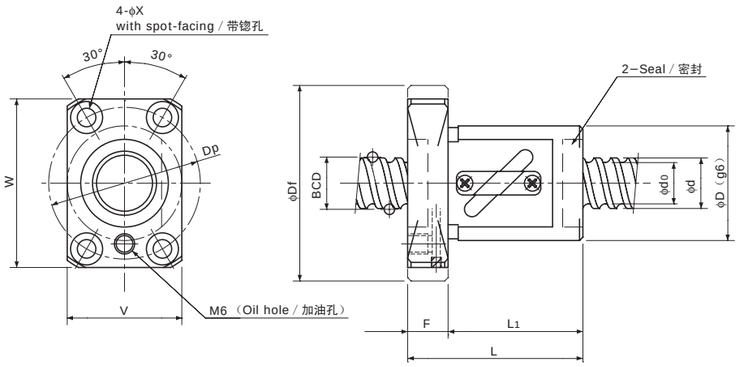
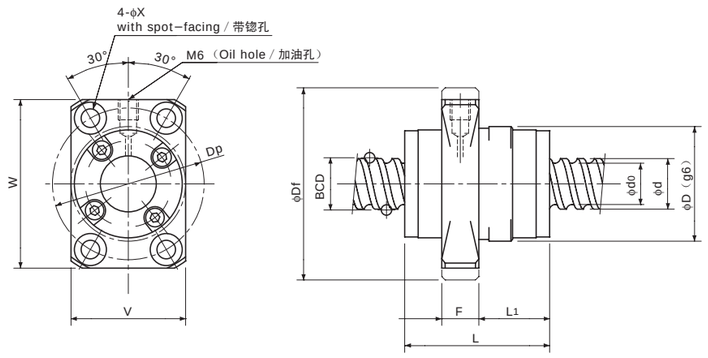
Single Nut with Flange
带法兰单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Type-4:Return-tube type
回路管循环方式



Type-5:End-deflector type
偏转器式循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸										Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	
FBS 1504 T	15	4	2.381	15.50	4°42′	13.0	2.5×1	4100 / 2580	8550 / 4300	136 / 112		4	32	56	41	31	10	48	32	43	5.5	FBS 1504 T
FEB 1505 A(1)	15	5	3.175	15.50	5°41′	12.2	3.7×1	8900 / —	17000 / —	208 / —		5	32	55	33	16	11	49	33	43	5.5	FEB 1505 A(1)
FEB 1505 A(2)	15	5	3.175	15.50	5°41′	12.2	3.7×1	8900 / —	17000 / —	208 / —		5	34	57	33	16	11	50	34	45	5.5	FEB 1505 A(2)
FBS 1505 T	15	5	3.175	15.80	5°45′	12.4	2.5×1	6900 / 4350	12500 / 6250	148 / 122		4	34	58	44	34	10	50	34	45	5.5	FBS 1505 T
FEB 1510 A(1)	15	10	3.175	15.50	11°36′	12.2	2.7×2	12000 / —	25000 / —	289 / —		5	32	55	43	21	11	49	33	43	5.5	FEB 1510 A(1)
FEB 1510 A(2)	15	10	3.175	15.50	11°36′	12.2	2.7×2	12000 / —	25000 / —	289 / —		5	34	57	43	21	11	50	34	45	5.5	FEB 1510 A(2)
FBS 1510 T	15	10	3.175	15.80	11°23′	12.4	1.5×1	4400 / 2540	7900 / 3450	87 / 69		4	34	58	52	40	12	50	34	45	6.0	FBS 1510 T
FEB 1520 A(1)	15	20	3.175	15.75	22°1′	12.4	1.7×2	8000 / —	16000 / —	178 / —		5	32	55	52	28.5	11	49	33	43	5.5	FEB 1520 A(1)
FEB 1520 A(2)	15	20	3.175	15.75	22°1′	12.4	1.7×2	8000 / —	16000 / —	178 / —		5	34	57	52	28.5	11	50	34	45	5.5	FEB 1520 A(2)
FBS 1520 T	15	20	3.175	15.80	21°56′	12.4	1.5×1	4400 / 2540	7900 / 3450	84 / 67		4	34	58	62	50	12	50	34	45	6.0	FBS 1520 T
FEB 1530 A(1)	15	30	3.175	15.75	31°14′	12.4	1.7×2	8000 / —	16000 / —	163 / —		5	32	55	71	45.5	11	49	33	43	5.5	FEB 1530 A(1)
FEB 1530 A(2)	15	30	3.175	15.75	31°14′	12.4	1.7×2	8000 / —	16000 / —	163 / —		5	34	57	71	45.5	11	50	34	45	5.5	FEB 1530 A(2)

注1)设计时,请注意使滚珠丝杠轴端的其中一端不超过丝杠轴底径。
如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。
需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时,请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

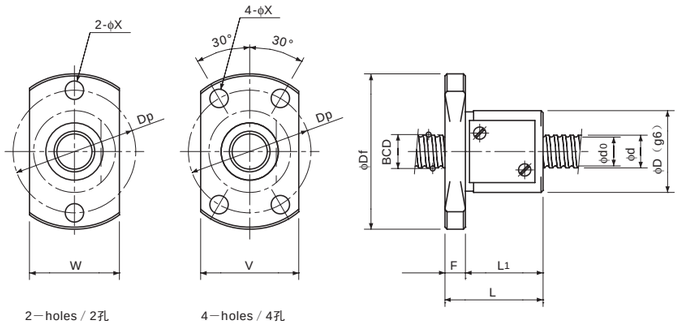
Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

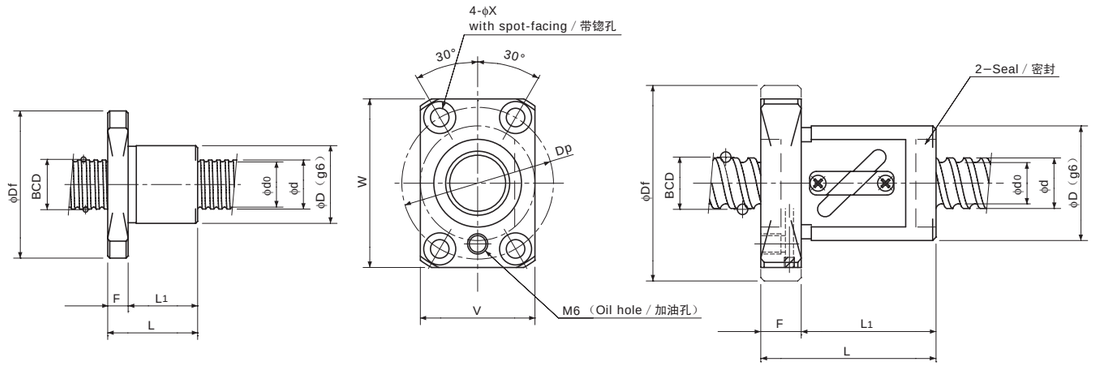
Precision Ball Screws 精密滚珠丝杠

Single Nut with Flange
带法兰单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Type-1:Return-plate type
复式回路板循环方式



Type-2:Internal-deflector type or
End-deflector type
陀螺式循环方式或偏转器式循环方式

Type-4:Return-tube type
回路管循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸										Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	
FBS 1601 B	16	1	0.8	16.15	1°08′	15.3	3.7×1	1000 / 640	3300 / 1650	164 / 138		1	28	48	21	15	6	30	30	39	5.5	FBS 1601 B
FKB 1602 A	16	2	1.2	16.30	2°14′	15.0	1×3	1850 / 1850	5000 / 5000	137 / 213		2	24	43	20	14	6	26	27	34	5.5	FKB 1602 A
FBS 1602 B	16	2	1.5875	16.30	2°14′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		1	28	48	25	19	6	30	30	39	5.5	FBS 1602 B
FKB 1602.5 A	16	2.5	1.5875	16.40	2°47′	14.7	1×3	2700 / 2700	6500 / 6500	142 / 221		2	24	43	22	16	6	26	27	34	5.5	FKB 1602.5 A
FBS 1602.5 B	16	2.5	1.5875	16.30	2°48′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		1	28	48	27	21	6	30	30	39	5.5	FBS 1602.5 B
FKB 1603 A	16	3	2.0	16.50	3°19′	14.4	1×3	3600 / 3600	8000 / 8000	146 / 227		2	26	45	32	26	6	28	28	36	5.5	FKB 1603 A
FBS 1603 B	16	3	2.0	16.30	3°21′	14.2	3.7×1	4900 / 3100	11600 / 5800	205 / 172		1	32	53	30	24	6	34	34	44	5.5	FBS 1603 B
FKB 1604 A	16	4	2.381	16.65	4°22′	13.9	1×3	4800 / 4800	10000 / 10000	152 / 237		2	28	47	29	23	6	30	30	38	5.5	FKB 1604 A
FBS 1604 B	16	4	2.381	16.30	4°28′	13.8	3.7×1	6200 / 3900	13600 / 6800	209 / 174		1	34	54	34	28	6	36	36	45	5.5	FBS 1604 B
FBS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100 / 5700	18200 / 9100	217 / 182		1	38	57	42	36	6	40	40	48	5.5	FBS 1605 B
FBS 2005 T	20	5	3.175	20.80	4°23′	17.5	2.5×1	8350 / 5260	17500 / 8750	189 / 157		4	40	68	48	36	12	60	40	53	6.6	FBS 2005 T
FBS 2010 T	20	10	4.7625	21.00	8°37′	17.7	2.5×1	13500 / 8350	25100 / 12800	195 / 160		4	46	74	65	50	15	66	46	59	6.6	FBS 2010 T

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需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时,请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
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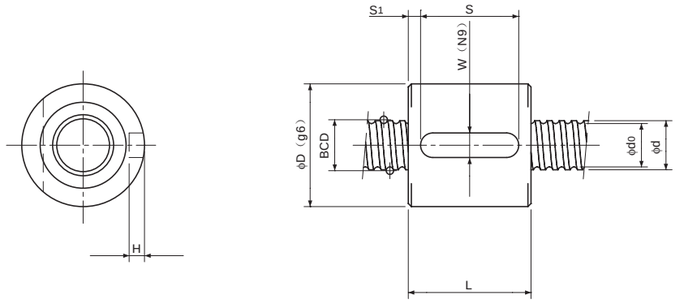
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut
套筒型单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Unit(单位)：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸						Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	W	H	S	S_1	
BS 0301 B	3	1	0.6	3.18	5°43′	2.4	3.7×1	330 / —	440 / —	42 / —		9	12	2	1.2	8	2	BS 0301 B
BS 0401 A	4	1	0.8	4.15	4°23′	3.3	2.7×1	420 / 270	570 / 290	40 / 34		10	12	2	1.2	8	2	BS 0401 A
BS 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7×1	560 / 350	790 / 400	54 / 45		11	14	3	1.8	8	3	BS 0401 B
BS 0402 A	4	2	0.8	4.15	8°43′	3.3	2.7×1	420 / 260	570 / 290	39 / 33		11	16	3	1.8	8	4	BS 0402 A
BS 0403 A	4	3	0.8	4.15	12°57′	3.3	2.7×1	420 / —	570 / —	39 / —		11	20	3	1.8	8	6	BS 0403 A
BS 0501 B	5	1	0.8	5.15	3°32′	4.3	3.7×1	630 / 400	1000 / 500	65 / 55		12	14	3	1.8	8	3	BS 0501 B
BS 0504 A	5	4	0.8	5.15	13°53′	4.3	2.7×1	470 / 300	720 / 360	47 / 39		12	22	3	1.8	12	5	BS 0504 A
BS 0601 B	6	1	0.8	6.15	2°58′	5.3	3.7×1	680 / 430	1200 / 610	75 / 63		13	14	3	1.8	10	2	BS 0601 B
BS 0601.5 B	6	1.5	1.0	6.20	4°24′	5.1	3.7×1	980 / 620	1600 / 800	79 / 67		14	16	3	1.8	10	3	BS 0601.5 B
BS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750 / 470	1200 / 590	58 / 49		15	15	3	1.8	10	2.5	BS 0602 A
BS 0602 B	6	2	1.0	6.20	5°52′	5.1	3.7×1	980 / 620	1600 / 800	79 / 67		15	18	3	1.8	12	3	BS 0602 B
BS 0602.5 A	6	2.5	1.0	6.20	7°19′	5.1	2.7×1	750 / 470	1200 / 590	59 / 49		15	16	3	1.8	10	3	BS 0602.5 A

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　　需要密封时，螺母的尺寸将发生变化，详情请垂询本公司。
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注3)表中的刚性值为螺母的刚性值，是在以下条件下，根据轴向弹性位移量计算得出的理论值。
　　齿侧间隙型：相当于基本额定动负载Ca的30%的轴向负载作用时
　　预压型：施加了相当于基本额定动负载Ca的5%的预压时
　　轴向负载及预压量与上述条件不同时，可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
　　需要左旋时，请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

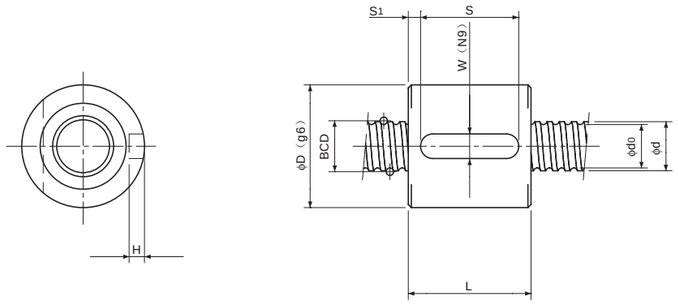
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
　　If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
　　Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
　　Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
　　Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
　　For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut
套筒型单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Unit(单位)：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸						Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	W	H	S	S_1	
BS 0801 B	8	1	0.8	8.15	2°15′	7.3	3.7×1	780 / 490	1650 / 820	95 / 80		16	14	3	1.8	10	2	BS 0801 B
BS 0801.5 B	8	1.5	1.0	8.20	3°20′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		16	16	3	1.8	10	3	BS 0801.5 B
BS 0802 A(1)	8	2	1.0	8.20	4°26′	7.1	2.7×1	850 / 540	1600 / 800	74 / 61		16	15	3	1.8	10	2.5	BS 0802 A(1)
BS 0802 B(1)	8	2	1.0	8.20	4°26′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		16	18	3	1.8	12	3	BS 0802 B(1)
BS 0802 A(2)	8	2	1.5875	8.30	4°23′	6.6	2.7×1	1850 / 1150	3000 / 1500	82 / 69		20	17	4	2.5	12	2.5	BS 0802 A(2)
BS 0802 B(2)	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 94		20	20	4	2.5	16	2	BS 0802 B(2)
BS 0802.5 A(1)	8	2.5	1.5875	8.00	5°41′	6.3	2.7×1	1850 / —	3000 / —	80 / —		16	16	3	1.8	8	4	BS 0802.5 A(1)
BS 0802.5 A(2)	8	2.5	1.5875	8.30	5°29′	6.6	2.7×1	1850 / 1150	3000 / 1500	82 / 69		20	19	4	2.5	12	3.5	BS 0802.5 A(2)
BS 0802.5 B	8	2.5	1.5875	8.30	5°29′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 93		20	22	4	2.5	16	3	BS 0802.5 B
BS 0803 A	8	3	2.0	8.30	6°34′	6.2	2.7×1	2600 / 1650	4200 / 2100	85 / 70		20	22	4	2.5	16	3	BS 0803 A
BS 0803 B	8	3	2.0	8.30	6°34′	6.2	3.7×1	3500 / 2200	5700 / 2800	116 / 97		20	26	4	2.5	20	3	BS 0803 B
BS 0804 A	8	4	2.0	8.30	8°43′	6.2	2.7×1	2600 / 1650	4200 / 2100	84 / 70		21	26	4	2.5	20	3	BS 0804 A
BS 0805 A	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850 / 1150	3000 / 1500	82 / 67		18	28	4	2.5	20	4	BS 0805 A

注1)设计时，请注意使滚珠丝杠轴端的其中一端不超过丝杠轴底径。
如果两个轴端设计得大于底径，则将无法组装螺母。
注2)标准螺母不带密封。
需要密封时，螺母的尺寸将发生变化，详情请垂询本公司。
某些型号的螺母不能安装密封，敬请注意。
注3)表中的刚性值为螺母的刚性值，是在以下条件下，根据轴向弹性位移量计算得出的理论值。
齿侧间隙型：相当于基本额定动负载Ca的30%的轴向负载作用时
预压型：施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时，可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时，请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

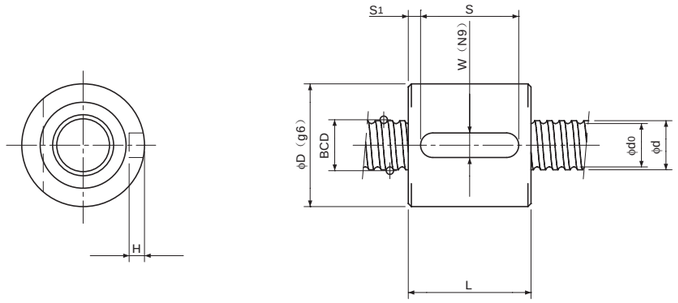
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above,
see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut
套筒型单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Unit(单位)：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸						Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	W	H	S	S_1	
BS 1001 B	10	1	0.8	10.15	1°48′	9.3	3.7×1	840 / 530	2000 / 1000	113 / 95		19	14	3	1.8	10	2	BS 1001 B
BS 1001.5 B	10	1.5	1.0	10.20	2°41′	9.1	3.7×1	1250 / 790	2800 / 1400	120 / 101		19	16	3	1.8	10	3	BS 1001.5 B
BS 1002 A	10	2	1.5875	10.30	3°32′	8.6	2.7×1	2100 / 1300	3800 / 1900	100 / 82		23	17	5	3	12	2.5	BS 1002 A
BS1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700 / 1750	5300 / 2700	134 / 112		23	20	5	3	16	2	BS1002 B
BS 1002.5 A	10	2.5	1.5875	10.30	4°25′	8.6	2.7×1	2100 / 1300	3800 / 1900	100 / 82		24	19	5	3	12	3.5	BS 1002.5 A
BS 1002.5 B	10	2.5	1.5875	10.30	4°25′	8.6	3.7×1	2700 / 1750	5300 / 2700	133 / 112		24	22	5	3	16	3	BS 1002.5 B
BS 1003 A	10	3	2.0	10.30	5°18′	8.2	2.7×1	3000 / 1800	5200 / 2600	103 / 84		24	22	5	3	16	3	BS 1003 A
BS 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900 / 2500	7200 / 3600	140 / 118		24	26	5	3	20	3	BS 1003 B
BS 1004 A	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000 / 1800	5200 / 2600	104 / 86		24	26	5	3	20	3	BS 1004 A
BS 1004 B	10	4	2.0	10.30	7°03′	8.2	3.7×1	3900 / 2500	7200 / 3600	139 / 118		24	30	5	3	20	5	BS 1004 B
BS 1005 A(1)	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / —	5200 / —	103 / —		23	26	5	3	16	5	BS 1005 A(1)
BS 1005 A(2)	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / 1800	5200 / 2600	103 / 85		24	34	5	3	28	3	BS 1005 A(2)

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注2)标准螺母不带密封。
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注3)表中的刚性值为螺母的刚性值，是在以下条件下，根据轴向弹性位移量计算得出的理论值。
　　齿侧间隙型：相当于基本额定动负载Ca的30%的轴向负载作用时
　　预压型：施加了相当于基本额定动负载Ca的5%的预压时
　　轴向负载及预压量与上述条件不同时，可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
　　需要左旋时，请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

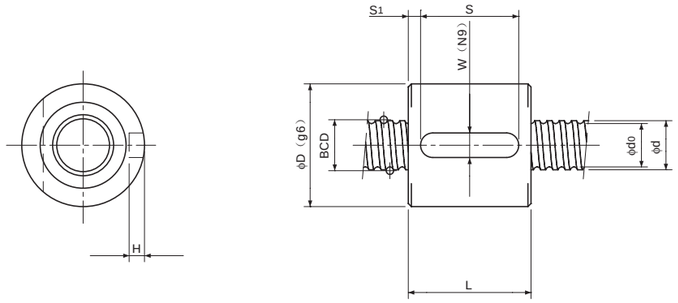
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
　　If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
　　Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
　　Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
　　Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
　　For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut
套筒型单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸						Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	W	H	S	S_1	
BS 1201 B	12	1	0.8	12.15	1°30′	11.3	3.7×1	910 / 570	2400 / 1200	131 / 110		22	14	4	2.5	10	2	BS 1201 B
BS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000 / 1900	6400 / 3200	156 / 132		25	20	5	3	16	2	BS 1202 B
BS 1202.5 B	12	2.5	1.5875	12.30	3°42′	10.6	3.7×1	3000 / 1850	6400 / 3200	156 / 130		26	22	5	3	16	3	BS 1202.5 B
BS 1203 B	12	3	2.0	12.30	4°26′	10.2	3.7×1	4300 / 2800	8700 / 4300	162 / 137		28	26	5	3	20	3	BS 1203 B
BS 1204 B	12	4	2.381	12.30	5°55′	9.8	3.7×1	5400 / 3400	10200 / 5100	165 / 139		28	31	5	3	25	3	BS 1204 B
BS 1205 A	12	5	2.381	12.30	7°22′	9.8	2.7×1	4100 / 2500	7400 / 3700	122 / 101		28	31	5	3	25	3	BS 1205 A
BS 1401 B	14	1	0.8	14.15	1°17′	13.3	3.7×1	960 / 610	2900 / 1450	148 / 124		26	16	5	3	10	3	BS 1401 B
BS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200 / 2000	7500 / 3800	176 / 148		26	20	5	3	16	2	BS 1402 B
BS 1402.5 B	14	2.5	1.5875	14.30	3°11′	12.6	3.7×1	3200 / 2000	7500 / 3700	176 / 148		28	22	5	3	16	3	BS 1402.5 B
BS 1403 B	14	3	2.0	14.30	3°49′	12.2	3.7×1	4600 / 2900	10100 / 5000	184 / 154		30	26	5	3	20	3	BS 1403 B
BS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700 / 3600	11600 / 5800	187 / 157		30	31	5	3	25	3	BS 1404 B
BS 1405 B	14	5	2.381	14.30	6°21′	11.8	3.7×1	5700 / 3600	11600 / 5800	186 / 157		30	38	5	3	28	5	BS 1405 B

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注2)标准螺母不带密封。
需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时,请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

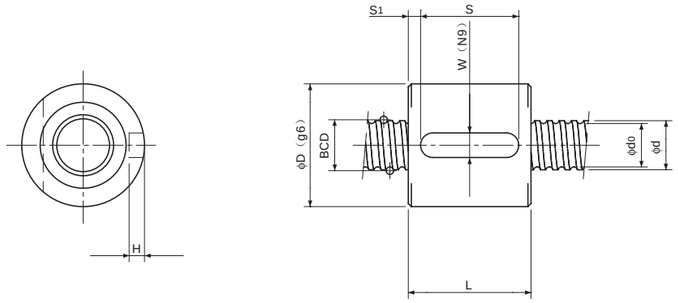
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut
套筒型单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Unit(单位)：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸						Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	W	H	S	S_1	
BS 1601 B	16	1	0.8	16.15	1°08′	15.3	3.7×1	1000 / 640	3300 / 1650	164 / 138		28	16	5	3	10	3	BS 1601 B
BS 1602 B	16	2	1.5875	16.30	2°14′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		28	20	5	3	16	2	BS 1602 B
BS 1602.5 B	16	2.5	1.5875	16.30	2°48′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		28	22	5	3	16	3	BS 1602.5 B
BS 1603 B	16	3	2.0	16.30	3°21′	14.2	3.7×1	4900 / 3100	11600 / 5800	205 / 172		32	26	5	3	20	3	BS 1603 B
BS 1604 B	16	4	2.381	16.30	4°28′	13.8	3.7×1	6200 / 3900	13600 / 6800	209 / 174		34	32	5	3	25	3.5	BS 1604 B
BS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100 / 5700	18200 / 9100	217 / 182		38	38	5	3	28	5	BS 1605 B

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注2)标准螺母不带密封。
需要密封时，螺母的尺寸将发生变化，详情请垂询本公司。
某些型号的螺母不能安装密封，敬请注意。
注3)表中的刚性值为螺母的刚性值，是在以下条件下，根据轴向弹性位移量计算得出的理论值。
齿侧间隙型：相当于基本额定动负载Ca的30%的轴向负载作用时
预压型：施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时，可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时，请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

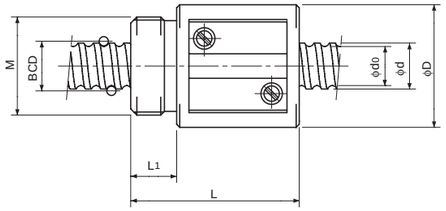
Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

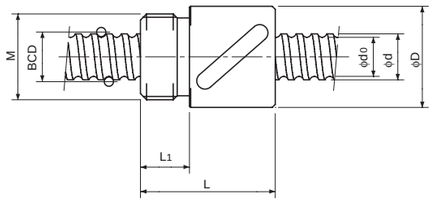
Precision Ball Screws 精密滚珠丝杠

Single Nut with M-thread
带公制螺纹单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Type-1:Return-plate type
复式回路板循环方式



Type-2:Return-tube type
回路管循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸					Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	L	L_1	M	
MS 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7×1	560 / 350	790 / 400	54 / 45		1	11	17	4	M9×0.75	MS 0401 B
MS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750 / 470	1200 / 590	58 / 49		1	16.5	22	8	M14×1.0	MS 0602 A
MS 0801.5 B	8	1.5	1.0	8.20	3°20′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		1	16.5	24	8	M14×1.0	MS 0801.5 B
MS 0802 B	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 94		1	20	27.5	7.5	M16×1.0	MS 0802 B
MS 0802.5 T(1)	8	2.5	1.5875	8.00	5°41′	6.3	3.5×1	2300 / —	3900 / —	102 / —		2	16.5	22	8	M14×1.0	MS 0802.5 T(1)
MS 0802.5 T(2)	8	2.5	1.5875	8.00	5°41′	6.3	3.5×1	2300 /—	3900 / —	102 / —		2	17.5	25.5	7.5	M15×1.0	MS 0802.5 T(2)
MS 0803 A	8	3	2.0	8.30	6°34′	6.2	2.7×1	2600 / 1650	4200 / 2100	85 / 70		1	20	28.5	7.5	M16×1.0	MS 0803 A
MS 0804 T	8	4	1.5875	8.00	9°03′	5.9	2.5×1	1750 / —	2800 / —	75 / —		2	16.5	24	8	M14×1.0	MS 0804 T
MS 0805 A	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850 / 1150	3000 / 1500	82 / 67		1	18	32.5	7.5	M15×1.0	MS 0805 A

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如果两个轴端设计得大于底径,则将无法组装螺母。
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预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时,请垂询本公司。
注5)为了便于安装配合零件而需要对螺母外径进行对边距离加工或开孔加工时,
请垂询本公司。
注6)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

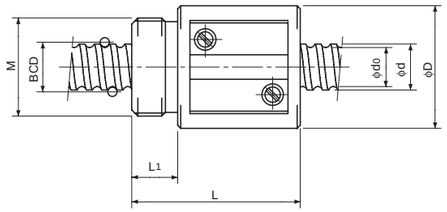
Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Across Flats or drill hole is available on the Ball Nut for the convenience of assembly. Please ask KSS representative.
Note 6)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

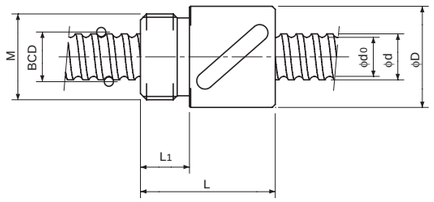
Precision Ball Screws 精密滚珠丝杠

Single Nut with M-thread
带公制螺纹单螺母

Backlash type/Preload type
齿侧间隙型/预压型



Type-1:Return-plate type
复式回路板循环方式



Type-2:Return-tube type
回路管循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸					Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	L	L_1	M	
MS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700 / 1750	5300 / 2700	134 / 112		1	23	27.5	7.5	M17×1.0	MS 1002 B
MS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000 / 1900	6400 / 3200	156 / 132		1	25	30	10	M20×1.0	MS 1202 B
MS 1204 T	12	4	2.381	12.30	5°55′	9.8	2.5×1	3900 / —	7000 / —	113 / —		2	25.5	34	10	M20×1.0	MS 1204 T
MS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200 / 2000	7500 / 3800	176 / 148		1	26	30	10	M22×1.5	MS 1402 B
MS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700 / 3600	11600 / 5800	187 / 157		1	30	38	10	M25×1.0	MS 1404 B

注1)设计时,请注意使滚珠丝杠轴端的其中一端不超过丝杠轴底径。
如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时,请垂询本公司。
注5)为了便于安装配合零件而需要对螺母外径进行对边距离加工或开孔加工时,
请垂询本公司。
注6)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

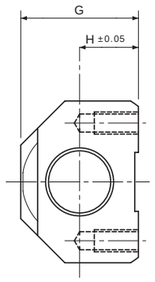
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

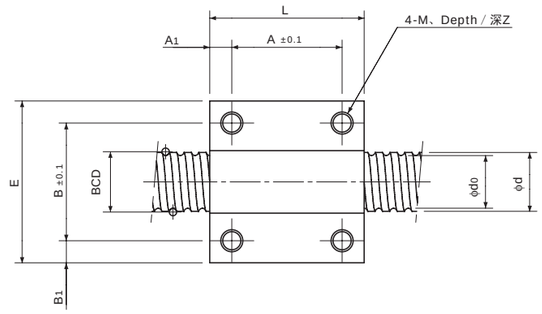
Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Across Flats or drill hole is available on the Ball Nut for the convenience of assembly. Please ask KSS representative.
Note 6)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Square type Single Nut
方型单螺母

Backlash type/Preload type
齿侧间隙型/预压型





Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸										Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			L	E	G	H	A	A_1	B	B_1	M	Z	
KS 0601 B	6	1	0.8	6.15	2°58′	5.3	3.7×1	680 / 430	1200 / 610	75 / 63		20	20	14	7	14	3	14	3	M3	6	KS 0601 B
KS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750 / 470	1200 / 590	58 / 49		20	20	14	7	14	3	14	3	M3	6	KS 0602 A
KS 0801 B	8	1	0.8	8.15	2°15′	7.3	3.7×1	780 / 490	1650 / 820	95 / 80		21	22	16	8	15	3	16	3	M3	6	KS 0801 B
KS 0802 A	8	2	1.0	8.20	4°26′	7.1	2.7×1	850 / 540	1600 / 800	74 / 61		21	22	16	8	15	3	16	3	M3	6	KS 0802 A
KS 1001 B	10	1	0.8	10.15	1°48′	9.3	3.7×1	840 / 530	2000 / 1000	113 / 95		26	28	22	12	18	4	20	4	M4	7	KS 1001 B
KS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700 / 1750	5300 / 2700	134 / 112		26	28	23	12	18	4	20	4	M4	7	KS 1002 B

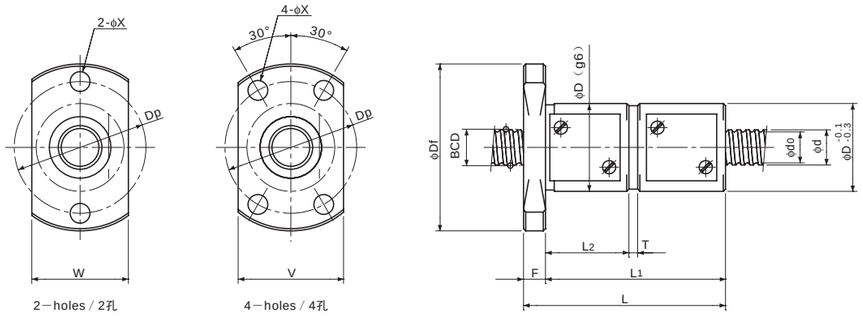
注1)设计时,请注意使滚珠丝杠轴端的其中一端不超过丝杠轴底径。
如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)标准螺纹旋向为右旋。
需要左旋时,请垂询本公司。
注5)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Double Nut with Flange
带法兰双螺母



2—holes / 2孔　　4—holes / 4孔

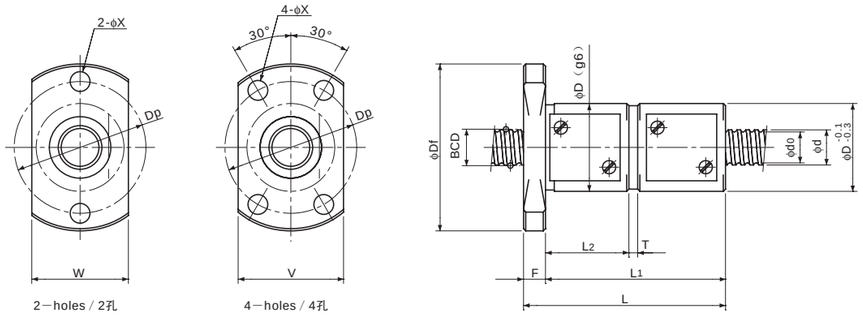
Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	Df	L	L_1	F	L_2	T	W	V	Dp	Bolt Hole 安装孔 X	
FSBS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750	1200	114		15	29	35	31	4	13.5	2	17	18	23	3.4	FSBS 0602 A
FSBS 0602 B	6	2	1.0	6.20	5°52′	5.1	3.7×1	980	1600	155		15	29	41	37	4	17	2	17	18	23	3.4	FSBS 0602 B
FSBS 0602.5 A	6	2.5	1.0	6.20	7°19′	5.1	2.7×1	750	1200	115		15	29	35.5	31.5	4	13.5	2	17	18	23	3.4	FSBS 0602.5 A
FSBS 0802 A(1)	8	2	1.0	8.20	4°26′	7.1	2.7×1	850	1600	144		16	30	33	29	4	12.5	2	18	18	24	3.4	FSBS 0802 A(1)
FSBS 0802 B(1)	8	2	1.0	8.20	4°26′	7.1	3.7×1	1100	2200	195		16	30	41	37	4	17	2	18	18	24	3.4	FSBS 0802 B(1)
FSBS 0802 A(2)	8	2	1.5875	8.30	4°23′	6.6	2.7×1	1850	3000	162		20	38	41	36	5	16.5	2	22	23	30	4.5	FSBS 0802 A(2)
FSBS 0802 B(2)	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400	4100	217		20	38	46	41	5	19	2	22	23	30	4.5	FSBS 0802 B(2)
FSBS 0802.5 A	8	2.5	1.5875	8.30	5°29′	6.6	2.7×1	1850	3000	161		20	38	45.5	40.5	5	18.5	2.5	22	23	30	4.5	FSBS 0802.5 A
FSBS 0802.5 B	8	2.5	1.5875	8.30	5°29′	6.6	3.7×1	2400	4100	219		20	38	51	46	5	21.5	2	22	23	30	4.5	FSBS 0802.5 B
FSBS 0803 A	8	3	2.0	8.30	6°34′	6.2	2.7×1	2600	4200	167		20	38	49	44	5	20	2	22	23	30	4.5	FSBS 0803 A
FSBS 0803 B	8	3	2.0	8.30	6°34′	6.2	3.7×1	3500	5700	227		20	38	56	51	5	23.5	2	22	23	30	4.5	FSBS 0803 B

注1)设计时,请注意使滚珠丝杠轴端的其中一端不超过丝杠轴底径。
　　如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。
　　需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
　　某些型号的螺母不能安装密封,敬请注意。
注3)刚性
　　表中的刚性值为施加了相当于基本额定动负载Ca的10%的预压,
　　并在相当于该预压量3倍的轴向负载作用时,根据轴向弹性位移量计算的理论值。
　　预压量与上述条件不同时,可通过p-A823的公式计算。
　　详情请垂询本公司。
注4)标准螺纹旋向为右旋。
　　需要左旋时,请垂询本公司。

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter,
　　otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
　　If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
　　Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)Rigidity
　　The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement
　　under the Preload equivalent to 10% of the Basic Dynamic Load Rating Ca.
　　For Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand screw. If Left-hand screw is required, please ask KSS representative.

Double Nut with Flange
带法兰双螺母



2—holes / 2孔　　4—holes / 4孔

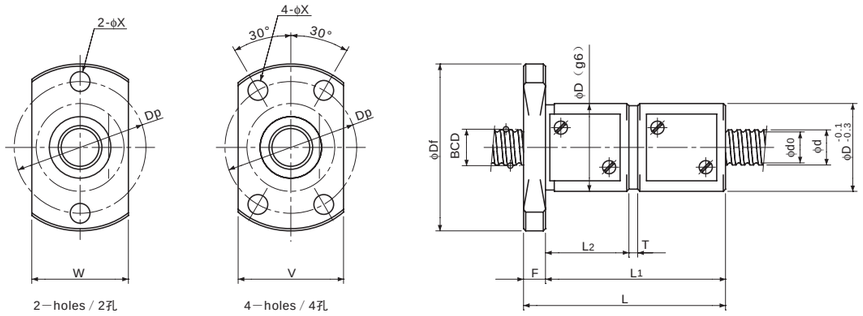
Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	Df	L	L_1	F	L_2	T	W	V	Dp	Bolt Hole 安装孔 X	
FSBS 1002 A	10	2	1.5875	10.30	3°32′	8.6	2.7×1	2100	3800	196		23	41	41	36	5	16.5	2	25	25	33	4.5	FSBS 1002 A
FSBS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700	5300	262		23	41	46	41	5	19	2	25	25	33	4.5	FSBS 1002 B
FSBS 1002.5 A	10	2.5	1.5875	10.30	4°25′	8.6	2.7×1	2100	3800	196		24	44	46.5	40.5	6	18.5	2.5	26	27	35	5.5	FSBS 1002.5 A
FSBS 1002.5 B	10	2.5	1.5875	10.30	4°25′	8.6	3.7×1	2700	5300	262		24	44	52	46	6	21.5	2	26	27	35	5.5	FSBS 1002.5 B
FSBS 1003 A	10	3	2.0	10.30	5°18′	8.2	2.7×1	3000	5200	202		24	44	50	44	6	20	2	26	27	35	5.5	FSBS 1003 A
FSBS 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900	7200	275		24	44	57	51	6	23.5	2	26	27	35	5.5	FSBS 1003 B
FSBS 1004 A	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000	5200	203		24	44	57	51	6	23	2	26	27	35	5.5	FSBS 1004 A
FSBS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000	6400	307		25	45	49	43	6	19.5	3	27	27	36	5.5	FSBS 1202 B
FSBS 1202.5 B	12	2.5	1.5875	12.30	3°42′	10.6	3.7×1	3000	6400	306		26	46	52	46	6	21	3	28	28	37	5.5	FSBS 1202.5 B
FSBS 1203 B	12	3	2.0	12.30	4°26′	10.2	3.7×1	4300	8700	318		28	48	60	54	6	24.5	3	30	30	39	5.5	FSBS 1203 B
FSBS 1204 B	12	4	2.381	12.30	5°55′	9.8	3.7×1	5400	10200	324		28	48	69	63	6	28	3	30	30	39	5.5	FSBS 1204 B

注1)设计时，请注意使滚珠丝杠轴端的其中一端不超过丝杠轴底径。
　　如果两个轴端设计得大于底径，则将无法组装螺母。
注2)标准螺母不带密封。
　　需要密封时，螺母的尺寸将发生变化，详情请垂询本公司。
　　某些型号的螺母不能安装密封，敬请注意。
注3)刚性
　　表中的刚性值为施加了相当于基本额定动负载Ca的10%的预压，
　　并在相当于该预压量3倍的轴向负载作用时，根据轴向弹性位移量计算的理论值。
　　预压量与上述条件不同时，可通过p-A823的公式计算。
　　详情请垂询本公司。
注4)标准螺纹旋向为右旋。
　　需要左旋时，请垂询本公司。

Note 1)The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter,
　　otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
　　If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
　　Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)Rigidity
　　The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement
　　under the Preload equivalent to 10% of the Basic Dynamic Load Rating Ca.
　　For Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)All models are Right-hand screw. If Left-hand screw is required, please ask KSS representative.

Double Nut with Flange
带法兰双螺母



2—holes / 2孔　　4—holes / 4孔

Unit(单位)：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	Df	L	L_1	F	L_2	T	W	V	Dp	Bolt Hole 安装孔 X	
FSBS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200	7500	345		26	46	49	43	6	19.5	3	28	28	37	5.5	FSBS 1402 B
FSBS 1402.5 B	14	2.5	1.5875	14.30	3°11′	12.6	3.7×1	3200	7500	345		28	48	52	46	6	21	3	30	30	39	5.5	FSBS 1402.5 B
FSBS 1403 B	14	3	2.0	14.30	3°49′	12.2	3.7×1	4600	10100	361		30	51	60	54	6	24.5	3	32	32	42	5.5	FSBS 1403 B
FSBS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700	11600	366		30	51	69	63	6	28	3	32	32	42	5.5	FSBS 1404 B
FSBS 1405 B	14	5	2.381	14.30	6°21′	11.8	3.7×1	5700	11600	365		30	51	79	73	6	32.5	3	32	32	42	5.5	FSBS 1405 B
FSBS 1602 B	16	2	1.5875	16.30	2°14′	14.6	3.7×1	3400	8600	386		28	48	49	43	6	19.5	3	30	30	39	5.5	FSBS 1602 B
FSBS 1602.5 B	16	2.5	1.5875	16.30	2°48′	14.6	3.7×1	3400	8600	385		28	48	52	46	6	21	3	30	30	39	5.5	FSBS 1602.5 B
FSBS 1603 B	16	3	2.0	16.30	3°21′	14.2	3.7×1	4900	11600	401		32	53	60	54	6	24.5	3	34	34	44	5.5	FSBS 1603 B
FSBS 1604 B	16	4	2.381	16.30	4°28′	13.8	3.7×1	6200	13600	409		34	54	70	64	6	28	4	36	36	45	5.5	FSBS 1604 B
FSBS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100	18200	425		38	57	87	81	6	37.5	4	40	40	48	5.5	FSBS 1605 B

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注2)标准螺母不带密封。
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注3)刚性
　　表中的刚性值为施加了相当于基本额定动负载Ca的10%的预压，
　　并在相当于该预压量3倍的轴向负载作用时，根据轴向弹性位移量计算的理论值。
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　　For Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
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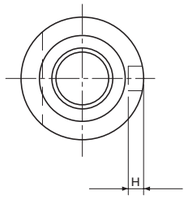
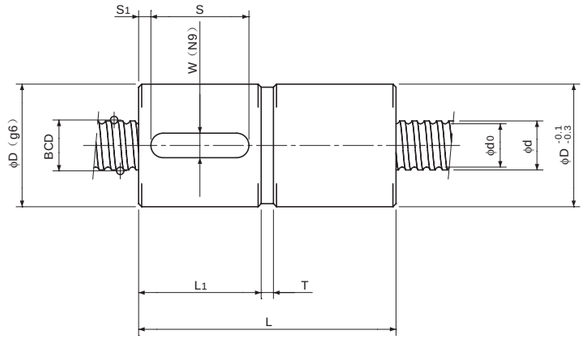
Sleeve type Double Nut
套筒型双螺母





Unit（单位）：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸								Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	L_1	T	W	H	S	S_1	
SWBS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750	1200	114		15	33	15.5	2	3	1.8	10	2.5	SWBS 0602 A
SWBS 0602 B	6	2	1.0	6.20	5°52′	5.1	3.7×1	980	1600	155		15	38	18	2	3	1.8	12	3	SWBS 0602 B
SWBS 0602.5 A	6	2.5	1.0	6.20	7°19′	5.1	2.7×1	750	1200	115		15	33.5	15.5	2.5	3	1.8	10	3	SWBS 0602.5 A
SWBS 0802 A(1)	8	2	1.0	8.20	4°26′	7.1	2.7×1	850	1600	144		16	31	14.5	2	3	1.8	10	2.5	SWBS 0802 A(1)
SWBS 0802 B(1)	8	2	1.0	8.20	4°26′	7.1	3.7×1	1100	2200	195		16	38	18	2	3	1.8	12	3	SWBS 0802 B(1)
SWBS 0802 A(2)	8	2	1.5875	8.30	4°23′	6.6	2.7×1	1850	3000	162		20	37	17.5	2	4	2.5	12	2.5	SWBS 0802 A(2)
SWBS 0802 B(2)	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400	4100	217		20	42	20	2	4	2.5	16	2	SWBS 0802 B(2)
SWBS 0802.5 A	8	2.5	1.5875	8.30	5°29′	6.6	2.7×1	1850	3000	161		20	41.5	19.5	2.5	4	2.5	12	3.5	SWBS 0802.5 A
SWBS 0802.5 B	8	2.5	1.5875	8.30	5°29′	6.6	3.7×1	2400	4100	219		20	47	22.5	2	4	2.5	16	3	SWBS 0802.5 B
SWBS 0803 A	8	3	2.0	8.30	6°34′	6.2	2.7×1	2600	4200	167		20	46	22	2	4	2.5	16	3	SWBS 0803 A
SWBS 0803 B	8	3	2.0	8.30	6°34′	6.2	3.7×1	3500	5700	227		20	53	25.5	2	4	2.5	20	3	SWBS 0803 B

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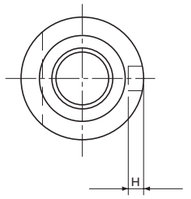
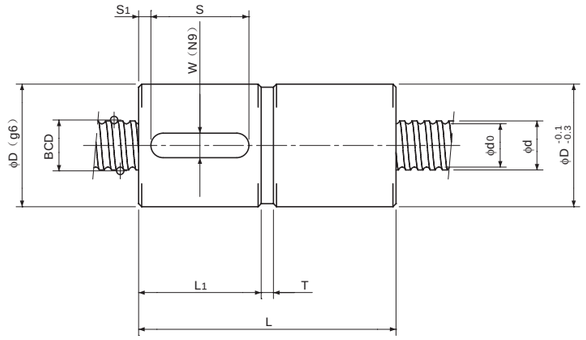
Sleeve type Double Nut
套筒型双螺母





Unit（单位）：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸								Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	L_1	T	W	H	S	S_1	
SWBS 1002 A	10	2	1.5875	10.30	3°32′	8.6	2.7×1	2100	3800	196		23	37	17.5	2	5	3	12	2.5	SWBS 1002 A
SWBS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700	5300	262		23	42	20	2	5	3	16	2	SWBS 1002 B
SWBS 1002.5 A	10	2.5	1.5875	10.30	4°25′	8.6	2.7×1	2100	3800	196		24	41.5	19.5	2.5	5	3	12	3.5	SWBS 1002.5 A
SWBS 1002.5 B	10	2.5	1.5875	10.30	4°25′	8.6	3.7×1	2700	5300	262		24	47	22.5	2	5	3	16	3	SWBS 1002.5 B
SWBS 1003 A	10	3	2.0	10.30	5°18′	8.2	2.7×1	3000	5200	202		24	46	22	2	5	3	16	3	SWBS 1003 A
SWBS 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900	7200	275		24	53	25.5	2	5	3	20	3	SWBS 1003 B
SWBS 1004 A	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000	5200	203		24	54	26	2	5	3	20	3	SWBS 1004 A
SWBS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000	6400	307		25	44	20.5	3	5	3	16	2	SWBS 1202 B
SWBS 1202.5 B	12	2.5	1.5875	12.30	3°42′	10.6	3.7×1	3000	6400	306		26	47	22	3	5	3	16	3	SWBS 1202.5 B
SWBS 1203 B	12	3	2.0	12.30	4°26′	10.2	3.7×1	4300	8700	318		28	56	26.5	3	5	3	20	3	SWBS 1203 B
SWBS 1204 B	12	4	2.381	12.30	5°55′	9.8	3.7×1	5400	10200	324		28	67	32	3	5	3	25	3	SWBS 1204 B

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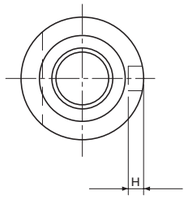
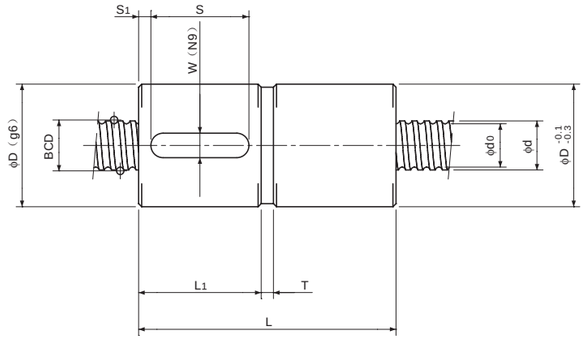
Sleeve type Double Nut
套筒型双螺母





Unit（单位）：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸								Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	L_1	T	W	H	S	S_1	
SWBS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200	7500	345		26	44	20.5	3	5	3	16	2	SWBS 1402 B
SWBS 1402.5 B	14	2.5	1.5875	14.30	3°11′	12.6	3.7×1	3200	7500	345		28	47	22	3	5	3	16	3	SWBS 1402.5 B
SWBS 1403 B	14	3	2.0	14.30	3°49′	12.2	3.7×1	4600	10100	361		30	56	26.5	3	5	3	20	3	SWBS 1403 B
SWBS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700	11600	366		30	67	32	3	5	3	25	3	SWBS 1404 B
SWBS 1405 B	14	5	2.381	14.30	6°21′	11.8	3.7×1	5700	11600	365		30	78	37.5	3	5	3	28	5	SWBS 1405 B
SWBS 1602 B	16	2	1.5875	16.30	2°14′	14.6	3.7×1	3400	8600	386		28	44	20.5	3	5	3	16	2	SWBS 1602 B
SWBS 1602.5 B	16	2.5	1.5875	16.30	2°48′	14.6	3.7×1	3400	8600	385		28	47	22	3	5	3	16	3	SWBS 1602.5 B
SWBS 1603 B	16	3	2.0	16.30	3°21′	14.2	3.7×1	4900	11600	401		32	56	26.5	3	5	3	20	3	SWBS 1603 B
SWBS 1604 B	16	4	2.381	16.30	4°28′	13.8	3.7×1	6200	13600	409		34	68	32	4	5	3	25	3.5	SWBS 1604 B
SWBS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100	18200	425		38	83	39.5	4	5	3	28	5	SWBS 1605 B

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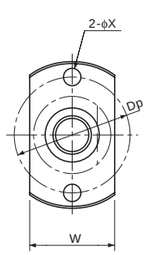
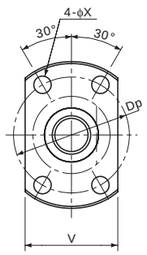
Bi-directional Nut with Flange
双向法兰螺母

Backlash type/Preload type
齿侧间隙型/预压型



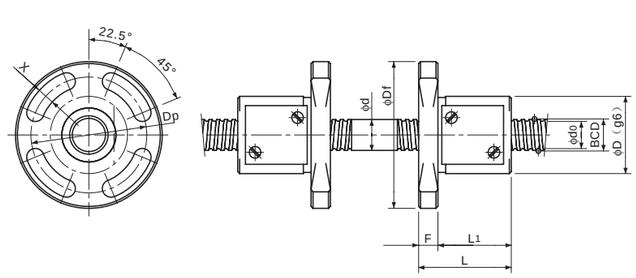
2－holes / 2孔

Flange type P
法兰型 P



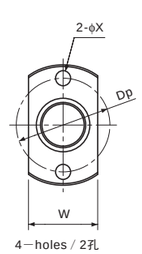
4－holes / 4孔

Flange type Q
法兰型 Q



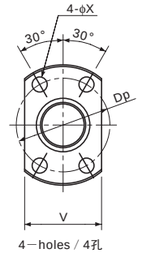
Flange type R
法兰型 R

Type-1:Return-plate type
复式回路板循环方式



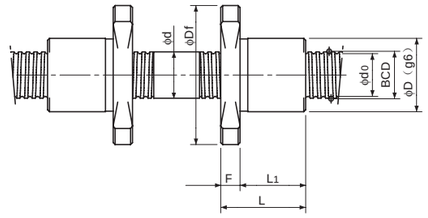
4－holes / 2孔

Flange type P
法兰型 P



4－holes / 4孔

Flange type Q
法兰型 Q



Type-2:Internal-deflector type
陀螺式循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	Flange Type 法兰类型	
FKB 0401 A	4	1	0.6	4.15	4°23′	3.4	1×3	300 / 300	430 / 430	38 / 59		2	9	19	13	10	3	11	13	14	2.9	P,Q	FKB 0401 A
FBS 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7×1	560 / 350	790 / 400	54 / 45		1	11	23	17	13	4	13	15	17	3.4	P,Q	FBS 0401 B
FKB 0501 A	5	1	0.6	5.15	3°32′	4.4	1×3	330 / 330	560 / 560	45 / 70		2	10	20	13	10	3	12	14	15	2.9	P,Q	FKB 0501 A
FBS 0501 B	5	1	0.8	5.15	3°32′	4.3	3.7×1	630 / 400	1000 / 500	65 / 55		1	12	24	17	13	4	14	15	18	3.4	P,Q	FBS 0501 B
FKB 0601 A	6	1	0.8	6.20	2°56′	5.3	1×3	560 / 560	950 / 950	55 / 86		2	11	23	14.5	11	3.5	13	15	17	3.4	P,Q	FKB 0601 A
FBS 0601 B	6	1	0.8	6.15	2°58′	5.3	3.7×1	680 / 430	1200 / 610	75 / 63		1	13	28	17	13	4	15	17	21.5	3.4	P,Q	FBS 0601 B
FKB 0801 A	8	1	0.8	8.20	2°13′	7.3	1×3	650 / 650	1300 / 1300	70 / 109		2	13	26	15	11	4	15	17	20	3.4	P,Q	FKB 0801 A
FBS 0801 B	8	1	0.8	8.15	2°15′	7.3	3.7×1	780 / 490	1650 / 820	95 / 80		1	16	30	17	13	4	18	18	24	3.4	P,Q	FBS 0801 B
FKB 0801.5 A	8	1.5	1.0	8.30	3°18′	7.2	1×3	890 / 890	1650 / 1650	73 / 113		2	15	28	20	16	4	17	19	22	3.4	P,Q	FKB 0801.5 A
FBS 0801.5 B	8	1.5	1.0	8.20	3°20′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		1	16	30	19	15	4	18	18	24	3.4	P,Q	FBS 0801.5 B
FKB 0802 A	8	2	1.2	8.30	4°23′	7.0	1×3	1300 / 1300	2300 / 2300	77 / 121		2	15	28	18	14	4	17	19	22	3.4	P,Q	FKB 0802 A
FBS 0802 B	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 94		1	20	38	24	19	5	22	23	30	4.5	P,Q,R	FBS 0802 B

注1)设计时,请注意使两个轴端不超过丝杠轴底径。
如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。
需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

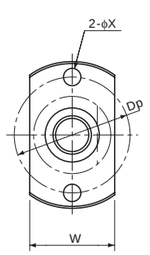
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

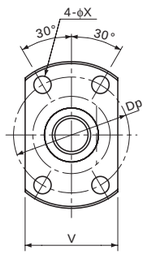
Bi-directional Nut with Flange
双向法兰螺母

Backlash type/Preload type
齿侧间隙型/预压型



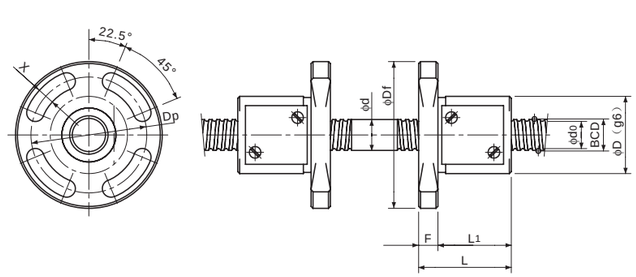
2－holes / 2孔

Flange type P
法兰型 P



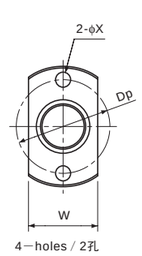
4－holes / 4孔

Flange type Q
法兰型 Q



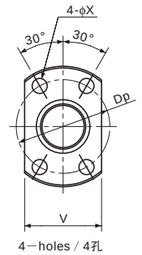
Flange type R
法兰型 R

Type-1:Return-plate type
复式回路板循环方式



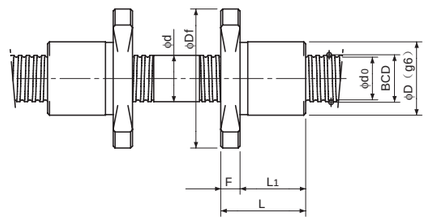
4－holes / 2孔

Flange type P
法兰型 P



4－holes / 4孔

Flange type Q
法兰型 Q



Type-2:Internal-deflector type
陀螺式循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	Flange Type 法兰类型	
FKB 1001 A	10	1	0.8	10.20	1°47′	9.3	1×3	720 / 720	1650 / 1650	84 / 131		2	15	28	15	11	4	17	19	22	3.4	P,Q	FKB 1001 A
FBS 1001 B	10	1	0.8	10.15	1°48′	9.3	3.7×1	840 / 530	2000 / 1000	113 / 95		1	19	37	18	13	5	21	22	29	4.5	P,Q	FBS 1001 B
FKB 1001.5 A	10	1.5	1.0	10.30	2°39′	9.2	1×3	990 / 990	2100 / 2100	87 / 136		2	17	34	21	16	5	19	21	26	4.5	P,Q	FKB 1001.5 A
FBS 1001.5 B	10	1.5	1.0	10.20	2°41′	9.1	3.7×1	1250 / 790	2800 / 1400	120 / 101		1	19	37	20	15	5	21	22	29	4.5	P,Q	FBS 1001.5 B
FKB 1002 A	10	2	1.2	10.30	3°32′	9.0	1×3	1450 / 1450	3000 / 3000	93 / 144		2	17	34	19	14	5	19	21	26	4.5	P,Q	FKB 1002 A
FBS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700 / 1750	5300 / 2700	134 / 112		1	23	41	24	19	5	25	25	33	4.5	P,Q,R	FBS 1002 B
FKB 1002.5 A	10	2.5	1.5875	10.40	4°23′	8.7	1×3	2100 / 2100	3800 / 3800	96 / 150		2	18	35	21	16	5	20	22	27	4.5	P,Q	FKB 1002.5 A
FBS 1002.5 B	10	2.5	1.5875	10.30	4°25′	8.6	3.7×1	2700 / 1750	5300 / 2700	133 / 112		1	24	44	27	21	6	26	27	35	5.5	P,Q,R	FBS 1002.5 B
FBS 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900 / 2500	7200 / 3600	140 / 118		1	24	44	30	24	6	26	27	35	5.5	P,Q,R	FBS 1003 B
FBS 1004 A	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000 / 1800	5200 / 2600	104 / 86		1	24	44	29	23	6	26	27	35	5.5	P,Q,R	FBS 1004 A
FBS 1005 A	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / 1800	5200 / 2600	103 / 85		1	24	44	34	28	6	26	27	35	5.5	P,Q,R	FBS 1005 A

注1)设计时,请注意使两个轴端不超过丝杠轴底径。
如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。
需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

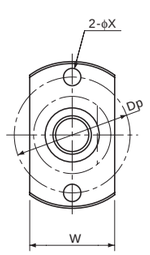
Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Precision Ball Screws 精密滚珠丝杠

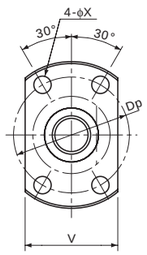
Bi-directional Nut with Flange
双向法兰螺母

Backlash type/Preload type
齿侧间隙型/预压型



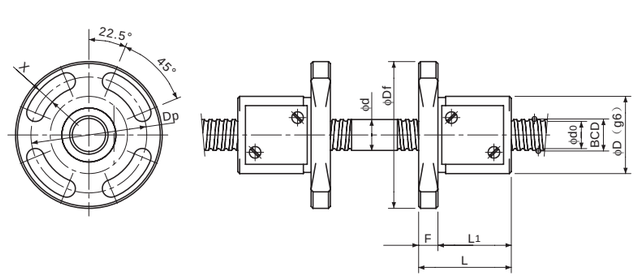
2－holes / 2孔

Flange type P
法兰型 P



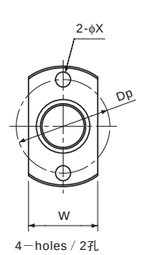
4－holes / 4孔

Flange type Q
法兰型 Q



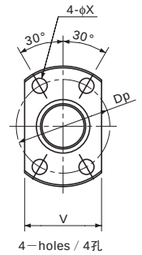
Flange type R
法兰型 R

Type-1:Return-plate type
复式回路板循环方式



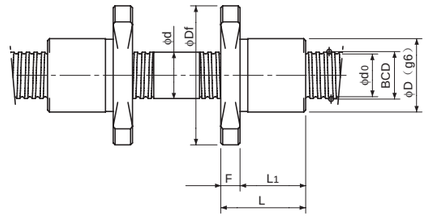
4－holes / 2孔

Flange type P
法兰型 P



4－holes / 4孔

Flange type Q
法兰型 Q



Type-2:Internal-deflector type
陀螺式循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	Flange Type 法兰类型	
FKB 1201 A	12	1	0.8	12.20	1°30′	11.3	1×3	780 / 780	2000 / 2000	97 / 152		2	17	34	16	11	5	19	21	26	4.5	P,Q	FKB 1201 A
FBS 1201 B	12	1	0.8	12.15	1°30′	11.3	3.7×1	910 / 570	2400 / 1200	131 / 110		1	22	40	18	13	5	24	24	32	4.5	P,Q	FBS 1201 B
FKB 1202 A	12	2	1.2	12.30	2°58′	11.0	1×3	1600 / 1600	3700 / 3700	109 / 169		2	19	36	19	14	5	21	23	28	4.5	P,Q	FKB 1202 A
FBS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000 / 1900	6400 / 3200	156 / 132		1	25	45	25	19	6	27	27	36	5.5	P,Q,R	FBS 1202 B
FKB 1202.5 A	12	2.5	1.5875	12.40	3°41′	10.7	1×3	2300 / 2300	4700 / 4700	112 / 174		2	20	37	21	16	5	22	24	29	4.5	P,Q	FKB 1202.5 A
FBS 1202.5 B	12	2.5	1.5875	12.30	3°42′	10.6	3.7×1	3000 / 1850	6400 / 3200	156 / 130		1	26	46	27	21	6	28	28	37	5.5	P,Q,R	FBS 1202.5 B
FKB 1203 A	12	3	2.0	12.50	4°22′	10.4	1×3	3100 / 3100	5700 / 5700	115 / 179		2	22	41	32	26	6	24	26	32	5.5	P,Q	FKB 1203 A
FBS 1203 B	12	3	2.0	12.30	4°26′	10.2	3.7×1	4300 / 2800	8700 / 4300	162 / 137		1	28	48	30	24	6	30	30	39	5.5	P,Q,R	FBS 1203 B
FBS 1204 B	12	4	2.381	12.30	5°55′	9.8	3.7×1	5400 / 3400	10200 / 5100	165 / 139		1	28	48	33	27	6	30	30	39	5.5	P,Q,R	FBS 1204 B

注1)设计时,请注意使两个轴端不超过丝杠轴底径。
如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。
需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

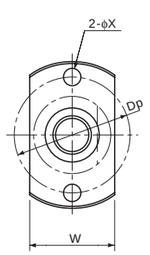
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

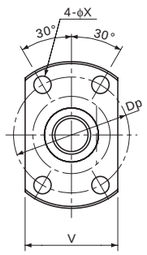
Bi-directional Nut with Flange
双向法兰螺母

Backlash type/Preload type
齿侧间隙型/预压型



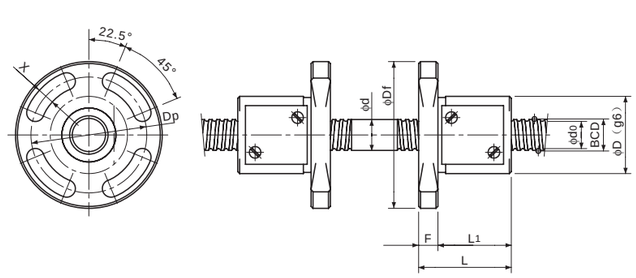
2－holes / 2孔

Flange type P
法兰型 P



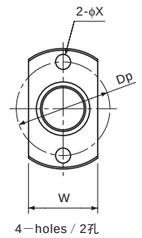
4－holes / 4孔

Flange type Q
法兰型 Q



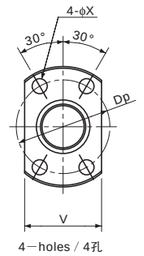
Flange type R
法兰型 R

Type-1:Return-plate type
复式回路板循环方式



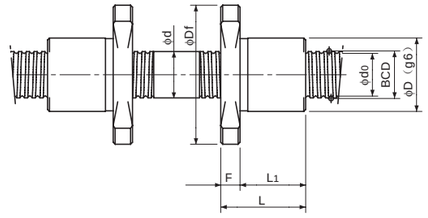
4－holes / 2孔

Flange type P
法兰型 P



4－holes / 4孔

Flange type Q
法兰型 Q



Type-2:Internal-deflector type
陀螺式循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	Flange Type 法兰类型	
FBS 1401 B	14	1	0.8	14.15	1°17′	13.3	3.7×1	960 / 610	2900 / 1450	148 / 124		1	26	46	21	15	6	28	28	37	5.5	P,Q	FBS 1401 B
FKB 1402 A	14	2	1.2	14.30	2°33′	13.0	1×3	1700 / 1700	4300 / 4300	122 / 190		2	21	40	20	14	6	23	26	31	5.5	P,Q	FKB 1402 A
FBS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200 / 2000	7500 / 3800	176 / 148		1	26	46	25	19	6	28	28	37	5.5	P,Q,R	FBS 1402 B
FKB 1402.5 A	14	2.5	1.5875	14.40	3°10′	12.7	1×3	2500 / 2500	5600 / 5600	127 / 197		2	22	41	22	16	6	24	26	32	5.5	P,Q	FKB 1402.5 A
FBS 1402.5 B	14	2.5	1.5875	14.30	3°11′	12.6	3.7×1	3200 / 2000	7500 / 3700	176 / 148		1	28	48	27	21	6	30	30	39	5.5	P,Q,R	FBS 1402.5 B
FKB 1403 A	14	3	2.0	14.50	3°46′	12.4	1×3	3400 / 3400	6800 / 6800	131 / 204		2	24	43	32	26	6	26	27	34	5.5	P,Q	FKB 1403 A
FBS 1403 B	14	3	2.0	14.30	3°49′	12.2	3.7×1	4600 / 2900	10100 / 5000	184 / 154		1	30	51	30	24	6	32	32	42	5.5	P,Q,R	FBS 1403 B
FKB 1404 A	14	4	2.381	14.65	4°58′	11.9	1×3	4500 / 4500	8600 / 8600	136 / 212		2	26	45	29	23	6	28	28	36	5.5	P,Q	FKB 1404 A
FBS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700 / 3600	11600 / 5800	187 / 157		1	30	51	33	27	6	32	32	42	5.5	P,Q,R	FBS 1404 B
FBS 1405 B	14	5	2.381	14.30	6°21′	11.8	3.7×1	5700 / 3600	11600 / 5800	186 / 157		1	30	51	39	33	6	32	32	42	5.5	P,Q,R	FBS 1405 B

注1)设计时,请注意使两个轴端不超过丝杠轴底径。
如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。
需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
预压型:施加了相当于基本额定动负载Ca的5%的预压时
轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

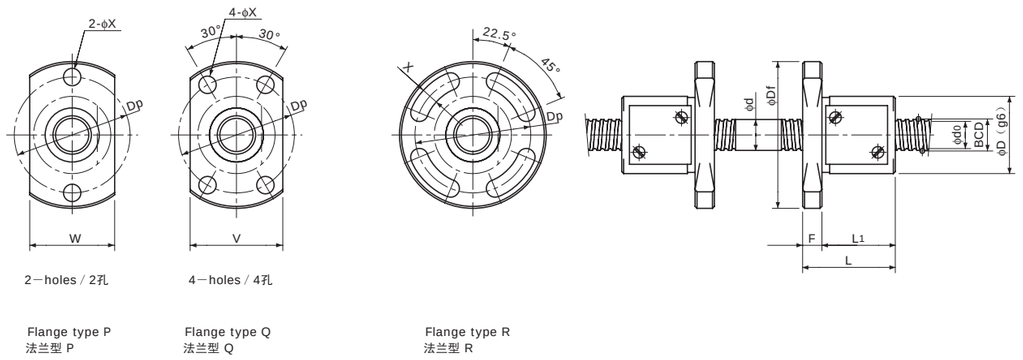
Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Bi-directional Nut with Flange
双向法兰螺母

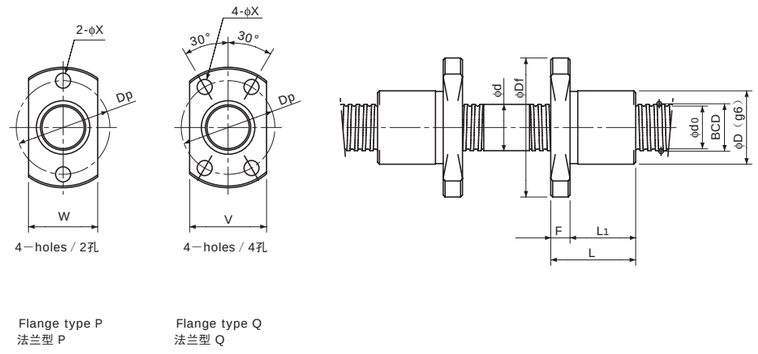
Backlash type/Preload type
齿侧间隙型/预压型



2－holes / 2孔　4－holes / 4孔

Flange type P 法兰型 P　Flange type Q 法兰型 Q　Flange type R 法兰型 R

Type-1:Return-plate type
复式回路板循环方式



4－holes / 2孔　4－holes / 4孔

Flange type P 法兰型 P　Flange type Q 法兰型 Q

Type-2:Internal-deflector type
陀螺式循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸											Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	Flange Type 法兰类型	
FBS 1601 B	16	1	0.8	16.15	1°08′	15.3	3.7×1	1000 / 640	3300 / 1650	164 / 138		1	28	48	21	15	6	30	30	39	5.5	P,Q	FBS 1601 B
FKB 1602 A	16	2	1.2	16.30	2°15′	15.0	1×3	1850 / 1850	5000 / 5000	137 / 213		2	24	43	20	14	6	26	27	34	5.5	P,Q	FKB 1602 A
FBS 1602 B	16	2	1.5875	16.30	2°14′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		1	28	48	25	19	6	30	30	39	5.5	P,Q,R	FBS 1602 B
FKB 1602.5 A	16	2.5	1.5875	16.40	2°47′	14.7	1×3	2700 / 2700	6500 / 6500	142 / 221		2	24	43	22	16	6	26	27	34	5.5	P,Q	FKB 1602.5 A
FBS 1602.5 B	16	2.5	1.5875	16.30	2°48′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		1	28	48	27	21	6	30	30	39	5.5	P,Q,R	FBS 1602.5 B
FKB 1603 A	16	3	2.0	16.50	3°19′	14.4	1×3	3600 / 3600	8000 / 8000	146 / 227		2	26	45	32	26	6	28	28	36	5.5	P,Q	FKB 1603 A
FBS 1603 B	16	3	2.0	16.30	3°21′	14.2	3.7×1	4900 / 3100	11600 / 5800	205 / 172		1	32	53	30	24	6	34	34	44	5.5	P,Q,R	FBS 1603 B
FKB 1604 A	16	4	2.381	16.65	4°22′	13.9	1×3	4800 / 4800	10000 / 10000	152 / 237		2	28	47	29	23	6	30	30	38	5.5	P,Q	FKB 1604 A
FBS 1604 B	16	4	2.381	16.30	4°28′	13.8	3.7×1	6200 / 3900	13600 / 6800	209 / 174		1	34	54	34	28	6	36	36	45	5.5	P,Q,R	FBS 1604 B
FBS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100 / 5700	18200 / 9100	217 / 182		1	38	57	42	36	6	40	40	48	5.5	P,Q,R	FBS 1605 B

注1)设计时,请注意使两个轴端不超过丝杠轴底径。
　　如果两个轴端设计得大于底径,则将无法组装螺母。
注2)标准螺母不带密封。
　　需要密封时,螺母的尺寸将发生变化,详情请垂询本公司。
　　某些型号的螺母不能安装密封,敬请注意。
注3)表中的刚性值为螺母的刚性值,是在以下条件下,根据轴向弹性位移量计算得出的理论值。
　　齿侧间隙型:相当于基本额定动负载Ca的30%的轴向负载作用时
　　预压型:施加了相当于基本额定动负载Ca的5%的预压时
　　轴向负载及预压量与上述条件不同时,可通过p-A823的公式计算。
注4)基本额定负载和刚性值(齿侧间隙型和预压型的刚性值可能会有不同)一并标示在上表中。

Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm
Dynamic 额定动负载 Ca	Static 额定静负载 Coa	
1000 / 640	3300 / 1650	164 / 138

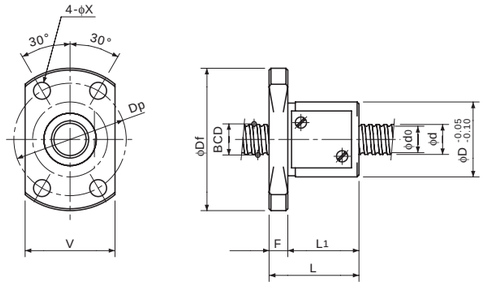
Preload type 预压型
Backlash type 齿侧间隙型

Note 1)The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2)Ball Nut dimension is without seal at the both ends.
　　If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
　　Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3)The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
　　Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
　　Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
　　For Axial load or Preload condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 4)Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

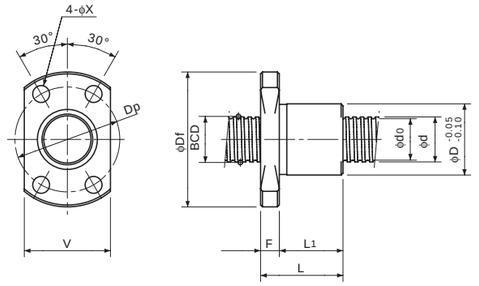
Rolled Ball Screws 冷轧滚珠丝杠

Single Nut with Flange
带法兰单螺母

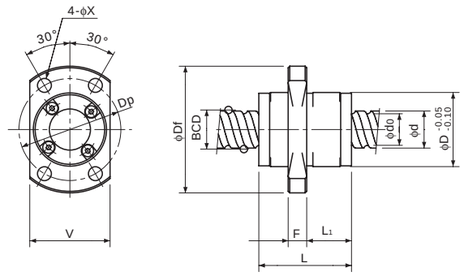
Backlash type
齿侧间隙型



Type-1:Return-plate type
复式回路板循环方式



Type-2:End-deflector type
偏转器式循环方式



Type-3:End-cap type or End-deflector type
端盖循环方式或偏转器式循环方式

Unit(单位)：mm

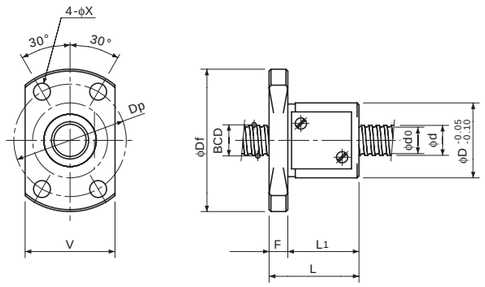
Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸										Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	
MRB 0401	4	1	0.8	4.15	4°23′	3.3	3.7×1	560	790	54		1	11	23	17	13	4	—	15	17	3.4	MRB 0401
MRB 0402	4	2	0.8	4.15	8°43′	3.3	2.7×1	420	570	39		1	11	23	19	15	4	—	15	17	3.4	MRB 0402
MRB 0504	5	4	0.8	5.15	13°53′	4.3	2.7×1	470	720	47		1	12	24	22	18	4	—	16	18	3.4	MRB 0504
MRB 0601 **	6	1	0.8	6.15	2°58′	5.3	3.7×1	680	1200	75		1	13	26	17	13	4	—	16	20	3.4	MRB 0601 **
MRB 0602	6	2	1.0	6.20	5°52′	5.1	2.7×1	750	1200	58		1	15	28	17	13	4	—	19	22	3.4	MRB 0602
MRB 0606	6	6	1.0	6.30	16°52′	5.2	1.6×2	870	1450	67		3	14	27	17	8	4	—	16	21	3.4	MRB 0606
MRB 0610	6	10	1.2	6.30	26°48′	5.0	1.2×2	950	1600	50		3	14	27	23	11.5	4	—	16	21	3.4	MRB 0610
MRB 0801 **	8	1	0.8	8.15	2°15′	7.3	3.7×1	780	1650	95		1	16	29	17	13	4	—	18	23	3.4	MRB 0801 **
MRB 0802 **	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400	4100	111		1	20	37	24	19	5	—	22	29	4.5	MRB 0802 **
MRB 0802.5	8	2.5	1.5875	8.00	5°41′	6.3	2.7×1	1850	3000	80		2	16	29	16	12	4	—	18	23	3.4	MRB 0802.5
MRB 0805	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850	3000	82		1	18	31	28	24	4	—	20	25	3.4	MRB 0805
MRB 0808	8	8	1.5875	8.40	16°52′	6.7	1.6×2	2200	3800	95		3	18	31	20	10	4	—	20	25	3.4	MRB 0808
MRB 0810	8	10	1.5875	8.40	20°45′	6.7	1.6×2	2200	3800	92		3	18	31	24	13	4	—	20	25	3.4	MRB 0810
MRB 0812	8	12	1.5875	8.40	24°27′	6.7	1.6×2	2200	4000	90		3	18	31	27	17	4	—	20	25	3.4	MRB 0812

注1)标准螺纹旋向为右旋。
注2)设计时，由于生产及组装螺母的关系，请使滚珠丝杠的两个轴端不超过丝杠轴底径。
需要单侧台阶型时，请垂询本公司。
注3)标准螺母不带密封。
不能安装密封，敬请注意。
注4)刚性
表中的刚性值，是在相当于基本额定动负载Ca的30%的轴向负载作用时，根据轴向弹性位移量计算的理论值。
轴向负载与上述条件不同时，可通过p-A823的公式计算。
注5)不锈钢冷轧滚珠丝杠
螺母型号后带**者可提供不锈钢冷轧滚珠丝杠。

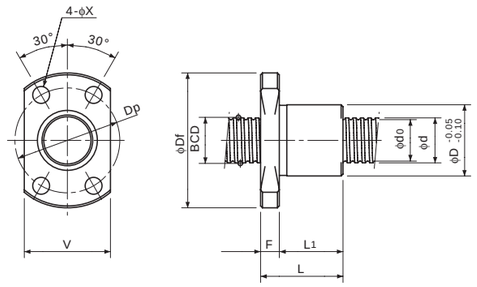
Note 1)All models are Right-hand screw.
Note 2)The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter,
because of productlon and Nut assembly reason. If bigger end-journal than Shaft diameter is required, please consult KSS.
Note 3)Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4)Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement
under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 5)Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

Single Nut with Flange
带法兰单螺母

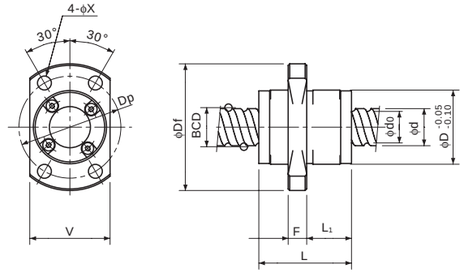
Backlash type
齿侧间隙型



Type-1:Return-plate type
复式回路板循环方式



Type-2:End-deflector type
偏转器式循环方式



Type-3:End-cap type or End-deflector type
端盖循环方式或偏转器式循环方式

Unit(单位)：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸										Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	
MRB 1002 **	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700	5300	134		1	23	40	24	19	5	—	25	32	4.5	MRB 1002 **
MRB 1004	10	4	2.0	10.30	7°03′	8.2	2.7 ×1	3000	5200	104		1	24	41	28	23	5	—	26	33	4.5	MRB 1004
MRB 1005	10	5	2.0	10.30	8°47′	8.2	2.7 ×1	3000	5200	103		2	23	40	26	21	5	—	25	32	4.5	MRB 1005
MRB 1006	10	6	2.0	10.30	10°30′	8.2	2.7 ×1	3000	5000	102		1	26	42	33	28	5	—	28	34	4.5	MRB 1006
MRB 1010	10	10	2.0	10.50	16°52′	8.4	1.6×2	3300	5900	117		3	23	40	24	13	5	—	25	32	4.5	MRB 1010
MRB 1012	10	12	2.0	10.50	19°59′	8.4	1.6×2	3300	6200	115		3	23	40	28	17	5	—	25	32	4.5	MRB 1012
MRB 1015	10	15	2.0	10.50	24°27′	8.4	1.6×2	3300	6400	110		3	23	40	33	22	5	—	25	32	4.5	MRB 1015
MRB 1020	10	20	1.5875	10.40	31°28′	8.7	0.7×4	2100	4000	88		3	20	37	23	13	5	—	22	29	4.5	MRB 1020

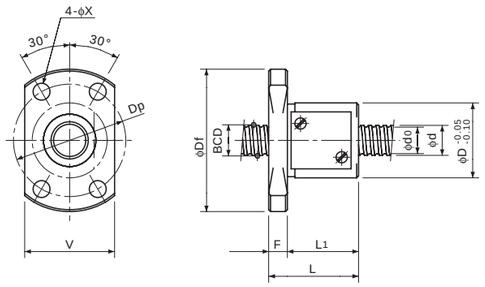
注1)标准螺纹旋向为右旋。
注2)设计时，由于生产及组装螺母的关系，请使滚珠丝杠的两个轴端不超过丝杠轴底径。
需要单侧台阶型时，请垂询本公司。
注3)标准螺母不带密封。
不能安装密封，敬请注意。
注4)刚性
表中的刚性值，是在相当于基本额定动负载Ca的30%的轴向负载作用时，根据轴向弹性位移量计算的理论值。
轴向负载与上述条件不同时，可通过p-A823的公式计算。
注5)不锈钢冷轧滚珠丝杠
螺母型号后带**者可提供不锈钢冷轧滚珠丝杠。

Note 1)All models are Right-hand screw.
Note 2)The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter,
because of productlon and Nut assembly reason. If bigger end-journal than Shaft diameter is required, please consult KSS.
Note 3)Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4)Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement
under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in p-A823, you can calculate Rigidity using this formula.
Note 5)Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

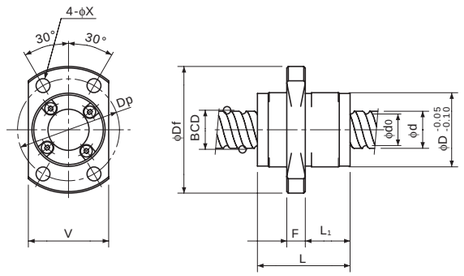
Rolled Ball Screws 冷轧滚珠丝杠

Single Nut with Flange
带法兰单螺母

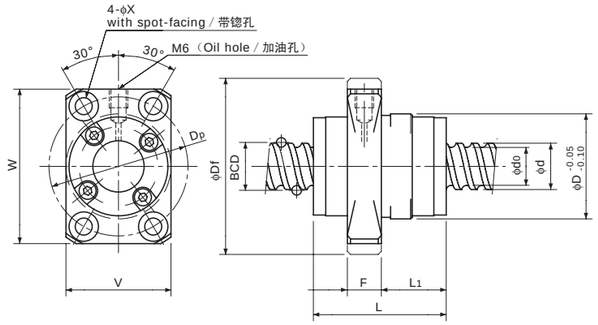
Backlash type
齿侧间隙型



Type-1:Return-plate type
复式回路板循环方式



Type-3:End-cap type or End-deflector type
端盖循环方式或偏转器式循环方式



Type-4:End-deflector type
偏转器式循环方式

Unit(单位)：mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸										Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	Df	L	L_1	F	W	V	Dp	Bolt Hole 安装孔 X	
MRB 1202	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000	6400	156		1	25	42	24	19	5	—	27	34	4.5	MRB 1202
MRB 1210	12	10	2.381	12.65	14°07′	10.2	1.7×2	5100	9800	152		3	24	41	30	14.5	6	—	26	33	4.5	MRB 1210
MRB 1312	13	12	2.381	13.50	15°48′	11.0	1.6×2	5000	9900	151		3	28	45	30	17	5	—	30	37	4.5	MRB 1312
MRB 1315	13	15	2.381	13.50	19°29′	11.0	1.6×2	5000	10300	147		3	28	45	35	22	5	—	30	37	4.5	MRB 1315
MRB 1320	13	20	2.381	13.50	25°15′	11.0	1.6×2	5000	10700	142		3	28	45	43	29	5	—	30	37	4.5	MRB 1320
MRB 1402	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200	7500	176		1	26	45	25	19	6	—	28	36	5.5	MRB 1402
MRB 1404	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700	11600	187		1	30	49	33	27	6	—	32	40	5.5	MRB 1404
MRB 1505(1)	15	5	3.175	15.50	5°41′	12.2	3.7×1	8900	17000	208		4	32	55	33	16	11	49	33	43	5.5	MRB 1505(1)
MRB 1505(2)	15	5	3.175	15.50	5°41′	12.2	3.7×1	8900	17000	208		4	34	57	33	16	11	50	34	45	5.5	MRB 1505(2)
MRB 1510(1)	15	10	3.175	15.50	11°36′	12.2	2.7×2	12000	25000	289		4	32	55	43	21	11	49	33	43	5.5	MRB 1510(1)
MRB 1510(2)	15	10	3.175	15.50	11°36′	12.2	2.7×2	12000	25000	289		4	34	57	43	21	11	50	34	45	5.5	MRB 1510(2)
MRB 1520(1)	15	20	3.175	15.75	22°01′	12.7	1.7×2	8000	16000	178		4	32	55	52	28.5	11	49	33	43	5.5	MRB 1520(1)
MRB 1520(2)	15	20	3.175	15.75	22°01′	12.7	1.7×2	8000	16000	178		4	34	57	52	28.5	11	50	34	45	5.5	MRB 1520(2)

注1)标准螺纹旋向为右旋。
注2)设计时，由于生产及组装螺母的关系，请使滚珠丝杠的两个轴端不超过丝杠轴底径。
需要单侧台阶型时，请垂询本公司。
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不能安装密封，敬请注意。
注4)刚性
表中的刚性值，是在相当于基本额定动负载Ca的30%的轴向负载作用时，根据轴向弹性位移量计算的理论值。
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Note 1)All models are Right-hand screw.
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because of productlon and Nut assembly reason. If bigger end-journal than Shaft diameter is required, please consult KSS.
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Note 4)Rigidity
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under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
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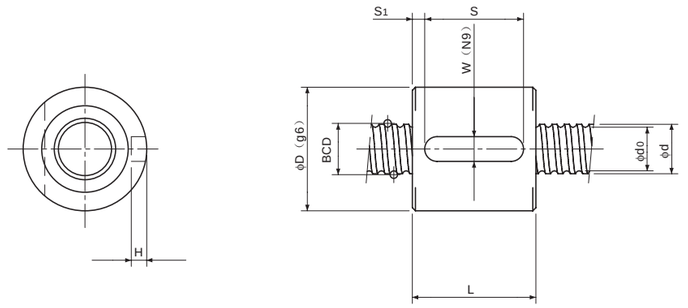
Note 5)Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

Sleeve type Single Nut
套筒型单螺母

Backlash type
齿侧间隙型



Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸						Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	W	H	S	S_1	
BSR 0401	4	1	0.8	4.15	4°23′	3.3	3.7×1	560	790	54		11	14	3	1.8	8	3	BSR 0401
BSR 0402	4	2	0.8	4.15	8°43′	3.3	2.7×1	420	570	39		11	16	3	1.8	8	4	BSR 0402
BSR 0504	5	4	0.8	5.15	13°53′	4.3	2.7×1	470	720	47		12	22	3	1.8	12	5	BSR 0504
BSR 0601 **	6	1	0.8	6.15	2°58′	5.3	3.7×1	680	1200	75		13	14	3	1.8	10	2	BSR 0601 **
BSR 0602	6	2	1.0	6.20	5°52′	5.1	2.7×1	750	1200	58		15	15	3	1.8	10	2.5	BSR 0602
BSR 0801 **	8	1	0.8	8.15	2°15′	7.3	3.7×1	780	1650	95		16	14	3	1.8	10	2	BSR 0801 **
BSR 0802 **	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400	4100	111		20	20	4	2.5	16	2	BSR 0802 **
BSR 0802.5	8	2.5	1.5875	8.00	5°41′	6.3	2.7×1	1850	3000	80		16	16	3	1.8	8	4	BSR 0802.5
BSR 0805	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850	3000	82		18	28	4	2.5	20	4	BSR 0805

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需要单侧台阶型时,请垂询本公司。
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不能安装密封,敬请注意。
注4)刚性
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轴向负载与上述条件不同时,可通过p-A823的公式计算。
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螺母型号后带**者可提供不锈钢冷轧滚珠丝杠。

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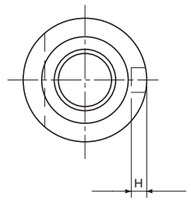
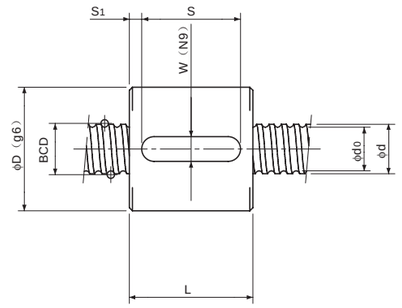
Note 5)Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

Sleeve type Single Nut
套筒型单螺母

Backlash type
齿侧间隙型





Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸						Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			D	L	W	H	S	S_1	
BSR 1002 **	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700	5300	134		23	20	5	3	16	2.5	BSR 1002 **
BSR 1004	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000	5200	104		24	26	5	3	20	3	BSR 1004
BSR 1005	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000	5200	103		23	26	5	3	16	5	BSR 1005
BSR 1006	10	6	2.0	10.30	10°30′	8.2	2.7×1	3000	5000	102		26	31	5	3	20	5.5	BSR 1006
BSR 1202	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000	6400	156		25	20	5	3	16	2	BSR 1202
BSR 1402	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200	7500	176		26	20	5	3	16	2	BSR 1402
BSR 1404	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700	11600	187		30	31	5	3	25	3	BSR 1404

注1)标准螺纹旋向为右旋。
注2)设计时,由于生产及组装螺母的关系,请使滚珠丝杠的两个轴端不超过丝杠轴底径。
需要单侧台阶型时,请垂询本公司。
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注4)刚性
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轴向负载与上述条件不同时,可通过p-A823的公式计算。
注5)不锈钢冷轧滚珠丝杠
螺母型号后带**者可提供不锈钢冷轧滚珠丝杠。

Note 1)All models are Right-hand screw.
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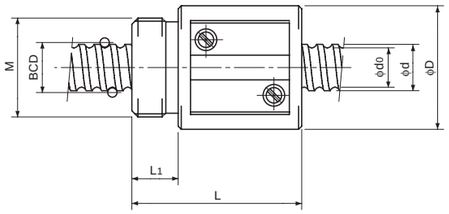
Note 5)Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

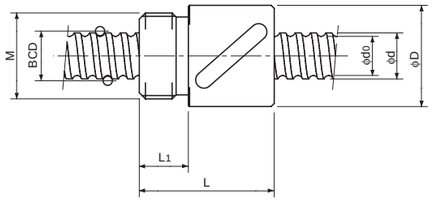
Rolled Ball Screws 冷轧滚珠丝杠

Single Nut with M-thread
带公制螺纹单螺母

Backlash type
齿侧间隙型



Type-1:Return-plate type
复式回路板循环方式



Type-2:Return-tube type
回路管循环方式

Unit(单位):mm

Ball Nut Model number 螺母型号	Shaft nominal dia. 丝杠轴公称外径 d	Lead 导程	Ball size 丝杠直径	BCD 钢珠中心直径	Lead angle 导程角	Root dia. 底径 d_0	Number of Circuit 循环数	Basic Load Rating 基本额定负载 N		Nut Rigidity 螺母刚性 N/μm		Nut dimension 螺母尺寸					Ball Nut Model number 螺母型号
								Dynamic 额定动负载 Ca	Static 额定静负载 Coa			Nut type 螺母类型	D	L	L_1	M	
MSR 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7×1	560	790	54		1	11	17	4	M9×0.75	MSR 0401 B
MSR 0802 B **	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400	4100	111		1	20	27.5	7.5	M16×1.0	MSR 0802 B **
MSR 0802.5 T(1)	8	2.5	1.5875	8.00	5°41′	6.3	3.5×1	2300	3900	102		2	16.5	22	8	M14×1.0	MSR 0802.5 T(1)
MSR 0802.5 T(2)	8	2.5	1.5875	8.00	5°41′	6.3	3.5×1	2300	3900	102		2	17.5	25.5	7.5	M15×1.0	MSR 0802.5 T(2)
MSR 0805 A	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850	3000	82		1	18	32.5	7.5	M15×1.0	MSR 0805 A
MSR 1002 B **	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700	5300	134		1	23	27.5	7.5	M17×1.0	MSR 1002 B **
MSR 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000	6400	156		1	25	30	10	M20×1.0	MSR 1202 B
MSR 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200	7500	176		1	26	30	10	M22×1.5	MSR 1402 B
MSR 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700	11600	187		1	30	38	10	M25×1.0	MSR 1404 B

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Note 5)Stainless Rolled Ball Screw
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滚珠丝杠的技术解说　Ball Screw Technical Description

滚珠丝杠的特点
Feature of Ball Screws

●机械效率高

KSS滚珠丝杠在丝杠轴与螺母之间插入钢珠形成滚动接触，使机械效率高达90%以上，而所需扭矩则在传统进给丝杠的1/3以下。此外，还可轻松地将直线运动转换为回转运动（逆动作）（图A-81）。

●轴向间隙

对于传统的三角丝杠及梯形丝杠等，如果缩小其轴向间隙，则会因滑动摩擦而使旋转扭矩增大。KSS滚珠丝杠即使在消除轴向间隙的状态下也能非常轻快地转动。另外，通过采用双螺母，还可进一步提高刚性。

●精度高

KSS滚珠丝杠是在恒温控制下，采用超精密进给丝杠及螺纹量规加工技术加工、组装而成，并进行了严格的检查。其精度高，在准确定位方面具有高度可靠性。

●High mechanical efficiency

KSS Ball Screws are fitted with steel Balls, providing rolling contact between the Nut and Screw Shaft, allowing for mechanical efficiency of over 90% and reducing the required Torque to less than one-third that of conventional Lead Screws. The design of the KSS Ball Screws also allows linear motion to be converted into rotary motion easily (Fig. A-81).

●Axial play

With conventional Triangular and Trapezoidal Screw threads, reducing the Axial play increases the rotational Torque due to the sliding friction.
KSS Ball Screws, on the other hand, are very easily rotated, even with no Axial play. The use of Double Nuts also provides increased Rigidity.

●High precision

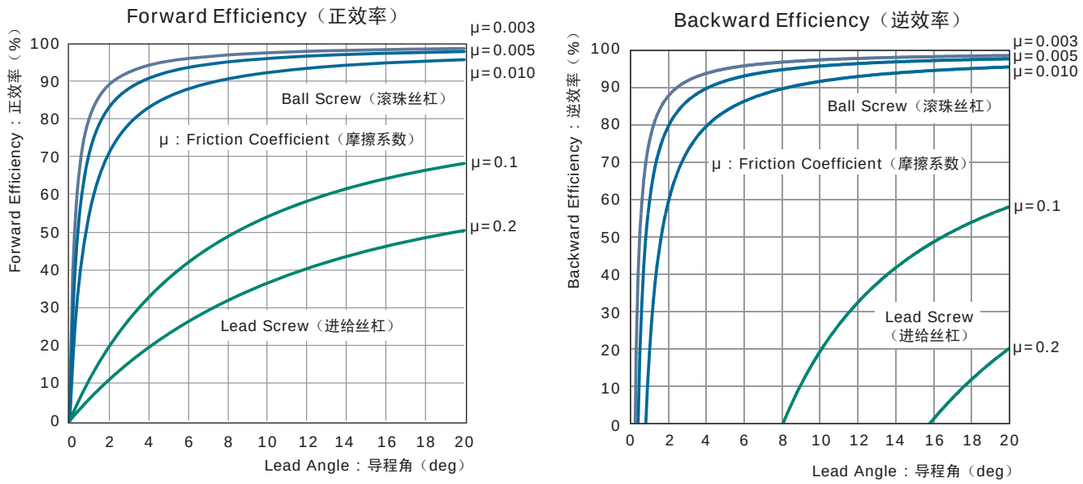
KSS Ball Screws are machined, assembled, and inspected using the technology of ultra-precision Lead Screw and Screw Gauge machining, under the temperature controlled room. High precision and accurate positioning ensure high reliability in use.

●寿命长

KSS滚珠丝杠采用经过热处理的适当材料加工而成，由于进行滚动接触运动，因此摩擦阻力极小，几乎不会发生磨损，可长期保持很高的精度。

●Long service life

The Ball Screw movement results in virtually no wear, as the rolling-contact design, combined with the use of carefully selected heat-treated materials, results in an extremely low friction. This is the reason that high precision can be kept over long period.



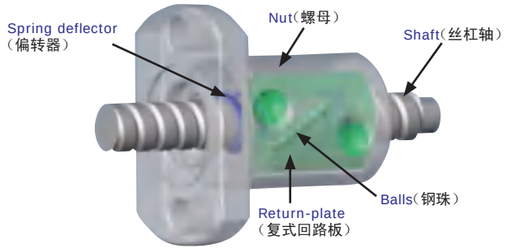
图A-81：机械效率
Fig. A-81：Mechanical Efficiency

滚珠丝杠的构造
Construction of Ball Screws

●复式回路板循环方式　Return-plate system

复式回路板循环方式，是通过安装在螺母内部的螺旋型偏转器将钢球抛出，使其沿着复式回路板的槽进行循环运动的方式。与回路管循环方式相比，具有可以缩小螺母外径的优点。在设备上安装时，如果将复式回路板部分安装在上方，则可使回转动作更加顺畅。

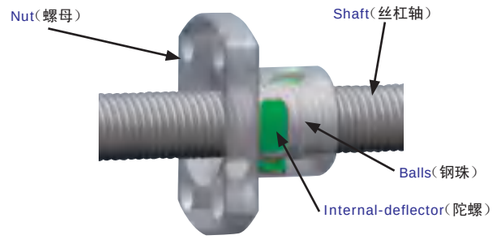
The Return-plate system uses coil-type deflectors incorporated inside the Nut to pick up the steel Balls and circulate them via the Return-plate channel. This system has the advantage of allowing the use of a Nut that is smaller in diameter than those employed in Return-tube systems. In addition, the upward-angle installation of the Return-plate ensures even smoother rotation.



●陀螺式循环方式　Internal-deflector system

陀螺式循环方式最大限度地缩小了螺母的外径及长度，使微型滚珠丝杠的结构更紧凑、更轻量。钢珠在承受轴向负载的同时，在丝杠轴及螺母的钢珠滚动槽中滚动时，沿着螺母内部的陀螺槽进入相邻的滚动槽，然后再次返回负载区，进行无限滚动循环。

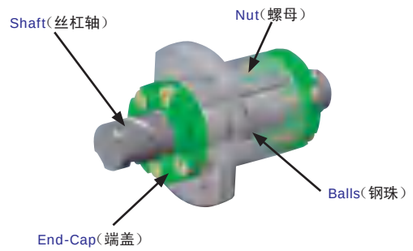
The Internal-deflector system employs a lightweight Miniature Ball Screw, which enables the Nut diameter and length to be reduced to the smallest possible size. The Balls bear the load while rolling along the screw groove between the Shaft and the Nut. The Balls are continuously circulated, transferred to the adjacent groove in the screw via the Internal-deflector channel and then back to the loaded groove area.



●端盖式循环方式　End-cap system

端盖式循环方式，是指钢珠沿着丝杠轴与螺母之间的槽滚动前行，从安装在螺母两端的循环部件（端盖）上的通路穿过螺母上的通孔，返回原位的循环方式。

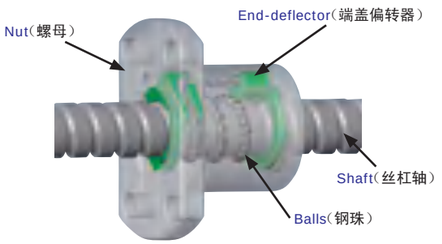
The End-cap system is a recirculating system in which the Balls advance by rolling through the screw groove between the Nut and the Screw Shaft. The Balls are then returned via the holes in the Nut and the channels in the recirculating sections of the End-caps on either end of the Nut.



●偏转器式循环方式　End-deflector system

偏转器式循环方式，是指钢珠从设置于螺母内部或外部的端盖偏转器，穿过螺母通孔，在原来的滚动槽内循环的方式。与复式回路板循环方式相比，可缩小螺母的外径，是一种最适用于中导程的循环方式。

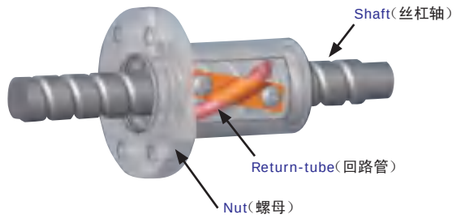
The Balls are circulated from End-deflector incorporated inside the Nut or outside the Nut through the hole in the Nut and the channels in the recirculating sections. Ball Nut diameter can be smaller than Return-plate system. This is suitable for the middle lead Ball Screws.



●回路管循环方式　Return-tube system

回路管循环方式，是指通过插入螺母中的回路管的前端，将正沿着丝杠轴与螺母之间的槽滚动的钢珠取出，使其穿过回路管后，再次返回螺纹槽的循环方式。

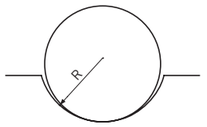
In the Return-tube system, Balls rolling between the Nut and the Shaft are picked up from the screw groove by the end of the Return-tube built into the Nut. Then, they flow back through the Return-tube to the screw groove.



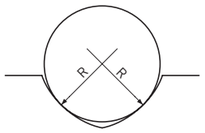
●螺纹槽形状

滚珠丝杠分为由1个弧形形成的圆弧和由2个弧形形成的拱弧两种类型。KSS滚珠丝杠采用拱弧型。

Ball screws may have either a circular arc profile, formed of a single arc, or a gothic arc profile, formed from two arcs.
KSS Ball Screws feature a gothic arc profile.



Circular arc groove
（圆弧）



Gothic arc groove
（拱弧）

滚珠丝杠的生产范围
The range of manufacturing for Ball Screws

按丝杠轴公称外径划分，KSS滚珠丝杠的生产范围为ϕ1.8～ϕ16mm。以下介绍了不同精度等级的丝杠轴的参考极限长度。具体长度会因轴端形状、材质及丝杠轴系列而异，详情请垂询本公司。

The range of manufacturing for KSS Ball Screws is from ϕ1.8 to ϕ16mm as Shaft nominal diameter. Maximum limit of overall lengths are shown below. Maximum limit of overall lengths will vary depending on the Shaft end configuration, materials and KSS series. Please inquire KSS for details.

●精密滚珠丝杠的生产极限长度（全长） Maximum limit of overall lengths for Precision Ball Screws

Unit(单位)：mm

Accuracy grade 精度等级 / Shaft nominal diameter 丝杠轴公称外径	C0	C1	C3	C5
4	90	120	160	170
6	140	180	240	250
8	200	250	330	350
10	260	320	420	450
12	320	390	510	550
14	380	460	600	660
16	450	540	700	770

注1)超出生产极限长度时，请垂询本公司。
Note 1)If required length exceeds the number in table above, please ask KSS representative.

●冷轧滚珠丝杠（Ct7&Ct10）的生产极限长度
Maximum limit of overall lengths for Rolled Ball Screws（Ct7 & Ct10）

Unit(单位)：mm

Shaft nominal diameter 丝杠轴公称外径	Maximum length 极限长度
4	240
5	300
6	350
8	450
10	650
12	700
13	700
14	700
15	1000

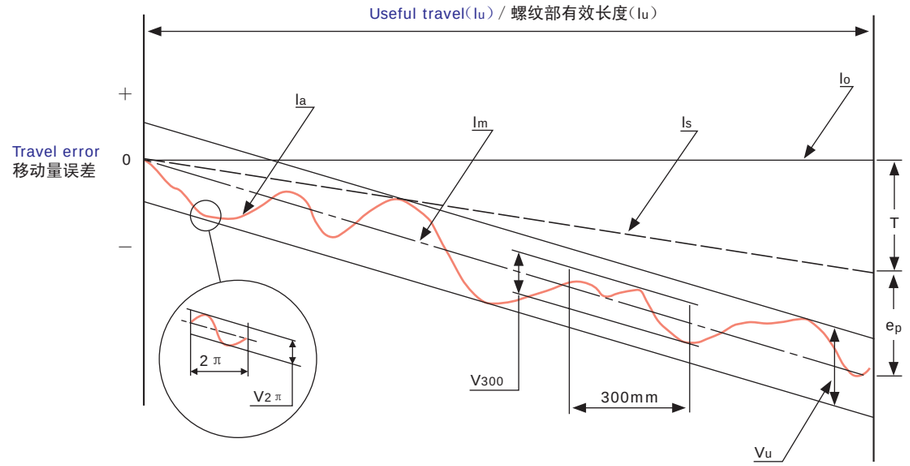
注1)超出生产极限长度时，请垂询本公司。
注2)冷轧滚珠丝杠的极限长度值中包括丝杠两端各25mm的不完全螺纹部分。
Note 1)If required length exceeds the number in table above, please ask KSS representative.
Note 2)Maximum limit of overall length for Rolled Ball Screws includes 25mm of incomplete thread area at both end.

滚珠丝杠的导程精度
Lead accuracy of Ball Screws

JIS B1192中规定，滚珠丝杠的导程精度是指，相对于螺母有效移动量或丝杠轴螺纹部有效长度的代表移动量误差及波动，以及相对于螺纹部有效长度中任意300mm及1圈（2π rad）的波动。
表A-83、84、85中列出了不同精度等级的各种特性的公差。

Ball Screw lead accuracy conforming to JIS B1192 is specified by the tolerance of actual mean travel error over the Nut effective travel amount, or Screw Shaft effective length, travel variation and travel variation within arbitrary 300mm, travel variation within arbitrary 1 revolution（2π rad）over the Screw Shaft effective length. Tolerance of each accuracy grades are shown in the Table A-83, 84, 85.

图A-82：移动量误差线图
Fig. A-82：Travel deviation diagram



公称移动量（l_0）　：按照公称导程旋转任意圈数时的轴向移动量。
标准导程（Phs）　：预测因温度上升及负载而引起的变形量，对公称导程进行了若干补偿的导程。
标准移动量的目标值（T）：预先将标准移动量设定为正或负时的目标值。
标准移动量（ls）　：按照标准导程旋转任意圈数时的移动量。
实际移动量（la）　：相对于任意丝杠轴旋转角的螺母实际轴向移动量。
代表移动量（lm）　：代表实际移动量倾向的直线。根据表示相对于滚珠丝杠有效移动量或螺纹部有效长度的实际移动量曲线，通过最小二乘法或类似的近似法求出。
代表移动量误差（e_p）：代表移动量减去标准移动量后的值。
波动（V_u）　：平行于代表移动量的两条线间的实际移动量最大幅度。
波动（V_{300}）　：相对于螺纹部有效长度中任意300mm的实际移动量最大幅度.
波动（$V_{2\pi}$）　：相对于螺纹部有效长度中任意1圈（2π rad）的实际移动量最大幅度。

Nominal travel（l_0）　：Amount of travel for a particular number of revolutions along nominal Lead.
Specified Lead（Phs）　：Lead diftering slighty from the nominal Lead, often selectd to compensate for an expected elongation caused by an increase in temperature or Load.
Target specified travel（T）　：Target value for cumulative specified Lead which has been increased or decreased in advance.
Specified travel（ls）　：Amount of travel for a particular number of revolutions along specified Lead.
Actual travel（la）　：Actual displacement of Ball Nut relative to the Ball Screw shaft, or vice versa, for a given number of revolutions.
Actual mean travel（lm）　：Straight line representing the trend of actual travel. To be found by method of the least-square or similar methods from the travel curve over the Ball Screw useful travel or the effective screw thread length
Actual mean travel deviation（e_p）　：Difference between the actual mean travel（lm） and the nominal travel（l_0） or the specified travel（ls）, 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_{300}）　：The widest range of the actual travel for any 300mm within the useful travel or the effective screw thread length.
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.

表 A-83 ： 精密滚珠丝杠（定位用：C系列）的代表移动量误差（±e_p）和波动（Vu）许用值
Table A-83 ： Tolerance on actual mean travel deviation（±e_p）and permissible variation of precision Ball Screws（for positioning ： C series）

Unit（单位）：μm

Accuracy Grade 精度等级			C0		C1		C3		C5	
Effective screw length（mm）螺纹部有效长度（mm）	Over 超过	Up to 以下	±e_p	Vu	±e_p	Vu	±e_p	Vu	±e_p	Vu
	—	100	3	3	3.5	5	8	8	18	18
	100	200	3.5	3	4.5	5	10	8	20	18
	200	315	4	3.5	6	5	12	8	23	18
	315	400	5	3.5	7	5	13	10	25	20
	400	500	6	4	8	5	15	10	27	20
	500	630	6	4	9	6	16	12	30	23
	630	800	7	5	10	7	18	13	35	25
	800	1000	8	6	11	8	21	15	40	27

表 A-84 ： 精密滚珠丝杠（定位用：C系列）每300mm及1圈的波动（V_{300}）、（$V_{2\pi}$）许用值
Table A-84 ： Permissible travel variation V_{300}, $V_{2\pi}$（for positioning ： C series）

Unit（单位）：μm

Accuracy grade 精度等级	C0		C1		C3		C5	
Item 项目	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$
Permissible value 许用值	3.5	3	5	4	8	6	18	8

表 A-85 ： 相对于300mm的Ct系列（7、10级）的波动（V_{300}）
Table A-85 ： Permissible travel variation V_{300} for Ct series（7,10 grade）

Unit（单位）：μm

Accuracy grade 精度等级	Ct7	Ct10
V_{300}	52	210

Ct系列（7级、10级）的代表移动量误差由下式求出。
Tolerance on actual mean travel deviation（e_p）is calculated as follows.

$$e_p = \frac{2 \times lu}{300} \times V_{300}$$

lu：螺纹部有效长度
Effective Screw thread length

为了与ISO保持一致，滚珠丝杠的日本工业标准（JIS B1191、1192）于1997年进行了修订。（统一为JIS B1192-1997）
修订后的标准制定了C系列（原JIS标准 C0、1、3、5）和Cp、Ct系列（与ISO统一的标准）的精度等级。本公司根据JIS B 1192-1997，对0、1、3、5级采用了C系列，对7、10级采用了Cp、Ct系列。

In the purpose of correspondence to ISO, Japan Industrial Standard（JIS B1191, 1192）of Ball Screw was revised in 1997.（JIS B1192-1997 unified）
Regarding accuracy grade, C series（current JIS C0, 1, 3, 5）and Cp, Ct series（standard corresponding to ISO）was established. KSS conforms to JIS B1192-1997 and adopts C series regarding 0,1,3,5 grade, Cp, Ct series regarding 7,10 grade.

滚珠丝杠的安装部精度
Ball Screw Run-out and location tolerances

为了与ISO保持一致，滚珠丝杠的日本工业标准（JIS B1191、1192）于1997年进行了修订（统一为JIS B1192-1997）。
修订后的标准制定了C系列（原JIS标准 C0、1、3、5）和Cp、Ct系列（与ISO统一的标准）的精度等级。C系列和Cp、Ct系列在安装部精度的标示方法和标准值上略有不同，本公司将其统一为下图（图A-86）中的标示方法和标准值（C系列），7级、10级参考了Cp、Ct系列的标准。

In the purpose of correspondence to ISO, Japan Industrial Standard（JIS B1191, 1192）of Ball Screw was revised in 1997（JIS B1192-1997 unified）.
Regarding accuracy grade, C series（current JIS C0, 1, 3, 5）and Cp, Ct series（standard corresponding to ISO）was established. There are some differences between C series and Cp, Ct series in notation and tolerances for accuracy of Ball Screw mounting section, but KSS uses notation of Fig. A-86 below and standard tolerance value, which conforms to C series standard, and regarding 7 grade, 10 grade, KSS refers to Cp, Ct series standard.

图A-86 ： 安装部精度的填写示例
Fig. A-86 ： Description of Run-out and location tolerances for Ball Screws

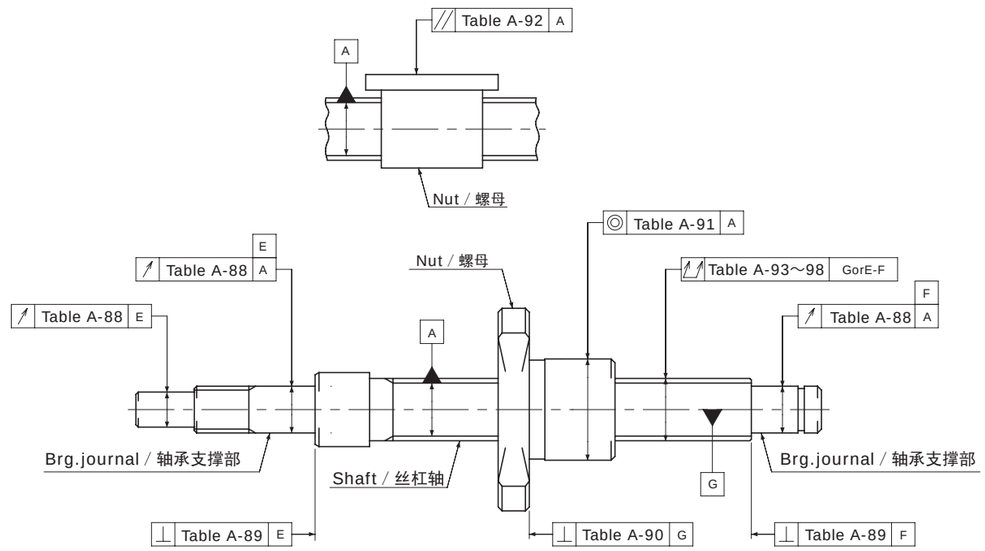


表 A-88 ：相对于丝杠轴螺纹槽面的支撑部外径的半径方向圆跳动
以及相对于丝杠轴支撑部轴线的零件安装部的半径方向圆跳动

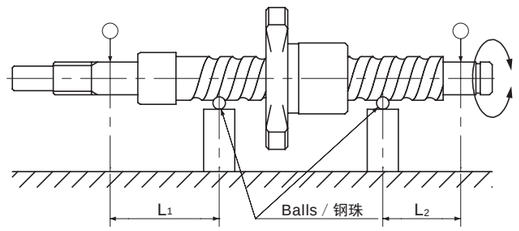
Table A-88 ：Radial Run-out of Bearing seat related to the centerline of screw groove and Radial Run-out of journal diameter related to the Bearing seat

Unit(单位):μm

Shaft nominal diameter（mm）丝杠轴公称外径（mm）		Permissible deviation of Radial Run-out 跳动公差（最大）					
Over 超过	Up to 以下	C0	C1	C3	C5	C7	C10
—	8	3	5	8	10	14	40
8	12	4	5	8	11	14	40
12	20	4	6	9	12	14	40

在测量该项目时，由于受丝杠轴轴线全跳动的影响，因此需要进行补偿。补偿方法为，根据丝杠轴总长与支点到测量点的距离(L_1,L_2)的比值（参照图A-87），利用第A809～A811页的表A-93～98的丝杠轴轴线的全跳动公差，求出补偿值（参照下式），然后加上表A-88中的公差。

This measurement item is affected by Total Run-out of the Screw Shaft, and so it must be corrected as follows. Find the corrected value from the Total Run-out tolerances given in Tables A-93～98 on page A809～A811 using the ratio of the total Shaft length to the distance between the supporting point and the measuring point(L_1,L_2)（see Fig. A-87), and add the values obtained to the tolerance given in Table A-88.



图A-87 ：圆跳动的补正
Fig. A-87 ：Compensation of Radial Run-out

$$\text{圆跳动的补正} = \frac{\text{全跳动公差（表 A-93～98）}}{\text{总长}} \times \text{测量间距}(L_1 \text{或} L_2)$$

$$\text{Compensation Value of Run-out} = \frac{\text{Tolerance of total Run-out（Table A-93～98）}}{\text{Total shaft length}} \times (L_1 \text{ or } L_2)$$

L_1 ,L_2 ：支点到测量点的距离（mm）
Distance btw supporting pt & measuring pt（mm）

表 A-89 ：相对于丝杠轴支撑部轴线的支撑部端面的垂直度

Table A-89 ：Axial Run-out（Perpendicularity）of Shaft(Bearing）face related to the centerline of the Bearing seat

Unit(单位):μm

Shaft nominal diameter（mm）丝杠轴公称外径（mm）		Permissible deviations of Axial Run-out（Perpendicularity）垂直度公差（最大）					
Over 超过	Up to 以下	C0	C1	C3	C5	C7	C10
—	8	2	3	4	5	7	10
8	12	2	3	4	5	7	10
12	20	2	3	4	5	7	10

表 A-90 ：相对于丝杠轴轴线的螺母基准端面或法兰安装面的垂直度

Table A-90 ：Axial Run-out（Perpendicularity）of Ball Nut location face related to the centerline of Screw Shaft

Unit(单位):μm

Nut outside diameter（mm）螺母外径		Permissible deviations of Axial Run-out（Perpendicularity）垂直度公差（最大）					
Over 超过	Up to 以下	C0	C1	C3	C5	C7	C10
—	20	5	6	8	10	14	20
20	32	5	6	8	10	14	20
32	50	6	7	8	11	18	30

表 A-91 ：相对于丝杠轴轴线的螺母外周面（圆柱形时）的半径方向圆跳动

Table A-91 ：Radial Run-out of Ball Nut location diameter related to the centerline of Screw Shaft

Unit(单位):μm

Nut outside diameter（mm）螺母外径		Permissible deviations of Radial Run-out 跳动公差（最大）					
Over 超过	Up to 以下	C0	C1	C3	C5	C7	C10
—	20	5	6	9	12	20	40
20	32	6	7	10	12	20	40
32	50	7	8	12	15	30	60

表 A-92 ：相对于丝杠轴轴线的螺母外周面（平面安装时）的平行度

Table A-92 ：Parallelism of rectangular Ball Nut related to the centerline of Screw Shaft

Unit(单位):μm

Mounting length（mm）标准安装长度（mm）		Permissible deviations of Parallelism 平行度公差（最大）					
Over 超过	Up to 以下	C0	C1	C3	C5	C7	C10
—	50	5	6	8	10	17	30
50	100	7	8	10	13	17	30

表 A-93 ： 丝杠轴轴线的半径方向全跳动（C0）

Table A-93 ： Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft（C0）

Unit（单位）: mm

Shaft total length 丝杠轴总长		Shaft nominal diameter 丝杠轴公称外径		
Over/超过		—	8	12
Up to/以下		8	12	20
Over 超过	Up to 以下	Permissible deviations of total Run-out in radial direction 跳动公差（最大）		
—	125	0.015	0.015	0.015
125	200	0.025	0.020	0.020
200	315	0.035	0.025	0.020
315	400	—	0.035	0.025
400	500	—	0.045	0.035
500	630	—	0.050	0.040
630	800	—	—	0.050
800	1000	—	—	0.065

表 A-94 ： 丝杠轴轴线的半径方向全跳动（C1）

Table A-94 ： Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft（C1）

Unit（单位）: mm

Shaft total length 丝杠轴总长		Shaft nominal diameter 丝杠轴公称外径		
Over/超过		—	8	12
Up to/以下		8	12	20
Over 超过	Up to 以下	Permissible deviations of total Run-out in radial direction 跳动公差（最大）		
—	125	0.020	0.020	0.015
125	200	0.030	0.025	0.020
200	315	0.040	0.030	0.025
315	400	0.045	0.040	0.030
400	500	—	0.050	0.040
500	630	—	0.060	0.045
630	800	—	—	0.060
800	1000	—	—	0.075

表 A-95 ： 丝杠轴轴线的半径方向全跳动（C3）

Table A-95 ： Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft（C3）

Unit（单位）: mm

Shaft total length 丝杠轴总长		Shaft nominal diameter 丝杠轴公称外径		
Over/超过		—	8	12
Up to/以下		8	12	20
Over 超过	Up to 以下	Permissible deviations of total Run-out in radial direction 跳动公差（最大）		
—	125	0.025	0.025	0.020
125	200	0.035	0.035	0.025
200	315	0.050	0.040	0.030
315	400	0.060	0.050	0.040
400	500	—	0.065	0.050
500	630	—	0.070	0.055
630	800	—	—	0.070
800	1000	—	—	0.095

表 A-96 ： 丝杠轴轴线的半径方向全跳动（C5）

Table A-96 ： Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft（C5）

Unit（单位）: mm

Shaft total length 丝杠轴总长		Shaft nominal diameter 丝杠轴公称外径		
Over/超过		—	8	12
Up to/以下		8	12	20
Over 超过	Up to 以下	Permissible deviations of total Run-out in radial direction 跳动公差（最大）		
—	125	0.035	0.035	0.035
125	200	0.050	0.040	0.040
200	315	0.065	0.055	0.045
315	400	0.075	0.065	0.055
400	500	—	0.080	0.060
500	630	—	0.090	0.075
630	800	—	—	0.090
800	1000	—	—	0.120

表 A-97 ： 丝杠轴轴线的半径方向全跳动（C7）
Table A-97 ： Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft（C7）
Unit（单位）: mm

Shaft total length 丝杠轴总长		Shaft nominal diameter 丝杠轴公称外径		
	Over/超过	—	8	12
	Up to/以下	8	12	20
Over 超过	Up to 以下	Permissible deviations of total Run-out in radial direction 跳动公差（最大）		
—	125	0.060	0.055	0.055
125	200	0.075	0.065	0.060
200	315	0.100	0.080	0.070
315	400	—	0.100	0.080
400	500	—	0.120	0.095
500	630	—	0.150	0.110
630	800	—	—	0.140
800	1000	—	—	0.170

表 A-98 ： 丝杠轴轴线的半径方向全跳动（C10）
Table A-98 ： Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft（C10）
Unit（单位）: mm

Shaft total length 丝杠轴总长		Shaft nominal diameter 丝杠轴公称外径		
	Over/超过	—	8	12
	Up to/以下	8	12	20
Over 超过	Up to 以下	Permissible deviations of total Run-out in radial direction 跳动公差（最大）		
—	125	0.100	0.095	0.090
125	200	0.140	0.120	0.110
200	315	0.210	0.160	0.130
315	400	—	0.210	0.160
400	500	—	0.270	0.200
500	630	—	0.350	0.250
630	800	—	0.460	0.320
800	1000	—	—	0.420

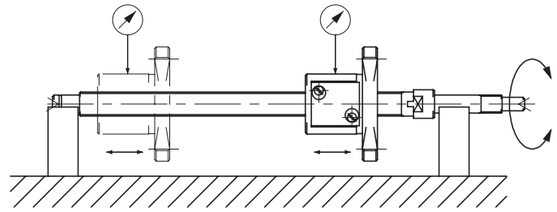
滚珠丝杠安装部精度的测量方法
Measuring method of Ball Screw Run-out and location tolerances

●相对于丝杠轴螺纹槽面的支撑部外径的半径方向圆跳动（表 A-88）

用V形块支撑丝杠轴两端，一边使丝杠轴旋转，一边读取测量头接触螺母外周面的千分表刻度。测量作业在支撑部附近的2处进行。

●Radial Run-out of Bearing seat related to the centerline of screw groove（Table A-88）

Place the Ball Screw in identical V-blocks at both Bearing seat. Place the dial gauge perpendicular to the Nut cylindrical surface. Rotate Screw Shaft slowly and record the dial gauge readings. Measurement should be done at near both ends of threaded part.

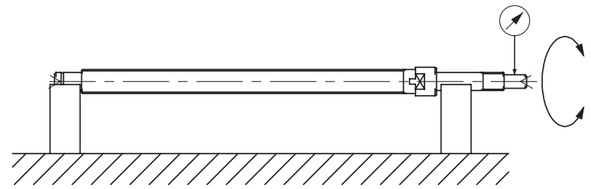


●相对于丝杠轴支撑部轴线的零件安装部的半径方向圆跳动（表A-88）

用V形块支撑丝杠轴两端，一边使丝杠轴旋转，一边读取测量头接触零件安装部的千分表刻度。

●Radial Run-out of journal diameter related to the Bearing seat（Table A-88）

Place the Ball Screw in identical V-blocks at both Bearing seats. Place the dial gauge perpendicular to the journal cylindrical surface. Rotate the Screw Shaft slowly and record the dial gauge readings.



●相对于丝杠轴支撑部轴线的支撑部端面的垂直度（表 A-89）

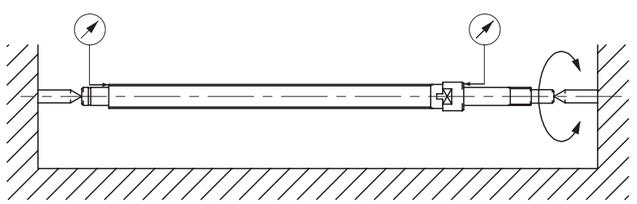
用两个中心孔支撑丝杠轴两端，一边使丝杠轴旋转，一边读取测量头接触支撑部端面的千分表刻度。

**图纸中的标示以支撑部外周面为基准，但由于支撑部外周面以中心孔为基准进行了加工，因此与用V形块支撑支撑部外周面时相同。

●Axial Run-out（Perpendicularity）of shaft（Bearing）face related to the centerline of the Bearing seat（Table A-89）

Support a Screw Shaft at both centers. Place the dial gauge perpendicular to the end face of the journal. Rotate the Screw Shaft slowly and record the dial gauge readings.

**This method is equivalent to the one, which is supported at both Bearing seats, because Bearing seats are ground related to both centers.

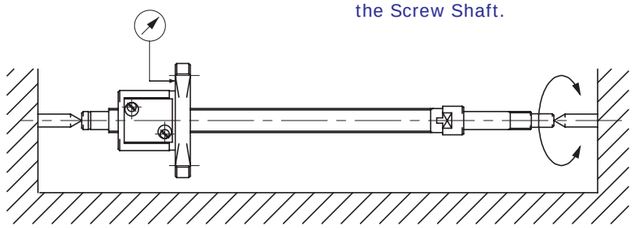


●相对于丝杠轴轴线的螺母基准端面或法兰安装面的垂直度（表 A-90）

用两个中心孔支撑丝杠轴两端，一边使轴与螺母一起旋转，一边读取测量头接触螺母法兰端面的千分表刻度。

●Axial Run-out（Perpendicularity）of Ball Nut location face related to the centerline of Screw Shaft（Table A-90）

Support the Ball Screw at both centers. Place the dial gauge perpendicular to the flange face. Rotate the Screw Shaft with Ball Nut slowly and record the dial gauge readings. Secure the Ball Nut against rotation on the Screw Shaft.

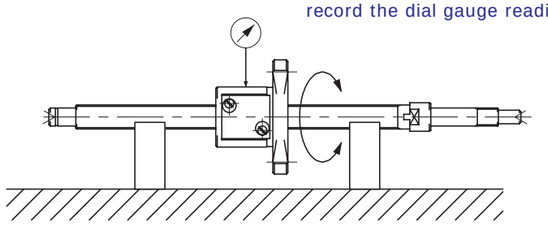


●相对于丝杠轴轴线的螺母外周面的半径方向圆跳动（表 A-91）

用V形块支撑丝杠轴螺母附近的外周面，一边使螺母旋转，一边读取测量头接触螺母外周面的千分表刻度。

●Radial Run-out of Ball Nut location diameter related to the centerline of Screw Shaft（Table A-91）

Place the Ball Screw on V-blocks at adjacent sides of the Ball Nut. Place the dial gauge perpendicular to the cylindrical surface of Ball Nut. Secure the Screw Shaft against rotation of Ball Nut. Rotate Ball Nut slowly and record the dial gauge readings.

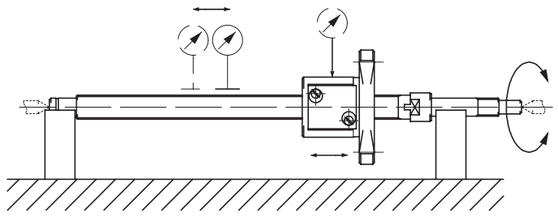


●丝杠轴轴线的半径方向全跳动（表 A-93～98）

用两个中心孔或V形块支撑丝杠轴两端，一边使丝杠轴旋转，一边读取测量头接触丝杠轴外周面或螺母外周面的千分表刻度。测量作业含整个范围，选多处进行。

●Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft（Table A-93～98）

Place the Ball Screw in identical V-blocks at both Bearing seats, or support the Ball Screw at both centers. Place the dial gauge with measuring shoe at the several points over the full thread length.Rotate the Screw Shaft slowly and record the dial gauge readings. Maximum value of measurement should be the Total Run-out.



材质和热处理、硬度
Material and Heat treatment, Surface hardness

KSS滚珠丝杠的标准材质、热处理和硬度如表A-99、100所示。表中数值可能会因系列及型号不同而略有差异，请参照本公司出示的规格图。

Standard material of KSS Ball Screws, Heat treatment and Surface hardness are shown in table A-99, 100. However, they vary depending on series or model number. Please refer to KSS drawings.

表 A-99 ： 一般产品的材质和热处理、硬度
Table A-99 ： Material, Heat treatment & Surface hardness for regular items

	Material 材质	Heat treatment 热处理	Surface hardness 表面硬度
Screw Shaft 丝杠轴	SCM415	Carburizing and quenching 渗碳淬火	HRC 58-62
Nut 螺母	SCM415	Carburizing and quenching 渗碳淬火	HRC 58-62

注）表中所示硬度为滚珠丝杠部的表面硬度。
Note）Hardness on table shows surface hardness of thread part.

表 A-100 ： 不锈钢产品的材质和热处理、硬度
Table A-100 ： Material, Heat treatment & Surface hardness for stainless steel items

	Material 材质	Heat treatment 热处理	Surface hardness 表面硬度
Screw Shaft 丝杠轴	SUS440C	Quenching and tempering 淬火、回火	HRC min.55 HRC 55以上
Nut 螺母	SUS440C	Quenching and tempering 淬火、回火	HRC min.55 HRC 55以上

注）表中所示硬度为滚珠丝杠部的表面硬度。
Note）Hardness on table shows surface hardness of thread part.

许用轴向负载
Permissible Axial load

建议尽量在有拉伸负载作用于丝杠轴的条件下使用。但根据使用条件，可能会有压缩负载作用，此时应避免丝杠轴发生压曲。
尤其在安装间距较小时，无论采用何种安装方法，都会受到许用拉伸应力或压缩负载及基本额定静负载Coa的限制。
压曲负载、许用拉伸和许用压缩负载可用下式求出。

It is recommended that Ball Screw Shafts be used almost exclusively under tension load conditions. However, in some applications, compression loads may exist, and under such conditions it must be determined that Shaft buckling will not occur.
Also, when the mounting span distance is short, there is a restriction on the permissible tension or compression load and the Basic Static Load Rating Coa unrelated to mounting.
Buckling load, permissible tension and permissible compression load can be calculated below.

●相对于压曲的许用压缩负载的计算公式
Permissible compression load calculation for buckling

$$P = \alpha \times \frac{n\pi^2 E \cdot I}{L^2} \quad N\{kgf\}$$ 欧拉公式（Formula for Oiler）

α：安全系数（Safety Factor）0.5
E：杨氏模量（Young's modulus） 2.08×10^5 N/mm²（MPa）{21,200kgf/mm²}
I：丝杠轴截面的最小惯性矩（Screw Shaft minimum moment of inertia of area）

$$I = \frac{\pi}{64} d^4 \quad mm^4$$

d：丝杠轴底径（Screw Shaft Root diameter） mm
L：安装间距（Mounting span distance） mm
n：取决于滚珠丝杠安装方法的系数（Factor for Ball Screw mounting method）

支撑-支撑（Supported—Supported）	n＝1
固定-支撑（Fixed—Supported）	n＝2
固定-固定（Fixed—Fixed）	n＝4
固定-自由（Fixed—Free）	n＝1/4

●相对于丝杠轴屈服应力的许用拉伸、压缩负载的计算公式
Permissible tension, compression load calculation for Screw Shaft yield stress

$$P = \sigma \times A \quad N\{kgf\}$$

σ：许用应力（Permissible stress） 98N/mm²（MPa）{10kgf/mm²}
A：丝杠轴的最小截面积（Screw Shaft minimum section area）

$$A = \frac{\pi}{4} d^2 \quad mm^2$$

d：丝杠轴底径（Screw Shaft Root diameter） mm

许用转速
Permissible speed

丝杠轴的安装方法决定了旋转丝杠轴的极限转速。转速接近极限值时会引起共振，导致丝杠轴无法运行。
此外，无论采用何种安装方法，滚珠丝杠都存在会导致循环部损坏的极限转速。

For Screw Shaft rotation, the mounting method determines the established rotation limits. When this value is approached, resonance phenomenon can occur, and operation becomes impossible. There is also rotation limit which causes damages to recirculating parts. This limit is unrelated to mounting methods.

●相对于临界速度的许用转速的计算公式
Permissible speed calculation for critical speed

$$N = \beta \times \frac{60 \cdot \lambda^2}{2\pi} \times \sqrt{\frac{E \cdot I \cdot g}{\gamma \cdot A \cdot L^4}} \quad min^{-1}\{rpm\}$$

β：安全系数（Safety Factor）0.8
E：杨氏模量（Young's modulus） 2.08×10^5 N/mm²（MPa）{21,200kgf/mm²}
I：丝杠轴截面的最小惯性矩（Screw Shaft minimum moment of inertia of area）

$$I = \frac{\pi}{64} d^4 \quad mm^4$$

d：丝杠轴底径（Screw Shaft Root diameter） mm
g：重力加速度（Gravity acceleration） 9.8×10^3 mm/sec²
γ：材料的比重（Material specific gravity） 7.7×10^{-5} N/mm³ {7.85×10^{-6}kgf/mm³}
L：安装间距（Mounting span distance） mm
A：丝杠轴的最小截面积（Screw Shaft minimum section area）

$$A = \frac{\pi}{4} d^2 \quad mm^2$$

λ：取决于滚珠丝杠安装方法的系数（Factor for Ball Screw mounting method）

支撑-支撑（Supported—Supported）	$\lambda = \pi$
固定-支撑（Fixed—Supported）	$\lambda = 3.927$
固定-固定（Fixed—Fixed）	$\lambda = 4.730$
固定-自由（Fixed—Free）	$\lambda = 1.875$

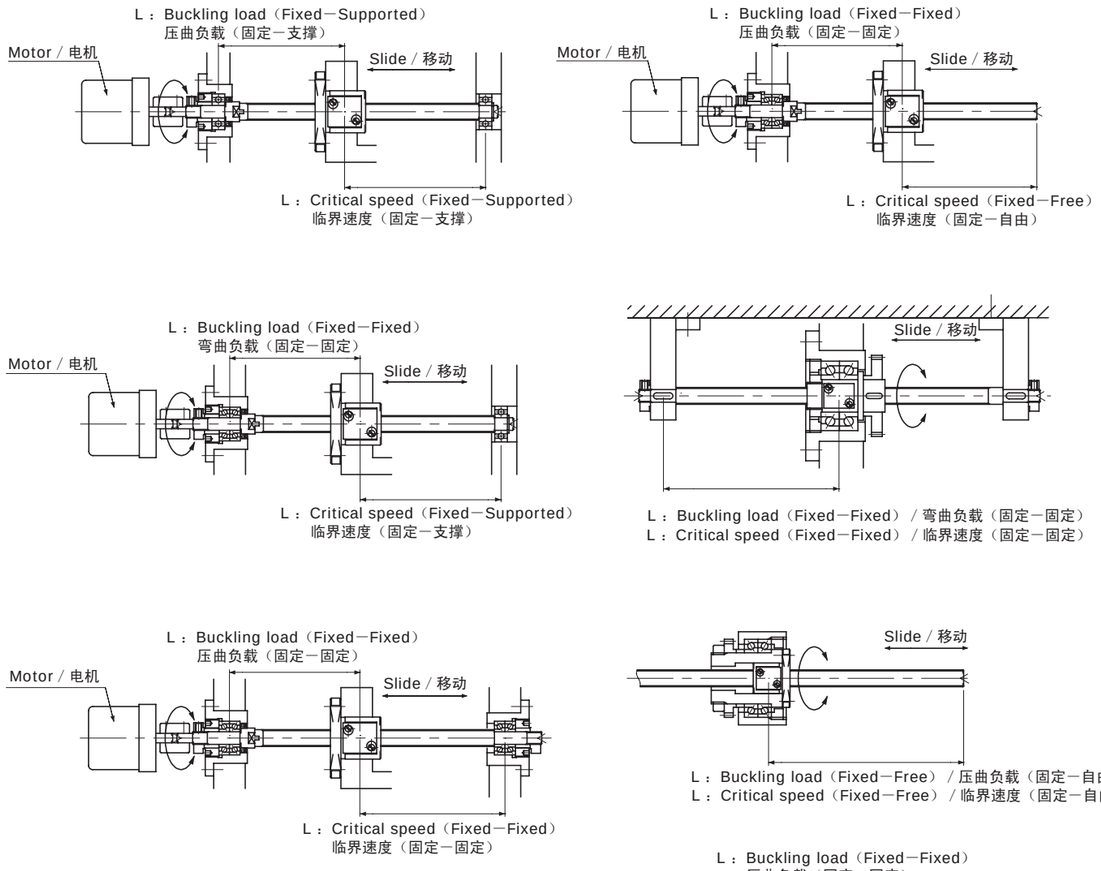
●相对于循环部损坏的极限转速
关于相对于循环部损坏的极限转速，一般多根据滚珠丝杠的钢珠速度dn值（丝杠轴公称外径×转速）来设定上限值，但对于像KSS滚珠丝杠这样的微型滚珠丝杠，dn值则不适用。KSS滚珠丝杠的循环部损坏极限转速为3,500～4,000rpm左右。该数值会因使用条件及环境而异，详情请垂询本公司。

●Rotation limits for damage on recirculating parts
Generally, regarding critical speed for damage on recirculating parts, limitation is established by dn value, which is multiplied Shaft nominal diameter of revolution, but dn value cannot be applied to Miniature Ball Screws. For KSS Ball Screws, please consider rotation limits by damage on recirculating parts as 3,500 to 4,000rpm. This value varies depending on operating conditions and environment. Please inquire KSS for details.

滚珠丝杠的安装方法
Ball Screw mounting methods

滚珠丝杠的典型安装方法如图A-101所示。由于安装方法会影响相对于压曲的许用轴向负载、以及相对于临界速度的许用转速，因此请在设计强度和转速时予以考虑。

Typical Ball Screw's mounting methods are shown in Fig. A-101. Mounting configuration affects permissible Axial load in relation to buckling, as well as permissible speed in relation to critical speed. Please refer to below when studying strength and speed.



图A-101：滚珠丝杠的安装方法
Fig. A-101：Ball Screw mounting methods

轴向间隙和预压
Axial play and Preload

通常，普通的单螺母滚珠丝杠的丝杠轴和螺母之间存在微小的轴向间隙。因此，当单螺母滚珠丝杠上有轴向负载作用时，上述轴向间隙和轴向负载所产生的弹性位移量的和就会导致间隙变大，形成齿隙。为消除这样的齿隙，应使滚珠丝杠的轴向间隙为负，即采用预先向丝杠轴和螺母间施加弹性变形，也就是“预压”的方法。

For standard Single Nut Ball Screws under normal conditions, a slight Axial play exists between the Screw Shaft and Nut. Consequently, when Axial loads act on Single Nut Ball Screws, total amount of Axial play and Elastic displacement due to Axial load becomes backlash. In order to prevent this backlash in Ball Screws, the Axial play can be reduced to a negative value. That is what we call “Preload", which is the method of causing Elastic deformation to the Balls between the Screw Shaft and Nut in advance.

●轴向间隙

KSS滚珠丝杠的间隙符号和轴向间隙的许用值如表A-102所示。
滚珠丝杠的精度等级和间隙符号的组合如表A-103所示。

●Axial play

Symbol and permissible value for Axial play are shown in Table A-102.
Combination of accuracy grade and symbol are shown in Table A-103.

表 A-102：间隙符号和轴向间隙的许用值
Table A-102：Symbol and permissible value for Axial play

Unit(单位)：mm

Symbol 间隙符号	0	02	05	20	50
Axial play 轴向间隙	0（Preloading） 0（预压）	0.002 max. 0.002以下	0.005 max. 0.005以下	0.02 max. 0.02以下	0.05 max. 0.05以下

表 A-103：精度等级和间隙符号的组合
Table A-103：Combination of accuracy grade and Axial play

Symbol 间隙符号 / Accuracy grade 精度等级	0	02	05	20	50
C0	C0-0	—	—	—	—
C1	C1-0	C1-02	—	—	—
C3	C3-0	C3-02	C3-05	C3-20	C3-50
C5	—	—	C5-05	C5-20	C5-50
C7	—	—	—	C7-20	C7-50
C10	—	—	—	C10-20	C10-50

注）希望采用上述以外的组合时，请垂询本公司。
Note）When combinations other than the above are requested, please inquire KSS.

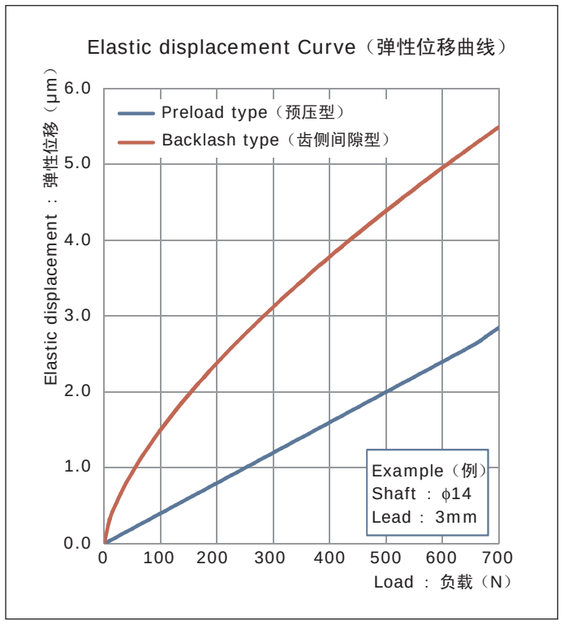
●预压的效果

使用预压，不仅可以消除滚珠丝杠的轴向间隙，还可减少由轴向负载引起的轴向位移量，提高刚性。
图A-104表示间隙规格滚珠丝杠和预压（无间隙）规格滚珠丝杠的轴向负载引起的弹性位移量的不同（理论值）。可以看出，通过预压，可减少（刚性提高）弹性位移量。

●Preload effect

Preload is not only used for removing Axial play, it also has the effect of reducing the amount of Axial displacement due to Axial load, and improving the Rigidity in Ball Screws. Fig. A-104 shows the difference of the amount of Elastic displacement (theoretical value) regarding Ball Screw with Axial play and Ball Screw with Preload under the Axial load.

图A-104 ： 间隙规格和预压规格的弹性位移曲线
Fig. A-104 ： Elastic displacement curve comparison between Backlash type and Preload type



●适当的预压量

预压量应该由所需刚性或许用齿侧间隙决定，但施加预压后，可能会产生以下影响：

1）动扭矩增大
2）因发热、温度上升而导致定位精度降低
3）缩短使用寿命

因此，应尽可能设定较低的预压量。

●Proper amount of Preload

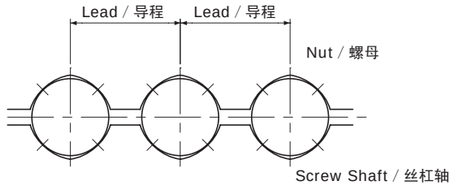
Although the amount of Preload should be determined by the required Rigidity and the permissible amount of backlash, when setting Preload, there are some concerning issues as follows.

1）Increased Dynamic Drag Torque
2）Heat generation
lowering of positioning accuracy
due to the temperature rise.
3）Shortened life

Therefore, it is advisable to establish the amount of Preload at the lowest possible limits.

●预压的方法

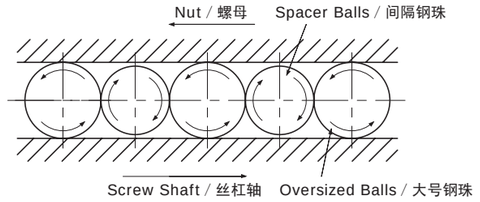
滚珠丝杠一般采用在2个螺母之间插入隔片（填隙片）的预压方法，即双螺母预压法。KSS滚珠丝杠充分发挥微型滚珠丝杠的特点，采用插入略微大于丝杠轴和螺母间隙的钢珠的预压方法、即“大号钢珠预压”法。利用该方法，只需1个螺母即可完全消除间隙，可保持紧凑结构。另外，通过每隔一处使用间隔钢珠（略小于施加预压的大号钢珠），避免了动作性能下降。



图A-105 ： 使用大号钢珠的预压状态
Fig. A-105 ： Preload by oversized Balls

●Preload methods

Generally, a method of Double Nut Preload by inserting a spacer between two Nuts is adopted. KSS Ball Screw adopts「Oversized Ball Preload」by inserting Balls slightly bigger than space between Screw Shaft and Nut. As a result, it can eliminate Axial play even with a Single Nut and it is possible to maintain compact. Moreover, operating performance will never be deteriorated by using spacer Balls (Balls with slightly smaller diameter than those of the oversize Balls) alternatively with oversize Balls.



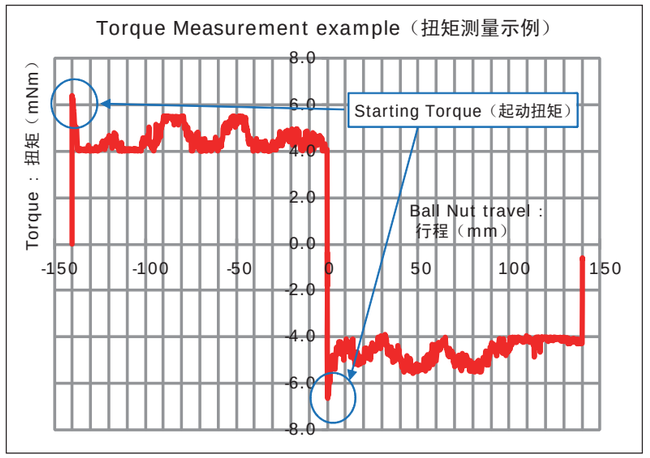
图A-106 ： 间隔钢珠
Fig. A-106 ： Spacer Balls

●预压的管理方法

直接测量并管理滚珠丝杠的预压量相当困难。因此，通常将滚珠丝杠的预压换算成预压动扭矩，通过测量该动扭矩来管理预压。预压动扭矩的值标示在规格图中，与客户协商决定。为了管理预压量（轴向间隙必须为0），预压动矩始终在一定的条件下进行测量。因此，润滑条件及使用条件的不同的机械会导致动扭矩产生差异，敬请注意。此外，起动扭矩（驱动滚珠丝杠时的扭矩）会略大于动扭矩，敬请注意。

●Preload control

It is difficult to control Preload amount by measuring. Therefore, Preload of Ball Screw is controlled by measuring Preload Dynamic Drag Torque, which is converted from Preload amount. Amount of Preload Dynamic Drag Torque is decided with customers by specification drawing. Preload Dynamic Drag Torque is measured under specific condition to verify the amount of Axial play is 0. Dynamic Drag Torque installed actual machine will vary depending on lubricating condition, load condition and so on. Starting torque (Torque for starting Ball Screw) is slightly bigger than Dynamic Drag Torque.



*为便于说明，图中所示的扭矩波动比实际有所夸大。
*Torque wave in this diagram is exaggerated for explanation.

图A-107 ： 动扭矩测量示例
Fig. A-107 ： Dynamic Drag Torpue measurement

进给丝杠轴系统的刚性
Rigidity in feed screw system

在精密机械中，为了提高进给丝杠的定位精度、增强抗负载刚性，必须对进给丝杠轴系统整体的刚性进行探讨。
进给丝杠轴系统的刚性如下所示。

In precision machinery, to improve positioning accuracy of the feed screws or to increase Rigidity for load, the Rigidity of the entire feed screw system must be examined. Feed screw system Rigidity is as follows.

$$\frac{1}{K}=\frac{1}{K_1}+\frac{1}{K_2}+\frac{1}{K_3}+\frac{1}{K_4}\quad \mu m/N\{\mu m/kgf\}$$

K ：进给丝杠轴系统整体的刚性（Total Rigidity of feed screw system） N/μm{kgf/μm}
K_1 ：丝杠轴的刚性（Screw Shaft Rigidity） N/μm{kgf/μm}
K_2 ：螺母的刚性（Nut Rigidity） N/μm{kgf/μm}
K_3 ：支撑轴承的刚性（Support Bearing Rigidity） N/μm{kgf/μm}
K_4 ：螺母和轴承安装部的刚性（Nut, Bearing fitting part Rigidity） N/μm{kgf/μm}

●进给丝杠轴系统整体的刚性　Total Rigidity of feed screw system　K

$$K=\frac{Fa}{\delta}\quad N/\mu m\{kgf/\mu m\}$$

Fa ：进给丝杠轴系统承受的轴向负载 N{kgf}
（Axial load applied to feed screw system）
δ ：进给丝杠轴系统的弹性位移量 μm
（Elastic displacement of feed screw system）

●丝杠轴的刚性　Screw Shaft Rigidity　K_1

（1）普通安装时（轴向为固定—自由时）（图A-108）
In case of general mounting(Fixed-Free in axial direction)(Fig. A-108)

$$K_1=\frac{A\cdot E}{r}\times 10^{-3}\quad N/\mu m\{kgf/\mu m\}$$

（2）两端固定时（图A-109）
In case of Fixed-Fixed mounting in axial direction(Fig. A-109)

$$K_1=\frac{A\cdot E\cdot L}{r\ (L-r)}\times 10^{-3}\quad N/\mu m\{kgf/\mu m\}$$

r ＝L/2时将产生最大轴向位移，刚性如下所示。
The max. axial displacement occurs when r ＝ L/2. The formula is as follows.

$$K_1=\frac{4\cdot A\cdot E}{L}\times 10^{-3}\quad N/\mu m\{kgf/\mu m\}$$

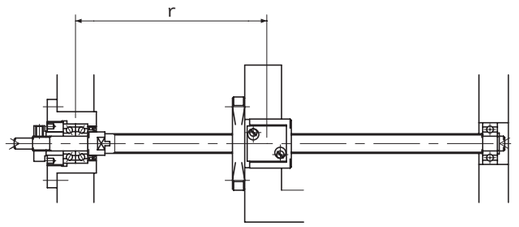
A ：丝杠轴的最小截面积（Screw Shaft minimum section area）

$$A=\frac{\pi}{4}d^2\quad mm^2$$

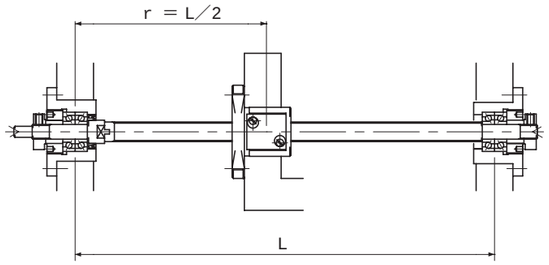
d ：丝杠轴底径（Screw Shaft Root diameter） mm
E ：杨氏模量（Young's modulus） 2.08×10^5 N/mm²（MPa）{21,200kgf/mm²}
l ：轴向固定点和螺母中央的距离（Axial distance between fixed point & Nut center） mm
L ：安装间距（Mounting span distance） mm

因此，因轴向负载Fa引起的丝杠轴弹性位移量δ可由下式求出。
Accordingly, the amount of Screw Shaft Elastic displacement δ due to Axial load Fa is as follows.

$$\delta=\frac{Fa}{K_1}\quad \mu m$$



图A-108 ：轴向为固定—自由时
Fig. A-108 ：Fixed-Free in axial direction



图A-109 ：两端固定时
Fig. A-109 ：Fixed-Fixed in axial direction

●螺母的刚性　K_2

(1)单螺母间隙规格的刚性

基本额定动负载Ca的30%的轴向负载作用时，螺母的理论静刚性值K_2请见“尺寸表”。轴向负载非基本额定动负载Ca的30%时，请用下式计算。关于尺寸表中未标出的型号的理论静刚性值，请垂询本公司。

$$K'_2 = K_2 \times \left(\frac{Fa}{0.3Ca} \right)^{1/3} \quad N/\mu m\{kgf/\mu m\}$$

K_2：尺寸表中标出的螺母刚性值(Nut Rigidity in dimension table)　N/μm{kgf/μm}
Fa：轴向负载(Axial load)　N{kgf}
Ca：基本额定动负载(Basic Dynamic Load Rating)　N{kgf}

(2)预压规格(零间隙规格)的刚性

施加相当于基本额定动负载Ca的5%(双螺母为10%)的预压负载时的螺母理论静刚性值K_2请见“尺寸表”。预压负载与上述不同时，可用下式计算，预压规格(零间隙规格)时，刚性值还会因预压动扭矩而变化。详情请垂询本公司。如有需要，本公司可为您计算尺寸表中标出的型号的理论静刚性值。

单螺母预压规格(Single Nut with oversized Ball Preload)

$$K'_2 = K_2 \times \left(\frac{Ga}{0.05Ca} \right)^{1/3} \quad N/\mu m\{kgf/\mu m\}$$

双螺母预压规格(Double Nut with Preload)

$$K'_2 = K_2 \times \left(\frac{Ga}{0.1Ca} \right)^{1/3} \quad N/\mu m\{kgf/\mu m\}$$

K_2：尺寸表中标出的螺母刚性值(Nut Rigidity in dimension table)　N/μm{kgf/μm}
Ga：预压负载(Preload amount)　N{kgf}
Ca：基本额定动负载(Basic Dynamic Load Rating)　N{kgf}

●Nut Rigidity　K_2

(1)Rigidity of Single Nut with backlash

The theoretical static Rigidity K_2 of the Nut under an Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca is described in dimension table. For Axial loads which are not 30% of the Basic Dynamic Load Rating Ca, please use the following formula. Please inquire KSS regarding theoretical Static Rigidity of model types which are not in dimension table.

(2)Rigidity of preloaded Ball Nut

The theoretical static Rigidity K_2 under a Preload equivalent to 5% (10% for Double Nut)of the Basic Dynamic Load Rating Ca is described in dimension table. For Preload amounts other than the above, please use the following formula. In case of Preload type Ball Screws, Rigidity varies depending on the dispersion of Preload Dynamic Drag Torque. Therefore, please inquire KSS for details. KSS will calculate theoretical Static Rigidity of required Nut models, which are not in the dimension table.

●支撑轴承的刚性　K_3

支撑轴承的刚性因所用轴承及其预压量而异，详情请洽询轴承制造商。

●Support Bearing Rigidity　K_3

Support Bearing Rigidity varies depending on the type of Bearing and amount of Preload. Please inquire Bearing manufacturers.

●螺母和轴承安装部的刚性　K_4

螺母安装部及轴承安装部等的刚性因装置的结构和设计而异，本公司未作具体规定，请尽量采用高刚性设计。

●Nut, Bearing fitting part Rigidity　K_4

Rigidity of Nut mounting part and Bearing mounting part vary depending on machine structure and design. KSS cannot mention the details but a design of high Rigidity must be considered.

●丝杠轴的扭曲刚性

与轴向位移相比，扭曲造成的定位误差值很小，需要考虑时，可由下式求出。

$$\theta = \frac{32T\,L}{\pi\,Gd^4} \times \frac{180}{\pi} \times 10 \quad deg$$

θ：扭力矩引起的扭曲角(Torsion angle due to torsion moment)　deg
T：扭力矩(Torsion moment)　N·cm{kgf·cm}
L：螺母与轴端支撑部的距离(Distance between Nut & Shaft end support)　mm
G：切变模量(Modulus of Rigidity)　8.3×10^4 N/mm²(MPa){8,500 kgf/mm²}
d：丝杠轴底径(Screw Shaft Root diameter)　mm

因扭曲角而引起的轴向位移量δa如下所示。

Amount of axial displacement δa due to torsion angle is as follows.

$$\delta a = r \times \frac{\theta}{360} \times 10^3 \quad \mu m$$

r：导程(Lead)　mm

●Screw Shaft torsion Rigidity

For positioning error due to torsion, this error is a relatively small compared to axial displacement. However, if investigation is required, the following formula may be used for calculation.

基本额定负载和基本额定寿命
Basic Load Rating and Basic Rating Life

●基本额定动负载Ca与基本额定寿命

滚珠丝杠的额定寿命是指一组相同的滚珠丝杠在相同的条件下运行时，其中90%的滚珠丝杠的滚珠槽及滚珠表面没有因滚动接触而导致疲劳剥落的状态下的总转数。基本额定动负载Ca是指额定寿命为100万转的轴向负载，该值以Ca标记在尺寸表中。滚珠丝杠的额定寿命L_{10}可利用该基本额定动负载Ca的值，通过下式推算。

$$L_{10} = \left(\frac{Ca}{f \cdot Fa}\right)^3 \times 10^6 \quad rev$$

不用总转数而用时间L_{10h}或行走距离L_{10d}来表示额定寿命时，可通过以下公式计算。

$$L_{10h} = \left(\frac{1}{60 \cdot N}\right) \times L_{10} \quad 时间(hours)$$

$$L_{10d} = \left(\frac{r}{10^6}\right) \times L_{10} \quad km$$

Ca：基本额定动负载(Basic Dynamic Load Rating)　N{kgf}
Fa：轴向负载(Axial load)　N{kgf}
N：转速(Revolution)　min^{-1}{rpm}
r：导程(Lead)　mm
f：负载系数(Load factor)
f＝1.0～1.2　几乎无振动、无冲击时
(for almost no vibration, no shock condition)
f＝1.2～1.5　稍有振动、冲击时
(for slight vibration, shock condition)
f＝1.5～3.0　有强烈振动、冲击时
(for severe vibration, shock condition)

一般情况下，作用于设备的轴向负载并不固定，其运行方式可分为几种。此时，可通过下式求出平均轴向负载Fam、平均转速N_m，然后算出额定寿命。

Axial load 轴向负载 N{kgf}	Revolution 转速 min^{-1}{rpm}	Working time 使用时间 %
Fa_1	N_1	t_1
Fa_2	N_2	t_2
Fa_3	N_3	t_3

$$Fam = \left(\frac{Fa_1^3 \cdot N_1 \cdot t_1 + Fa_2^3 \cdot N_2 \cdot t_2 + Fa_3^3 \cdot N_3 \cdot t_3}{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3}\right)^{1/3} \quad N\{kgf\}$$

$$N_m = \frac{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3}{t_1 + t_2 + t_3} \quad min^{-1}\{rpm\}$$

●Basic Dynamic Load Rating Ca and Basic Rating Life

The Basic Rating Life of Ball Screws means the total number of revolutions which 90% of the Ball Screws can endure. Failure is indicated by flaking caused by rolling fatigue on the surface of grooves or Balls. These figures are valid when a group of the same type Ball Screws are operated individually under the same conditions. The Basic Dynamic Load Rating Ca is the Axial load for which the Basic Rating Life is 1,000,000 revolutions. These values are listed under Ca in the dimension tables. Ball Screw's Basic Rating Life L_{10} can be estimated using Basic Dynamic Load Rating Ca in the following formula.

Also, in place of the total number of revolutions, the Basic Rating Life can be expressed in hours: L_{10h} or traveled distance: L_{10d}, and these can be calculated through the following formulas.

Generally, Axial load on the most machine is not constant and it can be divided into several operating pattern. In this case, Basic Rating Life can be calculated to figure up average Axial load Fam, average Revolution N_m in the following formula.

此外，轴向负载呈直线变化时的平均轴向负载Fam也可通过下式近似求出。

$$Fam = \frac{Fa\ min + 2 \cdot Fa\ max}{3} \quad N\{kgf\}$$

Fa min：最小轴向负载(Minimum Axial load)　N{kgf}
Fa max：最大轴向负载(Maximum Axial load)　N{kgf}

注)滚珠丝杠寿命的计算公式以润滑状态良好、无异物混入为前提，且是在无力矩负载以及径向负载作用的纯轴向负载下的计算公式。

Also, for Axial loads which vary linearly, the average Axial load Fam can be calculated approximately using the following formula.

Note)As the Basic Rating Life varies due to lubricating conditions, and contaminations, Moment load or Radial load, etc., this should be considered a rough estimate only.

●基本额定静负载Coa

基本额定静负载Coa是指在承受最大应力的接触部，使钢珠的滚动面和钢珠的永久变形量的和为钢珠直径的1/10000的轴向静止负载。该值以Coa标记于尺寸表中。该基本额定静负载Coa的值用于探讨静止状态或转速非常低(10rpm以下)时的负载条件。上述的永久变形量在多数情况下不影响使用。此时，螺纹槽部的最大许用负载Fa max可由下式求出。

$$Fa\ max = \frac{Coa}{fs} \quad N\{kgf\}$$

fs：静态安全系数(Static safety factor)
fs＝1～2　正常运行时(for normal operation)
fs＝2～3　有振动、冲击时(for vibration, shock)

●Basic Static Load Rating Coa

The Basic Static Load Rating Coa is the Axial Static load at which the amount of permanent deformation (Ball ＋ Raceway) occurring at the maximum stress contact point between the Ball and Raceway surfaces is 1/10,000 times the Ball diameter. These values are listed under Coa in the dimension tables. The Basic Static Load Rating Coa values apply to investigation of stationary state or extremely low Revolution load conditions (less than 10 rpm). However, in most cases the amount of permanent deformation causes absolutely no problems under the general conditions. The maximum permissible load Fa max for the screw groove can be found by using the following formula.

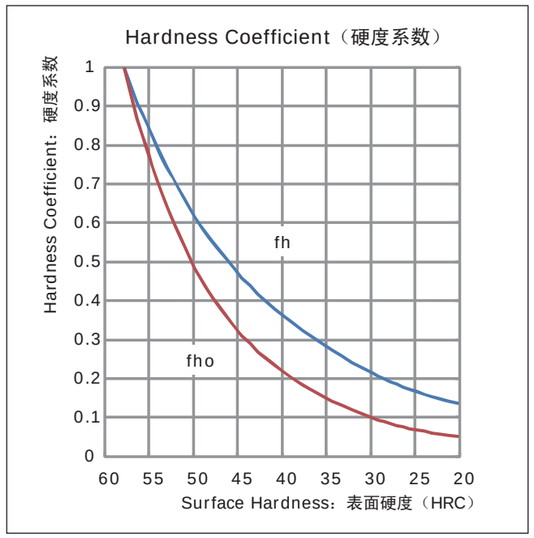
●硬度系数　Hardness coefficient

表面硬度小于HRC58时，需要对基本额定动负载Ca和基本额定静负载Coa进行补偿。通过下式进行补偿。

For Surface hardness of less than HRC58, the Basic Dynamic Load Rating Ca and the Basic Static Load Rating Coa must be adjusted. Adjustment is made by the following formula.

$$Ca' = fh \cdot Ca \quad (N)$$
$$Coa' = fho \cdot Coa \quad (N)$$

fh, fho：硬度系数(右图)
Hardness coefficient(See graph right)



驱动扭矩
Driving Torque

进给丝杠系统的驱动扭矩T由下式求出。

The feed screw system Driving Torque T is expressed according to the following formula.

$$T = T_1 + T_2 + T_3 + T_4 \quad N{\cdot}m\{kgf{\cdot}cm\}$$

T_1 ：加速产生的扭矩(Acceleration Torque) N·m{kgf·cm}
T_2 ：负载扭矩(Load Torque) N·m{kgf·cm}
T_3 ：预压动扭矩(Preload Dynamic Drag Torque) N·m{kgf·cm}
T_4 ：其他扭矩(Additional Torque) N·m{kgf·cm}

选择电机时需考虑进给丝杠系统产生的扭矩。
T_1～T_3可由下式求出。

When Motor selection, the feed screw system Driving Torque is needed.
T_1 ～ T_3 can be calculated by the following formula

●加速产生的扭矩 Acceleration Torque T_1

$$T_1 = \alpha \cdot I \quad N{\cdot}m$$

$$\alpha = \frac{2\pi N}{60 \cdot t} \quad rad/sec^2$$

$$I = Iw{\cdot}A^2 + Is{\cdot}A^2 + I_A A^2 + I_B \quad kg{\cdot}m^2$$

$$Iw = m_w \times \left(\frac{r}{2\pi}\right)^2 \times 10^{-6} \quad kg{\cdot}m^2$$

$$Is = m_S \times \left(\frac{d^2}{8}\right) \times 10^{-6} \quad kg{\cdot}m^2$$

$$m_S = \pi \left(\frac{d}{2}\right)^2 \times L \times \gamma \times 10^{-9} \quad kg$$

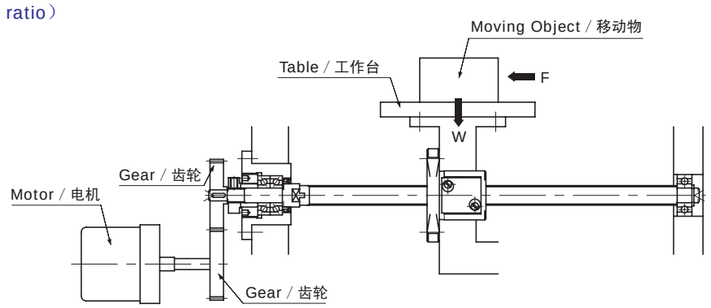
α ：角加速度(Angular acceleration) rad/sec²
I ：惯性矩(Inertia moment) kg·m²
Iw：移动物的电机轴换算的惯性矩 kg·m²
(Inertia moment of moving object by Motor axial conversion)
Is ：丝杠轴的惯性矩(Inertia moment of Screw Shaft) kg·m²
I_A ：丝杠轴侧的齿轮等的惯性矩(Inertia moment of gears on screw side) kg·m²
I_B ：电机侧的齿轮等的惯性矩(Inertia moment of gears on motor side) kg·m²
m_w：移动物质量(Mass of moving object) kg
m_S：丝杠轴质量(Mass of Screw Shaft) kg
r ：导程(Lead) mm
d ：丝杠轴外径(Screw Shaft diameter) mm
L ：丝杠轴长度(Ball Screw length) mm
γ ：比重(Specific gravity) 7,850 kg/m³
A ：减速比(Reduction ratio)
N ：电机转速(Motor speed) min⁻¹
t ：加速时间(Acceleration time) sec

●负载扭矩 Load Torque T_2

$$T_2 = \frac{P \cdot r \cdot A}{2\pi\eta} \times 10^{-3} = \frac{(F + \mu W)}{2\pi\eta} \cdot r \cdot A \times 10^{-3} \quad N{\cdot}m$$

$$T_2 = \frac{P \cdot r \cdot A}{2\pi\eta} \times 10^{-1} = \frac{(F + \mu W)}{2\pi\eta} \cdot r \cdot A \times 10^{-1} \quad kgf{\cdot}cm$$

P ：轴向负载(Axial load) N{kgf}
F ：负载(Load) N{kgf}
W：移动物重量(Weight of moving object) N{kgf}
r ：导程(Lead) mm
μ ：滑动面摩擦系数(Sliding surface friction coefficient)
η ：效率(Efficiency)0.9
A ：减速比(Reduction ratio)



●预压动扭矩 Preload Dynamic Drag Torque T_3

$$T_3 = 0.05 \times (\tan\beta)^{-0.5} \times \frac{Fa \cdot r}{2\pi} \times 10^{-3} \quad N{\cdot}m$$

$$T_3 = 0.05 \times (\tan\beta)^{-0.5} \times \frac{Fa \cdot r}{2\pi} \times 10^{-1} \quad kgf{\cdot}cm$$

β ：导程角(Lead angle) deg
Fa：预压负载(Preload) N{kgf}
r ：导程(Lead) mm

●其他扭矩 Additional Torque T_4

指上述以外时产生的扭矩。例如支撑轴承的摩擦扭矩及油封滑动阻力产生的扭矩等。

Described as Torque which occurs in addition to those listed above. For example, support Bearing friction Torque, oil seal resistance Torque, etc.

防锈与润滑
Rust prevention and Lubrication

●防锈处理

KSS滚珠丝杠以长期存放为前提，涂抹有防锈油。使用前请用清洁的精制煤油将其洗净，并涂抹润滑油或油脂。根据客户的需求，也可在出厂前涂抹油脂，但长期存放时可能会导致丝杠生锈，敬请注意。

注）KSS涂抹的防锈油侧重于防锈性能，并不具备润滑性能。因此，如果在涂有防锈油的状态下直接使用，可能会缩短丝杠寿命、导致扭矩变大、异常发热等问题。

●Rust prevention

KSS Ball Screws are applied anti-rust oil when shipping in case of no specific instruction. This oil should be removed before use. Wash Ball Screws with cleaned Kerosine and apply lubricant（Grease or Oil）on Ball Screws. As customer's request, specified Grease or Oil can be applied, but it should be noted that they are not suitable for long term storage purpose and rust might occur.

Note）Anti-rust oil is focused on anti-rust performance and it does not have lubricating function. Therefore, when using Ball Screws with anti-rust oil coating, the problems such as shortened Life, increase of Torque and abnormal heat generation occurs.

●润滑

使用滚珠丝杠时，必须涂抹润滑剂。否则会造成扭矩变大或缩短丝杠使用寿命等问题。涂抹润滑剂可以抑制因摩擦而导致的升温、机械效率下降，以及因磨损而导致的精度下降。

滚珠丝杠的润滑方式分为油脂润滑和油润滑。使用油脂润滑时，一般建议使用锂皂基油脂；使用油润滑时，建议使用ISO VG32～68（透平油）。此外，根据用途选择润滑剂也非常重要。特别是微型滚珠丝杠，油脂的搅拌阻力可能会引起扭矩变大等不良情况。本公司备有可在维持滚珠丝杠动作特性的同时，发挥优异润滑性能的KSS原装油脂。用于注重动作特性的低速定位时，备有MSG No.1（稠度 1号）油脂；用于高速、一般用途时，备有MSG No.2（稠度 2号）油脂。详情请参照目录第B101页的“微型滚珠丝杠专用油脂”。

●Lubrication

In Ball Screw use, lubricant should be required. If lubricant is not applied with, the problem such as increase of Torque and shortened Life occurs. Applying lubricant can minimize temperature increases, decline of mechanical efficiency due to friction, and deterioration of accuracy caused by wear.

Ball Screw lubrication is divided into Greasing and Oiling. A regular lithium-soap-based Grease and ISO VG32-68 Oil（turbine Oil #1 to #3）are recommended. It is highly important to choose lubricant depending on customer's usage. Especially in case of Miniature Ball Screws, malfunction such as increase of Torque are caused by the stir resistance. KSS original Greases which maintains Ball Screw's smooth movement and have high lubricating performance are prepared. MSG No.1 is appropriate for high smooth requirement and high positioning usage（consistency 1）. MSG No.2 is suitable for high speed and general usage（consistency 2）. Please refer to catalogue page B101「Original Grease for Miniature Ball Screws」.

一般使用条件下的润滑剂示例
Recommended lubricants for normal operating conditions

Lubricant 润滑剂	Type 种类	Product name 产品名称
Grease 油脂	Lithium-based Grease 锂基油脂	KSS original Grease MSG No.2 KSS原装油脂 MSG No.2
Lubricating Oil 润滑油	Sliding surface Oil or turbine Oil 滑动面油或透平油	Super Multi 68 Super Multi68

●检查和补充

使用油脂润滑时，大致检查时间为每2～3个月，使用油润滑时为每隔1周。检查时，请检查油量及有无脏污，并根据需要加油。

●Inspection and replenishment

Grease inspection should be performed once every two to three months, and Oil inspection should be performed approximately weekly. Check the Oil or Grease amount and contamination at each inspection and replenish if needed.

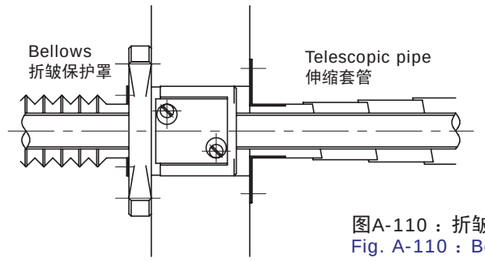
润滑剂的检查和补充时间间隔
Inspection and replenishment Interval of lubricant

Lubrication 润滑方法	Inspection frequency 检查时间间隔	Inspection Items 检点项目	Replenishment and replacement frequency 补充或更换时间间隔
Automatic intermittent lubrication 自动间歇加油	Weekly 每隔1周	Oil level, contamination 油量、脏污等	Replenish at each inspection, depending on tank capacity 根据油箱容量，在每次检查时适量补充。
Grease 油脂	Every 2 to 3 months initially 运行初期2～3个月	Contamination, swarf contamination 脏物、切屑的混入等	Replenish annually or as necessary, depending on Inspection results 通常每1年补充一次，但应根据检查结果适量补充。
Oil bath 油浴	Daily before operation 每天开工前	Oil suface check 油面管理	Set a rule for replenishment as necessary, depending on amount of wear. 根据消耗情况适当规定。

防尘
Dust prevention

滚珠丝杠的螺母内如果混入脏物或异物，可能会导致过早磨损、螺纹槽损伤、钢珠破裂和循环部损坏等，从而使滚珠丝杠无法工作。如果可能有上述情形发生，建议采取折皱保护罩和伸缩套管等防尘措施，以避免丝杠部外露。

In Ball Screws, if dust or other contaminations intrude into the Ball Nut, wear is accelerated, the screw groove will be damaged, circulation will be obstructed due to Ball fracture, damage of recirculation parts and so on. Eventually, the Ball Screws will cease to function. Where the possibility of dust or other contaminant exists, the screw thread section cannot be left exposed, and dust prevention measure such as a bellows or Telescopic pipe must be taken.



图A-110 ： 折皱保护罩和伸缩套管
Fig. A-110 ： Bellows & Telescopic pipe

KSS滚珠丝杠充分发挥微型滚珠丝杠的特点，重视小型化设计。因此，目录中介绍的型号均为不带密封的尺寸。需要密封时，请垂询本公司。螺母尺寸可能会因安装密封而发生变化，敬请注意。此外，某些型号不能安装密封，敬请谅解。

KSS Ball Screws are concentrated on compact design for a feature of Miniature Ball Screw. Therefore, all models in the catalogue are the dimension without seals. Please inquire KSS if seals are required. Please note that Nut dimension may change due to seal installation. Some models cannot install the seals.

表面处理
Surface treatment

出于防锈目的，本公司可对滚珠丝杠实施表面处理。本公司的防锈表面处理以黑铬处理为标准。需要其他表面处理时，请垂询本公司。

Surface treatment can be possible for the purpose of rust prevention. Black Chrome treatment（BCr）is KSS standard surface treatment for the purpose of rust prevention. Please inquire KSS if other surface treatments are needed.

●KSS黑铬处理滚珠丝杠的特点

- 涂层薄（2～3μm），可安装配合零件。
- 在严格的工序管理下，涂膜的厚度均一，不会影响滚珠丝杠的动作特性。
- 覆膜密接性良好，具有优异的防锈能力。
- 是MIL标准（MIL-DTL-14538D）公认的表面处理品。
- 需提高滑动特性时，可一并进行氟树脂涂层。

●Feature of KSS Ball Screws with Black Chrome（BCr）coating

- Due to thin film thickness（2～3μm），mating part can be applicable with BCr.
- Due to strict production management, film thickness can be treated equally and smoothness is kept.
- High anti-rust ability is possible.
- The surface treatment is officially authorized by MIL standard（MIL-DTL-14538D）
- To improve sliding characteristics, BCr＋fluorine resin coating is also available.

照片 A-111 ： 黑铬处理品
Photo A-111 ： Black Chrome coating

●防锈能力试验数据　Examination data of anti-rust ability

根据盐水喷雾试验，使用标准试样进行的防锈能力评估结果如下所示。

Based on the salt spray corrosion test（JIS Z2371），anti-rust ability has been evaluated, as follows.

- 标准试样 / Standard test piece ： 70mm×150mm×1mm（SPCC材/ material＝SPCC ）
- 数据 / Data ： 盐水喷雾试验24小时后的外观和评价数法的评估结果（数值越小，腐蚀越严重）
  Evaluated by appearance and rating number method
  after 24 hours of salt spray corrosion test.（The less number, the more corrosion）

	Rating number（Average） 评价数（平均值）
Sample A（BCr coating） 试样A（BCr处理）	9.3
Sample B（R coating） 试样B（R处理）	9～8
Sample C（M coating） 试样C（M处理）	3～4

Sample A
试样A

Sample B
试样B

Sample C
试样C

●RoHS指令的符合性　About RoHS compliance

KSS黑铬处理后的滚珠丝杠的Cr^{+6}量低于RoHS指令规定的阈值，完全符合RoHS指令。

The Cr^{+6} amount of KSS Black Chrome（BCr） coating is less value than the based on RoHS regulation.

可追溯性
Traceability

KSS滚珠丝杠的生产采用严格精选的材料，使用先进的生产的设备，在严格的温度管理下进行，从各生产工序到产品检查、出厂，采用一条龙的生产管理体。
如照片A-112所示，出厂检查合格的滚珠丝杠会发放合格证。
如有需要，也可提供检查结果表（照片 A-113）。
本公司生产的滚珠丝杠在螺母上标有生产编号（照片 A-114）。
与生产编号相应的出厂检查记录及生产记录由本公司保管，通过查询生产编号，可找出所有出厂检查数据。

KSS Ball Screws are manufactured from rigidly selected materials in our temperature controlled factory. They are manufactured using the latest production equipment, with consistent quality control supervision ranging from the production process to inspection and shipping.
Certificate of inspection, Photo A-112, will be attached with the Ball Screws which pass shipping inspection.
Inspection report can be handed in as customer's request shown in Photo A-113.
The Ball Screws produced by KSS have a serial number which is marked on the Nut（refer to the Photo A-114）.
Record of inspection and production trail which is in correspondence to a production number, are stored in KSS and inspection data can be retrieved by inquiry of a serial number.

照片 A-112：合格证
Photo A-112：Certificate of Inspection

照片 A-113：检查结果表
Photo A-113：Inspection report

照片 A-114：生产编号
Photo A-114：Serial Number

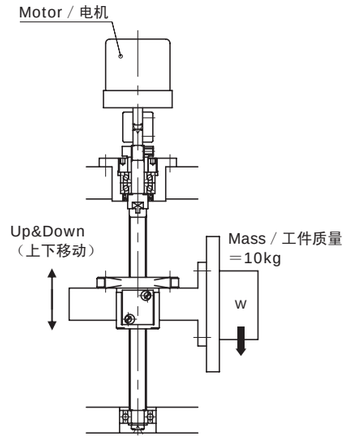
滚珠丝杠各种特性的计算示例
Calculation example of characteristic for Ball Screws.

滚珠丝杠各种特性的计算示例如下所示。以下均为模型算式，可能与实际情况有出入，敬请注意。

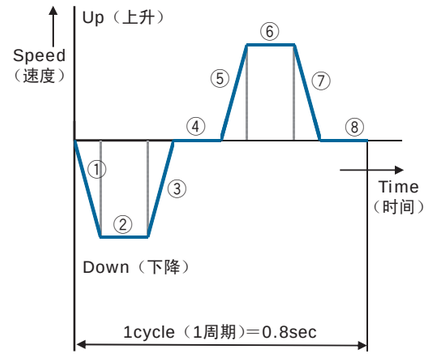
Calculation example of characteristic for Ball Screws are mentioned as follows. Each calculation example is modeled so that there is a case which is unrealistic.

例1：竖轴规格 Pick&Place
Example 1：Vertical Pick&Place

滚珠丝杠的型号和使用条件
Ball Screw model and operating condition



Operating pattern（运行周期线图）



滚珠丝杠的主要技术参数	Ball Screw spec.
轴径＝ϕ10mm	Shaft dia.＝ϕ10mm
导程＝10mm	Lead＝10mm
基本额定动负载Ca＝3,300N	Dynamic Capacity Ca＝3,300N
滚珠丝杠总长＝180mm	Total length＝180mm
轴向间隙＝20μm以下	Axial play＝20μm or less

运行条件	Operating Pattern
最高速度＝0.4m/sec	Max Speed＝0.4m/sec
**导程10mm时2,400 min^{-1}	** 2,400 min^{-1} because of Lead 10mm
加减速时间＝0.05sec	Acceleration & Deceleration time＝0.05sec
**图中①③⑤⑦	**①③⑤⑦ in diagram above
等速时间＝0.1sec	Constant speed time＝0.1sec
**图中②⑥	**②⑥ in diagram above
停止时间＝0.2sec	Halt time＝0.2sec
**图中④⑧	**④⑧ in diagram above
1周期＝0.8sec	Cycle time＝0.8sec

基本额定寿命的计算
Calculation of Basic Rating Life

基本额定寿命按以下步骤计算得出。
Basic Rating Life is calculated in the following procedure.

各种运行方式下的负载条件的计算 Calculation of Load condition for each operating pattern → 各种运行方式下的速度条件的计算 Calculation of Speed condition for each operating pattern → 平均负载 平均转速的计算 Calculation of average Load and Revolution → 额定寿命的计算 Calculation of Basic Rating Life

1)负载条件的计算

带编号的各种运行方式的负载条件如下所示。

①下降加速及⑦上升减速：
$F_1 = mg - m\alpha$
②、⑥等速：
$F_2 = mg$
③下降减速及⑤上升加速：
$F_3 = mg + m\alpha$
式中，
m ：移动物质量＝10kg
g ：重力加速度＝9.807m/sec^2
α ：加速度
达到0.4m/sec前的加速度
$\alpha = 0.4/0.05 = 8m/sec^2$

1)Calculation of Load condition

Load condition of each operation pattern which is numbered is as follows.

①Down&Acceleration、⑦Up&Deceleration ：
$F_1 = mg - m\alpha$
②、⑥Constant Speed area ：
$F_2 = mg$
③Down&Deceleration、⑤Up&Acceleration ：
$F_3 = mg + m\alpha$

m ：Mass＝10kg
g ：Gravity Acceleration＝9.807m/sec^2
α ：Acceleration
Acceleration up to 0.4m/sec
$\alpha = 0.4/0.05 = 8m/sec^2$

2)速度条件的计算

带编号的各种运行方式的转速如下所示。

等速时(②、⑥)：
0.4 m/sec＝0.4×60 m/min＝24m/min
＝2,400 min^{-1}(导程10mm时)
加减速时(①、③、⑤、⑦)：
上述的平均转速为2,400/2＝1,200 min^{-1}

2)Calculation of Speed condition

Revolution of each operation pattern which is numbered is as follows.

Constant speed area(②、⑥) ：
0.4 m/sec＝0.4×60m/min＝24m/min
＝2,400min^{-1}(Lead 10mm)
Acceleration and deceleration area(①、③、⑤、⑦)：
as above average revolution, 2,400/2＝1,200 min^{-1}

3)平均负载、平均转速的计算

总结上述计算结果，算出目录p-A825中所示的平均负载Fam和平均转速N_m。

3)Calculation of average Load, average Revolution

Calculation based on the above, calculate the average Load Fam shown in catalogue p-A825 and the average Revolution N_m.

$$Fam = \left(\frac{Fa_1^3 \cdot N_1 \cdot t_1 + Fa_2^3 \cdot N_2 \cdot t_2 + Fa_3^3 \cdot N_3 \cdot t_3}{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3} \right)^{1/3} \quad N$$

$$N_m = \frac{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3}{t_1 + t_2 + t_3} \quad min^{-1}$$

Operating Pattern 条件	Axial load 轴向负载 N	Revolution 转速 min^{-1}	time 使用时间 sec
①、⑦	Fa_1＝18.1	N_1＝1,200	t_1＝0.05×2＝0.1
②、⑥	Fa_2＝98.1	N_2＝2,400	t_2＝0.1×2＝0.2
③、⑤	Fa_3＝178.1	N_3＝1,200	t_3＝0.05×2＝0.1
Average 平均	Fam＝116.3	N_m＝1,800	Total(合计)0.4sec 1 cycle(1周期)：t＝0.8sec Halt time(停止)：0.4sec(50%)

4)基本额定寿命的计算

使用平均负载、平均转速的值，根据目录第A825页计算基本额定寿命。

4)Calculation of Basic Rating Life

Using average Load and average Revolution, Basic Rating Life is calculated according to the catalogue page A825.

基本额定寿命 / Basic Rating Life $L_{10h} = \{10^6/(60 \cdot N_m)\} \times \{Ca/(f \cdot Fam)\}^3$ 小时 / hours

L_{10h}＝96,280 小时/hours

f ：负载系数 / Load coefficient（假设为1.3/Assumption 1.3 ）
Ca：基本额定动负载/Basic Dynamic Load Rating(3,300N)

停止时间为50%，因此运行时间为96,280/0.5＝192,560小时。
在24小时运行的情况下，192,560/24＝8,023天，因此可确保足够的使用寿命。

Due to halt time is 50%,
96,280/0.5＝192,560 hours operation.
If 24 hours operation is premised.
192,560/24＝8,023 days, it shows that enough life is kept.

进给丝杠系统的驱动扭矩的计算

根据目录第A827页计算进给丝杠系统的驱动扭矩。这在选择电机时非常重要。
上述示例并非预压规格的滚珠丝杠，所以不产生预压动扭矩。因此只计算加速扭矩T_1、负载扭矩T_2。

Calculation of Driving Torque for feed screw system

Calculate Driving Torque for feed screw system according to the catalogue page A827. It is important when motor selection. In the above case, due to backlash type Ball Screw, Preload Dynamic Drag Torque does not occur. Therefore, calculate acceleration Torque T_1 and Load Torque T_2.

$$T = T_1 + T_2 + T_3 + T_4 \quad N\cdot m$$

T_1：加速产生的扭矩(Acceleration Torque) N·m
T_2：负载扭矩(Load Torque) N·m
T_3：预压动扭矩(Preload Dynamic Drag Torque) N·m
T_4：其他扭矩(Additional Torque) N·m

1)加速扭矩T_1的计算(Calculation of acceleration Torque T_1)

$$T_1 = \alpha \cdot I = \alpha (Iw + Is) N\cdot m$$

α ：角加速度(Angular acceleration) rad/sec^2
I ：惯性矩(Inertia moment) $kg\cdot m^2$
Iw ：移动物的电机轴换算的惯性矩 $kg\cdot m^2$
(Inertia moment of moving object by motor axial conversion)
Is ：丝杠轴的惯性矩(Inertia moment of Screw Shaft) $kg\cdot m^2$

$$Iw = m_w \times (r/2\pi)^2 = 2.53 \times 10^{-5} \quad kg\cdot m^2$$

m_w：移动物质量(Mass of moving object)＝10kg
r ：滚珠丝杠导程(Ball Screw Lead)＝0.01m

$$Is = m_s \times (d^2/8) = (d/2)^2 \pi \gamma \times L \times (d^2/8) = 0.139 \times 10^{-5} \quad kg\cdot m^2$$

m_s ：丝杠轴质量(Mass of Screw Shaft) kg
γ ：丝杠轴比重(Specific gravity of Screw Shaft)＝7,850kg/m^3
d ：丝杠轴外径(Shaft dia.)＝0.01m
L ：丝杠轴长度(Shaft length)＝0.18m

$$\alpha = (2\pi N)/60t = 5{,}026.5 \quad rad/sec^2$$

N ：最高速度(Max speed)＝ 2,400min^{-1}
t ：加速时间(Acceleration time)＝0.05sec

$$T_1 = 5{,}026.5 \times (2.53 + 0.139) \times 10^{-5} = 0.134 N\cdot m$$

2)负载扭矩T_2的计算(Calculation of Load Torque T_2)

$$T_2 = mgr/(2\pi\eta) = 0.173 N\cdot m$$

m：移动物质量(Mass of moving object)＝10kg
g：重力加速度(Gravity Acceleration)＝9.807m/sec^2
r：滚珠丝杠导程(Ball Screw Lead)＝0.01m
η：滚珠丝杠效率(Ball Screw efficiency)＝0.9

3)进给丝杠系统的驱动扭矩T的计算

根据以上计算，在不考虑支撑轴承等产生的扭矩时，滚珠丝杠轴系统的驱动扭矩如下所示。

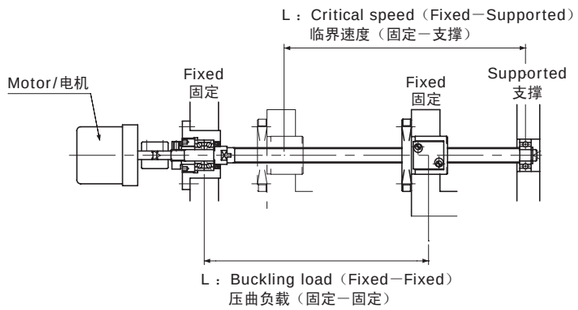
3)Calculation of Driving Torque T for feed screw system

In case without consideration of Torque by support Bearings, Driving Torque of Ball Screw is as follows.

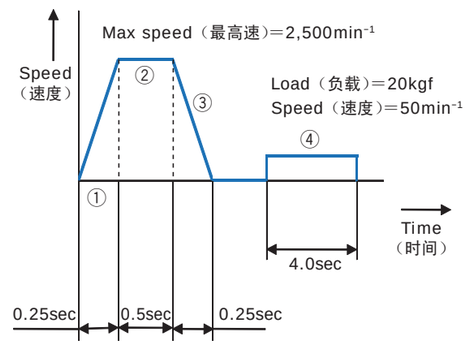
$$T = T_1 + T_2 = 0.134\ N\cdot m + 0.173\ N\cdot m = 0.307 N\cdot m$$

例2：横轴规格 小型车床
Example 2 ： Horizontal Small lathe

滚珠丝杠的型号和使用条件
Ball Screw model and operating condition



Operating pattern（运行周期线图）



滚珠丝杠的主要技术参数	Ball Screw spec.
轴径＝ϕ12mm	Shaft dia.＝ϕ12mm
导程＝2mm	Lead＝2mm
丝杠轴底径 d＝ϕ10.6mm	Shaft Root dia. d＝ϕ10.6mm
基本额定动负载Ca＝1,900N	Dynamic Capacity Ca＝1,900N
安装间距L＝400mm	Mounting span L＝400mm
轴向间隙＝0μm以下	Axial play＝0μm or less
移动物重量 W＝500kgf	Weight of moving object W＝500kgf
滑动面摩擦系数 μ＝0.01	Sliding surface friction coefficient μ＝0.01

运行条件	Operating Pattern
最高速度＝5m/min	Max Speed＝5m/min
**导程2mm时2,500 min^{-1}	** 2,500 min^{-1} because of Lead 2mm
周期线图：参照上图	Operating pattern ： see diagram above
①加速＝0.25sec	①Acceleration＝0.25sec
②等速＝0.5sec	②Constant speed＝0.5sec
③减速＝0.25sec	③Deceleration＝0.25sec
④负载作用时＝4.0sec	④Working＝4.0sec
负载＝20kgf	Load＝ 20 kgf
切削时进给＝50min^{-1}	Revolution at turning＝50 min^{-1}

许用轴向负载的计算

1)弯曲负载的探讨

根据目录第A815页的计算公式来计算压曲负载。

$$P = \alpha \times \frac{n\pi^2 E \cdot I}{L^2} \quad N\{kgf\} \qquad I = \frac{\pi}{64} d^4 \quad mm^4$$

将安全系数α＝0.5、
杨氏模量 E＝21,200kgf/mm²、
底径 d＝10.6mm、固定—固定的安装系数 n＝4、
安装间距L＝400mm代入上式。

P＝1,620kgf

该值远大于使用负载，因此没有问题。

2)相对于屈服应力的许用负载的探讨

根据目录第A815页的计算公式计算。

$$P = \sigma \times A \quad N\{kgf\} \qquad A = \frac{\pi}{4} d^2 \quad mm^2$$

将许用应力σ＝10 kgf/mm²、
底径d＝10.6mm代入上式。

P＝ 882kgf

该值远大于使用负载，因此没有问题。

Calculation of permissible Axial load

1)Study of Buckling load

Calculate Buckling load according to the following formula in Catalogue page A815.

Substitute safety factor α＝0.5,
Young's modulus E＝21,200kgf/mm²,
Root diameter d＝10.6mm,
Fixed—Fixed mounting factor n＝4,
mounting span distance L＝400mm in formula above.

P＝ 1,620 kgf

It is more than maximum Load so that there is no problem.

2)Study of permissible Load for yield stress

Calculate permissible Load for yield stress based on catalogue page A815.

Substitute permissible stress σ＝10 kgf/mm²,
Root diameter d＝10.6mm in the formula above.

P＝ 882kgf

It is more than maximum Load and there is no problem.

许用转速的计算

根据目录第A816页的计算公式计算。

$$N = \beta \times \frac{60 \cdot \lambda^2}{2\pi} \times \sqrt{\frac{E \cdot I \cdot g}{\gamma \cdot A \cdot L^4}} \quad min^{-1}\{rpm\}$$

$$I = \frac{\pi}{64} d^4 \quad mm^4 \qquad A = \frac{\pi}{4} d^2 \quad mm^2$$

将安全系数α＝0.8、
杨氏模量 E＝21,200kgf/mm²、
重力加速度 g＝ 9.8×10³mm/sec²
比重 γ＝7.85×10⁻⁶kgf/mm³、
底径 d＝10.6mm、
固定—支撑的安装系数 λ＝3.927、
安装间距L＝400mm代入上式。

N＝100,000min⁻¹

该值远大于最高转速，因此没有问题。

Calculation of permissible Revolution

Calculate permissible Revolution based on the catalogue page A816

Substitute safety factor α＝0.8,
Young's modulus E＝21,200kgf/mm²,
gravity acceleration g＝9.8×10³ mm/sec²,
material specific gravity γ＝7.85×10⁻⁶kgf/mm³,
Root diameter d＝10.6mm,
Fixed—Support mounting factor λ＝3.927,
mounting span distance L＝400mm in formula above.

N＝100,000min⁻¹

Therefore, it is more than maximum Revolution and there is no problem.

基本额定寿命的计算　Calculation of Basic Rating Life

1)根据周期线图计算负载条件

Calculation of Load condition according to the operating pattern diagram

速度(Speed)V＝5m/min＝83.3mm/sec
加速度(Acceleration)α ＝83.3/0.25＝333mm/sec^2＝0.333m/sec^2
加速产生的负载(Load due to Acceleration) $F = m\alpha = (W/g)\alpha = (500/9.807)\times 0.333 = 17$ kgf
恒速时的负载(Load during constant speed) $F_1=\mu W=5$kgf
恒速时的转速(Revolution at constant speed) $N_1=2{,}500$ min^{-1}
加速时的负载(Load during acceleration) $F_2 = F + F_1 = 22$ kgf
加速时的转速(Revolution at acceleration) $N_2=2{,}500/2=1{,}250$min^{-1}
减速时的负载(Load during deceleration) $F_3=F - F_1=12$kgf
减速时的转速(Revolution at deceleration) $N_3=2{,}500/2=1{,}250$ min^{-1}
切削时的负载(Load during turning) $F_4=20$kgf
切削时的转速(Revolution at turning) $N_4=50$min^{-1}

总结上述结果,如下表所示。
Sum up calculation results above, results are as follows.

Operating Pattern 条件	Axial load 负载 kgf	Revolution 转速 min^{-1}	time 使用时间 sec	Percentage 使用频率 %
①	17	1,250	0.25	5
②	5	2,500	0.5	10
③	12	1,250	0.25	5
④	20	50	4.0	80

2)平均负载、平均转速的计算

根据目录第A825页计算平均负载。

2)Calculation of average Load, average Revolution

According to catalogue page A825, average Load Fam is as follows.

$$Fam=\left(\frac{F_1^3N_1t_1+F_2^3N_2t_2+F_3^3N_3t_3+F_4^3N_4t_4}{N_1t_1+N_2t_2+N_3t_3+N_4t_4}\right)^{1/3} \quad N\{kgf\}$$

将上表中的数值代入后得出,Fam＝12.3kgf

Substitute each number in table in the formula above, Fam ＝ 12.3 kgf.

此外,将上表的数值代入目录第A825页的公式,得出平均转速N_m＝415min^{-1}。

In case of the average Revolution, substitute each number in table in the following formula, N_m ＝ 415 min^{-1}

$$N_m = \left(\frac{N_1t_1+N_2t_2+N_3t_3+N_4t_4}{t_1+t_2+t_3+t_4}\right) = 415\text{min}^{-1}$$

3)基本额定寿命的计算

将平均负载Fam和平均转速N_m代入目录第A825页的寿命计算公式中,可得出以下结果。

3)Calculation of Basic Rating Life

Substitute the average Load Fam and Revolution N_m in the following formula, page A825 in catalogue.

$$L_{10h}=\left(\frac{10^6}{60\cdot N_m}\right)\times\left(\frac{Ca}{f\cdot Fam}\right)^3 = 8.57\times 10^4 \quad 小时(hours)$$

其中,假设基本额定动负载Ca＝190kgf、负载系数f＝1.2。

Here, Basic Dynamic Load Rating Ca ＝ 190 kgf, Load factor f ＝ 1.2.

存放、操作及使用注意事项

●滚珠丝杠操作注意事项

滚珠丝杠属于精密零件，请遵照下述事项谨慎操作。

存放

存放时，请保持本公司原装包装状态。请勿随意开包或弄破内部包装。
否则会有异物进入或生锈，从而导致产品性能下降 。

操作

1.严禁拆分产品。否则会导致异物进入、精度下降或引发事故。
2.重新组装时，如果组装错误，可能会导致滚珠丝杠的功能丧失。因此，客户请勿自行重新组装。请将产品送回本公司，我们将有偿为您维修并重新组装。
3.滚珠丝杠的轴和螺母可能会因自重而掉落，请注意避免受伤。如果掉落，可能会因循环部件受损而导致性能下降，因此请务必委托本公司进行检查。请务必将产品送回本公司。我们将有偿为您检查。
4.如果滚珠丝杠掉落，循环部件、轴的外径以及钢珠等可能会划伤、损坏。这可能会导致产品功能丧失，如回转不良等。

●滚珠丝杠使用注意事项

防尘

请在清洁环境下使用滚珠丝杠。请同时使用防尘罩等防止异物、切屑等进入滚珠丝杠中。如果因防尘不当而导致异物、切屑等进入滚珠丝杠，可能会降低滚珠丝杠的性能或损坏循环部件，从而导致产品锁死。

润滑

请在使用前确认润滑状况。如果润滑不良，可能会导致滚珠丝杠在短期内丧失功能。
此外，防锈油并非润滑剂，使用前请用精制煤油等清洗滚珠丝杠，去除防锈油后涂上润滑剂（油脂或润滑油）。在常规用途下使用时，请每2～3个月检查一次油脂。使用过程中油脂变脏时，请擦去旧的油脂后涂抹新油脂。

许用转速和许用轴向负载

根据尺寸、材质及安装方式等不同，滚珠丝杠会受到轴向负载和转速的限制。建议在产品的设计阶段就使用条件与本公司充分协商。关于使用条件，请充分利用卷末的技术数据表。

超程

滚珠丝杠螺母发生超程时，可能导致钢珠脱落、循环部件受损或钢珠槽产生压痕等，从而引起动作不良。如果在该状态下继续使用，还可能导致早期磨损或循环部件损坏。因此请务必避免超程。
发生超程时，请与本公司联系检查事宜。我们将有偿为您检查。

使用温度

使用温度的极限通常设计在80°C以下。超过该温度使用时，可能会产生如下现象：

· 钢珠循环性能下降；
· 循环部件损伤或损坏；
· 相对于热处理部位的硬度降低。

如需在超过80°C的条件下使用，请垂询本公司。

偏负载

滚珠丝杠是一种产生轴向推力的机械元件，其结构不能承受径向负载和力矩负载。请注意避免对螺母部施加径向负载和力矩负载。如果滚珠丝杠承受径向负载或力矩负载，将会导致滚珠负载不均，从而显著缩短产品的使用寿命。
另外，安装滚珠丝杠时，轴承部与螺母托架之间的偏心也会导致偏负载，敬请注意。

Precaution of storage, handling and operating

●Handling precaution for Ball Screws

Ball screws are precision components, and must be handled carefully in accordance with the instruction below.

Storage

Ball Screws should be stored unopened in their original KSS packaging. Avoid opening the package or breaking the inner package unnecessarily. This may result in contamination or rusting, and may degrade operating performance.

Handling

1.Never disassemble Ball Screws. This will cause contamination, reduce accuracy, and lead to accidents.
2.Customers should not attempt to reassemble Ball Screws themselves. Incorrect reassembly can easily result in malfunction. Ball Screws should be returned to KSS, where they will be repaired and reassembled for a fee.
3.Take care to avoid injuries due to falling Ball Screw Shafts or Nuts. If dropped, performance may be adversely affected by damage to the recirculating component. Ball Screws must therefore be inspected by KSS for a fee. Please make sure you return dropped Shafts or Nuts.
4.Dropping Ball Screws may cause scratching or impact damage to recirculating components, Shaft outside diameters, Balls, or screw grooves, which may cause malfunction, such as incorrect rotation.

●Precaution of Ball Screw for operating

Dust proof

Ball Screws must be used in a clean environment. They should be used with a dustproof cover to prevent contamination from dust or swarf. Dust or swarf contamination due to insufficient dust protection may reduce the Ball Screw performance, cause damage to recirculating components, which lead to locking.

Lubrication

Check lubrication before use. Insufficient lubrication will rapidly deteriorate the operating performance of the Ball Screw. Since anti-rust oil is not lubricant（Grease/ Oil）, Ball Screws should be washed off anti-rust oil with clean Kerosene and apply lubricant before using Ball Screws. Please check the lubricant condition every 2 to 3months. If Grease is contaminated, remove old Grease, and replace with new Grease.

Critical speed and Axial load

Ball Screws have the maximum limit of speed and Axial load depending on its size, material, mounting method etc. when design Ball Screws, KSS would recommend that you consult with KSS engineering about the operating condition and model selection. To release your operating condition, please use Technical Data Sheet at the end of this catalogue.

Over-run

Allowing Ball Screw Nuts to overrun may result in malfunctioning due to Balls escaping, damage to recirculation components, and indentation of the Ball grooves. Continued use in this state will lead to rapid wear and damage to recirculation components. Ball Screw Nuts must therefore never be allowed to overrun. If overrunning occurs, contact KSS for an inspection for a fee.

Temperature

Ball Screws are designed to be used at operating temperatures up to 80°C. Avoid use at higher temperatures. This may result in the following problems .

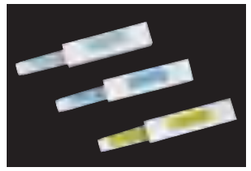
· Reduced performance of Ball recirculation, and smooth movement.
· Damage to recirculation components.
· Reduced hardness of heat treated components.

If it is necessary to work beyond the recommended temperatures, please consult with KSS first as we may be able to provide a solution.

Moment load or Radial load

Ball Screws primarily generate thrusts in the axial direction, and are not designed to withstand Radial loads and Moment loads. Care must be taken not to apply Radial loads and Moment loads to the Nut. If there loads act on the Ball Screws, Ball load uniformity is lost, and the life of Ball Screws is drastically reduced. When installing Ball Screws, misalignment between Ball Screw and Support Bearings or Nut Bracket causes the unbalanced load on Ball Screw, care must be taken.

微型滚珠丝杠专用油脂
Original Grease for Miniature Ball Screws



①MSG No.1(45cc, 380cc)：定位用 / Positioning usage

②MSG No.2(45cc, 380cc)：常规用途 / General usage

③MCG No.1(45cc)：无尘室专用 / Clean room usage

滚珠丝杠的动作特性一般会受到油脂特性的影响。
尤其是微型滚珠丝杠会受到很大的油脂稠度引起的搅拌阻力的影响，在涂抹油脂后丝杠扭矩可能会增大。因此，油脂的选择极为重要。
作为微型滚珠丝杠的专业厂商，本公司发挥多年积淀的技术专长，研发出了无损微型滚珠丝杠动作特性、且润滑性能优异的油脂。同时还备有起尘量极少的无尘室专用油脂。
客户可根据用途选择最适用的专用油脂。

In general, it is known that the operation characteristic of the Ball Screws is influenced by properties of Grease. Especially, the stir resistance of Grease influences Ball Screw torque after applying Grease. Selection of Grease is extremely important in the Miniature Ball Screws. KSS has developed Ball Screw excellent Grease, which has high lubrication performance without deteriorating Ball Screw operation.
KSS has also developed its exclusive Grease, which keeps smooth feeling and less contamination under clean room environment.
We think the best special Grease is prepared respectively according to customer's usage.

●特点

摩擦系数小、粘附性良好、润滑性优异，是最适于微型滚珠丝杠的油脂。
根据用户的不同用途，本公司备有常规环境下使用的稠度1号、稠度2号以及在无尘室使用的稠度1号油脂。

●Features

It is the best Grease for the Miniature Ball Screws, which has low coefficient of friction, good adhesion characteristic, excellent lubricity.

●用途

常规环境用	MSG No.1：	精密定位用途 最适于特别注重动作特性的用途。
	MSG No.2：	常规用途 较高转速下粘附性也很优异。
无尘室专用	MCG No.1：	用于无尘室内的低速定位， 注重低起尘和动作特性。

●Application

General use	MSG No.1：	High positioning usage appropriate for high smoothness requirement.
	MSG No.2：	General usage appropriate for high speed.
Clean room use	MCG No.1：	High positioning usage in clean room focused on less contamination, high smoothness.

●基本规格　Specifications

	MSG No.1	MSG No.2	MCG No.1
Application / 用途	General use / 一般规格	General use / 一般规格	Clean room use / 无尘室规格
Thickener / 增稠剂	Lithium / 锂皂	Lithium / 锂皂	Lithium / 锂皂
Base-oil / 基油	Synthetic oil / 合成油	Synthetic oil / 合成油	Synthetic oil / 合成油
Appearance / 外观	Light brown / 浅褐色	Light brown / 浅褐色	Beige / 米色
Consistency / 混合稠度	310～340	265～295	310～340
Temp.range / 使用温度范围	−60～120°C	−60～120°C	−30～120°C
Type / 型号	MSG-1-380, MSG-1-45	MSG-2-380, MSG-2-45	MCG-1-45

注1)型号末尾的数字表示封入量。
（380：380cc装、45：45cc装）
注2)在常温以外的环境下使用KSS原装油脂时，请垂询本公司。

Note 1)380：380cc contained, 45：45cc contained
Note 2)In case of the usage of this grease under other than room temperature, please consult KSS.

●油脂摩擦试验机（MSG No.1、MSG No.2）

1)试验装置
- 销盘式摩擦磨损试验机（照片 B-11）
- 销：3/16 英寸钢珠（SUJ2　HRC60～62）
- 负载：50N ⇒ 250N或350N（10N递增方式）
- 圆盘材料：SCM415（表面粗糙度＝0.8s）渗碳淬火（HRC58～62）

●Grease Friction Test（MSG No.1、MSG No.2）

1)Testing device
- Pin-on Disk test machine（Photo B-11）
- Pin：3/16 inch Steel Ball（SUJ2　HRC60～62）
- Load：50N ⇒ 250N or 350N（Step up each 10N）
- Disk material：SCM415（surface roughness＝0.8s）Case hardening（HRC58～62）

照片 B-11：销盘式摩擦磨损试验机
Photo B-11：Pin-on Disk test machine

2)其他油脂与MSG的比较数据
参照图B-12、B-13
试样A、B、D：锂基油脂
试样C：脲基油脂

2)Comparison data to other Grease
See Fig. B-12, B-13
Sample A,B,D：Lithium based Grease,
Sample C：Urea based Grease

从图中可以看出，MSG No.1几乎没有摩擦系数增大现象，有利于滚珠丝杠发挥其动作特性。

MSG No.1 hardly increase coefficient of friction.
It has an advantage for smooth operation.

Disk rev.（圆盘转速）＝100min^{-1}

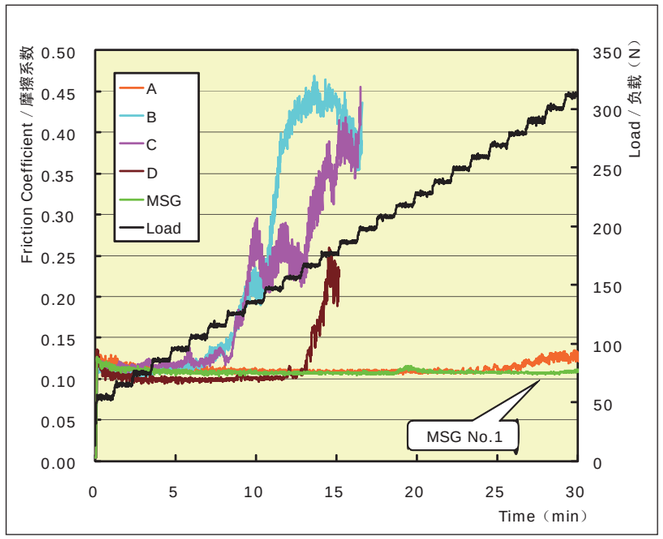


图 B-12：MSG No.1与其他油脂的比较图
Fig. B-12：Comparison btw MSG No.1 & others

MSG No.2即使在较高转速下，摩擦系数的增大也很少，可维持丝杠的动作特性。

MSG No.2 does not increase coefficient of friction under the relatively high speed.

Disk rev.（圆盘转速）＝500min^{-1}

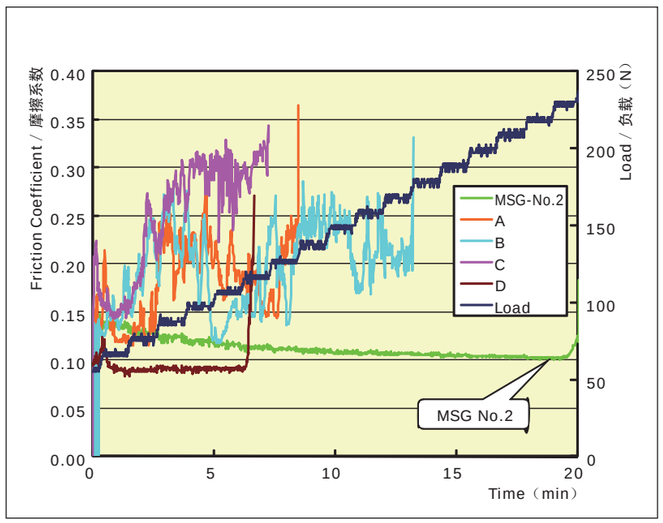


图 B-13：MSG No.2与其他油脂的比较图
Fig. B-13：Comparison btw MSG No.2 & others

●油脂承载能力测量

1)测量装置和测量方法

· 测量装置：
曾田式四球磨损试验机(照片 B-14)
· 测量方法：
750 min^{-1} 阶跃载荷方式(3/4 inch Ball)***

***注)阶跃载荷方式
将试样设置在试验机上，从0.5kgf/cm^2(0.049MPa)起，每1分中增加0.5kgf/cm^2的压力进行试验，产生烧结时的压力减去0.5kgf/cm^2的值即为承载能力。数值越大，油脂越不易烧结。

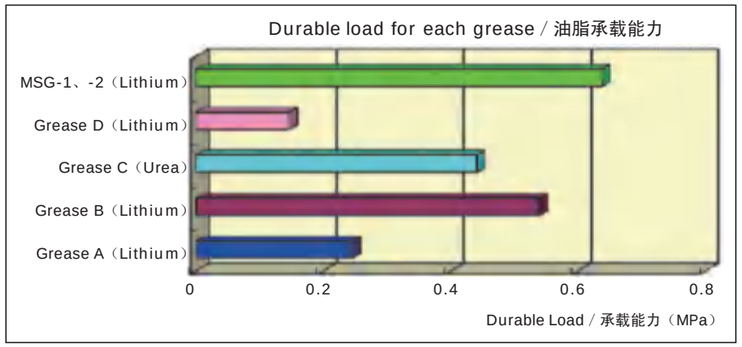
●Grease Load Test (MSG No.1、MSG No.2)

1)Testing device and method

· Testing device and method :
SOTA-4-Ball test machine(Photo B-14)
· Testing method :
750 min^{-1} Step load method
(3/4 inch Ball)***

***Note)Step load method
Pressure is added by each 0.5kgf/cm^2(0.049MPa) from the first 0.5kgf/cm^2 in every one minutes.
Durable load are defined when discoloration occur.

2)测量结果 Test results



照片 B-14：曾田式四球磨损试验机
Photo B-14 : SOTA-4-Ball wear test machine

●油脂起尘试验 (MCG No.1)

1)测量装置和测量方法

· 测量装置：照片 B-15
· 滚珠丝杠尺寸：ϕ10mm / 导程 15mm
· 测得的转速：500min^{-1}

比较本公司生产的常规用途油脂(MSG No.2)与其他公司生产的常规用途油脂后可以发现，本公司生产的KSS无尘室规格油脂MCG No.1即使经过运行时间后起尘量也很少。

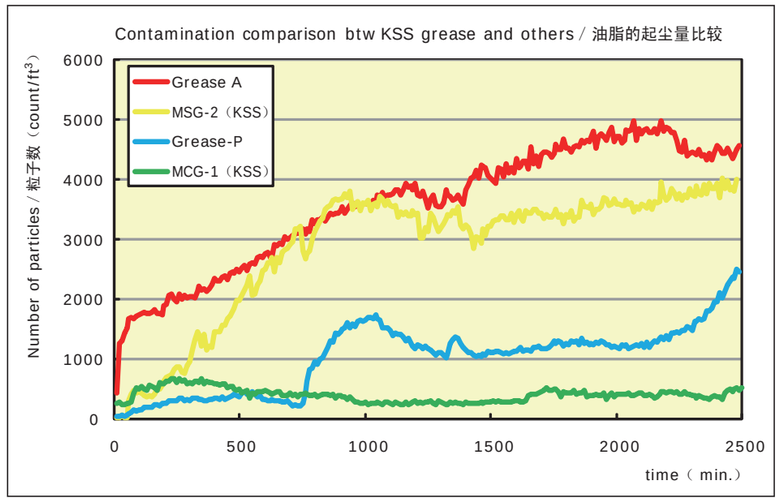
●Grease Contamination Test (MCG No.1)

1)Testing device and method

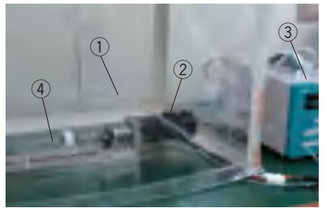
· Measurement device : see Photo B-15
· Ball Screw size : ϕ10mm / Lead 15mm
· Revolution : 500min^{-1}

KSS clean room Grease (MCG No.1) has less contamination compared to other Grease such as KSS general use Grease (MSG No.2) and other competitor's (Grease-A,-P)as the time passed.

2)测量结果(0.5μm粉尘) Test result(0.5μm particle)



①Suction / 吸引泵
②Servo Motor / 伺服电机
③Particle Counter / 计数器
④Sample / 试样



照片 B-15：清洁台
Photo B-15 : Clean bench

⚠操作注意事项

操作注意事项

· 如果油脂误入眼中，可能会引发炎症。
操作时请佩戴护目镜等防护用品，以免油脂误入眼中。
· 油脂如果触及皮肤，可能会引发皮肤炎。
操作时请佩戴保护手套等防护用品，以免油脂触及皮肤。
· 请勿饮用或食用。
(如果吞入腹中，可能会引起腹泻或呕吐。)
· 请将油脂放置于儿童用手够不到的场所。

应急处理

· 油脂一旦误入眼中，请用清水冲洗15分钟，并立即接受医生治疗。
· 油脂触及皮肤时，请用肥皂水充分清洗。
· 油脂吞入腹中时，请勿强行催吐，应立即接受医生治疗。

废油和废容器的处理

· 相关法令对油脂的处理方法作了明确规定。请依照法令正确处理。
· 不了解处理方法时，请咨询经销商后再处理。

存放方法

· 请用密封塞对油脂进行密封，以防脏物或水分等混入。
· 请避开直射阳光，存放于阴暗之处。

⚠Handling instruction

Handling Precaution

· It might be inflammatory when entering eyes.
Wear glasses when you handle it.
· When it touches the skin, it might be inflammatory.
Wear globes when you handle it.
· Do not eat or drink it.
It is likely to have loose bowels, and to vomit when drinking.
· Put the Grease on the place where child's hand does not reach.

First aid

· Wash for 15 minutes by clean water, and receive the doctor's diagnosis when it enters eyes.
· Wash enough with water and soap when it touches your skin.
· Receive the doctor's diagnosis without forcibly vomiting when drinking.

Disposal

· Dispose properly according to the law.
· Consult manufacturer about an uncertain point.

Storage

· Seal up to avoid mixing garbage and moisture.
· Avoid direct sunlight, and keep it in darkness.

接单生产 MG系列
Customized products MG series

本公司除了生产滚珠丝杠外，还生产精密进给丝杠。
精密进给丝杠具有滚珠丝杠所没有的小节距，可用于精度要求不高的场合。

KSS manufactures not only Ball Screws but also Precision Lead Screws.
It can be used as small Pitch which Ball Screws do not have, and it can be achievable when less precise products are needed.

●特点

可选择小节距
可选择难以用滚珠丝杠设定的小节距。

产品种类齐全
本公司以JIS规定的公制细牙螺纹、公制粗牙螺纹为标准，也可以提供梯形螺纹、统一协定螺纹、ACME螺纹、特殊节距、多条螺纹等。

低扭矩
充分发挥螺纹量规生产的技术专长，利用高超的研磨技术和镜面加工技术制造而成的丝杠产品，螺纹加工面表面粗糙度低、导程误差小，实现了低扭矩和低磨损。

螺母形状的自由度
螺母无形状限制，可根据客户设计制成各种形状。

●Features

Possible to select small Pitch
It is possible to select small Pitch which Ball Screws do not have.

Wide variety of size
Metric Fine Thread and Metric Coarse Thread based on JIS（Japanese Industrial Standard）are standardized but we also manufacture Trapezoidal Thread, Unified Screw Thread, ACME Screw Thread, special Pitch, and multiple start Thread.

Low torque
With knowhow of screw gauge, we make use of grinding technique, and lapping technique, so fine surface roughness and low wobble become reality, which lead low torque and less wear.

Flexibility of Nut configuration
Nut configuration is not restricted and it is possible to manufacture in accordance with customer's design.

●公称型号的构成　Model number notation

MG　6　P=0.5（2N）—　120　R　150
①　②　③　④　⑤　⑥　⑦

①进给丝杠符号
　MG：精密进给丝杠
　　M：普通进给丝杠
　**非公制螺纹时符号不同。
②丝杠轴外径（mm）
③节距（mm）
④螺纹条数
　2N＝2条，1条时省略
⑤螺纹部长度（mm）
⑥螺纹旋向　R＝右旋，L＝左旋
⑦丝杠轴总长（mm）

①Lead Screws series No.
　MG：Precision Lead Screws
　　M：General Lead Screws
　**Sign differs other than M-thread Screw.
②Screw Shaft outside diameter（mm）
③Pitch（mm）
④Number of Thread
　2N＝double-start thread、No identified for single-start thread
⑤Screw thread length（mm）
⑥Thread direction　R＝Right-hand, L＝Left-hand
⑦Screw Shaft total length（mm）

注1）型号列于本公司出示的“规格表”中。
注2）精度等级、轴向间隙未列入公称型号。
Note 1）Model number is mentioned in specification document that we hand in.
Note 2）Accuracy, Axial play are not mentioned in Model number notation.

●材质和表面硬度　Material & Surface hardness

Components / 零件	Material / 材质	Surface hardness / 表面硬度
Shaft / 丝杠轴	SKS3、SCM415、SUS440C	HRC50 or more （HRC50以上）
	SUS303	N/A（无规定）
Nut / 螺母	BC6、C5191B	N/A（无规定）

注1）本公司也可承接满足RoHS标准的无铅铜合金（AQ30）产品的生产。
Note1）Leadless Copper alloy（AQ30）which conforms to RoHS regulation is available.

●丝杠轴外径与节距的组合　Combination of Shaft dia. & Pitch

Unit（单位）：mm

Shaft dia. 轴径 \ Pitch 节距	0.25	0.35	0.4	0.45	0.5	0.7	0.75	0.8	1.0	1.25	1.5	2.0
2	◎		○									
2.5		◎		○								
3		◎			○							
4					◎	○						
5					◎			○				
6					◎		◎		○			
7					◎		◎		○			
8					◎		◎		◎	○	□	
9					◎		◎		◎		○	□
10					◎		◎		◎		○	□

◎　含公制细牙螺纹在内的推荐型号
○　公制粗牙螺纹
□　公制梯形螺纹
　***空栏部分请垂询本公司。

◎　Recommended model including Metric Fine Pitch Thread.
○　Metric Coarse Pitch Thread.
□　Metric Trapezoidal Thread.
　***Blank ： Can be manufactured, but please inquire KSS.

●超小节距（0.1mm）进给丝杠 / Ultra Fine Pitch（0.1mm）Lead Screws

虽然上表中没有列出，但本公司通过多年来累积起来的加工技术，
生产出了超小节距（0.1mm）产品。
如需超小节距产品，请垂询本公司。

0.1mm Pitch is not shown on the table above, but with our machining technique, we have experiences to manufacture 0.1mm Ultra Fine Pitch Lead Screws. If 0.1mm pitch is needed, please inquire KSS.

●轴向间隙推荐值　Recommended Axial play

Unit(单位):mm

Axial play 轴向间隙	max. 0.005 0.005以下	0.005～0.010	0.010～0.020	0.015～0.030	0.020～0.050

●制造极限长度　Maximum Length

Unit(单位):mm

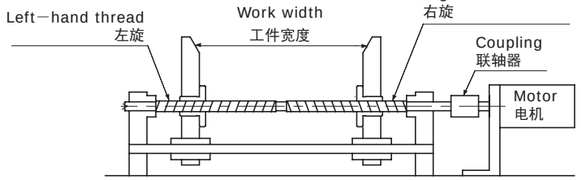
Grade 精度 \ Shaft dia. 丝杠轴外径	2	2.5	3	4	5	6	7	8	9	10
Precision type 精密级	25	30	80	120	160	200	250	300	350	400
Normal type 普通级	25	40	90	140	180	250	300	350	400	450

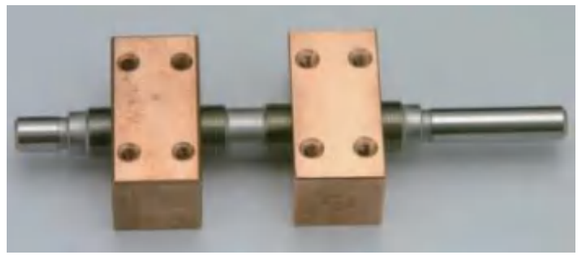
●双向进给丝杠

是在一根轴上同时加工左右旋螺纹，再分别安装螺母的开闭式进给丝杠。
由1台电机控制左右螺母的开闭运动，进行精密定位、确定宽度。
可生产任意形状的螺母。

●Bi-directional Lead Screws

Bi-directional Lead Screws which are machined Left handed and Right handed thread on a Shaft, and Nuts are mounted on each thread. Both Right and Left Nuts move symmetrically, precise positioning, and width adjustment by single motor. Nut configuration is designed freely to suit customer's requirements



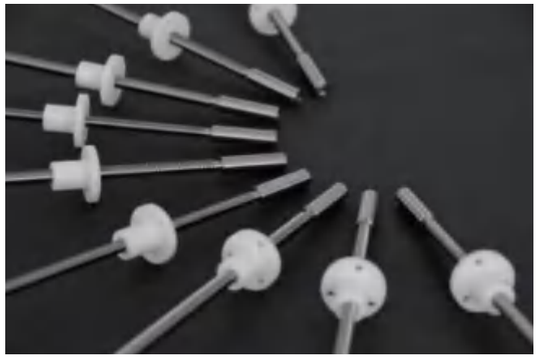


●特种进给丝杠

由于本公司的进给丝杠经过了研磨处理，因此将其称为精密进给丝杠。
如果客户需要，也可提供仅经过切削加工的经济型进给丝杠。大批量生产时，也可通过冷轧加工来生产丝杠轴。本公司还可生产采用树脂螺母的特种进给丝杠。该类产品的大批量生产也采用模具注塑成型。

●Special Lead Screws

KSS Lead Screws are defined as precision Lead Screws due to making use of grinding technique. According to customer's request, we manufacture Lead Screws which are done only machining process as a low price version. Moreover, when mass-production, it is possible to manufacture Screw Shaft by Rolling process.
The Lead Screws which have plastic Nuts are also available as special Lead Screws. In mass-production case, plastic Nuts are produced by injection mold.



●进给丝杠设计及使用注意事项

1)建议丝杠轴与螺母采用不同材质。
2)请注意避免螺纹面的表面压力和相对速度变高。
3)对于在螺纹面呈滑动接触的进给丝杠，润滑极其重要。请注意避免润滑不足现象。

●Precaution for design and use of Lead Screws

1)We recommend Shaft and Nut are made from different materials.
2)Make sure not to raise surface pressure and relative velocity on thread surface.
3)Lubricating is highly important for Lead Screws due to sliding contact by Flank surface. Make sure not to be lack of lubricant.

Precision Lead Screws 精密进给丝杠

树脂进给丝杠
Resin Lead Screws

●特点

· 由于丝杠轴上使用了SUS304（或SUS303），因此耐腐蚀性强。
· 轴径与导程的组合丰富多彩，选择范围广泛。
· MRH（标准材质）含有润滑剂，不加油也可使用。涂抹润滑剂后使用可使运行更顺畅。
· 采用与滚珠丝杠相同的拱弧槽，传动平滑。
· 以MRH型为标准，但可根据用途变更螺母材质。
· 也可通过选择无齿侧间隙型，将轴向齿隙设置为O。

●Features

· The Shaft is manufactured from SUS304(or SUS303), which gives excellent corrosion resistance.
· Wide range of combination of Shaft dia. and Lead are available.
· MRH incorporates a lubricating agent so it can be used without oiling. It is possible to obtain smooth movement with lubricant.
· Uses the same gothic arc grooves as Ball Screws, ensuring smooth transmission.
· MRH is standard in stock, but Nut material can be changed to order, based on the environmental condition.
· Selecting backlash free type, Axial play can be 0.

●种类

标准库存品

MRH-A、B系列：KSS产品

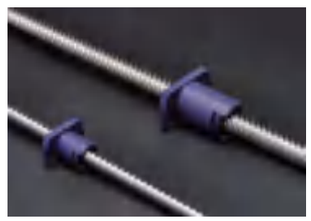
MRH标准库存品的螺母采用滑动性能良好的聚酰胺类树脂材质。该材质含有润滑剂，即使不加油也可使用。此外，其他材质也可作为选购件提供。

●Type

Standard products in stock

MRH-A,B series : KSS products

A Polyamide type Resin with good sliding properties is employed in the standard MRH Nut material. And because a lubricating agent is incorporated in the material, it can be used without oiling. Additionally, other Nut materials are available as options.



接单生产

MRH-BP2系列：KSS产品

采用滑动性能良好的聚酰胺类树脂，可通过双螺母＋中间弹簧组成无齿侧间隙构造。

Customized products

MRH-BP2 series : KSS products

A Polyamide type Resin with good sliding properties is employed.

Backlash free construction made possible with Double Nuts and a Spring in between.

接单生产

R-MSS(Y)系列：NTN精密树脂产品

具有耐腐蚀性、耐热性等性能，适用于多种环境，同时还备有高导程型（轴径的3倍）。

Customized products

R-MSS(Y) series : NTN Engineering plastics Corp. products

Corresponding to a wide range of environment and having corrosion resistance, heat resistance. High lead types(3 times as dia.) are available.

●丝杠轴公称外径与导程的组合　Combination of Shaft nominal dia. & Lead

Unit(单位)：mm

Shaft dia. 公称外径 \ Lead 导程	1	2	5	6	8	9	10	12	15	18	20	24	30	36
4	D109	D109												
6	D109	D105 D106 D109		D105 D106		D105 D106 D109				D109				
8	D109	D105 D106 D109	D105 D106		D105 D106			D105 D106 D109				D109		
10		D105 D106 D109		D105 D106			D105 D106		D105 D106 D109		D105 D106		D109	
12		D105 D106 D109		D105 D106			D105 D106			D109	D105 D106		D105 D106	D109
24														

注1)表中的数字表示产品刊载页码，D105和D109为齿侧间隙型的刊载页码，D106为无齿侧间隙型的刊载页码。
Note1)The numbers in each cell show pages in the catalogue. D105 and D109 are for back lash type, D106 is for backlash free type.

●规格

精度等级和间隙

KSS树脂导程丝杠的精度等级以滚珠丝杠的JIS Ct10为准，代表移动量误差按下式计算。
此外，轴向间隙为0.05～0.10mm（无齿侧间隙型除外）。

●Specifications

Accuracy grade and Axial play

Accuracy grade of KSS Resin Lead Screws is based on JIS Ct10. Actual mean travel deviation is calculated by following formula.
Axial play is 0.05 to 0.10mm(except Backlash free type).

代表移动量误差 / Actual mean travel deviation　ep：$ep = \frac{2 \times ru}{300} \times 0.21$（mm）

ru：螺纹部有效长度 / Effective Screw thread length(mm)

材　质　Material

Parts / 零　件	Material / 材质
Shaft / 丝杠轴	SUS304 or SUS303
Nut / 螺母	MC nylon（MC703HL）Nippon POLYPENCO LTD MC尼龙（MC703HL）日本POLYPENCO公司

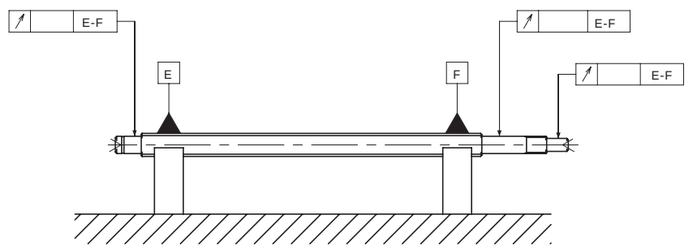
注1)适用于特殊环境的螺母材质请参照p-D104。
注2)需要上述以外的材质时，请垂询本公司。
Note 1)Please refer to p-D104 for Nut material suitable for special environment.
Note 2)If material other than the table is requested, please inquire KSS

丝杠轴安装精度

KSS树脂导程丝杠的丝杠轴安装部精度按下图进行标示、管理。
各部位的跳动精度标准以滚珠丝杠JIS Ct10为准。

Description of Run-out and location tolerance

Description of Run-out and location tolerance for KSS Resin Lead Screws is as follows.
Each part of Run-out tolerance is based on JIS Ct10 of Ball Screws.



●技术数据

螺纹槽形状

螺纹槽采用拱弧形状。与本公司滚珠丝杠所使用的槽形状基本相同。

机械效率

KSS树脂导程丝杠的机械效率η(%)可按下式计算。根据实测值统计得出的机械效率期待值为20～50%。一般情况下，导程越大，机械效率就越大。请以此为参考标准。

●Technical Data

Thread groove profile

The thread grooves are of a gothic arc design. This is basically the same as those used in our Ball Screws.

Mechanical efficiency

Mechanical efficiency of KSS Resin Lead Screws η (%) can be calculated by the following formula. The expected "Mechanical efficiency" calculated from measurements is 20%-50%.
Generally, as the Lead increases, "Mechanical efficiency" tends to be high. Please use this number as a reference.

$$\eta = \frac{Fa \times r}{T \times 2\pi} \times 100 \quad (\%)$$

Fa ：轴向负载 / Axial load(N)
R ：丝杠导程 / Screw Lead(m)
T ：旋转扭矩 / Rotational torque(Nm)

使用界限FV值和耐久数据

· 使用界限FV值

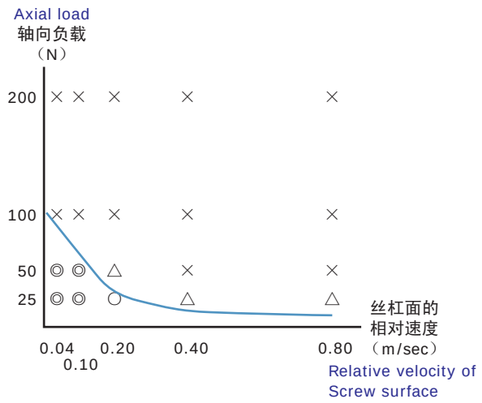
KSS树脂导程丝杠将轴向负载(F)与丝杠面相对速度(V)的乘积定义为FV值，是判断KSS树脂导程丝杠是否可用的大致标准。图D-11表示以MRH(材质:MC703HL)为螺母材料时，可进行无润滑运转的使用界限FV值。使用时，请用作参考。此外，可通过涂抹润滑剂改善运行条件。

FV value limits on use and endurance data

· FV value limits on use

For KSS Resin Lead Screws, the product of Axial Load and relative velocity of Screw surface is defined as FV, and this definition is reference to check if it is usable or not. Fig. D-11 is maximum FV which can be operated without lubricants in case of using Nut material MRH(Material : MC703HL).
Please use it as one of the reference. It is expected to improve operational condition by applying lubricants.

图D-11 ：使用界限FV值
Fig. D-11 ：FV value limits



实验型号 / Model ：MRH0805　　润　　滑 / Lubricant ：无 / None
运行评价 / Evaluation ：
◎可长时间保持稳定的运行状态。
Stable operational conditions were maintained for the long term.
○运行状态良好，但螺母处有磨损。
Operation were good, but some wears were seen on the Nuts.
△较短时间内即出现运行困难。
Operations became difficult in a relatively short time.
×很快出现运行困难。
Operations became difficult in the short time.

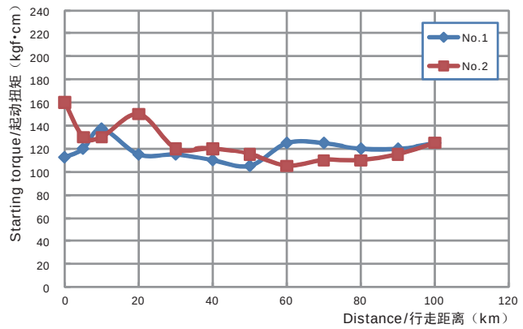
结果显示，FV＜5(N·m/s)时运行较为稳定。
FV＞10（N·m/s)时，难以稳定运行。
轴向负载的上限设定应比相对速度更为严格。

In case of FV＜5(N· m/s), stable operations were maintained.
Operations under FV＞10（N· m/s), maintaining stability was difficult.
Axial Load should be treated more carefully as to upper limits rather than relative speed.

· 预压品(BP2型)的耐久试验数据
Endurance test data of Preloaded products(BP2 type)

型　　号 / Model　：ϕ10mm、导程 / Lead ＝ 6mm
负　　载 / Load　：空载 / None
速　　度 / Speed　：1000rpm
行　　程 / Travel　：400mm(往复 / 2-way)
润　　滑 / Lubricant ：无 / None
耐久结果 / Result　：行走100km后无异常
After running 100km, operation were good.
起动扭矩变化 / Starting Torque monitor ：参照右表
see Diagram right

Starting torque during operation / 行走中起动扭矩的变化



●特殊品

KSS树脂导程丝杠除标准材质MC尼龙(MC703HL)外，也可采用下述螺母材质。
螺纹槽也可采用梯形螺纹、ACME螺纹等特殊形状，详情请垂询本公司。
大批量订购时，选择以注塑为前提的材料可降低螺母成本。

●Special products

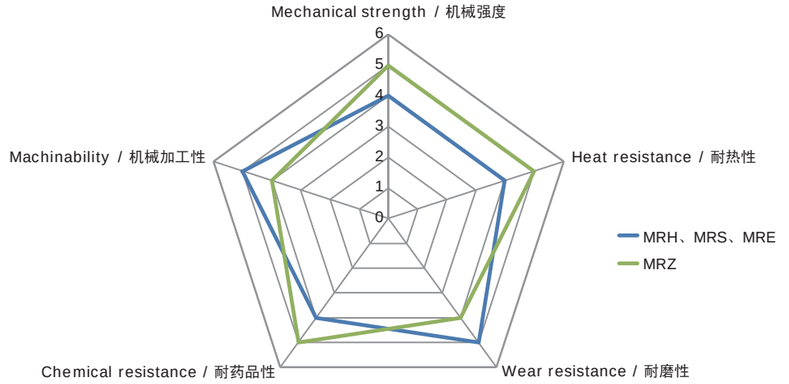
Regarding KSS Resin Lead Screws, the standard material of Nut is MC nylon(MC703HL), but we also provide with the following Nut materials.
Please inquire KSS if Trapezoidal thread and ACME thread are needed.
In case of bulk order, it is possible to save the price to select material which is manufactured by injection molding.

表D-12 ：各种产品性能比较表　Table D-12 ：Product performance comparison

Product 产品名称	MRH	MRS	MRE	MRZ
Classification 产品类别	Standard 标准库存品	Customized 接单生产		
Operating environment 使用环境	Standard environment 常规环境			Special environment 特殊环境
Nut appearnce 螺母外观				
Material 材质	Polyamide type 聚酰胺类			Polyether ether ketone type 聚醚醚酮类
Features 特点	Balanced performance 平衡特性			Flame resistance, heat/water resistance 阻燃性　耐热水性
Other 其他	Good sliding properties 滑动特性良好	—	Good electrical conductivity 导电性良好	Food hygiene, chemical resistance 食品卫生性　耐热性
Mechanical strength 机械强度	○	○	○	◎
Heat resistance 耐热性	○	○	○	◎
Wear resistance 耐磨损性	◎	◎	◎	○
Chemical resistance 耐药品性	○	○	○	◎
Machinability 机械加工性	◎	◎	◎	○

◎ 优异 / superior
○ 可用 / usable
△ 略差 / relatively inferior
▲ 较差 / Inferior

图D-13 ：各种材料评价　Fig. D-13 ：Evaluation each material



MRH–A、B系列(标准库存品)

MRH-A,B series(Standard Products)

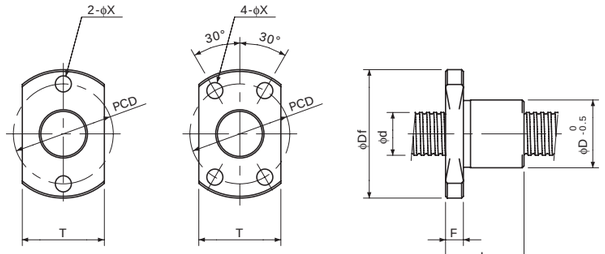
●尺寸表 Dimension table

公称型号的构成 Model number notation

MRH 06 02 A — 300 R 300 N2

①螺母类型符号
②丝杠轴公称外径(mm)
③导程(mm)
④法兰形状
A：2孔 …… 仅ϕ6mm产品
B：4孔
⑤螺纹部长度(mm)
⑥螺纹旋向(仅右旋)
⑦丝杠轴总长(mm)
⑧螺母个数
(例：N2表示带2个螺母　带1个螺母时无符号)

①Nut model
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Flange configuration
A：2 holes …… Only products with ϕ6mm
B：4 holes
⑤Screw thread length(mm)
⑥Thread direction(Right-hand only)
⑦Screw Shaft total length(mm)
⑧Number of Nut
(Example：N2 means 2 Nuts on a Shaft. There is no notation when 1 Nut.)



A type / A 型　　B type / B 型

Unit(单位)：mm

Model 型号	Screw Shaft 丝杠轴				Nut 螺母								Standard Shaft length 标准轴长
	Dia. 公称直径 d	Lead 导程	Root dia. 底径	No. of threads 螺纹条数	D	L	Df	F	P.C.D	X	Nut type 螺母类型	T	
MRH0602A	6	2	5.1	1	10	14	20	3	15	3.1	A	10	300
MRH0606A		6	5.2	2									
MRH0609A		9	5.3	4									
MRH0802B	8	2	6.6	1	13	16	26	4	20	3.6	B	17	400
MRH0805B		5	6.6	2									
MRH0808B		8	6.7	2									
MRH0812B		12	6.7	4									
MRH1002B	10	2	8.6	1	15	20	28		22			19	500
MRH1006B		6	8.4	2									
MRH1010B		10	8.4	2									
MRH1015B		15	8.4	4									
MRH1020B		20	8.7	4									
MRH1202B	12	2	10.6	1	18	24	31		25			20	600
MRH1206B		6	10.4	2									
MRH1210B		10	10.4	2									
MRH1220B		20	10.4	6									
MRH1230B		30	10.4	8									

注1)建议由本公司进行丝杠轴的追加加工。
如果由其他公司进行追加加工，本公司将不能保证追加加工后的精度，敬请谅解。
注2)如果由其他公司进行追加加工，加工时请将螺母从丝杠轴上拆下，并在加工后用清洁的精制煤油将附着在丝杠轴上的污垢等清洗干净。
注3)请将丝杠轴的轴端直径指定为不超过丝杠轴底径，并以1mm为单位指定丝杠长度。
注4)螺纹旋向仅为右旋。
注5)丝杠轴、螺母不单售。

Note 1)Additional machining of Screw Shafts should be performed by KSS. Note that accuracy cannot be guaranteed if additional machining is performed by someone other than KSS.
Note 2)When additional end-journal machining is performed by someone other than KSS, always remove the Nut from the Screw Shaft. After machining, wash away any debris on the Screw Shaft with clean refined kerosene or similar material.
Note 3)The Shaft end diameter should be smaller than the Screw Shaft Root diameter, and the Screw thread length should be specified in 1mm.
Note 4)Only Right-hand thread is available.
Note 5)Screw Shafts and Nuts are not sold separately.

MRH–BP2系列(接单生产)

MRH-BP2 series (Customized Products)

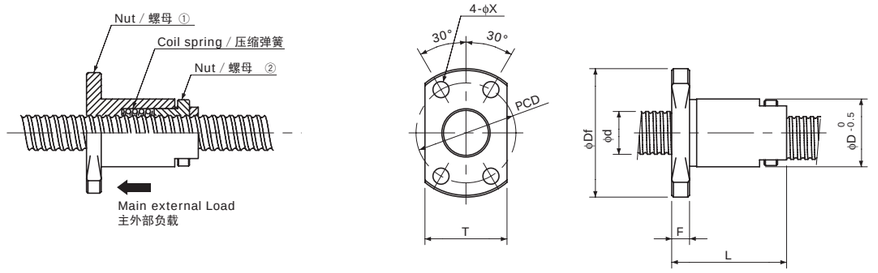
●尺寸表 Dimension table

公称型号的构成 Model number notation

MRH 06 02 B P2 — 300 R 300

①螺母类型符号
②丝杠轴公称外径(mm)
③导程(mm)
④法兰形状
B：双面切割(4孔)
⑤无齿隙符号
P2：标准设定
⑥螺纹部长度(mm)
⑦螺纹旋向(仅右旋)
⑧丝杠轴总长(mm)

①Nut model
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Flange configuration
B：2 flat faces(4 holes)
⑤Backlash free mark
P2：Standard Preload
⑥Screw thread length(mm)
⑦Thread direction(Right-hand only)
⑧Screw Shaft total length(mm)



Unit(单位)：mm

Model 型号	Screw Shaft 丝杠轴				Nut 螺母							Standard Shaft length 标准轴长
	Dia. 公称直径 d	Lead 导程	Root dia. 底径	No. of threads 螺纹条数	D	L	Df	F	P.C.D	X	T	
MRH0602BP2	6	2	5.1	1	13	20	26	4	20	3.6	17	300
MRH0606BP2		6	5.2	2								
MRH0609BP2		9	5.3	4								
MRH0802BP2	8	2	6.6	1	15	23	28		22		19	400
MRH0805BP2		5	6.6	2								
MRH0808BP2		8	6.7	2								
MRH0812BP2		12	6.7	4								
MRH1002BP2	10	2	8.6	1	18	30	31		25		20	500
MRH1006BP2		6	8.4	2								
MRH1010BP2		10	8.4	2								
MRH1015BP2		15	8.4	4								
MRH1020BP2		20	8.7	4								
MRH1202BP2	12	2	10.6	1	23	38	41	5	33	4.8	25	600
MRH1206BP2		6	10.4	2								
MRH1210BP2		10	10.4	2								
MRH1220BP2		20	10.4	6								
MRH1230BP2		30	10.4	8								

注1)建议由本公司进行丝杠轴的追加加工。
如果由其他公司进行追加加工，本公司将不能保证追加加工后的精度，敬请谅解。
注2)请将丝杠轴的轴端直径指定为不超过丝杠轴底径，并以1mm为单位指定丝杠长度。
注3)螺纹旋向仅为右旋。
注4)丝杠轴、螺母不单售。
注5)希望变更弹簧压力(小于或大于标准)时，请另行联系。
注6)建议按上图箭头所示方向使用主外部负载。

Note 1)Additional machining of Screw Shafts should be performed by KSS. Note that accuracy cannot be guaranteed if additional machining is performed by someone other than KSS.
Note 2)The Shaft end diameter should be smaller than the Screw Shaft Root diameter, and the Screw thread length should be specified in 1mm units.
Note 3)Only Right-hand thread is available.
Note 4)Screw Shafts and Nuts are not sold separately.
Note 5)Please inquire regarding spring tension(lower or higher than standard is available).
Note 6)It is recommended that the main external load is in the direction as indicated by the arrow in the Figure above.

●注意事项

1）润滑

· MRH系列螺母的标准材质MC尼龙虽然含油，但根据不同的使用条件，可能会产生噪音和早期磨损。可能出现这种情况时，建议同时使用可提高滑动性的表面处理（丝杠轴）和油脂。

2）轴端追加加工

· 建议由本公司进行丝杠轴的追加加工。如果由其他公司进行追加加工，本公司将不能保证追加加工后的精度，敬请谅解。

· 如果由其他公司进行追加加工，加工时请将螺母从丝杠轴上拆下，并在加工后用清洁的精制煤油将附着在丝杠轴上的污垢等清洗干净。此外，如果将无齿侧间隙型螺母从丝杠轴上拆下，将会导致难以恢复预压，因此请联系本公司进行追加加工。

3）操作、使用注意事项

· 本产品为精密零件，请勿对其施加冲击。

· 严禁拆分无齿侧间隙型螺母。

· 存放时，请保持本公司原装包装状态。请勿随意开包或弄破内部包装。否则会因异物进入而导致产品性能下降。

· 产品掉落时，可能会因零件损伤而导致产品性能下降，因此请务必委托本公司进行检查。请将产品送回本公司，我们将为您提供有偿检查。

· 产品的使用极限温度设计在80°C以下。超过该温度使用时，请垂询本公司。

· 树脂导程丝杠是一种产生轴向推力的机械元件，其结构不能承受径向负载。如果承受径向负载，可能会导致早期磨损及损伤，因此请勿在树脂导程丝杠与其它直动设备连用时对其施加径向负载。

· 支撑丝杠轴的轴承部、安装螺母的支架的嵌合、偏心、螺母安装面的垂直度等各安装部位的精度如果不良，将对树脂导程丝杠造成不良影响。因此，请充分注意相关零件的尺寸精度、形状精度及组装精度。

●Caution

1）Lubrication

· MC Nylon which is standard Nut material of MRH series includes oil, but depending on operating condition, abnormal noise or wearing at early stage might occur. In that case, surface treatment on shaft or grease applying are recommended.

2）Additional end-journal machining

· Additional machining of Screw Shaft should be performed by KSS. Note that accuracy cannot be guaranteed if additional end-journal machining is performed by someone other than KSS.

· When additional machining is performed by other than KSS, always remove the Nut from the Screw Shaft for additional machining.
After machining, wash away any debris on the Screw Shaft with clean refined kerosene or similar material. For Backlash free type, it is difficult to reproduce Preload if Nut is removed. We will do additional machining when needed.

3）Handling and use precaution.

· Do not subject to sudden impact, as this is a precision part.

· Do not disassemble Backlash free type Nut.

· When storing the products, please store in the original wrapping. Do not open the wrapping or tear the inner wrapping until ready to use. Dust may get inside the wrapper and may cause a decline in functionality.

· If the products falls, loss of functionality due to damage to component parts may result. Please send products back to KSS so that we can check the products. There will be a charge for this service.

· This product has been designed for normal use in temperatures under 80°C. In case of exceeding 80°C, please ask KSS.

· Resin Lead Screws are mechanical components that produces thrust toward the axis. It is not constructed to accept Radial Load（Radial direction）. This may result in wear and damage at an early stage. Therefore, there should be no Radial Load on the Resin Nut parts, take care to set up with other linear equipment for Radial Load.

· Coarse mounting accuracy such as misalignment of Nut bracket and Support Bearing, perpendicularity of Nut mounting face, will affect Resin Lead Screws performance, so be careful with the mounting accuracy.

R—MSS（Y）系列
R-MSS（Y）Series

●BEAREE为NTN的注册商标。
BEAREE product is NTN registered trademark.

●特点

与BEAREE AS5000（PPS树脂：聚苯硫醚）制螺母和不锈钢（SUS304）制丝杠轴组合相比，是适用环境更广的低噪音滑动丝杠。

●Features

BEAREE AS5000（PPS Resign：Poly Phenylene Sulfide）Nuts and Stainless（SUS304）Shafts are employed. This Lead Screw with low operating noise is able to be used as wide use.

· 适用于多种环境。
丝杠面平滑且导程较长，易于反向动作。

· 与滚珠丝杠相比，噪音较小。

· 与低磨损的树脂螺母相比，丝杠效率更高。

· Wide use：Because Screw surfaces are smooth and its lead is high, the reversed operation can be easy.

· Low operation noise compared with Ball Screws.

· Due to the Nuts with low friction, the Screw efficiency is high.

●规格　Specifications

Type / 类型	Single Nut with Flange / 带法兰单螺母
Nut material / 材质	BEAREE　AS5000 / BEAREE AS5000
Shaft material / 丝杠轴	SUS304
Axial play / 轴向间隙	50μm or less（lead 1mm, 2mm）/ 50μm以下（导程1mm、2mm） 100μm or less（more than lead 2mm）/ 100μm以下（导程超过2mm）
Accuracy grade / 精度等级	C10（JISB1192）
Cumulative lead error / 累积导程误差	±0.21/300mm

●材料特性表　Material characteristics

	AS5000
Specific gravity / 比重	1.53
Hardness / 硬度	80　Durometer / Durometer
Tensile strength / 抗拉强度	51Mpa
Elongation / 延伸率	3%
Bending strength / 弯曲强度	61Mpa
Water absorption rate / 吸水率	0.05%
Linear Expansion coefficient / 线膨胀系数	8.1×10^{-5} / °C
Maximum temperature / 使用极限温度	230°C

●尺寸表　Dimension table

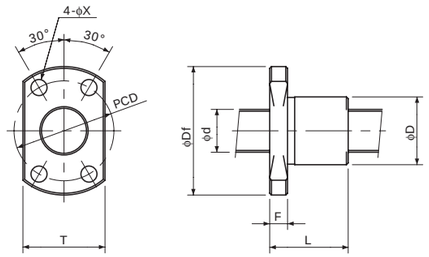
公称型号的构成　Model number notation

R — MSS 04 01 Y

① ② ③ ④ ⑤

①NTN公司产品
②微型树脂滑动丝杠
③丝杠轴公称外径（mm）
④导程（mm）
⑤螺母材质符号：BEAREE AS5000

①NTN products
②Miniature Plastic Lead Screws
③Shaft nominal diameter（mm）
④Lead（mm）
⑤Nut symbol：BEAREE AS5000



Unit（单位）：mm

Model 型号	Shaft 丝杠轴			Nut 螺母							Shaft length 标准轴长
	Dia. 公称直径 d	Lead 导程	Number of thread 螺纹条数	D	L	Df	F	P.C.D	X	T	
R-MSS0401Y	4	1	1	10	11.5	23	3.5	15	2.9	15	200
R-MSS0402Y		2	2								
R-MSS0601Y	6	1	1	12	14.5	26		18	3.4	17	300
R-MSS0602Y		2									
R-MSS0609Y		9	4								
R-MSS0618Y		18									
R-MSS0801Y	8	1	1	14	18	29	4	21		18	300
R-MSS0802Y		2									
R-MSS0812Y		12	4								400
R-MSS0824Y		24	6								
R-MSS1002Y	10	2	1	16	22	33	5	24	4.5	21	300
R-MSS1015Y		15	4								450
R-MSS1030Y		30	6								
R-MSS1202Y	12	2	1	18	25	35		26		22	300
R-MSS1218Y		18	6								500
R-MSS1236Y		36									

注1）标准丝杠轴的轴端未进行加工。本公司可提供轴端加工，如有需要敬请指示。

Note 1）End-journal is not machined. Please inquire, if end-journal machining is required.

●技术数据　Technical data

Model 型号	Shaft 丝杠轴		② Permissible Axial Load 许用轴向负载	② Permissible Revolution 许用转速	③ Tightening Torque（max） 紧固扭矩（最大）	① Efficiency 丝杠效率
	Dia. 公称直径 mm	Lead 导程 mm	N	rpm	N·mm	%
R-MSS0401Y	4	1	50	2000	180	45
R-MSS0402Y		2	60			70
R-MSS0601Y	6	1	120	2000	400	40
R-MSS0602Y		2	60			55
R-MSS0609Y		9	90			85
R-MSS0618Y		18	110			85
R-MSS0801Y	8	1	200	2000		30
R-MSS0802Y		2	290			45
R-MSS0812Y		12	210			80
R-MSS0824Y		24	210			85
R-MSS1002Y	10	2	460	1500	500	40
R-MSS1015Y		15	410			80
R-MSS1030Y		30	440			85
R-MSS1202Y	12	2	660	1000		35
R-MSS1218Y		18	750			75
R-MSS1236Y		36	540			80

许用判断标准：使用R-MSS0824Y在轴向负载100N、转速2000rpm的条件下进行移动距离200km的试验，确认无任何异常磨损。其他均由计算得出。

①丝杠效率是在测得丝杠轴在承受轴向负载且使树脂螺母旋转时的旋转扭矩后，由下式求出。

$$\eta = \frac{R \cdot Q \cdot \tan\beta}{M} \times 100\ (\%) \quad \tan\beta = \frac{Lead}{2\pi R}$$

η：丝杠效率
R：螺纹有效半径
Q：轴向负载
β：导程角
M：旋转扭矩

②许用轴向负载和许用转速是在下列试验条件下测得的值。
1）试验机：NTN滑动丝杠耐久试验机
2）条件：室温、无润滑剂、丝杠轴旋转、100mm行程往复（200mm/周期）
或200mm往复（400mm/周期）
3）许用值判断标准：按照上表的许用轴向负载和许用转速的组合条件运行10^3个周期或6×10^3个周期，确认丝杠面无变形和异常磨损。

③将树脂螺母固定于配合零件上时的安装螺丝紧固扭矩。

Criteria：MSS0824Y, verification of no remarkable wear after 200km running test under 100N of Axial Load and 2,000rpm of Speed. Other than that are obtained by calculation.

① Efficiency η is calculated by following formula based on measurement results of rotational torque（M） under the Axial Load（Q）.

$$\eta = \frac{R \cdot Q \cdot \tan\beta}{M} \times 100\ (\%) \quad \tan\beta = \frac{Lead}{2\pi R}$$

η：Efficiency
R：Pitch circle radius
Q：Axial Load
β：Lead angle
M：Rotational torque

② Permissible Axial Load and Permissible Revolution are based on the test results under the following condition.
1）Test machine：NTN Lead Screw Durability test machine
2）Condition：Room temperature, no lubricant, 100mm travel（200mm/ cycle） or 200mm travel（400mm/cycle）
3）Criteria：No remarkable damage or wear on Screw surface under the Permissible Load and Revolution in the table above.

③ This number means when Plastic Nut is fixed onto the Bracket.

滚珠丝杠支架组件篇　Ball Screw Support Units

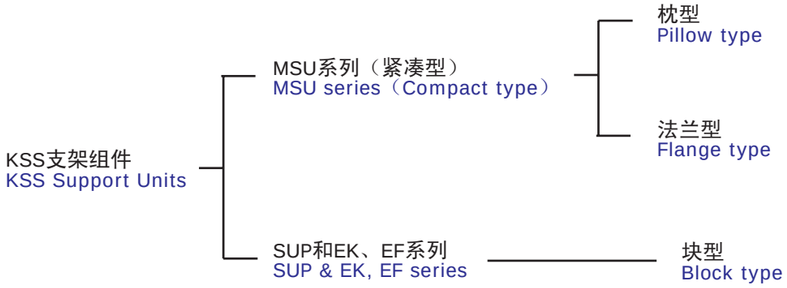
序言
Outline

KSS推出了最适合微型滚珠丝杠轴端的支架组件系列产品。特别是MSU系列（紧凑型），在以往的支架组件的基础上大幅度减轻了重量，实现了小型化。所有产品均设计为可以安装到KSS滚珠丝杠的标准形状轴端上。请务必与滚珠丝杠配合使用。

KSS provides the customer with suitable Support Units for end journal of Miniature Ball Screws.
Especially, MSU series, which is called Compact type, has feature of light weight & compact compared to existing series. All of our Support Units fit the standard end journal profile of KSS Ball Screws.
Please try and use them as well as Ball Screws.

●系列与分类 / Series classification

各系列均备有固定侧组件和支撑侧组件。
Each series can provide both of fixed-side and supported-side Support Units.

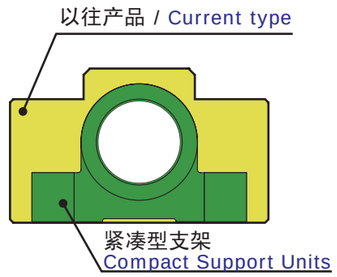


[MSU系列 / MSU Series]

与以往产品相比，重量减轻50％以上
Light weight（more than 50％ down）

与本公司产品相比 / Comparison to our current model

紧凑型支架组件
Compact Support Units



在以往支架组件的基础上最大限度地减小外形尺寸，实现了轻量小型化，最适合于微型滚珠丝杠。
This type of Support Unit has features of light-weight & compact profile compared to our conventional Support Units. KSS believes this type is suitable for Miniature Ball Screws.

●特点

- 去除了以往产品中累赘的部分，最大限度缩小了安装孔距，重量更轻、外形更紧凑。
- 安装有进行了预压管理的微型角接触球轴承，确保了轴向的高刚性。
- 角接触球轴承采用双封闭型，防尘性能佳、零件数量少，大大降低了成本。
- 轴承采用不锈钢材质，封入有低起尘润滑脂，也可在无尘环境中使用
- 系列中新增加超小尺寸（ϕ3）产品，推出超小型滚珠丝杠的支架组件
- 将枕型和法兰型两种（固定侧、支撑侧）产品标准化，扩大了用户的选择范围

●Features

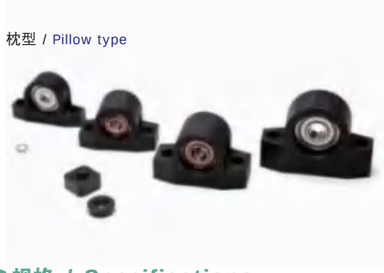
- By eliminating extra shape of Housing, and minimizing pitch of mounting holes, light-weight & compact design Support Units became reality.
- Pre-load controlled Angular Contact Bearings are installed, so Rigidity can be kept high.
- Reasonable price has been achieved with reducing number of components, because oil seals have been eliminated by using shielded type Angular Contact Bearings.
- Angular Contact Bearings are made from stainless steel and low contamination Grease is applied, so Support Units can be used in clean-environment.
- Ultra-compact size（ϕ3）is standardized, it would be suitable for Ultra Miniature Ball Screws.
- Pillow & Flange type are standardized for both fixed & supported side, so wide variety of choices are available.

●种类 / Variation

紧凑型支架组件（MSU系列）备有枕型和法兰型两种类型，可满足用户不同的安装状态。两种类型的固定侧、支撑侧组件均已实现标准化。枕型产品与以往产品相比，重量大幅度减轻，外形更紧凑。以往产品（块型）也在继续销售。

Compact Support Units（MSU series）provide 2 choices of Housing type, which are Pillow type and Flange type. Fixed side and supported side Units are standardized for each type. In case of Pillow type, it became light-weight & more compact compared to our conventional type. Our conventional models, which are Block type Support Units, are still available.

枕型 / Pillow type



法兰型 / Flange type

●规格 / Specifications

紧凑型支架组件（MSU系列）中安装的角接触球轴承使用不锈钢材质，封入有低起尘润滑脂。其他零件也采用不锈钢材质、或经过了发黑处理，也可应用于无尘环境。还可提供轴承钢（SUJ2）材质+封入了耐微动磨损润滑脂的产品，详情请向KSS咨询。

Angular Contact Bearings built in Compact Support Units（MSU series）are made from stainless steel and low contamination Grease is applied. Other components of Support Units are also made form stainless steel or are coated by black finishing. These series can be used in clean-environment.

[MSU系列使用的轴承 / Ball Bearings for MSU Series]

角接触球轴承 / Angular Contact Ball Bearings

用于紧凑型支架组件（MSU系列）固定侧的角接触球轴承。
根据用户需求，以轴承单体（组装好的状态）的形式销售。（参照E115-E116页）

This series is the Angular Contact Ball Bearings built in fixed side of Compact Support Units（MSU series）.
This can be provided as a set of DF or DB configuration only.
（Refer to dimension table in page E115-E116）

深沟球轴承 / Deep Groove Bearings

用于紧凑型支架组件（MSU系列）支撑侧的深沟球轴承。
根据用户需求，以轴承单体的形式销售。（参照E117-E118页）

This series is the Deep Groove Ball Bearings built in supported side of Compact Support Units（MSU series）.
This type can be provided as a Bearing itself.
（Refer to dimension table in page E117-E118）

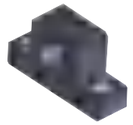
[EK、EF系列 / EK, EF Series]

固定侧
Fixed end

EK型 / EK type

支撑侧
Supported end

EF型 / EF type



SUP型 / SUP type

●特点

- 备有固定侧组件和支撑侧组件，固定侧组件中组装有角接触球轴承（已调整预压），通用性广；支撑侧组件中安装有深沟球轴承和止动环。
- 固定侧组件在两侧（单侧）内置有密封，因此在常规环境下无需采取特殊防尘措施。

●Features

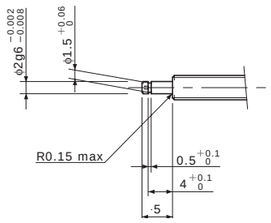
- Multi-use Angular Contact Ball Bearings（with pre-load）are built in Fixed side Support Units, and Deep Groove Bearing is attached in supported side Unit with stop ring.
- Fixed-side Support Unit has seals at both end（or one end）, so special dust protection is not necessary under normal circumstance.

●标准库存品 / Standardized end-journal profile

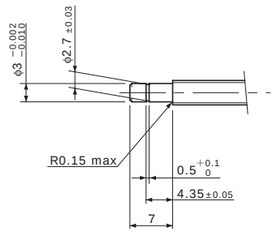
KSS支架组件均设计为可以安装到KSS微型滚珠丝杠的标准形状轴端上。KSS标准轴端形状及其对应的KSS支架组件的一览表如下所示。

KSS Support Units are designed to fit standard end-journal profile of KSS Miniature Ball Screws. Table below shows KSS Support Units list corresponding to standard end-journal profile.

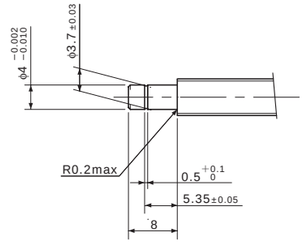
【支撑侧 / Supported side】



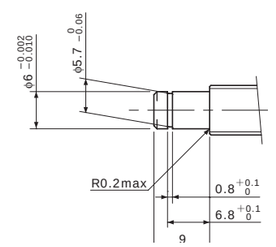
Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ2	MSU-3CS / MSU-3GS



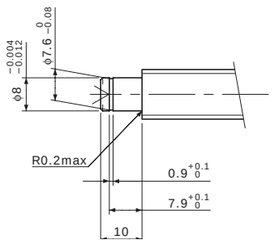
Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ3	MSU-4CS / MSU-4GS，SUP03-S



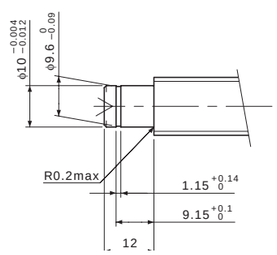
Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ4	MSU-5CS / MSU-5GS，SUP04-S



Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ6	MSU-6CS / MSU-6GS，EF6 MSU-8CS / MSU-8GS，EF8

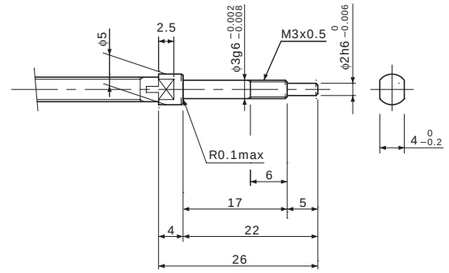


Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ8	EF10

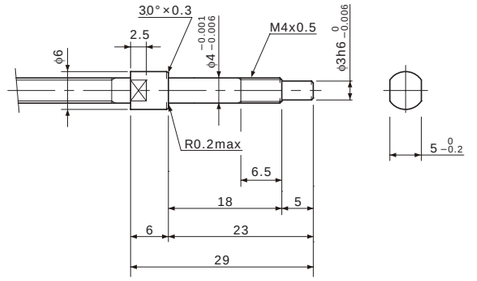


Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ10	EF12

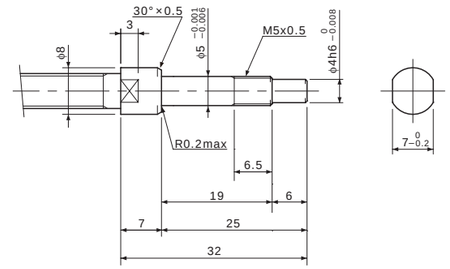
【固定侧 / Fixed side】



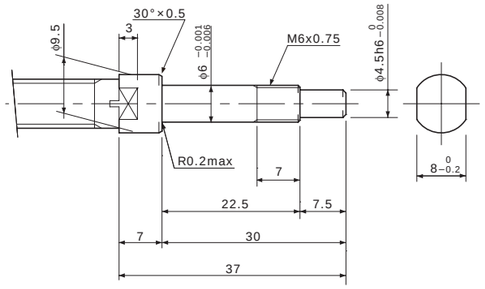
Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ3	MSU-3C / MSU-3G



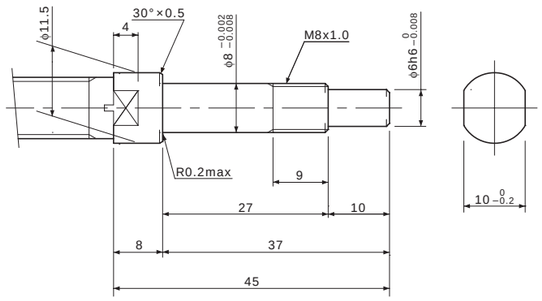
Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ4	MSU-4C / MSU-4G，EK4



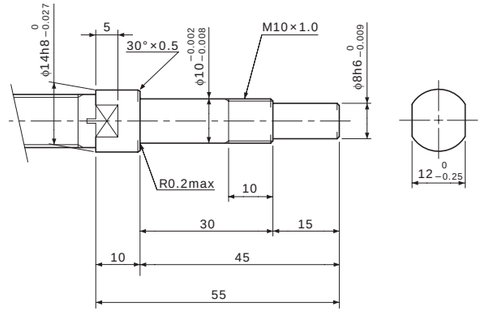
Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ5	MSU-5C / MSU-5G，EK5



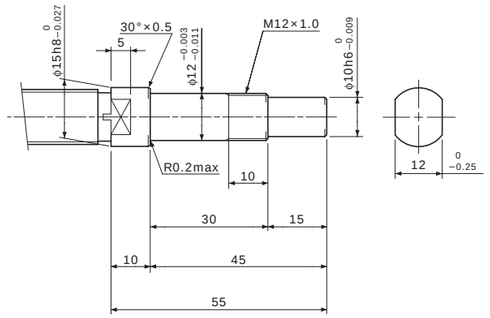
Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ6	MSU-6C / MSU-6G，EK6



Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ8	MSU-8C / MSU-8G，EK8



Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ10	EK10



Brg. Inner dia. 轴承内径	Support Unit model 适用的支架组件
ϕ12	EK12

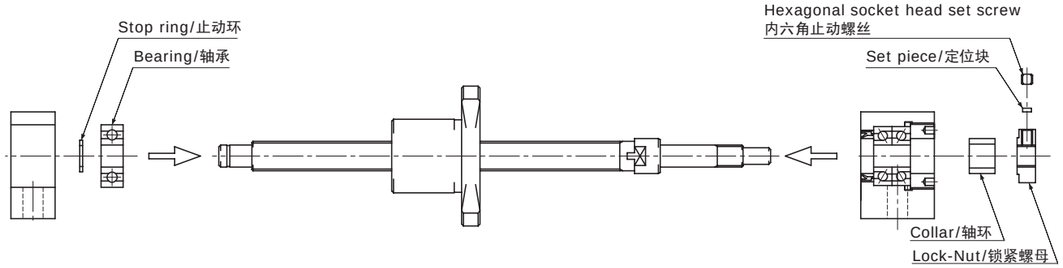
●安装步骤 / Mounting procedure

1.支架组件的组装

1）将固定侧支架组件组装在滚珠丝杠上。
注1）请勿拆分支架组件。
注2）将轴插入支架组件后，请用锁紧螺母进行紧固，避免定位块翘起。
2）插入固定侧支架组件后，用锁紧螺母进行紧固，并通过定位块、内六角止动螺丝进行固定。
3）组装支撑侧轴承，用止动环固定后装入外壳。

1.Assembling Support Unit

1）Mount the fixed end Support Unit onto the Ball Screw.
Note 1）Do not disassemble the Support Unit.
Note 2）Tighten the Lock-Nut after inserting the Shaft into the Support Unit, and make sure that the set piece is not allowed to curl.
2）Tighten the Lock-Nut after inserting into the fixed end Support Unit, and secure using the set piece and hexagonal socket head set screw.
3）Mount the supported end Bearing, secure with the stop ring, and fit into the Housing.

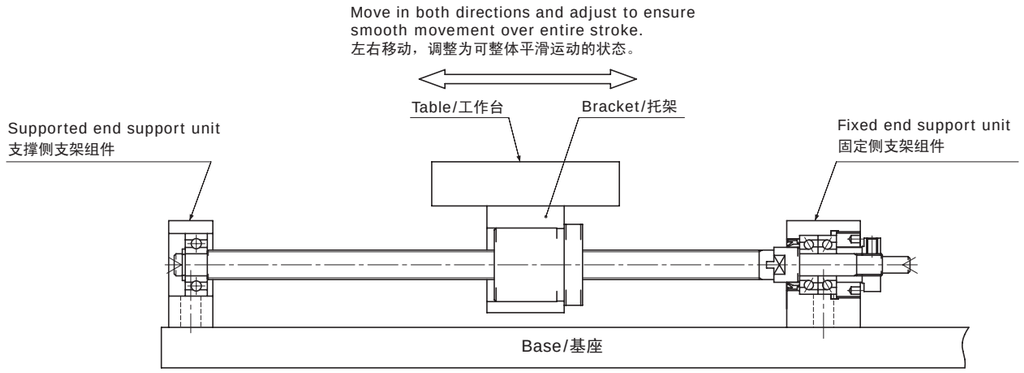


2.工作台和滚珠丝杠螺母的组装以及组件和基座的安装

1）将滚珠丝杠螺母插入工作台（使用托架时插入托架）后临时固定。
2）将固定侧支架组件临时固定到基座上。
注1）此时，请将工作台靠近支架组件侧进行定心，并将工作台调整到可平滑移动的状态。

2.Mounting the table on the Ball Screw Nut and mounting the Support Unit on the base

1）Insert the Ball Screw Nut into the table, or, when using Brackets to attach the table to the Ball Screw Nut, insert into the Bracket, and loosely tighten.
2）Loosely secure the fixed end Support Unit to the base.
Note 1）Move the table toward the Support Unit and center it. Adjust to ensure that the table moves smoothly.

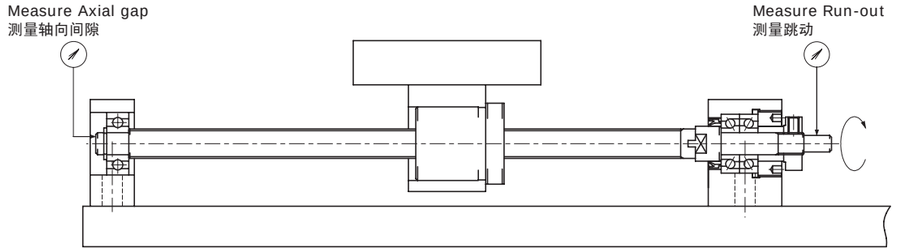


3.支撑侧外壳和基座的安装及精度确认

1）将工作台靠近支撑侧外壳并进行定心，然后使工作台往复运动，将其调整到整体可平滑运动的状态，然后临时固定到基座上。
2）通过千分表确认滚珠丝杠轴端的跳动、轴向间隙，同时切实紧固螺母、固定侧支架组件及支撑侧外壳。

3.Mounting the supported end Housing on the base and checking accuracy

1）Move the table toward the supported end Housing and center it. Move the table in both directions and adjust to ensure smooth movement over entire length. Secure loosely to the base.
2）Check the Run-out and Axial gap at the Ball Screw Shaft end using a dial gauge, and fully tighten the Nut, fixed end Support Unit and supported end Housing.

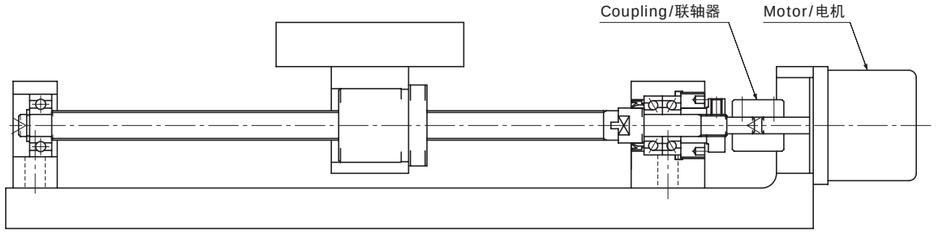


4.与电机的连接

1）将电机固定到主体上。
2）通过联轴器连接电机和滚珠丝杠。
3）请进行充分的磨合运行。

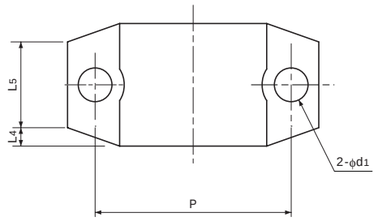
4.Connecting to the Motor

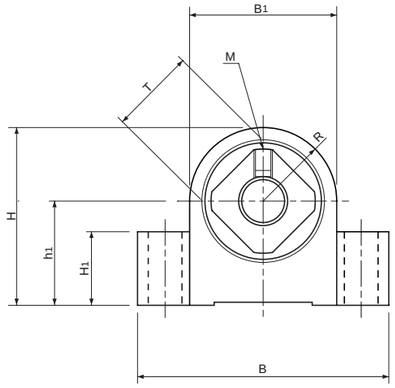
1）Secure the Motor to the main Unit.
2）Connect the Motor to the Ball Screw using the coupling.
3）Run in thoroughly.

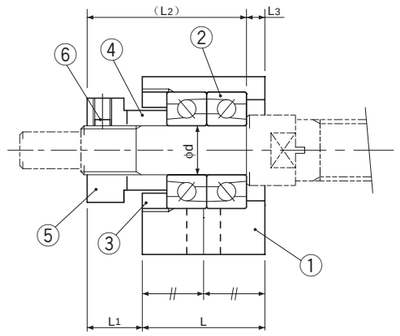


MSU Series
MSU系列

Pillow type（Fixed side）
枕型（固定侧）







●公称型号的构成 / Model number notation

MSU — 5 C S
① ② ③ ④

①系列符号
　MSU：KSS紧凑型支架组件系列
②公称型号
③形状符号
　C：枕型
　G：法兰型
④轴端符号
　无符号：固定侧
　S：支撑侧

①Series No.
　MSU：KSS Compact Support Unit Series
②Nominal number
③Housing type
　C：Pillow type
　G：Flange type
④End-journal type
　None：fixed side
　S：supported side

注）支撑侧支架组件的公称型号可能与轴承内径不一致，敬请注意。
Note）In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List / 零件表

Part No. 零件号	Part name 零件名称	Qty 数量
1	Housing / 外壳（Black Chrome coating / 黑铬处理）	1
2	Bearings / 轴承（with Shields / 带护板）	1 set
3	Pressure Nut / 压紧螺母	1
4	Collar / 轴环	1
5	Lock Nut / 锁紧螺母	1
6	Hexagonal socket head set screw / 内六角止动螺丝 （with set piece / 带定位块）	1 set

Unit（单位）：mm

Type 型号	Brg. Inner dia. 轴承内径 d 0 −0.005	L	L_1	L_2	L_3	L_4	L_5	B	H	h_1 0 −0.03	B_1		H_1	R	P	d_1	M	T	Lock Nut 锁紧螺母	Bearing 使用的轴承	Mass 重量 g	Type 型号
MSU-3C	3	12.5	5.5	16.5	1.5	2	8.5	24	14.5	9	11		5	5.5	18	3.5	M3	8	M3×0.5	MTA03-08HP5DF	16.5	MSU-3C
MSU-4C	4	14	5.5	17.5	2	2.5	9	27	17	10	14		6	7	21	3.5	M3	10	M4×0.5	MTA04-11HP5DF	27	MSU-4C
MSU-5C	5	15	5.5	18.5	2	2	11	30.5	19.5	11	17		6	8.5	23	4.5	M3	11	M5×0.5	MTA05-13HP5DF	35	MSU-5C
MSU-6C	6	17	7.5	22	2.5	2.5	12	35	22.5	13	19		8	9.5	26	5.5	M3	12	M6×0.75	MTA06-15HP5DF	50	MSU-6C
MSU-8C	8	20	9	26	3	3	14	41	29	17	24		12	12	32	5.5	M3	14	M8×1.0	MTA08-19HP5DF	96	MSU-8C

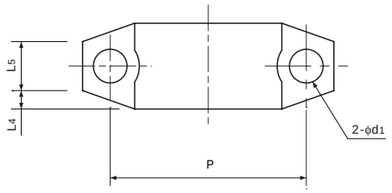
注1）角接触球轴承（ISC制）采用不锈钢材质，并注入有低起尘润滑脂（NSK LG2），是无尘规格的轴承。
注2）压紧螺母、轴环、锁紧螺母均经过了发黑处理。
注3）支架组件已经过预压调整，请勿进行拆分。

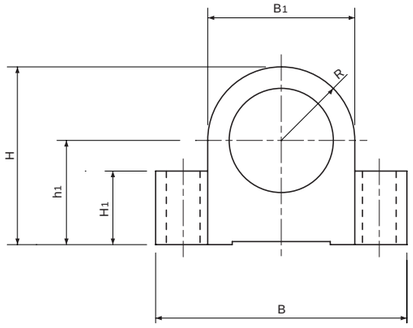
Note 1）Angular Contact Ball Bearings（manufactured by ISC）are designed for clean room use, they are made of Stainless steel with low contamination grease（NSK LG2）packed.
Note 2）Pressure Nut, Collar and Lock Nut are coated with Black finishing.
Note 3）Do not disassemble Support Unit, as they are pre-loaded and pre-adjusted.

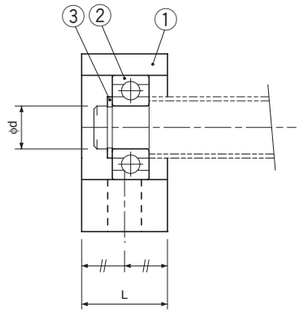
Support Unit 支架组件

MSU Series
MSU系列

Pillow type（Supported side）
枕型（支撑侧）







●公称型号的构成 / Model number notation

MSU — 5 C S
①　②　③　④

①系列符号
　MSU：KSS紧凑型支架组件系列
②公称型号
③形状符号
　C：枕型
　G：法兰型
④轴端符号
　无符号：固定侧
　S：支撑侧

①Series No.
　MSU：KSS Compact Support Unit Series
②Nominal number
③Housing type
　C：Pillow type
　G：Flange type
④End-journal type
　None：fixed side
　S：supported side

注）支撑侧支架组件的公称型号可能与轴承内径不一致，敬请注意。
Note）In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List / 零件表

Part No. 零件号	Part name 零件名称	Qty 数量
1	Housing / 外壳（Black Chrome coating / 黑铬处理）	1
2	Bearing / 轴承（with Shields / 带护板）	1
3	Stop ring / 止动环	1

Unit（单位）: mm

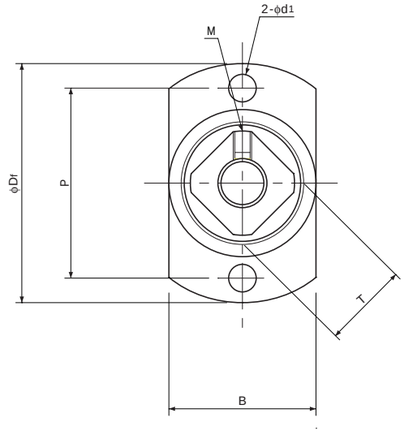
Type 型号	Brg. Inner dia. 轴承内径 d 0 −0.005	L	L_4	L_5	B	H	h_1 0 −0.03	B_1		H_1	R	P	d_1	Bearing 使用的轴承	Stop ring 使用的止动环	Mass 重量 g	Type 型号
MSU-3CS	2	8	2	4	24	14.5	9	11		5	5.5	18	3.5	602HZZ	ETW-1.5（OCHIAI / 落合）	8.5	MSU-3CS
MSU-4CS	3	10	2.5	5	27	17	10	14		6	7	21	3.5	623HZZ	G-3（IWATA / 磐田电工）	16	MSU-4CS
MSU-5CS	4	10	2	6	30.5	19.5	11	17		6	8.5	23	4.5	624HZZ	G-4（IWATA / 磐田电工）	21	MSU-5CS
MSU-6CS	6	12	2.5	7	35	22.5	13	19		8	9.5	26	5.5	B6-113HZZ1	STW-6（OCHIAI / 落合）	32	MSU-6CS
MSU-8CS	6	14	3	8	41	29	17	24		12	12	32	5.5	606HZZ1	STW-6（OCHIAI / 落合）	60	MSU-8CS

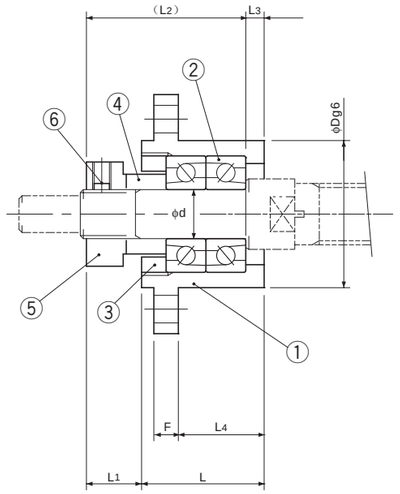
注1）深沟球轴承（ISC制）采用不锈钢材质，并注入有低起尘润滑脂（NSK LG2），是无尘规格的轴承。
注2）交货时使用的止动环可能会是同等规格的其他产品。

Note 1）Deep Groove Ball Bearing（manufactured by ISC）is designed for clean room use, it is made of Stainless steel with low contamination grease（NSK LG2）packed.
Note 2）Stop ring may be the equivalent one described in the table above.

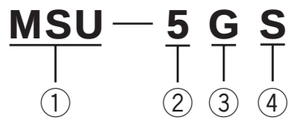
MSU Series
MSU系列

Flange type（Fixed side）
法兰型（固定侧）





●公称型号的构成 / Model number notation



①系列符号
　MSU：KSS紧凑型支架组件系列
②公称型号
③形状符号
　C：枕型
　G：法兰型
④轴端符号
　无符号：固定侧
　S：支撑侧

①Series No.
　MSU：KSS Compact Support Unit Series
②Nominal number
③Housing type
　C：Pillow type
　G：Flange type
④End-journal type
　None：fixed side
　S：supported side

注）支撑侧支架组件的公称型号可能与轴承内径不一致，敬请注意。
Note）In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List / 零件表

Part No. 零件号	Part name 零件名称	Qty 数量
1	Housing / 外壳（Black Chrome coating / 黑铬处理）	1
2	Bearings / 轴承（with Shields / 带护板）	1 set
3	Pressure Nut / 压紧螺母	1
4	Collar / 轴环	1
5	Lock Nut / 锁紧螺母	1
6	Hexagonal socket head set screw / 内六角止动螺丝 （with set piece / 带定位块）	1 set

Unit（单位）：mm

Type 型号	Brg. Inner dia. 轴承内径 d 0 −0.005	L	L_1	L_2	L_3	F	L_4	B	Df		D	P	d_1	M	T	Lock Nut 锁紧螺母	Bearing 使用的轴承	Mass 重量 g	Type 型号
MSU-3G	3	12.5	5.5	16.5	1.5	3	7.5	11	23		11	17	3.5	M3	8	M3×0.5	MTA03-08HP5DF	12.5	MSU-3G
MSU-4G	4	13.5	5.5	17.5	1.5	3	8.5	14	26		14	20	3.5	M3	10	M4×0.5	MTA04-11HP5DF	20	MSU-4G
MSU-5G	5	15	5.5	18.5	2	3	10	17	29		17	23	3.5	M3	11	M5×0.5	MTA05-13HP5DF	30	MSU-5G
MSU-6G	6	17	7.5	22	2.5	4	12	19	34		19	26	4.5	M3	12	M6×0.75	MTA06-15HP5DF	42	MSU-6G
MSU-8G	8	20	9	26	3	4	16	24	39		24	31	4.5	M3	14	M8×1.0	MTA08-19HP5DF	70	MSU-8G

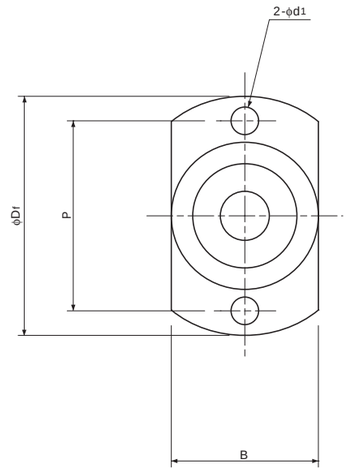
注1）角接触球轴承（ISC制）采用不锈钢材质，并注入有低起尘润滑脂（NSK LG2），是无尘规格的轴承。
注2）压紧螺母、轴环、锁紧螺母均经过了发黑处理。
注3）支架组件已经过预压调整，请勿进行拆分。

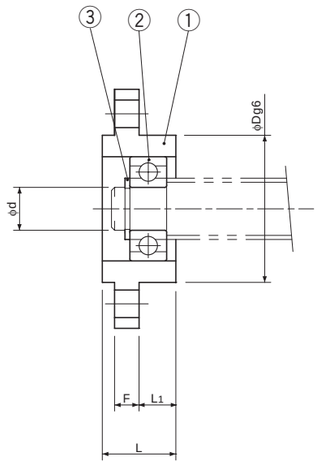
Note 1）Angular Contact Ball Bearings（manufactured by ISC）are designed for clean room use, they are made of Stainless steel with low contamination grease（NSK LG2）packed.
Note 2）Pressure Nut, Collar and Lock Nut are coated with Black finishing.
Note 3）Do not disassemble Support Unit, as they are pre-loaded and pre-adjusted.

Support Unit 支架组件

MSU Series
MSU系列

Flange type（Supported side）
法兰型（支撑侧）





●公称型号的构成 / Model number notation

MSU — 5 G S
① ② ③ ④

①系列符号
MSU：KSS紧凑型支架组件系列
②公称型号
③形状符号
C：枕型
G：法兰型
④轴端符号
无符号：固定侧
S：支撑侧

①Series No.
MSU：KSS Compact Support Unit Series
②Nominal number
③Housing type
C：Pillow type
G：Flange type
④End-journal type
None：fixed side
S：supported side

注）支撑侧支架组件的公称型号可能与轴承内径不一致，敬请注意。
Note）In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List / 零件表

Part No. 零件号	Part name 零件名称	Qty 数量
1	Housing / 外壳（Black Chrome coating / 黑铬处理）	1
2	Bearing / 轴承（with Shields / 带护板）	1
3	Stop ring / 止动环	1

Unit（单位）：mm

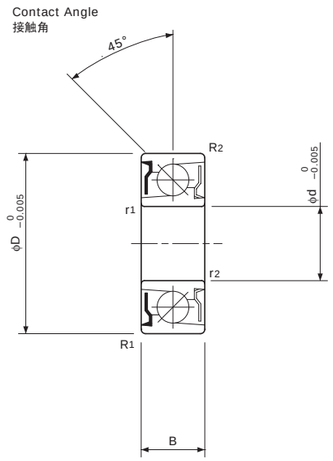
Type 型号	Brg. Inner dia. 轴承内径 d 0 −0.005	L	F	L1	B	Df		D	P	d1	Bearing 使用的轴承	Stop ring 使用的止动环	Mass 重量 g	Type 型号
MSU-3GS	2	8	3	3	11	23		11	17	3.5	602HZZ	ETW-1.5（OCHIAI / 落合）	7.5	MSU-3GS
MSU-4GS	3	10	3	5	14	26		14	20	3.5	623HZZ	G-3（IWATA / 磐田电工）	12	MSU-4GS
MSU-5GS	4	10	3	5	17	29		17	23	3.5	624HZZ	G-4（IWATA / 磐田电工）	16	MSU-5GS
MSU-6GS	6	10	4	5	19	34		19	26	4.5	B6-113HZZ1	STW-6（OCHIAI / 落合）	24	MSU-6GS
MSU-8GS	6	10	4	6	24	39		24	31	4.5	606HZZ1	STW-6（OCHIAI / 落合）	40	MSU-8GS

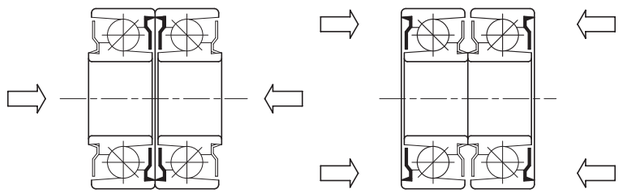
注1）深沟球轴承（ISC制）采用不锈钢材质，并注入有低起尘润滑脂（NSK LG2），是无尘规格的轴承。
注2）交货时使用的止动环可能会是同等规格的其他产品。

Note 1）Deep Groove Ball Bearing（manufactured by ISC）is designed for clean room use, it is made of Stainless steel with low contamination grease（NSK LG2）packed.
Note 2）Stop ring may be the equivalent one described in the table above.

Fixed side Ball Bearings for MSU series
MSU系列/固定侧轴承

Angular Contact Ball Bearings（Stainless type）
角接触球轴承（不锈钢规格）



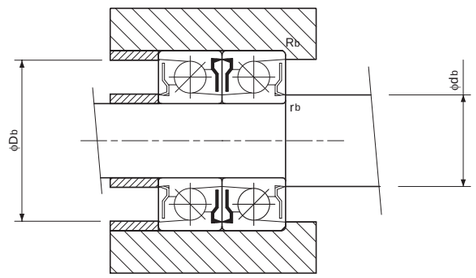


DB Type
（内圈预压）
对准青铜色

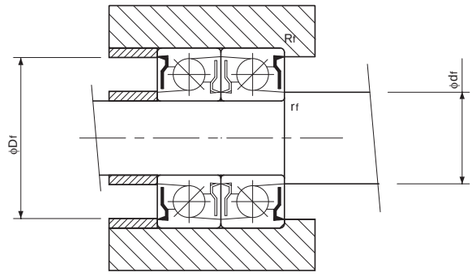
DB type
（Inner ring pre-load type）
**Silver colored shields are outside

DF Type
（外圈预压）
对准银色

DF type
（Outer ring pre-load type）
**Bronze colored shields are outside



DB Configuration
DB组合



DF Configuration
DF组合

●公称型号的构成 / Model number notation

MTA 08 − 19 H P5 DF
① ② ③ ④ ⑤ ⑥

①系列符号　①Series No.
②轴承内径（mm）　②Inner diameter of Bearing（mm）
③轴承外径（mm）　③Outer diameter of Bearing（mm）
④材料符号　④Material
　H ：不锈钢　　H :Stainless Steel
　T ：轴承钢　　T :Bearing Steel
⑤精度等级　⑤Accuracy grade
　相当于P5　　Equivalent to P5
⑥组合类型　⑥Duplex type
　DF：正面组合　　DF:Face to Face duplex
　DB：背面组合　　DB : Back to Back duplex

推荐的紧固扭矩 / Recommended tightening torque

Unit（单位）：N·cm（kgf·cm）

Type / 型号	DF type DF型	DB type DB型
MTA02-06HP5DF/DB	19.6（2.0）	9.8（1.0）
MTA03-08HP5DF/DB	19.6（2.0）	14.7（1.5）
MTA04-11HP5DF/DB	49（5.0）	19.6（2.0）
MTA05-13HP5DF/DB	49（5.0）	24.5（2.5）
MTA06-15HP5DF/DB	78.4（8.0）	29.4（3.0）
MTA08-19HP5DF/DB	78.4（8.0）	39.2（4.0）

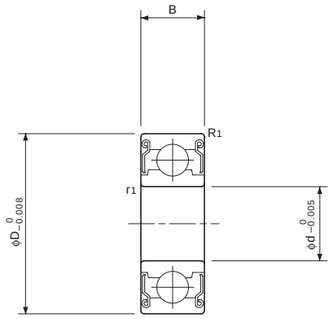
Unit（单位）：mm

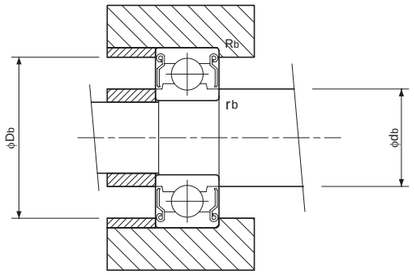
Type 型号	Dimension / 主要尺寸							Basic Load Rating 基本额定负载		Limit Speed 许用转速 min⁻¹		Abutment & Fillet / 推荐的安装尺寸								Mass 重量	Type 型号
				Chamfer（min.）/ 倒角尺寸（最小）								DF type / DF型				DB type / DB型					
	I.D. 内径 φd	O.D. 外径 φD	Width 宽度 B	r1	r2	R1	R2	Ca（N）	Coa（N）			Df max. 最大	df min. 最小	Rf max. 最大	rf max. 最大	Db max. 最大	db min. 最小	Rb max. 最大	rb max. 最大		
MTA02-06HP5DF/DB	2	6	3	0.10	0.10	0.10	0.04	470	360	26,000		5.0	2.8	0.10	0.10	5.3	3.0	0.04	0.10	0.8	MTA02-06HP5DF/DB
MTA03-08HP5DF/DB	3	8	4	0.10	0.10	0.15	0.03	820	670	22,000		6.7	3.9	0.15	0.10	7.2	4.4	0.03	0.10	1.8	MTA03-08HP5DF/DB
MTA04-11HP5DF/DB	4	11	4.5	0.20	0.20	0.20	0.10	1250	1130	17,000		8.9	5.1	0.20	0.20	9.5	6.2	0.10	0.20	3.8	MTA04-11HP5DF/DB
MTA05-13HP5DF/DB	5	13	5	0.20	0.20	0.20	0.10	1780	1740	16,000		10.8	6.1	0.20	0.20	11.3	7.2	0.10	0.20	5.6	MTA05-13HP5DF/DB
MTA06-15HP5DF/DB	6	15	5.5	0.20	0.20	0.20	0.20	2350	2360	14,000		12.5	7.2	0.20	0.20	13.2	8.6	0.20	0.20	7.8	MTA06-15HP5DF/DB
MTA08-19HP5DF/DB	8	19	6.5	0.20	0.20	0.30	0.30	3400	3480	13,000		15.8	9.4	0.30	0.20	16.8	11.4	0.30	0.20	14.5	MTA08-19HP5DF/DB

注1）角接触球轴承（ISC制）采用不锈钢材质，并注入有低起尘润滑脂（NSK LG2），是无尘规格的轴承。如有需要，也可提供普通材质（SUJ2）、加注有耐微动磨损润滑脂的产品。
注2）组合轴承时，请通过护板的颜色区分DF型或DB型（参照上图）。
注3）订货时，请指定组合类型（DF型或DB型）。
注4）仅销售组合轴承，不销售单品，敬请谅解！

Note 1）Angular Contact Ball Bearings（manufactured by ISC）are designed for clean room use, they are made of Stainless steel with low contamination grease（NSK LG2）packed.
If necessary, Bearing steel type Angular Contact Ball Bearings with anti-fretting grease can be also provided.
Note 2）Bearing duplex can be distinguished by the color of shield plate for each duplex, please refer to figure above.
Note 3）Please designate duplex number（DF or DB）, when you place order.
Note 4）This series can be provided as sets of DF or DB configuration only.

Supported side Ball Bearings for MSU series
MSU系列/支撑侧轴承





Unit（单位）：mm

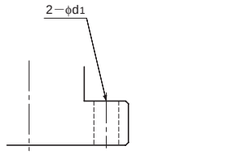
Type 型号	Dimension / 主要尺寸					Basic Load Rating 基本额定负载			Limit Speed 许用转速 min^{-1}	Abutment & Fillet / 推荐的安装尺寸				Mass 重量（g）	Type 型号
	I.D. 内径 φd	O.D. 外径 φD	Width 宽度 B	Chamfer（min.）/ 倒角尺寸（最小）						Db max. 最大	db min. 最小	Rb max. 最大	rb max. 最大		
				r1	R1	Cr（N）	Cor（N）								
602HZZ	2	7	3.5	0.15	0.15	320	102		63,000	6.25	3.85	0.15	0.15	0.6	602HZZ
623HZZ	3	10	4	0.15	0.15	535	175		50,000	7.98	4.35	0.15	0.15	1.7	623HZZ
624HZZ	4	13	5	0.20	0.20	1110	390		40,000	11.35	6.0	0.20	0.20	3.1	624HZZ
B6-113HZZ1	6	15	6	0.20	0.20	1470	535		40,000	13.3	7.9	0.20	0.20	4.3	B6-113HZZ1
606HZZ1	6	17	6	0.30	0.30	1920	670		38,000	14.8	8.2	0.30	0.30	6.1	606HZZ1

注1）深沟球轴承（ISC制）采用不锈钢材质，并注入有低起尘润滑脂（NSK LG2），是无尘规格的轴承。

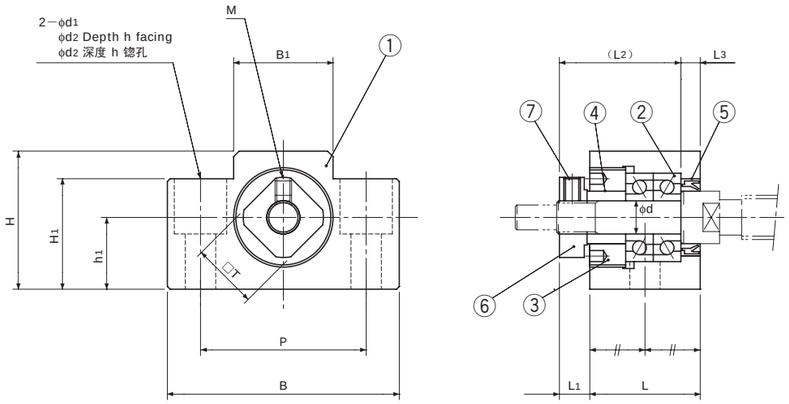
Note 1）Deep Groove Ball Bearings（manufactured by ISC）are designed for clean room use, they are made of Stainless steel with low contamination grease（NSK LG2）packed.

EK series
EK系列

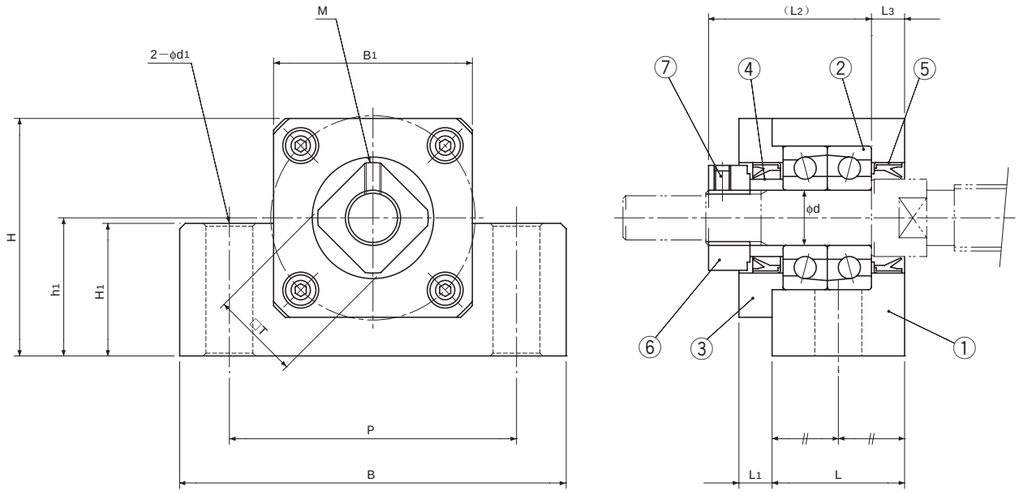
Block type（Fixed side）
块型（固定侧）



Mounting hole for EK4、EK5
EK4、EK5安装孔



EK4～EK8 type
EK4～EK8型



EK10～EK12 type
EK10～EK12型

EK4～EK8　Parts List　零件表

Part No. 零件号	Part name 零件名称	Qty 数量
1	Housing / 外壳	1
2	Bearing / 轴承	1 set
3	Pressure Nut / 压紧螺母	1
4	Collar / 轴环	1
5	Seal / 密封	1
6	Lock-Nut / 锁紧螺母	1
7	Hexagonal socket head set screw / 内六角止动螺丝（with set piece / 带定位块）	1

●公称型号的构成 / Model number notation

①系列符号/Series No.
②轴承内径/Inner diameter of Bearing（mm）

EK10～EK12　Parts List　零件表

Part No. 零件号	Part name 零件名称	Qty 数量
1	Housing / 外壳	1
2	Bearing / 轴承	1 set
3	Pressure cover / 压紧盖	1
4	Collar / 轴环	1
5	Seal / 密封	2
6	Lock-Nut / 锁紧螺母	1
7	Hexagonal socket head set screw / 内六角止动螺丝（with set piece / 带定位块）	1

Unit（单位）: mm

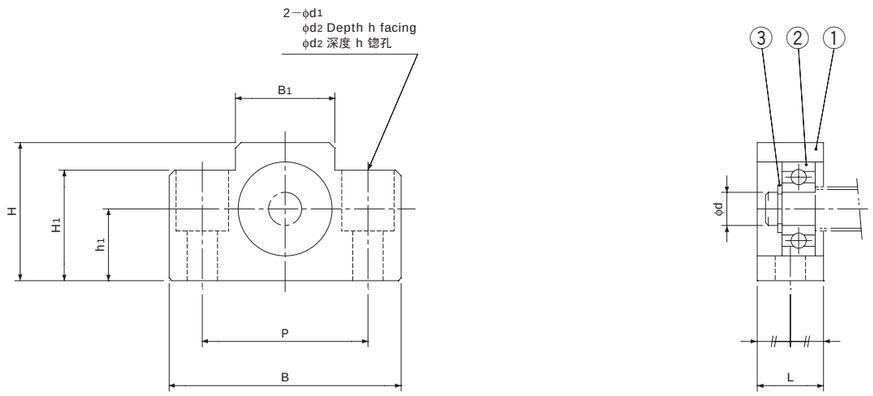
Type 型号	Brg. Inner dia. 轴承内径 d	L	L_1	L_2	L_3	B	H	h_1 ±0.02	B_1		H_1	P	d_1	d_2	h	M	T	Bearing 使用的轴承	Mass 重量 g	Type 型号
EK 4	4	15	5.5	17.5	3	34	19	10	18		7	26	4.5	—	—	M2.6	10	AC4-12P5	60	EK 4
EK 5	5	16.5	5.5	18.5	3.5	36	21	11	20		8	28	4.5	—	—	M2.6	11	AC5-14P5	80	EK 5
EK 6	6	20	5.5	22	3.5	42	25	13	18		20	30	5.5	9.5	11	M3	12	AC6-16P5	140	EK 6
EK 8	8	23	7	26	4	52	32	17	25		26	38	6.6	11	12	M3	14	AC8-18P5	240	EK 8
EK 10	10	24	6	29.5	6	70	43	25	36		24	52	9	—	—	M3	16	7000DFGMP5	460	EK 10
EK 12	12	24	6	29.5	6	70	43	25	36		24	52	9	—	—	M3	19	7001DFGMP5	440	EK 12

注）支架组件已经过预压调整，请勿进行拆分。
Note）Do not disassamble Support Unit, as they are pre-loaded and pre-adjusted.

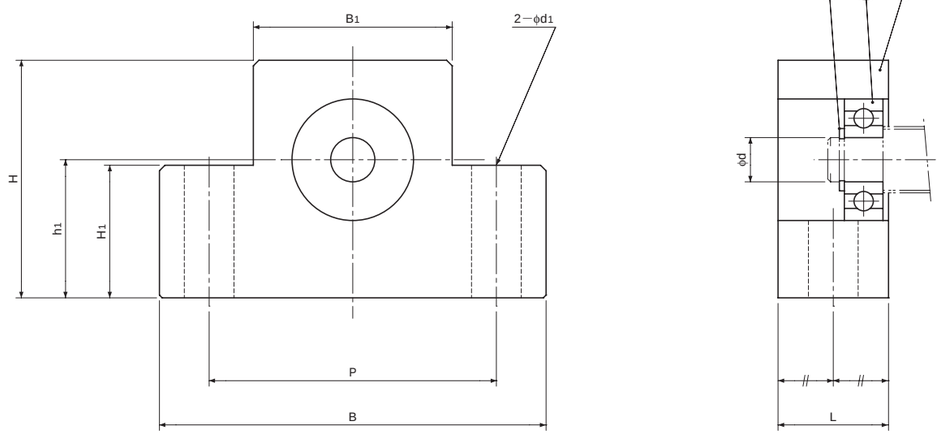
Support Unit 支架组件

SUP and EF series
SUP和EF系列

Block type（Supported side）
块型（支撑侧）



EF6、EF8 type / EF6、EF8型



SUP and EF10～EF12 type
SUP和EF10～EF12型

Parts List　零件表

Part No. 零件号	Part name 零件名称	Qty 数量
1	Housing / 外壳	1
2	Bearing / 轴承	1
3	Stop ring / 止动环	1

●公称型号的构成 / Model number notation

SUP 03 — S　　EF 8

①　②　③　　①　②

①系列符号/Series No.
②公称型号/Nominal number
③支撑侧符号/Supported side No.

注）EF型的公称型号可能与轴承内径不一致，敬请注意。
Note）In EF Series nominal No. may not be the same as Bearing Inner diameter.

Unit（单位）：mm

Type 型号	Brg. Inner dia. 轴承内径 d	L	B	H	h_1 ±0.02	B_1	H_1		P	d_1	d_2	h	Bearing 使用的轴承	Stop ring 使用的止动环	Mass 重量 g	Type 型号
SUP03-S	3	10	34	19	10	18	7		26	4.5	—	—	623ZZ	G-3	35	SUP03-S
SUP04-S	4	10	36	21	11	20	8		28	4.5	—	—	624ZZ	G-4	40	SUP04-S
EF 6	6	12	42	25	13	18	20		30	5.5	9.5	11	606ZZ	C6	70	EF 6
EF 8	6	14	52	32	17	25	26		38	6.6	11	12	606ZZ	C6	130	EF 8
EF 10	8	20	70	43	25	36	24		52	9	—	—	608ZZ	C8	330	EF 10
EF 12	10	20	70	43	25	36	24		52	9	—	—	6000ZZ	C10	320	EF 12

电机直连型滚珠丝杠 / 滑动丝杠篇
Direct Motor Drive Ball Screws / Lead Screws

MoBo 系列 / Series

是在驱动丝杠（滚珠丝杠或滑动丝杠）的轴端直接连接步进电机、不需要联轴器的紧凑型直线执行元件。

It's a Compact Linear Actuator series, what we call MoBo.
The MoBo is the combined product that Stepping Motor Shaft is directly mounted onto Drive Screw Shaft, and eliminated Coupling accordingly.

KSS以小型化为微型滚珠丝杠制造商的使命，不懈地追求产品的轻量小型化。
其代表产品MoBo（电机直连型滚珠丝杠/滑动丝杠），是将电机轴与滚珠丝杠轴合二为一的组合产品，不需要联轴器，从而缩短了长边方向的尺寸。
KSS自2001年推出MoBo以来，不断增加进给丝杠和电机的种类，为用户提供更多的选择。
本次，我们将电机直连型滚珠丝杠及滑动丝杠的各种产品汇集在一本产品目录中进行介绍，希望能加深用户对本公司MoBo系列产品的了解。
今后，我们将一如既往尽最大的努力满足用户的需求，开发出更多更好的产品，欢迎大家惠顾。

In KSS, we always pursue the downsizing of our products that is the mission of the Miniature Ball Screw manufacturer.
MoBo（Direct Motor Drive Ball Screws / Lead Screws）is one of our representative product, which combines a Motor Shaft and a Ball Screw / Lead Screw Shaft. MoBo is the combined product that can achieve shortening the longitudinal dimension by eliminating the Coupling.
Since KSS launched the first version of MoBo in 2001, we continued to add various type of MoBo on our line-up and provides the variety of choices to our customer.
This time KSS integrated all of our MoBo line-up into one catalogue to offer better understanding for the customer.
Now KSS will continue to meet the demand of the customer as much as possible, and will develop a better product in the future, thanking you in advance.

MoBo系列是驱动丝杠（滚珠丝杠 / 滑动丝杠）和步进电机（2相 / 5相）一体化的组合型产品，备有多种产品可供选择（表 F-1、表 F-2）。

MoBo series can offer many variety of choices, based on its combination of Stepping Motor type（2-phase or 5-phase）and Drive Screw type（Ball Screw or Lead Screw）.
Please refer Table F-1 and Table F-2.

表 F-1：驱动丝杠和电机的组合 / Table F-1；Combination of Drive Screw and Stepping Motor

Type 种 类	Drive Screw type / 驱动丝杠			Stepping Motor 步进电机		Additional Function 附属装置
	Precision Ball Screw 精密滚珠丝杠	Rolled Ball Screw 冷轧滚珠丝杠	Resin Lead Screw 树脂螺母滑动丝杠	2-phase 2相	5-phase 5相	
MB Precision type 精密型	○ JIS C3				○	
TMB Rolled type 冷轧型		○ JIS Ct7			○	
2TMB 2-phase Rolled type 2相冷轧型		○ JIS Ct7 equivalent 相当于JIS Ct7		○		
RM Resin type 树脂型			○ JIS Ct10 equivalent 相当于JIS Ct10	○		
SiMB Hybrid type 混合型	○ JIS C3 /C5			○		Encoder Memory chip 编码器 存储芯片

表 F-2：丝杠轴公称外径与导程的组合/ Table F-2；Combination of Shaft Nominal dia. & Lead

Unit（单位）：mm

Lead / 导程 / Shaft Nominal dia. / 轴径	0.5	1.0	2	4	5	6	10	12	20
4	MB	MB TMB SiMB							
5				TMB					
6		MB TMB	MB TMB			TMB			
8		MB TMB 2TMB SiMB	MB TMB 2TMB RM SiMB		TMB 2TMB RM SiMB			TMB 2TMB SiMB	
10			MB	MB			RM		RM

MoBo series
MoBo(魔博)系列
Direct Motor Drive Ball Screws / Lead Screws MoBo series
电机直连型滚珠丝杠 / 滑动丝杠