

Instruction Manual For IMB/DMB

Series Servo actuator

Lim-Tec (BeiJing) Transmission Equipment Co.,LTD.

Preface

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Safety Instruction

- * Do not operate dilapidated unit
- * Please read the manual before installation.
- * Comply with follow safety instruction

	Hazardous voltage	Live line work
	Mechanical hazards	The actuator and workshop may be damaged and the operator is in danger
	Important instructions	
	Attention	

IMB/DMB servo linear actuator use ball screw mechanism for converting rotary torque into linear motion. The application is similar with Hydraulic and pneumatic actuator.

Ball screw linear 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 linear actuator.

The servo linear actuator has rated thrust overload protection device and stroke adjustment mechanism. The user can adjust the working stroke within the rated stroke range.

一、 Servo linear actuator form

Lim-Tec company provide users the below form servo linear actuator

1. Synchronous belt parallel installation mode
2. Coupling linear mounting mode
3. Planetary reducer linear installation mode

二、 Selection for servo linear actuator

1、 Selection for servo linear actuator's type of construction

It depends on the user's demands and can consult with Lim-Tec's engineer.

2、 It depends on the user's demands and can consult with Lim-Tec's engineer.

3、 Selection for servo linear actuator's rated load

It depends on the user's demands and can consult with Lim-Tec's engineer

4、 Selection for servo linear actuator's stroke

It depends on the user's demands and can consult with Lim-Tec's engineer

5、 Selection for servo linear actuator's speed

It depends on the user's demands and can consult with Lim-Tec's engineer

三、 Principle and wiring diagram of servo linear actuator

1、 For the wiring and operation of servo motors and drivers matched with servo linear actuator, please refer to the specifications attached to the servo motors and drivers or the manufacturer's technical information

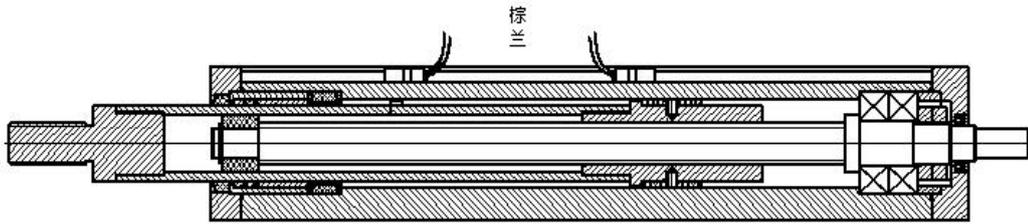
2、 Magnetic induction switch FCM wiring diagram(008)

The limit switch FCM stops the servo linear actuator when it reaches the limit position, thus protecting the servo linear actuator. FCM limit switch construction diagram (007). It is composed of a normally closed magnetic induction switch fixed on the outside of the servo linear actuator and a circular magnet on the screw nut inside the servo linear actuator. Circular magnet in the magnetic field around a 100 gauss area, induction switch with servo linear actuator movement which change its states, It can be added several magnetic induction switch FCM front and back between the two limit multiple in order to get the location information of servo linear actuator or stop somewhere in the middle. Because of the influence of the width of the magnetic field, two magnetic induction switch minimum distance is 10 mm; Moreover, the position information of the servo linear actuator obtained by the same magnetic induction switch can be different for the two directions of advance and retreat .The actual stroke of the servo linear actuator can be changed by moving the position of limit switch FCM.

FCM Rated Capacity		
	DC	AC
Voltage		
Power	20W	20VA
Current	300mA Resistance	
Inductive impedance	3W	

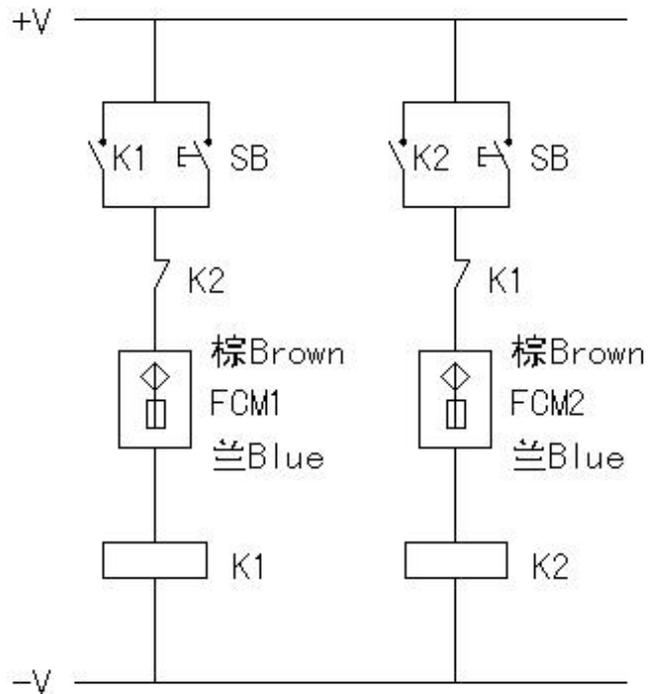
Note:FCM must be connected to the control circuit instead of the main circuit directly .

Matched with FCM :1m 2X0.25mm² cable



007

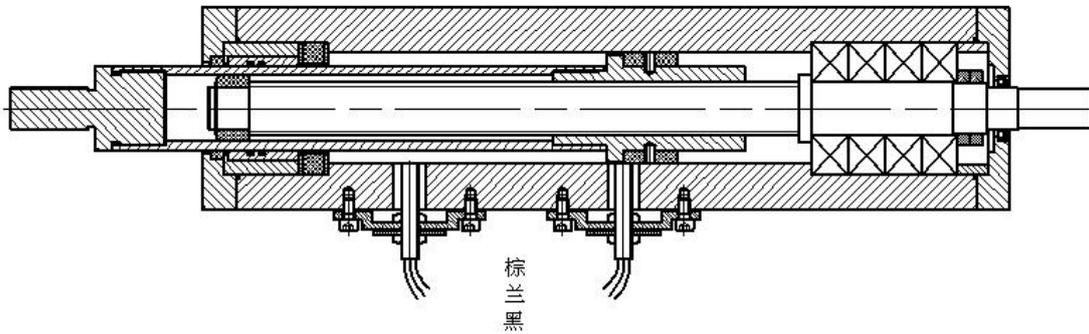
Servo linear actuator with magnetic induction limit switch



008

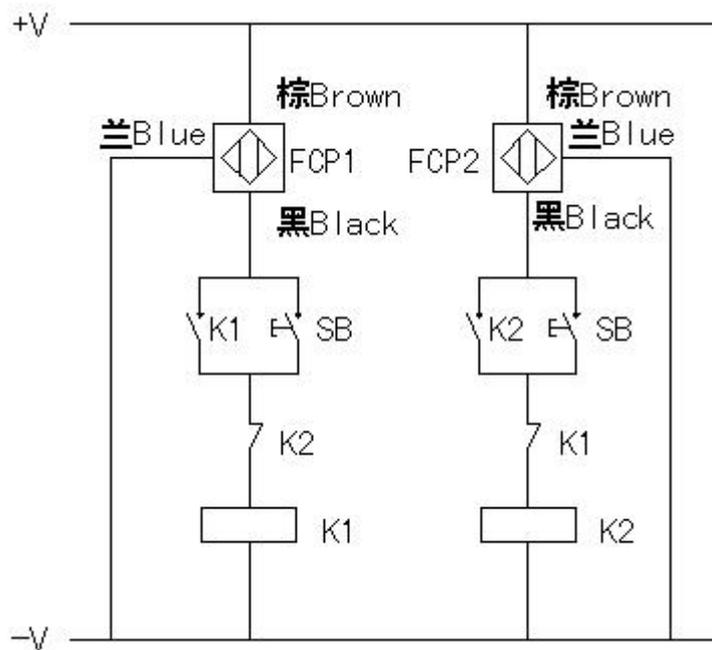
Magnetic induction limit switch FCM wiring diagram

3、 Proximity switch FCP wiring diagra (010)
 FCP structure as below drawing (009)



009

Servo linear actuator with proximity limit switch



010

Proximity switch FCP wiring diagra (010)

四、 Installation and debugging

1. Installation and commissioning

1.1. Positioning and installation

1.1.1. If the length of the linear actuator needs to be set differently (or lengthened or shortened) to make installation easier, follow the following procedure:



Do not set the length beyond the limit value of the linear actuator (minimum L_c , maximum L_a , see Figure 013)

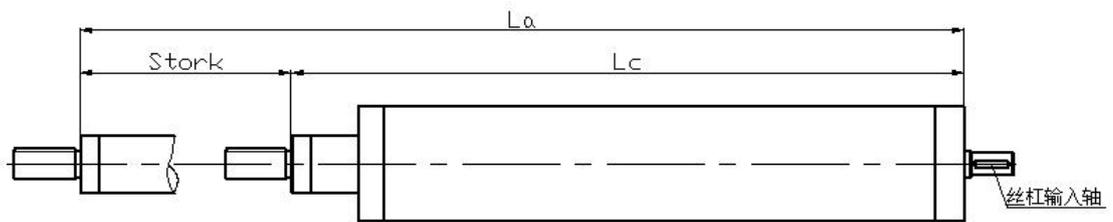
A) Servo linear actuator without reversing device

* Rotate manually the telescopic tube forward or backward until it reaches the desired length

B) Servo linear actuator with reversing device

* Remove the motor

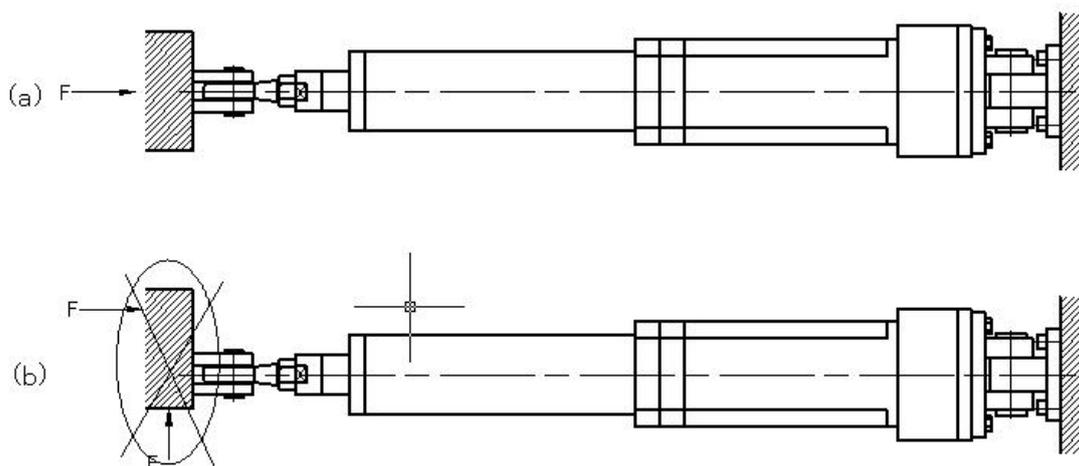
* Rotate manually the lead screw input shaft forward or backward to get the expansion tube in place.



limit value of the Servo linear actuator minimum L_c , maximum L_a , Figure 013

1.1.2. Check whether the fixed parts are well machined 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 to ensure that it is only subject to axial load (see Figure 014). If it is fastened or subjected to non-axial load, it will not work normally and its service life will be seriously affected.



014

Servo linear actuator (a) is right ; (b) is not right

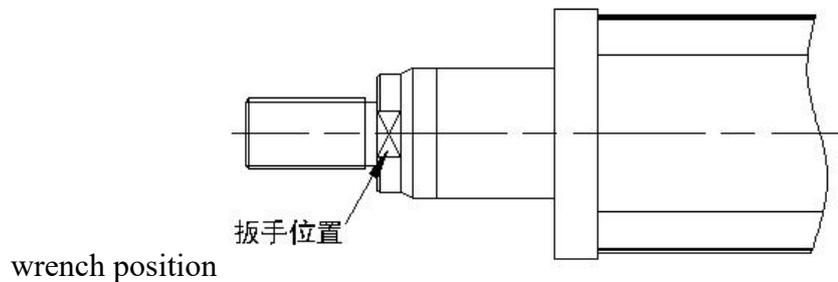
Note: When the servo linear actuator has side load, you can consider installing linear guide module to make the it work normally



1.1.4

Try not to apply torque on the telescopic pipe of the servo linear actuator, too much torque will damage the anti-reversing mechanism inside it .

When the expansion tube of servo linear actuator is connected to external equipment, the wrench position for fixing the expansion tube 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 mechanism of the servo linear actuator, the torque applied to the telescopic pipe shall not exceed the following values:

IMB/DMB10----3Nm

IMB/DMB20----5.6Nm

IMB/DMB30----11.4Nm

IMB/DMB40----28Nm

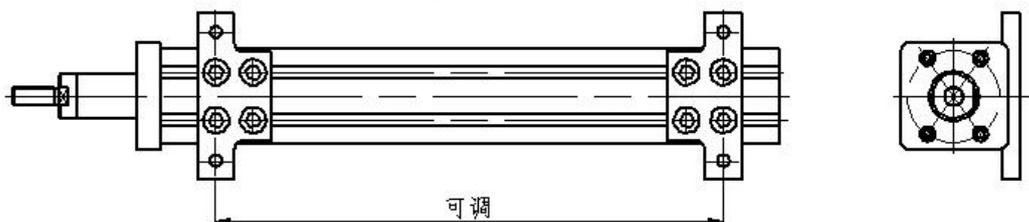
IMB/DMB50----40Nm

IMB/DMB60----76Nm

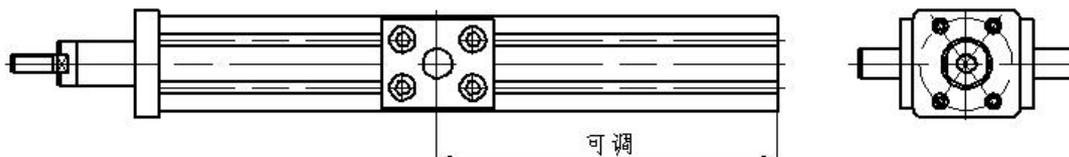
1.2. Servo linear actuator side (bottom plate) and trunnion mounting mode and fixing bolt torque.

1.2.1. Installation methods of side (bottom plate) and trunnion of different types of servo linear actuator are shown in the following figure (see Figure 015).

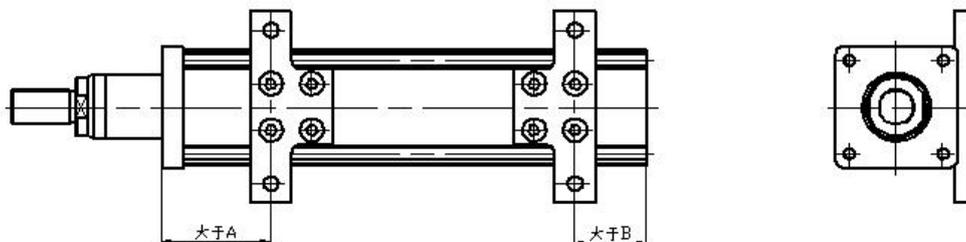
IMB10/20/30侧面（底座）安装形式SF



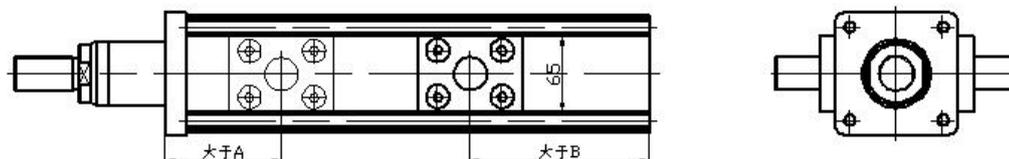
IMB10/20/30耳轴安装形式ST



IMB40/50/60侧面（底座）安装形式SF



IMB40/50/60耳轴安装形式ST



015

Servo linear actuator side (bottom plate) and trunnion mounting mode

1.2.2 IMB/DMB05/10/20/30 Servo linear actuator side (bottom 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 equipment.

IMB/DMB40/50/60 Servo linear actuator side (bottom plate) and trunnion mounting mode is screw fixed installation, the position of mounting plate and trunking shaft should be determined by the customer before ordering. Please refer to the product sample size drawing for the specific size adjustment range

Note: The mounting plate and trunnion must be perpendicular to the movement direction of the servo linear actuator; otherwise, the service life of the it will be seriously affected

IMB/DMB seris servo linear actuator side (bottom plate) and Torque values of trunnion mounting screws refer to the table below

Types	Appurtenant material	Torque value (N.m)
IMB/DMB05/10/20/30/40/ 50/60	Alloy Steel	28.5
IMB/DMB05/10/20/30/40/ 50/60	Stainless steel	19.1

1.3. Commissioning

1.3.1. Run a working cycle without load

1.3.2. Increase the load gradually and run the cycle until the maximum load is reached

五、 Lubrication

IMB/DMB series servo linear actuator has been filled with high temperature grease when leaving the factory. The interval time between regular lubrication bearing and ball screw is shown in the following table:

RMS rotational speed(RPM)	Recommend renew lubrication period(Hours)
250	10000
500	10000
1000	8000
1500	7000
2000	5800
2500	5000
3000	4000

Lim-Tec recommends using Mobilith SHC 220, a high performance, extreme-pressure grease. The unique physical properties of the synthetic base oil provides outstanding protection against wear, rust, corrosion and high or low-temperature degradation. Mobilith SHC allows for very low starting and running torque values. Its operating range is -40 degrees C to 177 degrees C (-40 degrees F to 350 degrees F).

六、

Disassemble and mounting of IMB/DMB Actuator



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

The following conditions are required for disassembly and replacement of components of the

servo linear actuator and corresponding reassembly:

- * Professionals
- * Related equipment
- * Basic knowledge of the composition
- * Follow the correct procedure
- * Compliance with existing national and regional health and safety regulations

If you have any questions, please contact Lim-Tec or his authorized agent

The following describes the specific locations of the parts concerned, which are indicated on the corresponding drawings

Disassembly of limit switch

A) Magnetic induction type limit switch

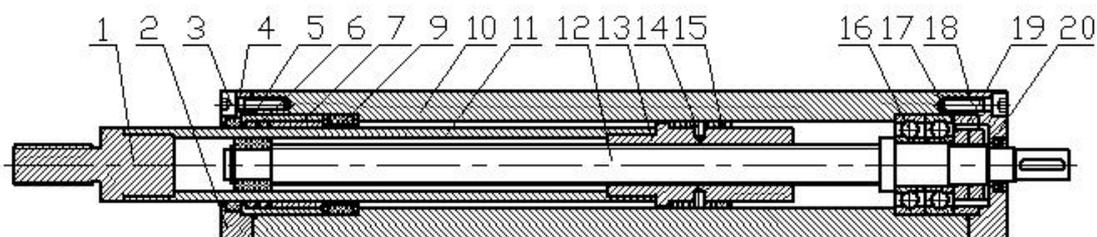
- 1、Screw off the fixed screw of the limit switch
- 2、Take down the limit switch

B) Proximity limit switch

- 1、Unscrew the fixing screws of the switch bracket
- 2、Remove the limit switch with the bracket

Disassembly of servo linear actuator ,figure

15



015

C) Disassembly of servo linear actuator:

- 1、Screw off both ends of the fixed cylinder block in a counterclockwise direction 2、20 of the 8 screws ,3 and 18
- 2、Remove the bearing rear-ring 19 and O-ring 5 at both ends of the cylinder block.
- 3、Tap the front end joint 1 gently and exit the front end joint 1 expansion pipe 11 ball screw 12 ball nut 13 anti-rotating block 15 bearing 16 and other parts along the axis
- 4、Heat the threaded part connected between the front end joint 1 and the expansion tube 11 to soften the thread sealant, then unscrew the front end joint, and then heat the threaded part connected between the expansion tube 11 and ball nut 13. Soften the thread sealant and then unscrew the expansion tube 11.
- 5、Heat and tighten the thread of the nut, soften the thread sealant and then unscrew the two

nuts

- 6、 Strike evenly along the outer ring of bearing 16 to remove the bearing 16
- 7、 Unscrew the two set screws 14 that hold the anti-tumbler 15 and remove the anti-tumbler 15 from the ball nut



DISPOSE CAREFULLY OF THE LUBRICANT!

016Disassembly of servo linear actuator ,see figure 016

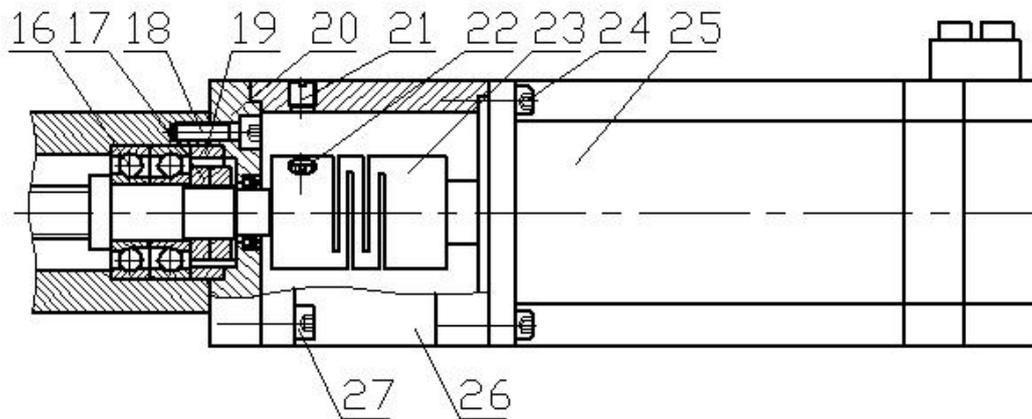


figure 016

D) Disassembly of 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、 For the rest parts disassembly is the same like the actuator .

Disassembly of synchronous belt parallel series servo linear actuator,see figure 017

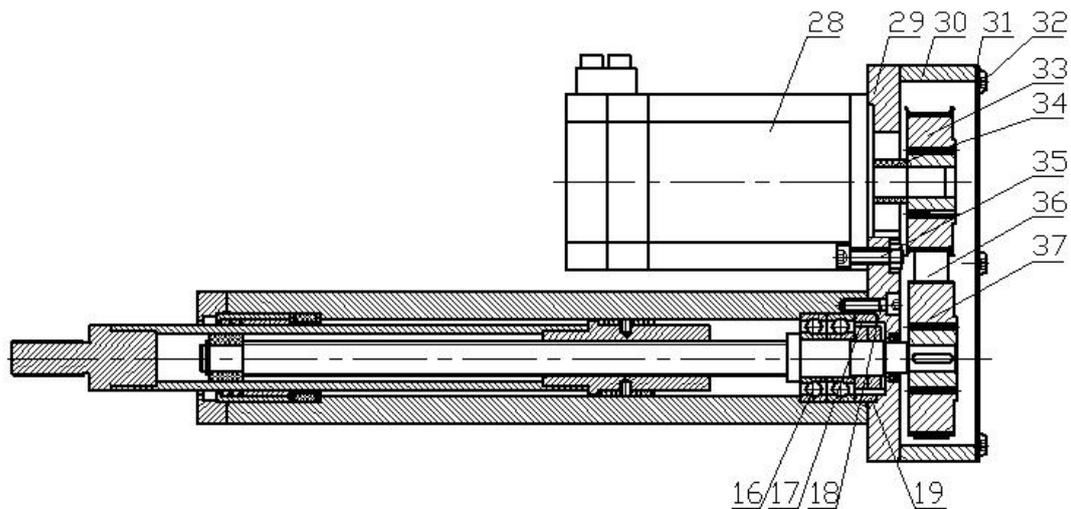


figure 017

- 1、 Unscrew the box cover screw 32, remove the box cover plate 31 and the box support plate 30
- 2、 Loosen the servo motor 28 fixing screw 35 and move the motor downward along the screw fixing groove. It is the synchronous belt 36 that becomes the relaxed state
- 3、 Screw out the tightening screws of the two synchronous belt wheels 33 and 37 cone sleeves, then screw into the screw hole of the pressure rod respectively, tighten the screws evenly to loosen the shaft sleeve on the hub, take off the two synchronous belt wheels 33 and 37 and the synchronous belt 36; (For detailed instructions on the installation and removal of the synchronous belt pulley, please refer to the synchronous belt and the use and maintenance of the synchronous belt pulley.)
- 4、 Unscrew the fixing screw 35 of the servo motor 28 and remove the servo motor 28
- 5、 For the rest parts disassembly is the same like the actuator .

Before reassembly

- 1、 The following should be noted before starting assembly
 - 1) Read the instructions in detail, when and where to use the materials, and follow the instructions for assembly
 - 2) Nitro-solvent cleaning is required for all parts to be cemented with screw
 - 3) Do not touch all treated parts surfaces, threads, and areas to be applied with sealant
 - 4) Apply thread sealant evenly over the outer thread with a brush and a small amount of sealant at the beginning of the inner thread
 - 5) Screw the internal thread into the external thread vertically, twist it forward twice and

then twist it backward once

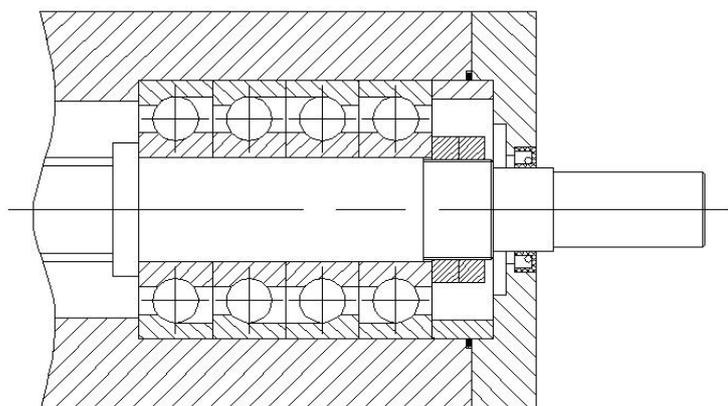
6) Let the threadlock - threadseal polymerise for (3 - 5) min.



All threaded parts fixed by thread lock must be also tightened with 15 Nm torque.

Installation of servo linear actuator

- 1、 Check all parts and components to make sure they are all in order
- 2、 Blow and clean the parts such as screw and wheel sleeve to ensure no dust, iron and other sundries
- 3、 Install the lead screw guide bearing on the ball screw, and install the shaft with an elastic retainer
- 4、 Lubricate ball screw appropriately and evenly. Clamp the ball nut on the working surface (the table is provided with through-hole for ball screw to pass through) with a special vise (the jaw is equipped with arc copper block). Apply thread sealant to the ball nut and screw into the power pipe.
- 5、 Assemble the anti-rotary block on the ball nut and lock it with the inner hexagon end setting screw
- 6、 Install the single-row angular contact ball bearing face to face (see the following picture) on the ball screw by hot loading (hot air gun or oil), and apply grease appropriately and evenly; Adjust the bearing clearance in place install and tighten the bearing nut to fix the bearing



- 7、 The ball screw assembly is loaded into the outer tube of the electric cylinder to ensure that the ball screw assembly can run freely in the outer tube of the electric cylinder
- 8、 The buffer assembly is assembled through the power tube in the front hole of the outer tube of the electric cylinder, then the guide bearing of the electric cylinder, the guide bearing sleeve of the electric cylinder and the O-ring are assembled together, and assembled through the power tube in the front hole of the outer tube of the electric cylinder
- 9、 Install the O-ring in the front slot of the outer tube of the electric cylinder, and

put the front end cover into the double lip dustproof ring, pass through the power tube and assemble in the front end of the outer tube of the electric cylinder; (Note: if the electric cylinder is installed with front-end flange FF, install the front-end flange mounting plate on the front end cover)

- 10、 Put the bearing retainer set into the rear end hole of the outer tube of the electric cylinder, and press the bearing outer ring; Then install the O-ring in the rear end slot of the outer tube of the electric cylinder (note: if the electric cylinder is installed in the trunking mode ST or in the side installation mode SF, install the square installation nut into four long slots on the side of the outer tube of the electric cylinder respectively); Then assemble the rear end cover of the electric cylinder; Turn the ball screw to ensure smooth running of the ball screw; The rotating oil seal is installed in the corresponding slot of the rear end cover of the electric cylinder.
- 11、 Install the coupling box body on the rear end cover of the electric cylinder with the hexagon socket cylindrical head screw, and set the lead screw positioning sleeve on the ball screw shaft
- 12、 Install the coupling and motor shaft spacer on the servo motor shaft (note: if there is a planetary reducer, first assemble the planetary reducer with the servo motor, and then install the coupling and motor shaft spacer on the output shaft of the planetary reducer); Ensure accurate positioning; At the same time, tighten the clamping screw on the coupling with the torque wrench and the corresponding torque force value to fix the coupling,
- 13、 Then the coupling and servo motor are assembled together with ball screw through the coupling, and through the threaded hole on the coupling box body, the clamping screw on the coupling on the other end is tightened with the torque wrench and the corresponding torque force value to fix the coupling
- 14、 Tighten the mounting screw on the servo motor, assemble the servo motor and the coupling box body, and then seal the threaded hole on the coupling box body with the inner hexagon taper fixing screw
- 15、 Apply thread sealant to the thread of the front-end connector of the servo linear actuator , install the front-end connector assembly and the other accessories.
- 16、 Install inductive proximity switch and ensure good sealing between FCP bracket,FCP seal plate,FCP large gasket and FCP small gasket
- 17、 Check whether the assembly of all parts is safe and correct.Connect electric trial operation to ensure that all indexes are qualified

Installation of parallel servo linear actuator

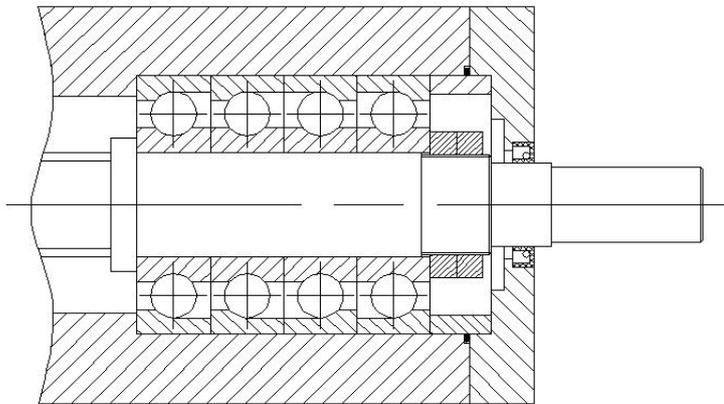
- 1.Check all parts and components to make sure they are all in order
- 2.Blow and clean the parts such as screw and wheel sleeve to ensure no dust, iron and other sundries
- 3.Install the lead screw guide bearing on the ball screw, and install the shaft with an elastic

retainer

4. Lubricate ball screw appropriately and evenly. Clamp the ball nut on the working surface (the table is provided with through-hole for ball screw to pass through) with a special vise (the jaw is equipped with arc copper block). Apply thread sealant to the ball nut and screw into the power pipe.

5. Assemble the anti-rotary block on the ball nut and lock it with the inner hexagon end setting screw

6. Install the single-row angular contact ball bearing face to face (see the following picture) on the ball screw by hot loading (hot air gun or oil), and apply grease appropriately and evenly; Adjust the bearing clearance in place install and tighten the bearing nut to fix the bearing



7. The ball screw assembly is loaded into the outer tube of the servo linear actuator to ensure that the ball screw assembly can run freely in the outer tube of it

8. The buffer assembly is assembled through the power tube in the front hole of the outer tube of the servo linear actuator, then assembling the guide bearing, the guide bearing sleeve and the O-ring of the servo linear actuator together, and assembled through the power tube in the front hole of the outer tube of the servo linear actuator

9. Install the O-ring in the front slot of the outer tube of the servo linear actuator, and put the front end cover into the double lip dust proof ring, pass through the power tube and assemble in the front end of the outer tube of the servo linear actuator; (Note: if the servo linear actuator is installed with front-end flange FF, install the front-end flange mounting plate on the front end cover)

10. Put the bearing retainer set into the rear end hole of the outer tube of the servo linear actuator, and press the bearing outer ring; Then install the O-ring in the rear end slot of the outer tube of it (note: if the servo linear actuator is installed in the trunking mode ST or in the side installation mode SF, install the square installation nut into four long slots on the side of the outer tube of it respectively); Then assemble the rear end cover of the servo

linear actuator; Turn the ball screw to ensure smooth running of the ball screw; The rotating oil seal is installed in the corresponding slot of the rear end cover of the servo linear actuator.

11. Install the slave wheel of the synchronous belt on the ball screw, and install the servo motor on the front cover of the synchronous belt box (note: if there is a planetary reducer, first assemble the planetary reducer with the servo motor, and then install the planetary reducer and servo motor components on the front cover of the synchronous belt box); Note: Do not tighten the four screws of the servo motor so as to adjust the center distance of the synchronous belt in the next step.

12. Install the synchronous belt driving wheel and the motor shaft spacer on the servo motor shaft; Install the synchronous belt and adjust the synchronous belt to the corresponding frequency and tensioning force to achieve the appropriate center distance. Tighten the four screws of the servo motor to fix the center distance

13. Install the support plate and back cover of the synchronous belt box by fixing it with screws (note: if the servo linear actuator is installed with the tail seat hinge RC, then assemble the fixing bolts, the tail seat and copper sleeve on the back cover of the synchronous belt box)

14. Apply thread sealant to the thread of the front-end connector of the servo linear actuator, install the front-end connector assembly and the other accessories.

15. Install inductive proximity switch and ensure good sealing between FCP bracket, FCP seal plate, FCP large gasket and FCP small gasket

16. Check whether the assembly of all parts is safe and correct.

17. Connect electric trial operation to ensure that all indexes are qualified

七、 Common faults and handling methods

Phenomenon	Cause	Solution
Motor does not run	Motor connection or setup problems	Contact motor manufacturer
Much noise	Lack of straightness or lateral force in installation	Check the telescopic straightness of the power tube, adjust the guide rail to reinstall; Ground lateral force
The motor rotates but the power tube does not flex	The timing belt is off or the coupling is loose	When power failure, open the synchronous belt box or check the coupling installed in straight line for any problems