SCREW TECHNOLOGY CO., LIMITED
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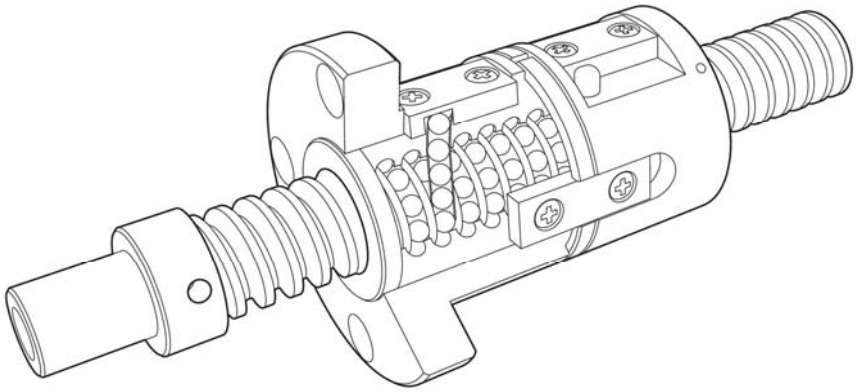
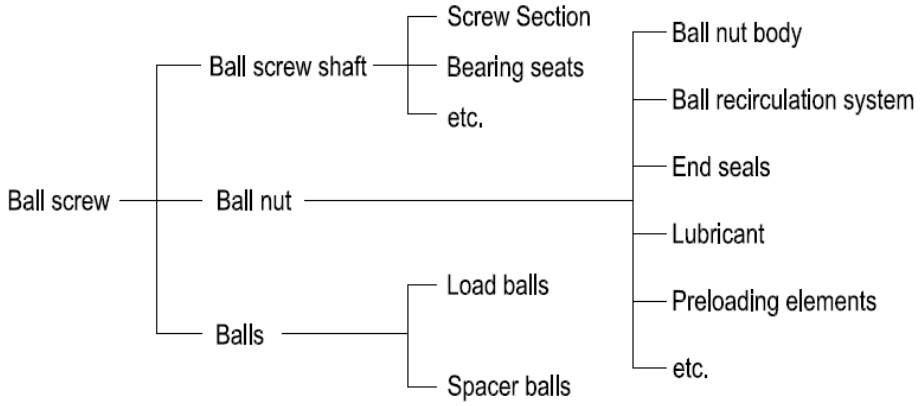
1. Brief Introduction

Ballscrews, also called a ball bearing screws, recirculating ballscrews, etc., consist of a screw spindle and a nut integrated with balls and the balls' return mechanism, return tubes or return caps. Ballscrews are the most common type of screws used in industrial machinery and precision machines. The primary function of a ballscrew is to convert rotary motion to linear motion or torque to thrust, and vice versa, with the features of high accuracy, reversibility and efficiency. Screwtech provides a wide range of ballscrews to satisfy your special requirements.

1.1 Basic profile of ball screw



1.2 Components of Ball Screw



2. Features

> High Efficiency *>Smooth Operation* *>High Accuracy*
> High Durability *>High Synchronism* *> High Reliability*

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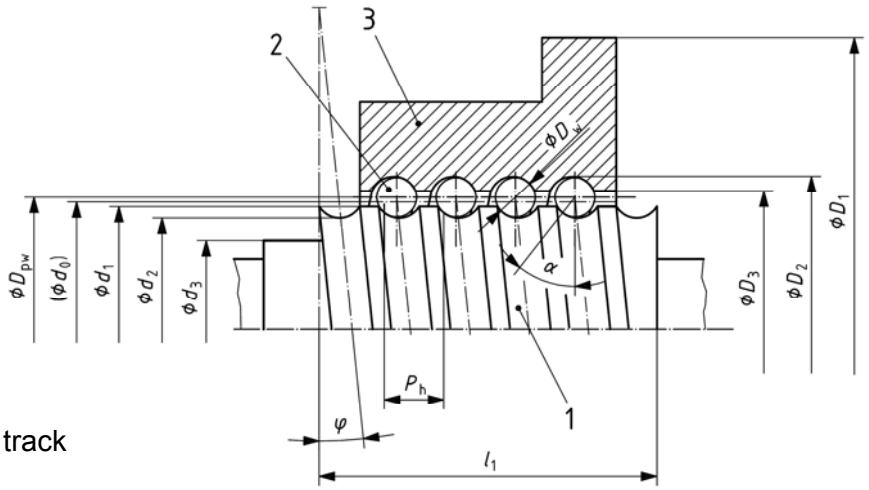
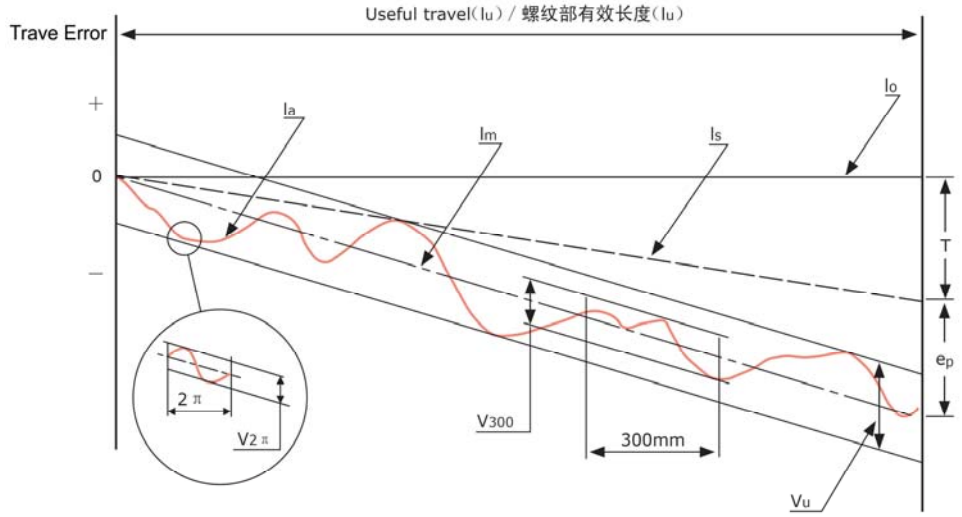
3. Dimensions of Ball Screw

d0 = nominal diameter
d1 = ball screw shaft outer diameter
d2 = ball screw shaft root diameter
d3 = journal diameter
D = ball nut body outer diameter
D4 = ball nut body root diameter
D3 = ball nut body internal diameter
Dpw = pitch circle diameter
Dw = nominal ball diameter
l1 = thread length
Ph = lead
α = angle of contact between ball and track
ϕ = lead angle



4. Lead Accuracy

The precision ground Ballscrews are controlled in accordance with "JIS B 1192:1997".



Actual mean travel deviation (e_p)	Difference between the actual mean travel (l_m) and the nominal travel (l_0) or the specified travel (l_s) , within the useful travel.
Travel variation (V_u)	The maximum width of the actual travel curve enclosed between two parallel lines along the actual mean travel line.
Travel variation ($V_{2\pi}$)	The widest range of the actual travel for one revolution (2π rad) within the useful travel or the effective screw thread length.
Travel variation (V_{300})	The widest range of the actual travel for any 300mm within the useful travel or the effective screw thread length.

4.1 Applications types and precision grade:

Type	Symbol	Grade	Remark
For positioning	C	0, 1, 3, 5	JIS standard
	Cp	1, 3, 5	Equivalent to ISO
For transport	Ct	1, 3, 5, 7, 10	

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4.2 Actual mean travel deviation (±ep) and permissible variation of precision Ball Screws (for positioning ball screw of C and Cp series)

Unit: μm

Accuracy Grade		C0		C1		C3		C5		Cp1		Cp3		Cp5	
$V_{2\pi}$		3		4		6		8		4		6		8	
V_{300}		3.5		5		8		18		6		12		23	
Effective screw length (lu)		e_p	V_u	e_p	V_u	e_p	V_u	e_p	V_u	e_p	V_u	e_p	V_u	e_p	V_u
above	below														
-	315	4	3.5	6	5	12	8	23	18	6	6	12	12	23	23
315	400	5	3.5	7	5	13	10	25	20	7	6	13	12	25	25
400	500	6	4	8	5	15	10	27	20	8	7	15	13	27	26
500	630	6	4	9	6	16	12	30	23	9	7	16	14	32	29
630	800	7	5	10	7	18	13	35	25	10	8	18	16	36	31
800	1000	8	6	11	8	21	15	40	27	11	9	21	17	40	34
1000	1250	9	6	13	9	24	16	46	30	13	10	24	19	47	39
1250	1600	11	7	15	10	29	18	54	35	15	11	29	22	55	44
1600	2000	/	/	18	11	35	21	65	40	18	13	35	25	65	51
2000	2500	/	/	22	13	41	24	77	46	22	15	41	29	78	59
2500	3150	/	/	26	15	50	29	93	54	26	17	50	34	96	69
3150	4000	/	/	30	18	60	35	115	65	32	21	62	41	115	82
4000	5000	/	/	/	/	72	41	140	77	/	/	76	49	140	99
5000	6300	/	/	/	/	90	50	170	93	/	/	/	/	170	119
6300	8000	/	/	/	/	110	60	210	115	/	/	/	/	/	/
8000	10000	/	/	/	/	/	/	260	140	/	/	/	/	/	/
10000	12000	/	/	/	/	/	/	320	170	/	/	/	/	/	/

4.3 Actual mean travel deviation (±ep) and permissible variation Ball Screws (for transport ball screw of Ct series)

Unit: μm

Grade			Ct1	Ct3	Ct5	Ct7	Ct10
Item	Actual mean travel deviation (e_p)		Calculate from $e_p=\frac{2*lu}{300}*V300$				
	Travel variation	V_u	Not specified				
		V_{300}	6	12	23	52	210
		$V_{2\pi}$	Not specified				

4.4 Travel variations of positioning ball screw (permissible value)

Accuracy Grade	C0		C1		C3		C5		Cp1		Cp3		Cp5	
Item	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}
permissible value	3.5	3	5	4	8	6	18	8	6	4	12	6	23	8

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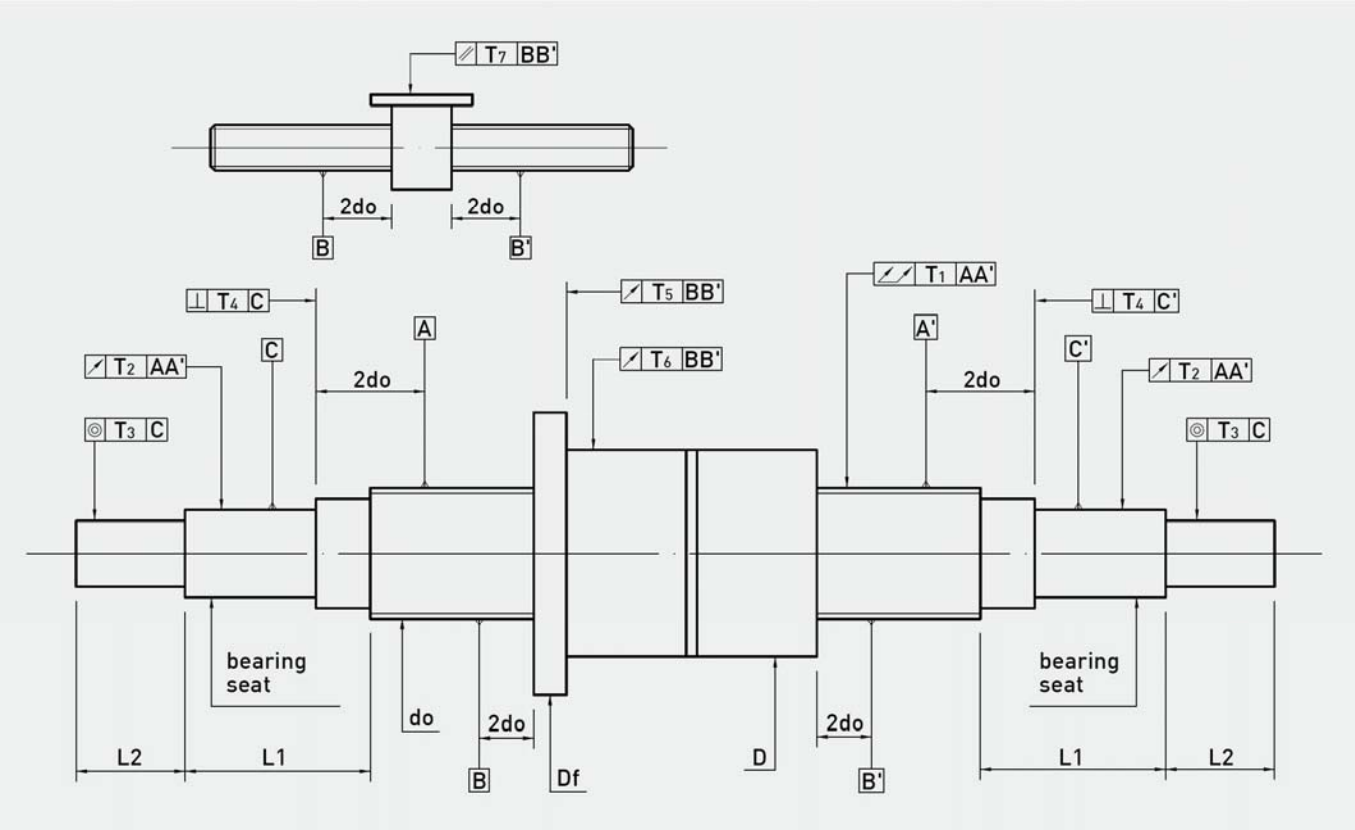
5. Run-out and location tolerances

All the measurements are made according to DIN 69051 and JIS B1192.



T1-A: Measurement of radial run-out of ball screw shaft outer diameter for ascertaining straightness related to AA' per length L_t, for C-series.

Nominal Diameter do (mm)		reference length	T1P (μm)			
above	up to	L5	Cp1, Ct1	Cp3, Ct3	Cp5, Ct5	Ct7
6	12	80	20	25	32	40
12	25	160				
25	50	315				
50	100	630				
100	200	1250				

Slenderness (Lt/do)		T1MAX (μm) (for Lt ≥ 4L5)			
above	up to	Cp1,Ct1	Cp3,Ct3	Cp5,Ct5	Ct7
-	40	40	50	64	80
40	60	60	75	96	120
60	80	100	125	160	200
80	100	160	200	256	320
-					

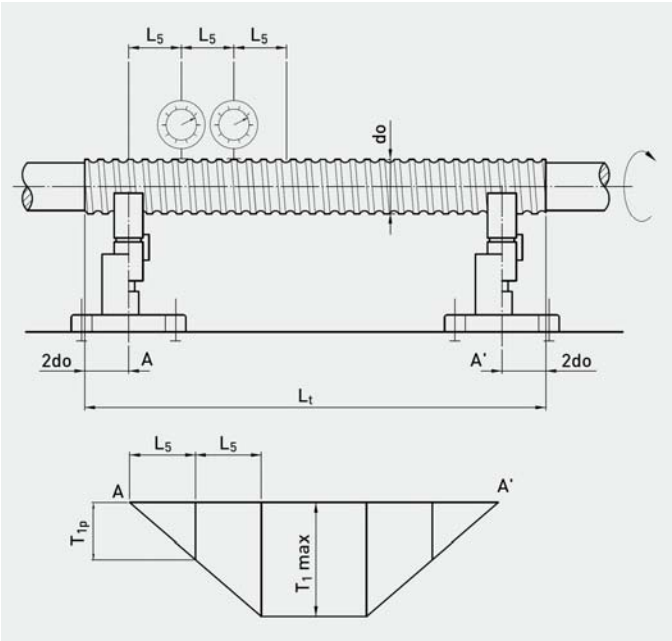


Fig. T1

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T1-B: Total run-out in radial direction on of threaded part outside diameter in respect to axial line of screw shaft supporting part of C-series ball screws.

Grade			C0						C1							C3							C5						
Nominal Diameter do (mm)		above	-	8	12	20	32	50	-	8	12	20	32	50	80	-	8	12	20	32	50	80	-	8	12	20	32	50	80
		up to and incl.	8	12	20	32	50	80	8	12	20	32	50	80	125	8	12	20	32	50	80	125	8	12	20	32	50	80	125
Total length of screw shaft	above	up to and incl.																											
	-	125	15	15	15				20	20	15					25	25	20					35	35	35				
	125	200	25	20	20	15			35	25	20	15				35	35	25	20				50	40	40	35			
	200	315	35	25	20	20			40	30	25	20				50	40	30	30				65	55	45	40			
	315	400		35	25	20	15		45	40	30	25	20			60	50	40	35	25			75	65	55	45	35		
	400	500		45	35	25	20			50	40	30	25				65	50	40	30				80	60	50	45		
	500	630		50	40	30	20	15		60	45	35	25	20			70	55	45	35	30			90	75	60	50	40	
	630	800			50	35	25	20			60	40	30	25				70	55	40	35				90	70	55	45	
	800	1000			65	45	30	25			75	55	40	30	25			95	65	50	40	30			120	85	65	50	45
	1000	1250			85	55	40	30			95	65	45	35	30			120	85	60	45	35			150	100	75	60	50
	1250	1600			110	70	50	40			130	85	60	45	35			160	110	75	55	40			190	130	95	70	55
	1600	2000				95	65	45				120	80	55	40				140	95	70	50				170	120	85	65
	2000	2500											100	70	50					120	85	60					150	110	80
	2500	3150											130	90	60					160	110	75					200	140	95
	3150	4000												120	80					220	150	100					260	180	120
	4000	5000																			200	130						240	160
	5000	6300																											210
	6300	8000																											280
	8000	10000																											370

T2: Measurement of radial run-out of bearing seat related to AA'.

T3: Measurement of radial run-out of journal diameter related to the bearing seat.

T4: Measurement of axial run-out of shaft (bearing) faces related to AA'.

Nominal Diameter do (mm)		length	T_{2P} (μm) (for $L_1 \le Lr$)				T_{3P} (μm) (for $L_2 \le Lr$)				Nominal Diameter do (mm)		T_{4P} (μm)			
Measuring Method			Fig. T2				Fig. T3						Fig.T4			
above	up to	Lr	Cp1, Ct1	Cp3, Ct3	Cp5, Ct5	Ct7	Cp1, Ct1	Cp3, Ct3	Cp5, Ct5	Ct7	above	up to	Cp1, Ct1	Cp3, Ct3	Cp5, Ct5	Ct7
6	20	80	10	12	20	40	5	6	8	12	6	63	3	4	5	6
20	50	125	12	16	25	50	6	8	10	16	63	125	4	5	6	8
50	125	200	16	20	32	63	8	10	12	20	125	200	-	6	8	10
125	200	315	-	25	40	80	-	12	16	25	-					
-			if $L_1 > Lr$, then $t_{2a} \le T_{2p} * L_1/Lr$				if $L_2 > Lr$, then $t_{3a} \le T_{3p} * L_2/Lr$				-					

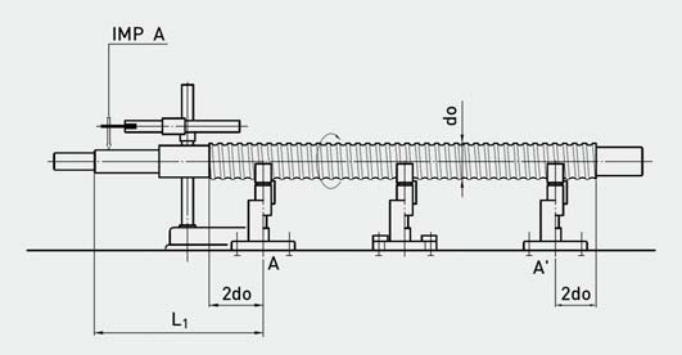

Fig. T2

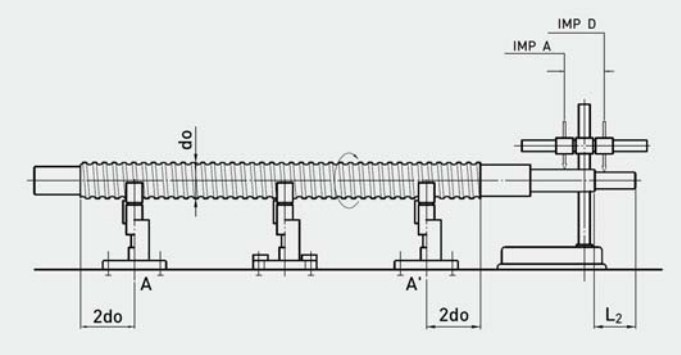

Fig. T3

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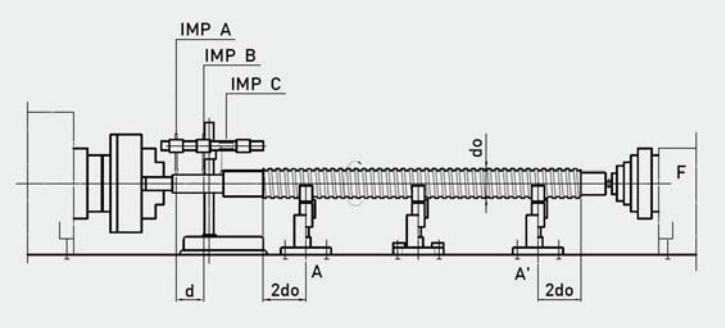

Fig. T4

T5: Measurement of axial run-out of ball nut location face related to AA'.
T6: Measurement of axial run-out of ball nut location diameter related to AA'.
T7: Deviation of parallelism of rectangular ball nut related to AA'.

Item		Perpendicularity tolerance (max)				Run-out tolerance (max)				Parallelism tolerance (max)					
Nut Flange Diameter Df (mm)		$T5_P$ (μm)				$T6_P$ (μm)				Length		$T7_P$ (μm)			
Measuring Method		Fig. T5				Fig. T6						Fig. T7			
above	up to	C0	C1	C3	C5	C0	C1	C3	C5	above	up to	C0	C1	C3	C5
-	20	5	6	8	10	5	6	9	12	-	50	5	6	8	10
20	32	5	6	8	10	6	7	10	12						
32	50	6	7	8	11	7	8	12	15						
50	80	7	8	10	13	8	10	15	19	50	100	7	8	10	13
80	125	7	9	12	15	9	12	20	27						
125	160	8	10	13	17	10	13	22	30						
160	200	-	11	14	18	-	16	25	34	100	200	-	10	13	17
200	250	-	12	15	20	-	18	28	38						

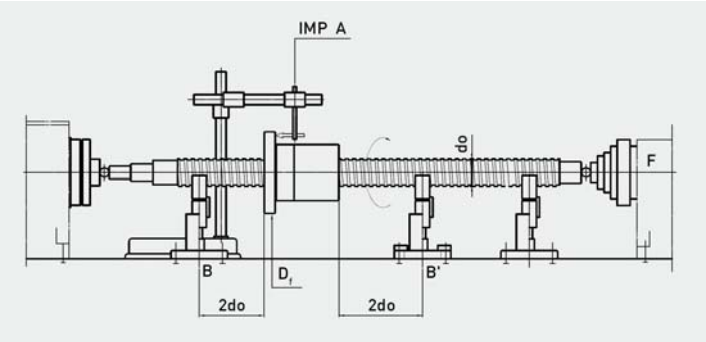

Fig. T5

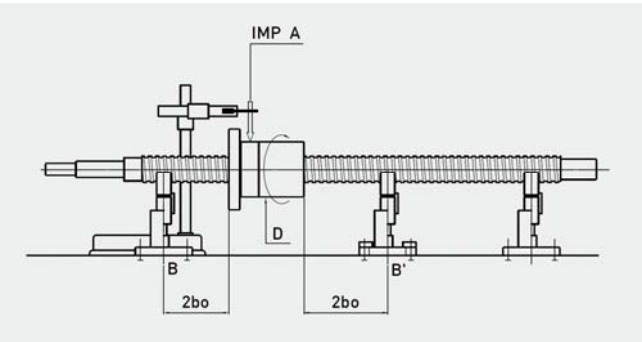

Fig. T6

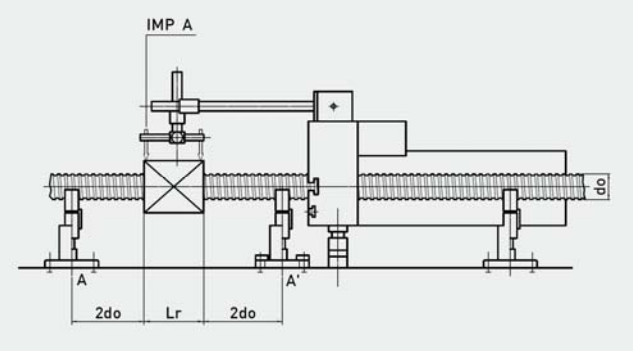

Fig. T7

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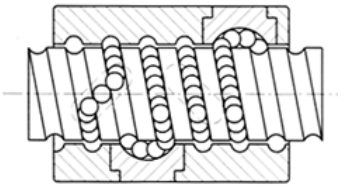
6. Normal diameter and lead

Type	Miniature					Regular								High lead				Super High Lead						
lead / dia.	1	1.5	2	2.5	3	3.175	4	4.23	5	5.08	6	6.35	8	10	12	12.7	16	20	24	25	25.4	32	40	50
6	G	G	G																					
8	G	G	G	G									G											
10	G	G	G	G			G							G										
12		G	G	G			G		G					G										
15														G				G						
16			G	G			G		G	G			G	G			G					G		
20			G	G			G		G	G	G			G			G	G					G	
22									G	G														
25				G			G		G	G	G	G	G	G		G	G	G		G				G
28								G	G	G	G	G		G										
32						G	G		G	G	G	G	G	G	G	G		G		G	G	G		
36									G		G		G	G	G									
40				G	G		G		G	G	G	G	G	G	G	G	G	G		G			G	G
45									G	G				G	G									
50									G	G	G	G	G	G	G	G		G		G			G	G
55													G	G	G	G								
63												G	G	G	G	G	G	G			G		G	G
70														G	G				G					
80														G	G	G	G	G						
100															G		G	G						

G:Precision ground grade ballscrews, either left-hand or right-hand screws are available.

7. Ordering codes

Ball return systems



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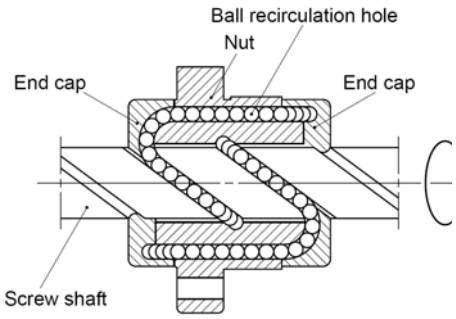

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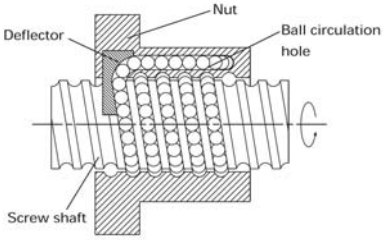
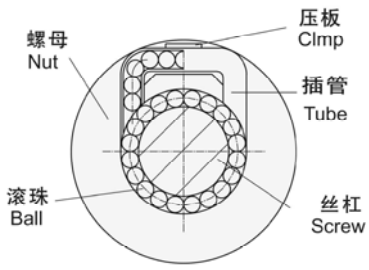


C type



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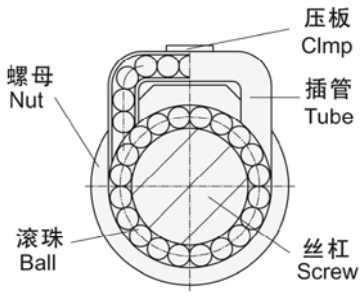
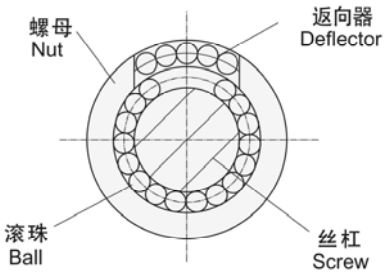


V type



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Example:

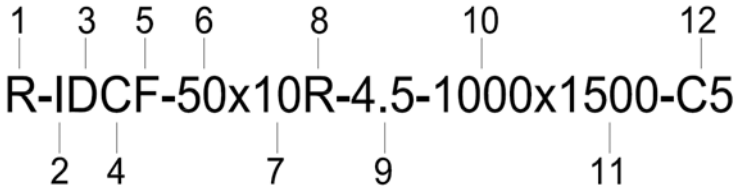

Figure	Item	Mark	Meaning
1	Manufacturing ways of shaft	G	Shaft made by grinding
		M	Miniature screw shaft made by grinding
		R	Shaft made by rolling
2	Ball return system	I	Internal recirculation with flop-over deflector
		V	External recirculation tube above nut diameter
		W	External recirculation tube within nut diameter
		E	Internal recirculation with end cap
		N	Internal recirculation with curved deflector
		C	Internal recirculation with end deflector
3	Nut type	S	Single nut
		D	Double nut
4	Preload type	S	spacer preload
		C	cover preload
		N	preload of enlarged ball
		O	offset pitch preload
		P	compressed preload
		Z	no preload
5	Nut Shape	F	Round nut with flange
		C	Cylindrical(round) nut without flange
		A	Round nut with thread mount (anchor)
		S	Square nut
		Z	Other shapes
6	Nominal diameter	xx	Nominal diameter (mm)
7	Lead	xx	Lead (mm)
8	Direction of thread	R	Right hand
		L	Left hand
		RL	Right hand thread +left hand thread
9	Ball turns (circuits)	x.x	Number of ball turns
10	Thread length	xxx	Length of the threaded part
11	Total length	xxx	Total length of ball screw
12	Accuracy Grade	C0-C5	Accuracy grade of JIS standard
		Cp1-Cp7	Accuracy grade of ISO standard for positioning
		Ct1-Ct7	Accuracy grade of ISO standard for transporting

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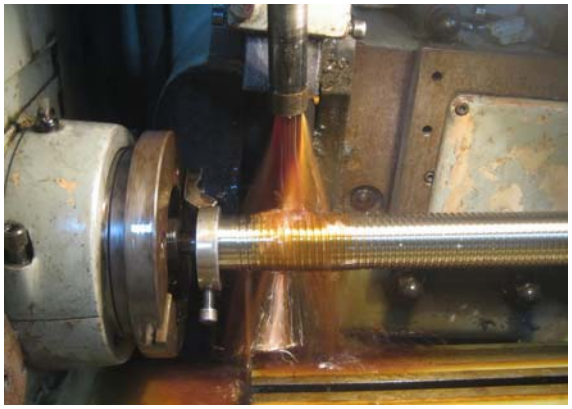
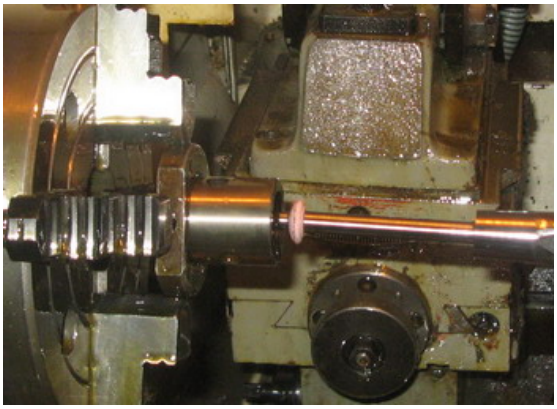
8. Main production equipments



Thread grinding of Screw Shaft



Inner thread grinding of nut

Thread grinding of Screw Shaft

Surface grinding of outer diameter

Factory of thread machines

Factory of CNC lathes

SCREW TECHNOLOGY CO., LIMITED
Add: No.18 Linyi Road,Chefang Town,SIP,Suzhou,China (215125)
Tel: +86-512-66903936, Fax: +86-512-82175260
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9. Main testing apparatus:

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10. Recommended accuracy grade for machine applications

Application grade		AXIS	Accuracy grade									
			0	1	2	3	4	5	6	7	8	10
CNC Machinery Tools	Lathes	X	•	•	•	•	•					
		Z				•	•	•				
	Milling machines Boring machines	X		•	•	•	•	•				
		Y		•	•	•	•	•				
		Z			•	•	•	•				
	Machine Center	X		•	•	•	•					
		Y		•	•	•	•					
		Z			•	•	•					
	Jig borers	X	•	•								
		Y	•	•								
		Z	•	•								
	Drilling machines	X				•	•	•				
		Y				•	•	•				
		Z					•	•	•			
	Grinders	X	•	•	•							
		Y		•	•	•						
	EDM	X		•	•	•						
		Y		•	•	•						
		Z			•	•	•	•				
	Wire cut EDM	X		•	•	•						
		Y		•	•	•						
		U		•	•	•	•					
		V		•	•	•	•					
	Laser Cutting Machine	X			•	•	•					
		Y			•	•	•					
		Z			•	•	•					
General Machinery	Punching Press	X				•	•	•				
		Y				•	•	•				
	Single Purpose Machines			•	•	•	•	•	•			
	Wood working Machines								•	•	•	•
	Industrial Robot (Precision)			•	•	•	•					
	Industrial Robot (General)							•	•	•	•	
	Coordinate Measuring Machine		•	•	•							
	Non-CNC Machine					•	•	•				
	Transport Equipment						•	•	•	•	•	•
	X-Y Table			•	•	•	•	•				
	Linear Actuator							•	•	•	•	
	Aircraft Landing Gear							•	•	•	•	
	Airfoil Control							•	•	•	•	
	Gate Valve								•	•	•	•
	Power steering								•	•	•	
	Glass Grinder				•	•	•	•	•			
	Surface Grinder						•	•				
	Induction Hardening Machine								•	•	•	•
	Electromachine			•	•	•	•	•	•			
	All-electric injection molding							•	•	•	•	•