

B-3-1.6 TW Series for Twin-Drive Systems

(1) Features

Variations in lead accuracy and preload torque between two ball screws, which consists of a unit of TW Series, are controlled, resulting improved travel accuracy and ball screw operating lifetime. Fig. 1 shows measures variation in lead accuracy while Fig. 2 displays an example of variation in thermal expansion between the two ball screws. Fig. 3 is a schematic diagram comparing travel accuracy between the TW Series and conventional model.

● High rigidity and long lifetime

Twin-drive systems are superior to single-drive systems in system rigidity, supporting the design of long-life feeding mechanism even if they make the shaft diameter one size smaller.

● High responsiveness to positioning commands

Twin-drive systems permit the use of screw shaft diameters that are one size smaller, thereby reducing screw shaft inertia by up to 50%, offering high responsiveness to positioning commands.

● Improved high-speed capability and noise level

Twin-drive systems allow the use of smaller screw diameters, resulting in no increase in the level of noise. The end-deflector recirculation system significantly improves high-speed capability and noise level compared with the existing return tube recirculation system, offering high-speed feeding of up to 1200 mm/min (shaft dia. 40 mm, lead 30 mm, rotational speed 4000 min⁻¹).

(2) Specifications

Table 1 Specifications of twin-drive systems

| | |
|-----------------------|--|
| Recirculation systems | End-deflector recirculation system, Return tube system, Deflector system |
| Shaft dia. | φ 32 – 63 mm |
| Lead | 10 – 30 mm |
| Accuracy grade | C5 |
| Screw shaft length | 3 m or less |

(3) Optional specifications

- Hollow shaft ball screw
- Provides high accuracy through the use of forced cooling. Please refer to hollow shaft ball screw (page B144) for more details.

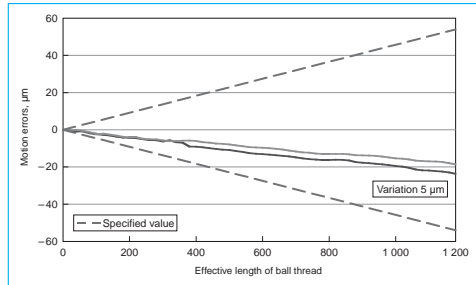


Fig. 1 Example of measured variation in lead accuracy

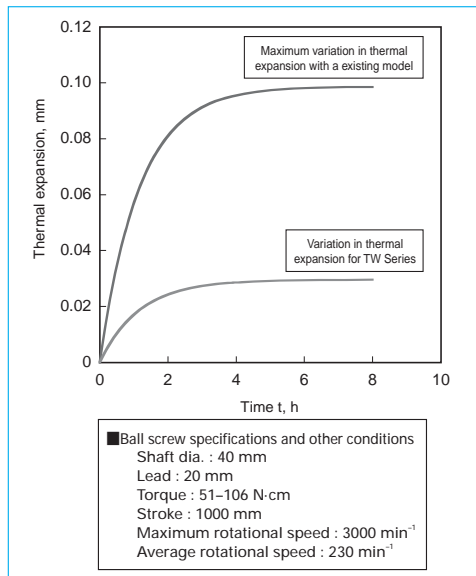


Fig. 2 Calculation example of the variation of thermal expansion

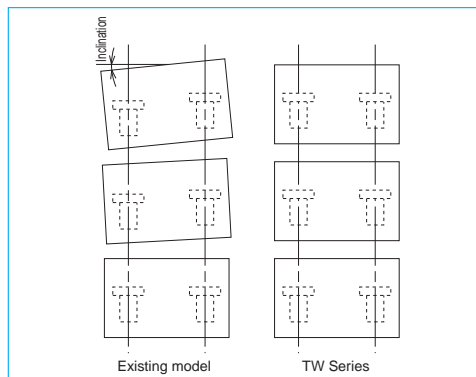


Fig. 3 Schematic diagram of travel accuracy

B-3-1.7 Hollow Shaft Ball Screw for high accuracy machine tools

The increase in speed of the feeding mechanism for highly accurate positioning may require some measures against thermal expansion of the ball screw (forced cooling using hollow ball screw). NSK standardized hollowed screw shafts and shaft ends configuration (sealing section and support bearing seat). NSK recommends this as the most effective measure against thermal expansion.

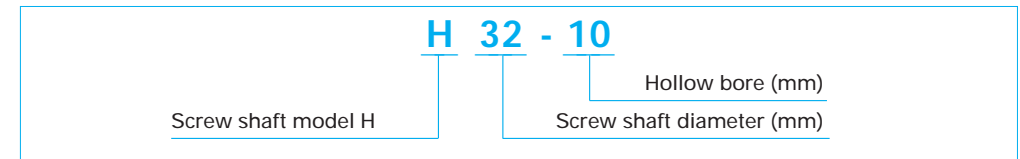
1. Features

- Stable positioning accuracy
Suppresses expansion of the ball screw shaft by rising temperature, and provides stable, precise positioning.
- Prevents displacement of various sections
Minimizes deformation of the ball screw support bearings as well as of the machine base which is caused by thermal expansion of ball screw. Forced cooling keeps the heat from spreading to other sections, and prevents the processing table from deforming due to heat.
- Reduces warm-up time
Temperature does not rise high, therefore cuts machine warm-up period.
- Maintains lubricant's effect
Removes heat from the ball screw, deterring lubricant deterioration.
- Easy designing for installation
Use support bearing unit exclusive for NSK ball screws (high load capacity for machine tools, see Page B449) and seal unit (Page B147) to standardized shaft end. This makes designing of mounting ball screw easy.

3. Model example of dimension table

A model number that indicates specification factors is structured as shown below.

◇Example of model



2. Design precautions

Refer to HMC type, end-deflector recirculation system, return tube recirculation system, and deflector recirculation system for ball screw specifications. If the overall ball screw length exceeds 3000 mm, contact NSK. For general precautions regarding ball screw, refer to "Design Precautions" (Page B84) and "Handling precautions" (Page B497).

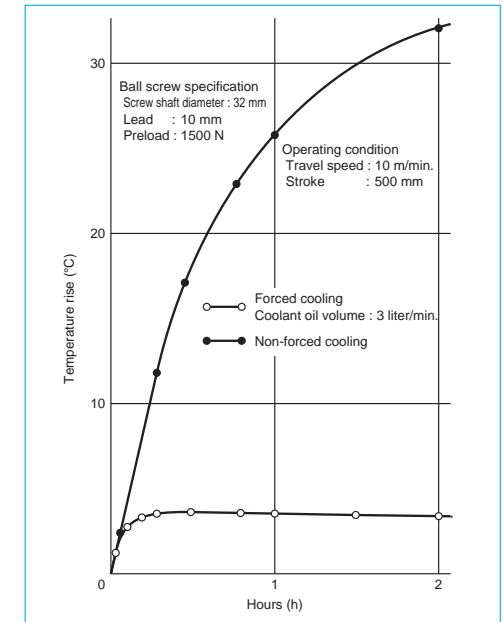
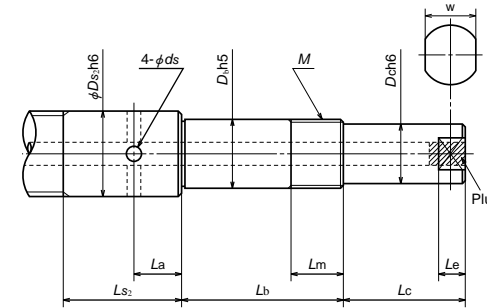
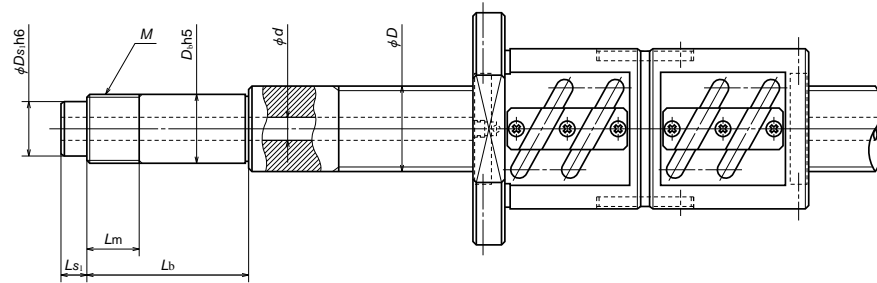
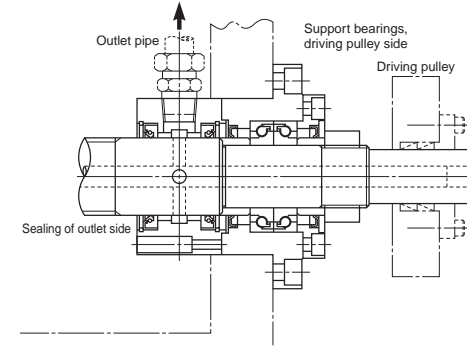
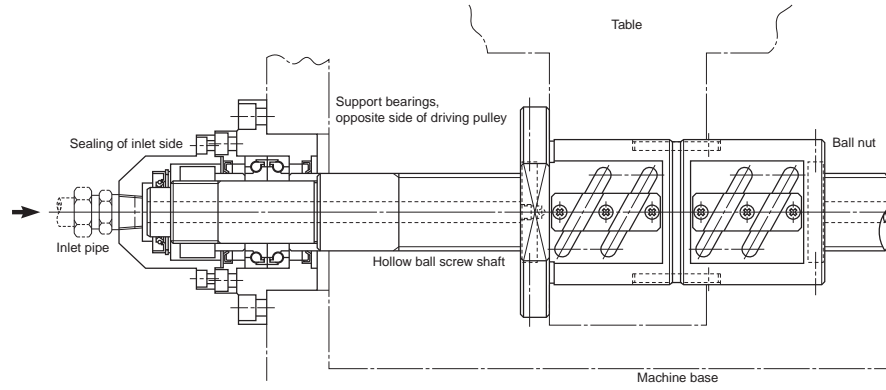


Fig. 1 Effect of forced cooling by hollow shaft ball screw

4. Example installation and standard dimensions



| Hollow shaft ball screw Model No. | Screw shaft | | Bearing seat | | | | Sealing | | | | | |
|-----------------------------------|-------------|----------|-------------------------|----------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|----------------|----|
| | Diameter D | Hollow d | Diameter D _b | Lock nut | | | Inlet | | Outlet | | | |
| | | | | M | L _m | L _b | D _{S1} | L _{S1} | D _{S2} | L _{S2} | L _a | ds |
| H32-10 | 32 | 10 | 25 | M25x1.5 | 26 | 89 | 20 | 15 | 32 | 60 | 25 | 6 |
| | | | | | | 104 | | | | | | |
| | | | | | | 119 | | | | | | |
| H40-12 | 40 | 12 | 30 | M30x1.5 | 26 | 89 | 25 | 15 | 40 | 60 | 25 | 7 |
| | | | | | | 104 | | | | | | |
| | | | | | | 119 | | | | | | |
| H50-15 | 50 | 15 | 40 | M40x1.5 | 30 | 92 | 32 | 15 | 50 | 65 | 27 | 8 |
| | | | | | | 107 | | | | | | |
| | | | | | | 122 | | | | | | |

Remarks 1. Please consult NSK for other models.

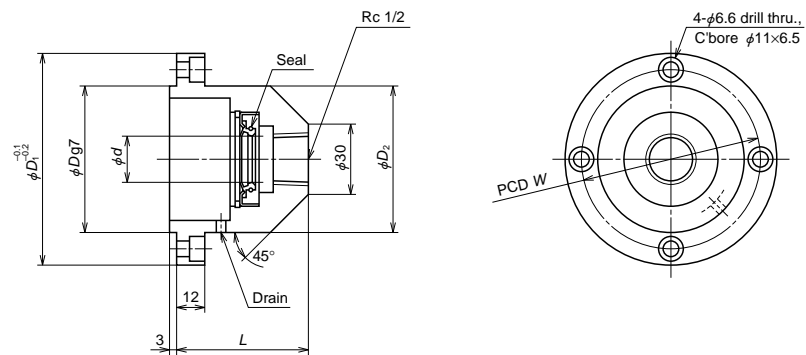
| Drive side | | Spanner flats | | Applicable support unit | Used bearing | Equipped seal unit | |
|----------------|----------------|---------------|----------------|---|--|--------------------|---------------------|
| D _c | L _c | w | L _e | | | Shaft end | Shaft outer surface |
| 20 | 40 | 17 | 8 | WBK25DF-31 WBK25DFD-31 | 25TAC62BDFDC10PN7A 25TAC62BDFDC10PN7A (25TAC62BDFFC10PN7A) | WSK20A-01 | WSK32B-01 |
| 25 | 50 | 22 | 10 | WBK30DF-31 WBK30DFD-31 | 30TAC62BDFDC10PN7A 30TAC62BDFDC10PN7A (30TAC62BDFFC10PN7A) | WSK25A-01 | WSK40B-01 |
| 35 | 70 | 30 | 13 | WBK40DF-31 WBK40DFD-31 WBK40DF-31 | 40TAC72BDFDC10PN7A 40TAC72BDFDC10PN7A 40TAC72BDFFC10PN7A | WSK32A-01 | WSK50B-01 |

Unit: mm

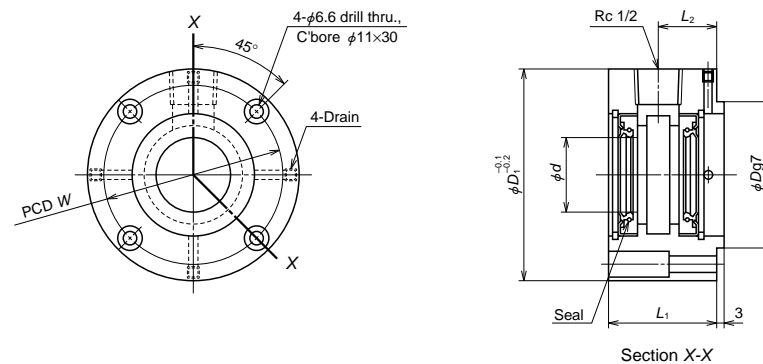
5. Seal units for hollow ball screw shaft (available by order)

This is an exclusive joint for coolant of the hollow ball screw shaft.

A Type
(for shaft end)



B Type
(for shaft outer surface)



Unit: mm

| Reference number | d | D | D_1 | D_2 | L | W | Fixing bolt |
|------------------|-----|-----|-------|-------|-----|-----|-------------|
| WSK20A-01 | 20 | 57 | 85 | 57 | 56 | 70 | M6 |
| WSK25A-01 | 25 | 57 | 85 | 57 | 56 | 70 | M6 |
| WSK32A-01 | 32 | 69 | 95 | 67 | 61 | 80 | M6 |

Unit: mm

| Reference number | d | D | D_1 | L_1 | L_2 | W | Fixing bolt |
|------------------|-----|-----|-------|-------|-------|-----|-------------|
| WSK32B-01 | 32 | 57 | 85 | 46 | 25 | 70 | M6 |
| WSK40B-01 | 40 | 57 | 85 | 46 | 25 | 70 | M6 |
| WSK50B-01 | 50 | 69 | 95 | 49 | 27 | 80 | M6 |

◇ Handling precautions

- Use NSK support unit (high load capacity for machine tools in Page B449) for installation in order to maintain the eccentricity between screw shaft and seal unit.
- Apply grease to the lip section for protection

- at the time of installation to the ball screw.
- Make certain that the drain holes (one for A Type, four for B Type) of the seal unit directly face downward when the unit is installed.