Rotary Shafts - D Tolerance h9 (Cold-drawn) / h7 (Ground) / g6 (Ground)

One End Stepped, Both Ends Tapped

For products uncovered by the e-Catalog Standard, see P.131.

■Select from h9 (Cold-drawn), h7 (Ground) and g6 (Ground) for your applications. Furthermore, h7 or g6 can be selected for P part tolerance of h9 (Cold-drawn).

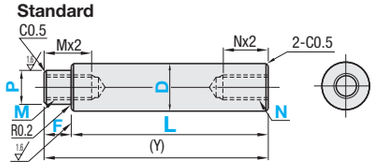
	Type Standard	Type Wrench Flats	Tolerance D	Tolerance P	M Material	S Surface Treatment
(1)	SFRMHA	SFRMHAS	h9 (Cold-drawn)	h7	S45C Equivalent	Black Oxide
	PSFRMHA	PSFRMHAS				Electroless Nickel Plating
	SSFRMHA	SSFRMHAS			SUS304	-
(2)	SFRMGA	SFRMGAS		g6	S45C Equivalent	Black Oxide
	PSFRMGA	PSFRMGAS				Electroless Nickel Plating
	SSFRMGA	SSFRMGAS			SUS304	-
(3)	SFRHA	SFRHAS	h7 (Ground)	h7	S45C Equivalent	Black Oxide
	PSFRHA	PSFRHAS				Electroless Nickel Plating
	SSFRHA	SSFRHAS			SUS304	-
(4)	SFRA	SFRAS	g6 (Ground)	g6	S45C Equivalent	Black Oxide
	PSFRA	PSFRAS				Electroless Nickel Plating
	SSFRA	SSFRAS			SUS304	-

■Tolerance Table

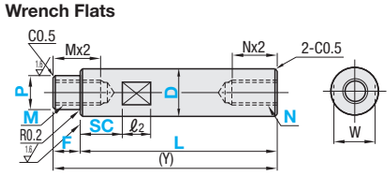
D, P	h9 (Cold-drawn)	h7 (Ground)	g6 (Ground)
3.1~6	0 / -0.030	0 / -0.012	-0.004 / -0.012
6.1~10	0 / -0.036	0 / -0.015	-0.005 / -0.014
10.1~18	0 / -0.043	0 / -0.018	-0.006 / -0.017
18.1~30	0 / -0.052	0 / -0.021	-0.007 / -0.020
30.1~50	0 / -0.062	0 / -0.025	-0.009 / -0.025

Surface roughness of Part D for h9 (Cold-drawn) is 6.3; Surface roughness for h7 (Ground) and g6 (Ground) is 1.6.

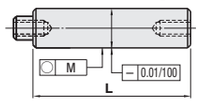
Standard



Wrench Flats



■Circularity and Straightness



Not applicable to h9 (Cold-drawn).

■Circularity of Part D

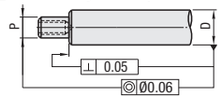
D over	D or Less	Circularity M
5	13	0.004
13	20	0.005
20	40	0.006
40	50	0.007

Not applicable to h9 (Cold-drawn).

■Tolerances of L, Y and Other Dimensions

Dimension over	Dimension or Less	Tolerance
2	6	±0.1
6	30	±0.2
30	120	±0.3
120	400	±0.5
400	1000	±0.8

■Concentricity and Perpendicularity



Not applicable to h9 (Cold-drawn).

(1) D Tolerance h9 (Cold-drawn) / P Tolerance h7 (2)D Tolerance h9 (Cold-drawn) / P Tolerance g6

Part Number Type Standard	Part Number Type Wrench Flats	D	0.1mm Increment L	0.1mm Increment F	1mm Increment P	M (Coarse) Selection	N (Coarse) Selection	1mm Increment SC (Wrench Flats Type only)	W	ℓ2	(Y) max.
(1)D Tol. h9 / P Tol. h7	(1)D Tol. h9 / P Tol. h7	6	15.0~398.0	2≤F≤Px5	5	2,6 3	2,6 3	SC+ℓ2≤L SC=0 or SC≥1 When SC ≤ M x 3 - F or L - SC ≤ N x 3, W - M (N) ≥ 2	5	8	400
SFRMHA	SFRMHAS	8	15.0~498.0			2,6 3 4 5	2,6 3 4 5 6		7		500
PSFRMHA	PSFRMHAS	10	15.0~598.0		For M3 ~ M8, M+2≤P<D	3 4 5 6	3 4 5 6		8		600
SSFRMHA	SSFRMHAS	12	15.0~698.0			4 5 6 8	4 5 6 8		10	10	700
(D6 is not available for SSFRMHA.)	(D6 is not available for SSFRMHAS.)	15	15.0~798.0		For M10 ~ 16, M+3≤P<D	4 5 6 8 10	4 5 6 8 10		13		800
(2)D Tol. h9 / P Tol. g6	(2)D Tol. h9 / P Tol. g6	20	30.0~998.0			4 5 6 8 10 12	4 5 6 8 10 12 16		17		1000
SFRMGA	SFRMGAS	25	50.0~998.0		For M20 or M24 M+4≤P<D	4 5 6 8 10 12 16	4 5 6 8 10 12 16		22		
PSFRMGA	PSFRMGAS	30	60.0~998.0			6 8 10 12 16 20	6 8 10 12 16 20		27	15	
SSFRMGA	SSFRMGAS	35	70.0~998.0			6 8 10 12 16 20 24	6 8 10 12 16 20 24		30		
(D6 is not available for SSFRMGA.)	(D6 is not available for SSFRMGAS.)										

(3)h7 (Ground)

Part Number Type Standard	Part Number Type Wrench Flats	D	0.1mm Increment L	0.1mm Increment F	1mm Increment P	M (Coarse) Selection	N (Coarse) Selection	W	ℓ2	(Y) max.
		6	15.0~398.0	2≤F≤Px5	5	2,6 3	2,6 3	5	8	400
		8	15.0~498.0			2,6 3 4 5	2,6 3 4 5 6	7		500
		10	15.0~598.0		For M3 ~ M8, M+2≤P<D	3 4 5 6	3 4 5 6	8		600
SFRHA	SFRHAS	12	15.0~698.0			4 5 6 8	4 5 6 8	10	10	700
		15	15.0~798.0		For M10 ~ 16, M+3≤P<D	4 5 6 8 10	4 5 6 8 10	13		800
PSFRHA	PSFRHAS	17	30.0~898.0			4 5 6 8 10 12	4 5 6 8 10 12	14		900
		20	30.0~998.0		For M20 or M24 M+4≤P<D	4 5 6 8 10 12	4 5 6 8 10 12 16	17		
SSFRHA	SSFRHAS	25	50.0~998.0			4 5 6 8 10 12 16	4 5 6 8 10 12 16	22		
		30	60.0~998.0			6 8 10 12 16 20	6 8 10 12 16 20	27	15	1000
		35	70.0~998.0		For M30 M+5≤P<D	6 8 10 12 16 20 24	6 8 10 12 16 20 24	30		
		40	80.0~998.0			10 12 16 20 24 30	10 12 16 20 24 30	36	20	
		50	100.0~998.0			12 16 20 24 30	12 16 20 24 30	41		

(4)g6 (Ground)

Part Number Type Standard	Part Number Type Wrench Flats	D	0.1mm Increment L	0.1mm Increment F	1mm Increment P	M (Coarse) Selection	N (Coarse) Selection	W	ℓ2	(Y) max.
		6	15.0~398.0	2≤F≤Px5	5	2,6 3	2,6 3	5	8	400
		8	15.0~498.0			2,6 3 4 5	2,6 3 4 5 6	7		500
		10	15.0~598.0			3 4 5 6	3 4 5 6	8		600
		12	15.0~698.0			4 5 6 8	4 5 6 8	10		700
SFRA	SFRAS	13	15.0~698.0		For M3 ~ M8, M+2≤P<D	4 5 6 8 10	4 5 6 8 10	11		
		15	15.0~798.0			4 5 6 8 10	4 5 6 8 10	13		800
PSFRA	PSFRAS	16	15.0~898.0		For M10 ~ 16, M+3≤P<D	4 5 6 8 10 12	4 5 6 8 10 12	14	10	900
		17	30.0~898.0			4 5 6 8 10 12	4 5 6 8 10 12			
SSFRA	SSFRAS	18	30.0~898.0		For M20 or M24 M+4≤P<D	4 5 6 8 10 12	4 5 6 8 10 12 16	15		
(D13, D16, D18 or D22 is not available for SSFRA.)	(D13, D16, D18 or D22 is not available for SSFRAS.)	20	30.0~998.0			4 5 6 8 10 12	4 5 6 8 10 12 16	17		
		22	50.0~998.0			4 5 6 8 10 12 16	4 5 6 8 10 12 16	19		
D13・16・18・22	D13・16・18・22	25	50.0~998.0		For M30 M+5≤P<D	4 5 6 8 10 12 16	4 5 6 8 10 12 16	22		
		30	60.0~998.0			6 8 10 12 16 20	6 8 10 12 16 20	27	15	1000
		35	70.0~998.0			6 8 10 12 16 20 24	6 8 10 12 16 20 24	30		
		40	80.0~998.0			10 12 16 20 24 30	10 12 16 20 24 30	36	20	
		50	100.0~998.0			12 16 20 24 30	12 16 20 24 30	41		

SC=0 or SC≥1: When SC ≤ M x 3 - F or when L - SC ≤ N x 3, W - M (N) ≥ 2

When D-P≤2, chamfer C at the step is 0.2 or less. Overall length requires Nx3≤L. Mx2+Nx2≤(Y) is required for (Y).

Ordering Example

	Part Number	L	F	P	M	N	SC
(1)D part h9 / P part h7	SFRMHA30	250	F30	P16	M10	N10	
(3)h7 (Ground) with Wrench Flat	SFRMHAS25	200	F40	P20	M10	N10	SC30

(4)g6 (Ground)

(1)D tolerance h9 (Cold-drawn) / P tolerance h7 (2)D tolerance h9 (Cold-drawn) / P tolerance g6

Type	SFRMHA, SFRMGA (S45C Equivalent, Black Oxide) SFRMHAS, SFRMGAS With wrench flats, add relevant surcharge to the prices shown below.									PSFRMHA, PSFRMGA (S45C Equivalent, Electroless Nickel Plating) PSFRMHAS, PSFRMGA With wrench flats, add relevant surcharge to the prices shown below.									SSFRMHA, SSFRMGA (SUS304) SSFRMHAS, SSFRMGAS With wrench flats, add relevant surcharge to the prices shown below.								
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 ~ 998.0	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 ~ 998.0	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 ~ 998.0
6							-	-	-							-	-	-	-	-	-	-	-	-	-	-	-
8								-	-								-	-								-	-
10								-	-								-	-								-	-
12									-									-									-
15									-									-									-
20																											
25																											
30	-									-									-								
35	-									-									-								

(3)h7 (Ground) (4)g6 (Ground)

Type	SFRHA, SFRA (S45C Equivalent, Black Oxide) SFRHAS, SFRAS With wrench flats, add relevant surcharge to the prices shown below.									PSFRHA, PSFRA (S45C Equivalent, Electroless Nickel Plating) PSFRHAS, PSFRAS With wrench flats, add relevant surcharge to the prices shown below.									SSFRHA, SSFRA (SUS304) SSFRHAS, SSFRAS With wrench flats, add relevant surcharge to the prices shown below.								
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 ~ 998.0	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 ~ 998.0	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 ~ 998.0
6							-	-	-							-	-	-							-	-	-
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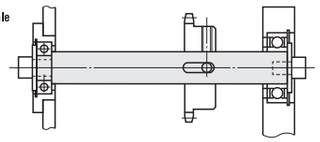
Example



Alterations

	Part Number	L	F	P	M	N	SC	
	SFRMHAS8	150	F20	P7	M5	N5	SC20	LKC (KC, WKC, FC---etc.)

Keyway

For details, see Alteration Overview P.843	1	2	1 (for 4th keyway)	Keyway on Step P (Position Zero from End Face)	Keyway on Step P (Position Specified)	Multiple Keyways on Step P
Alterations	KC A	WKC C E K	KZ Z (Applicable only when combined with both KC and WKC.)	PKC	PP PK	PV PW (Only when PP is specified, this Alteration is available.)
Code	KC	WKC	KZ	PKC	PP	PV
Dimension Increment	KC, A = 0.1mm Increment	WKC, C, E, K = 0.1mm Increment	KZ, Z = 0.1mm Increment	PKC = 0.1mm Increment	PP, PK = 0.1mm Increment	PV, PW = 0.1mm Increment
Ordering Example	KC50-A10	WKC5-C20-K5-E10	KC5-A10-WKC20-C10-K60-E10-KZ100-Z10	PKC10	PP5-PK10	PP5-PK10-PV5-PW10
Conditions	Key Length ≤ 100. *1, *2			Not applicable when P≤5. Key Length ≤ 70. *1, *2		

Set Screw Flat

For details, see Alteration Overview P.843	1	2	2 Set Screw Flats (Angle Specified)	Set Screw Flat on Step	F Dimension Part Set Screw Flats
Alterations	H FC G	H WFC J V W	H 0° AG SFC SG	PFC LC	WC
Code	FC	WFC	SFC	PFC	WC
Dimension Increment	FC, G = 1mm Increment	WFC, J, V, W = 1mm Increment	SFC, SG = 1mm Increment AG = 15° Increment	PFC, LC = 1mm Increment	WC=0.1mm
Ordering Example	FC10-G3	WFC10-J15-W10-V20	SFC10-SG3-AG120	PFC10-LC5	WC8
Conditions	For H dim., see P.843. G, J, V, SG, LC ≤ 70				

For details, see Alteration Overview P.843	Retaining Ring Groove D dim.	Retaining Ring Groove Step	Slit Cam Groove	L Dimension Tolerance	Concentricity	Tapped Depth
Alterations	TL TR m m	TF m For m dim., see P.844.	UC ℓ1 d For d, ℓ1 dim., see P.843.	LKC L<500CL ±0.05 L≥500CL ±0.1	Ø0.02 D L max 6~22 450 25~50 600	MD(Mx3) ND(Nx3)
Code	TL, TR	TF	UC	LKC	CKC	MD, ND (To specify any of these Alterations, replace M with MD or N with ND.)
Dimension Increment	TL, TR = 0.1mm Increment	TF = 0.1mm Increment	UC = 1mm Increment	-	-	-
Ordering Example	TL10	TF10	UC10	LKC	CKC	MD6
Conditions	2≤TR≤150/TL+F≤180	2≤TF≤150	Not applicable when D≥13.	Not applicable when L≥800.	Not applicable when D Tol. = h9.	M(N)2, M(N)2.6, M(N)24, M(N)30

For details about Alterations, see Alteration Overview (P.843). When combined with other alterations, ±2 degree phase difference may occur. Provide 2mm or more clearance between this alteration and others.
When multiple keyways or set screw flats are specified, they are added in the same plane. When the distance of the alterations are over 500mm, ±2 degree phase difference may occur.
*1. When multiple keyways are added with 2mm or less clearance between them, keyways will interfere. *2. When the keyway position is less than 1mm away from the end face, R is not applied. For details, see Alteration Details on P.843.