Size **R0.1～R3** UDC

UDCB

MG | UDC | 0° | R ±0.01 | Shank Dia 0/-0.005

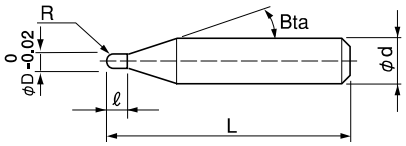
Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

Work Material																
Carbon Steels	Alloy Steels	Prehardened Steels	Hardened Steels					Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
S45C S55C	SK / SCM SUS	NAK HPM	～50HRC	～55HRC	～60HRC	～65HRC	～70HRC										
													○ *1			★	● *2

*1 DCB/DCLB series are highly recommended for Glass Filled Plastic milling.
*2 Hard Brittle (Non-Metallic) Materials: Ceramics (Alumina, Zirconia, etc.), Glasses and etc.

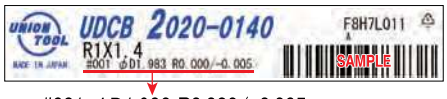
Features

Ball type End Mills for milling Cemented Carbide and Hard Brittle (Non-Metallic) Materials.
Developed to give improved hardness and durability, new Diamond coating also has outstanding adhesion to the cutting tool.
By combining the new coating with optimum cutting geometries, the tool "deep cuts" the work piece .
Leaves a burr and pit free surface finish on semi-roughing & finishing process.



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.

Label Sample



#001 φD1.983 R0.000/−0.005

Diameter and Ball R accuracy measurements are printed on the label to support High Precision milling.

Total 14 models　　Unit（mm）

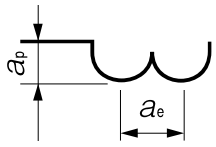
Model Number	Radius of Ball Nose R	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Suggested Retail Price ¥
UDCB 2002-0014	R0.1	0.14	16°	50	4	39,160
UDCB 2003-0021	R0.15	0.21	16°	50	4	39,160
UDCB 2004-0028	R0.2	0.28	16°	50	4	35,660
UDCB 2005-0035	R0.25	0.35	16°	50	4	35,660
UDCB 2006-0042	R0.3	0.42	16°	50	4	32,000
UDCB 2007-0049	R0.35	0.49	16°	50	4	32,000
UDCB 2008-0056	R0.4	0.56	16°	50	4	32,000
UDCB 2009-0063	R0.45	0.63	16°	50	4	32,000
UDCB 2010-0070	R0.5	0.7	16°	50	4	32,000
UDCB 2020-0140	R1	1.4	16°	50	4	32,000
UDCB 2030-0210	R1.5	2.1	16°	60	6	35,160
UDCB 2040-0280	R2	2.8	16°	60	6	35,160
UDCB 2050-0350	R2.5	3.5	16°	60	6	35,160
UDCB 2060-0420	R3	4.2	—	60	6	35,160

Milling Conditions for UDCB

WORK MATERIAL			CEMENTED CARBIDE(≧87HRA)					CEMENTED CARBIDE(<87HRA)					HARD BRITTLE MATERIALS				
Model Number	Radius of Ball Nose (mm)	Length of Cut (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a_p (mm)	a_p (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a_p (mm)	a_p (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a_p (mm)	a_e (mm)
2002-0014	**R0.1**	0.14	30,000	100	10	0.01	0.01	30,000	100	10	0.01	0.01	30,000	100	10	0.01	0.01
2003-0021	**R0.15**	0.21	30,000	125	13	0.015	0.03	30,000	125	13	0.015	0.03	30,000	125	13	0.015	0.03
2004-0028	**R0.2**	0.28	30,000	150	15	0.02	0.08	30,000	150	15	0.02	0.08	30,000	150	15	0.02	0.08
2005-0035	**R0.25**	0.35	30,000	175	18	0.025	0.11	30,000	175	18	0.025	0.11	30,000	175	18	0.025	0.11
2006-0042	**R0.3**	0.42	30,000	200	20	0.03	0.14	30,000	200	20	0.03	0.14	30,000	200	20	0.03	0.14
2007-0049	**R0.35**	0.49	30,000	225	23	0.035	0.17	30,000	225	23	0.035	0.17	30,000	225	23	0.035	0.17
2008-0056	**R0.4**	0.56	30,000	250	25	0.04	0.19	30,000	250	25	0.04	0.19	30,000	250	25	0.04	0.19
2009-0063	**R0.45**	0.63	30,000	275	28	0.045	0.22	30,000	275	28	0.045	0.22	30,000	275	28	0.045	0.22
2010-0070	**R0.5**	0.7	30,000	300	30	0.05	0.25	20,000	400	200	0.35	0.075	30,000	300	30	0.05	0.25
2020-0140	**R1**	1.4	30,000	300	100	0.1	0.3	16,500	420	210	0.25	0.1	24,000	240	100	0.1	0.3
2030-0210	**R1.5**	2.1	27,500	275	140	0.125	0.33	11,000	280	140	0.38	0.15	24,000	240	120	0.125	0.33
2040-0280	**R2**	2.8	24,000	240	120	0.15	0.35	8,250	300	150	0.5	0.2	24,000	240	120	0.15	0.35
2050-0350	**R2.5**	3.5	22,000	220	110	0.175	0.37	6,600	330	160	0.6	0.25	22,000	220	110	0.175	0.37
2060-0420	**R3**	4.2	20,000	200	100	0.2	0.4	5,500	280	140	0.65	0.28	20,000	200	100	0.2	0.4

These milling parameters are based on VF-20, VM-40, VC-70, VU-70 (TAS standard) for Cemented Carbide, and Alumina for Hard Brittle Materials.
These are for reference only.
Tool life may differ depending on the type of Cemented Carbide / Hard Brittle Materials. For best result, fine parameter adjustments may be required, depending on the materials of Cemented Carbide / Hard Brittle Materials; milling shape and strategy; machine rigidity and spindle capability.

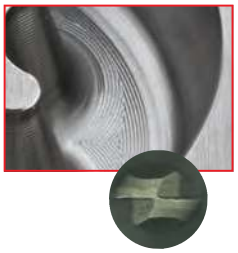
※ Feed Rate2: Feed rate of approach and *connection moves.
*Changing from one engagement point to the next.



Note:
- This application requires a high cutting force. A machine with poor rigidity and high vibration is not recommended.
- Allow sufficient machine and spindle warm-up time for stability and to remove any expansion of the main spindle before running the program.
- Tool setting length should achieve the least possible overhang.
- Avoid contact with the coated area of the shank. This will prevent tip vibration and tool jamming in the collet / holder.
- Run-out and vibration should be checked dynamically at the tool point while mounted in the machine and both should achieve the lowest level possible.
- Use an inclined or helical approach (Recommended inclination angle: <5 degree).
- Decrease both spindle speed and feed rate proportionally.
- Air blow is highly recommended for longer tool life. Both oil mist and oil coolant are alternatives.
- Recommend water soluble coolant for Hard Brittle (Non-Metallic) Materials.
- When milling some work pieces, heavier chips may be created. To evacuate these chips it is important to accurately position the coolant nozzle on the milling part.
- Remove chips to prevent heat generation and ignition during milling process.
- Protective gear, such as safety glasses and face guards are required when milling.
- Chips / dust generated while milling can have adverse affects on the machine parts if they are not properly evacuated. Take steps to assure proper evacuation.

Cemented Carbide Hexalobular milled with UDCB R0.5 x L0.7 — VF-20（92.5HRA）

One R0.5 ball end mill removed 91 mm³ of material

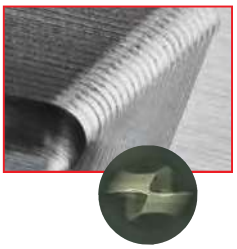


Work size: ϕ9 x Depth 2.2 mm

Spindle Speed	30,000 min^{-1}
Feed Rate	300 mm/min
a_p	0.05 mm
a_e	0.3 mm（Bottom Surface a_e=0.05 mm）
Coolant	Oil Mist
Cycle Time	39 min
Material Removal Amount	91.7 mm³　2.35 mm³/min

Cemented Carbide Pyramid milled with UDCB R0.5 x L0.7 — VM-40（90HRA）

Clean cutter traces! Equal surface condition!



Work size: 6.6 mm x Depth 1.85 mm

Spindle Speed	30,000 min^{-1}
Feed Rate	300 mm/min
a_p	0.05 mm
a_e	0.25 mm（Bottom Surface a_e=0.05 mm）
Coolant	Oil Mist
Cycle Time	24 min
Material Removal Amount	41.3 mm³　1.72 mm³/min

UDCB Series
VM-40(90HRA)
Pyramid Milling Video

UDCB Series
VF-20(92.5HRA)
Hexalobular Milling Video

Versatile coating!

Alumina / Zirconia Hexalobular milled with UDCB R0.5 x L0.7

Alumina Al_2O_3

Zirconia ZrO_2

Tool	UDCB 2010-0070 (R0.5 × 0.7)
Work Material	Alumina Al_2O_3 / Zirconia ZrO_2
Spindle Speed	30,000 min^{-1}
Feed Rate	300 mm/min
a_p	0.05 mm
a_e	0.05 mm
Coolant	Air Blow (Nozzle)
Cycle Time	98 min
Material Removal Amount	88.4 mm^3 0.9 mm^3/min

Size : ϕ9 x Depth 2.2 mm