

SLIDE SHAFT SPINDLE SHAFT

SLIDE SHAFT

ADVANTAGES	F-2
TYPES	F-3
CALCULATION OF DEFLECTION AND DEFLECTION ANGLE	F-4
NB SHAFT SN TYPE	F-6
NB STAINLESS STEEL SHAFT SNS TYPE	F-7
NB HOLLOW SHAFT SNT TYPE	F-8
NB CENTER-LINED TAPPED SHAFT SN(S)B TYPE	F-9
SHAFT SUPPORTER AND SHAFT SUPPORT RAIL	F-10
ACCURACY OF SA TYPE SUPPORT RAIL	F-10
SHAFT SUPPORTER SH-A TYPE	F-11
SHAFT SUPPORTER SH TYPE	F-12
SHAFT SUPPORTER SHF TYPE	F-13
SHAFT SUPPORT RAIL SA TYPE	F-14
SHAFT SUPPORTER WH-A TYPE (INCH SIZE)	F-16
SHAFT SUPPORT RAIL WA TYPE (INCH SIZE)	F-18
LOW SHAFT SUPPORT RAIL LWA TYPE (INCH SIZE)	F-19
SHAFT SUPPORT ASSEMBLY WSS TYPE (STANDARD TYPE)	F-20
SHAFT SUPPORT ASSEMBLY WSS-SS TYPE (STAINLESS TYPE)	F-21
NBCA SHAFT SF TYPE	F-22
NBCA STAINLESS STEEL SHAFT SFS TYPE	F-23
NBCA INCH SHAFT SFW TYPE	F-24
NBCA INCH STAINLESS STEEL SHAFT SFWS TYPE	F-25
NBCA INCH PRE-DRILLED SHAFT SFW-PD TYPE	F-26
NBCA INCH PRE-DRILLED STAINLESS STEEL SHAFT SFWS-PD TYPE	F-27
FORMAT SINGLE END TAPPED INCH SHAFT SFW TYPE	F-28
FORMAT BOTH ENDS TAPPED INCH SHAFT SFW TYPE	F-29
FORMAT THREADED INCH SHAFTS SFW TYPE (SINGLE END THREADED)	F-30
FORMAT THREADED INCH SHAFTS SFW TYPE (BOTH ENDS THREADED)	F-31
PRE-CUT SLIDE SHAFTS PC TYPE	F-32
FIT SERIES	F-33

SPINDLE SHAFT/SPINDLE UNIT

ADVANTAGES	F-34
SPINDLE UNIT SPECIFICATIONS (EXAMPLE)	F-36
EXAMPLES OF MACHINING	F-36
EXAMPLE OF DRAWING①	F-37
EXAMPLE OF DRAWING②	F-38
EXAMPLE OF DRAWING③	F-39

GENERAL MACHINE SHAFTHING

ADVANTAGES	F-40
MACHINING SPECIFICATIONS	F-40
EXAMPLES OF MACHINING①	F-41
EXAMPLES OF MACHINING②	F-42

SHAFT

The NB shaft can be used in a wide range of applications as a mechanical component from straight shaft to spindle shaft. NB's expertise in machining and heat-treatment turns into manufacturing spindle shaft, roll shaft, and general machinery shaft for rotational motion. NB's high accuracy technology answers various shaft machining requirements.

ADVANTAGES

Advanced Machining Technology

NB performs a wide variety of highly accurate machining processes to provide custom shafting from relatively simple machining, such as tapping and shaft stepping to the more demanding high-speed rotating shafts and spindles. NB can also answer the special grinding and bore machining requirements.

Excellent Wear Resistance

Most commonly used materials are high-carbon chromium bearing steel (SUSJ2) and martensite stainless steel (SUS440C or equivalent). NB's advanced heat-treatment technology gives these materials an excellent wear resistance by quenching and tempering to achieve a uniform hardened layer in the circumferential and axial directions. The cross-sectional picture below shows the hardened layer-depth of the NB shaft.

Hardened Layer
(cross section)



Surface Roughness

Precision grinding results in a surface roughness of less than Ra0.4.

Wide Selection of Shaft Types

SN type, SNS type, SNT type,
SNB, SNSB type (Center-lined tapped shaft)
Spindle shaft, roll shaft

Special Requirements

Based on the customer drawings and specifications NB will answer the customer requirements in material (SCM, SKS etc.), heat-treatment, surface treatment, etc.

Shaft Supporter and Shaft Support Rail

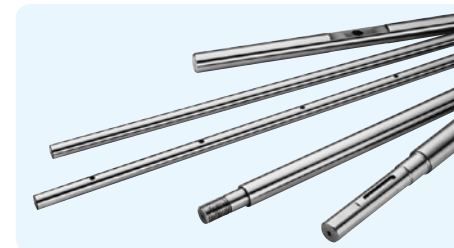
These components ease the shaft installation and help save the design/assembling time. (refer to page F-10)

FIT Series

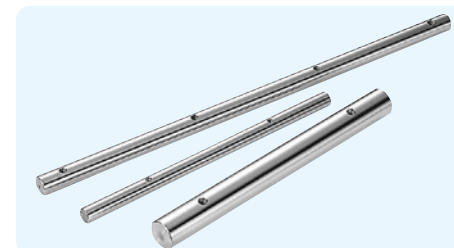
This series is a set of NB slide bush and NB shaft. By precise shaft-grinding, FIT series achieves the best-fit clearance adjustment for a smooth, high accuracy linear motion. (refer to page F-33)

TYPES

SN/SNS/SNT type (NB Shaft)



SNB/SNSB type (NB Center-lined Tapped Shaft)



NB shaft is a high-precision shaft that can be used with slide bush or any other bearings. A wide range of machining is provided for customer drawings and requirements.

Table F-1 Specifications

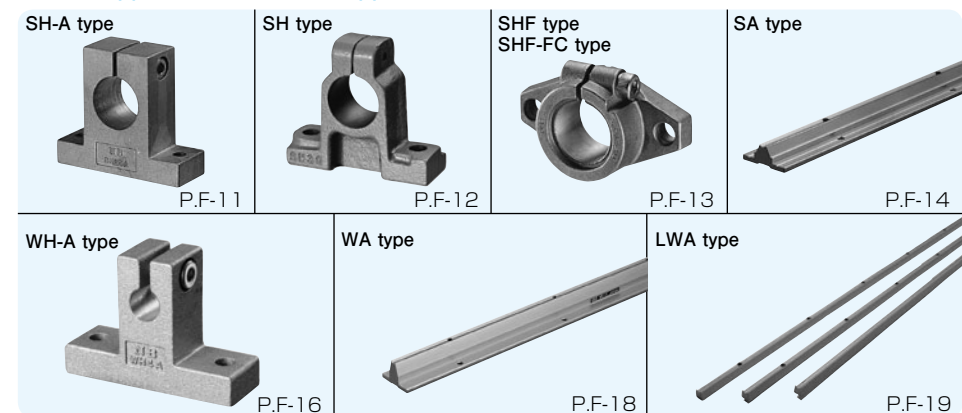
type	SN type	SNS type	SNT type
material	SUJ2	equivalent to SUS440C	SUJ2 (hollow shaft)
outer diameter tolerance	g6 or to be specified		
hardness	60HRC or more	56HRC or more	60HRC or more
surface roughness	Ra0.4 or less		
page	page F-6	page F-7	page F-8

Center-lined tapped shafts are standardized series for easy selection that can be used with the SA shaft support rails. (refer to page F-14)

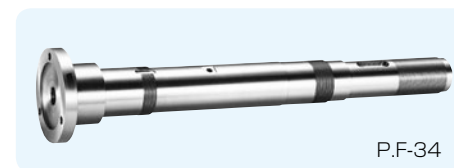
Table F-2 Specifications

type	SNB type	SNSB type
material	SUJ2	equivalent to SUS440C
outer diameter tolerance	g6 or to be specified	
hardness	60HRC or more	56HRC or more
surface roughness	Ra0.4 or less	
page	page F-9	

Shaft Supporter and Shaft Support Rail



Special Specifications



Based on drawings and specifications, NB manufactures spindle shafts, and roll shafts for the rotary motion application. Material, heat-treatment (hardening/tempering), surface treatment, etc, NB meets customer requirements. Please contact NB for details.

CALCULATION OF DEFLECTION AND DEFLECTION ANGLE

The following formulas are used to obtain the deflection and its angle of the shaft. Typical conditions are listed in Table F-3.

Table F-3 Formulas for Calculating Deflection and Deflection Angle

support method	specification	formula for deflection	formula for deflection angle
1 support support		$\delta_{\max} = \frac{P\ell^3}{48EI} = P\ell^3C$	$i_1 = 0$ $i_2 = \frac{P\ell^2}{16EI} = 3P\ell^2C$
2 fixed fixed		$\delta_{\max} = \frac{P\ell^3}{192EI} = \frac{1}{4}P\ell^3C$	$i_1 = 0$ $i_2 = 0$
3 support support		$\delta_{\max} = \frac{5p\ell^4}{384EI} = \frac{5}{8}p\ell^4C$	$i_2 = \frac{p\ell^3}{24EI} = 2p\ell^3C$
4 fixed fixed		$\delta_{\max} = \frac{p\ell^4}{384EI} = \frac{1}{8}p\ell^4C$	$i_2 = 0$
5 support support		$\delta_1 = \frac{Pa^2}{6EI} \left(2 + \frac{3b}{a} \right) = 8Pa^3 \left(2 + \frac{3b}{a} \right) C$ $\delta_{\max} = \frac{Pa^3}{24EI} \left(\frac{3\ell^2}{a^2} - 4 \right) = 2Pa^3 \left(\frac{3\ell^2}{a^2} - 4 \right) C$	$i_1 = \frac{Pab}{2EI} = 24PabC$ $i_2 = \frac{Pa(a+b)}{2EI} = 24Pa(a+b)C$
6 fixed fixed		$\delta_1 = \frac{Pa^2}{6EI} \left(2 - \frac{3a}{\ell} \right) = 8Pa^3 \left(2 - \frac{3a}{\ell} \right) C$ $\delta_{\max} = \frac{Pa^3}{24EI} \left(2 + \frac{3b}{a} \right) = 2Pa^3 \left(2 + \frac{3b}{a} \right) C$	$i_1 = \frac{Pa^2b}{2EI\ell} = \frac{24Pa^2bC}{\ell}$ $i_2 = 0$
7 fixed free		$\delta_{\max} = \frac{P\ell^3}{3EI} = 16P\ell^3C$	$i_1 = \frac{P\ell^2}{2EI} = 24P\ell^2C$ $i_2 = 0$
8 fixed free		$\delta_{\max} = \frac{p\ell^4}{8EI} = 6p\ell^4C$	$i_1 = \frac{p\ell^3}{6EI} = 8p\ell^3C$ $i_2 = 0$
9 support support		$\delta_{\max} = \frac{\sqrt{3}Mo\ell^2}{216EI} = \frac{2\sqrt{3}}{9}Mo\ell^2C$	$i_1 = \frac{Mo\ell}{12EI} = 4Mo\ell C$ $i_2 = \frac{Mo\ell}{24EI} = 2Mo\ell C$
10 fixed fixed		$\delta_{\max} = \frac{Mo\ell^2}{216EI} = \frac{2}{9}Mo\ell^2C$	$i_1 = \frac{Mo\ell}{16EI} = 3Mo\ell C$ $i_2 = 0$

δ_1 : deflection at the concentrated load point (mm) $\delta_{\max}$: maximum deflection (mm) i_1 : deflection angle at the concentrated load point (rad)
 i_2 : deflection angle at the support point (rad) Mo: moment (N·mm) P: concentrated load (N)
 p: uniformly distributed load (N/mm) a,b: concentrated load point distance (mm) ℓ : span (mm) I: moment of inertia of area (mm⁴)
 E: modulus of longitudinal elasticity (SUJ2) 2.06×10^5 (N/mm²) (SUS) 2.0×10^5 (N/mm²) C: $1/48EI$ (1/N·mm²)

The moment of inertia of area (I) is obtained using the following formulas:

● For solid shaft

$$I = \frac{\pi D^4}{64}$$

● For hollow shaft

$$I = \frac{\pi}{64} (D^4 - d^4)$$

I: moment of inertia of area (mm⁴)

D: outer diameter (mm) d: inner diameter (mm)

The values of the moment of inertia of area and C (=1/48 EI) for NB shafts are listed in Table F-4 and F-5.

Calculation Examples

1. Calculating the maximum deflection of a 30mm shaft with a 500mm span when a concentrated load of 980 N is applied at the mid-point of the shaft ... (neglecting the shaft weight)

① In case the support method is support-support:

From the given conditions, $P = 980$ N, $\ell = 500$ mm
 From Table F-4, C for an outer diameter of 30 mm,
 $C = 2.54 \times 10^{-12}$ (N·mm²).

Substituting these values into the corresponding formula (No. 1) in Table F-3,
 $\delta_{\max} = P\ell^3C = 0.31$ (mm)

② In case the support method is fixed-fixed:

Substituting the values into the corresponding formula (No. 2) given in Table F-3,

$$\delta_{\max} = \frac{1}{4}P\ell^3C = 0.08 \text{ (mm)}$$

2. Calculating the maximum deflection of a 60mm shaft with an inner diameter of 32 mm and a 2,000 mm span by its own weight ...

From Table F-5, C for an outer diameter of 60 mm,
 $C = 1.73 \times 10^{-13}$ (N·mm²)

The mass per unit length of a shaft with an outer diameter of 60 mm and an inner diameter of 32 mm is 15.9kg/m. Therefore, a uniformly distributed load of 0.156 N/mm is applied. Substituting these values into the formula (No. 3) given in Table F-3.

$$\delta_{\max} = \frac{5}{8}p\ell^4C = 0.27 \text{ (mm)}$$

Table F-4 Solid Shaft

outer diameter D (mm)	moment of inertia of area I (mm ⁴)	C=1/48EI (1/N·mm ²) SUJ2	equivalent to SUS440C
3	3.98	2.54×10^{-8}	2.62×10^{-8}
4	1.26×10	8.05×10^{-9}	8.29×10^{-9}
5	3.07×10	3.30×10^{-9}	3.40×10^{-9}
6	6.36×10	1.59×10^{-9}	1.64×10^{-9}
8	2.01×10^2	5.03×10^{-10}	5.18×10^{-10}
10	4.91×10^2	2.06×10^{-10}	2.12×10^{-10}
12	1.02×10^3	9.94×10^{-11}	1.02×10^{-10}
13	1.40×10^3	7.21×10^{-11}	7.43×10^{-11}
15	2.49×10^3	4.07×10^{-11}	4.19×10^{-11}
16	3.22×10^3	3.14×10^{-11}	3.24×10^{-11}
20	7.85×10^3	1.29×10^{-11}	1.33×10^{-11}
25	1.92×10^4	5.27×10^{-12}	5.43×10^{-12}
30	3.98×10^4	2.54×10^{-12}	2.62×10^{-12}
35	7.37×10^4	1.37×10^{-12}	1.41×10^{-12}
40	1.26×10^5	8.05×10^{-13}	8.29×10^{-13}
50	3.07×10^5	3.30×10^{-13}	3.40×10^{-13}
60	6.36×10^5	1.59×10^{-13}	1.64×10^{-13}
80	2.01×10^6	5.03×10^{-14}	5.18×10^{-14}
100	4.91×10^6	2.06×10^{-14}	2.12×10^{-14}
120	1.02×10^7	9.94×10^{-15}	—
150	2.49×10^7	4.07×10^{-15}	—

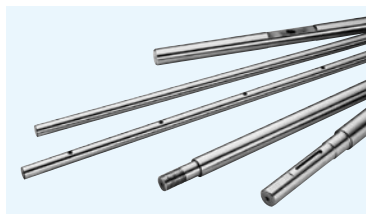
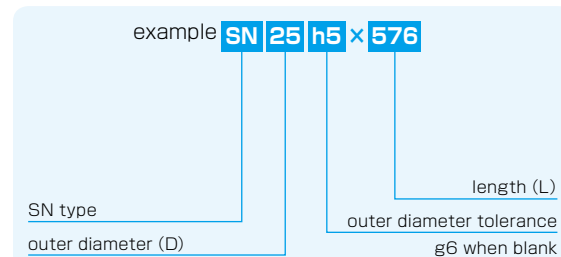
Table F-5 Hollow Shaft

outer diameter D (mm)	inner diameter d (mm)	moment of inertia of area I (mm ⁴)	C=1/48EI (1/N·mm ²)
6	2	6.28×10	1.61×10^{-9}
8	3	1.97×10^2	5.13×10^{-10}
10	4	4.78×10^2	2.11×10^{-10}
12	5	9.87×10^2	1.02×10^{-10}
13	6	1.34×10^3	7.55×10^{-11}
16	8	3.02×10^3	3.36×10^{-11}
20	10	7.36×10^3	1.37×10^{-11}
25	15	1.67×10^4	6.06×10^{-12}
30	16	3.65×10^4	2.77×10^{-12}
35	19	6.73×10^4	1.50×10^{-12}
40	20	1.18×10^5	8.57×10^{-13}
50	26	2.84×10^5	3.56×10^{-13}
60	32	5.85×10^5	1.73×10^{-13}
80	48	1.75×10^6	5.78×10^{-14}
100	60	4.27×10^6	2.37×10^{-14}

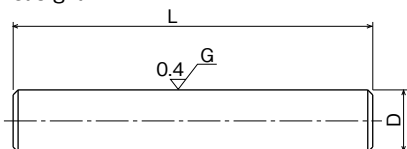
SN TYPE

– NB Shaft –

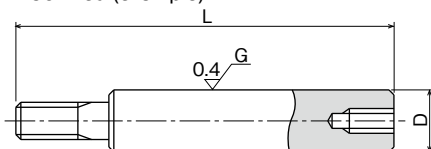
part number structure



straight



machined (example)



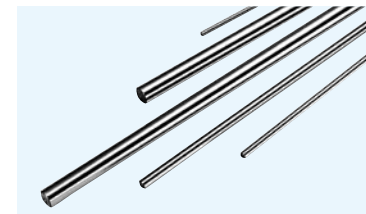
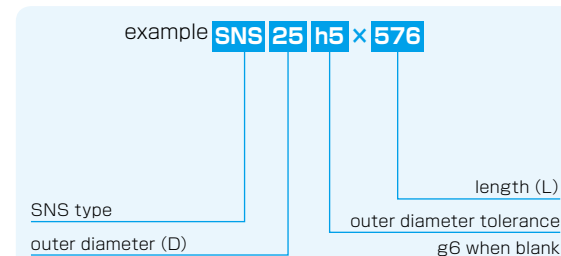
part number	outer diameter		length L	mass
	D mm	tolerance g6 μm		
SN 3	3	-2/-8	50 ← → 400	0.06
SN 4	4	- 4	100 ← → 500	0.10
SN 5	5		100 ← → 700	0.16
SN 6	6		100 ← → 1000	0.23
SN 8	8	- 5	200 ← → 1500	0.40
SN 10	10	-14	200 ← → 2000	0.62
SN 12	12	- 6	200 ← → 3000	0.89
SN 13	13		200 ← → 3000	1.04
SN 15	15		-17	300 ← → 4000
SN 16	16	300 ← → 4000		1.58
SN 20	20	- 7		300 ← → 5000
SN 25	25	-20	300 ← → 6000	3.85
SN 30	30		300 ← → 6000	5.55
SN 35	35		300 ← → 6000	7.55
SN 40	40	- 9	400 ← → 6000	9.87
SN 50	50	-25	400 ← → 6000	15.4
SN 60	60	-10	500 ← → 6000	22.2
SN 80	80		600 ← → 6000	39.5
SN100	100		800 ← → 6000	61.7
SN120	120	-12	1000 ← → 6000	88.8
SN150	150	-34	1500 ← → 4500	139
		-14/-39	1500 ← → 4500	

material: high-carbon chromium bearing steel (SUJ2) hardness: 60HRC (HV697) or more
Tolerances other than g6 are available upon request.

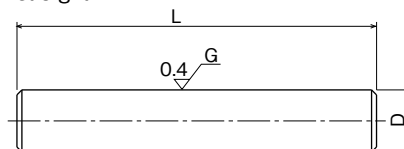
SNS TYPE

– NB Stainless Steel Shaft –

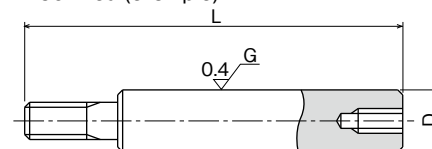
part number structure



straight



machined (example)



part number	outer diameter		length L	mass
	D mm	tolerance g6 μm		
SNS 3	3	-2/-8	50 ← → 300	0.06
SNS 4	4	- 4	100 ← → 400	0.10
SNS 5	5	-12	100 ← → 500	0.16
SNS 6	6		100 ← → 600	0.22
SNS 8	8	- 5	200 ← → 1000	0.39
SNS 10	10	-14	200 ← → 1500	0.61
SNS 12	12	- 6	200 ← → 2500	0.88
SNS 13	13	-17	200 ← → 3000	1.03
SNS 16	16		300 ← → 4000	1.56
SNS 20	20	- 7	300 ← → 5000	2.43
SNS 25	25	-20	300 ← → 6000	3.80
SNS 30	30		300 ← → 6000	5.48
SNS 35	35	- 9	400 ← → 6000	7.46
SNS 40	40	-25	400 ← → 6000	9.75
SNS 50	50		500 ← → 6000	15.2
SNS 60	60	-10	600 ← → 6000	21.9
SNS 80	80	-29	800 ← → 6000	39.0
SNS100	100	-12/-34	1000 ← → 6000	60.9

material: martensite stainless steel (equivalent to SUS440C)

hardness: 56HRC (HV613) or more

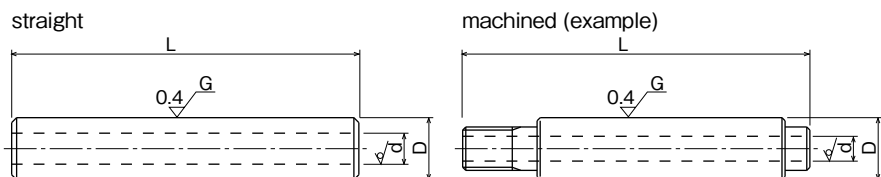
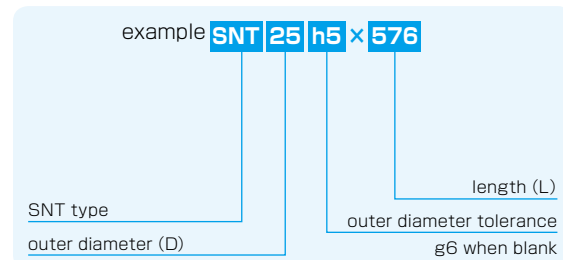
The maximum length of hardening is up to 4500mm for shafts with diameter over 80mm.

Tolerances other than g6 are available upon request.

SNT TYPE

— NB Hollow Shaft —

part number structure



part number	outer diameter D mm	tolerance g6 μm	inner diameter d mm	length L mm	mass Kg/m
SNT 6	6	-4/-12	2	100 → 400	0.20
SNT 8	8	-5	3	200 → 600	0.34
SNT 10	10	-14	4	200 → 1000	0.52
SNT 12	12	-6	5	200 → 1500	0.73
SNT 13	13	-17	6	200 → 1500	0.82
SNT 16	16		8	300 → 2500	1.18
SNT 20	20	-7	10	300 → 4000	1.85
SNT 25	25	-20	15	300 → 4000	2.46
SNT 30	30		16	300 → 4500	3.97
SNT 35	35	-9	19	400 → 4500	5.32
SNT 40	40	-25	20	400 → 4500	7.39
SNT 50	50		26	500 → 4500	11.3
SNT 60	60	-10	32	600 → 4500	15.9
SNT 80	80	-29	48	800 → 4500	25.3
SNT 100	100	-12/-34	60	1000 → 4500	39.5

material: high-carbon chromium bearing steel (SUJ2)

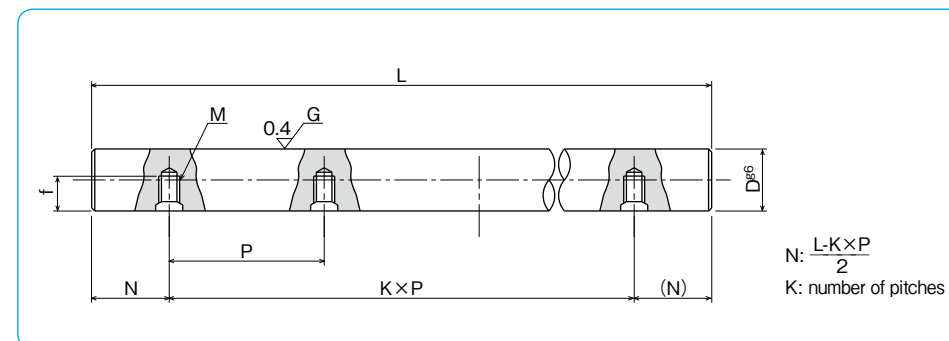
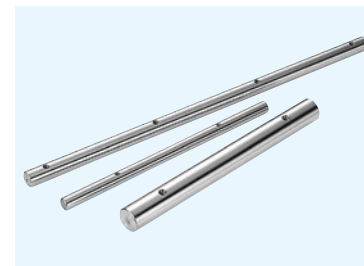
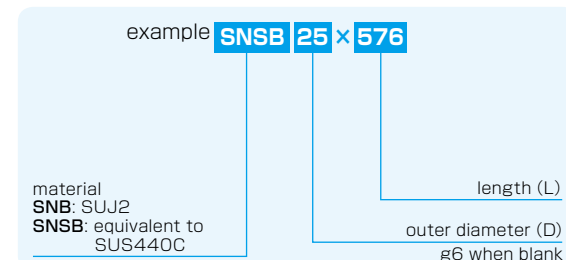
hardness: 60HRC (HV697) or more

Tolerances other than g6 are available upon request.

NB CENTER-LINED TAPPED SHAFT

A larger diameter shaft can overcome problems in maintaining precision functionality when a high or unbalanced load is applied. A combination of the center-lined tapped shaft together with the SA type support rail is ideal in such cases. (see pages F-18,19) The center-lined tapped shaft is standardized to simplify shaft selection.

part number structure



NB Center-Lined Tapped Shaft

part number	outer diameter D mm	tolerance g6* μm	pitch P mm	screw size M	tap depth f mm	maximum length L _{max} mm
SNB10	10	-5/-14	100	M4	4.5	1,500
SNB12	12	-6	100	M4	5.5	1,800
SNB13	13	-17	100	M4	6	2,000
SNB16	16		150	M5	7	4,000
SNB20	20	-7	150	M6	9	4,000
SNB25	25	-20	200	M6	12	4,000
SNB30	30		200	M8	15	4,500
SNB35	35	-9	200	M8	15	5,000
SNB40	40	-25	300	M8	18	6,000
SNB50	50		300	M10	22	6,000

material: high-carbon chromium bearing steel (SUJ2)

hardness: 60HRC (HV697) or more

*g6 is a standard tolerance of the outer diameter.

NB Center-Lined Tapped Stainless Steel Shaft

part number	outer diameter D mm	tolerance g6* μm	pitch P mm	screw size M	tap depth f mm	maximum length L _{max} mm
SNSB16	16	-6/-17	150	M5	7	2,000
SNSB20	20	-7	150	M6	9	3,000
SNSB25	25	-20	200	M6	12	4,000
SNSB30	30		200	M8	15	4,500
SNSB35	35	-9	200	M8	15	5,000
SNSB40	40	-25	300	M8	18	6,000
SNSB50	50		300	M10	22	6,000

material: martensite stainless steel (equivalent to SUS440C)

hardness: 56HRC (HV613) or more

*g6 is a standard tolerance of the outer diameter.

SHAFT SUPPORTER AND SHAFT SUPPORT RAIL

These components save design/assembling time and ease shaft installation.

SH·SH-A·WH-A type

These are most commonly used compact shaft supporters. SH type is made of cast iron and SH-A/WH-A type is made of aluminum alloy.

SH-A type

P.F-11

SH type

P.F-12

WH-A type

P.F-16

SHF·SHF-FC type

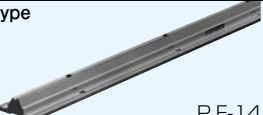
These are flanged type shaft supporters for a compact design. SHF is made of aluminum alloy and SHF-FC (shaft diameter 35 and over) is made of cast iron.

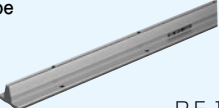
SHF type
SHF-FC type

P.F-13

SA·WA·LWA type (shaft support rail)

These support rails support shafts from below to avoid shaft deflection for a long-stroke/high load application. This type is made of aluminum alloy.

SA type

P.F-14

WA type

P.F-18

LWA type

P.F-19

ACCURACY OF SA TYPE SUPPORT RAIL

The accuracy of the SA support rails are measured as shown in Figure F-1.

Figure F-1 Measurement Method

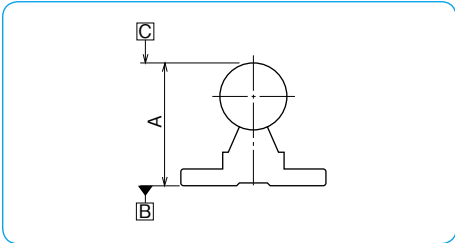
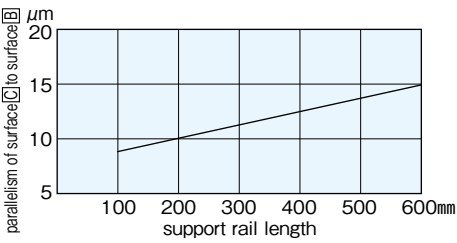
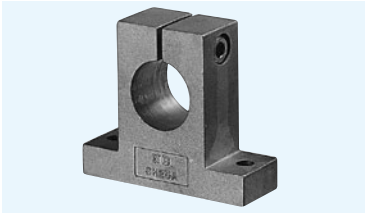


Figure F-2 Accuracy of SA type Support Rail



SH-A TYPE

– Shaft Supporter –

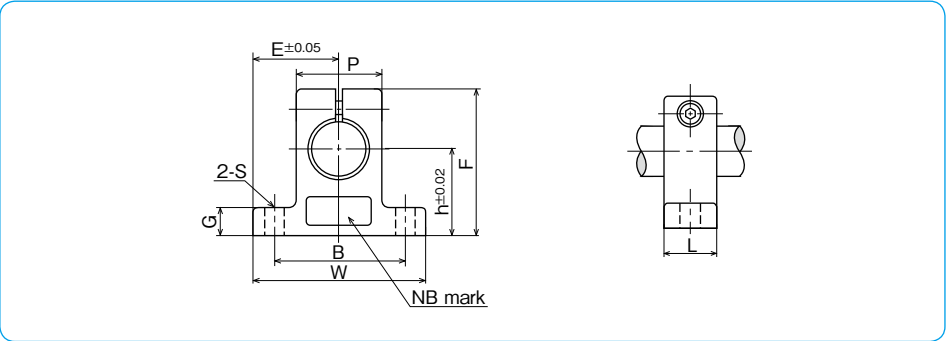


part number structure

example **SH 25 A**

SH-A type

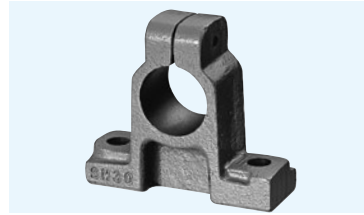
shaft diameter



part number	shaft diameter mm	major dimensions									tightening screw		mass g
		h mm	E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm	size	recommended torque N·m	
SH 8A	8	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH10A	10	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH12A	12	23	21	42	14	37.5	6	20	32	5.5 (M5)	M4	2	30
SH13A	13	23	21	42	14	37.5	6	20	32	5.5 (M5)	M4	2	30
SH16A	16	27	24	48	16	44	8	25	38	5.5 (M5)	M4	2	40
SH20A	20	31	30	60	20	51	10	30	45	6.6 (M6)	M5	3	70
SH25A	25	35	35	70	24	60	12	38	56	6.6 (M6)	M6	5.5	130
SH30A	30	42	42	84	28	70	12	44	64	9 (M8)	M6	5.5	180
SH35A	35	50	49	98	32	82	15	50	74	11 (M10)	M8	13.5	270
SH40A	40	60	57	114	36	96	15	60	90	11 (M10)	M8	13.5	420
SH50A	50	70	63	126	40	120	18	74	100	14 (M12)	M12	29	750
SH60A	60	80	74	148	45	136	18	90	120	14 (M12)	M12	29	1,100

SH TYPE

— Shaft Supporter —

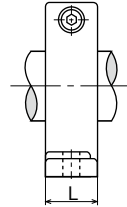
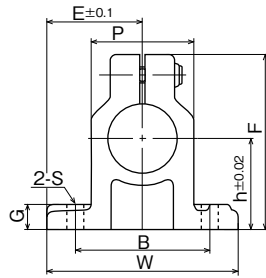


part number structure

example **SH 25**

SH type

shaft diameter



part number	shaft diameter mm	major dimensions									tightening screw		mass
		h mm	E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm	size	recommended torque N · m	
SH10	10	20	22	44	15	35	7	19	32	4.5 (M4)	M4	2	80
SH13	13	23	25	50	17	40	8	17	32	7 (M5)	M4	2	120
SH16	16	27	27.5	55	17	45	10	25	38	7 (M5)	M4	2	120
SH20	20	31	32.5	65	20	53	12	30	45	8 (M6)	M5	3	190
SH25	25	35	38	76	24	61	12	35	56	8 (M6)	M6	5.5	300
SH30	30	42	42.5	85	28	73	15	42	64	10 (M8)	M6	5.5	490
SH35	35	50	50	100	32	87	15	50	74	12 (M10)	M8	13.5	690
SH40	40	60	60	120	36	104	18	58	90	12 (M10)	M10	29	1,200
SH50	50	70	70	140	40	122	20	68	100	14 (M12)	M12	29	1,700
SH60	60	80	82.5	165	45	140	23	80	120	14 (M12)	M12	29	2,500

SHF TYPE

— Shaft Supporter Flange Type —



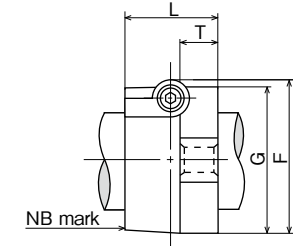
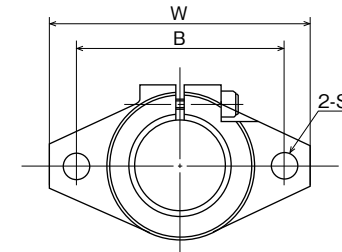
part number structure

example **SHF 35 FC**

SHF type

shaft diameter

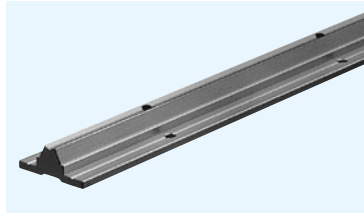
blank: aluminum alloy
FC: cast iron



part number		shaft diameter mm	major dimensions							tightening screw		mass	
aluminum alloy	cast iron		W mm	L mm	T mm	F mm	G mm	B mm	S mm	size	recommended torque N · m	aluminum alloy	cast iron
SHF10	—	10	43	10	5	24	20	32	5.5 (M5)	M4	2	13	—
SHF12	—	12	47	13	7	28	25	36	5.5 (M5)	M4	2	20	—
SHF13	—	13	47	13	7	28	25	36	5.5 (M5)	M4	2	20	—
SHF16	—	16	50	16	8	31	28	40	5.5 (M5)	M4	2	27	—
SHF20	—	20	60	20	8	37	34	48	7 (M6)	M5	3	40	—
SHF25	—	25	70	25	10	42	40	56	7 (M6)	M5	3	60	—
SHF30	—	30	80	30	12	50	46	64	9 (M8)	M6	5.5	110	—
SHF35	SHF35FC	35	92	35	14	58	50	72	12 (M10)	M8	13.5	140	380
SHF40	SHF40FC	40	102	40	16	67	56	80	12 (M10)	M10	29	205	510
SHF50	SHF50FC	50	122	50	19	83	70	96	14 (M12)	M12	29	360	890
SHF60	SHF60FC	60	140	60	23	95	82	112	14 (M12)	M12	29	530	1,500

SA TYPE

— Shaft Support Rail —



part number structure

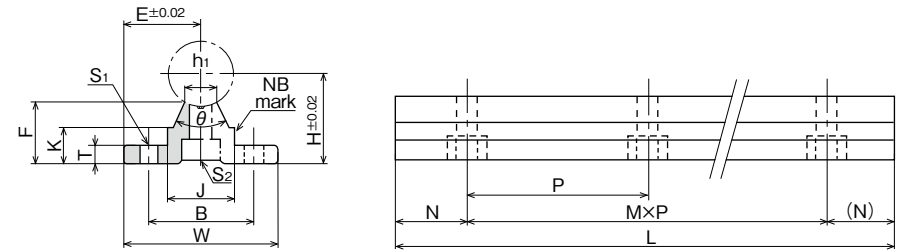
example SA 25 500

SA type

total length

shaft diameter

part number	shaft diameter mm	H mm	E mm	W mm	L mm	F mm	T mm	K mm	J mm	h ₁ mm	θ	B mm	N mm	M×P mm	S ₁ mm	S ₂	mass g
SA10-200	10	18	16	32	200	13.5	4	8.9	12.4	4.7	80°	22	50	1×100	4.5	M4	110
SA10-300					300									2×100			160
SA10-400					400									3×100			220
SA10-500					500									4×100			270
SA10-600					600									5×100			330
SA13-200	13	21	17	34	200	15	4.5	9.8	15	6	80°	25	50	1×100	4.5	M4	140
SA13-300					300									2×100			210
SA13-400					400									3×100			280
SA13-500					500									4×100			350
SA13-600					600									5×100			420
SA16-200	16	25	20	40	200	17.8	5	11.7	18.5	8	80°	30	25	1×150	5.5	M5	200
SA16-300					300									75 1×150			300
SA16-400					400									50 2×150			400
SA16-500					500									25 3×150			500
SA16-600					600									75 3×150			600
SA20-200	20	27	22.5	45	200	17.7	5	10	19	8	50°	30	25	1×150	5.5	M6	200
SA20-300					300									75 1×150			300
SA20-400					400									50 2×150			400
SA20-500					500									25 3×150			510
SA20-600					600									75 3×150			610
SA25-200	25	33	27.5	55	200	21	6	12	21.5	8	50°	35	100	1×150	6.5	M6	290
SA25-300					300									50 1×200			430
SA25-400					400									100 1×200			580
SA25-500					500									50 2×200			730
SA25-600					600									100 2×200			880

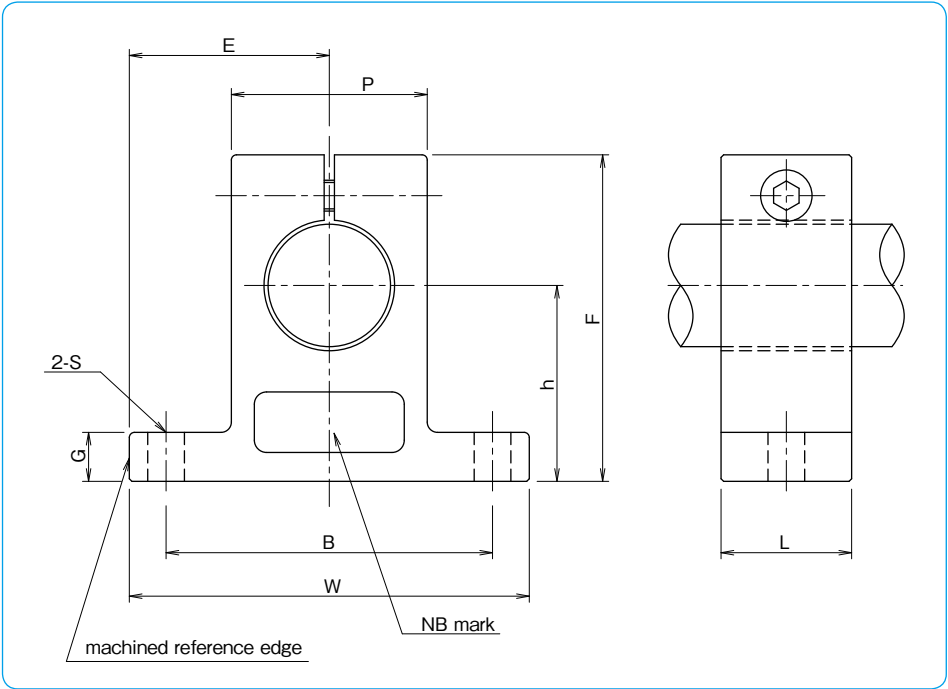
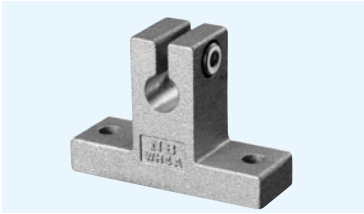
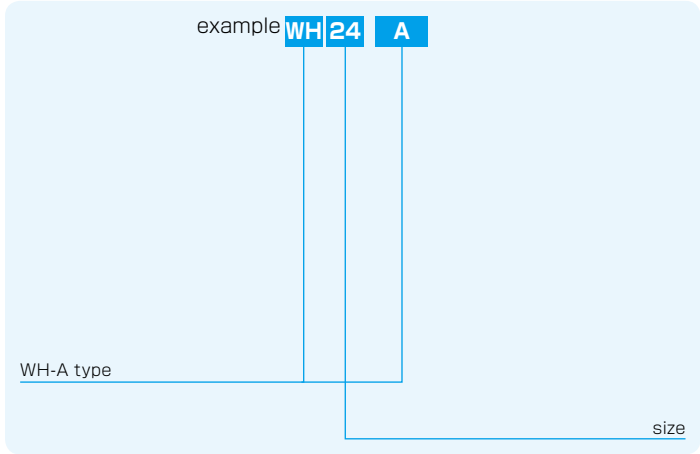


※ Mounting screws for the SN(S)B center-lined tapped shaft are included.

part number	shaft diameter mm	H mm	E mm	W mm	L mm	F mm	T mm	K mm	J mm	h ₁ mm	θ	B mm	N mm	M×P mm	S ₁ mm	S ₂	mass g
SA30-200	30	37	30	60	200	22.8	7	13	26.5	10.3	50°	40	25	1×150	6.5	M8	360
SA30-300					300									50 1×200			550
SA30-400					400									100 1×200			730
SA30-500					500									50 2×200			920
SA30-600					600									100 2×200			1,100
SA35-200	35	43	32.5	65	200	26.5	8	15.5	28	13	50°	45	25	1×150	9	M8	460
SA35-300					300									50 1×200			700
SA35-400					400									100 1×200			950
SA35-500					500									50 2×200			1,190
SA35-600					600									100 2×200			1,420
SA40-200	40	48	37.5	75	200	29.4	9	17	38	16	50°	55	25	1×150	9	M8	630
SA40-300					300									75 1×150			960
SA40-400					400									50 1×300			1,290
SA40-500					500									100 1×300			1,610
SA40-600					600									150 1×300			1,950
SA50-200	50	62	47.5	95	200	38.8	11	21	45	20	50°	70	25	1×150	11	M10	1,000
SA50-300					300									75 1×150			1,500
SA50-400					400									50 1×300			2,000
SA50-500					500									100 1×300			2,500
SA50-600					600									150 1×300			3,000

WH-A TYPE
— Shaft Supporter —
(Inch Standard)

part number structure



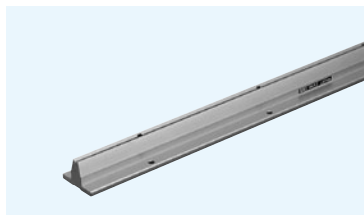
part number	shaft diameter	major dimensions				
		h ±.001 inch	E ±.005 inch	W inch	L inch	F inch
WH 4A	.2500	.6875	.7500	1.500	.500	1.063
WH 6A	.3750	.7500	.8125	1.625	.563	1.187
WH 8A	.5000	1.0000	1.0000	2.000	.625	1.625
WH 10A	.6250	1.0000	1.2500	2.500	.688	1.750
WH 12A	.7500	1.2500	1.2500	2.500	.750	2.063
WH 16A	1.0000	1.5000	1.5315	3.063	1.000	2.500
WH 20A	1.2500	1.7500	1.8750	3.750	1.125	3.000
WH 24A	1.5000	2.0000	2.1875	4.375	1.250	3.437
WH 32A	2.0000	2.5000	2.7500	5.500	1.500	4.375

major dimensions					mass	part number
G inch	P inch	B ±.01 inch	S inch	bolt# inch		
.250	.500	1.125	.156	# 6	.033	WH 4A
.250	.688	1.250	.156	# 6	.044	WH 6A
.250	.875	1.500	.188	# 8	.075	WH 8A
.313	1.000	1.875	.218	# 10	.106	WH 10A
.313	1.250	2.000	.218	# 10	.156	WH 12A
.375	1.500	2.500	.281	1/4	.294	WH 16A
.438	2.000	3.000	.346	5/16	.531	WH 20A
.500	2.250	3.500	.346	5/16	.725	WH 24A
.625	3.000	4.500	.406	3/8	1.400	WH 32A

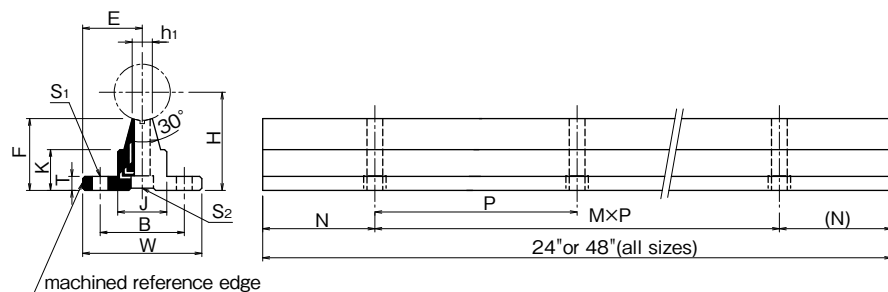
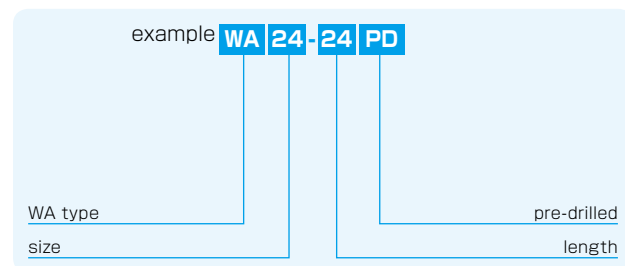
1kg≒2.205lbs
1lb≒0.454kg

WA TYPE

— Shaft Support Rail —
(Inch Standard)



part number structure



part number		shaft diameter	major dimensions								mounting dimensions						mass	
			H	E	W	F	T	K	J	h ₁	B	N	M×P	S ₁	S ₂			
		inch	±.001 inch	±.005 inch	inch	inch	inch	inch	inch	inch	±.01 inch	inch	inch	hole inch	bolt # inch	hole inch	bolt # inch	lbs
WA 8-	24PD	.5000	1.125	.7500	1.500	.903	.188	.466	.500	.255	1.000	2	5×4	.169	#6	.169	#6	1.326
	48PD												11×4					2.652
WA10-	24PD	.6250	1.125	.8125	1.625	.841	.250	.423	.500	.276	1.125	2	5×4	.193	#8	.193	#8	1.488
	48PD												11×4					2.976
WA12-	24PD	.7500	1.500	.8750	1.750	1.158	.250	.592	.625	.322	1.250	3	3×6	.221	#10	.221	#10	2.100
	48PD												7×6					4.200
WA16-	24PD	1.0000	1.750	1.0625	2.125	1.280	.250	.727	.875	.359	1.500	3	3×6	.281	1/4	.281	1/4	2.776
	48PD												7×6					5.552
WA20-	24PD	1.2500	2.125	1.2500	2.500	1.537	.313	.799	1.100	.437	1.875	3	3×6	.343	5/16	.343	5/16	4.060
	48PD												7×6					8.120
WA24-	24PD	1.5000	2.500	1.5000	3.000	1.798	.375	.922	1.375	.558	2.250	4	2×8	.343	5/16	.406	3/8	5.840
	48PD												5×8					11.680
WA32-	24PD	2.0000	3.250	1.8750	3.750	2.322	.500	1.450	1.500	.800	2.750	4	2×8	.406	3/8	.531	1/2	9.500
	48PD												5×8					19.000

All sizes are also available without pre-drilled mounting holes.

Complete shaft-rail assemblies are also available as well as custom drilling and lengths.

Please send drawings with customer specifications.

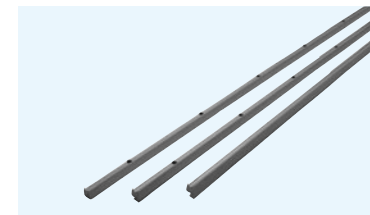
Product of NB Corporation of America

1kg≒2.205lbs

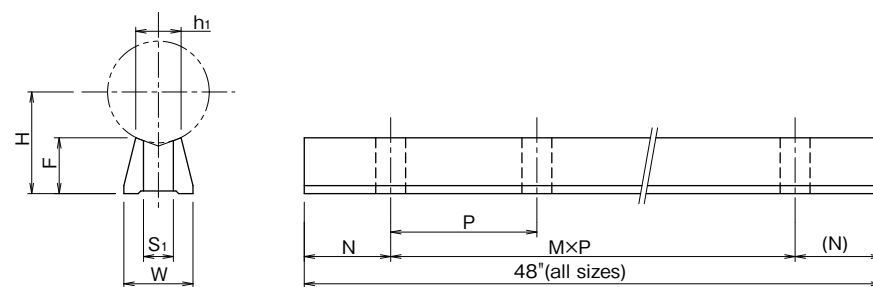
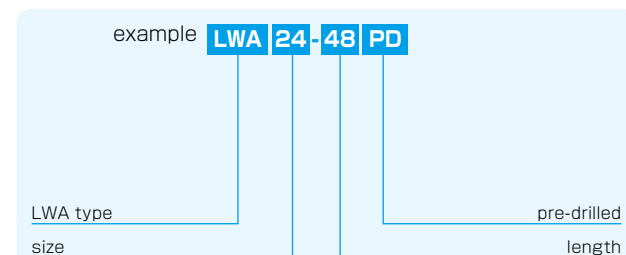
1lb≒0.454kg

LWA TYPE

— Low Shaft Support Rail —
(Inch Standard)



part number structure



part number	shaft diameter inch	major dimensions			mounting dimensions				mass lb
		H ±.002 inch	W inch	F inch	N inch	M×P inch	h ₁ inch	S ₁ inch	
LWA 8-48 PD	.5000	.5625	.37	.342	2	11×4	0.25	.169	0.11
LWA 10-48 PD	.6250	.6875	.45	.405	2	11×4	0.276	.193	0.17
LWA 12-48 PD	.7500	.7500	.51	.409	3	7×6	0.317	.220	0.20
LWA 16-48 PD	1.0000	1.0000	.69	.545	3	7×6	0.422	.283	0.35
LWA 20-48 PD	1.2500	1.1875	.78	.617	3	7×6	0.520	.343	0.44
LWA 24-48 PD	1.5000	1.3750	.93	.691	4	5×8	0.630	.406	0.58
LWA 32-48 PD	2.0000	1.7500	1.18	.836	4	5×8	0.824	.531	0.89

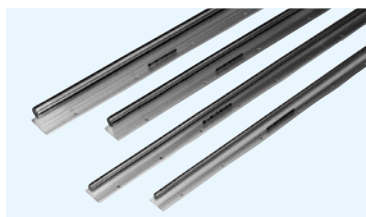
Product of NB Corporation of America

1kg≒2.205lbs

1lb≒0.454kg

WSS TYPE

— Shaft Support Assembly —
(Standard Type)

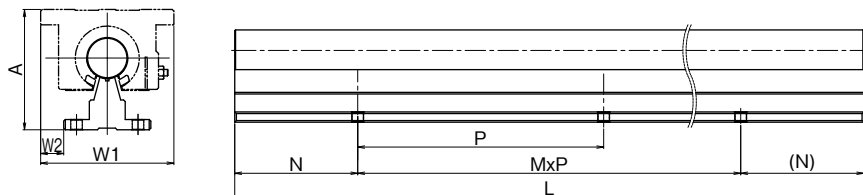


part number structure

example **WSS 16 x 36**

outer diameter

length

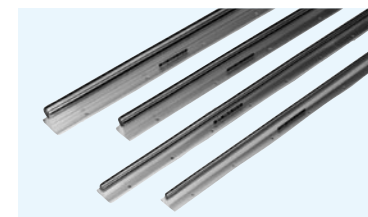


Part Number	Outer Diameter inch/mm	Outer Assembly Dimensions			Base Mounting Holes		Maximum Length	Weight lbs/ft kg/m
		A inch/mm	W1 inch/mm	W2 inch/mm	N inch/mm	P inch/mm		
WSS 8	1/2	1.812	2.000	0.2500	2.000	4.000	168	1.26
	12.700	46.02	50.80	6.35	50.80	101.60	4267.2	1.88
WSS 10	5/8	2.000	2.500	0.4375	2.000	4.000	180	1.83
	15.875	50.80	63.50	11.11	50.80	101.60	4572.0	2.72
WSS 12	3/4	2.437	2.750	0.5000	3.000	6.000	204	2.50
	19.050	61.90	69.85	12.70	76.20	152.40	5181.6	3.72
WSS 16	1	2.937	3.250	0.5625	3.000	6.000	204	4.06
	25.400	74.60	82.55	14.29	76.20	152.40	5181.6	6.04
WSS 20	1-1/4	3.625	4.000	0.7500	3.000	6.000	204	6.28
	31.750	92.08	101.60	19.05	76.20	152.40	5181.6	9.35
WSS 24	1-1/2	4.250	4.750	0.8750	4.000	8.000	204	8.60
	38.100	107.95	120.65	22.23	101.60	203.20	5181.6	12.8
WSS 32	2	5.375	6.000	1.1250	4.000	8.000	204	14.88
	50.800	136.53	152.40	28.58	101.60	203.20	5181.6	22.14

Product of NB Corporation of America

WSS-SS TYPE

— Shaft Support Assembly —
(Stainless Steel Type)

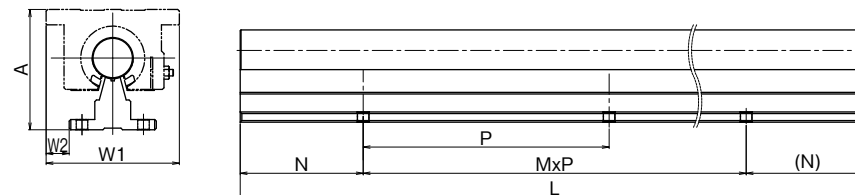


part number structure

example **WSS 8 x 36 - SS**

outer diameter

length



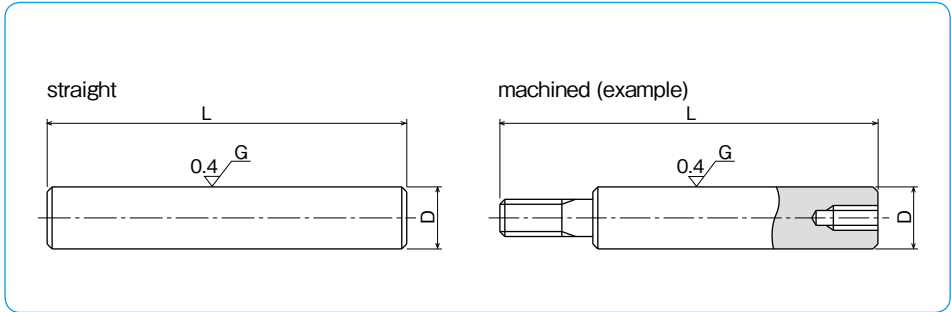
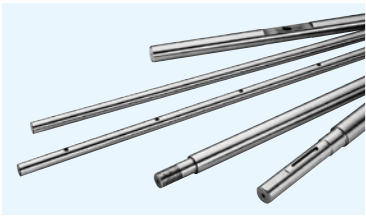
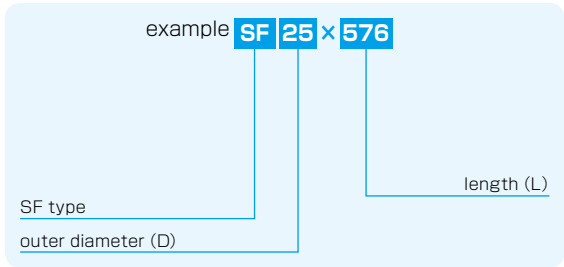
Part Number	Outer Diameter inch/mm	Outer Assembly Dimensions			Base Mounting Holes		Maximum Length	Weight lbs/ft kg/m
		A inch/mm	W1 inch/mm	W2 inch/mm	N inch/mm	P inch/mm		
WSS 8-SS	1/2	1.812	2.000	0.2500	2.000	4.000	158	1.26
	12.700	46.02	50.80	6.35	50.80	101.60	4013.2	1.88
WSS 10-SS	5/8	2.000	2.500	0.4375	2.000	4.000	158	1.83
	15.875	50.80	63.50	11.11	50.80	101.60	4013.2	2.72
WSS 12-SS	3/4	2.437	2.750	0.5000	3.000	6.000	158	2.50
	19.050	61.90	69.85	12.70	76.20	152.40	4013.2	3.72
WSS 16-SS	1	2.937	3.250	0.5625	3.000	6.000	158	4.06
	25.400	74.60	82.55	14.29	76.20	152.40	4013.2	6.04
WSS 20-SS	1-1/4	3.625	4.000	0.7500	3.000	6.000	158	6.28
	31.750	92.08	101.60	19.05	76.20	152.40	4013.2	9.35
WSS 24-SS	1-1/2	4.250	4.750	0.8750	4.000	8.000	158	8.60
	38.100	107.95	120.65	22.23	101.60	203.20	4013.2	12.8
WSS 32-SS	2	5.375	6.000	1.1250	4.000	8.000	204	14.88
	50.800	136.53	152.40	28.58	101.60	203.20	5181.6	22.14

Product of NB Corporation of America

SF TYPE

– NBCA Shaft –

part number structure



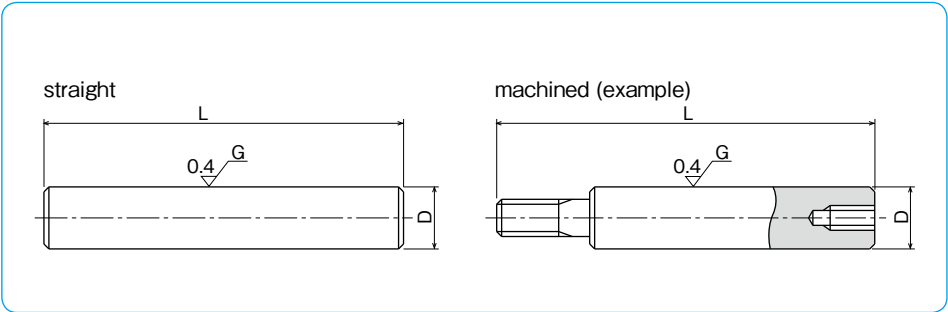
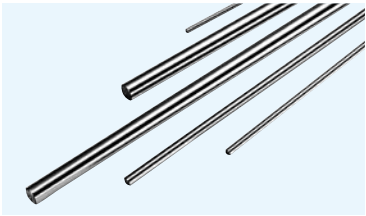
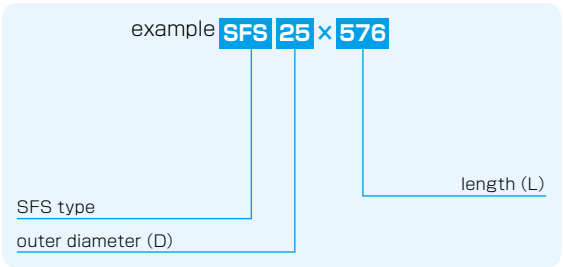
part number	outer diameter D mm	diameter tolerance g6 μm	length L mm	mass Kg/m
SF 6	6	-4/-12	100 → 3000	0.23
SF 8	8	-5	100 → 3000	0.40
SF 10	10	-14	100 → 3000	0.62
SF 12	12		100 → 3000	0.89
SF 13	13	-6	100 → 3000	1.04
SF 15	15	-17	100 → 3000	1.39
SF 16	16		100 → 3000	1.58
SF 20	20	-7	100 → 3000	2.47
SF 25	25	-20	100 → 3000	3.85
SF 30	30		100 → 3000	5.55
SF 35	35	-9	100 → 3000	7.55
SF 40	40	-25	100 → 3000	9.87
SF 50	50		100 → 3000	15.4

material: CF53 or Equivalent hardness: 60HRC (HV697) or more
Product of NB Corporation of America

SFS TYPE

– NBCA Stainless Steel Shaft –

part number structure



part number	outer diameter D mm	diameter tolerance g6 μm	length L mm	mass Kg/m
SFS 6	6	-4/-12	100 → 3000	0.22
SFS 8	8	-5	100 → 3000	0.39
SFS 10	10	-14	100 → 3000	0.61
SFS 12	12		100 → 3000	0.88
SFS 13	13	-6	100 → 3000	1.03
SFS 16	16	-17	100 → 3000	1.56
SFS 20	20	-7	100 → 3000	2.43
SFS 25	25	-20	100 → 3000	3.80
SFS 30	30		100 → 3000	5.48
SFS 35	35	-9	100 → 3000	7.46
SFS 40	40	-25	100 → 3000	9.75
SFS 50	50		100 → 3000	15.2

material: X46Cr13 or Equivalent
hardness: 52HRC (HV544) or more
Product of NB Corporation of America

SFW TYPE

— NBCA Inch Shaft —

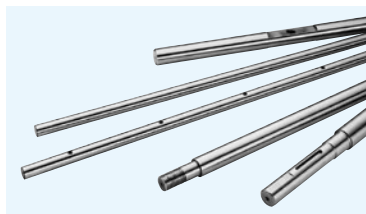
part number structure

example **SFW 24 x 3000**

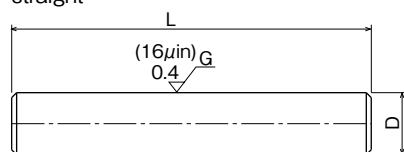
SFW type

size

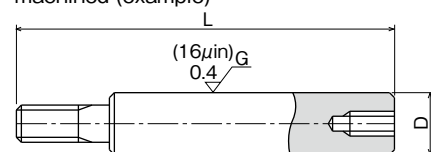
length (L)



straight



machined (example)



Part Number	Outer Diameter D inch/mm	Diameter inch/μm	Length L inch/mm	Mass lbs/inch kg/m
SFW 4	1/4 6.350	— .0005 — .0010 — .0013 — .0025	2 50.8	120 0.014 0.25
SFW 6	3/8 9.525		2 50.8	120 0.031 0.56
SFW 8	1/2 12.700		2 50.8	120 0.056 0.99
SFW 10	5/8 15.875		2 50.8	120 0.086 1.55
SFW 12	3/4 19.050		2 50.8	120 0.125 2.24
SFW 16	1 25.400		2 50.8	120 0.222 3.98
SFW 20	1-1/4 31.750		2 50.8	120 0.348 6.22
SFW 24	1-1/2 38.100		2 50.8	120 0.500 8.95
SFW 32	2 50.800		2 50.8	120 0.890 15.91

material: CF53 or Equivalent

hardness: 60 HRC or more

Product of NB Corporation of America

1kg ≒ 2.205lbs

SFWS TYPE

— NBCA Inch Stainless Steel Shaft —

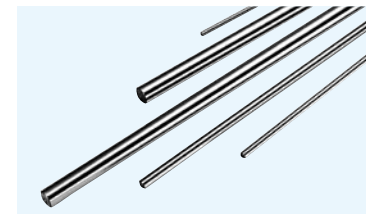
part number structure

example **SFWS 24 x 3000**

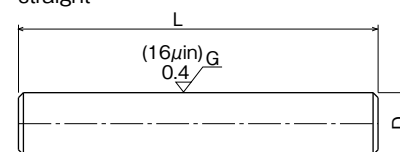
SFWS type

size

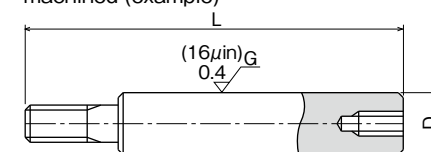
length (L)



straight



machined (example)



Part Number	Outer Diameter D inch/mm	Diameter inch/μm	Length L inch/mm	Mass lbs/inch kg/m
SFWS 2	1/8 3.175	— .0002 ~ — .0005 — 5 ~ — 12	2 50.8	16 0.004 0.10
SFWS 3	3/16 4.763	— .0002 ~ — .0006 — 5 ~ — 14	2 50.8	16 0.008 0.20
SFWS 4	1/4 6.350	— .0005 — .0010 — .0013 — .0025	2 50.8	120 0.014 0.25
SFWS 6	3/8 9.525		2 50.8	120 0.031 0.56
SFWS 8	1/2 12.700		2 50.8	120 0.056 0.99
SFWS 10	5/8 15.875		2 50.8	120 0.086 1.55
SFWS 12	3/4 19.050		2 50.8	120 0.125 2.24
SFWS 16	1 25.400		2 50.8	120 0.222 3.98
SFWS 20	1-1/4 31.750		2 50.8	120 0.348 6.22
SFWS 24	1-1/2 38.100		2 50.8	120 0.500 8.95
SFWS 32	2 50.800		2 50.8	120 0.890 15.91

material: X46Cr13 or Equivalent

hardness: 52 HRC or more

Product of NB Corporation of America

1kg ≒ 2.205lbs

SFW-PD

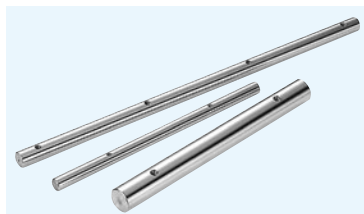
— NBCA Inch Pre-Drilled Shaft —

part number structure

example **SFW 24 x 72 - PD**

SFW type
size

pre-drilled shaft
length (L in inches)



SFWS-PD

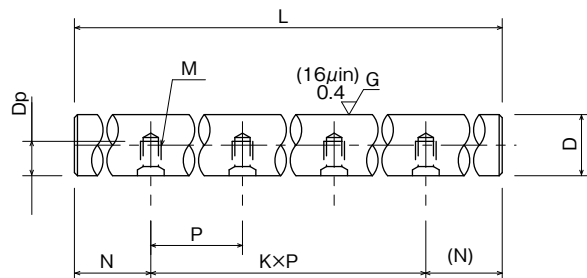
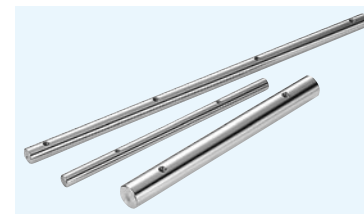
— NBCA Inch Pre-Drilled Stainless Steel Shaft —

part number structure

example **SFWS 24 x 72 - PD**

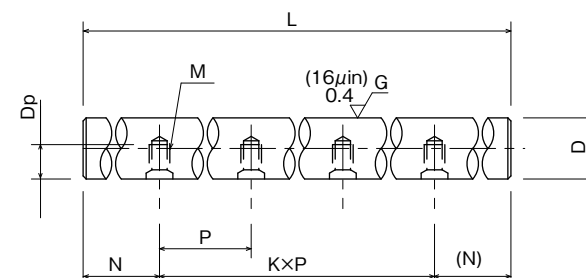
SFWS type
size

pre-drilled shaft
length (L in inches)



$$N = \frac{L - K \times P}{2}$$

K: number of pitches



$$N = \frac{L - K \times P}{2}$$

K: number of pitches

Part Number	Outer Diameter		Pitch P inch/mm	Bolt Size M	Tapped Hole Depth Dp inch/mm	Maximum Length L inch/mm
	D inch/mm	inch/µm				
SFW 8-PD	1/2	-.0005	4 101.6	# 6-32	0.280	168
	12.700	-.0010			7.1	4267.2
SFW 10-PD	5/8	-13	101.6	# 8-32	0.350	180
	15.875	-25			8.9	4572
SFW 12-PD	3/4	-.0005 -.0010	6 152.4	# 10-32	0.400	204
	19.050				10.2	5181.6
SFW 16-PD	1	-.0010 -13	6 152.4	1/4-20	0.500	204
	25.400				12.7	5181.6
SFW 20-PD	1-1/4	-25	6 152.4	5/16-18	0.650	204
	31.750				16.5	5181.6
SFW 24-PD	1-1/2	-0.0006 ~ -0.0011 -15 ~ -28	8 203.2	3/8-16	0.700	204
	38.100				17.8	5181.6
SFW 32-PD	2	-0.0006 ~ -0.0013 -15 ~ -33	8 203.2	1/2-13	0.850	204
	50.800				21.6	5181.6

material: CF53 or Equivalent

hardness: 60 HRC or more

Product of NB Corporation of America

1kg ≒ 2.205lbs

Part Number	Outer Diameter		Pitch P inch/mm	Bolt Size M	Tapped Hole Depth Dp inch/mm	Maximum Length L inch/mm
	D inch/mm	inch/µm				
SFWS 8-PD	1/2	-.0005	4 101.6	# 6-32	0.280	158
	12.700	-.0010			7.1	4013.2
SFWS 10-PD	5/8	-13	101.6	# 8-32	0.350	158
	15.875	-25			8.9	4013.2
SFWS 12-PD	3/4	-.0005 -.0010	6 152.4	# 10-32	0.400	158
	19.050				10.2	4013.2
SFWS 16-PD	1	-.0010 -13	6 152.4	1/4-20	0.500	158
	25.400				12.7	4013.2
SFWS 20-PD	1-1/4	-25	6 152.4	5/16-18	0.650	158
	31.750				16.5	4013.2
SFWS 24-PD	1-1/2	-0.0006 ~ -0.0011 -15 ~ -28	8 203.2	3/8-16	0.700	158
	38.100				17.8	4013.2
SFWS 32-PD	2	-0.0006 ~ -0.0013 -15 ~ -33	8 203.2	1/2-13	0.850	158
	50.800				21.6	4013.2

material: X46Cr13 or Equivalent

hardness: 52 HRC or more

Product of NB Corporation of America

1kg ≒ 2.205lbs

SFW-FS102/SFWS-FS102 TYPE

— Format Single End Tapped Inch Shaft —



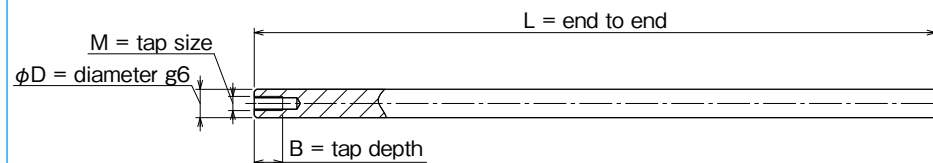
part number structure

example **SFW 16 × 18 - FS102**

material
SFW: CF53 or
 Equivalent
SFWS: X46Cr13 or
 Equivalent

size

FS102-Single End Tapped
 length(L in inches)



Part Number SFW	SFWS	Outer Diameter D		Tap Size M	Tap Depth B	Length in mm							
		inch/mm	inch/μm			6	8			12	18	24	
SFW 4-FS102		1/4		# 5-40	0.250"	6	8			12	18	24	
		6.350				152.4	203.2			304.8	457.2	609.6	
SFW 6-FS102	SFWS 6-FS102	3/8		# 8-32	0.330"	6	8*	9*	10*	12	18	24	36
		9.525				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 8-FS102	SFWS 8-FS102	1/2		1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		12.700				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 10-FS102	SFWS10-FS102	5/8	−0.0005	1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		15.875	−0.0010			152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 12-FS102	SFWS12-FS102	3/4	−13	5/16-18	0.625"	6	8*	9*	10*	12	18	24	36
		19.050	−25			152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 16-FS102	SFWS16-FS102	1		3/8-16	0.750"	6	8*	9*	10*	12	18	24	36
		25.400				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 20-FS102	SFWS20-FS102	1-1/4		1/2-13	1.000"	6	8*	9*	10*	12	18	24	36
		31.750				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 24-FS102	SFWS24-FS102	1-1/2	−0.0006	5/8-11	1.250"	6				12	18	24	36
		38.100	−0.0011			152.4				304.8	457.2	609.6	914.4

hardness of SFW: 60 HRC or more
 hardness of SFWS: 52 HRC or more
 Product of NB Corporation of America
 * SFWS is not available

SFW-FS103/SFWS-FS103 TYPE

— Format Both Ends Tapped Inch Shaft —



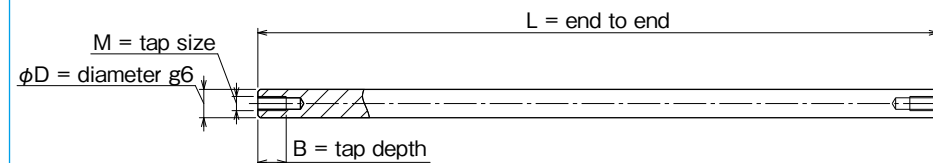
part number structure

example **SFWS 16 × 18 - FS103**

material
SFW: CF53 or
 Equivalent
SFWS: X46Cr13 or
 Equivalent

size

FS103-Both Ends Tapped
 length(L in inches)

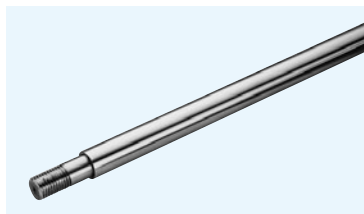


Part Number SFW	SFWS	Outer Diameter D		Tap Size M	Tap Depth B	Length in mm							
		inch/mm	inch/μm			6	8			12	18	24	
SFW 4-FS103		1/4		# 5-40	0.250"	6	8			12	18	24	
		6.350				152.4	203.2			304.8	457.2	609.6	
SFW 6-FS103	SFWS 6-FS103	3/8		# 8-32	0.330"	6	8*	9*	10*	12	18	24	36
		9.525				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 8-FS103	SFWS 8-FS103	1/2		1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		12.700				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 10-FS103	SFWS10-FS103	5/8	−0.0005	1/4-20	0.500"	6	8*	9*	10*	12	18	24	36
		15.875	−0.0010			152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 12-FS103	SFWS12-FS103	3/4	−13	5/16-18	0.625"	6	8*	9*	10*	12	18	24	36
		19.050	−25			152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 16-FS103	SFWS16-FS103	1		3/8-16	0.750"	6	8*	9*	10*	12	18	24	36
		25.400				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 20-FS103	SFWS20-FS103	1-1/4		1/2-13	1.000"	6	8*	9*	10*	12	18	24	36
		31.750				152.4	203.2	228.6	254	304.8	457.2	609.6	914.4
SFW 24-FS103	SFWS24-FS103	1-1/2	−0.0006	5/8-11	1.250"	6				12	18	24	36
		38.100	−0.0011			152.4				304.8	457.2	609.6	914.4

hardness of SFW: 60 HRC or more
 hardness of SFWS: 52 HRC or more
 Product of NB Corporation of America
 * SFWS is not available

SFW-FS115 TYPE

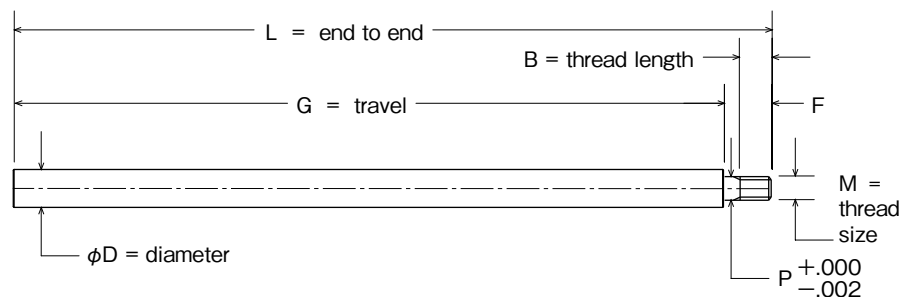
— Format Single End Threaded Inch Shafts —



part number structure

example **SFW 16 × 18 - FS115**

size

FS115-
Single End Threaded
length(L in inches)

Part Number	Outer Diameter D inch/mm	Thread Size M	Thread Length B inch/mm	Journal Length F inch/mm	Journal DIA P inch/mm	4" Travel G inch/mm	6" Travel G inch/mm	8" Travel G inch/mm	12" Travel G inch/mm	24" Travel G inch/mm	36" Travel G inch/mm	48" Travel G inch/mm
SFW 6-FS115	3/8 9.525	1/4-20	0.31 7.87	0.50 12.70	0.250 6.35	4.500 114.3	6.500 165.1	8.500 215.9	12.500 317.5	24.500 622.3		
SFW 8-FS115	1/2 12.700	5/16-18	0.39 9.91	0.63 15.88	0.313 7.95	4.625 117.5	6.625 168.3	8.625 219.1	12.625 320.7	24.625 625.5		
SFW 10-FS115	5/8 15.875	3/8-16	0.47 11.94	0.75 19.05	0.375 9.53	4.750 120.7	6.750 171.5	8.750 222.3	12.750 323.9	24.750 628.7		
SFW 12-FS115	3/4 19.050	1/2-13	0.63 16.00	1.00 25.40	0.500 12.70	5.000 127.0	7.000 177.8	9.000 228.6	13.000 330.2	25.000 635.0		
SFW 16-FS115	1 25.400	5/8-11	0.78 19.81	1.25 31.75	0.625 15.88		7.250 184.2	9.250 235.0	13.250 336.6	25.250 641.4	37.250 946.2	
SFW 20-FS115	1-1/4 31.750	3/4-10	0.94 23.88	1.50 38.10	0.750 19.05		7.500 190.5	9.500 241.3	13.500 342.9	25.500 647.7	37.500 952.5	
SFW 24-FS115	1-1/2 38.100	1-8	1.25 31.75	2.00 50.80	1.000 25.40			10.000 254.0	14.000 355.6	26.000 660.4	38.000 965.2	50.000 1270.0

material: CF53 or Equivalent

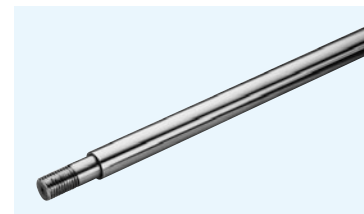
hardness: 60 HRC or more

stainless steel sizes are available on this series by quote only

Product of NB Corporation of America

SFW-FS116 TYPE

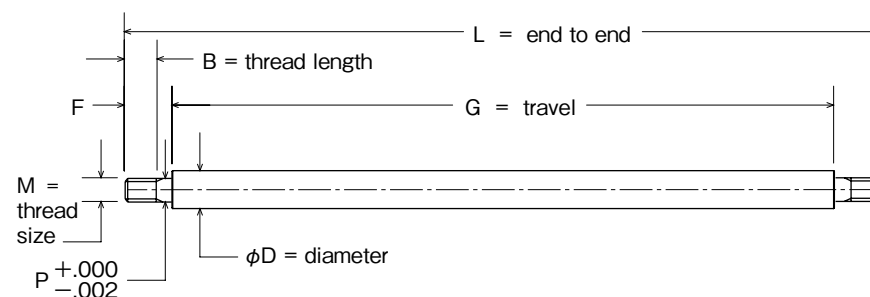
— Format Both Ends Threaded Inch Shafts —



part number structure

example **SFW 16 × 18 - FS116**

size

FS116-
Both End Threaded
length(L in inches)

Part Number	Outer Diameter D inch/mm	Thread Size M	Thread Length B inch/mm	Journal Length F inch/mm	Journal DIA P inch/mm	4" Travel G inch/mm	6" Travel G inch/mm	8" Travel G inch/mm	12" Travel G inch/mm	24" Travel G inch/mm	36" Travel G inch/mm	48" Travel G inch/mm
SFW 6-FS116	3/8 9.525	1/4-20	0.31 7.87	0.50 12.70	0.250 6.35	5.000 127.0	7.000 177.8	9.000 228.6	13.000 330.2	25.000 635.0		
SFW 8-FS116	1/2 12.700	5/16-18	0.39 9.91	0.63 15.88	0.313 7.95	5.250 133.4	7.250 184.2	9.250 235.0	13.250 336.6	25.250 641.4		
SFW 10-FS116	5/8 15.875	3/8-16	0.47 11.94	0.75 19.05	0.375 9.53	5.500 139.7	7.500 190.5	9.500 241.3	13.500 342.9	25.500 647.7		
SFW 12-FS116	3/4 19.050	1/2-13	0.63 16.00	1.00 25.40	0.500 12.70	6.000 152.4	8.000 203.2	10.000 254.0	14.000 355.6	26.000 660.4		
SFW 16-FS116	1 25.400	5/8-11	0.78 19.81	1.25 31.75	0.625 15.88		8.500 215.9	10.500 266.7	14.500 368.3	26.500 673.1	38.500 977.9	
SFW 20-FS116	1-1/4 31.750	3/4-10	0.94 23.88	1.50 38.10	0.750 19.05		9.000 228.6	11.000 279.4	15.000 381.0	27.000 685.8	39.000 990.6	
SFW 24-FS116	1-1/2 38.100	1-8	1.25 31.75	2.00 50.80	1.000 25.40			12.000 304.8	16.000 406.4	28.000 711.2	40.000 1016.0	52.000 1320.8

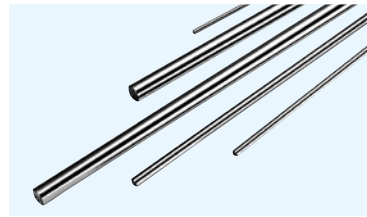
material: CF53 or Equivalent

hardness: 60 HRC or more

stainless steel sizes are available on this series by quote only

Product of NB Corporation of America

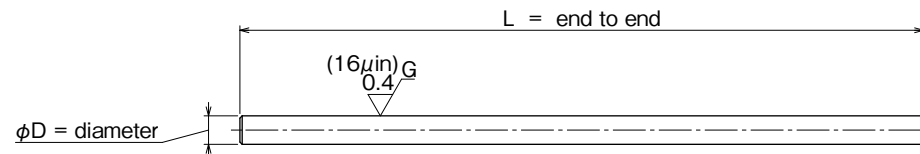
– Pre-Cut Slide Shafts –



example **PC 16 - 24**

size

length(L in inches)



material: CF53 or Equivalent
hardness: 60 HRC or more
Product of NB Corporation of America

example

F- SMS25GUU x1 / SNS25x550

FIT series

slide bush part number

shaft part number

number of slide bush on one shaft

- | target | clearance (+) ← 0 → clearance (-) |
|---------------|---|
| light motion |  |
| high accuracy |  |
| no play |  |

size	3~8	10~13	16~25	30~35	40	50~60
radial clearance limit	-3 μ m	-4 μ m	-6 μ m	-8 μ m	-10 μ m	-13 μ m

-
- The diagram illustrates the concept of fit between a shaft and a hole. The top part shows a 3D perspective view of a shaft (blue) inserted into a hole (grey). The bottom part shows a 2D cross-sectional view of the same assembly, with labels for 'Slide Bush' and 'Shaft'. A magnified view of the interface is shown on the right, with a legend indicating 'Preload' (Big), 'Right-Fit' (Medium), and 'Clearance' (Small).

SPINDLE SHAFT & SPINDLE UNIT

NB Spindle Shaft is backed by decades of precision manufacturing experience as well as up to date manufacturing facility to meet demands. NB is capable of handling all your spindle needs such as manufacturing of bearing case and spindle base, design and manufacturing of spindle unit, and overhauling of spindles.

ADVANTAGES

Spindle Unit

NB provides overhauling, engineering services as well as manufacturing of spindle unit.

Ultra Precision Machining

Spindle manufacturing facility is controlled to a constant temperature throughout the year for precision manufacturing of spindles.

Various Machining Solution Available

BT, BBT, HSK inner tapers, gauge and bearing matching, thread grinding, and many other spindle related machining are available.

Surface Treatments

Various surface treatments are available such as hard chrome and ceramic coating. Repairing a damaged spindle with replating and grinding is also available.

NB SPINDLE UNIT M-BT TYPE

Available for various kinds of tool holder

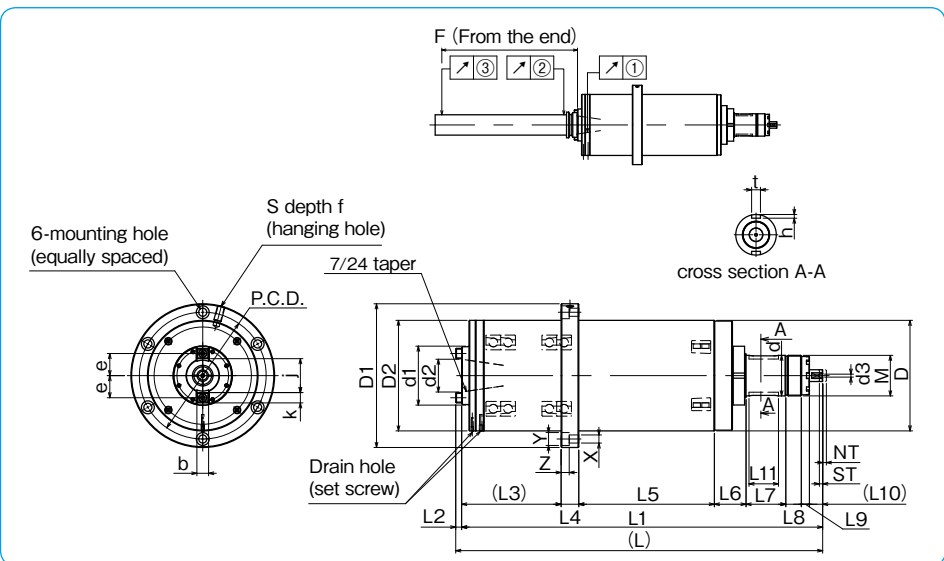
M-BT type is available not only BT but also BBT and HSK.

customization is available

high-speed rotation and high rigidity are possible.



M-BT type dimension table



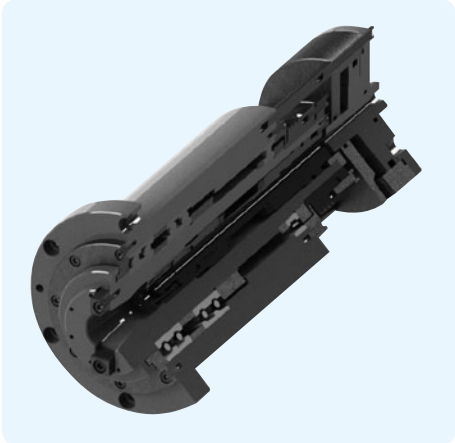
part number	major dimension															
	D	D1	D2	d	d1	d2	d3	L	L1	L2	L3	L4	L5	L6	L7	L8
M-BT30	130	170	130	45	68	31.75	4	413	405	8	115	20	137	43	39	26
M-BT40	150	195	150	55	80	44.45	4	498	490	8	135	24	184	43	54	21
M-BT50	230	290	230	85	130	69.85	4	717	704.5	12.5	197	35	270	59	79	30

part number	major dimension														
	L ₉	L ₁₀	L ₁₁	P.C.D	X × Y × Z	S	f	e	b	j	k	M	t		
	mm	mm	mm	tolerance mm	mm	mm	mm	mm	mm	tolerance mm	mm	mm	mm	tolerance mm	
M-BT30	8	17	30	+0.2 0	152	9 × 14 × 8.6	M10	20	24	15.9	34	14	M45 × 1.5	8	
M-BT40	11	18	40		172	11 × 17.5 × 11	M10	20	30	15.9	-0.02 -0.04	46	14	M55 × 2.0	12
M-BT50	11	23.5	60		260	16 × 23 × 15.2	M16	30	49	25.4	72	26	M85 × 2.0	14	

part number	major dimension		unclamp stroke	without tool NT	tool clamping force (theoretical value)	mass	maximum revolutions	bearing		rotational accuracy		
	h	tolerance						front	rear	runout of tapered portion (max)	runout of test bar (max)	F
M-BT30	4		4.5	3 ~ 4.5	3920	29	8000	7012C	NN3010	2	3	8
M-BT40	5	+0.2	4.5	2.5 ~ 5	7840	47	7000	7014C	NN3012	2	3	8
M-BT50	5.5		6.5	3 ~ 8	15680	161	4500	7022C	NN3019	2	3	8

In this drawing, position of drawbar is illustrated when it is on tool clamp.

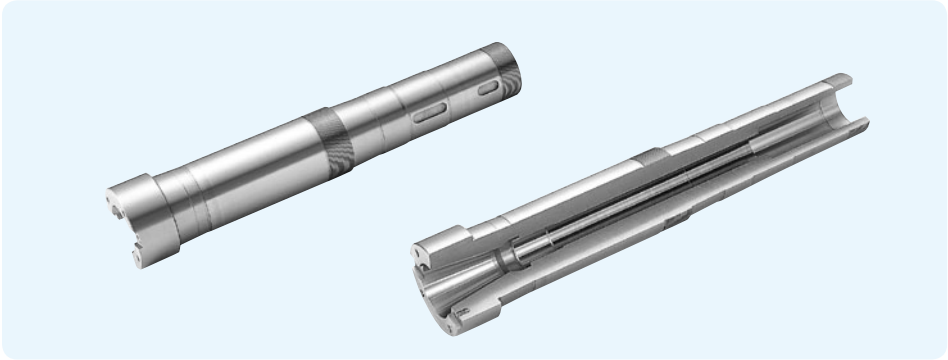
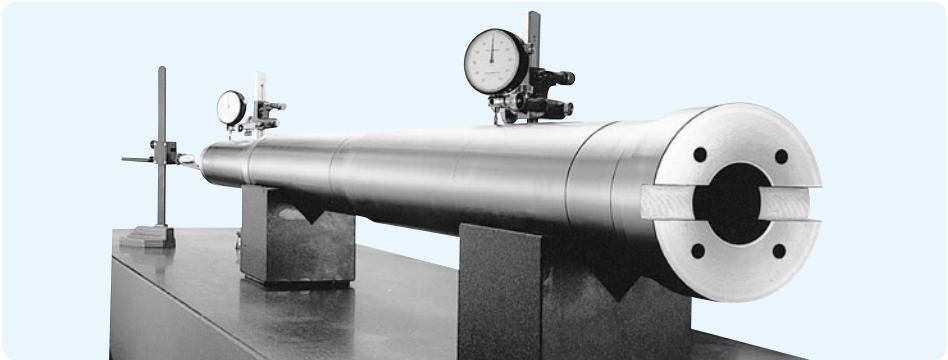
EXAMPLE OF SPINDLE UNIT DESIGN AND MACHINING



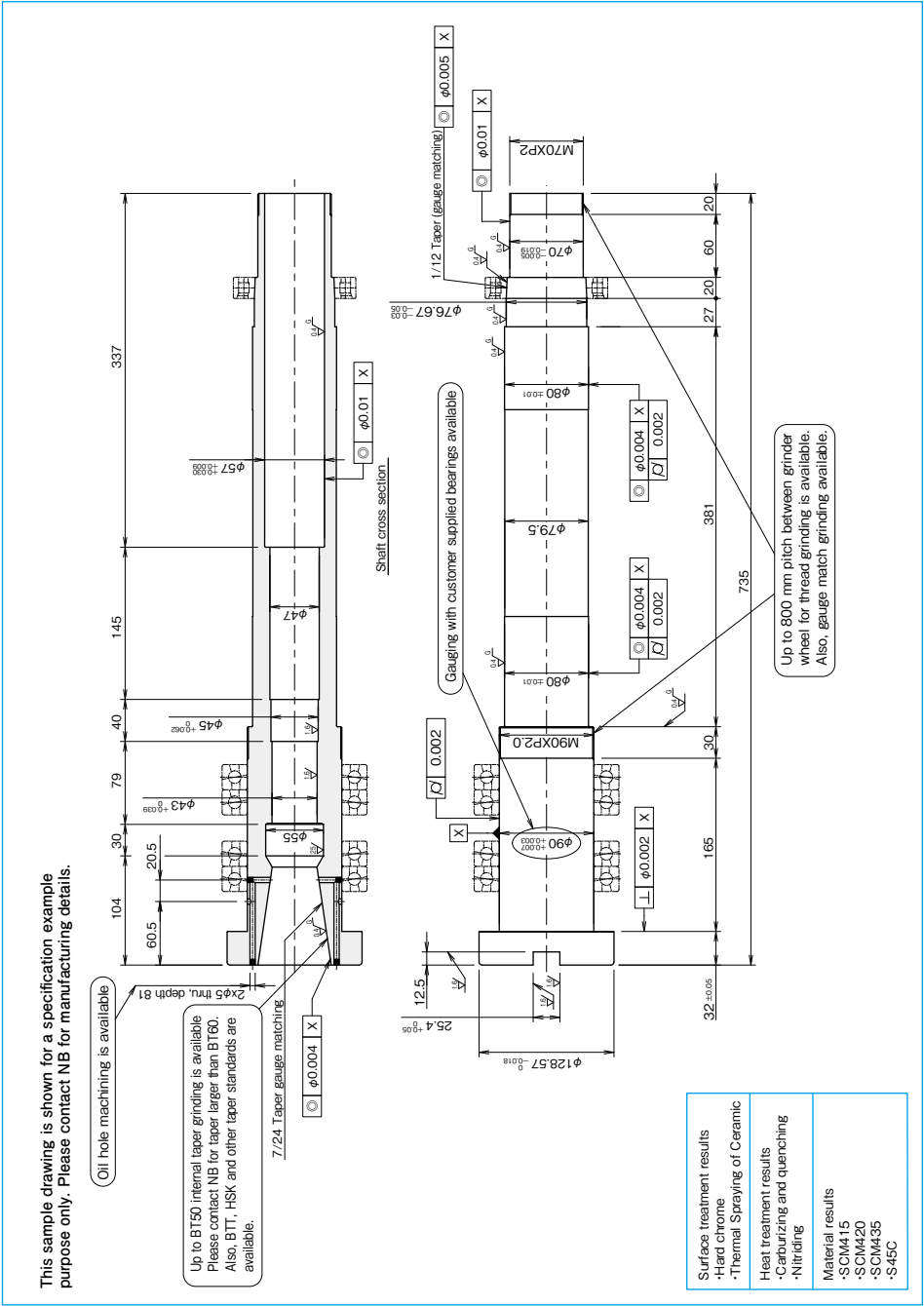
Example of spindle unit specification	
Machine used	Machining center
Mounting orientation	Vertical
Rotational Speed	Max. 10,000 rpm (Max. 700 rpm without tooling attached)
Spindle taper size	#30
Lubrication methods	Grease lubrication
Lubricant	ISOFLEX NBU15 (NOK Corporation)
Tool clamping power	400 kgf (theoretical)
Estimated drive power	3.5kW
Estimated weight	31kg

EXAMPLES OF MACHINING

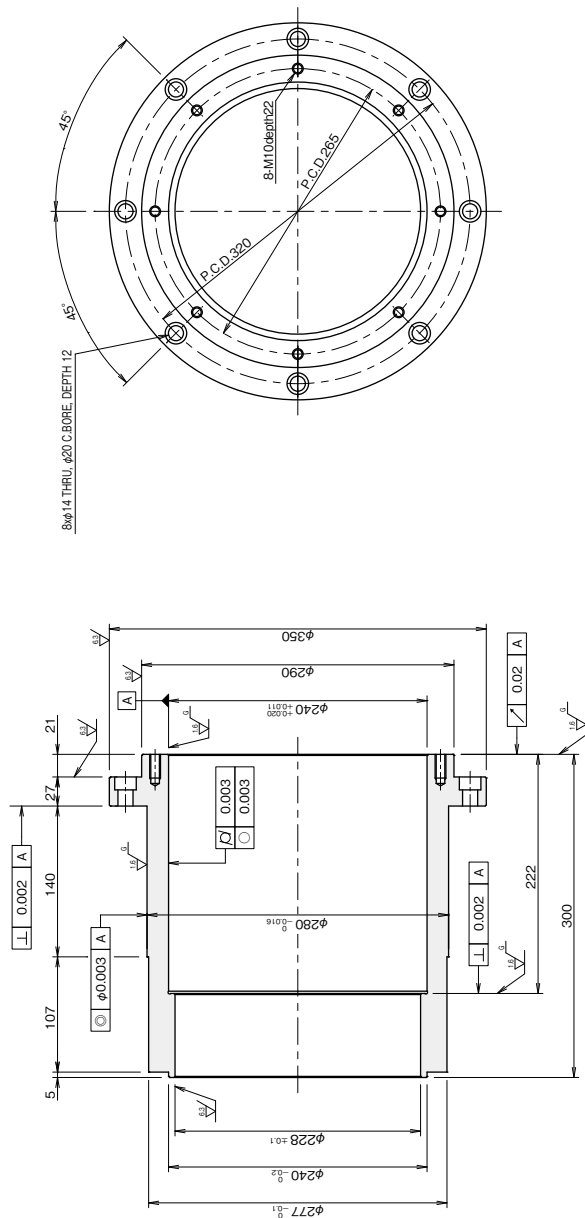
Spindle



EXAMPLE OF DRAWING ①



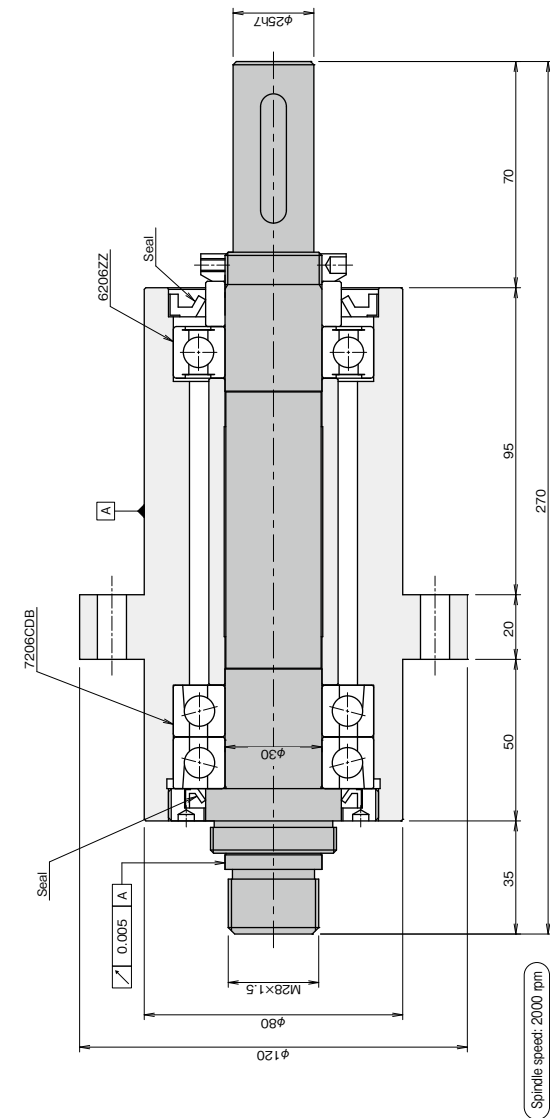
EXAMPLE OF DRAWING ②



Material results
 -S45C
 -SCM435

This sample drawing is shown for a specification example purpose only. Please contact NB for manufacturing details.

EXAMPLE OF DRAWING ③



Spindle speed: 2000 rpm

Custom design and manufacturing service for various spindle units is available. Please contact NB for details.

This sample drawing is shown for a specification example purpose only. Please contact NB for manufacturing details.

GENERAL MACHINE SHAFTING

NB general machine shafts are made to customer drawings. Integrated production from material sourcing, machining, heat treatments, surface treatments and final inspection, NB does it all.

ADVANTAGES

Small Lot Production Accepted

One piece custom accepted.

Variety of Machining Capabilities

From small to large, various shaft and spindle machining is available.

Surface Treatment

Various surface treatments are available such as hard chrome, electroless nickel plating, and low temperature black chrome.

Heat Treatment

Various heat treatments are available such as carburizing and induction hardening.

THERMAL-SPRAYING CERAMIC-COATING SPECIFICATIONS

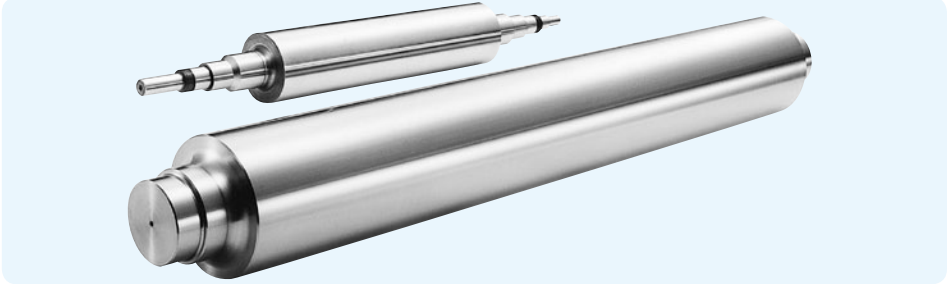
Parts that require wear and corrosion resistance can be thermal-sprayed with a ceramic material per NB's ceramic-coating specifications. Ceramic-coating can be applied to a wide variety of materials. The pores in the coated layer result in good lubrication characteristics and can be sealed to achieve high corrosion resistance.

Materials	High Carbon Chromium Bearing Steel (SUJ2)	Surface Treatment	Hard Chrome
	Chrome Molybdenum Steel (JIS SCM415, 420, 435)		Low Temperature Black Chrome
	Structural Carbon Steel (JIS S45C)		Electroless Nickel Plating
	Martensite Stainless Steel (SUS440)		Thermal Spray Ceramic Coating
	Austenite Stainless Steel (SUS303, 304)		Gauging with customer supplied nuts and bearings
	Tool Steel (JIS SK4)	Others	Triangular and trapezoidal thread grinding available
	Tool Steel (JIS SKS3)		
Heat Treatment	Induction Hardening		
	Induction Hardening (deep)		
	Carburizing and quenching		

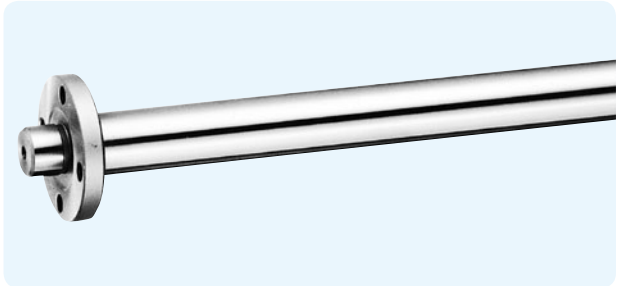
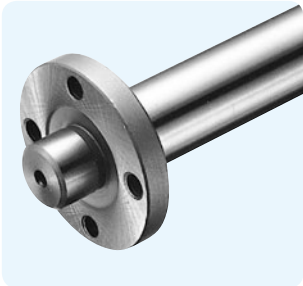
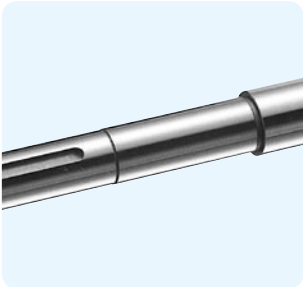
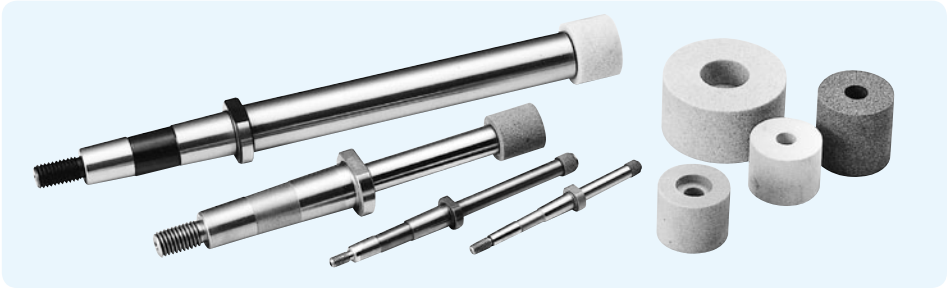
Machining Ability	Process Details / Manufacturing Contents	Maximum Machinable Diameter	Maximum Machinable Length	Remarks / Notes
	Centerless Grinding	φ60 mm outer diameter	4000mm	
	External Grinder	φ640 mm outer diameter	6000mm	
	Internal Grinder	φ200 mm inner diameter	300mm	Allowable work length: up to 1100 mm
	Vertical Grinder	φ350 mm inner diameter	300mm	
		φ630 mm outer diameter	300mm	
	Lathe	φ400	3800mm	
	Horizontal Machining Center	φ350	2000mm	Up to 3000 kg
	Vertical Machining Center	φ300	3000mm	Up to 3000 kg
	BT / Gun Drilling	φ80	2000mm	Up to 4000 mm long with both end machining for less than φ120 Up to 2000 mm long for φ120 and over

EXAMPLES OF MACHINING ①

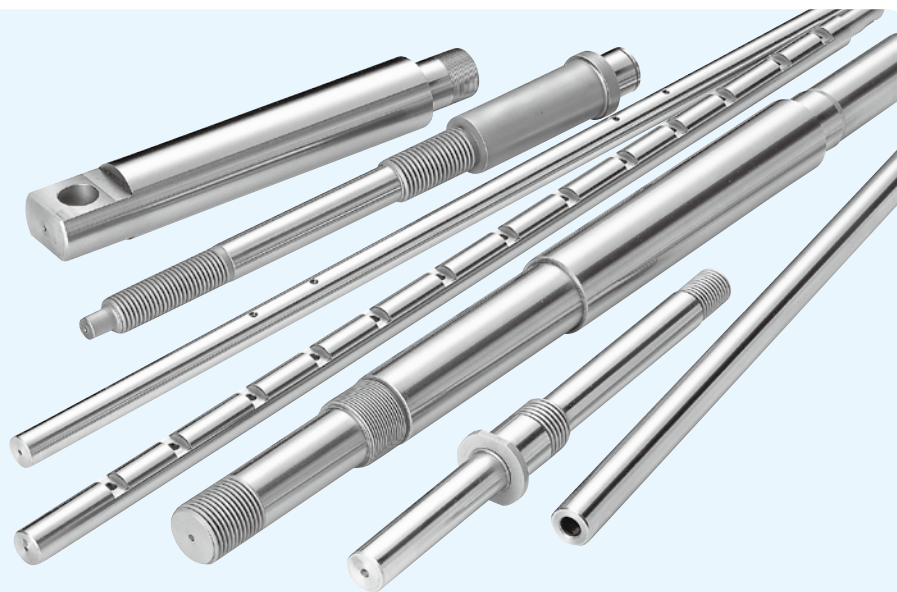
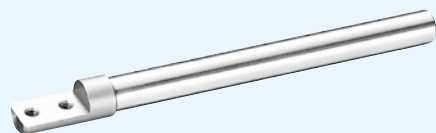
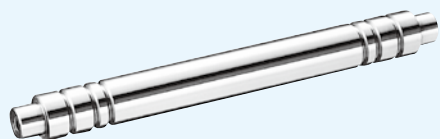
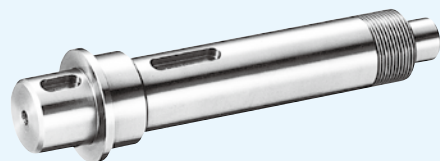
Roll Shaft



Quill Shaft



EXAMPLES OF MACHINING ②



Please visit at NB Website for more examples of machining.

SLIDE WAY SLIDE TABLE MINIATURE SLIDE GONIO WAY

SLIDE WAY

STRUCTURE AND ADVANTAGES	G-2
TYPES	G-3
ACCURACY	G-4
RATED LIFE	G-4
LOAD RATING	G-4
STROKE	G-6
LUBRICATION AND DUST PREVENTION	G-6
MOUNTING	G-6
INSTALLATION PROCEDURE OF NV TYPE	G-7
INSTALLATION PROCEDURE OF SV TYPE	G-8
SPECIAL MOUNTING SCREW BT TYPE	G-9
USE AND HANDLING PRECAUTIONS	G-9
DIMENSION TABLE	G-10~

SLIDE TABLE

STRUCTURE AND ADVANTAGES	G-26
TYPES	G-27
ACCURACY	G-27
RATED LIFE	G-28
LOAD RATING	G-28
USE AND HANDLING PRECAUTIONS	G-28
SPECIAL REQUIREMENTS	G-29
DIMENSION TABLE	G-30~

MINIATURE SLIDE

STRUCTURE AND ADVANTAGES	G-52
ACCURACY	G-53
LOAD RATING	G-53
RATED LIFE	G-53
MOUNTING	G-54
USE AND HANDLING PRECAUTIONS	G-55
DIMENSION TABLE	G-56~

GONIO WAY

STRUCTURE AND ADVANTAGES	G-58
ACCURACY OF RVF TYPE	G-59
ACCURACY OF RV TYPE	G-59
RATED LIFE	G-59
MOUNTING OF RVF TYPE	G-60
MOUNTING OF RV TYPE	G-62
RVF TYPE 2 AXES AND SPECIAL REQUIREMENTS	G-64
USE AND HANDLING PRECAUTIONS	G-65
DIMENSION TABLE	G-66~