



Size R0.3~R6

CFB



R0.3~R1.5

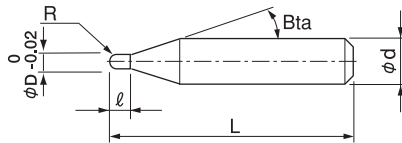
R2~R3

R4~R6

R2~R6

Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

Work Material																	
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels					Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
			~50HRC	~55HRC	~60HRC	~65HRC	~70HRC										
●	●	●	●	●				○	●		●	○		●	●		



The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

Total 14 models

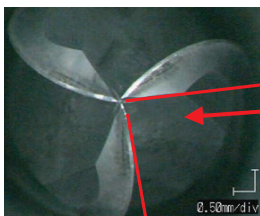
Unit (mm)

Model Number	Radius of Ball Nose R	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Suggested Retail Price ¥
CFB 3006-0090	R0.3	0.9	16°	50	4	6,890
CFB 3008-0120	R0.4	1.2	16°	50	4	6,720
CFB 3010-0150	R0.5	1.5	16°	50	4	6,230
CFB 3015-0225	R0.75	2.25	16°	50	4	6,890
CFB 3020-0300	R1	3	16°	50	4	6,720
CFB 3030-0450	R1.5	4.5	16°	60	6	6,890
CFB 3040-0600-4	R2	6	—	70	4	6,560
CFB 3040-0600			16°	70	6	6,890
CFB 3050-0750	R2.5	7.5	16°	80	6	7,790
CFB 3060-0900	R3	9	—	80	6	8,610
CFB 3080-1200	R4	12	—	90	8	12,300
CFB 3080-1200LS			120	8	13,940	
CFB 3100-1500	R5	15	—	100	10	16,320
CFB 3120-1800	R6	18	—	110	12	20,660

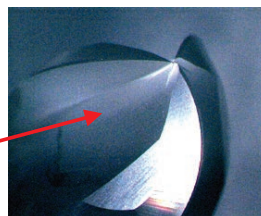
Feature 1 High efficiency

Big pocket improves chip evacuation even with multi-flutes. Achieves **deep milling**.

Refer to P.447 Deep milling high efficiency roughing examples.



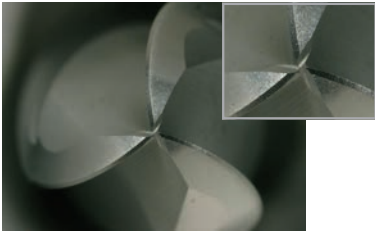
Wide angle



Deep tip pocket

Feature 2 Tip slot effect

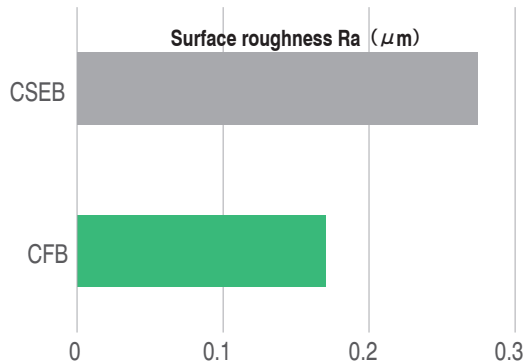
Micro 3 slot design at the tip prevents chip biting even at the peripheral speed zero point, providing **an excellent surface finish**.
Micro 3 slot design is applied to R1 or above.



- ☆ **Radius accuracy** of the whole ball
- ± 0.005 (R1 ~ R1.5)
 - ± 0.007 (R2 ~ R3)
 - ± 0.01 (R4 ~ R6)

Comparison with 2 flutes (Ra) PXA30 30HRC

Tool Diameter R3	
Spindle Speed (min ⁻¹)	14,000
Feed Rate (mm/min)	3,900
a_p (mm)	0.1
a_e (mm)	0.24
Coolant Water soluble (Through Spindle)	



CFB enables highly efficient finishing with a wide pitch of a_e 0.24.
※ The Ra of CSEB and CFB are both the same at a_e 0.12.

Feature 3 Designed for a wide range of materials

Suited for various heat-resistant alloys including Titanium and Inconel due to **large pocket, variable pitch and high lubricity coating**.
Tip slot design offers clean milling surfaces even for Copper, Aluminum and Acrylic.

Copper, Acrylic	
R3 Ball Finishing	
Spindle Speed (min ⁻¹)	30,000
Feed Rate (mm/min)	4,000
a_p (mm)	0.12
a_e (mm)	0.12
Coolant: Water soluble	



Copper C1100
55 × 50 × 23 mm
Excellent surface roughness even on Copper that prone to chatter marks.



Acrylic
55 × 50 × 23 mm
Even Acrylic shows this high transparency without polishing.

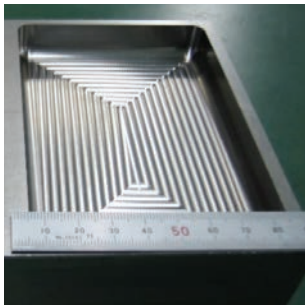
SUS304



Aluminum Alloys A7075



Titanium Alloys Ti-6Al-4V



CFB R3



· Coolant: Water soluble · Pocket size 55 × 50 × 23 mm

Process	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p (mm)	a _e (mm)	Cycle Time (min)
Roughing	9,000	3,000	0.6	3	9.5
Semi-finishing	9,000	3,000	0.7	0.7	4
Finishing	20,000	2,500	0.12	0.12	20.5
					34

CFB R3



· Coolant: Water soluble · Pocket size 55 × 50 × 23 mm

Process	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p (mm)	a _e (mm)	Cycle Time (min)
Roughing	12,000	6,000	0.6	3	5
Semi-finishing	12,000	6,000	0.7	0.7	2
Finishing	30,000	4,000	0.12	0.12	17
					24

CFB R5

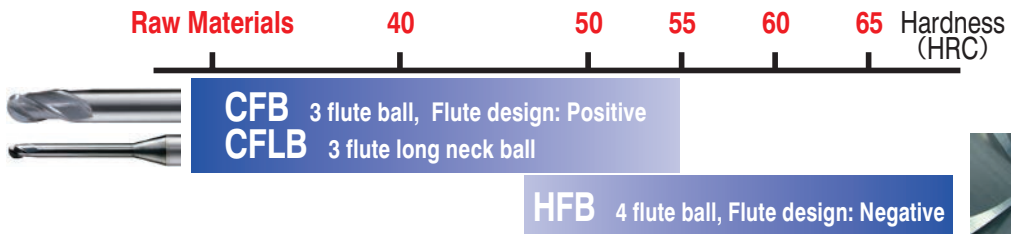


· Coolant: Water soluble · Pocket size 80 × 120 × 15 mm

Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p (mm)	a _e (mm)	Cycle Time (min)
3,900	2,000	1	3	25

Dramatically high feed with Titanium Alloys.

3 series of tip slot ball



3 flute long neck ball CFLB series (P530) and 4 flute ball HFB series for hard materials (P452) are also available.



- ø3mm Shank V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

Milling Conditions for CFB

◆Roughing

WORK MATERIAL		COPPER / ALUMINUM ALLOYS C1100 / A5052 / A7075 (~225HB)				ALLOY STEELS / PREHARDENED STEELS S45C / S50C / SKD / NAK (~45HRC)				HARDENED STEELS STAVAX / SKD61 (45~55HRC)			
Coolant		DRY (Unsuitable for Aluminum Alloys) / WET				DRY / WET				DRY			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
3006-0090	R0.3	30,000	1,000	0.03	0.13	30,000	1,000	0.03	0.13	30,000	700	0.03	0.13
3008-0120	R0.4	30,000	1,250	0.04	0.17	30,000	1,250	0.04	0.17	30,000	850	0.04	0.17
3010-0150	R0.5	30,000	1,500	0.05	0.21	30,000	1,500	0.05	0.21	30,000	1,000	0.05	0.21
3015-0225	R0.75	30,000	2,500	0.075	0.32	30,000	2,500	0.075	0.32	30,000	1,700	0.075	0.32
3020-0300	R1	30,000	3,200	0.2	0.6	30,000	3,200	0.2	0.6	30,000	2,500	0.2	0.6
3030-0450	R1.5	24,000	4,000	0.3	0.9	24,000	4,000	0.3	0.9	21,600	2,700	0.3	0.9
3040-0600	R2	18,000	4,000	0.4	1.2	18,000	4,000	0.4	1.2	16,200	2,700	0.4	1.2
3050-0750	R2.5	15,000	4,000	0.5	1.5	15,000	4,000	0.5	1.5	13,500	2,700	0.5	1.5
3060-0900	R3	12,000	4,000	0.6	1.8	12,000	4,000	0.6	1.8	10,800	2,700	0.6	1.8
3080-1200 (LS)	R4	9,000	4,000	0.8	2.4	9,000	4,000	0.8	2.4	8,100	2,700	0.75	2.1
3100-1500	R5	7,200	4,000	1	3	7,200	4,000	1	3	6,500	2,700	0.85	2.5
3120-1800	R6	6,000	4,000	1.2	3.6	6,000	4,000	1.2	3.6	5,400	2,700	0.95	3

WORK MATERIAL		TITANIUM ALLOYS / STAINLESS STEELS Ti-6Al-4V / SUS				HEAT RESISTANT ALLOYS Inconel718			
Coolant		DRY (Unsuitable for Aluminum Alloys) / WET				WET			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
3006-0090	R0.3	20,000	1,000	0.015	0.09	10,000	250	0.015	0.09
3008-0120	R0.4	20,000	1,250	0.02	0.12	10,000	310	0.02	0.12
3010-0150	R0.5	20,000	1,500	0.025	0.15	10,000	375	0.025	0.15
3015-0225	R0.75	20,000	2,500	0.035	0.22	10,000	625	0.035	0.22
3020-0300	R1	24,000	4,000	0.1	0.4	12,000	1,000	0.1	0.4
3030-0450	R1.5	16,000	4,000	0.15	0.65	8,000	1,000	0.15	0.65
3040-0600	R2	12,000	4,000	0.2	0.85	6,000	1,000	0.2	0.85
3050-0750	R2.5	10,000	4,000	0.25	1	5,000	1,000	0.25	1
3060-0900	R3	8,000	4,000	0.3	1.3	4,000	1,000	0.3	1.3
3080-1200 (LS)	R4	6,000	4,000	0.4	1.7	3,000	900	0.35	1.6
3100-1500	R5	4,800	4,000	0.5	2.1	2,400	800	0.4	1.9
3120-1800	R6	4,000	4,000	0.6	2.6	2,000	800	0.45	2.2

Apply when a deep tool setting causes the toolholder to extend beyond the full shank diameter and over the taper angle. Use the table below to adjust the parameters when compensating for extended overhang on the straight type design.

WORK MATERIAL	COPPER / CARBON STEELS / ALUMINUM ALLOYS S45C, S50C, A5052, A7075 (~225HB)				ALLOY STEELS / PREHARDENED STEELS SKD / NAK (~45HRC)				HARDENED STEELS STAVAX / SKD61 (45~55HRC)			
Overhang Length	Spindle Speed	Feed Rate	a _p Axial Depth	a _e Radial Depth	Spindle Speed	Feed Rate	a _p Axial Depth	a _e Radial Depth	Spindle Speed	Feed Rate	a _p Axial Depth	a _e Radial Depth
~3D	×1	×1~1.5(※)	×1	×1	×1	×1	×1	×1	×1	×1	×1	×1
4D	×0.9	×0.9~1.2(※)	×1	×1	×0.9	×0.9	×1	×1	×0.9	×0.9	×1	×1
5D	×0.75	×0.75	×1	×1	×0.75	×0.75	×0.9	×0.9	×0.75	×0.75	×0.85	×0.9
6D	×0.6	×0.6	×1	×1	×0.6	×0.6	×0.85	×0.9	×0.6	×0.6	×0.8	×0.85
7D	×0.45	×0.4	×0.95	×0.95	×0.45	×0.4	×0.8	×0.85	×0.45	×0.4	×0.7	×0.8
8D	×0.35	×0.3	×0.9	×0.9	×0.35	×0.3	×0.7	×0.8	×0.35	×0.3	×0.6	×0.75

WORK MATERIAL	TITANIUM ALLOYS / STAINLESS STEELS Ti-6Al-4V / SUS				HEAT RESISTANT ALLOYS Inconel718			
Overhang Length	Spindle Speed	Feed Rate	a _p Axial Depth	a _e Radial Depth	Spindle Speed	Feed Rate	a _p Axial Depth	a _e Radial Depth
~3D	×1	×1	×1	×1	×1	×1	×1	×1
4D	×0.9	×0.9	×1	×1	×0.9	×0.9	×1	×1
5D	×0.75	×0.75	×0.95	×0.95	×0.75	×0.75	×0.85	×0.9
6D	×0.6	×0.6	×0.9	×0.9	×0.6	×0.6	×0.8	×0.85
7D	×0.45	×0.4	×0.85	×0.9	×0.45	×0.4	×0.7	×0.8
8D	×0.35	×0.3	×0.85	×0.85	×0.35	×0.3	×0.6	×0.75

(※) For high efficiency milling, set the feed rate higher. For improved surface finish and/or longer tool life, reduce the feed rate.

Ø3mm Shank V Series

UDC-PCD Series

CBN Series

Square

Long Neck Square

Radius

Long Neck Radius

Taper Neck Radius

Ball / Long Shank Ball

Long Neck Ball

Taper Neck Ball

Taper

Barrel

Spiral V Cutter

Drill

Technical Data

Milling Conditions for CFB

◆Finishing (overhang length ~6D)

WORK MATERIAL		COPPER / CARBON STEELS / ALUMINUM ALLOYS S45C / S50C / A5052 / A7075 (~225HB)				ALLOY STEELS / HARDENED STEELS SKD / NAK (~45HRC)				HARDENED STEELS STAVAX / SKD61 (45~55HRC)			
Coolant		WET				DRY / OIL MIST / WET				DRY / OIL MIST			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
3020-0300	R1	53,000	4,000	0.05	0.04	45,000	3,400	0.05	0.04	36,800	2,200	0.05	0.04
3030-0450	R1.5	41,200	4,200	0.06	0.06	35,000	3,500	0.06	0.06	28,600	2,300	0.06	0.06
3040-0600	R2	29,400	4,400	0.08	0.08	24,000	3,700	0.08	0.08	20,400	2,400	0.08	0.08
3060-0900	R3	17,600	4,600	0.1	0.12	14,000	3,900	0.1	0.12	12,300	2,600	0.1	0.12
3080-1200	R4	14,600	4,600	0.1	0.16	12,400	3,900	0.1	0.16	10,200	2,600	0.1	0.16
3100-1500	R5	11,700	4,700	0.1	0.2	9,900	4,000	0.1	0.2	8,200	2,600	0.1	0.2
3120-1800	R6	8,800	4,800	0.1	0.24	7,400	4,000	0.1	0.24	6,200	2,700	0.1	0.24

WORK MATERIAL		TITANIUM ALLOYS / STAINLESS STEELS Ti-6Al-4V / SUS				HEAT RESISTANT ALLOYS Inconel718			
Coolant		WET				WET			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
3020-0300	R1	44,200	2,700	0.05	0.04	22,100	1,100	0.05	0.04
3030-0450	R1.5	34,400	2,800	0.06	0.06	17,200	1,100	0.06	0.06
3040-0600	R2	24,600	3,000	0.08	0.08	12,300	1,200	0.08	0.08
3060-0900	R3	14,800	3,200	0.1	0.12	7,400	1,300	0.1	0.12
3080-1200	R4	12,300	3,200	0.1	0.16	6,200	1,300	0.1	0.16
3100-1500	R5	9,900	3,200	0.1	0.2	5,000	1,300	0.1	0.2
3120-1800	R6	7,500	3,300	0.1	0.24	3,800	1,400	0.1	0.24

*When finishing with an overhang of over 6 x D, fine adjustments are recommended.

- 3mm Shank V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

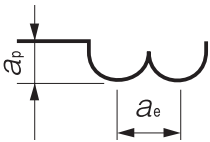
Milling Conditions for CFB

◆ Deep and high efficiency roughing (3xD overhang for straight type)

This parameter is effective in using the machine that has low acceleration and applying complex milling path that repeats accelerating/braking frequently.

WORK MATERIAL		COPPER / CARBON STEELS / ALUMINUM ALLOYS S45C / S50C / A5052 / A7075 (~225HB)				ALLOY STEELS / HARDENED STEELS SKD / NAK (~45HRC)			
Coolant		DRY (Unsuitable for Aluminum Alloys) / WET				DRY / WET			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
3020-0300	R1	30,000	2,500	0.4	0.8	30,000	2,500	0.4	0.8
3030-0450	R1.5	20,000	2,500	0.6	1.2	20,000	2,500	0.6	1.2
3040-0600	R2	15,000	2,500	0.8	1.6	15,000	2,500	0.8	1.6
3060-0900	R3	10,000	2,500	1.2	2.4	10,000	2,500	1.2	2.4
3080-1200	R4	7,100	2,350	1.6	3.2	7,100	2,350	1.6	3.2
3100-1500	R5	5,400	2,250	2	4	5,400	2,250	2	4
3120-1800	R6	4,500	2,250	2.4	4.8	4,500	2,250	2.4	4.8

WORK MATERIAL		HARDENED STEELS STAVAX / SKD61 (45~55HRC)				TITANIUM ALLOYS / STAINLESS STEELS Ti-6Al-4V / SUS			
Coolant		DRY				WET			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
3020-0300	R1	24,000	1,500	0.4	0.8	19,200	2,000	0.2	0.6
3030-0450	R1.5	16,000	1,500	0.6	1.2	12,800	2,000	0.3	0.9
3040-0600	R2	12,000	1,500	0.8	1.6	9,600	2,000	0.4	1.2
3060-0900	R3	8,000	1,500	1.2	2.4	6,400	2,000	0.6	1.8
3080-1200	R4	5,600	1,400	1.5	3	4,800	2,000	0.8	2.4
3100-1500	R5	4,300	1,300	1.7	3.5	3,900	2,000	1	3
3120-1800	R6	3,550	1,300	1.9	4.2	3,200	2,000	1.2	3.6



- Note:
- Fix the work piece firmly, and use a machine that has high rigidity and generates a low level of vibration especially under high efficient deep milling condition in roughing process.
 - Decrease the feed rate more than 50% from the milling parameters when slot milling.
 - Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machines maximum speed, or when the tool is chattering and heats up to a red color.
 - Decrease both spindle speed and feed rate 10% for slope milling.
 - Decrease both spindle speed and feed rate to meet required precision and to prevent the shank making contact with the work piece.
 - DRY: air blow, WET: water soluble or oil coolant.
 - A long overhang may cause tool deflection, leaving uncut material.

CFB Series
SKD61 (47HRC)
Milling Video



Ø3mm Shank
V Series

UDC-PCD
Series

CBN
Series

Square

Long Neck
Square

Radius

Long Neck
Radius

Taper Neck
Radius

Ball / Long
Shank Ball

Long Neck
Ball

Taper Neck
Ball

Taper

Barrel

Spiral
V Cutter

Drill

Technical Data