Shaft Alterations - Overview

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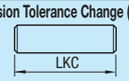
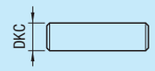
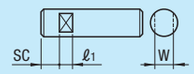
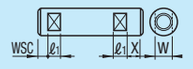
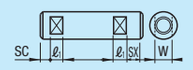
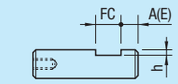
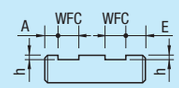
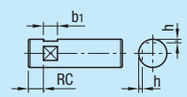
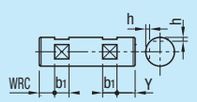
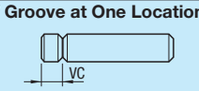
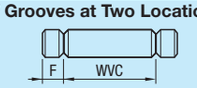
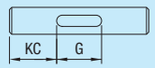
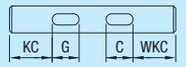
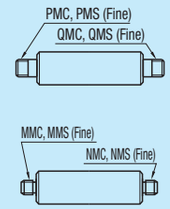
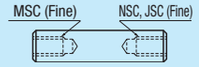
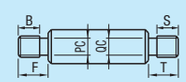
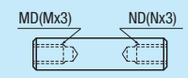
Alteration Type	Alterations	Code	Spec.
Tolerance Change	**L Dimension Tolerance Change (Precision)** 	LKC	Changes "L Tolerance" to a higher precision level. Ordering Code LKC L dimensions can be specified in 0.1mm increments for LKC. Application Notes See each product page for details. (P) L<200 ···▸L±0.03 200≤L<500 ···▸L±0.05 L≥500 ···▸L±0.1
	Revise O.D. Tolerance to h5 	DKC	O.D. tolerance is altered to h5. Ordering Code DKC Application Notes Available only for Hollow Shafts D: 6 → h5 Tolerance: 0 -0.005; 8,10 → 0 -0.006; 12~16 → 0 -0.008; 20~30 → 0 -0.009; 35~50 → 0 -0.011
Wrench Flats	**Wrench Flats at One Location** 	SC	Adds Wrench Flats at one location. Ordering Code SC5 (P) SC=1mm Increment (P) SC+ℓ1≤L (P) SC≥0 Application Notes Applicable to D=6 or more ⊗Not available in combination with WSC. (P) D dimensions in ( ) are only applied to Shaft End Configurable Type on **P.225**.
	Wrench Flats at Two Locations 	WSC	Adds Wrench Flats at two locations. Ordering Code WSC12-X8 (P) WSC, X=1mm Increment (P) WSC+X+ℓ1x2<L (P) WSC(X)≥0 Application Notes Applicable to D=6 or more ⊗Orientation between wrench flats is not coplanar. Not available in combination with SC or SX. (P) D dimensions in ( ) are only applied to Shaft End Configurable Type on **P.225**.
	Second Set of Wrench Flats 	SX	Adds a second set of Wrench Flats. Ordering Code SX15 (P) SX=1mm Increment (P) SC+SX+ℓ1x2<L (P) SX≥0 Application Notes Applicable to D=6 or more, only to With Wrench Flats Type. ⊗Orientation between wrench flats is not coplanar. Not available in combination with WSC.
Set Screw Flat	**Set Screw Flat at One Location**  (P) Specifying FC starting datum points vary depending on products. See each product page for details.	FC	Adds Set Screw Flat at one location. Ordering Code FC10-A8,FC10-E8 (P) FC, A(E) =1mm Increment (P) FC≤3xD (P) When 1.5xD<FC, FC≤L/2 (P) A(E)=0 or A(E)≥2 ⊗Not available in combination with WFC. D: 3~5 → h 0.5; 6~18 → 1; 20~40 → 2; 50 → 3
	Set Screw Flats at Two Locations 	WFC	Adds Set Screw Flats at two locations. Ordering Code WFC10-A8-E20 (P) WFC, A, E=1mm Increment (P) WFC≤3xD (P) When 1.5xD<WFC, 2WFC≤L/2 (P) A(E)=0 or A(E)≥2 ⊗Orientation between set screw flats is not coplanar. Not available in combination with FC. D: 3~5 → h 0.5; 6~18 → 1; 20~40 → 2; 50 → 3
	90-deg. Set Screw Flat at One Location 	RC	Adds 90-deg. Set Screw Flat at one location. Ordering Code RC10 (P) RC=1mm Increment (P) RC+b1≤L (P) RC≥2 Application Notes Only applicable to D=10 ~ 30. ⊗Not available in combination with WRC; not applicable to Precision Type. D: 10 → b1 6, h 0.5; 12~20 → 6, 1.0; 25 → 10, 1.0; 30 → 12, 1.0
	90-deg. Set Screw Flats at Two Locations 	WRC	Adds 90-deg. Set Screw Flats at two locations. Ordering Code WRC10-Y10 (P) WRC=1mm Increment (P) WRC+b1≤L (P) WRC(Y)≥2 Application Notes Only applicable to D=10 ~ 30. ⊗Orientation between set screw flats is not coplanar. Not available in combination with RC. Not applicable to Precision Type. D: 10 → b1 6, h 0.5; 12~20 → 6, 1.0; 25 → 10, 1.0; 30 → 12, 1.0
V Groove	**V Groove at One Location** 	VC	Adds V Groove at one location. (P) VC=1mm Increment (P) VC>W Application Notes Applicable to D=6 or more ⊗Different from VC Hollow Shafts. D: 6,8 → W 2; 10~18 → 4; 20~25 → 6; 30~35 → 8; 40~50 → 12
	V Grooves at Two Locations 	WVC	V Grooves at Two Locations Ordering Code WVC180-F8 (P) WVC, F=1mm Increment (P) F>W Application Notes Applicable to D=6 or more ⊗Different from WVC Hollow Shafts. D: 6,8 → W 2; 10~18 → 4; 20~25 → 6; 30~35 → 8; 40~50 → 12

■Shaft Alterations - Overview

Alteration Type	Alterations	Code	Spec.
Keyway	**Keyway** (P) A wide variety of Shafts with keyway alterations are available on the Rotary Shaft pages. **P.819~880** **Keyway at One Location: KC**  **Keyways at Two Locations: WKC**  (P) For specifying KC locations, starting datum points vary depending on products. See details on related pages.	KC WKC	KC: Adds Keyway at one location. Ordering Code KC10-G10 WKC: Adds Keyways at two locations. Ordering Code WKC10-C8-KC10-G10 (P) KC, WKC, G, C=1mm Increment (P) 4≤G(C)≤30 (P) G(C)≤L/3 (P) 2≤KC(WKC)≤L/3,KC(WKC)=0 (P) G+C≤L/3 (P) Mx2<KC+F (P) For One End / Both Ends Stepped and Tapped Type, Mx2<KC+F. Application Notes Only applicable to D=12, 16, 20, 25 and 30. ⊗For WKC, keyways cannot be machined coplanar. Not applicable to precision shafts. (P) When KC and WKC=0, keyway is configured as the drawing on right. Ex.) (P) When KC+G≥L, keyway is configured as the drawing on right. Ex.) Shaft Dia.: 12, 16, 20, 25, 30 → b 4, 5, 6, 8 (Standard Dimension; Tolerance (N9): 0 -0.03 / 0 -0.036) → t 2.5, 3.0, 3.5, 4.0 (Tolerance: +0.1 0 / +0.2 0) → r 0.08~0.16 / 0.16~0.25
Thread Alterations	**Change to Fine Thread** 	PMC PMS QMC QMS MMC MMS NMC NMS	Changes the threads to fine threads shown in the table below. (PMC, QMC, MMC, NMC→Applicable to bearing nut fine thread pitches.) (PMS, QMS, MMS, NMS→Applicable to cylinder fine thread pitches.) Ordering Code PMC15 (P) Ex.) When requesting M15 with D20 and 1.0 bearing nut fine thread pitch (P) D dimensions in ( ) are only applied to Shaft Ends Configurable Type on **P.225**. * marked sizes are not applicable to Precision Type.
	Change to Fine Tapped Thread 	MSC NSC JSC	Changes tapped threads to fine tapped threads shown in the table below. Ordering Code MSC14 (P) Ex.) When requesting M14 with D20 and 1.5 fine thread pitch Application Notes Applicable to D=12 or more ⊗Not applicable to D=35 and more for precision shafts.
	Undercut 	PC QC	PC: Adds undercut(s) on P dimension area. QC: Adds undercut(s) on Q dimension area. Ordering Code PC (P) For detailed undercut dimensions, see **P.111**. Application Notes Applicable to M=6 or more. ⊗Not applicable to D=Q and D=P.
	Change the effective tap depth to x3 	MD ND	Change the effective tap depth to M(N)x3. Ordering Code MD6/ND6 (M is changed to MD, N is changed to ND) Application Notes Only applicable to D=6~30, M(N)=6~20 (P) One End Tapped: MDx2.5+4≥L (P) Both Ends Tapped: MDx2.5+4+NDx2.5+4≥L

■Cautions for Alteration Selections

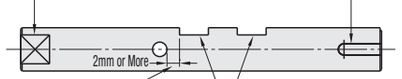
(P) Alterations may lower hardness. See **P.112**

(P) When selecting multiple alteration additions, the distance between machined areas should be greater than 2mm. (See below)

Ex. 1

Wrench Flats (SC)
(P) When the flats are to start from the ends, specify as "SC0".

Keyway (KC)
(P) See Rotary Shaft pages for more variations. **P.819 ~ P.880** (Rotary Shaft Index)



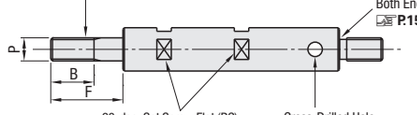
When Selecting Multiple Alterations
(P) The distance between machined areas should be greater than 2mm.

Set Screw Flat
(P) Orientation between two set screw flats is not coplanar.
- WFC (Set Screw Flats at Two Locations)
- WSC (Wrench Flats at Two Locations)
- WRC (90-deg. Set Screw Flats at Two Locations)
- WKC (Keyways at Two Locations)

Ex. 2

Threads
(P) Correlation between F and B:
When P≤6, B≤F-2;
when P=8 or 10, B≤F-3;
when P≤6, B≤F-5

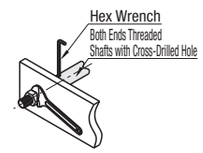
(P) F Length: 5≤F≤Px5
(P) B Length: B≥Pitchx3



90-deg. Set Screw Flat (RC)
(P) Orientation between two set screw flats is not coplanar.
(P) Recommended to be used with Shaft Collar **P.267**.

Cross-Drilled Hole

Undercut (PC, QC)
(P) For the following types, PC and QC alterations are no longer available. Please see pages below.
One End Threaded with Undercut **P.145, 147, 167, 169**
Both Ends Threaded with Undercuts **P.157, 159**



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