DIN BALL SCREWS
FOR THE MACHINE TOOL INDUSTRY
NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context, we develop technologies in the fields of rolling bearings, linear systems, components for the automotive industry and mechatronic systems. Our research and production facilities in Europe, Americas and Asia are linked together in a global technology network. Here we concentrate not only on the development of new technologies, but also on the continuous optimisation of quality – at every process stage.

Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.

Trademarks on this catalogue
All NSK product and service names listed in this catalogue are trademarks or registered trademarks of NSK Ltd.
High-speed operation
Depending on shaft diameter and lead combination, two types of recirculation system are used. One option is the newly developed internal deflector which is chosen for smaller leads (10 – 30 mm). The other is the end-deflector for higher leads between 20 and 40 mm. Both allow a high \( d \times n \) value of 150,000 ~ 160,000.

Features
› High speed capability
› High load capacity
› Low torque variation
› Low noise
› Dimensions according DIN-Norm
› Available from stock for prototypes

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New Development Achievement

High load capacity
1.4 times dynamic load rating is achieved by applying special TF bearing steel with dedicated heat treatment to ball screws for machine tools. This TF material has already been applied in the bearing industry several years ago and as well as to our high load capacity ball screws for injection molding machines. It contributes to high cycle operation with long life of ball screws.

Newly developed internal deflector for low torque variation
By using our own simulation technology for ball motion NSK has developed improved ball recirculation systems. The low torque variation contributes to the improvement of the surface profile of machined work pieces.

Low noise
Low noise technology that has previously been used for the end deflector type has now been applied to the new internal deflector type. Other low noise technology that reduces the noise from raceway can be applied to this series when the specified accuracy grade is C3 or higher. Please contact NSK when this feature is needed for accuracy grade C5.
**TF Steel technology**

**TF Steel technology now used for BS series**
We are applying our existing TF bearing steel technology to increase the robustness and lifespan of our new DIN ball screw series. Using this material enables us to extend our ball screw life by avoiding external early flaking due to stress at impressions.

**Properties of the TF material**
- Fine distribution of carbides and carbonitride particles
- Remaining austenite is checked properly to have the best combination of hardness and strength
- Due to this fact, excess material can be pushed back into the surface and thus avoids recurring tensions

**Advantages of the TF material**
- Far better lifespan in polluted environments
- Longer life even under normal conditions
- Better resistance against surface damage
- Reduced failure caused by broken parts released from impressions

**TF steel relieves the stress concentration due to hardness and toughness**

**Conventional steel**

1. Load
2. Load
3. Hard dirt
4. Crack will occur from the stress around the impression

**TF-Steel**

1. Load
2. Load
3. Load
4. No extra stress present

**Theory of decreasing the stress concentration around the impression**
Specifications

Series range and allowable feed rate

**DIN standard nut Dia. range**

<table>
<thead>
<tr>
<th>Shaft Diameter</th>
<th>10 mm</th>
<th>15 mm</th>
<th>20 mm</th>
<th>25 mm</th>
<th>30 mm</th>
<th>40 mm</th>
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<td>75</td>
<td>100</td>
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<td>40 mm</td>
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<td>60</td>
<td>80</td>
<td>100</td>
<td>120</td>
<td>160</td>
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<tr>
<td>50 mm</td>
<td>32</td>
<td>48</td>
<td>64</td>
<td>—</td>
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<tr>
<td>63 mm</td>
<td>23</td>
<td>35</td>
<td>47</td>
<td>—</td>
<td>71</td>
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</table>

**Remarks** Maximum allowable feed rate (m/min) is calculated from allowable rotating speed. Review of critical speed is required. Please contact NSK when the speed exceeds the maximum allowable dn value Ø 32 ~ Ø 50: 160,000, Ø 63: 150,000.

**DIN extended nut Dia. range**

<table>
<thead>
<tr>
<th>Shaft Diameter</th>
<th>10 mm</th>
<th>15 mm</th>
<th>20 mm</th>
<th>25 mm</th>
<th>30 mm</th>
<th>40 mm</th>
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<tr>
<td>32 mm</td>
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<td>—</td>
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<tr>
<td>40 mm</td>
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<tr>
<td>50 mm</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>80</td>
<td>100</td>
<td>120</td>
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<td>63 mm</td>
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<td>—</td>
<td>—</td>
<td>—</td>
<td>80</td>
<td>96</td>
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</table>

Dimensions

**ZSD (Internal deflector type)**

**ZSS (End deflector type)**

**Shape I (Shaft Dia. = 32)**

**Shape II (Shaft Dia. > 32)**
<table>
<thead>
<tr>
<th>Model No.</th>
<th>Shaft dia.</th>
<th>Lead</th>
<th>Effective ball turns</th>
<th>Turns × Circuits</th>
<th>Basic load rating (N)</th>
<th>Ball nut dimensions</th>
<th>DIN standard nut Dia.</th>
<th>DIN extended nut Dia.</th>
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<tr>
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</tbody>
</table>
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