Size R0.1～R6

Short Shank Ball

HB-S

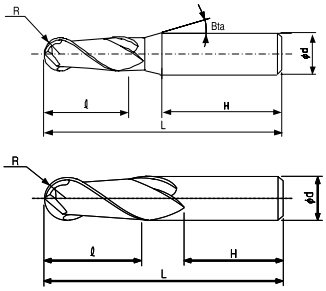
Super MG | HARD MAX | 30° | R ±0.005 R0.1～R3 | R ±0.007 R4～R6 | Shank Dia 0/-0.005

Material Applications（☆ Highly Recommended ◎ Recommended ○ Suggested）

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

Features

Shorter overhang offers higher feed rates and better precision.
Offers outstanding heat resistance and low friction properties for hard milling up to 65HRC.
Offers market leading, longer tool life.



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 15 models

Unit（mm）

Model Number	Radius of Ball Nose R	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter φ d	Shank Length H	Price (¥)
HB 2002-0020S	R0.1	0.2	16°	40	4	31.0	9,720
HB 2004-0040S	R0.2	0.4	16°	40	4	31.0	5,400
HB 2006-0060S	R0.3	0.6	16°	40	4	31.0	4,800
HB 2008-0080S	R0.4	0.8	16°	40	4	31.5	4,800
HB 2010-0100S	R0.5	1	16°	40	4	31.5	4,440
HB 2012-0120S	R0.6	1.2	16°	40	4	31.5	5,400
HB 2015-0150S	R0.75	1.5	16°	40	4	31.5	5,400
HB 2020-0200S	R1	2	16°	40	4	30.5	3,960
HB 2030-0300S	R1.5	3	16°	40	4	27.0	4,800
HB 2040-0400S	R2	4	16°	45	6	30.5	5,260
HB 2050-0500S	R2.5	5	16°	50	6	34.0	6,240
HB 2060-0600S	R3	6	—	50	6	31.5	6,600
HB 2080-0800S	R4	8	—	60	8	37.5	9,960
HB 2100-1000S	R5	10	—	60	10	31.0	12,000
HB 2120-1200S	R6	12	—	60	12	28.5	16,440

Milling Conditions for HB/HB-S

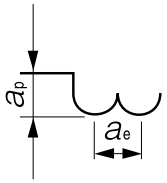
WORK MATERIAL			Copper OFC/TPC				PREHARDENED STEELS HARDENED STEELS NAK/SKD (30～45HRC)				HARDENED STEELS SKD/SKT (45～55HRC)				HARDENED STEELS SKD/SKT (55～65HRC)				
Model Number	Radius of Ball Nose (mm)	Length of Cut (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial 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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	
20006	R0.03	0.06	40,000	200	0.005 or below	0.030	40,000	160	0.003 or below	0.030	—	—	—	—	—	—	—	—	※
20008	R0.04	0.08	40,000	260	0.007 or below	0.040	40,000	200	0.004 or below	0.040	—	—	—	—	—	—	—	—	※
2001	R0.05	0.1	40,000	300	0.01 or below	0.050	40,000	300	0.005 or below	0.040	30,000	200	0.004 or below	0.040	—	—	—	—	※
2002	R0.1	0.2	54,000	430	0.012	0.008	54,000	630	0.020	0.060	44,300	500	0.016	0.048	32,800	375	0.010	0.028	
		0.3	54,000	430	0.007	0.008	54,000	430	0.020	0.051	44,300	345	0.016	0.040	32,800	260	0.010	0.023	
2003	R0.15	0.3	54,000	720	0.020	0.013	54,000	750	0.030	0.090	44,300	600	0.024	0.072	32,800	450	0.015	0.042	
		0.45	54,000	720	0.012	0.013	54,000	715	0.030	0.075	44,300	575	0.024	0.060	32,800	430	0.015	0.035	
2004	R0.2	0.4	54,000	870	0.028	0.016	54,000	1,000	0.040	0.120	44,300	800	0.032	0.096	32,800	600	0.020	0.056	
		0.6	54,000	870	0.016	0.016	54,000	880	0.040	0.105	44,300	700	0.032	0.084	32,800	525	0.020	0.049	
2005	R0.25	0.5	56,000	1,250	0.035	0.022	53,000	1,250	0.050	0.150	43,500	1,000	0.040	0.120	32,200	750	0.025	0.070	
		0.75	56,000	1,250	0.021	0.022	50,000	1,000	0.050	0.125	41,350	800	0.040	0.100	30,600	600	0.025	0.058	
2006	R0.3	0.6	58,000	1,510	0.042	0.026	52,000	1,380	0.060	0.180	42,650	1,100	0.048	0.144	31,500	825	0.030	0.084	
		0.9	58,000	1,510	0.025	0.026	48,500	1,020	0.060	0.155	40,500	810	0.048	0.124	30,000	610	0.030	0.072	
2008	R0.4	0.8	52,000	1,870	0.056	0.036	48,000	1,500	0.080	0.240	39,500	1,200	0.064	0.192	29,250	900	0.040	0.112	
		1.2	52,000	1,870	0.033	0.036	45,000	1,085	0.080	0.200	37,500	870	0.064	0.160	27,800	650	0.040	0.093	
2010	R0.5	1	41,000	1,660	0.063	0.040	45,000	1,560	0.100	0.300	36,900	1,250	0.080	0.240	27,300	940	0.050	0.140	
		1.5	41,000	1,660	0.037	0.040	42,000	1,250	0.100	0.255	35,000	1,000	0.080	0.200	25,900	750	0.050	0.117	
		2.5	41,000	1,660	0.022	0.040	40,000	1,000	0.100	0.200	31,500	800	0.080	0.160	23,000	600	0.050	0.090	
2012	R0.6	1.2	34,000	1,740	0.072	0.051	40,100	1,550	0.120	0.360	32,800	1,250	0.096	0.288	24,400	940	0.060	0.168	★
2015	R0.75	1.5	27,000	1,830	0.087	0.068	35,000	1,600	0.150	0.450	28,700	1,280	0.120	0.360	21,500	960	0.075	0.210	
		2	27,000	1,830	0.052	0.068	34,500	1,250	0.150	0.382	27,300	1,000	0.120	0.300	20,000	750	0.075	0.175	
		4	27,000	1,830	0.052	0.068	34,000	1,000	0.150	0.325	26,000	800	0.120	0.260	19,250	600	0.075	0.152	
2020	R1	2	20,000	1,780	0.112	0.089	30,000	1,850	0.200	0.600	24,600	1,480	0.160	0.480	18,250	1,110	0.100	0.280	
		3	20,000	1,780	0.080	0.089	27,900	1,500	0.200	0.510	23,300	1,200	0.160	0.408	17,250	900	0.100	0.238	
		6	20,000	1,780	0.067	0.089	26,500	1,350	0.200	0.435	22,000	1,080	0.160	0.348	16,250	810	0.100	0.203	
2025	R1.25	2.5	16,000	1,840	0.090	0.115	28,000	2,100	0.250	0.750	23,000	1,680	0.200	0.600	17,000	1,260	0.125	0.350	
		3.75	16,000	1,840	0.080	0.115	27,500	1,850	0.250	0.640	21,850	1,480	0.200	0.512	16,250	1,110	0.125	0.299	
		6	16,000	1,840	0.067	0.115	25,500	1,600	0.250	0.542	21,000	1,280	0.200	0.430	15,500	960	0.125	0.251	
2030	R1.5	3	13,000	2,220	0.197	0.171	25,500	2,520	0.300	0.957	21,000	2,050	0.240	0.766	15,500	1,530	0.150	0.447	★
		4.5	13,000	2,220	0.168	0.171	25,500	2,470	0.300	0.900	21,000	2,000	0.240	0.720	15,500	1,500	0.150	0.420	
		8	13,000	2,220	0.100	0.171	25,500	2,350	0.300	0.765	21,000	1,880	0.240	0.612	15,500	1,410	0.150	0.357	
2040	R2	4	10,000	2,080	0.266	0.208	21,000	2,450	0.400	1.380	17,300	1,960	0.320	1.100	12,800	1,470	0.200	0.644	★
		6	10,000	2,080	0.200	0.208	21,000	2,400	0.400	1.200	17,300	1,920	0.320	0.960	12,800	1,440	0.200	0.560	
		8	10,000	2,080	0.134	0.208	21,000	2,350	0.400	1.020	17,300	1,880	0.320	0.816	12,800	1,410	0.200	0.476	

※ For slotting, decrease feed rate more than 50% from the table.

Milling Conditions for HB/HB-S

WORK MATERIAL			Copper OFC/TPC				PREHARDENED STEELS HARDENED STEELS NAK/SKD (30～45HRC)				HARDENED STEELS SKD/SKT (45～55HRC)				HARDENED STEELS SKD/SKT (55～65HRC)				
Model Number	Radius of Ball Nose (mm)	Length of Cut (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)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	
2050	R2.5	5	8,300	1,990	0.215	0.240	18,000	2,560	0.500	1.660	14,800	2,050	0.400	1.330	11,000	1,530	0.250	0.770	★
		8	8,300	1,990	0.200	0.240	18,000	2,450	0.500	1.500	14,800	1,960	0.400	1.200	11,000	1,470	0.250	0.700	
		12	8,300	1,990	0.180	0.240	18,000	2,300	0.500	1.275	14,800	1,840	0.400	1.020	11,000	1,380	0.250	0.595	
2060	R3	6	6,900	1,940	0.290	0.281	16,000	2,700	0.600	2.340	13,000	2,160	0.480	1.870	9,600	1,620	0.300	1.090	★
		10	6,900	1,940	0.250	0.281	16,000	2,500	0.600	1.800	13,000	2,000	0.480	1.440	9,600	1,500	0.300	0.840	
		12	6,900	1,940	0.230	0.281	16,000	2,400	0.600	1.530	13,000	1,920	0.480	1.225	9,600	1,440	0.300	0.715	
2080	R4	8	5,720	1,000	0.400	0.175	12,500	2,300	0.800	3.100	10,250	1,840	0.640	2.480	7,600	1,380	0.400	1.446	★
		12	5,720	1,000	0.400	0.175	12,500	2,100	0.800	2.400	10,250	1,680	0.640	1.920	7,600	1,260	0.400	1.120	
		14	5,720	1,000	0.400	0.175	12,500	2,000	0.800	2.050	10,250	1,600	0.640	1.640	7,600	1,200	0.400	0.957	
2100	R5	10	4,550	700	0.500	0.154	10,500	2,200	1.000	3.750	8,650	1,780	0.800	3.000	6,400	1,340	0.500	1.750	★
		15	4,550	700	0.500	0.154	10,500	1,900	1.000	3.000	8,650	1,520	0.800	2.400	6,400	1,140	0.500	1.400	
		18	4,550	700	0.500	0.154	10,500	1,700	1.000	2.550	8,650	1,360	0.800	2.040	6,400	1,020	0.500	1.190	
2120	R6	12	3,770	600	0.600	0.159	9,000	1,850	1.200	4.420	7,380	1,480	0.960	3.540	5,450	1,110	0.600	2.060	★
		18	3,770	600	0.600	0.159	9,000	1,700	1.200	3.600	7,380	1,360	0.960	2.880	5,450	1,020	0.600	1.680	
		22	3,770	600	0.600	0.159	9,000	1,600	1.200	3.050	7,380	1,280	0.960	2.440	5,450	960	0.600	1.423	
Milling Amount			Semi-finishing～Finishing: See parameters in above table. Roughing: a_e≦0.4D Finishing: a_p>0.1 (Max 0.1)				Semi-finishing～Finishing: See parameters in above table. Roughing: a_e≦0.4D Finishing: a_p>0.1 (Max 0.1)				Semi-finishing～Finishing: See parameters in above table. Roughing: a_e≦0.35D Finishing: a_p>0.1 (Max 0.1)				Semi-finishing～Finishing: See parameters in above table. Roughing: a_e≦0.25D Finishing: a_p>0.1 (Max 0.1)				

a_p : Axial Depth (mm)
a_e : Radial Depth (mm)
D : Outside Diameter (mm)
n : Spindle Speed (min^{-1})
Vf : Feed Rate (mm/min)



Note:
·Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed.
·Recommend air blow or oil mist.
·Recommend oil coolant for Stainless Steels and Heat Resistant Alloys.
·Recommend wet coolant for Copper.

★Following size is only available on HB-S series.
2012-0120、2030-0300、2040-0400、2050-0500、2060-0600、2080-0800、2100-1000、2120-1200
*** Refer to page 227 for tool specification.**