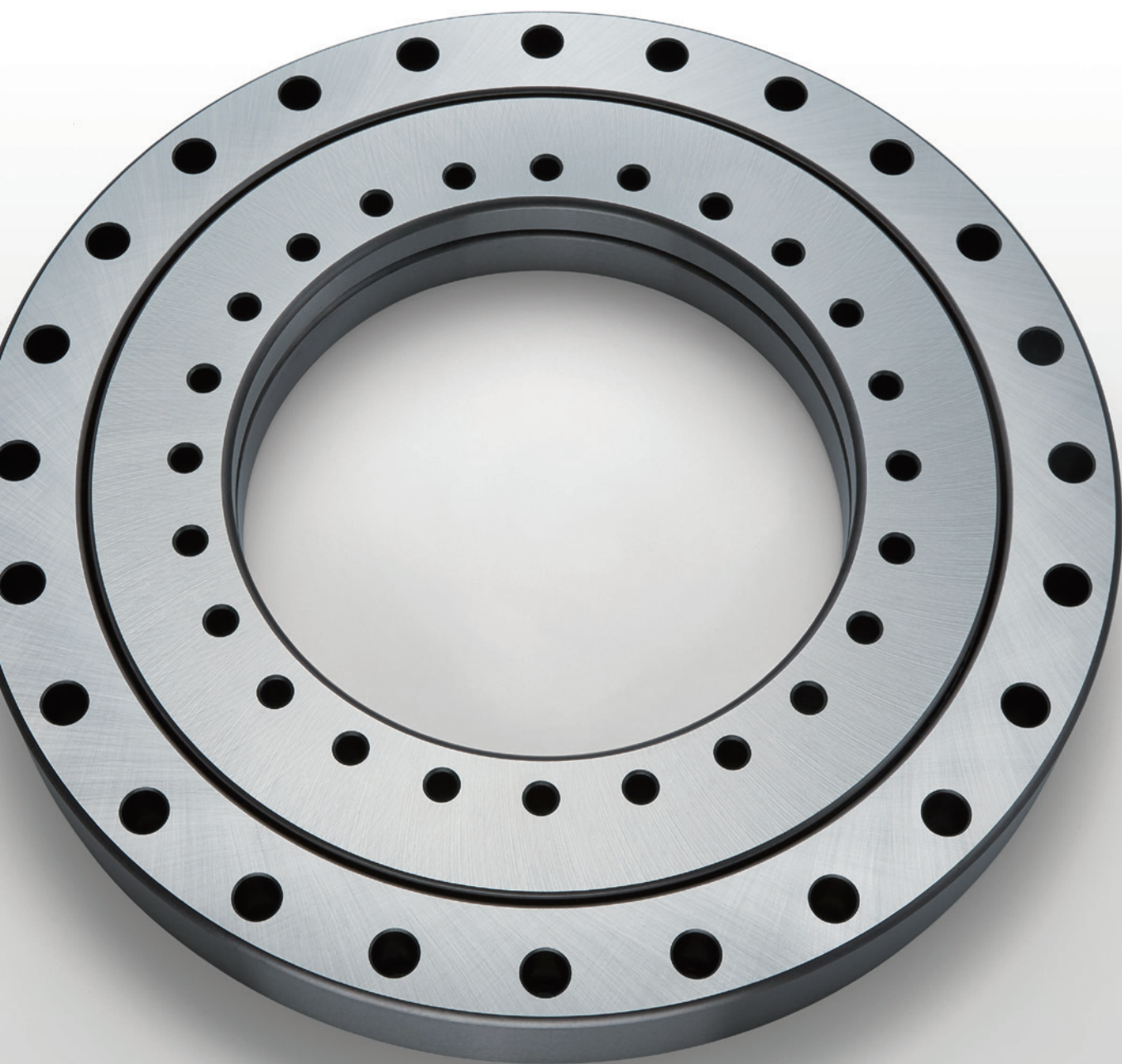


THK

NEW

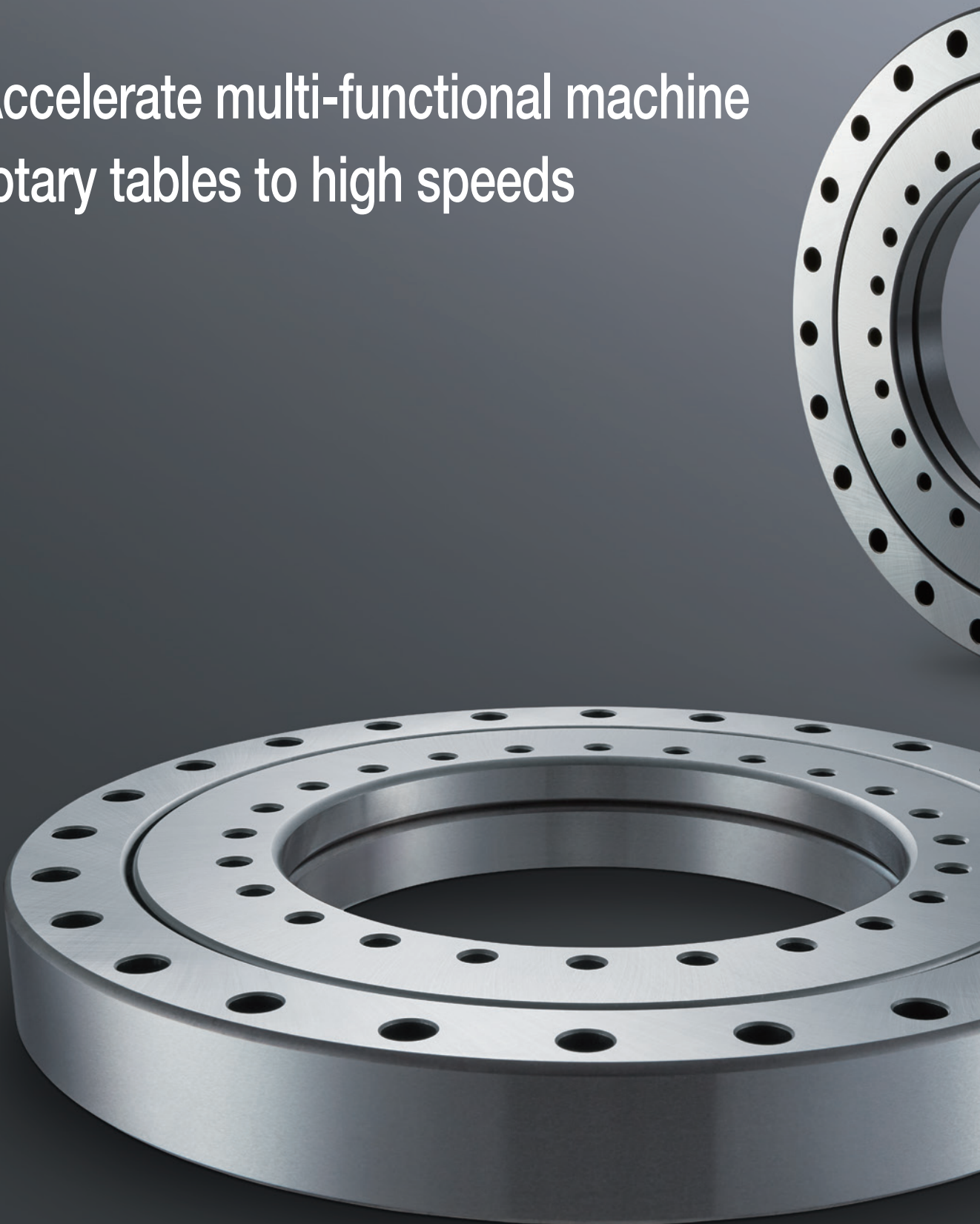
High-Speed Roller Ring

RT



Structure designed for high-speed rotation
Achieves high-speed rotary performance with a $Dpw \cdot N$ value of 300,000

Accelerate multi-functional machine
rotary tables to high speeds





High-Speed Roller Ring

RT

Feature 1 Superior High-Speed Rotary Performance

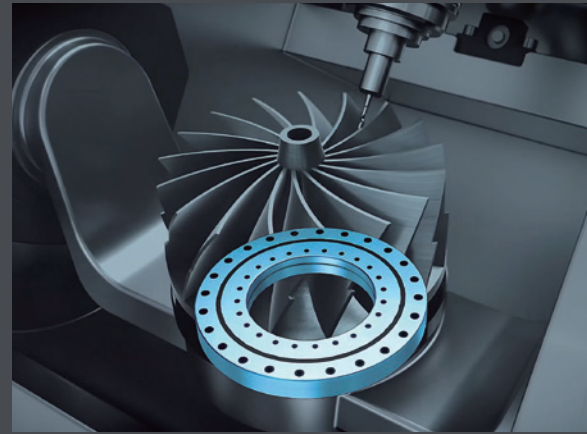
Feature 2 Easy to Install

High-Speed Roller Ring

RT

The roller ring specialized for high-speed rotation has arrived!

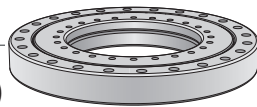
THK roller rings are used in the machine tool, robotics, and various other industries. THK has concentrated the know-how it has built in the course of this to develop the High-Speed Roller Ring RT for high-speed rotary performance.



A Lineup That Offers Choices Based on Specifications

Because the internal and external diameters, width dimensions, and mounting hole positions are identical on the High-Speed Roller Ring for Multi-Functional Machine Rotary Tables Model RT and the Double-Row Angular Roller Ring Model RW, you can select either based on the specifications you require.

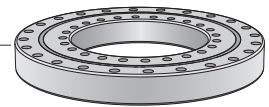
Model RT



High-Speed (Dpw-N value of 300,000)

This product speeds up rotary tables and contributes to shortened cycle times through superior high-speed rotary performance. It can also be used for lathe turning.

Model RW



High Rigidity

This product achieves high rigidity by increasing the number of rollers with a double-row structure. It is suited for the rotary tables of multi-functional machines.

External Dimensional Comparison

Unit: mm

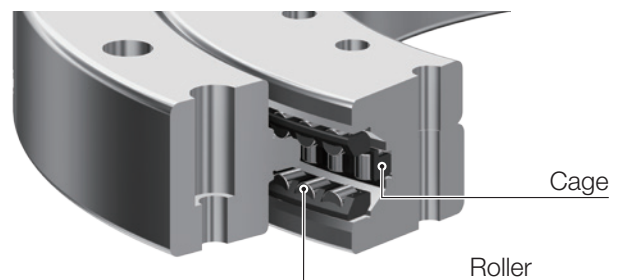
Model RT Model No.	Model RW Model No.	Inner diameter	Outer diameter	Width
RT228	RW228	160	295	35
RT297	RW297	210	380	40
RT445	RW445	350	540	50
RT665	*RW665	580	750	60

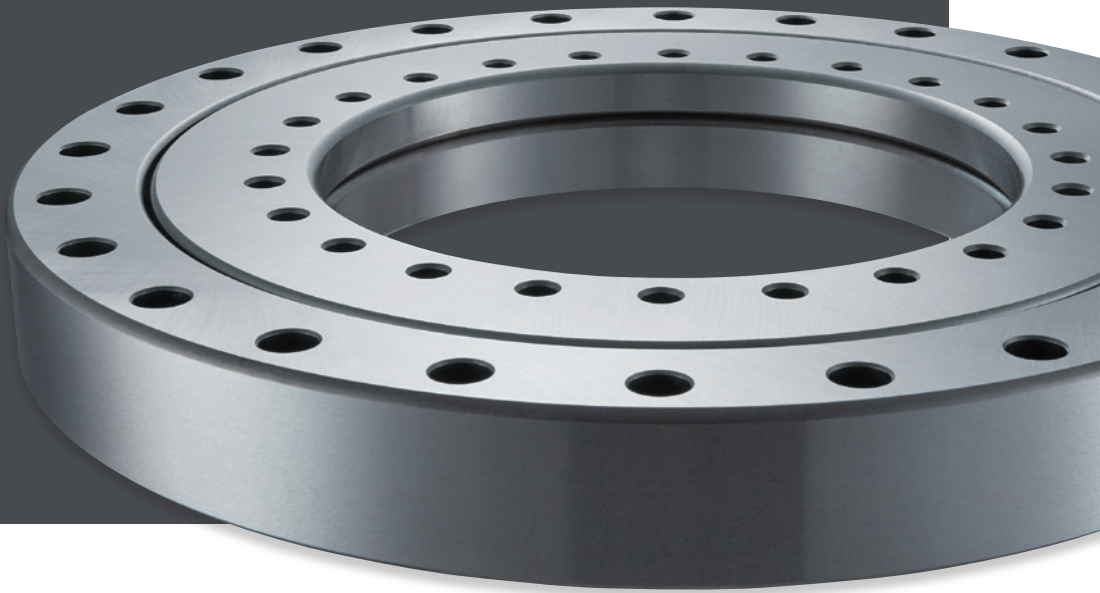
* The RW665 is a non-standard product. For details, contact THK.

Structure and Characteristics of the Model RT

The Model RT uses rollers as a rolling element for higher rigidity. It also has two axial rows of rollers and one radial row of rollers suited for high-speed rotation.

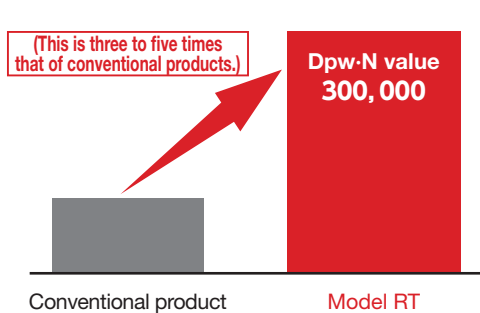
This model can be used for both outer and inner ring rotation.





Feature 1 Superior High-Speed Rotary Performance

The High-Speed Roller Ring Model RT has a roller contact structure suitable for high-speed rotation to suppress heat generation during high-speed rotation and achieves a Dpw·N value of 300,000.

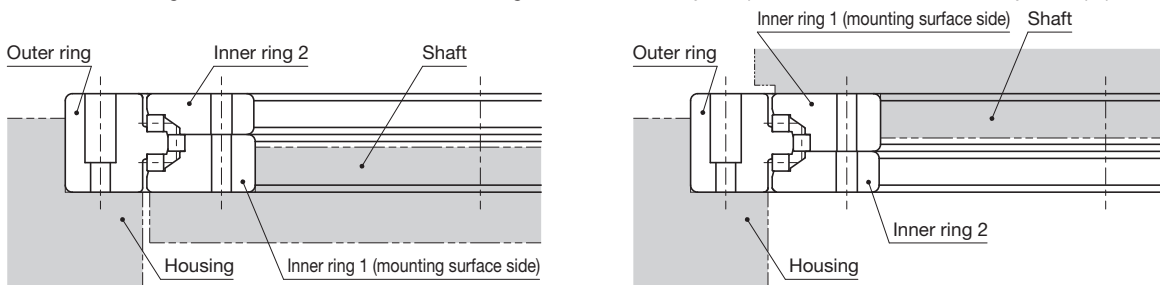


Model No.	Permissible rotational speed
RT228	1,290
RT297	990
RT445	660
RT665	440

Note: Dpw·N value:
roller pitch circle diameter (mm) × permissible rotational speed (min^{-1})

Feature 2 Easy to Install

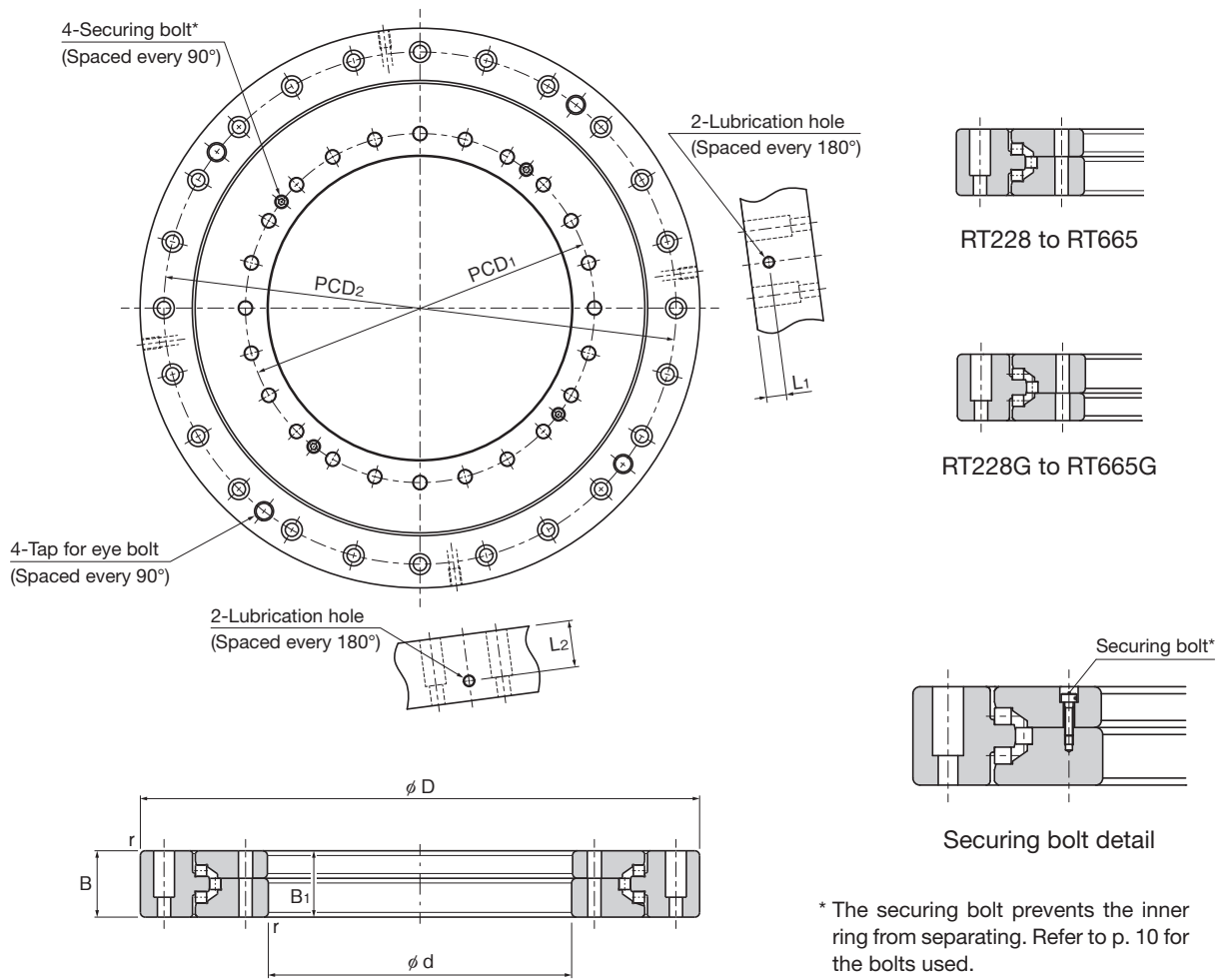
This product features mounting holes in the inner and outer rings, allowing the product to attach directly to shafts and housings. Because of that, other components that would be needed for mounting can be eliminated. In addition, you can choose the mounting surface orientation of the inner ring based on the way the product will be mounted to your equipment.



RT228 to RT665

RT228G to RT665G (opposite mounting surface)

Dimensional Table



Model No.	Main dimensions											
	Inner diameter		Outer diameter		Roller pitch circle diameter	Outer ring width		Inner ring width		Lubrication hole		
	d	Tolerance ¹	D	Tolerance ¹	Dpw	B	Tolerance	B ₁	Tolerance	Hole diameter	L ₁	L ₂
RT228	160	0 -0.025	295	0 -0.035	231	35	0 -0.1	35	0 -0.12	M6×0.75	10.5	24.5
RT297	210	0 -0.03	380	0 -0.04	300.4	40	0 -0.1	40	0 -0.12	M6×0.75	12	28
RT445	350	0 -0.04	540	0 -0.05	452.4	50	0 -0.15	50	0 -0.2	M6×0.75	15	35
RT665	580	0 -0.05	750	0 -0.075	674.5	60	0 -0.15	60	0 -0.2	M6×0.75	18	42

Model Number Coding

Select an option (orange box) Fixed symbol (grey box)

RT228

Model No.

CC0

Radial clearance/
axial clearance symbol ▶ p. 7
CC0: Negative clearance (preload)

P2

Accuracy symbol ▶ p. 7
No symbol: Rotational accuracy grade P5
P4: Rotational accuracy grade P4
P2: Rotational accuracy grade P2
USP: Rotational accuracy grade USP

B

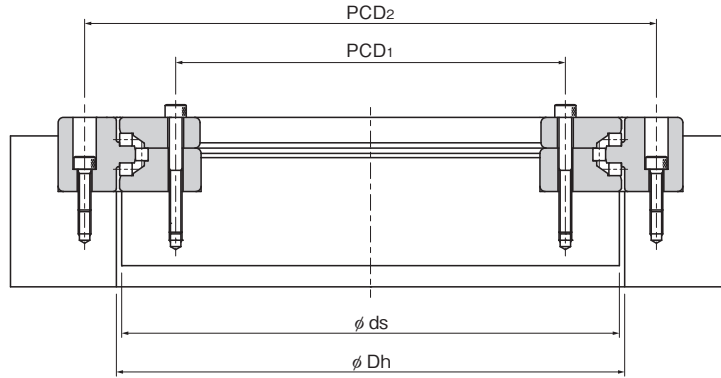
Mounting surface symbol ▶ p. 4
No symbol: Standard specifications
G: Inner and outer ring mounting surfaces are in opposite directions

G

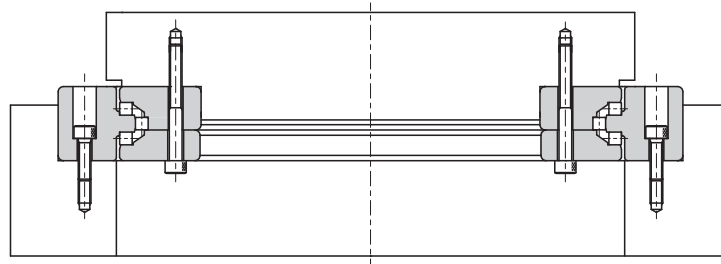
Component accuracy symbol
No symbol: Rotational accuracy of the inner ring
R: Rotational accuracy of the outer ring
B: Rotational accuracy of the inner and outer rings

-N

Grease nipple symbol ▶ p. 6
No symbol: No grease nipples included
-N: With grease nipple (A-M6F x4)



RT228 to RT665



RT228G to RT665G

Unit: mm

	Main dimensions				Tap for eye bolt ²	r_{min}	Shoulder height		Basic load rating (radial)		Basic load rating (axial)		Mass (kg)	Permissible rotational speed (min ⁻¹)
	Inner ring		Outer ring				ds (max)	Dh (min)	Cr (kN)	Cor (kN)	Ca (kN)	C _{oa} (kN)		
	PCD ₁	Mounting hole	PCD ₂	Mounting hole										
184	24- $\phi 7$ through	270	24- $\phi 7$ through $\phi 11$ counterbore depth 24.5	4-M10 through	2	237	240	41.7	90.6	83.8	535	12	1,290	
240	24- $\phi 9.3$ through	350	24- $\phi 9.3$ through $\phi 14.5$ depth 28	4-M12 through	2.5	308	313	71.7	161	144	950	22	990	
385	32- $\phi 9.3$ through	505	32- $\phi 9.3$ through $\phi 14.5$ depth 35	4-M12 through	2.5	462	468	119	307	238	1,780	46	660	
610	32- $\phi 10$ through	720	32- $\phi 10$ through $\phi 15$ counterbore depth 42	4-M12 through	3	686	693	187	548	366	3,090	72	440	

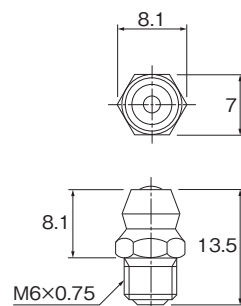
¹ The tolerance of the roller ring inner diameter and outer diameter is the arithmetic average of the maximum and minimum diameters obtained by measuring the roller ring inner and outer diameters at two points.

² The outer ring has threaded holes for eye bolts. Please use these for transporting the product. Always use all four holes to hoist the product when transporting it.

Note: Please consult with THK if you are considering this product in a size that does not appear in this catalog.

Options

Grease nipple (A-M6F)



* Lubrication accessories (piping joints and grease nipples) other than the standard options are also available.

Please contact THK if required. (For details about other lubrication accessories, please see the "Accessories for Lubrication" section of the general catalog.)

Radial Clearance/Axial Clearance

Radial Clearance and axial clearance for the Model RT are adjusted to negative clearance (preload) at the time of shipment.

Unit: μm

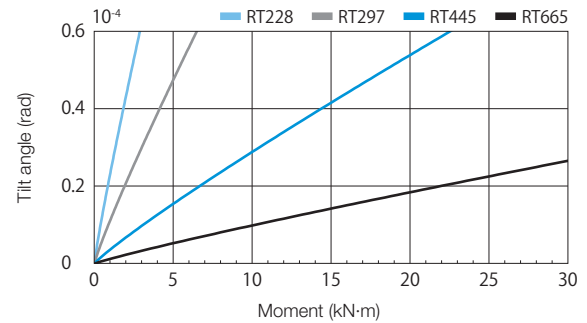
Model No.	Radial clearance		Axial clearance	
	Min.	Max.	Min.	Max.
RT228	-6	0	-6	0
RT297	-8	0	-8	0
RT445	-10	0	-10	0
RT665	-12	0	-12	0

Rigidity

The Model RT uses rollers as a rolling element for higher rigidity. The graph to the right shows the rigidity of different types of Model RT in isolation with internal clearance set to zero.

Note: The rigidity graph does not take into consideration the effects of deformation of the housing, presser flange, and bolts.

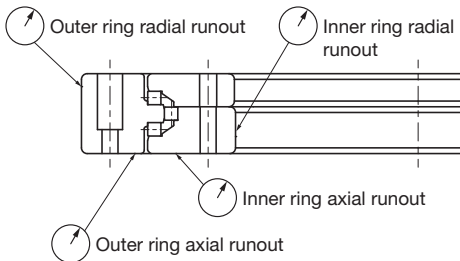
Moment Rigidity



Accuracy Standards

The Model RT is manufactured with rotational accuracy in accordance with the following tables.

RT228 to RT665



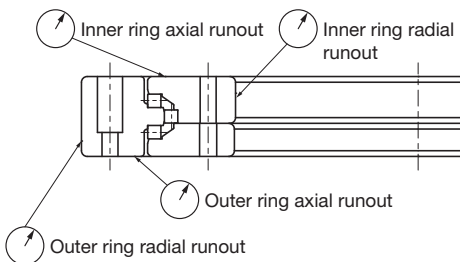
Inner Ring Rotational Accuracy

Unit: μm

Model No.	Radial runout tolerance of the inner ring				Axial runout tolerance of the inner ring			
	P5 grade	P4 grade	P2 grade	USP grade	P5 grade	P4 grade	P2 grade	USP grade
RT228	8	6	5	2.5	8	6	5	2.5
RT297	10	8	5	3	10	8	5	3
RT445	15	12	7	4	15	12	7	4
RT665	20	16	10	6	20	16	10	6

Note: The Model RT has a standard rotational accuracy grade of P5. (This is not shown in the Model No.)

RT228G to RT665G



Outer Ring Rotational Accuracy

Unit: μm

Model No.	Radial runout tolerance of the outer ring				Axial runout tolerance of the outer ring			
	P5 grade	P4 grade	P2 grade	USP grade	P5 grade	P4 grade	P2 grade	USP grade
RT228	18	11	7	4	18	11	7	4
RT297	20	13	8	5	20	13	8	5
RT445	25	16	10	7	25	16	10	7
RT665	30	20	13	8	30	20	13	8

Note: The Model RT has a standard rotational accuracy grade of P5. (This is not shown in the Model No.)

Permissible Rotational Speed

The permissible rotational speed is determined by a test performed under the conditions listed to the right. For this reason, the rotational speed may need to be revised depending on external conditions and environmental factors.

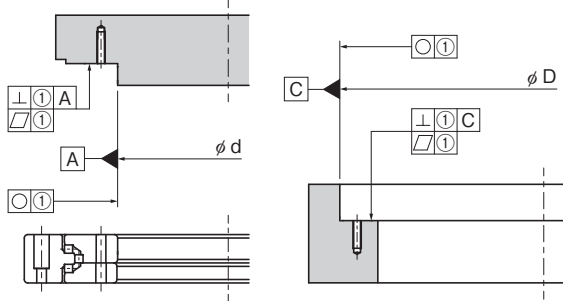
Test Conditions

- Installation method: As per the installation method described in this catalog [▶ p. 9](#)
- Temperature: Inner/outer ring at a stable temperature of 60°C or less
- Lubrication: Standard grease listed in this catalog [▶ p. 8](#)
- Applied load: Preload and jig weight only
- Warming-up operation: As per the method described in this catalog [▶ p. 10](#)

Peripheral Design

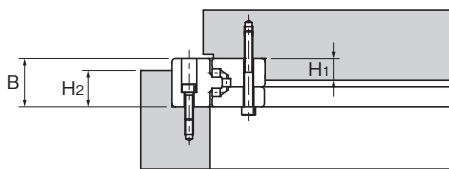
Recommended machining accuracies for peripheral attachments (shafts, housings, etc.) are displayed below.

Peripheral Machining Accuracy



Note: The figure above shows an installation example using a product with a model name ending in "G."

Shaft and Housing Fit Depth



Note: The figure above shows an installation example using a product with a model name ending in "G."

① Recommended Peripheral Machining Accuracy Unit: μm

Model No.	Circularity/perpendicularity/flatness	
	Shaft	Housing
RT228	5	8
RT297	7	9
RT445	9	11
RT665	11	13

Use the table below as a guideline for shaft and housing fit depths.

② Shaft and Housing Fit Depth

Inner Ring

Unit: mm

Application	Inner ring fit depth
When positioning accuracy is needed	$H_1 > 0.10 \times B$
When loads are large	$H_1 > 0.30 \times B$
When high rigidity is needed	$H_1 > 0.45 \times B$

Outer Ring

Unit: mm

Application	Outer ring fit depth
When positioning accuracy is needed	$H_2 > 0.15 \times B$
When loads are large	$H_2 > 0.50 \times B$
When high rigidity is needed	$H_2 > 0.75 \times B$

Fit

The Model RT does not normally need a fitting, but when precise positioning accuracy is required, or if it will operate under a heavy load, we recommend a fitting tolerance of g6 for the outer diameter of a shaft and H7 for the inner diameter of the housing. If higher rigidity is needed, we recommend measuring the inner and outer diameters of the bearings and applying a tight fit (about $0 \mu\text{m}$ to $5 \mu\text{m}$).

Note: When applying a tight fit, add a removal tap to the shaft and housing.

Lubrication

Standard Grease AFG

The standard specification Model RT uses grease lubrication. This product contains THK AFG Grease.

Note: Contact THK if a non-standard grease or oil specification is required.

Representative Physical Properties

Item	Representative property	Testing method
Consistency enhancer	Urea-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm^2/s (40°C)	25	JIS K 2220 23
Worked penetration (25°C, 60 W)	285	JIS K 2220 7
Mixing stability (100,000 W)	329	JIS K 2220 15
Dropping point: °C	261	JIS K 2220 8
Evaporation volume: mass% (99°C, 22 h)	0.2	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	0.5	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Passed	JIS K 2220 9
Low-temperature torque: $\text{mN}\cdot\text{m}$ (-20°C)	Starting	170
	Rotational	70
4-ball testing (welding load): N	3,089	ASTM D2596
Operating temperature range: °C	-45 to 160	
Color	Brown	

Installation Procedure

Follow this procedure to install the Model RT.

■ Inspecting Components before Installation

Thoroughly clean the shaft and housing and make sure there are no burrs.

■ Installing the Cross-Roller Ring onto a Housing or Shaft

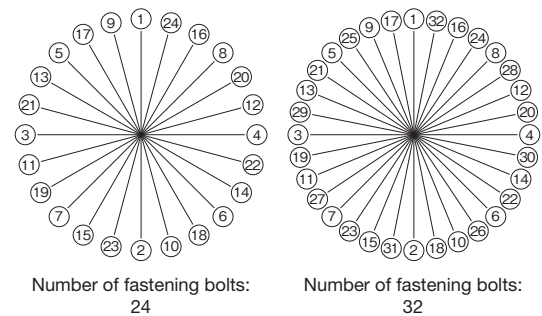
As it is easy for the product to tilt during installation, level it horizontally and gradually insert the product by tapping around its outside edge with a plastic mallet. Continue to hammer carefully until you hear the sound of it making direct contact with the reference surface.

Note: When inserting the inner ring, hammer the inner ring. When inserting the outer ring, hammer the outer ring.

■ Tightening the Fastening Bolts

- Before installing onto equipment, loosen the securing bolts just enough so that the inner ring doesn't separate.
- Installation to devices is done from the raceway wheel on the rotating side.
- After attaching the Model RT to paired components, align the fastening bolts while rotating the Model RT several times.
- Install the fastening bolts. Ensure that the fastening bolts do not interfere with the inner diameter of the Model RT mounting holes during installation.
- Bolt tightening should be divided into three or four steps, from temporary tightening to final tightening, moving diagonally between bolts in order. (See figure on right.)
- Following the order indicated by the numbers in the figure, tighten the fastening bolts evenly using a torque wrench.
- To prevent the securing bolts from unexpectedly falling out during use, make sure to remove them after tightening the fastening bolts.

Example bolt tightening order



Reference bolt tightening torque

Model No.	Bolt size	Tightening torque (N·m)
RT228	M6	14
RT297	M8	30
RT445	M8	30
RT665	M8	30

Note: The tightening torques shown in the table apply where fastening bolts have a strength grade of 10.9 to 12.9, seating surfaces and female threads are composed of structural steel, and the shape of mounting holes is the same as that of Model RT mounting holes or as specified by JIS B 1001. Contact THK if using different fastening bolts or mounting holes with a different shape.

Static Safety Factor

The basic static load rating (C_{0r}/C_{0a}) is a static load of a defined direction and size where the calculated contact stress of the roller and the raceway at the contact area under maximum stress is 4,000 (MPa). (Contact stress exceeding this value may impede rotation.) This value is indicated as " C_{0r} " or " C_{0a} " in the dimensional table. When a load is statically or dynamically applied, it is necessary to consider the static safety factor as shown below.

$$f_{sr} = \frac{C_{0r}}{P_{0r}}, \quad f_{sa} = \frac{C_{0a}}{P_{0a}}$$

- f_{sr} : Static safety factor for C_{0r}
- C_{0r} : Basic static load rating (radial) (N)
- P_{0r} : Static equivalent radial load (N)
- f_{sa} : Static safety factor for C_{0a}
- C_{0a} : Basic static load rating (axial) (N)
- P_{0a} : Static equivalent axial load (N)

Static Equivalent Radial Load P_{0r}

$$P_{0r} = F_r$$

- P_{0r} : Static equivalent radial load (N)
- F_r : Radial load (N)

Static Equivalent Axial Load P_{0a}

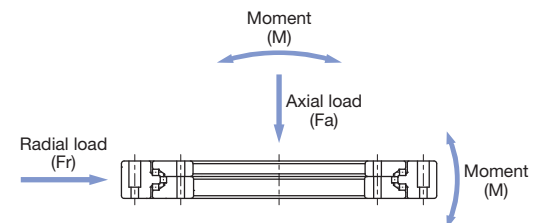
$$P_{0a} = X_0 \frac{M}{D_{pw}} + Y_0 F_a$$

- P_{0a} : Static equivalent axial load (N)
- F_a : Axial load (N)
- M : Moment (N·mm)
- X_0 : Static moment factor ($X_0 = 4.6$)
- Y_0 : Static axial factor ($Y_0 = 1$)
- D_{pw} : Roller pitch circle diameter (mm)

Static Safety Factor (f_{sr} , f_{sa}) (Guideline)

Load conditions ¹	Lower limit of f_{sr} , f_{sa} ²
Without vibrations or impacts	2 or greater
With vibrations or impacts	5 or greater

¹ In general, factors that cause vibration and impacts include acceleration and deceleration, sudden starts and stops, transmission of vibration and impacts from external devices and machines, and changes in processing force over time.
² The values in the table above are guidelines for minimum static safety factors. However, considering dynamic performance such as service life, we recommend a value of 7 or above.



Nominal Life

Contact THK for information about nominal life and service life time.

Handling

- (1) Please use at least two people to move any product with a mass of 20 kg or more, or use a cart or another method of conveyance. Otherwise, it may cause injury or damage the unit.
- (2) Follow the installation procedure on p. 9 during installation. Additionally, do not disassemble the roller ring other than where indicated.
- (3) Take care not to drop or strike the 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.
- (4) Wear appropriate safety gear, such as protective gloves and safety shoes, when handling the product.
- (5) When removing the Model RT from equipment, fasten the securing bolts so that the inner ring does not separate.

Model No.	Securing bolt (hexagonal-socket-head type bolt)
RT228 (G)	M3×12L 4 bolts
RT297 (G)	M4×12L 4 bolts
RT445 (G)	M5×16L 4 bolts
RT665 (G)	M6×20L 4 bolts

Precautions on Use

- (1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so could damage the product.
- (2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
- (3) Slight oscillations can inhibit the formation of an oil film between the raceways and the area of contact for the rolling elements, resulting in fretting. We recommend periodically rotating the roller ring several times to help ensure that an oil film forms on the surfaces and rolling elements.
- (4) Do not forcibly drive a pin, key, or other positioning device into the product. Press-fit it on gently. An impact could create indentations on the raceway and impair the product's function.
- (5) When installing the roller ring onto 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 movable (rotating) side may cause damage to the unit.
- (6) If the rigidity or accuracy of an attached component is insufficient, the bearing load will be concentrated at one location and performance will decline significantly. Therefore, consider carefully the rigidity and accuracy of the housing and shaft, and the strength of the securing bolts.
- (7) The performance of the roller ring, including accuracy, rotational torque, and service life, may be reduced by heat generated by motor gears. Keep the roller ring sufficiently far away from areas where heat is generated and add a cooling system as required.
- (8) If the housing is asymmetrical, any thermal deformation of the roller ring will be also. This can increase the uneven load on the roller ring and reduce its performance, including accuracy, rotational torque, and service life.
- (9) Keep the inner and outer rings at a temperature of 60°C or less during use.
- (10) Please keep in mind that the rotational torque will change depending on rotational speed, temperature, type of grease, and load conditions.
- (11) The roller ring performance values listed in this catalog are obtained with the specified preload applied. The performance of the roller ring may change if the preload changes due to factors such as fit, the rigidity and machining accuracy of peripheral components, and the difference in temperature of the inner and outer rings.

Lubrication

- (1) Do not mix different lubricants. Even greases 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 clean rooms, vacuums, and extreme heat or cold, use a lubricant suitable for its use/environment.
- (3) The consistency of grease and kinematic viscosity of base oil changes according to the temperature. Please keep in mind that the rotational torque of the roller ring may be affected by these changes.
- (4) Roller rings come with the standard grease listed on p. 8 applied, so they can be used immediately, but regular greasing is required to maintain good lubrication. Use the lubrication hole on the outer ring to replenish lubricant to the entire interior of the product every three to six months. The final lubrication interval/amount should be set at the actual machine. When the roller ring is filled up with grease, the initial rotational torque will increase due to grease resistance. Performing a warming-up operation will expel surplus grease, returning the torque to an appropriate value.
- (5) Perform the warming-up operation described below when first operating the product and after replenishing grease. Keep the inner and outer rings at a temperature of 60°C or less when performing a warming-up operation.

Warming-up operation method

1. Start operating the equipment at low speed and gradually increase the rotational speed in three or four stages up to the maximum.
2. At each rotational speed, wait for the periphery of the bearing to reach a stable temperature before continuing.

- (6) The structure of peripheral components will require careful consideration if contamination due to grease around the edges of the device is a concern.
- (7) Contact THK if considering using a special grease or a lubricant other than grease.

Storage

When storing the 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 if the product has been kept in storage for an extended period, the lubricant inside may have deteriorated. Please ensure that you replenish the lubricant before use.

Disposal

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

Recommended Products

Double-Row Angular Contact Roller Ring

RW

- High rigidity
- Easy to install




High-Speed, Double-Row Angular Contact Ring

BWH

- Superior high-speed performance
- No preload adjustment required
- Easy to install



High-Speed Roller Ring RT

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