



NEW

Large Lead Series

Compact Caged Ball Screw

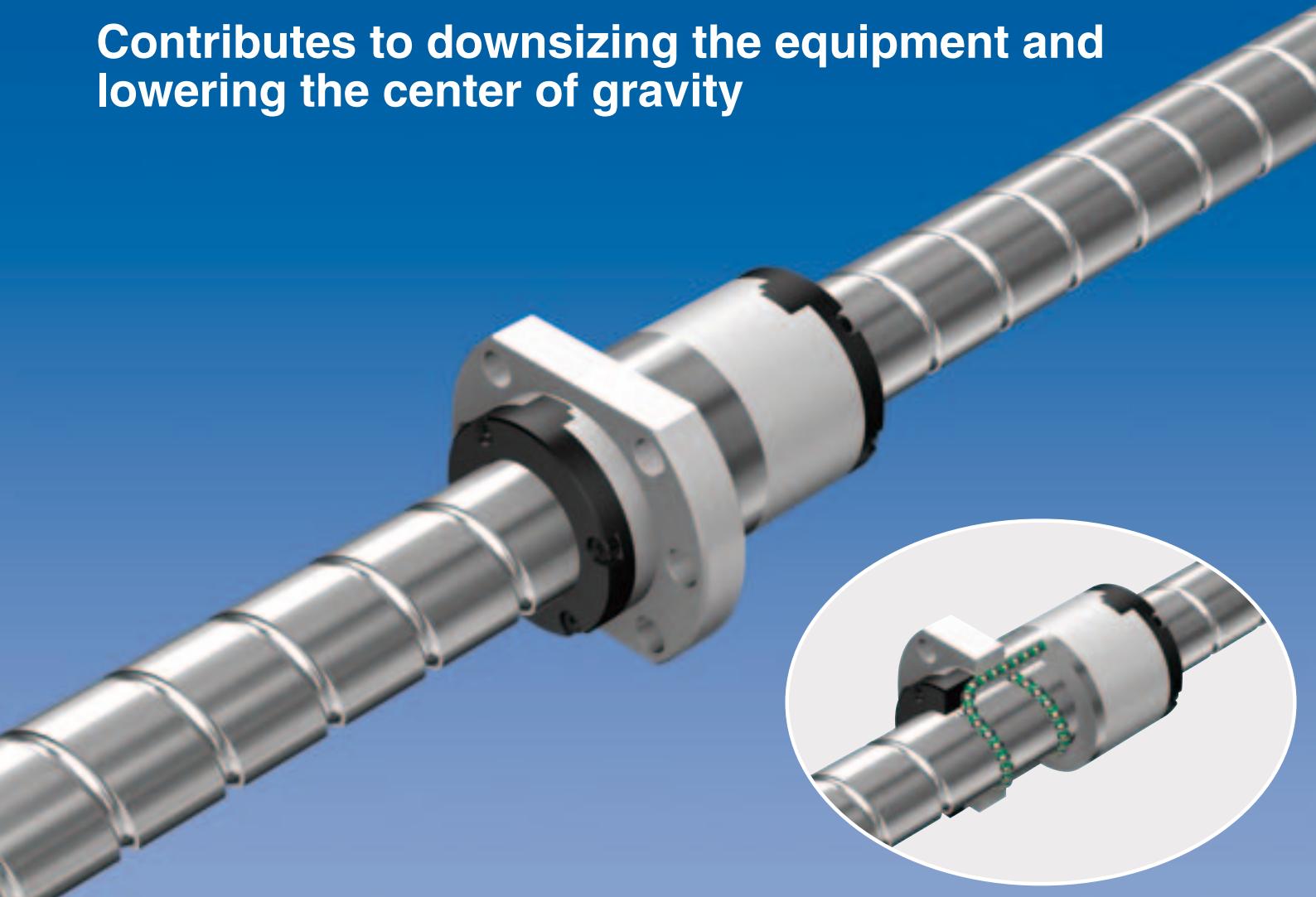
Capable of operating at high speed 5000 min⁻¹(max DN value: 130,000)

Achieves a slim nut with a new circulation system

Low noise, long-term maintenance-free operation,
low torque fluctuation

SDA

Contributes to downsizing the equipment and
lowering the center of gravity



For details, visit THK at www.thk.com

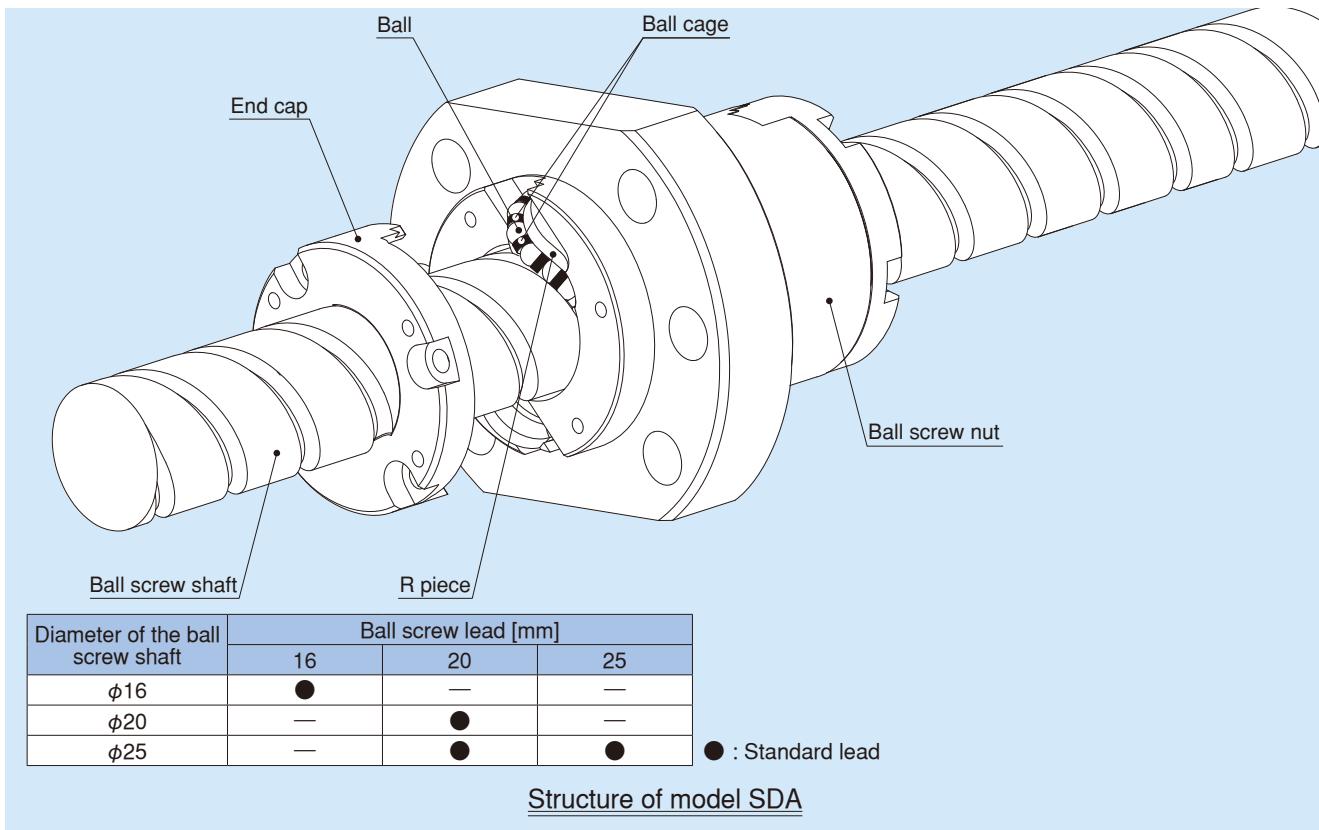
*Product information is updated regularly on the THK website.

Compact Caged Ball Screw

SDA

Structure

Model SDA is a compact Ball Screw with ball cage that adopts an end-cap circulation system.



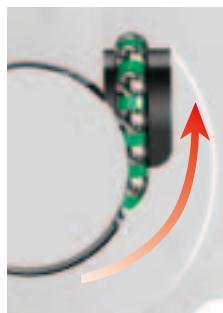
Features

Superb high-speed response

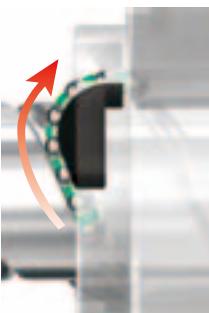
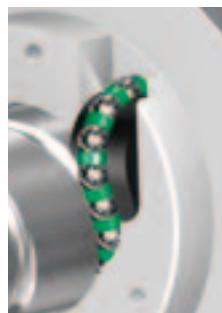
Use of a newly developed end cap and R piece achieves an ideal ball-circulation structure.

This enables SDA to perform high-speed operation at 5000 min⁻¹ (maximum DN value: 130,000) (approx. twice the previous model).

Ideal structure for ball circulation in the tangential direction



Circulate in the tangential direction



Circulate in the lead-angle direction

● Slim nut with a new circulation system

Use of a newly developed end cap and R piece achieves an ideal ball-circulation structure and significant downsizing of the product.

The nut dimensions are compliant with a DIN standard (DIN69051).*

* DIN standards refer to "Deutsche Industrie Normen" (German industrial standards) established by "Deutsches Institut für Normung e.V." (DIN, German Institute for Standards in English), and are broadly used as standards in all industrial fields in many countries in Europe, Asia, etc.



Downsized by 30% max
in outer diameter

(in comparison to THK's previous return-pipe system)

● Long-term maintenance-free operation

Use of a ball cage enables the formation of a grease pocket to increase grease retention, achieving long-term maintenance-free operation.

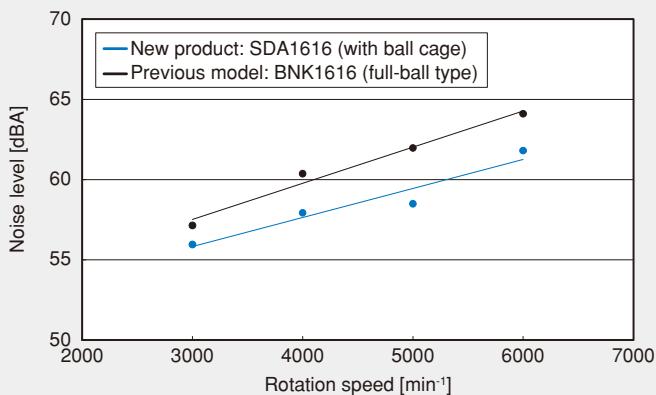
● Low noise, comfortable running sound

Use of a ball cage eliminates collision noise between balls and ensures comfortable running sound. In addition, an ideal circulation structure consisting of a newly developed end cap and R piece further reduces noise.

Noise level comparison

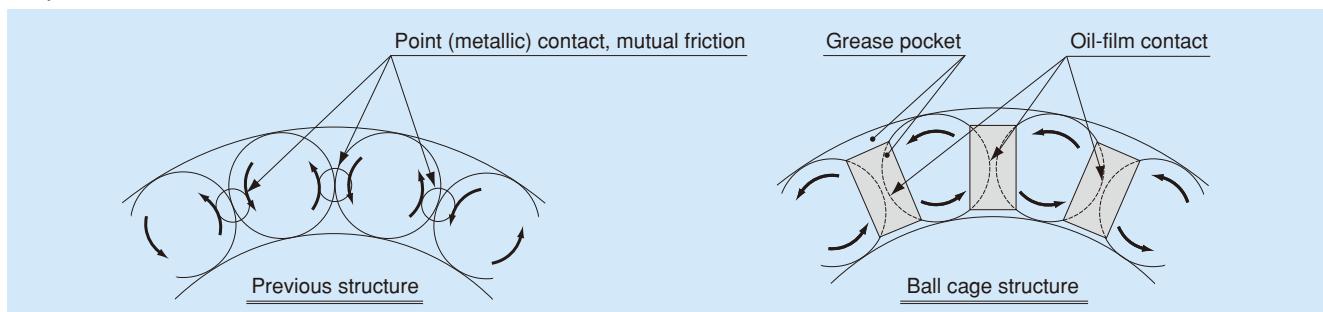
■ Conditions

Shaft diameter/lead	φ16/16 mm
Measuring instrument	Sound level meter
Measurement distance	1 m



● Smooth motion

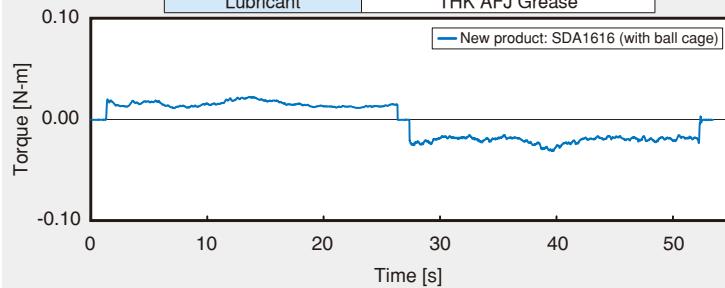
Since the use of a ball cage eliminates collision and mutual friction between balls, smooth and stable motion with low torque fluctuation is achieved.



Smoothness comparison

■ Conditions

Shaft diameter/lead	φ16/16mm
Rotation speed	60 min⁻¹
Stroke	550 mm
Lubricant	THK AFJ Grease



Lead accuracy and axial clearance

Lead accuracy

Compliant with ISO (International Organization for Standardization) standards and DIN standards (Deutsche Industrie Normen), in addition to the formerly observed JIS (Japanese Industrial Standards).

Correspondence table of accuracy standards

		Lead accuracy					
Accuracy standard	JIS	C0	C1	C2*	C3	C5	C7
ISO(DIN)	—	Cp1	—	Cp3	Cp5	—	—

* Represents lead accuracy under THK standards.

Axial clearance

Since model SDA adopts oversized ball preloading, the user can select an axial clearance according to the use.

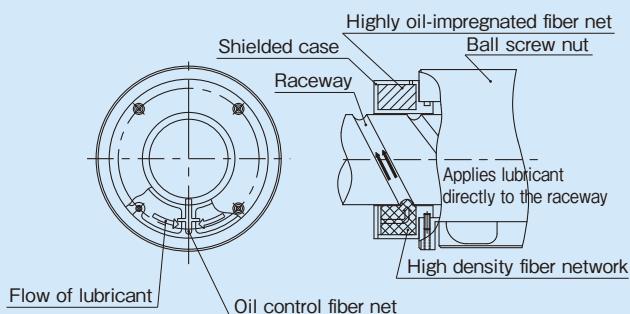
Clearance symbol	Axial clearance					Unit: mm
	G0	GT	G1	G2	G3	
Axial clearance	0 or less	0 to 0.005	0 to 0.01	0 to 0.02	0 to 0.05	

Options

For model SDA, QZ Lubricators and Wiper Rings for Ball Screws are available as options. QZ Lubricators which contains a highly oil impregnated fiber net are designed for long term maintenance free operation. Contact type seal, Wiper Ring W, excels in foreign material removal.

QZ Lubricator

QZ Lubricator is a lubrication system that supplies the adequate amount of lubricant to the raceway of the ball screw shaft.



<Features>

● Significantly extends maintenance interval

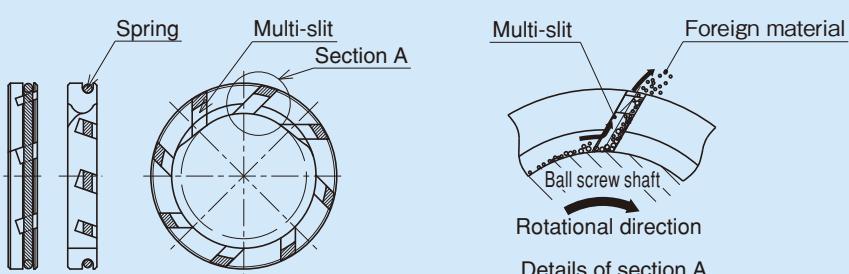
With ordinary grease lubrication in Ball Screws, a slightly amount of oil is lost as the Ball Screw operates. Attaching QZ Lubricator will supplement the oil loss over a long period of time and significantly extend the maintenance interval.

● An eco-friendly lubrication system

Since QZ Lubricator supplies the adequate amount of oil to the appropriate place through a high-density fiber net, it is an eco-friendly lubrication system that does not waste oil.

Wiper ring W

In wiper ring W, a highly wear resistant special resin elastically contacts the circumference and thread groove of the ball screw shaft, and removes foreign material from eight slits, preventing it from entering the ball screw nut.



<Features>

- Prevents foreign material from entering the ball screw nut.
- Contacts the ball screw shaft at constant pressure to reduce heat generation.

- Excels in resistance to wear, impact and chemicals.
- Attaching QZ Lubricator for Ball Screws and wiper ring W would significantly extend the maintenance interval even in a harsh environment.



Static safety factor

Basic static load rating C_{0a}

Basic static load rating (C_{0a}) generally means the permissible axial load of a Ball Screw. Depending on the service conditions, it is necessary to consider the following static safety factor for the calculated load. Note that when a Ball Screw is stationary or in motion, an unexpected external force may be applied due to an inertial force generated through collision or start/stop action.

■ 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 rating¹ [kN]
 F_a : Axial load [kN]

*1 Basic static load rating (C_{0a}) refers to the static load with a uniform direction and magnitude at which the sum of the permanent deformation of the rolling element and the permanent deformation of the raceway is 0.0001 times the diameter of the rolling element at a contact point to which the maximum stress is applied. The basic static load rating of a Ball Screw is defined on the basis of the axial load (specific value of each Ball Screw model is indicated in the dimensional table of the respective model).

Table 1 Static safety factor (f_s)

Machine using the Ball Screw	Load conditions	Lower limit of f_s
General industrial machines	Without vibrations/impact	1.0 to 3.5
	With vibrations/impact	2.0 to 5.0
Machine tools	Without vibrations/impact	1.0 to 4.0
	With vibrations/impact	2.5 to 7.0

Rated life and service life time

Basic dynamic load rating C_a

Basic dynamic load rating (C_a) is used to calculate the service life of a Ball Screw operating under a load. Basic dynamic load rating (C_a) refers to the load with constant direction and magnitude at which the rated life L is 10^6 [rev] when a group of identical Ball Screw units independently operate (basic dynamic load rating (C_a) is indicated in the dimensional table of the respective model).

■ Rated life L (total number of revolutions)

The service life of a Ball Screw is obtained from the following equation based on 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 : Rated life (total number of revolutions) [rev]
 C_a : Basic dynamic load rating² [kN]
 F_a : Applied axial load [kN]
 f_w : Load factor (Table 2)

*2 The rated life is calculated through load calculation assuming that favorable lubrication is secured and the product is assembled under ideal mounting conditions. The accuracy and deformation of the mounting member may affect the service life.

Table 2 Load factor (f_w)

Vibrations/impact	Velocity (V)	f_w
Very Low	Very slow $V \leq 0.25$ m/s	1.0 to 1.2
Low	Slow 0.25 m/s < $V \leq 1.0$ m/s	1.2 to 1.5
Medium	Medium 1.0 m/s < $V \leq 2.0$ m/s	1.5 to 2.0
High	High 2.0 m/s < V	2.0 to 3.5

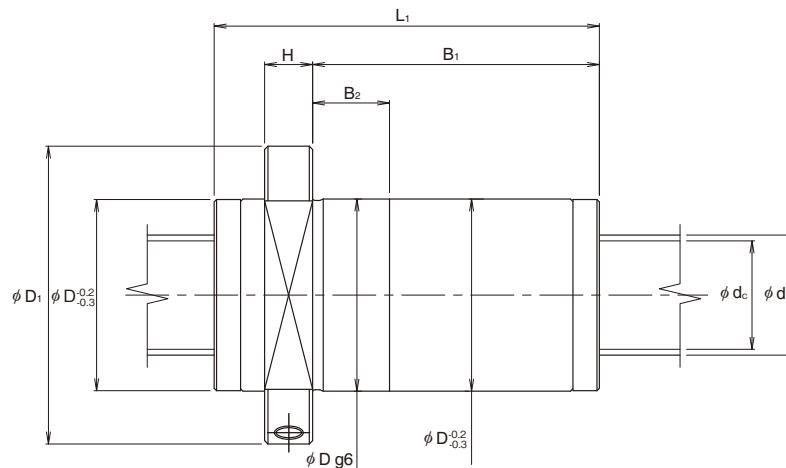
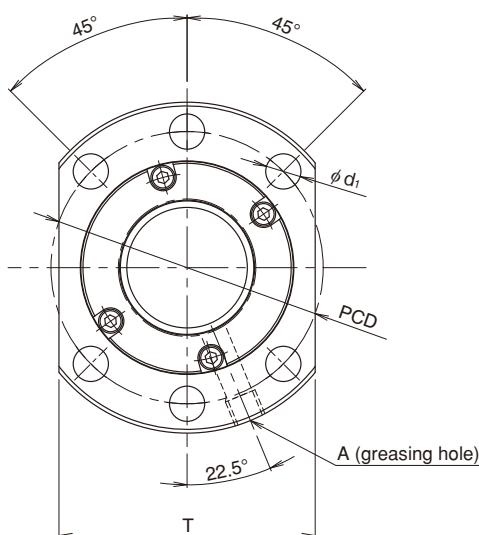
■ Service life time L_h

When the rated life (L) has been obtained, the service life time (L_h) is obtained from the following equation if the stroke length and the number of reciprocation are constant.

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

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

Dimensional table of model SDA



Unit: mm

Model No.	Screw shaft outer diameter d	Lead Ph	Ball center-to-center diameter dp	Screw shaft root diameter dc	No. of loaded circuits Row × turns	Basic load rating		Rigidity K [N/μm] Note 2)
						Ca [kN]	C0a [kN]	
★SDA1616-2.8	16	16	16.5	14.1	1 × 2.8	5.5	8.4	152
SDA2020-2.8	20	20	20.75	17.1		10.9	17.6	207
SDA2520-2.8	25	20	25.75	22.1		12.1	21.6	245
SDA2525-2.8	25	25	25.75	22.1		12.0	22.0	246

Nut dimensions									Max permissible rotation speed [min⁻¹] Note 1)
Outer diameter D	Flange diameter D ₁	Overall length L ₁	H	B ₁	B ₂	PCD	d ₁	T	
28	48	51.9	10	33.4	10	38	5.5	40	M6
36	58	65.8		45.3	12	47	6.6	44	
40	62	66.4		45.9	16	51	6.6	48	
40	62	80.2		59.7	16	51	6.6	48	

★ : The outer diameter dimension is compliant with DIN standard 69051 (lead 5 or less).

Note 1: The maximum permissible rotation speed is calculated from the DN value. Calculate the critical speed, and then select the lower value.

Note 2: Each rigidity value (K) in the table indicates the spring constant obtained from the load and the elastic deformation when an axial load at 30% of the basic dynamic load rating (C_a) is applied.

This value does not include the rigidity of parts related to the ball screw nut mounting section. Normally, apply 80% of the rigidity value (K) in the table.

If the axial load (F_a) is not 0.3 C_a, the rigidity value (K_N) is obtained from the following equation.

$$K_N = K \left(\frac{F_a}{0.3C_a} \right)^{\frac{1}{3}}$$

K: Rigidity value in the dimensional table

●Precautions

If desiring to shape both ends of the screw shaft to have a larger diameter than the outer diameter of the screw shaft, contact THK.

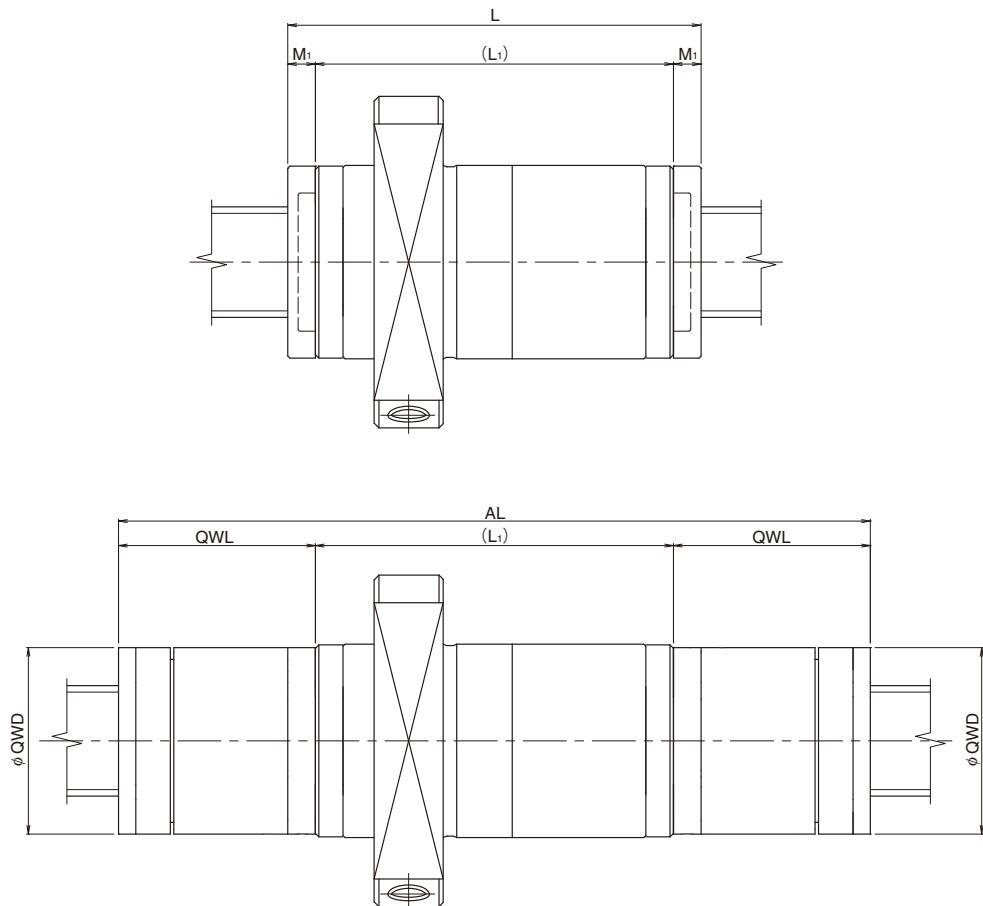
Example of model number coding

SDA2520-2.8 QZ RR GO +830L C3

1 2 3 4 5 6

1 Model number 2 With QZ Lubricator (no symbol for without QZ Lubricator) 3 Seal symbol (RR: labyrinth seal on both ends; WW: wiper ring on both ends) 4 Axial clearance (see P.3) 5 Overall length of ball screw shaft (in mm) 6 Accuracy standard (see P.3)

Dimensions of the ball screw nut attached with a labyrinth seal (RR), wiper ring (WW) and QZ Lubricator (QZ)



Model No.	Length of pro- jection with RR/ WW attached	Dimension with RR/WW attached	Length of projection with QZ attached	Outer diameter of projection with QZ attached	Dimension with QZWW attached
	M_1	L	QWL	QWD	AL
	SDA1616-2.8	4.0	59.9	28.5	27
SDA2020-2.8	5.5	76.8	33	35	131.8
SDA2520-2.8	5.5	77.4	33	39	132.4
SDA2525-2.8	5.5	91.2	33	39	146.2

Unit: mm

 Precautions on use

● Handling

- Do not disassemble the parts. Doing so may allow dust to enter the product and/or cause functional loss.
- Tilting the ball screw shaft and the ball screw nut may cause them to fall by its own weights.
- Do not drop or hit the Ball Screw. Doing so may cause personal injury and/or damage the product. Applying an impact to the product may cause functional loss even if the product looks intact.
- Do not remove the ball screw nut from the ball screw shaft. Doing so may cause balls or a ball cage to fall and make the product inoperable.
- Take care not to allow foreign material such as dust and cutting chips to enter the product. Failure to do so may damage the ball circulation part or cause functional loss.
- Some types of coolants may affect the functionality of the product. If using the product in an environment where a coolant could enter the ball screw nut, contact THK.
- Do not use the product at temperature exceeding 80°C. If the product is attached with QZ Lubricator, be sure to use it at temperature 50°C or below.
- If foreign material such as dust and cutting chips adheres to the product, replenish the lubricant after cleaning the product. For the type of the cleaning fluid, contact THK.
- If using the product for vertical application, take a measure to prevent it from falling such as adding a safety mechanism. Failure to do so may cause the ball screw nut to fall by its own weight.
- Do not use the product at speed exceeding the permissible rotation speed. Doing so may damage the product or cause an accident. Make sure that the service rotation speed is within the specification range designated by THK.
- Do not forcefully drive any component into the ball screw shaft or the ball screw nut. Doing so may cause an indentation on the raceway. Take care when mounting components.
- If misalignment or skewing occurs in the ball screw shaft support and the ball screw nut, it may substantially shorten the service life. Pay much attention to the components to be mounted and to the mounting accuracy.
- If using the product in a location constantly exposed to vibrations or in a special environment such as a clean room, vacuum, low temperature and high temperature, contact THK.
- Do not let the ball screw nut overshoot. Doing so may cause balls to fall or damage the ball circulation part.

● Lubrication

- Thoroughly wipe off anti-corrosion oil and feed lubricant before using the product.
- For use with high-speed rotation application, we have selected THK Grease AFJ for SDA Ball Screw. THK Grease AFJ provides superior performance in low-heat-generating characteristics.
- Do not mix lubricants with different physical properties.
- In locations constantly exposed to vibrations or in special environments such as a clean room, vacuum, low temperature and high temperature, normal lubricants may not be used. Contact THK for details.
- If planning to use a special lubricant, contact THK before using it.
- Lubrication interval varies according to the service conditions. Contact THK for details.
- In types attached with QZ Lubricator, the required minimum amount of lubricant is supplied to the raceway. Depending on the service conditions such as vertical application, the lubricant may drop from the ball screw shaft due to the nature of the lubricant.

● Storage

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

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