

## 2.1. Caged Ball® Technology

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#### ● Low noise, acceptable running sound

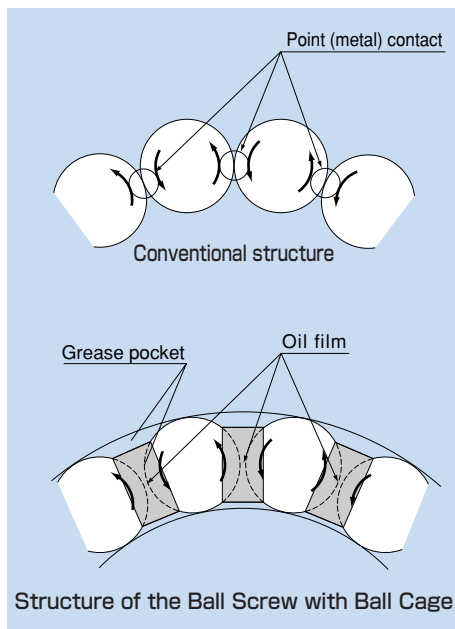
Use of the ball cage has eliminated collision noise between balls. Additionally, as balls are picked up in the tangential direction, collision noise from ball circulation has also been eliminated.

#### ● Long-term maintenance-free operation

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

#### ● Smooth motion

Use of the ball cage eliminates friction between balls and reduces torque fluctuation, thus to achieve smooth motion.



●Low Noise

■Low noise level data

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

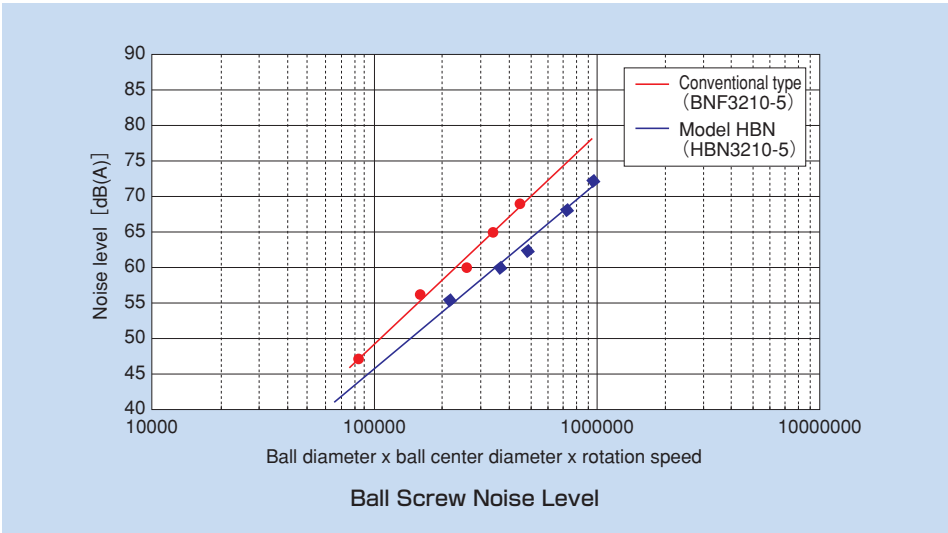
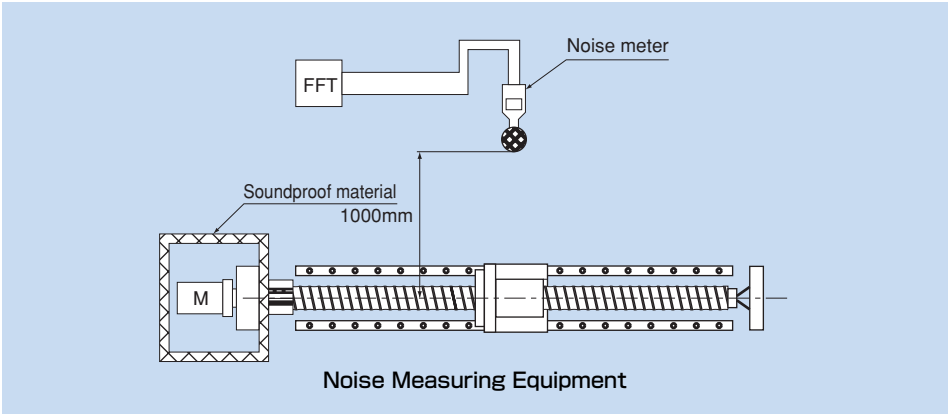
[Noise measurement]

Tested products: Ball Screw with Ball Cage model HBN3210-5

Conventional type: model BNF3210-5

[Conditions]

Stroke	600mm
Lubrication	Grease lubrication (lithium-based grease containing extreme pressure agent)



## ● Long-term Maintenance-free Operation

### ■ High speed, load-bearing capacity

Thanks to the ball circulating mechanism 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
Tested article	High-Speed Ball Screw with Ball Cage model SBN3210-7
Speed	3900 (min <sup>-1</sup> ) (DN value*: 130,000)
Stroke	400mm
Lubricant	THK AFG Grease
Quantity	12cm <sup>3</sup> (lubricated every 1,000 km)
Applied load	1.73kN
Acceleration	1G

##### [Test result]

Shows no anomaly after running 10,000 km.

\* DN value: Ball center diameter x rotation speed per minute

#### Load Bearing Test

##### [Test conditions]

Item	Description
Tested article	High-Speed Ball Screw with Ball Cage model SBN3210-7
Speed	1500 (min <sup>-1</sup> ) (DN value*: 50,000)
Stroke	300mm
Lubricant	THK AFG Grease
Quantity	12cm <sup>3</sup>
Applied load	17.3kN (0.5Ca)
Acceleration	0.5G

##### [Test result]

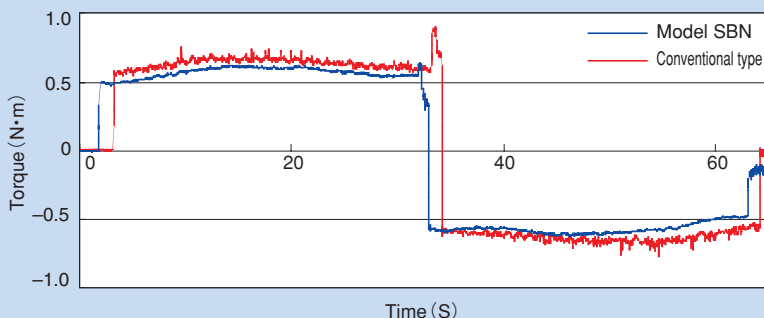
Shows no anomaly after running a distance 2.5 times the calculated service life.

## ● Smooth Motion

### ■ Low torque fluctuation

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

Item	Description
Shaft diameter/lead	32/10mm
Shaft rotation speed	60min <sup>-1</sup>



Torque Fluctuation Data