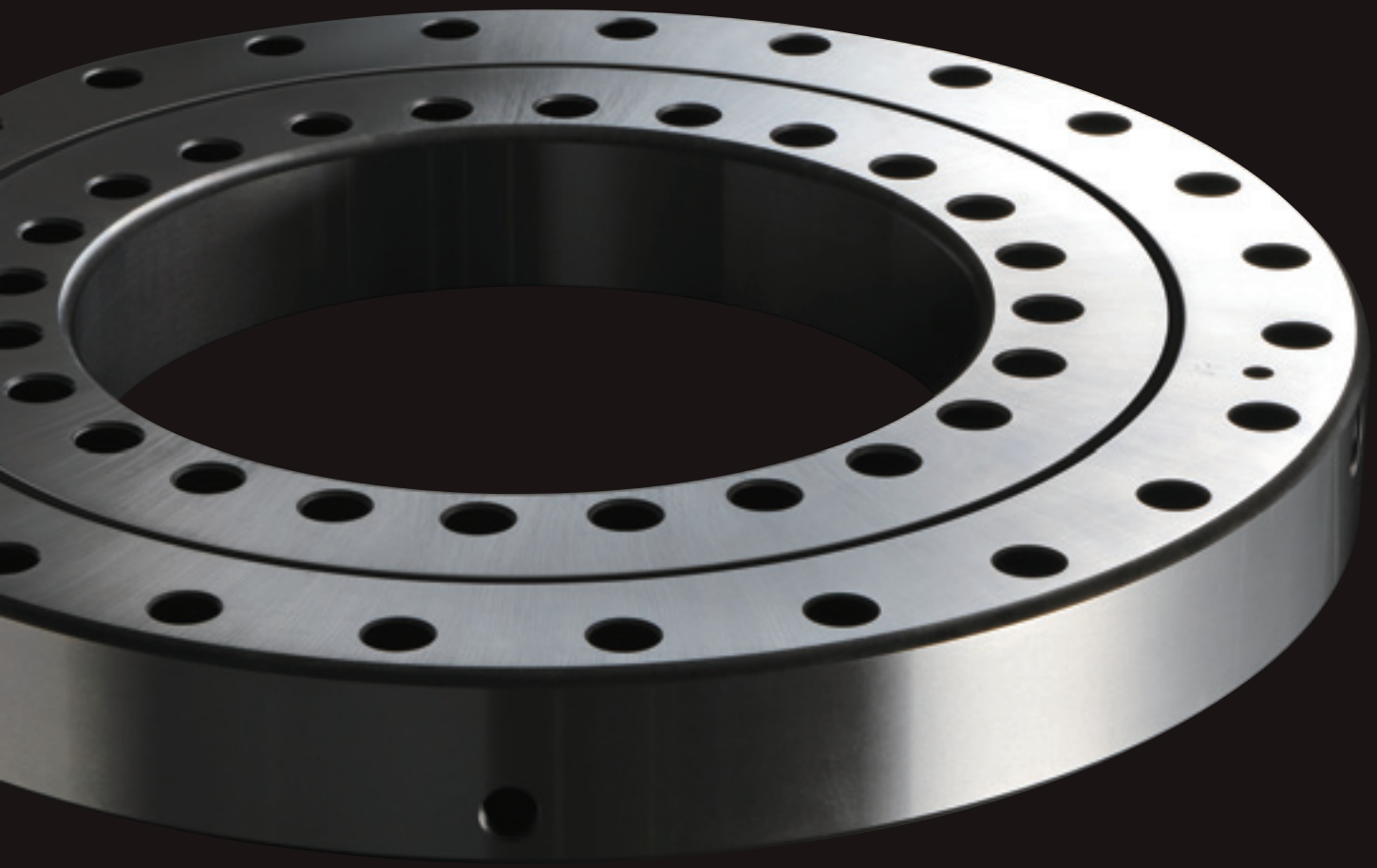
THK

NEW

Double-Row Angular Contact Roller Rings

RW

Adopts double-row rollers.
Achieves high rigidity, high accuracy and compactness.
Directly mounts securely, no presser flange required.



For details, visit THK at **www.thk.com**

*Product information is updated regularly on the THK website.

THK CO., LTD.
TOKYO. JAPAN

CATALOG No.361E

Double-Row Angular Contact Roller Rings

Double-row, and simple.

Achieves high rigidity, high accuracy and compactness.

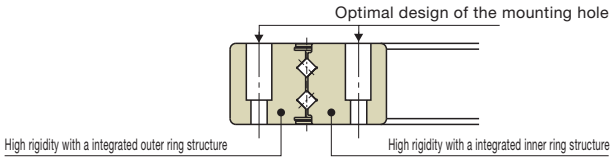
By integrating double-row small-diameter rollers on the raceway, the number of rollers incorporated in this new model (RW228) is approximately 5 times that of Cross-Roller Ring model RU*. While maintaining the compactness, it achieves higher rigidity and accuracy and a lower torque. In addition, the inner and outer rings in integrated structures have mounting holes, allowing the product to be directly mounted to the machine.

* Previous Cross-Roller Ring model RU

● Adopts Inner and Outer Rings that has Integrated Structures

High rigidity and high accuracy

The inner ring and the outer ring of model RW have integral structures to realize a high level of part rigidity. Since the inner ring and the outer ring are machined to have mounting bolt holes, and the size and number of the mounting bolt holes are optimally designed, the deformation of the raceway resulting from the mounting can be minimized and stable rotational performance can be achieved. In addition, the increased machining accuracy results in high rotational accuracy (see Accuracy Standards on page 5).



● Utilizes Small-diameter Rollers

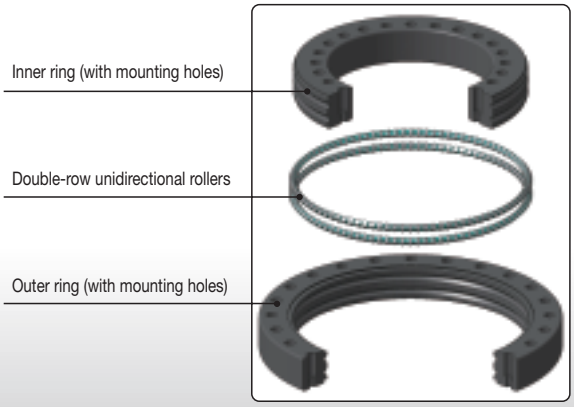
Lower torque

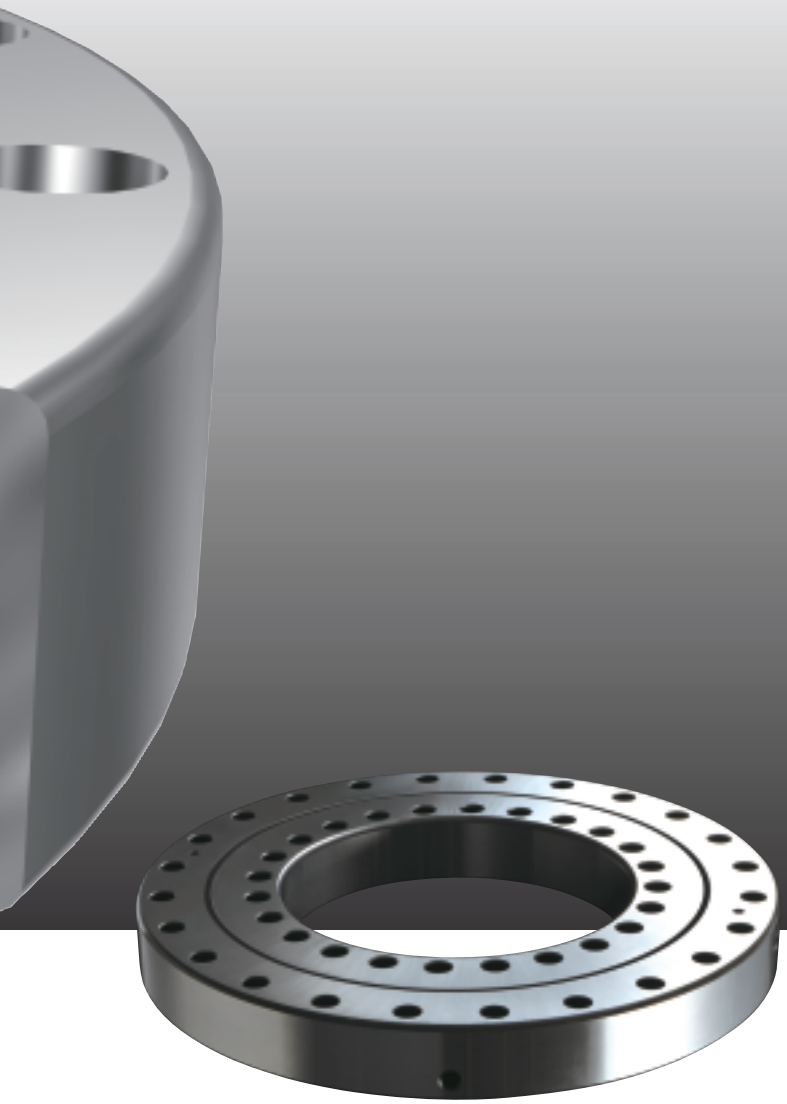
Model RW adopts small-diameter rollers to reduce the friction coefficient and realize a lower torque and low-temperature rise characteristics.

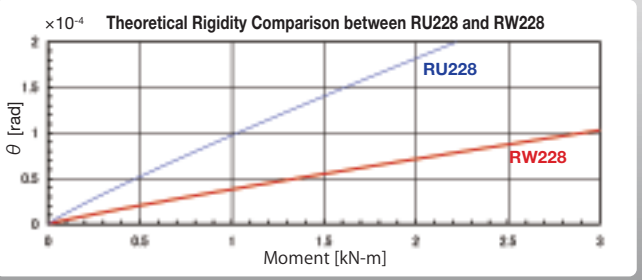
● Adopts Double-row Unidirectional Rollers

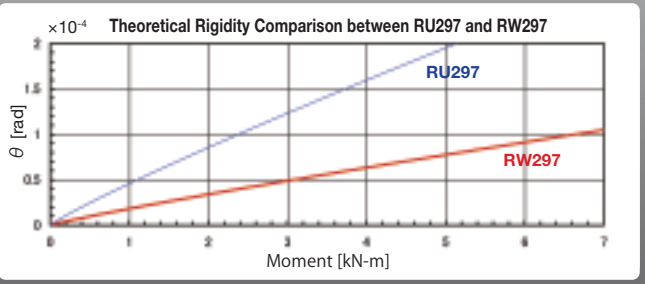
Increased rigidity

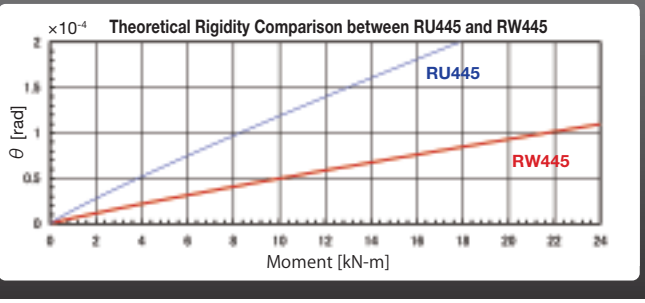
Despite having almost the same dimensions as the previous Cross-Roller Ring model RU*, model RW has rows of raceways twice that of model RU and has a DB structure to increase the rigidity.











●RW228
(outer diameter: 295 mm; inner diameter: 160 mm)

●RW297
(outer diameter: 380 mm; inner diameter: 210 mm)

●RW445
(outer diameter: 540 mm; inner diameter: 350 mm)

Nominal Life

[Nominal Life]

The service life is obtained from the following equation.

$$L=\left(\frac{f_T \cdot C}{f_w \cdot P_C}\right)^{\frac{10}{3}} \times 10^6$$

L : Nominal life
(the total number of revolutions that 90% of a group of identical Double-Row Angular Contact Roller Rings units operating under the same conditions can achieve without showing flaking from rolling fatigue)
C : Basic dynamic load rating* [N]
P_C : Dynamic equivalent radial load [N]
f_T : Temperature factor (see Fig. 1)
f_W : Load factor (see Table 1)

* The basic dynamic load rating (C) of model RW shows the radial load with interlocked direction and magnitude, under which the nominal life (L) is 1 million revolutions when a group of identical model RW units independently operate under the same conditions. The basic dynamic load rating (C) is indicated in the specification tables.

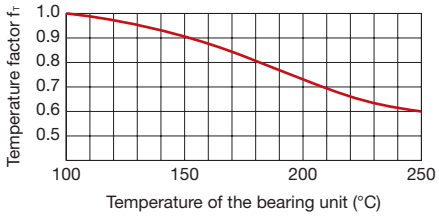


Fig. 1 Temperature factor (f_T)

Note) The normal service temperature is 80°C or below. If the product is to be used at a higher temperature, contact THK.

Table 1 Load Factor (f_w)

Service conditions	fw
Smooth motion without impact	1 to 1.2
Normal motion	1.2 to 1.5
Motion with severe impact	1.5 to 3

[Dynamic Equivalent Radial Load: P_C]

The dynamic equivalent radial load is obtained from the following equation.

$$P_C=X \cdot \left(F_r+\frac{2M}{dp}\right)+Y \cdot F_a$$

P_C : Dynamic equivalent radial load [N]
F_r : Radial load [N]
F_a : Axial load [N]
M : Moment [N-mm]
X : Dynamic radial factor (see Table 2)
Y : Dynamic axial factor (see Table 2)
dp : Roller pitch circle diameter [mm]

- If F_r = 0 [N] and M = 0 [N-mm], assume that X = 0.67 and Y = 0.67.
- For service life calculation with a preload taken into account, contact THK.

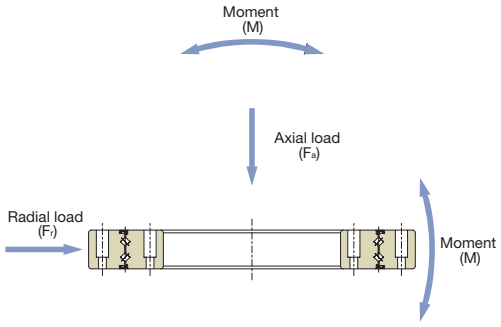


Table 2 Dynamic Radial Factor and Dynamic Axial Factor

Classification	X	Y
$\frac{F_a}{F_r+2M/dp} \leqq 1.5$	1	0.45
$\frac{F_a}{F_r+2M/dp} > 1.5$	0.67	0.67

[Calculating the Service Life Time]

The service life time of model RW is obtained from the following equation.

For Rotary Motion

$$L_h=\frac{L}{n_r \times 60}$$

L_h : Service life time [h]
n_r : Rotation speed per minute [min^{-1}]

Static Safety Factor

The basic static load rating C_0 refers to the static load with constant direction and magnitude, under which the calculated contact stress in the center of the contact area between the roller and the raceway load is 4,000 [MPa] (if the contact stress exceeds this value, performance may be affected). This value is indicated as "C_0" in the specification tables. When a load is statically or dynamically applied, it is necessary to consider the static safety factor as shown below.

$$\frac{C_0}{P_0} = f_s$$

f_s : Static safety factor (see Table 3)
C_0 : Basic static load rating [N]
P_0 : Static equivalent radial load [N]

Table 3 Static Safety Factor (f_s)

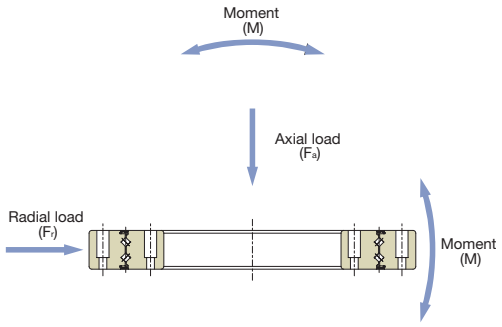
Load conditions	Lower limit of f_s
Normal load	1 to 2
Impact load	2 to 3

[Static Equivalent Radial Load: P_0]

The static equivalent radial load of model RW is obtained from the following equation.

$$P_0 = X_0 \cdot \left(F_r + \frac{2M}{dp}\right) + Y_0 \cdot F_a$$

P_0 : Static equivalent radial load [N]
F_r : Radial load [N]
F_a : Axial load [N]
M : Moment [N-mm]
X_0 : Static radial factor (X_0 = 1)
Y_0 : Static axial factor (Y_0 = 0.44)
dp : Roller pitch circle diameter [mm]



Permissible Load

Table 4 shows the permissible load of model RW.
The permissible load value takes into account the tightening strength of the mounting bolts. Consider the difference in the permissible loads between with and without a housing. If the applied radial load or moment is large, it is Recommended to insert the product into a housing. (For housing design, also see sections "Fit" and "Designing Peripheral Parts" on page 6).

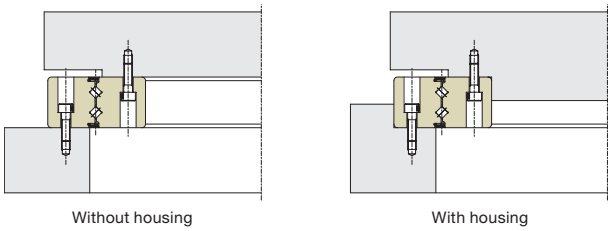


Table 4 Permissible Load of Model RW

Model No.	Without housing			With housing		
	Radial [kN]	Axial [kN]	Moment [kN-m]	Radial [kN]	Axial [kN]	Moment [kN-m]
RW228	7.5	54.4	2.3	26.6	54.4	3.0
RW297	12.1	97.1	5.0	47.6	97.1	7.1
RW445	16.2	219	9.8	107	219	24

Accuracy Standards

Model RW is manufactured with the accuracy and the dimensional tolerance in Tables 5 to 8.

[Rotational Accuracy]

Table 5 Rotational Accuracy of the Inner Ring of Model RW

Unit: μm

Model No.	Radial runout tolerance of the inner ring					Axial runout tolerance of the inner ring				
	Grade P5	Grade P4	Grade P2	Grade USP	Grade TSP	Grade P5	Grade P4	Grade P2	Grade USP	Grade TSP
RW228	8	6	5	2.5	2.5	8	6	5	2.5	2.5
RW297	10	8	5	3	3	10	8	5	3	3
RW445	15	12	7	4	4	15	12	7	4	4

Note) For model RW, grade P5 is the standard rotational accuracy. (Not indicated in model number.)

Table 6 Rotational Accuracy of the Outer Ring of Model RW

Unit: μm

Model No.	Radial runout tolerance of the outer ring				Axial runout tolerance of the outer ring			
	Grade P5	Grade P4	Grade P2	Grade USP	Grade P5	Grade P4	Grade P2	Grade USP
RW228	18	11	7	4	18	11	7	4
RW297	20	13	8	5	20	13	8	5
RW445	25	16	10	7	25	16	10	7

Note) For model RW, grade P5 is the standard rotational accuracy. (Not indicated in model number.)

[Wobbling Accuracy (Inner Ring of Grade TSP Only)]

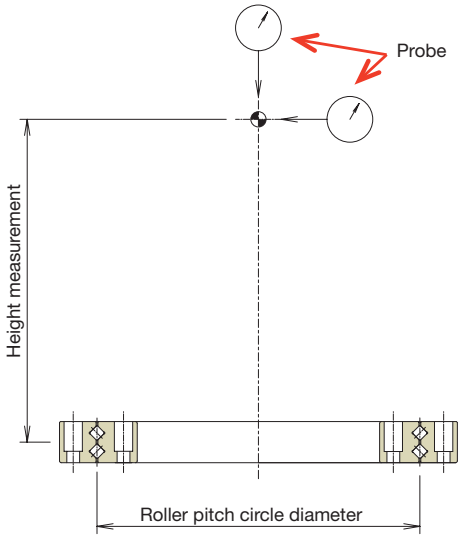
Wobbling Accuracy refers to the pure rotational accuracy of the bearing calculated by subtracting the profile accuracy (roundness and flatness) from the rotational accuracy of the bearing.

Measurement conditions: "height measurement" = "roller pitch circle diameter"

Table 7 Wobbling Accuracy of Model RW

Unit: μm

Model No.	Grade TSP	
	Radial direction	Axial direction
RW228	2	2
RW297	2	2
RW445	2	2



Method for wobbling accuracy measurement

[Dimensional Accuracy]

Table 8 Dimensional Tolerance of Bearing Inner Diameter, Outer Diameter and Width of Model RW

Unit: μm

Model No.	Dimensional tolerance of bearing inner diameter dm		Dimensional tolerance of bearing outer diameter Dm		Dimensional tolerance of bearing width B	
	Upper	Lower	Upper	Lower	Upper	Lower
RW228	0	−25	0	−35	0	−100
RW297	0	−30	0	−40	0	−100
RW445	0	−40	0	−50	0	−150

Note) "dm" and "Dm" represent the arithmetic mean values of the maximum diameter and the minimum diameter obtained through two-point measurement of the bearing inner diameter and the bearing outer diameter.

Radial Clearance

The radial clearance of model RW is adjusted to a negative value (preloaded) before shipment, which is controlled with the starting torque of the product.
Table 9 shows the specification values for the starting torque of model RW.

Note) The starting torque does not include seal resistance.

Table 9 Radial Clearance of Model RW

Model No.	Starting torque [N-m]	
	Minimum	Maximum
RW228	1	10
RW297	3	20
RW445	10	65

Fit

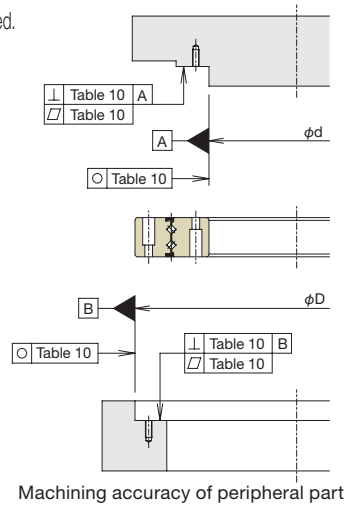
Although the design of model RW does not require a fitted housing, if positioning accuracy is required or a large load is applied, it is recommended to insert the product into a housing with a fit tolerance of g6 for the shaft and H7 for the hole (also see section “Permissible Load” on page 4, and section “Designing Peripheral Parts” below).
If higher rigidity is required, it is recommended to measure the inner and outer diameters of the bearing and to use a slight interference fit (approximately 0 to 5 μm) that corresponds to the measurements.
* If an interference fit is used, provide tapped hole for ring removal in the bearing/housing.

Designing Peripheral Parts

Table 10 shows the recommended machining accuracy for the peripheral parts (shaft and housing) to which model RW is to be installed.

Table 10 Recommended Machining Accuracy of Model RW’s Mating Part

Standard dimension d, D [mm]		Roundness Perpendicularity Flatness [μm]
Above	Or less	
120	180	5
180	250	7
250	315	8
315	400	9
400	500	10
500	630	11

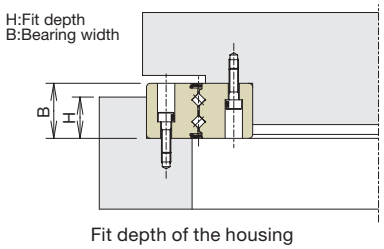


Machining accuracy of peripheral part

For the fit depth of the housing, see Table 11 as a guide.

Table 11 Housing Fit Depth for Model RW

Use of fit	Fit depth: H
If positioning accuracy is required	0.15 to 0.25×B
If an applied load is large	0.50 to 0.75×B
If high rigidity is required	0.75 to 1.00×B



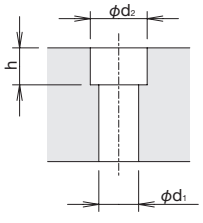
Fit depth of the housing

For the mating bolt holes for securing model RW-X, the values in Table 12 are recommended.

Table 12 Recommended Bolt Hole Dimensions of the Mating Part for Model RW-X

Unit: mm

Model No.	Bolt size	Recommended bolt hole dimensions		
		d_1	d_2	h
RW228	M6	7	11	6.5
RW297	M8	9.3	14.5	8.6
RW445	M8	9.3	14.5	8.6



Procedure for Assembly

When assembling model RW, follow the steps below.

[Inspect the parts prior to assembly]

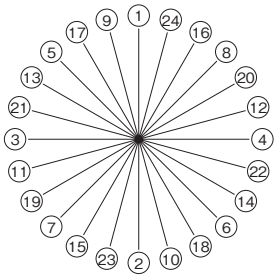
Thoroughly clean the housing and other parts to be assembled, and make sure that no burrs or knots are present.

[Install the bearing to the housing or shaft]

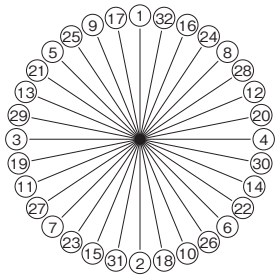
The product tends to tilt during installation. To prevent this, gradually drive the product into the housing or onto the shaft by gently tapping it with a plastic or copper mallet while keeping it perpendicular. Continue to tap until the bearing is properly contacting the reference surface.
Note) When installing the inner ring, only tap the inner ring; when installing the outer ring, only tap the outer ring.

[Tighten the mounting bolts]

(1) Install and align the ring with the required rotational accuracy.
(2) Place model RW onto the housing. Align model RW with the mounting holes.
(3) Insert the securing bolts into the holes. Turn the bolts by hand to make sure they do not show skewing which indicates misalignment of the holes.
(4) Fasten the mounting bolts in three to four steps from loose to fully fastened. Secure the bolts in a diagonal order. (Figure 1)
(5) When tightening the securing bolts, use a torque wrench and evenly tighten the bolts according to the values in Table 13.



In the case of 24 bolts



In the case of 32 bolts

Figure 1: Example of bolt tightening sequence

Table 13 Bolt Tightening Torque for Mounting Model RW

Model No.	Bolt size	Tightening torque [N-m]
RW228	M6	14
RW297	M8	30
RW445	M8	30

Permissible Rotation Speed

Table 14 shows the permissible rotation speed of model RW.

Table 14 Permissible Rotation Speed of Model RW

Model No.	Permissible rotation speed [min^{-1}]
RW228	350
RW297	270
RW445	180

Note 1) The values in Table 14 assume operation under no load. If a large load is applied or the permissible rotation speed is exceeded, contact THK.
Note 2) Depending on the lubrication or the load conditions, the product may generate considerable heat.

[Lubrication Specifications]

For the lubrication specifications of model RW, the lubricants in Table 15 are recommended.
Model RW contains THK AFB-LF Grease as standard.

Table 15 Recommended Lubrication Specifications

Lubrication specifications	Recommended lubricant
Grease lubrication	THK AFB-LF Grease (standard grease)
Oil lubrication	ISO VG68 Oil

Model Number Coding

RW297 UU CC0 P2 B G X −N

Option symbol

No Symbol : No accessory

-N : Grease nipple attached (A-PT1/8)

Inner Ring Hole symbol

No Symbol : Inner ring counterbore hole

X : Inner ring tapped hole (through hole)

Mounting Hole Orientation symbol [excluding X type]

No Symbol : The counterbore holes of the inner and outer rings face the same direction

G : The counterbore holes of the inner and outer rings face opposite direction

Sub-part Accuracy symbol

No Symbol : Rotational Accuracy of the Inner Ring

R : Rotational Accuracy of the Outer Ring

B : Rotational Accuracy of the Inner/Outer Rings

Accuracy symbol

No Symbol : 5-grade rotational accuracy

P4 : 4-grade rotational accuracy

P2 : 2-grade rotational accuracy

USP : USP-grade rotational accuracy

TSP : USP-grade rotational accuracy + wobbling accuracy

Radial clearance symbol

CC0 :Minus clearance (preload)

Seal symbol

No Symbol : Without seal

UU : Seal attached on both ends

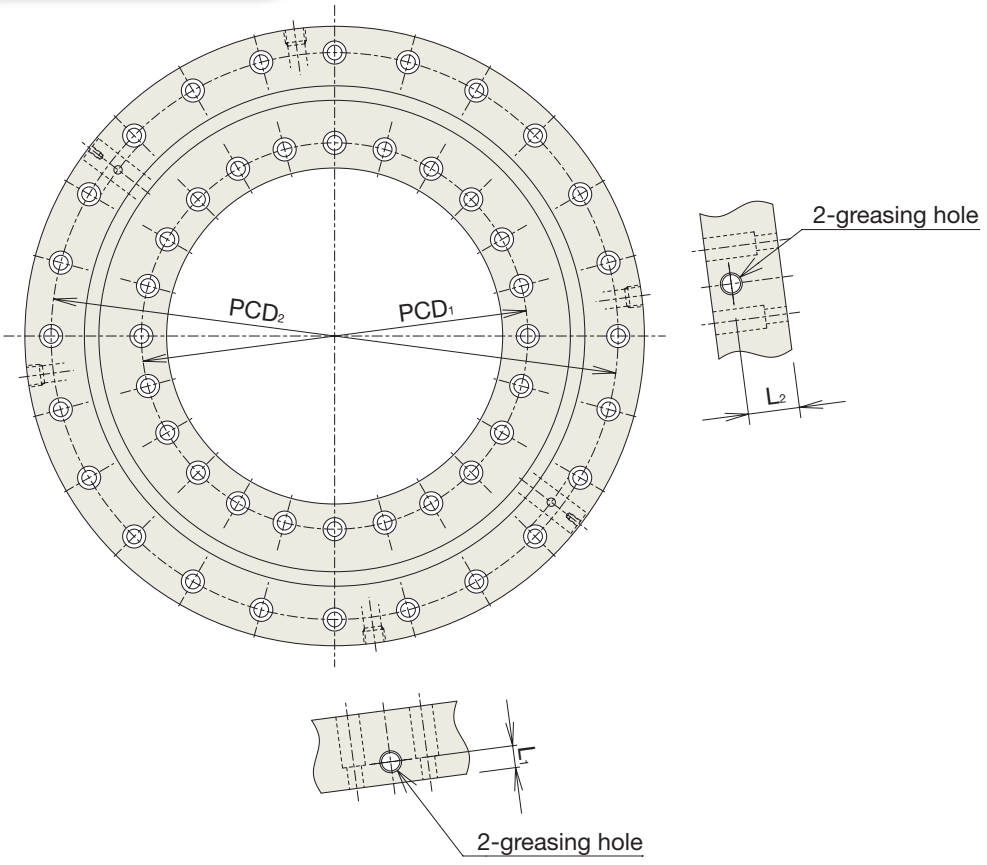
U : Seal attached on either end (counterbore side of the outer ring)

UT : Seal attached on either end (opposite to the counter-bore of the outer ring)

Model No.

Dimensional Table

Double-Row Angular Contact Roller Rings <RW>

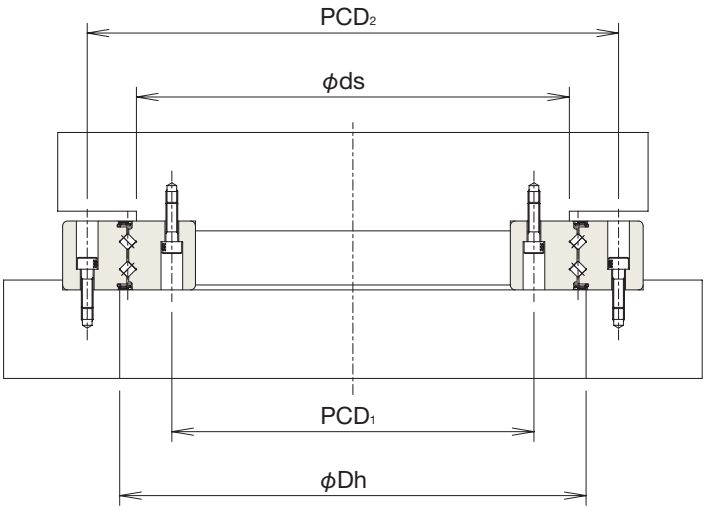


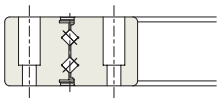
RW228 to RW445

RW228G to RW445G

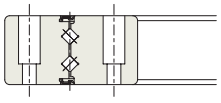
RW228X to RW445X

Model No.	Main dimensions								Shoulder height		Basic load rating (radial)	
	Inner diameter	Outer diameter	Roller pitch circle diameter	Width	Greasing hole						C	C_0
	d	D	dp	B	Hole diameter	L_1	L_2	r_{min}	ds	Dh	[kN]	[kN]
RW228 (G)	160	295	228.8	35	Rc1/8	10.5	24.5	2	220	240	58.4	158
RW228X												
RW297 (G)	210	380	299.2	40	Rc1/8	12	28	2.5	285	315	101	287
RW297X												
RW445 (G)	350	540	445.4	50	Rc1/8	15	35	2.5	425	465	214	647
RW445X												

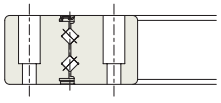




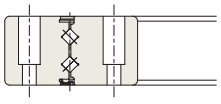
Model RW



Model RW···UU

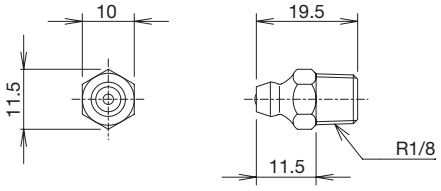


Model RW···U



Model RW···UT

Option



Grease nipple (type A-PT1/8)

* Accessories for lubrication (piping joint, grease fitting, etc.) other than the standard option may also be attached.
For inquiry, contact THK (for other accessories for lubrication, see section “Lubrication Accessories” in the general catalog).

Unit: mm

Mass	Mounting hole dimensions				Model No.
	Inner ring		Outer ring		
[kg]	PCD1	Mounting hole	PCD2	Mounting hole	
12	184	24-ϕ7 through ϕ11 counterbore depth 24.5	270	24-ϕ7 through ϕ11 counterbore depth 24.5	RW228 (G)
		24-M6 depth 18			RW228X
22	240	24-ϕ9.3 through ϕ14.5 counterbore depth 28	350	24-ϕ9.3 through ϕ14.5 counterbore depth 28	RW297 (G)
		24-M8 depth 24			RW297X
47	385	32-ϕ9.3 through ϕ14.5 counterbore depth 35	505	32-ϕ9.3 through ϕ14.5 counterbore depth 35	RW445 (G)
		32-M8 depth 24			RW445X

⚠ Precautions on Use

●Precautions on Handling

· Do not disassemble the Double-Row Angular Contact Roller Rings unit.

· Dropping or hitting the Double-Row Angular Contact Roller Rings unit may damage it. Applying an impact force to the product could cause functional loss even if the product looks intact.

●Lubrication

· Since each Double-Row Angular Contact Roller Rings unit contains high-quality lithium soap group grease No. 2 (THK AFB-LF Grease), you can start using the product without replenishing grease. However, the product requires regular lubrication since it has a smaller internal space than ordinary roller bearings and because the rollers need frequent lubrication due to their rolling contact structure.
To replenish grease, it is necessary to provide a grease path that leads to the oil holes formed on the circumference of the outer ring. As for the lubrication interval, normally replenish grease of the same type while rotating the ring so that it is distributed throughout the interior of the bearing at least every six to twelve months even if the product rotates infrequently.
When the bearing is filled up with grease, the initial rotational torque temporarily increases due to the resistance of the grease. However, surplus grease will run out of the seals and the torque will return to the normal level in a short period.

· Do not mix greases with different physical properties.

· In locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, normal lubricants may not be used. Contact THK for details.

· When planning to use a special lubricant, or use the product other than with grease lubrication, contact THK before use.

●Precautions on Use

· Entrance of foreign material may cause functional loss. Prevent foreign material, such as dust or cutting chips, from entering the product.

· Contact THK if you desire to use the product at a temperature above 80°C.

· Avoid an environment where a coolant may penetrate into the Double-Row Angular Contact Roller Rings unit.

· If foreign material adheres to the product, replenish the lubricant after cleaning the product with clean kerosene.

· When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, contact THK in advance.

· The seal of the Double-Row Angular Contact Roller Rings unit is a dust seal, and cannot prevent the entrance of fine dust or liquid foreign material.

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