High-Speed Caged Ball Screw

SBK

DN value: 210,000 (Achieves high-speed feed at 200 m/min)
High-Speed feed by a large lead
Low noise, long-term maintenance-free operation

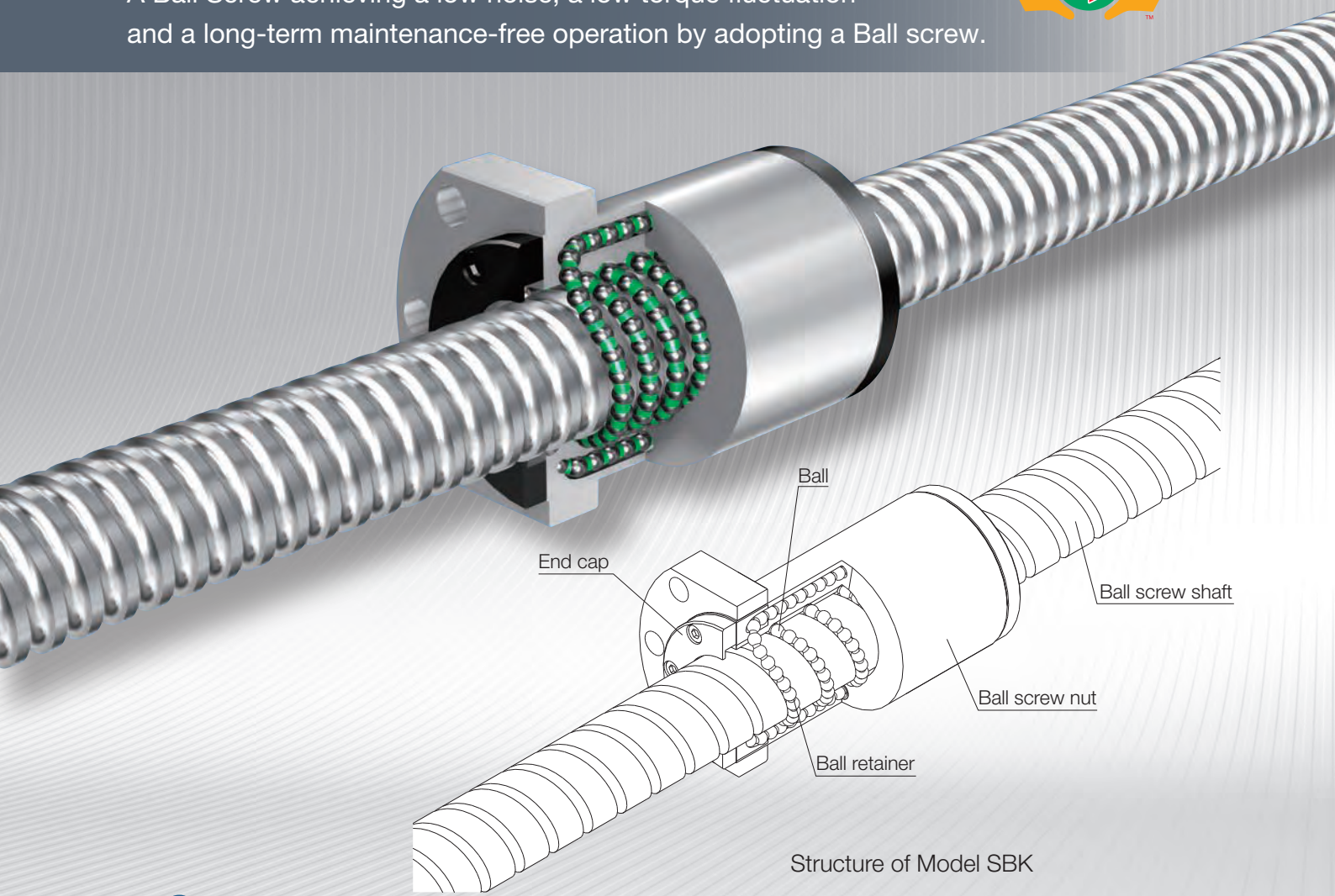
For details, visit THK at **www.thk.com**
*Product information is updated regularly on the THK website.

THK CO., LTD.
TOKYO, JAPAN

CATALOG No.330-3E

High-Speed Caged Ball Screw SBK

Model SBK is a ball screw suitable for high-speed usage.
A Ball Screw achieving a low noise, a low torque fluctuation
and a long-term maintenance-free operation by adopting a Ball screw.



Structure of Model SBK

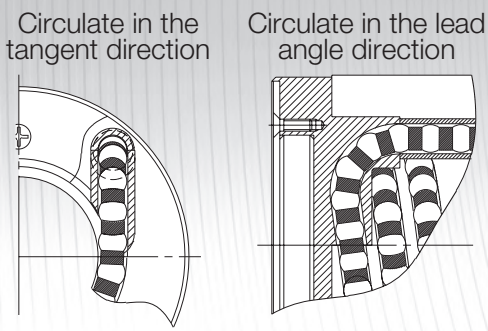
Structure

The use of a ball cage eliminates collision and friction between balls and increases the grease retention. This makes it possible to achieve a low noise, a low torque fluctuation and a long-term maintenance-free operation. Moreover, the ball circulation method suitable for high-speed usage enables usage with the DN value of 210 thousand*. (*DN value = Ball center-to-center diameter × revolutions per minute)
The preload method adopts the offset preload method to give phase difference between the raceways of row rows of the ball screw nut. The full length the ball screw nut is shorter than the double nut type, which realizes a compact structure.

Features

1 Very high speed

Model SBK has an ideal circulation structure in which balls are picked up in the tangent direction and lead angle direction by the end cap, which enables usage with the DN value up to 210 thousand and realizes fast feed up to 200m/min.



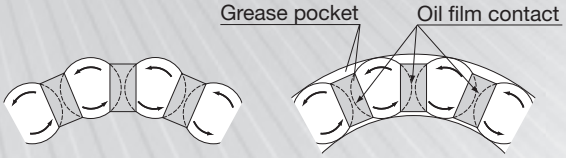
Ball circulation structure

2 Long-term maintenance-free operation

The friction between the balls has been eliminated, and the grease retention has been improved through the provision of grease pockets. As a result, the long-term maintenance-free operation (i.e., lubrication is unnecessary over a long period) is achieved.

3 Smooth Motion

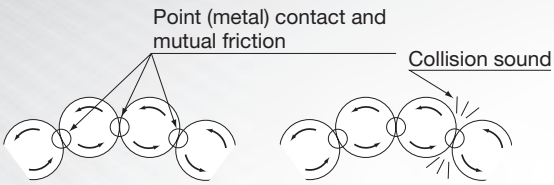
In model SBK, the use of the ball cage eliminates the collision and friction between the balls. It minimizes the torque fluctuation, thus allowing the smooth motion to be achieved.



Structure of the ball cage type

4 Low noise, acceptable running sound

In model SBK, the use of the ball cage eliminates the collision noise between the balls. Additionally, as balls are picked up in the tangential direction, the collision noise from the ball circulation has also been eliminated, which results in low noise and acceptable running sound.



Structure of the full-ball type

Performance

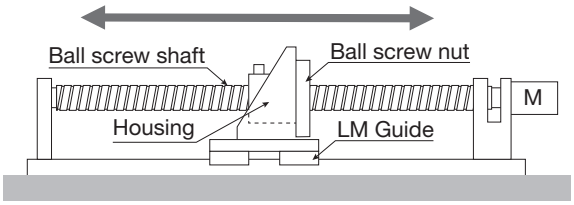
●High Speed, Load-bearing Capacity

With the optimal design for high speed and the caged ball technology, the Ball Screw with Ball Cage excels in high speed.

●High-speed Durability Test Data

[Test conditions]

Item	Description
Sample	High Speed Ball Screw with Ball Cage SBK5050-5.6
Speed	200m/min (DN value: 210 thousand)
Acceleration	25.48m/s^2 (2.6G)
Stroke	800mm
Rotational speeds	4000min^{-1}
Applied load	1.91kN
Lubrication	Grease Lubrication (THK AFJ Grease)



[Test results]

No anomaly after travelling 10,000 km

■Load Bearing Test Data

[Test conditions]

Item	Description
Sample	High Speed Ball Screw with Ball Cage SBK3636-5.6
Applied load	13.9kN
Speed	54m/min
Stroke	400mm
Acceleration	34.3m/s^2 (3.5G)
Rotational speeds	1500min^{-1}
Lubrication	Grease Lubrication (THK AFJ Grease)

Load bearing test equipment

[Test results]

Shows no deviation after running a distance 2.5 times the calculated service life.

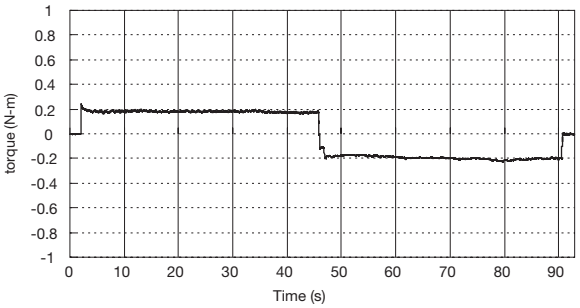
●Smooth Motion

The caged ball technology allows smoother motion to be achieved, thus to reduce torque fluctuation.

■Rotational Torque Evaluation Data

[Conditions]

Item	Description
Sample	High Speed Ball Screw with Ball Cage SBK5050-5.6
Speed	3m/min
Stroke	800mm
Rotational speeds	60min^{-1}
Lubrication	Grease Lubrication (THK AFJ Grease)



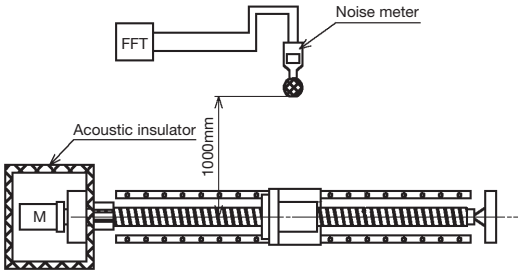
●Low Noise

Since the balls do not collide with each other thanks to ball cage, they do not produce a metallic sound and a low noise level is achieved.

■Noise Test Data

[Test conditions]

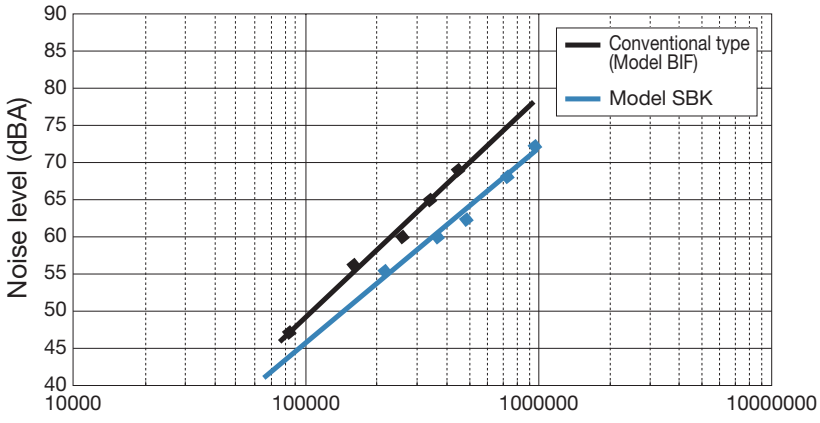
Item	Description
Sample	High Speed Ball Screw with Ball Cage Model SBK Conventional type Model BIF
Stroke	800mm
Lubrication	Grease Lubrication (THK AFJ Grease)



Noise measurement instrument

[Test results]

The noise of model SBK is 3 to 5dBA lower than that of the conventional type



Ball diameter × Ball Center-to-center diameter × Rotational speed

Accuracy Standards and Clearance in the Axial Direction

●Accuracy Standards

The accuracy of model SBK is controlled in accordance with an ISO standard (ISO 3408).
The lead accuracy measurement guarantees the accuracy by the reliable laser measuring equipment.
Accuracy grades C0 to C5 are defined in the linearity and the directional property, and C7 in the travel distance error in relation to 300 mm.

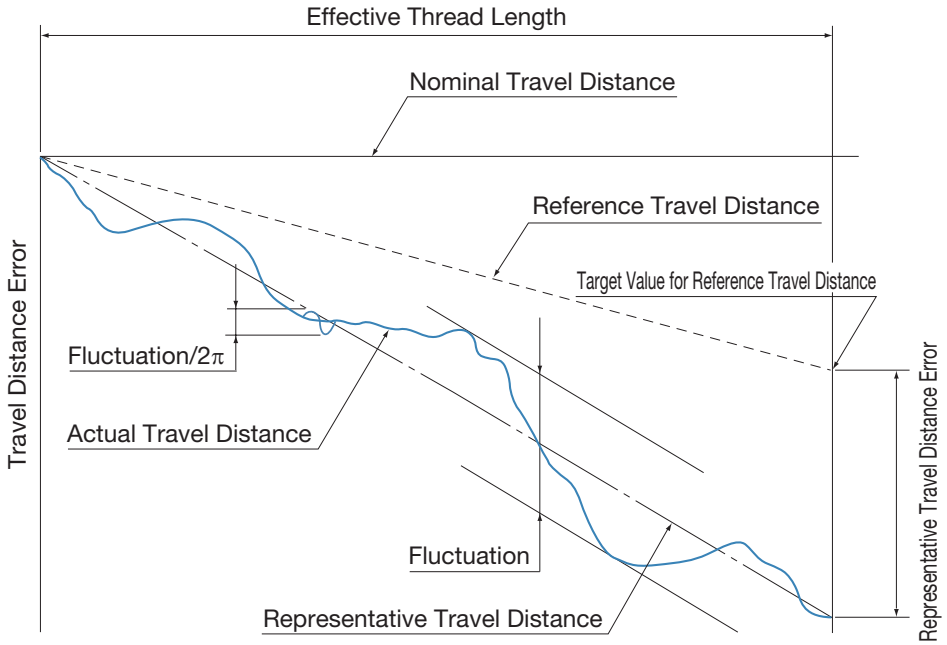


Fig.1 Terms on Lead Angle Accuracy

[Actual Travel Distance]

An error in the travel distance measured with an actual Ball Screw.

[Reference Travel Distance]

Generally, it is the same as nominal travel distance, but can be an intentionally corrected value of the nominal travel distance according to the intended use.

[Target Value for Reference Travel Distance]

You may provide some tension in order to prevent the screw shaft from runout, or set the reference travel distance in “negative” or “positive” value in advance given the possible expansion/contraction from external load or temperature. In such cases, specify a target value for the reference travel distance.

[Representative Travel Distance]

It is a straight line representing the tendency in the actual travel distance, and obtained with the least squares method from the curve that indicates the actual travel distance.

[Representative Travel Distance Error (with ±)]

Difference between the representative travel distance and the reference travel distance.

[Fluctuation]

The maximum width of the actual travel distance between two straight lines drawn in parallel with the representative travel distance.

[Fluctuation/300]

Indicates a fluctuation against a given thread length of 300 mm.

[Fluctuation/2π (Wobbling)]

A fluctuation in one revolution of the screw shaft.

Table 1 Lead Angle (Permissible Values) Unit: μm

Accuracy Grade		C0		C1		C2		C3		C5		C7
Effective Thread Length (mm)		Represen-tative Travel Distance Error	Fluctu-ation	Represen-tative Travel Distance Error	Fluctu-ation	Represen-tative Travel Distance Error	Fluctu-ation	Represen-tative Travel Distance Error	Fluctu-ation	Represen-tative Travel Distance Error	Fluctu-ation	Travel Distance Error
Above	Or Less											
—	100	3	3	3.5	5	5	7	8	8	18	18	
100	200	3.5	3	4.5	5	7	7	10	8	20	18	
200	315	4	3.5	6	5	8	7	12	8	23	18	
315	400	5	3.5	7	5	9	7	13	10	25	20	
400	500	6	4	8	5	10	7	15	10	27	20	
500	630	6	4	9	6	11	8	16	12	30	23	
630	800	7	5	10	7	13	9	18	13	35	25	
800	1000	8	6	11	8	15	10	21	15	40	27	
1000	1250	9	6	13	9	18	11	24	16	46	30	±50/ 300mm
1250	1600	11	7	15	10	21	13	29	18	54	35	
1600	2000	—	—	18	11	25	15	35	21	65	40	
2000	2500	—	—	22	13	30	18	41	24	77	46	
2500	3150	—	—	26	15	36	21	50	29	93	54	
3150	4000	—	—	30	18	44	25	60	35	115	65	
4000	5000	—	—	—	—	52	30	72	41	140	77	
5000	6300	—	—	—	—	65	36	90	50	170	93	
6300	8000	—	—	—	—	—	—	110	60	210	115	
8000	10000	—	—	—	—	—	—	—	—	260	140	

●Clearance in the Axial Direction

Clearance G0 is used as the clearance in the axial direction of model SBK as standard.

Table 2 Clearance in the Axial Direction Unit: mm

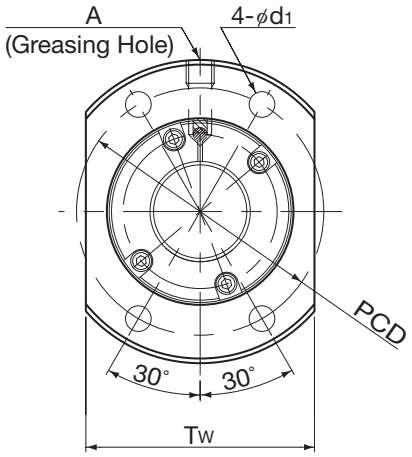
Clearance symbol	G0
Clearance in the Axial Direction	0 or smaller

●Maximum Length of the Ball Screw Shaft

Table 3 Maximum Length of the Screw Shaft Unit: mm

Screw Shaft Outer Diameter	C0	C1	C2	C3	C5	C7
15	570	670	830	950	980	1100
16	620	730	900	1050	1100	1400
20	820	950	1200	1400	1600	1800
25	1100	1400	1600	1800	2000	2400
32	1600	1800	2200	2500	2800	3200
36	2000	2100	2550	2950	3250	3650
40	2000	2400	2900	3400	3700	4300
50	2000	3100	3800	4500	5000	5800
55	2000	3450	4150	5300	6050	6500

SBK (Screw shaft outer diameter: 15 to 32mm)



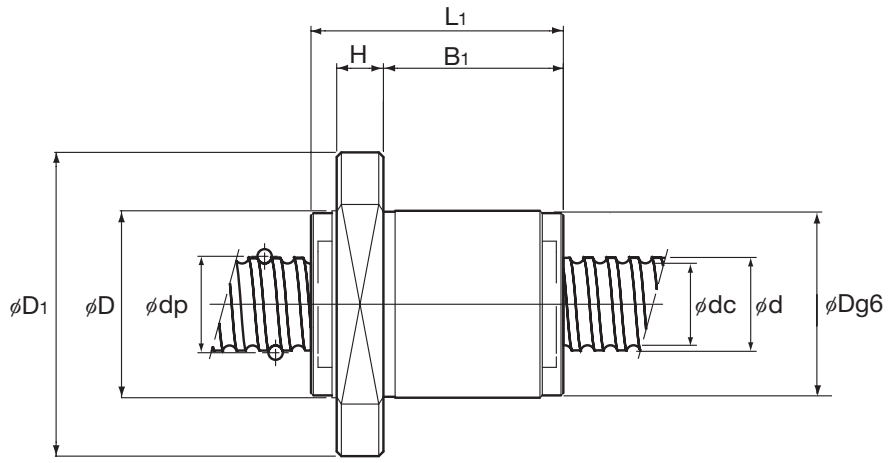
Model No.	Screw Shaft Outer Diameter d	Lead Ph	Ball Center-to-center Diameter dp	Thread Minor Diameter dc	Loaded Circuits Rows × Turns	Basic Load Rating Ca kN	Basic Load Rating C0a kN	Rigidity K N/μm
SBK 1520-3.6	15	20	15.75	12.2	1×1.8	5.8	7.8	178
SBK 1616-3.6	16	16	16.65	13.5	1×1.8	4.6	6.4	182
SBK 2010-5.6	20	10	20.75	17.2	1×2.8	10.7	17.3	353
SBK 2020-3.6	20	20	20.75	17.2	1×1.8	7	10.5	229
SBK 2030-3.6	20	30	20.75	17.2	1×1.8	6.9	11.2	236
SBK 2520-3.6	25	20	26	21.5	1×1.8	11	16.9	292
SBK 2525-3.6	25	25	26	21.5	1×1.8	10.8	16.9	290
SBK 3220-5.6	32	20	33.25	27.9	1×2.8	23.6	41.1	565
SBK 3232-5.6	32	32	33.25	27.9	1×2.8	23.1	41.8	567

Note) With model SBK, the raising of both ends of the thread groove is not available. When designing your system this way, contact THK.
When the Lubricator QZ and W wiper ring are attached, the overall length of the nut will increase. For details, see P.11.

Model Number Coding

SBK2525-3.6 QZ G0 +1200L C5

- SBK2525-3.6: Model No.
- QZ: With Lubricator QZ (No symbol when Lubricator QZ is not provided)
- G0: Symbol of clearance in the axial direction (All of Model SBK use Clearance G0.)
- +1200L: Screw shaft length (mm)
- C5: Accuracy symbol



Unit: mm

	Nut Dimensions									Screw Shaft Inertial Moment/ mm	Nut Mass	Shaft Mass	Maximum Permissible Rotation Speed
	Outer Diameter D	Flange Diameter D_1	Overall Length L_1	H	B_1	PCD	d_1	T_W	Greasing Hole A	kg-cm²/mm	kg	kg/m	min⁻¹
	38	62	54	10	38.5	49	5.5	39	M6	3.9×10^{-4}	0.41	1.27	
	33	54	45	10	29.5	43	4.5	38	M6	5.05×10^{-4}	0.25	1.46	
	40	65	45	10	29.5	53	5.5	49	M6	1.23×10^{-3}	0.37	2.18	
	40	65	54	10	38.5	53	5.5	49	M6	1.23×10^{-3}	0.43	2.32	5000
	40	65	71	10	55.5	53	5.5	49	M6	1.23×10^{-3}	0.55	2.36	
	47	74	57	12	38	60	6.6	56	M6	3.01×10^{-3}	0.59	3.58	
	47	74	68	12	49	60	6.6	56	M6	3.01×10^{-3}	0.69	3.63	
	58	92	82	15	58	74	9	68	M6	8.08×10^{-3}	1.23	5.82	3900
	58	92	118	15	94	74	9	68	M6	8.08×10^{-3}	1.70	5.99	

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

If the applied preload (Fa_0) is not 0.1 Ca, the rigidity value (K_N) is obtained from the following equation.

$$K_N = K\left(\frac{Fa_0}{0.1Ca}\right)^{\frac{1}{3}}$$

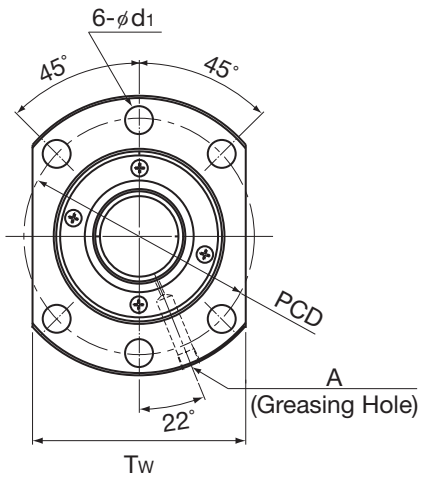
K: Rigidity value in the specification tables

*Lubrication

Lithium grease No. 2 is contained in model SBK as standard.

If you want any other grease or any types without grease, contact THK.

SBK (Screw shaft outer diameter: 36 to 55mm)



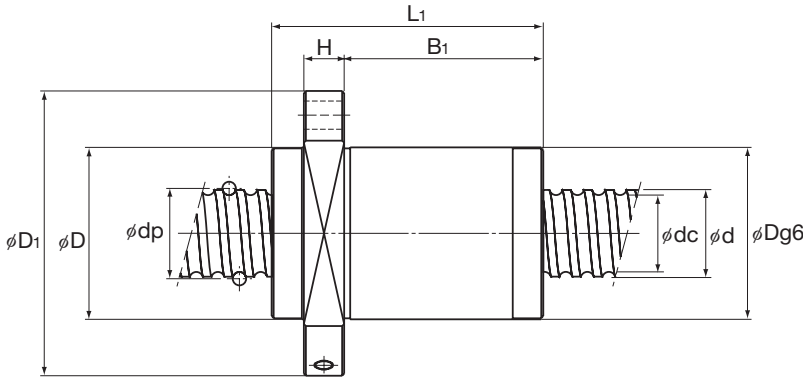
Model No.	Screw Shaft Outer Diameter d	Lead Ph	Ball Center-to-center Diameter dp	Thread Minor Diameter dc	Loaded Circuits Rows × Turns	Basic Load Rating Ca kN	Basic Load Rating C0a kN	Rigidity K N/μm
SBK 3620-7.6	36	20	37.75	30.4	1×3.8	48.5	85	870
SBK 3636-5.6	36	36	37.75	31.4	1×2.8	36.6	64.7	460
SBK 4020-7.6	40	20	42	34.1	1×3.8	59.7	112.7	970
SBK 4030-7.6	40	30	42	34.1	1×3.8	59.2	107.5	970
SBK 4040-5.6	40	40	42	34.9	1×2.8	44.8	80.3	520
SBK 5020-7.6	50	20	52	44.1	1×3.8	66.8	141.9	1170
SBK 5030-7.6	50	30	52	44.1	1×3.8	66.5	135	1170
SBK 5036-7.6	50	36	52	44.1	1×3.8	65.9	135	1170
SBK 5050-5.6	50	50	52	44.9	1×2.8	50.3	102.4	630
SBK 5520-7.6	55	20	57	49.1	1×3.8	69.8	156.4	1250
SBK 5530-7.6	55	30	57	49.1	1×3.8	69.2	147	1250
SBK 5536-7.6	55	36	57	49.1	1×3.8	69.1	148.7	1260

Note) With model SBK, the raising of both ends of the thread groove is not available. When designing your system this way, contact THK.
When the Lubricator QZ and W wiper ring are attached, the overall length of the nut will increase. For details, see P.11.

Model Number Coding

SBK3620-7.6 RR G0 +1500L C5

- SBK3620-7.6 — Model No.
- RR — Dust prevention accessory symbol
- G0 — Symbol of clearance in the axial direction (All of Model SBK use Clearance G0.)
- +1500L — Screw shaft length (mm)
- C5 — Accuracy symbol



Unit: mm

	Nut Dimensions									Screw Shaft Inertial Moment/mm	Nut Mass	Shaft Mass
	Outer Diameter D	Flange Diameter D_1	Overall Length L_1	H	B_1	PCD	d_1	T_W	Greasing Hole A	kg-cm²/mm	kg	kg/m
	73	114	110	18	81	93	11	86	R 1/8 (PT 1/8)	1.29×10^{-2}	3.4	5
	73	114	134	18	105	93	11	86	R 1/8 (PT 1/8)	1.29×10^{-2}	3.37	7.43
	80	136	110	20	79	112	14	103	R 1/8 (PT 1/8)	1.97×10^{-2}	4.5	5.7
	80	136	148	20	117	112	14	103	R 1/8 (PT 1/8)	1.97×10^{-2}	5.6	7
	80	136	146	20	115	112	14	103	R 1/8 (PT 1/8)	1.97×10^{-2}	4.74	9.16
	90	146	110	22	77	122	14	110	R 1/8 (PT 1/8)	4.82×10^{-2}	5.3	10.2
	90	146	149	22	116	122	14	110	R 1/8 (PT 1/8)	4.82×10^{-2}	6.6	11.9
	90	146	172	22	139	122	14	110	R 1/8 (PT 1/8)	4.82×10^{-2}	7.4	12.5
	90	146	175	22	142	122	14	110	R 1/8 (PT 1/8)	4.82×10^{-2}	6.46	14.72
	96	152	110	22	77	128	14	114	R 1/8 (PT 1/8)	7.05×10^{-2}	5.7	13
	96	152	149	22	116	128	14	114	R 1/8 (PT 1/8)	7.05×10^{-2}	7.2	14.8
	96	152	172	22	139	128	14	114	R 1/8 (PT 1/8)	7.05×10^{-2}	8.1	15.5

Note) The rigidity values in the table represent the spring constants obtained from the load and the elastic deformation when providing a preload 10% of the basic dynamic load rating (Ca) and applying an axial load three times greater than the magnitude of 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 value in the table as the actual value.
If the applied preload (Fa_0) is not 0.1 Ca, the rigidity value (K_N) is obtained from the following equation.

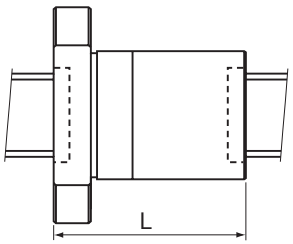
$$K_N = K\left(\frac{Fa_0}{0.1Ca}\right)^{\frac{1}{3}}$$

K: Rigidity value in the specification tables

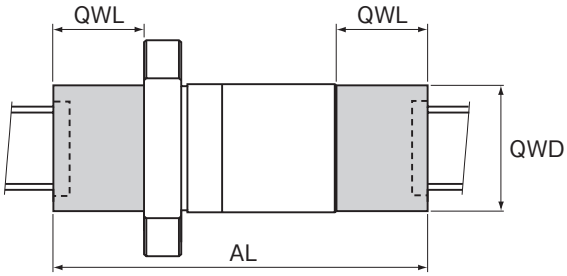
*Lubrication
Lithium grease No. 2 is contained in model SBK as standard.
(THK AFJ grease is contained in models SBK3636, 4040, and 5050)
If you want any other grease or any types without grease, contact THK.

Dimensions with an Option Attached

●Dimensions of the Ball Screw Nut with Wiper Ring W and Lubricator QZ Attached



With WW (without QZ)



With QZ+WW

Unit: mm

Model No.		WW compatible	QZ compatible	Dimensions with WW	Length of Protrusion when QZ Attached	Outer Diameter of Protrusion when QZ Attached	Dimensions including QZ and WW
				L	QWL	QWD	AL
SBK	1520-3.6	△	○	—	22	31	98
	1616-3.6	△	×	—	—	—	—
	2010-5.6	△	○	—	27	36	99
	2020-3.6	○	○	54	27	36	108
	2030-3.6	△	○	—	27	36	125
	2520-3.6	○	○	57	35.5	44	128
	2525-3.6	○	○	68	35.5	44	139
	3220-5.6	○	○	82	34.5	53	151
	3232-5.6	△	○	—	34.5	53	187
	3620-7.6	○	○	110	28	69	166
	3636-5.6	○	○	134	28	69	190
	4020-7.6	○	○	110	30.5	79	171
	4030-7.6	○	○	148	30.4	79	208.8
	4040-5.6	○	○	146	30.4	79	206.8
	5020-7.6	○	○	110	35	89	180
	5030-7.6	○	○	149	35	89	219
	5036-7.6	○	○	172	35	89	242
	5050-5.6	○	○	175	35	89	245
	5520-7.6	○	○	110	32	95	174
	5530-7.6	○	○	149	32	95	213
	5536-7.6	○	○	172	32	95	236

○: available △: available per request ×: not available

●Static Safety Factor

The basic static load rating C_0a (N) generally equals to the permissible axial load of a Ball Screw. Depending on the conditions, it is necessary to take into account the following static safety factor against the calculated load. 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.

$$Fa_{max} = \frac{C_0a}{f_s}$$

Fa_{max} : Allowable axial load (kN)
C_0a : Basic static load rating* (kN)
f_S : Static safety factor (see Table 4)

Table 4 Static Safety Factors (f_S)

Machine using the LM system	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

*The basic static load rating (C_0a) is a static load with a constant direction and magnitude whereby the sum of the amount of 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. With the Ball Screw, it is defined as the axial load.

●Studying the Service Life

Service Life of the Ball Screw

The Ball Screw in motion under an external load receives repeated stress on its raceways and balls. When the stress reaches the limit, the raceways break from fatigue and their surfaces flakes like scales. This phenomenon is called flaking. The service life of the Ball Screw is the total number of revolutions until the first flaking occurs on any of the raceways or the balls as a result of rolling fatigue of the material.
The service life of the Ball Screw varies from unit to unit even if they are manufactured in the same process and used in the same operating conditions. For this reason, when determining the service life of a Ball Screw unit, the nominal life as defined below is used as a guideline.
The nominal life is the total number of revolutions that 90% of identical Ball Screw units in a group achieve without developing flaking (scale-like pieces of a metal surface) after they independently operate in the same conditions.

Calculating the Nominal Life

The nominal life of the Ball Screw is calculated below using the basic dynamic load rating (Ca) and the applied axial load.

●Nominal Life (Total Number of Revolutions)

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

L : Nominal life (total number of revolutions) (rev)
Ca : Basic dynamic load rating* (N)
Fa : Applied axial load (N)
f_w : Load factor (see Table 5)

Table 5 Load Factor (f_w)

Vibration/ Impact	Speed (V)	f_w
Faint	Very low V≦0.25m/s	1 to 1.2
Weak	Slow 0.25<V≦1m/s	1.2 to 1.5
Medium	Medium 1<V≦2m/s	1.5 to 2
Strong	High V>2m/s	2 to 3.5

*The basic dynamic load rating (Ca) is used in calculating the service life when a Ball Screw operates under a load. The basic dynamic load rating (Ca) is a load with interlocked direction and magnitude under which the nominal life (L) equals to 10^6rev, when a group of the same Ball Screw units independently operate. (Specific basic dynamic load ratings (Ca) are indicated in the specification tables.)

*The nominal 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

If the revolutions per minute is determined, the service life time can be calculated below using the nominal life (L).

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

L_h : Service life time (h)
N : Revolutions per minute (min^{-1})
n : Number of reciprocations per minute (min^{-1})
Ph : Ball Screw lead (mm)
ℓ_s : Stroke length (mm)

●Service Life in Travel Distance

The Service Life in Travel Distance can be calculated below using the nominal life (L) and the Ball Screw lead.

$$L_s = \frac{L \times Ph}{10^6}$$

L_s : Service Life in Travel Distance (km)
Ph : Ball Screw lead (mm)

●Lubrication

When using a Ball Screw, you should make sure to provide effective lubrication.
Using the product without lubrication or lubricant being used out while using it may increase wear of the rolling elements and raceways or shorten the service life. Lubricants help to:

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

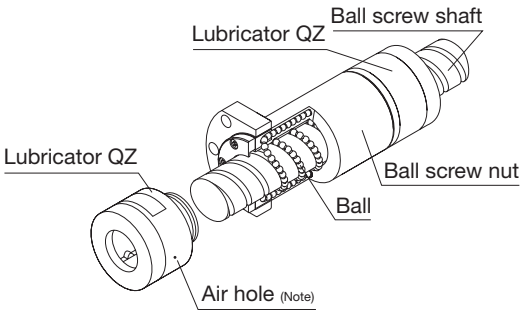
To fully bring out a ball screw' s functions, it is necessary to provide lubrication according to the conditions.

Lithium grease No. 2 is contained in model SBK as standard.
(THK AFJ grease is contained in models SBK3636, 4040, and 5050)

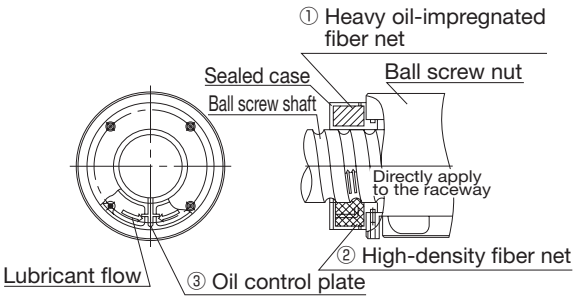
Lubricator QZ

A part for lubrication attached to the both ends of a ball screw nut.
Lubricator QZ feeds a right amount of lubricant directly to the raceway of the ball screw shaft.
This allows an oil film to be constantly formed between the balls and the raceway, and enables to significantly extend the lubrication maintenance interval.
In addition, it provides an environmentally friendly lubrication system that does not contaminate the surroundings.

Lubricator QZ consists of three major components. The lubricant contained in the Lubricator QZ is fed to a screw shaft raceway using the capillary phenomenon, which is used also in felt pens and many other products.
Note that the overall length of the ball screw nut dimensions will increase a little.



Note)Be careful not to block the hole with grease or other obstructions.



Structure of Lubricator QZ

〈Features〉

●Maintenance interval can be extended significantly
With normal grease lubrication in ball screw, grease is lost little by little over time during driving. Attaching Lubricator QZ enables to significantly extend the maintenance interval by supplying grease lost for a long time.

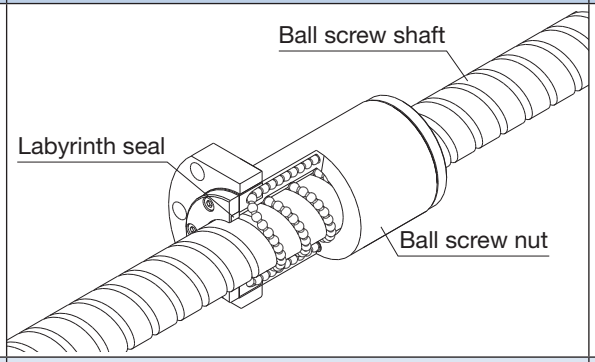
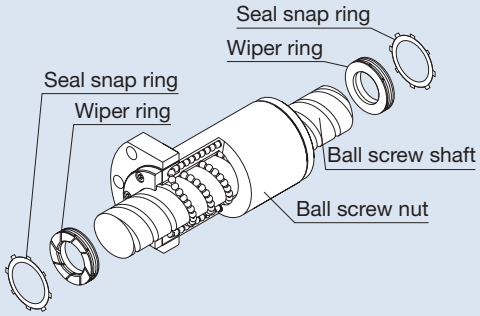
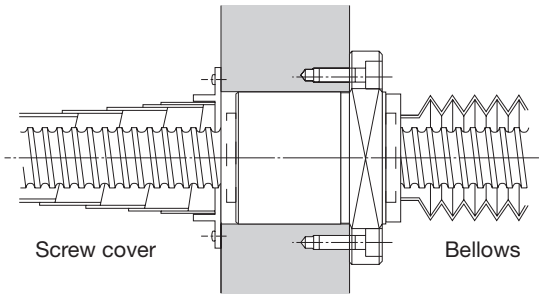
●This is the environmentally friendly lubrication system.
Lubricator QZ is an environment-friendly lubrication system since an appropriate amount of grease is supplied to appropriate portions by the high-density fiber net.

●Grease settings in accordance with usage are also available
Please contact THK.
(Contained standard lubricant = Equivalent to ISO VG220)

●Contamination Protection

Intrusion of foreign material into the ball screw may easily cause abnormal wear and a ball jam and reduce service life.
Therefore, we should prevent entry of foreign materials. When entrance of foreign material is a possibility, it is important to select a contamination protection accessory that meets the conditions.

THK provides various contamination protection accessories that meets the conditions.
If the conditions are a harsh environment for the ball screws, you can use a wiper ring or dedicated bellows both of which have high dust proof performance.

Contamination Protection Accessory	Appearance	Type of Foreign Matter		
		Dust	Spent chips	Coolant
Labyrinth seal (Precision Ball Screw) Symbol: RR		×	△	×
Wiper ring Symbol: WW		○	○	△
Dust Cover Bellows Screw cover		◎	◎	○

●Corrosion Resistance

Corrosion is a phenomena that can occur in any environment that has water (incl. moisture) and oxygen.
If corrosion occurs in a ball screw, the corrosion point will peel off and become foreign material, having a negative impact on the ball screw as well as deteriorating the functions of dust proofing accessories and lubricants, thus causing early damage.

The environments where corrosion easily occur include a place where water is applied to the product, an outdoor location, a place on the sea or near the sea.
Depending on the service environment, the Ball Screw requires corrosion resistance treatment or a different material. For details of corrosion resistance treatment or material change, contact THK.

Surface Treatment	Features	Appearance
AP-HC	Equivalent to industrial-use hard chrome plating, AP-HC achieves almost the same level of corrosion resistance as martensite stainless steel. In addition, it is highly wear resistant since the film hardness is extremely high, 750 HV or higher.	
AP-C	A type of industrial-use black chrome coating designed to increase corrosion resistance. It achieves lower cost and higher corrosion resistance than martensite stainless steel.	
AP-CF	A compound treatment that combines black chrome coating and special fluorocarbon resin coating and that is suitable for applications requiring high corrosion resistance.	

If using a product whose raceways are surface treated, set a higher safety factor.

●Precautions on Use

[Handling]

(1) Please use at least two people to move any product weighing 20 kg or more, or use a dolly or another conveyance. Doing so may cause injury or damage.
(2) Do not disassemble the parts. This will result in loss of functionality.
(3) Tilting the Ball Screw shaft and the Ball Screw nut may cause them to fall by their own weight.
(4) Take care not to drop or strike the Ball Screw. 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.
(5) When assembling, do not remove the Ball Screw nut from the Ball Screw shaft.
(6) When handling the product, wear protective gloves, safety shoes, etc., as necessary to ensure safety.

[Precautions on Use]

(1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
(2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
(3) Do not use the product at temperature of 80℃ or higher. Except for the heat-resistant models, exposure to higher temperatures may cause the resin/rubber parts to deform/be damaged.
(4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
(5) Micro-oscillation makes it difficult for oil film to be formed between the raceway in contact with the rolling element, and may lead to fretting. Accordingly, use grease offering excellent fretting toughness. It is also recommended that the Ball Screw nut be turned once or so on a regular basis to make sure oil film is formed between the raceway and rolling element.
(6) Do not use undue force when fitting parts (pin, key, etc.) to the product. This may generate pressure makes on the raceway, leading to loss of functionality.
(7) 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.
(8) If any of the rolling elements falls from the Ball Screw nut, contact THK instead of using the product.
(9) When using this product with a vertical orientation, take preventive measures such as adding a safety mechanism to prevent falls. The own weight of the Ball Screw nut may cause it to fall.
(10) 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.
(11) Do not cause the Ball Screw nut to overshoot. The ball may drop, circulating parts may be damaged, raceway in contact with the ball may develop pressure marks, etc., resulting in malfunction. Continuing to use the product in this condition may lead to premature wear or damage to circulating parts.
(12) Use the Ball Screw by providing a LM Guide, Ball Spline or other guide element. Otherwise, the Ball Screw may be damaged.
(13) Insufficient rigidity or accuracy of mounting members causes the bearing load to concentrate on one point and the bearing performance will drop significantly. Accordingly, give sufficient consideration to the rigidity/accuracy of the housing and base.

[Lubrication]

(1) Thoroughly wipe off anti-rust oil and feed lubricant before using the product.
(2) Do not mix of lubricants. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
(3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.

(4) When lubricating the product having no grease nipple or oil hole, apply grease directly on the raceway and stroke the product several times to let the grease spread inside.
(5) Lubricant viscosity can vary depending on the temperature. Take note that the torque of the Ball Screw also changes as the consistency of grease changes.
(6) After lubrication, the rotational torque of the Ball Screw may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
(7) Excess lubricant may spatter immediately after lubrication. If necessary, wipe off any spattered grease.
(8) The properties of grease deteriorate and its lubrication performance drops over time. Grease must be checked and added properly according to the use frequency of the machine.
(9) Although the lubrication interval may vary according to operating conditions and the service environment, lubrication should be performed approximately every 100 km in travel distance (three to six months). Set the final lubrication interval/amount based on the actual machine.
(10) Depending on the mounting orientation and access position, lubricant may not spread fully and poor lubrication may occur. Give full consideration to these factors in the design stage.
(11) 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.

[Storage]

When storing the Ball Screw, enclose it in a package designated by THK and store it in a room in a horizontal orientation while avoiding high temperature, low temperature and high humidity.
After the product has been in storage for an extended period of time, lubricant inside may have deteriorated, so add new lubricant before use.

[Disposal]

Dispose of the product properly as industrial waste.

QZ Lubricator for the Ball Screw

[Precaution on Selection]

Make sure the stroke length exceeds the total length of the screw shaft with the QZ Lubricator attached.

[Handling]

Take care not to drop or strike this product. Otherwise, it may cause injury or damage the unit.
Keep air holes clear of grease or other obstructions.
The QZ Lubricator lubricates the raceway only, so it must be used in combination with regular greasing or lubrication.
In models equipped with the QZ Lubricator, raceways are provided with the minimum required level of lubrication. Please note: Use of the product in a vertical position, or other usage conditions, may cause lubricant to drip from the ball screw shaft.

[Service environment]

Be sure the service temperature of this product is between –10 to 50℃, and do not clean the product by immersing it in an organic solvent or white kerosene, or leave it unpacked.

LIMITED WARRANTY

LIMITED WARRANTY AND LIMITATION OF LIABILITY: THK CO. LTD., FOR ITSELF AND ITS RELATED COMPANIES AND SUBSIDIARIES (HEREINAFTER DESCRIBED COLLECTIVELY AS “THK”) WARRANTS THAT ALL THK PRODUCTS SOLD WILL BE FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF TWELVE (12) MONTHS FROM DATE OF DELIVERY. THE FOREGOING TWELVE (12) MONTH WARRANTY SHALL NOT BE EXTENDED OR CHANGED BY THK FURNISHING ANY REPLACEMENTS, ADDITIONS, ATTACHMENTS, ACCESSORIES OR REPAIRS TO THE PRODUCT SUBSEQUENT TO THE DATE OF DELIVERY OR ACCEPTANCE. THE FOREGOING WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OF THK REGARDING THE PRODUCT.

DISCLAIMER OF OTHER WARRANTIES: OTHER THAN THE FOREGOING WARRANTY, THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OR ANY AFFIRMATIONS OF FACT OR PROMISES BY THK WITH RESPECT TO THE PRODUCT. THK DISCLAIMS ANY WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, NOT SPECIFICALLY SET FORTH ABOVE. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, THK EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, INFRINGEMENT OR ANY REPRESENTATIONS OF FACT OR QUALITY NOT EXPRESSLY SET FORTH HEREIN.

LIMITATION OF LIABILITY AND REMEDIES: THK'S SOLE RESPONSIBILITY AND LIABILITY INCURRED AS A RESULT OF THE SALE AND/OR USE OF THE PRODUCT, AND THE PURCHASER'S EXCLUSIVE REMEDY AGAINST THK UNDER ANY WARRANTY SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT, AT THK'S OPTION, OF PRODUCT COMPONENTS NOT CONFORMING TO THE WARRANTY. THE TOTAL LIABILITY OF THK SHALL IN NO EVENT EXCEED THE AMOUNT ACTUALLY PAID TO THK BY PURCHASER WITH RESPECT TO THE PRODUCT. THIS LIMITATION OF REMEDY IS INTENDED BY THE PARTIES TO SURVIVE EVEN IF THE REMEDY IS CLAIMED TO HAVE FAILED OF ITS ESSENTIAL PURPOSE. PURCHASER'S FULL AND COMPLETE PERFORMANCE OF ALL OBLIGATIONS OF PURCHASER RECITED IN THIS AGREEMENT IS A CONDITION PRECEDENT TO THK'S WARRANTY OBLIGATIONS AND LIABILITIES HEREIN.

PURCHASER'S DAMAGES AND LIMITATIONS: IN NO EVENT SHALL THK BE LIABLE TO PURCHASER, ITS ASSIGNS OR AGENTS, FOR ECONOMIC LOSS, INCIDENTAL OR CONSEQUENTIAL DAMAGES, IN CONTRACT OR IN TORT, INCLUDING BUT NOT LIMITED TO, ANY DAMAGES FOR LOST PROFITS, DOWN-TIME, LOST PRODUCTION, FAILURE TO MEET PURCHASER'S SALES CONTRACTS, OR DEFECTS IN PURCHASER'S MATERIALS OR WORKMANSHIP ARISING DIRECTLY OR INDIRECTLY FROM THE USE OF THE PRODUCT.

DISCLAIMER

This Catalog provides basic information relating to THK linear motion and related products. The Catalog, including all information, charts, formulas, factors, accuracy standards, tolerances and application recommendations contained herein, is only a starting point for the customer’ s selection of appropriate products, and may not apply in all intended applications. The Catalog is not a substitute for a proper application analysis conducted by an experienced, knowledgeable design engineer. Product selection should be based upon your specific application needs and conditions, which will vary greatly depending on many factors. No specific product application should be based solely on the information contained in this Catalog. All purchases of THK Products are subject to the limited warranty offered by THK Co., Ltd, for itself and on behalf of its related companies and subsidiaries. Customers should confirm independently that a contemplated application is safe, appropriate and effective.

"All trademarks used in this Catalog are registered trademarks in the Country of Japan. If there is any question as to the validity of such trademarks outside of Japan, an inquiry should be made in that particular country."

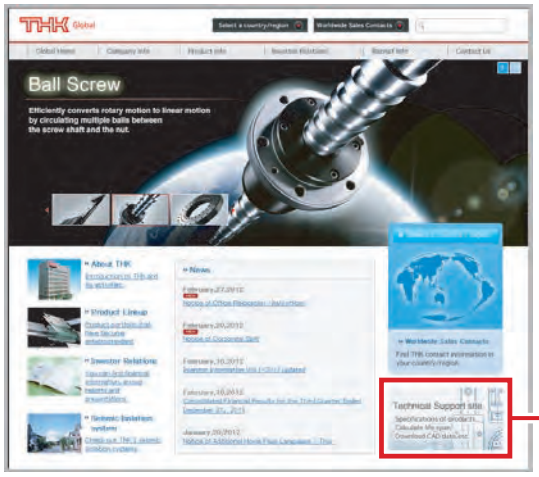
MEMO

Technical Support Site

The THK Technical Support Site lets you access product information and technical support online. You will also find a search feature for locating desired products and a calculation feature for calculating service life. 2D-CAD and 3D-CAD data are also downloadable.

http://www.thk.com/ or THK Search

Top page of the Global site



http://www.thk.com/

Technical Support Site

https://tech.thk.com/

Product Information
Search by model number or description.
Also contains detailed product specifications according to model number.

CAD Data
You can acquire 2D-CAD data (DXF files) on approximately 4,000 items, or 3D-CAD data according to specifications from rail lengths to installation of option items.
(* To use this service, you must log in first.)

Technical Information
Contains technical information, from application examples to research papers.
(* To use this service, you must log in first.)

Catalog Information
Order any of a variety of catalogs. You can also view in PDF format.
(* To use this service, you must log in first.)

Technical Calculation
Rated life (life time) can be calculated simply by entering model number, application criteria, etc.
(* To use this service, you must log in first.)

FAQ
Contains frequently asked questions.

Linear Motion System DVD Catalog

Linear Motion System DVD Catalog is also available. Please contact THK, distributors or other purchasable contacts in your area for a request.

Please choose your preferred language.

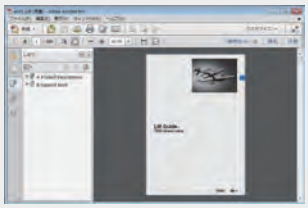
Displays product information.

Enables you to use 2-D CAD data (DXF files).

Enables you to use 3-D CAD data.

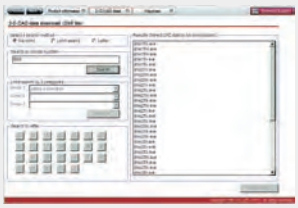
Product information (PDF file)

Contains catalog PDF data for new products and mechatronic products, in addition to the product information contained in the General Catalog.



2-D CAD data (DXF file)

You can use 2-D CAD data (DXF files) for approximately 4,000 products.

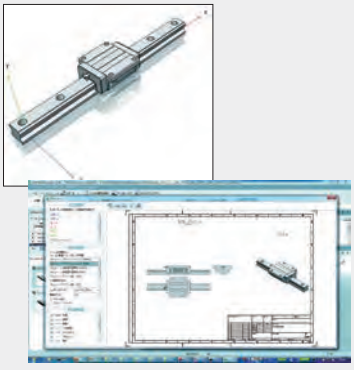


3-D CAD data generation program

This function enables you to use 3-D CAD data.

Selectable options and specifications

By combining product model numbers and options, you can generate 3-D CAD data tailored to your specifications.



3-D CAD and 2-D CAD data

You can then quickly and easily import the generated 3-D CAD data into your 3-D CAD software. 2-D CAD data can also be generated with this program.

CAD type	Formats supported
3-D CAD	DXF 3D / IGES / SAT / STEP Solidworks 2013, 2014, 2015, Macro 3D
2-D CAD	DXF Version 2004-2015