

## Product Catalog for Food Machinery





# Product Catalog for Food Machinery Components



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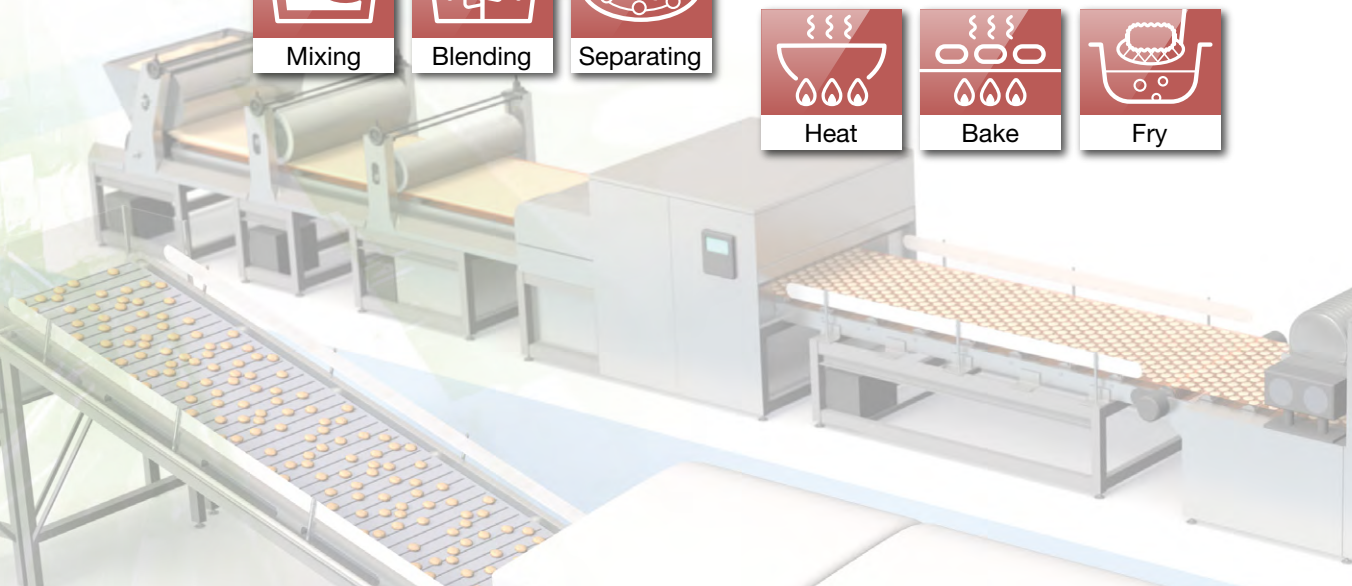
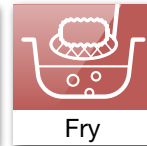
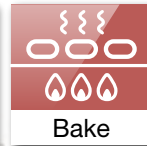
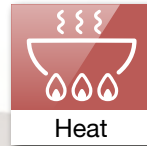
## Related Catalogs

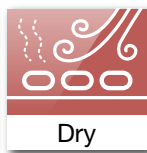
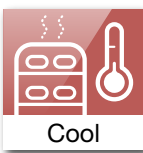
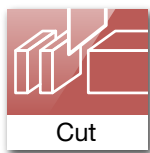
	Cat. No.
Ball and Roller Bearings	2202/E
Solid Grease Bearings	3022/E
Bearing Units	2400/E
Bearing Units Stainless Steel Series	3903/E
Bearing Units Plastic Series	3904/E
Triple-Lip Sealed Bearings for Bearing Units	3905/E
BEAREE High Performance Multi-Purpose Engineering Plastics (NTN Precision Resins)	5100/E
Miniature Resin Slide Screws	5112/E
Constant Velocity Joints for Industrial Machinery	5603/E
Tri Ball Joint Constant Velocity Joints (Small and Medium Size)	5602/E
Parts Feeder	7018/E
Care and Maintenance of Bearings	3017/E

Food Processing  
&  
NTN Products

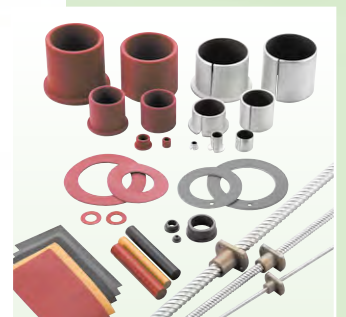
# NTN Products for Maintaining Reliability

Products for a wide range of environmental conditions such as high/low temperature or washdown, contributing to food safety and security.





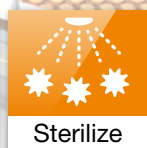
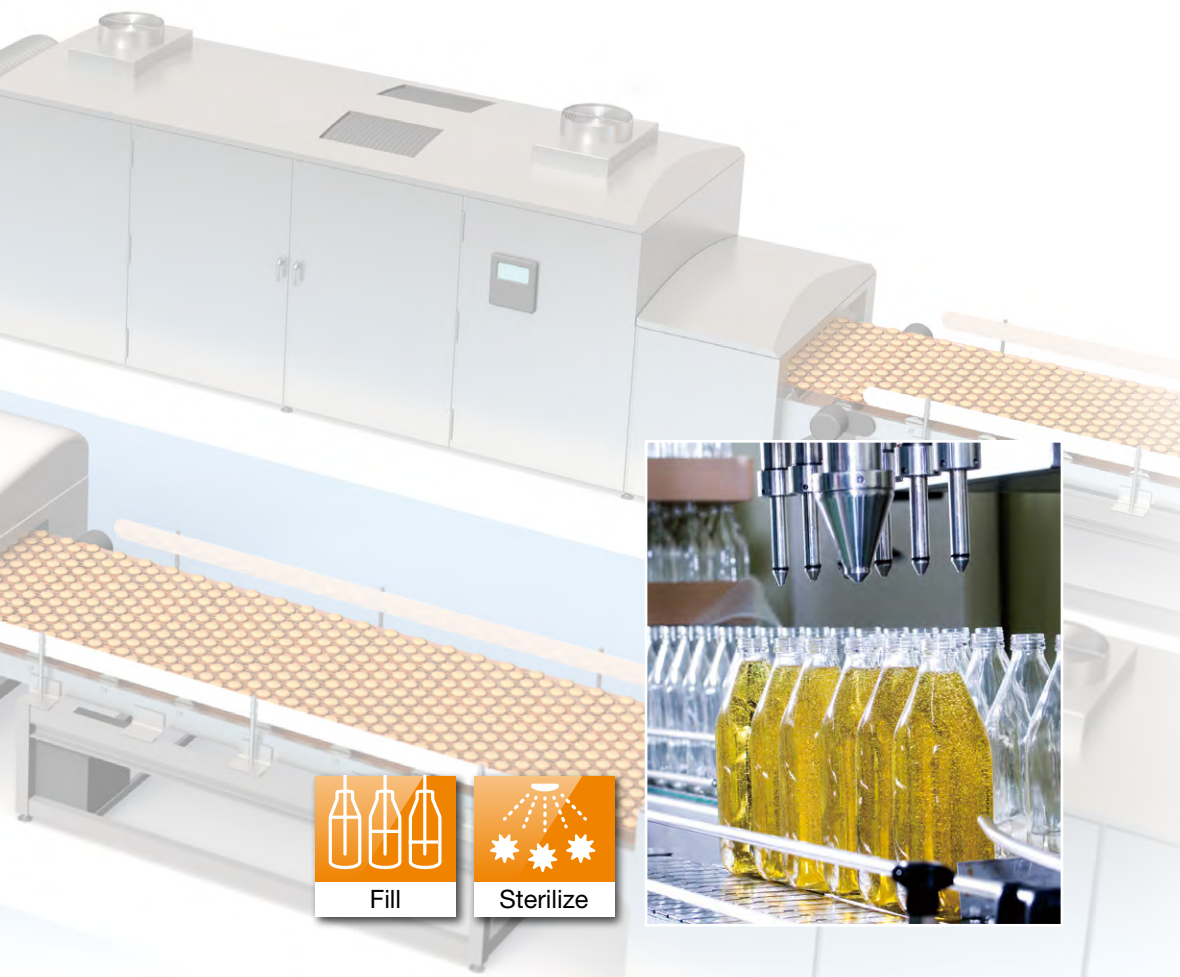
Stainless steel ball bearings and bearing units



BEAREE products



Constant velocity joints



Parts feeder

# Rolling Bearings & Bearing Units



## Comparison of Rolling Bearing Characteristics for Food Machinery

◎ : Excellent ○ : Good △ : Fair × : Poor

Item		Lubricant Type	Solid Grease for Food Machinery	General-purpose Grease for Food Machinery	General-purpose Solid Grease	Plastic Rolling Bearing
		Product Code	LP09	L791	LP03	—
Permissible operating temperature range (bearing outer ring)			-10 to 100°C (80°C max. for continuous operation)	-20 to 110°C	-20 to 80°C (60°C max. for continuous operation)	-20 to 80°C (60°C max. for continuous operation)
Applicable bearings	Standard type SUJ2		Not permissible*	Permissible	Permissible	PPS or polyimide
	Stainless steel SUS440C		Permissible	Permissible	Permissible	
Cost	Short-term		△	◎	△	△
	Long-term (incl. maintenance)		◎	△	◎	○
Lubricant life			○	○	◎	○
Oil loss, leakage			○	△	◎	◎
Food sanitation safety			◎	◎	×	◎

1. Spot-pack Solid Grease.
2. Applicable bearing configurations are deep groove ball bearings and bearing inserts.
3. Contact with organic solvents, wash oils, or other chemicals may degrade the performance of Solid Grease.

\* Food grade Solid Grease doesn't contain rust inhibitor and therefore is recommend for use in stainless steel bearings.  
**NTN** also fabricates bearing units fitted with austenitic stainless steel covers.

## Comparison of Housing Characteristics for Bearing Units

◎ : Excellent ○ : Good △ : Fair × : Poor

Housing Specification	Corrosion Resistance	Food Sanitation Safety	Cost	
			Short-term	Long-term
Standard painted type	×	×	◎	×
Thermoplastic	◎	◎	△	○
Stainless steel	◎	◎	×	◎

# Solid Grease Bearings for Food Machinery

## ● Features

### 1. Food Safe Grease

High safety, ultrahigh molecular weight polyethylene-based food machinery lubricant grease. Solid Grease is a category H1 lubricant (food-grade lubricants used in environments where there is some possibility of incidental food contact) approved by the NSF (National Sanitation Foundation) and the FDA (US Food and Drug Administration).

### 2. Reduced lubricant leakage

Solid Grease heat-solidifies to retain large volumes of internal lubricant. Solid Grease is fed steadily onto the rotating surfaces by the heat and centrifugal force of the bearings. In comparison to general-purpose lubricant greases, there is minimal lubricant leakage, preventing contamination of the ambient environment. This lubricant grease is ideally suited to ambient-temperature food and packing machinery applications.

### 3. Excellent lubrication

Solid Grease is resistant to leakage even when bearings are subjected to high vibration and centrifugal force. The solid lubricant is also less prone to emulsification and leakage due to water penetration, exhibiting excellent lubrication in comparison to general-purpose lubricant greases.



Solid Grease sealed bearings for food machinery  
(Ball bearings for bearing units)

Refer to the size charts (p-22)

## Solid Grease Specifications

Solid Grease (product code)	Resin	Lubricant	Permissible Operating Temperature Range (°C)
General-purpose Solid Grease (LP03)	Ultrahigh molecular weight polyethylene <sup>①</sup>	Li-mineral oil grease	-20 to 80°C (60°C max. for continuous operation)
Solid Grease for Food Machinery (LP09)	Ultrahigh molecular weight polyethylene <sup>①</sup>	Urea synthetic oil grease <sup>②</sup>	-10 to 100°C (80°C max. for continuous operation)

① FDA compliant.

② NSF H-1 approved.

## Permitted Rotational Speed

Solid Grease bearing permitted rotational speed

Bearing Type	Loading Condition	Permitted Rotational Speed ( $dn$ value) <sup>①</sup>		
		General-purpose		Food Machinery
		Spot-pack	Full-pack	Spot-pack
Deep groove ball bearings	Radial load	$200 \times 10^3$	$50 \times 10^3$	$100 \times 10^3$ <sup>②</sup>
Miniature/ small dia. ball bearings	Radial load	$200 \times 10^3$	—	—
Self-aligning ball bearings	Radial load	—	$30 \times 10^3$	—
Bearing Units	Radial load	$120 \times 10^3$	$30 \times 10^3$	$100 \times 10^3$
Needle roller bearings	Radial load	—	$30 \times 10^3$ <sup>③</sup>	—

①  $dn$  value :  $[dn = d$  (bearing bore diameter [mm])  $\times n$  (operating rotational speed [ $\text{min}^{-1}$ ])]

②  $Fw \cdot n$  value :  $[Fw \cdot n = Fw$  (roller bearing bore dia. [mm])  $\times n$  (operating rotational speed [ $\text{min}^{-1}$ ])]

③ Contact **NTN** for applications exceeding permitted rotational speeds.

## Minimum Required Load

In case of full-pack, in order for the rolling elements to rotate without slipping, at least 1% of the basic dynamic load rating is required. Contact **NTN** for more information.

## Production Range

### ● Solid Grease bearing for general use (LP03)

○ : Standard type △ : Special type × : Not available

Bearing Type	Lubricant Packing Specification		Production Sizes (bearing outer dia. dimensions)
	Spot-pack	Full-pack	
Deep groove ball bearings	○ <sup>①</sup>	△	Up to 350 mm dia.
Miniature/ small dia. ball bearings	○ <sup>①</sup>	×	(Bearing bore diameter : 6 to 9 mm)
Self-aligning ball bearings	×	○ <sup>①</sup>	Up to 250 mm dia.
Bearing Units	○ <sup>①</sup>	△	Up to 300 mm dia.
Needle roller bearings	×	○ <sup>②</sup>	③

① Certain bearing configurations and model numbers listed as standard specification are not available. Contact **NTN** for more information.

② Available dimensions of the needle roller bearings differ for each bearing configuration. Contact **NTN** for more information.

Note : Standard bearings are not manufactured from corrosion resistant materials. However, stainless steel bearings are also available.

### ● Solid Grease bearings (LP09) spot-pack for food machinery

● Ball bearings for stainless steel bearing units : Convert to full stainless steel with available stainless steel housings of F-UC204D1/LP09 to F-UC210D1/LP09. (Bearing Units Steel Series)

● Stainless steel deep groove ball bearings<sup>①</sup> (bearing outer diameter 350 mm or less)

① Food machinery-use Solid Grease contains no rust inhibitor additives, so we recommend that they are used for stainless steel bearings. Refer to the size charts (p-21). Contact **NTN** for sizes not included in the charts.

## Nomenclature (examples)

**SSN 2 03 LL /LP09**

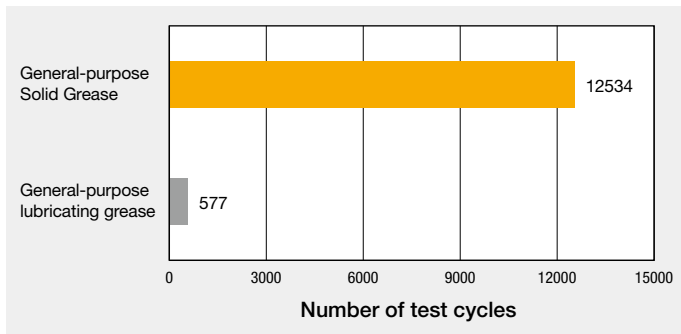
- SSN**: Stainless steel deep groove ball bearings
- 2**: Diameter series 2
- 03**: Nominal bore dia. 15 mm
- LL**: Contact seal on both sides (standard for the SSN type)
- /LP09**: Solid Grease for Food Machinery

**F- 6 0 11 J1 LLU /LP09 QT**

- F-**: Ball bearings using stainless steel
- 6**: Deep groove ball bearings
- 0**: Diameter series 0
- 11**: Nominal bore dia. 55 mm
- J1**: Stainless steel retainer
- LLU**: Contact seal on both sides (Non-contact seal on both sides : LLB, Shield on both sides : ZZ)
- /LP09**: Solid Grease for Food Machinery (No code for deep groove ball bearings spot-pack specifications) (No code for other bearing type full-pack specifications)
- QT**: Deep groove ball bearings full-pack specifications

## Water Penetration Performance Test Results

### Remaining amount of grease



### Test conditions

Test Bearings	General-purpose Solid Grease (LP03)	General-purpose Lubricating Grease (Li-mineral oil grease)
	Bearing Model No. : 6204ZZ	
Bearing load	$F_r$ : 785 N (belt tension)	
Rotational conditions	0 ↔ 10000 min <sup>-1</sup> (outer ring) Test cycles (fig. 2)	
Water injection sequence	The hatched sections of Figure 3 represent the 10 cycles in which water (10 cc) is injected inside the bearing one time per cycle by a syringe	

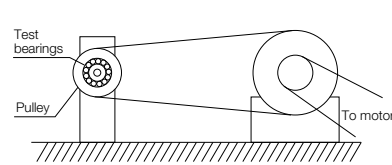


Figure 1. Outline of test equipment

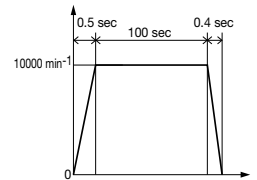


Figure 2. Test cycles

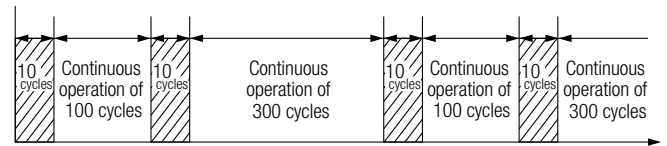


Figure 3. Water injection sequence

## Grease-Packed Bearings for Food Machinery

### ● Features

High safety, NSF H1 approved lubricating grease-packed bearing.

### ● Permissible operating temperature range

Supports from -20 to 110°C (bearing outer ring).

### ● Applicable bearings

Ball bearings for bearing units :

All configurations, 140 mm bearing bore dia. or smaller

Stainless steel deep groove ball bearings (standard)



Visual appearance of grease for food machinery  
NTN grease product code : L791



# Bearing Units Stainless Steel Series

## ● Features

### 1. Corrosion resistance

Excellent corrosion resistance compared to general cast iron series.

### 2. Clean environment maintained

High safety, low lubricant leakage – used with Solid Grease for food machinery.



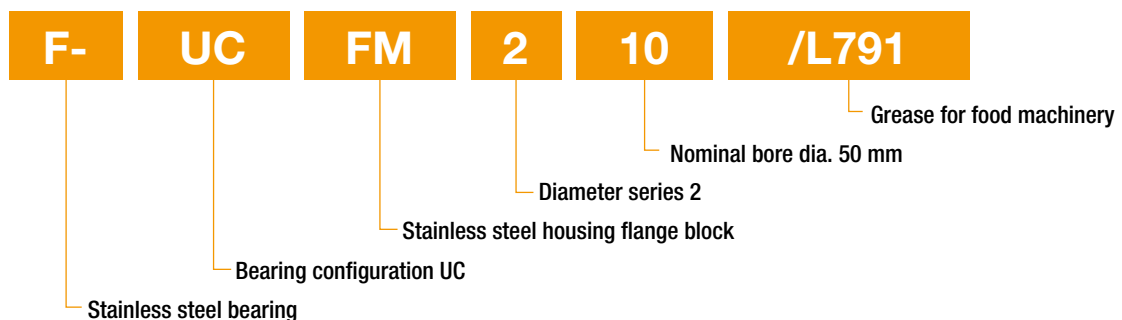
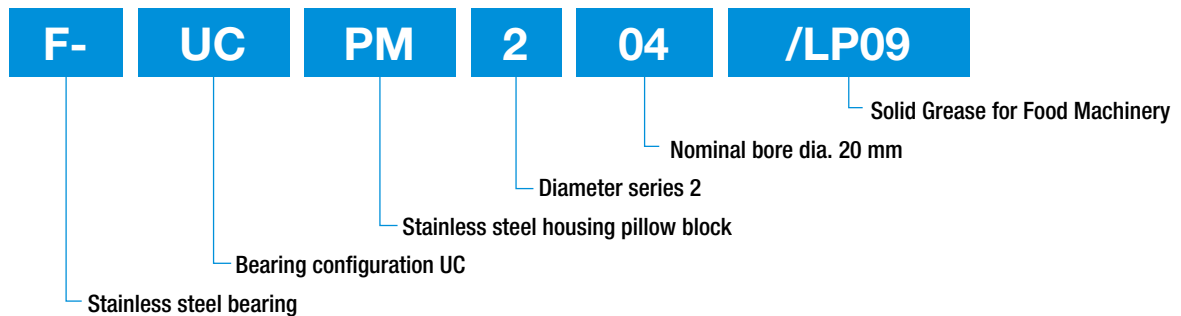
## Stainless Steel Series Materials Table

Components		Materials
Bearings	Raceway	Martensitic stainless steel (SUS440C or equivalent)
	Rolling element	Martensitic stainless steel (SUS440C)
	Slinger/retainer	Austenitic stainless steel (SUS304)
	Rubber seal	Nitrile rubber (NBR)
	Cup-point set screw	Martensitic stainless steel (SUS410)
Housing		Austenitic stainless steel castings (SCS13)
Cover		Austenitic stainless steel (SUS304)
Grease nipple		Austenitic stainless steel (SUS304)

Note : Food machinery-use Solid Grease is the standard lubricant for this series. However, contact **NTN** for stainless steel bearing units that use lubricants, such as grease for food machinery and heat-resistant grease.

Refer to the size charts (p-23)

## Nomenclature (examples)



## Stainless Steel Series Corrosion Resistance Test Results

### Test conditions

Tap water (10 ml/sec) is applied directly above the bearing unit and the rusting of the bearing and housing is observed.

	Materials	Results
Bearings	SUJ2 (general-purpose)	Significant rust in 7 hrs.
	<b>SUS440C (stainless steel)</b>	<b>Beginning of rust in 500 hrs.</b>
Housing	FC200 (general-purpose)	Significant rust in 80 hrs.
	<b>SCS13 (stainless steel)</b>	<b>Beginning of rust in 2000 hrs.</b>

## Bearing Units Plastic Series

### ● Features

#### 1. Corrosion resistance

Non-rusting, non-magnetic housing body

#### 2. Water resistant

Thermoplastic polyester resin is used in the housing material giving it excellent water-resistant characteristics.

#### 3. Lighter

Using a resin housing makes it 30 to 60% lighter compared to **NTN**'s cast iron units.



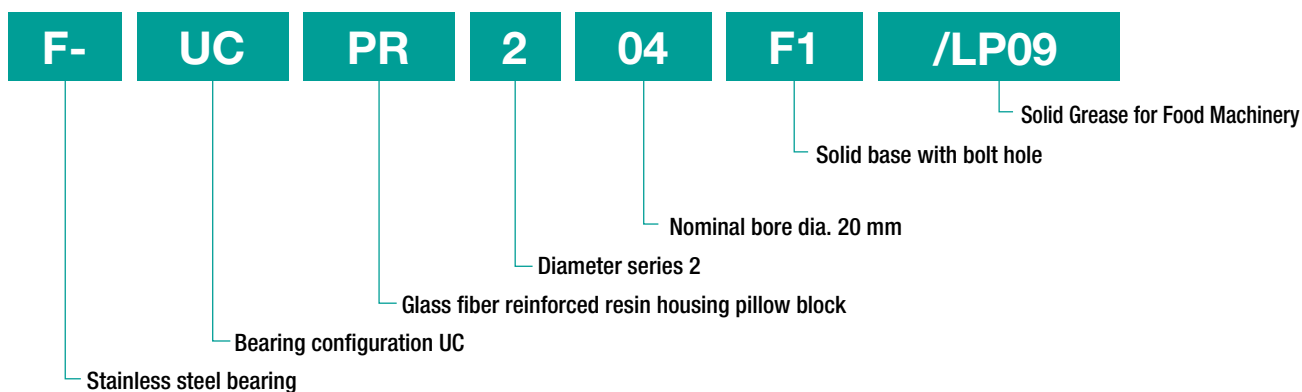
### Plastic Series Materials Table

Components		Materials
Bearings	Raceway	Martensitic stainless steel (SUS440C or equivalent)
	Rolling element	Martensitic stainless steel (SUS440C)
	Slinger/retainer	Austenitic stainless steel (SUS304)
	Rubber seal	Nitrile rubber (NBR)
	Cup-point set screw	Martensitic stainless steel (SUS410)
Housing	Main body	Glass fiber reinforced thermoplastic polyester (PBT)
	Mounting bolt sleeve	Austenitic stainless steel (SUS304)
	Grease nipple mounting nut	Austenitic stainless steel (SUS303)
Cover		Polypropylene (PP)
Spare plug		Polyethylene (PE)

Note : Food machinery-use Solid Grease is the standard lubricant for this series. However, contact **NTN** for products that use lubricants, such as grease for food machinery and heat-resistant grease.

Refer to the size charts (p-27)

### Nomenclature (examples)



### Plastic Series Corrosion Resistance

◎ : Excellent ○ : Good △ : Fair ▲ : Poor × : Extremely poor

Materials	Conditions	In Air		Under Water		Acid		
		Dry	Moisture	Natural Water	Salt Water	Nitric Acid	Sulfuric Acid	Hydrochloric Acid
<b>Thermoplastic polyester resin</b>		○	○	○	○	▲	○	○
<b>Polypropylene/polyethylene</b>		○	○	○	○	○	○	○
Martensitic stainless steel SUS440C, SUS410		○	△	△	▲	▲	×	×
Austenitic stainless steel SUS303, SUS304		◎	◎	◎	○	◎	○	△
High-carbon chromium bearing steel SUJ2		△	▲	▲	×	×	×	×
High-carbon steel/cast iron		▲	×	×	×	×	×	×

Note : This data is confirmation of the corrosion conditions on material surfaces. These conditions may be improved with anti-corrosion measures.

# Triple-Lip Sealed Bearings for Bearing Units

## ● Features

### 1. Dust/moisture resistance

A triple-lip seal is used in the bearing for excellent dust/moisture resistance compared to standard type seals.

### 2. Low-cost maintenance

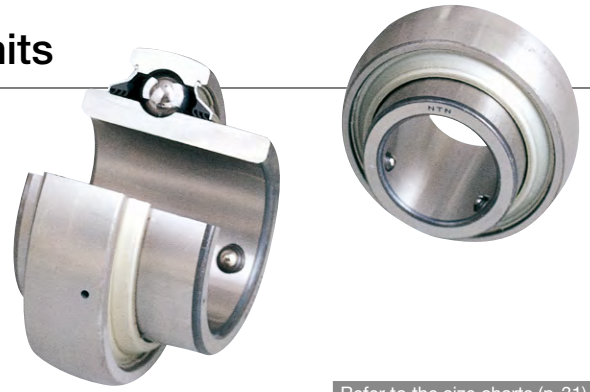
The long-life in dusty/moist environments extend the maintenance and inspection cycles, reducing maintenance costs (inspection, oil refill/exchange, etc.) and improving machine uptime.

### 3. Compact and low-cost

The bearing unit is interchangeable with the existing covered unit, depending on the conditions of use. This reduces the cost of the used bearing units and, where the cover is not required, the machinery and equipment are made more compact.

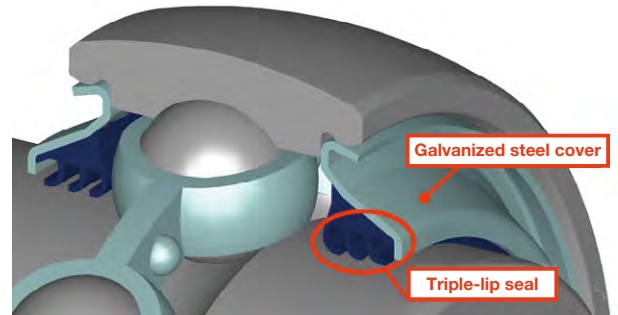
### 4. Interchangeability

Suitable for UC configuration bearings. Due to interchangeability with standard bearing units, these bearings can be readily interchanged in the aftermarket. Relubricatable type bearing units are recommended to minimize wear of the lip-section.



Refer to the size charts (p-31)

## Construction



## Permissible Temperature Range and Permitted Rotational Speed

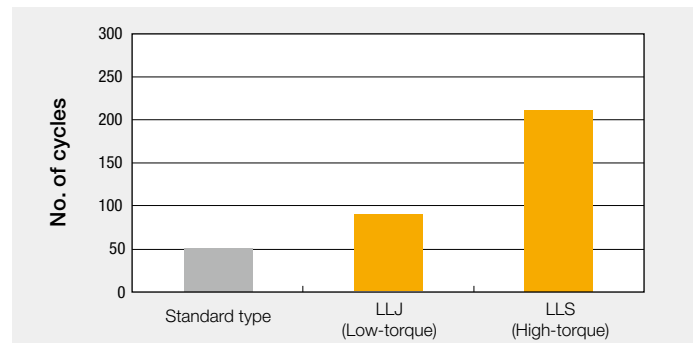
Temperature range for triple-lip sealed bearings	: -15 to 100°C
Low-torque type permitted $dn$ value	: 36,000
High-torque type permitted $dn$ value	: 21,000
[ $dn = d$ (bearing bore diameter [mm]) $\times$ $n$ (operating rotational speed [min <sup>-1</sup> ])]	

## Water-resistance Performance Test Results

### Test conditions

· Test bearings	: UC205D1 Standard type, LLJ (low-torque type), LLS (high-torque type)
· Rotational speed	: 800 min <sup>-1</sup>
· Load	: No-load (belt tension only)
· Test mode	: Intermittent operation (6 hrs. run/6 hrs. stop = 1 cycle)
· Test equipment	: <b>NTN</b> muddy water test equipment
· Muddy water specification	: JIS Z8901 Kanto Loam Class 8 Dust to water mixture ratio : 1 : 10 (ratio by weight)
· Quantity of muddy water	: Outer ring immersion degree 1/4 to 1/3
· Termination conditions	: Muddy water leakage from bearing, bearing seizure, 0.6 G vibration when operating

### Test results



## Bearing Specification

### 1. Applicable bearings

Bearing bore dimension of unit ball bearing : 100 mm or less

### 2. Special specification

The standard type within this series are packed with Li-mineral oil grease. However, in environments where food safety is required, these can be changed for bearings packed with grease for food machinery and stainless steel bearings.

### 3. Application examples

Suitable for extremely moist or dusty environments, such as bread/confectionery machinery, noodle machines, fish-processing machines, flour milling machines, rice/wheat milling machines, beverage processing machines, brewing equipment, and bottle making machines, etc.



## Selecting Bearing Units for Food Machinery

**Table 1 : Bearing Unit Specifications by Environment**

Environment	Bearing Unit Type	Product Code	Specification
Leak resistance	Solid Grease sealed bearings for food machinery	LP09	Heat-solidifying grease
100°C or higher	Heat-resistant bearing	HT2	See Table 2
-15°C or lower	Cold-resistant bearing	CT1	See Table 2
Corrosion-resistant	Stainless steel series	F-UCPM F-UCFM	Corrosion-resistant materials used
	Plastic series	F-UCPR F-UCFLR	
Resistant to external foreign material penetration	Stainless steel cover	F-FS-UCPM	Improved seal performance
	Plastic cover	F-RM-UCPR	
	Triple-lip seal	LLJ	

**Table 2 : Heat/Cold-resistant Bearing Specifications**

Grease leakage reduced by using high or low temp grease

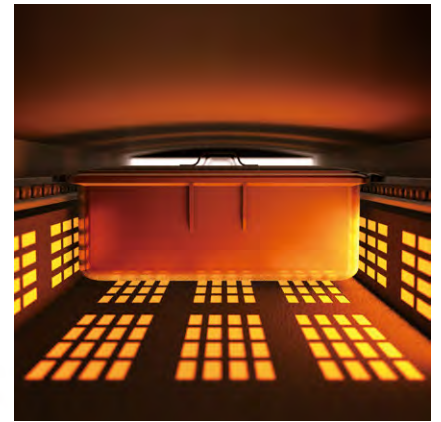
Item	Product Code	Operating Temperature Range (°C)	Grease	Bearing Seal	Bearing Clearance
High-temperature applications	HT2	Normal temperature to 180°C	Toray silicone SH44M	Non-contact shield	C4
Low-temperature applications	CT1	-50°C to normal temperature	Toray silicone SH33L	Non-contact shield	CN

1. Table 1 and Table 2 show examples of general specifications. Contact **NTN** for further information about the specifications not presented in the tables.
2. Grease in Table 2 is heat/cold-resistant grease. It may change according to the conditions of use or by request.

## Bearing Units – Applications

### Heat-Resistant Applications (HT2)

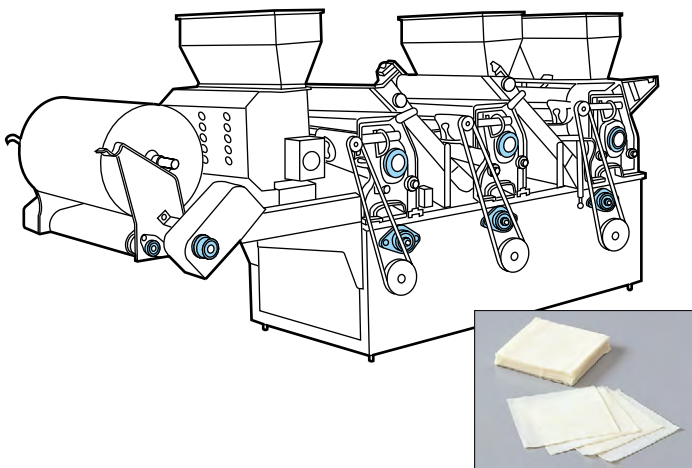
- Continuous rice cookers (conveyor units)



### Solid Grease-Packed Bearing Units for Food Machinery

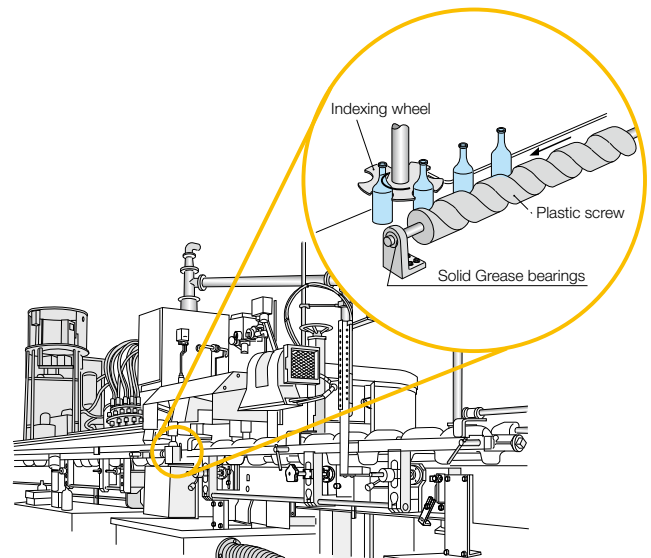
- Automatic wonton wrapper production line

Sealed against lubricant leakage



- Filler (liquid filling machine) container transfer unit

Sealed against lubricant leakage and container contamination



# BEAREE Products

## "NTN BEAREE products" that meet the demands of the food equipment industry

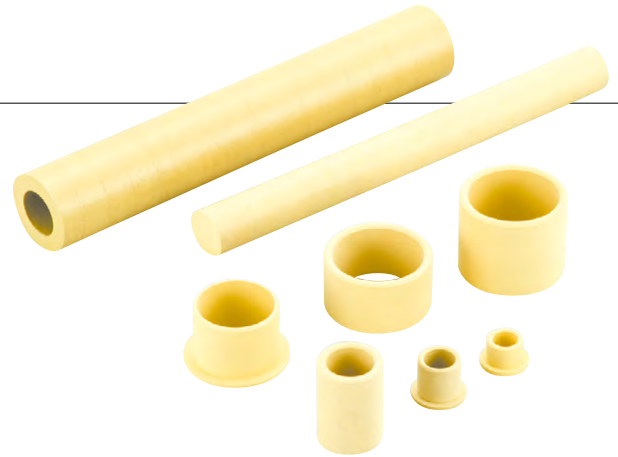
BEAREE materials are also used as sliding materials for food machinery.

The materials that have passed the synthetic resin equipment, containers, and packing standard tests (conducted by the Japan Food Research Laboratories) are profiled below.

## Sliding Materials for Food Machinery

### Features

1. Excellent friction/wear characteristics.
2. Friction coefficients during machine start-up and while operating at very low speeds are extremely low preventing operation 'stick-slip' phenomena.
3. Good compatibility with mild and stainless steels.
4. Resistant to acids, bases, and solvents.

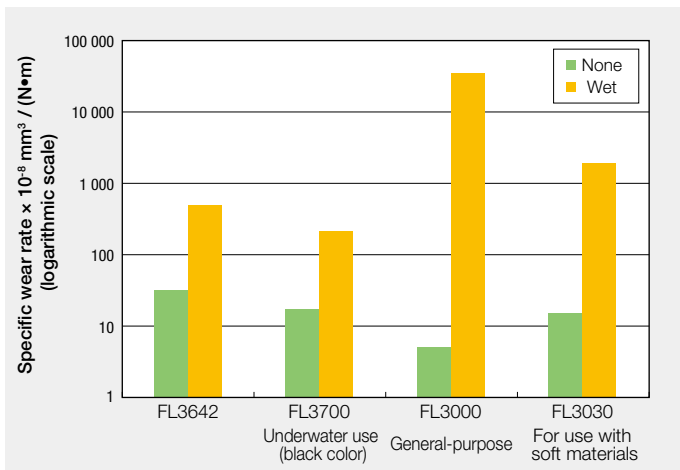


BEAREE FL3642

### Comparison of Specific Wear Rates of BEAREE FL3642 and NTN's Materials

#### Test conditions

Test equipment : NTN Thrust Tester  
 Surface pressure : 0.98 MPa  
 Circumferential speed : 32 m/min  
 Partner material : SUS304  
 Lubrication : None, water  
 Time : 50 h



Food machinery components catalog

## Materials that Have Passed Representative Synthetic Resin Container and Packing Standard Testing

○ : Good   △ : Conditionally acceptable   × : Unsuitable

Material Names	Color	Characteristics			Use Environment			Processing Method
		Permissible Surface Pressure : MPa	Permissible Slide Speed : m/min	Continuous Operating Temperature : °C	Dry	Under Water	In Oil	
BEAREE FL3642	Pale yellow	3	150	260	○	○	○	Machining
BEAREE FL3700	Black	3	150	260	○	○	○	Machining
BEAREE UH3000	White	1	30	80	△	△	○	Machining
BEAREE AS5000	Light brown	5	150	230	○	×	○	Injection molding
BEAREE AS5704	Black	5	150	230	△	○	○	Injection molding

Note : The permissible surface pressures and permissible slide speeds written in the above table are guideline values for when operating at ambient temperature.

## Fluorine-Based Resin Slide Bearings with Stainless Housings

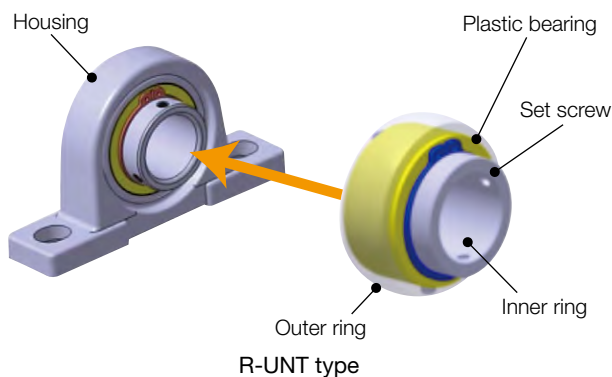
**Prolonged life achieved by inhibiting rust in high temperature and humidity environments**

**Maintenance-free VAVE proposal (roll ⇒ slide)**



### Features

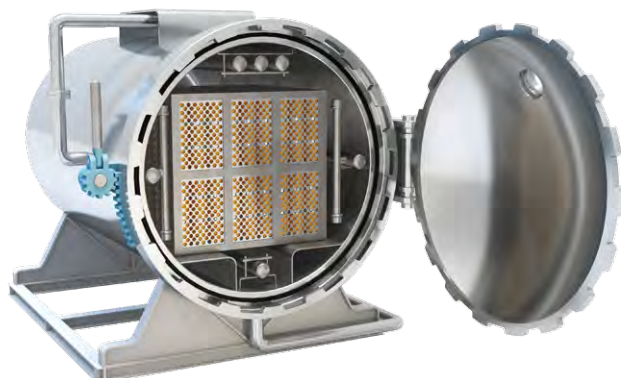
1. Chemical and water resistant characteristics.
2. Maintenance-free (greaseless).
3. For use in high-temperature environments (heat resistant to 260°C).



Component Parts	Materials
Inner ring	SUS304
Outer ring	
Set screw	SUS304
Plastic bearing	BEAREE FL3642/FL3700
Housing	SCS13 (stainless steel casting)

### Application Examples

- Point of use : Canning plants, retort sterilization furnaces
- Use environment : High-temperature steam sterilization (high temp./humidity)
- Use model number : R-UNT40004W (Bearing unit : F-UCPM208 equiv.)
- Use background : Due to premature failure of standard type bearing units, switching to this product changes the system to maintenance-free.



## Plastic Thrust Rolling Bearings

**Excellent high performance, easy to maintain plastic thrust rolling bearings**

### Features (comparison to PPS plastic slide bearings)

1. Lightweight, rustproof structure due to plastic cage and ceramic ball combination.
2. Fluorine-based resin is used making them heat resistant to 200°C.
3. Excellent, easy to maintain due to ingenuity of material composition and retainer pocket design.
4. White-colored materials make post-washing inspection of foreign material contamination easier.

Component Parts	Materials
Retainer	BEAREE FE5002
Balls	Ceramics

### Typical Applications

Food machinery pumps and agitators



R-ASY type

# Plastic Rolling Bearing

## ● Features

1. Excellent chemical and water resistant characteristics.
2. Usable without lubrication.
3. Lower torque than slide bearings.



### Plastic rolling bearing materials

Component Parts	Materials
Inner/outer rings	BEAREE AS5701 (PPS series), PK5031 (PEEK series)
Balls	Alumina ceramics
Retainer	PA66, PPS BEAREE FL3700 (PTFE series)

### Chemical resistance of materials used

Materials	Inner/Outer Rings		Retainer			Balls
	AS5701	PK5031	PA66	PPS	FL3700	
10% Hydrochloric acid	○	○	×	○	○	○
35% Sulfuric acid	△	×	×	○	○	○
35% Nitric acid	○	○	×	○	○	○
10% Acetic acid	○	○	×	○	○	○
10% Sodium hydroxide	○	○	○	×	○	○
10% Potassium hydroxide	○	○	○	△	○	○
30% Aqueous ammonia	○	○	×	△	○	○

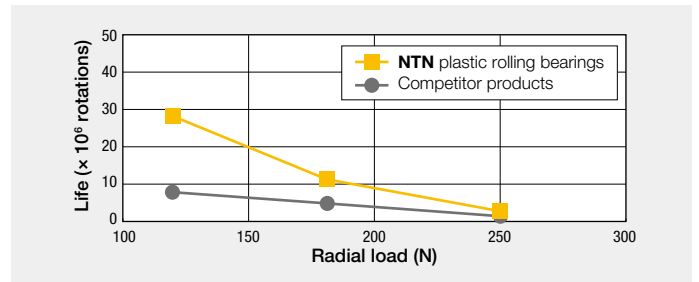
○ : Good △ : Acceptable × : Unsuitable

## Wear Life Test Results

### Test conditions

Test bearing size : 6206  
 Test equipment : **NTN** Plastic rolling bearing test equipment  
 Radial load : 100 N  
 Rotational speed : 500 min<sup>-1</sup>  
 Lubricant : None

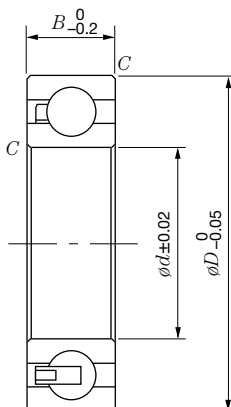
### Wear life test



## Size Charts

**R- PB 6000 A N Vn**

- R-** Product by **NTN** engineering plastics corporation
- PB** Plastic rolling bearing
- 6000** Bearing nominal number
- A** Inner/outer ring material codes  
A : BEAREE AS5701  
P : BEAREE PK5031
- N** Retainer material codes  
N : PA66  
A : PPS  
F : BEAREE FL3700
- Vn** Auxiliary codes  
Vn : n are serial numbers (V1, V2...)



Nominal Number	Bearing Nominal Number	Dimensions (mm)				Permissible Radial Load (N)	
		Bore Diameter (d)	Outer Diameter (D)	Width (B)	Chamfer (C)	BEAREE AS5701	BEAREE PK5031
R-PB6000	6000	10	26	8	0.3	20	35
R-PB6001	6001	12	28	8	0.3	20	40
R-PB6002	6002	15	32	9	0.3	20	45
R-PB6003	6003	17	35	10	0.3	25	55
R-PB6004	6004	20	42	12	0.6	40	80
R-PB6005	6005	25	47	12	0.6	40	90
R-PB6006	6006	30	55	13	1	40	110
R-PB6200	6200	10	30	9	0.3	20	40
R-PB6201	6201	12	32	10	0.6	25	55
R-PB6202	6202	15	35	11	1	30	75
R-PB6203	6203	17	40	12	1	40	90
R-PB6204	6204	20	47	14	1	50	115
R-PB6205	6205	25	52	15	1	60	120
R-PB6206	6206	30	62	16	1	70	180



# Miniature Resin Slide Screws

## Features

1. Excellent corrosion resistant, heat resistant, and chemical resistant characteristics.
2. Usable without lubrication.
3. Usable underwater and in oil.



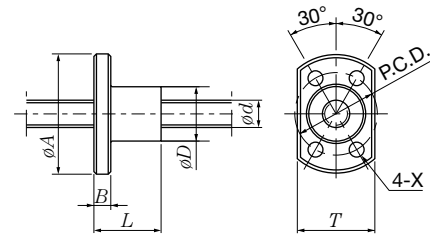
## Size Charts

Units : mm

Nominal Number	Threaded Shaft		Plastic Nut								Standard Shaft Length <sup>①</sup>	
	Nominal Diameter (d)	Nominal Lead	Outer Diameter (D <sub>3.2</sub> )	Overall Length (L)	Flange		Mounting Hole			2-Surface Width (T)		No. of Threads
					(A)	(B)	P.C.D.	Hole Diameter (X)	No. of Holes			
R-MSS0401Y	4	1	10	11.5	23	3.5	15	2.9	4	15	1	200
R-MSS0402Y		2									2	
R-MSS0601Y	6	1	12	14.5	26	3.4	18	3.4	4	17	1	300
R-MSS0602Y		2									4	
R-MSS0609Y		9									4	
R-MSS0618Y		18									4	
R-MSS0801Y	8	1	14	18	29	4	21	4.5	4	18	1	400
R-MSS0802Y		2									4	
R-MSS0812Y		12									6	
R-MSS0824Y		24									6	
R-MSS1002Y	10	2	16	22	33	5	24	4.5	4	21	1	300
R-MSS1015Y		15									4	
R-MSS1030Y		30									6	
R-MSS1202Y	12	2	18	25	35	26	4.5	4.5	4	22	1	500
R-MSS1218Y		18									6	
R-MSS1236Y		36									6	

**R- MSS 04 01 Y**

- Product by **NTN** engineering plastics corporation
- Miniature resin slide screws
- Threaded shaft nominal outer diameter mm
- Threaded shaft nominal lead mm
- Nut material code Y : BEAREE AS5000



① The ends of the threaded shaft are not machined (chamfered) as standard. However, machined shaft ends are available on request. Contact **NTN** for more information.

## Technical Data

Units : mm

Nominal Number	Thread Diameter (nominal)	Threaded Shaft		Permissible Axial Load <sup>②</sup> N	Permitted Rotational Speed <sup>③</sup> min <sup>-1</sup>	Tightening Torque (max) <sup>④</sup> N·mm	Screw Efficiency <sup>⑤</sup> (%)
		Lead	No. of Threads				
R-MSS0401Y	4	1	1	50	2500	180	45
R-MSS0402Y		2	2	60			70
R-MSS0601Y	6	1	1	120	2000	400	40
R-MSS0602Y		2	1	60			55
R-MSS0609Y		9	4	90			85
R-MSS0618Y		18	4	110			85
R-MSS0801Y	8	1	1	200	2000	400	30
R-MSS0802Y		2	1	290			45
R-MSS0812Y		12	4	210			80
R-MSS0824Y		24	6	210			85
R-MSS1002Y	10	2	1	460	1500	500	40
R-MSS1015Y		15	4	410			80
R-MSS1030Y		30	6	440			85
R-MSS1202Y	12	2	1	660	1000	500	35
R-MSS1218Y		18	6	750			75
R-MSS1236Y		36	6	540			80

① The screw efficiency is calculated by applying an axial load and measuring the rotational torque of the threaded shaft when the plastic nut is rotated, using the following formula.

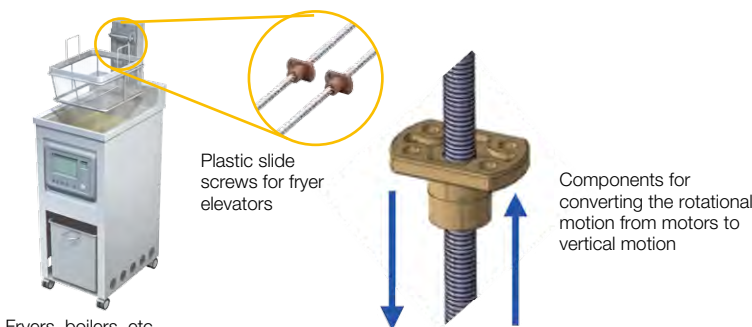
$$\eta = \frac{R \cdot Q \cdot \tan \beta}{M} \times 100 \quad \tan \beta = \frac{\text{Lead}}{2\pi R}$$

Whereby,  $\eta$  : screw efficiency (%), R : screw effective radius, and Q : axial load,  $\beta$  : lead angle, M : rotational torque

② The permissible axial load and permitted rotational speed are values obtained when tested under the following test conditions.

- 1) Test equipment **NTN** slide screw durability test equipment
- 2) Conditions Ambient temperature, without lubrication, threaded shaft rotational speed
- 3) Permissible value criteria Using R-MSS0824Y, it is confirmed that there is no abnormal wear by conducting testing over a travel distance of 200 km under the conditions of axial load : 98 N, rotational speed : 2000 min<sup>-1</sup>. Other values are derived by calculation.

③ Mounting bolt tightening torque when the plastic nut is secured to its partner component.

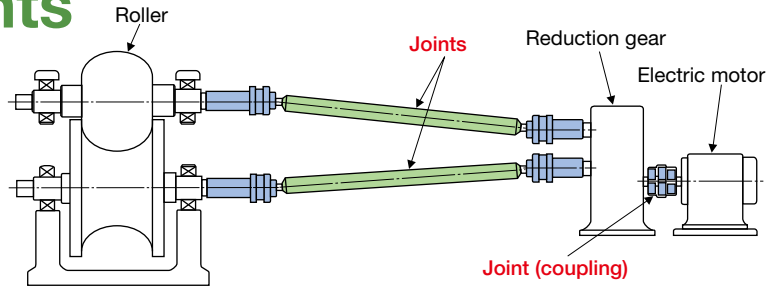


Fryers, boilers, etc.



# Constant Velocity Joints

These joints efficiently transfer rotational torque from an input (electric motor, etc.) to an output (roller, etc.) across a variety of angles and distances.



## Features

### 1. Smooth rotation

The constant velocity mechanism produces a smooth, quiet rotation and operation.

### 2. Maintains clean environments

The application of a rubber boot with the excellent sealing performance secures a clean and sanitary environment.

### 3. No lubrication required for prolonged periods

The excellent sealing performance of the boot prevents lubricant leakage and water penetration, making it possible to use for prolonged periods without lubricating.

### 4. Extensive product lineup

Choose the optimum joints and/or combination of joints from an extensive product lineup to match the application conditions.



## Constant Velocity Joint Types and Features

Type	Configuration		Nominal Number	Maximum Permissible Angle <sup>①</sup>	Features
Fixed system	Cup type		BJ75C to BJ225C	25°	Large permissible operating angle Excellent high-performance seal
	Drum type		BJ75M to BJ125M		
Sliding system	DOJ flange type		DOJ 68F to DOJ200F DOJ225F to DOJ625F	20° 8° to 10°	Joint internal expansion and contraction possible Low slide resistance (expansion-contraction resistance)
	TBJ flange type		TBJ8SF to TBJ60SF	16° to 18°	
	TBJ boss type		TBJ8SB to TBJ60SB		
Coupling system	BC series		BC68 to BC200 <sup>②</sup>	5°	No centering required Easy to install
	TBJ DF series		TBJ8DF to TBJ60DF	8°	
	TBJ DB series		TBJ8DB to TBJ60DB		

① The maximum permissible angle is determined by the restriction of the boot, the rotational speed of the joint, and the conditions of use.

② Larger joint specifications can also be manufactured according to customer requirements. Contact **NTN** for further information.

# BC Coupling

BC couplings manufactured by **NTN** can be used in replacement of general couplings.❶

Take a closer look at the easy installation/removal characteristics, degree of angular deflection, and eccentricity that these BC couplings can cope with comfortably.


Chain Coupling

Gear Coupling

Disc Coupling

Rubber Coupling

By substituting with BC couplings



No centering required  
 Improve work efficiency, reduce maintenance man-hours

No lubrication required  
 Boot-sealed to enable operation for prolonged periods without lubricating.

Absorb vibration

Replacement

BC coupling

## Comparison of coupling types (50 mm bore dia. comparison) ↓

Coupling Function	Chain Coupling	Gear Coupling	Disc Coupling	Rubber Coupling	<b>NTN BC Couplings</b>
Permissible angle of deflection (°)	1.0	1.5	1.0	0.3	5.0
Permissible degree of eccentricity (mm)	0.4	1.0	0.2	0.2	5.0
Permissible torque (N•m)	932	932	775	490	932
Permissible distance between shafts (mm)	12	8	12	3	103
Outer diameter (mm)	130	140	143	120	134
Weight (kg)	6.2	7.5	6.9	6.7	8.5
Independent installation and removal	Not permissible	Not permissible	Not permissible	Not permissible	Permissible
Maintenance	Time required for centering				No centering or re-lubrication required

❶ Replacement may not be possible depending on conditions. Check the conditions and location of use. Contact **NTN** for technical support.

## Examples of Use

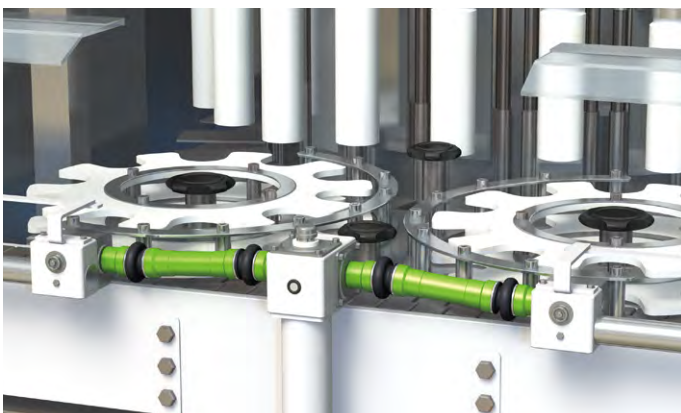
Canning line equipment, such as fish and shellfish, meats, fruits, soft drinks, alcoholic drinks, beverages, foods, etc.

Bottling line equipment, such as soft drinks, alcoholic drinks, beverages, sauces and liquid seasonings, etc.

Packet and cup-filling line equipment, such as instant foods, etc.

Machinery rotary drive units, such as bottle-washing, labeling, kneading machinery in addition to the above mentioned examples.

### ● Bottle-washing machinery screw driving units



### ● Capping machinery screw driving units



# Parts Feeder

## Function of a Parts Feeder

Parts feeders mainly serve three functions : **stockpiling** , **aligning** , and **supplying** .

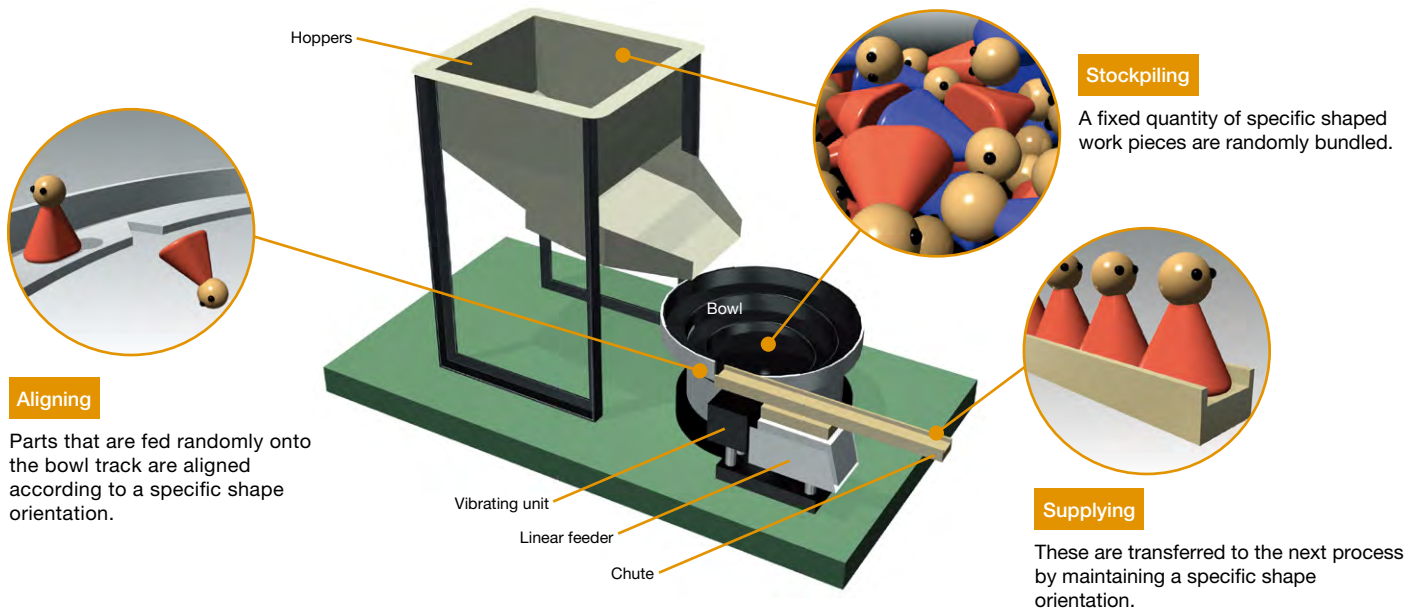
The most important function is 'aligning'. Aligning by use of attachments is the most commonplace method for aligning parts. Other aligning methods also use sensors and photo-imaging processes.

Aligning by attachment method aligns various shaped pieces on the inside and outer circumference of the bowl by using a feed track and attached simple mechanisms.

**NTN's** excellent main units, used in combination with optimum aligning methods to match a variety of work characteristics, provide stable automated line operations.



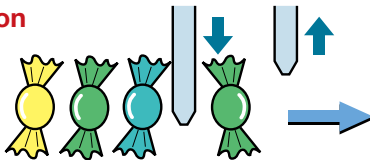
## Parts Feeder Configuration



## Escapement

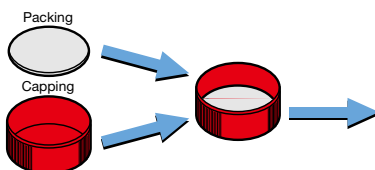
### Individual separation

Individual pieces are separated using a cylinder.



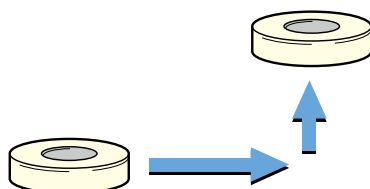
### Bundling

The individually transferred pieces are mechanically bundled together.



### Lifting

Lifting by guide holes.



## Foods Supplied by Parts Feeder

A variety of foods from confectionery, such as candy, ice cream, crackers, etc., to various shaped large cup noodle ingredients and powders can be supplied by matching individual characteristic shapes.

# One-touch Bowl Clamping

## Features

The bowl can be attached/detached by simple one-touch operation.

## Applications

- Periodic bowl washing/sterilizing for foods, medical products, etc.
- When it is necessary to exchange the bowl frequently in high-mix low-volume production lines (this can be optimized by combining with a microcomputer variable frequency controller).



# High Amplitude Linear Feeder

Using a spring amplifying mechanism to further enlarge the amplitude of conventional linear feeders makes it possible to transfer a variety of food products and vibration-absorbing work pieces while also saving energy.

## Features

### 1. High amplitude

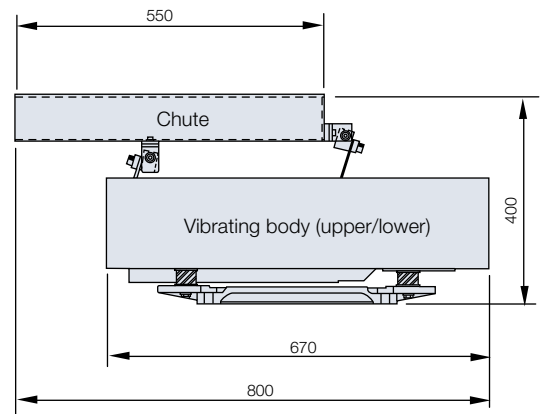
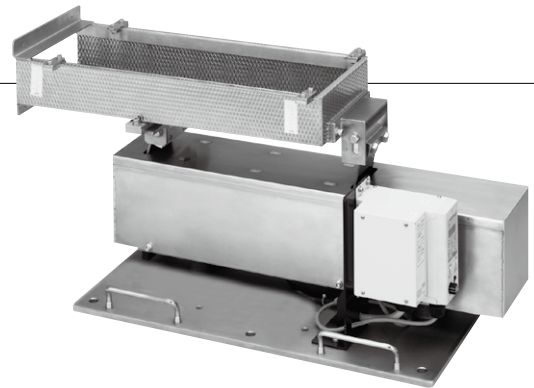
Food and vibration-absorbing pieces can be transferred at high speed by the spring amplifying mechanism.

### 2. Power saving

Using the spring amplifying mechanism requires no high power magnets thereby keeping power consumption on par with conventional machines.

### 3. Stability

By changing the strengths of the amplifying springs on the near and far sides, it is possible to suppress any non-uniform transfer across the entire chute and stabilize the transfer process.



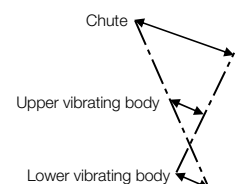
## Examples of Work Applications and Specifications

Examples of work applications	Various kinds of foods, such as pasted food, side dishes of lunch box, and multi-item foods, etc.
Maximum amplitude	3 to 4 mm
Power supply	Single-phase : 200 V, 50/60 Hz
Product dimensions	L : 800 × W : 250 × H : 400 mm
Product weight	Approx. 30 kg

\* These products are applicable to specific applications. Contact **NTN** for further information.

### Operating principle

By adjusting the frequency, the upper vibrating body and chute oscillate in the same direction/phase.



## Parts Feeder Examples of Use



Chocolate bars



Cut rice cakes



Snack salami

## Stainless Steel Sealed Deep Groove Ball Bearings

Shaft diameter  $d$  10 ~ 30 mm

### Product Specifications

(1) A contact seal type deep groove ball bearing, spot-packed with food machinery-use Solid Grease (LP09), using stainless steel inner/outer rings and retainer.

(2) Bearing precision

The dimensions and rotational precision conform to JIS Class 0.

(3) Radial internal clearance

The radial internal clearances are shown in the table below. The values of the radial internal clearances differ from JIS standard.

Units:  $\mu\text{m}$

Nominal Bore Diameter : mm		Radial Internal Clearance	
Greater Than	Equal to or Less Than	Min.	Max.
—	10	6	17
10	18	6	20
18	30	8	22

(4) Materials

Components	Materials
Inner ring	Martensitic stainless steel (SUS440C)
Outer ring	
Rolling element	Martensitic stainless steel (SUS440C)
Retainer	Austenitic stainless steel (SUS304)
Seal	Nitrile rubber + high-carbon steel

Also available in general-purpose Solid Grease (LP03) configuration

(5) The inner and outer ring production markings are as follows.

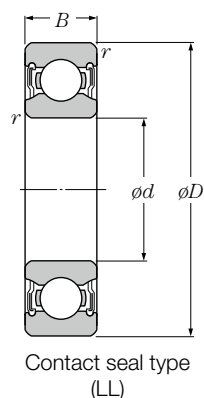
#### SSN0 Series

Part Number	Production Markings	
	Inner Ring	Outer Ring
SSN000LL	SS	SS
SSN001LL	SS	SS
SSN002LL	SS	SS
SSN003LL	SS	SMT, SS6003, JAPAN
SSN004LL	SS	SMT, SS6004, JAPAN
SSN005LL	SS	SMT, SS6005, JAPAN
SSN006LL	SS	SMT, SS6006, JAPAN

#### SSN2 Series

Part Number	Production Markings	
	Inner Ring	Outer Ring
SSN200LL	SS	SMT, SS6200, JAPAN
SSN201LL	SS	SMT, SS6201, JAPAN
SSN202LL	SS	SMT, SS6202, JAPAN
SSN203LL	SS	SMT, SS6203, JAPAN
SSN204LL	SS	SMT, SS6204, JAPAN
SSN205LL	SS	SMT, SS6205, JAPAN
SSN206LL	SMT, 6206RS, JAPAN	SS

### Size Charts



	Basic Dimensions			Basic Dynamic Load Rating	Basic Static Load Rating	Basic Dynamic Load Rating	Basic Static Load Rating	Part Number	Reference <sup>①</sup> (Basic Number)
	mm								
$d$	$D$	$B$	$r_s \text{ min}^{\text{②}}$	$C_r$	$C_{or}$	$C_r$	$C_{or}$		
10	26	8	0.3	3.50	1.96	360	200	SSN000LL/LP09	6000
	30	9	0.6	3.95	2.39	400	244	SSN200LL/LP09	6200
12	28	8	0.3	3.95	2.39	400	244	SSN001LL/LP09	6001
	32	10	0.6	5.25	3.05	535	310	SSN201LL/LP09	6201
15	32	9	0.3	4.30	2.86	440	291	SSN002LL/LP09	6002
	35	11	0.6	5.85	3.75	600	380	SSN202LL/LP09	6202
17	35	10	0.3	4.60	3.25	470	330	SSN003LL/LP09	6003
	40	12	0.6	7.35	4.8	750	490	SSN203LL/LP09	6203
20	42	12	0.6	7.20	5.05	735	515	SSN004LL/LP09	6004
	47	14	1	9.90	6.65	1 010	680	SSN204LL/LP09	6204
25	47	12	0.6	7.75	5.85	790	595	SSN005LL/LP09	6005
	52	15	1	10.8	7.85	1 100	800	SSN205LL/LP09	6205
30	55	13	1	10.2	8.25	1 040	845	SSN006LL/LP09	6006
	62	16	1	15	11.3	1 530	1 150	SSN206LL/LP09	6206

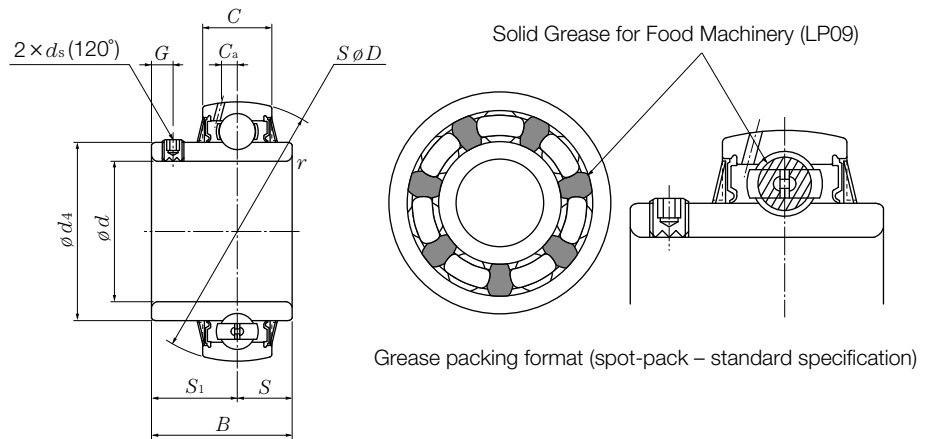
① Indicates the minimum permissible chamfer dimension  $r^*$ .

② The listed basic numbers are identification numbers for the main dimensions (in compliance to JIS B1512).

## Ball Bearings for Bearing Units

Shaft diameter  $\phi 20 \sim 50$  mm

F-UC2 type  
Cylindrical bore, set screw type  
(Stainless steel Solid Grease bearings)



Shaft Diameter mm	Bearing Number	Dimensions											Basic Dynamic Load Rating kN	Basic Static Load Rating kN	Coefficient fo	Bearing Mass kg (Ref.)
		mm														
		d	D	B	C	r <sup>s min</sup> ①	S	S <sub>1</sub>	G	ds	Ca	d <sub>4</sub>				
20	F-UC204D1/LP09	20	47	31	17	1	12.7	18.3	4.5	M5 × 0.8	3.8	29.6	9.9	6.65	13.2	0.17
25	F-UC205D1/LP09	25	52	34.1	17	1	14.3	19.8	5	M5 × 0.8	4	33.9	10.8	7.85	13.9	0.20
30	F-UC206D1/LP09	30	62	38.1	19	1	15.9	22.2	5	M6 × 0.75	4.9	40.8	15.0	11.3	13.8	0.30
35	F-UC207D1/LP09	35	72	42.9	20	1.5	17.5	25.4	6	M6 × 0.75	5.4	46.8	19.7	15.3	13.8	0.40
40	F-UC208D1/LP09	40	80	49.2	21	1.5	19	30.2	8	M8 × 1	6	53	22.4	17.8	14.0	0.60
45	F-UC209D1/LP09	45	85	49.2	22	1.5	19	30.2	8	M8 × 1	6.1	57.5	25.2	20.4	14.1	0.68
50	F-UC210D1/LP09	50	90	51.6	24	1.5	19	32.6	9	M8 × 1	6.1	62.4	27.0	23.2	14.4	0.78

① Indicates the minimum permissible chamfer dimension r.

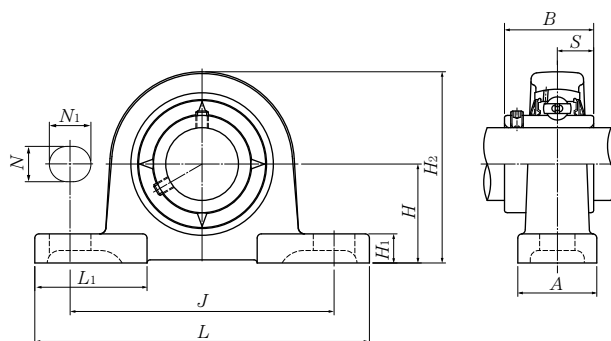
Note 1. The basic dynamic load ratings Cr of the bearings differ from ball bearings for stainless steel bearing units.

2. Solid Grease bearings are standard specification for this series. However, NTN also manufactures stainless steel bearings packed with lubricant greases for food machinery and heat-resistant applications.

## Stainless Steel Pillow Block Units

Shaft diameter  $\phi$  20 ~ 50 mm

F-UCPM2 type (stainless steel series)  
Cylindrical bore, set screw type  
Solid Grease bearings

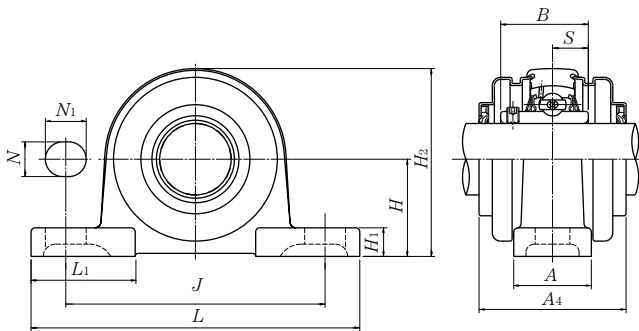


Shaft Diameter mm	Unit Number	Dimensions											Mounting Bolt Size
		mm											
		<i>H</i>	<i>L</i>	<i>J</i>	<i>A</i>	<i>N</i>	<i>N</i> <sub>1</sub>	<i>H</i> <sub>1</sub>	<i>H</i> <sub>2</sub>	<i>L</i> <sub>1</sub>	<i>B</i>	<i>S</i>	
20	F-UCPM204/LP09	33.3	120	95	30	12	14	11	64	42	31	12.7	M10
25	F-UCPM205/LP09	36.5	130	105	30	12	14	12	70	42	34.1	14.3	M10
30	F-UCPM206/LP09	42.9	155	121	36	17	20	13	82	54	38.1	15.9	M14
35	F-UCPM207/LP09	47.6	161	127	38	17	20	14	92	54	42.9	17.5	M14
40	F-UCPM208/LP09	49.2	171	137	40	17	20	14	98	52	49.2	19	M14
45	F-UCPM209/LP09	54	180	146	40	17	20	14	105	60	49.2	19	M14
50	F-UCPM210/LP09	57.2	195	159	45	19	22	16	114	65	51.6	19	M16

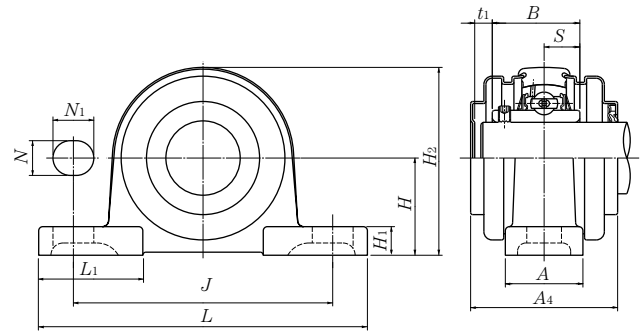
Note 1. Solid Grease bearings are standard specification for this series. However, **NTN** also manufactures stainless steel bearing units packed with lubricant greases for food machinery and heat-resistant applications.

2. The basic dynamic load ratings *C*<sub>r</sub> of the bearings differ from ball bearings for stainless steel bearing units.





Fitted with two open, rubber sealed, stainless steel covers



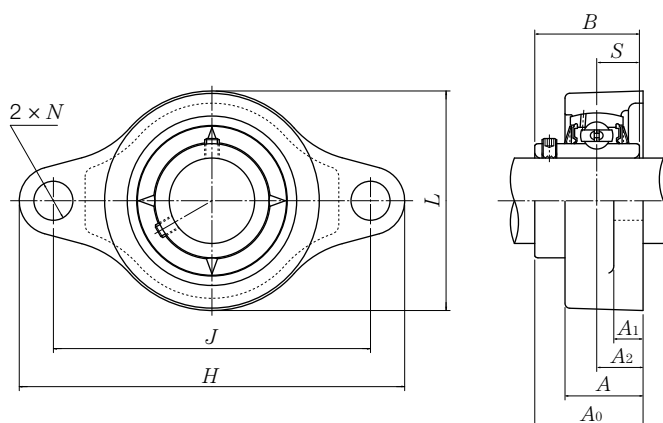
Fitted with one closed and one open, rubber sealed, stainless steel cover

Bearing Number	Basic Dynamic Load Rating kN <i>C<sub>r</sub></i>	Basic Static Load Rating kN <i>C<sub>0r</sub></i>	Housing Number	Units Fitted with Stainless Steel Covers		Dimensions		Unit Mass kg (Ref.)	
				Two Open, Rubber Sealed Covers	One Closed and One Open, Rubber Sealed Cover	mm <i>t<sub>1</sub></i>	mm <i>A<sub>4</sub></i>	Standard Type	Fitted with Covers
F-UC204D1/LP09	9.9	6.65	PM204	F-FS-UCPM204/LP09	F-FSM-UCPM204/LP09	5	51	0.6	0.6
F-UC205D1/LP09	10.8	7.85	PM205	F-FS-UCPM205/LP09	F-FSM-UCPM205/LP09	5	55	0.7	0.7
F-UC206D1/LP09	15.0	11.3	PM206	F-FS-UCPM206/LP09	F-FSM-UCPM206/LP09	5	60	1.1	1.1
F-UC207D1/LP09	19.7	15.3	PM207	F-FS-UCPM207/LP09	F-FSM-UCPM207/LP09	5	69	1.3	1.5
F-UC208D1/LP09	22.4	17.8	PM208	F-FS-UCPM208/LP09	F-FSM-UCPM208/LP09	6	80	1.7	1.8
F-UC209D1/LP09	25.2	20.4	PM209	F-FS-UCPM209/LP09	F-FSM-UCPM209/LP09	6	80	1.8	2.0
F-UC210D1/LP09	27.0	23.2	PM210	F-FS-UCPM210/LP09	F-FSM-UCPM210/LP09	6	85	2.4	2.6

## Stainless Steel Flange Block Units

Shaft diameter  $\phi 20 \sim 50$  mm

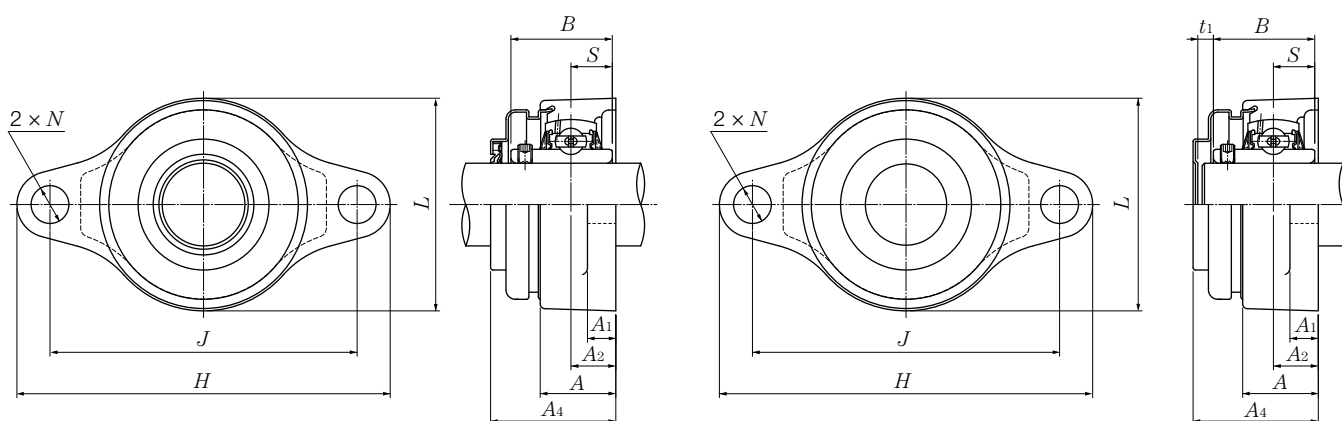
F-UCFM2 type (stainless steel series)  
Cylindrical bore, set screw type  
Solid Grease bearings



Shaft Diameter mm	Unit Number	Dimensions										Mounting Bolt Size
		<i>H</i>	<i>J</i>	<i>A<sub>2</sub></i>	<i>A<sub>1</sub></i>	mm			<i>L</i>	<i>A<sub>0</sub></i>	<i>B</i>	
20	F-UCFM204/LP09	112	90	15	10	25.5	12	60	33.3	31	12.7	M10
25	F-UCFM205/LP09	127	99	16	10	26.5	16	68	35.8	34.1	14.3	M14
30	F-UCFM206/LP09	145	117	18	10	30	16	80	40.2	38.1	15.9	M14
35	F-UCFM207/LP09	158	130	19	12	32	16	90	44.4	42.9	17.5	M14
40	F-UCFM208/LP09	172	144	21	12	35	16	100	51.2	49.2	19	M14
45	F-UCFM209/LP09	180	148	22	13	36	19	108	52.2	49.2	19	M16
50	F-UCFM210/LP09	189	157	22	13	37	19	115	54.6	51.6	19	M16

Note 1. Solid Grease bearings are standard specification for this series. However, **NTN** also manufactures stainless steel bearing units packed with lubricant greases for food machinery and heat-resistant applications.

2. The basic dynamic load ratings *C<sub>r</sub>* of the bearings differ from ball bearings for stainless steel bearing units.



Fitted with one open, rubber-sealed, stainless steel cover

Fitted with one closed stainless steel cover

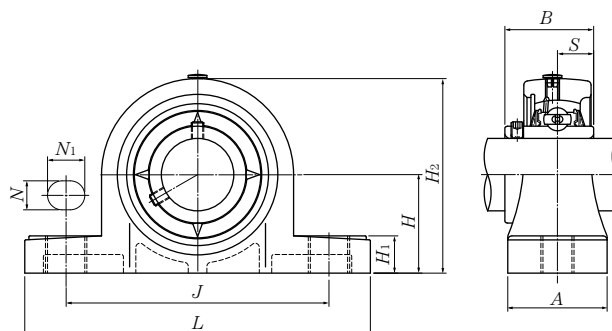
Bearing Number	Basic Dynamic Load Rating kN $C_r$	Basic Static Load Rating $C_{or}$	Housing Number	Units Fitted with Stainless Steel Covers		Dimensions		Unit Mass kg (Ref.)	
				One Open, Rubber Sealed Cover	One Closed Cover	$t_1$	$A_4$	Standard Type	Fitted with Cover
F-UC204D1/LP09	9.9	6.65	FM204	F-FS-UCFM204/LP09	F-FSM-UCFM204/LP09	5	40.5	0.4	0.4
F-UC205D1/LP09	10.8	7.85	FM205	F-FS-UCFM205/LP09	F-FSM-UCFM205/LP09	6.5	44	0.6	0.6
F-UC206D1/LP09	15.0	11.3	FM206	F-FS-UCFM206/LP09	F-FSM-UCFM206/LP09	6	48	0.8	0.9
F-UC207D1/LP09	19.7	15.3	FM207	F-FS-UCFM207/LP09	F-FSM-UCFM207/LP09	6.5	53.5	1.1	1.2
F-UC208D1/LP09	22.4	17.8	FM208	F-FS-UCFM208/LP09	F-FSM-UCFM208/LP09	7	61	1.4	1.5
F-UC209D1/LP09	25.2	20.4	FM209	F-FS-UCFM209/LP09	F-FSM-UCFM209/LP09	7	62	1.8	1.9
F-UC210D1/LP09	27.0	23.2	FM210	F-FS-UCFM210/LP09	F-FSM-UCFM210/LP09	7	64.5	1.9	2.0

## Glass Fiber Reinforced Resin Housing Pillow Block Unit

Shaft diameter

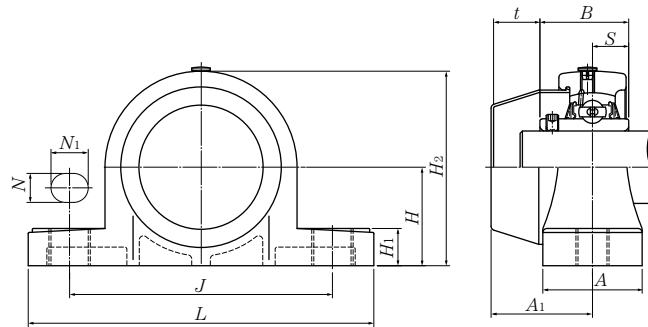
φ20 ~ 40 mm

F-UCPR2 (plastic series)  
Cylindrical bore, set screw type  
Solid Grease bearings



Shaft Diameter mm	Unit Number	Dimensions										Mounting Bolt Size
		<i>H</i>	<i>L</i>	<i>J</i>	<i>A</i>	mm		<i>H</i> <sub>1</sub>	<i>H</i> <sub>2</sub>	<i>B</i>	<i>S</i>	
20	F-UCPR204F1/LP09	33.3	127	95	38	11*	14*	14.2	65	31	12.7	M10
25	F-UCPR205F1/LP09	36.5	140	105	38	11*	14*	14.5	71	34.1	14.3	M10
30	F-UCPR206/LP09	42.9	162	119*	46	14*	18*	17.8	83	38.1	15.9	M12*
35	F-UCPR207/LP09	47.6	167	127	48	14*	18*	18	94	42.9	17.5	M12*
40	F-UCPR208F1/LP09	49.2	184	137	54	14*	18*	19.5	98	49.2	19	M12*

Note 1. Solid Grease bearings are standard specification for this series. However, **NTN** also manufactures ball bearings packed with lubricant grease for food machinery applications.  
 2. In certain places, the dimensions of the cast iron housings (JIS products) may differ slightly. (The main places are marked "\*".)  
 3. The basic dynamic load ratings *C*<sub>r</sub> of the bearings differ from ball bearings for stainless steel bearing units.  
 4. Nominal numbers shown with the "F1" suffix indicate a solid housing base.



Fitted with plastic cover

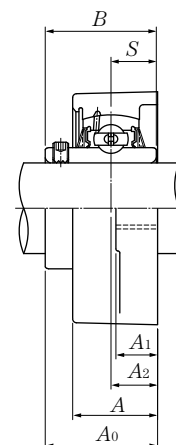
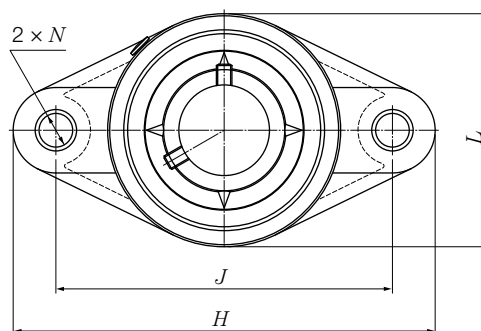
Bearing Number	Basic Dynamic Load Rating	Basic Static Load Rating	Housing Number	Units Fitted with One Closed Resin Cover	Dimensions		Unit Mass kg (Ref.)	
					mm		Standard Type	Fitted with Plastic Cover
	$C_r$	$C_{or}$			$A_1$	$t$		
F-UC204D1/LP09	9.9	6.65	PR204F1D1	F-RM-UCPR204F1/LP09	33	13	0.3	0.3
F-UC205D1/LP09	10.8	7.85	PR205F1D1	F-RM-UCPR205F1/LP09	34	13	0.3	0.3
F-UC206D1/LP09	15.0	11.3	PR206D1	F-RM-UCPR206/LP09	41	17	0.5	0.5
F-UC207D1/LP09	19.7	15.3	PR207D1	F-RM-UCPR207/LP09	43	24	0.7	0.7
F-UC208D1/LP09	22.4	17.8	PR208F1D1	F-RM-UCPR208F1/LP09	49	17	1.0	1.0

## Glass Fiber Reinforced Resin Housing Flange Block Unit

Shaft diameter

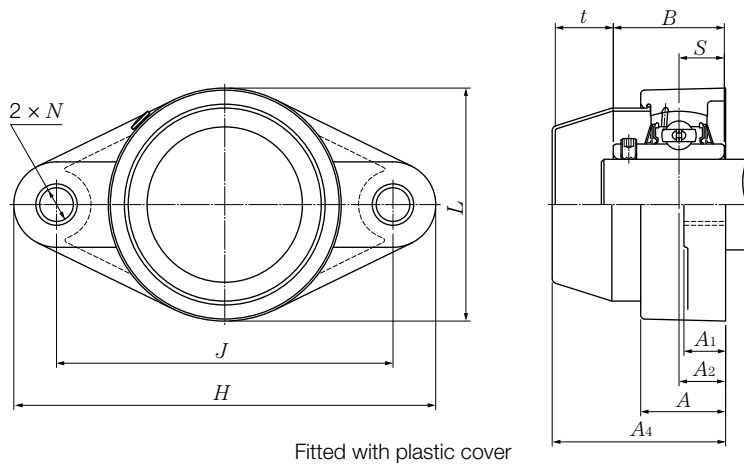
φ20 ~ 40 mm

F-UCFLR2 (plastic series)  
Cylindrical bore, set screw type  
Solid Grease bearings



Shaft Diameter mm	Unit Number	Dimensions										Mounting Bolt Size
		$H$	$J$	$A_2$	$A_1$	mm			$L$	$A_0$	$B$	
20	F-UCFLR204F1/LP09	113	90	15.4	11.4	26.5	11*	64.8	33.7	31	12.7	M10
25	F-UCFLR205F1/LP09	130	99	17	13.5	29.1	11*	70	36.8	34.1	14.3	M10*
30	F-UCFLR206F1/LP09	148	117	19	13.3	30.5	11*	80	41.2	38.1	15.9	M10*
35	F-UCFLR207/LP09	163	130	18	16.1	32.8	13*	90	43.4	42.9	17.5	M12*
40	F-UCFLR208/LP09	175	144	21.5	20	37.5	14*	100	51.7	49.2	19	M12*

Note 1. Solid Grease bearings are standard specification for this series. However, **NTN** also manufactures ball bearings packed with lubricant grease for food machinery applications.  
 2. In certain places, the dimensions of the cast iron housings (JIS products) may differ slightly. (The main places are marked "\*".)  
 3. The basic dynamic load ratings  $C_r$  of the bearings differ from ball bearings for stainless steel bearing units.  
 4. Nominal numbers shown with the "F1" suffix indicate a solid housing base.

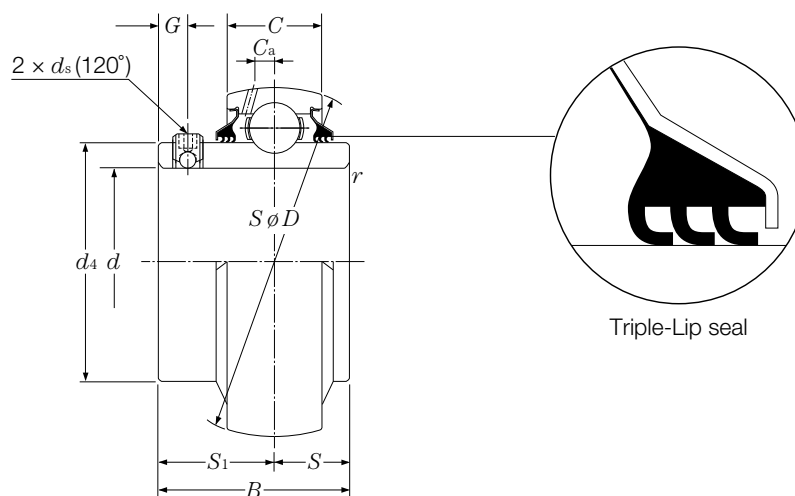


Bearing Number	Basic Dynamic Load Rating	Basic Static Load Rating	Housing Number	Units Fitted with One Closed Resin Cover	Dimensions		Unit Mass kg (Ref.)	
					$A_4$	$t$	Standard Type	Fitted with Plastic Cover
F-UC204D1/LP09	9.9	6.65	FLR204F1D1	F-RM-UCFLR204F1/LP09	47	12	0.3	0.3
F-UC205D1/LP09	10.8	7.85	FLR205F1D1	F-RM-UCFLR205F1/LP09	51	13	0.3	0.3
F-UC206D1/LP09	15.0	11.3	FLR206F1D1	F-RM-UCFLR206F1/LP09	59	16	0.5	0.5
F-UC207D1/LP09	19.7	15.3	FLR207D1	F-RM-UCFLR207/LP09	61	16	0.7	0.7
F-UC208D1/LP09	22.4	17.8	FLR208D1	F-RM-UCFLR208/LP09	71	18	0.9	1.0

## Ball Bearings for Triple-Lip Sealed Bearing Units UC2... LLJ Types

Shaft diameter  $d$  12 ~ 90 mm

Cylindrical bore, set screw type



Shaft Diameter mm	Bearing Number	Dimensions mm											Basic Dynamic Load Rating kN C <sub>r</sub>	Basic Static Load Rating kN C <sub>or</sub>	Coefficient f <sub>o</sub>	Bearing Mass kg (Ref.)
		d	D	B	C	r <sub>s</sub> min <sup>①</sup>	S	S <sub>1</sub>	G	ds	Ca	d <sub>4</sub>				
12	UC201D1LLJ	12	47	31	7	0.6	12.7	18.3	4.5	M 5 × 0.8	3.8	29.6	12.8	6.65	13.2	0.21
15	UC202D1LLJ	15	47	31	17	0.6	12.7	18.3	4.5	M 5 × 0.8	3.8	29.6	12.8	6.65	13.2	0.20
17	UC203D1LLJ	17	47	31	17	0.6	12.7	18.3	4.5	M 5 × 0.8	3.8	29.6	12.8	6.65	13.2	0.18
20	UC204D1LLJ	20	47	31	17	1	12.7	18.3	4.5	M 5 × 0.8	3.8	29.6	12.8	6.65	13.2	0.17
25	UC205D1LLJ	25	52	34.1	17	1	14.3	19.8	5	M 5 × 0.8	4	33.9	14.0	7.85	13.9	0.20
30	UC206D1LLJ	30	62	38.1	19	1	15.9	22.2	5	M 6 × 0.75	4.9	40.8	19.5	11.3	13.8	0.32
35	UC207D1LLJ	35	72	42.9	20	1.5	17.5	25.4	6	M 6 × 0.75	5.4	46.8	25.7	15.3	13.8	0.46
40	UC208D1LLJ	40	80	49.2	21	1.5	19	30.2	8	M 8 × 1	6	53	29.1	17.8	14.0	0.64
45	UC209D1LLJ	45	85	49.2	22	1.5	19	30.2	8	M 8 × 1	6.1	57.5	32.5	20.4	14.1	0.68
50	UC210D1LLJ	50	90	51.6	24	1.5	19	32.6	9	M 8 × 1	6.1	62.4	35.0	23.2	14.4	0.78
55	UC211D1LLJ	55	100	55.6	25	2	22.2	33.4	9	M 8 × 1	6.5	69	43.5	29.2	14.3	1.04
60	UC212D1LLJ	60	110	65.1	27	2	25.4	39.7	10	M10 × 1.25	7.3	77	52.5	36.0	14.3	1.46
65	UC213D1LLJ	65	120	65.1	32	2	25.4	39.7	10	M10 × 1.25	7.3	82.5	57.5	40.0	14.4	1.86
70	UC214D1LLJ	70	125	74.6	33	2	30.2	44.4	12	M10 × 1.25	7.7	87	62.0	44.0	14.5	2.10
75	UC215D1LLJ	75	130	77.8	34	2	33.3	44.5	12	M10 × 1.25	8	93	66.0	49.5	14.7	2.34
80	UC216D1LLJ	80	140	82.6	35	2.5	33.3	49.3	12	M10 × 1.25	8	98.1	72.5	53.0	14.6	2.78
85	UC217D1LLJ	85	150	85.7	36	2.5	34.1	51.6	12	M12 × 1.5	7.9	106.4	83.5	64.0	14.7	3.54
90	UC218D1LLJ	90	160	96	37	2.5	39.7	56.3	12	M12 × 1.5	8.7	111.6	96.0	71.5	14.5	4.40

① Indicates the minimum permissible chamfer dimension  $r$ .

Note 1. Refer to the related Bearing Units catalog (Cat. No. 2400) for the shaft size tolerances.

2. The precision of the ball bearings is identical to JIS B1558 (ball bearings for rolling bearings units).

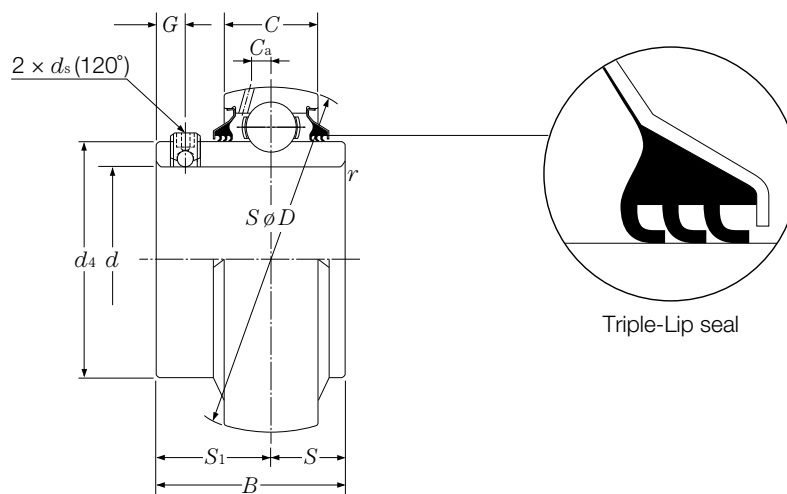
3. Contact **NTN** for the ball bearing shaft dimensions and tapered bore sizes in inches.



## Ball Bearings for Triple-Lip Sealed Bearing Units UC3... LLJ Types

Shaft diameter  $d$  25 ~ 100 mm

Cylindrical bore, set screw type



Shaft Diameter mm	Bearing Number	Dimensions mm											Basic Dynamic Load Rating kN Cr	Basic Static Load Rating kN Cor	Coefficient fo	Bearing Mass kg (Ref.)
		d	D	B	C	r <sub>s min</sub> <sup>①</sup>	S	S <sub>1</sub>	G	ds	Ca	d <sub>4</sub>				
25	UC305D1LLJ	25	62	38	20	1.5	15	23	6	M 6 × 0.75	5	36.8	21.2	10.9	12.6	0.35
30	UC306D1LLJ	30	72	43	23	1.5	17	26	6	M 6 × 0.75	5.6	44.9	26.7	15.0	13.3	0.56
35	UC307D1LLJ	35	80	48	25	2	19	29	8	M 8 × 1	5.7	49.4	33.5	19.1	13.1	0.70
40	UC308D1LLJ	40	90	52	27	2	19	33	10	M10 × 1.25	6.1	56	40.5	24.0	13.2	0.96
45	UC309D1LLJ	45	100	57	29	2	22	35	10	M10 × 1.25	7.1	63.5	53.0	32.0	13.1	1.28
50	UC310D1LLJ	50	110	61	32	2.5	22	39	12	M12 × 1.5	7.9	70.6	62.0	38.5	13.2	1.68
55	UC311D1LLJ	55	120	66	34	2.5	25	41	12	M12 × 1.5	8.5	76.6	71.5	45.0	13.2	2.08
60	UC312D1LLJ	60	130	71	36	2.5	26	45	12	M12 × 1.5	9	82.7	82.0	52.0	13.2	2.62
65	UC313D1LLJ	65	140	75	39	2.5	30	45	12	M12 × 1.5	9.4	88.2	92.5	60.0	13.2	3.22
70	UC314D1LLJ	70	150	78	41	2.5	33	45	12	M12 × 1.5	10	94.8	104	68.0	13.2	3.86
75	UC315D1LLJ	75	160	82	43	2.5	32	50	14	M14 × 1.5	10.5	101.3	113	77.0	13.2	4.70
80	UC316D1LLJ	80	170	86	45	2.5	34	52	14	M14 × 1.5	11.1	107.9	123	86.5	13.3	5.60
85	UC317D1LLJ	85	180	96	47	3	40	56	16	M16 × 1.5	11.5	114.4	133	97.0	13.3	6.70
90	UC318D1LLJ	90	190	96	49	3	40	56	16	M16 × 1.5	12.2	120.9	143	107	13.3	7.60
95	UC319D1LLJ	95	200	103	51	3	41	62	16	M16 × 1.5	12.7	127.5	153	119	13.3	8.70
100	UC320D1LLJ	100	215	108	55	3	42	66	18	M18 × 1.5	14	135.6	173	141	13.2	10.8

① Indicates the minimum permissible chamfer dimension r.

Note 1. Refer to the related Bearing Units catalog (Cat. No. 2400) for the shaft size tolerances.

2. The precision of the ball bearings is identical to JIS B1558 (ball bearings for rolling bearings units).

3. Contact NTN for the ball bearing shaft dimensions and tapered bore sizes in inches.

## Flaking (Delamination or Spalling)

Phenomena	Primary Causes	Primary Preventative Measures
<p>The raceway surface peels away in scale-like flakes. After the flaking develops, the remaining surface is markedly uneven/rough. This phenomenon is also called delamination, spalling or fatigue wear.</p>	<p>Although this fatigue phenomenon is caused by rolling motion, this phenomenon may occur prematurely if abnormally excessive loads are applied, poor bearing handling, poor shaft and/or housing precision, and installation errors, etc. Intrusion by foreign material and corrosion are also contributing factors.</p>	<ol style="list-style-type: none"> <li>(1) Investigate the existence of factors applying abnormal loads.</li> <li>(2) Reevaluate the conditions of use and, depending on the conditions, use bearings with a greater load capacity.</li> <li>(3) Improve the lubrication method by increasing the viscosity of the lubricant to form a good lubricant seal.</li> <li>(4) Prevent installation damage.</li> </ol>



Photo A-1

- Deep groove ball bearings
- Flaking has occurred on each of the inner/outer ring and balls
- Caused by excessive load



Photo A-2

- Angular bearing outer ring
- Flaking caused by the ball pitch on the raceway surface
- Caused by poor bearing handling



Photo A-3

- Deep groove ball bearing inner ring
- Flaking has occurred on one side of the raceway surface
- Caused by excessive axial load



Photo A-4

- Spherical roller bearing inner ring
- Flaking has occurred only on one side of the raceway surface
- Caused by excessive axial load

## Bearing Inspection and Maintenance

Performing periodic inspections and maintenance of the bearings makes it possible to maximize bearing performance, and also detect any early-stage bearing anomalies. Therefore, inspections and maintenance can increase productivity and economic efficiency by preventing bearing failures before they occur.

The inspection items written on the right are generally accepted methods for performing bearing maintenance and aftercare. Depending on the importance of the system or machinery being used, implementing inspection and maintenance by determining the inspection items and periodic inspection cycles is an important aspect of bearing maintenance and management.

### 1. Inspect the bearings while the machine is operating

Check the temperature, sound, and vibration of the bearings. Examine the characteristics of the lubricant and determine the cycle for refilling or replacing the lubricant.

### 2. Visually monitor the bearings

Carefully monitor any visible phenomena that appear when carrying out periodic inspections and after the bearings have been used. If there are visible signs of damage, take measures to prevent recurrence.

\* Representative examples regarding bearing damage and preventative measures are illustrated below. Refer to the related catalog : Care and Maintenance of Bearings (Cat. No. 3017) for more details.



Photo A-5

- Tapered roller bearings
- Flaking has occurred on 1/4 of the inner ring raceway surface circumference, rollers and outer ring are discolored light brown
- Caused by an excessive high preload condition



Photo A-6

- Double row angular ball bearing outer ring
- Flaking has occurred on 1/4 of the outer ring raceway surface circumference
- Caused by incorrect installation



Photo A-7

- Thrust ball bearing
- Flaking has occurred on the bearing shaft washer (bearing washer fitted on the side of the shaft) and rolling elements
- Caused by improper lubrication



Photo A-8

- Double row tapered roller bearing outer ring
- Flaking has occurred on the raceway surface
- Caused by electrical damage (electric current passing thru bearing)

# Indentation

Phenomena	Primary Causes	Primary Preventative Measures
Indentations on the raceway surface caused by compaction of solid foreign materials and impact (Brinell indentations).	Intrusion of solid foreign materials High internal stresses on the flaking side Dropping, impact damage due to poor bearing handling	(1) Prevent intrusion of foreign material. (2) If caused by metal fragments, investigate the existence of flaking also occurring in other bearings. (3) Provide better filtration system. (4) Improve bearing handling, method of assembly.

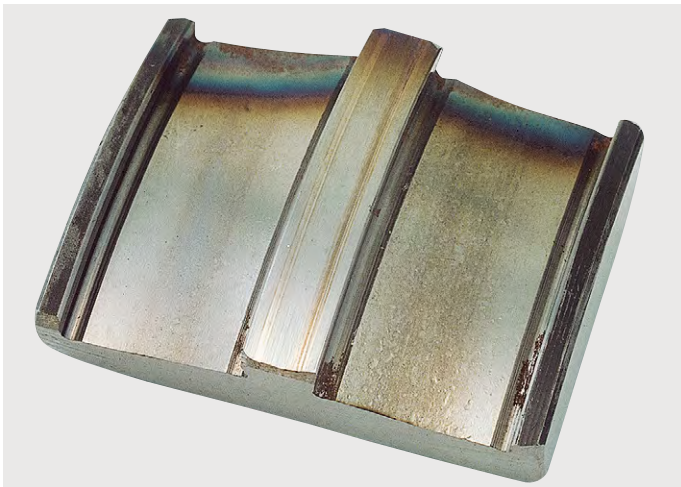


Photo B-1

- Spherical roller bearing inner ring (cut section)
- Indentation has occurred on one side of the raceway surface
- Caused by compaction of solid foreign material



Photo B-2

- Spherical roller bearing rollers
- Indentation has occurred on the rolling surface
- Caused by compaction of solid foreign material



Photo B-3

- Tapered roller bearing rollers
- Indentation has occurred on the rolling surface (temperature discoloration at both ends)
- Caused by intrusion of foreign material in the lubricant

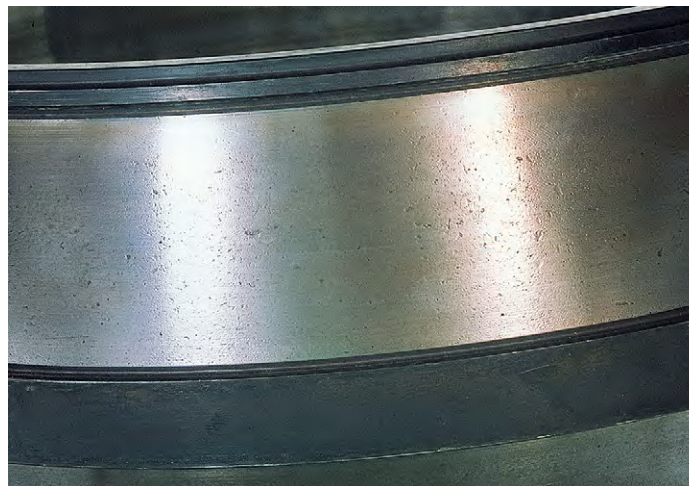


Photo B-4

- Tapered roller bearing inner ring
- Indentation has occurred on the raceway surface
- Caused by compaction of solid foreign material

# Chipping

Phenomena	Primary Causes	Primary Preventative Measures
Partial chipping	Compaction of solid foreign material Impact, excessive loading Poor bearing handling	(1) Investigate causes of impact, excessive loading and rectify/improve. (2) Improve bearing handling. (3) Improve seal performance.



Photo C-1

- Cylindrical roller bearings
- Chipping of inner/outer ring shoulder
- Caused by excessive impact load



Photo C-2

- Spherical roller bearing inner ring
- Chipping of shoulder section
- Caused by excessive impact load



Photo C-3

- Tapered roller bearing inner ring
- Extensive chipping of shoulder
- Caused by impact due to poor assembly



Photo C-4

- Double row tapered roller bearing inner ring
- End surface chipping
- Caused by impact due to poor bearing handling

## Rust, Corrosion

Phenomena	Primary Causes	Primary Preventative Measures
Rust, corrosion has occurred on surfaces of raceways and rolling elements. Rust forms in regular patterns similar to the pitch of the rolling elements.	Contamination by moisture, corrosive substances (acids, etc.) Condensation of airborne moisture Inappropriate packing, storage conditions, handling with bare hands	(1) Strengthen seal performance. (2) Inspect lubricant oil periodically. (3) Be cautious about handling bearings. (4) Take measures to prevent bearing corrosion during prolonged downtime.



Photo D-1

- Tapered roller bearing inner ring
- Rust formed at the pitch of the rollers on the raceway surface.



Photo D-2

- Tapered roller bearing outer ring
- Rust formed at the pitch of the rollers on the raceway surface.



Photo D-3

- Spherical roller bearing rollers
- Rust and corrosion have occurred on surfaces of the rolling surface
- Caused by water contamination

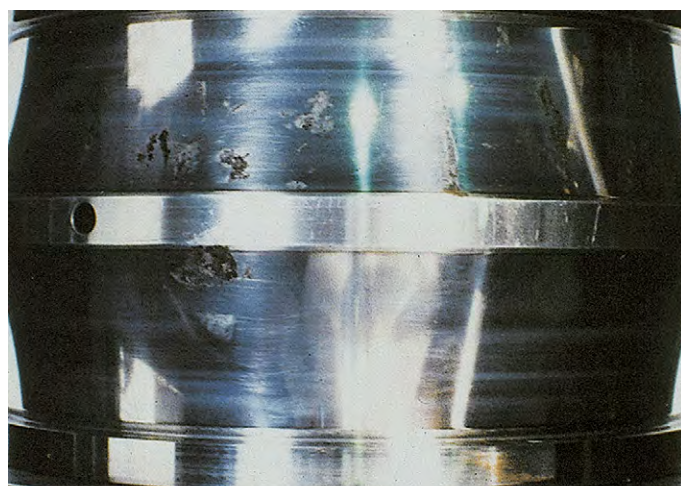


Photo D-4

- Spherical roller bearing inner ring (split type)
- Rust and corrosion have occurred on surfaces of the raceway
- Caused by water contamination

# Bearing Seizure

Phenomena	Primary Causes	Primary Preventative Measures
<p>Bearing has seized due to overheating and will not rotate. Discoloration, softening and welding of raceway, rolling element, and shoulder surfaces.</p>	<p>Poor heat dissipation when bearing heats up Insufficient lubricant and/or lubricant is not suitable Bearing clearances are too small Excessive load (or preload) Roller skew, incorrect installation tolerances</p>	<p>(1) Improve heat dissipation from bearings. (2) Review lubricant type and volume. (3) Prevent misalignment. (4) Reinvestigate the bearing clearances and preload. (5) Reinvestigate the conditions of use.</p>



Photo E-1

- Double row tapered roller bearing inner ring
- Discoloration, softening of inner ring due to seizure, and wear has occurred in a stepped pattern matching the roller pitch
- Caused by poor lubrication



Photo E-2

- Double row tapered roller bearing rollers
- Discoloration, scoring, and welding due to seizure has occurred on the surfaces and ends of the rollers and inner ring set shown in Photo E-1.



Photo E-3

- Spherical roller bearing outer ring
- Wear has occurred in a stepped pattern due to seizure of the raceway surface
- Caused by poor lubrication



Photo E-4

- Tapered roller bearing inner ring
- Raceway surface large diameter side and large shoulder surface have seized
- Caused by poor lubrication

## False Brinelling, Fretting Corrosion

Phenomena	Primary Causes	Primary Preventative Measures
<p>Red rust color from abrasion particles due to wear appear on the contact surfaces forming surface depressions. Depressions form at the pitch of the rolling elements on the raceway surface, which is also called false brinelling.</p>	<p>The bearing oscillation angle is too small.                      Insufficient lubricant (lubricant-free state)                      Load fluctuation                      Vibration during transportation                      Vibration, shaft deflection, installation error, insufficient fit interference</p>	<ol style="list-style-type: none"> <li>(1) Before transporting, preload the inner/outer ring separating packaging to prevent separation.</li> <li>(2) In case of an oscillating motion, use a higher consistency oil or grease.</li> <li>(3) Reinvestigate the lubricant type.</li> <li>(4) Secure the shaft and housing.</li> <li>(5) Re-evaluate the bearing shaft and housing fits.</li> </ol>



Photo F-1

- Cylinder roller bearing inner ring
- False brinelling has occurred around the total circumference of the raceway surface
- Caused by vibration



Photo F-2

- Deep groove ball bearing inner ring
- False brinelling has occurred around the total circumference of the raceway surface
- Caused by vibration



Photo F-3

- Cylinder roller bearing outer ring
- Fretting corrosion has occurred along the outer diameter



Photo F-4

- Tapered roller bearing outer ring
- Fretting corrosion has occurred along the outer diameter



# Creep

Phenomena	Primary Causes	Primary Preventative Measures
<p>The fitting surfaces on which creep occurs becomes polished, almost mirror like or cloudy surfaces. This may also be accompanied by scoring.</p>	<p>Insufficient interference fit</p>	<p>(1) Reinvestigate the fit interference. (2) Improve the machining precision of the shaft and housing.</p>



Photo G-1

- Deep groove ball bearing inner ring
- Surface rust due to bore surface creep



Photo G-2

- Tapered roller bearing inner ring
- Scoring caused by creep has occurred in the center section of the bore surface



Photo G-3

- Thrust ball bearing shaft washer
- Scoring and also friction cracking have occurred caused by bore surface creep

