B-3-1.1 HMD Type for High-Speed Machine Tools

This product is patented by NSK.

1. Features

● High speed

The permissible rotational speed (d·n value) has greatly increased to 160 000 compared with 135 000 of the HMC type.

● Low noise

Noise reduced by 5 dB or more compared with the HMC type ball screws for high-speed machine tools because of the end-deflector and middle-deflector systems.

● Nut mounting dimensions

The ball nut diameters are the same as those of the HMC type.

2. Specifications

(1) Recirculation system

Fig.1 shows the structure of the middle-deflector recirculation system of the HMC type.

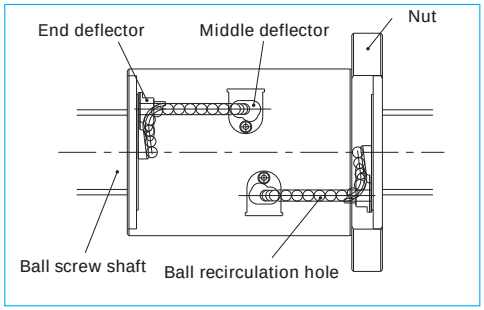


Fig. 1 Structure of middle-deflector recirculation system

(2) Accuracy grade and axial play

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

Table 1 Accuracy grade and axial play

Accuracy grade	C3, C5
Axial play	0 mm (Preloaded product)

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

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

Allowable d·n value: 160 000 or less

Criterion of maximum rotational speed

: 4 000 min^{-1}

Note: Please also review the critical speed. See "Technical Description: Permissible rotational speed" (Page B51) for details.

(4) Options

● For twin-drive systems (Refer to page B143)

Upon request, the variations in lead accuracy and preload torque between two ball screws of a pair of the TW series are controlled for the further improvement of the reliability.

● Hollow shaft ball screw (Refer to page B144)

The temperature rise and measures against thermal expansion of ball screw driving mechanism are the most challenging for high-speed machine tools. For the HMD type ball screws, we recommend to utilize the hollow for forced cooling system.

(5) Seal

Compact, thin plastic seal is available. Nut outside diameter is compact compare with the return tube recirculation system.

3. Design precautions

For general precautions regarding ball screws, refer to "Design Precautions" (Page B84) and "Handling Precautions" (Page B103).

4. Product categories

The HMD type has a model as follows.

Table 2 HMD type product categories

Nut models	Shape	Flange shape	Nut shape	Preload system
EM		Flanged Circular Ⅱ	Circular	Z Preload (medium preload)

5. Example of model number in dimension tables

A structure of "Model number" and "Reference number for ball screw" are as follows.

◇Model number

EM 40 20 - 6E

- EM — Nut model : EM
- 40 — Screw shaft diameter (mm)
- 20 — Lead (mm)
- 6E — Effective turns of balls

◇Reference number for ball screw

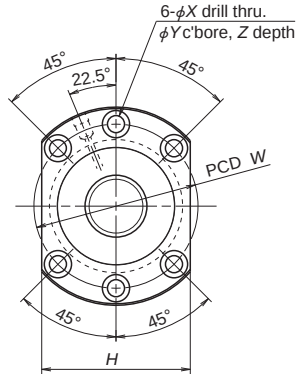
W 40 07 - ** Z M X T - C5 Z 20

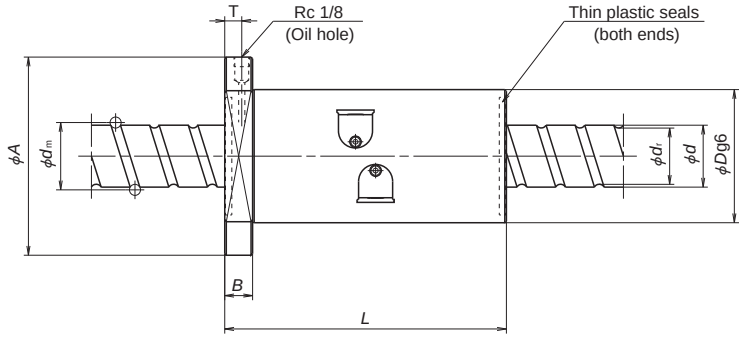
- W — Product code
- 40 — Screw shaft diameter (mm)
- 07 — Effective threaded length (in the unit of 100 mm)
- ** — NSK design serial number
- Z — Preload code: Z; Z preload
- M — Middle-deflector recirculation system
- X — Ball screw specification/appearance
- T — Hollow shaft specification
- C5 — Accuracy grade: C3 or C5
- Z — Axial play code: Z
- 20 — Lead (mm)

6. Handling Precautions

Maximum operating temperature: 80°C

If using NSK K1, operating temperature should not exceed 50°C. Refer to "Designing Precautions" (Page B84).





Unit: mm

Model No.	Shaft dia. *d*	Lead *l*	Ball dia. D_w	Ball circle dia. d_m	Root dia. d_r	Basic load rating(N) Dynamic C_a	Basic load rating(N) Static C_{0a}	Axial rigidity *K* (N/μm)
EM4016-4E	40	16	7.144	41.5	34.1	57100	130000	1020
EM4020-6E		20	6.350	41	34.4	66900	165000	1340
EM4025-6E		25	7.144	41.5	34.1	79100	191000	1370
EM4030-6E		30	7.144	41.5	34.1	79100	191000	1350
EM4516-4E	45	16	7.144	46.5	39.1	59600	145000	1060
EM4520-6E		20	6.350	46	39.4	69100	186000	1470
EM4525-6E		25	7.144	46.5	39.1	82500	213000	1510
EM5016-4E	50	16	7.144	51.5	44.1	61800	160000	1150
EM5020-6E		20	6.350	51	44.4	73200	206000	1600
EM5025-6E		25	7.144	51.5	44.1	85600	235000	1620
EM5030-6E		30	7.144	51.5	44.1	85600	235000	1630
EM6316-4E	63	16	9.525	65	55.2	11100	339000	1600

Ball nut dimensions										Max. feeding speed
Nut length *L*	Nut dia. *D*	Flange dia. *A*	Flange width *B*	Flange size *H*	Bolt hole size *X*	Bolt hole size *Y*	Bolt hole size *Z*	Bolt hole PCD *W*	Oil hole position *T*	(m/min)
160	86	128	18	96	11	17.5	11	106	11	64
150										80
182										100
213										120
160	92	134	18	102	11	17.5	11	112	11	56
150										70
182										88
160	98	140	18	107	11	17.5	11	118	11	51
150										64
182										80
213										96
170	122	180	28	138	18	26	17.5	150	14	40

Remarks 1. The right turn screw is standard. Please consult NSK for left turn screw.
2. Rigidity listed under the K column is when a 5% dynamic load rating is applied as preload.