

Features of the Cross-Roller Ring

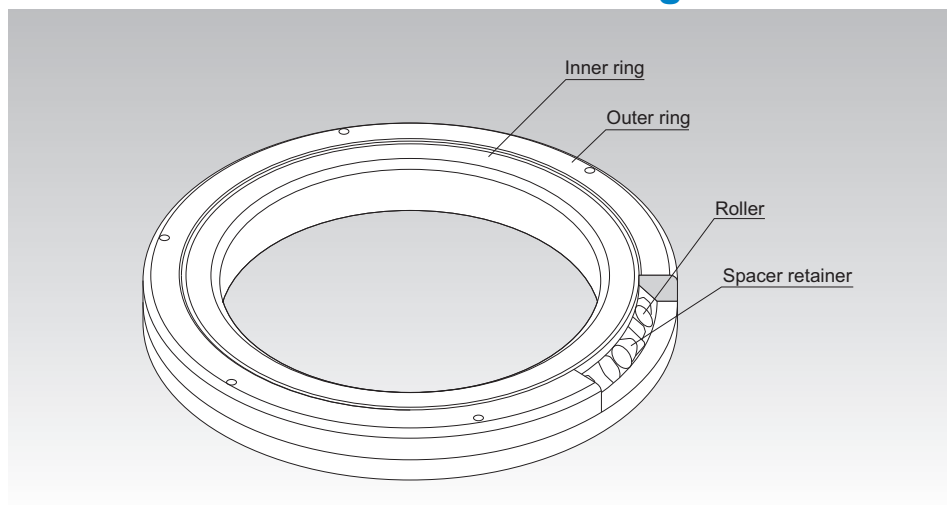


Fig. 1: Structure of Cross-Roller Ring Model RB

Structure and Features

With the cross-roller ring, cylindrical rollers are arranged with each roller perpendicular to the adjacent roller, in a 90° V groove, separated from each other by a spacer retainer. This design allows just one bearing to receive loads in all directions including radial, axial, and moment loads.

Since the cross-roller ring achieves high rigidity despite the minimum possible dimensions of the inner and outer rings, it is optimal for applications such as joints and swiveling units of industrial robots, swiveling tables of machining centers, rotary units of manipulators, precision rotary tables, medical equipment, measuring instruments, and IC manufacturing machines.

High Rotation Accuracy

The spacer retainer fit between the orthogonally arrayed rollers prevents the rollers from skewing and the rotational torque from increasing due to friction between rollers. Unlike conventional types using steel sheet retainers, the cross-roller ring does not cause unilateral contact or seizure of the rollers. Thus, even under a preload, the cross-roller ring provides stable rotation.

Since the inner and outer rings are designed to be separable, the preload can be adjusted, and this feature enables accurate rotation.

Features and Types

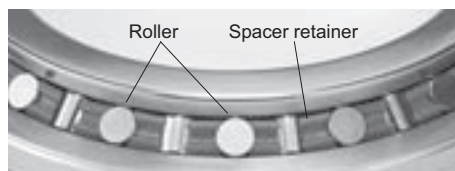
Features of the Cross-Roller Ring

Easy Handling

The separate inner and outer rings are secured after the rollers and spacer retainers are installed in order to prevent the rings from separating from each other, making for easy handling during installation.

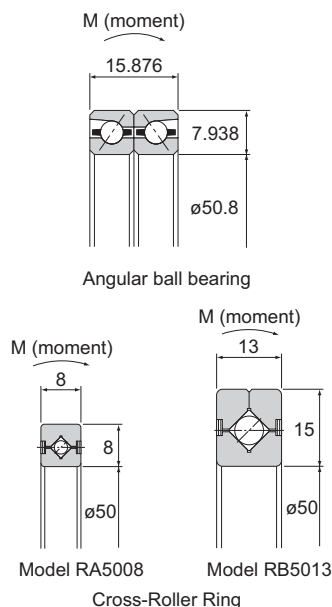
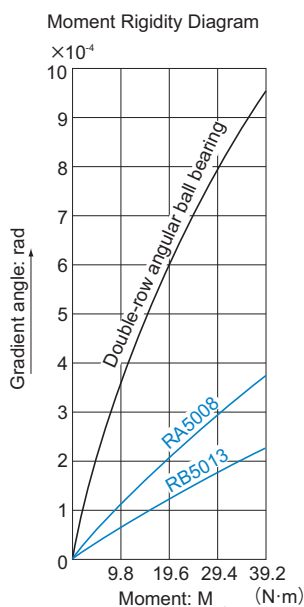
Skewing Prevention

The spacer retainer keeps rollers in their proper positions, thereby preventing them from skewing (tilting). This eliminates friction between rollers, and therefore secures a stable rotational torque.



Increased Rigidity (Three to Four Times Greater than the Conventional Type)

Unlike applications with thin angular ball bearings installed in double rows, the orthogonal array of rollers allows a single cross-roller ring unit to receive loads in all directions, increasing the rigidity to three to four times that of conventional types.

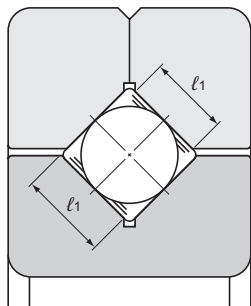


Large Load Capacity

- (1) Compared with conventional steel sheet retainers, the spacer retainer allows a longer effective contact length of each roller, significantly increasing the load capacity.

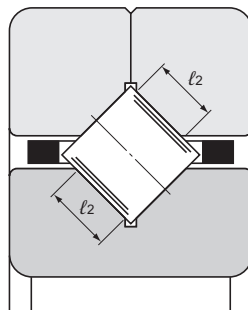
The spacer retainer guides rollers by supporting them over the entire length of each roller, whereas the conventional type of retainer supports them only at a point at the center of each roller. Such one-point contact cannot sufficiently prevent skewing.

Roller contact length



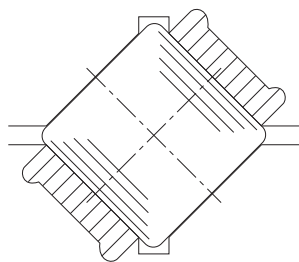
With a spacer retainer

$$l_1 > l_2$$

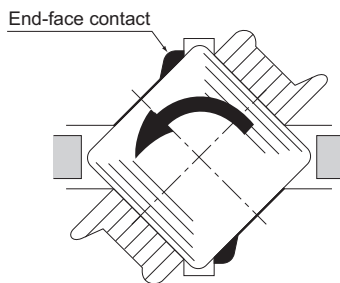


With a steel sheet retainer (conventional type)

- (2) As illustrated below, in conventional types the loaded areas between the outer ring and the inner ring are asymmetrical with regard to the center of the length of the roller. The greater the load applied, the greater the moment becomes, leading to end-face contact. This causes frictional resistance, which hinders smooth rotation and quickens wear.



Loaded areas symmetrical
With a spacer retainer



Loaded areas asymmetrical
With a steel sheet retainer (conventional type)