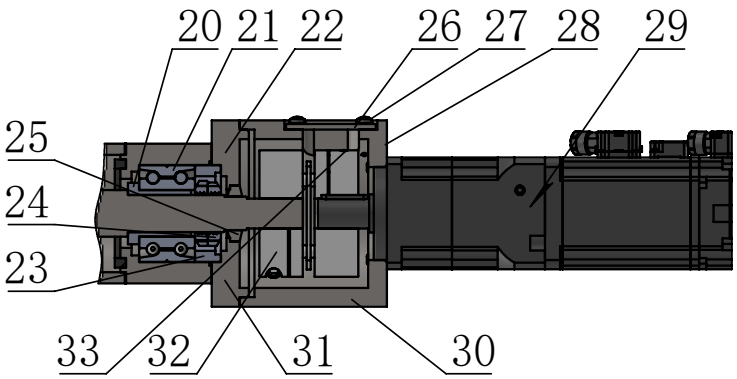


Figure 012

D) Disassembly of Inline servo linear actuator
1. Unscrew the screw 27 counterclockwise, remove the box cover 26 and loosen the clamping screw 33 on the coupling 32.
2. Unscrew the four fixed screws of the servo motor 29 and remove them together with the coupling 32 and the servo motor 29.
3. Unscrew the four screws 22 on the connecting flange 31 and remove it.
4. The remaining steps for disassembly are the same as those servo linear actuator disassembling.

7.4 Disassembly of Timing belt parallel series servo linear actuator (Figure 013)

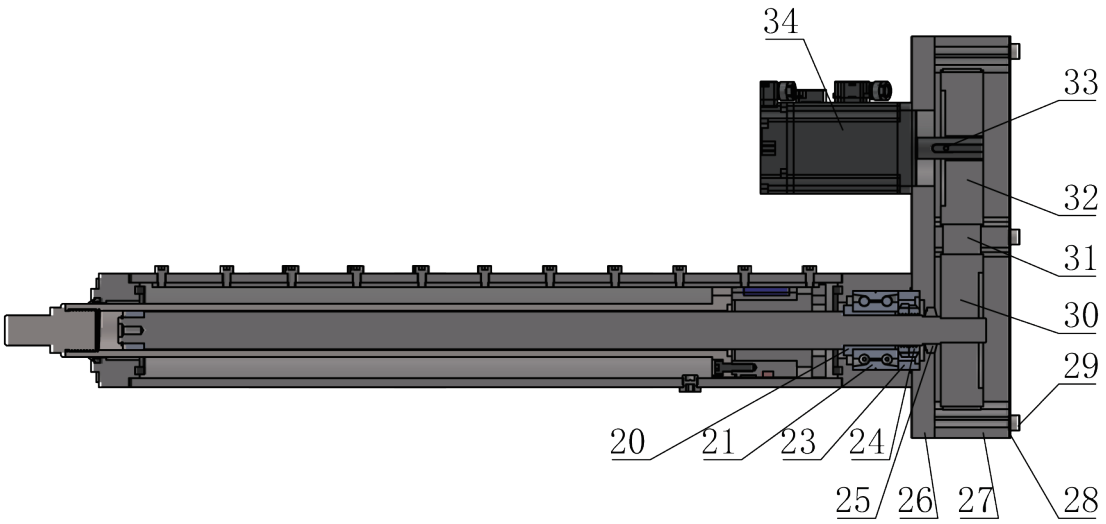


Figure 013

1. Unscrew the box cover screw 29, remove the box cover plate 28 and the box support plate 27.
2. Loosen the fixed screws of the servo motor 34 and move the motor downward along the screw slot to make the timing belt 31 in relaxed state.
3. Screw out the tightening screws on taper lock bush of two timing pulleys 30 and 32, then screw into the screw hole of taper lock bush respectively, tighten the screws evenly to loosen the shaft sleeve on the hub, take off the two timing pulleys 30 and 32 and the timing belt 31 (A detailed instructions of the installation and removal of timing pulleys can be found in the section on the use and maintenance of timing belt and timing pulley).
4. Unscrew the set screw 33 of the servo motor 34 and remove the servo motor 34.
5. The remaining steps for disassembly are the same as those servo linear actuator disassembling.

7.5 Before reassembly

1.Before starting the assembly, attention should be paid to the following points:

1) Read the instructions carefully. Follow the steps in the instructions when and where to use these materials and assemble them.

2) NITRO-SOLVENT cleaning is required for all parts to be cemented with thread sealant.

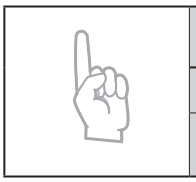
3) All processed parts surfaces, threads, and areas where sealant is to be applied are prohibited from being touched by hand.

4) Apply thread sealant on the external threads evenly with a brush. and a small amount of sealant at the beginning of the internal threads.

5) Screw the internal thread into the external thread vertically, screw two times frontward and one time backward.

6) Allow the thread sealant to polymerize for (3-5) minutes.

7) Loctite 263 lock sealant is recommended for use.



All threaded parts fixed by thread-lock must be tightened with the appropriate force.

M5	6Nm	M6	11Nm	M8	26Nm
M10	52Nm	M12	60Nm	Note: Consult Lim-Tec engineers for other specifications not being listed.	

7.6 Assembly of Inline series servo linear actuator

1. Check all parts and components to make sure they are correct and complete.

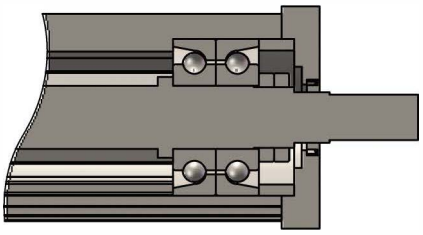
2. Blow and clean all parts such as lead screws, pulleys and sleeve parts to ensure there are no dust, iron filings or other debris.

3. Install the lead screw guide bearing on the ball screw, and install a shaft using elastic retaining ring.

4. Lubricate ball screw pair appropriately and evenly. Use a special tiger clamp (with arc-shaped copper blocks on the jaws) to clamp the ball nut on the workbench (which has through-holes for the ball screw to pass through). After applying thread sealant to the ball nut, screw it into the piston rod.

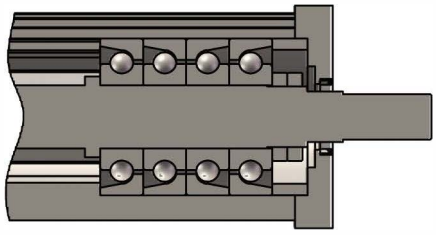
5. Assemble the anti-rotation block onto the ball screw nut and lock it with an internal hexagon tapered end screw.

6. Using thermal mounting method (with a heat gun or oil heat), install the single-row angular contact ball bearing onto the ball screw in accordance with the specified method (see the picture below), and apply lubricating grease appropriately and evenly. Adjust the bearing clearance in place, install and tighten the bearing nut to secure the bearing.



DMB05--DMB40/FMR25--FMR40/EMB05-EMB30

Bearing Installation Diagram for model number from DMB05 to DMB40,FMR25 to FMR



DMB45--DMB500/FMR50--FMR200

Bearing Installation Diagram for model number from DMB45 to DMB500, FMR50 to FMR200

7. Install the ball screw assembly into the outer tube of the servo linear actuator to ensure that the ball screw assembly operates smoothly within the outer tube of the servo linear actuator.

8. The buffer component is threaded through the piston rod and assembled into the hole at the front end of the outer tube of the servo linear actuator. Then the servo linear actuator guide bearing, guide bearing sleeve, and O-ring are assembled together and threaded through the piston rod into the hole at the front end of the outer tube of the servo linear actuator.

9. Install the O-ring in the groove at the front end of the outer tube of the servo linear actuator, and insert the front cover with double-lip dust seals through the piston rod into the front end of the outer tube of the actuator; (Note: If the servo linear actuator is installed with a front flange FF, install the front flange mounting plate on the front cover).

10. Install the bearing retainer into the rear hole of the servo linear actuator outer tube, pressing against the outer ring of the bearing. Then, place the O-ring into the groove at the rear end of the servo linear actuator outer tube. (Note: If the actuator is installed with a trunnion mount ST or a side mount SF, insert the square mounting nuts into the four long slots on the side of the actuator outer tube respectively.) Next, assemble the rear end cover of the actuator. Rotate the ball screw to ensure smooth rotation, and place the rotating oil seal into the corresponding groove on the rear end cover of the actuator.

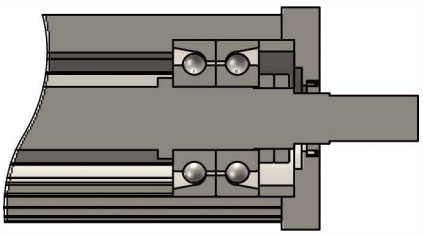
11. Assemble the coupling housing onto the rear end cover of the servo linear actuator using hexagon socket cylindrical head screws, and simultaneously set the lead screw positioning sleeve onto the ball screw shaft.

12. Install the coupling and motor shaft coupling sleeve on the servo motor shaft. If there is a planetary gearbox, first assemble the planetary gearbox with the servo motor, then install the coupling and motor shaft coupling sleeve on the output shaft of the planetary gearbox. Ensure accurate positioning. Use a torque wrench to tighten the clamping screws on the coupling with the corresponding torque value to secure the coupling in place.
13. Next, assemble the coupling and servo motor together via the coupling housing and the ball (roller) screw. Use a torque wrench to tighten the clamping screws on the other end of the coupling to the appropriate torque value through the threaded holes on the coupling housing to secure the coupling.

14. Tighten the mounting screws on the servo motor to assemble it with the coupling housing. Then, use the inner hexagon tapered end to tighten the screws and seal the threaded holes on the coupling housing.
15. Apply thread sealant to the threaded part of the front-end connector of the servo linear actuator, then install the front-end connector assembly and various mounting accessories.
16. Install the inductive proximity switch and ensure proper sealing between the FCP bracket, FCP seal plate, FCP large sealing gasket and FCP small sealing gasket.
17. Check if the assembly of all parts is safe and correct.Conduct an electrical test run to ensure all indicators meet the standards.

7.7 Assembly of Timing belt parallel series servo linear actuator

1. Check all parts and components to make sure they are correct and complete.
2. Blow and clean all parts such as lead screws, pulleys and sleeve parts to ensure there are no dust, iron filings or other debris.
3. Install the lead screw guide bearing on the ball (roller) screw, and install a shaft using elastic retaining ring.
4. Lubricate ball screw pair appropriately and evenly. Use a special tiger clamp (with arc-shaped copper blocks on the jaws) to clamp the ball nut on the workbench (which has through-holes for the ball screw to pass through). After applying thread sealant to the ball nut, screw it into the piston rod.

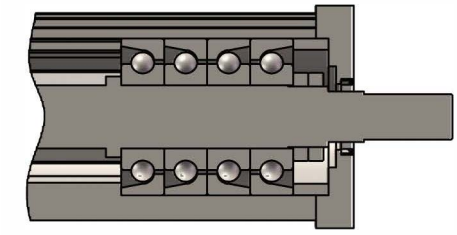


DMB05--DMB40/FMR25--FMR40/EMB05-EMB30

Bearing Installation Diagram for model number from DMB05 to DMB40,FMR25 to FMR40 and EMB05 to EMB30

5. Assemble the anti-rotation block onto the ball screw nut and lock it with an internal hexagon tapered end screw.

6. Using thermal mounting method (with a heat gun or oil heat), install the single-row angular contact ball bearing onto the ball screw in accordance with the specified method (see the picture below), and apply lubricating grease appropriately and evenly. Adjust the bearing clearance in place, install and tighten the bearing nut to secure the bearing.



DMB45--DMB500/FMR50--FMR200

Bearing Installation Diagram for model number from DMB45 to DMB500, FMR50 to FMR200

7. Install the ball (roller) screw assembly into the outer tube of the servo linear actuator to ensure that the ball (roller) screw assembly operates smoothly within the outer tube of the servo linear actuator.

8. The buffer component is threaded through the piston rod and assembled into the hole at the front end of the outer tube of the servo linear actuator. Then the servo linear actuator guide bearing, guide bearing sleeve, and O-ring are assembled together and threaded through the piston rod into the hole at the front end of the outer tube of the servo linear actuator.

9. Install the O-ring in the groove at the front end of the outer tube of the servo linear actuator, and insert the front cover with double-lip dust seals through the piston rod into the front end of the outer tube of the actuator; (Note: If the servo linear actuator is installed with a front flange FF, install the front flange mounting plate on the front cover).

10. Install the bearing retainer into the rear hole of the servo linear actuator outer tube, pressing against the outer ring of the bearing. Then, place the O-ring into the groove at the rear end of the servo linear actuator outer tube. (Note: If the actuator is installed with a trunnion mount ST or a side mount SF, insert the square mounting nuts into the four long slots on the side of the actuator outer tube respectively.) Next, assemble the rear end cover of the actuator. Rotate the ball screw to ensure smooth rotation, and place the rotating oil seal into the corresponding groove on the rear end cover of the actuator.

11. Install the timing belt driven pulley onto the ball screw, and mount the servo motor onto the front cover of the timing belt housing (Note: If there is a planetary reducer, first assemble the planetary reducer with the servo motor, then install the planetary reducer and servo motor assembly onto the front cover of the timing belt housing).Note: Do not tighten the four screws of the servo motor to allow for adjustment of the center distance of the timing belt in the next step.

12. Install the timing belt pulley and the motor shaft sleeve onto the servo motor shaft. Install the timing belt and adjust it to achieve the appropriate frequency and tension to reach the correct center distance. Tighten the four screws of the servo motor to fix the center distance.

13. Install the support plate and the back cover of the timing belt housing, and fix them with screws. (Note: If the servo linear actuator is installed with mounting method RC, then assemble the rear clevis seat bolts, rear clevis seat and parts such as the copper sleeve onto the back cover of the timing belt housing.)
14. Apply thread sealant to the threaded part of the front-end connector of the servo linear actuator, then install the front-end connector assembly and various mounting accessories.
15. Install the inductive proximity switch and ensure proper sealing between the FCP bracket, FCP seal plate, FCP large sealing gasket and FCP small sealing gasket.
16. Check if the assembly of all parts is safe and correct.
17. Conduct an electrical test run to ensure all indicators meet the standards.

Common Faults and Troubleshooting Methods:

Fault Phenomenon	Cause	Solution
Motor does not run	Motor connection or setup problems	Contact motor manufacturer
Excessive noise	mproper straightness or lateral force in installation	Check the telescopic straightness of the piston rod, adjust the guide rail and reinstall, remove lateral force
Motor rotates but the piston rod does not extend	The timing belt disengaged or coupling loosened	Turn off the power, open the timing belt housing, or check if there are any issues with the linear installation of the coupling

8.1 Electrical fault

For all electrical issues related to the motor, Lim-Tec will assist the customer in contacting the motor manufacturer.

If the limit switch is not functioning properly, please check all power connections to the switch and ensure that the wiring of switch is correct.

8.2 Coating Defect

Using electrostatic powder coating equipment (electrostatic spray plastic machine) to spray powder coatings onto the surface of a workpiece, the powder is evenly adsorbed onto the surface of the workpiece under the action of static electricity, forming a powdery coating. The powdery coating is then leveled and cured through high-temperature baking, resulting in a final coating with various effects (depending on the different types of powder coatings). The spraying effect surpasses the paint spraying processes in terms of mechanical strength, adhesion, corrosion resistance, and aging resistance.

The process steps are generally sandblasting---acid pickling and phosphating---polishing---baking (180-195℃) for 20-30 minutes at a constant temperature.

If plastic sealing falls off at the work site, apply with a brush dipped in coating powder.

8.3 Timing belt replacement

The lifespan laboratory data for the belt is 8000 hours. If it doesn't run up to this time, it's generally recommended to replace it every 3-4 years.

(The belts are varying degree aging after 7 natural years.)

Lim-Tec®