Rotary Shafts – D Tolerance h9 (Cold-Drawn) / h7 & g6 (Ground)

Retaining Ring Grooves on Both Ends

Select from h9 (Cold-drawn), h7 (Ground) and g6 (Ground) for your applications.

Rotary Shafts – Retaining Ring Grooves on Both Ends

RoHS 10

	Type: Standard – No Retaining Ring	Type: Standard – With Retaining Ring	Type: Retaining Ring Groove Outside Datum – With Retaining Ring	D Tolerance	Material	Surface Treatment
(1)	NSFMRR	NSFMRRA	—	h9 (Cold-Drawn)	1045 Carbon Steel or Equivalent	—
	SFMRR	SFMRRA				Black Oxide
	PSFMRR	PSFMRRA				Electroless Nickel Plating
	SSFMRR	SSFMRRA			304 Stainless Steel	—
(2)	NSFHRR	NSFHRRA	—	h7 (Ground)	1045 Carbon Steel or Equivalent	—
	SFHRR	SFHRRA				Black Oxide
	PSFHRR	PSFHRRA				Electroless Nickel Plating
	SSFHRR	SSFHRRA			304 Stainless Steel	—
(3)	NSFRR	NSFRRA	NSFRRGA	g6 (Ground)	1045 Carbon Steel or Equivalent	—
	SFRR	SFRRA	SFRRGA			Black Oxide
	PSFRR	PSFRRA	PSFRRGA			Electroless Nickel Plating
	SSFRR	SSFRRA	SSFRRGA		304 Stainless Steel	—
	—	HFRRA	—		4137 Alloy Steel or Equivalent Hardness 30~35 HRC min.	Black Oxide
	—	PHFRRA	—			Electroless Nickel Plating

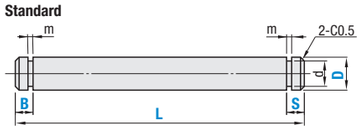
Tolerance Table

D	h9 (Cold-Drawn)	h7 (Ground)	g6 (Ground)
2 2.5 3	—	—	-0.002 -0.008
4–6	0 -0.030	0 -0.012	-0.004 -0.012
8–10	0 -0.036	0 -0.015	-0.005 -0.014
12–18	0 -0.043	0 -0.018	-0.006 -0.017
20–30	0 -0.052	0 -0.021	-0.007 -0.020
35–50	0 -0.062	0 -0.025	-0.009 -0.025

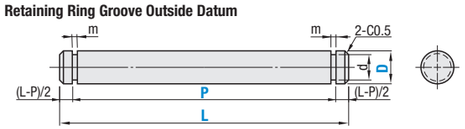
For Retaining Ring Groove Dimensions, **P.853**.

Surface roughness of D part for h9 (Cold-Drawn) is 6.3 for h7 (Ground) and g6 (Ground) is 1.6

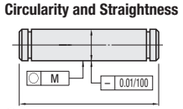
Standard



Retaining Ring Groove Outside Datum



Circularity and Straightness



Straightness of size D2, D2.5 is 0.1/100.

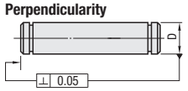
Not applicable to h9 (Cold-Drawn).

Circularity of Part D

D Over	D To	Circularity M
1	2.5	0.006
3	13	0.004
13	20	0.005
20	40	0.006
40	50	0.007

Not applicable to h9 (Cold-Drawn).

Perpendicularity



Not applicable to h9 (Cold-Drawn).

Tolerances of L and Other Dimensions

Dimension Over	Dimension To	Dimension Tolerance
2	6	±0.1
6	30	±0.2
30	120	±0.3
120	400	±0.5
400	800	±0.8

(1) h9 (Cold-Drawn)

Part Number Type: Standard – Without Retaining Ring	Type: Standard – With Retaining Ring	D	L 0.1 mm Increment	B / S 1 mm Increment	Retaining Ring No. Accessories: Retaining Rings 2 Pcs (Retaining Ring Type Only)
NSFMRR SFMRR PSFMRR SSFMRR D6 is not available for SSFMRR	NSFMRRA SFMRRA PSFMRRA SSFMRRA D6 is not available for SSFMRRA	3	15.0–150.0	2≤B / S<L/2	NETWS2
		4	15.0–200.0		NETWS3
		5	15.0–250.0		NETWS4
		6	15.0–400.0		NETWS5
		8	15.0–500.0	3≤B / S<L/2	NETWS7
		10	15.0–600.0		STWS10
		12	15.0–700.0	4≤B / S<L/2	STWS12
		15	15.0–800.0		STWS15
		20	30.0–1000.0		STWS20
		25	50.0–1000.0	5≤B / S<L/2	STWS25
		30	60.0–1000.0		STWS30
		35	70.0–1000.0		STWS35
		40	80.0–1000.0		STWS40
		50	100.0–1000.0		STWS50

(2) h7 (Ground)

Part Number Type: Standard – Without Retaining Ring	Type: Standard – With Retaining Ring	D	L 0.1 mm Increment	B / S 1 mm Increment	Retaining Ring No. Accessories: Retaining Rings 2 Pcs (Retaining Ring Type Only)
NSFHRR SFHRR PSFHRR SSFHRR	NSFHRRA SFHRRA PSFHRRA SSFHRRA	6	15.0–400.0	2≤B / S<L/2	NETWS5
		8	15.0–500.0	3≤B / S<L/2	NETWS7
		10	15.0–600.0		STWS10
		12	15.0–700.0	4≤B / S<L/2	STWS12
		15	15.0–800.0		STWS15
		20	15.0–1000.0		STWS20
		25	80.0–1000.0	5≤B / S<L/2	STWS25
		30	80.0–1000.0		STWS30
		35	80.0–1000.0		STWS35
		40	80.0–1000.0		STWS40
		50	100.0–1000.0		STWS50

(3) g6 (Ground)

Part Number Type: Standard – Without Retaining Ring	Type: Standard – With Retaining Ring	Type: Retaining Ring Groove Outside Datum	D	L 0.1 mm Increment	B, S 1 mm Increment ⓘ Standard	P 0.1 mm Increment ⓘ Retaining Ring Groove	m	Tolerance	d	Tolerance	Retaining Ring No. Accessories: Retaining Ring 2 pcs.(Retaining Ring Type Only)
NSFRR SFRR PSFRR SSFRR D13, 16, 18 and 22 are not available for SSFRR	NSFRRA SFRRA PSFRRA SSFRRA D13, 16, 18 and 22 are not available for SSFRRA	With Retaining Ring NSFRRGA SFRRGA PSFRRGA SSFRRGA D6 is not available for SSFRMRR	2	15.0–50.0	2≤B, S	3≤P≤L-4	0.4	+0.05 0	1.2	+0.06 0	NETWS1.2
			2.5	15.0–50.0			0.5		1.5		NETWS1.5
			3	15.0–150.0					2		NETWS2
			4	15.0–200.0			0.7	+0.1 0	3		NETWS3
			5	15.0–250.0					4	+0.075 0	NETWS4
			6	15.0–400.0					5		NETWS5
			8	15.0–500.0	3≤B, S	5≤P≤L-5	0.9		7	+0.09 0	NETWS7
			10	15.0–600.0			1.15		9.6	0 -0.09	STWS10
			12	15.0–700.0	4≤B, S	7≤P≤L-6		+0.14 0	11.5	0 -0.11	STWS12
			13	15.0–700.0					12.4		STWS13
			*15	15.0–800.0					14.3		STWS15
			16	15.0–900.0					15.2		STWS16
			17	30.0–900.0					16.2		STWS17
			18	30.0–900.0			1.35		17		STWS18
			*20	30.0–1000.0					19	0 -0.21	STWS20
			22	70.0–1000.0					21		STWS22
			*25	80.0–1000.0	5≤B, S	10≤P≤L-8			23.9		STWS25
			*30	80.0–1000.0			1.65		28.6		STWS30
			35	80.0–1000.0					33	0 -0.25	STWS35
			40	80.0–1000.0			1.9		38		STWS40
			50	100.0–1000.0					47		STWS50

*HFRRA Only * marked sizes are available

*PHFRRA Only * marked sizes are available

For NETWS and STWS retaining rings details, refer to **P.853**. The material of retaining ring is 304 Stainless Steel.

Rotary Shafts – D Tolerance h9 (Cold-Drawn) / h7 & g6 (Ground)

Retaining Ring Grooves on Both Ends, *continued*

Available Types

(1) h9 (Cold-Drawn)

Type	NSFMRR, NSFMRRA, SFMRR, SFMRRA, PSFMRR, PSFMRRA									SSFMRR, SSFMRRA								
D	Min. L 50.0	L50.1 100.0	L100.1 150.0	L150.1 200.0	L200.1 300.0	L300.1 400.0	L400.1 600.0	L600.1 800.0	L800.1 1000	Min. L 50.0	L50.1 100.0	L100.1 150.0	L150.1 200.0	L200.1 300.0	L300.1 400.0	L400.1 600.0	L600.1 800.0	L800.1 1000
3	•	•	•	—	—	—	—	—	—	•	—	—	—	—	—	—	—	—
4	•	•	•	•	—	—	—	—	—	•	•	•	•	—	—	—	—	—
5	•	•	•	•	•	—	—	—	—	•	•	•	•	•	—	—	—	—
6	•	•	•	•	•	•	—	—	—	—	—	—	—	—	—	—	—	—
8	•	•	•	•	•	•	•	—	—	•	•	•	•	•	•	•	—	—
10	•	•	•	•	•	•	•	—	—	•	•	•	•	•	•	•	—	—
12	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•	—
15	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•	—
20	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
25	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
30	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
35	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
40	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
50	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•

Type	HFRRA, PHFRRA							
D	Min. L 50.0	L50.1 100.0	L100.1 150.0	L150.1 200.0	L200.1 300.0	L300.1 400.0	L400.1 600.0	L600.1 800.0
15	•	•	•	•	•	•	•	•
20	•	•	•	•	•	•	•	•
25	—	•	•	•	•	•	•	•
30	—	•	•	•	•	•	•	•

(2) h7 (Ground) (3) g6 (Ground)

Type	NSFHRR, NSFRR, NSFHRRA, NSFRRA, NSFRRGA, SFHRR, SFRR, SFHRRA, SFRRA, SFRRGA, PSFHRR, PSFRR, PSFHRRA, PSFRRA, PSFRRGA									SSFHRR, SSFRR, SSFHRRA, SSFRRA, SSFRRGA								
D	Min. L–50.0	L50.1–100.0	L100.1–150.0	L150.1–200.0	L200.1–300.0	L300.1–400.0	L400.1–600.0	L600.1–800.0	L800.1–1000	Min. L–50.0	L50.1–100.0	L100.1–150.0	L150.1–200.0	L200.1–300.0	L300.1–400.0	L400.1–600.0	L600.1–800.0	L800.1–1000
2	•	—	—	—	—	—	—	—	—	•	—	—	—	—	—	—	—	—
2.5	•	—	—	—	—	—	—	—	—	•	—	—	—	—	—	—	—	—
3	•	•	•	—	—	—	—	—	—	•	—	—	—	—	—	—	—	—
4	•	•	•	•	—	—	—	—	—	•	•	•	•	—	—	—	—	—
5	•	•	•	•	•	—	—	—	—	•	•	•	•	•	—	—	—	—
6	•	•	•	•	•	•	—	—	—	•	•	•	•	•	•	—	—	—
8	•	•	•	•	•	•	•	—	—	•	•	•	•	•	•	•	—	—
10	•	•	•	•	•	•	•	—	—	•	•	•	•	•	•	•	•	—
12	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•	—
13	•	•	•	•	•	•	•	•	—	—	—	—	—	—	—	—	—	—
15	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•	—
16	•	•	•	•	•	•	•	•	•	—	—	—	—	—	—	—	—	—
17	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
18	•	•	•	•	•	•	•	•	•	—	—	—	—	—	—	—	—	—
20	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
22	—	•	•	•	•	•	•	•	•	—	—	—	—	—	—	—	—	—
25	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
30	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
35	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
40	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•
50	—	•	•	•	•	•	•	•	•	—	•	•	•	•	•	•	•	•

Part Number Example

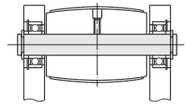
Part Number	- L	- B	- S	- P
SFMRR30	- 150	- B6	- S6	
SFHRR40	- 230	- B10	- S10	
SFRRGA20	- 180			- P150

Part Number Alterations

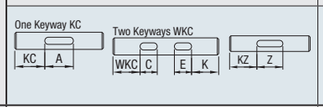
Part Number	- L	- B	- S	- (KC, WKC, FC...etc.)
SFRRA30	- 250	- B10	- S20	- KC20-A10

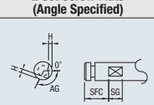
Application Example

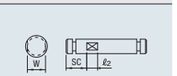
Select from h9 (Cold-Drawn), h7 (Ground) and g6 (Ground) for your applications.



Alterations



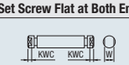


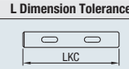


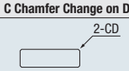
	Keyway	Set Screw Flat	2 Set Screw Flats (Angle Specified)	Slit Cam Groove	Wrench Flats
Code	KC / WKC / KZ	FC / WFC	SFC	UC	SC
Spec.	KC: Adds a keyway. **Ordering Code:** KC50-A10 WKC: Adds 2 Keyways. **Ordering Code:** WKC50-C8-K40-E10 **Ordering Code:** KZ100-Z10 KC, A, WKC, C, E, K, KZ, Z= 0.1 mm increment A, C, E, Z≤100 For keyway details refer to **P.853**. If 3 keyways are required use both KC and WKC. If 4th keyway is required use KZ only as addition to KC and WKC. Not applicable to D5 or less. When keyway position is less than 1 mm away from the end face, R is not applied. Ex.	FC: Adds 1 set screw flat. **Ordering Code:** FC10-G3 WFC: Adds 2 set screw flats. **Ordering Code:** WFC10-J3-W10-V3 FC, G, WFC, J, W, V = 1 mm Increment G, J, V≤50 D / H: 3–5 / 0.5; 6–17 / 1; 18–40 / 2; 50 / 3 Not applicable to D2 and D2.5.	Adds a set screw flat at any desired angle besides the datum plane (0°). SG, SFC = 1 mm Increment AG = 15° Increment SG≤50 **Ordering Code:** SFC10-SG3-AG120 D / H: 3–5 / 0.5; 6–17 / 1; 18–40 / 2; 50 / 3 Not applicable to D2 and D2.5. When combined with other alterations, ±2 degree phase differential may occur.	Adds a slit cam groove. UC = 1 mm Increment **Ordering Code:** UC10 UC+ℓ1≤L UC≥1 Not applicable to D2 nd D2.5. Not applicable to D13 or more. D / d / ℓ1: 3 / 2; 4 / 3; 5 / 4; 6 / 5; 8 / 7; 10 / 8 (4); 12 / 10 (5)	Adds a wrench flat. SC = 1 mm Increment SC+ℓ2≤L SC=0 or SC≥1 D / W / ℓ2: 6 / 5 / 8; 8 / 7 / 8; 10 / 8 / 8; 12 / 13 / 10; 15 / 16 / 13; 17 / 18 / 14; 20 / 22 / 17 (10) D / W / ℓ2: 25 / 22 / 10; 30 / 27 / 15; 35 / 30 / 15; 40 / 36 / 20; 50 / 41 / 20 Not applicable to D2–5 When combined with other alterations, ±2 degree phase differential may occur.

Keyways and set screw flats are added in the same plane. When the distance of the alterations are over 500 mm, ±2 degree phase differential may occur.

Alterations







	2 Set Screw Flat at Both Ends	Set Screw Flat Depth	L Dimension Tolerance	C Chamfer Change on D
Code	KWC	WC	LKC	CD
Spec.	Adds 2 Set Screw Flats at both ends. KWC = 1 mm Increment **Ordering Code:** KWC20 KWC≤B-m, S-m L≤680 is applicable Not applicable to D dimensions other than indicated above. D / W: 8 / 7; 10 / 8; 12 / 9; 15 / 12; 20 / 16; 25 / 20; 30 / 25; 35 / 30; 40 / 35; 50 / 45	Set Screw Flat Depth can be specified in 0.1 increments. **Ordering Code:** WC6.8 Applicable only when KWC alteration is performed. Not applicable to D dimensions other than indicated above. D / W: 8 / 4.0–6.9; 10 / 5.0–6.9; 12 / 6.0–8.9; 15 / 9.0–11.9; 20 / 13.0–15.9; 25 / 17.0–19.9; 30 / 22.0–24.9; 35 / 27.0–29.9; 40 / 32.0–34.9; 50 / 42.0–44.9	Changes L Dimension Tolerance. **Ordering Code:** LKC L<500 L±0.05 L≥500 L±0.1 Not applicable to L=800 or more.	CD= Selection from Table below. **Ordering Code:** CD2 Chamfer (CD) / Applicable Dia.: C2 / ø6 –ø51; C3 / ø8 –ø51; C4 / ø10 –ø51; C5 / ø12 –ø51