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 (SUJ2) 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)
SNW, SNWS type (Inch shaft)
SNW-PD, SNWS-PD type (Inch, pre-drilled 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.

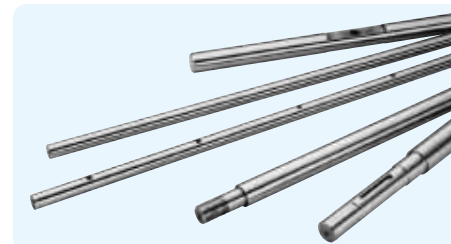### Shaft Supporter and Shaft Support Rail

These components ease the shaft installation and help save the design/assembling time. (refer to page F-14)
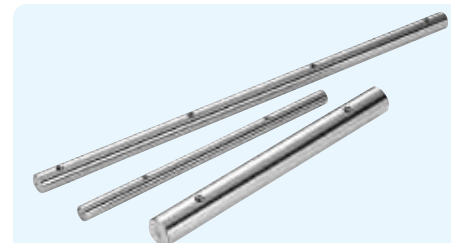
FIT Series

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-24)
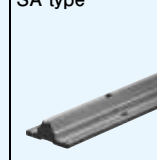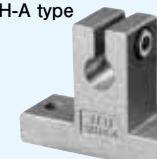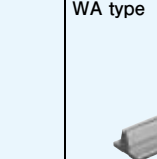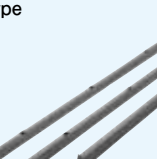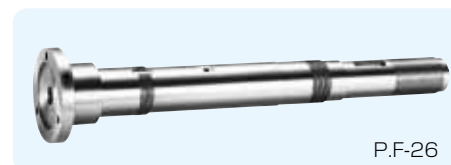
TYPES

SN/SNS/SNT type (NB Shaft)
SNW/SNWS type (Inch Shaft)

SNB/SNSB type (NB Center-lined Tapped Shaft)
SNW-PD/SNWS-PD type (Inch Shaft, Pre-drilled 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-18)

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	

The SNW and SNWS types are inch dimensional shafts with the same specifications as SN/SNS type (refer to page F-10,11). SNW-PD and SNWS-PD types are standardized series that can be used with the WA shaft support rails. (refer to page F-12,13,22)

Shaft Supporter and Shaft Support Rail

SH-A type — P.F-15
SH type — P.F-16
SHF type SHF-FC type — P.F-17
SA type — P.F-18
WH-A type — P.F-20
WA type — P.F-22
LWA type — P.F-23

Special Specifications

P.F-26

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 I support	ℓ/2, P, δ_{max}, i_2	$\delta_{max}=\dfrac{P\ell^3}{48EI}=P\ell^3C$	$i_1=0$ $i_2=\dfrac{P\ell^2}{16EI}=3P\ell^2C$
2 fixed I fixed	ℓ/2, P, δ_{max}	$\delta_{max}=\dfrac{P\ell^3}{192EI}=\dfrac{1}{4}P\ell^3C$	$i_1=0$ $i_2=0$
3 support I support	uniformly distributed load p, δ_{max}, i_2	$\delta_{max}=\dfrac{5p\ell^4}{384EI}=\dfrac{5}{8}p\ell^4C$	$i_2=\dfrac{p\ell^3}{24EI}=2p\ell^3C$
4 fixed I fixed	uniformly distributed load p, δ_{max}	$\delta_{max}=\dfrac{p\ell^4}{384EI}=\dfrac{1}{8}p\ell^4C$	$i_2=0$
5 support I support	δ_{max}, δ_1, a, b, a, i_1, P, P, i_2	$\delta_1=\dfrac{Pa^3}{6EI}\left(2+\dfrac{3b}{a}\right)=8Pa^3\left(2+\dfrac{3b}{a}\right)C$ $\delta_{max}=\dfrac{Pa^3}{24EI}\left(\dfrac{3\ell^2}{a^2}-4\right)=2Pa^3\left(\dfrac{3\ell^2}{a^2}-4\right)C$	$i_1=\dfrac{Pab}{2EI}=24PabC$ $i_2=\dfrac{Pa(a+b)}{2EI}=24Pa(a+b)C$
6 fixed I fixed	δ_{max}, δ_1, a, b, a, P, P, i_1	$\delta_1=\dfrac{Pa^3}{6EI}\left(2-\dfrac{3a}{\ell}\right)=8Pa^3\left(2-\dfrac{3a}{\ell}\right)C$ $\delta_{max}=\dfrac{Pa^3}{24EI}\left(2+\dfrac{3b}{a}\right)=2Pa^3\left(2+\dfrac{3b}{a}\right)C$	$i_1=\dfrac{Pa^2b}{2EI\ell}=\dfrac{24Pa^2bC}{\ell}$ $i_2=0$
7 fixed I free	P, δ_{max}, i_1	$\delta_{max}=\dfrac{P\ell^3}{3EI}=16P\ell^3C$	$i_1=\dfrac{P\ell^2}{2EI}=24P\ell^2C$ $i_2=0$
8 fixed I free	uniformly distributed load p, δ_{max}, i_1	$\delta_{max}=\dfrac{p\ell^4}{8EI}=6p\ell^4C$	$i_1=\dfrac{p\ell^3}{6EI}=8p\ell^3C$ $i_2=0$
9 support I support	ℓ/2, Mo, δ_{max}, i_1, i_2, δ_{max}	$\delta_{max}=\dfrac{\sqrt3 Mo\ell^2}{216EI}=\dfrac{2\sqrt3}{9}Mo\ell^2C$	$i_1=\dfrac{Mo\ell}{12EI}=4Mo\ell C$ $i_2=\dfrac{Mo\ell}{24EI}=2Mo\ell C$
10 fixed I fixed	ℓ/2, Mo, δ_{max}, i_1, δ_{max}	$\delta_{max}=\dfrac{Mo\ell^2}{216EI}=\dfrac{2}{9}Mo\ell^2C$	$i_1=\dfrac{Mo\ell}{16EI}=3Mo\ell C$ $i_2=0$

δ_1: deflection at the concentrated load point (mm)　δ_{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)

①In case the support method is support-support:
From the given conditions, P = 980 N, ℓ = 500mm
From Table F-4, C for an outer diameter of 30 mm, C=2.54×10^{-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,
$\delta_{max}=\dfrac{1}{4}P\ell^3C=0.08$ (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=1.73×10^{-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.

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

Table F-4 Solid Shaft

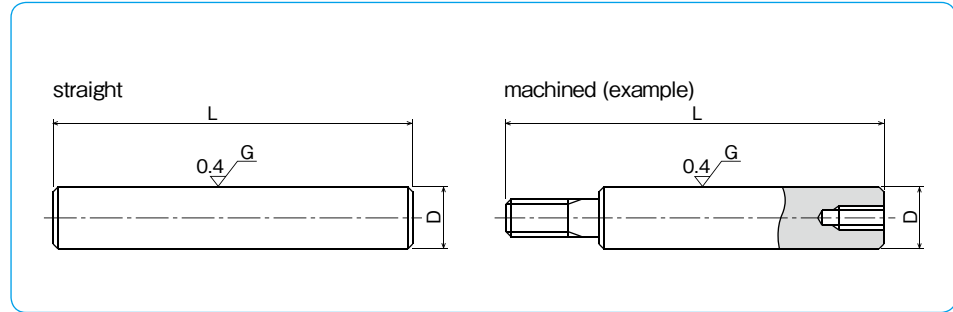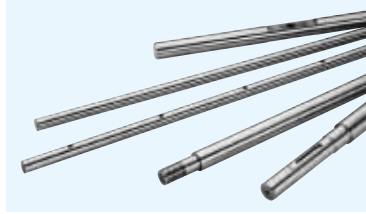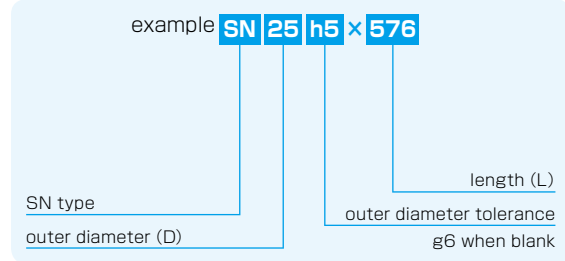| outer diameter D (mm)	moment of inertia of area I (mm⁴)	C=1/48EI (1/N・mm²) SUJ2	C=1/48EI (1/N・mm²) equivalent to SUS440C
3	3.98	2.54×10^{-8}	2.62×10^{-8}
4	1.26×10	8.05×10^{-9}	8.29×10^{-9}
5	3.07×10	3.30×10^{-9}	3.40×10^{-9}
6	6.36×10	1.59×10^{-9}	1.64×10^{-9}
8	2.01×10^2	5.03×10^{-10}	5.18×10^{-10}
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}	—
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 (mm⁴)	C=1/48EI (1/N・mm²)
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

example **SN** **25** **h5** × **576**

- SN type
- outer diameter (D)
- outer diameter tolerance — g6 when blank
- length (L)

straight

0.4 / G   L   D

machined (example)

0.4 / G   L   D

part number	outer diameter D mm	tolerance g6 μm	length L mm	mass Kg/m
SN 3	3	−2/−8	50 ←→ 400	0.06
SN 4	4	−4/−12	100 ←→ 500	0.10
SN 5	5	−4/−12	100 ←→ 700	0.16
SN 6	6	−4/−12	100 ←→ 1000	0.23
SN 8	8	−5/−14	200 ←→ 1500	0.40
SN 10	10	−5/−14	200 ←→ 2000	0.62
SN 12	12	−6/−17	200 → 3000	0.89
SN 13	13	−6/−17	200 → 3000	1.04
SN 15	15	−6/−17	300 ←→ 4000	1.39
SN 16	16	−6/−17	300 ←→ 4000	1.58
SN 20	20	−7/−20	300 → 5000	2.47
SN 25	25	−7/−20	300 → 6000	3.85
SN 30	30	−7/−20	300 → 6000	5.55
SN 35	35	−9/−25	400 → 6000	7.55
SN 40	40	−9/−25	400 → 6000	9.87
SN 50	50	−9/−25	500 → 6000	15.4
SN 60	60	−10/−29	600 → 6000	22.2
SN 80	80	−10/−29	800 → 6000	39.5
SN100	100	−12/−34	1000 → 6000	61.7
SN120	120	−12/−34	1500 ←→ 4500	88.8
SN150	150	−14/−39	1500 ←→ 4500	139

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

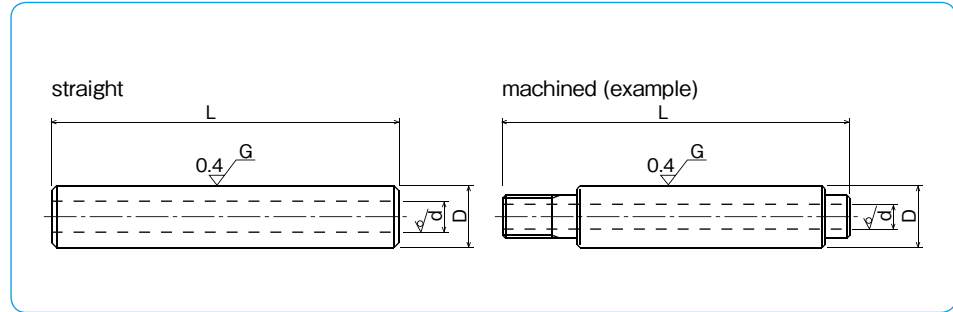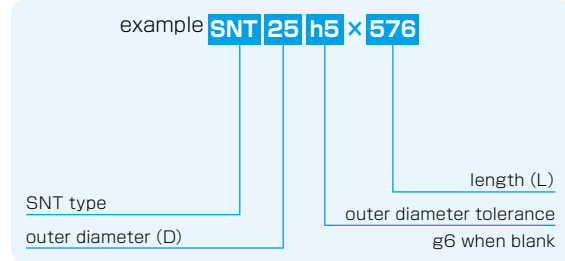# SNS TYPE
− NB Stainless Steel Shaft −

part number structure

example **SNS** **25** **h5** × **576**

- SNS type
- outer diameter (D)
- outer diameter tolerance — g6 when blank
- length (L)

straight

0.4 / G   L   D

machined (example)

0.4 / G   L   D
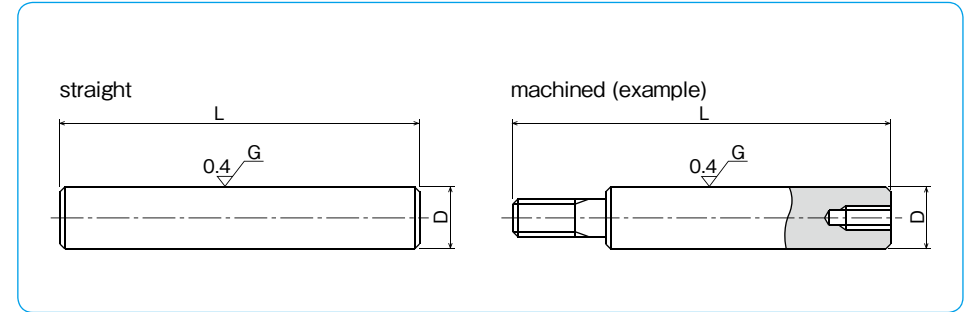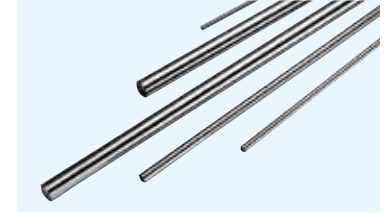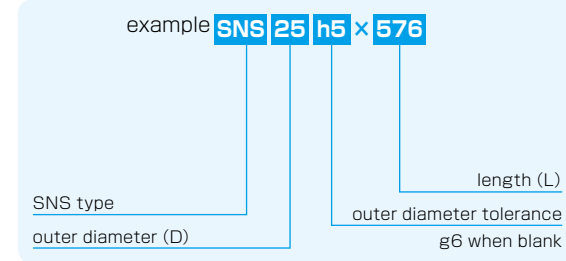
part number	outer diameter D mm	tolerance g6 μm	length L mm	mass Kg/m
SNS 3	3	−2/−8	50 ←→ 300	0.06
SNS 4	4	−4/−12	100 ←→ 400	0.10
SNS 5	5	−4/−12	100 ←→ 500	0.16
SNS 6	6	−4/−12	100 ←→ 600	0.22
SNS 8	8	−5/−14	200 ←→ 1000	0.39
SNS 10	10	−5/−14	200 ←→ 1500	0.61
SNS 12	12	−6/−17	200 → 2500	0.88
SNS 13	13	−6/−17	200 → 3000	1.03
SNS 16	16	−6/−17	300 → 4000	1.56
SNS 20	20	−7/−20	300 → 5000	2.43
SNS 25	25	−7/−20	300 → 6000	3.80
SNS 30	30	−7/−20	300 → 6000	5.48
SNS 35	35	−9/−25	400 → 6000	7.46
SNS 40	40	−9/−25	400 → 6000	9.75
SNS 50	50	−9/−25	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
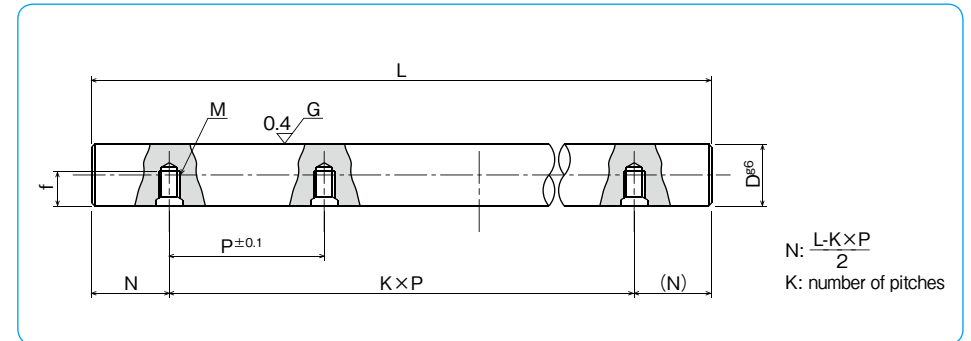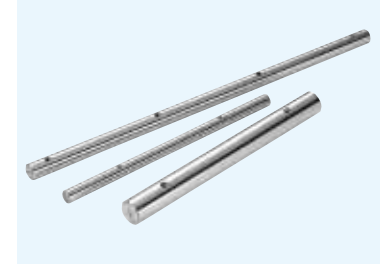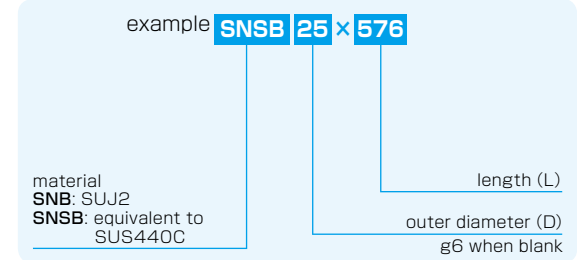## − NB Hollow Shaft −

part number structure

example **SNT** **25** **h5** × **576**

- SNT type
- outer diameter (D)
- outer diameter tolerance
  g6 when blank
- length (L)

straight

L

0.4 G

machined (example)

L

0.4 G

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
SNT100	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

example **SNSB** **25** × **576**

- material
  SNB: SUJ2
  SNSB: equivalent to SUS440C
- outer diameter (D)
  g6 when blank
- length (L)

L

M 0.4 G

f

P±0.1

N   K×P   (N)

$$N: \frac{L-K\times P}{2}$$
K: number of pitches

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 Lmax mm
SNB10	10	−5/−14	100	M4	4.5	1,500
SNB12	12		100	M4	5.5	1,800
SNB13	13	− 6 −17	100	M4	6	2,000
SNB16	16		150	M5	7	2,000
SNB20	20	− 7	150	M6	9	3,000
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.
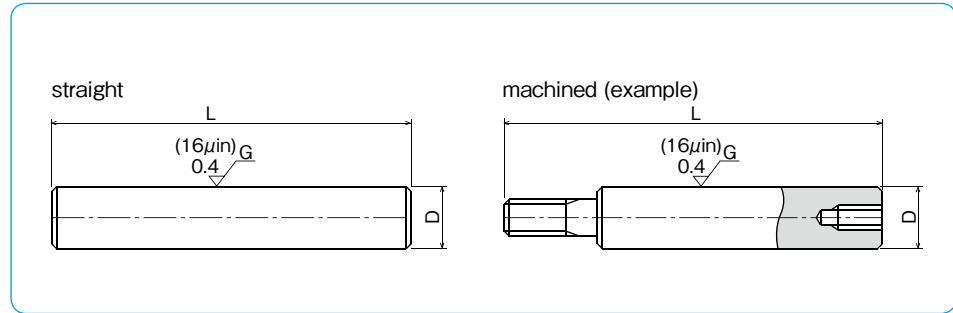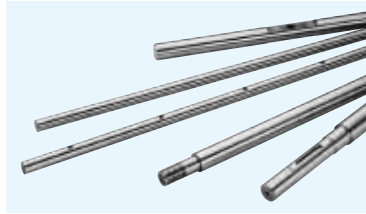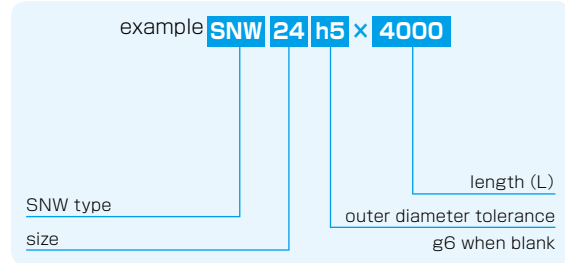
NB Center-Lined Tapped Stainless Steel Shaft

part number	outer diameter D mm	tolerance g6* μm	pitch P mm	screw size M	tap depth f mm	maximum length Lmax mm
SNSB16	16	−6/−17	150	M5	7	2,000
SNSB20	20		150	M6	9	3,000
SNSB25	25	− 7 −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.

SNW TYPE
— NB Inch Shaft —

part number structure

example **SNW** **24** **h5** × **4000**

- SNW type
- size
- outer diameter tolerance — g6 when blank
- length (L)

straight

L
(16μin)G 0.4
D

machined (example)

L
(16μin)G 0.4
D

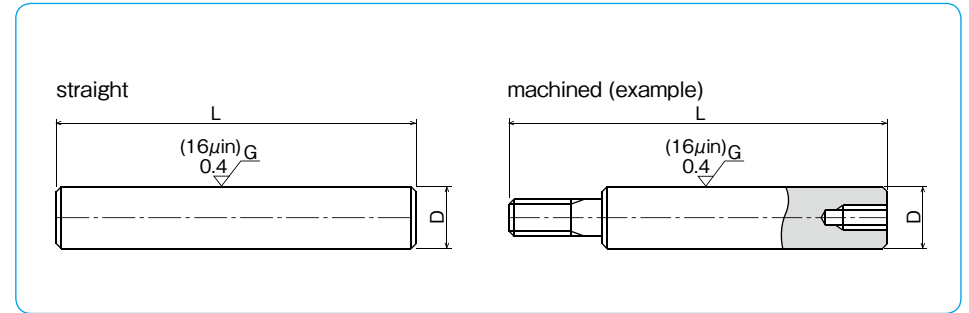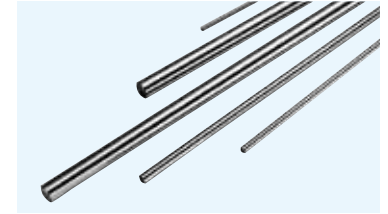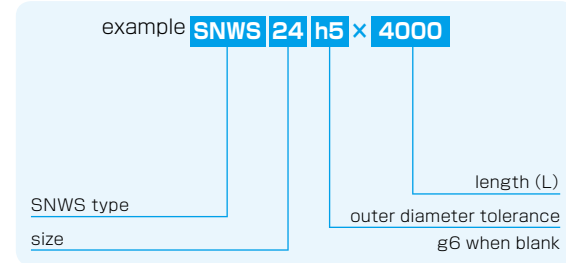| part number	outer diameter D inch / mm	tolerance g6 inch/μm	length L inch / mm	mass lbs/inch / Kg/m
SNW 4	1/4 / 6.350	−.0002 / −.0006	3.94 / 100 ← → 39.37 / 1000	0.014 / 0.25
SNW 6	3/8 / 9.525	−5 / −14	7.84 / 200 ← → 59.06 / 1500	0.031 / 0.56
SNW 8	1/2 / 12.700	−.0002 / −.0007	7.84 / 200 → 118.11 / 3000	0.056 / 0.99
SNW10	5/8 / 15.875	−6 / −17	7.84 / 200 ← → 157.48 / 4000	0.086 / 1.55
SNW12	3/4 / 19.050	−.0003 / −.0008	11.81 / 300 ← → 157.48 / 4000	0.125 / 2.24
SNW16	1 / 25.400	−7 / −20	11.81 / 300 ← → 157.48 / 4000	0.222 / 3.98
SNW20	1-1/4 / 31.750	−.0004 / −.0010	11.81 / 300 ← → 157.48 / 4000	0.348 / 6.22
SNW24	1-1/2 / 38.100	−9 / −25	15.75 / 400 ← → 157.48 / 4000	0.500 / 8.95
SNW32	2 / 50.800	−.0004 / −.0011 / −10 / −29	19.69 / 500 ← → 157.48 / 4000	0.890 / 15.91
SNW40	2-1/2 / 63.500		23.62 / 600 ← → 157.48 / 4000	1.391 / 25.00
SNW48	3 / 76.200		23.62 / 600 ← → 157.48 / 4000	2.003 / 37.92
SNW64	4 / 101.600	−.0005 / −.0013 / −12 / −34	39.37 / 1000 ← → 157.48 / 4000	3.560 / 64.02

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

1kg≒2.205lbs

SNWS TYPE
— NB Inch Stainless Steel Shaft —
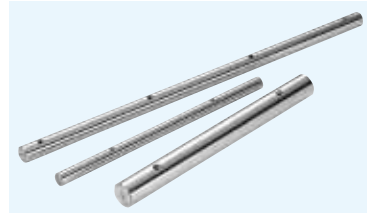
part number structure

example **SNWS** **24** **h5** × **4000**

- SNWS type
- size
- outer diameter tolerance — g6 when blank
- length (L)

straight

L
(16μin)G 0.4
D

machined (example)

L
(16μin)G 0.4
D

part number	outer diameter D inch / mm	tolerance g6 inch/μm	length L inch / mm	mass lbs/inch / Kg/m
SNWS 4	1/4 / 6.350	−.0002 / −.0006	3.94 / 100 ← → 23.62 / 600	0.014 / 0.25
SNWS 6	3/8 / 9.525	−5 / −14	7.84 / 200 ← → 39.37 / 1000	0.031 / 0.55
SNWS 8	1/2 / 12.700	−.0002 / −.0007	7.84 / 200 → 98.43 / 2500	0.056 / 0.98
SNWS10	5/8 / 15.875	−6 / −17	7.84 / 200 → 118.11 / 3000	0.086 / 1.54
SNWS12	3/4 / 19.050	−.0003 / −.0008	11.81 / 300 ← → 157.48 / 4000	0.125 / 2.22
SNWS16	1 / 25.400	−7 / −20	11.81 / 300 ← → 157.48 / 4000	0.222 / 3.95
SNWS20	1-1/4 / 31.750	−.0004 / −.0010	11.81 / 300 ← → 157.48 / 4000	0.420 / 6.16
SNWS24	1-1/2 / 38.100	−9 / −25	15.75 / 400 ← → 157.48 / 4000	0.500 / 8.88
SNWS32	2 / 50.800	−.0004 / −.0011 / −10 / −29	19.69 / 500 ← → 157.48 / 4000	0.890 / 15.78

material: martensite stainless steel (equivalent to SUS440C)
hardness: 56HRC (HV613) or more
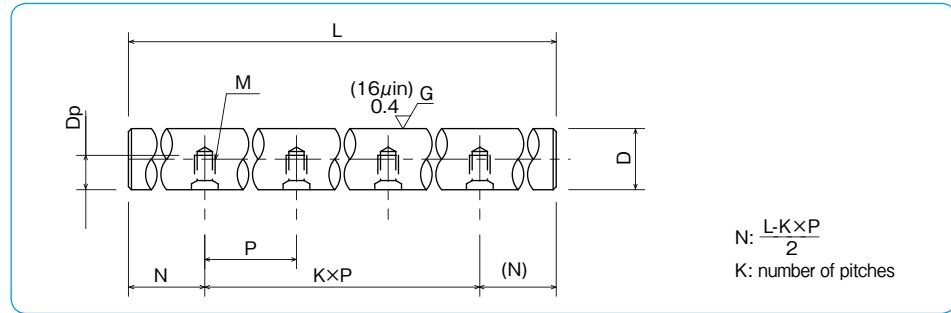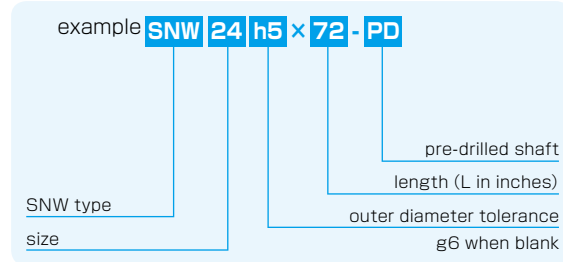Tolerances other than g6 are available upon request.

1kg≒2.205lbs

SNW-PD
— NB Inch Pre-Drilled Shaft —
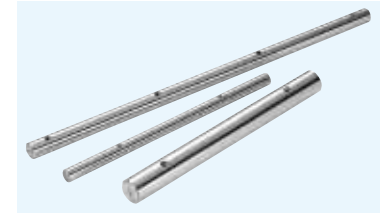
part number structure

example **SNW 24 h5 × 72 - PD**

pre-drilled shaft
length (L in inches)
outer diameter tolerance
g6 when blank
SNW type
size

$$N: \frac{L-K\times P}{2}$$
K: number of pitches

| part number | outer diameter | | pitch | bolt size | tapped hole depth | maximum length |
	D inch mm	tolerance g6* inch/μm	P inch/mm	M	Dp inch/mm	L inch/mm
SNW 8-PD	1/2 12.700	−.0002 −.0007	4 101.6	# 6-32	0.280 7.1	72 1,828.8
SNW10-PD	5/8 15.875	−6 −17		# 8-32	0.350 8.9	
SNW12-PD	3/4 19.050	−.0003 −.0008	6 152.4	# 10-32	0.400 10.2	
SNW16-PD	1 25.400	−7 −20		1/4-20	0.500 12.7	
SNW20-PD	1-1/4 31.750	−.0004 −.0010		5/16-18	0.650 16.5	
SNW24-PD	1/1/2 38.100	−9 −25	8 203.2	3/8-16	0.700 17.8	
SNW32-PD	2 50.800	−.0004/−.0011 −10/−29		1/2-13	0.850 21.6	

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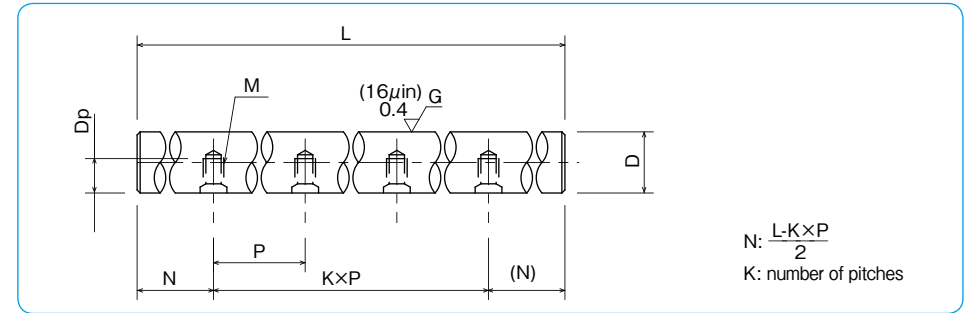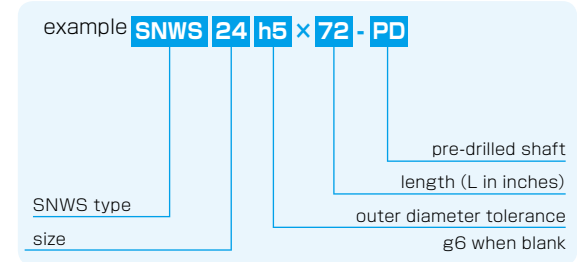Longer lengths are also available.

1kg≒2.205lbs

SNWS-PD
— NB Inch Pre-Drilled Stainless Steel Shaft —

part number structure

example **SNWS 24 h5 × 72 - PD**

pre-drilled shaft
length (L in inches)
outer diameter tolerance
g6 when blank
SNWS type
size

$$N: \frac{L-K\times P}{2}$$
K: number of pitches

| part number | outer diameter | | pitch | bolt size | tapped hole depth | maximum length |
	D inch mm	tolerance g6* inch/μm	P inch/mm	M	Dp inch/mm	L inch/mm
SNWS12-PD	3/4 19.050	−.0003 −.0008	6 152.4	#10−32	0.400 10.2	72 1,828.8
SNWS16-PD	1 25.400	−7 −20		1/4−20	0.500 12.7	
SNWS20-PD	1-1/4 31.750	−.0004 −.0010		5/16−18	0.650 16.5	
SNWS24-PD	1-1/2 38.100	−9 −25	8 203.2	3/8−16	0.700 17.8	
SNWS32-PD	2 50.800	−.0004/−.0011 −10/−29		1/2−13	0.850 21.6	

material: martensite stainless steel (equivalent to SUS440C)
hardness: 56HRC (HV613) or more
Tolerances other than *g6 are available upon request.
Longer lengths are also available.

SHAFT SUPPORTER AND SHAFT SUPPORT RAIL

These components save design/assembling time and ease shaft installation.
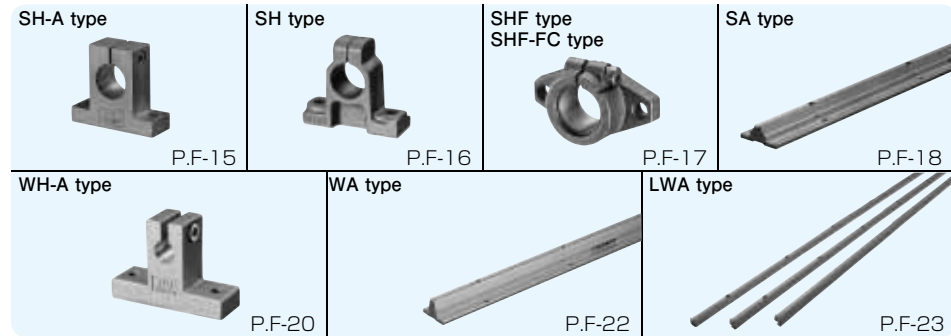
SH・SH-A・WH-A type
These are most commonly used compact shaft supporters. SH type is made of cast iron and SH-A/ WH-A type is made of aluminum alloy.

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.

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.

SH-A type	SH type	SHF type SHF-FC type	SA type
P.F-15	P.F-16	P.F-17	P.F-18

WH-A type	WA type	LWA type
P.F-20	P.F-22	P.F-23

ACCURACY

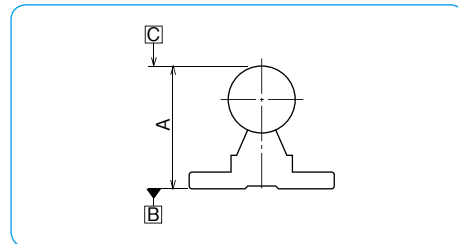The accuracy of the SA support rails are measured as shown in Figure F-1.
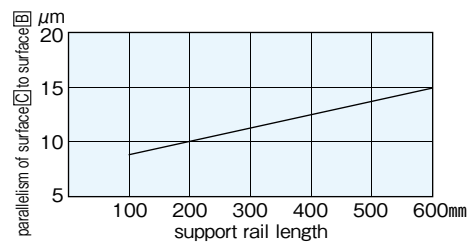
Figure F-1 Measurement Method

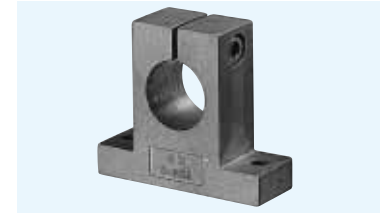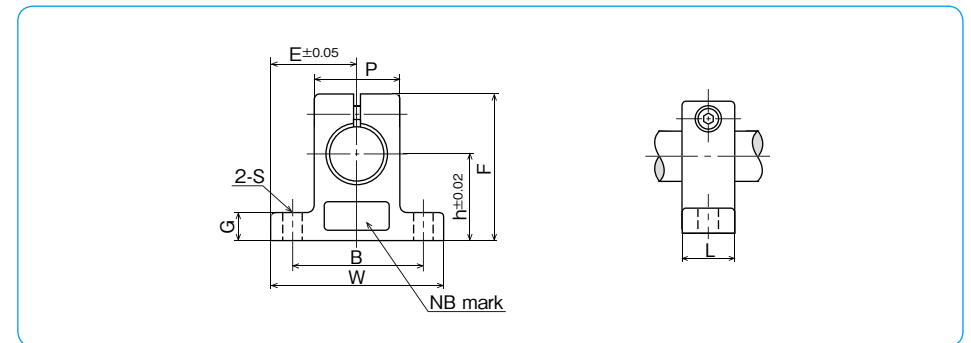Figure F-2 Accuracy of SA type Support Rail

SH-A TYPE
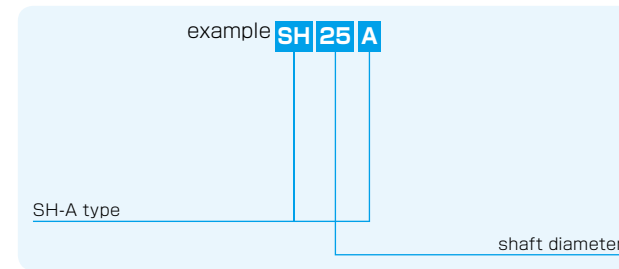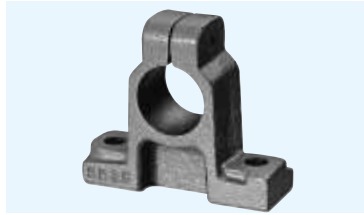— Shaft Supporter —

part number structure

example **SH** **25** **A**

SH-A type

shaft diameter

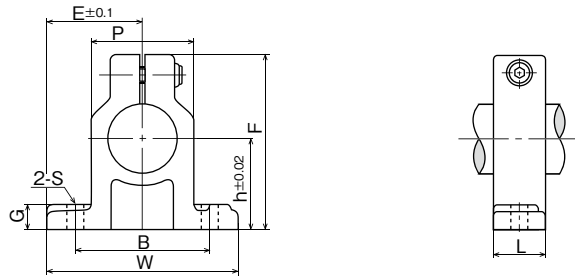| part number	shaft diameter mm	major dimensions									tightening screw		mass
		h mm	E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm	size	recommended torque N・m	g
SH 8A	8	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH10A	10	20	21	42	14	32.8	6	18	32	5.5 (M5)	M4	2	24
SH12A	12	23	21	42	14	37.5	6	20	32	5.5 (M5)	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

SHAFT

SH TYPE
— Shaft Supporter —

part number structure

example **SH** **25**

SH type — shaft diameter

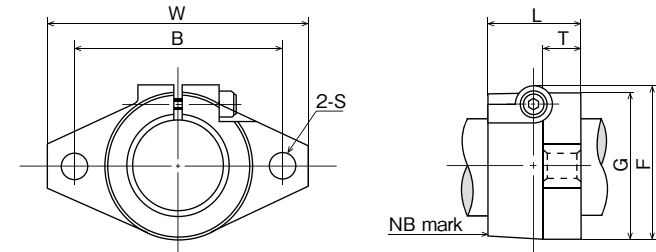| part number	shaft diameter mm	h mm	E mm	W mm	L mm	F mm	G mm	P mm	B mm	S mm	tightening screw size	recommended torque N·m	mass g
SH10	10	20	22	44	15	35	7	19	32	4.5 (M4)	M4	2	80
SH13	13	23	25	50	17	40	8	17	32	7 (M5)	M4	2	120
SH16	16	27	27.5	55	17	45	10	25	38	7 (M5)	M4	2	120
SH20	20	31	32.5	65	20	53	12	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

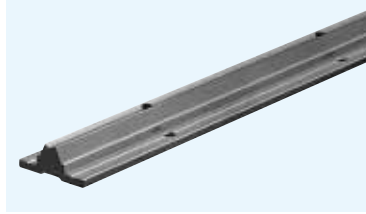example **SHF** **35** **FC**

SHF type — shaft diameter — blank: aluminum alloy / FC: cast iron

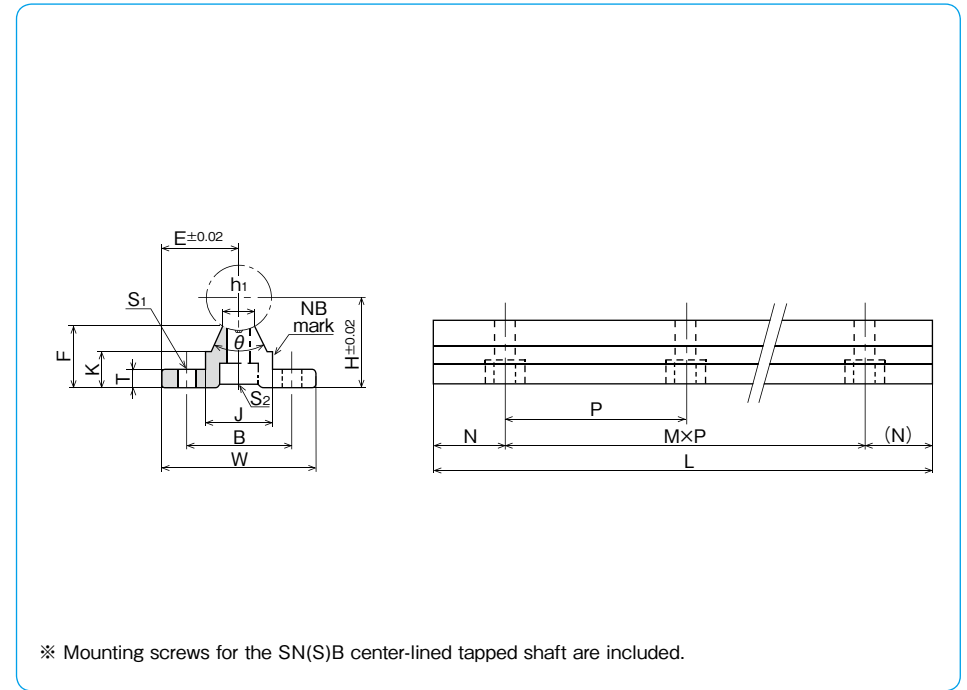	part number aluminum alloy	cast iron	shaft diameter mm	W mm	L mm	T mm	F mm	G mm	B mm	S mm	tightening screw size	recommended torque N·m	mass aluminum alloy g	mass cast iron g
SHF10	—	10	43	10	5	24	20	32	5.5 (M5)	M4	2	13	—
SHF12	—	12	47	13	7	28	25	36	5.5 (M5)	M4	2	20	—
SHF13	—	13	47	13	7	28	25	36	5.5 (M5)	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

SHAFT

SA TYPE
— Shaft Support Rail —

part number structure

example **SA** | **25** - **500**

total length

SA type

shaft diameter

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

part number	shaft diameter	major dimensions															mass
		H	E	W	L	F	T	K	J	h1	θ	B	N	M×P	S1	S2	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	mm		g
SA10-200					200								50	1×100			110
SA10-300					300								50	2×100			160
SA10-400	10	18	16	32	400	13.5	4	8.9	12.4	4.7	80°	22	50	3×100	4.5	M4	220
SA10-500					500								50	4×100			270
SA10-600					600								50	5×100			330
SA13-200					200								50	1×100			140
SA13-300					300								50	2×100			210
SA13-400	13	21	17	34	400	15	4.5	9.8	15	6	80°	25	50	3×100	4.5	M4	280
SA13-500					500								50	4×100			350
SA13-600					600								50	5×100			420
SA16-200					200								25	1×150			200
SA16-300					300								75	1×150			300
SA16-400	16	25	20	40	400	17.8	5	11.7	18.5	8	80°	30	50	2×150	5.5	M5	400
SA16-500					500								25	3×150			500
SA16-600					600								75	3×150			600
SA20-200					200								25	1×150			200
SA20-300					300								75	1×150			300
SA20-400	20	27	22.5	45	400	17.7	5	10	19	8	50°	30	50	2×150	5.5	M6	400
SA20-500					500								25	3×150			510
SA20-600					600								75	3×150			610
SA25-200					200								25	1×150			290
SA25-300					300								50	1×200			430
SA25-400	25	33	27.5	55	400	21	6	12	21.5	8	50°	35	100	1×200	6.5	M6	580
SA25-500					500								50	2×200			730
SA25-600					600								100	2×200			880

part number	shaft diameter	major dimensions															mass
		H	E	W	L	F	T	K	J	h1	θ	B	N	M×P	S1	S2	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	mm		g
SA30-200					200								25	1×150			360
SA30-300					300								50	1×200			550
SA30-400	30	37	30	60	400	22.8	7	13	26.5	10.3	50°	40	100	1×200	6.5	M8	730
SA30-500					500								50	2×200			920
SA30-600					600								100	2×200			1,100
SA35-200					200								25	1×150			460
SA35-300					300								50	1×200			700
SA35-400	35	43	32.5	65	400	26.5	8	15.5	28	13	50°	45	100	1×200	9	M8	950
SA35-500					500								50	2×200			1,190
SA35-600					600								100	2×200			1,420
SA40-200					200								25	1×150			630
SA40-300					300								75	1×150			960
SA40-400	40	48	37.5	75	400	29.4	9	17	38	16	50°	55	50	1×300	9	M8	1,290
SA40-500					500								100	1×300			1,610
SA40-600					600								150	1×300			1,950
SA50-200					200								25	1×150			1,000
SA50-300					300								75	1×150			1,500
SA50-400	50	62	47.5	95	400	38.8	11	21	45	20	50°	70	50	1×300	11	M10	2,000
SA50-500					500								100	1×300			2,500
SA50-600					600								150	1×300			3,000

SHAFT

WH-A TYPE
− Shaft Supporter −
(Inch Standard)
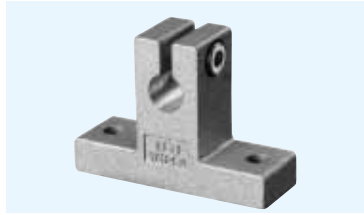
part number structure

example **WH 24 A**

WH-A type

size

2-S

G

E

P

F

h

B

W

NB mark

machined reference edge

L

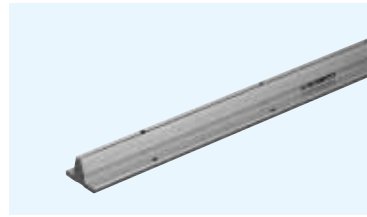| part number	shaft diameter	major dimensions				
		h ±.001	E ±.005	W	L	F
	inch	inch	inch	inch	inch	inch
WH 4A	.2500	.6875	.7500	1.500	.500	1.063
WH 6A	.3750	.7500	.8125	1.625	.563	1.187
WH 8A	.5000	1.0000	1.0000	2.000	.625	1.625
WH 10A	.6250	1.0000	1.2500	2.500	.688	1.750
WH 12A	.7500	1.2500	1.2500	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
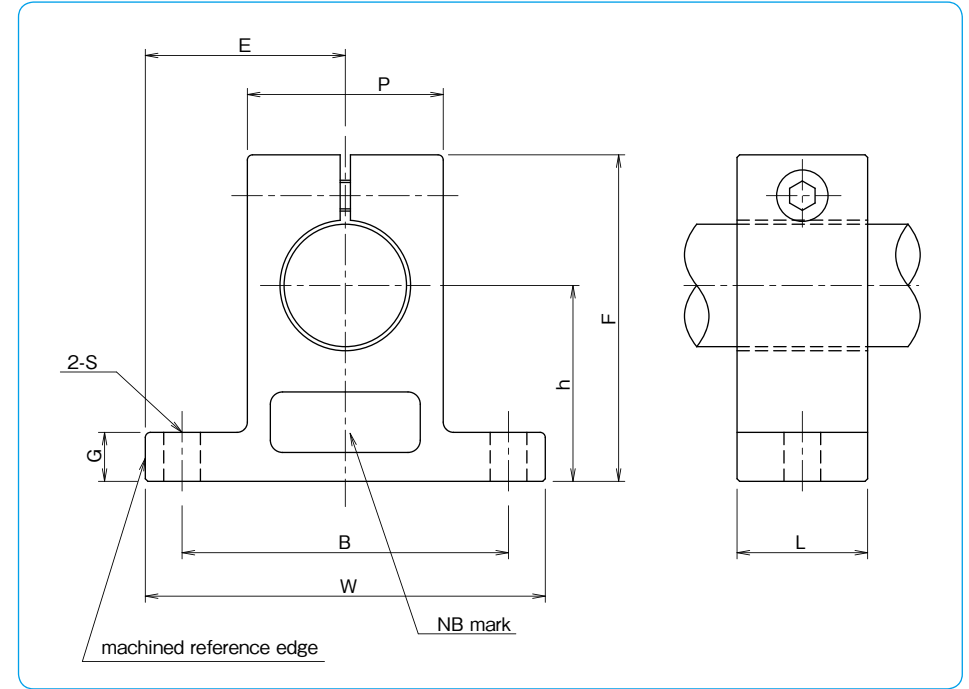
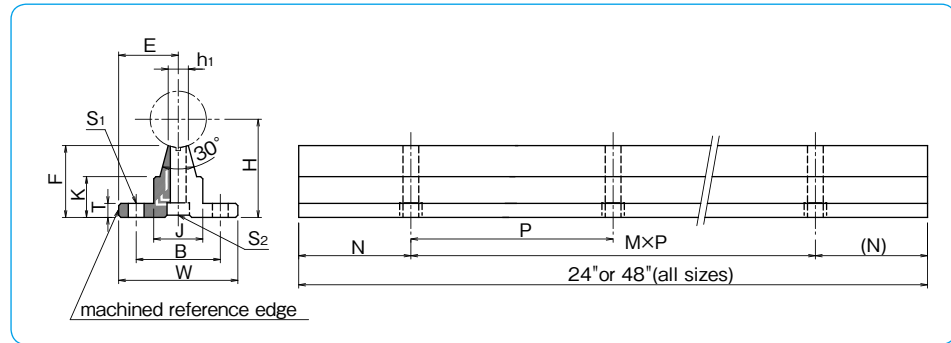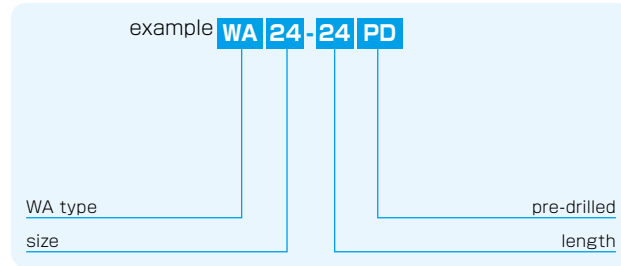| major dimensions					mass	part number
G	P	B ±.01	S	bolt#		
inch	inch	inch	inch	inch	lbs	
.250	.500	1.125	.156	＃6	.033	WH 4A
.250	.688	1.250	.156	＃6	.044	WH 6A
.250	.875	1.500	.188	＃8	.075	WH 8A
.313	1.000	1.875	.218	＃10	.106	WH 10A
.313	1.250	2.000	.218	＃10	.156	WH 12A
.375	1.500	2.500	.281	1/4	.294	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

SHAFT

WA TYPE
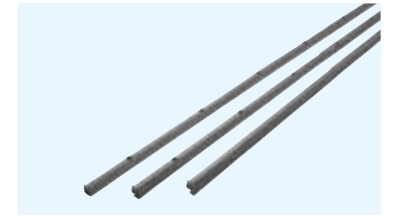— Shaft Support Rail —

(Inch Standard)

part number structure

example **WA** **24**-**24** **PD**

- WA type
- size
- pre-drilled
- length

machined reference edge

part number		shaft diameter	major dimensions								mounting dimensions			S1		S2		mass
			H ±.001	E ±.005	W	F	T	K	J	h1	B ±.01	N	M×P	hole	bolt#	hole	bolt#	
		inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	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.
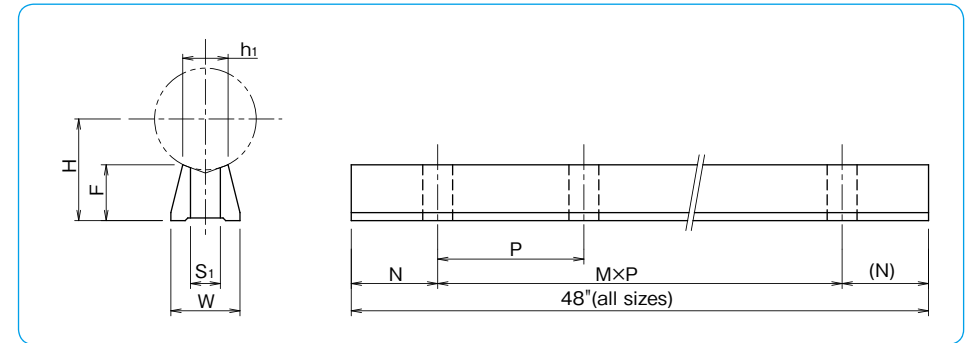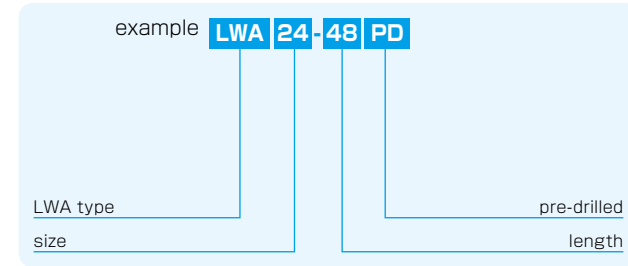Please send drawings with customer specifications.

1kg≒2.205lbs
1lb≒0.454kg

LWA TYPE
— Low Shaft Support Rail —

(Inch Standard)

part number structure

example **LWA** **24**-**48** **PD**

- LWA type
- size
- pre-drilled
- length

part number	shaft diameter	major dimensions				major dimensions			mass
		H ±.002	W	F	N	M×P	h1	S1	
	inch	inch	inch	inch	inch	inch	inch	inch	lb
LWA 8-48 PD	.5000	.5625	.37	.341	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	.224	0.20
LWA 16-48 PD	1.0000	1.0000	.69	.545	3	7×6	0.422	.281	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	.96	.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

1kg≒2.205lbs
1lb≒0.454kg

SHAFT