

Ball Screw

# Ball Screw Peripherals

# Support Unit

Models EK, BK, FK, EF, BF and FF

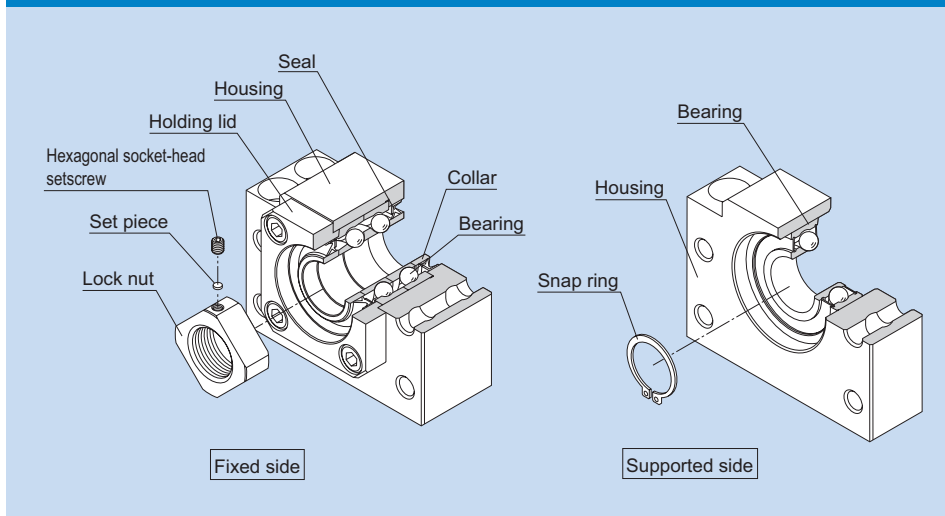


Fig.1 Structure of the Support Unit

## Structure and Features

The Support Unit comes in six types: models EK, FK, EF, and FF, which are standardized for the standard Ball Screw assembly provided with the finished shaft ends, and models BK and BF, which are standardized for ball screws in general.

The Support Unit on the fixed side contains a JIS Class 5-compliant angular bearing provided with an adjusted preload. The miniature type Support Unit models EK/FK 4, 5, 6 and 8, in particular, incorporate a miniature bearing with a contact angle of  $45^\circ$  developed exclusively for miniature Ball Screws. This provides stable rotational performance with a high rigidity and an accuracy.

The Support Unit on the supported side uses a deep-groove ball bearing.

The internal bearings of the Support Unit models EK, FK and BK contain an appropriate amount of lithium soap-group grease that is sealed with a special seal. Thus, these models are capable of operating over a long period.

#### [Uses the Optimal Bearing]

To ensure the rigidity balance with the Ball Screw, the Support Unit uses an angular bearing (contact angle: 30°; DF configuration) with a high rigidity and a low torque. Miniature Support Unit models EK/FK 4, 5, 6 and 8 are incorporated with a miniature angular bearing with a contact angle of 45° developed exclusively for miniature Ball Screws. This bearing has a greater contact angle of 45° and an increased number of balls with a smaller diameter. The high rigidity and accuracy of the miniature angular bearing provides the stable rotational performance.

#### [Support Unit Shapes]

The square and round shapes are available for the Support Unit to allow the selection according to the intended use.

#### [Compact and Easy Installation]

The Support Unit is compactly designed to accommodate the space in the installation site. As the bearing is provided with an appropriately adjusted preload, the Support Unit can be assembled with a Ball Screw unit with no further machining. Accordingly, the required man-hours in the assembly can be reduced and the assembly accuracy can be increased.

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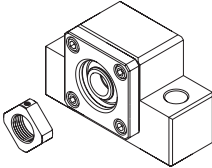
## Type

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[For the Fixed Side]

### Square Type Model EK

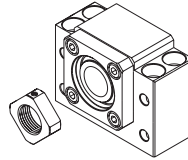
Specification Table⇒B-754



(Inner diameter:  $\phi 4$  to  $\phi 20$ )

### Square Type Model BK

Specification Table⇒B-756

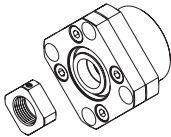


(Inner diameter:  $\phi 10$  to  $\phi 40$ )

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### Round Type Model FK

Specification Table⇒B-758

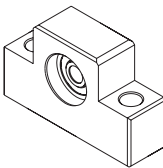


(Inner diameter:  $\phi 4$  to  $\phi 30$ )

[For the Supported Side]

### Square Type Model EF

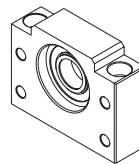
Specification Table⇒B-762



(Inner diameter:  $\phi 6$  to  $\phi 20$ )

### Square Type Model BF

Specification Table⇒B-764

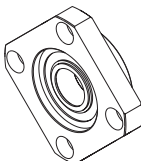


(Inner diameter:  $\phi 8$  to  $\phi 40$ )

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### Round Type Model FF

Specification Table⇒B-766



(Inner diameter:  $\phi 6$  to  $\phi 30$ )

## Types of Support Units and Applicable Screw Shaft Outer Diameters

Inner diameter of the fixed side Support Unit (mm)	Applicable model No. of the fixed side Support Unit	Inner diameter of the supported side Support Unit (mm)	Applicable model No. of the supported side Support Unit	Applicable screw shaft outer diameter (mm)
4	EK 4 FK 4	—	—	$\phi 4$
5	EK 5 FK 5	—	—	$\phi 6$
6	EK 6 FK 6	6	EF 6 FF 6	$\phi 8$
8	EK 8 FK 8	6	EF 8 FF 6	$\phi 10$
10	EK 10 FK 10 BK 10	8	EF 10 FF 10 BF 10	$\phi 12, \phi 14$
12	EK 12 FK 12 BK 12	10	EF 12 FF 12 BF 12	$\phi 14, \phi 15, \phi 16$
15	EK 15 FK 15 BK 15	15	EF 15 FF 15 BF 15	$\phi 20$
17	BK 17	17	BF 17	$\phi 20, \phi 25$
20	EK 20 FK 20 BK 20	20	EF 20 FF 20 BF 20	$\phi 25, \phi 28, \phi 32$
25	FK 25 BK 25	25	FF 25 BF 25	$\phi 36$
30	FK 30 BK 30	30	FF 30 BF 30	$\phi 40, \phi 45$
35	BK 35	35	BF 35	$\phi 45$
40	BK 40	40	BF 40	$\phi 50$

Note) The Supports Units in this table apply only to those Ball Screw models with recommended shaft ends shapes H, J and K, indicated on A-810.

## Model Numbers of Bearings and Characteristic Values

Angular ball bearing on the fixed side					Deep-groove ball bearing on the supported side			
Support Unit model No.	Bearing model No.	Axial direction			Support Unit model No.	Bearing model No.	Radial direction	
		Basic dynamic load rating Ca (kN)	Note) Permissible load (kN)	Rigidity (N/μm)			Basic dynamic load rating C (kN)	Basic static load rating Co(kN)
EK 4 FK 4	AC4-12P5	0.93	1.1	27	—	—	—	—
EK 5 FK 5	AC5-14P5	1	1.24	29	—	—	—	—
EK 6 FK 6	AC6-16P5	1.38	1.76	35	EF 6 FF 6	606ZZ	2.19	0.87
EK 8 FK 8	79M8DF GMP5	2.93	2.15	49	EF 8	606ZZ	2.19	0.87
EK 10 FK 10 BK 10	7000HTDF GMP5	6.08	3.1	65	EF 10 FF 10 BF 10	608ZZ	3.35	1.4
EK 12 FK 12 BK 12	7001HTDF GMP5	6.66	3.25	88	EF 12 FF 12 BF 12	6000ZZ	4.55	1.96
EK 15 FK 15 BK 15	7002HTDF GMP5	7.6	4	100	EF 15 FF 15 BF 15	6002ZZ	5.6	2.84
BK 17	7203HTDF GMP5	13.7	5.85	125	BF 17	6203ZZ	9.6	4.6
EK 20 FK 20	7204HTDF GMP5	17.9	9.5	170	EF 20 FF 20	6204ZZ	12.8	6.65
BK 20	7004HTDF GMP5	12.7	7.55	140	BF 20	6004ZZ	9.4	5.05
FK 25 BK 25	7205HTDF GMP5	20.2	11.5	190	FF 25 BF 25	6205ZZ	14	7.85
FK 30 BK 30	7206HTDF GMP5	28	16.3	195	FF 30 BF 30	6206ZZ	19.5	11.3
BK 35	7207DF GMP5	37.2	5.83	255	BF35	6207ZZ	25.7	15.3
BK 40	7208HTDF GMP5	44.1	27.1	270	BF 40	6208ZZ	29.1	17.8

Note) "Permissible load" indicates the static permissible load.

## Example of Installation

[Square Type Support Unit]

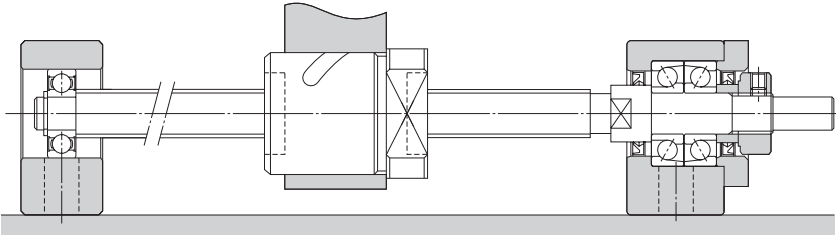


Fig.2 Example of Installing a Square Type Support Unit

[Round Type Support Unit]

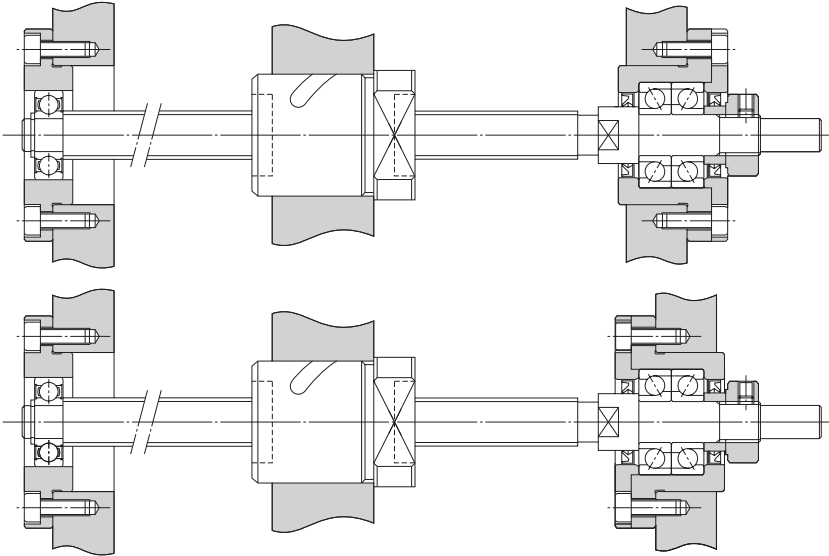


Fig.3 Example of Installing a Round Type Support Unit

## Mounting Procedure

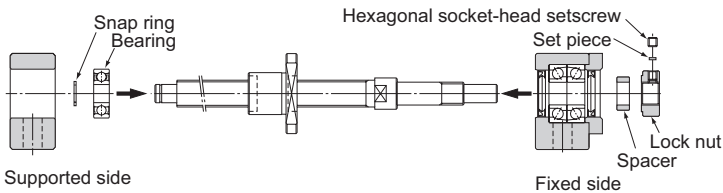
### [Installing the Support Unit]

- (1) Install the fixed side Support Unit with the screw shaft.
- (2) After inserting the fixed side Support Unit, secure the lock nut using the fastening set piece and the hexagonal socket-head setscrews.
- (3) Attach the supported side bearing to the screw shaft and secure the bearing using the snap ring, and then install the assembly to the housing on the supported side.

Note1) Do not disassemble the Support Unit.

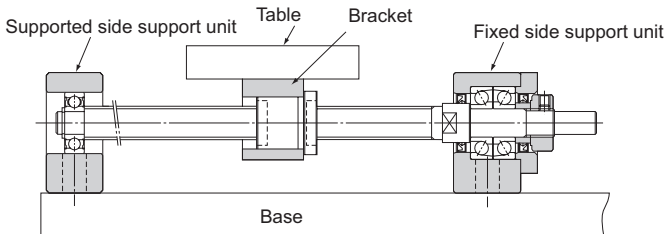
Note2) When inserting the screw shaft to the Support Unit, take care not to let the oil seal lip turn outward.

Note3) When securing the set piece with a hexagonal socket-head setscrew, apply an adhesive to the hexagonal socket-head setscrew before tightening it in order to prevent the screw from loosening. If planning to use the product in a harsh environment, it is also necessary to take a measure to prevent other components/parts from loosening. Contact THK for details.



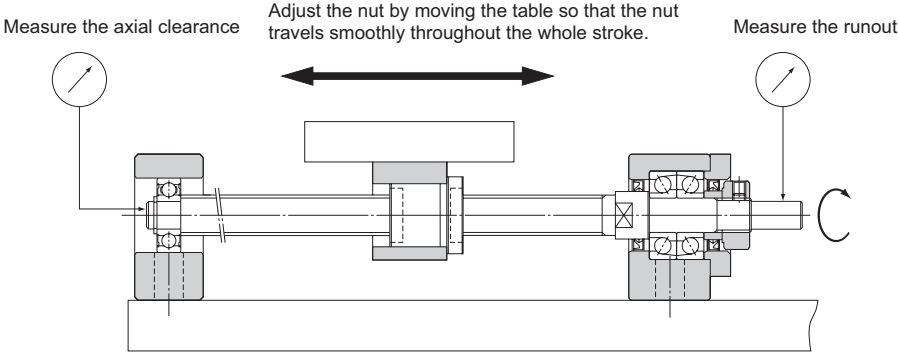
### [Installation onto the Table and the Base]

- (1) If using a bracket when mounting the ball screw nut to the table, insert the nut into the bracket and temporarily fasten it.
- (2) Temporarily fasten the fixed side Support Unit to the base. In doing so, press the table toward the fixed side Support Unit to align the axial center, and adjust the table so that it can travel freely.
  - If using the fixed side Support Unit as the reference point, secure a clearance between the ball screw nut and the table or inside the bracket when making adjustment.
  - If using the table as the reference point, make the adjustment either by using the shim (for a square type Support Unit), or securing the clearance between the outer surface of the nut and the inner surface of the mounting section (for a round type Support Unit).
- (3) Press the table toward the fixed-side Support Unit to align the axial center. Make the adjustment by reciprocating the table several times so that the nut travels smoothly throughout the whole stroke, and temporarily secure the Support Unit to the base.



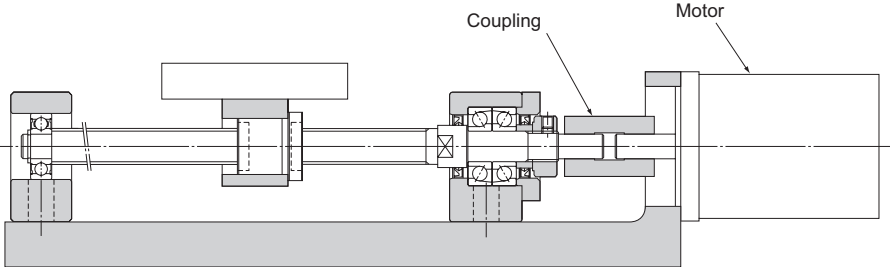
[Checking the Accuracy and Fully Fastening the Support Unit]

While checking the runout of the ball screw shaft end and the axial clearance using a dial gauge, fully fasten the ball screw nut, the nut bracket, the fixed side Support Unit and the supported-side Support Unit, in this order.



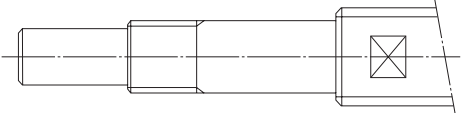
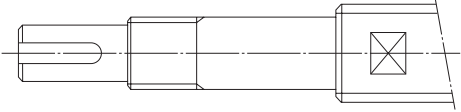
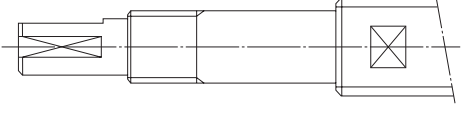
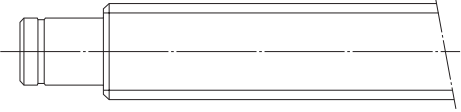
[Connection with the Motor]

- (1) Mount the motor bracket to the base.
- (2) Connect the motor and the ball screw using a coupling.
- Note) Make sure the mounting accuracy is maintained.
- (3) Thoroughly perform the break-in for the system.



## Types of Recommended Shapes of the Shaft Ends

To ensure speedy estimates and manufacturing of Ball Screws, THK has standardized the shaft end shapes of the screw shafts. The recommended shapes of shaft ends consist of shapes H, K and J, which allow standard Support Units to be used.

Mounting method	Symbol for shaft end shape		Shape	Supported Support Unit
Fixed	H J	H1		FK EK
		J1		BK
		H2		FK EK
		J2		BK
		H3		FK EK
		J3		BK
Supported	K			FF EF BF