



NEW

Miniature Ball Spline LT-X

Compact design (volume comparison: 80% of conventional THK product)

Stable, smooth motion

Corrosion resistant Martensite stainless steel



LT4X Actual Size

For details, visit THK at www.thk.com

*Product information is updated regularly on the THK website.

Miniature Ball Spline **LT-X**

Achieves Compact Design, High Rigidity, and Long Life

LT-X uses a new circulation method employing end caps and four rows of circular arc grooves (raceways) to enable stable and smooth motion with a small rolling resistance fluctuation when compared to THK's conventional LT (*1).

The new circulation method, which makes the compact size possible, achieves a substantially smaller diameter than THK's conventional LT.

LT-X also accommodates a large permissible load while sharing the same dimensions as THK's Linear Bushing (model LM*2), allowing replacement of LM for a more highly rigid and longer-life device.

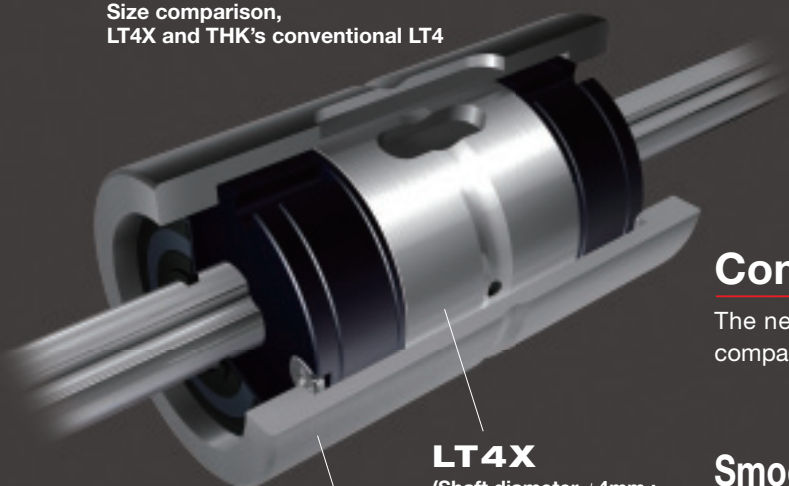


More compact
Smooth motion

Higher rigidity
Longer life



Size comparison,
LT4X and THK's conventional LT4



LT4X
(Shaft diameter $\phi 4\text{mm}$:
Outer diameter $\phi 8\text{mm}$)

Conventional THK item
LT4
(Shaft diameter $\phi 4\text{mm}$:
Outer diameter $\phi 10\text{mm}$)

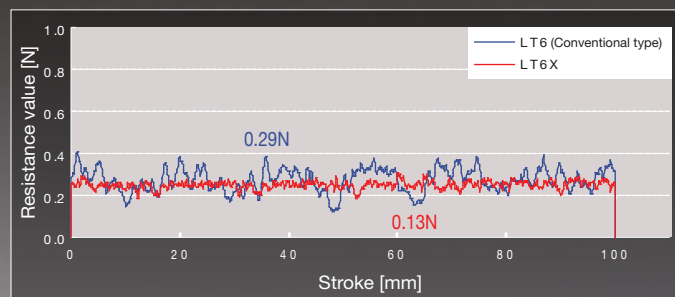
Compact

The new circulation method in LT-X allows for a much more compact design compared to conventional LT.

Smooth Motion (Small Rolling Fluctuation)

The new circulation method in LT-X allows for stable, smooth motion compared to conventional LT.

<Test conditions> Model No.---LT6/LT6X Speed---10mm/s Lubricant---AFF Grease



Corrosion Resistant

LT-X uses Martensite stainless steel for the spline nut, spline shaft, and balls, so it is corrosion resistant and an optimal choice for clean environments.

Dimensionally Interchangeable with Linear Bushing

The spline nut of LT-X has the same outer diameter and length as that of THK's Linear Bushing (model LM), allowing Linear Bushing LM to be replaceable with Miniature Ball Spline LT-X.



LT6X

LT6XL

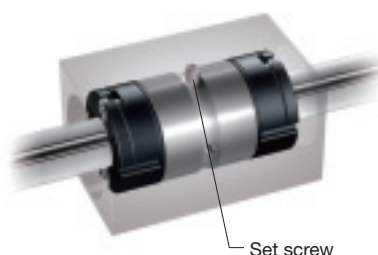
Mounting method

When fitting the spline nut and housing together for Miniature Ball Spline model LT-X, it is recommended that they be loose fitting to avoid deformation of the spline nut.

Housing Inner-diameter Tolerance	General conditions	H6
	If the accuracy does not need to be very high	H7

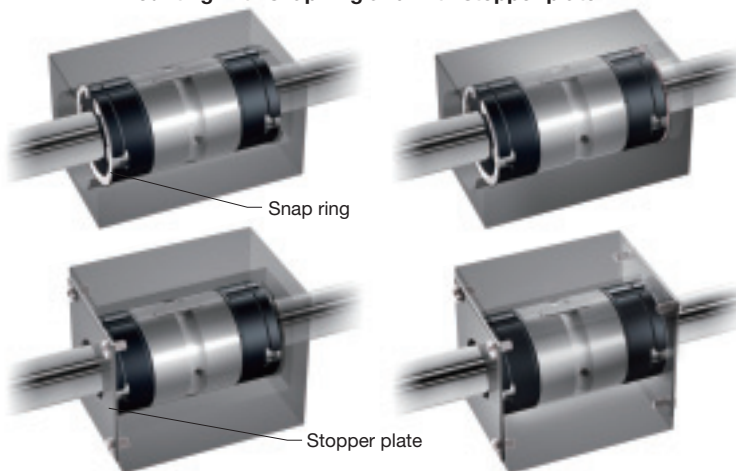
Mount Miniature Ball Spline model LT-X using the keyway on the nut (countersunk portion on LT4X). Also, the same as with THK's conventional Linear Bushing, mounting can also be carried out using a snap ring or stopper plate.

Model LT4X Housing



When mounting model LT4X, use M2 screws with thread lock, turning so they lightly contact the nut. To prevent deformation of the spline nut, avoid tightening the screws.

Mounting with snap ring and with stopper plate



Both ends of Miniature Ball Spline model LT-X's spline nut are resin end caps. Avoid applying excessive loads, as striking or strongly pushing may damage the caps. When using adhesive, contact THK for details.

Accuracy Standards

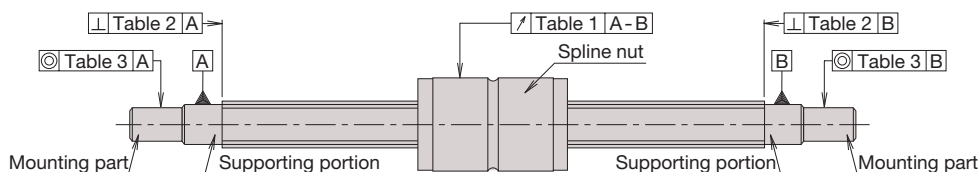


Table 1 Runout of the Spline Nut Circumference in Relation to the Support of the Spline Shaft

Overall spline shaft length [mm]		Runout (MAX) [μm]		
		Normal grade (No symbol)	High accuracy grade (H)	Precision Grade (P)
-	200 or less	72	46	26
-	Above 200	133	89	-

Table 2 Perpendicularity of the Spline Shaft End Face in Relation to the Support of the Spline Shaft

Perpendicularity (MAX) [μm]		
Normal grade (No symbol)	High accuracy grade (H)	Precision Grade (P)
22	9	6

Table 3 Concentricity of the Part-mounting in Relation to the Support of the Spline Shaft

Concentricity (MAX) [μm]		
Normal grade (No symbol)	High accuracy grade (H)	Precision Grade (P)
33	14	8

Clearance in the Rotation Direction

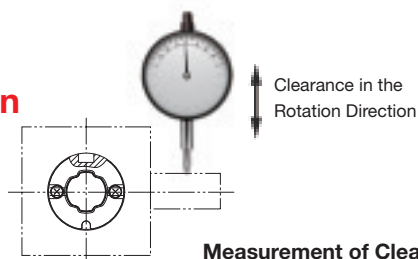
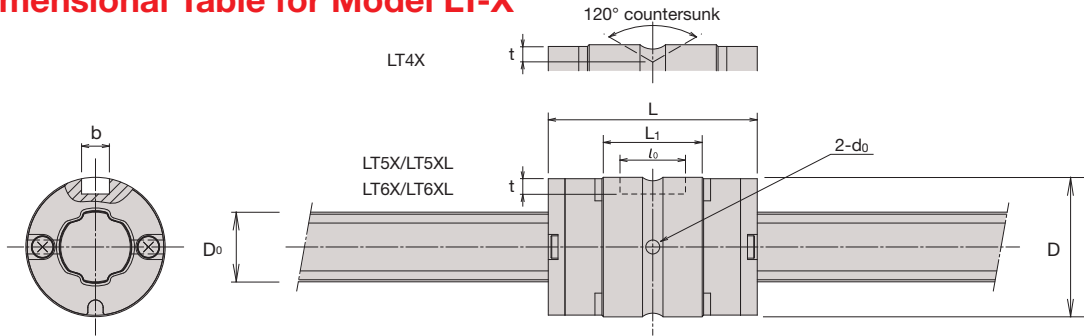


Table 4 Clearance in the rotation direction

Symbol	Clearance in the rotation direction [μm]
No symbol	-2 to +1
CL (Light preload)	-6 to -2

Measurement of Clearance in the Rotational Direction

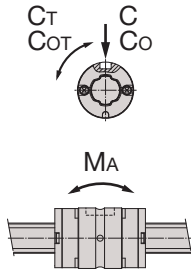
Dimensional Table for Model LT-X



Unit: mm

Model No.	Spline shaft diameter D _{h7}	Spline nut dimensions							Greasing hole d _o	Basic Load Rating		Permissible moment M _k [N·m]	Basic torque rating		Mass [g]
		Outer diameter		Length		Keyway				C [N]	C ₀ [N]		C _T [N·m]	C _{OT} [N·m]	
		D	Tolerance	L ^{*1}	L ₁	b H8	t	l ₀							
LT4X	4	8	0 -0.009	14.4 (12.0)	7.5	–	1	–	1	420	700	0.84	0.49	0.82	2.4
LT5X	5	10	0	15 (13.6)	7.3	2	1.2	4.7	1	560	850	1.04	0.82	1.25	3.7
LT5XL		10	-0.009	26 (24.6)	18.3	2	1.2	4.7	1	1090	2190	6.11	1.59	3.20	8.4
LT6X	6	12	0	19 (17.6)	10.2	2	1.2	6	1	980	1580	2.85	1.73	2.77	7.2
LT6XL		12	-0.011	30 (28.6)	21.2	2	1.2	6	1	1600	3150	10.6	2.81	5.54	13.9

*1: Spline nut length L is length with contamination protection accessory UU mounted. Values in () are appropriate dimensions without contamination protection accessory UU.



Precautions To Be Taken if an Eccentric Load Is Applied

By incorporating four rows of raceways, LT-X offers greatly enhanced performance with regard to eccentric loads (moment and torque) when compared to THK's conventional Linear Bushing LM. However, under conditions of a heavy eccentric load, poor operation or premature breakage may result. For heavy eccentric loads, use of Ball Spline LBS with an even larger load capacity is recommended. See the THK General Catalog when selecting a model.

Maximum manufactured lengths for spline shaft

Table 5 Maximum Manufactured Lengths for Model LT-X Spline Shaft

Model No.	Shaft diameter D _{sh7}	Mass [g/m]	Maximum manufactured lengths [mm]		
			Normal grade (No symbol)	High accuracy grade (H)	Precision grade (P)
LT4X	4	95	200	150	100
LT5X/LT5XL	5	150	250	200	100
LT6X/LT6XL	6	220	315	250	200

Material: equivalent to SUS440C
Hardness: 58 to 64 Hrc

Model number coding

2

LT6X

UU

CL

+100L

H

Number of spline nuts on one shaft
(no symbol for one nut)

Model No.

Contamination
protection
accessory
symbol

Symbol for
clearance in
the rotational
direction

Accuracy symbol

Overall spline shaft length
(in mm)

Also available are products with a specified clearance between spline shaft and spline nut, preload products (0 or less clearance), inclusion of specified grease (comes standard with THK-AFF grease fed and anti-rust oil applied), and considerations such as surface treatment (THK AP-C treatment, THK AP-CF treatment, THK AP-HC treatment). Contact THK for details.

THK Miniature Ball Spline LT-X



Precautions on use

●The Spline Nut and the Spline Shaft

- Do not remove the spline nut from the spline shaft unless it is necessary. If reinstalling the spline nut onto the spline shaft after inevitably removing the nut, align the ball position in the spline nut with the groove position of the spline shaft, and gradually insert the spline shaft straight into the spline nut. If the spline shaft is tilted when it is inserted, balls may fall out or the circulation part may be damaged.
- If the spline shaft gets stuck halfway while being inserted into the nut, do not force the shaft into the nut, but pull it out once, recheck the ball position and the groove position of the spline shaft, then gradually insert the shaft straight into the nut.
- After inserting the spline shaft into the spline nut, check whether the spline nut or the spline shaft smoothly moves. If the spline shaft was forcibly inserted, functional loss may have occurred even if the product looks intact.

●Handling

- Do not disassemble the parts. Doing so may cause dust to enter the product or degrade the assembly accuracy.
- Tilting the spline nut or the spline shaft when they are assembled may cause it to fall by its own weight.
- Do not drop or hit the Miniature Ball Spline. Doing so may damage it. Applying impact to the product may cause functional loss even if the product looks intact.

●Lubrication

- Thoroughly remove anti-rust oil and feed a lubricant before using the product.
- Do not mix lubricants of different physical properties.
- In locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, normal lubricants may not be used. Contact THK for details.
- When planning to use a special lubricant, contact THK before using it.
- When adopting oil lubrication, the lubricant may not be distributed throughout the product depending on the mounting orientation of nut. Contact THK for details.
- Lubrication interval varies according to the conditions. Contact THK for details.

●Precautions on Use

- Entrance of foreign material may damage the ball circulation part or cause functional loss. Prevent foreign material, such as dust and cutting chips, from entering the product.
- When planning to use the product in an environment where the coolant penetrates into the spline nut, it may disrupt the function of the product depending on the type of the coolant. Contact THK for details.
- Do not use the product at a temperature above 80°C. Contact THK if you desire to use the product at a temperature above 80°C.
- If foreign material, such as dust or cutting chips, adheres to the product, replenish the lubricant after cleaning the product. For the type of the cleaning fluid to be used, contact THK.
- When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, contact THK in advance.
- Removing the spline nut from the spline shaft then reinstalling it onto the shaft may cause balls to fall. Take much care in handling the product.

●Storage

- When storing the Miniature Ball Spline, enclose it in a package designated by THK and store it in a horizontal orientation while avoiding high temperature, low temperature and high humidity.

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THK CO., LTD.

HEAD OFFICE 3-11-6, NISHI-GOTANDA, SHINAGAWA-KU, TOKYO 141-8503 JAPAN
INTERNATIONAL SALES DEPARTMENT PHONE:+81-3-5434-0351 FAX:+81-3-5434-0353
Global site : <http://www.thk.com/>

EUROPE

THK GmbH

●EUROPEAN HEADQUARTERS

Phone:+49-2102-7425-555 Fax:+49-2102-7425-556

●DUSSELDORF OFFICE

Phone:+49-2102-7425-0 Fax:+49-2102-7425-299

●STUTTGART OFFICE

Phone:+49-7150-9199-0 Fax:+49-7150-9199-888

●MUNICH OFFICE

Phone:+49-8937-0616-0 Fax:+49-8937-0616-26

●U.K. OFFICE

Phone:+44-1384-47-1550 Fax:+44-1384-47-1551

●ITALY MILAN OFFICE

Phone:+39-039-284-2079 Fax:+39-039-284-2527

●ITALY BOLOGNA OFFICE

Phone:+39-051-641-2211 Fax:+39-051-641-2230

●SWEDEN OFFICE

Phone:+46-8-445-7630 Fax:+46-8-445-7639

●AUSTRIA OFFICE

Phone:+43-7229-51400 Fax:+43-7229-51400-79

●SPAIN OFFICE

Phone:+34-93-652-5740 Fax:+34-93-652-5746

●TURKEY OFFICE

Phone:+90-216-362-4050 Fax:+90-216-569-7150

●PRAGUE OFFICE

Phone:+420-2-41025-100 Fax:+420-2-41025-199

●MOSCOW OFFICE

Phone:+7-495-649-80-47 Fax:+7-495-649-80-44

THK Europe B.V.

●EINDHOVEN OFFICE

Phone:+31-040-290-9500 Fax:+31-040-290-9599

THK France S.A.S.

Phone:+33-4-3749-1400 Fax:+33-4-3749-1401

NORTH AMERICA

THK America, Inc.

●HEADQUARTERS

Phone:+1-847-310-1111 Fax:+1-847-310-1271

●CHICAGO OFFICE

Phone:+1-847-310-1111 Fax:+1-847-310-1182

●NORTH EAST OFFICE

Phone:+1-845-369-4035 Fax:+1-845-369-4909

●ATLANTA OFFICE

Phone:+1-770-840-7990 Fax:+1-770-840-7897

●LOS ANGELES OFFICE

Phone:+1-949-955-3145 Fax:+1-949-955-3149

●SAN FRANCISCO OFFICE

Phone:+1-925-455-8948 Fax:+1-925-455-8965

●DETROIT OFFICE

Phone:+1-248-858-9330 Fax:+1-248-858-9455

●TORONTO OFFICE

Phone:+1-905-820-7800 Fax:+1-905-820-7811

SOUTH AMERICA

THK Brasil LTDA

Phone:+55-11-3767-0100 Fax:+55-11-3767-0101

CHINA

THK (CHINA) CO., LTD.

●HEADQUARTERS

Phone:+86-411-8733-7111 Fax:+86-411-8733-7000

●SHANGHAI OFFICE

Phone:+86-21-6219-3000 Fax:+86-21-6219-9890

●BEIJING OFFICE

Phone:+86-10-8441-7277 Fax:+86-10-6590-3557

●CHENGDU OFFICE

Phone:+86-28-8526-8025 Fax:+86-28-8525-6357

●GUANGZHOU OFFICE

Phone:+86-20-8523-8418 Fax:+86-20-3801-0456

●SHENZHEN OFFICE

Phone:+86-755-2642-9587 Fax:+86-755-2642-9604

THK (SHANGHAI) CO., LTD.

Phone:+86-21-6275-5280 Fax:+86-21-6219-9890

TAIWAN

THK TAIWAN CO., LTD.

●TAIPEI HEAD OFFICE

Phone:+886-2-2888-3818 Fax:+886-2-2888-3819

●TAICHUNG OFFICE

Phone:+886-4-2359-1505 Fax:+886-4-2359-1506

●TAINAN OFFICE

Phone:+886-6-289-7668 Fax:+886-6-289-7669

KOREA

SEOUL REPRESENTATIVE OFFICE

Phone:+82-2-3468-4351 Fax:+82-2-3468-4353

SINGAPORE

THK LM SYSTEM Pte. Ltd.

Phone:+65-6884-5500 Fax:+65-6884-5550

THAILAND

THK LM System Pte. Ltd. Representative Office in Thailand

Phone:+660-2751-3001 Fax:+660-2751-3003

INDIA

BANGALORE REPRESENTATIVE OFFICE

Phone:+91-80-2330-1524 Fax:+91-80-2330-1524