

Ball Screw Spline BNS

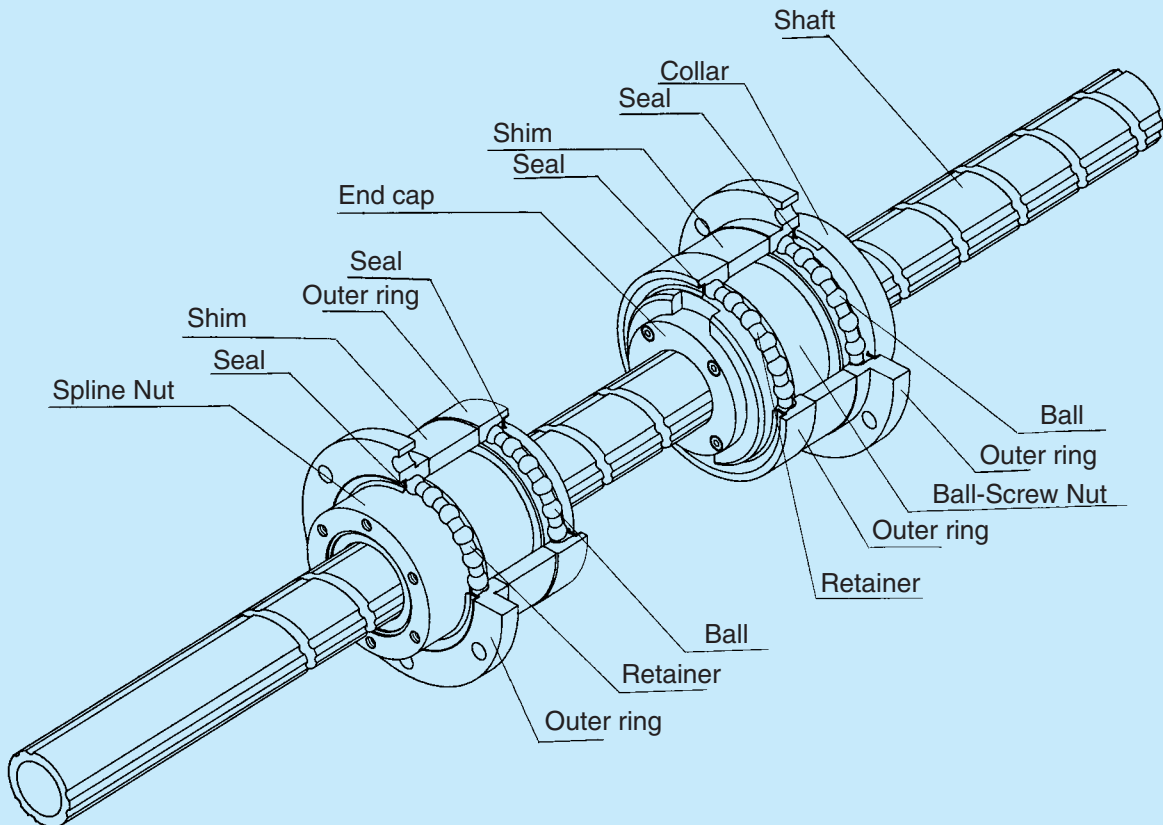


Fig. 1 Construction of the Ball Screw Spline

Construction and Features

The Ball-Screw Spline contains Ball Screw raceways and Ball Spline grooves crossing one another. The Nuts of the Ball Screw and Ball Spline have dedicated support bearings embedded on their exterior. Therefore, the Ball-Screw Spline is a stroke-rotation unit.

The Ball-Screw Spline can simultaneously achieve three modes of motion (rotational, linear and spiral) on a single shaft by rotating and stopping the Ball Screw and Spline Nuts.

The Ball-Screw Spline is best suited for applications in devices requiring both rotational and linear motion in a single unit, including the Z-axis of scalar robots, assembly robots, automatic loaders, and machining-center ATC.

Zero axial clearance

The Ball Spline has an angular-contact structure that causes no backlash in the rotational direction, enabling precise positioning.

Lightweight and compact

The Nut and support bearing are formed into one unit, permitting a high-precision, compact design. Moreover, the low inertia resulting from use of the lightweight Nut enables sensitive response.

Simple installation

The Ball-Spline Nut is designed so that balls do not fall off if the Spline Nut is removed from the shaft, making installation simple.

Bolting to the housing is all that's required. The Rotating Nut system is ready to use. (H7 is the recommended tolerance for the housing inner diameter.)

Smooth movement with low noise

As the Ball Screw is based on an end-cap mechanism, smooth movement can be achieved with low noise.

Highly rigid support bearing

The support bearing on the Ball Screw side is designed to have a contact angle of 60°, ensuring high rigidity in the axial direction, while that on the Ball Spline side is designed to have a contact angle of 30°, ensuring high rigidity in the moment direction. These contact angles provide highly rigid support for the shaft.

The Ball-Screw Spline comes with rubber seals attached as a standard accessory. These seals prevent the entry of foreign matter.

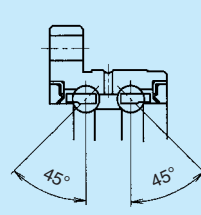


Fig. 2 Construction of the Type BNS-A Support Bearing

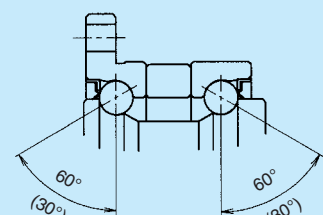


Fig. 3 Construction of the Type BNS Support Bearing

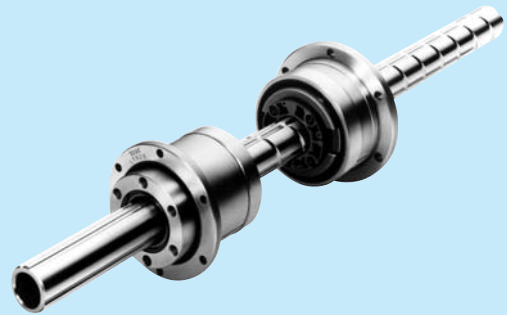
Types

Type BNS-A



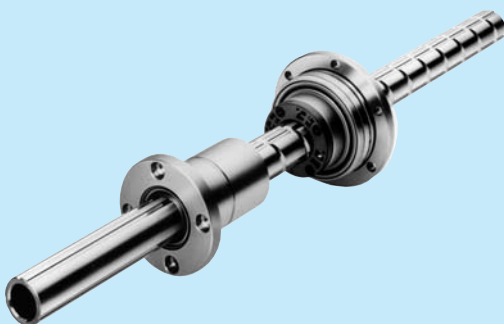
[Compact type: For rotational motion + linear motion]

Type BNS



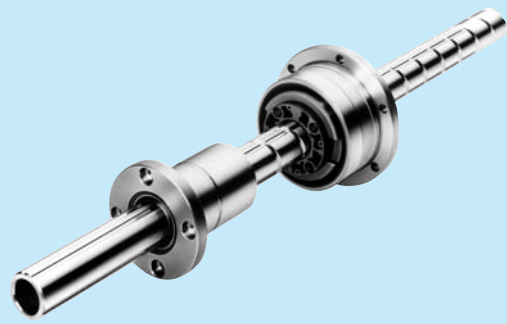
[Heavy-load type: For rotational motion + linear motion]

Type NS-A



[Compact type: For linear motion]

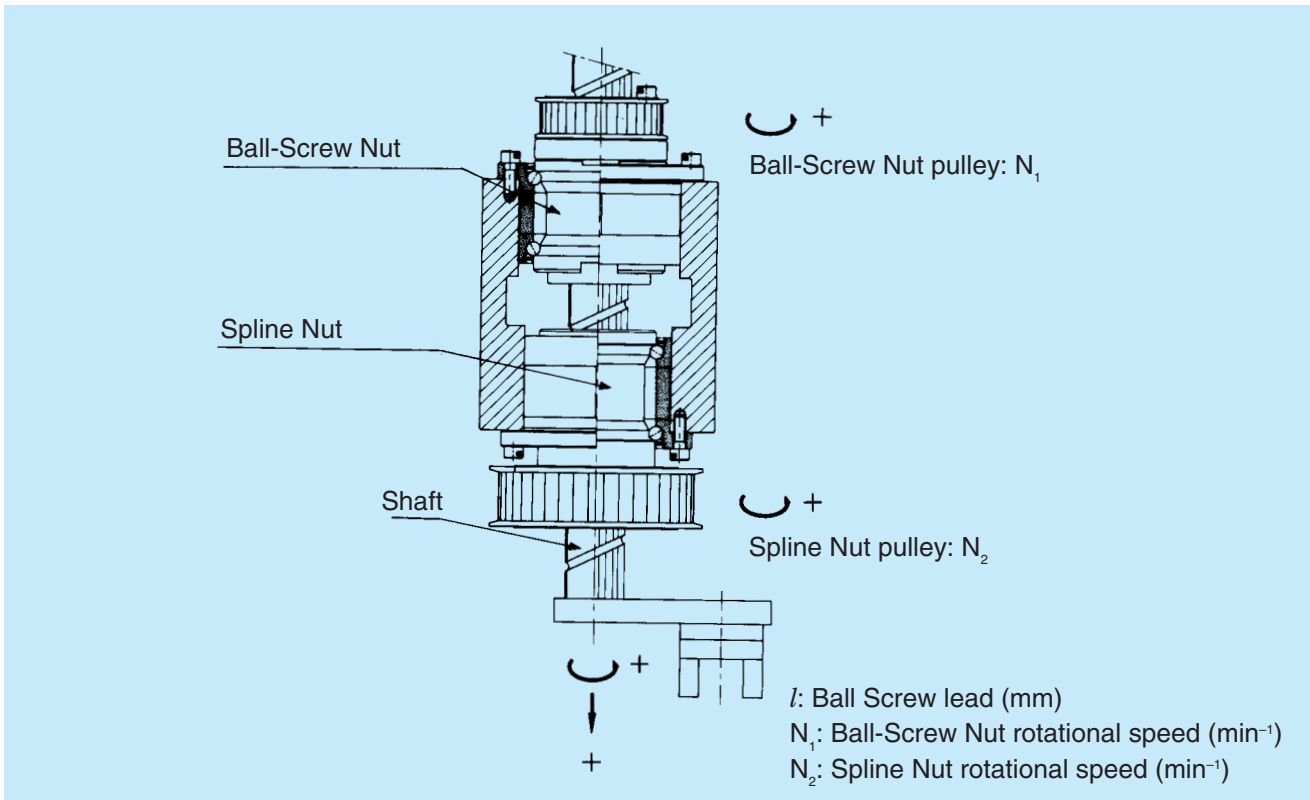
Type NS



[Heavy-load type: For linear motion]

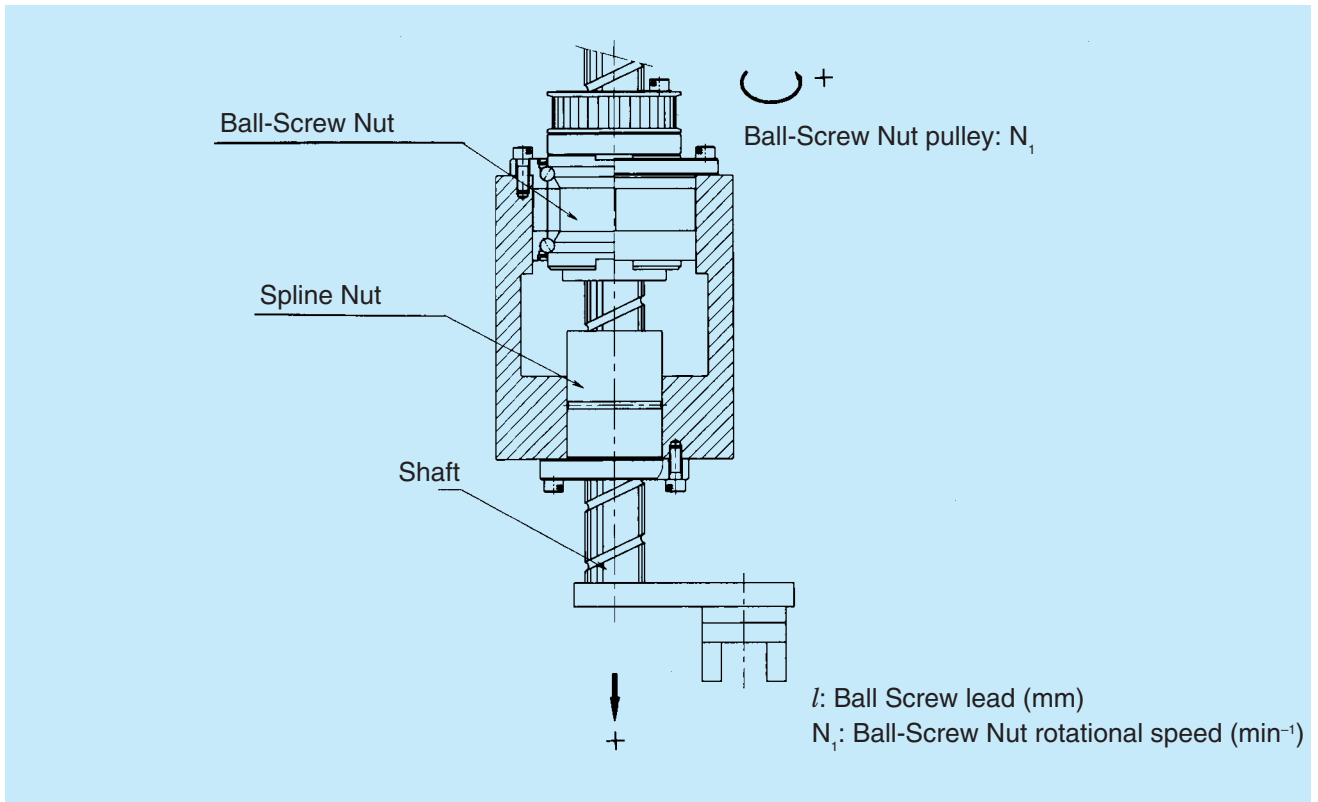
Operation Pattern

1. Type BNS Basic Operation



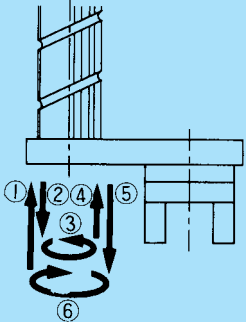
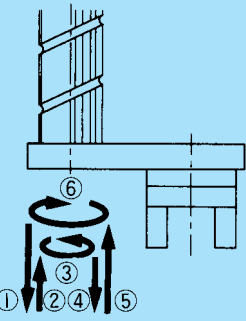
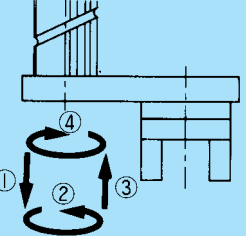
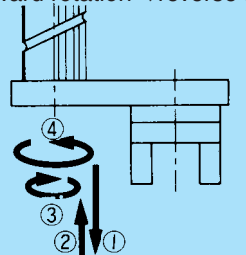
| Movement | Moving direction | Input | | Shaft movement | |
|-----------------|-----------------------|---------------------|-----------------------------|---|---|
| | | Ball Screw pulley | Ball Spline pulley | Vertical (speed) | Rotation (speed) |
| 1. Vertical | ① Vertical → downward | N_1 (forward) | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | Rotation → 0 | | | | |
| | ② Vertical → upward | $-N_1$ (reverse) | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | Rotation → 0 | | | | |
| 2. Rotation | ① Vertical → 0 | N_1 | N_2 (forward) | 0 | N_2 (forward) ($N_1 = N_2 \neq 0$) |
| | Rotation → forward | | | | |
| | ② Vertical → 0 | $-N_1$ | $-N_2$ (reverse) | 0 | $-N_2$ (reverse) ($-N_1 = N_2 \neq 0$) |
| | Rotation → reverse | | | | |
| 3. Spiral | ① Vertical → upward | 0 | N_2 ($N_2 \neq 0$) | $V = N_2 \times l$ | N_2 (forward) |
| | Rotation → forward | | | | |
| | ② Vertical → downward | 0 | $-N_2$ ($-N_2 \neq 0$) | $V = -N_2 \times l$ | $-N_2$ (reverse) |
| | Rotation → reverse | | | | |

2. Type NS Basic Operation

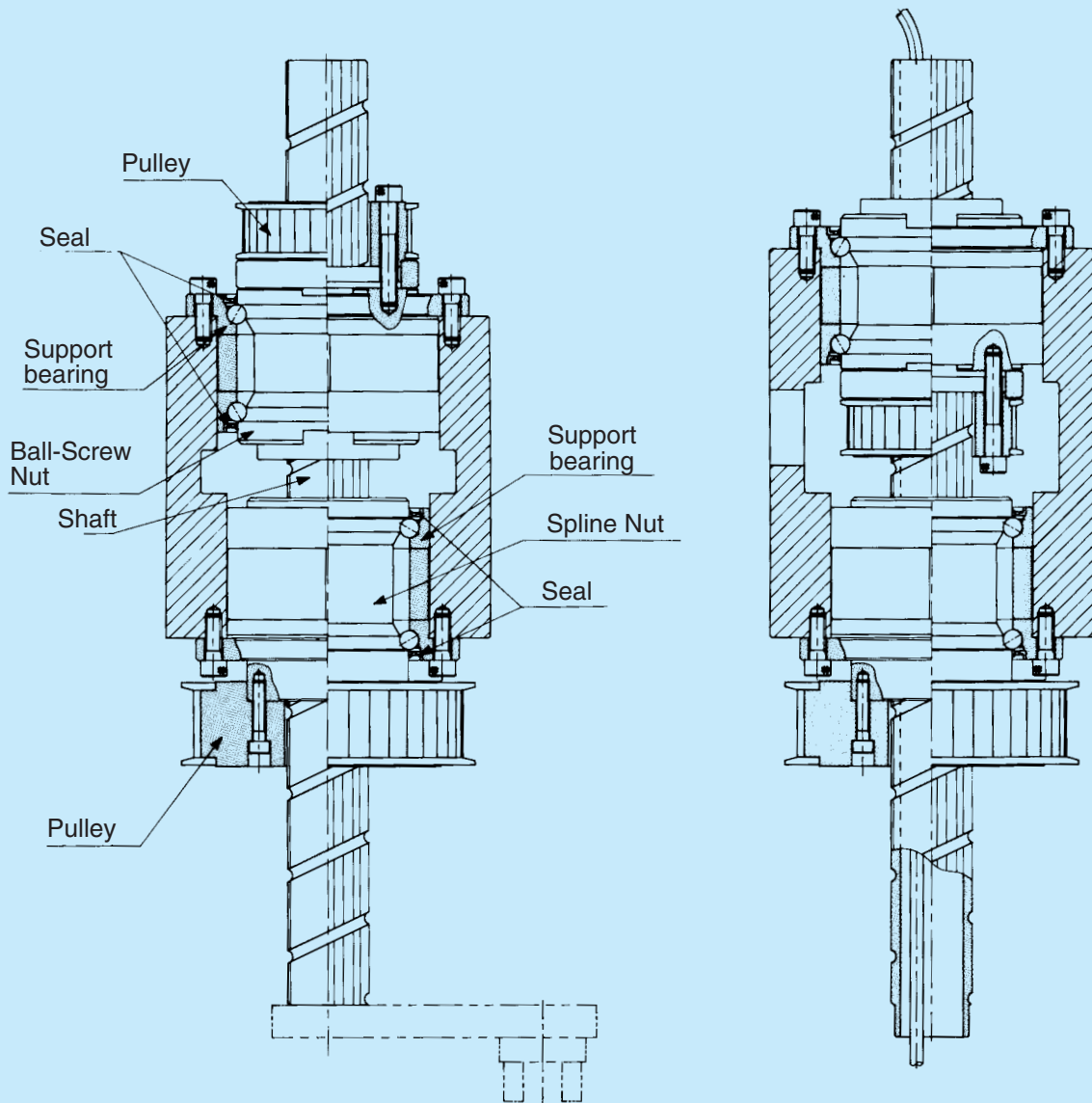


| Movement | Moving direction | Input Ball Screw pulley | Shaft movement Vertical (speed) |
|-----------------|---------------------|----------------------------|---|
| 1. Vertical | ① Vertical→downward | N_1 (forward) | $V = N_1 \times l$ ($N_1 \neq 0$) |
| | ② Vertical→upward | $-N_1$ (reverse) | $V = -N_1 \times l$ ($N_1 \neq 0$) |

3. Type BNS Applied Operation

| Movement | Moving direction | Input | | Shaft movement | | |
|--|------------------|-------------------|---------------------|---------------------|---|---|
| | | Ball Screw pulley | Ball Spline pulley | Vertical (speed) | Rotation (speed) | |
| 1. Upward→downward →forward rotation→upward →downward→reverse rotation  | ① | Vertical→upward | $-N_1$ (reverse) | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ② | Vertical→downward | N_1 (forward) | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ③ | Rotation→forward | N_1 | N_2 (forward) | 0 | N_2 (forward) ($N_1=N_2 \neq 0$) |
| | ④ | Vertical→upward | $-N_1$ | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ⑤ | Vertical→downward | N_1 | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ⑥ | Rotation→reverse | $-N_1$ | $-N_2$ (reverse) | 0 | $-N_2$ (reverse) ($-N_1=N_2 \neq 0$) |
| 2. Downward→upward →forward rotation→downward →upward→reverse rotation  | ① | Vertical→downward | N_1 | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ② | Vertical→upward | $-N_1$ | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ③ | Rotation→forward | N_1 | N_2 | 0 | N_2 ($N_1=N_2 \neq 0$) |
| | ④ | Vertical→downward | N_1 | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ⑤ | Vertical→upward | $-N_1$ | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ⑥ | Rotation→reverse | $-N_1$ | $-N_2$ | 0 | $-N_2$ ($-N_1=N_2 \neq 0$) |
| 3. Downward→forward rotation →upward→reverse rotation  | ① | Vertical→downward | N_1 | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ② | Rotation→forward | N_1 | N_2 | 0 | N_2 ($N_1=N_2 \neq 0$) |
| | ③ | Vertical→upward | $-N_1$ | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ④ | Rotation→reverse | $-N_1$ | $-N_2$ | 0 | $-N_2$ ($-N_1=N_2 \neq 0$) |
| 4. Downward→upward →forward rotation→reverse rotation  | ① | Vertical→downward | N_1 | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ② | Vertical→upward | $-N_1$ | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | ③ | Rotation→reverse | $-N_1$ | $-N_2$ | 0 | $-N_2$ ($-N_1=N_2 \neq 0$) |
| | ④ | Rotation→forward | N_1 | N_2 | 0 | N_2 ($N_1=N_2 \neq 0$) |

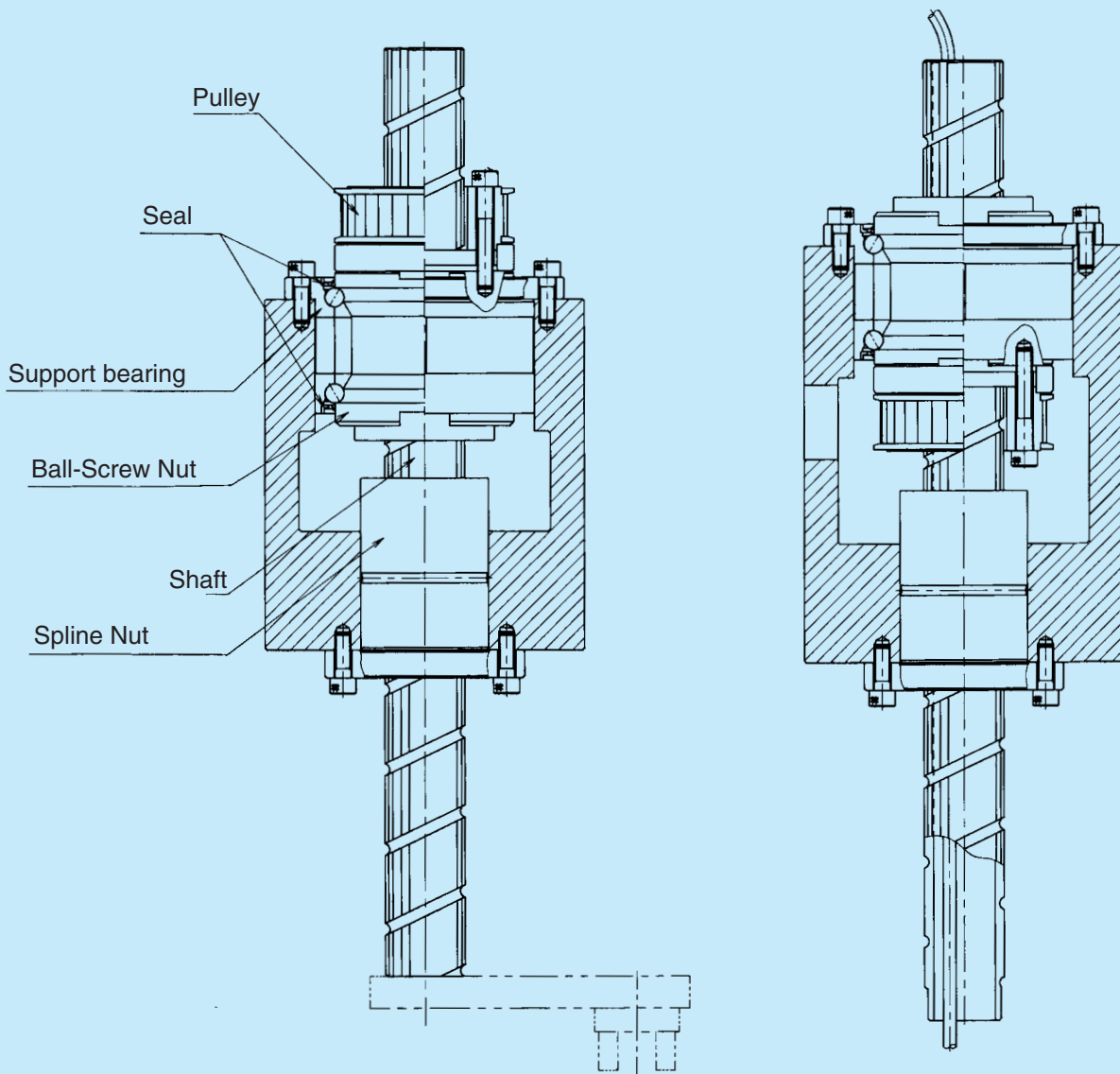
Sample Assembly



An example assembly. The pulleys for the Ball-Screw Nut and Ball-Spline Nut inputs are mounted in the “out/out” mode. The housing length can be minimized.

Assembly in which the Ball-Screw Nut pulley is installed in the housing

Fig. 4 Sample Assembly of Type BNS



Assembly in which the Ball-Screw Nut pulley is installed outside the housing.
The housing length can be minimized.

Assembly in which the Ball-Screw Nut pulley is installed in the housing

Fig. 5 Sample Assembly of Type NS

Accuracy

The Ball-Screw Spline is manufactured to the following specifications.

Ball Screw

Axial clearance : 0 max.

Lead accuracy : C5

(For details on the specifications, see page D-31.)

Ball Spline

Clearance in the rotational direction

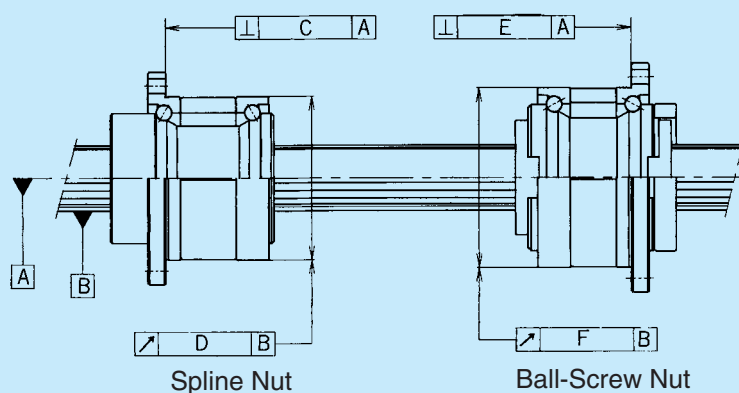
: 0 max. (CL: light preload)

(For details on the specifications, see page B-82 for type BNS and page B-69 for type NS.)

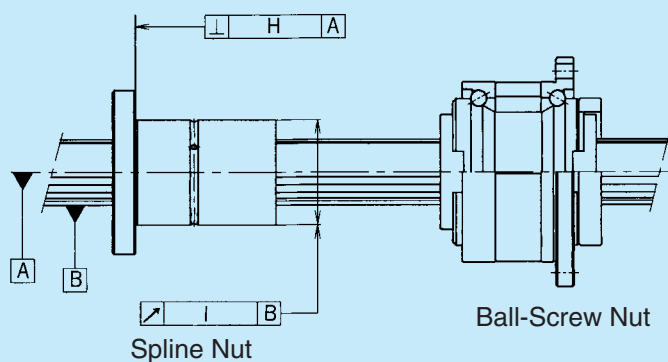
Accuracy grade : H

(For details on the specifications, see page B-33.)

Type BNS



Type NS



Unit: mm

| Model No. | C | D | E | F | H | |
|--------------------|-------|-------|-------|-------|-------|-------|
| BNS0812 NS 0812 | 0.014 | 0.017 | 0.014 | 0.016 | 0.010 | 0.013 |
| BNS1015 NS 1015 | 0.014 | 0.017 | 0.014 | 0.016 | 0.010 | 0.013 |
| BNS1616 NS 1616 | 0.018 | 0.021 | 0.016 | 0.020 | 0.013 | 0.016 |
| BNS2020 NS 2020 | 0.018 | 0.021 | 0.016 | 0.020 | 0.013 | 0.016 |
| BNS2525 NS 2525 | 0.021 | 0.021 | 0.018 | 0.024 | 0.016 | 0.016 |
| BNS3232 NS 3232 | 0.021 | 0.021 | 0.018 | 0.024 | 0.016 | 0.016 |
| BNS4040 NS 4040 | 0.025 | 0.025 | 0.021 | 0.033 | 0.019 | 0.019 |
| BNS5050 NS 5050 | 0.025 | 0.025 | 0.021 | 0.033 | 0.019 | 0.019 |

Lubrication

If grease is to be fed to the Ball-Screw Spline, a greasing plate must be assembled in the housing in advance.

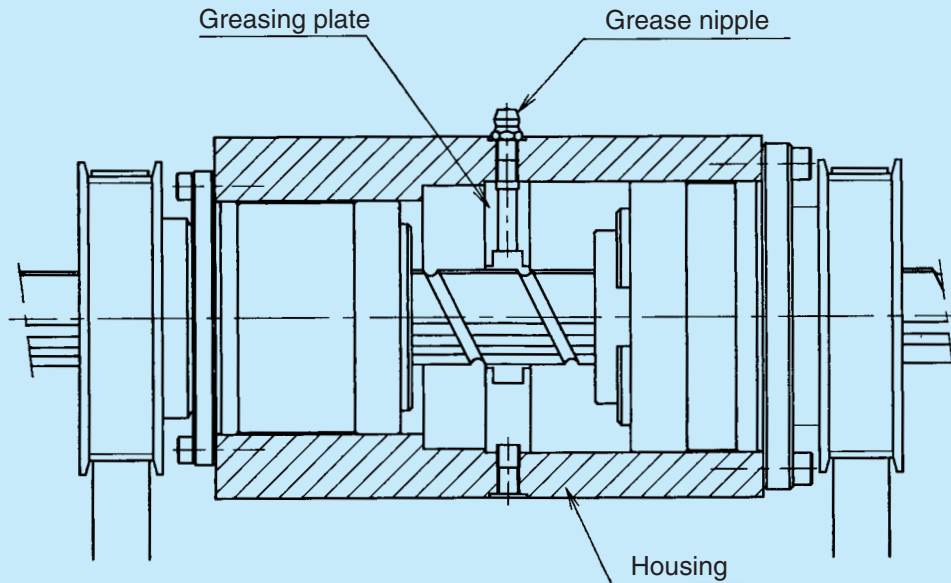


Fig. 6 Lubrication Method

Model-Number Coding

The chief specifications of the Ball-Screw Spline are indicated in the model number. When contacting us to receive a price quote or order a product, or for any other reason, specify the desired model number (given below) and provide any relevant drawings to ensure a prompt reply.

- Ball-Screw Spline
 $\frac{\text{BNS2020}}{(1)} + \frac{400L}{(2)}$

- (1) Model number
 (2) Shaft overall length (mm)

Table 1 BNS Screw-Shaft Inertial Moment

| Model No. | J kgcm ² /mm |
|-----------|-------------------------|
| BNS 1616 | 3.92×10^{-4} |
| BNS 2020 | 9.37×10^{-4} |
| BNS 2525 | 2.20×10^{-3} |
| BNS 3232 | 5.92×10^{-3} |
| BNS 4040 | 1.43×10^{-2} |
| BNS 5050 | 3.52×10^{-2} |

Application Example

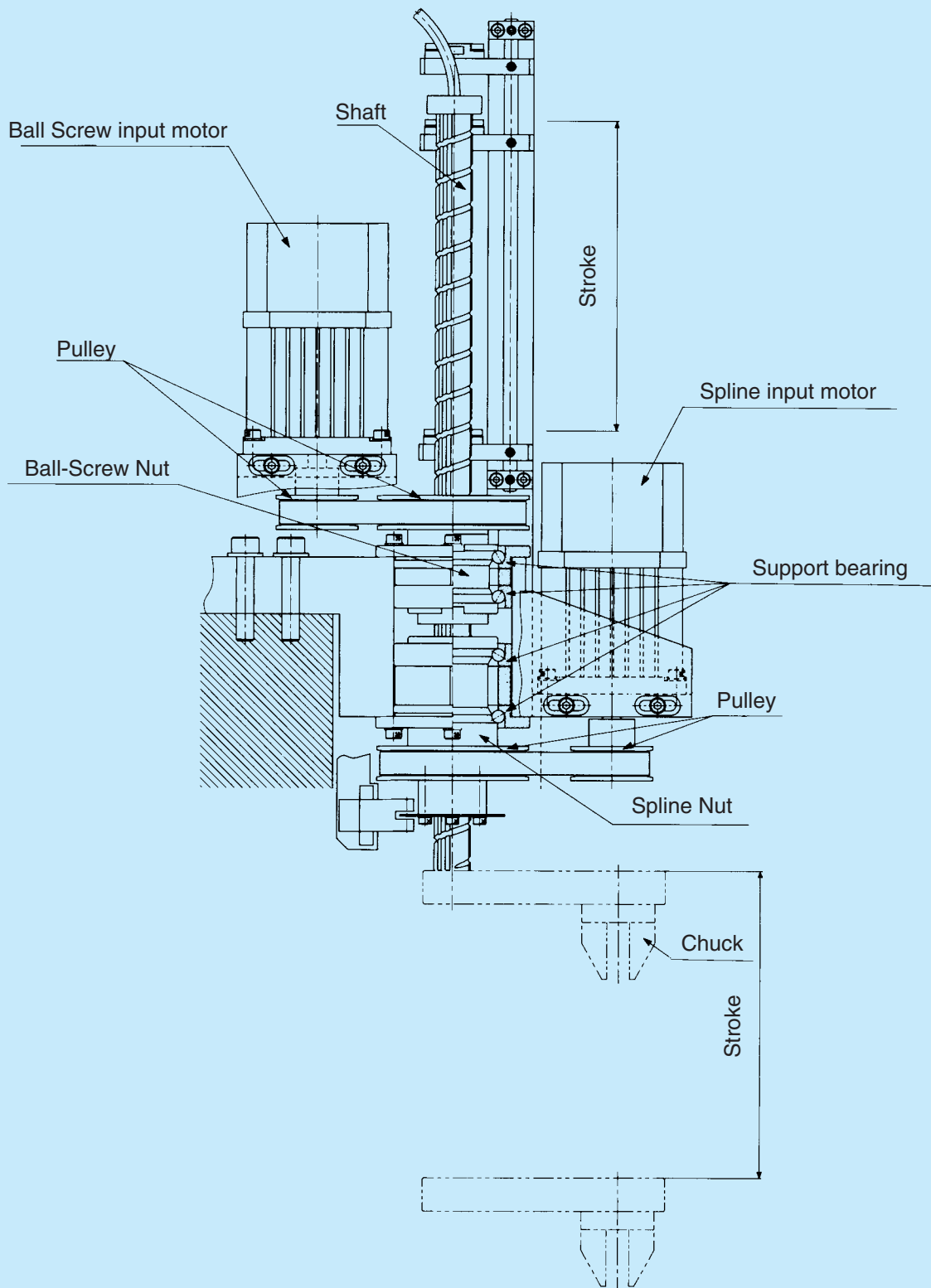
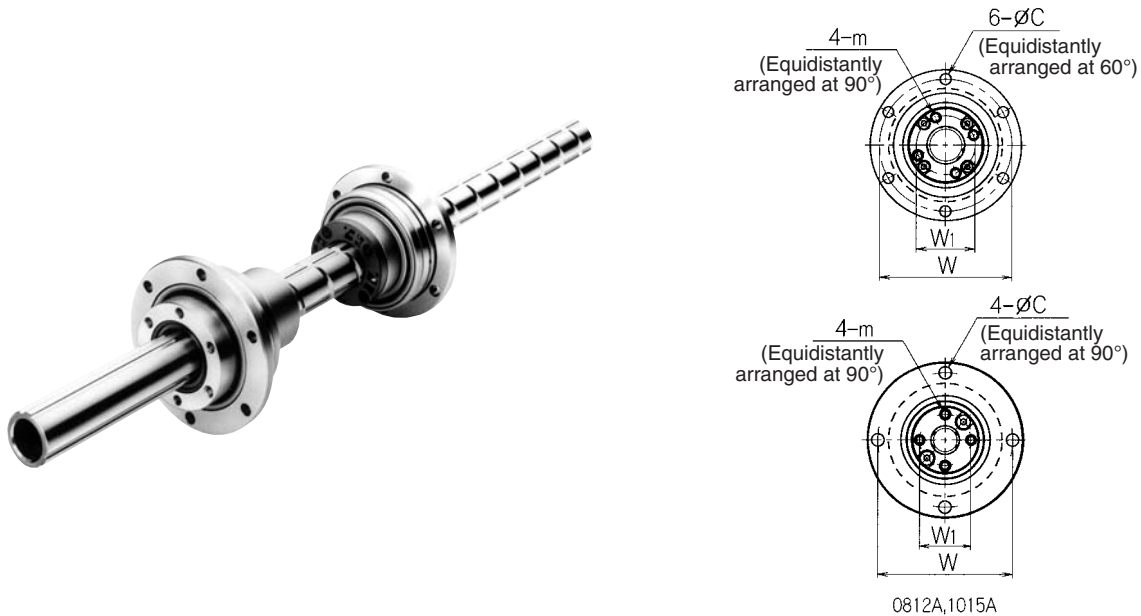


Fig. 7 Application Example of Type BNS

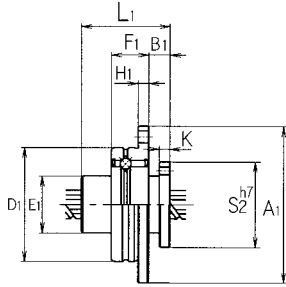
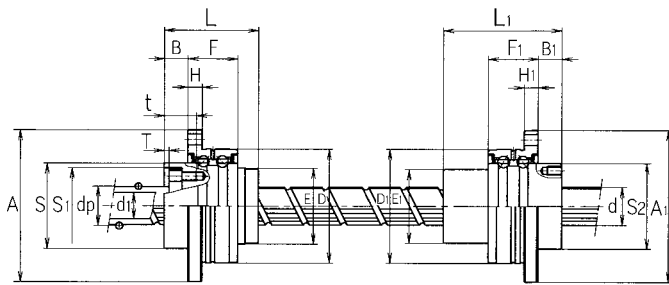
Type BNS-A (Compact Type: For Rotational Motion + Linear Motion)



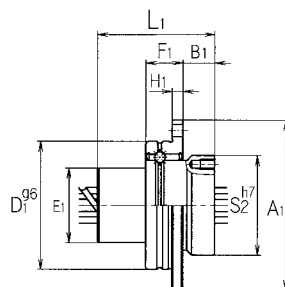
| Model No. | Screw shaft OD d | Screw shaft ID d ₁ | Lead l | Ball Screw dimensions | | | | | | | |
|----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|--------------------------------------|-----------------------|----------------------|---------------------|-----------------|------------------------------|
| | | | | Basic load rating | | Ball center-to-center diameter dp | OD D ^{g6} | Flange diameter A | Overall length L | S ^{h7} | S ₁ ^{h7} |
| C _a kN | C _{0a} kN | C _a kN | C _{0a} kN | C _a kN | C _{0a} kN | | | | | | |
| BNS 0812A | 8 | - | 12 | 1.1 | 1.8 | 8.4 | 32 | 44 | 28.5 | 22 | 19 |
| BNS 1015A | 10 | - | 15 | 1.7 | 2.7 | 10.5 | 36 | 48 | 34.5 | 26 | 23 |
| BNS 1616A | 16 | 11 | 16 | 3.9 | 7.2 | 16.65 | 48 | 64 | 40 | 36 | 32 |
| BNS 2020A | 20 | 14 | 20 | 6.1 | 12.3 | 20.75 | 56 | 72 | 48 | 43.5 | 39 |
| BNS 2525A | 25 | 18 | 25 | 9.1 | 19.3 | 26.0 | 66 | 86 | 58 | 52 | 47 |
| BNS 3232A | 32 | 23 | 32 | 13.0 | 29.8 | 33.25 | 78 | 103 | 72 | 63 | 58 |
| BNS 4040A | 40 | 29 | 40 | 21.4 | 49.7 | 41.75 | 100 | 130 | 88 | 79.5 | 73 |

| Model No. | Ball Spline dimensions | | | | | | | | | |
|-----------|------------------------|----------------------|---|-----------------------|------|------------------------------------|-----------------------------------|----------------------------------|------------------------------|----------------|
| | Basic load rating | | Static permissible moment M _A Nm | Basic torque rating | | OD D ₁ ^{g6} | Flange diameter A ₁ | Overall length L ₁ | S ₂ ^{h7} | E ₁ |
| C kN | C ₀ kN | C _T Nm | | C _{0T} Nm | | | | | | |
| BNS 0812A | 1.5 | 2.6 | 5.9 | 2.0 | 2.9 | 32 | 44 | 25 | 24 | 16 |
| BNS 1015A | 2.7 | 4.9 | 15.7 | 3.9 | 7.8 | 36 | 48 | 33 | 28 | 21 |
| BNS 1616A | 7.1 | 12.6 | 67.6 | 31.3 | 34.3 | 48 | 64 | 50 | 36 | 31 |
| BNS 2020A | 10.2 | 17.8 | 118 | 56.8 | 55.8 | 56 | 72 | 63 | 43.5 | 35 |
| BNS 2525A | 15.2 | 25.8 | 210 | 105 | 103 | 66 | 86 | 71 | 52 | 42 |
| BNS 3232A | 20.5 | 34.0 | 290 | 180 | 157 | 78 | 103 | 80 | 63 | 52 |
| BNS 4040A | 37.8 | 60.4 | 687 | 418 | 377 | 100 | 130 | 100 | 79.5 | 64 |

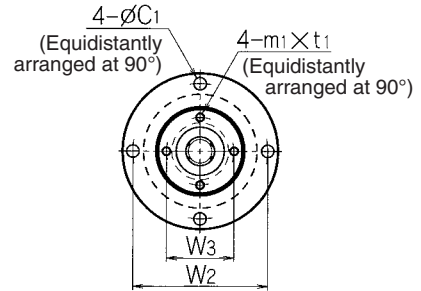
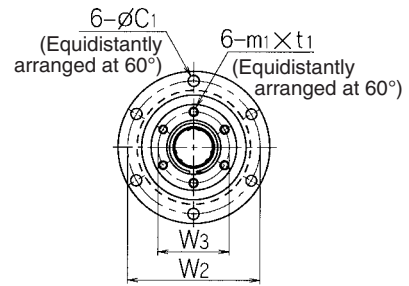
Note: • For model-number coding, see page D-256.



BNS0812A



BNS1015A

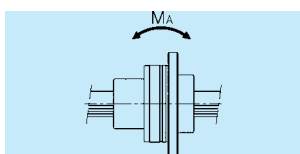


0812A, 1015A

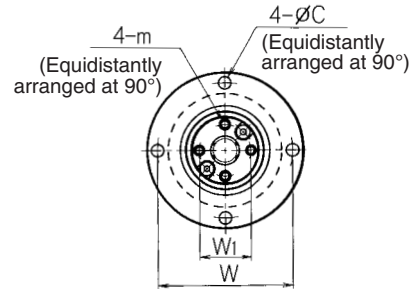
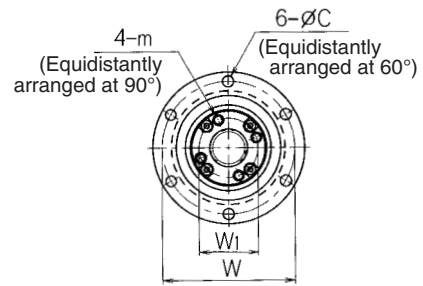
Unit: mm

| E | H | F | B | T | W | W ₁ | m | t | C | Support-bearing basic load rating | | Nut inertial moment kgcm ² |
|----|----|------|------|-----|-----|----------------|----------|------|-----|-----------------------------------|-----------------------|--|
| | | | | | | | | | | C _a kN | C _{0a} kN | |
| 19 | 3 | 10.5 | 7 | 1.5 | 38 | 14.5 | M2.6 | 10 | 3.4 | 0.8 | 0.5 | 0.03 |
| 23 | 3 | 10.5 | 8 | 1.5 | 42 | 18 | M3 × 0.5 | 11.5 | 3.4 | 0.9 | 0.7 | 0.08 |
| 32 | 6 | 21 | 10 | 2 | 56 | 25 | M4 × 0.7 | 13.5 | 4.5 | 8.7 | 10.5 | 0.35 |
| 39 | 6 | 21 | 11 | 2.5 | 64 | 31 | M5 × 0.8 | 16.5 | 4.5 | 9.7 | 13.4 | 0.85 |
| 47 | 7 | 25 | 13 | 3 | 75 | 38 | M6 | 20 | 5.5 | 12.7 | 18.2 | 2.12 |
| 58 | 8 | 25 | 14 | 3 | 89 | 48 | M6 | 21 | 6.6 | 13.6 | 22.3 | 5.42 |
| 73 | 10 | 33 | 16.5 | 3 | 113 | 61 | M8 | 24.5 | 9 | 21.5 | 36.8 | 17.2 |

| H ₁ | F ₁ | B ₁ | K | W ₂ | W ₃ | m ₁ × t ₁ | C ₁ | Support-bearing basic load rating | | Spline Nut inertial moment kgcm ² |
|----------------|----------------|----------------|---|----------------|----------------|---------------------------------|----------------|-----------------------------------|-----------------------|---|
| | | | | | | | | C _a kN | C _{0a} kN | |
| 3 | 10.5 | 6 | 3 | 38 | 19 | M2.6 × 3 | 3.4 | 0.6 | 0.2 | 0.03 |
| 3 | 10.5 | 9 | - | 42 | 23 | M3 × 0.5 × 4 | 3.4 | 0.8 | 0.3 | 0.08 |
| 6 | 21 | 10 | - | 56 | 30 | M4 × 0.7 × 6 | 4.5 | 6.7 | 6.4 | 0.44 |
| 6 | 21 | 12 | - | 64 | 36 | M5 × 0.8 × 8 | 4.5 | 7.4 | 7.8 | 0.99 |
| 7 | 25 | 13 | - | 75 | 44 | M5 × 0.8 × 8 | 5.5 | 9.7 | 10.6 | 2.20 |
| 8 | 25 | 17 | - | 89 | 54 | M6 × 10 | 6.6 | 10.5 | 12.5 | 5.17 |
| 10 | 33 | 20 | - | 113 | 68 | M6 × 10 | 9 | 16.5 | 20.7 | 16.1 |



Type NS-A (Compact Type: For Linear Motion)

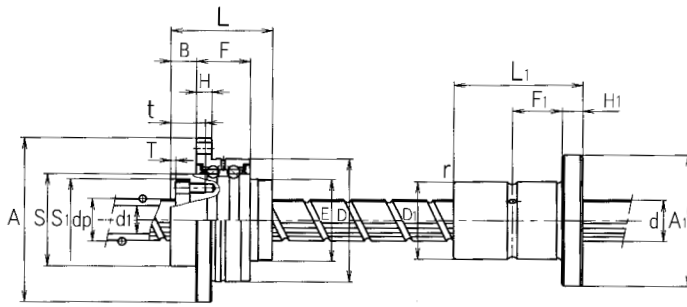


0812A,1015A

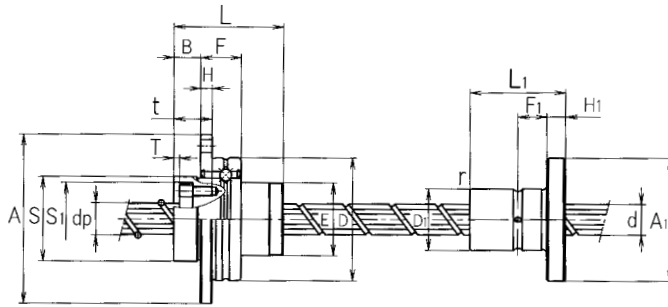
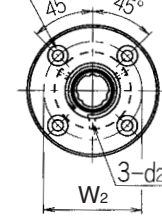
| Model No. | Screw shaft OD d | Screw shaft ID d ₁ | Lead l | Ball Spline dimensions | | | | | | | |
|----------------------|-----------------------|----------------------------------|-----------------------|------------------------|-----------------------|--------------------------------------|-----------------------|----------------------|---------------------|-----------------|------------------------------|
| | | | | Basic load rating | | Ball center-to-center diameter dp | OD D ^{g6} | Flange diameter A | Overall length L | S ^{h7} | S ₁ ^{h7} |
| C _a kN | C _{0a} kN | C _a kN | C _{0a} kN | C _a kN | C _{0a} kN | | | | | | |
| NS 0812A | 8 | - | 12 | 1.1 | 1.8 | 8.4 | 32 | 44 | 28.5 | 22 | 19 |
| NS 1015A | 10 | - | 15 | 1.7 | 2.7 | 10.5 | 36 | 48 | 34.5 | 26 | 23 |
| NS 1616A | 16 | 11 | 16 | 3.9 | 7.2 | 16.65 | 48 | 64 | 40 | 36 | 32 |
| NS 2020A | 20 | 14 | 20 | 6.1 | 12.3 | 20.75 | 56 | 72 | 48 | 43.5 | 39 |
| NS 2525A | 25 | 18 | 25 | 9.1 | 19.3 | 26.0 | 66 | 86 | 58 | 52 | 47 |
| NS 3232A | 32 | 23 | 32 | 13.0 | 29.8 | 33.25 | 78 | 103 | 72 | 63 | 58 |
| NS 4040A | 40 | 29 | 40 | 21.4 | 49.7 | 41.75 | 100 | 130 | 88 | 79.5 | 73 |

| Model No. | Ball Spline dimensions | | | | | | | |
|-----------|------------------------|----------------------|---|-----------------------|------|-----------------------------------|--|--|
| | Basic load rating | | Static permissible moment M _A Nm | Basic torque rating | | OD D ₁ | Flange diameter A ₁ ^{0.2} | |
| C kN | C ₀ kN | C _T Nm | | C _{0T} Nm | | | | |
| NS 0812A | 1.5 | 2.6 | 5.9 | 2.0 | 2.9 | 16 ⁰ _{-0.011} | 32 | |
| NS 1015A | 2.8 | 4.9 | 15.7 | 3.9 | 7.8 | 21 ⁰ _{-0.013} | 42 | |
| NS 1616A | 7.1 | 12.6 | 67.6 | 31.4 | 34.3 | 31 ⁰ _{-0.013} | 51 | |
| NS 2020A | 10.2 | 17.8 | 118 | 56.8 | 55.8 | 35 ⁰ _{-0.016} | 58 | |
| NS 2525A | 15.2 | 25.8 | 210 | 105 | 103 | 42 ⁰ _{-0.016} | 65 | |
| NS 3232A | 20.5 | 34.0 | 290 | 180 | 157 | 49 ⁰ _{-0.016} | 77 | |
| NS 4040A | 37.8 | 60.4 | 687 | 418 | 377 | 64 ⁰ _{-0.019} | 100 | |

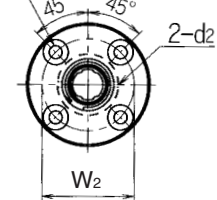
Note: • For model-number coding, see page D-256.



4-X drill ϕY counter bore depth Z
(Equidistantly arranged at 90°)



4-X drill ϕY counter bore depth Z
(Equidistantly arranged at 90°)

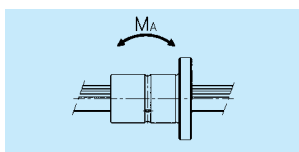


0812A, 1015A

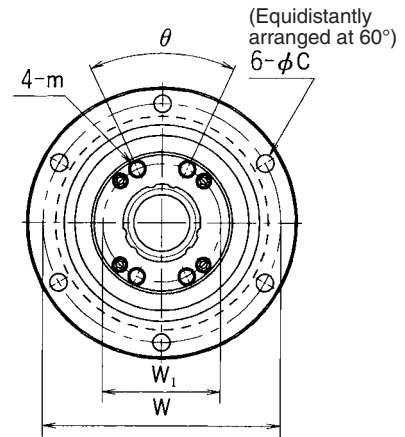
Unit: mm

| E | H | F | B | T | W | W ₁ | m | t | C | Support-bearing basic load rating | | Nut inertial moment kgcm ² |
|----|----|------|------|-----|-----|----------------|----------|------|-----|-----------------------------------|-----------|--|
| | | | | | | | | | | Ca kN | Coa kN | |
| 19 | 3 | 10.5 | 7 | 1.5 | 38 | 14.5 | M2.6 | 10 | 3.4 | 0.8 | 0.5 | 0.03 |
| 23 | 3 | 10.5 | 8 | 1.5 | 42 | 18 | M3 × 0.5 | 11.5 | 3.4 | 0.9 | 0.7 | 0.08 |
| 32 | 6 | 21 | 10 | 2 | 56 | 25 | M4 × 0.7 | 13.5 | 4.5 | 8.7 | 10.5 | 0.35 |
| 39 | 6 | 21 | 11 | 2.5 | 64 | 31 | M5 × 0.8 | 16.5 | 4.5 | 9.7 | 13.4 | 0.85 |
| 47 | 7 | 25 | 13 | 3 | 75 | 38 | M6 | 20 | 5.5 | 12.7 | 18.2 | 2.12 |
| 58 | 8 | 25 | 14 | 3 | 89 | 48 | M6 | 21 | 6.6 | 13.6 | 22.3 | 5.42 |
| 73 | 10 | 33 | 16.5 | 3 | 113 | 61 | M8 | 24.5 | 9 | 21.5 | 36.8 | 17.2 |

| Overall length L ₁ | H ₁ | F ₁ | r | d ₂ | W ₂ | Mounting hole | | |
|----------------------------------|----------------|----------------|-----|----------------|----------------|---------------|-----|-----|
| | | | | | | X | Y | Z |
| 25 | 5 | 7.5 | 0.5 | 1.5 | 24 | 3.4 | 6.5 | 3.3 |
| 33 | 6 | 10.5 | 0.5 | 1.5 | 32 | 4.5 | 8 | 4.4 |
| 50 ⁰ _{-0.2} | 7 | 18 | 0.5 | 2 | 40 | 4.5 | 8 | 4.4 |
| 63 ⁰ _{-0.2} | 9 | 22.5 | 0.5 | 2 | 45 | 5.5 | 9.5 | 5.4 |
| 71 ⁰ _{-0.3} | 9 | 26.5 | 0.5 | 3 | 52 | 5.5 | 9.5 | 5.4 |
| 80 ⁰ _{-0.3} | 10 | 30 | 0.5 | 3 | 62 | 6.6 | 11 | 6.5 |
| 100 ⁰ _{-0.3} | 14 | 36 | 0.5 | 4 | 82 | 9 | 14 | 8.6 |



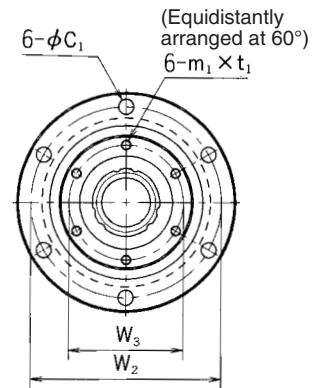
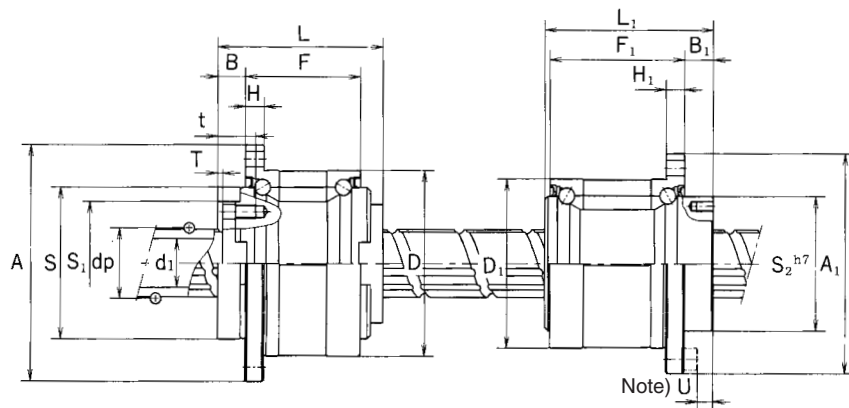
Type BNS (Heavy-Load Type: For Rotational Motion + Linear Motion)



| Model No. | Screw shaft OD d | Screw shaft ID d ₁ | Lead l | Basic load rating | | Ball center-to-center diameter dp | Ball Spline dimensions | | | |
|-----------|---------------------|----------------------------------|-----------|----------------------|-----------------------|--------------------------------------|------------------------------------|----------------------|---------------------|-----------------|
| | | | | C _a kN | C _{0a} kN | | OD D | Flange diameter A | Overall length L | S ^{h7} |
| BNS 1616 | 16 | 11 | 16 | 3.9 | 7.2 | 16.65 | 52 ⁰ _{-0.007} | 68 | 43.5 | 40 |
| BNS 2020 | 20 | 14 | 20 | 6.1 | 12.3 | 20.75 | 62 ⁰ _{-0.007} | 78 | 54 | 50 |
| BNS 2525 | 25 | 18 | 25 | 9.1 | 19.3 | 26.0 | 72 ⁰ _{-0.007} | 92 | 65 | 58 |
| BNS 3232 | 32 | 23 | 32 | 13.0 | 29.8 | 33.25 | 80 ⁰ _{-0.007} | 105 | 80 | 66 |
| BNS 4040 | 40 | 29 | 40 | 21.4 | 49.7 | 41.75 | 110 ⁰ _{-0.008} | 140 | 98 | 90 |
| BNS 5050 | 50 | 36 | 50 | 31.8 | 77.6 | 52.2 | 120 ⁰ _{-0.008} | 156 | 126 | 100 |

| Model No. | Basic load rating | | Static permissible moment M _A Nm | Basic torque rating | | OD D ₁ | Flange diameter A ₁ | Overall length L ₁ |
|-----------|-------------------|----------------------|---|----------------------|-----------------------|------------------------------------|-----------------------------------|----------------------------------|
| | C kN | C ₀ kN | | C _T Nm | C _{0T} Nm | | | |
| BNS 1616 | 7.1 | 12.6 | 67.6 | 31.3 | 34.3 | 52 ⁰ _{-0.007} | 68 | 50 |
| BNS 2020 | 10.2 | 17.8 | 118 | 56.8 | 55.8 | 56 ⁰ _{-0.007} | 72 | 63 |
| BNS 2525 | 15.2 | 25.8 | 210 | 105 | 103 | 62 ⁰ _{-0.007} | 78 | 71 |
| BNS 3232 | 20.5 | 34.0 | 290 | 180 | 157 | 80 ⁰ _{-0.007} | 105 | 80 |
| BNS 4040 | 37.8 | 60.4 | 687 | 418 | 377 | 100 ⁰ _{-0.008} | 130 | 100 |
| BNS 5050 | 60.8 | 94.5 | 1340 | 842 | 768 | 120 ⁰ _{-0.008} | 156 | 125 |

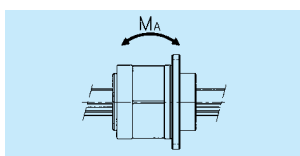
- Notes:
- Dimension U refers to the distance from the head of the hexagon socket button head screw to the Nut end face.
 - For model-number coding, see page D-256.



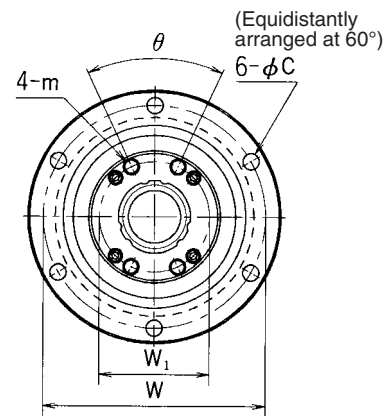
Unit: mm

| S_1^{H7} | H | F | B | T | W | W_1 | m | t | C | θ° | Support-bearing basic load rating | | Nut inertial moment |
|------------|----|------|------|---|-----|-------|----------|----|-----|----------------|-----------------------------------|----------------|---------------------|
| | | | | | | | | | | | C_a kN | C_{oa} kN | kgcm ² |
| 32 | 5 | 27.5 | 9 | 2 | 60 | 25 | M4 × 0.7 | 12 | 4.5 | 40 | 19.4 | 19.2 | 0.48 |
| 39 | 6 | 34 | 11 | 2 | 70 | 31 | M5 × 0.8 | 16 | 4.5 | 40 | 26.8 | 29.3 | 1.44 |
| 47 | 8 | 43 | 12.5 | 3 | 81 | 38 | M 6 | 19 | 5.5 | 40 | 28.2 | 33.3 | 3.23 |
| 58 | 9 | 55 | 14 | 3 | 91 | 48 | M 6 | 19 | 6.6 | 40 | 30.0 | 39.0 | 6.74 |
| 73 | 11 | 68 | 16.5 | 3 | 123 | 61 | M 8 | 22 | 9 | 50 | 59.3 | 74.1 | 27.9 |
| 90 | 12 | 80 | 25 | 4 | 136 | 75 | M10 | 28 | 11 | 50 | 62.2 | 83.0 | 58.2 |

| S_2^{H7} | H_1 | F_1 | B_1 | W_2 | W_3 | $m_1 \times t_1$ | C_1 | U | Support-bearing basic load rating | | Nut inertial moment |
|------------|-------|-------|-------|-------|-------|------------------|-------|----|-----------------------------------|-------------|---------------------|
| | | | | | | | | | C kN | C_o kN | kgcm ² |
| 39.5 | 5 | 37 | 10 | 60 | 32 | M 5 × 8 | 4.5 | 5 | 12.7 | 11.8 | 0.52 |
| 43.5 | 6 | 48 | 12 | 64 | 36 | M 5 × 8 | 4.5 | 7 | 16.2 | 15.5 | 0.87 |
| 53 | 6 | 55 | 13 | 70 | 45 | M 6 × 8 | 4.5 | 8 | 17.6 | 18.0 | 1.72 |
| 65.5 | 9 | 60 | 17 | 91 | 55 | M 6 × 10 | 6.6 | 10 | 20.1 | 24.0 | 5.61 |
| 79.5 | 11 | 74 | 23 | 113 | 68 | M 6 × 10 | 9 | 13 | 37.2 | 42.5 | 14.7 |
| 99.5 | 12 | 97 | 25 | 136 | 85 | M10 × 15 | 11 | 13 | 41.6 | 54.1 | 62.5 |

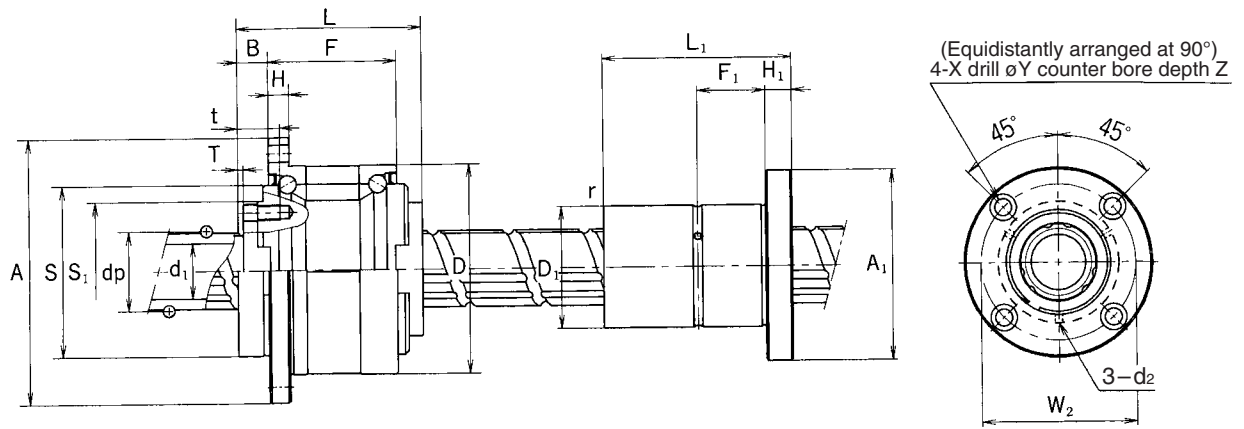


Type NS (Heavy-Load Type: For Linear Motion)



| Movement | Moving direction | Input | | Shaft movement | |
|-------------|----------------------|---------------------|-----------------------------|---|---|
| | | Ball Screw pulley | Ball Spline pulley | Vertical (speed) | Rotation (speed) |
| 1. Vertical | ① Vertical→ downward | N_1 (forward) | 0 | $V = N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | Rotation→0 | | | | |
| | ② Vertical→ upward | $-N_1$ (reverse) | 0 | $V = -N_1 \times l$ ($N_1 \neq 0$) | 0 |
| | Rotation→0 | | | | |
| 2. Rotation | ① Vertical→0 | N_1 | N_2 (forward) | 0 | N_2 (forward) ($N_1=N_2 \neq 0$) |
| | Rotation→ forward | | | | |
| | ② Vertical→0 | $-N_1$ | $-N_2$ (reverse) | 0 | $-N_2$ (reverse) ($-N_1=N_2 \neq 0$) |
| | Rotation→ reverse | | | | |
| 3. Spiral | ① Vertical→ upward | 0 | N_2 ($N_2 \neq 0$) | $V = N_2 \times l$ | N_2 (forward) |
| | Rotation→ forward | | | | |
| | ② Vertical→ downward | 0 | $-N_2$ ($-N_2 \neq 0$) | $V = -N_2 \times l$ | $-N_2$ (reverse) |
| | Rotation→ reverse | | | | |

Note: • For model-number coding, see page D-256.



Unit: mm

| S_1^{H7} | H | F | B | T | W | W_1 | m | t | C | θ° | Support-bearing basic load rating | | Nut inertial moment kgcm ² |
|------------|----|------|------|---|-----|-------|-----|----|-----|----------------|-----------------------------------|----------------|--|
| | | | | | | | | | | | C_a kN | C_{oa} kN | |
| 32 | 5 | 27.5 | 9 | 2 | 60 | 25 | M4 | 12 | 4.5 | 40 | 19.4 | 19.2 | 0.48 |
| 39 | 6 | 34 | 11 | 2 | 70 | 31 | M5 | 16 | 4.5 | 40 | 26.8 | 29.3 | 1.44 |
| 47 | 8 | 43 | 12.5 | 3 | 81 | 38 | M6 | 19 | 5.5 | 40 | 28.2 | 33.3 | 3.23 |
| 58 | 9 | 55 | 14 | 3 | 91 | 48 | M6 | 19 | 6.6 | 40 | 30.0 | 39.0 | 6.74 |
| 73 | 11 | 68 | 16.5 | 3 | 123 | 61 | M8 | 22 | 9 | 50 | 59.3 | 74.1 | 27.9 |
| 90 | 12 | 80 | 25 | 4 | 136 | 75 | M10 | 28 | 11 | 50 | 62.2 | 83.0 | 58.2 |

| Flange diameter A_1 | Overall length L_1 | H_1 | F_1 | r | d_2 | W_2 | Mounting hole | | |
|--------------------------|-------------------------|-------|-------|-----|-------|-------|---------------|------|-----|
| | | | | | | | X | Y | Z |
| 51 | $50_{-0.2}^0$ | 7 | 18 | 0.5 | 2 | 40 | 4.5 | 8 | 4.4 |
| 58 | $63_{-0.2}^0$ | 9 | 22.5 | 0.5 | 2 | 45 | 5.5 | 9.5 | 5.4 |
| 65 | $71_{-0.3}^0$ | 9 | 26.5 | 0.5 | 3 | 52 | 5.5 | 9.5 | 5.4 |
| 77 | $80_{-0.3}^0$ | 10 | 30 | 0.5 | 3 | 62 | 6.9 | 11 | 6.5 |
| 100 | $100_{-0.3}^0$ | 14 | 36 | 0.5 | 4 | 82 | 9 | 14 | 8.6 |
| 124 | $125_{-0.3}^0$ | 16 | 46.5 | 1 | 4 | 102 | 11 | 17.5 | 11 |

