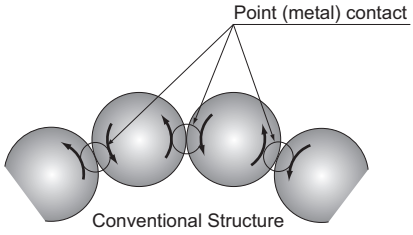
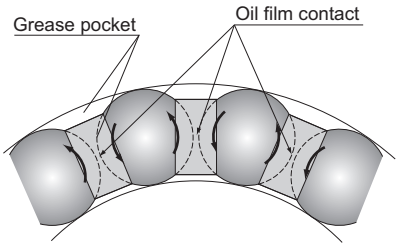
Studying the Caged Technology

[Low Noise, Acceptable Running Sound]
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.

[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.

[Smooth Motion]
The use of a ball cage eliminates the friction between the balls and minimizes the torque fluctuation, thus allowing the smooth motion to be achieved.





Structure of the Ball Screw with Ball Cage

[Low Noise]

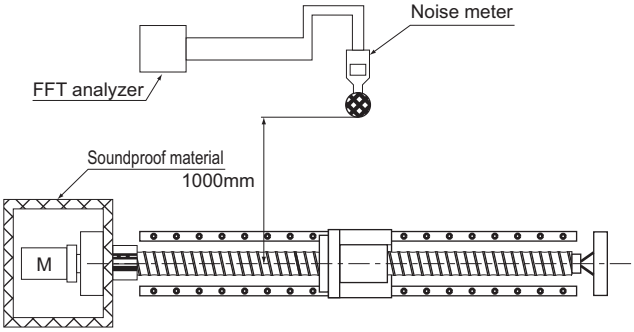
● Noise Level Data

Since the balls in the Ball Screw with the Ball Cage do not collide with each other, they do not produce a metallic sound and a low noise level is achieved.

■Noise Measurement

[Conditions]

Item	Description
Sample	Caged ball screw HBN3210-5 Conventional type: model BNF3210-5
Stroke	600mm
Lubrication	Grease lubrication (lithium-based grease containing extreme pressure agent)



Noise measurement instrument

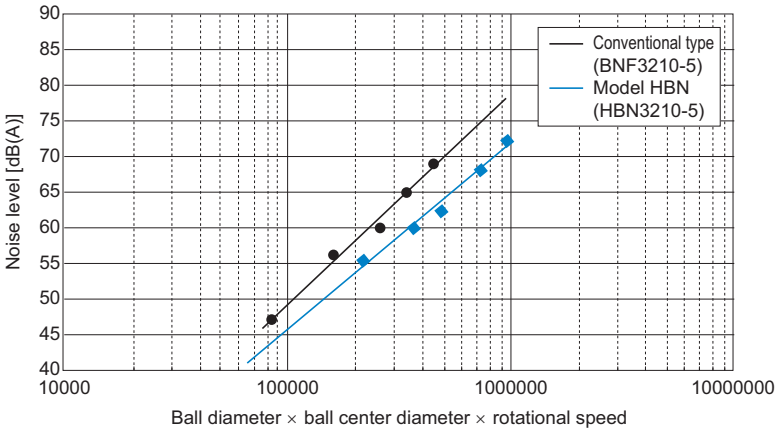


Fig.14 Ball Screw Noise Level

[Long-term Maintenance-free Operation]

● High speed, Load-bearing Capacity

Thanks to the ball circulating method supporting high speed and the caged ball technology, the Ball Screw with Ball Cage excels in high speed and load-bearing capacity.

■High Speed Durability Test

[Test conditions]

Item	Description
Sample	High Speed Ball Screw with Ball Cage SDA3110V-5
Speed	5000(min^{-1})(DN value*: 160,000)
Stroke	500 mm
Lubricant	THK AFJ Grease
Quantity	4 cm^3(lubricated every 500 km)
Applied load	1.27 kN
Acceleration	0.5 G

* DN value: Ball center-to-center diameter x revolutions per minute

[Test result]
Shows no deviation after running 6,000 km.

■Load Bearing Test

[Test conditions]

Item	Description
Sample	High Speed Ball Screw with Ball Cage SBN5016V-5
Speed	1500(min^{-1})(DN value*: 79,000)
Stroke	400 mm
Lubricant	THK AFG Grease
Quantity	57.7 cm^3(Lubricated every 100 km)
Applied load	36.1 kN(0.38 Ca)
Acceleration	0.5 G

[Test result]
Shows no deviation after running for the calculated service life

[Smooth Motion]

● Low Torque Fluctuation

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

[Conditions]

Item	Description
Shaft diameter/lead	25/5 mm
Shaft rotational speed	100 min^{-1}

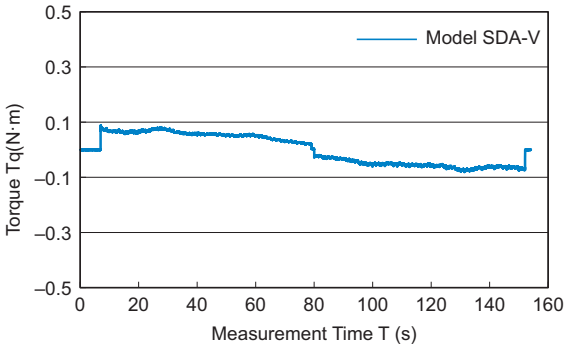


Fig.15 Torque Fluctuation Data

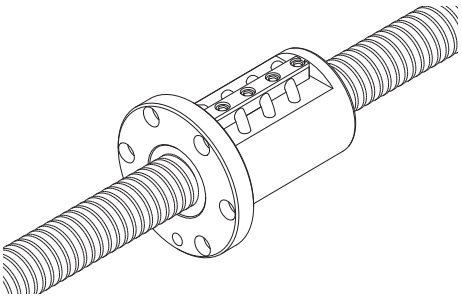
Types and Features

[Preload Type]

Model SBN-V

Specification Table⇒A15-110

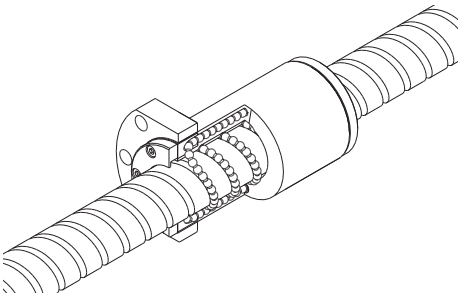
The circulation structure feature allows the balls to be picked up tangential to the direction of movement. The circulation components have been strengthened, increasing the DN value to 160,000 (small type: 130,000).



Model SBK

Specification Table⇒A15-114

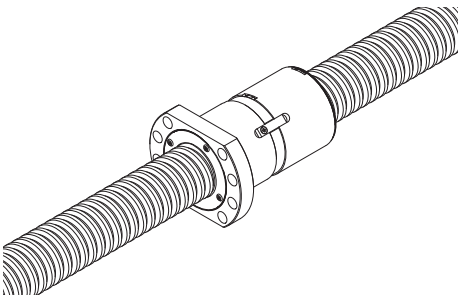
As a result of adopting the offset preloading method, which shifts two rows of grooves of the ball screw nut, a compact structure is achieved.



Model SDAN-V

Specification Table⇒A15-76

The preload method utilizes a combination of two ball screw nuts preloaded with spacers to eliminate backlash. The nut dimensions conform to ISO standards (ISO 3408). This type has improved axial rigidity in comparison with the Model SDA-V.



Model SDAN-VX

Specification Table⇒A15-76

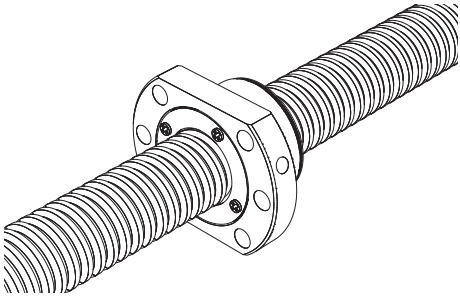
Full-Ball types are also available.

[Preload/No Preload Type]

Model SDA-V

Specification Table⇒A15-82

A ball screw with newly developed circulation components that give it an ideal ball circulation structure. (DN value: 160,000)
The nut dimensions conform to ISO standards (ISO 3408). Furthermore, the use of the newly developed thin film seal reduces the length of the nut, achieving a more compact design for the device.



Model SDA-VZ

Specification Table⇒A15-82

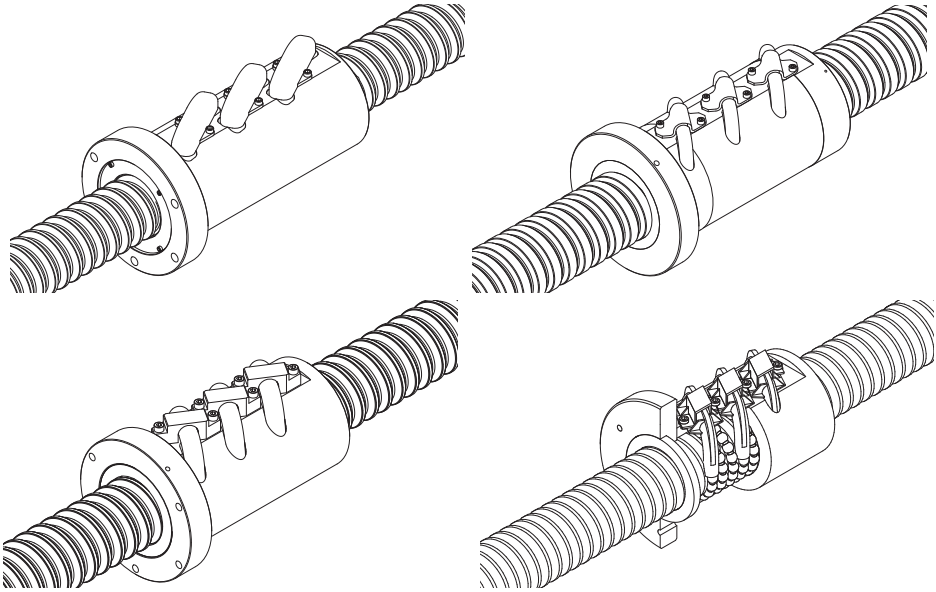
Full-Ball types are also available.(DN value: 130,000)

[No Preload Type]

Models HBN-V/HBN-K/HBN-KA/HBN

Specification Table⇒A15-224

With the optimal design for high loads, this ball screw model achieves a rated load more than twice the conventional type.



Model SBKH

Specification Table⇒A15-234

Model SBKH is a ball screw that achieves a high load carrying capacity and is capable of high-speed operation (92 m/min at a maximum).