

## 1.1. Structure and Features of the Cross-Roller Ring

With the Cross-Roller Ring, cylindrical rollers are arranged crosswise, 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 fitting among cross-arrayed rollers prevents rollers from skewing and the rotation torque from increasing due to friction between rollers. Unlike conventional types using steel sheet retainers, the Cross-Roller Ring does not cause unilateral contact of roller or locked rollers. Thus, even under a preload, the Cross-Roller Ring provides stable rotation.

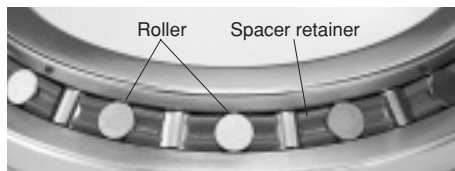
Since the inner and outer rings are designed to be separable, the bearing clearance can be adjusted. In addition, a preload can be applied. These features enable accurate rotation.

### ●Easy Handling

The inner and outer rings, which are separable, are secured to the Cross-Roller Ring body after being installed with rollers and spacer retainers in order to prevent the rings from separating from each other. Thus, it is easy to handle the rings when installing the Cross-Roller Ring.

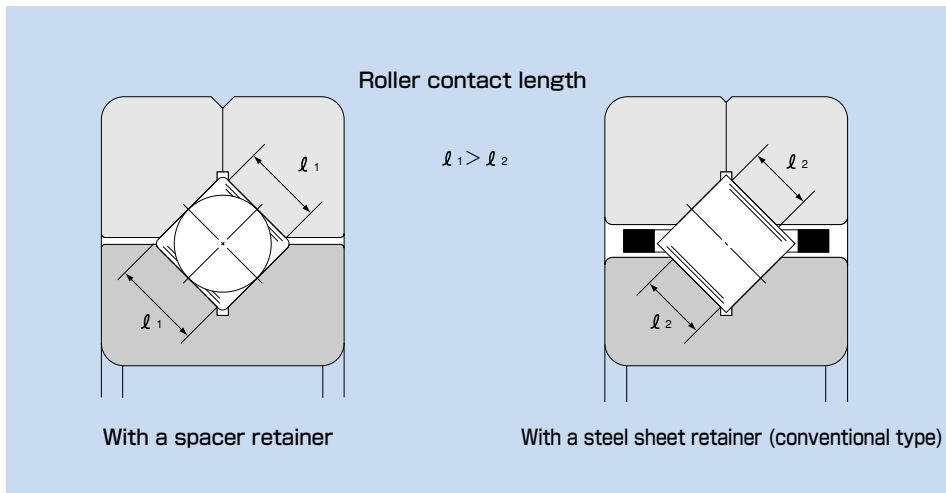
### ●Skewing Prevention

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

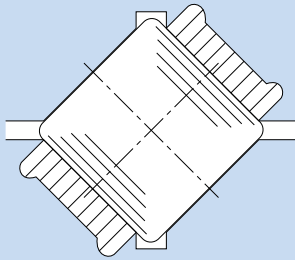


## ● Large Load Capacity

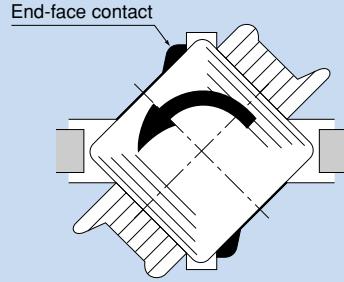
- ① Compared with conventional steel sheet retainers, the spacer retainer allows a longer effective contact length of each roller, thus to significantly increase the load capacity. The spacer retainer guides rollers by holding them over the entire length of each roller, whereas the conventional type of retainer supports them only at a point at the center of each roller. Such one-point contact cannot sufficiently prevent skewing.



- ② In conventional types, the loaded areas are asymmetrical between the outer-ring and the inner-ring sides around the roller longitudinal axis. The greater the applied load is, the greater the moment becomes, leading end-face contact to occur. This causes frictional resistance, which hinders smooth rotation and quickens wear.



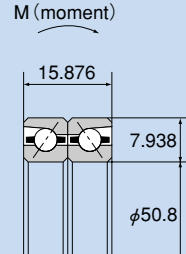
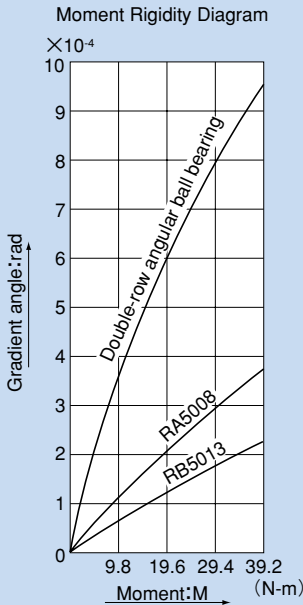
Loaded areas symmetrical  
Design with a spacer retainer



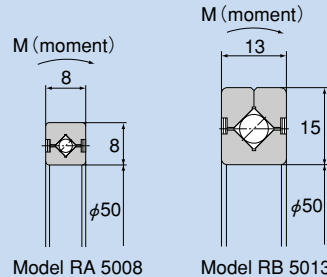
Loaded areas asymmetrical  
Design with a steel sheet retainer (conventional type)

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

Unlike the thin angular ball bearings installed in double rows, the cross array of rollers allows a single Cross-Roller Ring unit to receive loads in all directions, increasing the rigidity to three to four times greater than the conventional type.



Angular ball bearing



Model RA 5008

Model RB 5013

Cross-Roller Ring