

Standard-Lead Rolled Ball Screw

Return-Pipe Nut

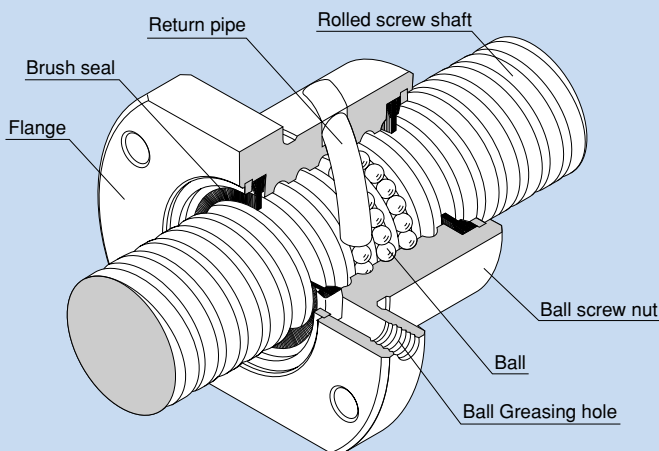


Fig. 1 Structure of the Return-Pipe Nut

Structure and Features

With the Return-Pipe Nut, balls under a load roll around the circumference of the screw shaft, while receiving an axial load on the ball raceways formed between the screw shaft and the ball screw nut, then pass through the return pipe incorporated in the ball screw nut and circulate back to the loaded area, thus to achieve infinite motion.

● Allows Easy Machining of the Ball Screw Nut Mounting Holes

Since model BTK has a return pipe incorporated in the ball screw nut, its exterior is compact and space saving. As opposed to the conventional model whose return pipe sticks out of the circumference, the mounting holes on the housing of model BTK can easily be formed through simple lathing because it is unnecessary to cut a recess for the return pipe by milling. As a result, the required man-hours can be reduced.

● Allows Low Shaft Center Position

With models BTK and MTF, the flange circumference is cut flat at the top and bottom, allowing the shaft center to be positioned lower than the conventional type with a round flange.

● Easy Installation

Model BNT has a square ball screw nut equipped with screw holes for installation to eliminate the need for a housing and allows compact design.

● High Dust Prevention Effect

The ball screw nut of models BTK and BNT is incorporated with a highly dust preventive brush seal.

Types and Features

Non-preload Type Model BTK



A compact type with a round nut incorporated with a return pipe. The flange circumference is cut flat at the top and bottom, allowing the shaft center to be positioned low.

Non-preload Type Model MTF



A miniature type with a screw shaft diameter of $\phi 6$ to $\phi 12$ mm and a lead of 1 to 2 mm.

Square Ball Screw Nut, Non-preload Type Model BNT



Since it has a square ball screw nut equipped with screw holes for installation, this model can compactly be installed directly to the machine body without a housing.

Model BTK

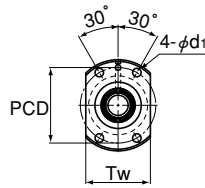
Rolled Ball Screw

Note The rigidity values in the table represent spring constants each obtained from the load and the elastic displacement when providing an axial load 30% of the basic dynamic load rating (Ca). These values do not include the rigidity of the components related to mounting the ball screw nut. Therefore, it is normally appropriate to regard roughly 80% of the value in the table as the actual value. If the axial load (Fa) is not 0.3 Ca, the rigidity value (KN) is obtained from the following equation.

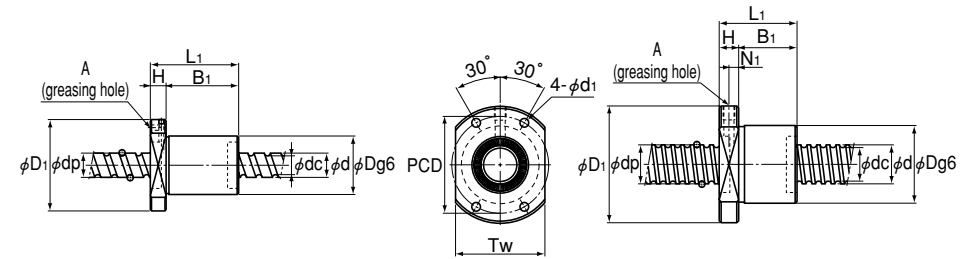
where

$$K_N = K \left(\frac{F_a}{0.3C_a} \right)^{\frac{1}{3}}$$

K: Rigidity value in the dimensional table.



Models BTK 1006 and 1208



Models BTK 1404 to 5016

Unit: mm

Model No.	Screw shaft outer diameter d	Lead R	Ball center diameter dp	Thread minor diameter dc	No. of loaded circuits Rows x turns	Basic load rating		Rigidity K N/μm	Nut dimensions							Axial clearance	Standard shaft length	Screw shaft inertial moment/mm ² ·cm ² /mm			
						Ca kN	Ca kN		Outer diameter D	Flange diameter D1	Overall length L1	H	B1	PCD	d1				Tw	Greasing hole N1	A
BTK 1006-2.6	10	6	10.5	7.8	1X2.65	2.8	4.9	88	26	42	36	8	28	34	4.5	29	—	3	0.05	200,300	7.71×10 ⁻⁵
BTK 1208-2.6	12	8	12.65	9.7	1X2.65	3.8	6.8	108	29	45	44	8	36	37	4.5	32	—	3	0.05	200,300	1.6×10 ⁻⁴
BTK 1404-3.6	14	4	14.4	11.5	1X3.65	5.5	11.5	150	31	50	40	10	30	40	4.5	37	5	M6	0.1	500,1000	2.96×10 ⁻⁴
BTK 1405-2.6		5	14.5	11.2	1X2.65	5	11.4	116	32	50	40	10	30	40	4.5	38	5	M6	0.1		2.96×10 ⁻⁴
BTK 1605-2.6	16	5	16.75	13.5	1X2.65	5.4	13.3	130	34	54	40	10	30	44	4.5	40	5	M6	0.1	500,1000	5.05×10 ⁻⁴
BTK 1808-3.6	18	8	19.3	14.4	1X3.65	13.1	31	210	50	80	61	12	49	65	6.6	60	5	M6	0.1	500,1000	8.09×10 ⁻⁴
BTK 2005-2.6	20	5	20.5	17.2	1X2.65	6	16.5	150	40	60	40	10	30	50	4.5	46	5	M6	0.1	500,1000	1.23×10 ⁻³
BTK 2010-2.6		10	21.25	16.4	1X2.65	10.6	25.1	160	52	82	61	12	49	67	6.6	64	5	M6	0.1		1.23×10 ⁻³
BTK 2505-2.6	25	5	25.5	22.2	1X2.65	6.7	20.8	180	43	67	40	10	30	55	5.5	50	5	M6	0.1	1500	3.01×10 ⁻³
BTK 2510-5.3		10	26.8	20.2	2X2.65	31.2	83.7	400	60	96	98	15	83	78	9	72	5	M6	0.1		3.01×10 ⁻³
BTK 2806-2.6	28	6	28.5	25.2	1X2.65	7	23.4	200	50	80	47	12	35	65	6.6	60	6	M6	0.1	500,1000	4.74×10 ⁻³
BTK 2806-5.3			28.5	25.2	2X2.65	12.8	46.8	390	50	80	65	12	53	65	6.6	60	6	M6	0.1		4.74×10 ⁻³
BTK 3210-2.6	32	10	33.75	27.2	1X2.65	19.8	53.8	250	67	103	68	15	53	85	9	78	5	M6	0.14	2000,2500	8.08×10 ⁻³
BTK 3210-5.3			33.75	27.2	2X2.65	36	107.5	490	67	103	98	15	83	85	9	78	5	M6	0.14		8.08×10 ⁻³
BTK 3610-2.6	36	10	37	30.5	1X2.65	20.8	59.8	270	70	110	70	17	53	90	11	82	7	M6	0.17	500,1000,2000,2500,3000	1.29×10 ⁻²
BTK 3610-5.3			37	30.5	2X2.65	37.8	118.7	530	70	110	100	17	83	90	11	82	7	M6	0.17		1.29×10 ⁻²
BTK 4010-5.3	40	10	41.75	35.2	2X2.65	40.3	134.9	590	76	116	100	17	83	96	11	88	7	M6	0.17	1000,1500	1.97×10 ⁻²
BTK 4512-5.3	45	12	46.5	39.2	2X2.65	49.5	169	650	82	128	118	20	98	104	14	94	8	M6	0.17	2000,3000	3.16×10 ⁻²
BTK 5016-5.3	50	16	52.7	42.9	2X2.65	93.8	315.2	930	102	162	145	25	120	132	18	104	12.5	PT 1/8	0.2	3500	4.82×10 ⁻²

Note Those models marked with ○ can be attached with QZ Lubricator or the wiper ring. For dimensions of the ball screw nut with either accessory being attached, see page k-260.

Model number coding **BTK1405-2.6 ZZ**
Ball Screw Nut

- 1 Model number
- 2 Seal symbol - no symbol: without seal; ZZ: brush seal attached to both ends of the ball screw nut (see page k-25)

Model number coding **TS 14 05 +500L C7**
Screw Shaft

- 1 Symbol for rolled ball screw shaft
- 2 Screw shaft outer diameter (in mm)
- 3 Lead (in mm)
- 4 Overall screw shaft length (in mm)
- 5 Accuracy symbol (see page k-8) (no symbol for class C10)

Model number coding

BTK1405-2.6 ZZ +500L C7 T

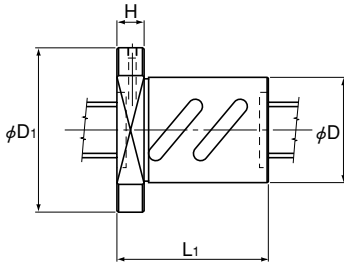
Combination of the Ball Screw Nut and the Screw Shaft

1 2 3 4 5

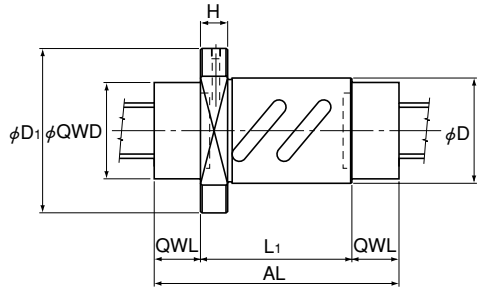
- 1 Model number
- 2 Seal symbol - no symbol: without seal; ZZ: brush seal attached to both ends of the ball screw nut (see page k-25)
- 3 Overall shaft length (in mm)
- 4 Accuracy symbol (see page k-8) (no symbol for class C10)
- 5 Symbol for rolled shaft

Model BTK

Dimensions of the Ball Screw Nut Attached with Wiper Ring (WW) and QZ Lubricator (QZ)



With WW (without QZ)



With QZ + WW

Unit: mm

Model No.	Dimensions including WW				Dimensions including QZ and WW		
	Nut length	Flange width	Flange diameter	Nut diameter	Length	Outer diameter	Overall length incl. QZ and WW
	L_1	H	D_1	Dg6	QWL	QWD	AL
BTK 2510-5.3	98	15	96	60	32.5	45	163
BTK 3210-2.6	68	15	103	67	32	57	132
BTK 3210-5.3	98	15	103	67	32	57	162
BTK 3610-2.6	70	17	110	70	31	64	132
BTK 3610-5.3	100	17	110	70	31	64	162
BTK 4010-5.3	100	17	116	76	34	66	168
BTK 5016-5.3	145	25	162	102	35	79	215

Model number coding

BTK2510-5.3 QZ WW +1000L C7 T

1 2 3 4 5 6

- 1 Model number
- 2 With QZ Lubricator (see page k-22)
- 3 Seal symbol - RR : Labyrinth seal attached to both ends of the ball screw nut (see page k-25)
WW: Wiper ring attached to both ends of the ball screw nut (see page k-26)
- 4 Overall screw shaft length (mm)
- 5 Accuracy symbol (see page k-8) (no symbol for class C10)
- 6 Symbol for rolled shaft

Note QZ Lubricator and wiper ring are not sold alone.


Precautions on Use

QZ Lubricator for the Ball Screw


Handling

- Dropping or hitting the product may damage it. Use much care when handling it.
- Unduly disassembling the product may cause foreign matter from entering the product or degrade the accuracy. Do not disassemble the product unless it is inevitable.
- Do not clean the product with an organic solvent or white kerosene.
- Do not leave the product package open over a long period of time.
- Do not block the hole for air vent near the model number indication with grease or the like.

Service Temperature Range

- Use this product within a temperature range of -10°C to +50°C. When desiring to use the product out of this temperature range, contact .

Use in a Special Environment

- When desiring to use the product in a special environment, contact .

Corrosion Prevention


- QZ Lubricator is designed to provide the essential minimum amount of a lubricant to the ball raceway. It does not provide a corrosion-prevention effect to the whole Ball Screw.

Wiper Ring for the Ball Screw


Handling

- Dropping or hitting the product may damage it. Use much care when handling it.
- Unduly disassembling the product may cause foreign matter from entering the product or degrade the accuracy. Do not disassemble the product unless it is inevitable.
- When using this product in a harsh environment, we recommend using it in combination with QZ Lubricator.

Service Temperature Range

- Use this product within a temperature range of -20°C to +80°C. When desiring to use the product out of this temperature range, contact .

Use in a Special Environment

- When desiring to use the product in a special environment, contact .

Chemical Resistance

- Avoid using the product in an atmosphere containing an acid or alkali solvent.

Model MTF

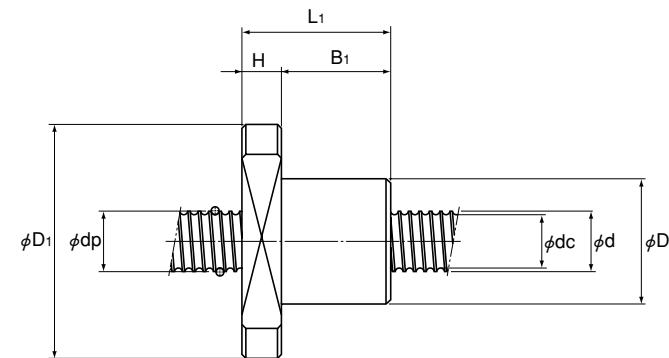
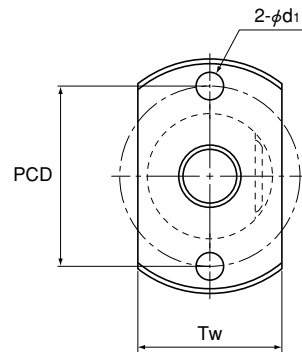
Miniature Rolled Ball Screw

Note The rigidity values in the table represent spring constants each obtained from the load and the elastic displacement when providing an axial load 30% of the basic dynamic load rating (Ca). These values do not include the rigidity of the components related to mounting the ball screw nut. Therefore, it is normally appropriate to regard roughly 80% of the value in the table as the actual value. If the axial load (Fa) is not 0.3 Ca, the rigidity value (K_N) is obtained from the following equation.

where

$$K_N = K \left(\frac{F_a}{0.3C_a} \right)^{\frac{1}{3}}$$

K: Rigidity value in the dimensional table.



Unit: mm

Model No.	Screw shaft outer diameter d	Lead R	Ball center diameter dp	Thread minor diameter dc	No. of loaded circuits Rows x turns	Basic load rating		Rigidity K N/μm	Outer diameter D ^{-0.05 -0.10}	Nut dimensions						Axial clearance	Standard shaft length	Screw shaft inertial moment/mm ² kg·cm ² /mm	
						Ca kN	C _{0a} kN			Flange diameter D ₁	Overall length L ₁	H	B ₁	PCD	d ₁				Tw
MTF 0601-3.7	6	1	6.15	5.3	1×3.7	0.7	1.2	70	13	30	21	5	16	21.5	3.4	17	0.05	150,250	9.99×10 ⁻⁶
MTF 0802-3.7	8	2	8.3	6.6	1×3.7	2.1	3.8	90	20	40	28	6	22	30	4.5	24	0.05		3.16×10 ⁻⁵
MTF 1002-3.7	10	2	10.3	8.6	1×3.7	2.3	4.8	110	23	43	28	6	22	33	4.5	27	0.05	200,300	7.71×10 ⁻⁵
MTF 1202-3.7	12	2	12.3	10.6	1×3.7	2.5	5.8	130	25	47	30	8	22	36	5.5	29	0.05		1.6×10 ⁻⁴

Note Model MTF cannot be attached with a seal.

Note The ball screw nut and the screw shaft of model MTF are not sold alone. Model MTF is applied only with anti-corrosive oil.

Model number coding

MTF0601-3.7 +250L C7 T

1 2 3 4

- 1 Model number
- 2 Overall screw shaft length (in mm)
- 3 Accuracy symbol (see page k-8) (no symbol for class C10)
- 4 Symbol for rolled shaft

Model BNT

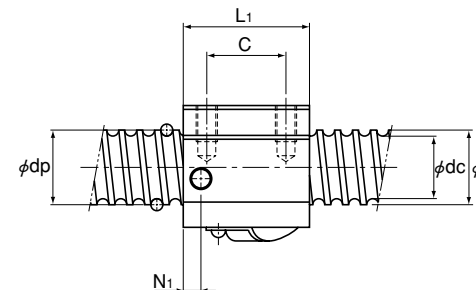
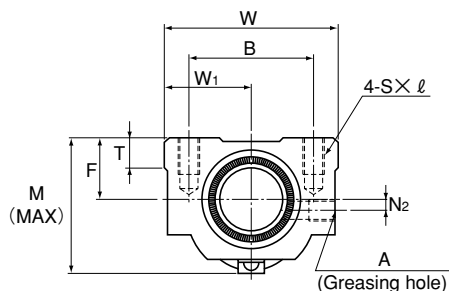
Square-nut, Non-preload Type

Note The rigidity values in the table represent spring constants each obtained from the load and the elastic displacement when providing an axial load 30% of the basic dynamic load rating (Ca). These values do not include the rigidity of the components related to mounting the ball screw nut. Therefore, it is normally appropriate to regard roughly 80% of the value in the table as the actual value. If the axial load (Fa) is not 0.3 Ca, the rigidity value (K_N) is obtained from the following equation.

where

$$K_N = K \left(\frac{F_a}{0.3C_a} \right)^{\frac{1}{3}}$$

K: Rigidity value in the dimensional table.



Unit: mm

Model No.	Screw shaft outer diameter d	Lead R	Ball center diameter dp	Thread minor diameter dc	No. of loaded circuits Rows x turns	Basic load rating		Rigidity K N/μm	Nut dimensions			Mounting hole							Axial clearance	Screw shaft inertial moment/mm ² ·cm ² /mm		
						Ca kN	C _{0a} kN		Width W	Center height F	Overall length L ₁	B	C	S × l	W ₁	T	M	N ₁			N ₂	A
BNT 1404-3.6	14	4	14.4	11.5	1X3.65	5.5	11.5	150	34	13	35	26	22	M4X7	17	6	30	6	2	M6	0.1	2.96×10 ⁻⁴
BNT 1405-2.6		5	14.5	11.2	1X2.65	5	11.4	110	34	13	35	26	22	M4X7	17	6	31	6	2	M6	0.1	2.96×10 ⁻⁴
BNT 1605-2.6	16	5	16.75	13.5	1X2.65	5.4	13.3	130	42	16	36	32	22	M5X8	21	21.5	32.5	6	2	M6	0.1	5.05×10 ⁻⁴
BNT 1808-3.6		8	19.3	14.4	1X3.65	13.1	31	210	48	17	56	35	35	M6X10	24	10	44	8	3	M6	0.1	8.09×10 ⁻⁴
BNT 2005-2.6	20	5	20.5	17.2	1X2.65	6	16.5	150	48	17	35	35	22	M6X10	24	9	39	5	3	M6	0.1	1.23×10 ⁻³
BNT 2010-2.6		10	21.25	16.4	1X2.65	10.6	25.1	160	48	18	58	35	35	M6X10	24	9	46	10	2	M6	0.1	1.23×10 ⁻³
BNT 2505-2.6	25	5	25.5	22.2	1X2.65	6.7	20.8	180	60	20	35	40	22	M8X12	30	9.5	45	7	5	M6	0.1	3.01×10 ⁻³
BNT 2510-5.3		10	26.8	20.2	2X2.65	31.2	83.7	400	60	23	94	40	60	M8X12	30	10	55	10	—	M6	0.1	3.01×10 ⁻³
BNT 2806-2.6	28	6	28.5	25.2	1X2.65	7	23.4	200	60	22	42	40	18	M8X12	30	10	50	8	—	M6	0.1	4.74×10 ⁻³
BNT 2806-5.3			28.5	25.2	2X2.65	12.8	46.8	390	60	22	67	40	40	M8X12	30	10	50	8	—	M6	0.1	4.74×10 ⁻³
BNT 3210-2.6	32	10	33.75	27.2	1X2.65	19.8	53.8	250	70	26	64	50	45	M8X12	35	12	62	10	—	M6	0.14	8.08×10 ⁻³
BNT 3210-5.3			33.75	27.2	2X2.65	36	107.5	490	70	26	94	50	60	M8X12	35	12	62	10	—	M6	0.14	8.08×10 ⁻³
BNT 3610-2.6	36	10	37	30.5	1X2.65	20.8	59.3	270	86	29	64	60	45	M10X16	43	17	67	11	—	M6	0.17	1.29×10 ⁻²
BNT 3610-5.3			37	30.5	2X2.65	37.8	118.7	530	86	29	96	60	60	M10X16	43	17	67	11	—	M6	0.17	1.29×10 ⁻²
BNT 4512-5.3	45	12	46.5	39.2	2X2.65	49.5	169	650	100	36	115	75	75	M12X20	50	20.5	80	13	—	M6	0.2	3.16×10 ⁻²

Model number coding **BNT1405-2.6 ZZ**
 Ball Screw Nut 1 2

1 Model number
2 Seal symbol - no symbol: without seal;
 ZZ: brush seal attached to both ends of the ball screw nut (see page k-25)

Model number coding **TS 14 05 +500L C7**
 Screw Shaft 1 2 3 4 5

1 Symbol for rolled ball screw shaft
2 Screw shaft outer diameter (in mm) **3** Lead (in mm)
4 Overall screw shaft length (in mm)
5 Accuracy symbol (see page k-8) (no symbol for class C10)

Model number coding **BNT1405-2.6 ZZ +500L C7 T**
 Combination of the Ball Screw Nut and the Screw Shaft 1 2 3 4 5

1 Model number
2 Seal symbol - no symbol: without seal;
 ZZ: brush seal attached to both ends of the ball screw nut (see page k-25)
3 Overall shaft length (in mm) **4** Accuracy symbol (see page k-8) (no symbol for class C10)
5 Symbol for rolled shaft