B-3-2.1 End Deflector Type Ball Screws

This product is being applied for a patent.

1. Features
   ● Low and less offensive noise
   The average noise level is reduced by more than 6 dB compared with our existing products. At low-speed rotation, the ball screws are nearly silent, while their noise is unprecedentedly low at high-speed rotation.

   ● High-speed operation
   Realizes the d·n of 180 000, outstanding for ball screws and far surpassing the 100 000 d·n performance of existing return tube type products. For high-lead ball screws, high-speed operation at over 200 m/min is also possible.

   ● Compact
   The external diameter of the ball nut is 30% smaller than our existing models. Compact configurations are possible for low-profile XY tables as well as for other devices and equipment.

   ● Grease fitting provided as standard equipment
   The ball screws with shaft diameters equal to or less than ø25 are equipped with a grease fitting (M5 × 0.8) as a standard. Lubrication ports are provided in 2 places for ease of maintenance. The ball screws can be easily connected to an integrated lubrication system.

2. Specifications

   1. Ball recirculation system
      Fig. 2 shows the structure of the end-deflector recirculation system.

   2. Accuracy grade and axial play
      The available standard accuracy grade and axial play are as follows. Please consult NSK for other grades.

      | Accuracy grade  | Axial play          |
      |-----------------|---------------------|
      | C0, C1, C2, C3, C5, Ct7 | Z, 0 mm (preloaded); T, 0.005 mm or less; S, 0.020 mm or less; N, 0.050 mm or less |

3. Design precautions
   When designing the shaft end of a ball screw which diameter is 25 mm or less, or 32 mm or over, and the lead is the same as its shaft diameter, one end of the screw must meet either one of the following conditions. If not, we cannot install the ball nut on the screw shaft.
   • Cut the ball groove through to the shaft end.
   • The diameters of bearing journals and the gear or pulley seat must be less than the root diameter of ball groove *dr* specified on the dimension table.

4. Product categories
   End deflector type ball screws have the model as follows.

5. Structure of model number and reference number
   The following describe the structure of “Model number” and “Reference number for ball screw”.

6. Design precautions
   When designing the shaft end of a ball screw which diameter is 25 mm or less, or 32 mm or over, and the lead is the same as its shaft diameter, one end of the screw must meet either one of the following conditions. If not, we cannot install the ball nut on the screw shaft.
   ● Cut the ball groove through to the shaft end.
   ● The diameters of bearing journals and the gear or pulley seat must be less than the root diameter of ball groove *dr* specified on the dimension table.

For general precautions regarding ball screws, refer to “Design Precautions”(page B83) and “Handling Precautions”(page B103).

5. Structure of model number and reference number
   The following describe the structure of “Model number” and “Reference number for ball screw”.

Model number
   BSS 10 10 - 2E
   Nut model: BSS
   Screw shaft diameter (mm)
   Effective turns of balls
   Lead (mm)

Reference number for ball screw
   H 10 01 - **
   Product code
   Screw shaft diameter (mm)
   Effective threaded length (in the unit of 100 mm)
   NSK design serial number
   Preload code: No code, non-preload; P, P-preload (page B6)
For ball screws with shaft diameters less than ø25, the standard Compact FA PSS type can be available.

Note: 1) The axial rigidity \(X\) in the table above is a theoretical value derived from elastic displacement between screw grooves and balls when axial load is applied to a ball nut for which preload is set at 5% of the basic dynamic load rating (C).

For ball screws with shaft diameters less than ø25, the standard Compact FA PSS type can be available.

2) Dimensions in parentheses are for flat nut configurations.
### Screw shaft diameter $d = 32$ mm

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Shaft dia.</th>
<th>Lead</th>
<th>Ball dia.</th>
<th>Ball circle dia.</th>
<th>Root dia.</th>
<th>Effective turns of balls</th>
<th>Basic load rating (N)</th>
<th>Axial rigidity $K$ (N/μm)</th>
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<tbody>
<tr>
<td></td>
<td>$d$</td>
<td>$l$</td>
<td>$D_1$</td>
<td>$d_1$</td>
<td>$d$</td>
<td></td>
<td>$C_d$</td>
<td>$C_a$</td>
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<tr>
<td>BSS3205-4E</td>
<td>32</td>
<td>5</td>
<td>3.175</td>
<td>32.5</td>
<td>29.2</td>
<td>4</td>
<td>14 200</td>
<td>41 400</td>
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<tr>
<td>BSS3210-6E</td>
<td>10</td>
<td>12</td>
<td>5.556</td>
<td>33</td>
<td>27.2</td>
<td>6</td>
<td>43 300</td>
<td>111 000</td>
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<td>36 700</td>
<td>90 800</td>
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<td>716</td>
</tr>
<tr>
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<td>27.2</td>
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<td>15 300</td>
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<td>BSS3224-2E</td>
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<td>15 300</td>
<td>32 400</td>
<td>232</td>
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<td>34 100</td>
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<td>10</td>
<td>6.35</td>
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<td>30.4</td>
<td>6</td>
<td>55 200</td>
<td>142 000</td>
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<td>6.35</td>
<td>37</td>
<td>30.4</td>
<td>6</td>
<td>55 200</td>
<td>142 000</td>
<td>959</td>
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</table>

### Screw shaft diameter $d \geq 36$ mm

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Nut entire length</th>
<th>Nut diameter</th>
<th>Seal section diameter</th>
<th>Flange diameter</th>
<th>Flange width</th>
<th>Nut length</th>
<th>Notched flange</th>
<th>Bolt hole PCD</th>
<th>Bolt hole dimension</th>
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<td>BSS3620-5E</td>
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<td>94</td>
<td>128</td>
<td>96</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The axial rigidity $K$ in the table above is a theoretical value derived from elastic displacement between screw grooves and balls when axial load is applied to a ball nut for which preload is set at 3% of the basic dynamic load rating ($C_d$).