

NB

NEW

ROTARY BALL SPLINE

SPB type

LINEAR + ROTATIONAL MOTION
COMPACT·HIGH RIGIDITY·
HIGH ACCURACY·HIGH SPEED



NIPPON BEARING CO., LTD.

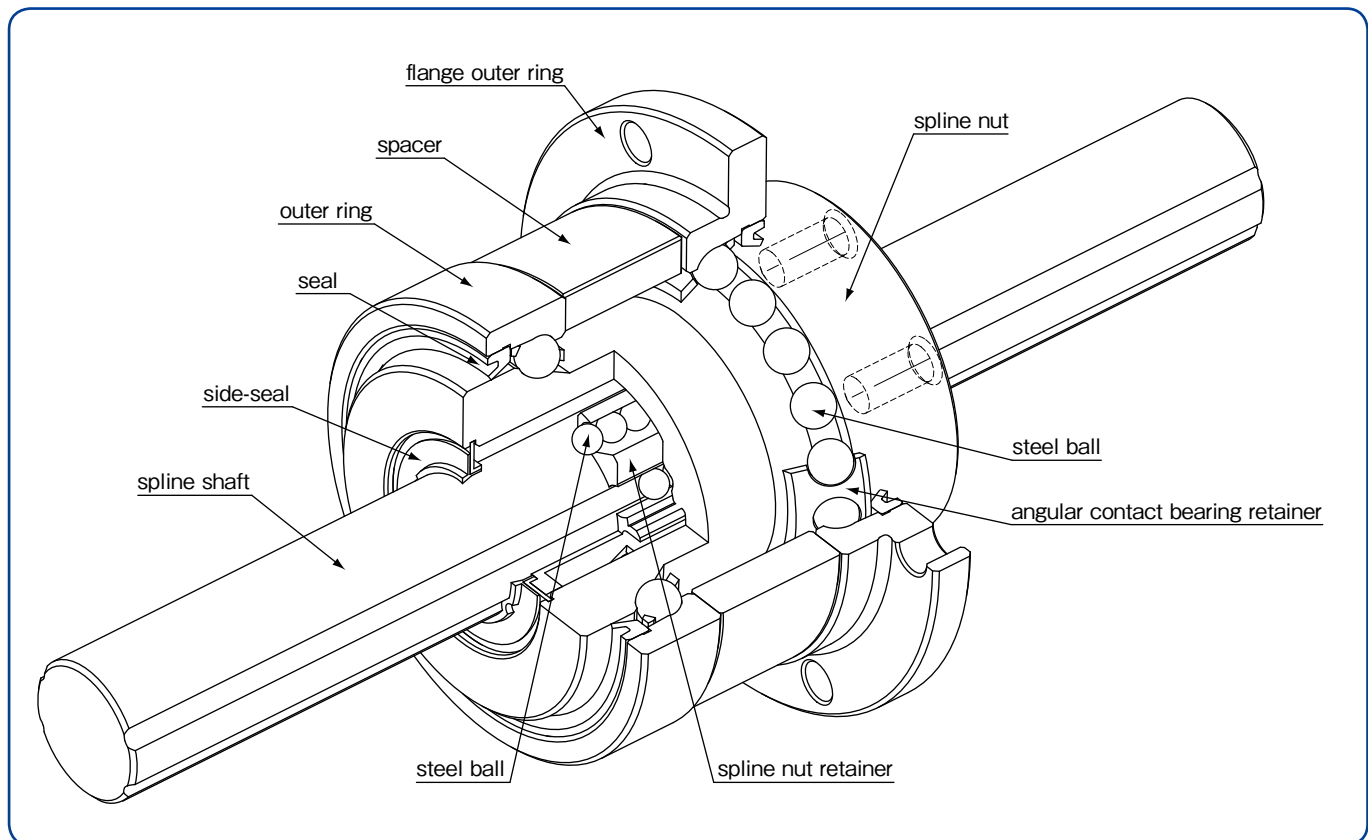
NB ROTARY BALL SPLINE

SPB type

STRUCTURE AND ADVANTAGES

The NB rotary ball spline SPB type combines a spline nut and a set of angular contact bearings in a compact, high accurate, and high-speed rotation-capable assembly, providing both linear and rotational motion at the same time.

Figure 1 Structure of SPB type



PRELOAD AND CLEARANCE

The amount of clearance and preload for the spline nut is expressed in terms of the clearance in the rotational direction. Three levels of preload are available: standard, light (T1), and medium (T2). The preload is properly adjusted by the spacer for the angular contact bearings.

Table 1 Preload and Clearance in Rotational Direction (Linear Motion) unit/ μm

part number	standard	light (T1)	medium (T2)
SPB16	-3~+1	- 8~-3	-13~- 8
SPB20	-4~+2	-12~-4	-20~-12
SPB25			

Table 2 Operating Conditions and Preload

preload	symbol	operating conditions
standard	blank	minute vibration is applied. a precise motion is required. a torque is applied in a given direction.
light	T1	slight vibration is applied. slight torsional load is applied. cyclic torque is applied.
medium	T2	shock/vibration is applied. over-hang load is applied. torsional load is applied.

HANDLING PRECAUTION

The spacer is adjusted to give a proper spacing for the best preload condition. Please do not adjust the spacer.

ACCURACY

The NB rotary ball spline is measured for accuracy at the points shown in Figure 2.

Figure 2 Accuracy Measurement Points

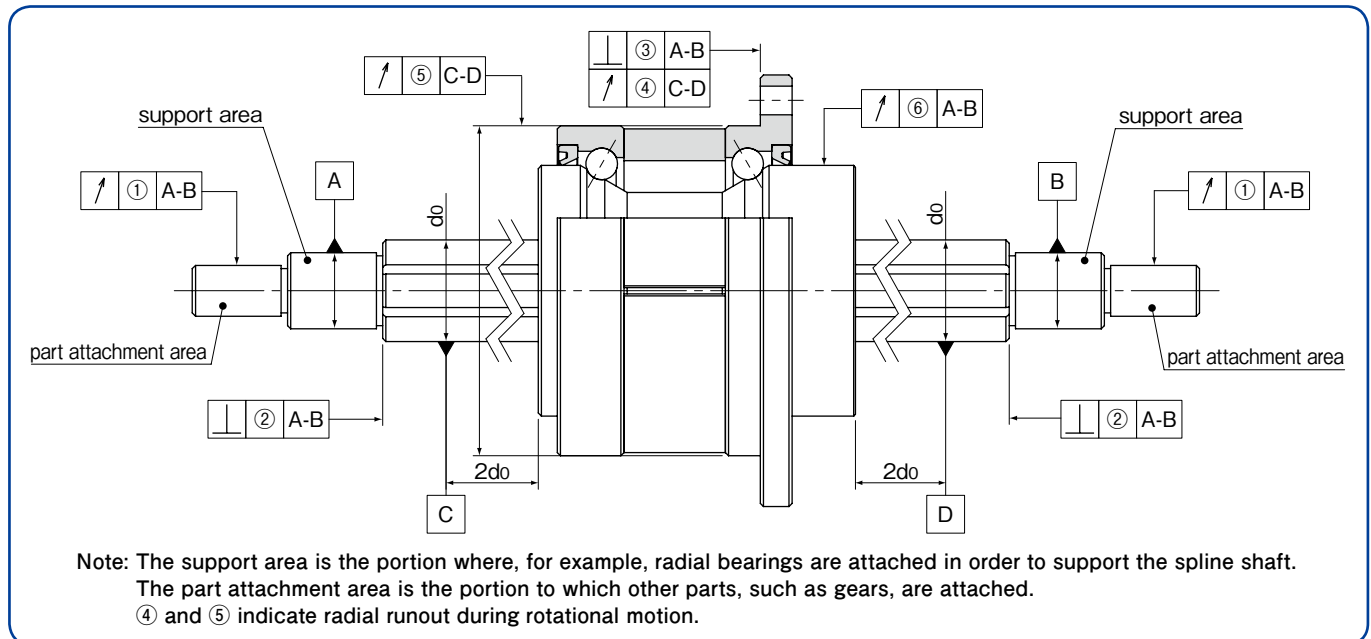


Table 3 Tolerance of Spline Shaft Groove Torsion (Max.)

accuracy grade	high	precision (P)
tolerance	13 μ m/100mm	6 μ m/100mm

The groove torsion is indicated per 100mm, arbitrarily set as the effective length of the spline shaft section.

Table 4 Tolerance Relative to Spline Support Area (Max.)

unit/ μ m

part number	①radial runout of part attachment area		②perpendicularity of the end of the spline shaft section (when grinding is requested on the drawing)		③perpendicularity of the flange	
	high-grade	precision-grade (P)	high-grade	precision-grade (P)	high-grade	precision-grade (P)
SPB16	19	12	11	8	18	13
SPB20						
SPB25	22	13	13	9	21	16

Table 5 Radial Runout of Outer Surface of Rotary Spline Nut Relative to Spline Shaft Area (Max.)

unit/ μ m

part number	④lateral runout of flange mounting side		⑤radial runout of outer ring	
	high-grade	precision-grade (P)	high-grade	precision-grade (P)
SPB16	18	13	21	16
SPB20				
SPB25	21	16		

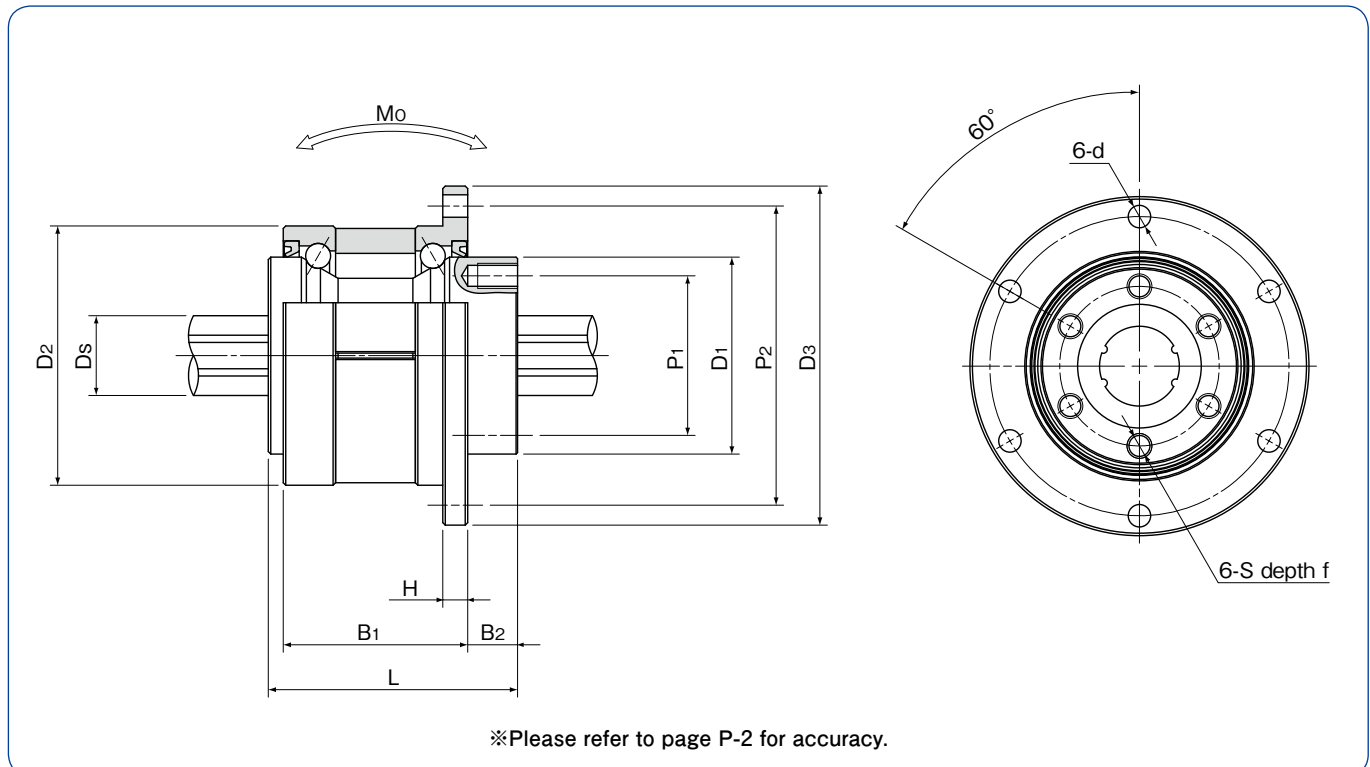
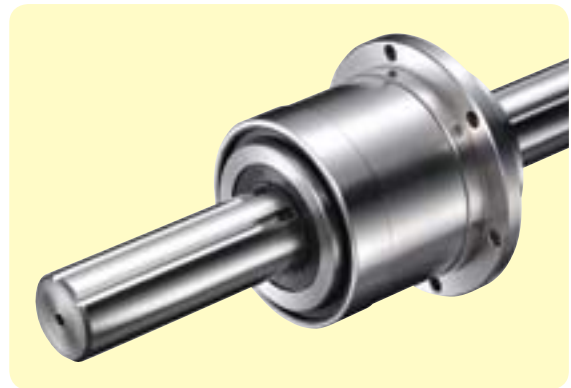
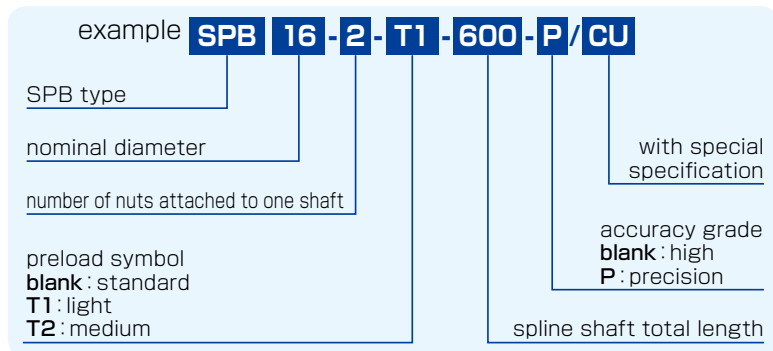
Table 6 ⑥Radial Runout of Spline Nut Relative to Spline Support Area (Max.)

unit/ μ m

spline shaft total length (mm)		part number			
		SPB16		SPB20-25	
greater than	or less	high-grade	precision-grade (P)	high-grade	precision-grade (P)
—	200	34	18	32	18
200	315	45	25	39	21
315	400	53	31	44	25
400	500	62	38	50	29
500	630	75	46	57	34
630	800	92	58	68	42
800	1,000	115	75	83	52
1,000	1,250	153	97	102	65
1,250	1,600	195★	127★	130	85
1,600	2,000	—	—	171	116

★SPB16 shaft maximum length : 1,500mm

part number structure



part number	major dimensions					major dimensions of angular contact bearings						spline shaft		rotary ball spline				angular contact bearings		allowable static moment	mass		※ maximum	size
	D1	L	P1	S	f	D2	D3	H	B1	B2	P2	d	Ds	dynamic	static	dynamic	static	dynamic	static	Mo	nut	shaft	revolutions	
	h7	mm	P.C.D.		mm	mm	mm	mm	mm	mm	P.C.D.	mm	mm	C _T	C _{0T}	C	C ₀	C	C ₀	N·m	kg	kg/m	rpm	
SPB16	39.5	50	32	M5	8	52	68	5	37	10	60	4.5	16	60	110	6.12	11.2	13.0	12.8	46	0.45	1.5	4,000	16
SPB20	43.5	63	36	M5	8	56	72	6	48	12	64	4.5	20	105	194	8.9	16.3	17.4	17.2	110	0.69	2.4	3,600	20
SPB25	53	71	45	M6	8	62	78	6	55	13	70	4.5	25	189	346	12.8	23.4	22.1	22.5	171	0.92	3.7	3,200	25

※Maximum revolutions for grease lubrication, please contact NB in case of oil lubrication.

1kN≒102kgf 1N·m≒0.102kgf·m



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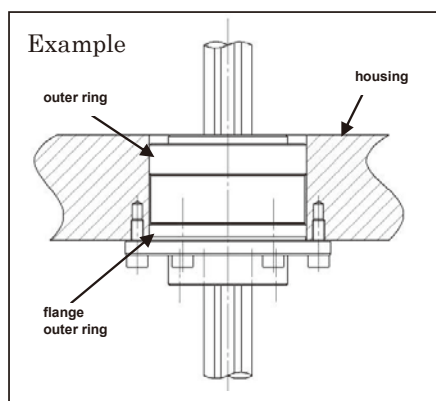
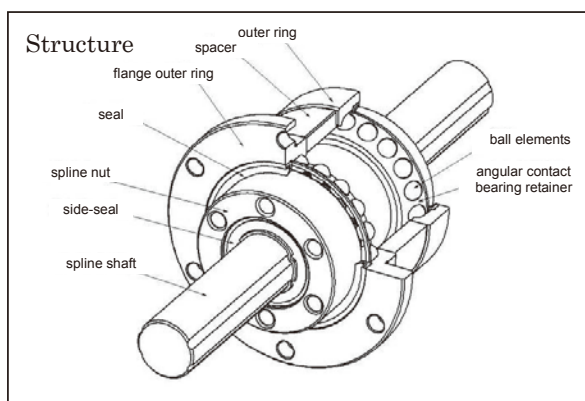
SPB type

<Use and Handling Precautions>

NB Rotary Ball Spline SPB type is a precision component.

Handle with care according to the following precautions.

- **Do not adjust the spacer.** The spacer is pre-adjusted for a best preload condition.
Never hold the spacer by hand and avoid excessive vibration or shock to assure the expected precision.
- Do not take off the nut from the shaft. In case the shaft to be reinserted to the nut, align the NB mark on the nut and shaft. Make sure to align the shaft spline grooves with the rows of balls and the seal lip of the nut when inserting the shaft to the nut. For the preloaded set, exercise added care.
- **Never disassemble the Nut**
- Remove burrs, dust and anti-rust oil from the mounting surface before installation.
- **Make the housing** of SPB type to be an **H7 tolerance** and to be **enough depth so that the flange outer ring and the outer ring are inside the housing**. Otherwise, the spacer shall be dislocated and then the spacer will come out of the nut.
- Re-lubricate the spline portion and angular-contact-bearing portion with a similar type of grease periodically.
- Operating Temperature Range: from -20°C to 80°C.



- Please refer to the NB general catalogue for details.



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For more information, please contact NB