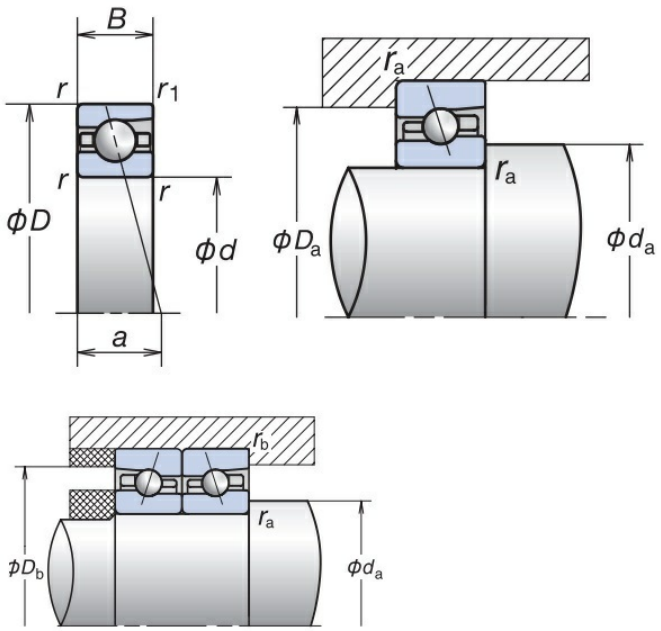
7208CTRDFDMP4

High-Accuracy Angular Contact Ball Bearings, Standard Series



Technical sheet of 7208CTRDFDMP4

What are the Benefits of choosing 7208CTRDFDMP4 bearings?

- **High simultaneous load-bearing capacity:** Capable of simultaneously withstanding combined radial and axial loads and operating at high speeds.
- **High speed limit:** Optimized contact angle and cage design suitable for ultra-high-speed operation (e.g., machine tool spindles).
- **Rigidity and precision:** Provides extremely high rotational accuracy and system rigidity, ensuring precision in machining or operation.
- **Preload adjustment:** Precise preload adjustment is possible through paired installation (back-to-back/face-to-face), eliminating backlash and improving system stability.
- **Versatile design:** Offers different contact angles (e.g., 15°, 25°) to accommodate different speeds and load requirements.

Type :		Angular contact ball bearings, super-precision
Model :		7208CTRDFDMP4
Main demensions :	40 mm × 80 mm × 18 mm	Bore Dia × Outside Dia × Width Dia
M kg:	1.098	Mass
HS Code :	8482103000	Bearing customs code
d mm:	40	inner ring diameter

D mm:	80	Outer ring diameter
B(T) mm:	18	Overall Width
Cr kN:	37.267	Radial dynamic load rating
C0r kN:	24.317	Radial static load rating
Grease r/min:	18803	Reference speed
Oil r/min:	28802	Limiting speed

Detailed parameters and installation dimensions:

Part Number	7208CTRDFDMP4
Cage	TR = Phenolic resin, Outer ring guided
Preload	M = Medium Preload
DFD Preload - M	1362.72 N | 306 lbf
Temperature - T(min)	-30 °C
Temperature - T(max)	120 °C
Seal	Open type
Inner and outer ring Material	GCr15SiMn
DFD Axial Rigidity - M	266.4 N/µm
Balls Material	GCr15SiMn
Bearing Type	High-Accuracy Angular Contact Ball Bearings, Standard Series
Speed ratings (grease) - n_B	18803 min^{-1}
Speed ratings (oil) - n_G	28802 min^{-1}
Dimension series	2 = 02 Series
Series	72 series (72..CTRDFDMP4)
Bore	Cylindrical
Dimension Inside - d φ	40 mm | 1.5748 inch
Dimension Outside - D Φ	80 mm | 3.1496 inch
Dimension Width - B	18 mm | 0.7087 inch
Units	Metric
Load	Axial
Dimension Chamfer - r min	1.1 mm | 0.0433 inch
Dimension Chamfer - r_1 min	0.6 mm | 0.0236 inch
Manufacturer Part Code	7208C TR DFDM P4
Rows NO.	One
Permissible Axial Load	16982 N | 3817 lbf
Factor - f_o	14.1
Effective Load Center - a	17.0 mm | 0.6693 inch
Accuracy class	P4 = (ABEC-7 / ISO Class 4)
Arrangement	DFD = Three set (>><)
Radial Dynamic Capacity - C_r	37267 N | 8377 lbf
Radial Static Capacity - C_{0r}	24317 N | 5466 lbf
Abutment Dimensions Shaft - d_a min	47 mm | 1.8504 inch

Abutment Dimensions Housing - D_a max	73 mm | 2.8740 inch
Abutment Dimensions Housing - D_b max	75 mm | 2.9527 inch
Design type	7 = Standard High-Accuracy
Contact angle - α	C = 15 °
Fillet Radius - r_a max	1 mm | 0.0394 inch
Fillet Radius - r_b max	0.6 mm | 0.0236 inch
Measured Axial Clearance - M	-29 µm
Bearing DFD Mass - m	1.098 kg | 2.4207 lb

What are the applications of the 7208CTRDFDMP4 bearing?

- **Machine tool manufacturing (spindles, grinding heads):** Achieve extremely high speeds and machining accuracy, improving surface quality and production efficiency.
- **Aerospace (accessory gearboxes, gyroscopes):** Maintain high reliability and long lifespan during high-speed operation, adapting to harsh environments.
- **Precision instruments (measuring equipment, optical instruments):** Provide extremely low vibration and smooth operation, ensuring measurement accuracy.
- **High-speed motors (electric spindles, permanent magnet motors):** Support ultra-high speed operation, reducing temperature rise and power consumption.
- **Semiconductor equipment (wafer dicing machines, lithography machines):** Ensure micron-level positioning accuracy and long-term stability, improving yield.
- **Medical devices (CT scanners, surgical robots):** Achieve quiet and smooth rotation, meeting medical safety standards.
- **Robotics (joint reducers):** Improve joint response speed and repeatability, enhancing dynamic performance.

How should choose the right model for a Angular contact ball bearings, super-precision?

Selecting ultra-precision angular contact ball bearings can be summarized in three steps: choose the series, match the angle, and select the suffix.

Step 1: Choose the Series – Determine the product line based on the operating conditions.

Several dedicated series are designed for different applications; you can directly choose the appropriate one:

Robust Series: General purpose preferred. Suitable for general machine tool spindles such as machining centers. Low heat generation, high speed; models with seals can extend grease life to 1.7 times that of open bearings. BNR: 18° high-speed type, and BER: 25° general-purpose type.
Standard Series (70/72/79): Conventional precision, high cost-effectiveness. Suitable for general precision machinery and lead screw supports; optional seals can increase grease life by 1.5 times.
SpinShotⅡ Series: Dedicated for electric spindles. Optimized oil-air lubrication; NT#40 level can reach 40,000 min^{-1}, with noise reduction of 3-5dB.
BSR Series: Dedicated for small diameters (inner diameter ≤25mm). Suitable for small ultra-high-speed spindles and internal grinding spindles. TAC-F Series: Dedicated for heavy-duty cutting. 50° contact angle, highest rigidity, suitable for heavy cutting and high-rigidity shaft applications.
BNRD/BERD series (ROBUSTDYNA): Higher rigidity and load-bearing capacity than the BNR/BER series, suitable for applications such as machining center spindles. BNRD: 18°, BERD: 25°

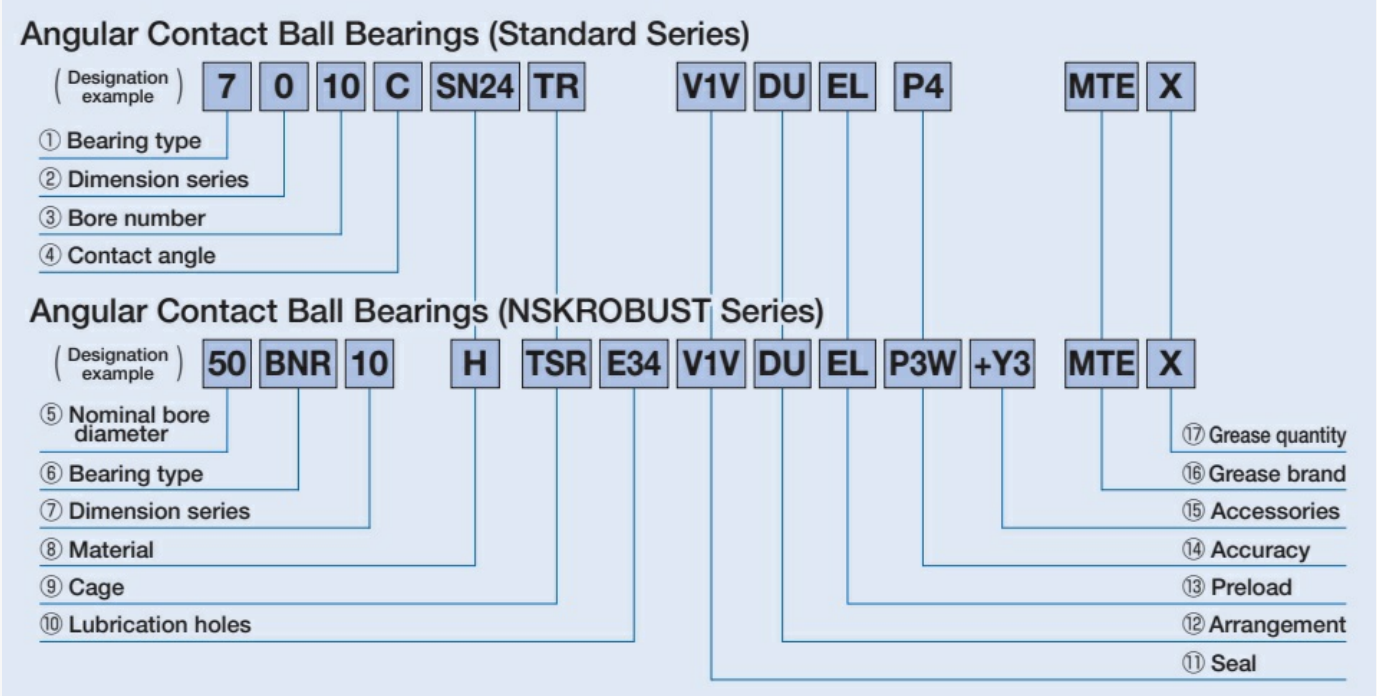
Step 2: Understanding the Angle Designation

The contact angle determines axial load capacity and high-speed performance. Different series have different designations:

Standard series, C: 15° (ultra-high speed), A5: 25° (general purpose, most commonly used), A: 30° (medium load), and B: 40° (heavy load).
Robust series, BNR: 18° (Robust high-speed type), BER: 25° (Robust general purpose type), and BSR: 15° (Robust small diameter type).
BNRD/BERD series (ROBUSTDYNA): BNRD: 18° (Ultra-high speed, low heat generation), BERD: 25° (High speed + high rigidity, better load-bearing capacity).

The selection principle is that a smaller contact angle is more suitable for high speeds, while a larger contact angle allows for stronger axial load resistance.

Step 3: Matching the Suffix – Locking in the Complete Model Number



Bearing Type①⑥

① 7: High-Accuracy Angular Contact Ball Bearings (Standard Series)

⑥ High-Speed Angular Contact Ball Bearings (ROBUST Series)
BNR,BER: BASIC Series
BNRD,BERD: ROBUSTDYNA
BSR: MINI Series

Contact Angle④⑥

④ Standard Series (C: 15° A5: 25° A: 30°)

⑥ ROBUST Series (BNR,BNRD: 18°, BER,BERD: 25°, BSR: 15°)

Dimension Series②⑦

② Standard Series (9: 19 Series, 0: 10 Series, 2: 02 Series)
⑦ ROBUST Series (19: 19 Series, 29: 29 Series, 10: 10 Series, 20: 20 Series, 02: 02 Series)

Bore Number③⑤

③ Standard Series
Up to 3: Bore diameter 00: 10mm, 01: 12mm, 02: 15mm, 03: 17mm
4 and above: Bore diameter = Bore number x 5 (mm)

⑤ ROBUST Series
Nominal bore diameter = Bore dimension (mm)

⑧ Material

Standard Series (No code: Steel ball SN24: Seramic ball)

ROBUST Series
S Type: Inner and outer ring use Bearing steel (SUJ2), Balls use Bearing steel (SUJ2)
E Type: Inner and outer ring use Bearing steel (SUJ2), Balls use Ultra long life rolling elements (EQTF)
H Type: Inner and outer ring use Bearing steel (SUJ2), Balls use Ceramic (Si3N4)
J Type: Inner and outer ring use Ultra Long life steel (SUJ7), Balls use Ceramic (Si3N4)
X Type: Inner and outer ring use Heat resistant steel for highspeed operation (SHX), Balls use Ceramic (Si3N4)
XE(SpinshotⅡ) Type: Inner and outer ring use Heat resistant steel for highspeed operation (SHX), Balls use Ceramic (Si3N4)

⑩ Lubrication Holes

No code: No lubrication holes E34: Direct lubrication bearing

⑨ Cage

T = phenolic resin cage, inner ring guided
T1X = polyamide resin cage, ball guided
TA = Phenolic resin, Outer ring guided
TR = Phenolic resin, Outer ring guided
TSR = PPS resin, Outer ring guided
TX = Phenolic resin, Outer ring guided
TYA = polyamide resin cage, ball guided, high speed
TYN = Polyamide resin, Ball guided
MY = Brass, ball guided

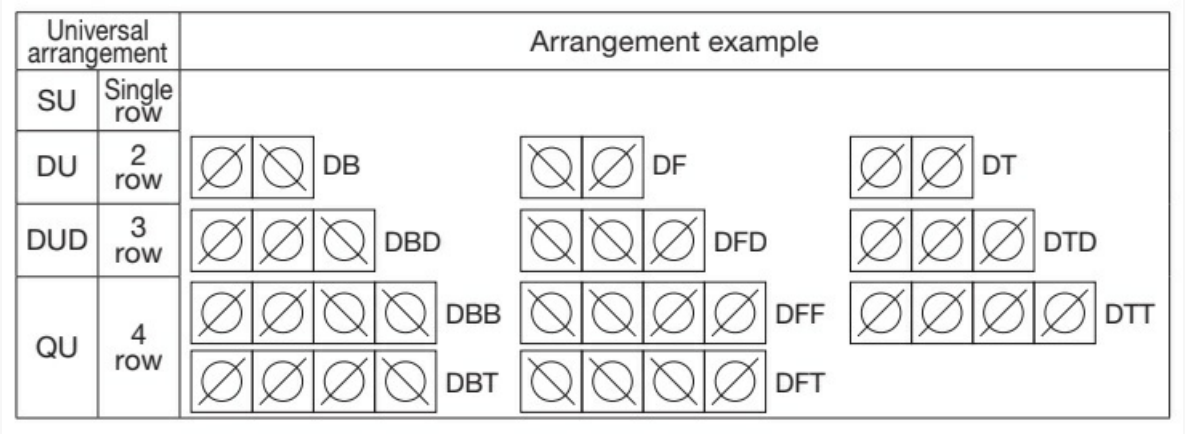
⑪ Seal
No code: Open type V1V: Non-contact rubber seal

⑮ Accessories

+Y3: O-ring on bearing outside surface Available for ROBUST direct lubrication bearings (E34) only.

⑫ Arrangement

DU is a universal pairing of two rows; DB is back-to-back; DF is face-to-face; DT is tandem.



⑬ Preload

EL: Extra Light Preload
L: Light Preload
M: Medium Preload
H: Heavy Preload

CP: Special Measured (–) Axial Clearance
CA: Special Measured (+) Axial Clearance

⑭ Accuracy

P2: ISO Class 2
P4: ISO Class 4
P5: ISO Class 5
P3W: Special class (Special tolerances for deviation of inner/outer ring width, others are P3)
P3: Special class (ISO Class 4 dimensional tolerances and ISO Class 2 running accuracy)
P4Y: Special class (Special bore and outside diameter tolerances, others are ISO Class 4. See figure on left.)

⑯ Grease Brand

Grease typically used in machine tool spindles:
MTR: ROBUSTGRD MTS: MTS grease

⑰ Grease Quantity

X: 15% of internal space K: 20% of internal space L: 30% of internal space

Three-step selection process: Determine the series → Select the contact angle → Match the suffixes (cage + material + seal + preload + arrangement + precision). Following this logic will allow you to select the complete NSK ultra-precision angular contact ball bearing model.

What is the mounting procedure for 7208CTRDFDMP4 bearings?

Cleaning and Inspection: Clean the bearing in a dust-free environment. After a rough wash to remove contaminants, perform a fine wash until the bearing feels smooth and responsive to the touch. Simultaneously check the accuracy of the mating surfaces of the shaft and bearing housing.

Measurement and Fitting: Precisely measure the bearing's inner and outer diameters. Mark the

corresponding positions on the shaft and housing bores for alignment during assembly to compensate for any deviations.

Installation and Positioning: Apply pressure evenly using a specialized tool, focusing only on the interference fit rings. If heat fitting is used, tighten the inner ring during cooling to prevent clearance from affecting the preload.

Preload Adjustment: When installing in pairs, ensure the parallelism of the inner and outer spacers is ≤1μm. Adjust the preload force to the specified value by grinding the spacers.

Lubrication Inspection: Add the specified amount of grease or oil mist lubricant. After installation, manually rotate the bearing to check its flexibility and operating noise.

Special Note for mounting 7208CTRDFDMP4 bearings?

Clean Environment: Operation must be performed in a dust-free cleanroom with humidity ≤65% to prevent dust and impurities from affecting accuracy.

No Striking: Direct striking of the bearings is strictly prohibited. Special tools must be used, and force must be applied evenly.

Matching Marks: Bearings used in pairs are not interchangeable. Installation must strictly follow the factory matching marks.

Rust-Proof Storage: Long-term storage requires regular rust-proofing treatment. Maintain ventilation and avoid corrosive gases.

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