

Rotary Shaft Alteration Guide

Rotary Shaft Alteration Guide continued

Alterations		code	Increment	Alteration Example	Spec.																							
KEYWAY	One Keyway	KC	KC, A = 0.1mm Inc.	KC50-A10	<ul style="list-style-type: none"> b = A, E, C ≤ 100 KC and WKC combination is if need 3 Keyways Combination with KZ is if need 4 Keyways Not applicable for D = 2 - 5 																							
	Two Keyways	WKC	WKC, C, K, E = 0.1mm Inc.	WKC50-C8-K40-E10																								
	4th Keyway (at 1 pls)	KZ	KZ, Z = 0.1mm Inc.	KC5-A10-WKC20-C10-K60-E10-KZ100-Z10																								
	Keyway on Step P (at the end)	PKC, QKC	PKC, QKC = 0.1mm Inc.	PKC10, QKC15	<ul style="list-style-type: none"> Not applicable when D. of steps are 02 - 5. PKC, QKC ≤ 70, PKC (QKC) ≤ F (T) Please see Table 1 of Keyway KC size Not Applicable when P, Q < 5. Keyways applied in the same line, but can not added in the same plane. 																							
	Keyway on Step (dim. specified)	PP, QP, QQ, QK	PP, PK = 0.1mm Inc. QQ, QK = 0.1mm Inc.	PP5-PK10	<ul style="list-style-type: none"> Add Keyway at one location Please see Table 1 of Keyway KC size Not applicable when D. of steps are 02 - 5. PK, QK ≤ 70, PP + PK ≤ F, QQ + QK ≤ T Not Applicable when P, Q < 5. Keyways applied in the same line, but can not added in the same plane. 																							
	Keyway on Step (add more)	PV, QV	PV, PW = 0.1mm Inc. QV, QW = 0.1mm Inc.	PP5-PK10-PV30-PW10	<ul style="list-style-type: none"> Add Keyways at two locations Please see Table 1 of Keyway KC size Not applicable when D. of steps are 02 - 5. Add PV, QV when PP and QQ combination is applied. PW, QW ≤ 70, PV + PW ≤ F, QV + QW ≤ T 																							
SET SCREW FLAT	One Set Screw Flat	FC	FC, G = 1mm Inc.	FC10-G3	<ul style="list-style-type: none"> Add Set Screw Flat G, J, V ≤ 70 Added in the same line, but can not added in the same plane. Not applicable at D2, D2.5 <table border="1"> <tr><th>D, P, Q</th><th>H</th></tr> <tr><td>3 - 5</td><td>0.5</td></tr> <tr><td>6 - 17</td><td>1</td></tr> <tr><td>18 - 40</td><td>2</td></tr> <tr><td>50</td><td>3</td></tr> </table>	D, P, Q	H	3 - 5	0.5	6 - 17	1	18 - 40	2	50	3													
	D, P, Q	H																										
	3 - 5	0.5																										
	6 - 17	1																										
18 - 40	2																											
50	3																											
Two Set Screw Flats	WFC	WFC, J, W, V = 1mm Inc.	WFC10-J3-W10-V3	<table border="1"> <tr><th>D, P, Q</th><th>H</th></tr> <tr><td>3 - 5</td><td>0.5</td></tr> <tr><td>6 - 17</td><td>1</td></tr> <tr><td>18 - 40</td><td>2</td></tr> <tr><td>50</td><td>3</td></tr> </table>	D, P, Q	H	3 - 5	0.5	6 - 17	1	18 - 40	2	50	3														
D, P, Q	H																											
3 - 5	0.5																											
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Three Set Screw Flats	FC with WFC		FC10-G3-WFC20-J5-W10-V3																									
Set Screw Flat on Step	PFC, QFC	PFC, LC = 1mm Inc. QFC, RC = 1mm Inc.	PFC10-LC5																									
2 SET SCREW FLATS	Angle specified	SFC	SFC, SG = 1mm Inc. AG = 15 Deg. Inc.	SFC10-SG3-AG90	<ul style="list-style-type: none"> Adds a set screw flat at any angle besides the datum plane (0°) SG ≤ 50 Not applicable at D2, D2.5 When combined with other alterations, ±2° phase differential may occur. <table border="1"> <tr><th>D</th><th>H</th></tr> <tr><td>3 - 5</td><td>0.5</td></tr> <tr><td>6 - 17</td><td>1</td></tr> <tr><td>18 - 40</td><td>2</td></tr> <tr><td>50</td><td>3</td></tr> </table>	D	H	3 - 5	0.5	6 - 17	1	18 - 40	2	50	3													
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	3 - 5	0.5																										
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18 - 40	2																											
50	3																											
At Both Ends (Not Both Ends Stepped type)	KWC	KWC = 1mm Inc.	KWC20	<ul style="list-style-type: none"> Adds two set screw flats at both ends KWC ≤ B-m, S-m Applicable when L ≤ 680 Not applicable for D other than indicated right Table. <table border="1"> <tr><th>D</th><th>W</th><th>D</th><th>W</th></tr> <tr><td>8</td><td>4.0</td><td>6.9</td><td>25</td></tr> <tr><td>10</td><td>5.0</td><td>7.9</td><td>30</td></tr> <tr><td>12</td><td>6.0</td><td>8.9</td><td>35</td></tr> <tr><td>15</td><td>9.0</td><td>11.9</td><td>40</td></tr> <tr><td>20</td><td>13.0</td><td>15.9</td><td>50</td></tr> </table>	D	W	D	W	8	4.0	6.9	25	10	5.0	7.9	30	12	6.0	8.9	35	15	9.0	11.9	40	20	13.0	15.9	50
D	W	D	W																									
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20	13.0	15.9	50																									
At Both Ends (Both Stepped type)	KWC	KWC = 1mm Inc.	KWC20	<ul style="list-style-type: none"> Adds two set screw flats at both ends KWC ≤ F, T Applicable when Y ≤ 680 Not applicable when P (Q) < 4 <table border="1"> <tr><th>P, Q</th><th>(H)</th><th>W</th></tr> <tr><td>5</td><td>0.5</td><td></td></tr> <tr><td>6 - 17</td><td>1</td><td></td></tr> <tr><td>18 - 40</td><td>2</td><td>P (Q) - (2×H)</td></tr> <tr><td>41 - 50</td><td>3</td><td></td></tr> </table>	P, Q	(H)	W	5	0.5		6 - 17	1		18 - 40	2	P (Q) - (2×H)	41 - 50	3										
P, Q	(H)	W																										
5	0.5																											
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18 - 40	2	P (Q) - (2×H)																										
41 - 50	3																											
Dimension	WC	WC = 0.1mm Inc.	WC6.8	<ul style="list-style-type: none"> Can specify of W dimension in 0.1mm inc. Applicable at only KWC is applied Not applicable for D other than indicated right Table. <table border="1"> <tr><th>D</th><th>WC</th><th>D</th><th>WC</th></tr> <tr><td>8</td><td>4.0</td><td>6.9</td><td>25</td></tr> <tr><td>10</td><td>5.0</td><td>7.9</td><td>30</td></tr> <tr><td>12</td><td>6.0</td><td>8.9</td><td>35</td></tr> <tr><td>15</td><td>9.0</td><td>11.9</td><td>40</td></tr> <tr><td>20</td><td>13.0</td><td>15.9</td><td>50</td></tr> </table>	D	WC	D	WC	8	4.0	6.9	25	10	5.0	7.9	30	12	6.0	8.9	35	15	9.0	11.9	40	20	13.0	15.9	50
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20	13.0	15.9	50																									
RETAINING RING GROOVE	Straight Type	TA, TB	TA, TB = 0.1mm Inc.	TA10-TB10	<ul style="list-style-type: none"> Adds a retaining ring groove (Applicable retaining rings are included) 2 ≤ TA, TB, TL, TR, TF, TT ≤ 150 For dimensions of the retaining ring groove, P850 																							
	Stepped type	On the Body	TL, TR	TL, TR = 0.1mm Inc.	TL10-TR10																							
		On the Step	TF, TT	TF, TT = 0.1mm Inc.	TF10-TT10																							

Alterations		code	Increment	Alteration Example	Spec.																																																								
French Flat		SC	SC = 1mm Inc.	SC10	<ul style="list-style-type: none"> Adds a French Flat SC + E2 ≤ LSC = 0 and SCs=1 Not applicable when D2 - 5 Alterations are added in the same line when a distance of the alterations are over 500mm, ±2° phase differential may occur. For dimensions of the shafts with different end types, please refer to P893. <table border="1"> <tr><th>D</th><th>W</th><th>E2</th><th>D</th><th>W</th><th>E2</th></tr> <tr><td>6</td><td>5</td><td>17</td><td>18</td><td>14</td><td></td></tr> <tr><td>8</td><td>7</td><td>8</td><td>20</td><td>17</td><td>10</td></tr> <tr><td></td><td></td><td>10</td><td>8</td><td>25</td><td>22</td></tr> <tr><td></td><td></td><td>12</td><td>13</td><td>10</td><td>30</td></tr> <tr><td></td><td></td><td>15</td><td>16</td><td>13</td><td>35</td></tr> <tr><td></td><td></td><td></td><td></td><td>40</td><td>38</td></tr> <tr><td></td><td></td><td></td><td></td><td>50</td><td>41</td></tr> <tr><td></td><td></td><td></td><td></td><td>20</td><td></td></tr> </table>	D	W	E2	D	W	E2	6	5	17	18	14		8	7	8	20	17	10			10	8	25	22			12	13	10	30			15	16	13	35					40	38					50	41					20			
D	W	E2	D	W	E2																																																								
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				20																																																									
Clit Cam Groove		UC	UC = 1mm Inc.	UC10	<ul style="list-style-type: none"> Adds a Clit Cam Groove UC + E1 ≤ L UC ≥ 1 Not applicable when D2, 2.5 Not applicable when D > 13 <table border="1"> <tr><th>D</th><th>d</th><th>E1</th><th>D</th><th>d</th><th>E1</th></tr> <tr><td>3</td><td>2</td><td>8</td><td>7</td><td>4</td><td></td></tr> <tr><td>4</td><td>3</td><td>4</td><td>10</td><td>8</td><td>5</td></tr> <tr><td>5</td><td>4</td><td></td><td>12</td><td>10</td><td></td></tr> <tr><td>6</td><td>5</td><td></td><td></td><td></td><td></td></tr> </table>	D	d	E1	D	d	E1	3	2	8	7	4		4	3	4	10	8	5	5	4		12	10		6	5																														
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3	2	8	7	4																																																									
4	3	4	10	8	5																																																								
5	4		12	10																																																									
6	5																																																												
L Dimension Tolerance		LKC	-	LKC	<ul style="list-style-type: none"> L Dimension Tolerance L < 500 → L±0.05 L ≥ 500 → L±0.1 Not applicable when L ≥ 800 																																																								
Concentricity		CKC	-	CKC	<ul style="list-style-type: none"> Concentricity of shafts 00.02 Applicable for within dimension L range in the right table. Not applicable for D part of H9 (Cold Drawn) Not applicable combination with PC, QC <table border="1"> <tr><th>D</th><th>Lmax</th></tr> <tr><td>6 - 22</td><td>450</td></tr> <tr><td>25 - 50</td><td>600</td></tr> </table>	D	Lmax	6 - 22	450	25 - 50	600																																																		
D	Lmax																																																												
6 - 22	450																																																												
25 - 50	600																																																												
Left Hand Thread		PLM, QLM	-	PLM (QLM)	<ul style="list-style-type: none"> Changes threads at P (Q) ends to Left hand thread Not applicable combination with PMC, QMC 																																																								
Fine Thread		PMC, QMC	-	PMC20 (QMC20)	<ul style="list-style-type: none"> Changes thread to Fine thread as right table Dimensions P (Q) and PMC (QMC) are the same. Phase change dimension P (Q) to PMC (QMC). <table border="1"> <tr><th>D</th><th>PMC, QMC</th><th>D</th><th>PMC, QMC</th></tr> <tr><td>6</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>8</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>10</td><td>4</td><td>5</td><td>6</td></tr> <tr><td>12</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>15</td><td>5</td><td>6</td><td>8</td></tr> <tr><td>17</td><td>5</td><td>6</td><td>8</td></tr> <tr><td>20</td><td>6</td><td>8</td><td>10</td></tr> <tr><td>25</td><td>8</td><td>10</td><td>12</td></tr> <tr><td>30</td><td>10</td><td>12</td><td>15</td></tr> <tr><td>35</td><td>12</td><td>15</td><td>17</td></tr> <tr><td>40</td><td>15</td><td>17</td><td>20</td></tr> <tr><td>45</td><td>17</td><td>20</td><td>25</td></tr> <tr><td>50</td><td>20</td><td>25</td><td>30</td></tr> </table>	D	PMC, QMC	D	PMC, QMC	6	3	4	5	8	3	4	5	10	4	5	6	12	3	4	5	15	5	6	8	17	5	6	8	20	6	8	10	25	8	10	12	30	10	12	15	35	12	15	17	40	15	17	20	45	17	20	25	50	20	25	30
D	PMC, QMC	D	PMC, QMC																																																										
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40	15	17	20																																																										
45	17	20	25																																																										
50	20	25	30																																																										
Tapped		PM, QM	PM, QM = selectable	PM4	<ul style="list-style-type: none"> Add Taps Not applicable other than P dimensions in the right table. When wall thickness of tapped ends are more than 0.5mm (P-PM) 2 ≥ 0.5 and (Q-QM) 2 ≥ 0.5 <table border="1"> <tr><th>M/Sa</th><th>PM (M)</th><th>App. Dia. (P)</th><th>M/Sa</th><th>QM (M)</th><th>App. Dia. (Q)</th></tr> <tr><td>M2</td><td>03 - 049</td><td>M8</td><td>09 - 049</td><td></td><td></td></tr> <tr><td>M2.5</td><td>04 - 049</td><td>M10</td><td>011 - 049</td><td></td><td></td></tr> <tr><td>M3</td><td>04 - 049</td><td>M12</td><td>013 - 049</td><td></td><td></td></tr> <tr><td>M4</td><td>05 - 049</td><td>M16</td><td>015 - 049</td><td></td><td></td></tr> <tr><td>M5</td><td>06 - 049</td><td>M20</td><td>017 - 049</td><td></td><td></td></tr> <tr><td>M6</td><td>08 - 049</td><td>M25</td><td>021 - 049</td><td></td><td></td></tr> </table>	M/Sa	PM (M)	App. Dia. (P)	M/Sa	QM (M)	App. Dia. (Q)	M2	03 - 049	M8	09 - 049			M2.5	04 - 049	M10	011 - 049			M3	04 - 049	M12	013 - 049			M4	05 - 049	M16	015 - 049			M5	06 - 049	M20	017 - 049			M6	08 - 049	M25	021 - 049																
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Tapped Depth		MD, ND	-	MD6	<ul style="list-style-type: none"> Change Tap length to M (N) × 3. Taps at both ends: MD × 3.5 + 4 + ND × 3.5 ≤ L Tap at one side end: MD × 3.5 + 4 ≤ L Please change M to MD and N to ND when specify dimensions. Not applicable when M(N)2, M(N)2.6, M(N)24, M(N)30 																																																								
Slit		MM	-	MM	<ul style="list-style-type: none"> Adds a Slit at D dimension face When specified with WC, slit plane is not the same. Not applicable when D is more than 35. <table border="1"> <tr><th>D</th><th>N</th><th>V</th></tr> <tr><td>6 - 13</td><td>1.2</td><td>1.5</td></tr> <tr><td>15 - 20</td><td>2.0</td><td>2.5</td></tr> <tr><td>22 - 30</td><td>3.0</td><td>3.8</td></tr> </table>	D	N	V	6 - 13	1.2	1.5	15 - 20	2.0	2.5	22 - 30	3.0	3.8																																												
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Undercut		PC, QC	-	PC (QC)	<ul style="list-style-type: none"> PC, QC: Adds an Undercut on P, Q For undercut dimension and details, please refer to P850 F-8 ≤ M × 2 Not applicable when D = P, D = Q 																																																								
C Chamfering Width	On the D (Body)	CD	CD = selectable	CD3	<ul style="list-style-type: none"> Changes a Chamfer on D part Not applicable other than D dimensions on the right table <table border="1"> <tr><th>Chamfer (CD)</th><th>Appl. (D dim.)</th></tr> <tr><td>C2</td><td>06 - 050</td></tr> <tr><td>C3</td><td>08 - 050</td></tr> <tr><td>C4</td><td>10 - 050</td></tr> <tr><td>C5</td><td>12 - 050</td></tr> </table>	Chamfer (CD)	Appl. (D dim.)	C2	06 - 050	C3	08 - 050	C4	10 - 050	C5	12 - 050																																														
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On the P (Steps)	CP, CQ	CP, CQ = selectable	CP3	<ul style="list-style-type: none"> Not applicable when 03 - 05 Change C chamfer on P and Q Not applicable other than P and Q dimensions on the right table <table border="1"> <tr><th>Chamfer (CP, CQ)</th><th>Appl. (P & Q dim.)</th></tr> <tr><td>C2</td><td>06 - 049</td></tr> <tr><td>C3</td><td>08 - 049</td></tr> <tr><td>C4</td><td>10 - 049</td></tr> <tr><td>C5</td><td>12 - 049</td></tr> </table>	Chamfer (CP, CQ)	Appl. (P & Q dim.)	C2	06 - 049	C3	08 - 049	C4	10 - 049	C5	12 - 049																																															
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ROTARY SHAFT Dimensions of Thread and Undercut (PC, QC) (ref.)

P (= M) Q (= N)	PC QC	Combined with Fine thread	
		PMC QMC	PC QC
3	2.4	3	2.4
4	3.2	4	3.2
5	4.1	5	4.1
6	4.4	6	4.8
8	6.0	8	6.4
10	7.7	10	8.4
12	9.4	12	10.4
16	13.0	15	13.4
20	16.4	17	15.4
24	19.6	20	18.4
30	25.0	25	22.7
		30	27.7

ROTARY SHAFT Dimensions of Retaining Ring Groove

Diameter	d Tol.	W(m) Tol.	Applicable Ring	Diameter	d Tol.	W(m) Tol.	Applicable Ring
2	1.2	0.4	JIS E type 1.2	20	19	1.35	JIS C type 20
2.5	1.5	+0.06	JIS E type 1.5	21	20		JIS C type 21
3	2	0	JIS E type 2	22	21		JIS C type 22
4	3		JIS E type 3	23	22		JIS C type 23
5	4		JIS E type 4	24	22.9		JIS C type 24
6	5	+0.075	JIS E type 5	25	23.9		JIS C type 25
7	6	0	JIS E type 6	26	24.9		JIS C type 26
8	7	+0.09	JIS E type 7	28	26.6		JIS C type 28
9	8	0	JIS E type 8	29	27.6		JIS C type 29
10	9.6	0/-0.09	JIS C type 10	30	28.6		JIS C type 30
11	10.5		JIS C type 11	32	30.3		JIS C type 32
12	11.5		JIS C type 12	35	33		JIS C type 35
13	12.4		JIS C type 13	40	38		JIS C type 40
14	13.4		JIS C type 14	45	42.5		JIS C type 45
15	14.3	0	JIS C type 15	50	47	2.2	JIS C type 50
16	15.2	-0.11	JIS C type 16				
17	16.2		JIS C type 17				
18	17		JIS C type 18				
19	18	1.35	JIS C type 19				

ROTARY SHAFT Dimensions of Hex Socket on the D diameter

Diameter	b	h
6	7	2.5
8	9	3
10	11	4
12	15	5
16	19	6
20	24	8
25	30	10