# Rotary Shafts - D Tolerance h9 (Cold-drawn) / h7 (Ground) / g6 (Ground)

## One End Tapped

For products uncovered by the e-Catalog Standard, see P.131.

■Select from h9 (Cold-drawn), h7 (Ground) and g6 (Ground) for your applications.

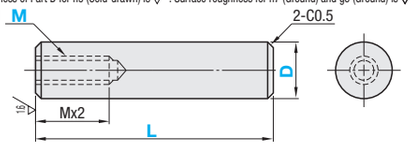
| | Type Standard | Type Wrench Flats | D Tolerance | M Material | S Surface Treatment |
|---|---|---|---|---|---|
| (1) | SFMRT | SFMRTS | h9 (Cold-drawn) | S45C Equivalent | Black Oxide |
| | PSFMRT | PSFMRTS | | | Electroless Nickel Plating |
| | SSFMRT | SSFMRTS | | SUS304 | - |
| (2) | SFHRT | SFHRTS | h7 (Ground) | S45C Equivalent | Black Oxide |
| | PSFHRT | PSFHRTS | | | Electroless Nickel Plating |
| | SSFHRT | SSFHRTS | | SUS304 | - |
| (3) | SFRT | SFRTS | g6 (Ground) | S45C Equivalent | Black Oxide |
| | PSFRT | PSFRTS | | | Electroless Nickel Plating |
| | SSFRT | SSFRTS | | SUS304 | - |
| | HFRT | - | | SCM435 H Hardness: 30 ~ 35HRC | Black Oxide |
| | PHFRT | - | | | Electroless Nickel Plating |

■Tolerance Table

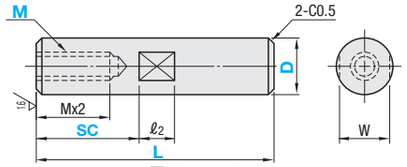
| D | h9 (Cold-drawn) | h7 (Ground) | g6 (Ground) |
|---|---|---|---|
| 4~6 | 0 / -0.030 | 0 / -0.012 | -0.004 / -0.012 |
| 8, 10 | 0 / -0.036 | 0 / -0.015 | -0.005 / -0.014 |
| 12~18 | 0 / -0.043 | 0 / -0.018 | -0.006 / -0.017 |
| 20~30 | 0 / -0.052 | 0 / -0.021 | -0.007 / -0.020 |
| 35~50 | 0 / -0.062 | 0 / -0.025 | -0.009 / -0.025 |

Surface roughness of Part D for h9 (Cold-drawn) is 6.3. Surface roughness for h7 (Ground) and g6 (Ground) is 1.6.

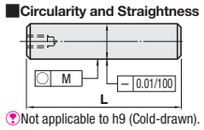
Standard




Wrench Flats




■Circularity and Straightness



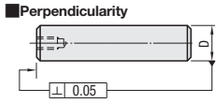

Not applicable to h9 (Cold-drawn).

■Circularity of Part D

| D over | D or Less | Circularity M |
|---|---|---|
| 3 | 13 | 0.004 |
| 13 | 20 | 0.005 |
| 20 | 40 | 0.006 |
| 40 | 50 | 0.007 |

Not applicable to h9 (Cold-drawn).

■Perpendicularity




Not applicable to h9 (Cold-drawn).

■Tolerances of L and Other Dimensions

| Dimension over | Dimension or Less | Tolerance |
|---|---|---|
| 2 | 6 | ±0.1 |
| 6 | 30 | ±0.2 |
| 30 | 120 | ±0.3 |
| 120 | 400 | ±0.5 |
| 400 | 1000 | ±0.8 |

### (1)h9 (Cold-drawn)

| Part Number Type Standard | Wrench Flats | D | L 1mm Increment | M (Coarse) Selection | SC 1mm Increment Wrench Flats Type only | W | ℓ2 |
|---|---|---|---|---|---|---|---|
| SFMRT | SFMRTS | 4 | 15.0~200.0 | 2 | - | - | - |
| | | 5 | 15.0~250.0 | 2 2.6 3 | | | |
| | | 6 | 15.0~400.0 | 2.6 3 4 | SC+ℓ2≤L<br>SC=0 or SC≥1<br>For SC≤Mx3, W-M≥2 | 5 | 8 |
| | | 8 | 15.0~500.0 | 2.6 3 4 5 6 | | 7 | |
| PSFMRT | PSFMRTS | 10 | 15.0~600.0 | 3 4 5 6 | | 8 | |
| | | 12 | 15.0~700.0 | 4 5 6 8 | | 10 | 10 |
| | | 15 | 15.0~800.0 | 4 5 6 8 10 | | 13 | |
| SSFMRT (D4, D5 or D6 is not available for SSFMRT.) | SSFMRTS (D4, D5 or D6 is not available for SSFMRTS.) | 20 | 30.0~1000.0 | 4 5 6 8 10 12 16 | | 17 | |
| | | 25 | 50.0~1000.0 | 4 5 6 8 10 12 16 | | 22 | |
| | (Wrench flats are not available for D4 and D5.) | 30 | 60.0~1000.0 | 6 8 10 12 16 20 | | 27 | 15 |
| | | 35 | 70.0~1000.0 | 6 8 10 12 16 20 24 | | 30 | |

### (2)h7 (Ground)

When L≤Mx3, the pilot hole may go through.

| Part Number Type Standard | Wrench Flats | D | L 1mm Increment | M (Coarse) Selection | SC 1mm Increment Wrench Flats Type only | W | ℓ2 |
|---|---|---|---|---|---|---|---|
| SFHRT | SFHRTS | 4 | 15.0~200.0 | 2 | - | - | - |
| | | 5 | 15.0~250.0 | 2 2.6 3 | | | |
| | | 6 | 15.0~400.0 | 2.6 3 4 | SC+ℓ2≤L<br>SC=0 or SC≥1<br>For SC≤Mx3, W-M≥2 | 5 | 8 |
| | | 8 | 15.0~500.0 | 2.6 3 4 5 6 | | 7 | |
| | | 10 | 15.0~600.0 | 3 4 5 6 | | 8 | |
| PSFHRT | PSFHRTS | 12 | 15.0~700.0 | 4 5 6 8 | | 10 | 10 |
| | | 15 | 15.0~800.0 | 4 5 6 8 10 | | 13 | |
| SSFHRT | SSFHRTS | 17 | 30.0~900.0 | 4 5 6 8 10 12 | | 14 | |
| | | 20 | 30.0~1000.0 | 4 5 6 8 10 12 16 | | 17 | |
| | | 25 | 50.0~1000.0 | 4 5 6 8 10 12 16 | | 22 | |
| | | 30 | 60.0~1000.0 | 6 8 10 12 16 20 | | 27 | 15 |
| | | 35 | 70.0~1000.0 | 6 8 10 12 16 20 24 | | 30 | |
| | (Wrench flats are not available for D4 and D5.) | 40 | 80.0~1000.0 | 10 12 16 20 24 30 | | 36 | 20 |
| | | 50 | 100.0~1000.0 | 12 16 20 24 30 | | 41 | |

### (3)g6 (Ground)

When L≤Mx3, the pilot hole may go through.

| Part Number Type Standard | Wrench Flats | D | L 1mm Increment | M (Coarse) Selection | SC 1mm Increment Wrench Flats Type only | W | ℓ2 |
|---|---|---|---|---|---|---|---|
| SFRT | SFRTS | 4 | 15.0~200.0 | 2 | - | - | - |
| | | 5 | 15.0~250.0 | 2 2.6 3 | | | |
| | | 6 | 15.0~400.0 | 2.6 3 4 | SC+ℓ2≤L<br>SC=0 or SC≥1<br>For SC≤Mx3, W-M≥2 | 5 | 8 |
| | | 8 | 15.0~500.0 | 2.6 3 4 5 6 | | 7 | |
| | | 10 | 15.0~600.0 | 3 4 5 6 | | 8 | |
| PSFRT | | 12 | 15.0~700.0 | 4 5 6 8 | | 10 | 10 |
| | | 13 | 15.0~700.0 | 4 5 6 8 | | 11 | |
| SSFRT (D13, D16, D18 or D22 is not available for SSFRT.) | PSFRTS | *15 | 15.0~800.0 | 4 5 6 8 10 | | 13 | |
| | | 16 | 15.0~900.0 | 4 5 6 8 10 | | 14 | |
| | | 17 | 30.0~900.0 | 4 5 6 8 10 12 | | | |
| *HFRT (Only * marked sizes are available.) | SSFRTS (D13, D16, D18 or D22 is not available for SSFRTS.) | 18 | 30.0~900.0 | 4 5 6 8 10 12 | | 15 | |
| | | *20 | 30.0~1000.0 | 4 5 6 8 10 12 16 | | 17 | |
| | | 22 | 40.0~1000.0 | 4 5 6 8 10 12 16 | | 19 | |
| *PHFRT (Only * marked sizes are available.) | | *25 | 50.0~1000.0 | 4 5 6 8 10 12 16 | | 22 | |
| | (Wrench flats are not available for D4 and D5.) | *30 | 60.0~1000.0 | 6 8 10 12 16 20 | | 27 | 15 |
| | | *35 | 70.0~1000.0 | 6 8 10 12 16 20 24 | | 30 | |
| | | *40 | 80.0~1000.0 | 10 12 16 20 24 30 | | 36 | 20 |
| | | *50 | 100.0~1000.0 | 12 16 20 24 30 | | 41 | |

When L≤Mx3, the pilot hole may go through. For HFRT, PHFRT, the upper limit for L dim. is 800.

Ordering Example

| Part Number | - | L | - | M | - | SC |
|---|---|---|---|---|---|---|
| SFMRT30 | - | 250 | - | M12 | | |
| SSFHRTS25 | - | 200 | - | M8 | - | SC20 |



### (1)h9 (Cold-drawn)

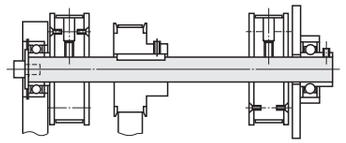
| Type D | SFMRT (S45C Equivalent, Black Oxide) SFMRTS With wrench flats, add relevant surcharge to the prices shown below. Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 | L800.1 ~ 1000.0 | PSFMRT (S45C Equivalent, Electroless Nickel Plating) PSFMRTS With wrench flats, add relevant surcharge to the prices shown below. Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 | L800.1 ~ 1000.0 | SSFMRT (SUS304) SSFMRTS With wrench flats, add relevant surcharge to the prices shown below. Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 | L800.1 ~ 1000.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | | | | - | - | - | - | - | | | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | | | | | | - | - | - | - | | | | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 6 | | | | | | | - | - | - | | | | | | | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8 | | | | | | | | - | - | | | | | | | | - | - | | | | | | | | - | - | - |
| 10 | | | | | | | | - | - | | | | | | | | - | - | | | | | | | | - | - | - |
| 12 | | | | | | | | | - | | | | | | | | | - | | | | | | | | | | - |
| 15 | | | | | | | | | - | | | | | | | | | - | | | | | | | | | | - |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | - | | | | | | | | | - | | | | | | | | | - | | | | | | | | | |
| 35 | - | | | | | | | | | - | | | | | | | | | - | | | | | | | | | |

### (2)h7 (Ground) (3)g6 (Ground)

| Type D | SFHRT, SFRT (S45C Equivalent, Black Oxide) SFHRTS, SFRTS With wrench flats, add relevant surcharge to the prices shown below. Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 | L800.1 ~ 1000.0 | PSFHRT, PSFRT (S45C Equivalent, Electroless Nickel Plating) PSFHRTS, PSFRTS With wrench flats, add relevant surcharge to the prices shown below. Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 | L800.1 ~ 1000.0 | SSFHRT, SSFRT (SUS304) SSFHRTS, SSFRTS With wrench flats, add relevant surcharge to the prices shown below. Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 | L800.1 ~ 1000.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | | | | | - | - | - | - | - | | | | | - | - | - | - | - | | | | | - | - | - | - | - |
| 5 | | | | | | - | - | - | - | | | | | | - | - | - | - | | | | | | - | - | - | - |
| 6 | | | | | | | - | - | - | | | | | | | - | - | - | | | | | | | - | - | - |
| 8 | | | | | | | | - | - | | | | | | | | - | - | | | | | | | | - | - |
| 10 | | | | | | | | - | - | | | | | | | | - | - | | | | | | | | - | - |
| 12 | | | | | | | | | - | | | | | | | | | - | | | | | | | | | | - |
| 13 | | | | | | | | | - | | | | | | | | | - | - | - | - | - | - | - | - | - | - | - |
| 15 | | | | | | | | | - | | | | | | | | | - | | | | | | | | | | - |
| 16 | | | | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | - | | | | | | | | | - | | | | | | | | | - | | | | | | | | | |
| 35 | - | | | | | | | | | - | | | | | | | | | - | | | | | | | | | |
| 40 | - | | | | | | | | | - | | | | | | | | | - | | | | | | | | | |
| 50 | - | | | | | | | | | - | | | | | | | | | - | | | | | | | | | |

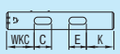
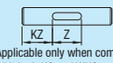
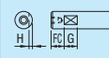
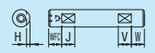
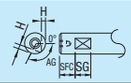
| Type D | HFRT (SCM435 Hardness 30~35HRC, Black Oxide) Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 | PHFRT (SCM435 Hardness 30~35HRC, Electroless Nickel Plating) Min. L ~ 50.0 | L50.1 ~ 100.0 | L100.1 ~ 150.0 | L150.1 ~ 200.0 | L200.1 ~ 300.0 | L300.1 ~ 400.0 | L400.1 ~ 600.0 | L600.1 ~ 800.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | |
| 30 | - | | | | | | | | - | | | | | | | |
| 35 | - | | | | | | | | - | | | | | | | |
| 40 | - | | | | | | | | - | | | | | | | |
| 50 | - | | | | | | | | - | | | | | | | |

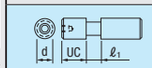
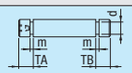
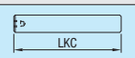
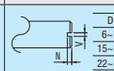
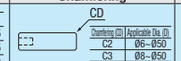
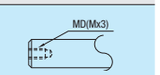
Example



Alterations

| Part Number | - | L | - | M | - | SC | - | (KC, WKC, FC···etc.) |
|---|---|---|---|---|---|---|---|---|
| SFMRTS10 | - | 150 | - | M4 | - | SC30 | - | LKC |

| Alterations (For details, see Alteration Overview P.843) | Keyway 1 | Keyway 2 | Keyway 1 (for 4th keyway) | Set Screw Flat 1 | Set Screw Flat 2 | Set Screw Flats (Angle Specified) |
|---|---|---|---|---|---|---|
| | |  |  Applicable only when combined with both KC and WKC. |  |  |  |
| Code | KC | WKC | KZ | FC | WFC | SFC |
| Dimension Increment | KC, A = 0.1mm Increment | WKC, C, E, K = 0.1mm Increment | KZ, Z = 0.1mm Increment | FC, G = 1mm Increment | WFC, J, V, W = 1mm Increment | SFC, SG = 1mm Increment<br>AG = 15° Increment |
| Ordering Example | KC50-A10 | WKC5-C20-K5-E10 | KC5-A10-WKC20-C10-K60 -E10-KZ100-Z10 | FC10-G3 | WFC10-J15-W10-V20 | SFC10-SG3-AG120 |
| Conditions | Not applicable when Shaft Dia. ≤ Ø5. Key Length ≤ 100. *1, *2 | | | For H dim., see P.843. G, J, V, SG ≤ 70 | | |

| Alterations (For details, see Alteration Overview P.843) | Slit Cam Groove | Retaining Ring Groove | L Dimension Tolerance | Slit Added | Changes Part D Chamfering | Tapped Depth |
|---|---|---|---|---|---|---|
| |  For d, ℓ1 dim., see P.843. |  For m dim., see P.844. |  L<500···→L±0.05 L≥500···→L±0.1 |  Slit is added on the opposite side to the tapped thread. |  |  |
| Code | UC | TA, TB | LKC | MM | CD | MD (To specify this Alteration, replace M with MD.) |
| Dimension Increment | UC = 1mm Increment | TA, TB = 0.1mm Increment | - | - | CD = Selectable | - |
| Ordering Example | UC10 | TA10 | LKC | MM | CD2 | MD6 |
| Conditions | Not applicable when Shaft Dia. ≥ Ø13. | 2≤TA, TB≤150 | Not applicable when L≥800. | Not applicable when Shaft Dia. ≥ Ø35. | The tapped side is not machined. | Not applicable when M = 2, 2.6, 24 or 30. |

For details about Alterations, see Alteration Overview (P.843).
When combined with other alterations, ±2 degree phase difference may occur. Provide 2mm or more clearance between this alteration and others.
When multiple keyways or set screw flats are specified, they are added in the same plane. When the distance of the alterations are over 500mm, ±2 degree phase difference may occur.
*1. When multiple keyways are added with 2mm or less clearance between them, keyways will interfere.
*2. When the keyway position is less than 1mm away from the end face, R is not applied. For details, see Alteration Details on P.843.