

13.2. Dust Prevention

Dust and foreign matter that enter the Ball Screw may cause accelerated wear and breakage, as with roller bearings. Therefore, where contamination by dust or foreign matter (e.g., cutting chips) is predicted, screw shafts must always be completely covered by dust prevention devices (e.g., bellows, screw cover, wiper ring).

If the Ball Screw is used in an atmosphere free from foreign matter but with suspended dust, a labyrinth seal (for precision Ball Screw) and a brush seal (for rolled Ball Screw) can be used in place of dust prevention devices. When placing an order, indicate the respective model number. The labyrinth seal is designed to maintain a slight clearance between the seal and the screw shaft raceway so that torque does not develop and no heat is generated, though its effect in dust prevention is limited.

With Ball Screws except the large-lead and super-lead types, there is no difference in nut dimensions between those with and without a seal.

With the wiper ring, special resin with high wear resistance and low dust generation removes foreign matter while closely contacting the circumference of the ball screw shaft and the screw thread. It is capable of preventing foreign matter from entering the Ball Screw even in harsh environments.

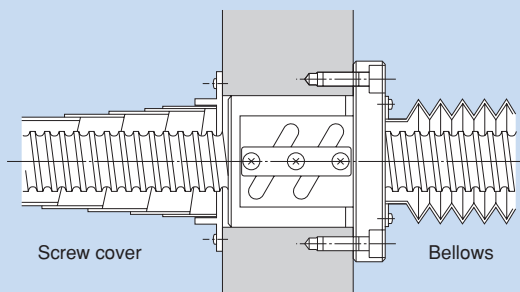
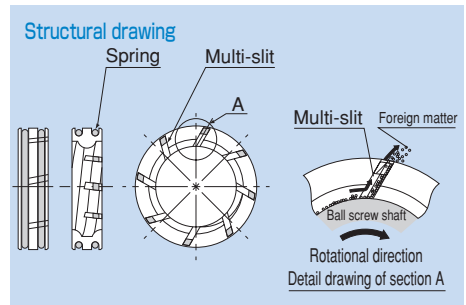
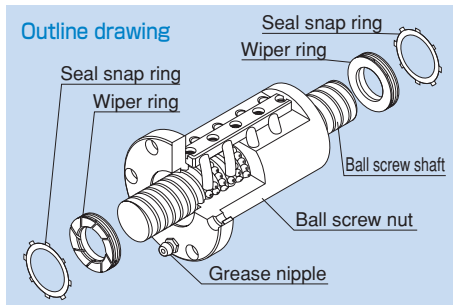


Fig. 1 Dust Prevention Cover

13.2.1. Wiper Ring W for the Ball Screw

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



Features

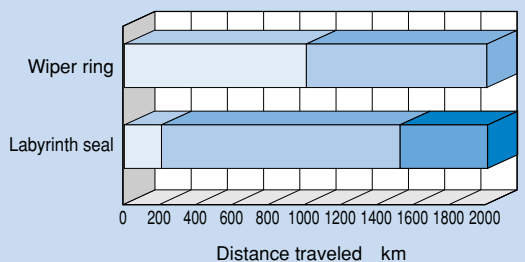
- A total of eight slits on the circumference remove foreign matter in succession, and prevents entrance of foreign matter.
- Contacts the ball screw shaft to reduce the flowing out of grease.
- Contacts the ball screw shaft at a constant pressure level using a spring, thus to minimize heat generation.
- Since the material is highly resistant to wear and chemicals, its performance will not easily be deteriorated even if it is used over a long period.

Test in an environment exposed to foreign matter

[Test conditions]

Item	Description
Model No.	BIF3210-5G0+1500LC5
Maximum rotation speed	1000min ⁻¹
Maximum speed	10m/min
Maximum circumferential speed	1.8m/s
Time constant	60ms
Dowel	1s
Stroke	900mm
Load	1.31kN
(through internal load)	
Grease	THK AFG Grease 8cm ³ Initial lubrication to the ball screw nut only.
Foundry dust	FCD400 average particle diameter: 250 μm
Volume of foreign matter per shaft	5g/h

[Test result]



□ No problem ■ Flaking occurs on the ball shaft raceway ■ Flaking occurs on the ball

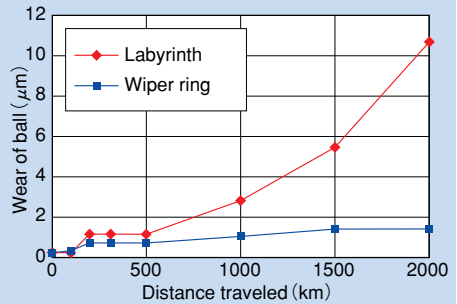
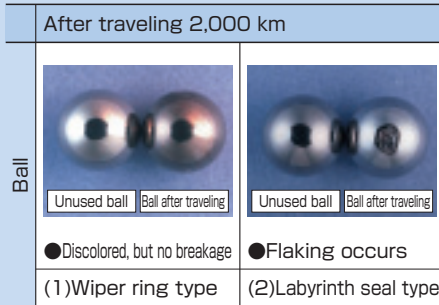
(1) Wiper ring specifications

Slight flaking occurred in the ball screw shaft at travel distant of 1,000 km.

(2) Labyrinth seal specifications

Flaking occurred throughout the circumference of the screw shaft raceway at travel distance of 200 km.

Flaking occurred on the balls after traveling 1,500 km.



(1) Wiper ring type

Wear of balls at a travel distance of 2,000 km: 1.4 μm.

(2) Labyrinth seal type

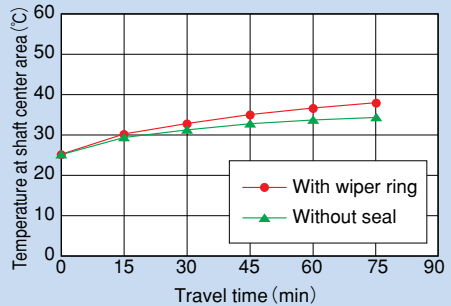
Starts to be worn rapidly after 500 km, and the ball wear amount at the travel distance of 2,000 km: 11 μm.

Heat generation test

[Test conditions]

Item	Description
Model No.	BLK3232DG0+1426LC5
Maximum rotation speed	1000min ⁻¹
Maximum speed	32m/min
Maximum circumferential speed	1.7m/s
Time constant	100ms
Stroke	1000mm
Load (through internal load)	0.98kN
Grease	THK AFG Grease 5cm ³ (contained in the ball screw nut)

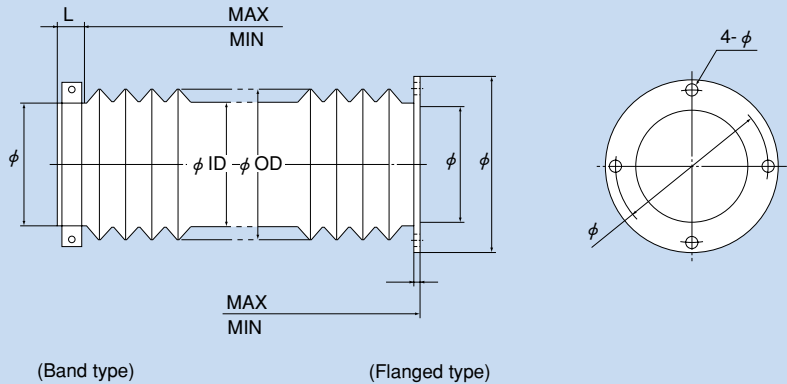
[Test result]



Unit: °C

	With wiper ring	Without wiper ring
Heat generation temperature	37.1	34.5
Temperature rise	12.2	8.9

Bellows Specifications



Bellows Dimensions

Stroke mm MAX. mm MIN. mm

Permissible outer diameter φ OD Desired inner diameter φ ID

How It Is Used

Orientation (horizontal, vertical, slant) Speed () mm/sec. min.

Motion (reciprocation, vibration)

Service Conditions

Oil/water resistance (necessary, not necessary) Oil name

Chemical resistance Name × %

Location (indoor, outdoor)

Remarks Number of units to be manufactured