



THK Linear Motion System

Ball Screw

Instruction Manual

No. 1030-T34668

Table of Contents

1. Introduction	1-1
1-1 Foreword	1-1
1-2 About This Manual	1-1
1-3 Applying This Product	1-2
1-4 Product Support	1-2
1-5 Product Information and THK Information	1-2
2. Precautions on Use	2-1
2-1 Safety Related Warning Displays	2-1
2-2 Handling	2-1
2-3 Precautions on Use	2-2
2-4 Lubrication	2-3
2-5 Storage	2-3
2-6 Disposal	2-3
3. Mounting Procedure	3-1
3-1 Assembling the Support Unit	3-1
3-2 Checking Accuracy and Fully Fastening	3-1
3-3 Installing onto Table and Base	3-2
3-4 Connection with the Motor	3-2
4. Lubrication	4-1
4-1 Lubrication Interval	4-1
4-2 Sealing Method	4-3

1. Introduction

1. Introduction

1-1 Foreword

Thank you for purchasing this THK product. This manual describes the precautions on use, assembly method, and lubrication method that apply to a Ball Screw.

1-2 About This Manual

1-2-1 Intended Audience

Persons in charge of product mounting design, installation, wiring, and maintenance, and persons actually using the product.

1-2-2 Using This Manual

This manual describes the correct handling of this product and precautions on its use. For maximum product performance and long-term use, read this manual carefully and understand its contents so that you use this product safely and properly. When printing this manual for reading, store it in a place where the intended audience can read it when necessary.

1-2-3 Notice and Attention

- Do not handle or use this product in any way other than as described in this manual.
- No part of this manual may be duplicated, reproduced, or loaned without permission.
- Due to a continuing process of product improvement, information contained herein is subject to change without notice.
- Efforts have been made to ensure the accuracy of the information contained herein. If, however, you notice an error or have a concern, notify THK.
- The diagrams contained herein are representative examples and may vary from the actual product.
- THK will not be liable for the effects resulting from the use of this manual for any reason whatsoever.
- This manual also applies to special products, but content specified on the Delivery Specification Diagram takes priority.

*Special products are products that differ from standard products listed in the catalog, in material and/or specifications.

1-3 Applying This Product

- Do not use this product for equipment or systems used in life-threatening situations.
- Consult THK beforehand when considering using this product for special applications such as in passenger vehicles or in medical, aviation and space, nuclear power, or electrical power equipment or systems.
- This product was manufactured under strict quality control, but this does not completely rule out product failure. When using this product in equipment where failure of this product could cause a severe accident or damage, install a safety device or backup device to prevent the occurrence of severe accidents or damage.

1-4 Product Support

Efforts have been made to ensure the accuracy of the information contained herein. If, however, you have a concern, notify THK.

1-5 Product Information and THK Information

For the latest product information and company information, we recommend that you regularly access and view the THK website.

- Website URL: <https://www.thk.com/eng/>
- Technical support site URL: <https://tech.thk.com/>

2. Precautions on Use

2-1

Safety Related Warning Displays

This manual uses the following safety related warning displays. Descriptions containing safety related warning displays are serious and must be followed.



Warning

"A matter which, if mishandled, could result in death or serious injury."



Caution

"A matter which, if mishandled, could result in physical injury or material damage."



"Prohibited (never do this)"



"Required (always do this)"

2-2

Handling



CAUTION



Handle with care

- Please use at least two people to move any product weighing 20 kg or more, or use a dolly or other conveyance. Failure to do so could cause injury or damage the product.



Do not disassemble

- Do not disassemble the parts. This could impair the product's functions.



Falling objects

- Tilting the screw shaft and the Ball Screw nut may cause them to fall by their own weight.
- Take care not to drop or strike the Ball Screw. This could cause injury and damage the product. If the product is dropped or impacted, functionality may be reduced even if there is no surface damage.



Handle with care

- When assembling, be sure not to remove the Ball Screw nut from the Ball Screw shaft.
- When handling the product, wear safety gloves and safety boots, etc., as appropriate to ensure safety.

2. Precautions on Use

2-3

Precautions on Use

CAUTION



Prevent dust

- Prevent foreign materials, such as cutting chips or coolant, from entering the product. Failure to do so could damage the product.
- Prevent foreign materials, such as cutting chips, coolant, corrosive solvents or water from getting in the product by using a bellows or cover when the product is used in an environment where such a thing is likely.
- If foreign materials such as cutting chips adhere to the product, clean the product and then replenish the lubricant.
- Slight oscillations can inhibit the formation of an oil film between the raceway and the area of contact for rolling elements, resulting in fretting. Therefore, be sure to use a type of grease with high fretting resistance properties. We recommend periodically rotating the Ball Screw nut once to help ensure that an oil film forms between the raceway and the rolling elements.



Maximum temperature

- Do not use this product if the external temperature exceeds 80 °C. If used in excess of this temperature, there is a risk that the resin and rubber parts may deform or become damaged (except the heat-resistant type).



Handle with care

- Do not forcibly drive a pin, key, or other positioning parts into the product. This could create indentations on the raceway and impair the product's functions.
- If misalignment or tilting occurs with the Ball Screw shaft supporting portion and the Ball Screw nut, it may substantially shorten the service life. Pay attention to the components to be mounted and to the mounting accuracy.
- Do not exceed the permissible rotational speed when using the product. Doing so may cause the product to become damaged or result in an accident. Please keep the rotational speed within THK specifications.
- Do not allow the Ball Screw nut to overshoot. The product may malfunction if any of the balls fall out, the circulation components become damaged, or indentations form on the ball raceway. Continuing to use the product under these circumstances may lead to premature wear or damage to the circulation components.
- When using the Ball Screw, be sure to use guide elements such as an LM guide or ball spline. This is one of the primary reasons why products become damaged.
- A lack of rigidity and accuracy of mounting components may cause the bearing load to localize, reducing the performance of the bearing significantly. Therefore, consider carefully the rigidity and accuracy of the housing and base, and the strength of the securing bolts.



Falling objects

- If any of the rolling elements fall from the Ball Screw nut, discontinue use and contact THK.
- If the unit will be positioned vertically, install safety equipment or take other measures to prevent it from falling over. There is a chance the Ball Screw nut may fall under its own weight.

2. Precautions on Use

2-4

Lubrication

CAUTION



Check lubricant

- Thoroughly remove anti-rust oil and feed lubricant before using the product.
- Do not mix different lubricants. Even grease containing the same type of thickening agent may, if mixed, interact in an adverse manner due to disparate additives or other ingredients.
- When using the product in locations subject to constant vibrations or in special environments such as in clean rooms, vacuums and under low/high temperatures, be sure to use a lubricant suitable for the specification/environment.
- When lubricating products that do not feature a grease nipple or oil hole, directly coat the raceway surfaces with lubricant and perform several warm-up strokes to ensure that the grease permeates the interior.
- Grease consistency can vary depending on the temperature. Keep in mind that the torque of the Ball Screw may be affected by changes in consistency.
- Following lubrication, there is the possibility that the rotational torque of the Ball Screw may increase due to the stirring resistance of the grease. Before commencing operations, make sure to run the unit through several warm-up cycles to ensure that the grease is adequately integrated and dispersed.
- Excess grease may spatter immediately after lubrication. Wipe off spattered grease as necessary.
- The properties of the grease deteriorate over time, thereby degrading the lubricity. It is necessary to inspect and apply the grease in accordance with the usage frequency.
- How often grease should be replenished varies depending on the usage conditions and environment. We recommend greasing the system approximately every 100 km traveled (three to six months). Final greasing interval/amount should be set at an actual machine.
- There is a risk that lubrication may not work sufficiently if the lubricating oil does not circulate (because of how it is mounted or the oiling port of the nut), so be sure to give these factors adequate consideration during design.
- It is necessary to use a good quality lubricant when using Ball Screws. Usage with no lubrication may increase wear on the rolling elements and shorten the service life. Table 3-1 shows a guideline for the oil feed amount.

2-5

Storage

Store the Ball Screw horizontally in its original packaging in an indoor location where it is not exposed to high or low temperatures or high humidity. Please note that if the product has been kept in storage for an extended period of time, the lubricant inside may have deteriorated. Please therefore ensure that you replenish the lubricant before re-use.

2-6

Disposal

The product should be disposed of appropriately as industrial waste.

3. Mounting Procedure

3. Mounting Procedure

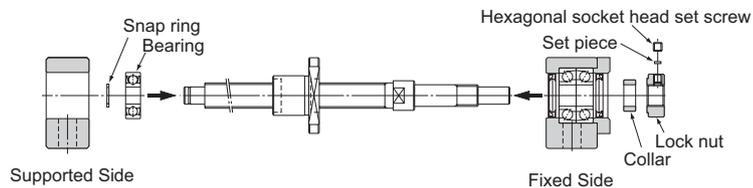
3-1 Assembling the Support Unit

- (1) Mount the fixed side Support Unit on the screw shaft.
- (2) After inserting the fixed side Support Unit, secure the lock nut using the fastening set piece and the hexagon socket set screws.
- (3) Attach the supported side bearing to the screw shaft and secure the bearing using the snap ring, and then mount the assembly on the housing on the supported side.

Note1: Do not disassemble the Support Unit.

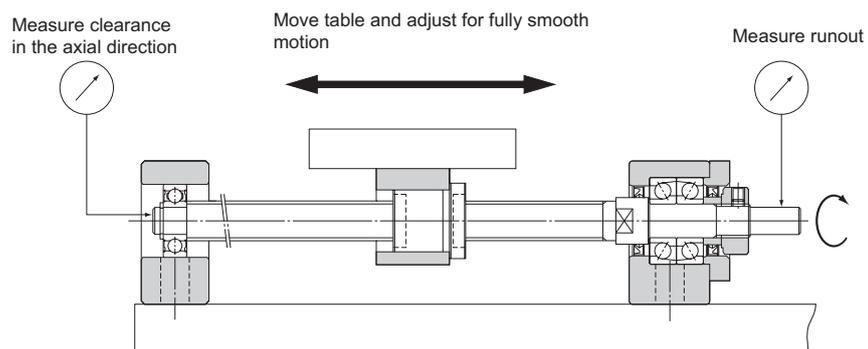
Note2: When inserting the screw shaft into the Support Unit, take care not to let the oil seal lip turn outward.

Note3: When securing the set piece with a hexagon socket set screw, apply an adhesive to the hexagon socket set screw before tightening it in order to prevent the screw from loosening. If planning to use the product in a harsh environment, other measures must also be considered to prevent loosening. Contact THK for details.



3-2 Checking Accuracy and Fully Fastening

While checking the runout of the Ball Screw shaft end and the clearance in the axial direction using a dial gauge, fully fasten the Ball Screw nut, the nut bracket, the fixed side Support Unit and the supported side Support Unit, in this order.

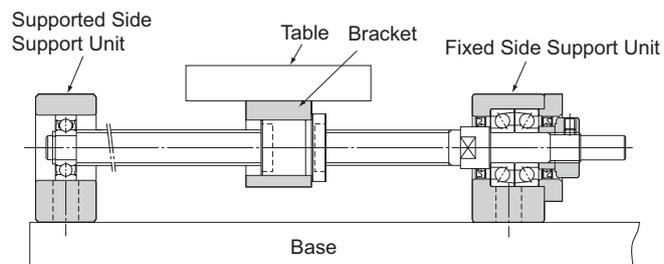


3. Mounting Procedure

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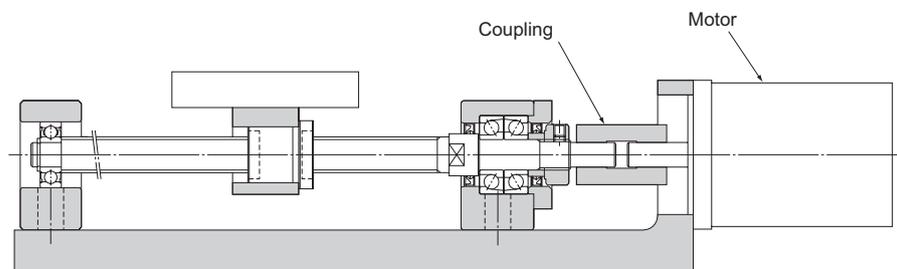
3-3 Installing onto Table and Base

- (1) If using a bracket when mounting the Ball Screw nut to the table, insert the nut into the bracket and temporarily fasten it.
- (2) Temporarily fasten the fixed side Support Unit to the base.
In doing so, press the table toward the fixed side Support Unit to align the axial center, and adjust the table so that it can travel freely.
 - If using the fixed side Support Unit as the reference point, secure a clearance between the Ball Screw nut and the table or inside the bracket when making the adjustment.
 - If using the table as the reference point, make the adjustment either by using a shim (for a rectangular type Support Unit), or by securing the clearance between the outer surface of the nut and the inner surface of the mounting section (for a round type Support Unit).
- (3) Press the table toward the table supported side Support Unit to align the axial center. Make the adjustment by reciprocating the table several times so that the nut travels smoothly throughout the whole stroke, and temporarily fasten the Support Unit to the base.



3-4 Connection with the Motor

- (1) Mount the motor bracket to the base.
- (2) Connect the motor and the Ball Screw using a coupling.
Note: Make sure the mounting precision is maintained.
- (3) Thoroughly run in the system.



4. Lubrication

It is necessary to use a good quality lubricant when using Ball Screws. Usage without lubrication may increase wear on the rolling elements and shorten the service life.

A lubricant has the following effects.

- (1) Minimizes friction in moving elements to prevent seizure and reduce wear.
- (2) Forms an oil film on the raceway to decrease stress acting on the surface and extend rolling fatigue life.
- (3) Covers the metal surface in an oil film to prevent rust formation.

To optimize Ball Screw functions, provide lubrication appropriate to the usage conditions.

It is necessary to study the mounting positions of the grease nipple and piping joint according to the installation direction.

(If the Ball Screw installation direction is other than horizontal use, the lubricant may not reach the raceway completely. Be sure to let THK know the installation direction and the exact position in each LM block where the grease nipple or the piping joint will be attached. See the general catalog for the installation direction of the Ball Screw.)

Even with a Ball Screw with seals, the internal lubricant gradually seeps out during operation. Therefore, the system needs to be lubricated at an appropriate interval according to the usage conditions.

4-1

Lubrication Interval

4-1-1

Grease Lubrication

How often grease should be replenished varies depending on the usage conditions and environment. We recommend greasing the system approximately every 100 km traveled (three to six months). Final greasing interval/amount should be set at an actual machine.

Normally, relubricate using the same grease type and through the lubrication hole or grease nipple provided on the Ball Screw. Mixing different types of grease may deteriorate the system's performance due to increased consistency or other such factor.

Lubricant	Type	Brand name
Grease	Lithium-Based Grease Urea-Based Grease Calcium-Based Grease	AFA Grease (THK)
		AFB-LF Grease (THK)
		AFC Grease (THK)
		AFE-CA Grease (THK)
		AFF Grease (THK)
		AFG Grease (THK)
		AFJ Grease (THK)
		L100 Grease (THK)
		L450 Grease (THK)
		L500 Grease (THK)
		L700 Grease (THK)
		Alvania Grease S No.2 (Showa Shell Sekiyu)
		Eponex Grease No.2 (Idemitsu Kosan)
		or equivalent

*The recommended grease will vary according to the usage conditions and environment.

4. Lubrication

4. Lubrication

4-1-2 Oil Lubrication

LM systems that require oil lubrication are shipped with only anti-rust oil applied. Please indicate when ordering.

- The amount of oil to be applied varies depending on the stroke length. For a long stroke, increase the lubrication frequency or the amount of oil applied so that an oil film is able to form in the stroke end of the raceway.
- In environments where coolant may spatter, the lubricant may become mixed with the coolant. This could result in the lubricant being emulsified or washed away, causing significantly degraded lubrication performance. In such locations, apply a lubricant with high viscosity (kinematic viscosity: approx. 68 cst) and high emulsification resistance, and adjust the lubrication frequency or the amount of the applied lubricant accordingly.
- For machine tools and similar devices that are subject to heavy loads, require high rigidity, and operate at high speed, oil lubrication is recommended.
- Make sure that lubrication oil discharges normally from the ends of the lubrication piping; that is, the oiling ports that connect to your linear motion system.

Lubricant	Type	Brand name
Oil	Raceway Oil or Turbine Oil ISOVG32 to 68	Daphne Super Multi Oil (Idemitsu Kosan)
		Mobil DTE Oil Series (Exxon Mobil)
		Shell Tonna S3 M (Showa Shell Sekiyu)
		Mobil Vactra Numbered Series (Exxon Mobil)
		Mobil Vactra No. 2 SLC (Exxon Mobil)
	or equivalent	

4. Lubrication

4. Lubrication

4-2 Sealing Method

4-2-1 Sealing Method

Turn the shaft 1/2 turn after sealing one shot with a grease gun, and repeat until the specified amount is sealed in. (Figure 4-1)



Figure 4-1 Sealing Using a Grease Gun

After sealing in the grease, move the nut about three times the full length of the nut to distribute the grease across the whole nut. (Figure 4-2)

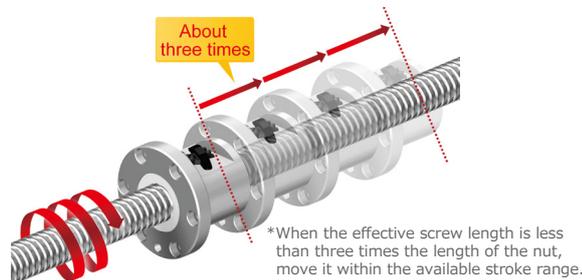


Figure 4-2 After Sealing Using a Grease Gun

4-2-2 Cautions When Sealing



Caution "A matter which, if mishandled, could result in physical injury or in only material damage."

- (1) Grease will leak from the seal unless the shaft is rotated while sealing, preventing sealing the specified amount in the nut.
- (2) Wipe off any leaked grease, and redo grease sealing, following the sealing directions. Contact THK for the grease sealing amount.

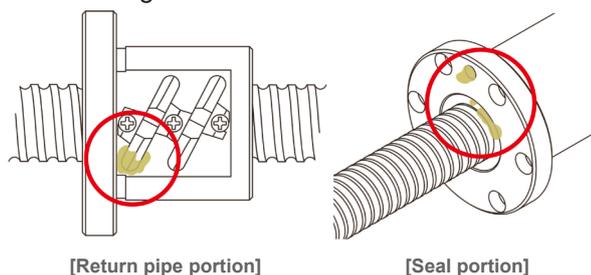


Figure 4-3 Return Pipe/Seal

Appendix

Revision History

The instruction manual number is on the back cover.

Publication Date	Instruction Manual No.	Revisions
December 2017	No. 1030-T34668	First edition

THK CO., LTD.

Inquiries

Website URL: <https://www.thk.com/eng/>

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