



**NEW**

Cross Roller Ring for Robots

**RF**



Easy to install  
Fewer mounting components  
Reduced weight

# Introducing the Flanged Cross Roller Ring Model RF





Cross Roller Ring for Robots

# RF

**Feature 1** Thin, Lightweight, Flanged Design

**Feature 2** Reduced Weight and Number of Robot Components



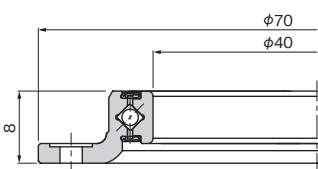
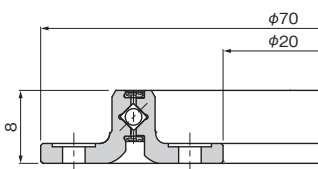
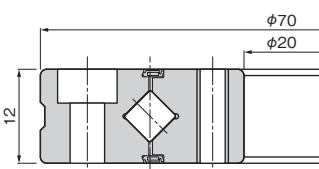
Since the Model RF is lightweight, it is also suitable for applications such as ceiling-mounted rotating arms. Additionally, it is capable of smooth rotary motion because it can receive loads and moments in any direction.

# RF Series

## Feature 1 Thin, Lightweight, Flanged Design

The unique flanged design achieves an even lighter weight.

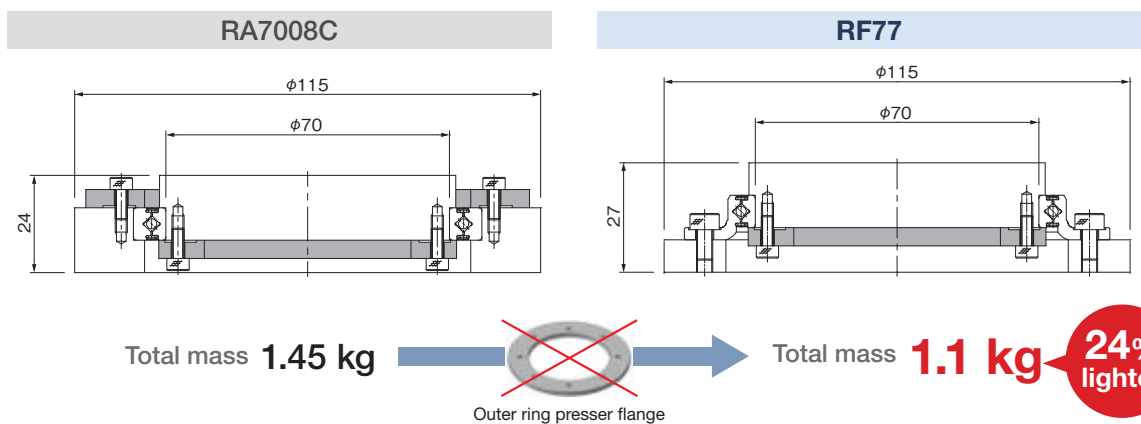
**Mass Comparison** (between models with equal outer diameters and dimensions)

|                                         | Straight-type inner ring RF45                                                     | Flange-type inner ring RF45F                                                       | Conventional mounting hole type RU42                                                |
|-----------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                         |  |  |  |
| Model No.                               | RF45                                                                              | RF45F                                                                              | RU42                                                                                |
| Cross-sectional area (mm <sup>2</sup> ) | 51                                                                                | 73                                                                                 | 297                                                                                 |
| Product mass (kg)                       | 0.06                                                                              | 0.08                                                                               | 0.29                                                                                |

## Feature 2 Reduced Weight and Number of Robot Components

This is the ideal product for robots requiring weight reduction and improved productivity.

**Mass Comparison** (between models with equal outer diameters and dimensions)



- Can be installed directly onto a shaft or housing → **Increases a robot's productivity**
- Does not require a presser flange → **Simplifies design and reduces installation time**
- Reduces product weight → **Allows lighter weights than conventional products**



## Structure

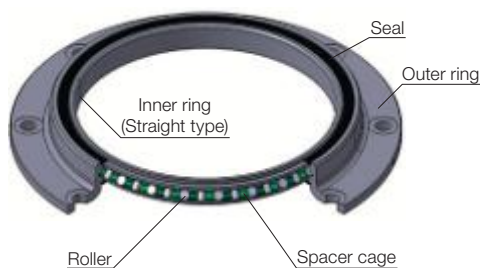
The cross array of rollers allows a single bearing to receive loads and moments in all directions.

The flanged design simplifies installation and minimizes the cross-sectional area of the product.

This is a lightweight unit that maintains the ease of assembly achieved by the Model RU, a conventional cross roller ring with mounting holes.

## Lineup

### Straight-Type Inner Ring



- Leaves open space inside the ring  
Allows for high levels of freedom in design and provides space for wiring, etc.
- Same inner ring dimensions as the Model RA  
Can easily replace existing equipment.

| Shaft diameter | Model No. |
|----------------|-----------|
| 40             | RF45      |
| 50             | RF57      |
| 60             | RF67      |
| 70             | RF77      |
| 90             | RF97      |
| 120            | RF127     |

### Flange-Type Inner Ring



- Flanged inner and outer rings  
Shorten assembly time and make devices more lightweight.

| Shaft diameter | Model No. |
|----------------|-----------|
| 20             | RF45F     |
| 30             | RF57F     |
| 40             | RF67F     |
| 45             | RF77F     |
| 65             | RF97F     |
| 95             | RF127F    |

## Accuracy Standards

### Rotational Accuracy

Rotational Accuracy of the Inner Ring

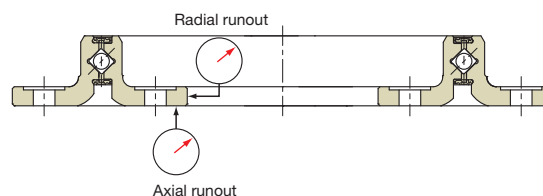
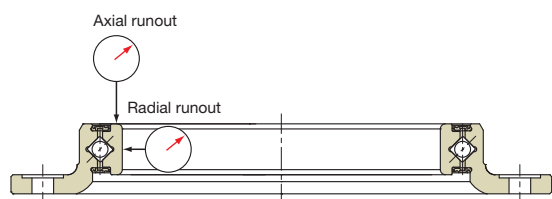
Unit:  $\mu\text{m}$

| Model No. | Radial runout tolerance of the inner ring | Axial runout tolerance of the inner ring |
|-----------|-------------------------------------------|------------------------------------------|
| RF45      | 13                                        | 13                                       |
| RF57      | 13                                        | 13                                       |
| RF67      | 13                                        | 13                                       |
| RF77      | 15                                        | 15                                       |
| RF97      | 15                                        | 15                                       |
| RF127     | 20                                        | 20                                       |

Rotational Accuracy of the Inner Ring

Unit:  $\mu\text{m}$

| Model No. | Radial runout tolerance of the inner ring | Axial runout tolerance of the inner ring |
|-----------|-------------------------------------------|------------------------------------------|
| RF45F     | 13                                        | 13                                       |
| RF57F     | 13                                        | 13                                       |
| RF67F     | 15                                        | 15                                       |
| RF77F     | 15                                        | 15                                       |
| RF97F     | 20                                        | 20                                       |
| RF127F    | 25                                        | 25                                       |



### Dimensional Accuracy

Dimensional Tolerances of the Bearing Inner Diameter, Outer Diameter, and Width

Unit:  $\mu\text{m}$

| Model No. | Tolerance of the bearing inner diameter |       |       | Tolerance of the bearing outer diameter |       |       | Tolerance of the bearing inner ring width |       |       | Tolerance of the bearing outer ring width |       |       |
|-----------|-----------------------------------------|-------|-------|-----------------------------------------|-------|-------|-------------------------------------------|-------|-------|-------------------------------------------|-------|-------|
|           | Diameter (mm)                           | Upper | Lower | Diameter (mm)                           | Upper | Lower | Width (mm)                                | Upper | Lower | Width (mm)                                | Upper | Lower |
| RF45      | 40                                      | 0     | -12   | 70                                      | 0     | -13   | 6                                         | 0     | -120  | 8                                         | -     | -     |
| RF57      | 50                                      | 0     | -12   | 85                                      | 0     | -15   | 8                                         | 0     | -120  | 11                                        | -     | -     |
| RF67      | 60                                      | 0     | -15   | 95                                      | 0     | -15   | 8                                         | 0     | -120  | 11                                        | -     | -     |
| RF77      | 70                                      | 0     | -15   | 105                                     | 0     | -15   | 8                                         | 0     | -120  | 11                                        | -     | -     |
| RF97      | 90                                      | 0     | -20   | 125                                     | 0     | -18   | 8                                         | 0     | -120  | 11                                        | -     | -     |
| RF127     | 120                                     | 0     | -20   | 160                                     | 0     | -25   | 8                                         | 0     | -120  | 11                                        | -     | -     |

Dimensional Tolerances of the Bearing Inner Diameter, Outer Diameter, and Width

Unit:  $\mu\text{m}$

| Model No. | Tolerance of the bearing inner diameter |       |       | Tolerance of the bearing outer diameter |       |       | Tolerance of the bearing inner ring width |       |       | Tolerance of the bearing outer ring width |       |       |
|-----------|-----------------------------------------|-------|-------|-----------------------------------------|-------|-------|-------------------------------------------|-------|-------|-------------------------------------------|-------|-------|
|           | Diameter (mm)                           | Upper | Lower | Diameter (mm)                           | Upper | Lower | Width (mm)                                | Upper | Lower | Width (mm)                                | Upper | Lower |
| RF45F     | 20                                      | 0     | -10   | 70                                      | 0     | -13   | 8                                         | -     | -     | 8                                         | -     | -     |
| RF57F     | 30                                      | 0     | -10   | 85                                      | 0     | -15   | 11                                        | -     | -     | 11                                        | -     | -     |
| RF67F     | 40                                      | 0     | -12   | 95                                      | 0     | -15   | 11                                        | -     | -     | 11                                        | -     | -     |
| RF77F     | 45                                      | 0     | -12   | 105                                     | 0     | -15   | 11                                        | -     | -     | 11                                        | -     | -     |
| RF97F     | 65                                      | 0     | -15   | 125                                     | 0     | -18   | 11                                        | -     | -     | 11                                        | -     | -     |
| RF127F    | 95                                      | 0     | -20   | 160                                     | 0     | -25   | 11                                        | -     | -     | 11                                        | -     | -     |

Note) The tolerance of the bearing inner diameter and outer diameter is the arithmetic average of the maximum and minimum diameters obtained in measuring the bearing inner diameter at two points.

Note) The tolerance of the bearing outer diameter indicates the value before separation.



# Lubrication

## Standard Grease

AFB-LF Grease is a general-purpose grease that provides excellent extreme pressure resistance and mechanical stability through the use of a refined mineral oil base oil and a lithium-based consistency enhancer.

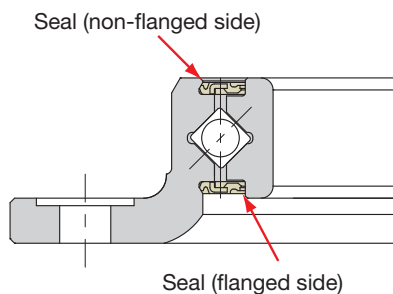
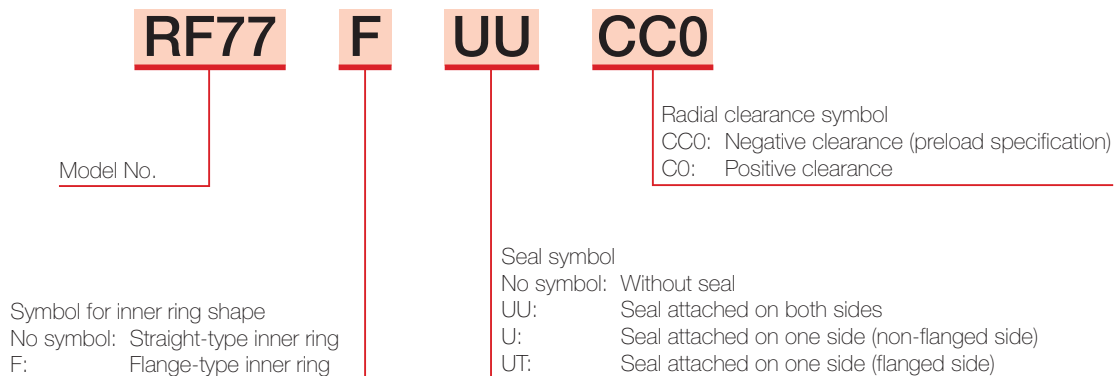
\*Non-standard greases are also available. Contact THK for details.

## AFB-LF Representative Physical Properties

| Item                                                    | Representative physical property | Testing method |
|---------------------------------------------------------|----------------------------------|----------------|
| Consistency enhancer                                    | Lithium-based                    |                |
| Base oil                                                | Refined mineral oil              |                |
| Base oil kinematic viscosity: mm <sup>2</sup> /s (40°C) | 170                              | JIS K 2220 23  |
| Worked penetration (25°C, 60 W)                         | 275                              | JIS K 2220 7   |
| Mixing stability (100,000 W)                            | 345                              | JIS K 2220 15  |
| Dropping point: °C                                      | 193                              | JIS K 2220 8   |
| Evaporation volume: mass% (99°C, 22 h)                  | 0.4                              | JIS K 2220 10  |
| Oil separation rate: mass% (100°C, 24 h)                | 0.6                              | JIS K 2220 11  |
| Copper plate corrosion (B method, 100°C, 24 h)          | Passed                           | JIS K 2220 9   |
| Low-temperature torque: mN·m (-20°C)                    | Starting                         | JIS K 2220 18  |
|                                                         | Rotational                       |                |
| 4-ball testing (welding load): N                        | 3089                             | ASTM D2596     |
| Operating temperature range: °C                         | -15 to 100                       |                |
| Color                                                   | Yellowish brown                  |                |

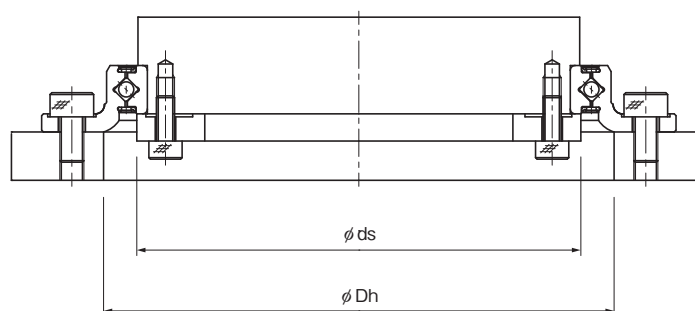
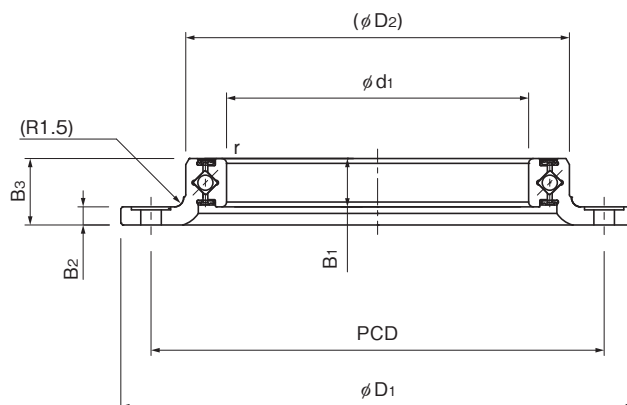
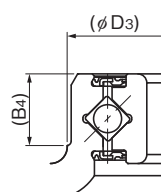
## Model Number Coding

Select an option. \*Specify each item for the models in the catalog.



# Specification Table

## Straight-type inner ring



Unit: mm

| Shaft diameter | Model No. | Main dimensions |                |                |                   |                              |                   |     |                |                |                | Shoulder height |          | Permissible load | Mass (kg) |
|----------------|-----------|-----------------|----------------|----------------|-------------------|------------------------------|-------------------|-----|----------------|----------------|----------------|-----------------|----------|------------------|-----------|
|                |           | Inner diameter  | Outer diameter |                |                   | Roller pitch circle diameter | Width             |     |                |                |                | ds (max)        | Dh (min) | Moment (N·m)     |           |
|                |           |                 | d <sub>1</sub> | D <sub>1</sub> | (D <sub>2</sub> ) |                              | (D <sub>3</sub> ) | dp  | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> |                 |          |                  |           |
| 40             | RF45      | 40              | 70             | 49             | 49.7              | 44.7                         | 6                 | 2.1 | 8              | 4              | 0.15           | 42.5            | 50.5     | 5.12             | 0.06      |
| 50             | RF57      | 50              | 85             | 63.4           | 64.1              | 57                           | 8                 | 3   | 11             | 6              | 0.5            | 53.5            | 64.5     | 15.3             | 0.13      |
| 60             | RF67      | 60              | 95             | 73.4           | 74.1              | 67                           | 8                 | 3   | 11             | 6              | 0.5            | 63.5            | 74.5     | 21.8             | 0.15      |
| 70             | RF77      | 70              | 105            | 83.4           | 84.1              | 77                           | 8                 | 3   | 11             | 6              | 0.5            | 73.5            | 84.5     | 28.3             | 0.17      |
| 90             | RF97      | 90              | 125            | 103.4          | 104.1             | 97                           | 8                 | 3   | 11             | 6              | 0.5            | 93.5            | 104.5    | 45.1             | 0.22      |
| 120            | RF127     | 120             | 160            | 133.4          | 134.1             | 127                          | 8                 | 3   | 11             | 6              | 0.5            | 123.5           | 134.5    | 76.9             | 0.30      |

\* The outer diameter indicates the value before separation.

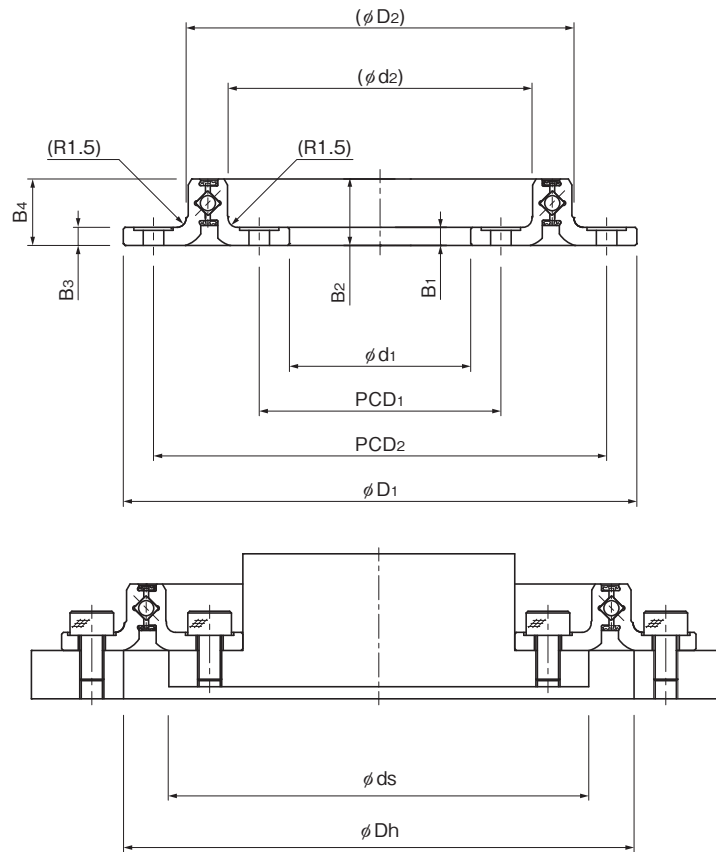
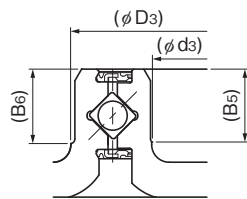
\* The shoulder height  $\phi ds$  should be designed so that it is inside the raceway.

Unit: mm

| Shaft diameter | Model No. | Mounting hole-related |                                                                  |
|----------------|-----------|-----------------------|------------------------------------------------------------------|
|                |           | Outer ring            |                                                                  |
|                |           | PCD                   | Mounting hole                                                    |
| 40             | RF45      | 60                    | 6- $\phi 3.4$ drilled through, $\phi 6.5$ counterbore depth 0.1  |
| 50             | RF57      | 75                    | 8- $\phi 3.4$ drilled through, $\phi 6.5$ counterbore depth 0.1  |
| 60             | RF67      | 85                    | 8- $\phi 3.4$ drilled through, $\phi 6.5$ counterbore depth 0.1  |
| 70             | RF77      | 95                    | 8- $\phi 4.5$ drilled through, $\phi 8$ counterbore depth 0.1    |
| 90             | RF97      | 115                   | 12- $\phi 4.5$ drilled through, $\phi 8$ counterbore depth 0.1   |
| 120            | RF127     | 148                   | 12- $\phi 5.5$ drilled through, $\phi 9.5$ counterbore depth 0.1 |



## Flange-type inner ring



Unit: mm

| Shaft diameter | Model No. | Main dimensions |                   |                   |                |                   |                   |                              |                                 |                                 |                                    | Shoulder height |          | Permissible load | Mass (kg) |              |
|----------------|-----------|-----------------|-------------------|-------------------|----------------|-------------------|-------------------|------------------------------|---------------------------------|---------------------------------|------------------------------------|-----------------|----------|------------------|-----------|--------------|
|                |           | Inner diameter  |                   |                   | Outer diameter |                   |                   | Roller pitch circle diameter | Width                           |                                 |                                    |                 | ds (max) | Dh (min)         |           | Moment (N·m) |
|                |           | d <sub>1</sub>  | (d <sub>2</sub> ) | (d <sub>3</sub> ) | D <sub>1</sub> | (D <sub>2</sub> ) | (D <sub>3</sub> ) | dp                           | B <sub>1</sub> , B <sub>3</sub> | B <sub>2</sub> , B <sub>4</sub> | (B <sub>5</sub> , B <sub>6</sub> ) |                 |          |                  |           |              |
| 20             | RF45F     | 20              | 40.4              | 40.1              | 70             | 49                | 49.7              | 44.7                         | 2.1                             | 8                               | 4                                  | 39              | 50.5     | 5.12             | 0.08      |              |
| 30             | RF57F     | 30              | 50.6              | 50.4              | 85             | 63.4              | 64.1              | 57                           | 3                               | 11                              | 6                                  | 49.5            | 64.5     | 15.3             | 0.17      |              |
| 40             | RF67F     | 40              | 60.6              | 60.4              | 95             | 73.4              | 74.1              | 67                           | 3                               | 11                              | 6                                  | 59.5            | 74.5     | 21.8             | 0.20      |              |
| 45             | RF77F     | 45              | 70.6              | 70.4              | 105            | 83.4              | 84.1              | 77                           | 3                               | 11                              | 6                                  | 69.5            | 84.5     | 28.3             | 0.24      |              |
| 65             | RF97F     | 65              | 90.6              | 90.4              | 125            | 103.4             | 104.1             | 97                           | 3                               | 11                              | 6                                  | 89.5            | 104.5    | 45.1             | 0.30      |              |
| 95             | RF127F    | 95              | 120.4             | 120.2             | 160            | 133.4             | 134.1             | 127                          | 3                               | 11                              | 6                                  | 129.5           | 134.5    | 76.9             | 0.42      |              |

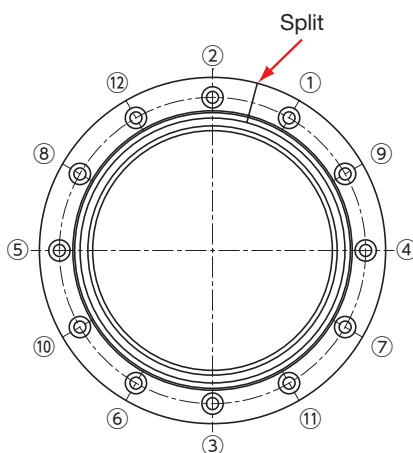
\* The outer diameter indicates the value before separation.

Unit: mm

| Shaft diameter | Model No. | Mounting hole-related |                                                     |                  |                                                     |
|----------------|-----------|-----------------------|-----------------------------------------------------|------------------|-----------------------------------------------------|
|                |           | Inner ring            |                                                     | Outer ring       |                                                     |
|                |           | PCD <sub>1</sub>      | Mounting hole                                       | PCD <sub>2</sub> | Mounting hole                                       |
| 20             | RF45F     | 30                    | 6-φ3.4 drilled through, φ6.5 counterbore depth 0.1  | 60               | 6-φ3.4 drilled through, φ6.5 counterbore depth 0.1  |
| 30             | RF57F     | 40                    | 8-φ3.4 drilled through, φ6.5 counterbore depth 0.1  | 75               | 8-φ3.4 drilled through, φ6.5 counterbore depth 0.1  |
| 40             | RF67F     | 50                    | 8-φ3.4 drilled through, φ6.5 counterbore depth 0.1  | 85               | 8-φ3.4 drilled through, φ6.5 counterbore depth 0.1  |
| 45             | RF77F     | 56                    | 8-φ4.5 drilled through, φ8 counterbore depth 0.1    | 95               | 8-φ4.5 drilled through, φ8 counterbore depth 0.1    |
| 65             | RF97F     | 76                    | 12-φ4.5 drilled through, φ8 counterbore depth 0.1   | 115              | 12-φ4.5 drilled through, φ8 counterbore depth 0.1   |
| 95             | RF127F    | 107                   | 12-φ5.5 drilled through, φ9.5 counterbore depth 0.1 | 148              | 12-φ5.5 drilled through, φ9.5 counterbore depth 0.1 |

## Notes

- The product does not have a greasing hole.
- The outer ring of this product was split to allow roller insertion. Pay attention to the mounting orientation so that the split section does not overlap with the area under the maximum load.  
Fasten the bolts on the outer ring starting from the mounting holes to the right and left of the split section so that it will not open up.  
Contact THK for details.



This catalog only describes the product's basic specifications.  
Please contact THK if you are considering purchasing this product.

## Handling

- (1) The improper installation of a spacer cage in a cross roller ring greatly impacts its rotational functionality. Please do not disassemble the cross roller ring.
- (2) Take care not to drop or strike the cross roller ring. Otherwise, it may cause injury or damage the unit. Even if there is no outward indication of damage, a sudden impact could prevent the unit from functioning properly.
- (3) Wear appropriate safety gear, such as protective gloves and safety shoes, when handling the product.

## Precautions on Use

- (1) Prevent foreign materials, such as cutting chips or coolant, from entering the product. Failure to do so could damage the product.
- (2) Prevent foreign materials, such as cutting chips, coolant, corrosive solvents, or water from getting in the product by using a bellows or cover when the product is used in an environment where such a thing is likely.
- (3) Do not use this product if the external temperature exceeds 80°C. If used above this temperature, there is a risk that the resin and rubber parts may deform or become damaged.
- (4) Clean the product if foreign materials such as cutting chips adhere to the product.
- (5) Slight oscillations can inhibit the formation of an oil film between the raceways and the area of contact for the balls, resulting in fretting. We recommend periodically rotating the cross roller ring several times to help ensure that a film forms on the surfaces and rolling elements.
- (6) Please be aware that the cross roller ring seals are dust seals and may be unable to prevent the ingress of very fine particles and liquids.
- (7) Do not forcibly drive a pin, key, or any other positioning device into the product. This could create indentations on the raceways and impair the product's function.
- (8) When installing the cross roller ring to a housing, if the inner ring is fixed, hammer the inner ring to insert it. If the outer ring is fixed, hammer the outer ring. Hammering the non-fixed side may cause damage to the unit.
- (9) If the mounting material lacks sufficient rigidity or accuracy, the bearing load may be focused in one area, and bearing functionality will dramatically decrease. Therefore, carefully consider the rigidity and accuracy of the housing and base, and the strength of the securing bolts.
- (10) Be careful of the dimensional tolerances of the mounting components to ensure that the presser flange firmly holds the inner and outer rings from the sides. (Straight-type inner ring)

## Lubrication

- (1) Do not mix different lubricants. Even grease containing the same type of thickening agent may, if mixed, interact negatively due to disparate additives or other ingredients.
- (2) When using the product in locations exposed to constant vibrations or in special environments such as in clean rooms, vacuums, and low/high temperatures, use a lubricant suitable for its use/environment.
- (3) Grease viscosity can vary depending on the temperature. Please keep in mind that the torque of the cross roller ring may be affected by changes in viscosity.
- (4) Excess grease may protrude from the outside edge of the cross roller ring. The structure of peripheral components will require careful consideration if contamination due to grease around the edges of the device is a concern.
- (5) When planning to use a special grease or a lubricant other than grease, please contact THK.

## Storage

When storing the cross roller ring, pack it as designated by THK and store it indoors in a horizontal position away from high or low temperatures and high humidity.

Please note that after the product has been in storage for an extended period, the lubricant inside may have deteriorated.

## Disposal

The product should be treated as industrial waste and disposed of appropriately.

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## Other Recommended Products

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### Cross Roller Ring

#### RAU

- Wide lineup includes super-small models.  
The thin type (5 mm) is the smallest cross roller ring diameter.
- Lineup includes:  
5 mm width thin type:  $\phi$  10 to  $\phi$  100 inner diameter  
8 mm and 13 mm width:  $\phi$  50 to  $\phi$  200 inner diameter



### Cross Roller Ring

#### RU

- Easy to install
- Stable rotating accuracy and torque
- Lineup includes inner diameters from  $\phi$  20 to  $\phi$  350



## Cross Roller Ring for Robots RF

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