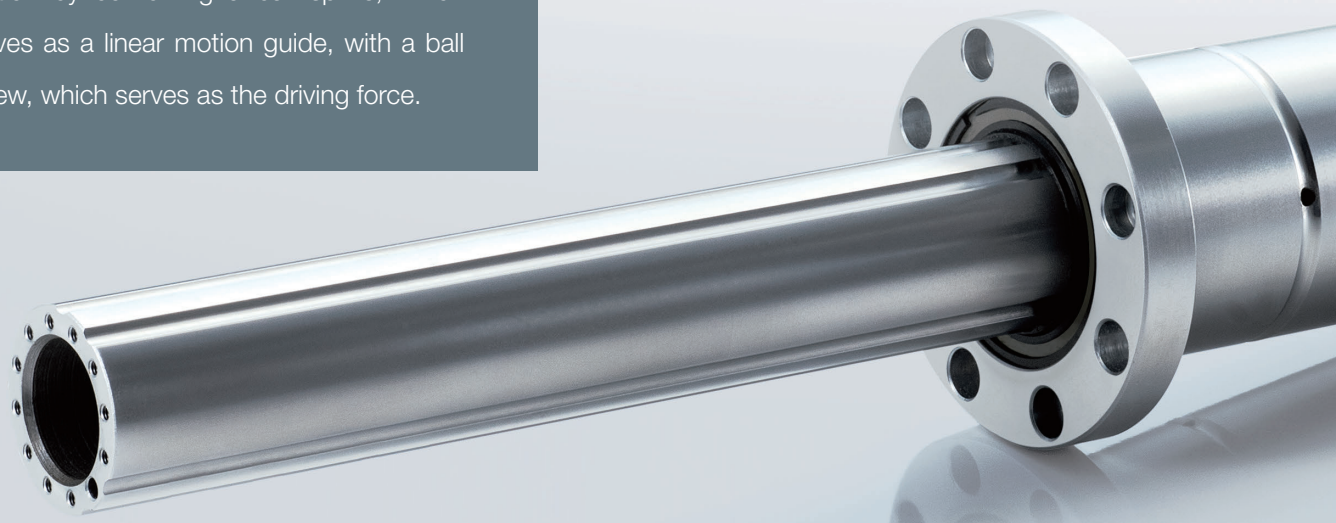
Ball Spline with Integrated Ball Screw **DSP**

Combined linear motion guide and drive element
that transmits high thrust with smooth movement

Ball Spline with Integrated Ball Screw

DSP

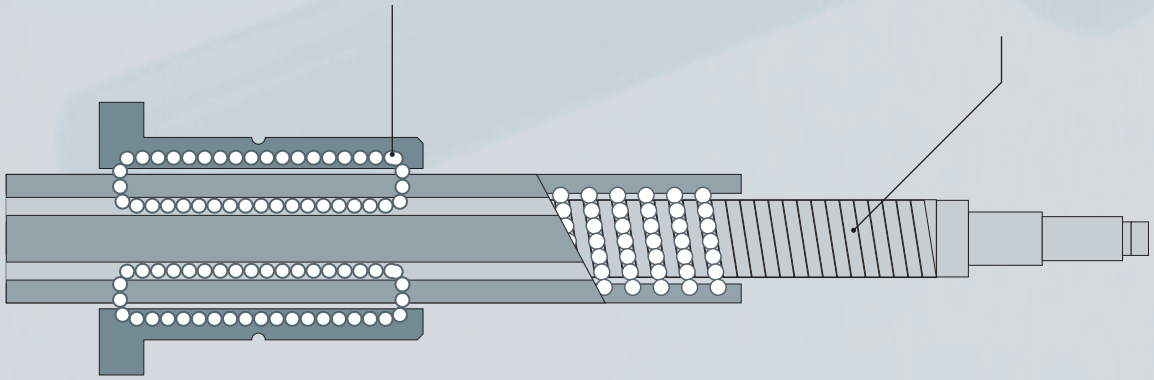
High thrust is transmitted with smooth motion by combining a ball spline, which serves as a linear motion guide, with a ball screw, which serves as the driving force.



Ball spline

Linear motion guide × Drive element

Ball screw

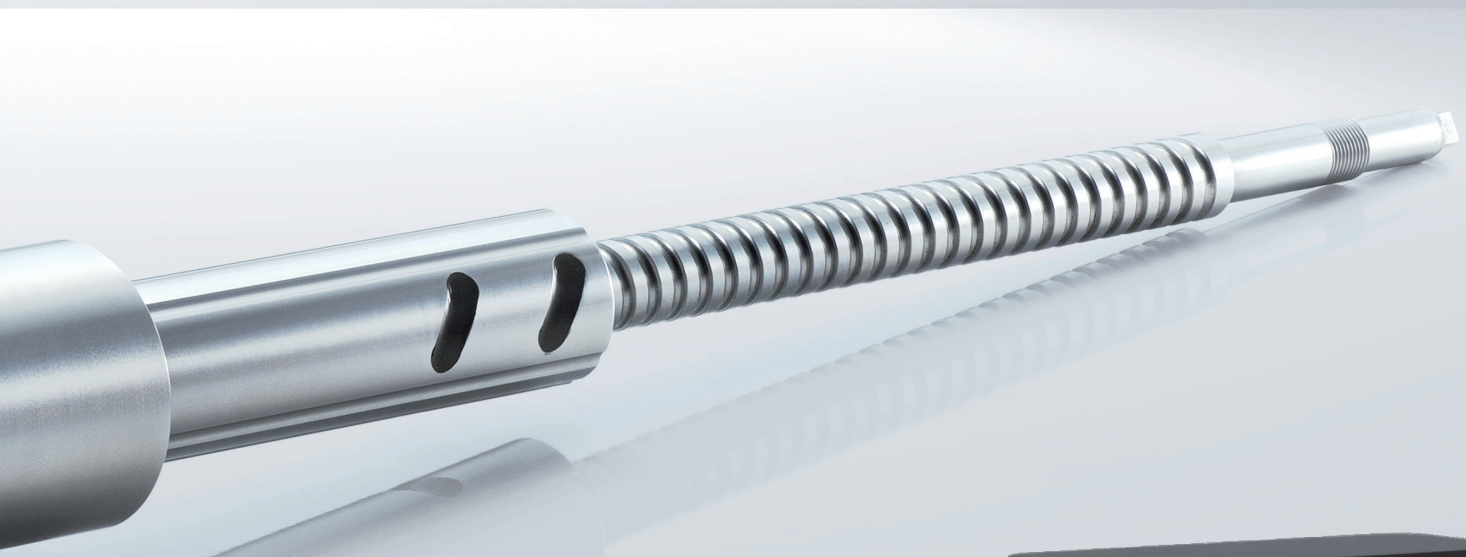


Ball spline

The ball spline provides smooth motion as balls roll along raceways precisely ground into the spline shaft.

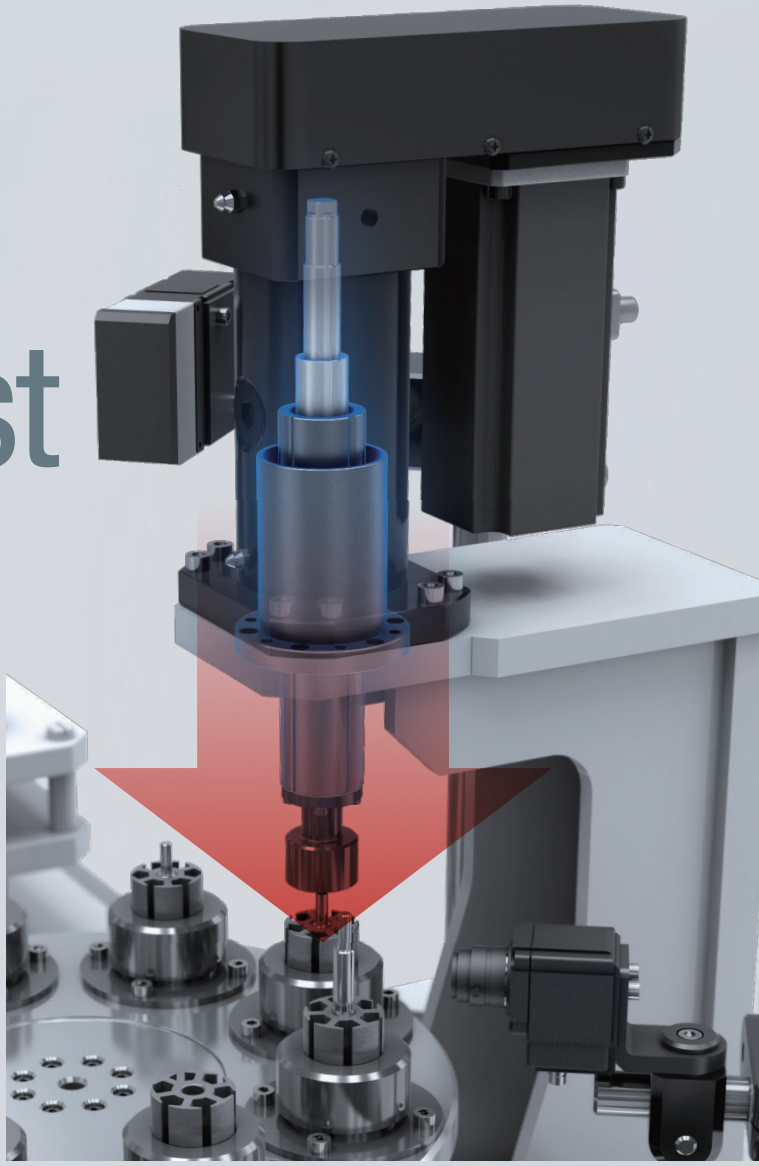
Ball screw

The ball screw provides high drive efficiency for linear and rotary motion, moving via balls that circulate between the screw shaft and nut.



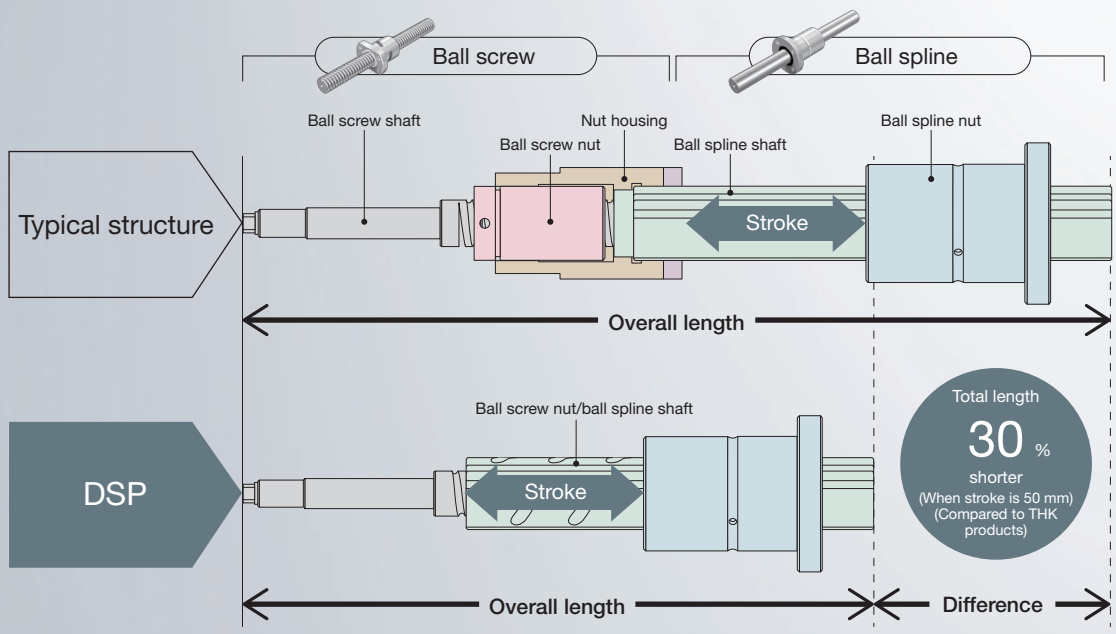
High thrust

Combined with a reduction gear, the DSP is suited for press applications that require high thrust, such as press fitting and caulking.



Machine requires less space due to compact structure

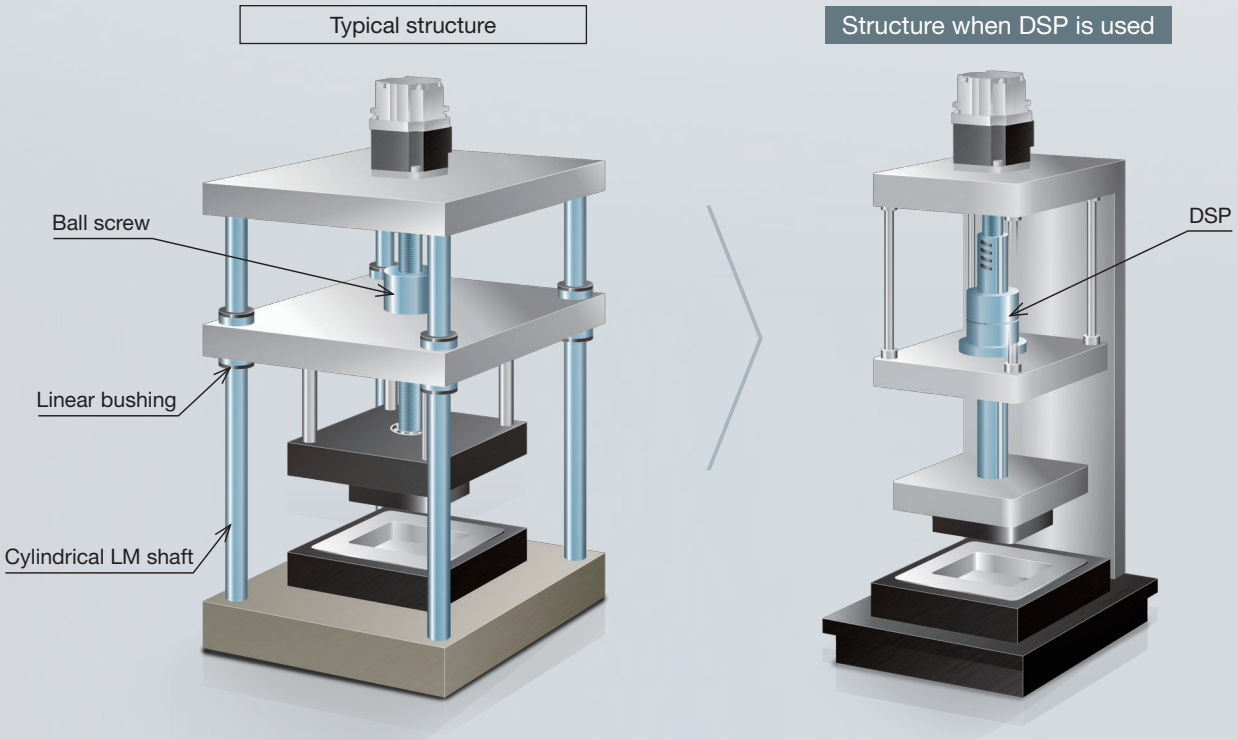
The overall length of the DSP is compact compared to conventional products due to its unique structure, which combines the linear motion guide and drive element. As a result, incorporating the DSP in equipment allows for space savings in height and width.



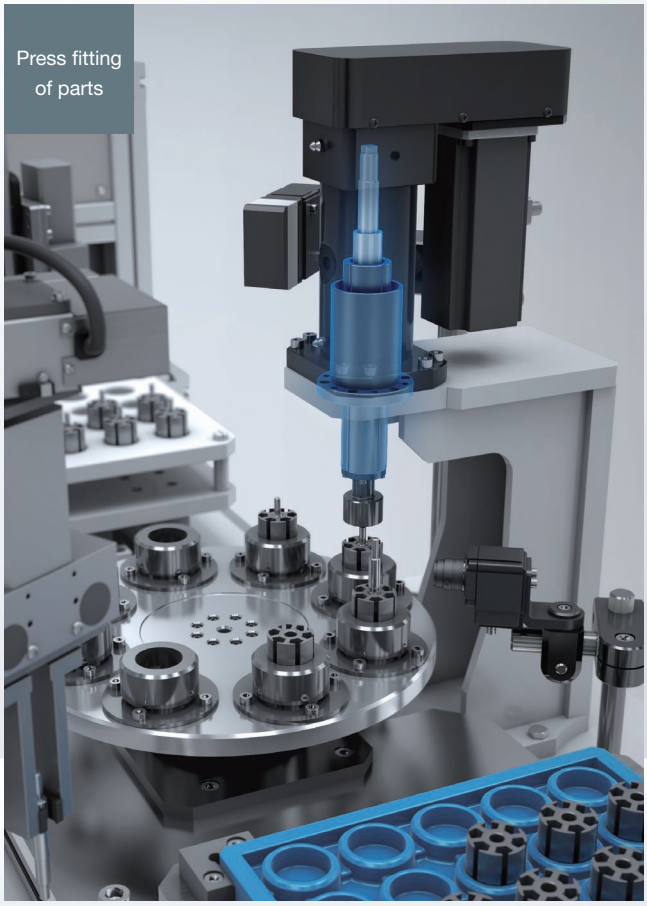
Reduces equipment design and fabrication time

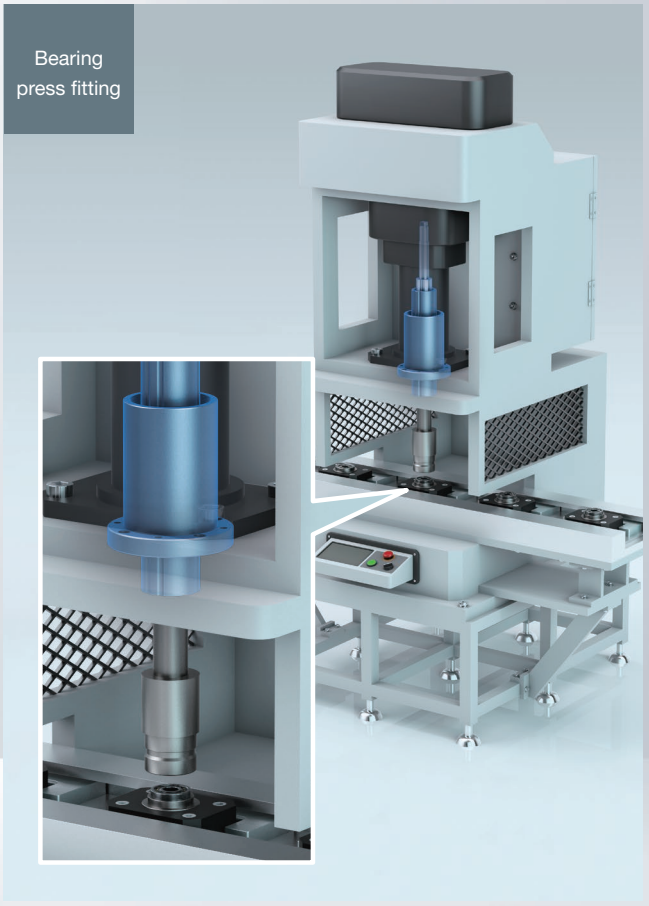
The DSP has fewer components than conventional products, helping to reduce equipment design and fabrication time through a reduction in assembly time and manufactured parts.

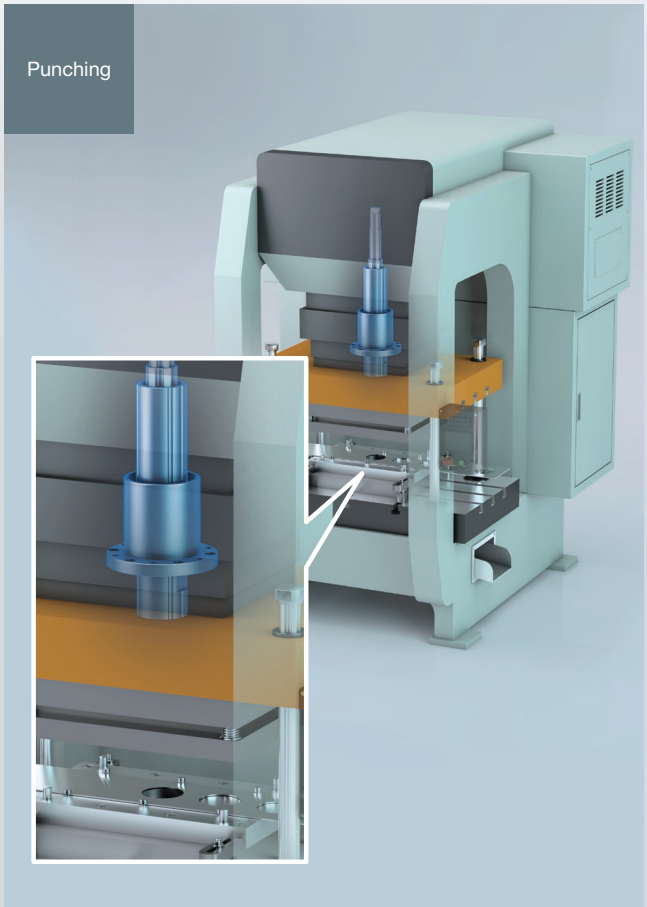
Press forming machine

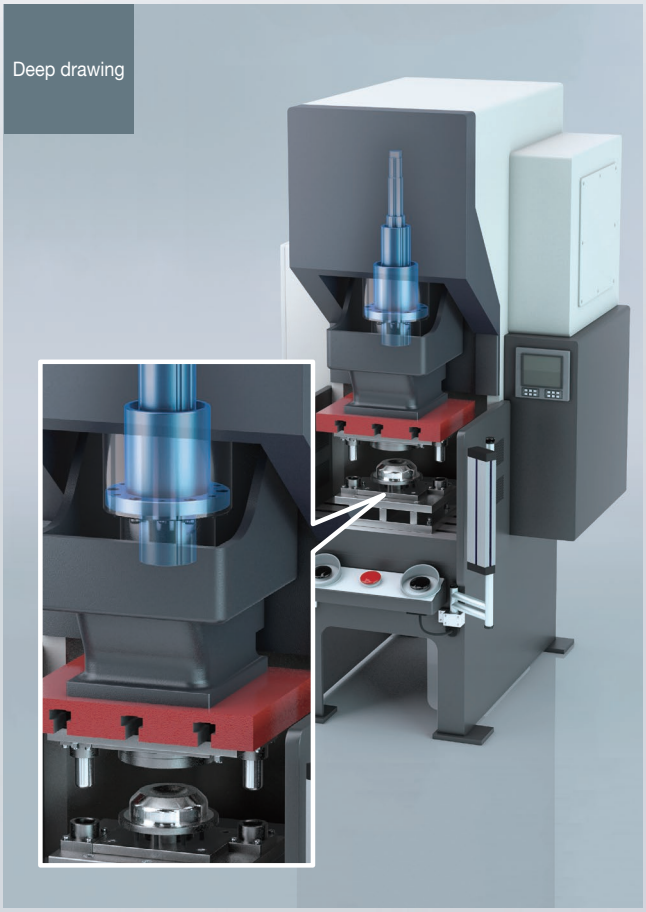


Application examples



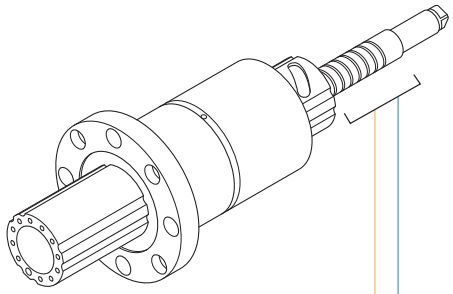




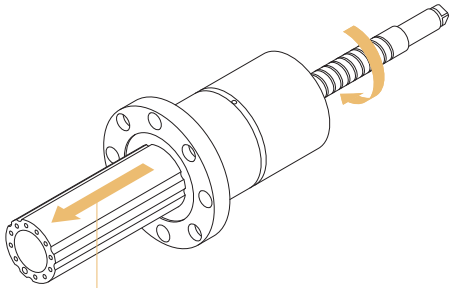


Movement Mechanism

The ball spline nut unit is fixed, and the ball spline rod is moved by rotating the ball screw shaft in the direction of the arrows.

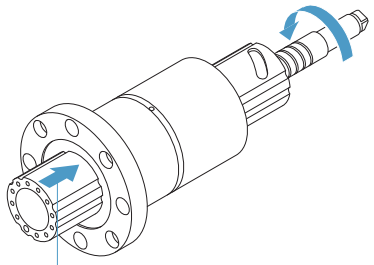


1 When the screw shaft is rotated in the direction of the arrow...



2 The rod is pushed out.

1 When the screw shaft is rotated in the direction of the arrow...

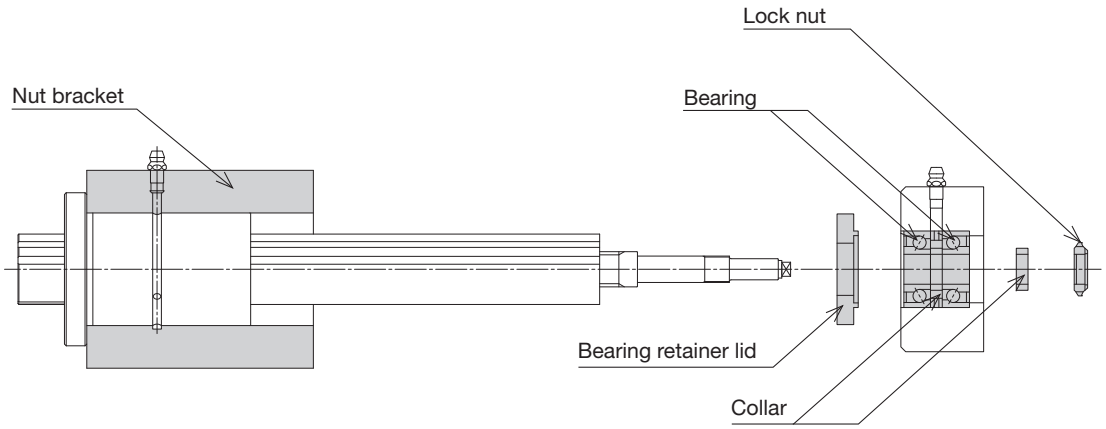


2 The rod is pulled in.

Assembly Example

The spline nut is mounted on the nut bracket.

After mounting the bearing on the fixed side, the lock nut is tightened and secured on the ball screw shaft side.



Model Number Coding

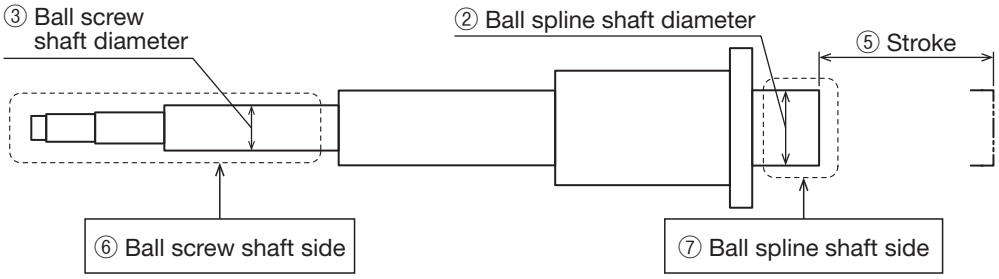
Model ①	Ball spline shaft diameter ②	Ball screw shaft diameter ③	Ball screw lead ④		Stroke ⑤		Shaft end shape: Ball screw shaft side ⑥	Shaft end shape: Ball spline shaft side ⑦		Options ⑧		Customization 1 (Surface treatment) ⑨	Customization 2 ⑩	Customization 3 ⑪	Customization 4 ⑫
DSP	30	16	06	—	050	—	M	N	—	N	—	N	X	N	N
DSP	30: 30 mm	16: 16 mm	06: 6 mm		050: 50 mm		M: Straight shaft (standard)	N: Standard (DSP 30 to 60: End face tap) (DSP80: Inner diameter threading)		N: None		N: No surface treatment	X	N: None	N: None
	40: 40 mm	20: 20 mm	08: 8 mm		100: 100 mm			A: Outer diameter threading				S: With surface treatment (THK AP-C treatment)			
	50: 50 mm	25: 25 mm	10: 10 mm		150: 150 mm			B: Inner diameter threading							
	60: 60 mm	32: 32 mm	10H: 10 mm		200: 200 mm			C: End face tap							
	80: 80 mm	36: 36 mm	12: 12 mm		250: 250 mm										
		50: 50 mm													

Combination Options

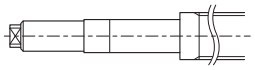
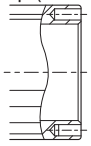
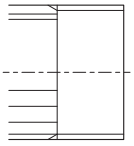
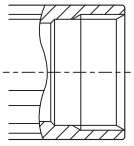
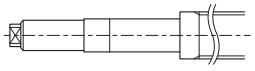
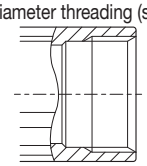
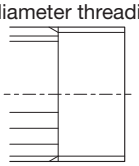
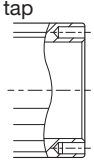
①	②	③	④
DSP	30	16	06
	40	20	06
		25	08
	50	32	06
	60	36	10
			10H
	80	50	12

①②	Shaft end shape		
	⑥⑦	Ball screw shaft side	Ball spline shaft side
DSP30 to DSP60	MN	Straight shaft	End face tap
	MA	Straight shaft	Outer diameter threading
	MB	Straight shaft	Inner diameter threading
DSP80	MN	Straight shaft	Inner diameter threading
	MA	Straight shaft	Outer diameter threading
	MC	Straight shaft	End face tap

Note: Standard shaft end shape varies by model. See figures below for details.



Shaft End Shape

①②	⑥ Ball screw shaft side	⑦ Ball spline shaft side		
	Symbol: M	Symbol: N	Symbol: A	Symbol: B
DSP30 to 60	Straight shaft 	End face tap (standard) 	Outer diameter threading 	Inner diameter threading 
DSP80	Symbol: M	Symbol: N	Symbol: A	Symbol: C
	Straight shaft 	Inner diameter threading (standard) 	Outer diameter threading 	End face tap 

Customization 1

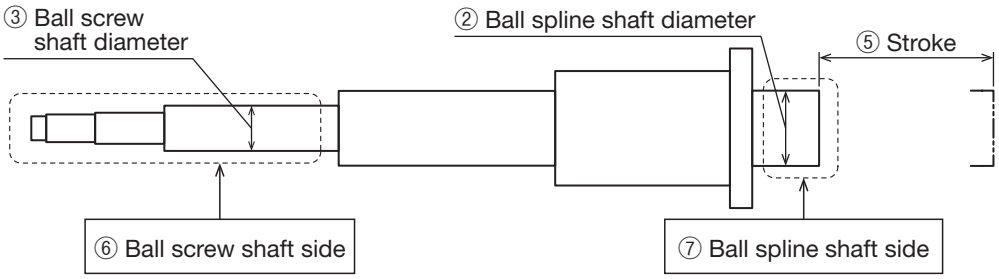
Surface Treatment (THK AP-C Treatment)

Surface treatment (AP-C treatment) can be selected to increase corrosion resistance.

DSP30 1606

Model Number Coding

Model	Ball spline shaft diameter	Ball screw shaft diameter	Ball screw lead		Stroke		Shaft end shape		Options		Customization 1 (Surface treatment)	Customization 2	Customization 3	Customization 4
①	②	③	④		⑤		⑥ Ball screw shaft side	⑦ Ball spline shaft side	⑧		⑨	⑩	⑪	⑫
DSP	30	16	06	—	050	—	M	N	N	—	N	X	N	N
DSP	30	16	06		050: 50 mm 100: 100 mm 150: 150 mm 200: 200 mm 250: 250 mm		M: Straight shaft (standard)	N: End face tap (standard) A: Outer diameter threading B: Inner diameter threading	N: None		N: No surface treatment S: With surface treatment (THK AP-C treatment)	X	N: None	N: None



Shaft End Shape

⑥ Ball screw shaft side	⑦ Ball spline shaft side		
Symbol: M	Symbol: N	Symbol: A	Symbol: B
Straight shaft	End face tap (standard)	Outer diameter threading	Inner diameter threading

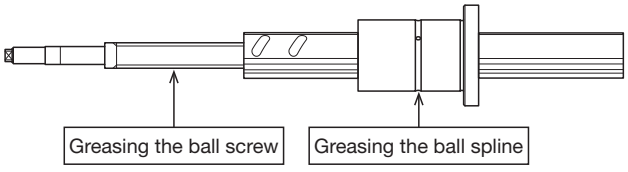
Basic Specifications

DSP	Constant axial load (kN)*	1.6
	Instantaneous axial load (kN)*	3.3
Ball screw	Ball screw lead (mm)	6
	Basic dynamic load rating Ca (kN)	9.7
	Basic static load rating C_0a (kN)	18.3
	Ball screw shaft diameter (mm)	ϕ16
	Ball screw shaft thread minor diameter (mm)	ϕ13.2
	Ball center-to-center diameter (mm)	ϕ16.8
	Axial clearance (mm)	0.010 max (G1)
	Accuracy grade	C5
	DN value	70000
Ball spline	Basic dynamic load rating C (kN)	20.5
	Basic static load rating C_0 (kN)	34
	Ball spline shaft diameter (mm)	ϕ30
	Clearance in the rotational direction (mm)	-0.010 to -0.004 (CL: light preload)

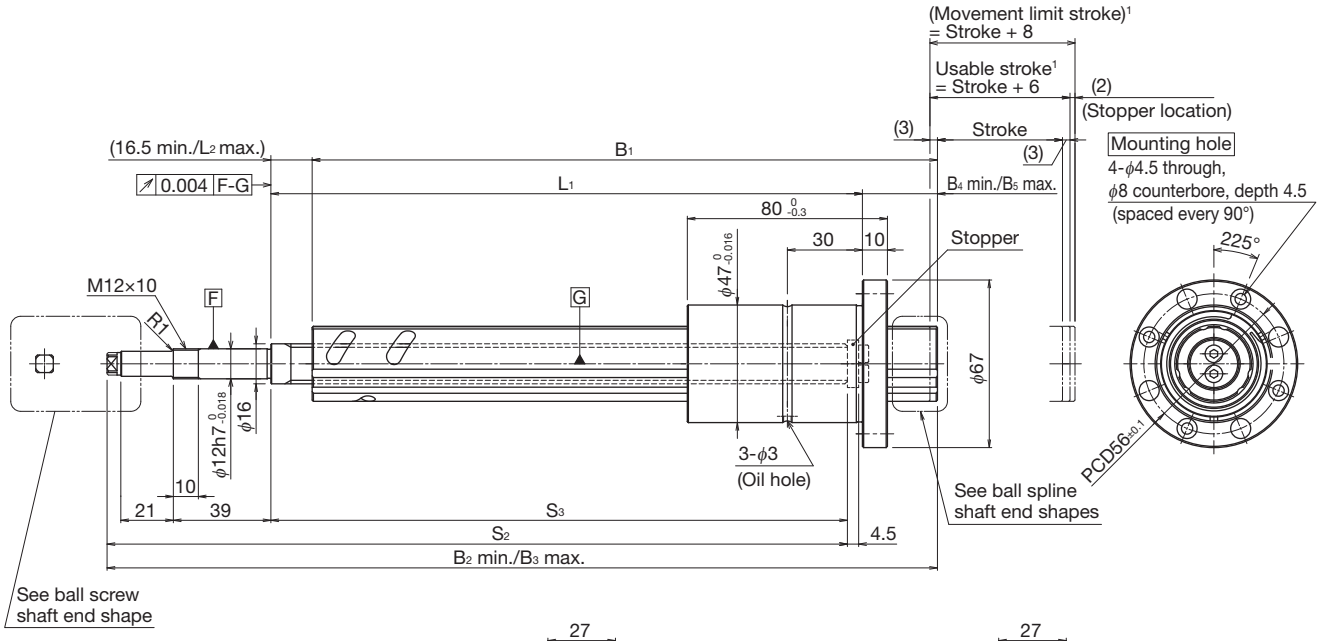
* This value is estimated. Please consider the strength of the mounting part.

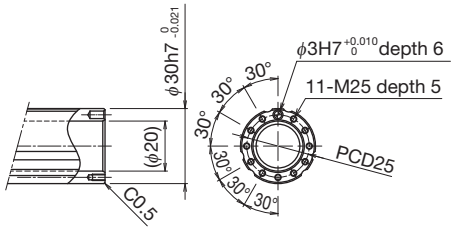
Maintenance

For the ball screw, apply grease directly to the screw shaft.
For the ball spline, replenish lubricant from the oil hole of the ball spline nut and apply grease directly to the ball spline shaft.

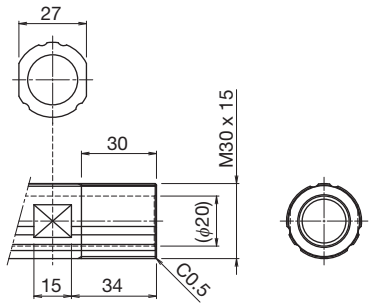


Dimensions

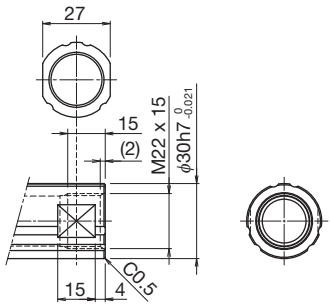




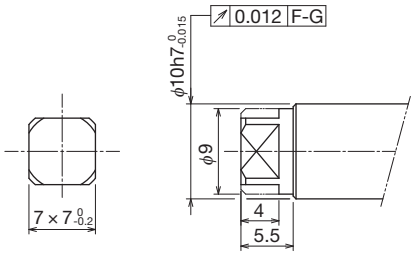
Ball spline
shaft end shape: N
End face tap (standard)



Ball spline
shaft end shape: A
Outer diameter threading



Ball spline
shaft end shape: B
Inner diameter threading



Ball screw shaft end shape

[1] Use the product within the usable stroke range.

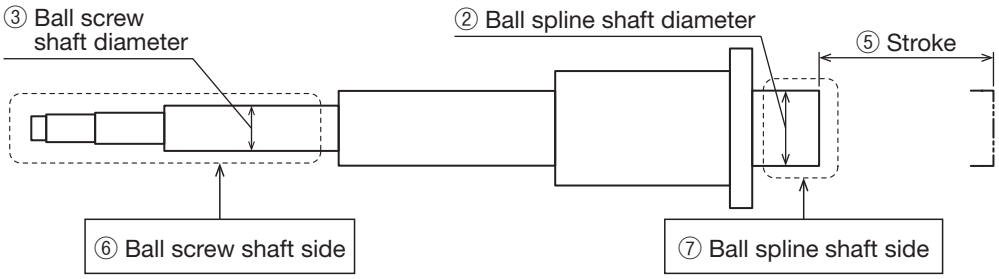
Stroke (mm) (Max. usable stroke)		50 (56)			100 (106)			150 (156)			200 (206)			250 (256)		
Dimensions (mm)	L_1	136.5			186.5			236.5			286.5			336.5		
	L_2	66.5			116.5			166.5			216.5			266.5		
Ball screw shaft dimensions (mm)	S_2	196			246			296			346			396		
	S_3	130.5			180.5			230.5			280.5			330.5		
Ball spline shaft end shape[2]		N	A	B	N	A	B	N	A	B	N	A	B	N	A	B
Ball spline shaft dimensions (mm)	B_1	150	185	155	200	235	205	250	285	255	300	335	305	350	385	355
	B_2	232	267	237	282	317	287	332	367	337	382	417	387	432	467	437
	B_3	282	317	287	382	417	387	482	517	487	582	617	587	682	717	687
	B_4	30	65	35	30	65	35	30	65	35	30	65	35	30	65	35
	B_5	80	115	85	130	165	135	180	215	185	230	265	235	280	315	285
Mass (kg)		1.3			1.5			1.8			2			2.2		

[2] Ball spline shaft end shapes: N: End face tap (standard), A: Outer diameter threading, B: Inner diameter threading.

DSP40 2006

Model Number Coding

Model	Ball spline shaft diameter	Ball screw shaft diameter	Ball screw lead		Stroke		Shaft end shape		Options		Customization 1 (Surface treatment)	Customization 2	Customization 3	Customization 4
							Ball screw shaft side	Ball spline shaft side						
①	②	③	④		⑤		⑥	⑦	⑧		⑨	⑩	⑪	⑫
DSP	40	20	06	–	050	–	M	N	N	–	N	X	N	N
DSP	40	20	06		050: 50 mm 100: 100 mm 150: 150 mm 200: 200 mm 250: 250 mm		M: Straight shaft (standard)	N: End face tap (standard) A: Outer diameter threading B: Inner diameter threading	N: None		N: No surface treatment S: With surface treatment (THK AP-C treatment)	X	N: None	N: None



Shaft End Shape

⑥ Ball screw shaft side	⑦ Ball spline shaft side		
Symbol: M	Symbol: N	Symbol: A	Symbol: B
Straight shaft	End face tap (standard)	Outer diameter threading	Inner diameter threading

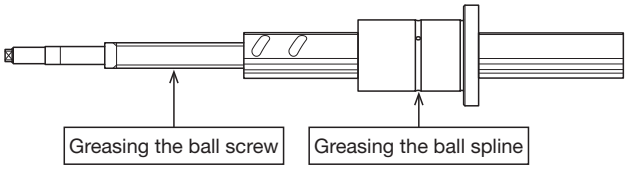
Basic Specifications

DSP	Constant axial load (kN)*	3.2
	Instantaneous axial load (kN)*	6.4
Ball screw	Ball screw lead (mm)	6
	Basic dynamic load rating Ca (kN)	17.7
	Basic static load rating C_0a (kN)	35.8
	Ball screw shaft diameter (mm)	ϕ20
	Ball screw shaft thread minor diameter (mm)	ϕ16.4
	Ball center-to-center diameter (mm)	ϕ21
	Axial clearance (mm)	0.010 max (G1)
	Accuracy grade	C5
	DN value	70000
Ball spline	Basic dynamic load rating C (kN)	37.8
	Basic static load rating C_0 (kN)	60.5
	Ball spline shaft diameter (mm)	ϕ40
	Clearance in the rotational direction (mm)	-0.016 to -0.008 (CL: light preload)

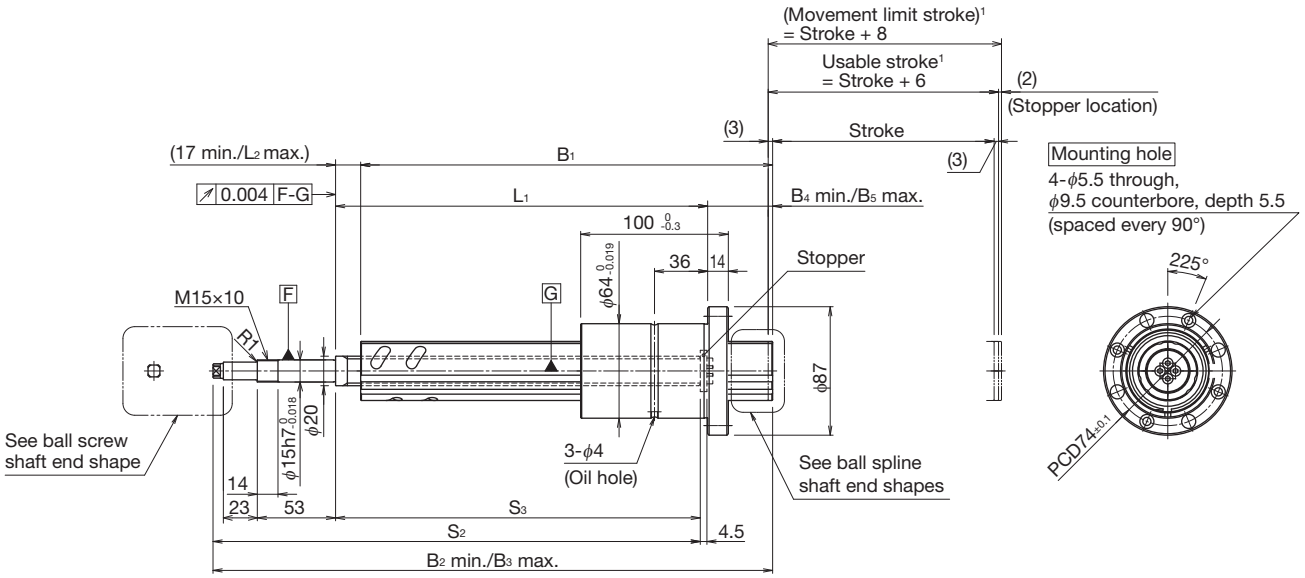
* This value is estimated. Please consider the strength of the mounting part.

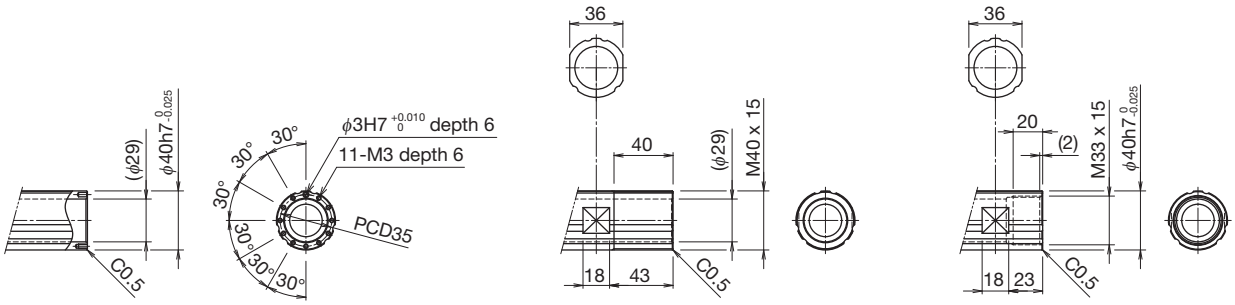
Maintenance

For the ball screw, apply grease directly to the screw shaft.
For the ball spline, replenish lubricant from the oil hole of the ball spline nut and apply grease directly to the ball spline shaft.



Dimensions

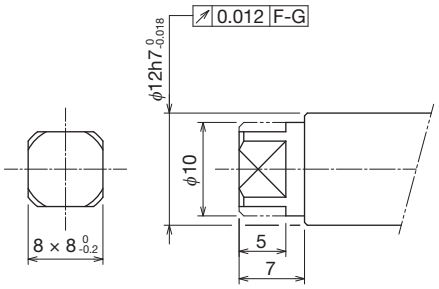




Ball spline
shaft end shape: N
End face tap (standard)

Ball spline
shaft end shape: A
Outer diameter threading

Ball spline
shaft end shape: B
Inner diameter threading



Ball screw shaft end shape

[1] Use the product within the usable stroke range.

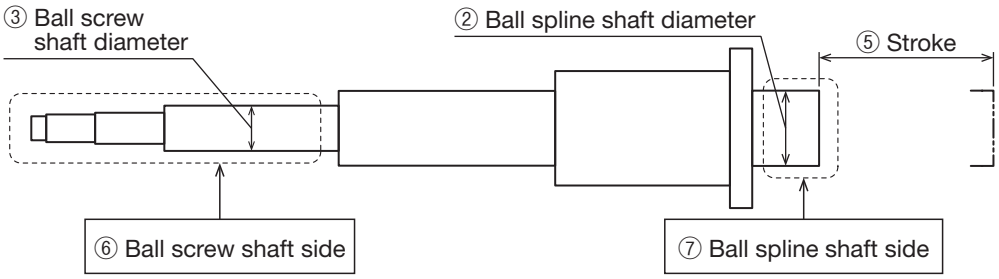
Stroke (mm) (Max. usable stroke)		50 (56)			100 (106)			150 (156)			200 (206)			250 (256)		
Dimensions (mm)	L_1	152			202			252			302			352		
	L_2	67			117			167			217			267		
Ball screw shaft dimensions (mm)	S_2	230			280			330			380			430		
	S_3	147			197			247			297			347		
Ball spline shaft end shape[2]		N	A	B	N	A	B	N	A	B	N	A	B	N	A	B
Ball spline shaft dimensions (mm)	B_1	179	216	196	229	266	246	279	316	296	329	366	346	379	416	396
	B_2	279	316	296	329	366	346	379	416	396	429	466	446	479	516	496
	B_3	329	366	346	429	466	446	529	566	546	629	666	646	729	766	746
	B_4	44	81	61	44	81	61	44	81	61	44	81	61	44	81	61
	B_5	94	131	111	144	181	161	194	231	211	244	281	261	294	331	311
Mass (kg)		2.7			3.1			3.4			3.8			4.1		

[2] Ball spline shaft end shapes: N: End face tap (standard), A: Outer diameter threading, B: Inner diameter threading.

DSP40 2508

Model Number Coding

Model	Ball spline shaft diameter	Ball screw shaft diameter	Ball screw lead		Stroke		Shaft end shape		Options		Customization 1 (Surface treatment)	Customization 2	Customization 3	Customization 4
							Ball screw shaft side	Ball spline shaft side						
①	②	③	④		⑤		⑥	⑦	⑧		⑨	⑩	⑪	⑫
DSP	40	25	08	—	050	—	M	N	N	—	N	X	N	N
DSP	40	25	08		050: 50 mm 100: 100 mm 150: 150 mm 200: 200 mm 250: 250 mm		M: Straight shaft (standard)	N: End face tap (standard) A: Outer diameter threading B: Inner diameter threading	N: None		N: No surface treatment S: With surface treatment (THK AP-C treatment)	X	N: None	N: None



Shaft End Shape

⑥ Ball screw shaft side	⑦ Ball spline shaft side		
Symbol: M	Symbol: N	Symbol: A	Symbol: B
Straight shaft	End face tap (standard)	Outer diameter threading	Inner diameter threading

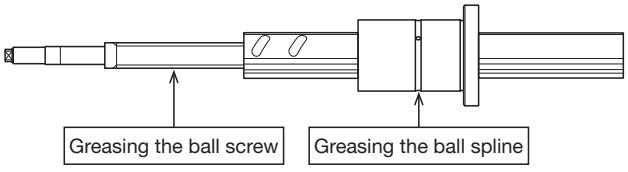
Basic Specifications

DSP	Constant axial load (kN)*	5.6
	Instantaneous axial load (kN)*	11.2
Ball screw	Ball screw lead (mm)	8
	Basic dynamic load rating Ca (kN)	30.4
	Basic static load rating C_0a (kN)	75
	Ball screw shaft diameter (mm)	ϕ25
	Ball screw shaft thread minor diameter (mm)	ϕ21.4
	Ball center-to-center diameter (mm)	ϕ26
	Axial clearance (mm)	0.010 max (G1)
	Accuracy grade	C5
	DN value	70000
Ball spline	Basic dynamic load rating C (kN)	37.8
	Basic static load rating C_0 (kN)	60.5
	Ball spline shaft diameter (mm)	ϕ40
	Clearance in the rotational direction (mm)	-0.016 to -0.008 (CL: light preload)

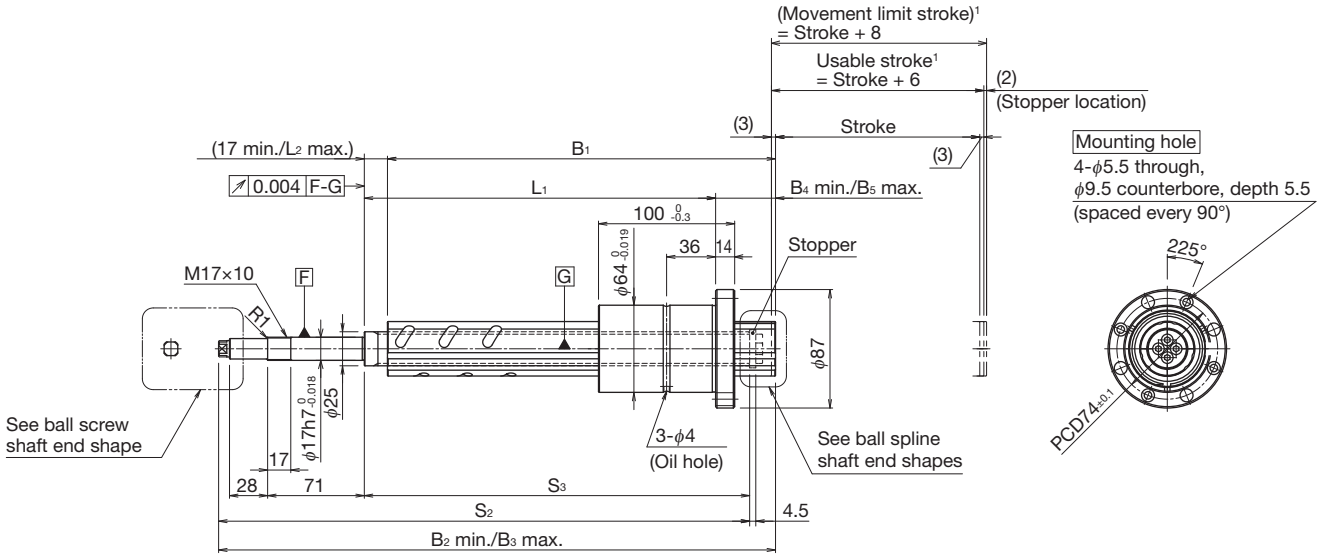
* This value is estimated. Please consider the strength of the mounting part.

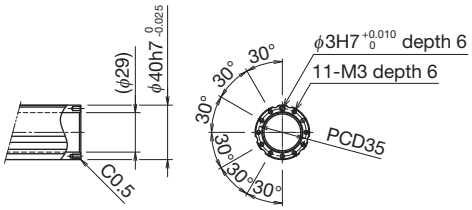
Maintenance

For the ball screw, apply grease directly to the screw shaft.
For the ball spline, replenish lubricant from the oil hole of the ball spline nut and apply grease directly to the ball spline shaft.

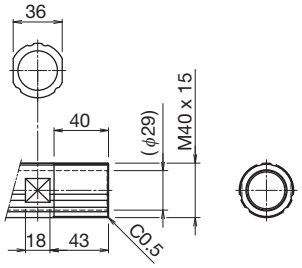


Dimensions

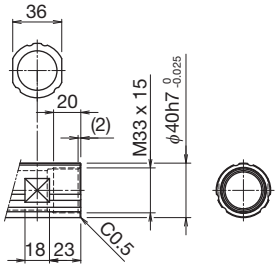




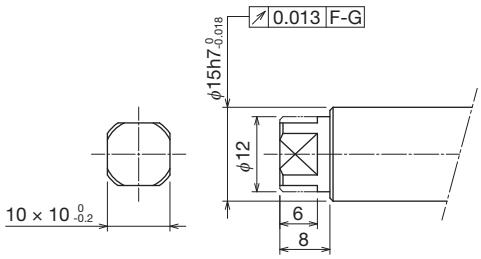
Ball spline
shaft end shape: N
End face tap (standard)



Ball spline
shaft end shape: A
Outer diameter threading



Ball spline
shaft end shape: B
Inner diameter threading



Ball screw shaft end shape

[1] Use the product within the usable stroke range.

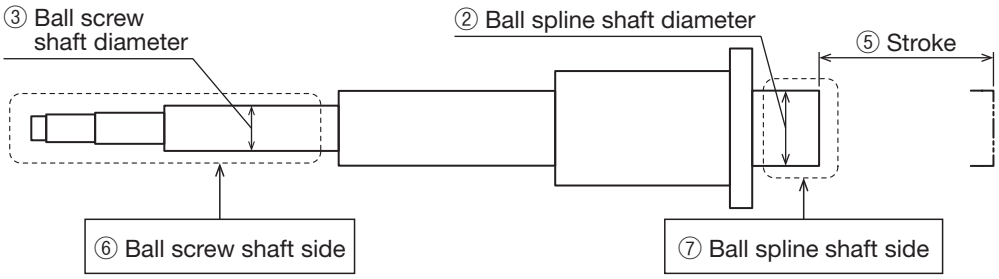
Stroke (mm) (Max. usable stroke)		50 (56)			100 (106)			150 (156)			200 (206)			250 (256)		
Dimensions (mm)	L_1	158			208			258			308			358		
	L_2	67			117			167			217			267		
Ball screw shaft dimensions (mm)	S_2	290			340			390			440			490		
	S_3	183			233			283			333			383		
Ball spline shaft end shape[2]		N	A	B	N	A	B	N	A	B	N	A	B	N	A	B
Ball spline shaft dimensions (mm)	B_1	185	222	202	235	272	252	285	322	302	335	372	352	385	422	402
	B_2	309	346	326	359	396	376	409	446	426	459	496	476	509	546	526
	B_3	359	396	376	459	496	476	559	596	576	659	696	676	759	796	776
	B_4	44	81	61	44	81	61	44	81	61	44	81	61	44	81	61
	B_5	94	131	111	144	181	161	194	231	211	244	281	261	294	331	311
Mass (kg)		3.1			3.5			4			4.4			4.8		

[2] Ball spline shaft end shapes: N: End face tap (standard), A: Outer diameter threading, B: Inner diameter threading.

DSP50 3206

Model Number Coding

Model	Ball spline shaft diameter	Ball screw shaft diameter	Ball screw lead		Stroke		Shaft end shape		Options		Customization 1 (Surface treatment)	Customization 2	Customization 3	Customization 4
①	②	③	④		⑤		⑥ Ball screw shaft side	⑦ Ball spline shaft side	⑧		⑨	⑩	⑪	⑫
DSP	50	32	06	—	050	—	M	N	N	—	N	X	N	N
DSP	50	32	06		050: 50 mm 100: 100 mm 150: 150 mm 200: 200 mm 250: 250 mm		M: Straight shaft (standard)	N: End face tap (standard) A: Outer diameter threading B: Inner diameter threading	N: None		N: No surface treatment S: With surface treatment (THK AP-C treatment)	X	N: None	N: None



Shaft End Shape

⑥ Ball screw shaft side	⑦ Ball spline shaft side		
Symbol: M	Symbol: N	Symbol: A	Symbol: B
Straight shaft	End face tap (standard)	Outer diameter threading	Inner diameter threading

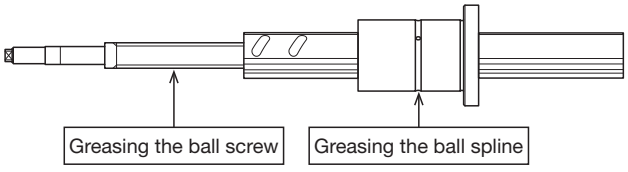
Basic Specifications

DSP	Constant axial load (kN)*	8.4
	Instantaneous axial load (kN)*	16.8
Ball screw	Ball screw lead (mm)	6
	Basic dynamic load rating Ca (kN)	49.3
	Basic static load rating C_0a (kN)	149.4
	Ball screw shaft diameter (mm)	ϕ32
	Ball screw shaft thread minor diameter (mm)	ϕ28.4
	Ball center-to-center diameter (mm)	ϕ33
	Axial clearance (mm)	0.010 max (G1)
	Accuracy grade	C5
	DN value	70000
Ball spline	Basic dynamic load rating C (kN)	60.9
	Basic static load rating C_0 (kN)	94.5
	Ball spline shaft diameter (mm)	ϕ50
	Clearance in the rotational direction (mm)	-0.016 to -0.008 (CL: light preload)

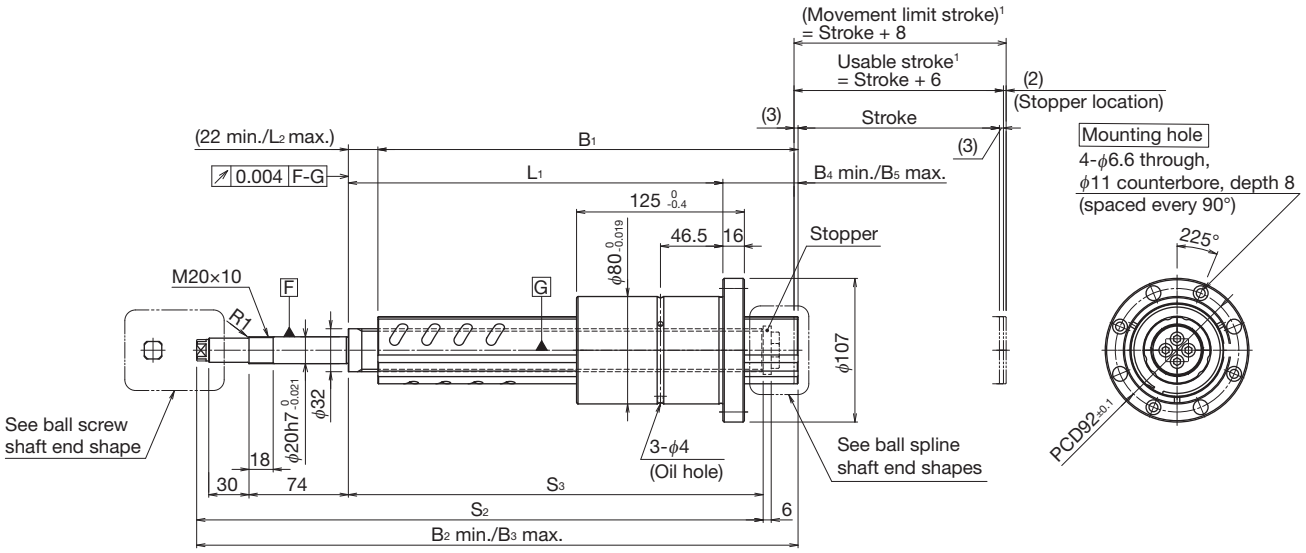
* This value is estimated. Please consider the strength of the mounting part.

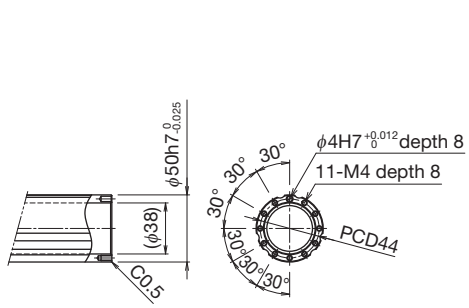
Maintenance

For the ball screw, apply grease directly to the screw shaft.
For the ball spline, replenish lubricant from the oil hole of the ball spline nut and apply grease directly to the ball spline shaft.

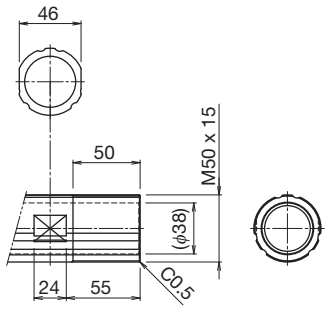


Dimensions

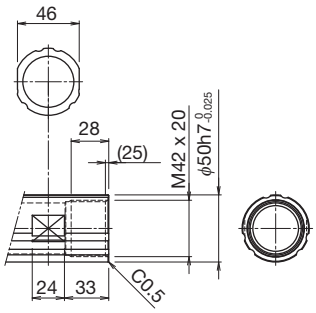




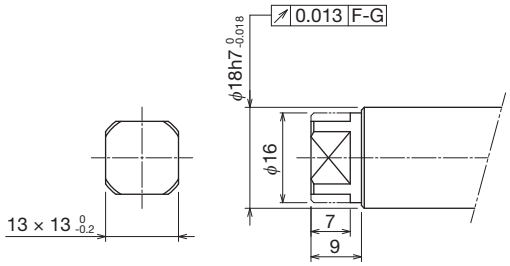
Ball spline
shaft end shape: N
End face tap (standard)



Ball spline
shaft end shape: A
Outer diameter threading



Ball spline
shaft end shape: B
Inner diameter threading



Ball screw shaft end shape

[1] Use the product within the usable stroke range.

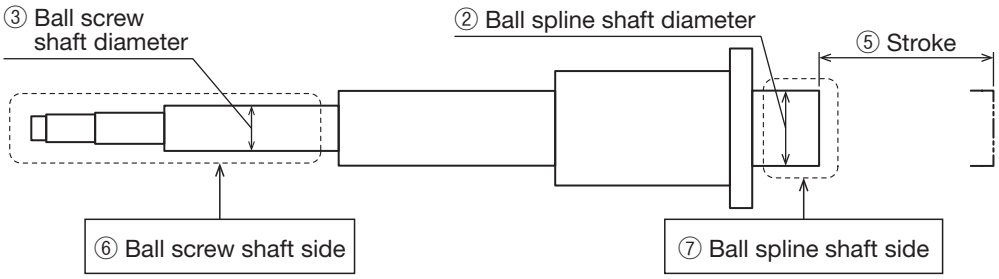
Stroke (mm) (Max. usable stroke)		50 (56)			100 (106)			150 (156)			200 (206)			250 (256)		
Dimensions (mm)	L_1	179			229			279			329			379		
	L_2	72			122			172			222			272		
Ball screw shaft dimensions (mm)	S_2	322			372			422			472			522		
	S_3	209			259			309			359			409		
Ball spline shaft end shape[2]		N	A	B	N	A	B	N	A	B	N	A	B	N	A	B
Ball spline shaft dimensions (mm)	B_1	213	258	236	263	308	286	313	358	336	363	408	386	413	458	436
	B_2	348	393	371	398	443	421	448	493	471	498	543	521	548	593	571
	B_3	398	443	421	498	543	521	598	643	621	698	743	721	798	843	821
	B_4	56	101	79	56	101	79	56	101	79	56	101	79	56	101	79
	B_5	106	151	129	156	201	179	206	251	229	256	301	279	306	351	329
Mass (kg)		5.5			6.2			6.8			7.5			8.1		

[2] Ball spline shaft end shapes: N: End face tap (standard), A: Outer diameter threading, B: Inner diameter threading.

DSP60 3610

Model Number Coding

Model	Ball spline shaft diameter	Ball screw shaft diameter	Ball screw lead		Stroke		Shaft end shape		Options		Customization 1 (Surface treatment)	Customization 2	Customization 3	Customization 4
①	②	③	④		⑤		⑥ Ball screw shaft side	⑦ Ball spline shaft side	⑧		⑨	⑩	⑪	⑫
DSP	60	36	10	–	050	–	M	N	N	–	N	X	N	N
DSP	60	36	10		050: 50 mm 100: 100 mm 150: 150 mm 200: 200 mm 250: 250 mm		M: Straight shaft (standard)	N: End face tap (standard) A: Outer diameter threading B: Inner diameter threading	N: None		N: No surface treatment S: With surface treatment (THK AP-C treatment)	X	N: None	N: None



Shaft End Shape

⑥ Ball screw shaft side	⑦ Ball spline shaft side		
Symbol: M	Symbol: N	Symbol: A	Symbol: B
Straight shaft	End face tap (standard)	Outer diameter threading	Inner diameter threading

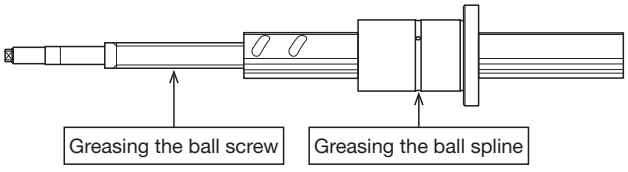
Basic Specifications

DSP	Constant axial load (kN)*	10.9
	Instantaneous axial load (kN)*	21.8
Ball screw	Ball screw lead (mm)	10
	Basic dynamic load rating Ca (kN)	59.5
	Basic static load rating C_0a (kN)	148.7
	Ball screw shaft diameter (mm)	ϕ36
	Ball screw shaft thread minor diameter (mm)	ϕ30.5
	Ball center-to-center diameter (mm)	ϕ37.75
	Axial clearance (mm)	0.010 max (G1)
	Accuracy grade	C5
	DN value	70000
Ball spline	Basic dynamic load rating C (kN)	73.5
	Basic static load rating C_0 (kN)	111.7
	Ball spline shaft diameter (mm)	ϕ60
	Clearance in the rotational direction (mm)	-0.022 to -0.012 (CL: light preload)

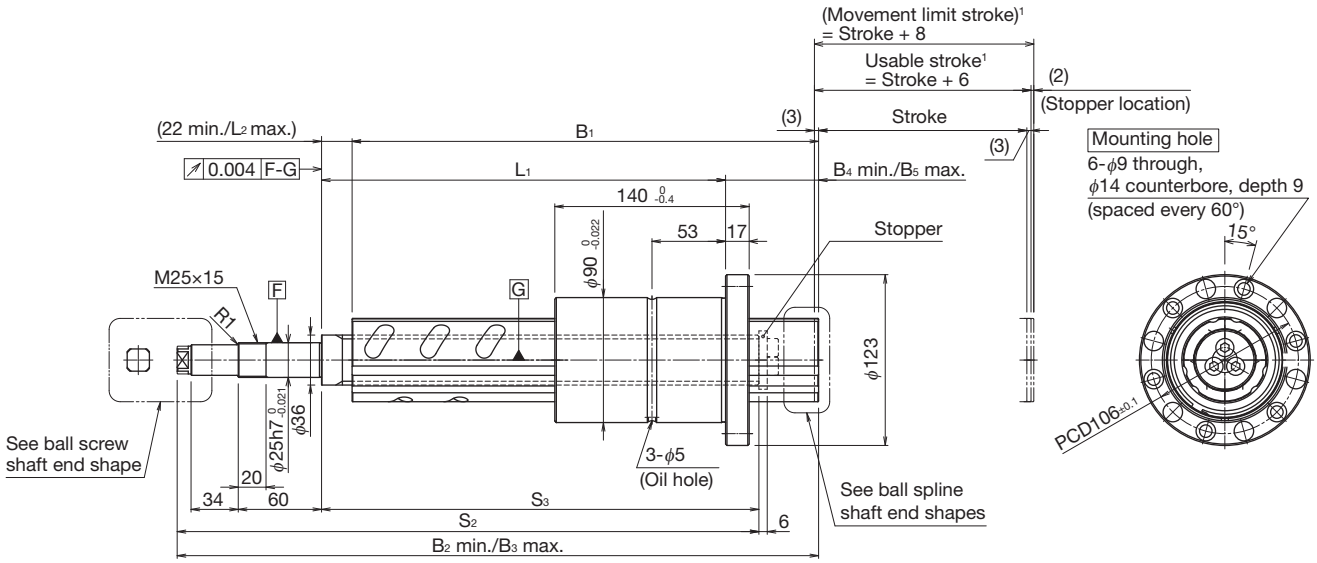
* This value is estimated. Please consider the strength of the mounting part.

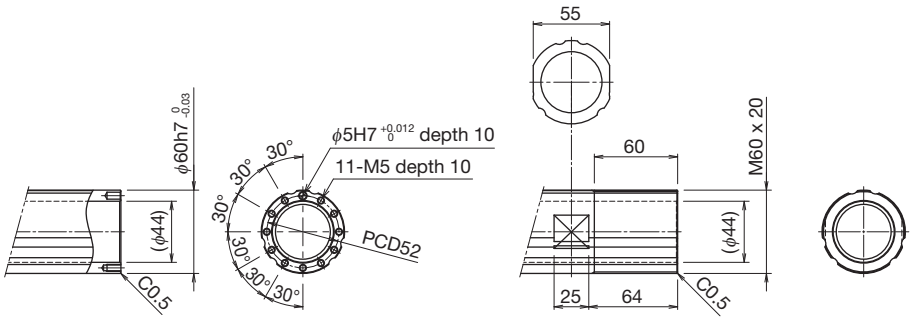
Maintenance

For the ball screw, apply grease directly to the screw shaft.
For the ball spline, replenish lubricant from the oil hole of the ball spline nut and apply grease directly to the ball spline shaft.



Dimensions

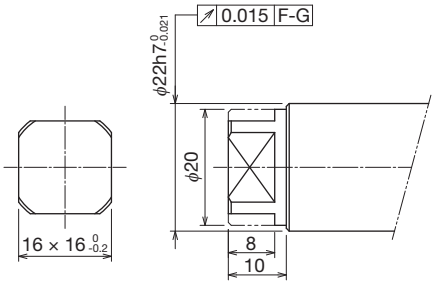




Ball spline
shaft end shape: N
End face tap (standard)

Ball spline
shaft end shape: A
Outer diameter threading

Ball spline
shaft end shape: B
Inner diameter threading



Ball screw shaft end shape

[1] Use the product within the usable stroke range.

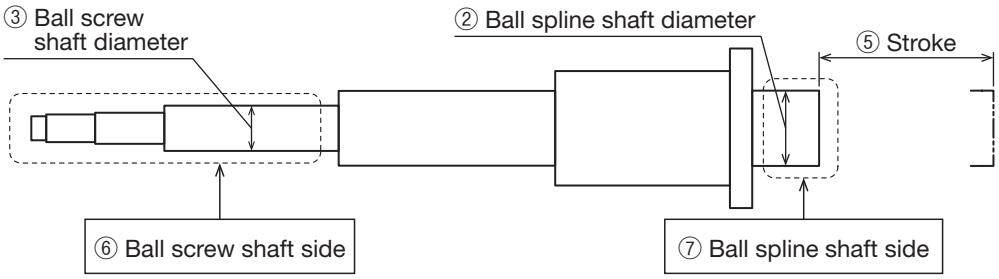
Stroke (mm) (Max. usable stroke)		50 (56)			100 (106)			150 (156)			200 (206)			250 (256)		
Dimensions (mm)	L_1	191			241			291			341			391		
	L_2	72			122			172			222			272		
Ball screw shaft dimensions (mm)	S_2	319			369			419			469			519		
	S_3	215			265			315			365			415		
Ball spline shaft end shape[2]		N	A	B	N	A	B	N	A	B	N	A	B	N	A	B
Ball spline shaft dimensions (mm)	B_1	236	281	251	286	331	301	336	381	351	386	431	401	436	481	451
	B_2	362	407	377	412	457	427	462	507	477	512	557	527	562	607	577
	B_3	412	457	427	512	557	527	612	657	627	712	757	727	812	857	827
	B_4	67	112	82	67	112	82	67	112	82	67	112	82	67	112	82
	B_5	117	162	132	167	212	182	217	262	232	267	312	282	317	362	332
Mass (kg)		7.8			8.7			9.6			10.6			11.5		

[2] Ball spline shaft end shapes: N: End face tap (standard), A: Outer diameter threading, B: Inner diameter threading.

DSP60 3610H

Model Number Coding

Model	Ball spline shaft diameter	Ball screw shaft diameter	Ball screw lead		Stroke		Shaft end shape: Ball screw shaft side	Shaft end shape: Ball spline shaft side		Options		Customization 1 (Surface treatment)	Customization 2	Customization 3	Customization 4
①	②	③	④		⑤		⑥	⑦		⑧		⑨	⑩	⑪	⑫
DSP	60	36	10H	—	050	—	M	N	—	N	—	N	X	N	N
DSP	60	36	10H		050: 50 mm 100: 100 mm 150: 150 mm 200: 200 mm 250: 250 mm		M: Straight shaft (standard)	N: End face tap (standard) A: Outer diameter threading B: Inner diameter threading		N: None		N: No surface treatment S: With surface treatment (THK AP-C treatment)	X	N: None	N: None



Shaft End Shape

⑥ Ball screw shaft side	⑦ Ball spline shaft side		
Symbol: M	Symbol: N	Symbol: A	Symbol: B
Straight shaft	End face tap (standard)	Outer diameter threading	Inner diameter threading

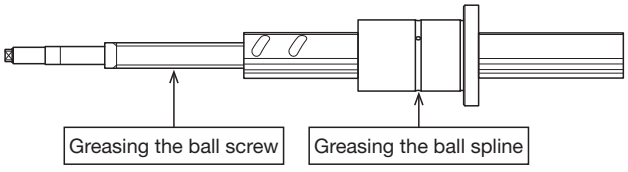
Basic Specifications

DSP	Constant axial load (kN)*	17.8
	Instantaneous axial load (kN)*	35.6
Ball screw	Ball screw lead (mm)	10
	Basic dynamic load rating Ca (kN)	80.9
	Basic static load rating C_0a (kN)	212.5
	Ball screw shaft diameter (mm)	ϕ36
	Ball screw shaft thread minor diameter (mm)	ϕ30.5
	Ball center-to-center diameter (mm)	ϕ37.75
	Axial clearance (mm)	0.010 max (G1)
	Accuracy grade	C5
	DN value	70000
Ball spline	Basic dynamic load rating C (kN)	73.5
	Basic static load rating C_0 (kN)	111.7
	Ball spline shaft diameter (mm)	ϕ60
	Clearance in the rotational direction (mm)	-0.022 to -0.012 (CL: light preload)

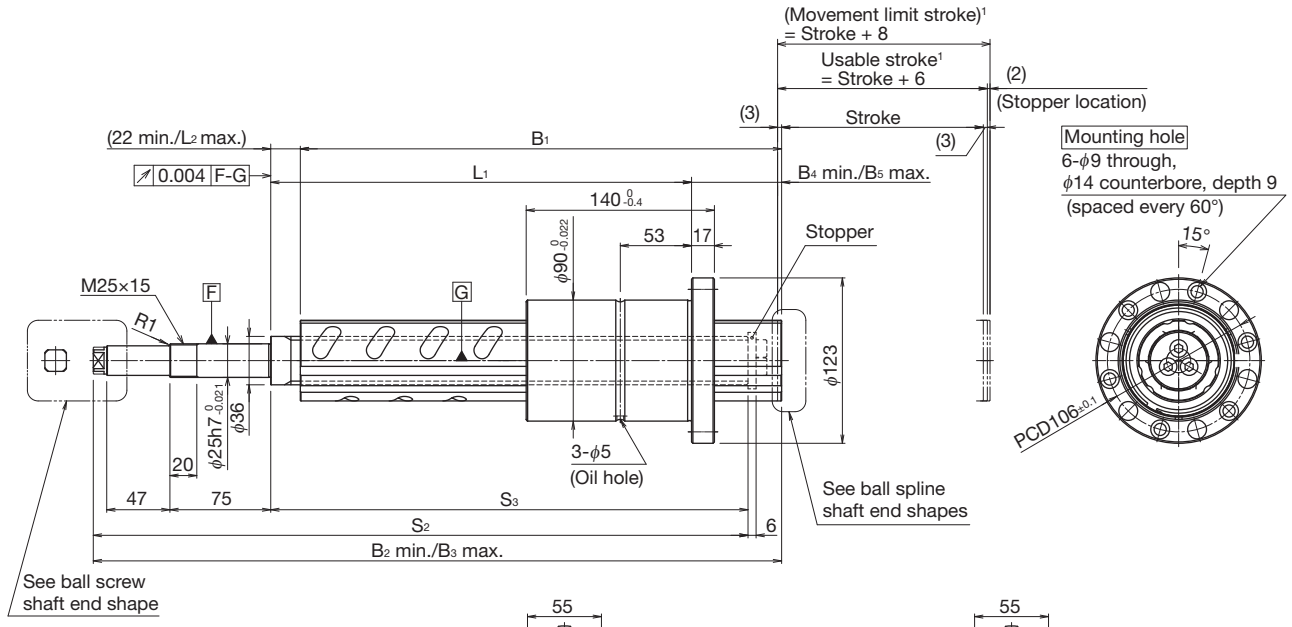
* This value is estimated. Please consider the strength of the mounting part.

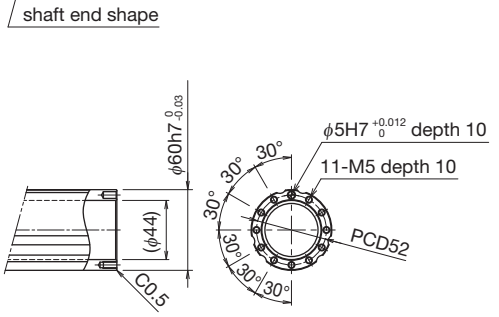
Maintenance

For the ball screw, apply grease directly to the screw shaft.
For the ball spline, replenish lubricant from the oil hole of the ball spline nut and apply grease directly to the ball spline shaft.

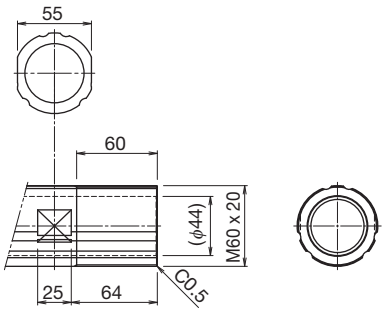


Dimensions

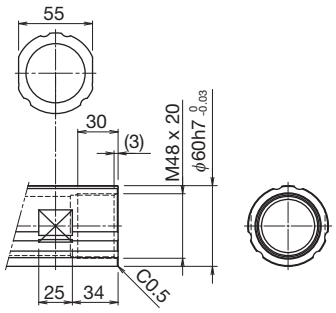




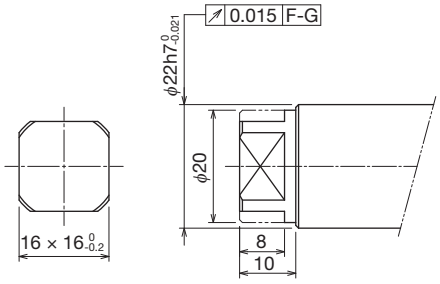
Ball spline
shaft end shape: N
End face tap (standard)



Ball spline
shaft end shape: A
Outer diameter threading



Ball spline
shaft end shape: B
Inner diameter threading



Ball screw shaft end shape

[1] Use the product within the usable stroke range.

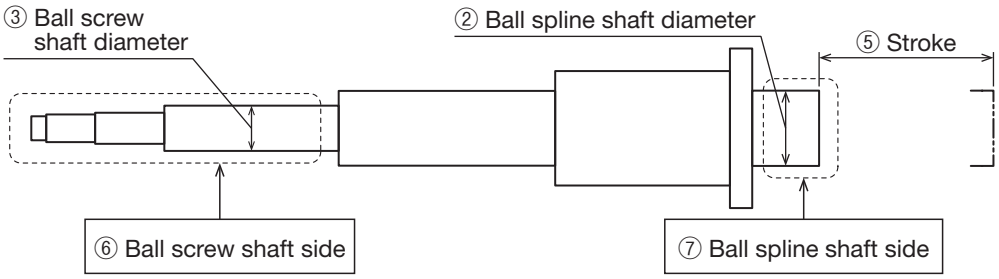
Stroke (mm) (Max. usable stroke)		50 (56)			100 (106)			150 (156)			200 (206)			250 (256)		
Dimensions (mm)	L_1	213			263			313			363			413		
	L_2	72			122			172			222			272		
Ball screw shaft dimensions (mm)	S_2	387			437			487			537			587		
	S_3	255			305			355			405			455		
Ball spline shaft end shape[2]		N	A	B	N	A	B	N	A	B	N	A	B	N	A	B
Ball spline shaft dimensions (mm)	B_1	258	303	290	308	353	340	358	403	390	408	453	440	458	503	490
	B_2	412	457	444	462	507	494	512	557	544	562	607	594	612	657	644
	B_3	462	507	494	562	607	594	662	707	694	762	807	794	862	907	894
	B_4	67	112	99	67	112	99	67	112	99	67	112	99	67	112	99
	B_5	117	162	149	167	212	199	217	262	249	267	312	299	317	362	349
Mass (kg)		8.6			9.5			10.4			11.3			12.2		

[2] Ball spline shaft end shapes: N: End face tap (standard), A: Outer diameter threading, B: Inner diameter threading.

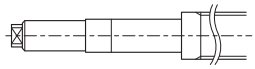
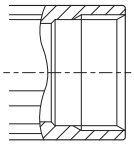
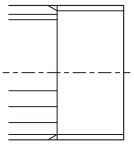
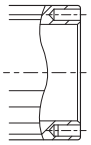
DSP80 5012

Model Number Coding

Model	Ball spline shaft diameter	Ball screw shaft diameter	Ball screw lead		Stroke		Shaft end shape: Ball screw shaft side	Shaft end shape: Ball spline shaft side		Options		Customization 1 (Surface treatment)	Customization 2	Customization 3	Customization 4
①	②	③	④		⑤		⑥	⑦		⑧		⑨	⑩	⑪	⑫
DSP	80	50	12	–	050	–	M	N	–	N	–	N	X	N	N
DSP	80	50	12		050: 50 mm 100: 100 mm 150: 150 mm 200: 200 mm 250: 250 mm		M: Straight shaft (standard)	N: Inner diameter threading (standard) A: Outer diameter threading C: End face tap		N: None		N: No surface treatment S: With surface treatment (THK AP-C treatment)	X	N: None	N: None



Shaft End Shape

⑥ Ball screw shaft side	⑦ Ball spline shaft side		
Symbol: M	Symbol: N	Symbol: A	Symbol: C
Straight shaft	Inner diameter threading (standard)	Outer diameter threading	End face tap
			

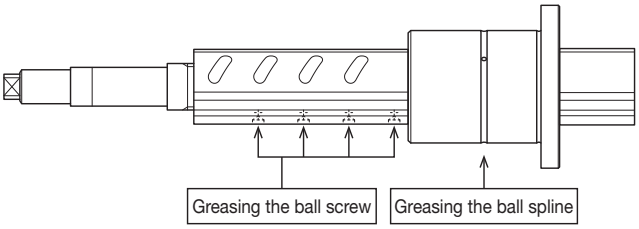
Basic Specifications

DSP	Constant axial load (kN)*	48
	Instantaneous axial load (kN)*	120
Ball screw	Ball screw lead (mm)	12
	Basic dynamic load rating Ca (kN)	150.7
	Basic static load rating C_0a (kN)	451.9
	Ball screw shaft diameter (mm)	ϕ50
	Ball screw shaft thread minor diameter (mm)	ϕ43.3
	Ball center-to-center diameter (mm)	ϕ52.25
	Axial clearance (mm)	0.010 max (G1)
	Accuracy grade	C5
	DN value	70000
Ball spline	Basic dynamic load rating C (kN)	104.9
	Basic static load rating C_0 (kN)	154.8
	Ball spline shaft diameter (mm)	ϕ80
	Clearance in the rotational direction (mm)	-0.022 to -0.012 (CL: light preload)

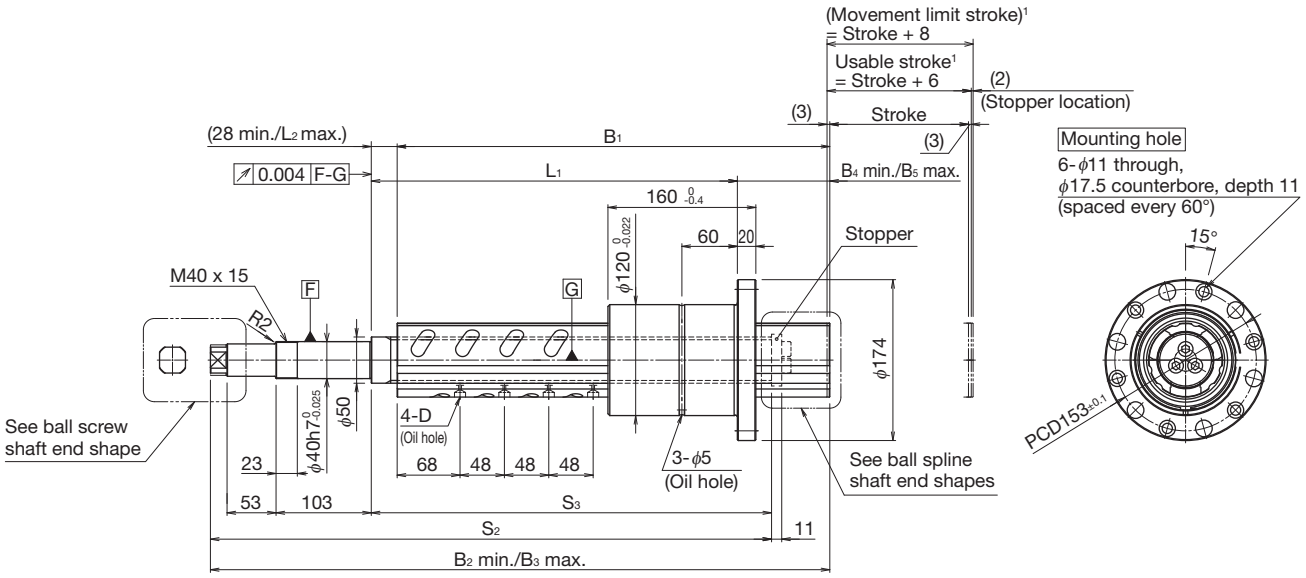
* This value is estimated. Please consider the strength of the mounting part.

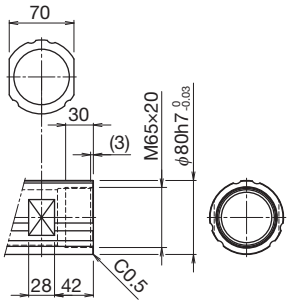
Maintenance

For the ball screw, apply grease directly to the screw shaft.
For the ball spline, replenish lubricant from the oil hole of the ball spline nut and apply grease directly to the ball spline shaft.

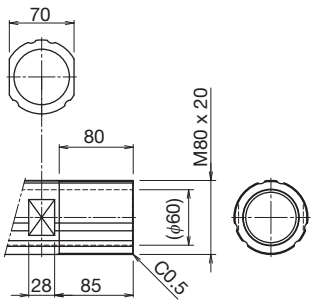


Dimensions

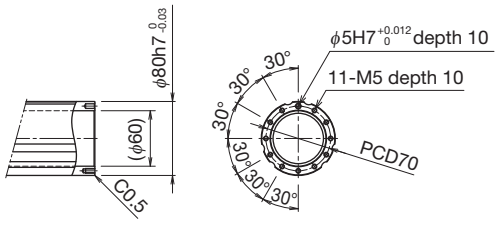




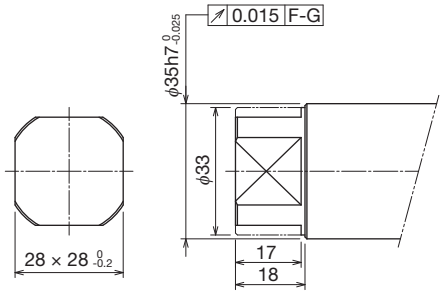
Ball spline
shaft end shape: N
End face tap (standard)



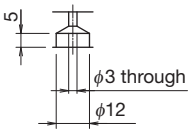
Ball spline
shaft end shape: A
Outer diameter threading



Ball spline
shaft end shape: C
End face tap



Ball screw shaft end shape



D details (1:1)

[1] Use the product within the usable stroke range.

Stroke (mm) (Max. usable stroke)		50 (56)		100 (106)		150 (156)		200 (206)		250 (256)	
Dimensions (mm)	L_1	296		346		396		446		496	
	L_2	78		128		178		228		278	
Ball screw shaft dimensions (mm)	S_2	507		557		607		657		707	
	S_3	333		383		433		483		533	
Ball spline shaft end shape[2]		N/C	A	N/C	A	N/C	A	N/C	A	N/C	A
Ball spline shaft dimensions (mm)	B_1	368	411	418	461	468	511	518	561	568	611
	B_2	570	613	620	663	670	713	720	763	770	813
	B_3	620	663	720	763	820	863	920	963	1020	1063
	B_4	100	143	100	143	100	143	100	143	100	143
	B_5	150	193	200	243	250	293	300	343	350	393
Mass (kg)		23.6		25.3		27		28.7		30.4	

[2] Ball spline shaft end shapes: N: Inner diameter threading (standard), A: Outer diameter threading, C: End face tap.

Surface Treatment

THK AP-C Treatment

AP-C treatment is a type of industrial black chrome plating designed to increase corrosion resistance. It costs less and achieves higher corrosion resistance than martensitic stainless steel.

Technical Materials

Axial Load Estimate

DSP model	DSP301606	DSP402006	DSP402508	DSP503206	DSP603610	DSP603610H	DSP805012
Ball spline shaft diameter (mm)	30	40	40	50	60	60	80
Ball screw shaft diameter (mm)	16	20	25	32	36	36	50
Ball screw lead (mm)	6	6	8	6	10	10	12
Constant axial load (kN)	1.6	3.2	5.6	8.4	10.9	17.8	48
Instantaneous axial load (kN)	3.3	6.4	11.2	16.8	21.8	35.6	120

Note) Strength of mounting part must be considered separately.

⚠Precautions on Use

Handling

- Please use at least two people to move any product weighing 20 kg or more, or use a cart or another method of conveyance. Otherwise, it may cause injury or damage the unit.
- Do not disassemble the parts. This may result in loss of functionality.
- Tilting the screw shaft and nut may cause them to fall under their own weight.
- Take care not to drop or strike this product. Otherwise, it may cause injury or damage the unit. Even if there is no outward indication of damage, a sudden impact could prevent the unit from functioning properly.
- When assembling, be sure not to remove the nut from the screw shaft.
- Wear appropriate safety gear, such as protective gloves and safety shoes, when handling the product.

Precautions on Use

- Prevent foreign materials, such as cutting chips or coolant, from entering the product. Failure to do so could damage the product.
- Prevent foreign materials, such as cutting chips, coolant, corrosive solvents, or water from getting in the product by using a bellows or cover when the product is used in an environment where such a thing is likely.
- The operating temperature range for this product is between -15°C to 80°C (no freezing or condensation).
- If foreign materials such as cutting chips adhere to the product, replenish the lubricant after washing the product.
- Slight oscillations can inhibit the formation of an oil film between the raceways and the area of contact for the balls, resulting in fretting. Therefore, be sure to use a type of grease with high fretting resistance.
  We recommend periodically rotating the nut once to help ensure that a film forms between the raceways and balls.
- Do not forcibly drive a pin, key, or other positioning device into the product. This could create indentations in the raceways and impair the product's function.
- Skewing or misalignment of the nut and the element that supports the shaft can drastically reduce service life. Inspect the components carefully and make sure they are mounted correctly.
- If any balls fall out of the nut, contact THK. Do not use the product in that condition.
- If the unit will be mounted vertically, install safety equipment or take other measures to prevent it from falling. The nut may fall under its own weight.
- Do not exceed the permissible rotation speed when using the product. This could damage the product or otherwise cause it to malfunction. Please use the product within the range of speeds we have specified.
- Do not allow the nut to overshoot. The product may malfunction if any of the balls fall out, the circulation components become damaged, or any indentations form in the ball raceways.
  Continuing to use the product under these circumstances may lead to premature wear or damage to the circulation components.
- Insufficient rigidity or accuracy of the mounting surface could cause an unexpected load to act on the ball screw, which could lead to premature failure of the product.
  Therefore, give sufficient consideration to the rigidity and accuracy of the housing and base.
- Do not touch any moving parts while the product is in operation or in an operable state.
- If performing a task involving multiple people, confirm how to perform the work, what signals will be used, and how to handle problems before beginning, and assign another person to monitor the work.
- A stopper is installed inside the product. It is intended to limit the stroke, and may become damaged in the event of a strong impact.

Lubrication

- Thoroughly wipe off anti-rust oil and feed lubricant before using the product.
- Do not mix different lubricants. Even grease containing the same type of thickening agent may, if mixed, interact negatively due to disparate additives or other ingredients.
- When using the product in locations exposed to constant vibrations or in special environments such as in clean rooms, vacuums, and low/high temperatures, use a lubricant suitable for its use/environment.
- When lubricating products that do not feature a grease nipple or oil hole, directly coat the raceways with lubricant and perform several warm-up strokes to ensure that the grease permeates the interior.
- Grease viscosity can vary depending on the temperature. Please keep in mind that the torque may be affected by changes in viscosity.
- After lubrication, the rotational torque of the DSP may increase due to the stirring resistance of the grease. Be sure to perform a warming-up operation and allow the grease to break in sufficiently before operating the machinery.
- Excess grease may spatter after lubrication. Wipe off spattered grease as necessary.
- Grease deteriorates over time, which decreases the lubricity. Perform regular grease inspections and replenish grease based on frequency of use.
- The greasing interval varies depending on the usage conditions and environment. Grease the system approximately every 500 km of travel distance (6 months). The final greasing interval/amount should be set at the actual machine.
- There is a risk that lubrication may not work sufficiently if the lubricating oil does not circulate due to the mounting orientation or the oiling port of the nut, so be sure to give these factors adequate consideration during design.
- It is necessary to provide adequate lubrication when using the DSP. Using the product without lubrication may increase wear on the rolling elements and shorten the service life.

Storage

- When storing the DSP, pack it as designated by THK and store it indoors in a horizontal position away from high or low temperatures and high humidity.
- Please note that if the product has been kept in storage for an extended period, the lubricant inside may have deteriorated. Please ensure that you replenish the lubricant before using.

Disposal

- The product should be treated as industrial waste and disposed of appropriately.

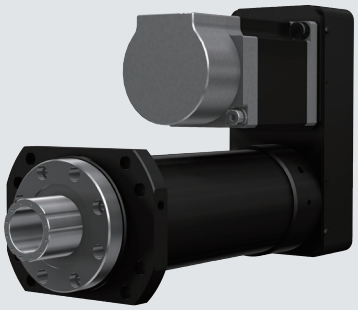
Other Recommended Products

Press Series

For servo press

PC

- ○ Achieves high thrust, with 250 kN instantaneous maximum thrust
- ○ Electric actuator with DSP built in
- ○ Select from a wide variety of controllers

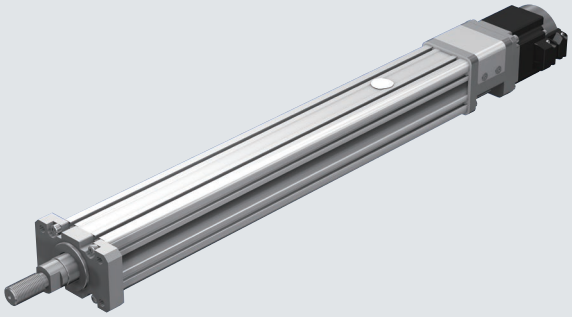


Press Series

Cylinder type

PCT

- ○ Wide selection of rated thrust from approx. 100 N to 800 N
- ○ Select either direct motor coupling or motor wrap
- ○ Supports a flexible variety of mounting orientations



Ball Spline with Integrated Ball Screw **DSP**

THK CO., LTD.

Headquarters 2-12-10 Shibaura, Minato-ku, Tokyo 108-8506 Japan

International Sales Department Phone: +81-3-5730-3860

www.thk.com

CATALOG No.421-2E ©THK CO., LTD. 202207