



New

**High Feed
Performance**

High feed milling tool for better productivity

HRM Tools

Features

Powerful & economic milling tool with double clamping and 3 corner-use insert.

- Revolutionary design of the cutter and the special cutting edge of the insert make superb feed rate possible when compared with conventional tools.
(Max. fz=3.5mm/tooth, 0.14ipt)
- Low-cutting-resistance chip breaker achieves excellent cutting performance and longer tool life.
- HRM can cover various applications due to HRM insert sizes 08,10,13 and 15 line up.



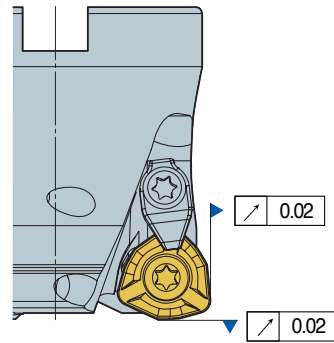
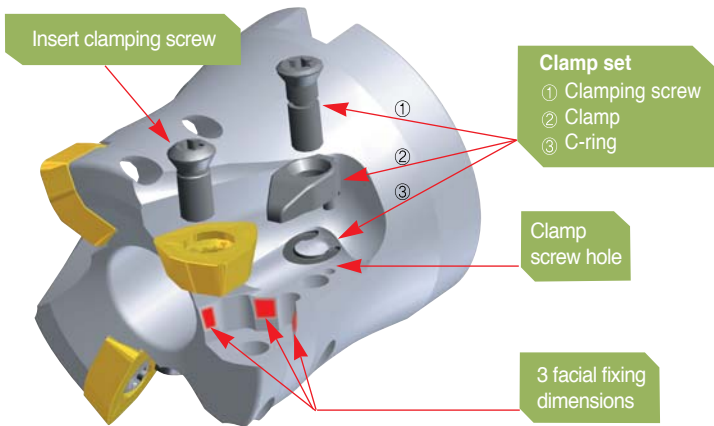
HRM Tools

High feed milling tool for better productivity

Clamping System | Side clearance range | Features of insert



Clamping System

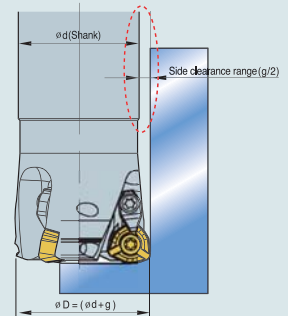


– High tolerance of tip seat part prevents chattering and guarantees high quality surface roughness

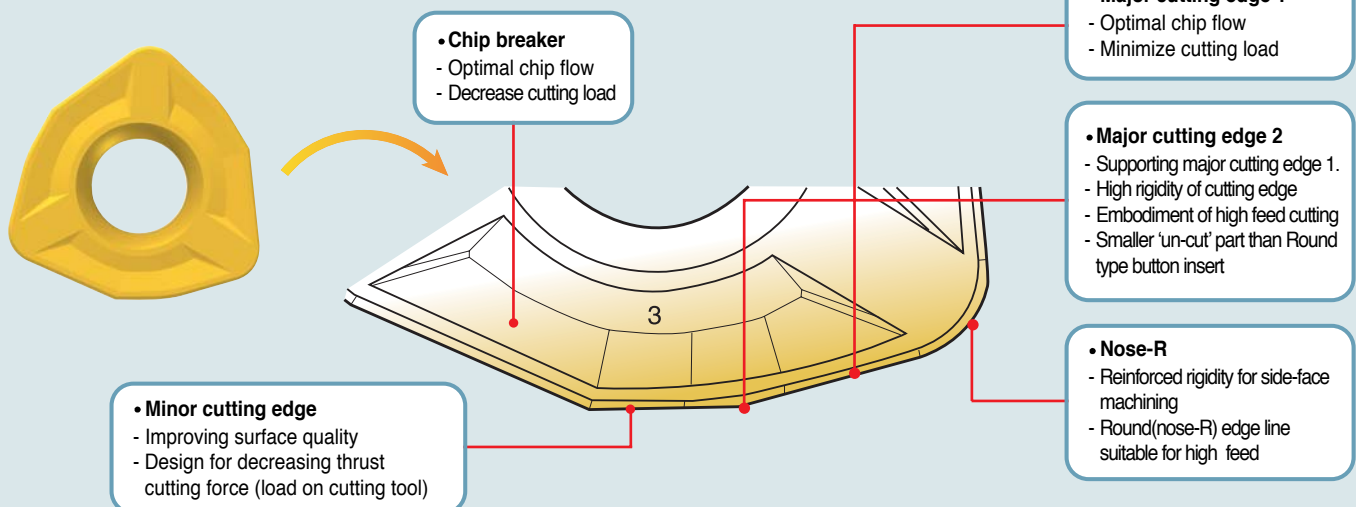
Side clearance range

Designation	øD(mm)	ød(mm)	øD(inch)	ød(inch)
HRMS0821HR-2□20	21	20	0.83	0.79
HRMS1026HR-2□25	26	25	1.02	0.98
HRMS1333HR-2□32	33	32	1.30	1.26
HRMS1335HR-2□32	35	32	1.38	1.26
HRMS1340HR-3□32	40	32	1.57	1.26
HRMS1550HR-3□32	50	32	1.97	1.26
HRMS1550HR-3□40	50	40	1.97	1.57
HRMS1550HR-3□42	50	42	1.97	1.65
HRMS1563HR-3□32	63	32	2.48	1.26
HRMS1563HR-3□40	63	40	2.48	1.57
HRMS1563HR-4□42	63	42	2.48	1.65

• The side clearance prevents interference between tool and workpiece even in deep hole machining.



Features of insert



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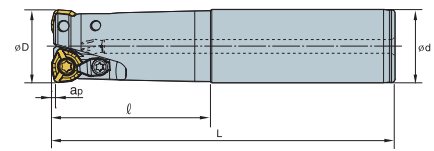
HRM Shank



HRMS 08000/10000/13000/15000



HRMS0800HR-□□00
 HRMS1000HR-□□00
 HRMS1300HR-□□00
 HRMS1500HR-□□00



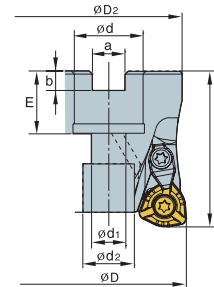
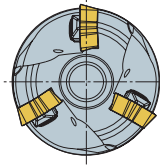
Desingation	Stock	Dimensions(mm)					ap	Insert
		øD	L	ød	ℓ			
0820HR-2S20	●	20	130	20	50	1.0	2	WDKT080316ZDSR-MH
0820HR-2M20	●		180	20	100			
0820HR-2L20	●		250	20	130			
0821HR-2S20	●	21	130	20	50			
0821HR-2M20	●		180	20	50			
0821HR-2L20	●		250	20	50			
1025HR-2S25	●	25	140	25	60	1.0~1.5	2	WDKT10T320ZDSR-MH
1025HR-2M25	●		200	25	120			
1025HR-2L25	●		300	25	180			
1026HR-2S25	●	26	140	25	60			
1026HR-2M25	●		200	25	60			
1026HR-2L25	●		300	25	60			
1030HR-2S32	●	30	150	32	70	1.5~2.0	2	WDKT130520ZDSR-MH
1030HR-2M32	●		200	32	120			
1030HR-2L32	●		300	32	180			
1332HR-2S32	●	32	150	32	70			
1332HR-2M32	●		200	32	120			
1332HR-2L32	●		300	32	180			
1333HR-2S32	●	33	150	32	70			
1333HR-2M32	●		200	32	70			
1333HR-2L32	●		300	32	70			
1335HR-2S32	●	35	150	32	50			
1335HR-2M32	●		200	32	50			
1335HR-2L32	●		300	32	50			
1340HR-3S32	●	40	150	32	50	1.5~2.0	3	WDKT130520ZDSR-MH
1340HR-3M32	●		250	32	50			
1340HR-3L32	●		300	32	50			
1340HR-3S40	○	40	150	40	60			
1340HR-3M40	○		250	40	130			
1340HR-3L40	○		300	40	180			
1340HR-3S42	●	40	150	42	60			
1340HR-3M42	●		250	42	130			
1340HR-3L42	●		300	42	180			
1550HR-3S32	○	50	150	32	50	2.0~2.5	3	WDKT150625ZDSR-MH
1550HR-3M32	○		250	32	50			
1550HR-3L32	○		300	32	50			
1550HR-3S40	○	50	150	40	50			
1550HR-3M40	○		250	40	50			
1550HR-3L40	○		300	40	50			
1550HR-3S42	●	50	150	42	50			
1550HR-3M42	●		250	42	50			
1550HR-3L42	●		300	42	50			
1563HR-4S32	○	63	150	32	50	2.0~2.5	4	WDKT150625ZDSR-MH
1563HR-4M32	○		250	32	50			
1563HR-4L32	○		300	32	50			
1563HR-4S40	○	63	150	40	50			
1563HR-4M40	○		250	40	50			
1563HR-4L40	○		300	40	50			
1563HR-4S42	●	63	150	42	50			
1563HR-4M42	●		250	42	50			
1563HR-4L42	●		300	42	50			

HRMS

● Stock item, ○ Under preparing for stock



HRMC(M)13000/15000



• HRMC-Inch bore

Designation	Stock	Dimensions(mm)										Bolt		Insert	Available arbor	
		ϕD	ϕD_2	ϕd	F	a	b	ϕd_1	ϕd_2	E						
HRMC	13050HR-3	●	50	47	22.225	50	8.4	5	11	16.4	20	3	M10 × 35	Fig.1	WDKT 130520 ZDSR- MH	BT40/BT50 FMA22.225
	13050HR-4	●	50	47	22.225	50	8.4	5	11	16.4	20	4				BT40/BT50/SK40/SK50 FMA31.75
	13063HR-4	●	63	60	22.225	50	8.4	5	11	17	20	4				BT40/BT50 FMA22.225
	13080HR-5	●	80	76	31.75	70	12.95	8	18	26	32	5	M16 × 45	Fig.1	WDKT 150625 ZDSR- MH	BT40/BT50/SK40/SK50 FMA31.75
	15063HR-3	●	63	60	22.225	50	8.4	5	11	17	20	3	M10 × 35	Fig.1		BT40/BT50 FMA22.225
	15080HR-4	●	80	76	31.75	70	12.95	8	18	26	32	4	M16 × 45	Fig.1		BT40/BT50/SK40/SK50 FMA31.75
	15100HR-5	●	100	96	31.75	70	12.95	8	18	26	32	5				BT40/BT50/SK40/SK50 FMA38.1
	15100HR-6	●	100	96	31.75	70	12.95	8	18	26	32	6	M20 × 40	Fig.1		BT50 FMA50.8
	15125HR-6	●	125	98	38.1	63	16.15	10	22	32	35	6				MBA - M24
15160R-7	●	160	100	50.8	63	19.25	11	-	72	38	7					

• Please refer to detail information of arbor on 2006 DINE's catalogue P5

● Stock item, ○ Under preparing for stock

• HRMCM-Metric bore

Designation	Stock	Dimensions(mm)										Bolt		Insert	Available arbor	
		ϕD	ϕD_2	ϕd	F	a	b	ϕd_1	ϕd_2	E						
HRMCM	13050HR-3	●	50	47	22	50	10.4	6.3	11	16.4	21	3	M10 × 35	Fig.1	WDKT 130520 ZDSR- MH	BT30/BT40/BT50 FMC22
	13050HR-4	●	50	47	22	50	10.4	6.3	11	16.4	21	4				SK30/SK40/SK50 FMC22
	13063HR-4	●	63	60	22	50	10.4	6.3	11	17	21	4				BT40/BT50/SK30/SK40/SK50 FMC27
	13080HR-5	●	80	76	27	70	12.4	7.0	13	20	23	5	M12 × 45	Fig.1	WDKT 150625 ZDSR- MH	BT30/BT40/BT50 FMC22
	15063HR-3	●	63	60	22	50	10.4	6.3	11	17	21	3	M10 × 35	Fig.1		SK30/SK40/SK50 FMC22
	15080HR-4	●	80	76	27	70	12.4	7.0	13	20	23	4	M12 × 45	Fig.1		BT40/BT50/SK30/SK40/SK50 FMC27
	15100HR-5	●	100	96	32	70	14.4	8	18	26	26	5	M16 × 45	Fig.1		BT40/BT40/SK50 FMC32
	15100HR-6	●	100	96	32	70	14.4	8	18	26	26	6				M20 × 40
	15125HR-6	○	125	98	40	63	16.4	9	22	32	29	6	MBA -M20	Fig.2		SK50 FMC40
15160R-7	○	160	100	40	63	16.4	9	-	72	35	7					

• Please refer to detail information of arbor on 2006 DINE's catalogue P5

● Stock item, ○ Under preparing for stock

Available bolt

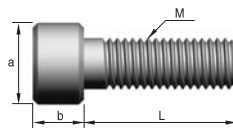


Fig.1

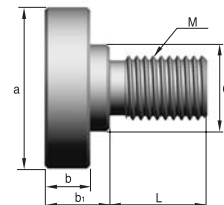


Fig.2

Designation	Dimensions(mm)						pitch	Fig.
	a	b	b ₁	c	L			
M10X35	16	10	-	-	35	1.5	1	
M12X45	18	12	-	-	45	1.75	1	
M16X45	24	16	-	-	45	2.0	1	
M20X40	30	20	-	-	40	2.5	1	
MBA-M20	50	14	20	27	30	2.5	2	
MBA-M24	65	14	24	37	36	3.0	2	



HRM Tools

High feed milling tool for better productivity

Available arbor

Available arbor

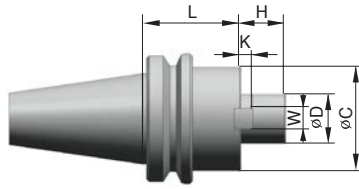


Fig.1

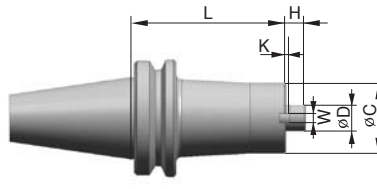


Fig.2

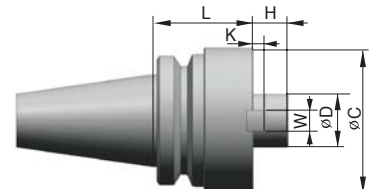


Fig.3

Designation	Available arbor	Stock	Fig.	Taper No.	Dimensions(mm)						Kg	Bolt
					øD	L	øC	H	W	K		
HRMC 13050HR-3 13050HR-4 13063HR-4 15063HR-3	BT40-FMA22.225-45	●	1	BT40	22.225	45	40	18	8	3.5	1.2	M10×35
	BT40-FMA22.225-105	●	2	BT40	22.225	105	40	18	8	3.5	1.9	
	BT50-FMA22.225-60	●	1	BT50	22.225	60	40	18	8	3.5	3.9	
	BT50-FMA22.225-120	●	2	BT50	22.225	120	40	18	8	3.5	4.7	
	BT50-FMA22.225-180	●	2	BT50	22.225	180	40	18	8	3.5	5.4	
HRMC 13080HR-5 15080HR-4 15100HR-5 15100HR-6	BT40-FMA31.75-45	●	1	BT40	31.75	45	60	30	12.7	7	1.6	M16×45
	BT40-FMA31.75-75	●	1	BT40	31.75	45	60	30	12.7	7	3.0	
	SK40-FMA31.75-45	●	1	SK40	31.75	45	60	30	12.7	7	1.6	
	SK40-FMA31.75-75	●	1	SK40	31.75	45	60	30	12.7	7	3.0	
	BT50-FMA31.75-45	●	1	BT50	31.75	45	60	30	12.7	7	4.6	
	BT50-FMA31.75-75	●	1	BT50	31.75	75	60	30	12.7	7	5.2	
	BT50-FMA31.75-105	●	2	BT50	31.75	105	60	30	12.7	7	6.0	
	BT50-FMA31.75-260	●	2	BT50	31.75	260	60	30	12.7	7	10.3	
	SK50-FMA31.75-45	●	1	SK50	31.75	45	60	30	12.7	7	4.6	
	SK50-FMA31.75-75	●	1	SK50	31.75	75	60	30	12.7	7	5.2	
15125HR-6	BT40-FMA38.1-60	●	3	BT40	38.1	60	80	34	15.9	9	2.9	M20×40
	SK40-FMA38.1-50	●	3	SK40	38.1	50	80	34	15.9	9	4.7	
	BT50-FMA38.1-45	●	1	BT50	38.1	45	80	34	15.9	9	4.3	
	BT50-FMA38.1-75	●	1	BT50	38.1	75	80	34	15.9	9	5.5	
	SK50-FMA38.1-75	●	1	SK50	38.1	75	80	34	15.9	9	5.5	
15160R-7	BT50-FMA50.8-45	●	1	BT50	50.8	45	100	36	19.1	10	4.8	MBA-M24
	BT50-FMA50.8-75	●	1	BT50	50.8	75	100	36	19.1	10	6.8	

● Stock item, ○ Under preparing for stock

Designation	Available arbor	Stock	Fig.	Taper No.	Dimensions(mm)						Kg	Bolt
					øD	L	øC	H	W	K		
HRMCM 13050HR-3 13050HR-4 13063HR-4 15063HR-3	BT30-FMC22-45	●	3	BT30	22	45	48	19	10	5.6	1.2	M10×35
	SK30-FMC22-50	●	3	SK30	22	50	48	19	10	5.6	1.2	
	BT40-FMC22-45	●	1	BT40	22	45	48	19	10	5.6	2.0	
	SK40-FMC22-55	●	1	BT50	22	55	48	19	10	5.6	2.0	
	BT50-FMC22-60	●	1	BT50	22	60	48	19	10	5.6	3.6	
	BT50-FMC22-200	●	2	BT50	22	200	48	19	10	5.6	6.5	
	BT50-FMC22-250	●	2	BT50	22	250	48	19	10	5.6	7.4	
	SK50-FMC22-55	●	1	SK50	22	55	48	19	10	5.6	3.6	
HRMCM 13080HR-5 15080HR-4	SK30-FMC27-55	●	3	SK30	27	55	60	21	12	6.3	1.5	M12×45
	BT40-FMC27-60	●	3	BT40	27	60	60	21	12	6.3	2.5	
	SK40-FMC27-55	●	3	SK40	27	55	60	21	12	6.3	2.5	
	SK40-FMC27-90	●	3	SK40	27	90	60	21	12	6.3	3.4	
	BT50-FMC27-150	●	1	BT50	27	150	60	21	12	6.3	6.2	
	SK50-FMC27-55	●	1	SK50	27	55	60	21	12	6.3	2.5	
	SK50-FMC27-150	●	1	SK50	27	150	60	21	12	6.3	5.6	
15100HR-5 15100HR-6	BT40-FMC32-60	●	3	BT40	32	60	78	24	14	7	3.4	M16×45
	SK40-FMC32-60	●	3	SK40	32	60	78	24	14	7	3.4	
	SK50-FMC32-50	●	1	SK50	32	50	78	24	14	7	4.2	
	SK50-FMC32-105	●	1	SK50	32	105	78	24	14	7	6.8	
15125HR-6 15160R-7	SK50-FMC40-60	●	3	SK50	40	60	89	27	16	8	7.6	M20×40 MBA-M20

● Stock item, ○ Under preparing for stock

HRM Tools

High feed milling tool for better productivity

HRM insert | Application area | Parts | Corner R programming

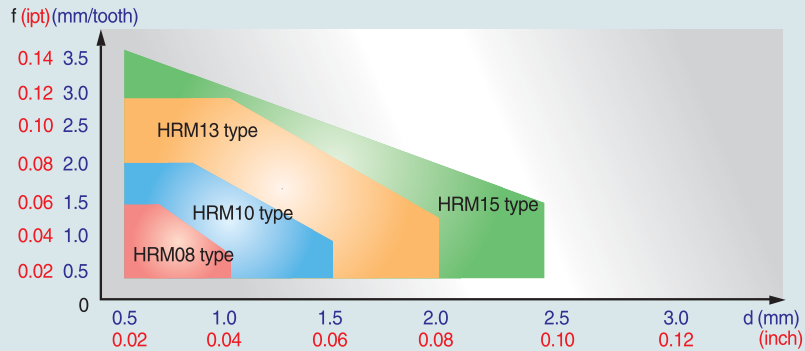


HRM insert

Designation	Grade					Dimensions(mm)						Configuration
	PC3525	PC3545	PC9530	PC6510	PC8520	d	t	F	R	α°	a_p	
WDKT080316ZDSR-MH	●	●	○	●	●	8	3.18	1.2	1.6	15°	1.0	
WDKT10T320ZDSR-MH	●	●	○	●	●	10	3.97	1.5	2.0	15°	1.5	
WDKT130520ZDSR-MH	●	●	●	●	●	13.5	5.56	2.1	2.0	15°	2.0	
WDKT150625ZDSR-MH	●	●	●	●	●	15	6.35	3.5	2.5	15°	2.5	

● Stock item, ○ Under preparing for stock

Application area



Parts

Tool	Shape	Screw	Clamp	Clamp Screw	C-ring	Wrench		
						A	B	C
HRMS08000		FTNA0306	-	-	-	TW09P	-	-
HRMS10000		FTKA0408	CHH3.5R1	CTX03510	CR03	-	TW15S	-
HRM 13000	Ø32,33,35	FTGA0510-P	CHH4.5R1	CTX04513H	CR03	-	-	TW20
	Ø40	FTGA0512-P				-	-	TW20
	Ø50,63,80	FTGA0513-P				-	-	TW20
HRM 15000	Ø50,63	FTGA0513-P	CHH5.5R1	CTX0515	CR04	-	-	TW20
	Ø80,100,125,160	FTGA0513-P				-	-	TW20

Corner R programming

Designation	Condition				Approx. R (mm)		Approx. R (inch)		Configuration
	Max. a_p (mm)	Max. f_z (mm/tooth)	Max. a_p (inch)	Max. f_z (ipt)	Input.R	Uncut	Input.R	Uncut	
WDKT080316ZDSR-MH	1.0	1.5	0.048	0.08	2.0R	0.38	0.08	0.0152	
WDKT10T320ZDSR-MH	1.5	2.0	0.06	0.08	2.5R	0.47	0.10	0.0188	
WDKT130520ZDSR-MH	2.0	3.0	0.08	0.12	3.0R	0.72	0.12	0.0288	
WDKT150625ZDSR-MH	2.5	3.5	0.10	0.12	3.0R	0.88	0.12	0.0352	

• Information for uncut part by using "Input.R" for CAM program.

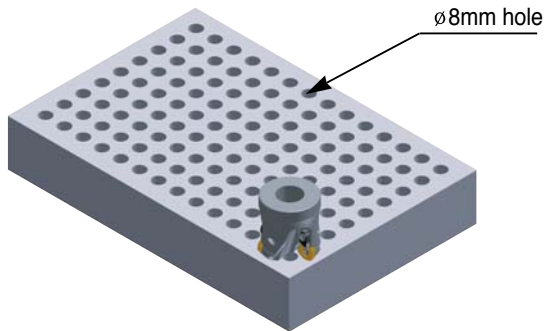
• Uncut part can be changed by poor machine condition or weak clamp of workpiece, etc.

HRM Tools

High feed milling tool for better productivity

Toughness test | Wear resistance test | Application example

Toughness test



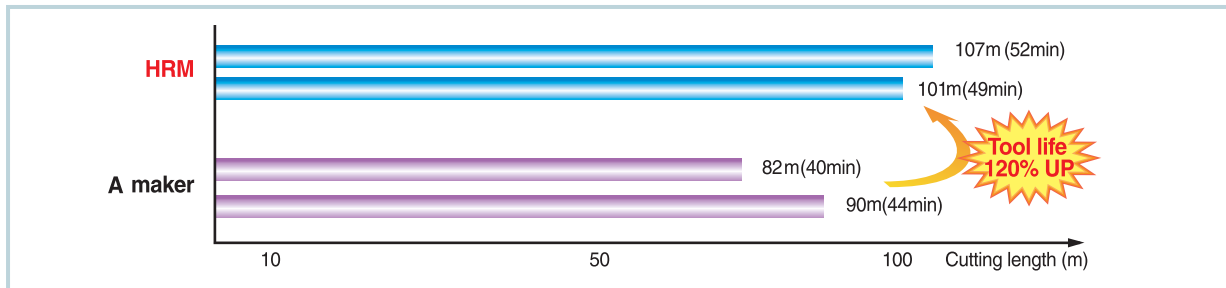
HRM cutter- Interrupted cutting

※Cutting condition

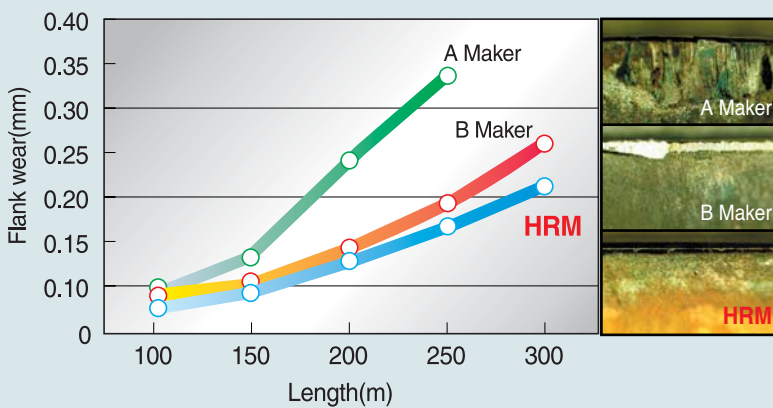
- Tool : HRMCM13050R-3
WDKT130520ZDSR-MH (PC3545)
- Workpiece: SCM440, AISI 4140, 41CrMo5 (HRC34)

	V	fz	ap	ae
Metric	180	1.8	1.0	37
Inch	600	0.072	0.04	1 1/2

- Dry down cut, 1 tooth cutting
- Workpiece size : 350 × 250 × 50(mm)



Wear resistance test



※Cutting condition

- Tool : HRMCM13050R-3
WDKT130520ZDSR-MH (PC3535)
- Workpiece: SKD11
X165CrMoV12 (280HB)

	V	fz	ap	ae
Metric	200	2.5	1.5	37
Inch	660	0.1	0.06	1 1/2

- Dry down cut, 1tooth cutting
- Workpiece size : 300 × 250 × 100(mm)

Application example



※Cutting condition

- Tool : HRMCM13080R-5
WDKT130520ZDSR-MH
- Workpiece: S55C (255HB)
AISI 1050, Ck55 (Carbon steel)

	V	F	ap	ae	L
Metric	160	4586	1.5	65	250
Inch	530	183	0.06	2 5/8	10

- Machine : Horizontal MC, 23KW, Air blow
- Chip removal rate: 447cm³/min

447cm³/min

※Result

Machining time shortened up to 30% with no change of ap & ae.
Increase feed rate only.

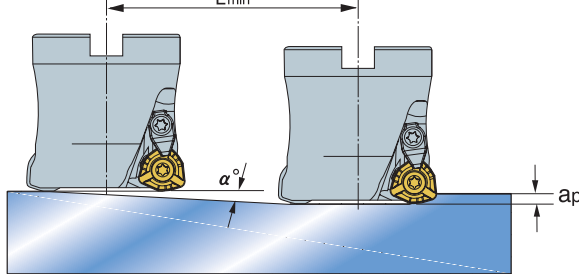


Recommended grade as per workpiece

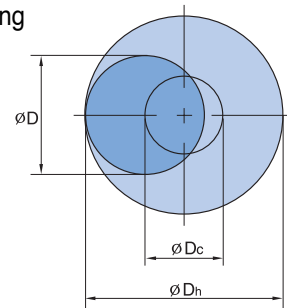
Workpiece	Recommended grade	
	Light intermittent machining	Heavy intermittent machining
SM45C, SM50C SCM □□□	PC3525, PC6510	PC9530
STD11, STD61	PC3525	PC3545
Stainless steel (STS300 □□□)	PC3545	
KP1(HP1A) KP4(HP4A) STAVAX, GCD(FCD) GC(FC)	PC6510	PC3525
NAK55, NAK80(HP70)	PC8520	

Ramping & helical cutting technical data

Ramping



Helical cutting



Tool pass diameter

$$L_{min} = \frac{ap}{\tan \alpha^\circ} \text{ (mm)}$$

$$\phi Dc = \phi Dh - \phi D$$

ϕDc = Tool pass of tool center

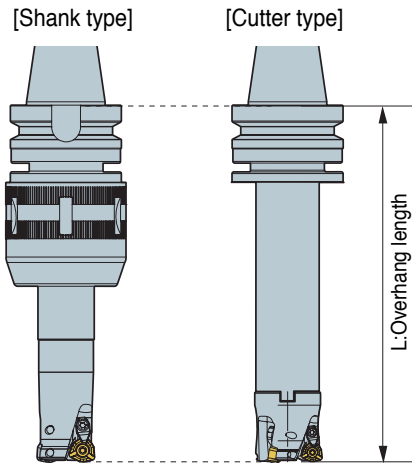
ϕDh = Desirable hole diameter on workpiece

ϕD = Tool diameter

Designation	Tool Diameter ϕD (mm)	Valid Cutting Diameter (mm)	Ramping			Helical		
			Max. ap (mm)	Max.Angle α°	Cutting Length L_{min} (mm)	Min.hole ϕDh min(mm)	Max.hole ϕDh max(mm)	
HRMC(M)	13050HR-□	50	38	2.0	2°	57.3	77	96
	13063HR-□	63	51	2.0	1°40'	68.6	103	122
	13080HR-□	80	68	2.0	1°30'	76.4	137	156
	15063HR-□	63	50	2.5	2°40'	53.7	101	121
	15080HR-□	80	67	2.5	2°	71.6	135	155
	15100HR-□	100	87	2.5	1°30'	95.5	175	195
	15125HR-□	125	112	2.5	50'	171.9	225	245
15160R-□	160	147	2.5	30'	286.5	295	315	
HRMS	0820HR-□□20	20	11.2	1.0	3°30'	16.3	28	36
	1025HR-□□25	25	14	1.5	4°	21.5	33	46
	1030HR-□□32	30	19	1.5	3°30'	24.5	43	56
	1332HR-□□32	32	20	2.0	4°	28.6	39	60
	1335HR-□□32	35	23	2.0	3°30'	32.7	45	66
	1340HR-□□□□	40	28	2.0	3°	38.2	55	76
	1550HR-□□□□	50	37	2.5	2°50'	50.5	75	95
	1563HR-□□□□	63	50	2.5	2°40'	53.7	101	121



Overhang length (L)



- L = Overhang length
- $V(\text{m/min}) = \pi \times D \times N / 1000$
- $F(\text{mm/min}) = fz \times z \times N$
- $Q(\text{cm}^3/\text{min}) = a_p \times a_e \times F / 1000$
- $W(\text{kW}) = Q \times K_s / 60 \times 102 \times \eta$
- $H(\text{Hp}) = W / 0.75$

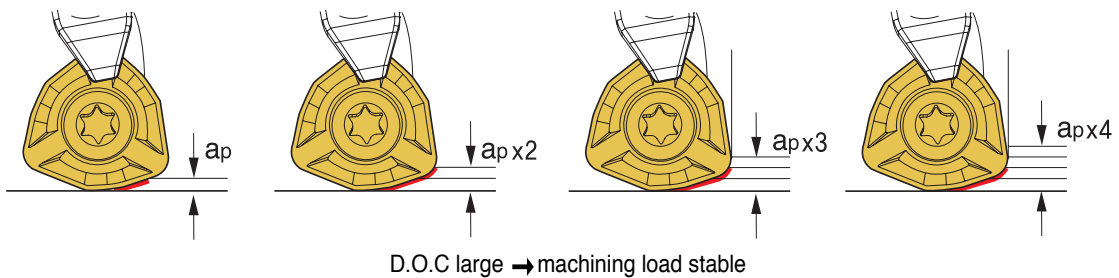
※**Note**

- fz = feed rate(mm/tooth)
- z = Tooth, $\pi = 3.14$, D =Tool Diameter(ϕ)
- N = rpm
- a_p = axial depth of cut(mm)
- a_e = radial depth of cut(mm)
- K_s = Specific cutting force (kg/mm^2)
- η = Machine efficiency(%)

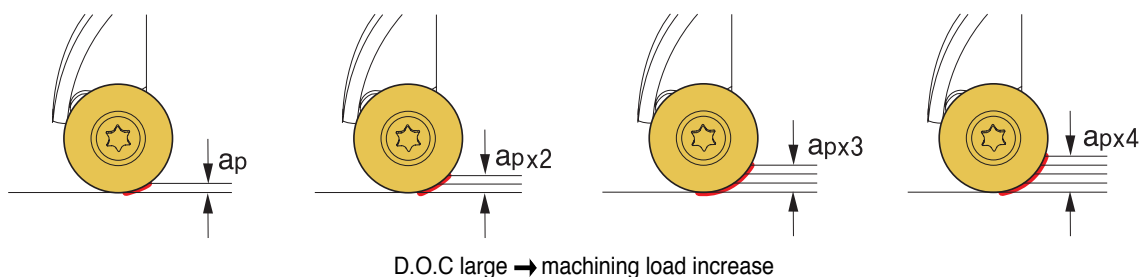
Instruction

- 1) Insert should be correctly clamped in seat part of cutter
- 2) In case of noise from chattering, reduce L (overhang length) or decrease feed rate, spindle speed and axial depth of cut.
- 3) Reduce spindle speed or axial depth of cut if the power of machine is not powerful enough.
- 4) Use coolant or air for smooth of chip evacuation and long tool life.
- 5) Reduce axial depth of cut, spindle speed and feed approx. 30~50% of recommendation in machining of high hardness material (HRC 50~60).
- 6) Overhang length written in "recommended cutting condition table" from page 10 is represent the length L from the picture "Overhang Length(L)" shown above.
- 7) Use recommended cutting condition for better tool life. Especially, axial depth of cut (a_p) should be certainly fulfilled.
- 8) Even during deep pocket milling, HRM tool remains constant cutting force due to the unique corner geometry of the insert.
- 9) To get stable cutting, it's better to apply radial depth of cut (a_e) more than 60% of tool diameter.

HRM



Round



- ☞ HRM insert uses same area of cutting edge at every pass.
- ☞ It makes it possible to perform high feed milling when the depth is getting deeper.



Recommended cutting condition

Workpiece	Hardness	Grade	V (m/min)	fz (mm/t)	overhang (mm)	ø 20/21mm (2 teeth)					ø 25mm (2 teeth)					
						N(min ⁻¹)	F(mm/min)	a _d (mm)	Q(cm ³ /min)	pc(KW)	N(min ⁻¹)	F(mm/min)	a _d (mm)	Q(cm ³ /min)	pc(KW)	
P	General structural steel Mild steel	Under 200H _B	PC3525	180(120~230)	1.0	150	2865	5730	1.0	114	4.1	2292	4584	1.1	126	4.5
			PC3525	160(120~200)	0.9	200	2546	4584	0.8	73	2.6	2037	3667	0.9	82	2.9
			PC3545	150(100~170)	0.7	250	2387	3342	0.6	40	1.4	1910	2674	0.7	46	1.7
	Carbon steel, Alloy steel	Under 30H _R C	PC3525	160(130~190)	1.0	150	2546	5093	0.8	81	2.9	2037	4074	0.9	91	3.2
			PC3525	150(130~180)	0.9	200	2387	4297	0.6	51	1.8	1910	3438	0.7	60	2.1
			PC3545	130(100~150)	0.7	250	2069	2897	0.5	29	1.1	1655	2979	0.6	44	1.6
	High carbon steel Alloy steel	30~40 H _R C	PC3525	110(90~130)	0.9	150	1751	3151	0.8	50	1.8	1401	2521	0.9	56	2
			PC3545	100(80~130)	0.7	200	1592	2228	0.6	26	1	1273	1783	0.7	31	1.1
			PC3545	90(80~120)	0.5	250	1432	1432	0.4	11	0.41	1146	1146	0.5	14	0.51
	Pre-hardened steel	40~50 H _R C	PC3525	100(70~120)	0.7	150	1592	2228	0.6	26	1	1273	1783	0.7	31	1.1
			PC3525	80(70~120)	0.5	200	1273	1273	0.4	10	0.36	1019	1019	0.5	12	0.46
	M	Stainless steel	Under 270H _B	PC9530	120(70~160)	0.9	150	1910	3438	1.0	68	2.5	1528	2750	1.0	68
PC8520				120(70~160)	0.7	200	1910	2674	0.8	42	1.5	1528	2139	0.8	42.78	1.5
K	Cast Iron	Under 350N/mm ²	PC6510	150(100~200)	1.3	150	2387	6207	1.0	124	4.4	1910	4966	1.0	124	4.4
			PC6510	150(100~200)	1.1	200	2387	5252	0.8	84	3	1910	4202	0.8	84	3
Workpiece	Hardness	Grade	V (m/min)	fz (mm/t)	overhang (mm)	ø 32mm (2 teeth)					ø 40mm (3 teeth)					
						N(min ⁻¹)	F(mm/min)	a _d (mm)	Q(cm ³ /min)	pc(KW)	N(min ⁻¹)	F(mm/min)	a _d (mm)	Q(cm ³ /min)	pc(KW)	
P	General structural steel Mild steel	Under 200H _B	PC3525	180(120~230)	1.5	170	1790	5371	1.2	206	7.3	1432	6446	1.2	309	11.1
			PC3525	160(120~200)	1.3	220	1592	4138	1.0	132	4.7	1273	4966	1.0	198	7.1
			PC3545	150(100~170)	1.1	270	1492	3283	0.8	84	3	1194	3939	0.8	126	4.5
	Carbon steel, Alloy steel	Under 30H _R C	PC3525	160(130~190)	1.4	170	1592	4456	1.0	142	5.1	1273	5348	1.0	214	7.6
			PC3525	150(130~180)	1.2	220	1492	3581	0.8	91	3.2	1194	4297	0.8	137	4.9
			PC3545	130(100~150)	1.0	270	1293	2586	0.7	57	2.1	1035	3104	0.7	87	3.1
	High carbon steel Alloy steel	30~40 H _R C	PC3525	110(90~130)	1.3	170	1094	2845	1.0	91	3.2	875	3414	1.0	136	4.8
			PC3545	100(80~130)	1.1	220	955	2188	0.8	56	2	796	2626	0.8	84	3
			PC3545	90(80~120)	0.9	270	895	1611	0.6	30	1.1	716	1934	0.6	46	1.6
	Pre-hardened steel	40~50 H _R C	PC3525	100(70~120)	1.0	170	955	1989	0.8	50	1.8	796	2387	0.8	76	3.6
			PC3525	80(70~120)	0.8	250	796	1273	0.6	24	0.9	637	1528	0.6	36	1.3
	M	Stainless steel	Under 270H _B	PC9530	120(70~160)	1.2	170	1194	2865	1.2	110	3.9	955	3438	1.2	165
PC8520				120(70~160)	1.0	250	1194	2387	1.0	76	2.7	955	2865	1.0	114	4.1
K	Cast Iron	Under 350N/mm ²	PC6510	150(100~200)	1.7	170	1492	5073	1.2	194	6.9	1194	6088	1.2	292	13.9
			PC6510	150(100~200)	1.5	250	1492	4476	1.0	143	5.1	1194	5371	1.0	214	7.6
Workpiece	Hardness	Grade	V (m/min)	fz (mm/t)	overhang (mm)	ø 50mm (3 teeth)					ø 63mm (4 teeth)					
						N(min ⁻¹)	F(mm/min)	a _d (mm)	Q(cm ³ /min)	pc(KW)	N(min ⁻¹)	F(mm/min)	a _d (mm)	Q(cm ³ /min)	pc(KW)	
P	General structural steel Mild steel	Under 200H _B	PC3525	180(120~230)	1.5	170	1146	5157	1.4	361	12.9	909	5457	1.4	481	17.2
			PC3525	160(120~200)	1.3	220	1019	3973	1.2	238	8.5	808	4204	1.2	317	11.4
			PC3545	150(100~170)	1.0	270	955	2865	1.0	143	5.1	758	3032	1.0	191	6.8
	Carbon steel, Alloy steel	Under 30H _R C	PC3525	160(130~190)	1.5	170	1019	4584	1.2	275	9.8	808	4850	1.2	366	13.1
			PC3525	150(130~180)	1.3	220	955	3724	1.0	186	6.6	758	3941	1.0	248	8.8
			PC3545	130(100~150)	1.0	270	828	2483	0.8	99	3.5	657	2627	0.8	132	4.7
	High carbon steel Alloy steel	30~40 H _R C	PC3525	110(90~130)	1.3	170	700	2731	1.2	163	5.8	556	2890	1.2	218	7.8
			PC3545	100(80~130)	1.1	220	637	2101	1.0	105	3.7	505	2223	1.0	140	5
			PC3545	90(80~120)	0.8	270	573	1375	0.8	55	1.9	455	1455	0.8	73	2.6
	Pre-hardened steel	40~50 H _R C	PC3525	100(70~120)	1.1	170	637	2101	1.0	105	3.7	505	1667	1.0	105	3.7
			PC3525	80(70~120)	0.9	250	509	1375	0.8	55	1.9	404	1091	0.8	55	1.9
	M	Stainless steel	Under 270H _B	PC9530	120(70~160)	1.3	170	764	2979	1.4	208	7.4	606	3153	1.4	278
PC8520				120(70~160)	1.1	250	764	2521	1.2	176	6.3	606	2668	1.2	201	7.2
K	Cast Iron	Under 350N/mm ²	PC6510	150(100~200)	1.7	170	955	4870	1.4	340	12.2	758	5154	1.4	454	16.2
			PC6510	150(100~200)	1.5	250	955	4297	1.2	257	9.2	758	4547	1.2	343	12.3

Recommended cutting condition

Workpiece	Hardness	Grade	V (m/min)	fz (mm/t)	overhang (mm)	ø50mm (3 teeth)					ø63mm (4 teeth)					
						N(min ⁻¹)	F(mm/min)	a _a (mm)	Q(cm ³ /min)	pc(KW)	N(min ⁻¹)	F(mm/min)	a _a (mm)	Q(cm ³ /min)	pc(KW)	
P	General structural steel Mild steel	Under 200Hb	PC3525	180(120~230)	1.5	150	1146	5157	1.4	310	11.1	909	5457	1.4	481	17.2
			PC3525	160(120~200)	1.3	250	1019	3973	1.3	258	8.5	808	4204	1.3	344	12.3
			PC3545	150(100~170)	1.3	350	954	3724	1.0	186	7.9	758	3941	1.0	248	8.8
	Carbon steel, Alloy steel	Under 30HrC	PC3525	160(130~190)	1.5	150	1019	3973	1.2	238	7.8	808	4850	1.2	367	13.1
			PC3525	150(130~180)	1.3	250	954	3724	1.1	205	7.3	758	3941	1.1	273	9.7
			PC3545	130(100~150)	1.1	350	827	2731	0.9	123	4.3	657	3416	0.9	194	6.1
	High carbon steel Alloy steel	30~40 HrC	PC3525	110(90~130)	1.3	150	700	2731	1.1	150	4.8	556	2890	1.1	200	6.3
			PC3545	100(80~130)	1.1	250	636	2101	1.0	105	3.7	505	2223	1.0	140	3.7
			PC3545	90(80~120)	0.8	350	572	1375	0.8	55	1.9	455	1455	0.8	73	2.3
Pre-hardened steel	40~50 HrC	PC3525	100(70~120)	0.8	150	636	1337	1.0	67	2.4	505	1617	1.0	102	3.2	
		PC3525	80(70~120)	0.6	250	509	916	0.7	32	1.8	404	970	0.7	43	1.3	
M	Stainless steel	Under 270Hb	PC9530	120(70~160)	1.2	150	763	2979	1.3	18	6.4	606	2910	1.3	238	7.5
			PC8520	120(70~160)	1.0	250	763	2292	1.1	13	4.5	606	2425	1.1	168	5.3
K	Cast Iron	Under 350N/mm ²	PC6510	150(100~200)	1.3	150	954	3724	1.2	22	7.9	758	3638	1.2	297	9.4
					1.1	250	954	2865	1.0	16	5.6	758	3335	1.0	210	6.6
Workpiece	Hardness	Grade	V (m/min)	fz (mm/t)	overhang (mm)	ø80mm (5 teeth)					ø100mm (6 teeth)					
						N(min ⁻¹)	F(mm/min)	a _a (mm)	Q(cm ³ /min)	pc(KW)	N(min ⁻¹)	F(mm/min)	a _a (mm)	Q(cm ³ /min)	pc(KW)	
P	General structural steel Mild steel	Under 200Hb	PC3525	180(120~230)	1.5	150	716	5371	1.4	601	19.1	573	5157	1.4	722	22.9
			PC3525	160(120~200)	1.3	250	637	4138	1.3	430	13.7	509	3973	1.3	516	16.4
			PC3545	150(100~170)	1.2	350	597	3581	1.0	286	9.1	477	3438	1.0	344	10.9
	Carbon steel, Alloy steel	Under 30HrC	PC3525	160(130~190)	1.5	150	716	4775	1.2	458	14.6	509	4584	1.2	550	17.5
			PC3525	150(130~180)	1.3	250	597	3879	1.1	341	10.8	477	3724	1.1	409	13
			PC3545	130(100~150)	1.1	350	517	2845	0.9	204	6.5	414	2731	0.9	245	7.8
	High carbon steel Alloy steel	30~40 HrC	PC3525	110(90~130)	1.3	150	438	1845	1.1	250	7.9	350	2731	1.1	300	9.5
			PC3545	100(80~130)	1.1	250	398	2188	1.0	175	5.5	318	2101	1.0	210	6.6
			PC3545	90(80~120)	0.8	350	358	1432	0.8	91	2.9	286	1375	0.8	110	3.5
Pre-hardened steel	40~50 HrC	PC3525	100(70~120)	0.8	150	398	1592	1.0	127	4.0	318	1528	1.0	152	4.8	
		PC3525	80(70~120)	0.6	250	318	955	0.7	53	1.7	255	917	0.7	64	2.7	
M	Stainless steel	Under 270Hb	PC9530	120(70~160)	1.2	150	477	2865	1.3	297	9.4	382	2750	1.3	357	11.4
			PC8520	120(70~160)	1.0	250	477	2387	1.1	210	6.6	382	2292	1.1	252	8
K	Cast Iron	Under 350N/mm ²	PC6510	150(100~200)	1.3	150	597	3879	1.2	372	11.8	477	3724	1.2	446	14.2
					1.1	250	597	3283	1.0	262	8.3	477	3151	1.0	315	10
Workpiece	Hardness	Grade	V (m/min)	fz (mm/t)	overhang (mm)	ø125mm (6 teeth)					ø160mm (7 teeth)					
						N(min ⁻¹)	F(mm/min)	a _a (mm)	Q(cm ³ /min)	pc(KW)	N(min ⁻¹)	F(mm/min)	a _a (mm)	Q(cm ³ /min)	pc(KW)	
P	General structural steel Mild steel	Under 200Hb	PC3525	180(120~230)	1.5	150	458	4125	1.4	722	22.9	358	3760	1.4	842	26.8
			PC3525	160(120~200)	1.3	250	407	3178	1.3	516	16.4	318	2897	1.3	602	19.1
			PC3545	150(100~170)	1.2	350	382	2750	1.0	349	10.9	298	2507	1.0	401	12.7
	Carbon steel, Alloy steel	Under 30HrC	PC3525	160(130~190)	1.5	150	407	3667	1.2	550	17.5	318	3342	1.2	641	20.4
			PC3525	150(130~180)	1.3	250	382	2979	1.1	410	13	298	2716	1.1	478	15.2
			PC3545	130(100~150)	1.1	350	331	2582	0.9	290	7.5	259	1991	0.9	287	9.1
	High carbon steel Alloy steel	30~40 HrC	PC3525	110(90~130)	1.3	150	280	2185	1.1	300	7.8	219	1991	1.1	351	11.1
			PC3545	100(80~130)	1.1	250	255	1681	1.0	210	5.4	199	1532	1.0	245	7.7
			PC3545	90(80~120)	0.8	350	229	1100	0.8	110	2.8	179	1003	0.8	128	4.1
Pre-hardened steel	40~50 HrC	PC3525	100(70~120)	0.8	150	255	1222	1.0	153	3.9	199	1114	1.0	178	5.6	
		PC3525	80(70~120)	0.6	250	204	733	0.7	64	1.7	159	668	0.7	75	2.4	
M	Stainless steel	Under 270Hb	PC9530	120(70~160)	1.2	150	306	2200	1.3	357	11.4	239	2005	1.3	417	13.3
			PC8520	120(70~160)	1.0	250	306	1833	1.1	252	8	239	1671	1.1	294	9.3
K	Cast Iron	Under 350N/mm ²	PC6510	150(100~200)	1.3	150	382	2979	1.2	447	14.2	298	2716	1.2	521	16.6
					1.1	250	382	2521	1.0	315	10	298	2298	1.0	367	11.7



HRM code system

■ Cutter type

HRM High Removal Milling

C Cutter type
C = Cutter

(M) Metric or Inch type

	D	d
Not shown	Metric	Inch
M	Metric	Metric
A	Inch	Inch

15 Insert I/C
13 = 13 size insert
15 = 15 size insert

063 Cutter diameter

Not shown	Metric 63mm
A	Inch

R Direction of rotation
R = Right
L = Left

3 Number of tooth
3 = 3 teeth

■ Shank type

HRM High Removal Milling

S Shank type
S = Shank

13 Insert I/C
08 = 08 size insert
10 = 10 size insert
13 = 13 size insert
15 = 15 size insert

32 Cutter diameter

Not shown	Metric 32mm
A	Inch

R Direction of rotation
R = Right
L = Left

2 Number of tooth
2 = 2 teeth

S Overhang
S = Standard type
M = Middle type
L = Long type

32 Shank diameter
32 mm



Warning

※ Safety instruction

- Use glasses safely and face cover with protective equipment. If cutting condition and use method are inaccurate, you may be injured by broken tools or scattered chips.
- Excessive cutting load may influence badly on both tool and machine.
Make suitable tool replacement for preventing failure of machining.
- After machine stopped, clean remained chips from machine with special cleaning equipment.
- Keep safety distance from acute and hot chip during machining.
- Make precaution for prevention of fire in advance when you use insoluble cutting oil.
- Assembled parts may be scattered at high speed cutting. Please use protective equipment.