

Driving Shafts

Straight

■ **Features:** Rotary Shafts suitable for driving motion. Accuracies and shapes needed for rotary driving applications are selectable.

Type	D Tolerance	Material	Hardness	Surface Treatment
KZAN	h7	S45C	-	-
KZAC				Black Oxide
KZAP				Electroless Nickel Plating
KZAF	h6	S45C	Induction Hardened Surface Hardness 50HRC-	-

D	Tolerance		D	Circularity M (Not Hardened/Hardened)
	h7	h6		
10	0	0	10	0.004
12	-0.015	-0.009	12	0.003
15	0	0	15	
17	-0.018	-0.011	17	
20	0	0	20	0.005
25	-0.021	-0.013	25	
30	0	0	30	
35	0	0	35	0.006
40	-0.025	-0.016	40	
45	0	0	45	
50	0	0	50	0.007

*For KZAF, 1.5 will be 1.5
*KZAF may have centering holes on shaft ends.

RoHS Please note that D dimension tolerance of KZAF is different from that of KZAN, KZAC and KZAP.

Part Number Type	D	L 0.5mm Increment
KZAN KZAC KZAP KZAF	10	50.0~300.0
	12	
	15	
	17	100.0~400.0
	20	
KZAF	25	
	30	100.0~500.0
	35	
	40	
	45	200.0~500.0
50		

Ordering Example Part Number - L
KZAN30 - 500

About KZAF (Induction Hardened)

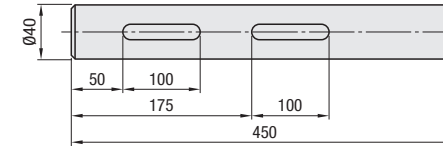
When alterations on the right-hand page are specified, the shafts are induction hardened (except the threaded sections) after machining. As a result, these may occur:
 ①: Due to thermal conduction to the thread, the threads may be hardened by 2 ~ 3mm.
 ②: Induction Hardened may shrink the keyway width (around -0.01 ~ -0.02). If the key becomes hard to fit, adjust it by gauging.

Type	KZAN					KZAC					KZAP				
	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5
D	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0
10															
12															
15															
17															
20															
25															
30															

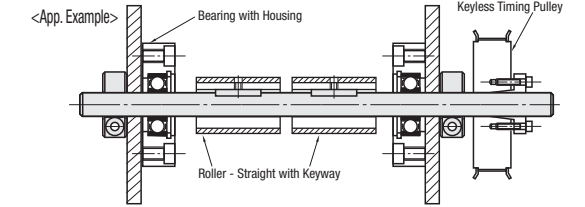
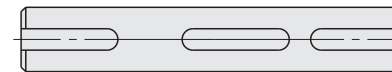
Type	KZAF				
	Min. L	L100.5	L200.5	L300.5	L400.5
D	~100.0	~200.0	~300.0	~400.0	~500.0
10					
12					
15					
17					
20					
25					
30					
35					
40					
45					
50					

Selection of Driving Shaft

In selecting a driving shaft, select the basic shape and size from the specification table, then select necessary alterations such as thread machining, keyway addition etc.
 <Selection Example of Part Number>
 - Alteration Selection: Two Keyways



The example below shows the keyway shape under the following conditions: When KA, KB, KC, KD, ZA, ZB, ZC, ZD=0 When KA+HA, KB+HB, KC+HC, KD+HD, ZA+HA, ZB+HB, ZC+HC or ZD+HD = L



Alterations Part Number - L - (MA, NA, KA, TA, SC, WA...etc.)
 KZAF40 - 450 - KA50 - HA100 - KB175 - HB170

Alterations	Code		Spec.																																																												
	Left End	Right End																																																													
Threaded Ends 	MA MSA MMA	MB MSB MMB	Adds threads at shaft ends. Specify the length of the threads. (Accuracy, coarse or fine threads can be specified by ordering code.) [Ordering Code] MA15-MSB15 1mm Increment 5≤ Thread Length ≤Mx5 <table border="1"> <thead> <tr> <th>Code</th> <th>Left End</th> <th>Right End</th> <th>Screw Accuracy</th> <th>M (Coarse)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> </tr> </thead> <tbody> <tr> <td>MA</td> <td>MB</td> <td>Coarse</td> <td>JIS 6h (Class 2)</td> <td>M10</td> <td>1.5</td> <td>M10</td> <td>0.75</td> <td>M25</td> <td>1.5</td> </tr> <tr> <td>MSA</td> <td>MSB</td> <td>Fine (Standard)</td> <td>JIS 6h (Class 2)</td> <td>M20</td> <td>2.5</td> <td>M15</td> <td>1.0</td> <td>M35</td> <td>1.5</td> </tr> <tr> <td>MMA</td> <td>MMB</td> <td>Fine (Precision)</td> <td>JIS 4h (Class 1)</td> <td>M30</td> <td>3.5</td> <td>M17</td> <td>1.0</td> <td>M40</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M20</td> <td>1.0</td> <td>M45</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M50</td> <td>1.5</td> </tr> </tbody> </table>	Code	Left End	Right End	Screw Accuracy	M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch	MA	MB	Coarse	JIS 6h (Class 2)	M10	1.5	M10	0.75	M25	1.5	MSA	MSB	Fine (Standard)	JIS 6h (Class 2)	M20	2.5	M15	1.0	M35	1.5	MMA	MMB	Fine (Precision)	JIS 4h (Class 1)	M30	3.5	M17	1.0	M40	1.5							M20	1.0	M45	1.5									M50	1.5
Code	Left End	Right End	Screw Accuracy	M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch																																																						
MA	MB	Coarse	JIS 6h (Class 2)	M10	1.5	M10	0.75	M25	1.5																																																						
MSA	MSB	Fine (Standard)	JIS 6h (Class 2)	M20	2.5	M15	1.0	M35	1.5																																																						
MMA	MMB	Fine (Precision)	JIS 4h (Class 1)	M30	3.5	M17	1.0	M40	1.5																																																						
						M20	1.0	M45	1.5																																																						
								M50	1.5																																																						
Tapped Ends 	NA	NB	Adds taps on shaft ends. Select the thread diameter. [Ordering Code] NA5-NB5 NA, NB ≤ D-4 NA (Coarse) NB (Coarse) Selection M3 M4 M5 M6 M8 M10 M12 M16 M20 M24 M30 M36																																																												
Retaining Ring Groove 	TA	TB	Adds a retaining ring groove. Specify the position of a retaining ring groove. [Ordering Code] TA10-TB10 TA, TB = 1mm Increment 4≤TA(TB) Retaining rings are included. For dimensions of the retaining ring groove, P820																																																												
Keyway 	KA KB KC KD		Adds a keyway. Specify the position and the length of the keyway. [Ordering Code] KA10-HA30-KB100-HB50 KA, HA, KB, HB, KC, HC, KD, HD = 1mm Increment 3≤HA, HB, HC, HD≤100 Keyway Details P820 When more than 2 keyways are added, the tolerances may shift by up to 0.2°.																																																												
Keyway Machining + Set Screw Flat 	ZA ZB ZC ZD		Adds a flat at any designated angle based on the keyways. Specify the position and the length for each keyway, and the angle for the set screw flats. [Ordering Code] ZA40-HA20-AA90 ZA, HA, ZB, HB, ZC, HC, ZD, HD = 1mm Increment AA, AB, AC, AD = 30° Increment 30° ≤ AA, AB, AC, AD ≤ 330° 3≤ZA, HB, HC, HD≤100 Keyway Details P820 Ordering Code <table border="1"> <thead> <tr> <th>Keyway Position Specified</th> <th>Keyway Width Specified</th> <th>Angle Specified</th> <th>D</th> <th>10-17</th> <th>18-40</th> <th>45, 50</th> </tr> </thead> <tbody> <tr> <td>ZA</td> <td>HA</td> <td>AA</td> <td>H</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>ZB</td> <td>HB</td> <td>AB</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZC</td> <td>HC</td> <td>AC</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZD</td> <td>HD</td> <td>AD</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> The length of each set screw flat is the same as that of each keyway. For a keyway and the angle of a set screw flat, the tolerances may shift by up to ±0.2°.	Keyway Position Specified	Keyway Width Specified	Angle Specified	D	10-17	18-40	45, 50	ZA	HA	AA	H	1	2	3	ZB	HB	AB					ZC	HC	AC					ZD	HD	AD																													
Keyway Position Specified	Keyway Width Specified	Angle Specified	D	10-17	18-40	45, 50																																																									
ZA	HA	AA	H	1	2	3																																																									
ZB	HB	AB																																																													
ZC	HC	AC																																																													
ZD	HD	AD																																																													
Wrench Flats 	SC		Adds a wrench flat. Specify the position of a wrench flat. [Ordering Code] SC180 SC = 1mm Increment 0≤SC≤L-ℓ <table border="1"> <thead> <tr> <th>D</th> <th>10</th> <th>12</th> <th>15</th> <th>17</th> <th>20</th> <th>25</th> <th>30</th> <th>35</th> <th>40</th> <th>45</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>8</td> <td>10</td> <td>13</td> <td>14</td> <td>17</td> <td>22</td> <td>27</td> <td>30</td> <td>36</td> <td>38</td> <td>41</td> </tr> <tr> <td>ℓ</td> <td>8</td> <td></td> <td></td> <td></td> <td>10</td> <td></td> <td></td> <td>15</td> <td></td> <td></td> <td>20</td> </tr> </tbody> </table>	D	10	12	15	17	20	25	30	35	40	45	50	W	8	10	13	14	17	22	27	30	36	38	41	ℓ	8				10			15			20																								
D	10	12	15	17	20	25	30	35	40	45	50																																																				
W	8	10	13	14	17	22	27	30	36	38	41																																																				
ℓ	8				10			15			20																																																				
2 Set Screw Flats (Angle Specified) 	WA WB WC		Adds a flat at any designated angle besides the datum plane 0°. Specify the position, the length and the angle of the set screw flats. When 0° is specified, only one set screw flat is machinable. [Ordering Code] WA15-GA10-AAO WA, WB, WC, GA, GB, GC = 1mm Increment AA, AB, AC = 30° Increment 0° ≤ AA, AB, AC ≤ 330° Ordering Code <table border="1"> <thead> <tr> <th>Set Screw Flat Position Specified</th> <th>Set Screw Flat Width Specified</th> <th>Angle Specified</th> <th>D</th> <th>10-17</th> <th>18-40</th> <th>45, 50</th> </tr> </thead> <tbody> <tr> <td>WA</td> <td>GA</td> <td>AA</td> <td>H</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>WB</td> <td>GB</td> <td>AB</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>WC</td> <td>GC</td> <td>AC</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified	D	10-17	18-40	45, 50	WA	GA	AA	H	1	2	3	WB	GB	AB					WC	GC	AC																																				
Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified	D	10-17	18-40	45, 50																																																									
WA	GA	AA	H	1	2	3																																																									
WB	GB	AB																																																													
WC	GC	AC																																																													

Driving Shafts

One End Stepped

■ **Features:** Rotary Shafts suitable for driving motion. Accuracies and shapes needed for rotary driving applications are selectable.

Type	D, P Tolerance	Concentricity	Perpendicularity	Material	Hardness	Surface Treatment
KZBE	h7	00.05	0.05	S45C	-	Black Oxide
KZBN						
KZBC				S45C	-	Black Oxide
KZBP	h6	00.01	0.01			Electroless Nickel Plating
KZBF				S45C	Induction Hardened Surface Hardness 50HRC-	

D	Tolerance		D	Circularity M
	h7	h6		
10	0	0	10	0.004
12	0	0	12	0.005
15	-0.018	-0.011	15	0.003
17	0	0	17	0.005
20	0	0	20	0.006
25	-0.021	-0.013	25	0.005
30	0	0	30	0.005
35	0	0	35	0.005
40	0	0	40	0.005
45	0	0	45	0.005
50	0	0	50	0.005

Ⓜ LA ≤ L/2
 Ⓜ The shaft may have centering holes on ends.
 Ⓜ There is an undercut 1.5mm or less in width and 0.3mm or less in depth on the stepped part.
 Ⓜ Step P of KZBE has no grinding undercut. Step R=0.2 or Less

Part Number	D	0.5mm Increment L	1mm Increment P	0.5mm Increment LA
KZBE (D10~30)	10		7~9	10.0~50.0
	12	50.0~300.0	7~11	10.0~50.0
	15		10~14	10.0~70.0
	17	100.0~400.0	10~16	10.0~70.0
	20		14~19	10.0~100.0
KZBN KZBC KZBP KZBF	25		14~24	10.0~100.0
	30	100.0~500.0	20~29	
	*35		20~34	20.0~150.0
	*40		20~39	20.0~150.0
	*45	200.0~500.0	20~44	20.0~150.0
*50		25~49	20.0~200.0	

Ordering Example: **Part Number** - L - P - LA
KZBN30 - 320 - P25 - LA40

■ **About KZBF (Induction Hardened)**
 When alterations on the right-hand page are specified, the shafts are induction hardened (except the threaded sections) after machining. As a result, these may occur:
 ①: Due to thermal conduction to the thread, the threads may be hardened by 2 ~ 3mm.
 ②: Induction Hardened may shrink the keyway width (around -0.01 ~ -0.02). If the key becomes hard to fit, adjust it by gauging.

* marked sizes are not available for KZBE.

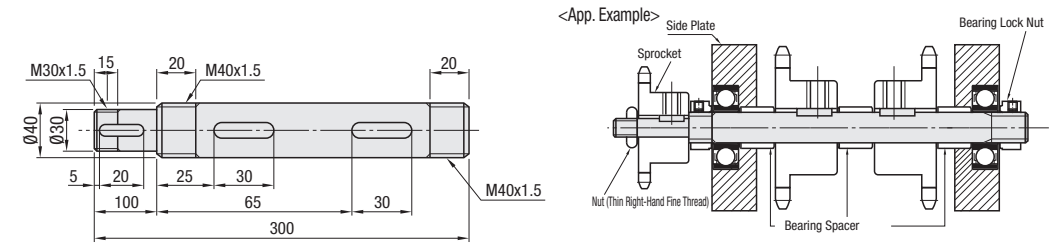
Type	KZBE					KZBN					KZBC				
	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5
10	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0
12															
15															
17															
20															
25															
30															
35															
40															
45															
50															

Type	KZBP					KZBF				
	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5
10	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0
12										
15										
17										
20										
25										
30										
35										
40										
45										
50										

Selection of Driving Shaft

In selecting a driving shaft, select the basic shape and size from the specification table, then select necessary alterations such as thread machining, keyway addition etc.

- <Selection Example of Part Number>
- Alteration Selection: Three Keyways, Three Threaded Ends (Fine Thread)



Alterations Part Number - L - P - LA - (MA, NA, KA, TA, SA, WA--etc.)
KZBN40 - 300 - P30 - LA100 - MSA15 - MSD20 - MSB20 - KA5 - HA20 - KB25 - HB30 - KC65 - HC30

Alterations	Code		Spec.																																																																												
	Left End	Right End																																																																													
Threaded Ends 	MA MSA MMA MD MSD MMD	MB MSB MMB	Adds threads at shaft ends. Specify the length of the threads. (Accuracy, coarse or fine threads can be specified by ordering code.) [Ordering Code] MA15-MSB15 1mm Increment 5≤ Thread Length ≤ Mx5, LA-2 <table border="1"> <thead> <tr> <th>Code</th> <th>Left End</th> <th>Right End</th> <th>Screw Accuracy</th> <th>M (Coarse)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> </tr> </thead> <tbody> <tr> <td>MA</td> <td>MD</td> <td>MB</td> <td>Coarse</td> <td>JIS 6h (Class 2)</td> <td>M10</td> <td>1.5</td> <td>M10</td> <td>0.75</td> <td>M25</td> <td>1.5</td> </tr> <tr> <td>MSA</td> <td>MSD</td> <td>MSB</td> <td>Fine (Standard)</td> <td>JIS 6h (Class 2)</td> <td>M12</td> <td>1.75</td> <td>M12</td> <td>1.0</td> <td>M35</td> <td>1.5</td> </tr> <tr> <td>MMA</td> <td>MMD</td> <td>MMB</td> <td>Fine (Precision)</td> <td>JIS 4h (Class 1)</td> <td>M20</td> <td>2.5</td> <td>M17</td> <td>1.0</td> <td>M40</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M24</td> <td>3</td> <td>M15</td> <td>1.0</td> <td>M45</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M30</td> <td>3.5</td> <td>M20</td> <td>1.0</td> <td>M50</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M36</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Code	Left End	Right End	Screw Accuracy	M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch	MA	MD	MB	Coarse	JIS 6h (Class 2)	M10	1.5	M10	0.75	M25	1.5	MSA	MSD	MSB	Fine (Standard)	JIS 6h (Class 2)	M12	1.75	M12	1.0	M35	1.5	MMA	MMD	MMB	Fine (Precision)	JIS 4h (Class 1)	M20	2.5	M17	1.0	M40	1.5						M24	3	M15	1.0	M45	1.5						M30	3.5	M20	1.0	M50	1.5						M36	4				
Code	Left End	Right End	Screw Accuracy	M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch																																																																						
MA	MD	MB	Coarse	JIS 6h (Class 2)	M10	1.5	M10	0.75	M25	1.5																																																																					
MSA	MSD	MSB	Fine (Standard)	JIS 6h (Class 2)	M12	1.75	M12	1.0	M35	1.5																																																																					
MMA	MMD	MMB	Fine (Precision)	JIS 4h (Class 1)	M20	2.5	M17	1.0	M40	1.5																																																																					
					M24	3	M15	1.0	M45	1.5																																																																					
					M30	3.5	M20	1.0	M50	1.5																																																																					
					M36	4																																																																									
Tapped Ends 	NA NB		Adds taps on shaft ends. Select the thread diameter. [Ordering Code] NA5-NB5 Ⓜ NA, NB ≤ D(P)-4 <table border="1"> <thead> <tr> <th>Selection</th> <th>NA (Coarse)</th> <th>NB (Coarse)</th> </tr> </thead> <tbody> <tr> <td></td> <td>M3</td> <td>M4</td> </tr> <tr> <td></td> <td>M5</td> <td>M6</td> </tr> <tr> <td></td> <td>M8</td> <td>M10</td> </tr> <tr> <td></td> <td>M12</td> <td>M16</td> </tr> <tr> <td></td> <td>M20</td> <td>M24</td> </tr> <tr> <td></td> <td>M30</td> <td>M36</td> </tr> </tbody> </table>	Selection	NA (Coarse)	NB (Coarse)		M3	M4		M5	M6		M8	M10		M12	M16		M20	M24		M30	M36																																																							
Selection	NA (Coarse)	NB (Coarse)																																																																													
	M3	M4																																																																													
	M5	M6																																																																													
	M8	M10																																																																													
	M12	M16																																																																													
	M20	M24																																																																													
	M30	M36																																																																													
Retaining Ring Groove 	TA TB		Adds a retaining ring groove. Specify the position of a retaining ring groove. [Ordering Code] TA10-TB10-TC10 TA, TB, TC = 1mm Increment 4≤ TA ≤ LA-3 Ⓜ Retaining rings are included. Ⓜ For dimensions of the retaining ring groove, P820 Ⓜ P=27, 31, 33, 34, 36~39, 41~44, Not available for 46~49.																																																																												
Keyway Machining 	KA KB KC		Adds a keyway. Specify the position and the length of the keyway. [Ordering Code] KA10-HA30-KB100-HB50 KA, HA, KB, HB, KC, HC = 1mm Increment Ⓜ 3≤ HA, HB, HC ≤ 100 Ⓜ Keyway Details P820 Ⓜ When more than 2 keyways are added, the tolerances may shift by up to 0.2%. Ⓜ Specify the keyway position more than 2mm away from the stepped part.																																																																												
Keyway Machining + Set Screw Flat 	ZA ZB ZC		Adds a flat at any designated angle based on the keyways. Specify the position and the length for each keyway, and the angle for the set screw flats. [Ordering Code] ZA40-HA20-AA90 ZA, HA, ZB, HB, ZC, HC = 1mm Increment AA, AB, AC = 30° Increment 30° ≤ AA, AB, AC ≤ 330° Ⓜ 3≤ HA, HB, HC ≤ 100 Ⓜ Keyway Details P820 Ⓜ Specify the keyway position more than 2mm away from the stepped part. Ⓜ Ordering Code <table border="1"> <thead> <tr> <th>Keyway Position Specified</th> <th>Keyway Width Specified</th> <th>Angle Specified</th> <th>D, P</th> <th>7~17</th> <th>18~40</th> <th>41~50</th> </tr> </thead> <tbody> <tr> <td>ZA</td> <td>HA</td> <td>AA</td> <td>H</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>ZB</td> <td>HB</td> <td>AB</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZC</td> <td>HC</td> <td>AC</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Keyway Position Specified	Keyway Width Specified	Angle Specified	D, P	7~17	18~40	41~50	ZA	HA	AA	H	1	2	3	ZB	HB	AB					ZC	HC	AC																																																				
Keyway Position Specified	Keyway Width Specified	Angle Specified	D, P	7~17	18~40	41~50																																																																									
ZA	HA	AA	H	1	2	3																																																																									
ZB	HB	AB																																																																													
ZC	HC	AC																																																																													
Wrench Flats 	SA SC		Adds a wrench flat. Specify the position of a wrench flat. [Ordering Code] SA5 SA, SC = 1mm Increment 0 ≤ SA, SC ≤ LA-L, L-L <table border="1"> <thead> <tr> <th>D</th> <th>10</th> <th>12</th> <th>15</th> <th>17</th> <th>20</th> <th>25</th> <th>30</th> <th>35</th> <th>40</th> <th>45</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>8</td> <td>10</td> <td>13</td> <td>14</td> <td>17</td> <td>22</td> <td>27</td> <td>30</td> <td>36</td> <td>38</td> <td>41</td> </tr> <tr> <td>ℓ</td> <td>8</td> <td></td> <td></td> <td></td> <td>10</td> <td></td> <td></td> <td>15</td> <td></td> <td></td> <td>20</td> </tr> </tbody> </table>	D	10	12	15	17	20	25	30	35	40	45	50	W	8	10	13	14	17	22	27	30	36	38	41	ℓ	8				10			15			20																																								
D	10	12	15	17	20	25	30	35	40	45	50																																																																				
W	8	10	13	14	17	22	27	30	36	38	41																																																																				
ℓ	8				10			15			20																																																																				
2 Set Screw Flats (Angle Specified) 	WA WB WC		Adds a flat at any designated angle besides the datum plane 0°. Specify the position, the length and the angle of the set screw flats. When 0° is specified, only one set screw flat is machinable. [Ordering Code] WA15-GA10-AA0 WA, WB, WC, GA, GB, GC = 1mm Increment AA, AB, AC = 30° Increment 0° ≤ AA, AB, AC ≤ 330° Ⓜ Ordering Code <table border="1"> <thead> <tr> <th>Set Screw Flat Position Specified</th> <th>Set Screw Flat Width Specified</th> <th>Angle Specified</th> <th>D, P</th> <th>7~17</th> <th>18~40</th> <th>41~50</th> </tr> </thead> <tbody> <tr> <td>WA</td> <td>GA</td> <td>AA</td> <td>H</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>WB</td> <td>GB</td> <td>AB</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>WC</td> <td>GC</td> <td>AC</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified	D, P	7~17	18~40	41~50	WA	GA	AA	H	1	2	3	WB	GB	AB					WC	GC	AC																																																				
Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified	D, P	7~17	18~40	41~50																																																																									
WA	GA	AA	H	1	2	3																																																																									
WB	GB	AB																																																																													
WC	GC	AC																																																																													

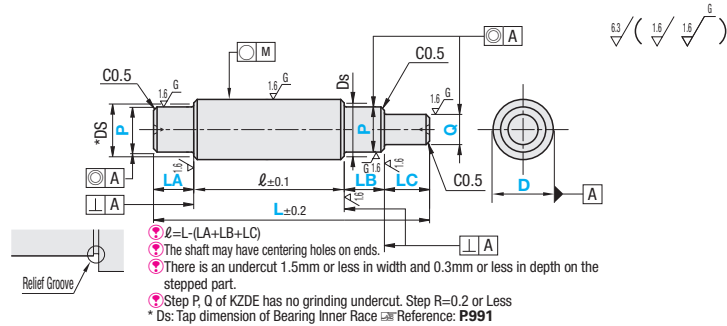
Driving Shafts

One End Stepped One End Double Stepped

■ **Features:** Rotary Shafts suitable for driving motion. Accuracies and shapes needed for rotary driving applications are selectable.



Type	D, P, Q Tolerance	Concentricity	Perpendicularity	Material	Hardness	Surface Treatment	D	Tolerance h7	h6	D	Circularity M	KZDE	Others
KZDE	h7	00.05	0.05	S45C	-	Black Oxide	10	0.015	0.009	10	0.004		0.003
KZDN				S45C	-	Black Oxide	12	0	0	12	0.005		
KZDC				S45C	-	Black Oxide	15	-0.018	-0.011	15	0.005		
KZDP				SUS304	-	Electroless Nickel Plating	20	0	0	20	0.006		
KZDS	h6	00.01	0.01	SUS304	-	-	25	0	-0.013	25	0.006		
KZDF				S45C	Induction Hardened	Surface Hardness 50HRC-	30	-	0	30	-		0.005
							35	-	0	35	-		
							40	-	0	40	-		
							50	-	-0.016	50	-		



RoHS

Part Number	0.5mm Increment	Selection	0.5mm Increment	1mm Increment	0.5mm Increment	*Ds	
KZDE (D10-30)	10	6	4.0-40.0	4.0-40.0	5-7	3.0-30.0	
	12	8	5.0-50.0	5.0-50.0	7-9	4.0-40.0	
	15	10	5.0-75.0	5.0-50.0	7-11	5.0-60.0	
	20	12	5.0-100.0	5.0-50.0	10-14	5.0-75.0	
	KZDN KZDC KZDP KZDS KZDF	25	15	10.0-100.0	10.0-60.0	14-19	10.0-100.0
		30	17	10.0-125.0	10.0-60.0	14-24	10.0-125.0
		*35	20	15.0-150.0	15.0-70.0	20-29	15.0-150.0
		40	25	20.0-150.0	20.0-70.0	20-39	20.0-150.0
		*50	30	20.0-150.0	20.0-70.0	20-44	20.0-150.0

Ordering Example Part Number - L - P - LA - LB - Q - LC
KZDN25 - 500 - P20 - LA100 - LB60 - Q15 - LC80

■ **About KZDF (Induction Hardened)**
When alterations on the right-hand page are specified, the shafts are induction hardened (except the threaded sections) after machining. As a result, these may occur:
①: Due to thermal conduction to the thread, the threads may be hardened by 2 ~ 3mm.
②: Induction Hardened may shrink the keyway width (around -0.01 ~ -0.02). If the key becomes hard to fit, adjust it by gauging.

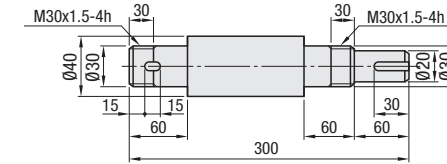
Type	KZDE					KZDN					KZDC				
D	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5
10	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0
12															
15															
20															
25															
30															
35															
40															
50															

Type	KZDP					KZDS					KZDF				
D	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5
10	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0	~100.0	~200.0	~300.0	~400.0	~500.0
12															
15															
20															
25															
30															
35															
40															
50															

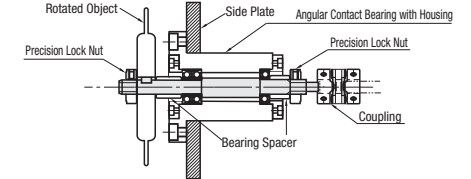
■ Selection of Driving Shaft

In selecting a driving shaft, select the basic shape and size from the specification table, then select necessary alterations such as thread machining, keyway addition etc.

<Selection Example of Part Number>
• Alteration Selection: Two Threaded Ends, Two Keyways



<App. Example>




Part Number - L - P - LA - LB - Q - LC - (MA, NA, KA, TA, SA, WA--etc.)
KZDN40 - 300 - P30 - LA60 - LB60 - Q20 - LC60 - MMA30 - MMB30 - KA15 - HA15 - KC0 - HC30

Alterations	Code	Spec.																																																																																							
Threaded Ends 	MA MSA MMA MB MSB MMB MC MSC MMC	Adds threads at shaft ends. Specify the length of the threads. (Accuracy, coarse or fine threads can be specified by ordering code.) [Ordering Code] MA15-MSB15 1mm Increment 5: Thread Length ≤Mv5, LA(LB, LC)-2 <table border="1"> <thead> <tr> <th>Code</th> <th>Left End</th> <th>Right End</th> <th>Screw Accuracy</th> <th>M (Coarse)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> </tr> </thead> <tbody> <tr> <td>MA</td> <td>MB</td> <td>MC</td> <td>Coarse</td> <td>JIS 6h (Class 2)</td> <td>M5</td> <td>0.8</td> <td>M5</td> <td>0.5</td> <td>M20</td> <td>1.0</td> </tr> <tr> <td>MSA</td> <td>MSB</td> <td>MSC</td> <td>Fine (Standard)</td> <td>JIS 6h (Class 2)</td> <td>M6</td> <td>1.0</td> <td>M6</td> <td>0.75</td> <td>M25</td> <td>1.5</td> </tr> <tr> <td>MMA</td> <td>MMB</td> <td>MMC</td> <td>Fine (Precision)</td> <td>JIS 4h (Class 1)</td> <td>M8</td> <td>1.25</td> <td>M8</td> <td>0.75</td> <td>M30</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M10</td> <td>1.5</td> <td>M10</td> <td>0.75</td> <td>M35</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M12</td> <td>1.75</td> <td>M12</td> <td>1.0</td> <td>M40</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M20</td> <td>2.5</td> <td>M15</td> <td>1.0</td> <td>M45</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>M30</td> <td>3.5</td> <td>M17</td> <td>1.0</td> <td>M50</td> <td>1.5</td> </tr> </tbody> </table>	Code	Left End	Right End	Screw Accuracy	M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch	MA	MB	MC	Coarse	JIS 6h (Class 2)	M5	0.8	M5	0.5	M20	1.0	MSA	MSB	MSC	Fine (Standard)	JIS 6h (Class 2)	M6	1.0	M6	0.75	M25	1.5	MMA	MMB	MMC	Fine (Precision)	JIS 4h (Class 1)	M8	1.25	M8	0.75	M30	1.5						M10	1.5	M10	0.75	M35	1.5						M12	1.75	M12	1.0	M40	1.5						M20	2.5	M15	1.0	M45	1.5						M30	3.5	M17	1.0	M50	1.5
Code	Left End	Right End	Screw Accuracy	M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch																																																																																
MA	MB	MC	Coarse	JIS 6h (Class 2)	M5	0.8	M5	0.5	M20	1.0																																																																															
MSA	MSB	MSC	Fine (Standard)	JIS 6h (Class 2)	M6	1.0	M6	0.75	M25	1.5																																																																															
MMA	MMB	MMC	Fine (Precision)	JIS 4h (Class 1)	M8	1.25	M8	0.75	M30	1.5																																																																															
					M10	1.5	M10	0.75	M35	1.5																																																																															
					M12	1.75	M12	1.0	M40	1.5																																																																															
					M20	2.5	M15	1.0	M45	1.5																																																																															
					M30	3.5	M17	1.0	M50	1.5																																																																															
Tapped Ends 	NA NC	Adds taps on shaft ends. Select the thread diameter. [Ordering Code] NA5-NC5 (NA, NC) ≤P(Q)-4 <table border="1"> <thead> <tr> <th>NA (Coarse)</th> <th>NC (Coarse)</th> </tr> </thead> <tbody> <tr> <td>M3</td> <td>M4</td> </tr> <tr> <td>M10</td> <td>M12</td> </tr> <tr> <td>M24</td> <td>M30</td> </tr> <tr> <td>M36</td> <td>M36</td> </tr> </tbody> </table>	NA (Coarse)	NC (Coarse)	M3	M4	M10	M12	M24	M30	M36	M36																																																																													
NA (Coarse)	NC (Coarse)																																																																																								
M3	M4																																																																																								
M10	M12																																																																																								
M24	M30																																																																																								
M36	M36																																																																																								
Keyway Machining 	KA KB KC KD	Adds a keyway. Specify the position and the length of the keyway. [Ordering Code] KA10-HA30-KB100-HB50 KA, HA, KB, HB, KC, HC, KD, HD = 1mm Increment 3: ≤HA, HB, HC, HD ≤100 Keyway Details P820 When more than 2 keyways are added, the tolerances may shift by up to 0.2%. Specify the keyway position more than 2mm away from the stepped part.																																																																																							
Keyway Machining + Set Screw Flat 	ZA ZB ZC ZD	Adds a flat at any designated angle besides the datum plane 0°. Specify the length and width for each keyway, and the angle for the set screw flat. [Ordering Code] ZA40-HA20-AA90 ZA, HA, ZB, HB, ZC, HC, ZD, HD = 1mm Increment AA, AB, AC, AD = 30° Increment 30° ≤ AA, AB, AC, AD ≤ 330° 3: ≤HA, HB, HC, HD ≤100 Keyway Details P820 Specify the keyway position more than 2mm away from the stepped part. • Ordering Code <table border="1"> <thead> <tr> <th>Keyway Position Specified</th> <th>Keyway Width Specified</th> <th>Angle Specified</th> <th>D, P, Q</th> <th>5</th> <th>6-17</th> <th>18-40</th> <th>41-50</th> </tr> </thead> <tbody> <tr> <td>ZA</td> <td>HA</td> <td>AA</td> <td>H</td> <td>0.5</td> <td>1</td> <td>2</td> <td>3</td> </tr> </tbody> </table> The length of each set screw flat is the same as that of each keyway. For a keyway and the angle of a set screw flat, the tolerances may shift by up to ±0.2°.	Keyway Position Specified	Keyway Width Specified	Angle Specified	D, P, Q	5	6-17	18-40	41-50	ZA	HA	AA	H	0.5	1	2	3																																																																							
Keyway Position Specified	Keyway Width Specified	Angle Specified	D, P, Q	5	6-17	18-40	41-50																																																																																		
ZA	HA	AA	H	0.5	1	2	3																																																																																		
Retaining Ring Groove 	TA TB TC	Adds a retaining ring groove. Specify the position of a retaining ring groove. [Ordering Code] TA10-TB10-TC10 TA, TB, TC = 1mm Increment 4: ≤TA ≤ LA-3 Retaining rings are included. For dimensions of the retaining ring groove, P820 Q = 27, 31, 33, 34, 36 ~ 39. Not available for 41 ~ 44. <table border="1"> <thead> <tr> <th>P, Q</th> <th>5</th> <th>6-17</th> <th>18-40</th> <th>41-50</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>0.5</td> <td>1</td> <td>2</td> <td>3</td> </tr> </tbody> </table>	P, Q	5	6-17	18-40	41-50	H	0.5	1	2	3																																																																													
P, Q	5	6-17	18-40	41-50																																																																																					
H	0.5	1	2	3																																																																																					
Wrench Flats 	SA SD SC	Adds a wrench flat. Specify the position of a wrench flat. [Ordering Code] SA5 SA, SB, SD = 1mm Increment SA, SC, SD ≥ 0 SA ≤ LA-ℓ, SC ≤ LC-ℓ, SD ≤ LB-LC-ℓ <table border="1"> <thead> <tr> <th>D</th> <th>10</th> <th>12</th> <th>15</th> <th>20</th> <th>25</th> <th>30</th> <th>35</th> <th>40</th> <th>50</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>8</td> <td>10</td> <td>13</td> <td>17</td> <td>22</td> <td>27</td> <td>30</td> <td>36</td> <td>41</td> </tr> <tr> <td>ℓ</td> <td>8</td> <td></td> <td></td> <td>10</td> <td></td> <td>15</td> <td></td> <td>20</td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>P, Q</th> <th>5</th> <th>6</th> <th>7</th> <th>8-10</th> <th>11-13</th> <th>14-15</th> <th>16-18</th> <th>19-21</th> <th>22-25</th> <th>26-28</th> <th>29-31</th> <th>32-37</th> <th>38-41</th> <th>42-45</th> </tr> </thead> <tbody> <tr> <td>W₁</td> <td>4</td> <td>5</td> <td>5.5</td> <td>7</td> <td>10</td> <td>13</td> <td>14</td> <td>17</td> <td>19</td> <td>22</td> <td>27</td> <td>30</td> <td>36</td> <td>38</td> </tr> <tr> <td>ℓ</td> <td></td> <td></td> <td></td> <td></td> <td>8</td> <td></td> <td>10</td> <td></td> <td></td> <td>15</td> <td></td> <td>20</td> <td></td> <td></td> </tr> </tbody> </table>	D	10	12	15	20	25	30	35	40	50	W	8	10	13	17	22	27	30	36	41	ℓ	8			10		15		20		P, Q	5	6	7	8-10	11-13	14-15	16-18	19-21	22-25	26-28	29-31	32-37	38-41	42-45	W ₁	4	5	5.5	7	10	13	14	17	19	22	27	30	36	38	ℓ					8		10			15		20														
D	10	12	15	20	25	30	35	40	50																																																																																
W	8	10	13	17	22	27	30	36	41																																																																																
ℓ	8			10		15		20																																																																																	
P, Q	5	6	7	8-10	11-13	14-15	16-18	19-21	22-25	26-28	29-31	32-37	38-41	42-45																																																																											
W ₁	4	5	5.5	7	10	13	14	17	19	22	27	30	36	38																																																																											
ℓ					8		10			15		20																																																																													
2 Set Screw Flats (Angle Specified) 	WA WB WC WD WE	Adds a flat at any designated angle besides the datum plane 0°. Specify the position, the length and the angle of the set screw flats. When 0° is specified, only one set screw flat is machinable. [Ordering Code] WA15-GA10-AA0 WA, WC, WD, WE, GA, GC, GD, GE = 1mm Increment AA, AB, AC, AD = 30° Increment 0° ≤ AA, AB, AC, AD ≤ 330° • Ordering Code <table border="1"> <thead> <tr> <th>Set Screw Flat Position Specified</th> <th>Set Screw Flat Width Specified</th> <th>Angle Specified</th> <th>D, P, Q</th> <th>5</th> <th>6-17</th> <th>18-40</th> <th>41-50</th> </tr> </thead> <tbody> <tr> <td>WA</td> <td>GA</td> <td>AA</td> <td>H</td> <td>0.5</td> <td>1</td> <td>2</td> <td>3</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>WA</th> <th>WB</th> <th>WC</th> <th>WD</th> <th>WE</th> </tr> </thead> <tbody> <tr> <td>GA</td> <td>GB</td> <td>GC</td> <td>GD</td> <td>GE</td> </tr> </tbody> </table> • WE is applicable for KZDE only.	Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified	D, P, Q	5	6-17	18-40	41-50	WA	GA	AA	H	0.5	1	2	3	WA	WB	WC	WD	WE	GA	GB	GC	GD	GE																																																													
Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified	D, P, Q	5	6-17	18-40	41-50																																																																																		
WA	GA	AA	H	0.5	1	2	3																																																																																		
WA	WB	WC	WD	WE																																																																																					
GA	GB	GC	GD	GE																																																																																					
Tolerance Change 	PJ (js6) PK (k6)	Changes the tolerance of P Dimension of the stepped part to js6 or k6. [Ordering Code] PJ or PK Both LA and LB tolerances will be changed. Not available for KZDE.																																																																																							

Driving Shafts

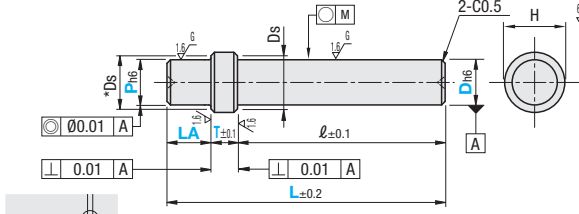
Shouldered

■ **Features:** Rotary Shafts suitable for driving motion. Accuracies and shapes needed for rotary driving applications are selectable.



Type	D, P Tolerance	Concentricity	Material	Hardness	Surface Treatment
KZEN	h6	Ø0.01	S45C		-
KZEC					Black Oxide
KZEP			Electroless Nickel Plating		
KZES			-		
KZEF			SUS304		Induction Hardened Surface Hardness 50HRC-

D	Tolerance h6	Circularity M
8	0	0.003
10	-0.009	
12, 12A	0	
15	-0.011	
17, 17A	0	
20	0	0.005
25	-0.013	
30	0	
35	-0.016	
40	0	
45	-0.016	



Ⓢ $\phi = L - (LA + T)$ Ⓢ $LA + T < L/2$
 Ⓢ The shaft may have centering holes on ends.
 Ⓢ There is an undercut 1.5mm or less in width and 0.3mm or less in depth on the stepped part.
 *Ds: Tap dimension of Bearing Inner Race Reference: P.991

Part Number Type	0.5mm Increment		1mm Increment		0.5mm Increment		H	*Ds
	D	L	T	P	LA	Ds		
KZEN	8	50.0-300.0	5	6-9	4.0-40.0	12	10	
	10		10	8-12	5.0-50.0	15	13	
	12		15	10-13				14
	12A	100.0-400.0	10	12-18	5.0-60.0	16		
	15		15	12-18	5.0-75.0	20	18	
	17		20	14-18				19
	17A		25	14-20	5.0-100.0	25	21	
	20			17-23				24
	25	100.0-500.0	10	20-28	10.0-125.0	30	29	
	30		20	25-33	15.0-150.0	35	34	
35	30		28-38				39	
40	200.0-500.0	40	35-47	20.0-150.0	48	48		
45		50	35-48				49	

Ordering Example **Part Number** - L - T - P - LA
KZEN30 - 350 - T20 - P25 - LA50

■ **About KZEF (Induction Hardened)**
 When alterations on the right-hand page are specified, the shafts are induction hardened (except the threaded sections) after machining.
 As a result, these may occur:
 ①: Due to thermal conduction to the thread, the threads may be hardened by 2 ~ 3mm.
 ②: Induction Hardened may shrink the keyway width (around -0.01 ~ -0.02). If the key becomes hard to fit, adjust it by gauging.

Type	KZEN					KZEC					KZEP				
	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5
D	-100.0	-200.0	-300.0	-400.0	-500.0	-100.0	-200.0	-300.0	-400.0	-500.0	-100.0	-200.0	-300.0	-400.0	-500.0
8															
10															
12															
12A															
15															
17															
17A															
20															
25															
30															
35															
40															
45															

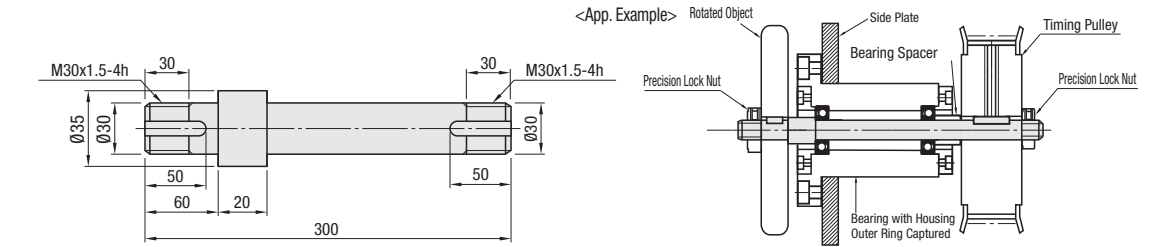
Type	KZES					KZEF				
	Min. L	L100.5	L200.5	L300.5	L400.5	Min. L	L100.5	L200.5	L300.5	L400.5
D	-100.0	-200.0	-300.0	-400.0	-500.0	-100.0	-200.0	-300.0	-400.0	-500.0
8										
10										
12										
12A										
15										
17										
17A										
20										
25										
30										
35										
40										
45										

Selection of Driving Shaft

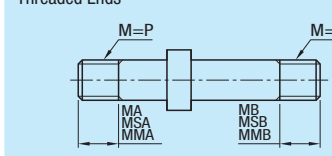
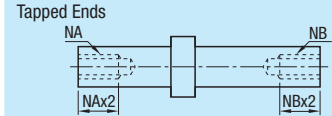
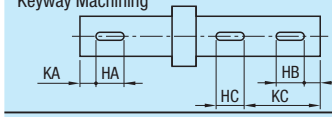
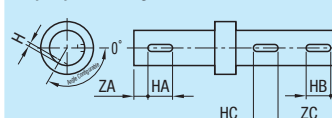
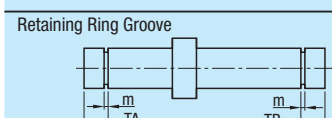
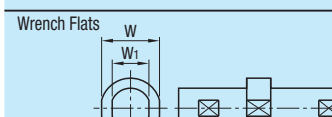
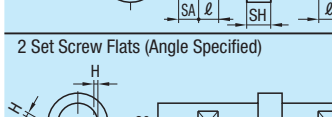
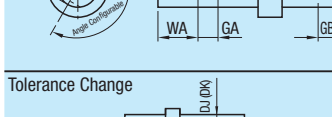
In selecting a driving shaft, select the basic shape and size from the specification table, then select necessary alterations such as thread machining, keyway addition etc.

<Selection Example of Part Number>

• Alteration Selection: Two Threaded Ends (Fine Thread, Precision Grade), Two Keyways



Alterations **Part Number** - L - T - P - LA - (MA, NA, KA, TA, SA, WA--etc.)
KZEF30 - 300 - T20 - P30 - LA60 - MMA30 - MMB30 - KA0 - HA50 - KB0 - HB50

Alterations	Code		Spec.																																																																																	
	Left End	Right End																																																																																		
Threaded Ends 	MA	MB	Adds threads at shaft ends. Specify the length of the threads. (Accuracy, coarse or fine threads can be specified by ordering code.) [Ordering Code] MA15-MSB15 1mm Increment 5≤ Thread Length <Mx5, LA-2 <table border="1"> <thead> <tr> <th>Code</th> <th colspan="2">Screw Accuracy</th> <th>M (Coarse)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> <th>M (Fine)</th> <th>Pitch</th> </tr> </thead> <tbody> <tr> <td>Left End</td> <td>Right End</td> <td>JIS 6h (Class 2)</td> <td>M6</td> <td>1.0</td> <td>M6</td> <td>0.75</td> <td>M25</td> <td>1.5</td> </tr> <tr> <td>MSA</td> <td>MSB</td> <td>Fine (Standard) JIS 6h (Class 2)</td> <td>M8</td> <td>1.25</td> <td>M8</td> <td>0.75</td> <td>M30</td> <td>1.5</td> </tr> <tr> <td>MMA</td> <td>MMB</td> <td>Fine (Precision) JIS 4h (Class 1)</td> <td>M10</td> <td>1.5</td> <td>M10</td> <td>0.75</td> <td>M35</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>M12</td> <td>1.75</td> <td>M12</td> <td>1.0</td> <td>M40</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>M20</td> <td>2.5</td> <td>M15</td> <td>1.0</td> <td>M45</td> <td>1.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>M24</td> <td>3</td> <td>M17</td> <td>1.0</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>M30</td> <td>3.5</td> <td>M20</td> <td>1.0</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>M36</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Ⓢ When D, P=M, thread length can be specified.	Code	Screw Accuracy		M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch	Left End	Right End	JIS 6h (Class 2)	M6	1.0	M6	0.75	M25	1.5	MSA	MSB	Fine (Standard) JIS 6h (Class 2)	M8	1.25	M8	0.75	M30	1.5	MMA	MMB	Fine (Precision) JIS 4h (Class 1)	M10	1.5	M10	0.75	M35	1.5				M12	1.75	M12	1.0	M40	1.5				M20	2.5	M15	1.0	M45	1.5				M24	3	M17	1.0						M30	3.5	M20	1.0						M36	4				
Code	Screw Accuracy		M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch																																																																												
Left End	Right End	JIS 6h (Class 2)	M6	1.0	M6	0.75	M25	1.5																																																																												
MSA	MSB	Fine (Standard) JIS 6h (Class 2)	M8	1.25	M8	0.75	M30	1.5																																																																												
MMA	MMB	Fine (Precision) JIS 4h (Class 1)	M10	1.5	M10	0.75	M35	1.5																																																																												
			M12	1.75	M12	1.0	M40	1.5																																																																												
			M20	2.5	M15	1.0	M45	1.5																																																																												
			M24	3	M17	1.0																																																																														
			M30	3.5	M20	1.0																																																																														
			M36	4																																																																																
Tapped Ends 	NA	NB	Adds taps on shaft ends. Select the thread diameter. [Ordering Code] NA5-NB5 Ⓢ NA, NB ≤ D(P)-4 NA (Coarse) NB (Coarse) Selection M3 M4 M5 M6 M8 M10 M12 M16 M20 M24 M30 M36																																																																																	
Keyway Machining 	KA	KB	Adds a keyway. Specify the position and the length of the keyway. [Ordering Code] KA10-HA30-KB100-HB50 KA, HA, KB, HB, HC, KC = 1mm Increment Ⓢ 3≤HA, HB, HC≤100 Ⓢ Keyway Details P.820 Ⓢ When more than 2 keyways are added, the tolerances may shift by up to 0.2°.																																																																																	
Keyway Machining + Set Screw Flat 	ZA	ZB	Adds a flat at any designated angle based on the keyways. Specify the position and the length for each keyway, and the angle for the set screw flats. [Ordering Code] ZA40-HA20-AA90 ZA, HA, ZB, HB, ZC, HC, ZD, HD = 1mm Increment AA, AB, AC, AD = 30° Increment 30°≤AA, AB, AC, AD ≤330° Ⓢ 3≤HA, HB, HC, HD≤100 Ⓢ Keyway Details P.820 Ⓢ Specify the keyway position more than 2mm away from the shouldered part. • Ordering Code <table border="1"> <thead> <tr> <th>Keyway Position Specified</th> <th>Keyway Width Specified</th> <th>Angle Specified 30° Increment</th> <th>D, P</th> <th>6-17</th> <th>18-40</th> <th>41-48</th> </tr> </thead> <tbody> <tr> <td>ZA</td> <td>HA</td> <td>AA</td> <td>H</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>ZB</td> <td>HB</td> <td>AB</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZC</td> <td>HC</td> <td>AC</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Ⓢ The length of each set screw flat is the same as that of each keyway. Ⓢ For a keyway and the angle of a set screw flat, the tolerances may shift by up to ±0.2°.	Keyway Position Specified	Keyway Width Specified	Angle Specified 30° Increment	D, P	6-17	18-40	41-48	ZA	HA	AA	H	1	2	3	ZB	HB	AB					ZC	HC	AC																																																									
Keyway Position Specified	Keyway Width Specified	Angle Specified 30° Increment	D, P	6-17	18-40	41-48																																																																														
ZA	HA	AA	H	1	2	3																																																																														
ZB	HB	AB																																																																																		
ZC	HC	AC																																																																																		
Retaining Ring Groove 	TA	TB	Adds a retaining ring groove. Specify the position of a retaining ring groove. [Ordering Code] TA10-TB100 TA, TB = 1mm Increment Ⓢ 4≤TA≤LA-3 Ⓢ Retaining rings are included. Ⓢ For dimensions of the retaining ring groove, P.820 Ⓢ P=27, 31, 33, 34, 36~39. Not available for 41~44 and 46~48. <table border="1"> <thead> <tr> <th colspan="2">P, D: Retaining Ring Type E, P: Retaining Ring Type C</th> </tr> <tr> <th>Material</th> <th>Hardness</th> </tr> </thead> <tbody> <tr> <td>S45C</td> <td>-</td> </tr> <tr> <td>SUS304</td> <td>-</td> </tr> <tr> <td>S45C</td> <td>Surface 50HRC-</td> </tr> </tbody> </table> Retaining Ring: Spring Steel Surface Treatment: Black Oxide, Electroless Nickel Plating Material: SUS304-CSP, Spring Steel	P, D: Retaining Ring Type E, P: Retaining Ring Type C		Material	Hardness	S45C	-	SUS304	-	S45C	Surface 50HRC-																																																																							
P, D: Retaining Ring Type E, P: Retaining Ring Type C																																																																																				
Material	Hardness																																																																																			
S45C	-																																																																																			
SUS304	-																																																																																			
S45C	Surface 50HRC-																																																																																			
Wrench Flats 	SA	SB	Adds a wrench flat. Specify the position of a wrench flat. [Ordering Code] SA5-SB10-SH SA, SB = 1mm Increment SA, SB ≥ 0 SA ≤LA-ℓ, SB ≤LA-T-ℓ Ⓢ Specification of the length for SH is not necessary. Adds wrench flats on the shoulder. (ℓ=H) <table border="1"> <thead> <tr> <th>D</th> <th>8</th> <th>10</th> <th>12</th> <th>15</th> <th>17</th> <th>20</th> <th>25</th> <th>30</th> <th>35</th> <th>40</th> <th>45</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>7</td> <td>8</td> <td>10</td> <td>13</td> <td>14</td> <td>17</td> <td>22</td> <td>27</td> <td>30</td> <td>36</td> <td>38</td> </tr> <tr> <td>ℓ</td> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>15</td> <td></td> <td>20</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>P</th> <th>6</th> <th>7</th> <th>8-10</th> <th>11-13</th> <th>14-15</th> <th>16-18</th> <th>19-21</th> <th>22-25</th> <th>26-28</th> <th>29-31</th> <th>32-37</th> <th>38-41</th> <th>42-45</th> <th>46-48</th> </tr> </thead> <tbody> <tr> <td>W1</td> <td>5</td> <td>5.5</td> <td>7</td> <td>10</td> <td>13</td> <td>14</td> <td>17</td> <td>19</td> <td>22</td> <td>27</td> <td>30</td> <td>36</td> <td>38</td> <td>41</td> </tr> <tr> <td>ℓ</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>15</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	D	8	10	12	15	17	20	25	30	35	40	45	W	7	8	10	13	14	17	22	27	30	36	38	ℓ	8								15		20	P	6	7	8-10	11-13	14-15	16-18	19-21	22-25	26-28	29-31	32-37	38-41	42-45	46-48	W1	5	5.5	7	10	13	14	17	19	22	27	30	36	38	41	ℓ										15				
D	8	10	12	15	17	20	25	30	35	40	45																																																																									
W	7	8	10	13	14	17	22	27	30	36	38																																																																									
ℓ	8								15		20																																																																									
P	6	7	8-10	11-13	14-15	16-18	19-21	22-25	26-28	29-31	32-37	38-41	42-45	46-48																																																																						
W1	5	5.5	7	10	13	14	17	19	22	27	30	36	38	41																																																																						
ℓ										15																																																																										
2 Set Screw Flats (Angle Specified) 	WA	WB	Adds a flat at any designated angle besides the datum plane 0°. Specify the position, the length and the angle of the set screw flats. When 0° is specified, only one set screw flat is machinable. [Ordering Code] WA15-GA10-AAO WA, WB, GA, GB = 1mm Increment AA, AB = 30° Increment 0°≤AA, AB ≤330° • Ordering Code <table border="1"> <thead> <tr> <th>Set Screw Flat Position Specified</th> <th>Set Screw Flat Width Specified</th> <th>Angle Specified 30° Increment</th> <th>D, P</th> <th>6-17</th> <th>18-40</th> <th>41-48</th> </tr> </thead> <tbody> <tr> <td>WA</td> <td>GA</td> <td>AA</td> <td>H</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>WB</td> <td>GB</td> <td>AB</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified 30° Increment	D, P	6-17	18-40	41-48	WA	GA	AA	H	1	2	3	WB	GB	AB																																																																
Set Screw Flat Position Specified	Set Screw Flat Width Specified	Angle Specified 30° Increment	D, P	6-17	18-40	41-48																																																																														
WA	GA	AA	H	1	2	3																																																																														
WB	GB	AB																																																																																		
Tolerance Change 	DJ (j6)	DK (k6)	Changes the D dimension tolerance to j6 or k6. [Ordering Code] DJ or DK																																																																																	

