Shafts

Standard & Precision Type / One End Threaded & One End Tapped with Wrench Flats / One End Threaded & One End Tapped with Cross-Drilled Hole

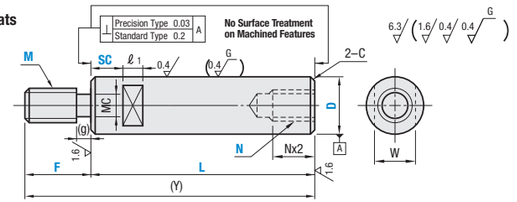
Shafts – Standard & Precision Type / One End Threaded & One End Tapped with Wrench Flats / One End Threaded & One End Tapped with Cross-Drilled Hole

RoHS10

Type							Material	Hardness	Surface Treatment
Precision Type	Standard			With Cross-Drilled Holes					
D Tol. g6	D Tol. g6	D Tol. h5	D Tol. f8	D Tol. g6	D Tol. f8				
VAFZ	SAFZ	SFBU	—	SAHD	—		52100 Bearing Steel Equivalent	Effective Hardened Depth of Induction Hardened **P.199** 52100 Bearing Steel Equivalent 58 HRC min. SUS440C (13Cr) Stainless Steel Equivalent 56 HRC min.	—
VSAFZ	SSAFZ	SSFBU	—	SSAHD	—		SUS440C (13Cr) Stainless Steel Equivalent		Hard Chrome Plating Plating Hardness: HV 750~ Plating Thickness 5 μ or More
VPAFZ	PSAFZ	PSFBU	—	PSAHD	—		52100 Bearing Steel Equivalent		
VPSAFZ	PSSAFZ	PSSFBU	—	PSSAHD	—		SUS440C (13Cr) Stainless Steel Equivalent		
VRFZ	RSAFZ	—	—	RSAHD	—		52100 Bearing Steel Equivalent		Low Temperature Black Chrome Plating
—	—	—	PSAGZ	—	PSHGD		1045 Carbon Steel Equivalent	—	Hard Chrome Plating Plating Hardness: HV 750~ Plating Thickness: 10 μ or More
—	—	—	PSSAGZ	—	—		304 Stainless Steel		

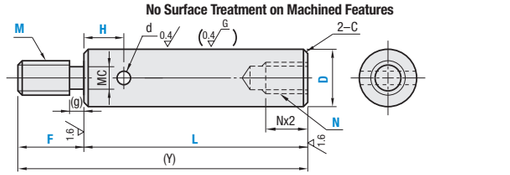
- Annealing caused by machining wrench flats and shaft end threading (effective thread length + approx. 10 mm) may lower hardness. **P.199**
- Cross-drilled hole areas may be out of O.D. tolerances due to annealing-induced deformation
- Circularity, Straightness, Perpendicularity Concentricity, Changes in Hardness **P.198**.
- Features of Low Temp. Black Chrome Plating **P.213**.
- For Shafts without wrench flats or cross-drilled holes, please see **P.242**.

With Wrench Flats



With Cross-Drilled Holes

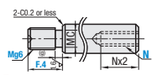
(D≤30, L≤500)



D	D Tolerance g6	h5	f8
8	-0.005 -0.014	0 -0.006	-0.013 -0.035
10			
12	-0.006 -0.017	0 -0.008	-0.016 -0.043
13			
15			
16			
18			
20	-0.007 -0.020	0 -0.009	-0.020 -0.053
25			
30			
35	-0.009 -0.025	0 -0.011	-0.025 -0.064
40			
50			

Features of Precision Shafts

Perpendicularity is ⊥ 0.03



- Precision shafts have centering holes on end faces.

Part Number Type	D	1 mm Increment L	F	M (Coarse Thread)	M (Coarse Thread)	Wrench Flats Dimensions SC	W	ℓ1	(Y) Max.	C
Precision Type Shafts with Wrench Flats Tolerance g6 VAFZ VSAFZ VPAFZ VPSAFZ VRFZ	8	25–295	5≤F≤Mx3 F-g≥Pitchx3	6	3 4 5	SC=1 mm Increment SC+ℓ1≤L SC≥0 Details of Wrench Flats **P.199**	7	8	300	0.5 or Less
	10	25–345		6 8	3 4 5 6		8		350	
	12	25–345		6 8 10	4 5 6 8		10		350	
	13	25–345		6 8 10	4 5 6 8		11		350	
	15	25–345		6 8 10 12	4 5 6 8 10		13		350	
	16	25–345		6 8 10 12	4 5 6 8 10		14	10	350	
	18	25–345		6 8 10 12 16	4 5 6 8 10 12		16		350	
	20	25–445		6 8 10 12 16	4 5 6 8 10 12		17		450	1.0 or Less
	25	25–445		8 10 12 16 20	4 5 6 8 10 12 16		22		450	
	30	25–445		8 10 12 16 20 24	4 5 6 8 10 12 16 20		27	15	450	

- Overall length L requires Nx3≤L.
- Shaft ends may have centering holes.

L	1 mm Increments Pitch	MC	MC
6	1.0	4.4 (4.2)	2
8	1.25	6.0	3
10	1.5	7.7	
12	1.75	9.4	4
16	2.0	13.0	
20	2.5	16.4	5
24	3.0	19.6	
30	3.5	25.0	

MC dimensions in ( ) are for Precision Type M6.

Part Number Type	D	1 mm Increment L	F	M (Coarse Thread)	M (Coarse Thread)	Wrench Flats Dimensions SC	W	ℓ1	Cross-Drilled Hole Dimensions H	d	(Y) Max.	C
Standard Type Shafts with Wrench Flats D Tolerance g6 SAFZ SSAFZ PSAFZ PSSAFZ RSAFZ D≤30, L≤500	8	25–1095	5≤F≤Mx3 F-g≥Pitchx3	(5) 6	3 4 5	SC=1 mm Increment SC+ℓ1≤L SC≥0 Details of Wrench Flats **P.199**	7	8	H=Specified in 1 mm increments L≥H+d/2+6+Nx2.5 H≥d/2+2	3	1100	0.5 or Less
Shafts with Wrench Flats D Tol. h5 SFBU SSFBU PSFBU PSSFBU	10	25–1195		(5) 6 8	3 4 5 6		8				1200	
Shafts with Cross-Drilled Holes D≤30, L≤500 D Tolerance g6 SAHD SSAHD PSAHD PSSAHD RSAHD	12	25–1395		(5) 6 8 10	(3) 4 5 6 8		10				1400	
	13	25–1395		(5) 6 8 1012	(3) 4 5 6 8		11			4	1400	
	15	25–1395		(5) 6 8 1012	(3) 4 5 6 8 10		13				1400	
	16	25–1395		(5) 6 8 1012	4 5 6 8 10		14	10			1400	
	18	25–1395		(5) 6 8 101216	4 5 6 8 1012		16			6	1400	
	20	25–1395		(5)(6) 8 101216	4 5 6 8 1012		17				1400	
D Tolerance f8 PSHGD	25	25–1395		(5)(6) 8 10121620 24	4 5 6 8 101216		22			7	1400	1.0 or Less
PSAGZ PSSAGZ	30	25–1493		(6) 8 10121620 24	6 8 10121620		27	15			1500	
	35	25–1492		10121620 2430	8 10121620 24		30			—	1500	
	40	25–1490		121620 2430	10121620 2430		36	20			1500	
	50	25–1490		161620 2430	121620 2430		41				1500	

- Cross-Drilled Holes types are available with D≤30 and L≤500.

- M( ) and N( ) dimensions are applicable only for D diameter tolerance with g6.
- Overall length L requires Nx2.5+4≤L.

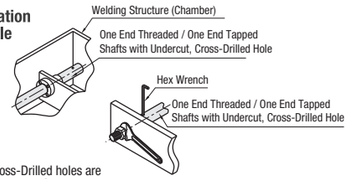
Shafts

Standard & Precision Type / One End Threaded & One End Tapped with Wrench Flats / One End Threaded & One End Tapped with Cross-Drilled Hole, *continued*

Part Number Example

Part Number	-	L	-	F	-	M	-	N	-	SC	-	H
SAFZ20	-	277	-	F25	-	M12	-	N12	-	SC10		
SSAHD20	-	277	-	F25	-	M12	-	N12			-	H10

Application Example

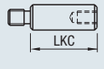
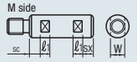
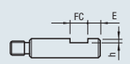
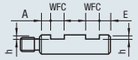


Shafts with Cross-Drilled holes are suitable for narrow work space.

Part Number Alterations

Part Number	-	L	-	F	-	M (MMC / MMS)	-	N (NSC)	-	SC	-	H	-	(LKC...etc.)
SAFZ30	-	250	-	F40	-	M20	-	N20	-	SC10	-	LKC		

Alteration Details **P.200**

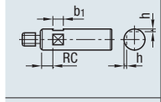
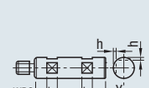
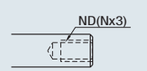
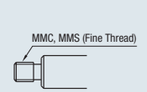
Alterations	Code	Spec.
	LKC	Alteration to L Dimension Tolerance **Ordering Code:** LKC **Application Notes:** Applicable when L=200 or less for precision type ⊗ Not applicable when D-P≤2 L dimensions can be specified in 0.1 increment for LKC. ! L<200 →L±0.03 200≤L<500 →L±0.05 L≥500 →L±0.1
	SX	Second Set of Wrench Flats **Ordering Code:** SX15 **Application Notes:** Applicable to Shafts with Wrench Flats only. SX = 1 mm increment ! SC+SX+ℓ1x2<L ! SX≥0 ⊗ Orientation between wrench flat features is random.
	FC	Set Screw Flat at One Location **Ordering Code:** FC10-E8 **Application Notes:** ⊗ Not applicable to precision type FC, E = 1 mm increments ! FC≤3xD ! When 1.5xD<FC, FC≤L/2 ! E=0 or E≥2 ⊗ Not available in combination with WFC
	WFC	Set Screw Flats at Two Locations **Ordering Code:** WFC8-A8-E4 **Application Notes:** ⊗ Not applicable to precision type WFC, A, E = 1 mm increment ! WFC≤3xD ! When 1.5xD<FC, 2WFC≤L/2 ! A (E)=0 or A (E)≥2 ⊗ Orientation between set screw flats is random. Not available in combination with FC.

D	W	ℓ1	D	d	ℓ1
8	7	8	20	17	10
10	8		25	22	
12	10		30	27	15
13	11		35	30	
15	13	10	40	36	20
16	14		50	41	
18	16				

D	h
8–18	1
20–40	2
50	3

D	h
8–18	1
20–40	2
50	3

- Please see Shaft Alteration Overview for details if provided. **P.200**
- When selecting multiple alteration additions, the distance between machined areas should be greater than 2 mm. **P.201**
- Alterations may lower hardness. **P.199**

Alterations	Code	Spec.
	RC	90° Set Screw Flat at One Location **Ordering Code:** RC10 **Application Notes:** Only applicable for D=10–30 ⊗ Not applicable to precision type ⊗ Not available in combination with WRC. ! For details, see Shaft Alteration Overview **P.200**.
	WRC	90° Set Screw Flats at Two Locations **Ordering Code:** WRC10-Y10 **Application Notes:** Only applicable to D=10–30 ⊗ Not applicable to precision type ⊗ Not available in combination with RC. ⊗ Orientation between set screw features is random. ! For details, see Shaft Alteration Overview **P.200**.
	NSC	Change to Fine Tapped Thread **Ordering Code:** NSC14 (N is changed to NSC) **Application Notes:** Applicable for D=12 or more ! For details, see Shaft Alteration Overview **P.200**.
	ND	Change the effective length of tapped part to Nx3. **Ordering Code:** ND6 (N is changed to ND) **Application Notes:** Only applicable to D=10–30 and N=6~20 ! One End Tapped: NDx3.5+7≤L ! Cannot combine with NSC.
	MMC MMS	Change to fine threads. **Ordering Code:** MMC14 (M is changed to MMC) MMS14 (M is changed to MMS) ! For details, see Shaft Alteration Overview **P.200**.

Undercut Dimensions for Fine Threads (1) MMC	Pitch	MC	(g)
6	0.75	4.8	2.0
8	1.0	6.4	
10		8.4	
12		10.4	
15		13.4	
17		15.4	
20		18.4	
25	1.5	22.7	3.0
30		27.7	

Undercut Dimensions for Fine Threads (2) MMS	Pitch	MC	(g)
10	1.25	8	3
12	1.5	9.7	
14		11.7	
18		15.7	