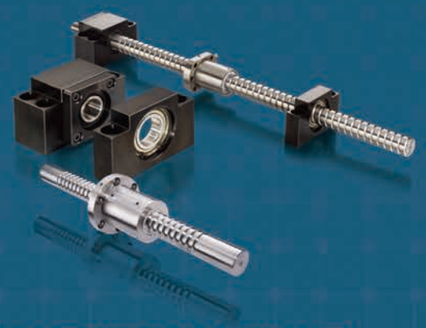

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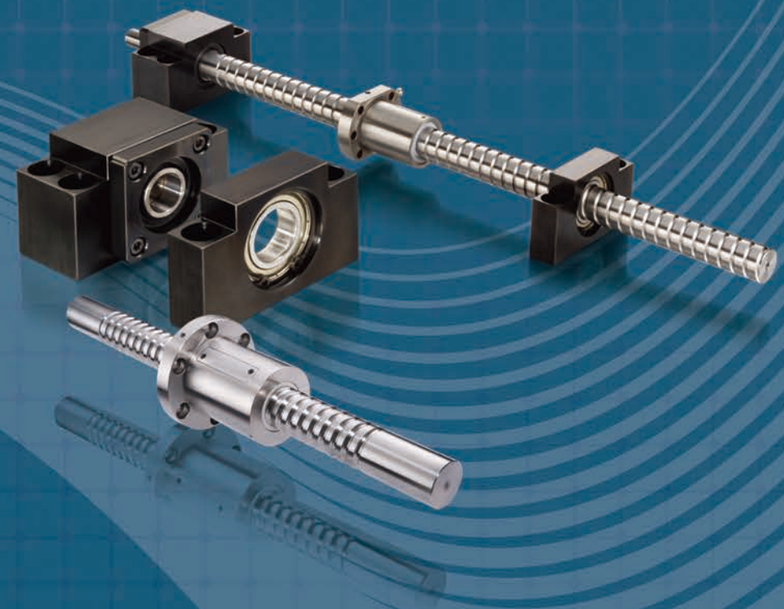
2013.08
BU

Support Units for Ball Screw

Support Units for Ball Screw

TPI®

Support Units for Ball Screw



CAT NO:2262/TE

Contents

TUNG PEI INDUSTRIAL CO., LTD.

CAT. NO. 2262/TE 2013.08

1. Design Features

TPI offers 4 types of precision Ball Screw Support Units: TBK Series, TFK Series, TBF Series and TFF Series. The designs of these 4 types have all been standardized, making these support units the perfect choice for a Ball Screw assembly.

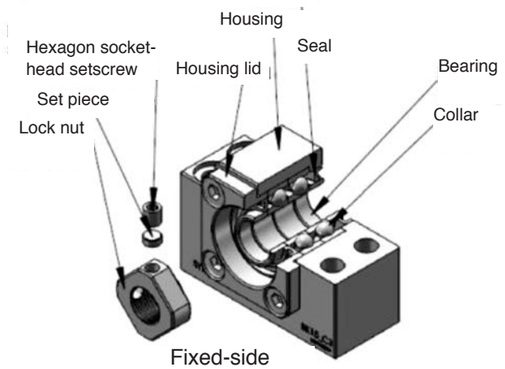
All of TPI Ball Screw Support Units are equipped with TPI's own High Precision Angular Contact Ball Bearings, caliberated with precise preload to guarantee that the whole assembly operates with high rigidity, high accuracy, and high stability. TPI's Angular Contact Ball Bearings contain high durable grease that effectively increases the support unit's life. Re-lubrication will not be necessary. Also, we make sure that our valued customers save significantly on installation time and maintenance cost. Futhermore, TPI Ball Screw Support Units are available in rectangular and round shapes to accomodate various working requirements. To see detailed structures and features, please refer to figure 1-1 & 1-2 .

TPI Ball Screw Support Units are optimized to save space. They can be easily installed and adapted to small working space. Since the bearings inside TPI Ball Screw Support Units have been adjusted with appropriate preload, they can be assembled with the ball screws without further machining. You will gain the advantage of reduced installation time and increased ball screw assembly accuracy.

There are 2 choices of surface treatment for TPI Ball Screw Support Unit : black oxidizing finish and electroless nickel plating finish. Both are highly effective against corrosion in a harsh working environment.

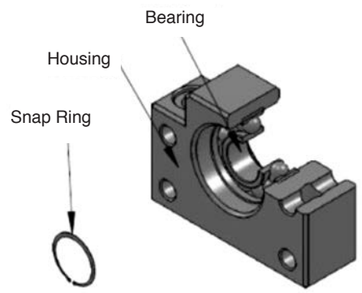
After 72 hours of withstanding in a salt spray chamber as shown in Fig, 1-3, TPI Ball Screw Support Units with nickel plating surface still look brand new.〈Salt spray experiment is an accelerated corrosion test. In a natural environment, it may take a full year to achieve corrosion; whereas with salt spray, the experiment only needs 24 hours to achieve the same result.〉

Fig.1-1 Structure of fixed-side support units



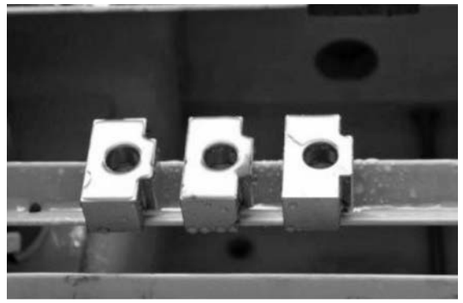
Fixed-side

Fig.1-2 Structure of supported-side support units



Supported-side

Fig.1-3 Salt spray experiment



TPI Ball Screw Support Unit is equipped with High Precision Angular Contact Ball Bearing. Adjusted preload in the axial direction not only increases the whole assembly's rigidity, but also increases the performance of axial rotational and positioning accuracy.

TPI Ball Screw Support Units excel in rotational accuracy, positioning accuracy, and operation durability performance. When running on the same motor conditions against other competitor’ s products, TPI Ball Screw Support Units exerted the best torque performance. The Sliding Thrust Test indicates that TPI's revolutionary design offer even lower axial starting torque, rotation starting torque than Japanese brands, resulting in excellent motor operation efficiency.

Fig.1-4 Sliding Thrust Test

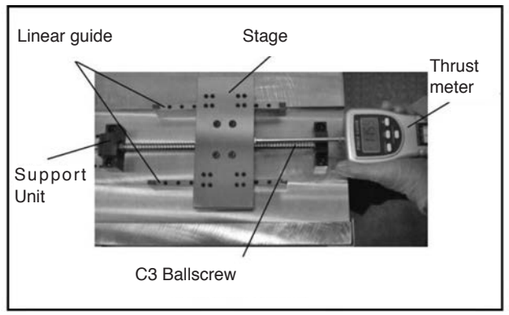
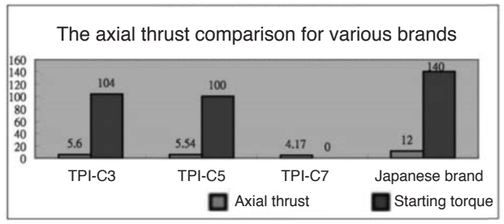
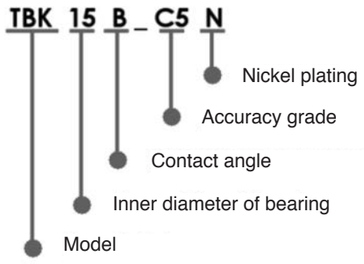


Fig.1-5 Result of Sliding Thrust Test



2. Number Codes for Support Unit

2.1 Number Codes



2.2 Comparison Table of TPI Support Units with Other Brands

Table 2-1 TBK series

TPI	THK	NSK
TBK10	BK10	-
TBK12	BK12	-
TBK15	BK15	-
TBK17	BK17	WBK17-01A
TBK20	BK20	-
TBK25	BK25	-

Table 2-2 TBF series

TPI	THK	NSK
TBF10	BF10	-
TBF12	BF12	-
TBF15	BF15	-
TBF17	BF17	WBK17S-01
TBF20	BF20	-
TBF25	BF25	-

Table 2-3 TFK series

TPI	THK	NSK	KURODA	MISUMI
TFK08	FK08	WBK08-11	BUM-08	BRW08
TFK10	FK10	WBK10-11	BUM-10	BRW10
TFK12	FK12	WBK12-11	BUM-12	BRW12
TFK15	FK15	WBK15-11	BUM-15	BRW15
TFK17	FK17	-	-	-
TFK20	FK20	WBK20-11	BUM-20	BRW20
TFK25	FK25	WBK25-11	BUM-25	BRW25

Table 2-4 TFF series

TPI	THK	MISUMI
TFF06	FF06	BUR06
TFF10	FF10	BUR10
TFF12	FF12	BUR12
TFF15	FF15	BUR15
TFF17	FF17	-
TFF20	FF20	BUR20
TFF25	FF25	BUR25

2.3 Appilication Conditions

Applicable ball-screw OD (mm)	ϕ10 ~ ϕ12	ϕ10 ~ ϕ15	ϕ14 ~ ϕ18	ϕ20	ϕ25 ~ ϕ28	ϕ25 ~ ϕ28	ϕ25 ~ ϕ28	ϕ30 ~ ϕ36
Axial load kgf	103	195	217	240	413	428	587	709
Static load kgf	280	530	610	700	1220	1340	1690	2090
Limiting RPM	40000	24000	22000	19000	16000	15000	13000	12000
Bearing	708A	7000A	7001A	7002A	7203A	7004A	7204A	7205A
Applicable model	TFK08	TBK10	TBK12	TBK15	TBK17	TBK20		TBK25
		TFK10	TFK12	TFK15	TFK17		TFK20	TFK25
	TFF06	TBF10	TBF12	TBF15	TBF17	TBF20		TBF25
		TFF10	TFF12	TFF15	TFF17		TFF20	TFF25

Note :

If mouted with Fixed-side and Fixed-side at the same time, the axial load needs to be multiplied by 2 .

3. TBK Series (Fixed-side , Rectangular)

3.1 Model and Number Codes

Model	Number code	Surface teatment	Ball screw grade	Bearing	
				Model	Max. starting torque (gf-cm)
TBK10	TBK10_C7	Black oxidizing	C7	7000A P0	No preload
	TBK10_C5		C5		190
	TBK10_C3		C3	7000A P5	190
	TBK10_C7N	Electroless nickel plating	C7	7000A P0	No preload
	TBK10_C5N		C5		190
	TBK10_C3N		C3	7000A P5	190
TBK12	TBK12_C7	Black oxidizing	C7	7001A P0	No preload
	TBK12_C5		C5		210
	TBK12_C3		C3	7001A P5	210
	TBK12_C7N	Electroless nickel plating	C7	7001A P0	No preload
	TBK12_C5N		C5		210
	TBK12_C3N		C3	7001A P5	210
TBK15	TBK15_C7	Black oxidizing	C7	7002A P0	No preload
	TBK15_C5		C5		230
	TBK15_C3		C3	7002A P5	230
	TBK15_C7N	Electroless nickel plating	C7	7002A P0	No preload
	TBK15_C5N		C5		230
	TBK15_C3N		C3	7002A P5	230
TBK17	TBK17_C7	Black oxidizing	C7	7203A P0	No preload
	TBK17_C5		C5		370
	TBK17_C3		C3	7203A P5	370
	TBK17_C7N	Electroless nickel plating	C7	7203A P0	No preload
	TBK17_C5N		C5		370
	TBK17_C3N		C3	7203A P5	370
TBK20	TBK20_C7	Black oxidizing	C7	7004A P0	No preload
	TBK20_C5		C5		380
	TBK20_C3		C3	7004A P5	380
	TBK20_C7N	Electroless nickel plating	C7	7004A P0	No preload
	TBK20_C5N		C5		380
	TBK20_C3N		C3	7004A P5	380
TBK25	TBK25_C7	Black oxidizing	C7	7205A P0	No preload
	TBK25_C5		C5		730
	TBK25_C3		C3	7205A P5	730
	TBK25_C7N	Electroless nickel plating	C7	7205A P0	No preload
	TBK25_C5N		C5		730
	TBK25_C3N		C3	7205A P5	730

Black oxidizing
Application environment : Normal

Oil nozzle (option)

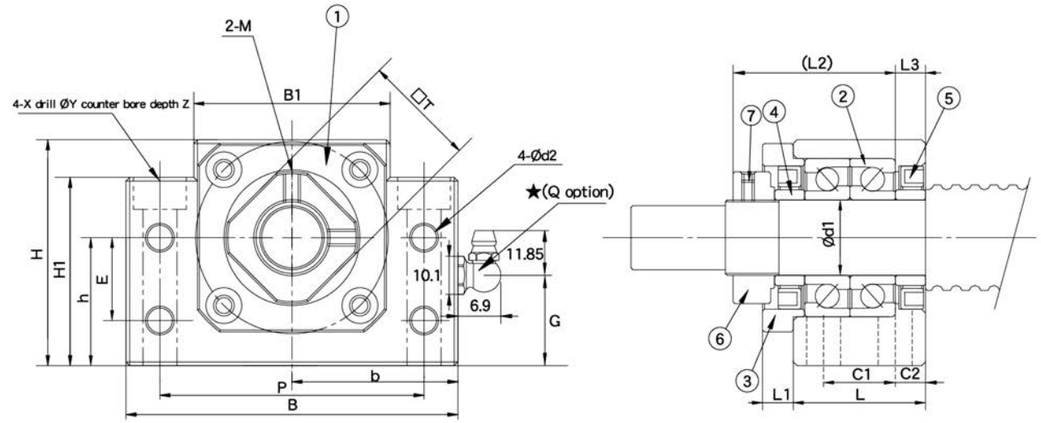
Electroless nickel plating
Application environment : Clean room

◆Grade C7 is designed without preload treatment, and the maximum axial clearance is 0.018 mm.
◆Grade C5 is designed with preload treatment, and there is no axial clearance.
◆Bearings inside are assembled by DF way.
◆The standard model is without oil nozzle, if required, please advice in advance.

3.2 Dimensions

No.	Part Name	Qty
1	Housing	1
2	Bearing	1 set
3	Holding lid	1
4	Collar	2
5	Seal	2
6	Lock nut	1 set
7	Hexagon socket-head Setscrew	2

Oil nozzle (option)



Unit：mm

Model	Shaft diameter d1	L	L1	L2	L3	B	H	b ±0.02	h ±0.02	B1	H1	E	P	C1	C2	d2	X	Y	Z	M	T	G	Q	Weight kg
TBK10	10	25	5	29.5	5	60	39	30	22	34	32.5	15	46	13	6	5.5	6.6	10.8	5	M3	16	15	M6	0.4
TBK12	12	25	5	29.5	5	60	43	30	25	34	32.5	18	46	13	6	5.5	6.6	10.8	1.5	M4	19	18	M6	0.45
TBK15	15	27	6	32	6	70	48	35	28	40	38	18	54	15	6	5.5	6.6	11	6.5	M4	22	18	M6	0.6
TBK17	17	35	9	44	7	86	64	43	39	50	55	28	68	19	8	6.6	9	14	8.5	M4	24	30	M6	1.3
TBK20	20	35	8	43	8	88	60	44	34	52	50	22	70	19	8	6.6	9	14	8.5	M4	30	24	M6	1.3
TBK25	25	42	12	54	9	106	80	53	48	64	70	33	85	22	10	9	11	17	11	M5	35	37	M6	2.4

4. TBF Series (Supported-side , Rectangular)

4.1 Model and Number Codes

Model	Number code	Surface teatment	Ball screw grade	Bearing
TBF10	TBF10_C7	Black oxidizing	C7	608ZZ
	TBF10_C3		C3 C5	608ZZ
	TBF10_C7N	Electroless nickel plating	C7	608LLU
	TBF10_C3N		C3 C5	608LLU
TBF12	TBF12_C7	Black oxidizing	C7	6000ZZ
	TBF12_C3		C3 C5	6000ZZ
	TBF12_C7N	Electroless nickel plating	C7	6000LLU
	TBF12_C3N		C3 C5	6000LLU
TBF15	TBF15_C7	Black oxidizing	C7	6002ZZ
	TBF15_C3		C3 C5	6002ZZ
	TBF15_C7N	Electroless nickel plating	C7	6002LLU
	TBF15_C3N		C3 C5	6002LLU
TBF17	TBF17_C7	Black oxidizing	C7	6203ZZ
	TBF17_C3		C3 C5	6203ZZ
	TBF17_C7N	Electroless nickel plating	C7	6203LLU
	TBF17_C3N		C3 C5	6203LLU
TBF20	TBF20_C7	Black oxidizing	C7	6004ZZ
	TBF20_C3		C3 C5	6004ZZ
	TBF20_C7N	Electroless nickel plating	C7	6004LLU
	TBF20_C3N		C3 C5	6004LLU
TBF25	TBF25_C7	Black oxidizing	C7	6205ZZ
	TBF25_C3		C3 C5	6205ZZ
	TBF25_C7N	Electroless nickel plating	C7	6205LLU
	TBF25_C3N		C3 C5	6205LLU

Black oxidizing
Application environment : Normal

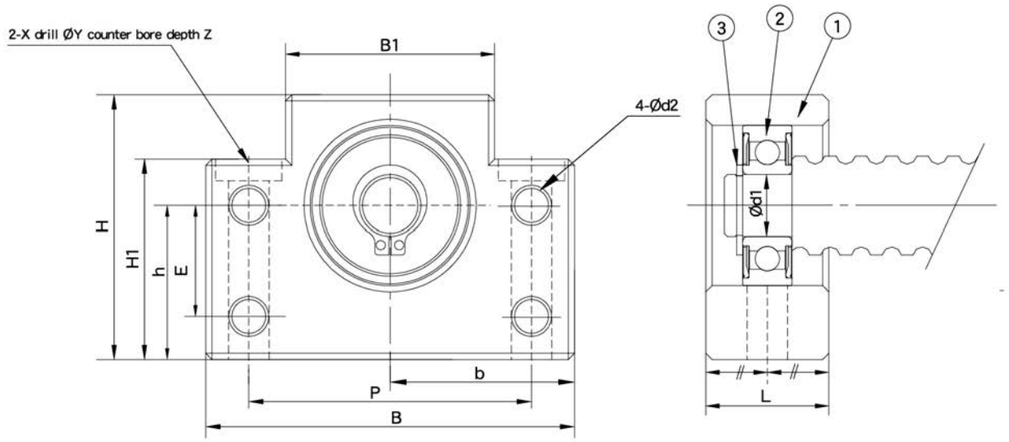
Electroless nickel plating
Application environment : Clean room

◆Double steel shields are used for black oxidizing Support Units.

◆Double rubber seals are used for electroless nickel plating Support Units.

4.2 Dimensions

No.	Part Name	Qty
1	Housing	1
2	Bearing	1 set
3	Snap ring	1



Unit：mm

Model	Shaft diameter d1	L	B	H	b ±0.02	h ±0.02	B1	H1	E	P	d2	X	Y	Z	Bearing	Snap ring	Weight kg
TBF10	8	20	60	39	30	22	34	32.5	15	46	5.5	6.6	10.8	5	608ZZ	S08	0.3
TBF12	10	20	60	43	30	25	34	32.5	18	46	5.5	6.6	10.8	1.5	6000ZZ	S10	0.35
TBF15	15	20	70	48	35	28	40	38	18	54	5.5	6.6	11	6.5	6002ZZ	S15	0.4
TBF17	17	23	86	64	43	39	50	55	28	68	6.6	9	14	8.5	6203ZZ	S17	0.75
TBF20	20	26	88	60	44	34	52	50	22	70	6.6	9	14	8.5	6004ZZ	S20	0.77
TBF25	25	30	106	80	53	48	64	70	33	85	9	11	17	11	6205ZZ	S25	1.45

5. TFK Series (Fixed-side , Round)

5.1 Model and Number Codes

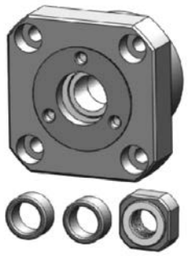
Model	Number code	Surface teatment	Ball screw grade	Bearing	
				Model	Max. starting torque (gf-cm)
TFK08	TFK08_C7	Black oxidizing	C7	708A P0	No preload
	TFK08_C5		C5		90
	TFK08_C3		C3	708A P5	90
	TFK08_C7N	Electroless nickel plating	C7	708A P0	No preload
	TFK08_C5N		C5		90
	TFK08_C3N		C3	708A P5	90
TFK10	TFK10_C7	Black oxidizing	C7	7000A P0	No preload
	TFK10_C5		C5		190
	TFK10_C3		C3	7000A P5	190
	TFK10_C7N	Electroless nickel plating	C7	7000A P0	No preload
	TFK10_C5N		C5		190
	TFK10_C3N		C3	7000A P5	190
TFK12	TFK12_C7	Black oxidizing	C7	7001A P0	No preload
	TFK12_C5		C5		210
	TFK12_C3		C3	7001A P5	210
	TFK12_C7N	Electroless nickel plating	C7	7001A P0	No preload
	TFK12_C5N		C5		210
	TFK12_C3N		C3	7001A P5	210
TFK15	TFK15_C7	Black oxidizing	C7	7002A P0	No preload
	TFK15_C5		C5		230
	TFK15_C3		C3	7002A P5	230
	TFK15_C7N	Electroless nickel plating	C7	7002A P0	No preload
	TFK15_C5N		C5		230
	TFK15_C3N		C3	7002A P5	230

◆Grade C7 is designed without preload treatment, and the maximum axial clearance is 0.018 mm.

◆Grade C5 is designed with preload treatment, and there is no axial clearance.

◆Bearings inside are assembled by DF way.

Black oxidizing
Application environment : Normal



Electroless nickel plating
Application environment : Clean room

Black oxidizing
Application environment : Normal

Electroless nickel plating
Application environment : Clean room

Model	Number code	Surface teatment	Ball screw grade	Bearing	
				Model	Max. starting torque (gf-cm)
TFK17	TFK17_C7	Black oxidizing	C7	7203A P0	No preload
	TFK17_C5		C5		370
	TFK17_C3		C3	7203A P5	370
	TFK17_C7N	Electroless nickel plating	C7	7203A P0	No preload
	TFK17_C5N		C5		370
	TFK17_C3N		C3	7203A P5	370
TFK20	TFK20_C7	Black oxidizing	C7	7204A P0	No preload
	TFK20_C5		C5		550
	TFK20_C3		C3	7204A P5	550
	TFK20_C7N	Electroless nickel plating	C7	7204A P0	No preload
	TFK20_C5N		C5		550
	TFK20_C3N		C3	7204A P5	550
TFK25	TFK25_C7	Black oxidizing	C7	7205A P0	No preload
	TFK25_C5		C5	7205A P0	730
	TFK25_C3		C3	7205A P5	730
	TFK25_C7N	Electroless nickel plating	C7	7205A P0	No preload
	TFK25_C5N		C5	7205A P0	730
	TFK25_C3N		C3	7205A P5	730

◆Grade C7 is designed without preload treatment, and the maximum axial clearance is 0.018 mm.

◆Grade C5 is designed with preload treatment, and there is no axial clearance.

◆Bearings inside are assembled by DF way.

◆The standard model is without oil nozzle, if required, please advice in advance.

★Option

Black oxidizing
Application environment : Normal

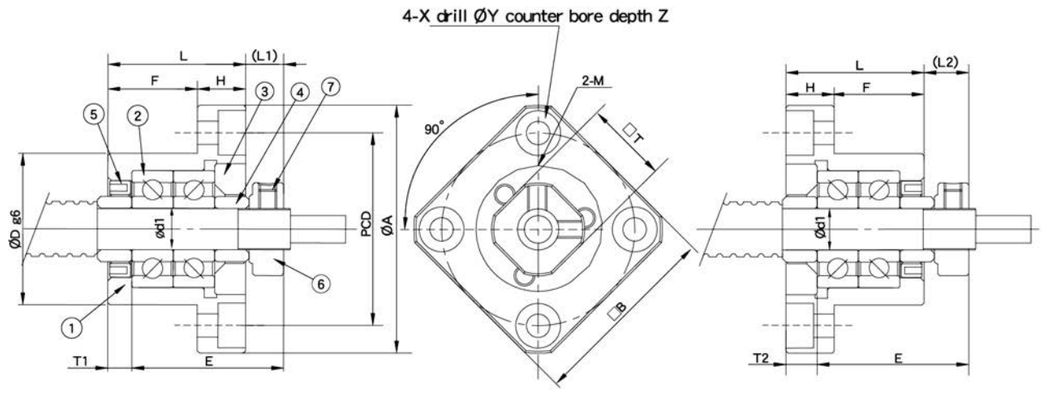
★Option

Electroless nickel plating
Application environment : Clean room

5.2 Dimensions

TFK08

No.	Part Name	Qty
1	Housing	1
2	Bearing	1 set
3	Holding lid	1
4	Collar	2
5	Seal	1
6	Lock nut	1 set
7	Hexagon socket-head Setscrew	2



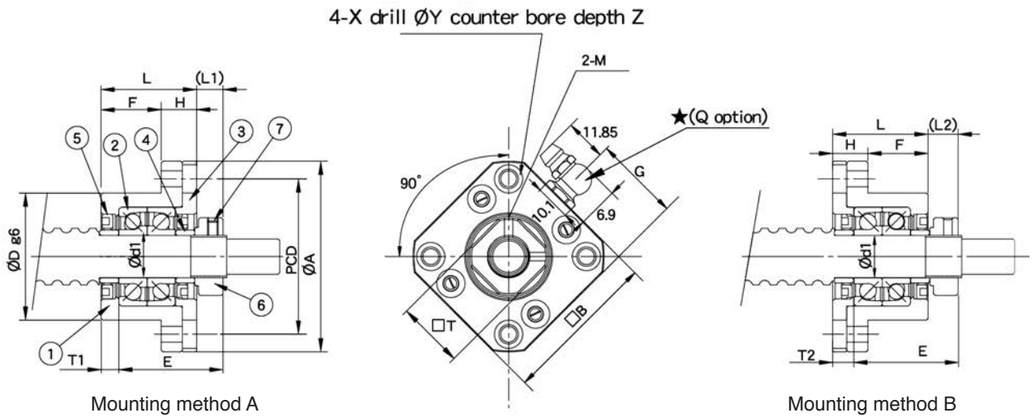
Mounting method A　　Mounting method B

Unit：mm

Model	Shaft diameter d1	L	H	F	E	Dg6		A	PCD	B	Mounting method A		Mounting method B		X	Y	Z	M	T	Weight kg
											L1	T1	L2	T2						
TFK08	8	23	9	14	26	28	-0.007 -0.020	43	35	35	7	4	8	5	3.4	6.5	4	M3	14	0.2

TFK10 ~ TFK25

No.	Part Name	Qty
1	Housing	1
2	Bearing	1 set
3	Holding lid	1
4	Collar	2
5	Seal	2
6	Lock nut	1 set
7	Hexagon socket-head Setscrew	2



Mounting method A　　Mounting method B

Unit：mm

Model	Shaft diameter d1	L	H	F	E	Dg6		A	PCD	B	Mounting method A		Mounting method B		X	Y	Z	M	T	G	Q	Weight kg
											L1	T1	L2	T2								
TFK10	10	27	10	17	29.5	34	-0.009 -0.025	52	42	42	7.5	5	8.5	6	4.5	8	4	M3	16	-	M6	0.25
TFK12	12	27	10	17	29.5	36	-0.009 -0.025	54	44	44	7.5	5	8.5	6	4.5	8	4	M4	19	-	M6	0.26
TFK15	15	32	15	17	36	40	-0.009 -0.025	63	50	52	10	6	12	8	5.5	9.5	6	M4	22	26	M6	0.4
TFK17	17	45	22	23	47	50	-0.009 -0.025	77	62	61	11	9	14	12	6.6	11	10	M4	24	30.5	M6	0.85
TFK20	20	52	22	30	50	57	-0.010 -0.029	85	70	68	8	10	12	14	6.6	11	10	M4	30	34	M6	1.2
TFK25	25	57	27	30	59	63	-0.010 -0.029	98	80	79	13	10	20	17	9	15	13	M5	35	39.5	M6	1.6

6. TFF Series (Supported-side , Round)

6.1 Model and Number Codes

Model	Number code	Surface teatment	Ball screw grade	Bearing
TFF06	TFF06_C7	Black oxidizing	C7	606ZZ
	TFF06_C3		C3 C5	606ZZ
	TFF06_C7N	Electroless nickel plating	C7	606VV
	TFF06_C3N		C3 C5	606VV
TFF10	TFF10_C7	Black oxidizing	C7	608ZZ
	TFF10_C3		C3 C5	608ZZ
	TFF10_C7N	Electroless nickel plating	C7	608LLU
	TFF10_C3N		C3 C5	608LLU
TFF12	TFF12_C7	Black oxidizing	C7	6000ZZ
	TFF12_C3		C3 C5	6000ZZ
	TFF12_C7N	Electroless nickel plating	C7	6000LLU
	TFF12_C3N		C3 C5	6000LLU
TFF15	TFF15_C7	Black oxidizing	C7	6002ZZ
	TFF15_C3		C3 C5	6002ZZ
	TFF15_C7N	Electroless nickel plating	C7	6002LLU
	TFF15_C3N		C3 C5	6002LLU
TFF17	TFF17_C7	Black oxidizing	C7	6203ZZ
	TFF17_C3		C3 C5	6203ZZ
	TFF17_C7N	Electroless nickel plating	C7	6203LLU
	TFF17_C3N		C3 C5	6203LLU
TFF20	TFF20_C7	Black oxidizing	C7	6204ZZ
	TFF20_C3		C3 C5	6204ZZ
	TFF20_C7N	Electroless nickel plating	C7	6204LLU
	TFF20_C3N		C3 C5	6204LLU
TFF25	TFF25_C7	Black oxidizing	C7	6205ZZ
	TFF25_C3		C3 C5	6205ZZ
	TFF25_C7N	Electroless nickel plating	C7	6205LLU
	TFF25_C3N		C3 C5	6205LLU

Black oxidizing
Application environment : Normal

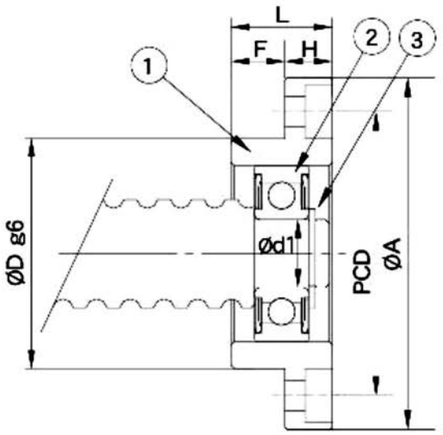
Electroless nickel plating
Application environment : Clean room

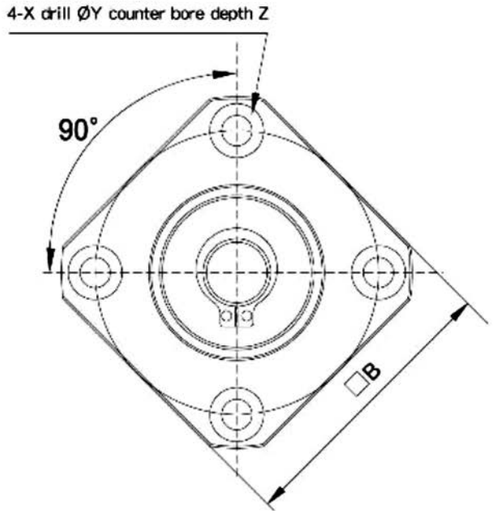
◆Double steel shields are used for black oxidizing Support Units.

◆Double rubber seals are used for electroless nickel plating Support Units.

6.2 Dimensions

No.	Part Name	Qty
1	Housing	1
2	Bearing	1 set
3	Snap ring	1



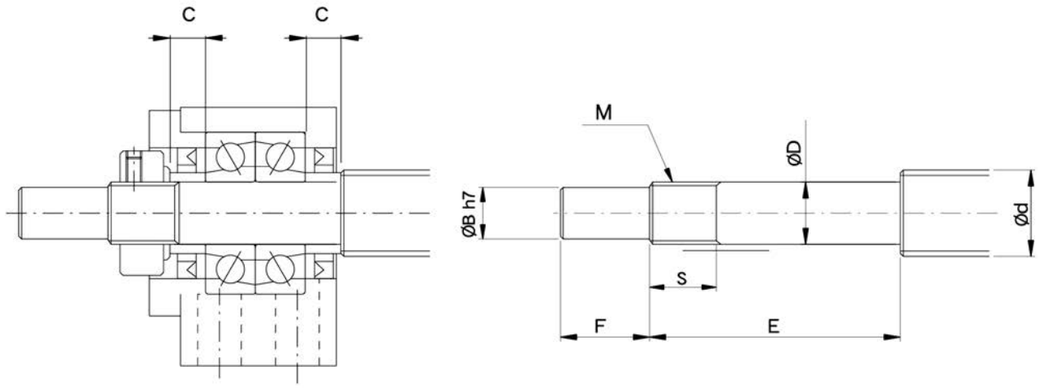


Unit：mm

Model	Shaft diameter d1	L	H	F	Dg6		A	PCD	B	X	Y	Z	Bearing	Snap ring	Weight kg
TFF06	6	10	6	4	22	-0.007 -0.020	36	28	28	3.4	6.5	4	606ZZ	S06	0.08
TFF10	8	12	7	5	28	-0.007 -0.020	43	35	35	3.4	6.5	4	608ZZ	S08	0.1
TFF12	10	15	7	8	34	-0.009 -0.025	52	42	42	4.5	8	4	6000ZZ	S10	0.2
TFF15	15	17	9	8	40	-0.009 -0.025	63	50	52	5.5	9.5	5.5	6002ZZ	S15	0.2
TFF17	17	20	11	9	50	-0.009 -0.025	77	62	61	6.6	11	6.5	6203ZZ	S17	0.4
TFF20	20	20	11	9	57	-0.010 -0.029	85	70	68	6.6	11	6.5	6204ZZ	S20	0.5
TFF25	25	24	14	10	63	-0.010 -0.029	98	80	79	9	14	8.5	6205ZZ	S25	0.7

7. Recommended Shaft End Shape

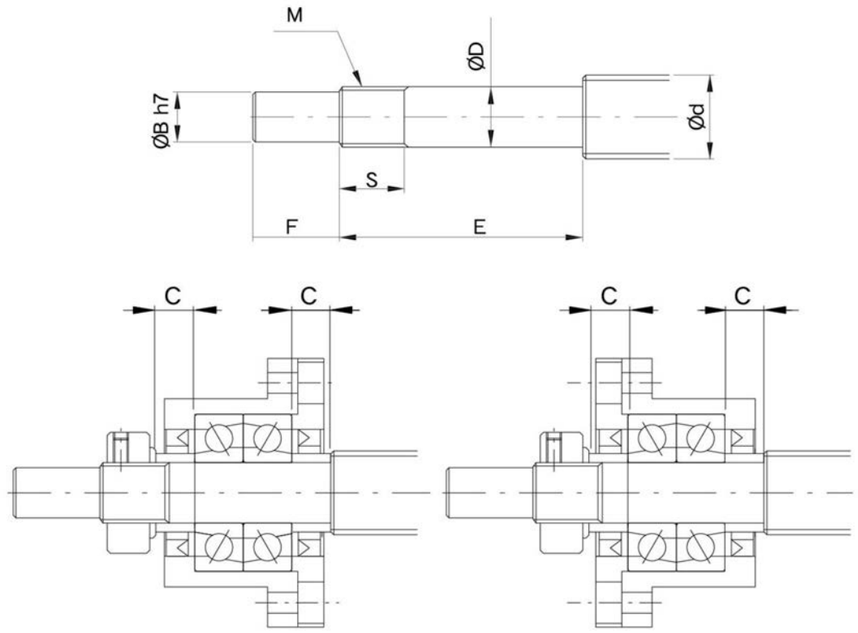
7.1 Recommended Shaft End Shape for TBK Type



Unit：mm

Model	Ballscrew shaft OD	Shaft support portion OD		B	E	F	Metric screw thread		Length of sleeve
	d	D					M	S	C
TBK10	12/14/15	10	-0.008 -0.015	8	36	15	M10×1	12	5.5
TBK12	14/15/16	12	-0.008 -0.017	10	36	15	M12×1	12	5.5
TBK15	18/20	15	-0.008 -0.017	12	40	20	M15×1	12	6
TBK17	20/25	17	-0.008 -0.017	15	53	23	M17×1	17	7
TBK20	25/28	20	-0.010 -0.020	17	53	25	M20×1	15	8
TBK25	32/36	25	-0.010 -0.020	20	66	30	M25×1.5	20	9

7.2 Recommended Shaft End Shape for TFK Type

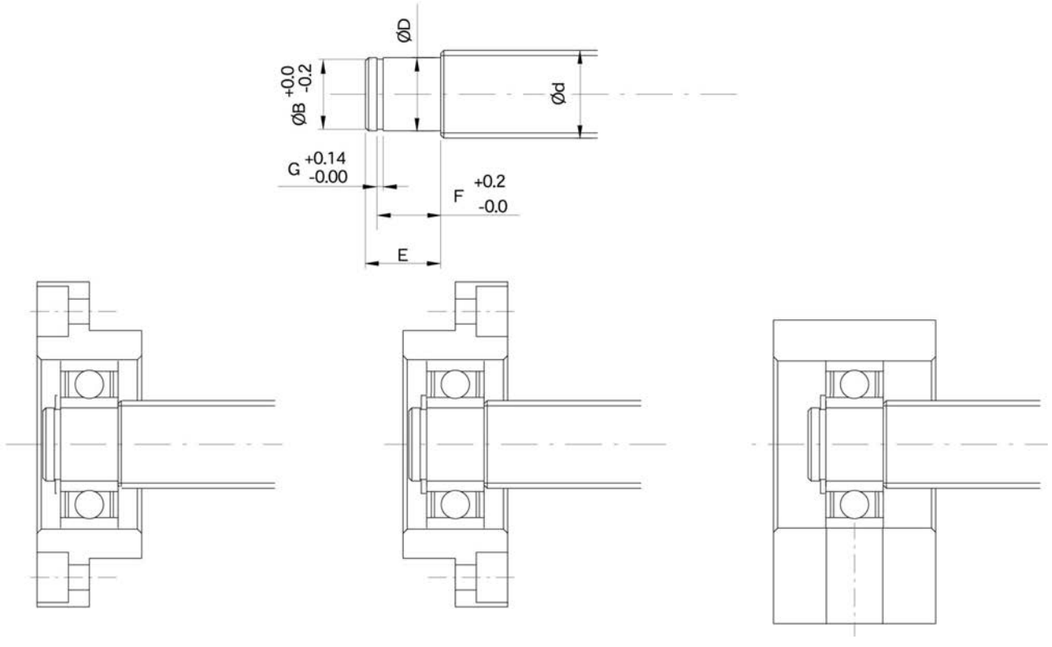


Direction A　　Direction B

Unit：mm

Model	Ballscrew shaft OD	Shaft support portion OD		B	E	F	Metric screw thread		Length of sleeve
	d	D					M	S	C
TFK08	10/12	8	-0.008 -0.015	6	32	9	M8×1	10	5.5
TFK10	12/14/15	10	-0.008 -0.015	8	36	15	M10×1	12	5.5
TFK12	14/15/16	12	-0.008 -0.017	10	36	15	M12×1	12	5.5
TFK15	18/20	15	-0.008 -0.017	12	48	20	M15×1	13	10
TFK17	20/25	17	-0.008 -0.017	15	59	23	M17×1	17	10
TFK20	25/28/30	20	-0.010 -0.020	17	64	25	M20×1	16	11
TFK25	30/32/36	25	-0.010 -0.020	20	76	30	M25×1.5	20	14

7.3 Recommended Shaft End Shape for TBF Type and TFF Type



TFF type
Direction A

TFF type
Direction B

TBF type

Unit：mm

Model		Ballscrew shaft OD	Shaft support portion OD		E	B	F	G
		d	D					
TFF06	-	8	6	-0.008 -0.015	9	5.7	6.8	0.8
TFF10	TBF10	12/14/15	8	-0.008 -0.015	10	7.6	7.9	0.9
TFF12	TBF12	14/15/16	10	-0.008 -0.015	11	9.6	9.15	1.15
TFF15	TBF15	18/20	15	-0.008 -0.017	13	14.3	10.15	1.15
TFF17	TBF17	20/25	17	-0.008 -0.017	16	16.2	13.15	1.15
TFF20	TBF20	25/28/30	20	-0.010 -0.020	19(TFF20) 16(TBF20)	19	15.35(TFF20) 13.35(TBF20)	1.35
TFF25	TBF25	30/32/36	25	-0.010 -0.020	20	23.9	16.35	1.35

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