

B-3-2.5 High-speed Low-noise Deflector Recirculation Ball Screws

1. Features

Deflector (bridge) recirculation allows for the outer diameter of the nut to be extremely small. With optimizations to keep ball recirculation smooth, technology to reduce impact forces between balls, and specialized ball groove specifications to lower noise from ball travel by approximately 4dB(A) compared to conventional bridge deflectors, these high-speed, low-noise ball screws offer smooth and stable operating characteristics. In addition, revised internal designs provide higher load capacity for select sizes.

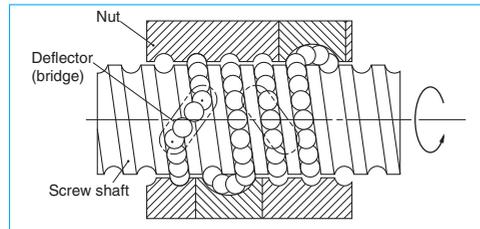


Fig. 1 Structure of deflector(bridge) recirculation system

Table 1 Accuracy grade and axial play

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

2. Specifications

(1) Ball recirculation system

Deflector (bridge) recirculation provides a compact nut outer diameter with relatively small leads. The structure of the recirculation system is shown in Fig. 1.

(2) Accuracy grade and axial play

The available standard accuracy grades and axial play are shown in Table 1. Please consult NSK for other grades.

(3) Allowable *d·n* value and the criterion of maximum rotational speed

The allowable *d·n* value and criterion of maximum rotational speed are shown below. Please consult NSK if the rotational speed exceeds the permissible range below.

Allowable *d·n* value: $\leq 160\,000$

(For models SFYD6320, ZFYD6320, SFYD6330, and ZFYD6330: $\leq 150\,000$)

Standard of rotational speed :5 000 min⁻¹

Note: Please also review the critical speed. Refer to "Technical Description: Permissible Rotational Speed" (page B47) for details.

Table 2

Nut	Shape	Flange shape	Preload
SFYD		Compliant with DIN standards. (Other shapes are also available.)	Nopreload, Slight axial play
ZFYD			Z-preload (medium preload)

3. Lineup

High-speed, low-noise deflector (bridge) recirculation ball screws are available with the preload/clearance configurations shown in Table 2.

4. Design Precautions

When designing the screw shaft end, 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.

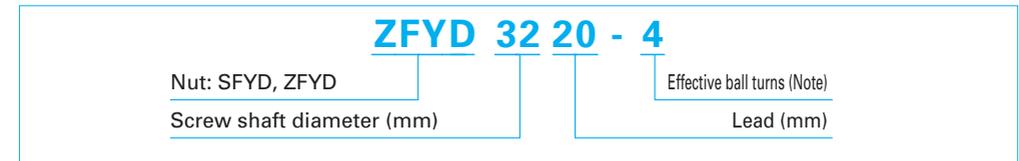
- The diameters of bearing journals and the gear or pulley seat must be less than the root diameter of ball groove *d*, specified in the dimension tables.

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

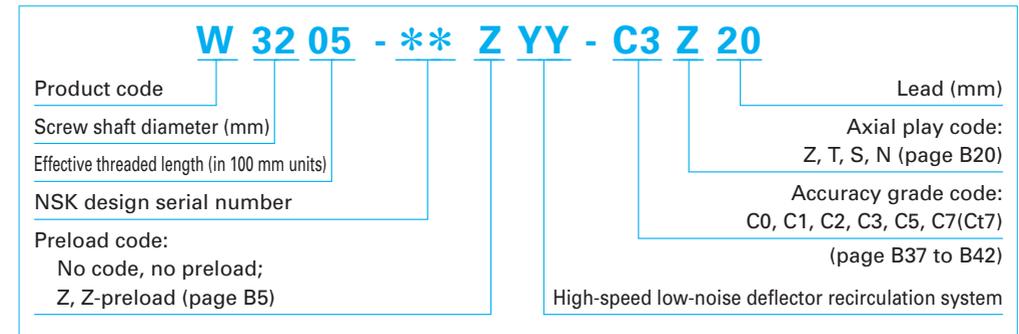
The following explains the codes used in model numbers and ball screw reference numbers.

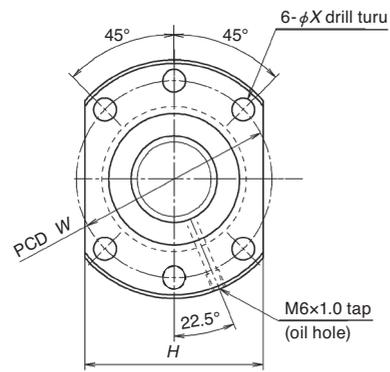
◇Model number



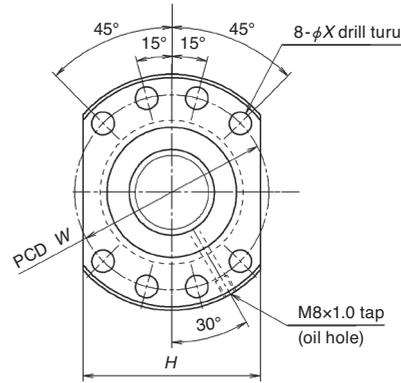
Note: In ZFYD, the number here is twice the effective ball turns.

◇Reference number for ball screws

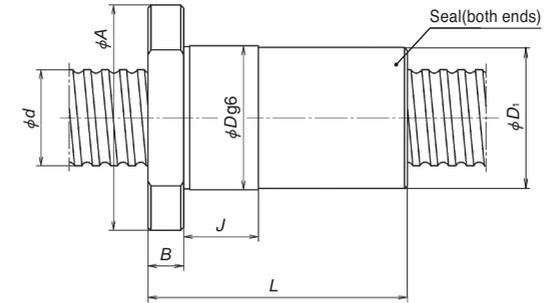




SFYD32, ZFYD32 (Screw shaft diameter d=32mm)



SFYD40, ZFYD40 (Screw shaft diameter d=40mm)
SFYD50, ZFYD50 (Screw shaft diameter d=50mm)
SFYD63, ZFYD63 (Screw shaft diameter d=63mm)



Model No.	Preload	Shaft dia. <i>d</i>	Lead <i>l</i>	Ball dia. <i>D_w</i>	Root dia. <i>d_r</i>	Effective ball turns Turns × Circuits	Basic load ratings (N)	
							Dynamic <i>C_d</i>	Static <i>C_{st}</i>
SFYD 3210-5	Clearance Z	32	10	5.556	27.7	1×5	41 900	83 200
ZFYD 3210-10						1×5	41 900	83 200
SFYD 3215-3	Clearance Z	32	15	5.556	27.7	1×3	26 800	49 700
ZFYD 3215-6						1×3	26 800	49 700
SFYD 3220-2	Clearance Z	32	20	5.556	27.7	1×2	18 700	32 900
ZFYD 3220-4						1×2	18 700	32 900
SFYD 4010-4	Clearance Z	40	10	7.144	34.6	1×4	52 400	103 000
ZFYD 4010-8						1×4	52 400	103 000
SFYD 4015-3	Clearance Z	40	15	7.144	34.6	1×3	40 700	77 100
ZFYD 4015-6						1×3	40 700	77 100
SFYD 5010-4	Clearance Z	50	10	7.144	44.6	1×4	59 100	133 000
ZFYD 5010-8						1×4	59 100	133 000
SFYD 5020-4	Clearance Z	50	20	7.938	44	1×4	67 200	145 000
ZFYD 5020-8						1×4	67 200	145 000
SFYD 6310-5	Clearance Z	63	10	7.144	57.6	1×5	81 900	220 000
ZFYD 6310-10						1×5	81 900	220 000
SFYD 6320-5	Clearance Z	63	20	9.525	56	1×5	153 000	385 000
ZFYD 6320-10						1×5	153 000	385 000
SFYD 6330-3	Clearance Z	63	30	9.525	56	1×3	97 700	230 000
ZFYD 6330-6						1×3	97 700	230 000

Notes: 1. Values for axial rigidity *K* above are theoretical values obtained from the elastic deformation between the screw groove and ball when axial load is 30% of the basic dynamic load rating *C_d*, for clearance (no preload), 5% for P-preload. Refer to the "Technical Description" on page B56 if axial load and preload differ from the conditions above or if deformation of the ball nut body must be considered.

2. Mountings listed are based on dimensions specified by the German Institute for Standardization (DIN). Mounting dimensions can be adjusted to match other ball screws, etc. Please contact NSK for details.

Unit: mm

Axial rigidity <i>K</i> (N/μm)	Ball nut dimensions								
	Nut total length <i>L</i>	Nut diameter <i>D</i>	Flange diameter <i>A</i>	Nut diameter <i>D₁</i>	Diameter g6 <i>J</i>	Flange width <i>B</i>	Flange dimension <i>H</i>	Bolt hole dimension <i>X</i>	Bolt hole PCD <i>W</i>
537	94	50	80	(49)	40	12	62	9	65
836	156								
326	88	50	80	(49)	40	12	62	9	65
508	148								
218	81	50	80	(49)	40	12	62	9	65
339	132								
520	87	63	93	(62)	40	14	70	9	78
811	137								
393	95	63	93	(62)	40	14	70	9	78
612	155								
636	90	75	110	(74)	40	16	85	11	93
990	140								
633	140	75	110	(74)	40	16	85	11	93
984	240								
989	104	90	125	(89)	40	18	95	11	108
1 540	164								
1 248	166	95	135	(94)	40	20	100	13.5	115
1 943	286								
757	157	95	135	(94)	40	20	100	13.5	115
1 179	269								

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