

MIRROR RADIUS

RNM Type

RNM
TYPE

Shank Type

High Precision Indexable Radius End Mill

- Corner radius accuracy **below $\pm 0.010\text{mm}$**



Fig.1

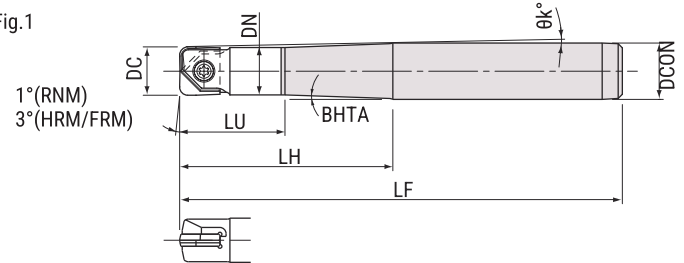
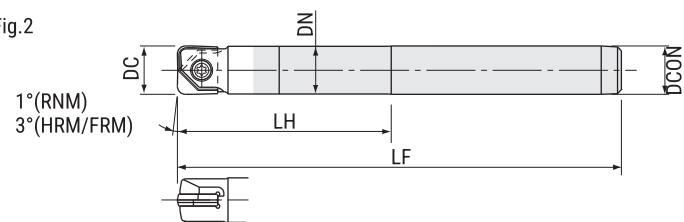


Fig.2



Cat.No.	Stock	Dimensions (mm)								Parts		Inserts	Fig.
		DC	LU	LH	LF	DN	BHTA	θk	DCON	Screws	Wrench		
RNMS-060015U-S06C	●	6	—	15	60	5.7	—	—	6	FSW-2005H	A-06	RNM-060 HRM-060 FRM-060	2
RNMM-060030U-S06C	●	6	—	30	80	5.7	—	—	6				2
RNMS-080020U-S08C	●	8	—	20	70	7.6	—	—	8	FSW-2506H	A-07	RNM-080 HRM-080/090 FRM-080	2
RNMM-080040U-S08C	●	8	—	40	90	7.6	—	—	8				2
RNMM-080053T-S12C	●	8	20	53	110	7.8	2°	2°12'	12				1
RNML-080075S-S08C	●	8	—	75	140	7.8	—	—	8				2
RNMM-100050S-S10C	●	10	—	50	110	9.8	—	—	10	FSW-3007H	A-08	RNM-100 HRM-100/110 FRM-100	2
RNML-100075S-S10C	●	10	—	75	140	9.8	—	—	10				2
RNMM-120053S-S12C	●	12	—	53	110	11.8	—	—	12	KSW-3509	A-15	RNM-120 HRM-120/130 FRM-120	2
RNML-120095S-S12C	●	12	—	95	160	11.8	—	—	12				2

Screw	Torque (N.m)
FSW-2005H	0.5
FSW-2506H	0.9
FSW-3007H	1.2
KSW-3509	3.0

MRX
TYPE**Modular Type****High Precision Indexable Radius End Mill**Through
coolant
hole

Face Milling

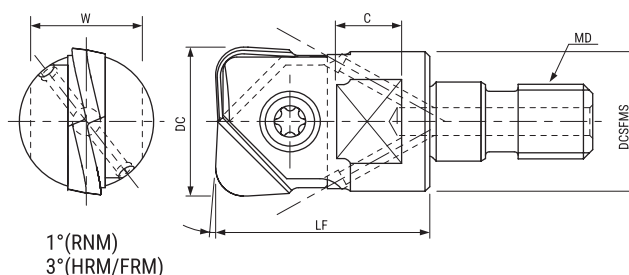
Shoulder Milling

Copy Milling

Pocket Milling

Helical Interpolation

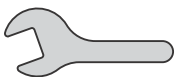
- RNM / Corner radius accuracy **below $\pm 0.010\text{mm}$**
- HRM / Corner radius accuracy **$\pm 0.015\text{ mm}$**
- FRM / Corner radius accuracy **$\pm 0.010\text{ mm}$**
- O.D. run out / MRX + MSN carbide shank **below $\pm 0.015\text{mm}$**



Cat.No.	Stock	Dimensions (mm)						Parts		Inserts
		DC	LF	DCSFMS	MD	C	W	Screws	Wrench	
MRX-100-M6	●	10	18	9.7	M6	6.5	8	FSW-3007H	A-08	RNM-100 HRM-100/110 FRM-100...
MRX-120-M6	●	12	20	11.5	M6	6.5	8	KSW-3509	A-15	RNM-120 HRM-120/130 FRM-120
MRX-160-M8	●	16	23	15	M8	8	12	FSW-4013H	A-15	RNM-160 HRM-160/170 FRM-160/170...
MRX-200-M10	●	20	30	18.5	M10	8	14	FSW-5016H	A-20W	HRM-200/220 FRM-200/210
MRX-250-M12	●	25	35	24	M12	10	17	FSW-6020	A-30	FRM-250
MRX-300-M16	○	30	43	29	M16	12.5	22	KSW-8025	A-30	FRM-300
MRX-320-M16	●	32	43	30	M16	12.5	22	KSW-8025	A-30	FRM-320

Screw	Torque (N.m)
FSW-3007H	1.2
KSW-3509	3.0
FSW-4013H	3.0
FSW-5016H	4.0
FSW-6020	6.0
KSW-8025	6.0

■ **Spanner**

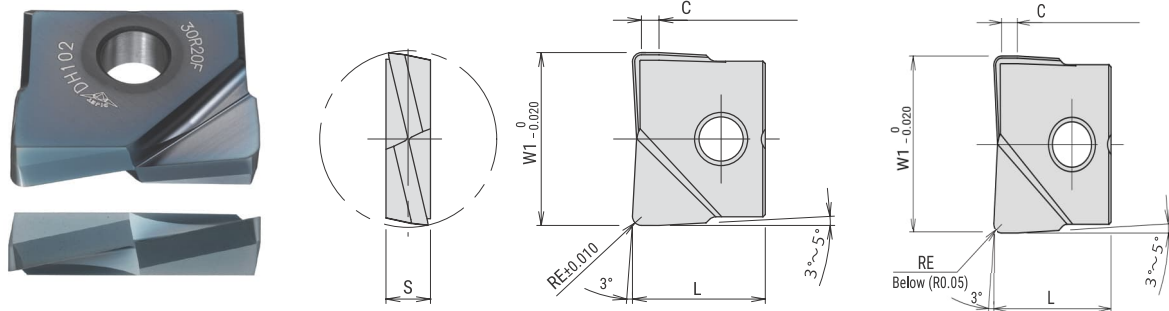
	Cat.No.	MD	Torque	width across flat	Thickness	Length
	DS-08	M6	8.0 N.m	12	4	85
	DS-12	M8	16 N.m	12	4	93

FRM
TYPE**High feed geometry**

from Semi-finishing to finishing

Corner radius accuracy
 ± 0.010 mm

FRM-□□□-R0



Cat.No.	PVD Coating		Dimensions(mm)				
	DH102	JC8015	RE	L	W1	S	C
FRM-060-R0		●	※	5	6	2	0.8
FRM-060-R03	●	●	0.3	5	6	2	0.8
FRM-060-R05	●	●	0.5	5	6	2	0.8
FRM-060-R10	●	●	1	5	6	2	0.8
FRM-080-R0		●	※	7	8	2.4	1.2
FRM-080-R03	●	●	0.3	7	8	2.4	1.2
FRM-080-R05	●	●	0.5	7	8	2.4	1.2
FRM-080-R10	●	●	1	7	8	2.4	1.2
FRM-100-R0		●	※	8.5	10	2.6	1.5
FRM-100-R03	●	●	0.3	8.5	10	2.6	1.5
FRM-100-R05	●	●	0.5	8.5	10	2.6	1.5
FRM-100-R10	●	●	1	8.5	10	2.6	1.5
FRM-100-R20	●	●	2	8.5	10	2.6	1.5
FRM-120-R0		●	※	10	12	3	1.5
FRM-120-R03	●	●	0.3	10	12	3	1.5
FRM-120-R05	●	●	0.5	10	12	3	1.5
FRM-120-R10	●	●	1	10	12	3	1.5
FRM-120-R15	●		1.5	10	12	3	1.5
FRM-120-R20	●	●	2	10	12	3	1.5
FRM-120-R30	●		3	10	12	3	1.5
FRM-130-R05		●	0.5	10	13	3	1.5
FRM-130-R10		●	1	10	13	3	1.5

Cat.No.	PVD Coating		Dimensions(mm)				
	DH102	JC8015	RE	L	W1	S	C
FRM-160-R0		●	※	12	16	4	2
FRM-160-R03	●	●	0.3	12	16	4	2
FRM-160-R05	●	●	0.5	12	16	4	2
FRM-160-R10	●	●	1	12	16	4	2
FRM-160-R15	●		1.5	12	16	4	2
FRM-160-R20	●	●	2	12	16	4	2
FRM-160-R30	●		3	12	16	4	2
FRM-170-R03		●	0.3	12	17	4	2
FRM-170-R05		●	0.5	12	17	4	2
FRM-170-R10	●	●	1	12	17	4	2
FRM-170-R20		●	2	12	17	4	2
FRM-200-R0		●	※	15	20	5	2
FRM-200-R03	●	●	0.3	15	20	5	2
FRM-200-R05	●	●	0.5	15	20	5	2
FRM-200-R10	●	●	1	15	20	5	2
FRM-200-R15	●		1.5	15	20	5	2
FRM-200-R20	●	●	2	15	20	5	2
FRM-200-R30	●	●	3	15	20	5	2
FRM-210-R05		●	0.5	15	21	5	2
FRM-210-R10	●	●	1	15	21	5	2
FRM-210-R20		●	2	15	21	5	2
FRM-250-R03	●	●	0.3	18.5	25	6	2.5
FRM-250-R05	●	●	0.5	18.5	25	6	2.5
FRM-250-R10	●	●	1	18.5	25	6	2.5
FRM-250-R15	●		1.5	18.5	25	6	2.5
FRM-250-R20	●	●	2	18.5	25	6	2.5
FRM-250-R30	●	●	3	18.5	25	6	2.5
FRM-260-R03		●	0.3	18.5	26	6	2.5
FRM-260-R05		●	0.5	18.5	26	6	2.5
FRM-260-R10		●	1	18.5	26	6	2.5
FRM-300-R03	○	○	0.3	22.5	30	7	3
FRM-300-R05	○	○	0.5	22.5	30	7	3
FRM-300-R10	○	○	1	22.5	30	7	3
FRM-300-R20	○	○	2	22.5	30	7	3
FRM-300-R30	○	○	3	22.5	30	7	3
FRM-320-R03	●	●	0.3	23.5	32	7	3
FRM-320-R05	●	●	0.5	23.5	32	7	3
FRM-320-R10	●	●	1	23.5	32	7	3
FRM-320-R20	●	●	2	23.5	32	7	3
FRM-320-R30	●		3	23.5	32	7	3

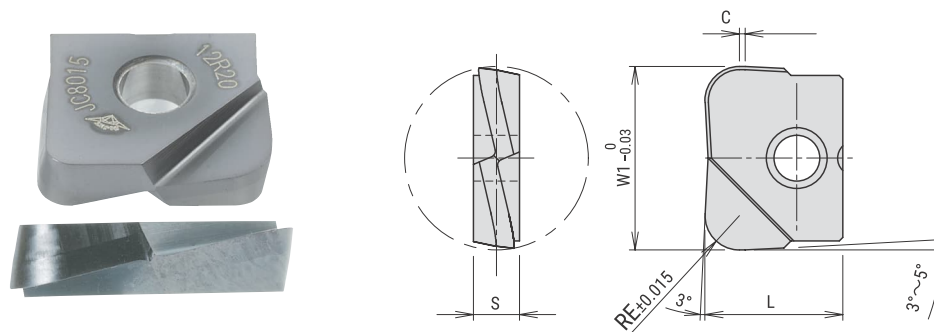
MIRROR RADIUS

RNM Type

HRM
TYPE

High feed geometry

from Semi-finishing to finishing

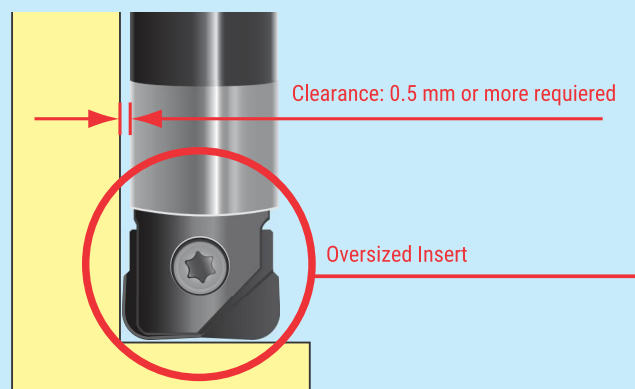
Corner radius accuracy
 ± 0.015 mm

Cat.No.	PVD Coating	Dimensions(mm)				
	JC8015	RE	L	W1	S	C
HRM-060-R05	●	0.5	5	6	2	—
HRM-060-R10	●	1	5	6	2	—
HRM-060-R15	●	1.5	5	6	2	—
HRM-080-R20	●	2	7	8	2.4	0.3
HRM-090-R20	●	2	7	9	2.4	0.3
HRM-100-R20	●	2	8.5	10	2.6	0.3
HRM-110-R20	●	2	8.5	11	2.6	0.3
HRM-120-R20	●	2	10	12	3	0.5
HRM-130-R20	●	2	10	13	3	0.5
HRM-160-R20	●	2	12	16	4	0.5
HRM-160-R30	●	3	12	16	4	0.5
HRM-170-R30	●	3	12	17	4	0.5
HRM-200-R20	●	2	15	20	5	0.5
HRM-200-R30	●	3	15	20	5	0.5
HRM-220-R30	○	3	15	22	5	0.5

Mirror Radius Oversized Insert

Recommended to use oversized insert ※ for increasing side clearance to prevent the damage of shank by sticking chips.

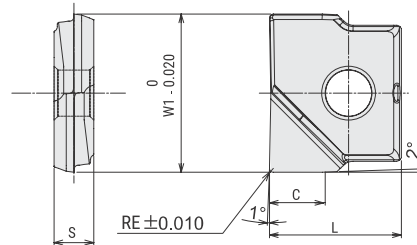
(※) HRM-090-R20, HRM-110-R20, HRM-130-R20,
HRM-170-R30, HRM-220-R30



RNM
TYPE

Neutral geometry

good for finishing non-ferrous materials such as Aluminium, Copper

Corner radius accuracy
 ± 0.010 mm

Cat.No.	Diamond Coating	Uncoated	Dimensions(mm)				
	JC10000	KT9 (K10)	RE	L	W1	S	C
RNM-080-R03		○	0.3	7	8	2.4	2.7
RNM-080-R05	●	●	0.5	7	8	2.4	2.7
RNM-080-R10		●	1	7	8	2.4	2.7
RNM-100-R03		○	0.3	8.5	10	2.6	3.3
RNM-100-R05	●	●	0.5	8.5	10	2.6	3.3
RNM-100-R10	○	●	1	8.5	10	2.6	3.3
RNM-100-R15		○	1.5	8.5	10	2.6	3.3
RNM-100-R20		○	2	8.5	10	2.6	3.3
RNM-120-R03		○	0.3	10	12	3	4
RNM-120-R05	○	●	0.5	10	12	3	4
RNM-120-R10	○	●	1	10	12	3	4
RNM-120-R15		○	1.5	10	12	3	4
RNM-120-R20		●	2	10	12	3	4
RNM-160-R03		●	0.3	12	16	4	5.3
RNM-160-R05		●	0.5	12	16	4	5.3
RNM-160-R10		●	1	12	16	4	5.3
RNM-160-R15		○	1.5	12	16	4	5.3
RNM-160-R20		○	2	12	16	4	5.3
RNM-200-R03		○	0.3	15	20	5	6.7
RNM-200-R05		○	0.5	15	20	5	6.7
RNM-200-R10		●	1	15	20	5	6.7
RNM-200-R15		○	1.5	15	20	5	6.7
RNM-200-R20		○	2	15	20	5	6.7

■ Grade Selection Guide

Material	Insert	Grade	RNM		HRM	FRM	
			JC10000	KT9	JC8015	DH102	JC8015
Carbon steel below 250HB	FRM HRM	JC8015			◎		◎
Cast steel below 285HB	FRM HRM	JC8015			◎		◎
Tool & Die steel below 255HB	FRM HRM	JC8015			◎		◎
Mold steel 30 - 36HRC	FRM HRM	JC8015			◎		◎
Mold steel 38 - 43HRC	FRM HRM	JC8015			◎		◎
Hardened die steel 42 - 52HRC	FRM HRM	DH102 JC8015			○	◎	○
Hardened die steel 55 - 62HRC	FRM	DH102				◎	
HSS 63 - 70HRC	FRM	DH102				◎	
Grey & Nodular cast iron below 300HB	FRM HRM	DH102 JC8015			○	◎	○
Austenitic stainless steel (304,316,317) 17Cr	FRM HRM	JC8015			◎	○	◎
Aluminium alloy (A5052)	RNM	KT9		◎			
Copper alloy (C1100)	RNM	KT9		◎			
Graphite	RNM	JC10000	◎				
Titanium alloy (Ti-6Al-4V) 35 - 43HRC	HRM FRM	JC8015			◎		◎
Heat resistant alloy (INCO718) 35 - 43HRC	HRM FRM	JC8015			◎		◎

Note) ◎ : First choice ○ : Second choice

■ Recommended Cutting Conditions | RNM type | Side Finishing

Material	Cat.No	Grade		Tool dia.(mm)				
				8	10	12	16	20
Aluminium	RNM	KT9	$n(\text{min}^{-1})$	13,930	11,140	9,280	6,960	5,570
			$Vf(\text{mm/min})$	5,570	4,460	3,710	3,500	2,800
			$ap(\text{mm})$	0.4	0.5	0.6	0.8	1.0
			$ae(\text{mm})$	0.2	0.2	0.2	0.2	0.2
Copper alloy	RNM	KT9	$n(\text{min}^{-1})$	9,950	7,960	6,630	4,970	3,980
			$Vf(\text{mm/min})$	3,980	3,180	2,650	2,500	2,000
			$ap(\text{mm})$	0.3	0.3	0.4	0.5	0.7
			$ae(\text{mm})$	0.15	0.15	0.15	0.15	0.15
Graphite	RNM	JC10000	$n(\text{min}^{-1})$	13,930	11,140	9,280	—	—
			$Vf(\text{mm/min})$	5,570	4,460	3,710	—	—
			$ap(\text{mm})$	0.4	0.5	0.6	—	—
			$ae(\text{mm})$	0.2	0.2	0.2	—	—

■ Recommended Cutting Conditions | RNM type | Bottom Finishing

Material	Cat.No	Grade		Tool dia.(mm)				
				8	10	12	16	20
Aluminium	RNM	KT9	$n(\text{min}^{-1})$	11,940	9,550	7,960	5,970	4,770
			$Vf(\text{mm/min})$	4,780	3,820	3,180	3,580	2,860
			$ap(\text{mm})$	0.25	0.25	0.25	0.25	0.3
			$ae(\text{mm})$	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)
Copper alloy	RNM	KT9	$n(\text{min}^{-1})$	7,960	6,370	5,310	3,980	3,180
			$Vf(\text{mm/min})$	2,390	1,910	1,590	1,190	950
			$ap(\text{mm})$	0.2	0.2	0.2	0.2	0.25
			$ae(\text{mm})$	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)
Graphite	RNM	JC10000	$n(\text{min}^{-1})$	11,940	9,550	7,960	—	—
			$Vf(\text{mm/min})$	4,780	3,820	3,180	—	—
			$ap(\text{mm})$	0.25	0.25	0.25	—	—
			$ae(\text{mm})$	1.2 (~4)	1.2 (~5)	1.5 (~5)	—	—

- Note) 1. Please adjust cutting conditions according to machine rigidity or work rigidity.
 2. These cutting conditions represent stable machining at length $3 \times D_c$.
 Please adjust cutting conditions according to overhang length.
 3. In case of chatter occurring, recommended to reduce ap or feed.
 4. Use air blow.

Overhang length	$n(\text{min}^{-1})$	$Vf(\text{mm/min})$
~3Dc	100%	100%
3Dc~5Dc	70%	70%
5Dc~10Dc	50%	50%

Recommended Cutting Conditions | FRM type | Side Finishing

Material	Grade		Tool dia. (mm)								
			6	8	10	12/13	16/17	20/21	25/26	30	32
Carbon steel below 250HB	JC8015	n (min ⁻¹)	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980
		Vf (mm/min)	3,980	2,990	2,870	2,390	2,390	1,910	1,530	1,270	1,190
		ap (mm)	0.2	0.3	0.3	0.3	0.4	0.5	0.8	1.0	1.2
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tool & Die steel below 255HB	JC8015	n (min ⁻¹)	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980
		Vf (mm/min)	3,980	2,990	2,870	2,390	2,390	1,910	1,530	1,270	1,190
		ap (mm)	0.2	0.3	0.3	0.3	0.4	0.5	0.8	1.0	1.2
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mold steel 30 - 36HRC	JC8015	n (min ⁻¹)	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980
		Vf (mm/min)	3,980	2,990	2,870	2,390	2,390	1,910	1,530	1,270	1,190
		ap (mm)	0.2	0.3	0.3	0.3	0.4	0.5	0.8	1.0	1.2
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mold steel 38 - 43HRC	JC8015	n (min ⁻¹)	14,850	11,140	8,910	7,430	5,570	4,460	3,570	2,970	2,790
		Vf (mm/min)	3,710	2,790	2,670	2,230	1,670	1,340	1,070	890	840
		ap (mm)	0.2	0.2	0.3	0.3	0.4	0.5	0.8	1.0	1.2
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hardened die steel 42 - 52HRC	DH102 JC8015	n (min ⁻¹)	13,260	9,950	7,960	6,630	4,970	3,980	3,180	2,650	2,490
		Vf (mm/min)	1,330	1,000	800	660	750	600	480	400	370
		ap (mm)	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.8	1.0
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hardened die steel 55 - 62HRC	DH102	n (min ⁻¹)	10,610	7,960	6,370	5,310	3,980	3,180	2,550	2,120	1,990
		Vf (mm/min)	1,060	800	640	530	600	480	380	320	300
		ap (mm)	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.8	1.0
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
HSS 63 - 70HRC	DH102	n (min ⁻¹)	7,960	5,970	4,770	3,980	2,980	2,390	1,910	1,590	1,490
		Vf (mm/min)	320	240	290	320	300	240	190	160	150
		ap (mm)	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Grey & Nodular cast iron below 300 HB	DH102 JC8015	n (min ⁻¹)	18,570	13,930	11,140	9,280	6,960	5,570	4,460	3,710	3,480
		Vf (mm/min)	6,500	4,880	3,900	3,250	3,480	3,340	2,680	2,230	2,090
		ap (mm)	0.2	0.3	0.3	0.3	0.4	0.5	0.8	1.0	1.2
		ae (mm)	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Stainless steel	JC8015	n (min ⁻¹)	14,850	11,140	8,910	7,430	5,570	4,460	3,570	2,970	2,790
		Vf (mm/min)	4,460	3,340	2,670	2,230	2,230	1,780	1,430	1,190	1,120
		ap (mm)	0.2	0.3	0.3	0.3	0.4	0.5	0.8	1.0	1.0
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Titanium alloy (Ti-6Al-4V)	JC8015	n (min ⁻¹)	5,310	3,980	3,180	2,650	1,990	1,590	1,270	1,060	990
		Vf (mm/min)	1,060	800	760	640	480	380	320	270	250
		ap (mm)	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Heat resistant alloy (INCO718)	JC8015	n (min ⁻¹)	4,240	3,180	2,550	2,120	1,590	1,270	1,020	850	800
		Vf (mm/min)	850	640	610	510	380	300	260	210	200
		ap (mm)	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4
		ae (mm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

- Note) 1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These cutting conditions represent stable machining at length 3 x Dc.
Please adjust cutting conditions according to overhang length.
3. In case of chatter occurring, recommended to reduce ap or feed.
4. Use air blow.

Overhang length	n (min ⁻¹)	Vf (mm/min)
~3Dc	100%	100%
3Dc~5Dc	70%	70%
5Dc~10Dc	50%	50%

■ Recommended Cutting Conditions | FRM type | Bottom Finishing

Material	Grade		Tool dia. (mm)								
			6	8	10	12/13	16/17	20/21	25/26	30	32
Carbon steel below 250HB	JC8015	n (min ⁻¹)	13,790	10,350	8,280	6,900	5,170	4,140	3,310	2,760	2,590
		Vf (mm/min)	3,450	3,110	2,480	2,070	2,070	1,660	1,320	1,100	1,040
		ap (mm)	0.1	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Tool & Die steel below 255HB	JC8015	n (min ⁻¹)	13,790	10,350	8,280	6,900	5,170	4,140	3,310	2,760	2,590
		Vf (mm/min)	3,450	3,110	2,480	2,070	2,070	1,660	1,320	1,100	1,040
		ap (mm)	0.1	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Mold steel 30 - 36HRC	JC8015	n (min ⁻¹)	13,790	10,350	8,280	6,900	5,170	4,140	3,310	2,760	2,590
		Vf (mm/min)	3,450	3,110	2,480	2,070	2,070	1,660	1,320	1,100	1,040
		ap (mm)	0.1	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Mold steel 38 - 43HRC	JC8015	n (min ⁻¹)	12,730	9,550	7,640	6,370	4,770	3,820	3,060	2,550	2,390
		Vf (mm/min)	3,180	2,870	2,290	1,910	1,430	1,150	920	770	720
		ap (mm)	0.1	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Hardened die steel 42 - 52HRC	DH102 JC8015	n (min ⁻¹)	10,080	7,560	6,050	5,040	3,780	3,020	2,420	2,020	1,890
		Vf (mm/min)	1,010	760	610	600	570	450	360	300	280
		ap (mm)	0.05	0.06	0.08	0.1	0.1	0.15	0.15	0.15	0.15
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Hardened die steel 55 - 62HRC	DH102	n (min ⁻¹)	6,900	5,170	4,140	3,450	2,590	2,070	1,660	1,380	1,290
		Vf (mm/min)	690	520	410	410	390	310	250	210	190
		ap (mm)	0.05	0.06	0.08	0.1	0.1	0.15	0.15	0.15	0.15
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
HSS 63 - 70HRC	DH102	n (min ⁻¹)	5,310	3,980	3,180	2,650	1,990	1,590	1,270	1,060	990
		Vf (mm/min)	210	160	190	210	200	160	130	110	100
		ap (mm)	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		ae (mm)	1.0 (~2)	1.2 (~3)	1.2 (~4)	1.5 (~5)	2.0 (~6)	2.5 (~8)	4.0 (~10)	4.2 (~12)	4.2 (~13)
Grey & Nodular cast iron below 300 HB	DH102 JC8015	n (min ⁻¹)	15,920	11,940	9,550	7,960	5,970	4,770	3,820	3,180	2,980
		Vf (mm/min)	4,780	4,180	3,340	3,180	2,390	1,910	1,910	1,590	1,490
		ap (mm)	0.1	0.15	0.15	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Stainless steel	JC8015	n (min ⁻¹)	12,730	9,550	7,640	6,370	4,770	3,820	3,060	2,550	2,390
		Vf (mm/min)	3,180	2,870	2,290	1,910	1,910	1,530	1,220	1,020	960
		ap (mm)	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Titanium alloy (Ti-6Al-4V)	JC8015	n (min ⁻¹)	2,920	2,190	1,750	1,460	1,090	880	700	580	550
		Vf (mm/min)	580	440	350	290	220	180	140	120	110
		ap (mm)	0.1	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2
		ae (mm)	1.0 (~3)	1.2 (~4)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)
Heat resistant alloy (INCO718)	JC8015	n (min ⁻¹)	2,920	2,190	1,750	1,460	1,090	880	700	580	550
		Vf (mm/min)	580	440	350	290	220	180	140	120	110
		ap (mm)	0.1	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2
		ae (mm)	1.0 (~3)	1.2 (~5)	1.2 (~5)	1.5 (~5)	2.0 (~9)	2.5 (~13)	4.0 (~18)	4.2 (~23)	4.2 (~25)

Note) 1. Please adjust cutting conditions according to machine rigidity or work rigidity.
 2. These cutting conditions represent stable machining at length 3 x Dc.
 Please adjust cutting conditions according to overhang length.
 3. In case of chatter occurring, recommended to reduce ap or feed.
 4. Use air blow.

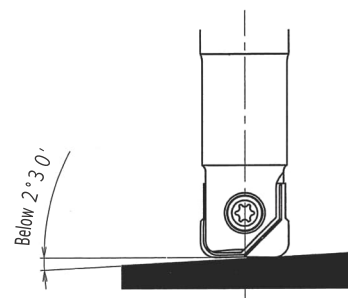
Overhang length	n (min ⁻¹)	Vf (mm/min)
~3Dc	100%	100%
3Dc~5Dc	70%	70%
5Dc~10Dc	50%	50%

Recommended Cutting Conditions | HRM type | High Feed / Semi finishing

Material		Tool dia. (mm)									
		Ø6×R1.5		Ø8×R2/Ø9×R2				Ø10×R2/Ø11×R2			
		2.5 D	5.0 D	2.5 D	5.0 D	7.5 D	10 D	2.5 D	5.0 D	7.5 D	10 D
Carbon steel below 250HB	n (min ⁻¹)	9,000	9,000	7,500	7,500	7,500	7,500	6,000	6,000	6,000	6,000
	Vf (mm/min)	8,000	7,200	8,200	6,750	6,750	6,750	7,200	6,000	6,000	6,000
	ap (mm)	0.2	0.15	0.4	0.4	0.25	0.2	0.4	0.4	0.25	0.2
	ae (mm)	2.1	2.1	2.8	2.8	2.8	2.8	4.2	4.2	4.2	4.2
Mold steel 30 - 43HRC	n (min ⁻¹)	8,500	8,500	7,100	7,100	7,100	7,100	5,700	5,700	5,700	5,700
	Vf (mm/min)	7,600	6,800	7,800	6,400	6,400	6,400	6,800	5,700	5,700	5,700
	ap (mm)	0.2	0.15	0.4	0.4	0.25	0.2	0.4	0.4	0.25	0.2
	ae (mm)	2.1	2.1	2.8	2.8	2.8	2.8	4.2	4.2	4.2	4.2
Tool & Die steel below 255HB	n (min ⁻¹)	8,500	8,500	7,100	7,100	7,100	7,100	5,700	5,700	5,700	5,700
	Vf (mm/min)	7,600	6,800	7,800	6,400	6,400	6,400	6,800	5,700	5,700	5,700
	ap (mm)	0.2	0.15	0.4	0.4	0.25	0.2	0.4	0.4	0.25	0.2
	ae (mm)	2.1	2.1	2.8	2.8	2.8	2.8	4.2	4.2	4.2	4.2
Stainless steel below 250HB	n (min ⁻¹)	8,000	8,000	6,700	6,700	6,700	6,700	5,400	5,400	5,400	5,400
	Vf (mm/min)	6,400	5,600	7,300	6,000	6,000	6,000	6,400	5,400	5,400	5,400
	ap (mm)	0.2	0.15	0.4	0.4	0.25	0.2	0.4	0.4	0.25	0.2
	ae (mm)	2.1	2.1	2.8	2.8	2.8	2.8	4.2	4.2	4.2	4.2
Hardened die steel 40 - 50HRC	n (min ⁻¹)	6,900	6,900	6,000	6,000	6,000	6,000	4,700	4,700	4,700	4,700
	Vf (mm/min)	5,500	4,800	6,600	4,800	4,800	4,800	5,600	4,700	4,700	4,700
	ap (mm)	0.15	0.1	0.2	0.2	0.15	0.1	0.2	0.2	0.15	0.1
	ae (mm)	2.1	2.1	2.8	2.8	2.8	2.8	4.2	4.2	4.2	4.2
Grey & Nodular cast iron below 300 HB	n (min ⁻¹)	7,400	7,400	6,400	6,400	6,400	6,400	5,100	5,100	5,100	5,100
	Vf (mm/min)	6,600	5,900	7,600	5,700	5,700	5,700	6,100	5,100	5,100	5,100
	ap (mm)	0.2	0.15	0.4	0.4	0.25	0.2	0.4	0.4	0.25	0.2
	ae (mm)	2.1	2.1	2.8	2.8	2.8	2.8	4.2	4.2	4.2	4.2

ap adjustment by corner radius $ap \times \text{ratio}$	Tool dia. (mm)	ap (mm)
	Ø6×R0.5	65%
	Ø6×R1.0	80%
	Ø6×R1.5	100%

- Note) 1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. In case of chatter occurring, recommended to reduce ap or Vf .
3. Recommended to reduce the parameters when using on low horse power machine.
4. Use air blow.
5. Reduce ap , n & Vf by 30% in case of cutting material 50-55HRC.
6. Reduce Vf for better surface finish.
7. Use angle 2°30' or below in case of ramping (see right figure).
8. In case of slotting with over $5xD_c$, reduce Vf or ap appropriately.



★ Insert Mounting Information

1. Make sure the insert seat on body is carefully cleaned.
2. Make sure insert itself is clean, especially the hole and face location.
3. Change insert screw when threads starts to wear.
4. Do not over tighten screw. See table for torque specifications.

Toll dia. (mm)	Torque
ϕD_c	N·m
6	0.5
8	0.9
10	1.2
12	2.0
16	3.0
20	4.0

■ Recommended Cutting Conditions | **HRM type** | High Feed / Semi finishing

	Tool dia. (mm)											
	Ø12×R2/Ø13×R2				Ø16×R3/Ø17×R3				Ø20×R3/Ø22×R3			
	2.5 D	5.0 D	7.5 D	10 D	2.5 D	5.0 D	7.5 D	10 D	2.5 D	5.0 D	7.5 D	10 D
<i>n</i> (min ⁻¹)	5,000	5,000	5,000	5,000	3,800	3,800	3,800	3,800	3,000	3,000	3,000	3,000
<i>Vf</i> (mm/min)	6,000	5,000	5,000	5,000	4,500	3,800	3,800	3,800	3,600	3,000	3,000	3,000
<i>ap</i> (mm)	0.5	0.4	0.25	0.2	0.6	0.6	0.4	0.3	0.6	0.6	0.4	0.3
<i>ae</i> (mm)	5.6	5.6	5.6	5.6	7	7	7	7	9.8	9.8	9.8	9.8
<i>n</i> (min ⁻¹)	4,700	4,700	4,700	4,700	3,500	3,500	3,500	3,500	2,800	2,800	2,800	2,800
<i>Vf</i> (mm/min)	5,600	4,700	4,700	4,700	4,200	3,500	3,500	3,500	3,300	2,800	2,800	2,800
<i>ap</i> (mm)	0.4	0.4	0.25	0.2	0.6	0.6	0.4	0.3	0.6	0.6	0.4	0.3
<i>ae</i> (mm)	5.6	5.6	5.6	5.6	7	7	7	7	9.8	9.8	9.8	9.8
<i>n</i> (min ⁻¹)	4,700	4,700	4,700	4,700	3,500	3,500	3,500	3,500	2,800	2,800	2,800	2,800
<i>Vf</i> (mm/min)	5,600	4,700	4,700	4,700	4,200	3,500	3,500	3,500	3,300	2,800	2,800	2,800
<i>ap</i> (mm)	0.4	0.4	0.25	0.2	0.6	0.6	0.4	0.3	0.6	0.6	0.4	0.3
<i>ae</i> (mm)	5.6	5.6	5.6	5.6	7	7	7	7	9.8	9.8	9.8	9.8
<i>n</i> (min ⁻¹)	4,500	4,500	4,500	4,500	3,400	3,400	3,400	3,400	2,700	2,700	2,700	2,700
<i>Vf</i> (mm/min)	5,400	4,500	4,500	4,500	4,000	3,400	3,400	3,400	3,200	2,700	2,700	2,700
<i>ap</i> (mm)	0.4	0.4	0.25	0.2	0.6	0.6	0.4	0.3	0.6	0.6	0.4	0.3
<i>ae</i> (mm)	5.6	5.6	5.6	5.6	7	7	7	7	9.8	9.8	9.8	9.8
<i>n</i> (min ⁻¹)	4,000	4,000	4,000	4,000	3,000	3,000	3,000	3,000	2,400	2,400	2,400	2,400
<i>Vf</i> (mm/min)	4,800	4,000	4,000	4,000	3,600	3,000	3,000	3,000	2,800	2,400	2,400	2,400
<i>ap</i> (mm)	0.2	0.2	0.15	0.1	0.3	0.3	0.25	0.2	0.3	0.3	0.25	0.2
<i>ae</i> (mm)	5.6	5.6	5.6	5.6	7	7	7	7	9.8	9.8	9.8	9.8
<i>n</i> (min ⁻¹)	4,200	4,200	4,200	4,200	3,200	3,200	3,200	3,200	2,500	2,500	2,500	2,500
<i>Vf</i> (mm/min)	5,000	4,200	4,200	4,200	3,800	3,200	3,200	3,200	3,000	2,500	2,500	2,500
<i>ap</i> (mm)	0.4	0.4	0.25	0.2	0.6	0.6	0.4	0.3	0.6	0.6	0.4	0.3
<i>ae</i> (mm)	5.6	5.6	5.6	5.6	7	7	7	7	9.8	9.8	9.8	9.8

ap adjustment by corner radius ap × ratio	Tool dia. (mm)	ap (mm)	Tool dia. (mm)	ap (mm)
	Ø16×R2.0	75%	Ø20×R2.0	75%
	Ø16×R3.0	100%	Ø20×R3.0	100%