

THK

NEW

Double-Nut Caged Ball Screw

SBKN

The basic dynamic load rating is 1.8 times larger than comparable models. Achieves long service life.
DN value of 160,000. Supports high-speed operation.
Low noise and long-term maintenance-free operation.



For details, visit THK at www.thk.com

*Product information is updated regularly on the THK website.

THK CO., LTD.
TOKYO, JAPAN

CATALOG No.384E

Double-Nut Caged Ball Screw

Supports long service life time and high speed.

The load capability doubled due to the adoption of the double-nut type compared with the single-nut type

Achieves a rated load approximately 2 times larger than that of the single-nut type.

	Double-nut SBKN3620-7.6	Single-nut SBK3620-7.6
Basic dynamic load rating	88.1kN	48.5kN
Basic static load rating	170.1kN	85.0kN

The service life time is approximately 6 times larger

Implements an optimized circulation structure

Achieves high-speed operation with a maximum DN value of 160,000 due to the adoption of an optimized circulation structure with the newly developed end piece and R piece.

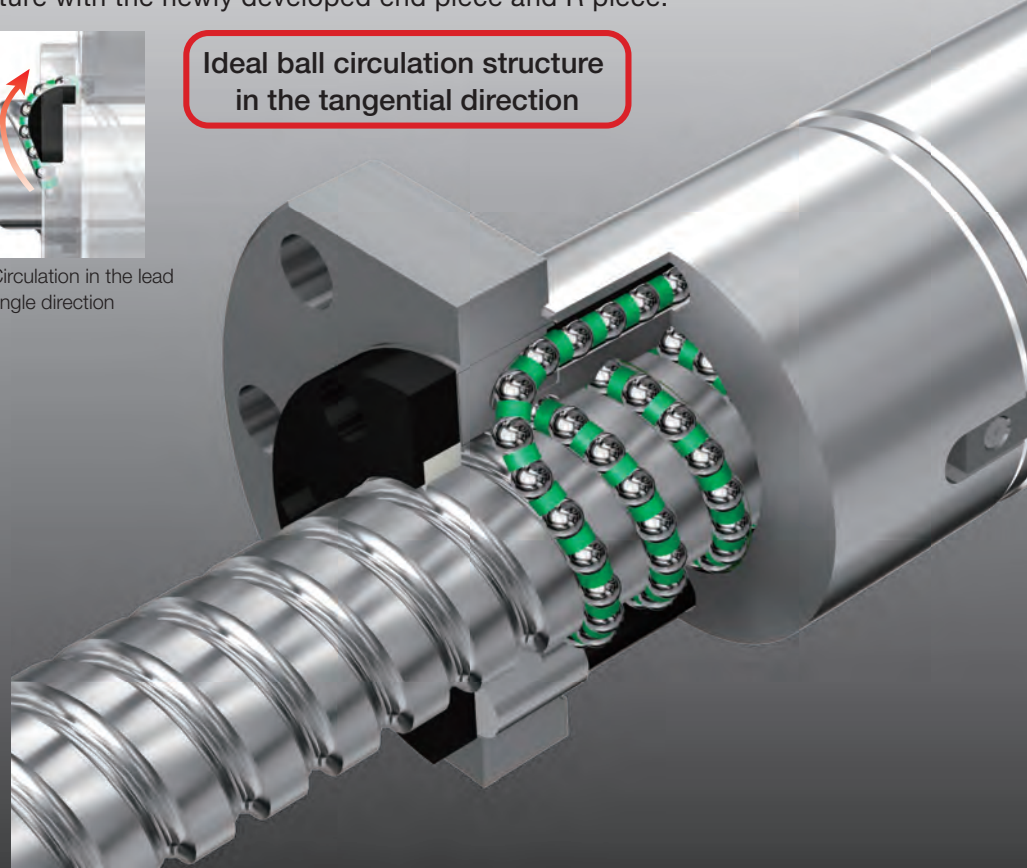


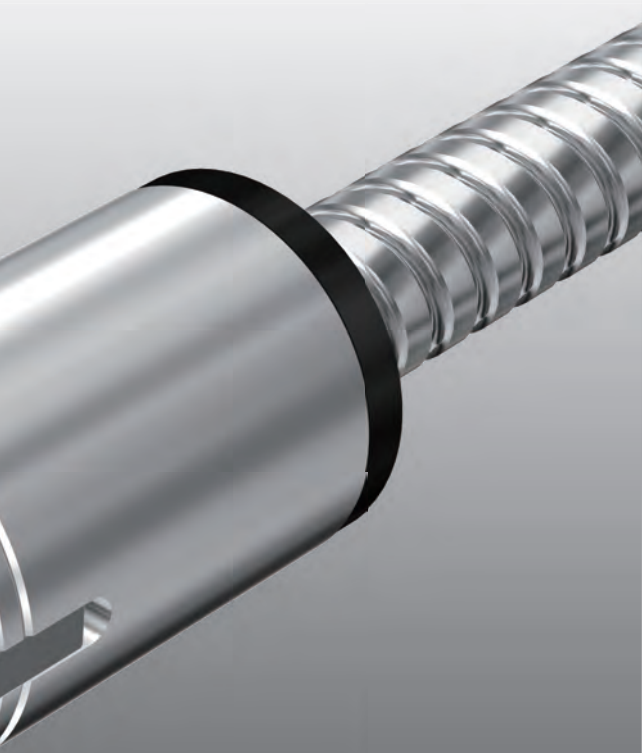
Circulation in the tangential direction



Circulation in the lead angle direction

Ideal ball circulation structure in the tangential direction



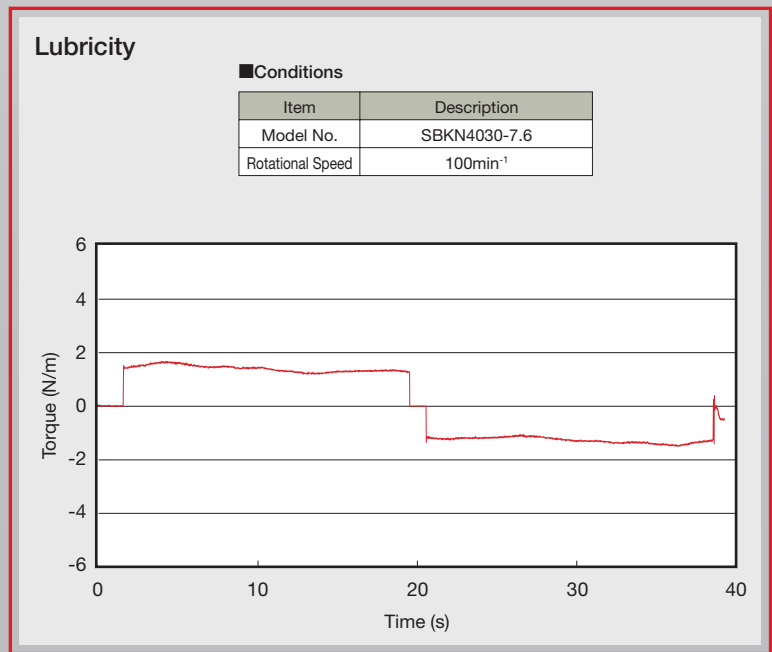
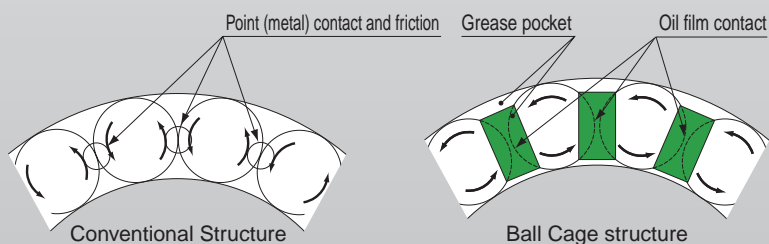


High Speed and Load-Bearing Capacity

Model SBKN uses optimized ball circulation structure and Caged Ball technology to achieve high speed and load durability.

High Speed Durability Test		Load Bearing Test	
■ Test conditions		■ Test conditions	
Item	Description	Item	Description
Model No.	SBKN4030-7.6	Model No.	SBKN4020-7.6
Rotational Speed	3800min ⁻¹ (DN value: 160,000)	Rotational Speed	1500min ⁻¹ (DN value: 63,000)
Speed	114m/min	Speed	30.0m/min
Stroke	650mm	Stroke	500mm
Lubricant	Multemp HRL grease	Lubricant	Multemp HRL grease
Quantity	14cm ³	Quantity	10cm ³
Acceleration	9.8m/s ²	Applied load	41.4 kN(0.38Ca)
Result		Result	
Shows no deviation after running 10,000 km.		Shows no deviation after running a distance approximately 2 times the calculated service life.	

Caged Ball technology eliminates collisions and friction between balls, minimizing torque fluctuation and achieving smooth, stable operation.



Product Overview

Double-Nut Caged Ball Screw

Lead Angle Accuracy and Axial Clearance

[Lead angle accuracy]

They comply with JIS (Japanese Industrial Standards) as before as well as ISO (ISO Standards) and DIN (Deutsche Industrie Normen).

Accuracy standard correspondence table

		Lead angle accuracy (Permissible value)					
Accuracy standards	JIS	C0	C1	C2*	C3	C5	C7
	ISO (DIN)	-	Cp1	-	Cp3	Cp5	-

*THK standard lead angle accuracy applies.

[Axial clearance]

Model SBKN adopts the double-nut preloading method ; G0 is the only axial clearance available.

		Unit: mm
Clearance symbol	G0	
Axial clearance	0 or less	

Static safety factor

[Basic static load rating C_{0a}]

The basic static load rating (C_{0a}) is normally the permissible axial load of ball screw. It is necessary to consider the following static safety factor for the calculated load based on the conditions. When the Ball Screw is stationary or in motion, unexpected external force may be applied through an inertia caused by the impact or the start and stop.

■ Static safety factor f_s

$$f_s \leq \frac{C_{0a}}{F_a}$$

f_s : Static safety factor (Table 1)
 C_{0a} : Basic static load rating^{*1}[kN]
 F_a : Axial load [kN]

Table 1 Static safety factor (f_s)

Machine type	Load conditions	Lower limit of f_s
General industrial machinery	Without vibration or impact	1.0 to 3.5
	With vibration or impact	2.0 to 5.0
Machine tool	Without vibration or impact	1.0 to 4.0
	With vibration or impact	2.5 to 7.0

*1 The basic static load rating (C_{0a}) is a static load with a constant direction and magnitude whereby the sum of the permanent deformation of the rolling element and that of the raceway on the contact area under the maximum stress is 0.0001 times the rolling element diameter. It is defined by the axial load for ball screw. (Specific values of each ball screw are indicated in the specification table for the corresponding model number.)

Nominal Life and Service Life Time

[Basic dynamic load rating C_a]

The basic dynamic load rating (C_a) is used to calculate the service life when the ball screw operates under a load. The basic dynamic load rating (C_a) is a load with interlocked direction and magnitude under which the nominal life (L) equals to 10^6 [rev]. (The basic dynamic load rating (C_a) is indicated in the specification table for the corresponding model number.)

■ Nominal Life L (Total Number of Revolutions)

The service life of the Ball Screw is calculated from the equation below using the basic dynamic load rating and the applied axial load.

$$L = \left(\frac{C_a}{f_w \cdot F_a} \right)^3 \times 10^6$$

L : Nominal life (total number of revolutions) [rev]
 C_a : Basic dynamic load rating^{*2}[kN]
 F_a : Load axial load [kN]
 f_w : Load factor (Table 2)

Table 2 Load factor (w)

Vibration/Impact	Speed (V)	f_w
Faint	Very low $V \leq 0.25$ m/s	1.0 to 1.2
Weak	Slow 0.25 m/s < $V < 1.0$ m/s	1.2 to 1.5
Medium	Medium speed 1.0 m/s < $V < 2.0$ m/s	1.5 to 2.0
High	High speed 2.0 m/s < V	2.0 to 3.5

*2 The rated service life is estimated by calculating the load on the premise that the product is set up in ideal mounting conditions with the assurance of good lubrication. The service life can be affected by the precision of the mounting materials used and any distortion.

■ Service Life Time L_h

Once the nominal life (L) has been obtained, the service life time (L_h) can be obtained using the following equation if the stroke length and the number reciprocations are constant.

$$L_h = \frac{L \times Ph}{2 \times \ell_s \times n_1 \times 60}$$

L_h : Service life time [h]
 ℓ_s : Stroke length [mm]
 n_1 : Number of reciprocations per minute [min^{-1}]
 Ph : Lead [mm]

Lubrication accessories and dust control accessories

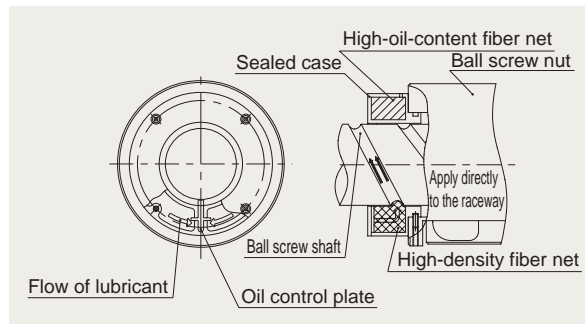
Model SBKN is available with the QZ Lubricator for ball screws and contact seal wiper ring W to remove minute contamination and to achieve long term maintenance-free operation.

[QZ Lubricator]

Lubricator QZ is a lubrication system to supply the right amount of lubricant to the raceway of the ball screw shaft.

●Features

- The maintenance interval can be extended significantly
With normal grease lubrication in a ball screw, oil is lost gradually during operation. QZ Lubricator can extend the maintenance interval supplementing the lost oil in the long run.
- Environmentally friendly lubrication system
Since QZ Lubricator applies the right amount of lubricant to the ball raceway by the high-density fiber net, it is an environmentally friendly lubrication system that does not contaminate the surroundings.

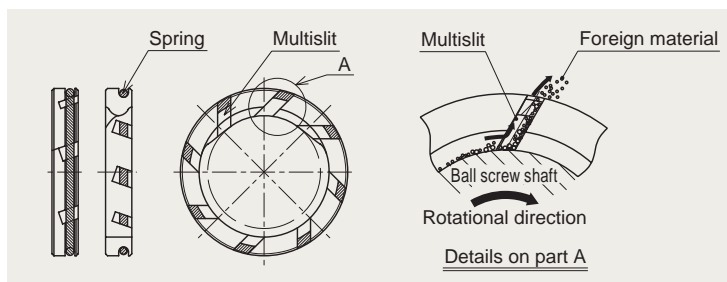


[Wiper ring W]

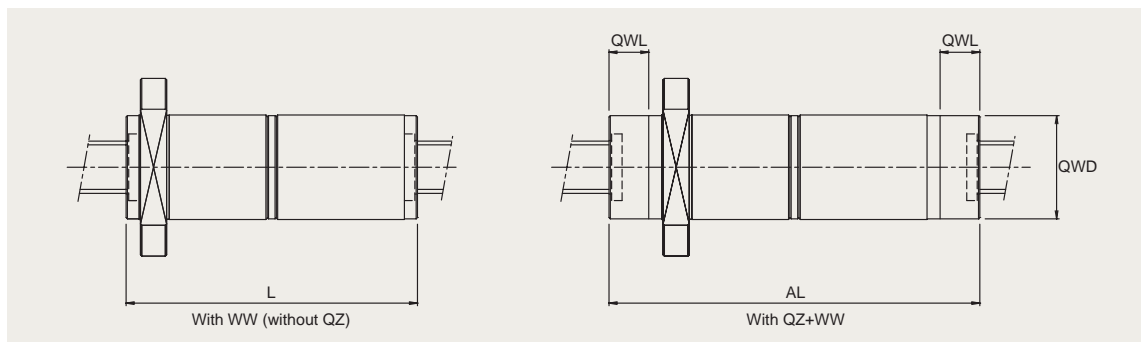
With the wiper ring W, a special resin scraper with high wear resistance and low dust generation removes foreign material and prevents foreign material from entering the ball screw nut while elastically contacting the circumference of the ball screw shaft and the screw thread.

●Features

- Prevents foreign material from entering the ball screw nut
- Contacts the ball screw shaft at a constant pressure level, thus to minimize the heat generation.
- High wear resistance, impact resistance, and chemical resistance
- Extends the maintenance interval even in a severe environment if QZ Lubricator for ball screw and wiper ring W are installed.



Dimensions of the Ball Screw Nut Attached with Wiper Ring (WW) and QZ Lubricator (QZ)



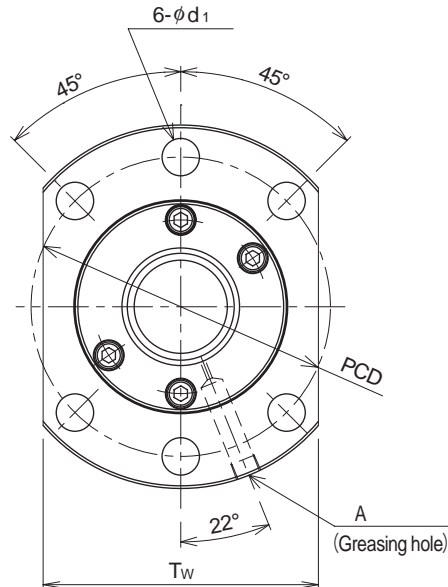
Unit: mm

Model No.	WW availability	QZ availability	With WW Dimensions	Length of protrusion with QZ attached	Outer diameter of protrusion with QZ attached	Dimensions including QZWW
			L	QWL	QWD	AL
SBKN 3620-7.6	○	○	210	28	69	266
SBKN 4020-7.6	○	○	210	30.5	79	271
SBKN 4030-7.6	○	○	283	30.4	79	343.8
SBKN 5020-7.6	○	○	210	35	89	280
SBKN 5030-7.6	○	○	284	35	89	354
SBKN 5036-7.6	○	○	334	35	89	404
SBKN 5520-7.6	○	○	210	32	95	274
SBKN 5530-7.6	○	○	284	32	95	348
SBKN 5536-7.6	○	○	334	32	95	398

Dimensional Table

Double-Nut Caged Ball Screw

Model SBKN



Model No.	Screw shaft Outerdiameter d	Lead Ph	Ball center-to-center diameter dp	Root diameter of screw shaft dc	No. of circuits under load Rows×turns	Basic Load Rating		Rigidity K [N/μm]
						C _a [kN]	C _r [kN]	
SBKN3620-7.6	36	20	37.75	30.4	2×3.8	88.1	170.1	1660
SBKN4020-7.6	40	20	42	34.1	2×3.8	108.9	227.1	1856
SBKN4030-7.6	40	30	42	34.1	2×3.8	108.1	216.7	1845
SBKN5020-7.6	50	20	52	44.1	2×3.8	121.2	283.7	2209
SBKN5030-7.6	50	30	52	44.1	2×3.8	120.8	269.9	2223
SBKN5036-7.6	50	36	52	44.1	2×3.8	120.1	271.6	2218
SBKN5520-7.6	55	20	57	49.1	2×3.8	127.2	314.6	2123
SBKN5530-7.6	55	30	57	49.1	2×3.8	126.4	297.3	2381
SBKN5536-7.6	55	36	57	49.1	2×3.8	125.9	299	2399

Model Number coding

SBKN3620-7.6 QZ RR G0 +1000L C5

Model No.

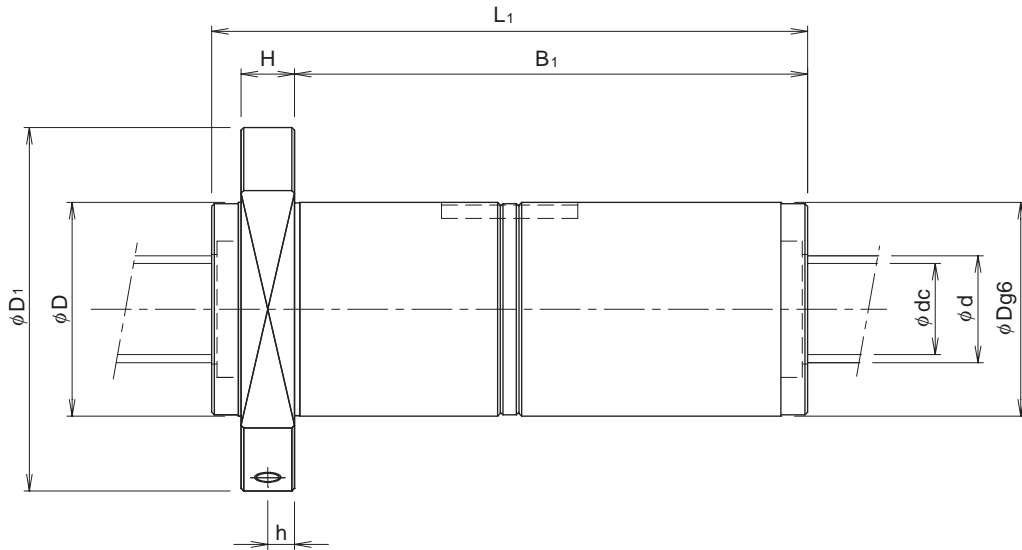
Symbol for clearance
in the axial direction
(see page3)

Seal symbol
RR: labyrinth seal on both ends
WW: Two-sided wiper ring

With QZ Lubricator
(no symbol without
QZ Lubricator)

Accuracy
symbol
(-> P.3)

Overall ball screw shaft length (in mm)



Unit: mm

Nut dimensions										Nut mass [kg]	Shaft mass [kg/m]
Outer diameter D	Flange diameter D ₁	Overall length L ₁	H	B ₁	h	PCD	d ₁	Tw	Greasing Hole A		
73	114	210	18	181	9	93	11	86	PT 1/8	4.59	5.0
80	136	210	20	179	10	112	14	103	PT 1/8	5.45	5.7
80	136	283	20	252	10	112	14	103	PT 1/8	7.72	7.0
90	146	210	22	177	11	122	14	110	PT 1/8	6.56	10.2
90	146	284	22	251	11	122	14	110	PT 1/8	8.96	11.9
90	146	334	22	301	11	122	14	110	PT 1/8	10.53	12.5
96	152	210	22	177	11	128	14	114	PT 1/8	7.15	13.0
96	152	284	22	251	11	128	14	114	PT 1/8	9.76	14.8
96	152	334	22	301	11	128	14	114	PT 1/8	10.90	15.5

Note) The rigidity values (K) in the table represent spring constants each obtained from the load and the elastic deformation when providing a preload 10% of the basic dynamic load rating (C_a) and applying an axial load three times greater than the preload.

These values do not include the rigidity of the components related to mounting the ball screw nut. Therefore, it is normally appropriate to regard roughly 80% of the rigidity values (K) in the table as the actual value.

If the applied preload (F_{a0}) is not 0.1C_a, the rigidity value (K_n) is obtained from the following equation.

$$K_N = K \left(\frac{F_{a0}}{0.1C_a} \right)^{\frac{1}{3}} \quad K: \text{Rigidity value in the dimensional tables}$$

●Precautions

With model SBKN, the raising of both ends of the thread groove is not available.

When designing your system this way, contact THK.

THK Double-Nut Caged Ball Screw Model SBKN

Precautions on Use

● Handling

- This product consists mostly of heavy items (20 kg or more). When moving heavy items, use 2 or more people or moving equipment. Failure to do so could cause injury or product damage.
- Do not disassemble the parts. This will cause loss of functionality.
- 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 or product damage. Failure to do so could cause injury or product damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
- When assembling this product, do not remove the ball screw nut from the ball screw shaft.
- When handling this product, wear protective gloves, protective shoes, etc. as needed to ensure safety.

● Precautions on Use

- Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
- If you use this product in any environments where cutting chips, coolant, corrosive solution, water, etc. get into the product, prevent them from getting into the product using a bellow, cover, etc.
- Do not use the product at temperature of 80°C or higher. If this temperature is exceeded, the resin/rubber parts may be deformed/damaged, excluding a heat-resistant type. In the case of the specifications with QZ Lubricator, be sure to use it at 50°C or below.
- If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product with pure white kerosene.
- Slight rocking can inhibit the formation of a film of oil between the rolling surface and the areas of contact of rolling elements, resulting in fretting. THK recommends periodically rotating ball screw nut 1 several times to help ensure that a film forms on the surfaces and rolling elements.
- Do not forcibly drive a pin, key, or other positioning device into this product. This could create indentations on the raceway and impair the product's function.
- If an offset or skewing occurs with the ball screw shaft support and the ball screw nut, it may substantially shorten the service life. Pay much attention to components to be mounted and to the mounting accuracy.
- If any of the rolling elements falls from the ball screw nut, contact THK instead of using the product.
- If the unit will be positioned vertically, install safety equipment or take other measures to prevent it from toppling over. The ball screw nut may drop by its own weight.
- Do not use this product beyond its permissible rotational speed. Doing so may cause accidents or component damage. Be sure to use the product within the specification range designated by THK.
- Do not cause the ball screw nut to overrun. This will lead to problems such as ball displacement, damage to ball circulation components, or indentation on the ball raceway, which may cause a malfunction. If you keep using the product as it is, it may lead to early wear or damage on circulation components.
- To avoid damaging the product, use the ball screw in combination with an LM Guide, Ball Spline, or other guide element.
- If the rigidity and accuracy of the mounting components are insufficient, the load of the bearing will be concentrated locally and the bearing performance will be deteriorated significantly. Therefore, examine the rigidity and accuracy of the housing and base and the strength of the fixing bolt sufficiently.

● Lubrication

- Thoroughly remove anti-rust oil and feed lubricant before using the product.
- Do not mix lubricants of different physical properties. Even lubricants 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 exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use a grease that suit the service environment.
- To lubricate a product without any grease nipples nor oil holes, apply a lubricant directly to the raceway and perform several warm-up strokes with the unit to ensure that lubricant permeates the interior.
- Lubricant viscosity can vary depending on the temperature. Please keep in mind that the ball screw's sliding resistance may be affected by changes in viscosity.
- Following lubrication, stirring-resistance within the lubricant can cause the ball screw to exhibit increased rotational torque. Before commencing operations, make sure to run the unit through several warm-up cycles to ensure that the lubricant is adequately integrated and dispersed.
- Even when the unit is equipped with seals, excess grease may spatter immediately after lubrication. If necessary, wipe off any spattered grease.
- Grease inspection and application in accordance with the use frequency are necessary because the property of the grease is deteriorated as the time elapses and the lubrication performance decreases.
- Though greasing intervals vary depending on the conditions and environments, we recommend greasing the system approximately every 100 km of travel distance (3 to 6 months). Set the final greasing interval and amount with the actual equipment.
- The application must be designed in such a way that the mounting position and nut's filler does not prevent lubricant from circulating.
- When using a ball screw, it is necessary to provide effective lubrication. Using the product without lubrication may increase wear of the rolling elements or shorten the service life.
- In the specifications with QZ Lubricator, the minimum necessary grease is applied to the raceway. Note that the lubricant may drop from the ball screw shaft depending on the property of the lubricant in some conditions such as vertical installation.

● Storage

- When storing the Ball Screw, enclose it in a package designated by THK and store it in a horizontal orientation while avoiding a high temperature, a low temperature and a high humidity in an indoor location.
- In products stored for a long time, their internal lubricants may be aged so apply a lubricant again before use.

● Disposal

- The product shall be disposed as an industrial waste in a right manner.

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