

# Driving Shafts

## Both Ends Stepped

Rotary Shafts suitable for driving motion. Accuracies and shapes needed for rotary driving applications are selectable.

**Driving Shafts – Both Ends Stepped**

RoHS10

Type	D, P Tolerance	Concentricity	Perpendicularity	Material	Hardness	Surface Treatment
KZCE	h7	φ0.05	⊥0.05	1045 Carbon Steel or Equivalent	—	Black Oxide
KZCN	h6	φ0.01	⊥0.01	1045 Carbon Steel or Equivalent	—	—
KZCC						Black Oxide
KZCP						Electroless Nickel Plating
KZCF	h6	φ0.01	⊥0.01	1045 Carbon Steel or Equivalent	Induction Hardened Surface Hardness 50 HRC min.	—

ⓐ LA+LB ≤ L/2  
 ⓑ c=L-(LA+LB)  
 ⓒ The shaft may have Center holes on ends.  
 ⓓ There is an undercut less than 1.5 mm in width and less than 0.3 mm in depth on the stepped part.  
 ⓔ Step P of KZCE has no grinding undercut. Step R=0.2 or less.

\*Ds: Tap dimension of Bearing Inner Race, reference: P.1028.

Part Number	D	0.5 mm Increment		*Ds
		L	P	
KZCE (D10-30)	10	50.0-300.0	6	8
	12		8	9.5
	15		10	11.5
	20		12	14
	25		15	18
KZCN	25	100.0-500.0	17	21
	30		20	24
	35		25	29
	40		30	37
	50		40	48
KZCC	10	200.0-500.0	6	8
	12		8	9.5
	15		10	11.5
	20		12	14
	25		15	18
KZCP	10	200.0-500.0	6	8
	12		8	9.5
	15		10	11.5
	20		12	14
	25		15	18
KZCF	10	200.0-500.0	6	8
	12		8	9.5
	15		10	11.5
	20		12	14
	25		15	18

Part Number Example: **KZCF50 - 450 - P45 - LA80 - LB50**

### KZCF (Induction Hardened)

When alterations on the right page are specified, the shafts are induction hardened (except the threaded sections) after machining.

As a result, this may occur:

- Due to thermal conduction to the thread, the threads may be hardened by 2-3 mm.
- Induction Hardened may shrink the keyway width (around -0.01 - -0.02). If the key becomes hard to fit, adjust it by gauging.

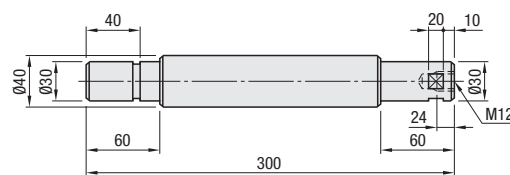
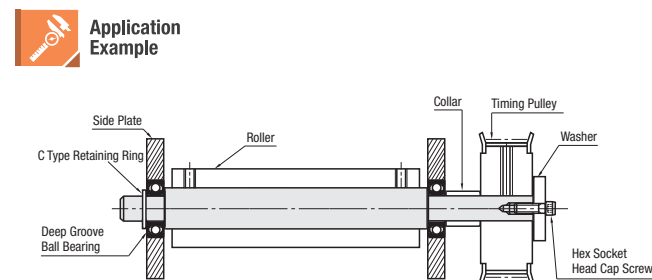
### Available Types

Type	KZCE					KZCN, KZCC, KZCP, KZCF				
	Min. L -100.0	L100.5-200.0	L200.5-300.0	L300.5-400.0	L400.5-500.0	Min. L -100.0	L100.5-200.0	L200.5-300.0	L300.5-400.0	L400.5-500.0
10	•	•	•	•	•	•	•	•	•	•
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 No. >  
Alteration Selection: A retaining ring groove, two set screw flats at 0-90° and a tap.



# Driving Shafts

## Both Ends Stepped, continued

Part Number Alterations: **KZCF40 - 300 - P30 - LA60 - LB60 - NB12 - TA40 - WB10 - GB20 - AB90** (MA, NA, KA, TA, SA, WA...etc.)

Alterations	Code			Spec.																																																																		
	Left End	Middle	Right End																																																																			
<b>Threaded Ends</b> 	MA MSA MMA	MC MSC MMC	MD MSD MMD	Adds threads at shaft ends. Specify the length of the threads. (For accuracy, coarse or fine threads can be specified by an ordering code.) Ordering Code: MA15-MSB15 1 mm Increment 5≤Thread length≤Mx5, LA(LB)-2 <table border="1"> <thead> <tr> <th>Code</th> <th>Screw Precision</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 MC</td> <td>Coarse</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 MSC</td> <td>Fine (Coarse)</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>MMA MMC</td> <td>Fine (Precision)</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>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>M30</td> <td>3.5</td> <td>M17</td> <td>1.0</td> <td>M50</td> <td>1.5</td> </tr> </tbody> </table>	Code	Screw Precision	M (Coarse)	Pitch	M (Fine)	Pitch	M (Fine)	Pitch	MA MC	Coarse	M6	1.0	M6	0.75	M25	1.5	MSA MSC	Fine (Coarse)	M10	1.5	M10	0.75	M35	1.5	MMA MMC	Fine (Precision)	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																		
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<b>Tapped Ends</b> 	NA	—	NB	Adds a tap at the shaft end. Select the thread diameter. Ordering Code: NA5-NB5 ⓐ NA, NB≤P-4 <table border="1"> <thead> <tr> <th>NA (Coarse)</th> <th>NB (Coarse)</th> </tr> </thead> <tbody> <tr> <td>M3 M4 M5 M6 M8</td> <td>Selectable</td> </tr> <tr> <td>M10 M12 M16 M20</td> <td></td> </tr> <tr> <td>M24 M30 M36</td> <td></td> </tr> </tbody> </table>	NA (Coarse)	NB (Coarse)	M3 M4 M5 M6 M8	Selectable	M10 M12 M16 M20		M24 M30 M36																																																											
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<b>Keyway Machining</b> 	KA	KC KD	KB	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 = 1 mm Increment ⓐ 3≤HA / HB / HC / HD≤100 ⓑ For keyway details refer to P.853. ⓒ When more than 2 keyways are added / the tolerances may shift by up to 0.2°. ⓓ Specify the keyway position more than 2 mm away from the stepped part.																																																																		
<b>Keyway Machining + Set Screw Flat</b> 	ZA	ZC ZD	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 = 1 mm Increment AA / AB / AC / AD = 30° Increment 30°≤AA / AB / AC / AD ≤ 330° ⓐ HA / HB / HC / HD≤100 ⓑ For keyway details refer to P.853. ⓒ Specify the keyway position more than 2 mm away from the stepped part. <table border="1"> <thead> <tr> <th rowspan="2">Keyway Position Specified</th> <th rowspan="2">Keyway Width Specified</th> <th rowspan="2">Angle Specified 30° Increment</th> <th colspan="3">D / P</th> </tr> <tr> <th>6-17</th> <th>20-40</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> </tr> <tr> <td>ZB</td> <td>HB</td> <td>AB</td> <td></td> <td></td> <td>3</td> </tr> <tr> <td>ZC</td> <td>HC</td> <td>AC</td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZD</td> <td>HD</td> <td>AD</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	20-40	45, 50	ZA	HA	AA	H	1	2	ZB	HB	AB			3	ZC	HC	AC				ZD	HD	AD																																				
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<b>Retaining Ring Groove</b> 	TA	TC TD	TB	Adds a retaining ring groove. Specify the position of a retaining ring groove. Ordering Code: TA10-TB10 TA / TB = 1 mm Increment 4≤TA (TB)≤LA (LB)-3 ⓐ Retaining rings are attached. ⓑ Detailed "Retaining Ring Groove Dimensions Rotary & Driving Shafts" on P.853. <table border="1"> <thead> <tr> <th rowspan="2">Material</th> <th rowspan="2">Hardness</th> <th rowspan="2">Surface Treatment</th> <th>Retaining Ring</th> </tr> <tr> <th>Material</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1045 Carbon Steel or Equivalent</td> <td rowspan="2">—</td> <td>—</td> <td>Spring Steel</td> </tr> <tr> <td>Black Oxide</td> <td>304 Stainless Steel-CSP</td> </tr> <tr> <td></td> <td></td> <td>Electroless Nickel Plating</td> <td>Spring Steel</td> </tr> </tbody> </table>	Material	Hardness	Surface Treatment	Retaining Ring	Material	1045 Carbon Steel or Equivalent	—	—	Spring Steel	Black Oxide	304 Stainless Steel-CSP			Electroless Nickel Plating	Spring Steel																																																			
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<b>Wrench Flat</b> 	SA	SD	SB	Adds a Wrench Flat. Specify the position of a wrench flat. Ordering Code: SA5 SA / SB / SD = 1 mm Increment SA / SB / SD≥0 SA≤LA-ℓ / SB≤LB-ℓ / SD≤L-LA-LB-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>10</td> <td></td> <td>15</td> <td></td> <td>20</td> <td></td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>P</th> <th>6</th> <th>8, 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<sub>1</sub></td> <td>5</td> <td>7</td> <td>10</td> <td>13</td> <td>14</td> <td>17</td> <td>19</td> <td>27</td> <td>30</td> <td>36</td> <td>38</td> </tr> <tr> <td>ℓ</td> <td></td> <td>8</td> <td></td> <td>10</td> <td></td> <td>15</td> <td></td> <td>20</td> <td></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	6	8, 10	12	15	17	20	25	30	35	40	45	W <sub>1</sub>	5	7	10	13	14	17	19	27	30	36	38	ℓ		8		10		15		20			
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<b>2 Set Screw Flats (Angle Specified)</b> 	WA	WC	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-AA0 WA / WB / WC / GA / GB / GC=1 mm Increment AA / AB / AC=30° Increment 0°≤AA / AB / AC ≤ 330° <table border="1"> <thead> <tr> <th rowspan="2">Set Screw Flat Position Specified</th> <th rowspan="2">Set Screw Flat Width Specified</th> <th rowspan="2">Angle Specified 30° Increment</th> <th colspan="3">D / P</th> </tr> <tr> <th>6-17</th> <th>20-40</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> </tr> <tr> <td>WB</td> <td>GB</td> <td>AB</td> <td></td> <td></td> <td>3</td> </tr> <tr> <td>WC</td> <td>GC</td> <td>AC</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	20-40	45, 50	WA	GA	AA	H	1	2	WB	GB	AB			3	WC	GC	AC																																										
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<b>Tolerance Change</b> 		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 KZCE.																																																																		

ⓐ For dimensions of the retaining ring groove P.853.  
 ⓑ For Keyway details, see P.853.