Ball Screw

Ball Screw Peripherals

Support Unit

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

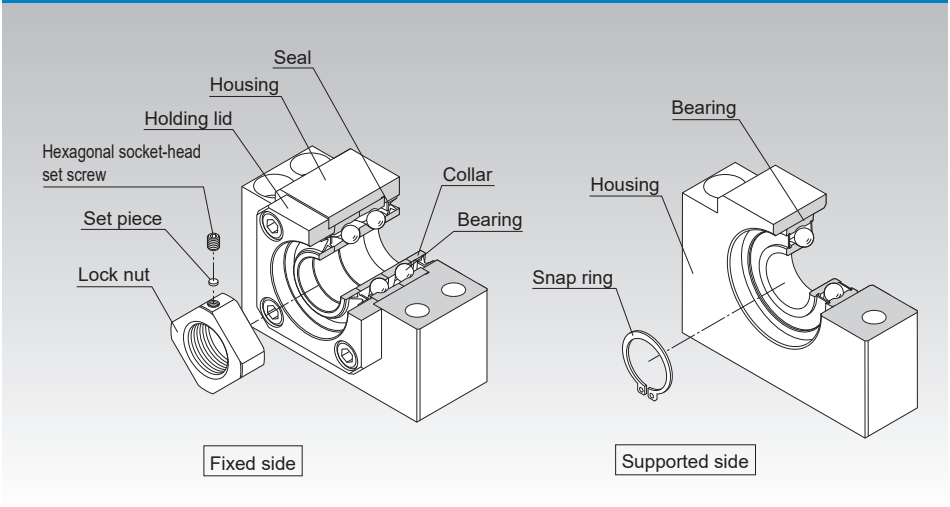


Fig. 1: Structure of the Support Unit

Structure and Features

The support unit comes in six types: models EK, FK, EF, and FF, which are tailored to fit the Model BNK precision ball screw with finished shaft ends, and models BK and BF, which are standardized for general ball screws.
The support unit on the fixed side includes a JIS Class 5-compliant angular bearing provided with an adjusted preload.
The support unit on the supported side uses a deep-groove ball bearing.
The internal bearings of support unit models EK, FK, and BK contain an optimal quantity of lithium soap-based grease retained by a special seal, enabling these models to operate over a long period of time.

Optimal Bearing Utilization

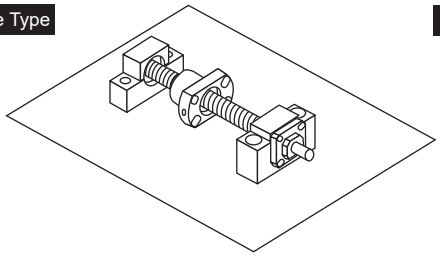
To ensure rigidity balance with the ball screw, the support unit uses an angular bearing (contact angle: 30°; DF configuration) with a high rigidity and a low torque. Miniature support unit models EK/FK 4, 5, and 6 incorporate a miniature angular bearing developed exclusively for miniature ball screws. 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 stable rotational performance.

Support Unit Shapes

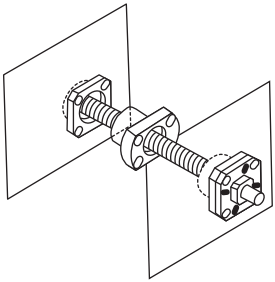
Support units are available in square and round shapes to fit various intended applications.

Installation Example

Square Type



Round Type



Compact and Easy to Install

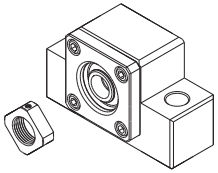
The support unit is compactly designed to accommodate the space in the installation site. The support unit includes a bearing with an adjusted preload, so it can be assembled with a ball screw unit with no further machining, reducing the labor required for installation and increasing the assembly accuracy.

Types

For the Fixed Side

Square Model EK

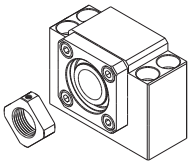
Dimensional Table⇒A15-328



(Inner diameter: ϕ4 to ϕ20)

Square Model BK

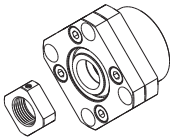
Dimensional Table⇒A15-330



(Inner diameter: ϕ10 to ϕ40)

Round Model FK

Dimensional Table⇒A15-332

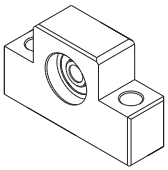


(Inner diameter: ϕ4 to ϕ30)

For the Supported Side

Square Model EF

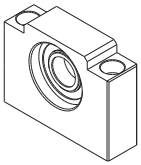
Dimensional Table⇒A15-336



(Inner diameter: ϕ6 to ϕ20)

Square Model BF

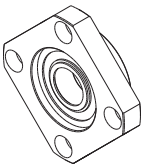
Dimensional Table⇒A15-338



(Inner diameter: ϕ8 to ϕ40)

Round Model FF

Dimensional Table⇒A15-340



(Inner diameter: ϕ6 to ϕ30)

Types of Support Units and Applicable Screw Shaft Outer Diameters

Inner diameter of fixed-side support unit (mm)	Inner diameter of supported-side support unit (mm)	Applicable model No. of fixed-side support unit	Applicable model No. of the supported-side support unit	Model BNK with unfinished shaft ends (applicable model No.)	Recommended shapes for shaft ends (applicable shaft outer diameter ϕD)	
					Shaft end H (mm)	Shaft end J (mm)
4	—	EK 4 FK 4	—	BNK0401 BNK0501	ϕ6	———
5	—	EK 5 FK 5	—	BNK0601	ϕ8	———
6	6	EK 6 FK 6	EF 6 FF 6	BNK0801 BNK0802 BNK0810	ϕ8 ϕ10	———
8	6	EK 8 FK 8	EF 8 FF 6	BNK1002	ϕ12	———
10	8	EK 10 FK 10 BK 10	EF 10 FF 10 BF 10	BNK1004 BNK1010 BNK1202 BNK1205 BNK1208	ϕ14 ϕ15	ϕ14 ϕ15
12	10	EK 12 FK 12 BK 12	EF 12 FF 12 BF 12	BNK1402 BNK1404 BNK1408 BNK1510 BNK1520 BNK1616	ϕ16 ϕ18	ϕ16 ϕ18
15	15	EK 15 FK 15	EF 15 FF 15	BNK2010 BNK2020	ϕ20 ϕ25	———
		BK 15	BF 15	———	———	ϕ20
17	17	BK 17	BF 17	———	———	ϕ25
20	20	EK 20 FK 20	EF 20 FF 20	BNK2520	ϕ28 ϕ30 ϕ32	———
		BK 20	BF 20	———	———	ϕ28 ϕ30 ϕ32
25	25	FK 25	FF 25	———	ϕ36	———
		BK 25	BF 25	———	———	ϕ36
30	30	FK 30	FF 30	———	ϕ40	ϕ40
		BK 30	BF 30	———		
35	35	BK 35	BF 35	———	———	ϕ45
40	40	BK 40	BF 40	———	———	ϕ50 ϕ55

Note1) The support units in this table apply only to those ball screw models with recommended shaft ends shapes H, J, and K, indicated on A15-326.
Note2) For recommended shapes for shaft ends H, J, and K; refer to pages A15-342 to A15-347.

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	Axial direction			Support unit model No.	Bearing model No.	Radial direction	
		Basic dynamic load rating Ca (kN)	Permis-sible load (kN)	Rigidity (N/μm)			Basic dynamic load rating C (kN)	Basic static load rating C_0 (kN)
EK 4 FK 4	704 equivalent (DF P5)	0.93	1.1	27	—	—	—	—
EK 5 FK 5	705 equivalent (DF P5)	1	1.24	29	—	—	—	—
EK 6 FK 6	706 equivalent (DF P5)	1.38	1.76	35	EF 6 FF 6	606ZZ	2.19	0.87
EK 8 FK 8	798 equivalent (DF P5)	2.93	2.15	49	EF 8	606ZZ	2.19	0.87
EK 10 FK 10 BK 10	7000 equivalent (DF P5)	6.08	3.1	65	EF 10 FF 10 BF 10	608ZZ	3.35	1.4
EK 12 FK 12 BK 12	7001 equivalent (DF P5)	6.66	3.25	88	EF 12 FF 12 BF 12	6000ZZ	4.55	1.96
EK 15 FK 15 BK 15	7002 equivalent (DF P5)	7.6	4	100	EF 15 FF 15 BF 15	6002ZZ	5.6	2.84
BK 17	7203 equivalent (DF P5)	13.7	5.85	125	BF 17	6203ZZ	9.6	4.6
EK 20 FK 20	7204 equivalent (DF P5)	17.9	9.5	170	EF 20 FF 20	6204ZZ	12.8	6.65
BK 20	7004 equivalent (DF P5)	12.7	7.55	140	BF 20	6004ZZ	9.4	5.05
FK 25 BK 25	7205 equivalent (DF P5)	20.2	11.5	190	FF 25 BF 25	6205ZZ	14	7.85
FK 30 BK 30	7206 equivalent (DF P5)	28	16.3	195	FF 30 BF 30	6206ZZ	19.5	11.3
BK 35	7207 equivalent (DF P5)	37.2	21.9	255	BF 35	6207ZZ	25.7	15.3
BK 40	7208 equivalent (DF P5)	44.1	27.1	270	BF 40	6208ZZ	29.1	17.8

Installation Example

Square Support Unit

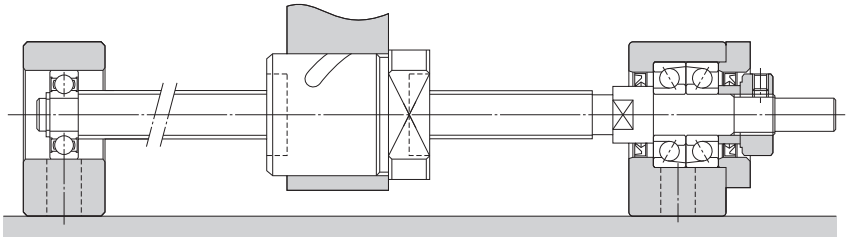


Fig. 2: Square Support Unit Installation Example

Round Support Unit

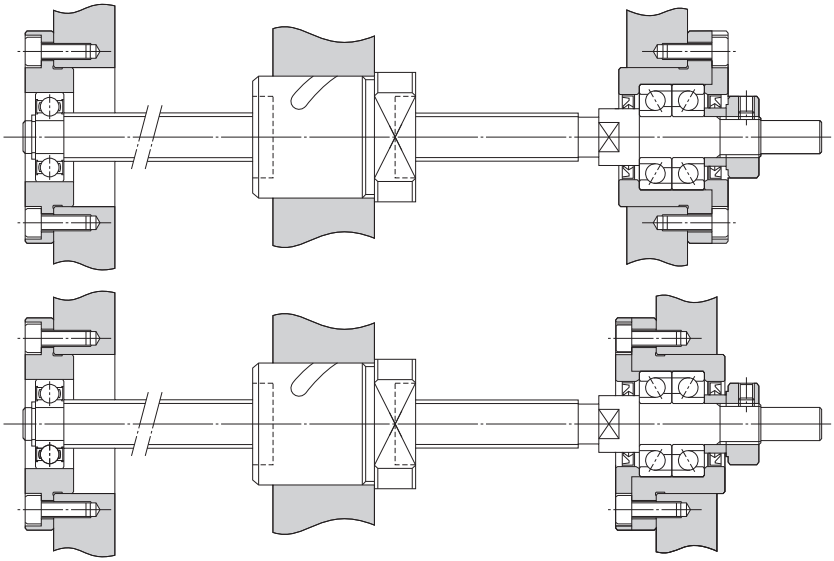


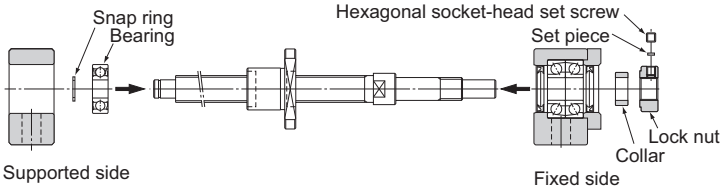
Fig. 3: Round Support Unit Installation Example

Mounting Procedure

Installing the Support Unit

(1) Mount the fixed-side support unit on the screw shaft.
(2) After attaching 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, secure the bearing using the snap ring, and then install the assembly to the housing on the supported side.

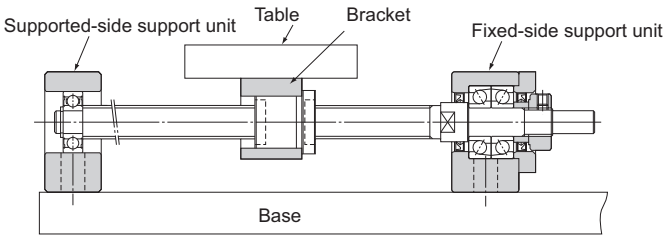
Note1) Do not disassemble the support unit.
Note2) When inserting the screw shaft to the support unit, take care not to let the oil seal lip turn outward.
Note3) When securing the set piece with a hexagonal socket-head setscrew, apply an adhesive to the hexagonal socket-head setscrew before tightening 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 measures to prevent other components/parts from loosening. Contact THK for details.



Installation onto the Table and the Base

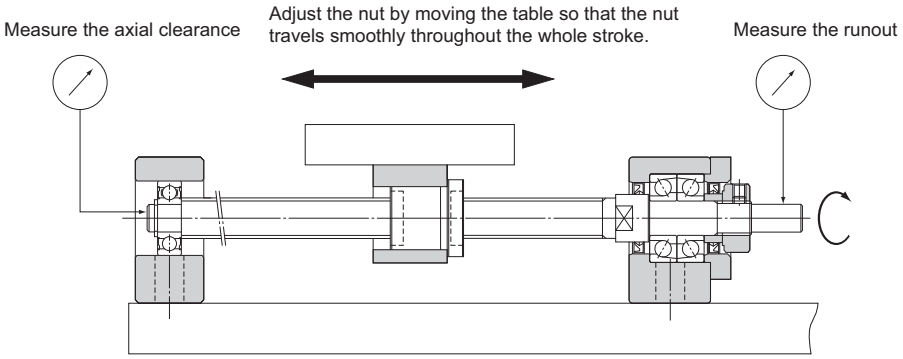
(1) If using a bracket when mounting the ball screw nut to the table, insert the nut into the bracket and temporarily fasten it.
(2) Temporarily fasten the fixed-side support unit to the base.
In doing so, press the table toward the fixed-side support unit to align the center of the axis, and adjust 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 a shim (for a square support unit), or securing clearance between the outer surface of the nut and the inner surface of the mounting section (for a round support unit).

(3) Press the table toward the fixed-side support unit to align the center of the axis. Make the adjustment by cycling the table several times so that the nut travels smoothly throughout the whole stroke, and temporarily secure the support unit to the base.



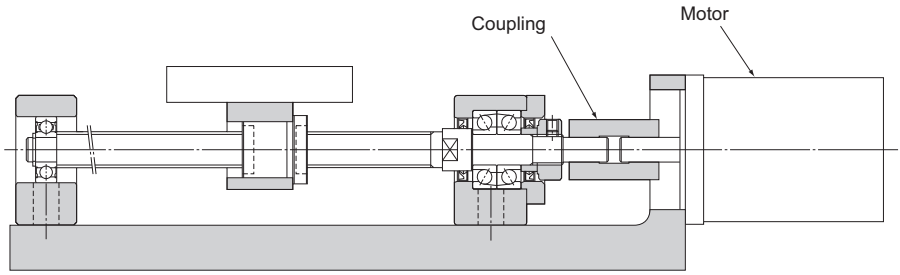
Checking the Accuracy and Fully Fastening the Support Unit

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 that order.



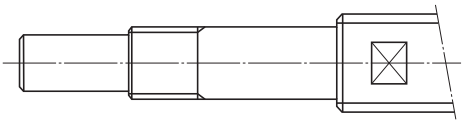
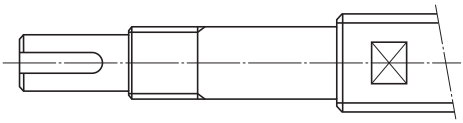
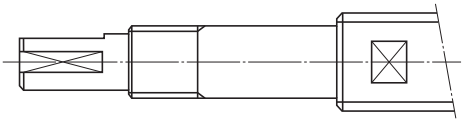
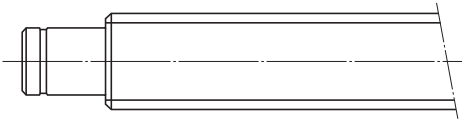
Connection with the Motor

(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 a warming-up operation for the system.



Types of Recommended Shapes for the Shaft Ends

To ensure speedy estimates and manufacturing of ball screws, THK has standardized the shapes of screw shafts ends. The recommended shapes for 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	Compatible 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