Shell Type Needle Roller Bearings

- Shell Type Caged Needle Roller Bearings
- Shell Type Grease Retained Full Complement Needle Roller Bearings

**Structure and features**

IKO Shell Type Needle Roller Bearings are lightweight bearings with large load ratings. They employ a shell type outer ring made from a thin special-steel plate which is accurately drawn, carburized and quenched, thus providing the lowest sectional height among the needle roller bearings.

There are two types of bearings available in this series: the caged type and the full complement type. The appropriate type can be selected according to the operating conditions. The caged type has a structure in which the needle rollers are accurately guided by the cage and thrust rings. It is useful for applications at high-speed rotation. The full complement type needle roller bearing, on the other hand, is suitable for heavy-load applications at low-speed rotation.

Since these bearings are press-fitted into the housing, no fixtures for axial positioning are needed. They are ideal for use in mass-produced articles that require economy, and have a wide variety of applications.
Shell Type Caged Needle Roller Bearings

Standard type
This type has a narrow gap between the bore of the marked-side flange of the outer ring (brand, bearing number, etc. are marked) and the shaft, which prevents grease leaks and the entry of foreign particles. This type has wide applications.

Closed end type
This type is completely closed on one side of the outer ring, and is ideal for use when perfect closing of shaft ends is desired.

Type with seals at both sides
This type has a wider outer ring than the standard type and is installed with seals consisting of a reinforcing ring and special synthetic rubber to prevent grease leaks and the entry of foreign particles.

Shell Type Grease Retained Full Complement Needle Roller Bearings

This type has full complement rollers which extend to the full width of the outer ring raceway. It can, therefore, withstand heavy bearing loads and is most suitable for low and medium rotational speeds as well as rocking motions. As lubricating grease is prepacked with the rollers, the bearing can be operated immediately after being fitted.

Identification Number
The identification number of Shell Type Needle Roller Bearings consists of a model code and dimensions. Examples of the arrangement are shown below. When using with inner rings, the assembled inner rings shown in the dimension tables are used. An example in this case is also shown below. Inner rings are delivered separately.

Examples of identification number
Example 1

Example 2 (With inner ring)

Accuracy
The outer rings of Shell Type Needle Roller Bearings are thin and therefore cannot avoid deformation due to heat treatment. It is thus not appropriate to take direct measurements of the bearing. The roller set bore diameter is measured using a plug gauge or tapered gauge after press-fitting the bearing to a suitable ring gauge. The gauge specifications are shown in Tables 2.1 and 2.2.

Tolerances of outer ring width C are shown in Table 3.

Note:
(1) Also applicable to TA L, YL, TLA, – YY
(2) Also applicable to TA L, TL, YL, TLA, – UU
(3) Also applicable to TA 1212Z model, and the upper value is for TA 1212Z model
(4) The lower value is for TA 2012Z model, and the upper value is for models other than TA 2012Z model
(5) The lower value is for TA 22120Z model, and the upper value is for models other than those models.
(6) The lower value is for TA 243216Z and TA 243220Z models, and the upper value is for models other than those models.

Table 2.1 Measuring gauges for metric series bearings

Table 2.2 Measuring gauges for inch series bearings

Table 3 Tolerances of outer ring width C

Table 4 Tolerances of outer ring width C

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch
Fit

As the outer ring is thin, the correct dimensions and accuracy of Shell Type Needle Roller Bearings are obtained only after they have been press-fitted into the housing bore. Bearing accuracy is directly affected by housing dimensions, shape and rigidity. This should be taken into account when considering fit and accuracy. The radial clearance after fitting the bearing to the shaft and the housing bore varies with their tolerances.

Table 4 shows the recommended fit for Shell Type Needle Roller Bearings.

Table 5 shows a calculation example of radial clearance after fitting. This calculation applies to bearings without inner ring to be fitted into rigid steel or cast iron housings. When the housing is made of light alloy or a thin steel pipe, it is necessary to check dimensions by actual measurement.

Generally, when making the radial clearance smaller, it is recommended that the shaft diameter be increased, without decreasing the housing bore diameter.

Lubrication

Bearings with prepacked grease are shown in Table 6. ALVANIA GREASE S2 (Shell Lubricants Japan K.K.) is prepacked as the lubricating grease. In the case of bearings without prepacked grease, perform proper lubrication for use. If the bearings are operated without lubrication, the wear of the roller contact surfaces will increase and the bearing life will be shortened.

Table 5 Calculation example of radial clearance after fitting

Static Safety Factor

Since Shell Type Needle Roller Bearings employ an outer ring made from a thin steel plate which is drawn, carburized and quenched, excessively large loads must be avoided. The required static safety factor is usually more than 3.

Specifications of shaft and housing

Shell Type Needle Roller Bearings are commonly used without an inner ring. In such cases, the surface hardness of the raceway surface should be 58 ~ 64HRC and the surface roughness should not exceed 0.2 μm. However, when the operating condition is not severe, a surface roughness 0.8 μm, or less can be used.

If the surface hardness is low, the load rating must be corrected by the hardness factor shown on page A20. When the shaft cannot be heat treated and finished by grinding, the use of IKO Inner Rings for Shell Type Needle Roller Bearings (See page H1.) is recommended.

Mounting

Shell Type Needle Roller Bearings should be pressed into the housings gently using the appropriate tool as shown in Fig. 1, with their marked end surface up. As the outer ring is thin, it must never be struck directly with a hammer.

Since the outer rings of Shell Type Needle Roller Bearings are firmly fitted to housing bores with interference, it is unnecessary to fix them axially. Fig. 2 shows mounting examples.
## SHELL TYPE NEEDLE ROLLER BEARINGS

### Shaft dia. 4 — 10mm

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**Note:** Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
### SHELL TYPE NEEDLE ROLLER BEARINGS

#### Shaft dia. 12 — 15mm

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#### Boundary dimensions mm

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Note: Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.

Remark: Shaft Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch
### SHELL TYPE NEEDLE ROLLER BEARINGS

#### Shaft dia. 16 — 19mm

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### Boundary dimensions mm

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### Notes
- Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of the value is allowable.
- Shaft Type Grease Retained Half Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
Shells Type Needle Roller Bearings

Identification number

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Boundary dimensions mm

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Remarks:
- Shells Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.

[1] Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
**SHELL TYPE NEEDLE ROLLER BEARINGS**

**Shaft dia. 22 — 24mm**

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**Boundary dimensions**

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<tr>
<th>Boundary dimensions mm</th>
<th>Standard mounting dimensions mm</th>
<th>Basic-dynamic load rating</th>
<th>Basic-static load rating</th>
<th>Allowable rotational speed</th>
<th>Assembled inner ring</th>
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Note: Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.

Shelf Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
### Shell Type Needle Roller Bearings

#### Shaft dia. 25 – 28mm

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#### Boundary Dimensions

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<th>Standard Mounting Dimensions mm</th>
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#### Notes:
1. Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
2. Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
### Shaft dia. 29 – 35mm

<table>
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<th>Identification number</th>
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<th>Closed end</th>
<th>Mass [Ref.] g</th>
<th>Grease retained Mass [Ref.] g</th>
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### Boundary dimensions mm

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<th>Boundary dimensions mm</th>
<th>Standard mounting dimensions mm</th>
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<th>Basic static load rating C</th>
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**Remarks**
1. Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
2. Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.

**Note**:

* 1N=0.102kgf=0.2248lbs.
* 1mm=0.03937inch

*YT 2520 58.5*
Iko Shell Type Needle Roller Bearings

### Shaft dia. 37 - 45mm

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<th>Mass (Ref.) g</th>
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### Boundary dimensions mm

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### Standard mounting dimensions mm

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### Identification number

- TA 4012 Z
- TAM 4102 Z
- TAMW 4102 Z
- YT 4015
- YT 4025

### Remarks

1. Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
2. Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
**SHELL TYPE NEEDLE ROLLER BEARINGS**

**Shaft dia. 50 — 62mm**

<table>
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**Boundary dimensions mm**

| F | D | C | $\frac{t_{1}}{t_{2}}$ Max. | $h_{6}$ | $h_{7}$ | J7 | N7 | Min. | Max. | Max. | Min. | $C_{0}$ | Allowable rotational speed(*) | Assembled inner ring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 58 | 20 | 2.8 | 50.000 | 49.984 | — | — | 57.991 | 57.961 | 28 | 36 | 64 | 100 | 6 | 500 | IRT 4520 |
| 50 | 62 | 12 | 3.4 | 50.000 | 49.984 | — | — | 54.981 | 54.984 | 17 | 25 | 38 | 64 | 6 | 500 | IRT 4525 |
| 50 | 62 | 15 | 3.4 | 50.000 | 49.984 | — | — | 49.984 | 49.984 | 25 | 38 | 59 | 64 | 6 | 500 | IRT 4540 |
| 50 | 62 | 20 | 3.4 | 50.000 | 49.984 | — | — | 49.984 | 49.984 | 38 | 64 | 76 | 64 | 6 | 500 | IRT 4545 |
| 50 | 62 | 25 | 3.4 | 50.000 | 49.984 | — | — | 49.984 | 49.984 | 76 | 76 | 158 | 64 | 6 | 500 | IRT 4545 |

**Notes:**
1. Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
2. Shafts Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.

**Remarks:**
- ‘F’ in the identification number indicates that rolling elements are arranged in double rows.
- ‘W’ in the identification number indicates that rolling elements are arranged in double rows.

1N=0.102kgf=0.2248lbs.

1mm=0.03937inch
### SHELL TYPE NEEDLE ROLLER BEARINGS

**Shaft dia. 65 — 70mm**

<table>
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<tr>
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<th>Standard Mass (Ref.) g</th>
<th>Closed end</th>
<th>Mass (Ref.) g</th>
<th>Standard Mass (Ref.) g</th>
<th>Closed end Mass (Ref.) g</th>
<th>Grease retained Mass (Ref.) g</th>
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**Boundary dimensions mm**

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<th>(\ell_1)</th>
<th>Standard mounting dimensions mm</th>
<th>Basic dynamic load rating (C)</th>
<th>Basic static load rating (C_0)</th>
<th>Allowable rotational speed (n) min(^{-1})</th>
<th>Assembled inner ring</th>
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<td>IRT 5545</td>
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**Notes:**
1. Allowing rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
2. "W" in the identification number indicates that rolling elements are arranged in double rows.
3. Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.

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1N=0.102kgf=0.2248lbs.
1mm=0.03937inch
<table>
<thead>
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<th>Identification number</th>
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<td>BA 47 Z</td>
<td>BA 55 Z</td>
<td>BA 56 Z</td>
<td>BA 57 Z</td>
<td>BA 59 Z</td>
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</tbody>
</table>

**Note:** Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.

**Remark:** Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
### Shell Type Needle Roller Bearings

**Shaft dia. 11.112 ~ 12.700mm**

<table>
<thead>
<tr>
<th>Shaft dia.</th>
<th>Identification number</th>
<th>Standard Mass (Ref. 9 g)</th>
<th>Closed end Mass (Ref. 9 g)</th>
<th>Standard Mass (Ref. 9 g)</th>
<th>Closed end Mass (Ref. 9 g)</th>
<th>Grease retained Mass (Ref. 9 g)</th>
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**Boundary dimensions (mm/inch)**

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<th>F&lt;sub&gt;max&lt;/sub&gt;</th>
<th>D</th>
<th>C</th>
<th>f&lt;sub&gt;2&lt;/sub&gt; Max.</th>
<th>Shaft dia.</th>
<th>Housing bore dia.</th>
<th>C</th>
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<td>12.700</td>
<td>17.472</td>
<td>17.454</td>
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</tbody>
</table>

**Notes:**
- Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
- Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
Shell Type Needle Roller Bearings

Identification number

<table>
<thead>
<tr>
<th>Identification number</th>
<th>Mass (ref.) g</th>
<th>Closed end</th>
<th>Mass (ref.) g</th>
<th>Closed end</th>
<th>Grease retained</th>
<th>Mass (ref.) g</th>
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Note: Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.

Shaft Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
### SHELL TYPE NEEDLE ROLLER BEARINGS

#### Inch Series

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### Boundary dimensions (mm/inch)

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<th>Basic static load rating</th>
<th>Allowable rotational speed (rpm)</th>
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**Notes:**
- Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
- Standard type bearings are not provided with prepacked grease; perform proper lubrication when using these types of bearings.

**Remark:**
- Steel Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
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Note: Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of the value is allowable.

Shel Type Grease Retained Full Complement Needle Roller Bearings are provided with prepackaged grease. Standard type and closed end type bearings are not provided with prepackaged grease, so perform proper lubrication when using these types of bearings.
### Shell Type Needle Roller Bearings

**Inch Series**

#### Shaft dia. 23.812 — 26.988mm

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#### Boundary dimensions (mm/inch)

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<td>2.8</td>
<td>25.400</td>
</tr>
</tbody>
</table>

#### Allowable rotational speed (1)

<table>
<thead>
<tr>
<th>Fmax</th>
<th>D</th>
<th>C</th>
<th>φ1</th>
<th>Shaft dia.</th>
<th>Housing bore dia.</th>
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<tbody>
<tr>
<td></td>
<td>mm</td>
<td>mm</td>
<td>Max.</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>23.812</td>
<td>30.162</td>
<td>12.70</td>
<td>500</td>
<td>2.8</td>
<td>8.000</td>
</tr>
<tr>
<td>25.400</td>
<td>31.750</td>
<td>9.52</td>
<td>375</td>
<td>2.8</td>
<td>6.010</td>
</tr>
<tr>
<td>26.988</td>
<td>33.333</td>
<td>12.70</td>
<td>500</td>
<td>2.8</td>
<td>25.400</td>
</tr>
</tbody>
</table>

**Notes:**

- Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
- Shaft Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.

---

**Diagram:**

- Shell Type Grease Retained Full Complement Needle Roller Bearings are depicted with a diagram showing the components such as the shaft, housing, and needle roller arrangement.

---

**Table:**

- The table includes dimensions such as shaft diameter, housing bore diameter, load rating, and rotational speed for different models of needle roller bearings.

---

**Dimensions:**

- Boundary dimensions (mm/inch)
- Standard mounting dimensions (mm)
- Bore diameter (mm)
**IKO**

**SHELL TYPE NEEDLE ROLLER BEARINGS**

**Inch Series**

**Shaft dia. 28.575 — 30.162mm**

<table>
<thead>
<tr>
<th>Shaft dia. (mm)</th>
<th>Identification number</th>
<th>Standard</th>
<th>Mass (Ref.</th>
<th>Closed end</th>
<th>Mass (Ref.</th>
<th>Closed end</th>
<th>Mass (Ref.</th>
<th>Grease retained</th>
<th>Mass (Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inch</td>
<td></td>
<td>inch</td>
<td></td>
<td>inch</td>
<td></td>
<td></td>
<td>inch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.575</td>
<td></td>
<td>(1 1/8)</td>
<td>14.5</td>
<td>18.1</td>
<td>39</td>
<td>52</td>
<td>YB 186</td>
<td>25.5</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19.5</td>
<td>23</td>
<td>59</td>
<td>52</td>
<td>YB 188</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>29.5</td>
<td>33</td>
<td>48.5</td>
<td>52</td>
<td>YB 1812</td>
<td>38.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30.162</td>
<td>37.5</td>
<td>62</td>
<td>57</td>
<td>YB 1910</td>
<td>42.5</td>
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</table>

**Boundary dimensions (mm)(inch)**

<table>
<thead>
<tr>
<th>Fy</th>
<th>D</th>
<th>C</th>
<th>f</th>
<th>t</th>
<th>Max.</th>
<th>Min.</th>
<th>Max.</th>
<th>Min.</th>
<th>Allowable rotational speed(1)</th>
<th>Assembled inner ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.575</td>
<td>34.925</td>
<td>9.525</td>
<td>39</td>
<td>375</td>
<td>38.5</td>
<td>38.5</td>
<td>25.5</td>
<td>25.5</td>
<td>6.330</td>
<td>9.910</td>
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<tr>
<td>28.575</td>
<td>34.925</td>
<td>12.700</td>
<td>37</td>
<td>375</td>
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<td>26 900</td>
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<td>28.575</td>
<td>34.925</td>
<td>19.050</td>
<td>35</td>
<td>375</td>
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<td>38.5</td>
<td>34 900</td>
<td>34 900</td>
<td>13 000</td>
<td>26 900</td>
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<tr>
<td>28.575</td>
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<td>25.400</td>
<td>33</td>
<td>375</td>
<td>38.5</td>
<td>38.5</td>
<td>38 700</td>
<td>38 700</td>
<td>5 500</td>
<td>39 400</td>
</tr>
</tbody>
</table>

**Allowable rotational speed**

(1) Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.

**Remark**

Shaft Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
## SHELL TYPE NEEDLE ROLLER BEARINGS

### Inch Series

**Shaft dia. 31.750 — 33.338mm**

<table>
<thead>
<tr>
<th>Identification number</th>
<th>Mass (Ref. I g)</th>
<th>Shaft dia. (mm)</th>
<th>Mass (Ref. I g)</th>
<th>Closed end</th>
<th>Mass (Ref. I g)</th>
<th>Closed end</th>
<th>Mass (Ref. I g)</th>
<th>Grease retained</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 208 Z</td>
<td>21.5</td>
<td>31.750 (1 1/4)</td>
<td>—</td>
<td>26</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 2010 Z</td>
<td>27</td>
<td>31.750 (1 1/4)</td>
<td>—</td>
<td>31.5</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 2012 Z</td>
<td>32.5</td>
<td>31.750 (1 1/4)</td>
<td>—</td>
<td>37</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 2016 Z</td>
<td>43</td>
<td>31.750 (1 1/4)</td>
<td>—</td>
<td>475</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 2020 Z</td>
<td>53.5</td>
<td>31.750 (1 1/4)</td>
<td>—</td>
<td>58</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 218 Z</td>
<td>28.5</td>
<td>33.338 (1 5/16)</td>
<td>—</td>
<td>35</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 2110 Z</td>
<td>35.5</td>
<td>33.338 (1 5/16)</td>
<td>—</td>
<td>43</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 2112 Z</td>
<td>49</td>
<td>33.338 (1 5/16)</td>
<td>—</td>
<td>49</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

**Boundary dimensions (mm/inch)**

<table>
<thead>
<tr>
<th>Reference</th>
<th>D</th>
<th>C</th>
<th>Fw, N</th>
<th>D</th>
<th>C</th>
<th>Fw, N</th>
<th>D</th>
<th>C</th>
<th>Fw, N</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 208 Z</td>
<td>26</td>
<td>—</td>
<td>—</td>
<td>BA 2010 Z</td>
<td>—</td>
<td>—</td>
<td>BA 2012 Z</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>BA 2016 Z</td>
<td>475</td>
<td>—</td>
<td>—</td>
<td>BA 2020 Z</td>
<td>58</td>
<td>—</td>
<td>BA 218 Z</td>
<td>35</td>
<td>—</td>
</tr>
<tr>
<td>BA 2112 Z</td>
<td>49</td>
<td>—</td>
<td>—</td>
<td>BA 2110 Z</td>
<td>43</td>
<td>—</td>
<td>BA 208 Z</td>
<td>21.5</td>
<td>—</td>
</tr>
</tbody>
</table>

**Note:**
- Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of the value is allowable.
- Shaft Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
**SHELL TYPE NEEDLE ROLLER BEARINGS**

### Inch Series

#### Shaft dia. 34.925 – 38.100mm

<table>
<thead>
<tr>
<th>Identification number</th>
<th>Shaft dia. mm (inch)</th>
<th>Mass (Ref. g)</th>
<th>Closed end</th>
<th>Mass (Ref. g)</th>
<th>Closed end</th>
<th>Mass (Ref. g)</th>
<th>Grease retained</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BA 228 Z</strong></td>
<td>34.925 (1 3/8)</td>
<td>23.5</td>
<td>BA 228</td>
<td>29</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2212 Z</strong></td>
<td>34.925 (1 3/8)</td>
<td>35.5</td>
<td>BA 2212</td>
<td>41</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2216 Z</strong></td>
<td>34.925 (1 3/8)</td>
<td>47.5</td>
<td>BA 2216</td>
<td>53</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2220 Z</strong></td>
<td>34.925 (1 3/8)</td>
<td>59</td>
<td>BA 2220</td>
<td>64</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 22220 Z</strong></td>
<td>34.925 (1 3/4)</td>
<td>—</td>
<td>BHA 2220</td>
<td>71</td>
<td>BHA 2226</td>
<td>BHA 2227</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2228 Z</strong></td>
<td>34.925 (1 3/4)</td>
<td>—</td>
<td>BHA 228</td>
<td>37</td>
<td>BHA 228</td>
<td>BHA 228</td>
<td>—</td>
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<tr>
<td><strong>BA 234 Z</strong></td>
<td>38.100 (1 1/2)</td>
<td>38.5</td>
<td>BA 234</td>
<td>47.5</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2410 Z</strong></td>
<td>38.100 (1 1/2)</td>
<td>48.5</td>
<td>BA 2410</td>
<td>57.5</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2412 Z</strong></td>
<td>38.100 (1 1/2)</td>
<td>58.5</td>
<td>BA 2412</td>
<td>67.5</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2414 Z</strong></td>
<td>38.100 (1 1/2)</td>
<td>69</td>
<td>BA 2414</td>
<td>78</td>
<td>—</td>
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</tr>
<tr>
<td><strong>BA 2416 Z</strong></td>
<td>38.100 (1 1/2)</td>
<td>79</td>
<td>BA 2416</td>
<td>88</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>BA 2420 Z</strong></td>
<td>38.100 (1 1/2)</td>
<td>97.5</td>
<td>BA 2420</td>
<td>106</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

#### Boundary dimensions mm (inch)

<table>
<thead>
<tr>
<th>Fw</th>
<th>D</th>
<th>C</th>
<th>D/H</th>
<th>C/J</th>
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</thead>
<tbody>
<tr>
<td>34.925</td>
<td>41.275</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
</tr>
<tr>
<td>34.925</td>
<td>41.275</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
</tr>
<tr>
<td>34.925</td>
<td>41.275</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
</tr>
<tr>
<td>34.925</td>
<td>41.275</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
</tr>
<tr>
<td>34.925</td>
<td>41.275</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
</tr>
<tr>
<td>38.100</td>
<td>47.625</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
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<tr>
<td>38.100</td>
<td>47.625</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
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<tr>
<td>38.100</td>
<td>47.625</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
</tr>
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<td>38.100</td>
<td>47.625</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
</tr>
<tr>
<td>38.100</td>
<td>47.625</td>
<td>12.70</td>
<td>0.500</td>
<td>2.8</td>
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</table>

#### Standard mounting dimensions mm

<table>
<thead>
<tr>
<th>Basic dynamic rating</th>
<th>Basic static rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 770</td>
<td>16 600</td>
</tr>
<tr>
<td>28 900</td>
<td>52 000</td>
</tr>
<tr>
<td>10 000</td>
<td>10 000</td>
</tr>
<tr>
<td>10 000</td>
<td>10 000</td>
</tr>
<tr>
<td>10 000</td>
<td>10 000</td>
</tr>
<tr>
<td>10 000</td>
<td>10 000</td>
</tr>
</tbody>
</table>

#### Assembled inner ring

| IRB 188 | 18 800 |
| IRB 182 | 28 000 |
| IRB 182 | 28 000 |
| IRB 182 | 28 000 |
| IRB 182 | 28 000 |
| IRB 182 | 28 000 |

Note: Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable. Standard type and closed end type bearings are not provided with prepackaged grease, so perform proper lubrication when using these types of bearings.
**SHELL TYPE NEEDLE ROLLER BEARINGS**

### Inch Series

<table>
<thead>
<tr>
<th>Shaft dia.</th>
<th>Identification number</th>
<th>Identification number</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm (inch)</td>
<td>Standard</td>
<td>Mass (Ref. l)</td>
</tr>
<tr>
<td>41.275 (1(\frac{3}{8}))</td>
<td>BA 268 Z</td>
<td>41</td>
</tr>
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<td></td>
<td>BA 2610 Z</td>
<td>52</td>
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<tr>
<td></td>
<td>BA 2616 Z</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>BA 2620 Z</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>BA 2812 Z</td>
<td>67.5</td>
</tr>
<tr>
<td></td>
<td>BA 2816 Z</td>
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<td>BA 2824 Z</td>
<td>136</td>
</tr>
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<td></td>
<td>BA 308 Z</td>
<td>47.5</td>
</tr>
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<td>BA 3010 Z</td>
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<td>BA 3012 Z</td>
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<td>BA 3016 Z</td>
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<td></td>
<td>BA 328 Z</td>
<td>50</td>
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<tr>
<td></td>
<td>BA 3216 Z</td>
<td>104</td>
</tr>
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<td></td>
<td>BA 3220 Z</td>
<td>128</td>
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<td></td>
<td>BA 3224 Z</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>BA 3226 Z</td>
<td>180</td>
</tr>
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<td></td>
<td>BA 3312 Z</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>BA 3316 Z</td>
<td>139</td>
</tr>
<tr>
<td></td>
<td>BA 3324 Z</td>
<td>205</td>
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<tr>
<td></td>
<td>BA 3328 Z</td>
<td>152</td>
</tr>
<tr>
<td></td>
<td>BA 3334 Z</td>
<td>210</td>
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</table>

**Boundary dimensions mm (inch)**

<table>
<thead>
<tr>
<th>Fmax</th>
<th>D</th>
<th>C</th>
<th>(i_1) Max</th>
<th>Shell dia.</th>
<th>Housing bore dia.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(i_1) Max</td>
<td>(i_1) Min</td>
<td>(J_P) Max</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>41.275</td>
<td>41</td>
<td>60.800</td>
<td>12.70(0.500)</td>
<td>13 700</td>
<td>19 800</td>
</tr>
<tr>
<td>41.275</td>
<td>41</td>
<td>60.800</td>
<td>15.88(0.625)</td>
<td>18 900</td>
<td>30 000</td>
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<tr>
<td>41.275</td>
<td>41</td>
<td>60.800</td>
<td>25.40(1.000)</td>
<td>33 000</td>
<td>61 400</td>
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<tr>
<td>41.275</td>
<td>41</td>
<td>60.800</td>
<td>31.75(1.250)</td>
<td>41 400</td>
<td>82 100</td>
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<tr>
<td>41.275</td>
<td>41</td>
<td>60.800</td>
<td>15.88(0.625)</td>
<td>37 000</td>
<td>71 700</td>
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<tr>
<td>44.450</td>
<td>44.450</td>
<td>63.975</td>
<td>19.05(0.750)</td>
<td>25 200</td>
<td>44 500</td>
</tr>
<tr>
<td>44.450</td>
<td>44.450</td>
<td>63.975</td>
<td>25.40(1.000)</td>
<td>34 800</td>
<td>67 400</td>
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<tr>
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<td>44.450</td>
<td>63.975</td>
<td>31.75(1.250)</td>
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<td>90 200</td>
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<tr>
<td>44.450</td>
<td>44.450</td>
<td>63.975</td>
<td>38.10(1.500)</td>
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<td>113 000</td>
</tr>
<tr>
<td>44.450</td>
<td>44.450</td>
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<td>63.975</td>
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<td>67.150</td>
<td>31.75(1.250)</td>
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<td>60.325</td>
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<td>60.325</td>
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<td>136 000</td>
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<td>50.800</td>
<td>60.325</td>
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<td>156 000</td>
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<td>50.800</td>
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<td>62 100</td>
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<td>64.294</td>
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<td>94 700</td>
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<td>52.388</td>
<td>64.294</td>
<td>38.10(1.500)</td>
<td>73 900</td>
<td>154 000</td>
</tr>
</tbody>
</table>

**Notes:**
1. Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.
2. Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end types are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.

**Remarks:**
1. "\(\text{V}\)" in the identification number indicates that rolling elements are arranged in double rows.
**SHELL TYPE NEEDLE ROLLER BEARINGS**

**Inch Series**

<table>
<thead>
<tr>
<th>Shaft dia. mm (inch)</th>
<th>Identification number</th>
<th>Mass (Ref. g)</th>
<th>Closed end Mass (Ref. g)</th>
<th>Standard Mass (Ref. g)</th>
<th>Grease retained Mass (Ref. g)</th>
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<tbody>
<tr>
<td>53.975 (2 1/8)</td>
<td>BA 348 Z BAM 348</td>
<td>70.5</td>
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<tr>
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<td>BA 3424 Z BAM 3424</td>
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<td>57.150 (2 1/4)</td>
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<tr>
<td>66.675 (2 5/8)</td>
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<td>BA 4412 Z BAM 4412</td>
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<tr>
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<td>BA 4416 Z BAM 4416</td>
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<tr>
<td>69.850 (2 3/4)</td>
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</tr>
</tbody>
</table>

**Note:** Allowable rotational speed applies to oil lubrication. For grease lubrication, a maximum of 60% of this value is allowable.

**Remark:** Shell Type Grease Retained Full Complement Needle Roller Bearings are provided with prepacked grease. Standard type and closed end type bearings are not provided with prepacked grease, so perform proper lubrication when using these types of bearings.
### Shell Type Needle Roller Bearings

#### With Seals

#### Shaft Dia. 12 – 50mm

<table>
<thead>
<tr>
<th>Shaft Dia.</th>
<th>Identification Number</th>
<th>Mass (Ref.)</th>
<th>Boundary Dimensions mm</th>
<th>Standard Mounting Dimensions mm</th>
<th>Basic Dynamic Load Rating C</th>
<th>Basic Static Load Rating C0</th>
<th>Allowable Rotational Speed (1)</th>
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<tbody>
<tr>
<td>12</td>
<td>TLA 1216 UU</td>
<td>11.7</td>
<td>12 18 16</td>
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<tr>
<td>14</td>
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<td>15.000 14.989 20.993 20.972</td>
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</tbody>
</table>

**Note:** Allowable rotational speed applies to grease lubrication.

**Remark:** The type with seals is provided with prepacked grease.

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**B49**

**1N=0.102kgf=0.2248lbs.**

**1mm=0.03937inch**