

BRP

MULTI FUNCTIONAL MILLING



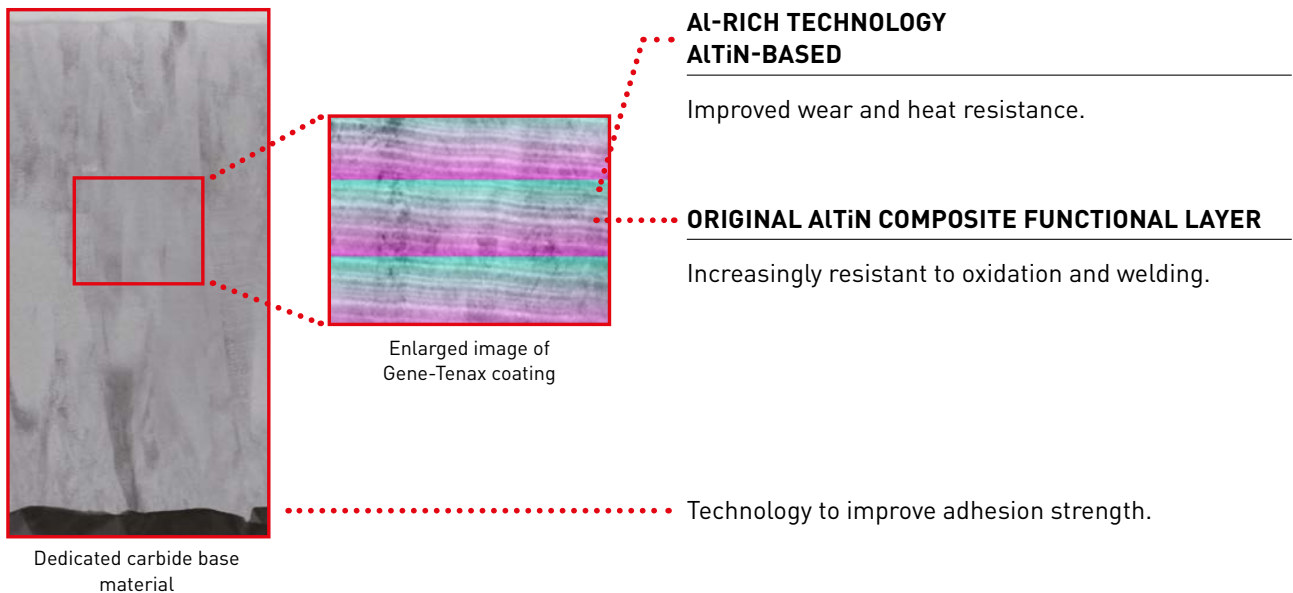
MP1220 / MP1230* / MP1240*

MULTI-LAYER PVD COATING FOR MILLING

ONE INSERT SERIES TO SOLVE ALL PROBLEMS WHEN MACHINING STEELS, STAINLESS STEELS, HEAT RESISTANT AND TITANIUM ALLOYS.

GENE-TENAX COATING

By controlling the coating structure at the nano level, damage to the coating has been vastly reduced compared to conventional lamination. By successfully laminating multiple films, simultaneous strengthening of heat, wear and welding resistance is achieved. Additionally the coating is now much less prone to cracking and with the increased adhesive strength, the most stable grade for milling has been created.



ACHIEVES TOUGHNESS FOR A WIDE RANGE OF WORK MATERIALS

STEEL MACHINING DAMAGE



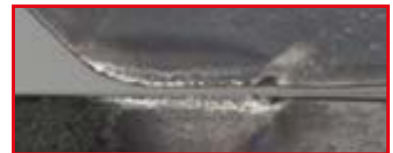
Cutting edge that is resistant to wear when machining steel

STAINLESS STEEL MACHINING DAMAGE



Cutting edge that is less susceptible to notching when machining stainless steel

HEAT RESISTANT AND TITANIUM ALLOYS MACHINING DAMAGE



Cutting edge that is resistant to chipping when machining heat resistant and titanium alloys



Thermal cracking



Notching

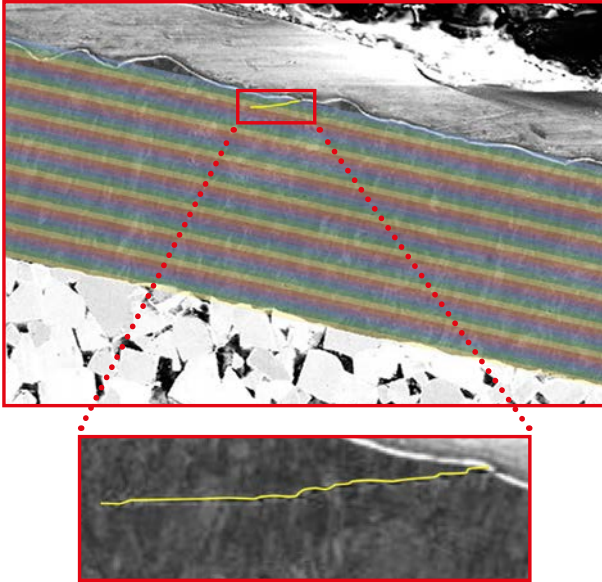


Chipped cutting edge

NEW MULTILAYER TECHNOLOGY

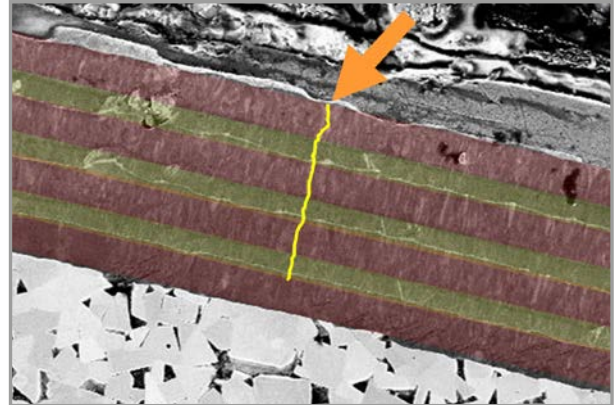
The adoption of a new multi-layer technology has succeeded in suppressing crack propagation and dramatically improved fracture resistance when compared to conventional technology.

MP1200 SERIES MULTI-LAYER TECHNOLOGY



Prevents cracks

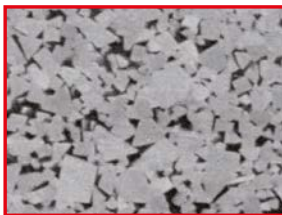
CONVENTIONAL LAYER TECHNOLOGY



MULTI-GRADE SYSTEM

Using simulation technology, precise analysis of the cutting edge load and temperature when machining different workpiece materials was carried out. This led to the creation of different substrates for three different grades and ensures optimal performance for each type of workpiece material. Ensuring the best performance over a wide range of applications.

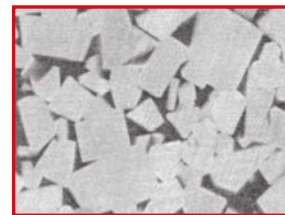
MP1220



MP1230*



MP1240*



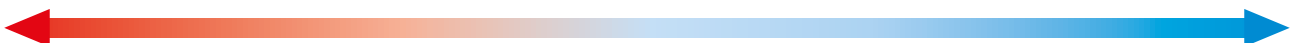
2µm

SELECTION GUIDELINES

Steel, Carbon steel

Stainless steel

**Titanium alloys,
Heat resistant alloys ***



- Hard grade
- Stable cutting
- Emphasis on wear resistance and mechanical properties

- Tough grade
- Unstable cutting
- Emphasis on fracture resistance and thermal properties

*

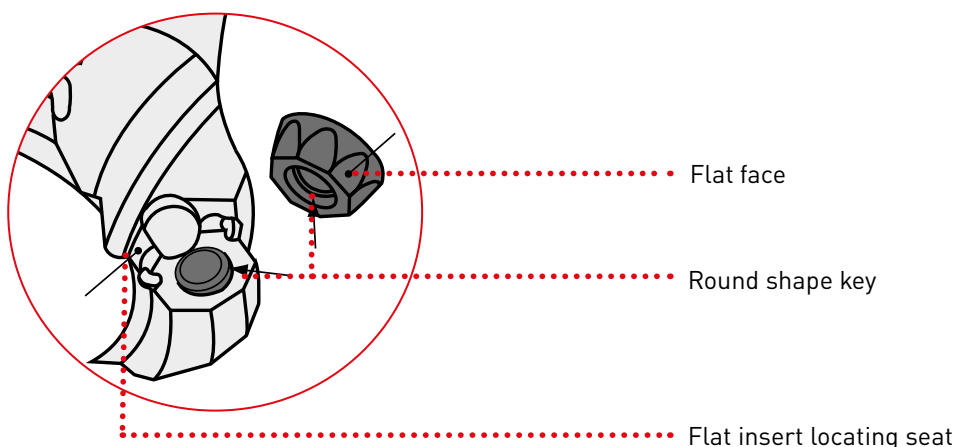
MULTI FUNCTIONAL MILLING



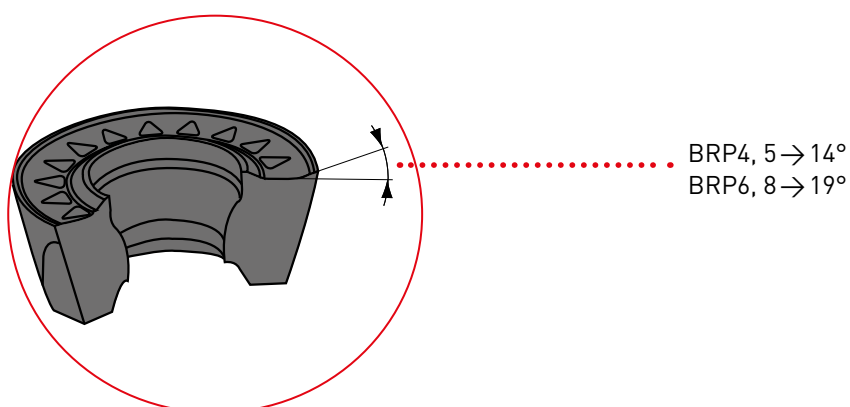
- 11° positive insert
- Round shape insert with a strong cutting edge
- Wide range of tools available
- Suitable for mould machining

BRP

PREVENTION OF INSERT MOVEMENT



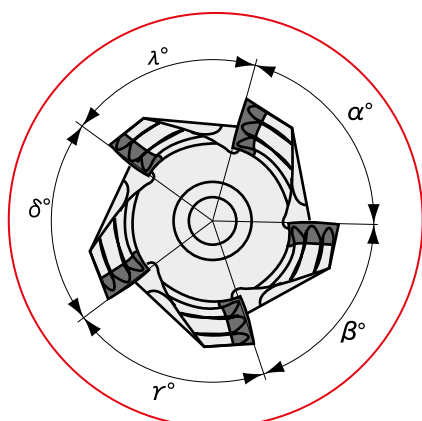
A flat insert locating seat and matching insert face prevents the insert from rotating while cutting. A round shape key prevents insert movement by absorbing the cutting load and resisting the centrifugal force caused by the rotation of the tool.



JS chipbreaker with a large rake angle provides excellent sharpness. The feed rate can be increased by 15 % and the improved chip control helps to prevent insert fracturing.

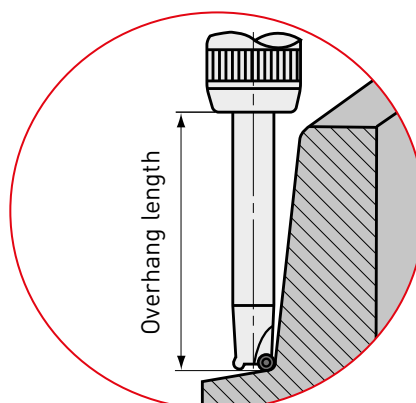
PREVENT CHATTERING/VIBRATION

The inserts are arranged in an irregular pitch. This arrangement prevents synchronised vibration resulting in the elimination of chattering.



COMPLETE SERIES LINEUP

The optimum tool can be selected from a variety of insert sizes and body types.



MX3030

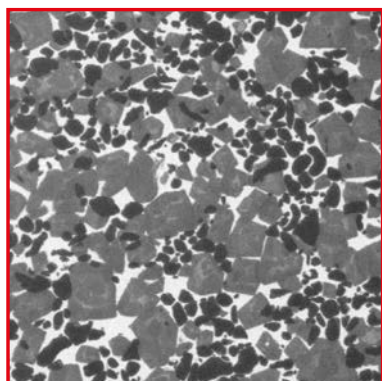
NEW CERMET GRADE FOR A WIDER RANGE OF APPLICATIONS

Enables excellent surface finishes even at high efficiency machining conditions.

IMPROVED MACHINING EFFICIENCY BY MAINTAINING EXCELLENT SURFACE FINISHES EVEN AT LARGE DEPTHS OF CUT

Cermet has a low affinity with iron, excellent thermal stability and oxidation resistance, and is therefore a suitable grade for finishing. However, it does not have the same bonding strength as cemented carbide thereby creating the challenge to compensate for fracture resistance.

MX3030 solves the challenge with higher thermal conductivity than conventional products and has excellent thermal cracking resistance. Therefore, it is possible to suppress wear and maintain high quality surface finishes. Also, since MX3030 has excellent toughness, improved machining efficiency even at large depths of cut can be realised.



MX3030

A special alloy is used for the binder material



Fracture resistance properties increased

High hardness Ti compound particles are used in the substrate



High wear resistance properties



MV1000 SERIES

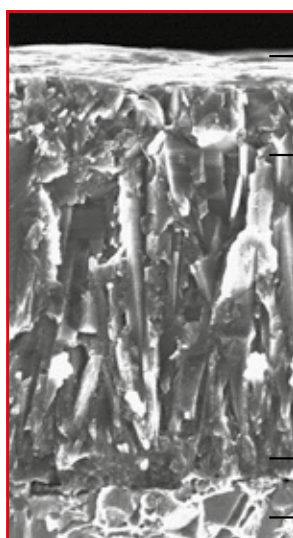
COATED CARBIDE GRADE FOR MILLING

ADVANCED WEAR RESISTANCE

By adopting the newly developed Al-Rich coating technology, the (Al,Ti)N with a high Al content ratio displays very high hardness. This greatly improves oxidation and wear resistance.

ADVANCED THERMAL SHOCK RESISTANCE

The extreme heat resistance of this new series achieves amazing stability, not only during dry cutting, but also when wet cutting where inserts are usually prone to thermal cracking.



Graphical representation

EXCELLENT WELDING RESISTANCE

Smooth surface.

OUTSTANDING WEAR RESISTANCE

Newly developed Al-Rich coating.

EXCELLENT CHIPPING RESISTANCE FOR STABLE MACHINING

Newly developed bonding layer.

FRACTURE RESISTANCE FOR THE ULTIMATE STABILITY

Exclusive cemented carbide substrate.

MV1020

This grade has advanced wear and thermal shock resistance and also achieves stable cutting at unprecedented cutting speeds, especially when machining steel and ductile cast iron, thus greatly reducing work time.

MV1030

The new Al-Rich coating also provides excellent wear resistance. An unprecedented performance against sudden breakage was also realised especially during problematic wet cutting and when machining stainless steels.



Material	ISO	CVD
P Steel	P10	MV1020
	P20	
	P30	
	P40	
		MV1030

Material	ISO	CVD
M Stainless steel	M10	MV1030
	M20	
	M30	
	M40	

Material	ISO	CVD
K Cast iron	K10	MV1020
	K20	
	K30	
	K40	
		MV1030

1. Dry cutting is recommended for machining stainless steel with MV1030.

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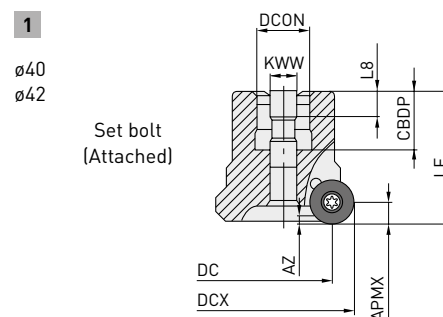
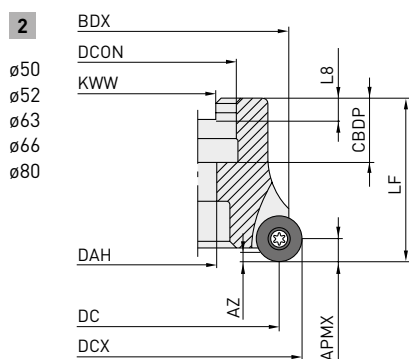


MULTI FUNCTIONAL MILLING

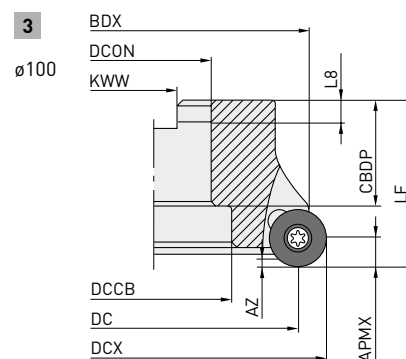
P M K S H



GAMP $\pm 5^\circ$
GAMF $\pm 4^\circ - 0^\circ$



Set an attached bolt.



Right hand tool holder only.

ARBOR TYPE

Order number	Stock	APMX	DC	DCON	DCX	LF	AZ	WT	ZNF	Type
BRP6P-040A03R	★	6	27.9	16	40	40	4	0.4	3	1
BRP6P-050A04R	★	6	37.8	22	50	50	4	0.5	4	2
BRP6P-063A05R	★	6	50.8	22	63	50	4	0.7	5	2
BRP6N-042A04R	●	6	29.8	16	42	40	4	0.4	4	1
BRP6N-050A04R	●	6	37.8	22	50	50	4	0.5	4	2
BRP6N-052A05R	●	6	39.8	22	52	50	4	0.5	5	2
BRP6N-063A05R	●	6	50.8	22	63	50	4	0.7	5	2
BRP6N-066A06R	●	6	53.8	22	66	50	4	0.7	6	2
BRP6N-080A06R	●	6	67.8	27	80	50	4	1.2	6	2
BRP8P-063A04R	★	8	46.8	22	63	50	5.5	0.7	4	2
BRP8N-063A04R	●	8	46.8	22	63	50	5.5	0.7	4	2
BRP8N-080A06R	●	8	63.8	27	80	50	5.5	1.2	6	2
BRP8N-100B07R	●	8	83.8	32	100	50	5.5	1.6	7	3

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BRP – MULTI FUNCTIONAL MILLING – ARBOR TYPE

MOUNTING DIMENSIONS

Order number	CBDP	DAH	DCCB	DCON	DCX	KWW	L8	Type
BRP6P-040A03R	18	–	–	16	40	8.4	5.6	1
BRP6P-050A04R	20	11	–	22	50	10.4	6.3	2
BRP6P-063A05R	20	11	–	22	63	10.4	6.3	2
BRP6N-042A04R	18	–	–	16	42	8.4	5.6	1
BRP6N-050A04R	20	11	–	22	50	10.4	6.3	2
BRP6N-052A05R	20	11	–	22	52	10.4	6.3	2
BRP6N-063A05R	20	11	–	22	63	10.4	6.3	2
BRP6N-066A06R	20	11	–	22	66	10.4	6.3	2
BRP6N-080A06R	22	13	–	27	80	12.4	8	2
BRP8P-063A04R	20	11	–	22	63	10.4	6.3	2
BRP8N-063A04R	20	11	–	22	63	10.4	6.3	2
BRP8N-080A06R	22	13	–	27	80	12.4	8	2
BRP8N-100B07R	32	–	45	32	100	14.4	8	3
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SPARE PARTS

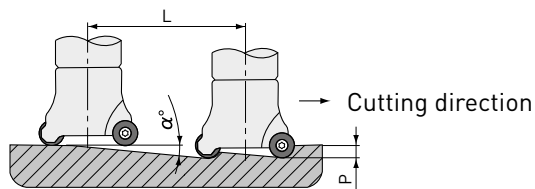
Tool holder type			
	Clamp screw	Wrench	Set bolt
BRP6	TS43	TKY15D	HDS08030
BRP8	TS54	TKY25D	–

*1 Clamp torque (N • m): TS43 = 3.5, TS54 = 7.5

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RAMPING

Ramp angle and cutting length



Formula for min cutting length,
L min, according to max. ramp angle

$$L = \frac{P}{\tan \alpha} \text{ (mm)}$$

Type	Tool diameter	Max. ramp angle [°]	$\tan \alpha$	Min. cutting length according to max. ramp angle L min(mm)*				
	Ø	α° max		P=2 mm	P=4 mm	P=5 mm	P=6 mm (max.)	P=8 mm (max.)
BRP4	16	12.2	0.216	9	18	–	–	–
	20	14.52	0.259	7	15	–	–	–
	25	8.8	0.155	12	25	–	–	–
BRP5	16	4.52	0.079	25	50	63	–	–
	20	11.4	0.202	9	19	24	–	–
	25	14.4	0.257	7	15	19	–	–
	32	8.37	0.147	13	27	33	–	–
BRP6	32	15.91	0.285	7	14	17	21	–
	40	10.29	0.181	11	22	27	33	–
	50	7.12	0.125	16	32	40	48	–
	63	5.08	0.089	22	44	56	67	–
	80	3.69	0.064	31	62	77	93	–
	40	18.86	0.342	5	11	14	17	23
BRP8	50	11.91	0.211	9	18	23	28	37
	63	8.01	0.141	14	28	35	42	56
	80	5.60	0.098	20	40	50	61	81
	100	4.13	0.072	27	55	69	83	110

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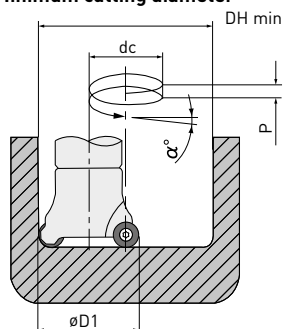
* Decimal points are omitted for values of L min

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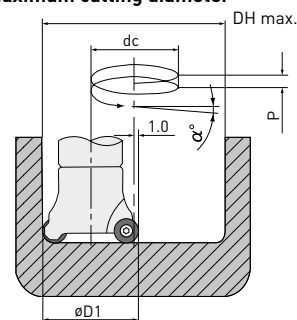
HELICAL MILLING

Cutting hole diameter and depth of cut.

Minimum cutting diameter



Maximum cutting diameter



Type	Tool diameter øD1	øDH*1	ødc*2	Indication angle (α°)					øDH*1	ødc*2	Indication angle (α°)				
				P=2 mm	P=4 mm	P=5 mm	P=6 mm	P=8 mm			P=2 mm	P=4 mm	P=5 mm	P=6 mm	P=8 mm
BRP4	16	24	8	4.55	9.10	–	–	–	30	14	2.60	5.20	–	–	–
	20	32	12	3.04	6.08	–	–	–	38	18	2.03	4.05	–	–	–
	25	42	17	2.15	4.29	–	–	–	48	23	1.59	3.17	–	–	–
BRP5	16	22	6	d=1 mm, %°=3.04°					30	14	2.60	–	6.50	–	–
	20	30	10	3.64	–	9.10	–	–	38	18	2.03	–	5.08	–	–
	25	40	15	2.43	–	6.08	–	–	48	23	1.59	–	3.98	–	–
	32	54	22	1.66	–	4.15	–	–	62	30	1.22	–	3.04	–	–
BRP6	32	52	20	1.82	3.64	–	5.45	–	62	30	1.22	2.43	–	3.64	–
	40	68	28	1.30	2.60	–	3.90	–	78	38	0.96	1.92	–	2.88	–
	50	88	38	0.96	1.92	–	2.88	–	98	48	0.76	1.52	–	2.28	–
	63	114	51	0.72	1.43	–	2.14	–	124	61	0.60	1.20	–	1.79	–
	80	148	68	0.5	1.07	–	1.61	–	158	78	0.47	0.94	–	1.40	–
BRP8	40	64	24	–	3.04	–	4.55	6.06	78	38	–	1.92	–	2.88	3.38
	50	84	34	–	2.14	–	3.22	4.28	98	48	–	1.52	–	2.28	3.04
	63	110	47	–	1.55	–	2.33	3.10	124	61	–	1.20	–	1.79	2.39
	80	144	64	–	1.14	–	1.71	2.28	158	78	–	0.94	–	1.40	1.87
	100	184	84	–	0.87	–	1.30	1.74	198	98	–	0.74	–	1.12	1.49

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*1 DH = Cutting hole diameter: Ø (mm)

*2 dc = Tool pass diameter: Ø (mm)

BRP4 DH min= (D1 - 4) x 2,

BRP5 DH min= (D1 - 5) x 2,

BRP6 DH min= (D1 - 6) x 2,

BRP8 DH min= (D1 - 8) x 2,

DH max = (D1 - 1) x 2,

DH max = (D1 - 1) x 2,

DH max = (D1 - 1) x 2,

DH max = (D1 - 1) x 2,

P max = 4 (mm)

P max = 5 (mm)

P max = 6 (mm)

P max = 8 (mm)

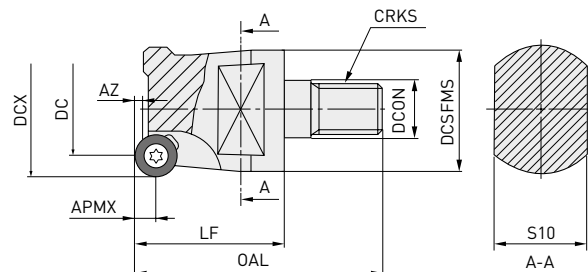
dc = (Tool pass diameter) = DH-D

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MULTI FUNCTIONAL MILLING

P M K S H



Right hand tool holder only.

SCREW-IN TYPE

Order number	Stock	APMX	DC	DCON	DCX	LF	OAL	AZ	ZNF
BRP4NR161M08	●	4	7.8	8.5	16	28	46	1	1
BRP4NR202M10	●	4	11.8	10.5	20	28	47	2	2
BRP4NR253M12	●	4	16.8	12.5	25	32	54	2	3
BRP4NR323M16	●	4	23.8	17	32	36	59	2	3
BRP5NR201M10	★	5	9.8	10.5	20	32	51	1.2	1
BRP5NR252M12	●	5	14.8	12.5	25	32	54	2.5	2
BRP5NR323M12	●	5	21.8	12.5	32	36	58	2.5	3
BRP5NR323M16	●	5	21.8	17	32	36	59	2.5	3
BRP6NR322M16	●	6	19.8	17	32	35	58	4	2
BRP6NR403M16	●	6	27.8	17	40	43	66	4	3
BRP6NR424M16	●	6	29.8	17	42	43	66	4	4

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MOUNTING DIMENSIONS

Order number	CRKS	S10	DCON	DCSFMS	DCX
BRP4NR161M08	M8	10	8.5	13	16
BRP4NR202M10	M10	15	10.5	18	20
BRP4NR253M12	M12	17	12.5	21	25
BRP4NR323M16	M16	22	17	29	32
BRP5NR201M10	M10	15	10.5	18	20
BRP5NR252M12	M12	17	12.5	21	25
BRP5NR323M12	M12	17	12.5	21	32
BRP5NR323M16	M16	22	17	29	32
BRP6NR322M16	M16	22	17	29	32
BRP6NR403M16	M16	22	17	29	40
BRP6NR424M16	M16	22	17	29	42

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RECOMMENDED CUTTING CONDITIONS

Material	Properties	Grade	Vc	
P	Mild steel	≤180HB	MV1020	300 (200 – 400)
			MP1220	250 (200 – 300)
			MV1030	250 (200 – 300)
			F7030	250 (200 – 300)
			VP15TF	250 (200 – 300)
			MX3030 *	180 (130 – 250)
			UTi20T	150 (100 – 200)
	Carbon steel Alloy steel	180 – 280HB	MV1020	260 (170 – 350)
			MP1220	180 (130 – 220)
			MV1030	220 (170 – 270)
			F7030	180 (130 – 220)
			VP15TF	180 (130 – 220)
			MX3030 *	150 (120 – 180)
			UTi20T	140 (100 – 170)
		280 – 380HB	MV1020	180 (100 – 250)
			MP1220	160 (110 – 190)
			F7030	160 (110 – 190)
			VP15TF	160 (110 – 190)
			MV1030	135 (90 – 180)
			MX3030 *	100 (80 – 160)
			UTi20T	100 (70 – 120)
	Pre-hardened steel	35 – 45HRC	MP1220	120 (80 – 140)
			F7030	120 (80 – 140)
			VP15TF	120 (80 – 140)
			UTi20T	90 (60 – 100)
	High Alloy steel	300HB	F7030	130 (90 – 160)
			VP15TF	130 (90 – 160)
			UTi20T	100 (70 – 120)
M	Stainless steel	≤270HB	MP1220	180 (130 – 220)
			F7030	180 (130 – 220)
			VP15TF	180 (130 – 220)
			MX3030 *	150 (120 – 180)
			UTi20T	140 (100 – 170)
	Austenitic stainless steel	≤200HB	MV1020	250 (200 – 300)
			MV1030	220 (170 – 270)
		>200HB	MV1020	220 (170 – 270)
			MV1030	190 (140 – 240)
	PH stainless steel	<450HB	MV1020	190 (140 – 240)
			MV1030	170 (120 – 220)

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* MX3030:
Depth of cut (mm) = 3

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RECOMMENDED CUTTING CONDITIONS

Material	Properties	Grade	Vc
K	Gray cast iron	MP1220	170 (130 – 220)
		F7030	—
		VP15TF	170 (130 – 220)
		MX3030 *	150 (120 – 180)
		UTi20T	140 (100 – 170)
	≤450MPa	MV1020	240 (130 – 350)
		MV1030	190 (130 – 250)
	360 – 500MPa	MP1220	140 (100 – 180)
		F7030	—
		MX3030 *	150 (120 – 180)
H	Ductile cast iron	VP15TF	140 (100 – 180)
		UTi20T	120 (80 – 140)
		F7030	—
		VP15TF	110 (80 – 140)
		UTi20T	90 (70 – 110)
	500 – 800MPa	MV1020	220 (80 – 350)
		MP1220	110 (80 – 140)
		MV1030	110 (80 – 150)
	40 – 55HRC	F7030	—
		VP15TF	60 (50 – 100)
		UTi20T	60 (40 – 70)

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* MX3030:
Depth of cut (mm) = 3

RECOMMENDED FEED PER TOOTH (MM/T.)

Type	Depth of cut (mm)							
	1	2	3	4	5	6	7	8
BRP4	0.40	0.30	0.20	0.10	—	—	—	—
BRP5	0.40	0.35	0.30	0.20	0.10	—	—	—
BRP6	0.50	0.40	0.30	0.25	0.23	0.20	—	—
BRP8	0.60	0.50	0.45	0.40	0.33	0.30	0.25	0.20

SYMBOLS

 Recommended cutting conditions	MACHINING TYPE
NEW Completely new products or expansions released in the current Spring or Autumn product launch and are not included in the latest version of the General Catalogue.	 Roughing
NEW Products or expansions that have already been introduced in one of the previous Spring or Autumn product launches but are not included in the latest General Catalogue.	 Medium cutting
APPLICATION	 Light cutting
 Face milling	 Pre-finishing
 Chamfer milling	 Finishing
 Shoulder milling with R	 Fine-finishing
 Face milling close to a wall	TOOL MATERIAL
 Shoulder milling	 Ultra micro grain carbide Ultra micro grain carbide substrate material.
 Side milling	 Cubic boron nitride Mitsubishi Materials' original CBN material.
 Slot milling	 Ceramic For high speed efficient machining of super alloys due to the excellent high temperature strength property.
 Ramping	 High hardness powder metallurgy HSS High hardness powder metallurgy HSS substrate material.
 Pocket milling	 High grade high alloy HSS High grade high alloy HSS substrate material.
 Slot milling with R	 Cobalt high speed steel Cobalt high speed steel substrate material.
 Copy milling	 High speed steel High speed steel substrate material.
 T-Slot milling	

SYMBOLS

COATING



SMART MIRACLE coating

New smooth and dense coating technology for high efficiency milling of difficult to cut materials.



CRN coating

Newly developed CrN coating for Copper Electrodes machining.



Violet coating

Increased tool life of 2-3 times more than TiN coated products.



DP coating

New generation coating suitable for a wide range of materials.



MIRACLE coating

The original Miracle (Al,Ti)N coating. Also suitable for dry cutting.



[Al, Ti]N coating

[Al,Ti]N highly versatile application range.



[Al,Ti,Cr]N multi-layer coating

For carbon, alloy and hardened steels.



IMPACT MIRACLE coating

Single phase nano crystal coating technology has higher film hardness and heat resistance.



MIRACLE coating

The original MIRACLE (Al,Ti)N coating. Also suitable for dry cutting.



VFR coating

The [AlCrSi]N/[AlTiSi]N PVD multilayer coating is ideal for machining of extremely hard materials up to 70 HRC.



DLC coating

Hardness similar to CVD diamond coating achieved with high adhesion strength.



Diamond coating

Suitable for CFRP and CFRP-aluminium materials.



Diamond coating

Suitable for graphite machining.



Diamond coating

The original CVD diamond coating.



CVD Diamond coating

Unique multi-layer micro-grain diamond crystal control technology drastically improves wear resistance and smoothness.

CUTTING EDGE PROPERTIES



Sharp corner edge

Indicates the end mill has a sharp corner edge.



Gash land

Indicates the end mill cutting edge has a protective chamfer.



Rake angle



Helix angle

Indicates the helix angle of the end mill.



Point angle

Indicates the drill point angle.



Roughing flute geometry



Variable helix



Rounded gash



Corner angle

WEB THINNING



X type point geometry

X web thinning used at the drill point.



XR type point geometry

XR web thinning used at the drill point.



S type point geometry

Easy cutting geometry.



N type point geometry

Effective when the point web is thick.



Chipbreaker

SYMBOLS

TOLERANCES



Tolerance of taper angle
Indicates the tolerance of the taper angle.



R tolerance
Indicates the radial tolerance of a ball nose end mill.



R tolerance
Indicates the radial tolerance of the corner radius.



R tolerance
Indicates the radial tolerance of a cutter with a corner radius.



Outside diameter tolerance
Indicates the diameter tolerance of the end mill.



Peak tolerance
Indicates the tolerance for the end diameter.



h5 Shank diameter tolerance



h6 Shank diameter tolerance



Drill tolerance / diameter

COOLANT HOLES



External coolant



Internal coolant



Internal coolant



Centered, internal coolant hole



Radial, internal coolant holes



Internal coolant holes



Internal coolant holes

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