HMX series

end mills for high-hardness steel machining

Lattice heterogeneous coating

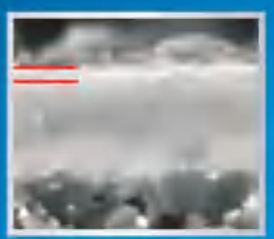
- Lattice heterogeneous coating added with special elements, with high hardness and excellent high temperature oxidation resistance, more suitable for high hardness materials and high speed machining
- Excellent coating processing technology, more closely combined with substrate

New technology
Breakthrough upgrading

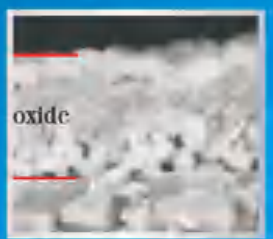
- Unique edge structure, properly designed flute profile, for outstanding cutting performance.
- Orange red coating allows for better wear observation.
- Special after treatment greatly reduces friction, for smoother chip evacuation and superior surface quality.

Perfect high temperature oxidation resistance:

After oxidation at 1100 °C, the coating of HMX series only has a very thin oxide layer, while the similar products of Company A has completely oxidized.



HMX series



A company

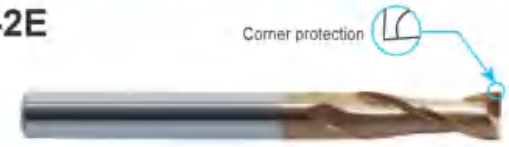
2-flute flattened end mills with straight shank


Side face

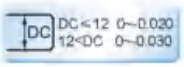

Step shoulder

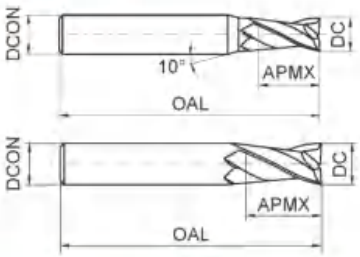

Straight slot

HMX-2E



- For slot milling.
- Very suitable for high speed cutting and dry cutting.





Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
HMX-2E-D1.0F	1.0	3	3	50	2	Picture 1	●
HMX-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
HMX-2E-D1.0	1.0	6	3	50	2	Picture 1	●
HMX-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
HMX-2E-D1.5	1.5	6	4	50	2	Picture 1	●
HMX-2E-D2.0F	2.0	3	6	50	2	Picture 1	●
HMX-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
HMX-2E-D2.0	2.0	6	6	50	2	Picture 1	●
HMX-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
HMX-2E-D2.5	2.5	6	8	50	2	Picture 1	●
HMX-2E-D3.0F	3.0	3	8	50	2	Picture 2	●
HMX-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
HMX-2E-D3.0	3.0	6	8	50	2	Picture 1	●
HMX-2E-D3.5S	3.5	4	10	50	2	Picture 1	●
HMX-2E-D3.5	3.5	6	10	50	2	Picture 1	●
HMX-2E-D4.0S	4.0	4	11	50	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 Graphics category and identification B295 Cutting parameters B601 Non-standard customization B652-B653

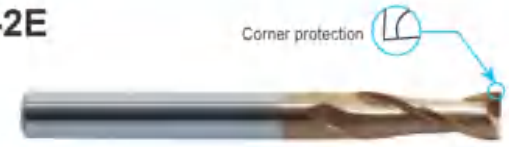
2-flute flattened end mills with straight shank

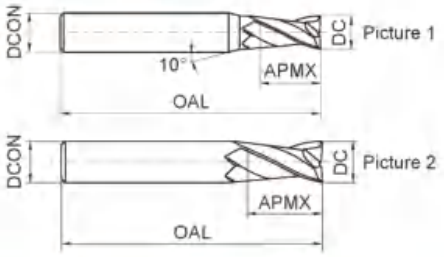

Side face


Step shoulder

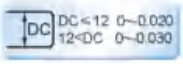

Straight slot

HMX-2E





- For slot milling.
- Very suitable for high speed cutting and dry cutting.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
HMX-2E-D4.0	4.0	6	11	50	2	Picture 1	●
HMX-2E-D4.5	4.5	6	11	50	2	Picture 1	●
HMX-2E-D5.0	5.0	6	13	50	2	Picture 1	●
HMX-2E-D5.5	5.5	6	16	50	2	Picture 1	●
HMX-2E-D6.0	6.0	6	16	50	2	Picture 2	●
HMX-2E-D7.0	7.0	8	20	60	2	Picture 1	●
HMX-2E-D8.0	8.0	8	20	60	2	Picture 2	●
HMX-2E-D9.0	9.0	10	22	75	2	Picture 1	●
HMX-2E-D10.0	10.0	10	25	75	2	Picture 2	●
HMX-2E-D11.0	11.0	12	26	75	2	Picture 1	●
HMX-2E-D12.0	12.0	12	30	75	2	Picture 2	●
HMX-2E-D14.0	14.0	14	32	100	2	Picture 2	●
HMX-2E-D16.0	16.0	16	45	100	2	Picture 2	●
HMX-2E-D18.0	18.0	18	45	100	2	Picture 2	●
HMX-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B601
Non-standard customization B652-B653

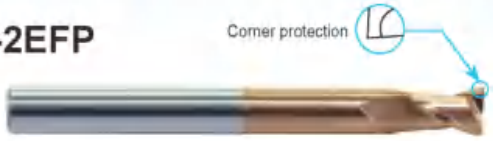
2-flute flattened end mills with straight shank, long neck and short cutting edge

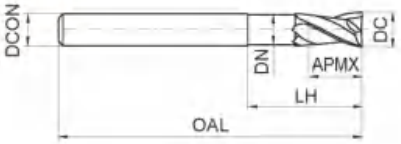

Side face


Step shoulder

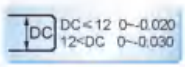

Straight slot

HMX-2EFP





- High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling.



Type	Basic dimension(mm)						Number of teeth Z	Stock
	DC	DCON	APMX	LH	DN	OAL		
HMX-2EFP-D6.0	6.0	6	9	30	5.8	75	2	●
HMX-2EFP-D8.0	8.0	8	12	40	7.8	100	2	●
HMX-2EFP-D10.0	10.0	10	15	50	9.6	100	2	●
HMX-2EFP-D12.0	12.0	12	18	50	11.5	100	2	●
HMX-2EFP-D16.0	16.0	16	24	50	15.5	150	2	●
HMX-2EFP-D20.0	20.0	20	30	60	19.5	150	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminium alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 Graphics category and identification B295 Cutting parameters B602 Non-standard customization B652-B653

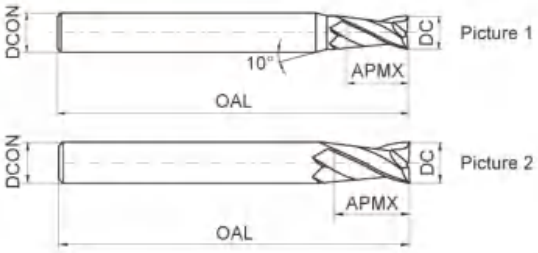
2-flute flattened end mills with long shank


Side face


Step shoulder


Straight slot

HMX-2EBL/X



- HMX-2E series with long shank.

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
HMX-2EBL-D3.0	3.0	6	8	75	2	Picture 1	○
HMX-2EBL-D4.0S	4.0	4	11	75	2	Picture 2	○
HMX-2EBL-D4.0	4.0	6	11	75	2	Picture 1	○
HMX-2EBL-D6.0	6.0	6	16	75	2	Picture 2	○
HMX-2EBX-D6.0	6.0	6	16	100	2	Picture 2	○
HMX-2EBL-D8.0	8.0	8	20	75	2	Picture 2	○
HMX-2EBX-D8.0	8.0	8	20	100	2	Picture 2	○
HMX-2EBL-D10.0	10.0	10	25	100	2	Picture 2	○
HMX-2EBX-D10.0	10.0	10	25	150	2	Picture 2	○
HMX-2EBL-D12.0	12.0	12	30	100	2	Picture 2	○
HMX-2EBX-D12.0	12.0	12	30	150	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B601
Non-standard customization B652-B653

4-flute flattened end mills with straight shank

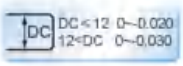

Side face

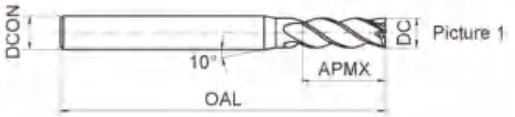

Step shoulder

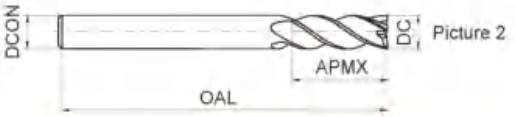

Straight slot

HMX-4E

- For side milling and shallow slot milling.
- Very suitable for high speed cutting and dry cutting.







Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
HMX-4E-D1.0F	1.0	3	3	50	4	Picture 1	●
HMX-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
HMX-4E-D1.0	1.0	6	3	50	4	Picture 1	●
HMX-4E-D1.5F	1.5	3	4	50	4	Picture 1	●
HMX-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
HMX-4E-D1.5	1.5	6	4	50	4	Picture 1	●
HMX-4E-D2.0F	2.0	3	6	50	4	Picture 1	●
HMX-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
HMX-4E-D2.0	2.0	6	6	50	4	Picture 1	●
HMX-4E-D2.5F	2.5	3	8	50	4	Picture 1	●
HMX-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
HMX-4E-D2.5	2.5	6	8	50	4	Picture 1	●
HMX-4E-D3.0F	3.0	3	8	50	4	Picture 2	●
HMX-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
HMX-4E-D3.0	3.0	6	8	50	4	Picture 1	●
HMX-4E-D3.5S	3.5	4	10	50	4	Picture 1	●
HMX-4E-D4.0S	4.0	4	11	50	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 · Graphics category and identification B295 · Cutting parameters B603 · Non-standard customization B652-B653

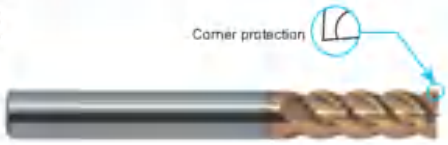
4-flute flattened end mills with straight shank


Side face

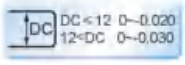

Step shoulder

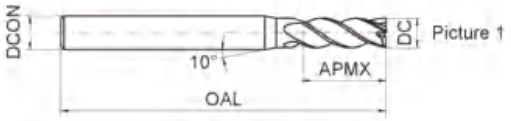

Straight slot

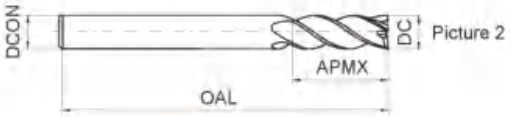
HMX-4E



- For side milling and shallow slot milling.
- Very suitable for high speed cutting and dry cutting.







Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
HMX-4E-D3.5	3.5	6	10	50	4	Picture 1	●
HMX-4E-D4.0	4.0	6	11	50	4	Picture 1	●
HMX-4E-D4.5	4.5	6	11	50	4	Picture 1	●
HMX-4E-D5.0	5.0	6	13	50	4	Picture 1	●
HMX-4E-D5.5	5.5	6	16	50	4	Picture 1	●
HMX-4E-D6.0	6.0	6	16	50	4	Picture 2	●
HMX-4E-D7.0	7.0	8	20	60	4	Picture 1	●
HMX-4E-D8.0	8.0	8	20	60	4	Picture 2	●
HMX-4E-D9.0	9.0	10	22	75	4	Picture 1	●
HMX-4E-D10.0	10.0	10	25	75	4	Picture 2	●
HMX-4E-D11.0	11.0	12	26	75	4	Picture 1	●
HMX-4E-D12.0	12.0	12	30	75	4	Picture 2	●
HMX-4E-D14.0	14.0	14	32	75	4	Picture 2	●
HMX-4E-D16.0	16.0	16	45	100	4	Picture 2	●
HMX-4E-D18.0	18.0	18	45	100	4	Picture 2	●
HMX-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

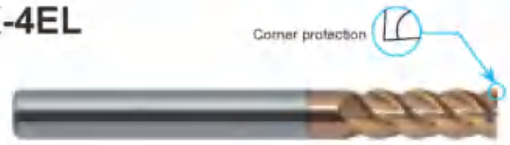
Applicable workpiece material table ◎Very suitable ○Suitable

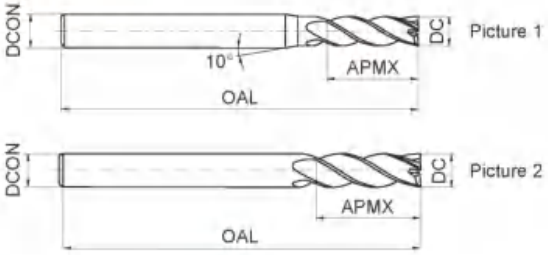
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B603
Non-standard customization B652-B653

4-flute flattened end mills with straight shank and long cutting edge

HMX-4EL

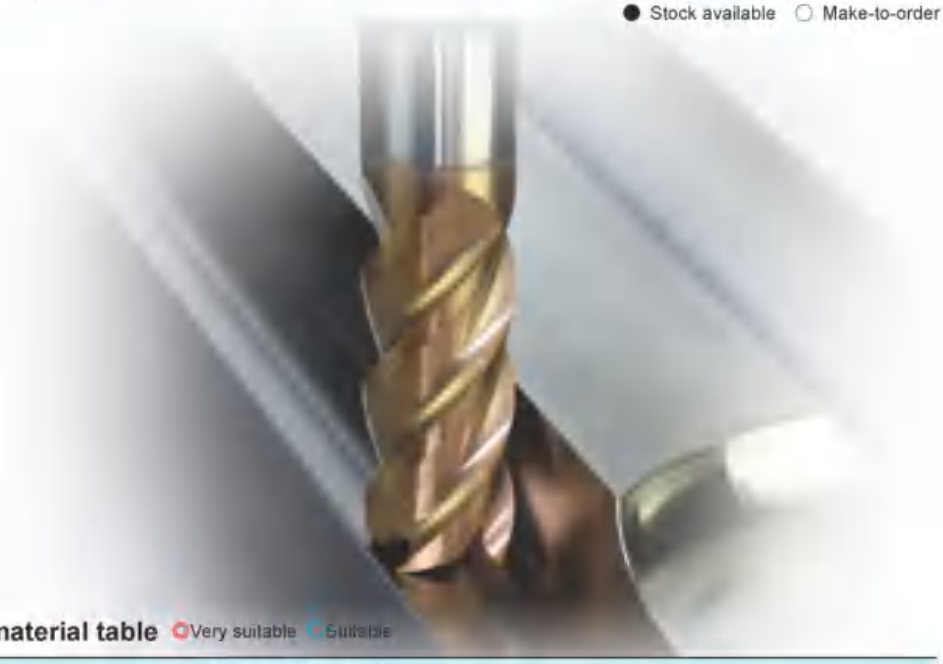




- HMX-4E series with long cutting edge.

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
HMX-4EL-D3.0	3.0	6	12	75	4	Picture 1	●
HMX-4EL-D4.0	4.0	6	15	75	4	Picture 1	●
HMX-4EL-D5.0	5.0	6	20	75	4	Picture 1	●
HMX-4EL-D6.0	6.0	6	20	75	4	Picture 2	●
HMX-4EL-D8.0	8.0	8	25	100	4	Picture 2	●
HMX-4EL-D10.0	10.0	10	30	100	4	Picture 2	●
HMX-4EL-D12.0	12.0	12	35	100	4	Picture 2	●
HMX-4EL-D14.0	14.0	14	40	100	4	Picture 2	●
HMX-4EL-D16.0	16.0	16	50	150	4	Picture 2	●
HMX-4EL-D20.0	20.0	20	55	150	4	Picture 2	●

● Stock available ○ Make-to-order



Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B603 | Non-standard customization B652-B653

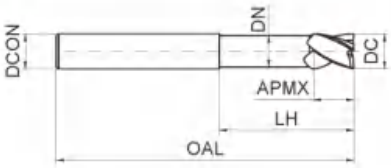
4-flute flattened end mills with straight shank, long neck and short cutting edge


Side face

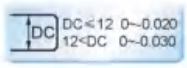

Step shoulder


Straight slot

HMX-4EFP



- High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling.



Type	Basic dimension(mm)						Number of teeth Z	Stock
	DC	DCON	APMX	LH	DN	OAL		
HMX-4EFP-D6.0	6.0	6	9	30	5.8	75	4	●
HMX-4EFP-D8.0	8.0	8	12	40	7.8	100	4	●
HMX-4EFP-D10.0	10.0	10	15	50	9.6	100	4	●
HMX-4EFP-D12.0	12.0	12	18	50	11.5	100	4	●
HMX-4EFP-D16.0	16.0	16	24	50	15.5	150	4	●
HMX-4EFP-D20.0	20.0	20	30	60	19.5	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B604
Non-standard customization B652-B653

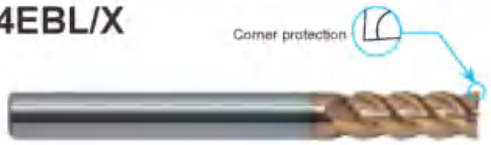

Side face

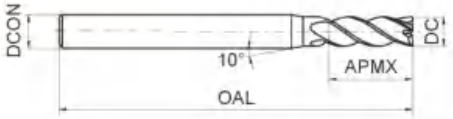

Step shoulder


Straight slot

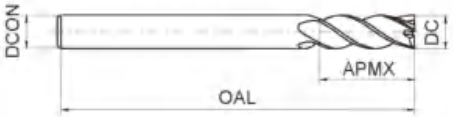
4-flute flattened end mills with long shank

HMX-4EBL/X



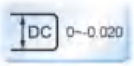


Picture 1



Picture 2

● HMX-4E series with long shank.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
HMX-4EBL-D3.0S	3.0	4	8	75	4	Picture 1	●
HMX-4EBL-D3.0	3.0	6	8	75	4	Picture 1	●
HMX-4EBL-D4.0S	4.0	4	11	75	4	Picture 2	●
HMX-4EBL-D4.0	4.0	6	11	75	4	Picture 1	●
HMX-4EBL-D6.0	6.0	6	16	75	4	Picture 2	●
HMX-4EBX-D6.0	6.0	6	16	100	4	Picture 2	●
HMX-4EBL-D8.0	8.0	8	20	75	4	Picture 2	●
HMX-4EBX-D8.0	8.0	8	20	100	4	Picture 2	●
HMX-4EBL-D10.0	10.0	10	25	100	4	Picture 2	●
HMX-4EBX-D10.0	10.0	10	25	150	4	Picture 2	●
HMX-4EBL-D12.0	12.0	12	30	100	4	Picture 2	●
HMX-4EBX-D12.0	12.0	12	30	150	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminium alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B603 | Non-standard customization B652-B653

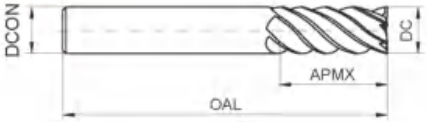
6-flute flattened end mills with straight shank


Side face

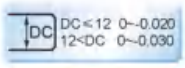

Step shoulder


Straight slot

HMX-6E



- High tool rigidity reduce tool deflection in side milling.
- Very suitable for high speed cutting and dry cutting.



Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
HMX-6E-D6.0	6.0	6	18	60	6	●
HMX-6E-D8.0	8.0	8	20	60	6	●
HMX-6E-D10.0	10.0	10	30	75	6	●
HMX-6E-D12.0	12.0	12	32	75	6	●
HMX-6E-D16.0	16.0	16	40	100	6	●
HMX-6E-D20.0	20.0	20	45	100	6	●

● Stock available ○ Make-to-order

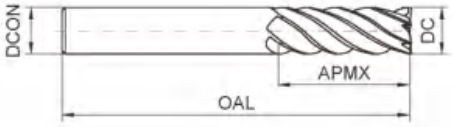
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B605
Non-standard customization B652-B653

6-flute flattened end mills with straight shank and long cutting edge

HMX-6EL



- HMX-6E series with long cutting edge.

Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
HMX-6EL-D6.0	6.0	6	24	75	6	●
HMX-6EL-D8.0	8.0	8	32	75	6	●
HMX-6EL-D10.0	10.0	10	40	100	6	●
HMX-6EL-D12.0	12.0	12	45	100	6	●
HMX-6EL-D16.0	16.0	16	64	150	6	●
HMX-6EL-D20.0	20.0	20	75	150	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

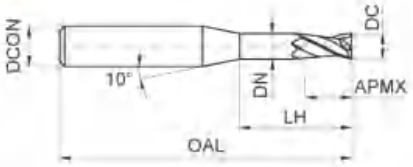
Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 Graphics category and identification B295 Cutting parameters B606 Non-standard customization B652-B653

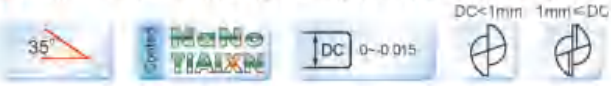
2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep flattened slot

HMX-2EP



- Suitable for narrow slot milling or milling of fine parts that could generate interference.



Type	Basic dimension(mm)						Number of teeth Z	Stock
	DC	DCON	APMX	LH	DN	OAL		
HMX-2EP-D0.3-M02	0.3	4	0.4	2	0.25	50	2	●
HMX-2EP-D0.3-M04	0.3	4	0.4	4	0.25	50	2	●
HMX-2EP-D0.4-M02	0.4	4	0.6	2	0.35	50	2	●
HMX-2EP-D0.4-M04	0.4	4	0.6	4	0.35	50	2	●
HMX-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	●
HMX-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	●
HMX-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	●
HMX-2EP-D0.6-M04	0.6	4	0.9	4	0.55	50	2	●
HMX-2EP-D0.6-M06	0.6	4	0.9	6	0.55	50	2	●
HMX-2EP-D0.7-M04	0.7	4	1.0	4	0.65	50	2	●
HMX-2EP-D0.7-M06	0.7	4	1.0	6	0.65	50	2	●
HMX-2EP-D0.7-M08	0.7	4	1.0	8	0.65	50	2	●
HMX-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	●
HMX-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	●
HMX-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	●
HMX-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	●
HMX-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	●
HMX-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	●
HMX-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	●
HMX-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	●
HMX-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	●
HMX-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	●
HMX-2EP-D1.2-M06	1.2	4	1.8	6	1.15	50	2	●
HMX-2EP-D1.2-M08	1.2	4	1.8	8	1.15	50	2	●
HMX-2EP-D1.2-M10	1.2	4	1.8	10	1.15	50	2	●
HMX-2EP-D1.2-M12	1.2	4	1.8	12	1.15	50	2	●
HMX-2EP-D1.5-M06	1.5	4	2.3	6	1.45	50	2	●
HMX-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	●
HMX-2EP-D1.5-M10	1.5	4	2.3	10	1.45	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

◎Very suitable ○Suitable

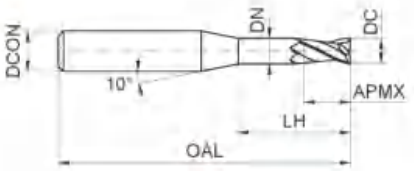
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B607-B608
Non-standard customization B652-B653

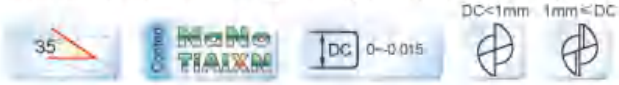
2-flute flattened end mills with straight shank, long neck and short cutting edge


Deep flattened slot

HMX-2EP



- Suitable for narrow slot milling or milling of fine parts that could generate interference.



Type	Basic dimension(mm)						Number of teeth Z	Stock
	DC	DCON	APMX	LH	DN	OAL		
HMX-2EP-D1.5-M12	1.5	4	2.3	12	1.45	50	2	●
HMX-2EP-D1.5-M14	1.5	4	2.3	14	1.45	50	2	●
HMX-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	●
HMX-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	●
HMX-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	●
HMX-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	●
HMX-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	●
HMX-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	●
HMX-2EP-D2.5-M08	2.5	4	3.7	8	2.4	50	2	●
HMX-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	●
HMX-2EP-D2.5-M12	2.5	4	3.7	12	2.4	50	2	●
HMX-2EP-D2.5-M14	2.5	4	3.7	14	2.4	50	2	●
HMX-2EP-D2.5-M16	2.5	4	3.7	16	2.4	60	2	●
HMX-2EP-D2.5-M18	2.5	4	3.7	18	2.4	60	2	●
HMX-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	●
HMX-2EP-D3.0-M06	3.0	6	4.5	6	2.85	50	2	●
HMX-2EP-D3.0-M08	3.0	6	4.5	8	2.85	50	2	●
HMX-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	●
HMX-2EP-D3.0-M12	3.0	6	4.5	12	2.85	50	2	●
HMX-2EP-D3.0-M14	3.0	6	4.5	14	2.85	60	2	●
HMX-2EP-D3.0-M16	3.0	6	4.5	16	2.85	60	2	●
HMX-2EP-D3.0-M18	3.0	6	4.5	18	2.85	60	2	●
HMX-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	●
HMX-2EP-D4.0-M12	4.0	6	6.0	12	3.85	60	2	●
HMX-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	●
HMX-2EP-D4.0-M20	4.0	6	6.0	20	3.85	60	2	●
HMX-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	●
HMX-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	●
HMX-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 · Graphics category and identification B295 · Cutting parameters B607-B608 · Non-standard customization B652-B653

2-flute flattened end mills with straight shank and tiny diameter

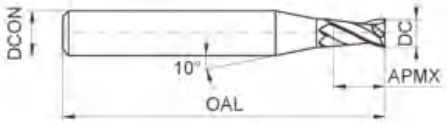

Side face

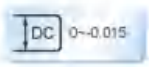

Step shoulder


Straight slot

HMX-2ES

- Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part, etc.





Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
HMX-2ES-D0.3	0.3	4	0.6	50	2	●
HMX-2ES-D0.4	0.4	4	0.8	50	2	●
HMX-2ES-D0.5	0.5	4	1.0	50	2	●
HMX-2ES-D0.6	0.6	4	1.2	50	2	●
HMX-2ES-D0.7	0.7	4	1.4	50	2	●
HMX-2ES-D0.8	0.8	4	1.6	50	2	●
HMX-2ES-D0.9	0.9	4	1.8	50	2	●
HMX-2ES-D1.0	1.0	4	2.0	50	2	●
HMX-2ES-D1.1	1.1	4	2.0	50	2	●
HMX-2ES-D1.2	1.2	4	2.5	50	2	●
HMX-2ES-D1.3	1.3	4	2.5	50	2	●
HMX-2ES-D1.4	1.4	4	3.0	50	2	●
HMX-2ES-D1.5	1.5	4	3.0	50	2	●
HMX-2ES-D1.6	1.6	4	3.5	50	2	●
HMX-2ES-D1.7	1.7	4	3.5	50	2	●
HMX-2ES-D1.8	1.8	4	4.0	50	2	●
HMX-2ES-D1.9	1.9	4	4.0	50	2	●
HMX-2ES-D2.0	2.0	4	4.0	50	2	●
HMX-2ES-D2.1	2.1	4	4.0	50	2	●
HMX-2ES-D2.2	2.2	4	4.5	50	2	●
HMX-2ES-D2.3	2.3	4	4.5	50	2	●
HMX-2ES-D2.4	2.4	4	5.0	50	2	●
HMX-2ES-D2.5	2.5	4	5.0	50	2	●
HMX-2ES-D2.6	2.6	4	5.0	50	2	●
HMX-2ES-D2.7	2.7	4	5.5	50	2	●
HMX-2ES-D2.8	2.8	4	5.5	50	2	●
HMX-2ES-D2.9	2.9	4	6.0	50	2	●
HMX-2ES-D3.0	3.0	4	6.0	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B609
Non-standard customization B652-B653

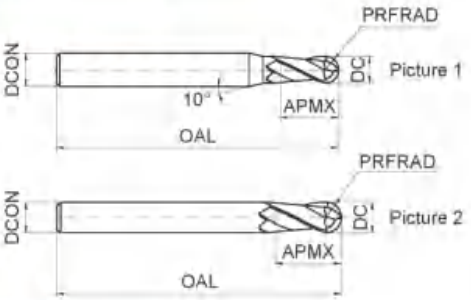
2-flute ball nose end mills with straight shank


Profile


Cavity


Ball nose slot

HMX-2B



- For profile milling.
- Very suitable for high speed cutting and dry cutting.

35° | Coated Nano TiAlN | DC: DC≤12 0~-0.020, 12<DC 0~-0.030 | PRFRAD: PRFRAD±0.01

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	PRFRAD	DCON	APMX	OAL			
HMX-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
HMX-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
HMX-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
HMX-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
HMX-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
HMX-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
HMX-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
HMX-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
HMX-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
HMX-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
HMX-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
HMX-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
HMX-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
HMX-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
HMX-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
HMX-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
HMX-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
HMX-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
HMX-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
HMX-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
HMX-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
HMX-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
HMX-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
HMX-2B-R10.0	20.0	10.0	20	40	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

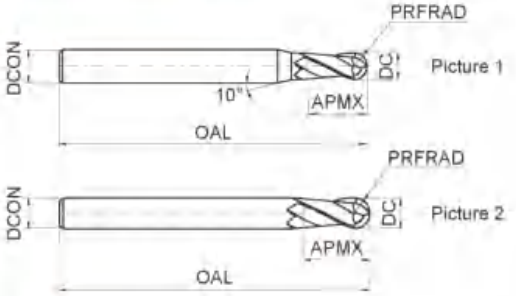
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B610 | Non-standard customization B652-B653

2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

HMX-2BL/M/X



- HMX-2B series with long shank.

35° | Coated: Nano TiAlN | DC: DC≤12 0~-0.020, 12<DC 0~-0.030 | PRFRAD: PRFRAD±0.01

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	PRFRAD	DCON	APMX	OAL			
HMX-2BL-R1.0S	2.0	1.0	4	4	75	2	Picture 1	●
HMX-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
HMX-2BL-R1.25S	2.5	1.25	4	5	75	2	Picture 1	●
HMX-2BL-R1.25	2.5	1.25	6	6	75	2	Picture 1	●
HMX-2BL-R1.5S	3.0	1.5	4	6	75	2	Picture 1	●
HMX-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
HMX-2BL-R1.75S	3.5	1.75	4	8	75	2	Picture 1	●
HMX-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
HMX-2BL-R2.0S	4.0	2.0	4	8	75	2	Picture 2	●
HMX-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	●
HMX-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	●
HMX-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	●
HMX-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	●
HMX-2BX-R3.0	6.0	3.0	6	12	100	2	Picture 2	●
HMX-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	●
HMX-2BM-R4.0	8.0	4.0	8	16	75	2	Picture 2	●
HMX-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	●
HMX-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	●
HMX-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	●
HMX-2BX-R5.0	10.0	5.0	10	20	150	2	Picture 2	●
HMX-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
HMX-2BX-R6.0	12.0	6.0	12	24	150	2	Picture 2	●
HMX-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	●
HMX-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	●
HMX-2BL-R10.0	20.0	10.0	20	40	150	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B610 | Non-standard customization B652-B653

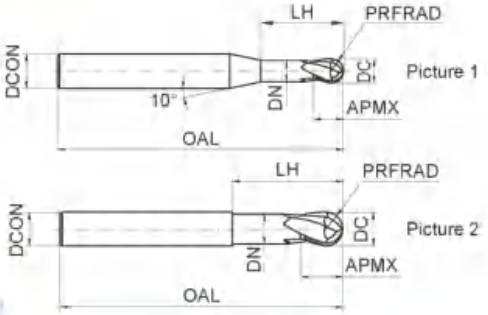
2-flute ball nose end mills with straight shank, long neck and short cutting edge


Profile

Cavity

Ball nose slot

HMX-2BFP



- Short cutting edge and high rigidity designed, applicable for heavy cutting.

35° | Casted | Nano TiAlN | DC: DC≤12 0~-0.020, 12<DC 0~-0.030 | PRFRAD: PRFRAD±0.01

Type	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	DC	PRFRAD	APMX	DN	LH	DCON	OAL			
HMX-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	●
HMX-2BFP-R0.75	1.5	0.75	1.5	1.45	3.0	6	75	2	Picture 1	●
HMX-2BFP-R1.0	2.0	1.0	2	1.95	4.0	6	75	2	Picture 1	●
HMX-2BFP-R1.5	3.0	1.5	3	2.85	6.0	6	75	2	Picture 1	●
HMX-2BFP-R2.0	4.0	2.0	4	3.85	8.0	6	75	2	Picture 1	●
HMX-2BFP-R2.5	5.0	2.5	5	4.85	10.0	6	75	2	Picture 1	●
HMX-2BFP-R3.0	6.0	3.0	6	5.8	12.0	6	75	2	Picture 2	●
HMX-2BFP-R4.0	8.0	4.0	8	7.8	16.0	8	100	2	Picture 2	●
HMX-2BFP-R5.0	10.0	5.0	10	9.6	20.0	10	100	2	Picture 2	●
HMX-2BFP-R6.0	12.0	6.0	12	11.5	24.0	12	100	2	Picture 2	●
HMX-2BFP-R8.0	16.0	8.0	16	15.5	32.0	16	150	2	Picture 2	●
HMX-2BFP-R10.0	20.0	10.0	20	19.5	40.0	20	150	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B610 | Non-standard customization B652-B653

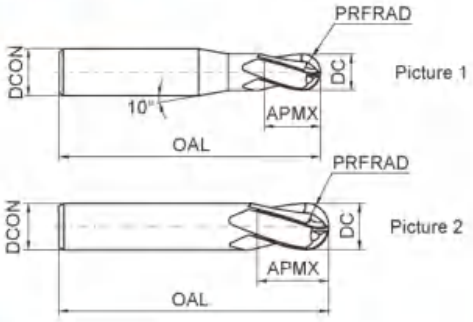
4-flute ball nose end mills with straight shank


Profile

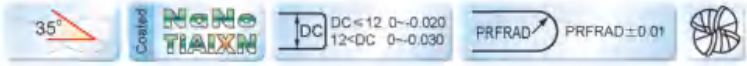

Cavity


Ball nose slot

HMX-4B



- 4-flute ball nose end mills can operate with higher feed speed and machining efficiency, extending too life in machining high-hardness workpiece.



Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	PRFRAD	DCON	APMX	OAL			
HMX-4B-R1.5	3.0	1.5	6	6	50	4	Picture 1	●
HMX-4B-R2.0	4.0	2.0	6	8	50	4	Picture 1	●
HMX-4B-R2.5	5.0	2.5	6	10	50	4	Picture 1	●
HMX-4B-R3.0	6.0	3.0	6	12	50	4	Picture 2	●
HMX-4B-R4.0	8.0	4.0	8	16	60	4	Picture 2	●
HMX-4B-R5.0	10.0	5.0	10	20	75	4	Picture 2	●
HMX-4B-R6.0	12.0	6.0	12	24	75	4	Picture 2	●
HMX-4B-R7.0	14.0	7.0	14	28	75	4	Picture 2	●
HMX-4B-R8.0	16.0	8.0	16	32	100	4	Picture 2	●
HMX-4B-R9.0	18.0	9.0	18	36	100	4	Picture 2	●
HMX-4B-R10.0	20.0	10.0	20	40	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B611
Non-standard customization B652-B653

4-flute ball nose end mills with straight and long shank


Profile

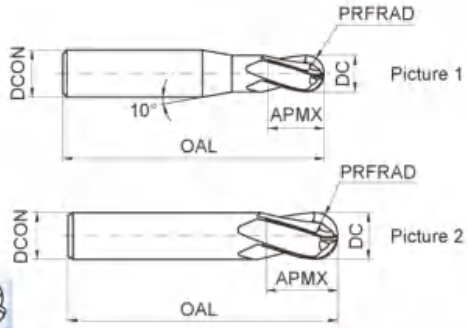
Cavity

Ball nose slot

HMX-4BL

- HMX-4B series with long shank.

35° | Coated NaNo TiAlXN | DC: DC≤12 0~-0.020, 12<DC 0~-0.030 | PRFRAD: PRFRAD±0.01



Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	PRFRAD	DCON	APMX	OAL			
HMX-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
HMX-4BL-R2.0	4.0	2.0	6	8	75	4	Picture 1	○
HMX-4BL-R2.5	5.0	2.5	6	10	75	4	Picture 1	○
HMX-4BL-R3.0	6.0	3.0	6	12	75	4	Picture 2	○
HMX-4BL-R4.0	8.0	4.0	8	16	100	4	Picture 2	○
HMX-4BL-R5.0	10.0	5.0	10	20	100	4	Picture 2	○
HMX-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
HMX-4BL-R7.0	14.0	7.0	14	28	100	4	Picture 2	○
HMX-4BL-R8.0	16.0	8.0	16	32	150	4	Picture 2	○
HMX-4BL-R9.0	18.0	9.0	18	36	150	4	Picture 2	○
HMX-4BL-R10.0	20.0	10.0	20	40	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminium alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B611 | Non-standard customization B652-B653

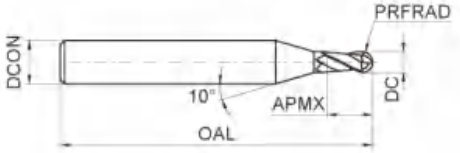
2-flute ball nose end mills with straight shank and tiny diameter


Profile

Cavity

Ball nose slot

HMX-2BS



- Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part, etc.

35° | Coated NanoTiAlN | DC 0~-0.015 | PRFRAD PRFRAD±0.005 PRFRAD<0.5 PRFRAD±0.01 PRFRAD≥0.5

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	PRFRAD	DCON	APMX	OAL		
HMX-2BS-R0.15	0.30	0.15	4	0.5	50	2	●
HMX-2BS-R0.20	0.40	0.20	4	0.6	50	2	●
HMX-2BS-R0.25	0.50	0.25	4	0.8	50	2	●
HMX-2BS-R0.30	0.60	0.30	4	0.9	50	2	●
HMX-2BS-R0.35	0.70	0.35	4	1.0	50	2	●
HMX-2BS-R0.40	0.80	0.40	4	1.2	50	2	●
HMX-2BS-R0.45	0.90	0.45	4	1.3	50	2	●
HMX-2BS-R0.50	1.00	0.50	4	1.5	50	2	●
HMX-2BS-R0.60	1.20	0.60	4	1.8	50	2	●
HMX-2BS-R0.70	1.40	0.70	4	2.0	50	2	●
HMX-2BS-R0.75	1.50	0.75	4	2.3	50	2	●
HMX-2BS-R0.80	1.60	0.80	4	2.5	50	2	●
HMX-2BS-R0.90	1.80	0.90	4	2.7	50	2	●
HMX-2BS-R1.00	2.00	1.00	4	3.0	50	2	●
HMX-2BS-R1.25	2.50	1.25	4	3.7	50	2	●
HMX-2BS-R1.50	3.00	1.50	4	4.5	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

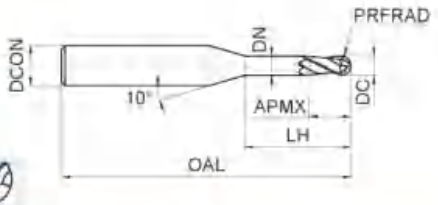
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B612 | Non-standard customization B652-B653

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

HMX-2BP



- Applicable for machining narrow slot and free-form surface.

35° | Coating: AlTiN | DC: 0~-0.015 | PRFRAD: PRFRAD ±0.005 PRFRAD=0.5, PRFRAD ±0.01 PRFRAD >0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	PRFRAD	APMX	DN	LH	DCON	OAL		
HMX-2BP-R0.15-M02	0.3	0.15	0.4	0.25	2	4	50	2	●
HMX-2BP-R0.15-M04	0.3	0.15	0.4	0.25	4	4	50	2	●
HMX-2BP-R0.2-M02	0.4	0.2	0.6	0.35	2	4	50	2	●
HMX-2BP-R0.2-M04	0.4	0.2	0.6	0.35	4	4	50	2	●
HMX-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	●
HMX-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	●
HMX-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	●
HMX-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	●
HMX-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	●
HMX-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	●
HMX-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	●
HMX-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	●
HMX-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	●
HMX-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	●
HMX-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	●
HMX-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	●
HMX-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	●
HMX-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	●
HMX-2BP-R0.6-M06	1.2	0.6	1.8	1.15	6	4	50	2	●
HMX-2BP-R0.6-M08	1.2	0.6	1.8	1.15	8	4	50	2	●
HMX-2BP-R0.6-M12	1.2	0.6	1.8	1.15	12	4	50	2	●
HMX-2BP-R0.6-M16	1.2	0.6	1.8	1.15	16	4	50	2	●
HMX-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	●
HMX-2BP-R0.75-M12	1.5	0.75	2.3	1.45	12	4	50	2	●
HMX-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	●
HMX-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	●
HMX-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	●
HMX-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	●
HMX-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	●
HMX-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	●
HMX-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	50	2	●

● Stock available ○ Make-to-order

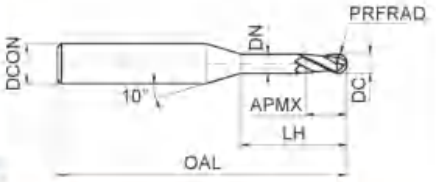
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B613-B614 | Non-standard customization B652-B653

2-flute ball nose end mills with straight shank, long neck and short cutting edge

HMX-2BP



- Applicable for machining narrow slot and free-form surface.

35° | Coated: NaNo TiAlN | DC 0~-0.015 | PRFRAD: PRFRAD ±0.005 PRFRAD<0.5, PRFRAD ±0.01 PRFRAD>0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	PRFRAD	APMX	DN	LH	DCON	OAL		
HMX-2BP-R1.25-M08	2.5	1.25	3.7	2.4	8	4	50	2	●
HMX-2BP-R1.25-M12	2.5	1.25	3.7	2.4	12	4	50	2	●
HMX-2BP-R1.25-M16	2.5	1.25	3.7	2.4	16	4	60	2	●
HMX-2BP-R1.25-M20	2.5	1.25	3.7	2.4	20	4	60	2	●
HMX-2BP-R1.5-M08	3.0	1.5	4.5	2.85	8	6	50	2	●
HMX-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	●
HMX-2BP-R1.5-M12	3.0	1.5	4.5	2.85	12	6	50	2	●
HMX-2BP-R1.5-M16	3.0	1.5	4.5	2.85	16	6	60	2	●
HMX-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	●
HMX-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	●
HMX-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	●
HMX-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	●
HMX-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	●
HMX-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	●
HMX-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	●

● Stock available ○ Make-to-order

Tool type: HMX-2BP-R0.3-M08
Dimensions: R0.3mm
Workpiece material: S136(52HRC)
Rotating speed: 30000r/min
Feed speed: 200mm/min
Axial cutting depth: a_p=0.02mm
Radial cutting depth: a_e=0.04mm
Cutting style: contour machining (mould of car light)
Cooling system: air blow
Machine tool: MIKRON HSM 800

End mill	HMX-2BP-R0.3-M08	Similar product of company A
Cutting time	300min	180min
Abrasion value	0.025mm	0.048mm
Abrasion condition		

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B613-B614 | Non-standard customization B652-B653

4-flute R end mills with straight shank

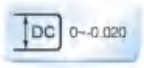

Radius shoulder

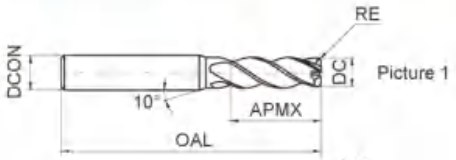

Profile


Radius corner slot

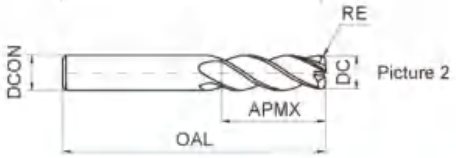
HMX-4R

- Wide application, applicable for several machining forms.





Picture 1



Picture 2

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	RE	DCON	APMX	OAL			
HMX-4R-D1.0R0.2	1.0	0.2	4	3	50	4	Picture 1	●
HMX-4R-D1.5R0.2	1.5	0.2	4	4	50	4	Picture 1	●
HMX-4R-D2.0R0.2	2.0	0.2	4	6	50	4	Picture 1	●
HMX-4R-D2.0R0.5	2.0	0.5	4	6	50	4	Picture 1	●
HMX-4R-D2.5R0.2	2.5	0.2	4	8	50	4	Picture 1	●
HMX-4R-D2.5R0.5	2.5	0.5	4	8	50	4	Picture 1	●
HMX-4R-D3.0R0.2	3.0	0.2	4	8	50	4	Picture 1	●
HMX-4R-D3.0R0.5	3.0	0.5	4	8	50	4	Picture 1	●
HMX-4R-D4.0R0.2	4.0	0.2	4	10	50	4	Picture 2	●
HMX-4R-D4.0R0.3	4.0	0.3	4	10	50	4	Picture 2	●
HMX-4R-D4.0R0.5	4.0	0.5	4	10	50	4	Picture 2	●
HMX-4R-D5.0R0.2	5.0	0.2	6	13	50	4	Picture 2	●
HMX-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
HMX-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
HMX-4R-D6.0R0.2	6.0	0.2	6	16	50	4	Picture 2	●
HMX-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
HMX-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

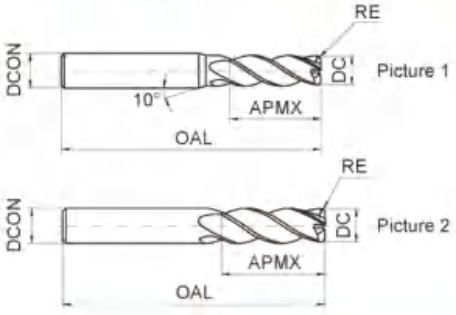
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 · Graphics category and identification B295 · Cutting parameters B615 · Non-standard customization B652-B653

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

HMX-4R



- Wide application, applicable for several machining forms.

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	RE	DCON	APMX	OAL			
HMX-4R-D8.0R0.2	8.0	0.2	8	20	60	4	Picture 2	●
HMX-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
HMX-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
HMX-4R-D10.0R0.2	10.0	0.2	10	25	75	4	Picture 2	●
HMX-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
HMX-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
HMX-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
HMX-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
HMX-4R-D12.0R0.2	12.0	0.2	12	30	75	4	Picture 2	●
HMX-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
HMX-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
HMX-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
HMX-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B615 | Non-standard customization B652-B653

4-flute R end mills with long shank


Radius shoulder

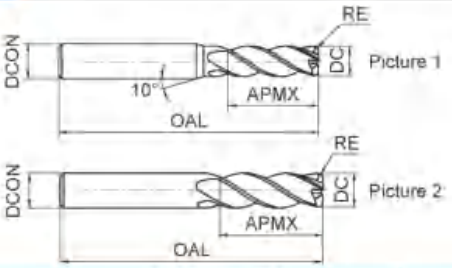

Profile


Radius corner slot

HMX-4RBL/M/X

- HMX-4R series with long shank.

35° | Coated AlTiN | DC 0~-0.020



Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	RE	DCON	APMX	OAL			
HMX-4RBL-D4.0R0.2S	4.0	0.2	4	10	75	4	Picture 2	●
HMX-4RBL-D4.0R0.2	4.0	0.2	6	10	75	4	Picture 1	●
HMX-4RBL-D4.0R0.5S	4.0	0.5	4	10	75	4	Picture 2	●
HMX-4RBL-D4.0R0.5	4.0	0.5	6	10	75	4	Picture 1	●
HMX-4RBL-D6.0R0.2	6.0	0.2	6	16	75	4	Picture 2	●
HMX-4RBX-D6.0R0.2	6.0	0.2	6	16	100	4	Picture 2	●
HMX-4RBL-D6.0R0.5	6.0	0.5	6	16	75	4	Picture 2	●
HMX-4RBX-D6.0R0.5	6.0	0.5	6	16	100	4	Picture 2	●
HMX-4RBL-D6.0R1.0	6.0	1.0	6	16	75	4	Picture 2	●
HMX-4RBX-D6.0R1.0	6.0	1.0	6	16	100	4	Picture 2	●
HMX-4RBM-D8.0R0.2	8.0	0.2	8	20	75	4	Picture 2	●
HMX-4RBL-D8.0R0.2	8.0	0.2	8	20	100	4	Picture 2	●
HMX-4RBM-D8.0R0.5	8.0	0.5	8	20	75	4	Picture 2	●
HMX-4RBL-D8.0R0.5	8.0	0.5	8	20	100	4	Picture 2	●
HMX-4RBM-D8.0R1.0	8.0	1.0	8	20	75	4	Picture 2	●
HMX-4RBL-D8.0R1.0	8.0	1.0	8	20	100	4	Picture 2	●
HMX-4RBL-D10.0R0.2	10.0	0.2	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R0.2	10.0	0.2	10	25	150	4	Picture 2	●
HMX-4RBL-D10.0R0.5	10.0	0.5	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R0.5	10.0	0.5	10	25	150	4	Picture 2	●
HMX-4RBL-D10.0R1.0	10.0	1.0	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R1.0	10.0	1.0	10	25	150	4	Picture 2	●
HMX-4RBL-D10.0R2.0	10.0	2.0	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R2.0	10.0	2.0	10	25	150	4	Picture 2	●
HMX-4RBL-D12.0R0.2	12.0	0.2	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R0.2	12.0	0.2	12	30	150	4	Picture 2	●
HMX-4RBL-D12.0R0.5	12.0	0.5	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R0.5	12.0	0.5	12	30	150	4	Picture 2	●
HMX-4RBL-D12.0R1.0	12.0	1.0	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R1.0	12.0	1.0	12	30	150	4	Picture 2	●
HMX-4RBL-D12.0R2.0	12.0	2.0	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R2.0	12.0	2.0	12	30	150	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

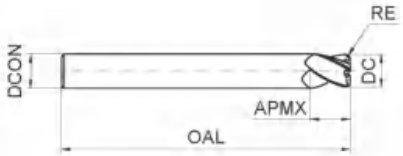
Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B615 | Non-standard customization B652-B653

4-flute R end mills with straight shank and short cutting edge

Radius shoulder | Profile | Radius corner slot

HMX-4RF

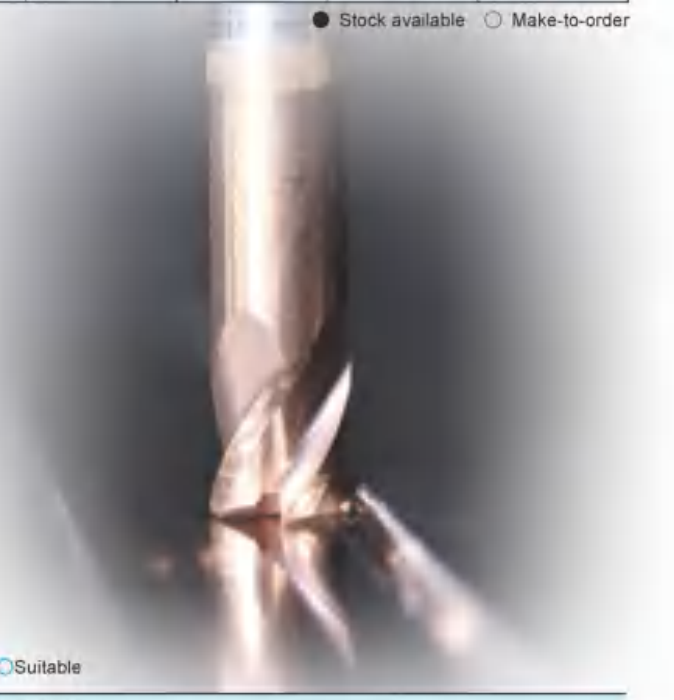


- High-rigidity short edge design, for cutting with high feed rate at high speed.

35° | Coated NaNo TiAlN | DC 0~-0.020

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
HMX-4RF-D6.0R0.5	6.0	0.5	6	6	50	4	●
HMX-4RF-D6.0R1.0	6.0	1.0	6	6	50	4	●
HMX-4RF-D8.0R0.5	8.0	0.5	8	8	60	4	●
HMX-4RF-D8.0R1.0	8.0	1.0	8	8	60	4	●
HMX-4RF-10.0R0.5	10.0	0.5	10	10	75	4	●
HMX-4RF-D10.0R1.0	10.0	1.0	10	10	75	4	●
HMX-4RF-D10.0R2.0	10.0	2.0	10	10	75	4	●
HMX-4RF-D12.0R0.5	12.0	0.5	12	12	75	4	●
HMX-4RF-D12.0R1.0	12.0	1.0	12	12	75	4	●
HMX-4RF-D12.0R2.0	12.0	2.0	12	12	75	4	●

● Stock available ○ Make-to-order



Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 | Graphics category and identification B295 | Cutting parameters B615 | Non-standard customization B652-B653

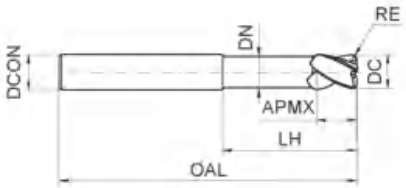
4-flute R end mills with straight shank, long neck and short cutting edge


Radius shoulder

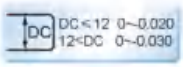

Profile


Radius corner slot

HMX-4RP



- Long shank and short cutting edge designed for deep cavity milling.



Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	LH	OAL		
HMX-4RP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	●
HMX-4RP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	●
HMX-4RP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	●
HMX-4RP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	●
HMX-4RP-10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	●
HMX-4RP-10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	●
HMX-4RP-10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	●
HMX-4RP-12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	●
HMX-4RP-12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	●
HMX-4RP-12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	●
HMX-4RP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	●
HMX-4RP-D16.0R2.0	16.0	2.0	16	15.5	16	40	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminium alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294 · Graphics category and identification B295 · Cutting parameters B615 · Non-standard customization B652-B653

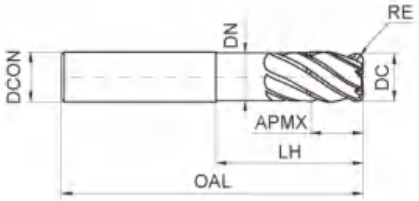
6-flute R end mills with straight shank and high rigidity


Radius shoulder

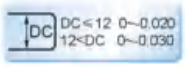
Profile

Radius corner slot

HMX-6R-MAX



● High rigidity short cutting edge designed for high cutting speed, high feed, high efficient machining.



Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	APMX	DN	LH	OAL		
HMX-6R-D6R0.5-MAX	6.0	0.5	6	6	5.8	16	50	6	○
HMX-6R-D8R1.0-MAX	8.0	1.0	8	8	7.8	24	60	6	○
HMX-6R-D10R1.0-MAX	10.0	1.0	10	10	9.8	30	75	6	○
HMX-6R-D12R1.0-MAX	12.0	1.0	12	12	11.5	36	75	6	○
HMX-6R-D16R1.0-MAX	16.0	1.0	16	16	15.5	48	100	6	○
HMX-6R-D20R1.0-MAX	20.0	1.0	20	20	19.5	50	100	6	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

Code key B294
Graphics category and identification B295
Cutting parameters B616
Non-standard customization B652-B653

RM series
End mills for super alloy machining

Typical application

Aircraft engine parts, aviation rocket driving parts, all kinds of missile driving devices, pump truck and ship booster parts
Aircraft engine parts, aviation rocket driving parts, all kinds of missile driving devices, pump truck and ship booster parts

Unequal teeth pitch structure

New passivation process strengthens the edge

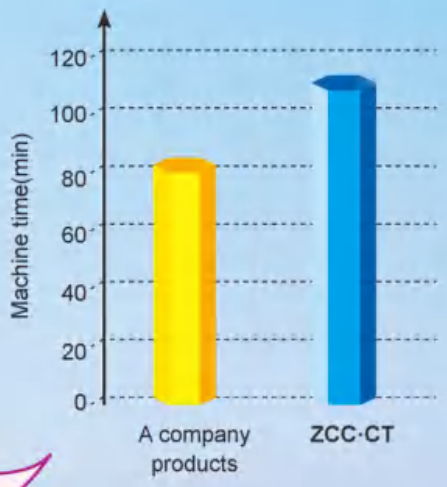
Mirror-like grinding quality of rear face

Special geometry design, taking into account tool rigidity and chip space

Adopt super fine grain mitrax+special coating for super alloy machining effectively postpones the tools wearance and improves the breakage resistance

Application case 1

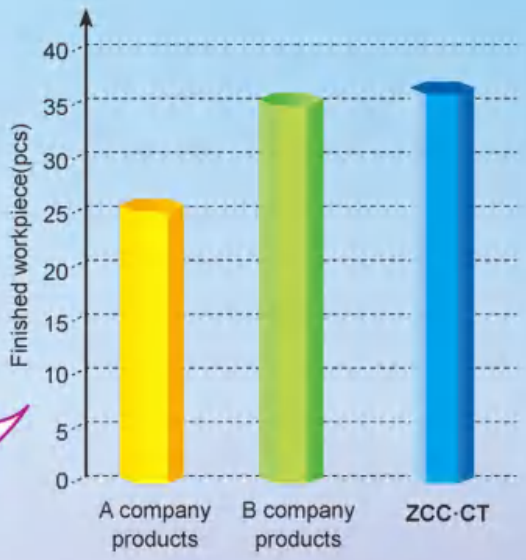
Workpiece material: incol718
Processing: side milling
Tool: RM-4R-D10.0R1.5
Cutting parameters: S=1000r/min, F=150mm/min
Ap=12mm, Ae=1.0mm



Conclusion: RM-4R-D10.0R1.5 has better wear resistance, longer tool life and less burrs on workpiece.

Application case 2

Workpiece material: GH4169
Processing: side milling
Tool: RM-4R-D12.0R1.5
Cutting parameters: S=1000r/min, F=200mm/min
Ap=5.5-7.5mm, Ae=1.5-2mm



Conclusion: RM-4R-D12.0R1.5 cuts lightly with less burrs and longer tool life. Customer is very satisfied.

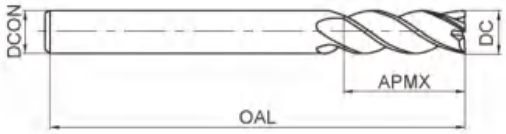
4-flute flattened end mills with straight shank

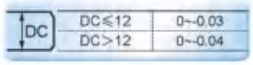

Side face


Step shoulder


Straight slot

RM-4E





Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
RM-4E-D6.0	6	6	16	50	4	●
RM-4E-D8.0	8	8	20	60	4	●
RM-4E-D10.0	10	10	25	75	4	●
RM-4E-D12.0	12	12	30	75	4	●
RM-4E-D14.0	14	14	35	90	4	●
RM-4E-D16.0	16	16	35	90	4	●
RM-4E-D20.0	20	20	45	100	4	●
RM-4E-D25.0	25	25	50	110	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B617
Non-standard customization B652-B653

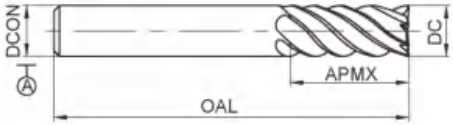

Side face

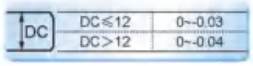
Step shoulder

Straight slot

5-flute flattened end mills with straight shank

RM-5E





Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
RM-5E-D10.0	10	10	25	75	5	●
RM-5E-D12.0	12	12	30	75	5	●
RM-5E-D14.0	14	14	35	90	5	●
RM-5E-D16.0	16	16	35	90	5	●
RM-5E-D20.0	20	20	45	100	5	●
RM-5E-D25.0	25	25	50	110	5	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B617
Non-standard customization B652-B653

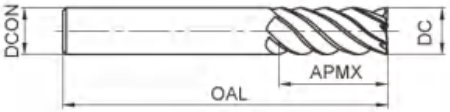
6-flute flattened end mills with straight shank

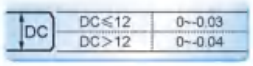

Side face


Step shoulder


Straight slot

RM-6E





Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
RM-6E-D10.0	10	10	25	75	6	●
RM-6E-D12.0	12	12	30	75	6	●
RM-6E-D14.0	14	14	35	90	6	●
RM-6E-D16.0	16	16	35	90	6	●
RM-6E-D20.0	20	20	45	100	6	●
RM-6E-D25.0	25	25	50	110	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B618
Non-standard customization B652-B653

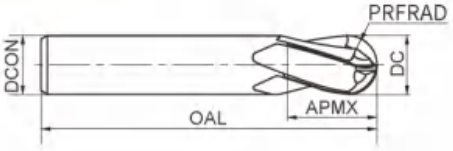
4-flute ball nose end mills with straight shank

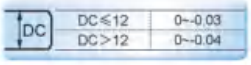

Profile

Cavity

Ball nose slot

RM-4B





Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	PRFRAD	DCON	APMX	OAL		
RM-4B-R3.0	6	3	6	9	50	4	●
RM-4B-R4.0	8	4	8	12	60	4	●
RM-4B-R5.0	10	5	10	15	75	4	●
RM-4B-R6.0	12	6	12	18	75	4	●
RM-4B-R8.0	16	8	16	24	85	4	●
RM-4B-R10.0	20	10	20	30	100	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B621
Non-standard customization B652-B653

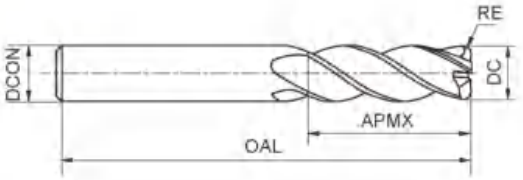
4-flute R end mills with straight shank

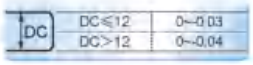

Radius shoulder


Profile


Radius corner slot

RM-4R





Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-4R-D6.0R0.2	6	0.2	6	16	50	4	●
RM-4R-D6.0R0.3	6	0.3	6	16	50	4	●
RM-4R-D6.0R0.5	6	0.5	6	16	50	4	●
RM-4R-D6.0R0.75	6	0.75	6	16	50	4	●
RM-4R-D6.0R1.0	6	1.0	6	16	50	4	●
RM-4R-D8.0R0.2	8	0.2	8	20	60	4	●
RM-4R-D8.0R0.3	8	0.3	8	20	60	4	●
RM-4R-D8.0R0.5	8	0.5	8	20	60	4	●
RM-4R-D8.0R0.75	8	0.75	8	20	60	4	●
RM-4R-D8.0R1.0	8	1.0	8	20	60	4	●
RM-4R-D8.0R2.0	8	2.0	8	20	60	4	●
RM-4R-D10.0R0.2	10	0.2	10	25	75	4	●
RM-4R-D10.0R0.3	10	0.3	10	25	75	4	●
RM-4R-D10.0R0.5	10	0.5	10	25	75	4	●
RM-4R-D10.0R0.75	10	0.75	10	25	75	4	●
RM-4R-D10.0R1.0	10	1.0	10	25	75	4	●
RM-4R-D10.0R1.5	10	1.5	10	25	75	4	●
RM-4R-D10.0R2.0	10	2.0	10	25	75	4	●
RM-4R-D12.0R0.2	12	0.2	12	30	75	4	●
RM-4R-D12.0R0.3	12	0.3	12	30	75	4	●
RM-4R-D12.0R0.5	12	0.5	12	30	75	4	●
RM-4R-D12.0R0.75	12	0.75	12	30	75	4	●
RM-4R-D12.0R1.0	12	1.0	12	30	75	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 · Graphics category and identification B295 · Cutting parameters B619 · Non-standard customization B652-B653

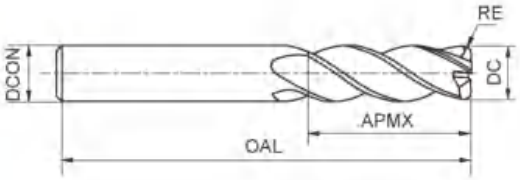
4-flute R end mills with straight shank

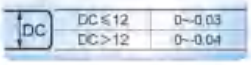

Radius shoulder


Profile


Radius corner slot

RM-4R





Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-4R-D12.0R1.5	12	1.5	12	30	75	4	●
RM-4R-D12.0R2.0	12	2.0	12	30	75	4	●
RM-4R-D12.0R2.5	12	2.5	12	30	75	4	●
RM-4R-D12.0R3.0	12	3.0	12	30	75	4	●
RM-4R-D14.0R0.2	14	0.2	14	35	90	4	●
RM-4R-D14.0R0.3	14	0.3	14	35	90	4	●
RM-4R-D14.0R0.5	14	0.5	14	35	90	4	●
RM-4R-D14.0R0.75	14	0.75	14	35	90	4	●
RM-4R-D14.0R1.0	14	1.0	14	35	90	4	●
RM-4R-D14.0R1.5	14	1.5	14	35	90	4	●
RM-4R-D14.0R2.0	14	2.0	14	35	90	4	●
RM-4R-D14.0R2.5	14	2.5	14	35	90	4	●
RM-4R-D14.0R3.0	14	3.0	14	35	90	4	●
RM-4R-D16.0R0.2	16	0.2	16	35	90	4	●
RM-4R-D16.0R0.3	16	0.3	16	35	90	4	●
RM-4R-D16.0R0.5	16	0.5	16	35	90	4	●
RM-4R-D16.0R0.75	16	0.75	16	35	90	4	●
RM-4R-D16.0R1.0	16	1.0	16	35	90	4	●
RM-4R-D16.0R1.5	16	1.5	16	35	90	4	●
RM-4R-D16.0R2.0	16	2.0	16	35	90	4	●
RM-4R-D16.0R2.5	16	2.5	16	35	90	4	●
RM-4R-D16.0R3.0	16	3.0	16	35	90	4	●
RM-4R-D16.0R4.0	16	4.0	16	35	90	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B619
Non-standard customization B652-B653

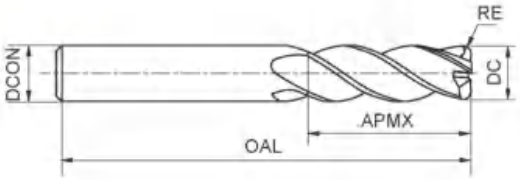
4-flute R end mills with straight shank

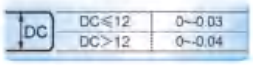

Radius shoulder


Profile


Radius corner slot

RM-4R





Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-4R-D20.0R0.2	20	0.2	20	45	100	4	●
RM-4R-D20.0R0.3	20	0.3	20	45	100	4	●
RM-4R-D20.0R0.5	20	0.5	20	45	100	4	●
RM-4R-D20.0R0.75	20	0.75	20	45	100	4	●
RM-4R-D20.0R1.0	20	1.0	20	45	100	4	●
RM-4R-D20.0R1.5	20	1.5	20	45	100	4	●
RM-4R-D20.0R2.0	20	2.0	20	45	100	4	●
RM-4R-D20.0R2.5	20	2.5	20	45	100	4	●
RM-4R-D20.0R3.0	20	3.0	20	45	100	4	●
RM-4R-D20.0R4.0	20	4.0	20	45	100	4	●
RM-4R-D25.0R1.0	25	1.0	25	50	110	4	●
RM-4R-D25.0R2.0	25	2.0	25	50	110	4	●
RM-4R-D25.0R3.0	25	3.0	25	50	110	4	●
RM-4R-D25.0R4.0	25	4.0	25	50	110	4	●
RM-4R-D25.0R5.0	25	5.0	25	50	110	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

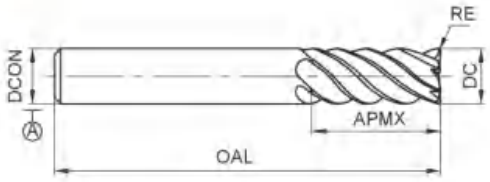
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminium alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 · Graphics category and identification B295 · Cutting parameters B619 · Non-standard customization B652-B653

5-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

RM-5R



42° | Coated TiALXN | DC: DC≤12 0~-0.03, DC>12 0~-0.04

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-5R-D6.0R0.2	6	0.2	6	16	50	5	●
RM-5R-D6.0R0.3	6	0.3	6	16	50	5	●
RM-5R-D6.0R0.5	6	0.5	6	16	50	5	●
RM-5R-D6.0R0.75	6	0.75	6	16	50	5	●
RM-5R-D6.0R1.0	6	1.0	6	16	50	5	●
RM-5R-D8.0R0.2	8	0.2	8	20	60	5	●
RM-5R-D8.0R0.3	8	0.3	8	20	60	5	●
RM-5R-D8.0R0.5	8	0.5	8	20	60	5	●
RM-5R-D8.0R0.75	8	0.75	8	20	60	5	●
RM-5R-D8.0R1.0	8	1.0	8	20	60	5	●
RM-5R-D8.0R2.0	8	2.0	8	20	60	5	●
RM-5R-D10.0R0.2	10	0.2	10	25	75	5	●
RM-5R-D10.0R0.3	10	0.3	10	25	75	5	●
RM-5R-D10.0R0.5	10	0.5	10	25	75	5	●
RM-5R-D10.0R0.75	10	0.75	10	25	75	5	●
RM-5R-D10.0R1.0	10	1.0	10	25	75	5	●
RM-5R-D10.0R1.5	10	1.5	10	25	75	5	●
RM-5R-D10.0R2.0	10	2.0	10	25	75	5	●
RM-5R-D12.0R0.2	12	0.2	12	30	75	5	●
RM-5R-D12.0R0.3	12	0.3	12	30	75	5	●
RM-5R-D12.0R0.5	12	0.5	12	30	75	5	●
RM-5R-D12.0R0.75	12	0.75	12	30	75	5	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

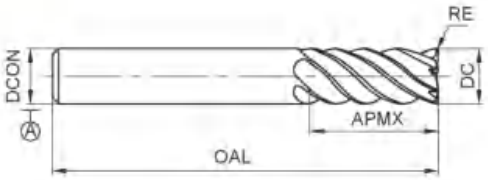
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B619 | Non-standard customization B652-B653

5-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

RM-5R



42° | Coated TiALXN | DC: DC≤12 0~-0.03, DC>12 0~-0.04

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-5R-D12.0R1.0	12	1.0	12	30	75	5	●
RM-5R-D12.0R1.5	12	1.5	12	30	75	5	●
RM-5R-D12.0R2.0	12	2.0	12	30	75	5	●
RM-5R-D12.0R2.5	12	2.5	12	30	75	5	●
RM-5R-D12.0R3.0	12	3.0	12	30	75	5	●
RM-5R-D14.0R0.2	14	0.2	14	35	90	5	●
RM-5R-D14.0R0.3	14	0.3	14	35	90	5	●
RM-5R-D14.0R0.5	14	0.5	14	35	90	5	●
RM-5R-D14.0R0.75	14	0.75	14	35	90	5	●
RM-5R-D14.0R1.0	14	1.0	14	35	90	5	●
RM-5R-D14.0R1.5	14	1.5	14	35	90	5	●
RM-5R-D14.0R2.0	14	2.0	14	35	90	5	●
RM-5R-D14.0R2.5	14	2.5	14	35	90	5	●
RM-5R-D14.0R3.0	14	3.0	14	35	90	5	●
RM-5R-D16.0R0.2	16	0.2	16	35	90	5	●
RM-5R-D16.0R0.3	16	0.3	16	35	90	5	●
RM-5R-D16.0R0.5	16	0.5	16	35	90	5	●
RM-5R-D16.0R0.75	16	0.75	16	35	90	5	●
RM-5R-D16.0R1.0	16	1.0	16	35	90	5	●
RM-5R-D16.0R1.5	16	1.5	16	35	90	5	●
RM-5R-D16.0R2.0	16	2.0	16	35	90	5	●
RM-5R-D16.0R2.5	16	2.5	16	35	90	5	●
RM-5R-D16.0R3.0	16	3.0	16	35	90	5	●
RM-5R-D16.0R4.0	16	4.0	16	35	90	5	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

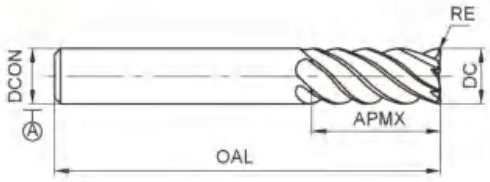
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B619 | Non-standard customization B652-B653

5-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

RM-5R



42° | Coated TIALXN | DC: DC≤12 0~-0.03, DC>12 0~-0.04

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-5R-D20.0R0.2	20	0.2	20	45	100	5	●
RM-5R-D20.0R0.3	20	0.3	20	45	100	5	●
RM-5R-D20.0R0.5	20	0.5	20	45	100	5	●
RM-5R-D20.0R0.75	20	0.75	20	45	100	5	●
RM-5R-D20.0R1.0	20	1.0	20	45	100	5	●
RM-5R-D20.0R1.5	20	1.5	20	45	100	5	●
RM-5R-D20.0R2.0	20	2.0	20	45	100	5	●
RM-5R-D20.0R2.5	20	2.5	20	45	100	5	●
RM-5R-D20.0R3.0	20	3.0	20	45	100	5	●
RM-5R-D20.0R4.0	20	4.0	20	45	100	5	●
RM-5R-D25.0R1.0	25	1.0	25	50	110	5	●
RM-5R-D25.0R2.0	25	2.0	25	50	110	5	●
RM-5R-D25.0R3.0	25	3.0	25	50	110	5	●
RM-5R-D25.0R4.0	25	4.0	25	50	110	5	●
RM-5R-D25.0R5.0	25	5.0	25	50	110	5	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

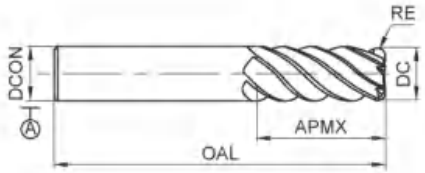
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B619 | Non-standard customization B652-B653

6-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

RM-6R



45° | Coated TiALXN | DC: DC≤12 0~-0.03, DC>12 0~-0.04

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-6R-D10.0R1.0	10	1.0	10	25	75	6	●
RM-6R-D10.0R2.0	10	2.0	10	25	75	6	●
RM-6R-D12.0R1.0	12	1.0	12	30	75	6	●
RM-6R-D12.0R2.0	12	2.0	12	30	75	6	●
RM-6R-D12.0R3.0	12	3.0	12	30	75	6	●
RM-6R-D14.0R1.0	14	1.0	14	35	90	6	●
RM-6R-D14.0R2.0	14	2.0	14	35	90	6	●
RM-6R-D14.0R3.0	14	3.0	14	35	90	6	●
RM-6R-D16.0R1.0	16	1.0	16	35	90	6	●
RM-6R-D16.0R2.5	16	2.5	16	35	90	6	●
RM-6R-D16.0R4.0	16	4.0	16	35	90	6	●
RM-6R-D20.0R1.0	20	1.0	20	45	100	6	●
RM-6R-D20.0R2.5	20	2.5	20	45	100	6	●
RM-6R-D20.0R4.0	20	4.0	20	45	100	6	●
RM-6R-D25.0R1.0	25	1.0	25	50	110	6	●
RM-6R-D25.0R2.5	25	2.5	25	50	110	6	●
RM-6R-D25.0R4.0	25	4.0	25	50	110	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

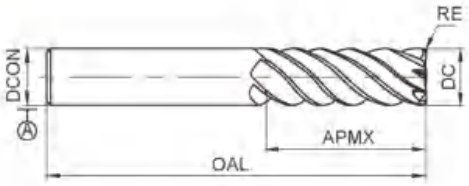
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B620 | Non-standard customization B652-B653

7-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

RM-7R



45° | Coated TiALXN | DC: DC≤12 0~-0.03, DC>12 0~-0.04

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-7R-D10.0R0.2	10	0.2	10	25	75	7	●
RM-7R-D10.0R0.3	10	0.3	10	25	75	7	●
RM-7R-D10.0R0.5	10	0.5	10	25	75	7	●
RM-7R-D10.0R0.75	10	0.75	10	25	75	7	●
RM-7R-D10.0R1.0	10	1.0	10	25	75	7	●
RM-7R-D10.0R1.5	10	1.5	10	25	75	7	●
RM-7R-D10.0R2.0	10	2.0	10	25	75	7	●
RM-7R-D12.0R0.2	12	0.2	12	30	75	7	●
RM-7R-D12.0R0.3	12	0.3	12	30	75	7	●
RM-7R-D12.0R0.5	12	0.5	12	30	75	7	●
RM-7R-D12.0R0.75	12	0.75	12	30	75	7	●
RM-7R-D12.0R1.0	12	1.0	12	30	75	7	●
RM-7R-D12.0R1.5	12	1.5	12	30	75	7	●
RM-7R-D12.0R2.0	12	2.0	12	30	75	7	●
RM-7R-D12.0R2.5	12	2.5	12	30	75	7	●
RM-7R-D12.0R3.0	12	3.0	12	30	75	7	●
RM-7R-D14.0R0.2	14	0.2	14	35	90	7	●
RM-7R-D14.0R0.3	14	0.3	14	35	90	7	●
RM-7R-D14.0R0.5	14	0.5	14	35	90	7	●
RM-7R-D14.0R0.75	14	0.75	14	35	90	7	●
RM-7R-D14.0R1.0	14	1.0	14	35	90	7	●
RM-7R-D14.0R1.5	14	1.5	14	35	90	7	●
RM-7R-D14.0R2.0	14	2.0	14	35	90	7	●
RM-7R-D14.0R2.5	14	2.5	14	35	90	7	●
RM-7R-D14.0R3.0	14	3.0	14	35	90	7	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

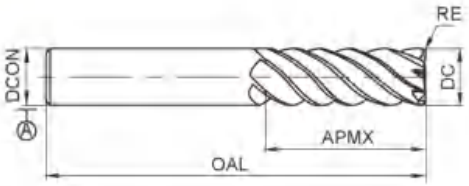
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B620 | Non-standard customization B652-B653

7-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

RM-7R



45° | Coated TiALXN | DC: DC≤12 0~-0.03, DC>12 0~-0.04

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
RM-7R-D16.0R0.2	16	0.2	16	35	90	7	●
RM-7R-D16.0R0.3	16	0.3	16	35	90	7	●
RM-7R-D16.0R0.5	16	0.5	16	35	90	7	●
RM-7R-D16.0R0.75	16	0.75	16	35	90	7	●
RM-7R-D16.0R1.0	16	1.0	16	35	90	7	●
RM-7R-D16.0R1.5	16	1.5	16	35	90	7	●
RM-7R-D16.0R2.0	16	2.0	16	35	90	7	●
RM-7R-D16.0R2.5	16	2.5	16	35	90	7	●
RM-7R-D16.0R3.0	16	3.0	16	35	90	7	●
RM-7R-D16.0R4.0	16	4.0	16	35	90	7	●
RM-7R-D20.0R0.2	20	0.2	20	45	100	7	●
RM-7R-D20.0R0.3	20	0.3	20	45	100	7	●
RM-7R-D20.0R0.5	20	0.5	20	45	100	7	●
RM-7R-D20.0R0.75	20	0.75	20	45	100	7	●
RM-7R-D20.0R1.0	20	1.0	20	45	100	7	●
RM-7R-D20.0R1.5	20	1.5	20	45	100	7	●
RM-7R-D20.0R2.0	20	2.0	20	45	100	7	●
RM-7R-D20.0R2.5	20	2.5	20	45	100	7	●
RM-7R-D20.0R3.0	20	3.0	20	45	100	7	●
RM-7R-D20.0R4.0	20	4.0	20	45	100	7	●
RM-7R-D25.0R1.0	25	1.0	25	50	110	7	●
RM-7R-D25.0R2.0	25	2.0	25	50	110	7	●
RM-7R-D25.0R3.0	25	3.0	25	50	110	7	●
RM-7R-D25.0R4.0	25	4.0	25	50	110	7	●
RM-7R-D25.0R5.0	25	5.0	25	50	110	7	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

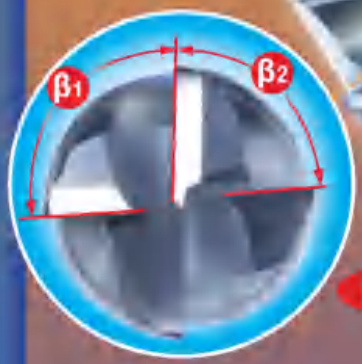
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B620 | Non-standard customization B652-B653

MM Sries

High performance universal end mills for stainless steel

It's suitable for high-efficiency and universal machining for variety stainless steel and steel.



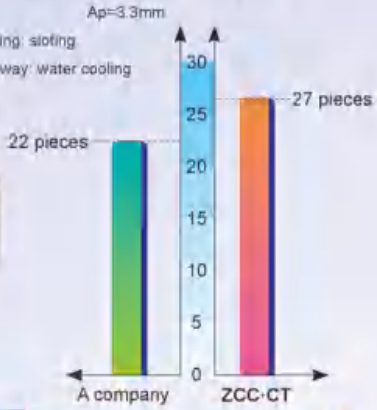
β1≠β2

- Unequal teeth pitch and unequal helical structure improve tools vibration resistance largely and improve the smoothness of machined surface.
- Unique flute design, taking the tool rigidity account with chip space, can meet the work conditions of high feed milling and cycloid curve milling.
- Unique edge treatment technics effectively reduce processing stick, postpone the tool wearance and improve the tool service life greatly.

- Matrix and coating with better universalty and wear resistance.

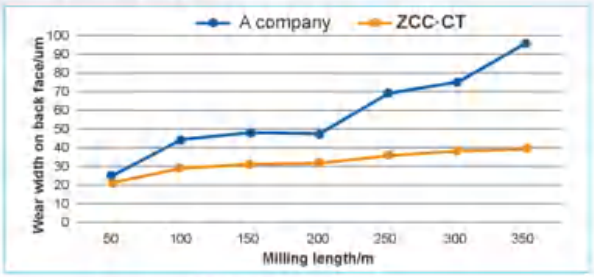
Application case 1

Workpiece: medical devices
Machined material: SUS304
Machine: CNC
Cutting tool: MM-4R-D8.0R0.5,
4-flute coating R end mills
Cutting parameters: S=2500rpm, F=250mm/min,
Ap=3.3mm
Processing: slotting
Cooling way: water cooling

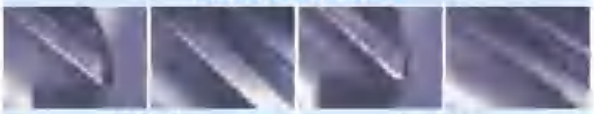


Application case 2

Machined material: SUS304
Machine: CNC
Cutting tool: MM-4E-D6.0
Cutting parameters: S=5300rpm, F=2120mm/min,
Ap=9mm, Ae=0.6mm
Cooling way: water cooling



Picture of tool wear



ZCC·CT A company

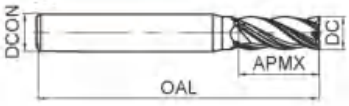
4-flute flattened end mills with straight shank


Side face

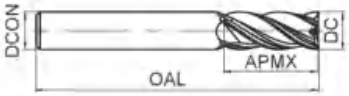

Step shoulder


Straight slot

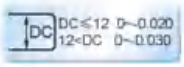
MM-4E



Picture 1



Picture 2



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
MM-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
MM-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
MM-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
MM-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
MM-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
MM-4E-D3.0	3.0	6	8	50	4	Picture 1	●
MM-4E-D4.0S	4.0	4	11	50	4	Picture 2	●
MM-4E-D4.0	4.0	6	11	50	4	Picture 1	●
MM-4E-D5.0	5.0	6	13	50	4	Picture 1	●
MM-4E-D6.0	6.0	6	16	50	4	Picture 2	●
MM-4E-D7.0	7.0	8	20	60	4	Picture 1	●
MM-4E-D8.0	8.0	8	20	60	4	Picture 2	●
MM-4E-D9.0	9.0	10	22	75	4	Picture 1	●
MM-4E-D10.0	10.0	10	25	75	4	Picture 2	●
MM-4E-D12.0	12.0	12	30	75	4	Picture 2	●
MM-4E-D14.0	14.0	14	32	75	4	Picture 2	●
MM-4E-D16.0	16.0	16	45	100	4	Picture 2	●
MM-4E-D18.0	18.0	18	45	100	4	Picture 2	●
MM-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					◎				○	○

Code key B294 Graphics category and identification B295 Cutting parameters B622 Non-standard customization B652-B653

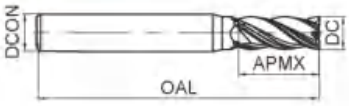
4-flute flattened end mills with long shank


Side face

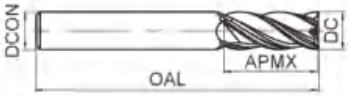

Step shoulder


Straight slot

MM-4EF



Picture 1



Picture 2

35°/37°

Coated NaNo TiAlN

DC DC≤12 0~-0.020 12<DC 0~-0.030

Shank tolerance h5

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
MM-4EF-D1.0S	1.0	4	2	50	4	Picture 1	●
MM-4EF-D1.5S	1.5	4	3	50	4	Picture 1	●
MM-4EF-D2.0S	2.0	4	4	50	4	Picture 1	●
MM-4EF-D2.5S	2.5	4	5	50	4	Picture 1	●
MM-4EF-D3.0S	3.0	4	6	50	4	Picture 1	●
MM-4EF-D3.0	3.0	6	6	50	4	Picture 1	●
MM-4EF-D4.0S	4.0	4	8	50	4	Picture 2	●
MM-4EF-D4.0	4.0	6	8	50	4	Picture 1	●
MM-4EF-D5.0	5.0	6	10	50	4	Picture 1	●
MM-4EF-D6.0	6.0	6	12	50	4	Picture 2	●
MM-4ES-D7.0	7.0	8	14	60	4	Picture 1	●
MM-4EF-D8.0	8.0	8	16	60	4	Picture 2	●
MM-4EF-D9.0	9.0	10	18	75	4	Picture 1	●
MM-4EF-D10.0	10.0	10	20	75	4	Picture 2	●
MM-4EF-D12.0	12.0	12	24	75	4	Picture 2	●
MM-4EF-D14.0	14.0	14	28	75	4	Picture 2	●
MM-4EF-D16.0	16.0	16	32	100	4	Picture 2	●
MM-4EF-D18.0	18.0	18	36	100	4	Picture 2	●
MM-4EF-D20.0	20.0	20	40	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

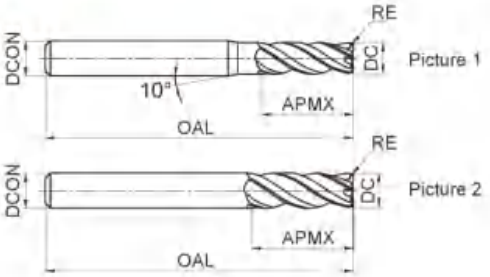
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					◎				○	○

Code key B294
Graphics category and identification B295
Cutting parameters B622
Non-standard customization B652-B653

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

MM-4R



35°/37° | Coated NaNo TiAlN | DC DC≤12 0~-0.020 12<DC 0~-0.030 | Shank tolerance h5

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	RE	DCON	APMX	OAL			
MM-4R-D1.0R0.1S	1.0	0.1	4	3	50	4	Picture 1	●
MM-4R-D1.5R0.2S	1.5	0.2	4	4	50	4	Picture 1	●
MM-4R-D2.0R0.2S	2.0	0.2	4	6	50	4	Picture 1	●
MM-4R-D3.0R0.2S	3.0	0.2	4	8	50	4	Picture 1	●
MM-4R-D3.0R0.3S	3.0	0.3	4	8	50	4	Picture 1	●
MM-4R-D4.0R0.2S	4.0	0.2	4	10	50	4	Picture 2	●
MM-4R-D4.0R0.3S	4.0	0.3	4	10	50	4	Picture 2	●
MM-4R-D4.0R0.5S	4.0	0.5	4	10	50	4	Picture 2	●
MM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
MM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
MM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
MM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
MM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
MM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
MM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
MM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
MM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
MM-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●
MM-4R-D16.0R1.0	16.0	1.0	16	45	100	4	Picture 2	●
MM-4R-D16.0R2.0	16.0	2.0	16	45	100	4	Picture 2	●
MM-4R-D16.0R3.0	16.0	3.0	16	45	100	4	Picture 2	●
MM-4R-D20.0R1.0	20.0	1.0	20	45	100	4	Picture 2	●
MM-4R-D20.0R2.0	20.0	2.0	20	45	100	4	Picture 2	●
MM-4R-D20.0R3.0	20.0	3.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

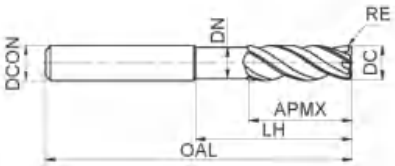
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					◎				○	○

Code key B294 | Graphics category and identification B295 | Cutting parameters B623 | Non-standard customization B652-B653

4-flute R end mills with long shank and straight shank

Radius shoulder | Profile | Radius corner slot

MM-4RFP



35°/37° | Coated NANO TIAN | DC DC≤12 0~-0.020 12<DC 0~-0.030 | Shank tolerance h5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	LH	OAL		
MM-4RFP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	●
MM-4RFP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	●
MM-4RFP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	●
MM-4RFP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	●
MM-4RFP-D10.0R0.5	10.0	0.5	10	9.5	10	30	100	4	●
MM-4RFP-D10.0R1.0	10.0	1.0	10	9.5	10	30	100	4	●
MM-4RFP-D10.0R2.0	10.0	2.0	10	9.5	10	30	100	4	●
MM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	12	36	120	4	●
MM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	12	36	120	4	●
MM-4RFP-D12.0R3.0	12.0	3.0	12	11.5	12	36	120	4	●
MM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	●
MM-4RFP-D16.0R2.0	16.0	2.0	16	15.5	16	40	150	4	●
MM-4RFP-D16.0R3.0	16.0	3.0	16	15.5	16	40	150	4	●
MM-4RFP-D20.0R1.0	20.0	1.0	20	19	20	60	150	4	●
MM-4RFP-D20.0R2.0	20.0	2.0	20	19	20	60	150	4	●
MM-4RFP-D20.0R3.0	20.0	3.0	20	19	20	60	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					◎				○	○

Code key B294 | Graphics category and identification B295 | Cutting parameters B623 | Non-standard customization B652-B653

TM series

end mills for titanium machining

- High flexural strength, can significantly avoids the risks of premature chipping, suitable for titanium alloy materials milling machining.

- Polished finish for both flank and rake face improves the surface smoothness, reduces friction, reduces cutting force and temperature, reduces abrasive wear caused by smearing.

- Adopting unequal pitch structure leads to high-efficiency milling with low vibration.

$\alpha \neq \beta$

Application field

Suitable for Aerospace industries applications or machining titanium alloy parts, improve machining efficiency for the customers;

Suitable for finishing titanium alloy parts in Aerospace industries to improve the dimensional accuracy of the parts.

Longer tool life

Machining component: Housings and casings

Workpiece material: TC4

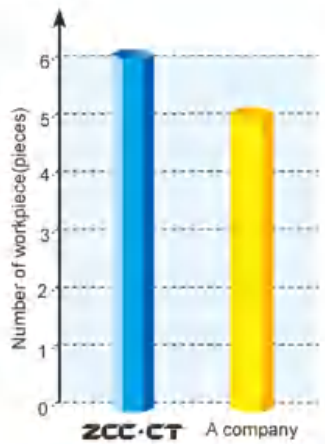
Cutting tool: TM-5R-D16.0R0.5

Cutting parameters: S=720r/min,
F=128~160mm/min,
ap=13~15.3mm,
ae=8~16mm

CNC Machine type: planomiller

Method: Slot milling, Side face milling

Cooling method: Emulsion

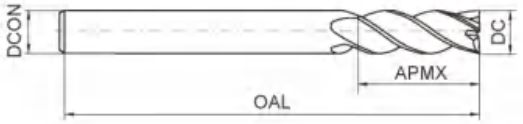


Test result: **ZCC-CT** product processed 6 components, product from A company only processed 5 components.

Side face Step shoulder

4-flute flattened end mills with straight shank

TM-4E



38° Coated AlCrXN DC DC≤12 0~-0.030 12<DC 0~-0.040

Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
TM-4E-D6.0	6.0	6	16	50	4	●
TM-4E-D8.0	8.0	8	20	60	4	●
TM-4E-D10.0	10.0	10	25	75	4	●
TM-4E-D12.0	12.0	12	30	75	4	●
TM-4E-D14.0	14.0	14	35	90	4	●
TM-4E-D16.0	16.0	16	35	90	4	●
TM-4E-D20.0	20.0	20	45	100	4	●
TM-4E-D25.0	25.0	25	50	110	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 Graphics category and identification B295 Cutting parameters B624 Non-standard customization B652-B653

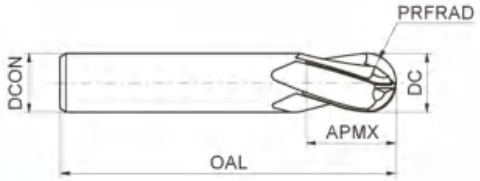
4-flute ball nose end mills

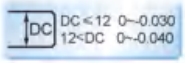

Profile

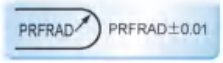

Cavity


Ball nose slot

TM-4B







Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	PRFRAD	DCON	APMX	OAL		
TM-4B-R3.0	6.0	3.0	6	9	50	4	●
TM-4B-R4.0	8.0	4.0	8	12	60	4	●
TM-4B-R5.0	10.0	5.0	10	15	75	4	●
TM-4B-R6.0	12.0	6.0	12	18	75	4	●
TM-4B-R8.0	16.0	8.0	16	24	85	4	●
TM-4B-R10.0	20.0	10.0	20	30	100	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

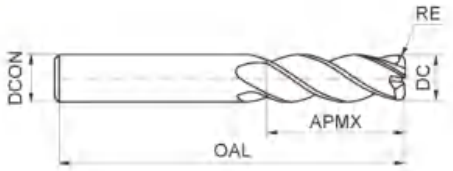
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 Graphics category and identification B295 Cutting parameters B624 Non-standard customization B652-B653

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-4R



38° | Coated AlCrXN | DC DC<12 0~-0.030 12<DC 0~-0.040

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
TM-4R-D6.0R0.2	6.0	0.2	6	16	50	4	●
TM-4R-D6.0R0.3	6.0	0.3	6	16	50	4	●
TM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	●
TM-4R-D6.0R0.75	6.0	0.75	6	16	50	4	●
TM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	●
TM-4R-D8.0R0.2	8.0	0.2	8	20	60	4	●
TM-4R-D8.0R0.3	8.0	0.3	8	20	60	4	●
TM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	●
TM-4R-D8.0R0.75	8.0	0.75	8	20	60	4	●
TM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	●
TM-4R-D8.0R2.0	8.0	2.0	8	20	60	4	●
TM-4R-D10.0R0.2	10.0	0.2	10	25	75	4	●
TM-4R-D10.0R0.3	10.0	0.3	10	25	75	4	●
TM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	●
TM-4R-D10.0R0.75	10.0	0.75	10	25	75	4	●
TM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	●
TM-4R-D10.0R1.5	10.0	1.5	10	25	75	4	●
TM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	●
TM-4R-D12.0R0.2	12.0	0.2	12	30	75	4	●
TM-4R-D12.0R0.3	12.0	0.3	12	30	75	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B624 | Non-standard customization B652-B653

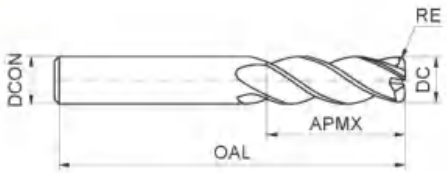
4-flute R end mills with straight shank

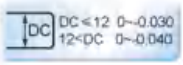

Radius shoulder


Profile


Radius corner slot

TM-4R





Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
TM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	●
TM-4R-D12.0R0.75	12.0	0.75	12	30	75	4	●
TM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	●
TM-4R-D12.0R1.5	12.0	1.5	12	30	75	4	●
TM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	●
TM-4R-D12.0R2.5	12.0	2.5	12	30	75	4	●
TM-4R-D12.0R3.0	12.0	3.0	12	30	75	4	●
TM-4R-D14.0R0.2	14.0	0.2	14	35	90	4	●
TM-4R-D14.0R0.3	14.0	0.3	14	35	90	4	●
TM-4R-D14.0R0.5	14.0	0.5	14	35	90	4	●
TM-4R-D14.0R0.75	14.0	0.75	14	35	90	4	●
TM-4R-D14.0R1.0	14.0	1.0	14	35	90	4	●
TM-4R-D14.0R1.5	14.0	1.5	14	35	90	4	●
TM-4R-D14.0R2.0	14.0	2.0	14	35	90	4	●
TM-4R-D14.0R2.5	14.0	2.5	14	35	90	4	●
TM-4R-D14.0R3.0	14.0	3.0	14	35	90	4	●
TM-4R-D16.0R0.2	16.0	0.2	16	35	90	4	●
TM-4R-D16.0R0.3	16.0	0.3	16	35	90	4	●
TM-4R-D16.0R0.5	16.0	0.5	16	35	90	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

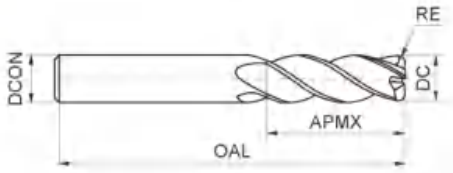
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B624
Non-standard customization B652-B653

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-4R



Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
TM-4R-D16.0R0.75	16.0	0.75	16	35	90	4	●
TM-4R-D16.0R1.0	16.0	1.0	16	35	90	4	●
TM-4R-D16.0R1.5	16.0	1.5	16	35	90	4	●
TM-4R-D16.0R2.0	16.0	2.0	16	35	90	4	●
TM-4R-D16.0R2.5	16.0	2.5	16	35	90	4	●
TM-4R-D16.0R3.0	16.0	3.0	16	35	90	4	●
TM-4R-D16.0R4.0	16.0	4.0	16	35	90	4	●
TM-4R-D20.0R0.2	20.0	0.2	20	45	100	4	●
TM-4R-D20.0R0.3	20.0	0.3	20	45	100	4	●
TM-4R-D20.0R0.5	20.0	0.5	20	45	100	4	●
TM-4R-D20.0R0.75	20.0	0.75	20	45	100	4	●
TM-4R-D20.0R1.0	20.0	1.0	20	45	100	4	●
TM-4R-D20.0R1.5	20.0	1.5	20	45	100	4	●
TM-4R-D20.0R2.0	20.0	2.0	20	45	100	4	●
TM-4R-D20.0R2.5	20.0	2.5	20	45	100	4	●
TM-4R-D20.0R3.0	20.0	3.0	20	45	100	4	●
TM-4R-D20.0R4.0	20.0	4.0	20	45	100	4	●
TM-4R-D25.0R1.0	25.0	1.0	25	50	110	4	●
TM-4R-D25.0R2.0	25.0	2.0	25	50	110	4	●
TM-4R-D25.0R3.0	25.0	3.0	25	50	110	4	●
TM-4R-D25.0R4.0	25.0	4.0	25	50	110	4	●
TM-4R-D25.0R5.0	25.0	5.0	25	50	110	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

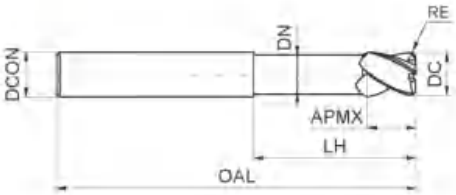
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B624 | Non-standard customization B652-B653

4-flute R end mills with long neck, straight shank

Radius shoulder | Profile | Radius corner slot

TM-4RP



38° | Coated AlCrXN | DC DC≤12 0~-0.030 12<DC 0~-0.040

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	LH	OAL		
TM-4RP-D8.0R0.5	8.0	0.5	8	7.4	16	25	75	4	●
TM-4RP-D8.0R1.0	8.0	1.0	8	7.4	16	25	75	4	●
TM-4RP-D10.0R0.5	10.0	0.5	10	9.4	20	32	75	4	●
TM-4RP-D10.0R1.0	10.0	1.0	10	9.4	20	32	75	4	●
TM-4RP-D10.0R2.0	10.0	2.0	10	9.4	20	32	75	4	●
TM-4RP-D10.0R3.0	10.0	3.0	10	9.4	20	32	75	4	●
TM-4RP-D12.0R0.5	12.0	0.5	12	11.4	24	40	90	4	●
TM-4RP-D12.0R1.0	12.0	1.0	12	11.4	24	40	90	4	●
TM-4RP-D12.0R2.0	12.0	2.0	12	11.4	24	40	90	4	●
TM-4RP-D12.0R3.0	12.0	3.0	12	11.4	24	40	90	4	●
TM-4RP-D16.0R0.5	16.0	0.5	16	15.0	32	50	100	4	●
TM-4RP-D16.0R1.0	16.0	1.0	16	15.0	32	50	100	4	●
TM-4RP-D16.0R2.0	16.0	2.0	16	15.0	32	50	100	4	●
TM-4RP-D16.0R3.0	16.0	3.0	16	15.0	32	50	100	4	●
TM-4RP-D20.0R0.5	20.0	0.5	20	19.0	35	60	110	4	●
TM-4RP-D20.0R1.0	20.0	1.0	20	19.0	35	60	110	4	●
TM-4RP-D20.0R2.0	20.0	2.0	20	19.0	35	60	110	4	●
TM-4RP-D20.0R3.0	20.0	3.0	20	19.0	35	60	110	4	●
TM-4RP-D25.0R1.0	25.0	1.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R2.0	25.0	2.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R3.0	25.0	3.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R4.0	25.0	4.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R5.0	25.0	5.0	25	24.0	45	75	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

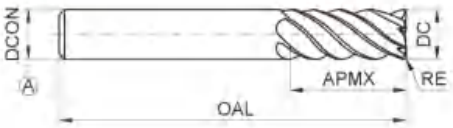
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B624 | Non-standard customization B652-B653

5-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-5R



42° | Coated AlCrXN | DC DC<12 0~-0.030 12<DC 0~-0.040

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
TM-5R-D6.0R0.2	6.0	0.2	6	16	50	5	○
TM-5R-D6.0R0.3	6.0	0.3	6	16	50	5	○
TM-5R-D6.0R0.5	6.0	0.5	6	16	50	5	○
TM-5R-D6.0R0.75	6.0	0.75	6	16	50	5	○
TM-5R-D6.0R1.0	6.0	1.0	6	16	50	5	○
TM-5R-D8.0R0.2	8.0	0.2	8	20	60	5	○
TM-5R-D8.0R0.3	8.0	0.3	8	20	60	5	○
TM-5R-D8.0R0.5	8.0	0.5	8	20	60	5	○
TM-5R-D8.0R0.75	8.0	0.75	8	20	60	5	○
TM-5R-D8.0R1.0	8.0	1.0	8	20	60	5	○
TM-5R-D8.0R2.0	8.0	2.0	8	20	60	5	○
TM-5R-D10.0R0.2	10.0	0.2	10	25	75	5	○
TM-5R-D10.0R0.3	10.0	0.3	10	25	75	5	○
TM-5R-D10.0R0.5	10.0	0.5	10	25	75	5	○
TM-5R-D10.0R0.75	10.0	0.75	10	25	75	5	○
TM-5R-D10.0R1.0	10.0	1.0	10	25	75	5	○
TM-5R-D10.0R1.5	10.0	1.5	10	25	75	5	○
TM-5R-D10.0R2.0	10.0	2.0	10	25	75	5	○
TM-5R-D12.0R0.2	12.0	0.2	12	30	75	5	○
TM-5R-D12.0R0.3	12.0	0.3	12	30	75	5	○
TM-5R-D12.0R0.5	12.0	0.5	12	30	75	5	○
TM-5R-D12.0R0.75	12.0	0.75	12	30	75	5	○
TM-5R-D12.0R1.0	12.0	1.0	12	30	75	5	○
TM-5R-D12.0R1.5	12.0	1.5	12	30	75	5	○
TM-5R-D12.0R2.0	12.0	2.0	12	30	75	5	○
TM-5R-D12.0R2.5	12.0	2.5	12	30	75	5	○
TM-5R-D12.0R3.0	12.0	3.0	12	30	75	5	○
TM-5R-D14.0R0.2	14.0	0.2	14	35	90	5	○
TM-5R-D14.0R0.3	14.0	0.3	14	35	90	5	○
TM-5R-D14.0R0.5	14.0	0.5	14	35	90	5	○
TM-5R-D14.0R0.75	14.0	0.75	14	35	90	5	○

Applicable workpiece material table

◎Very suitable ○Suitable ● Stock available ○ Make-to-order

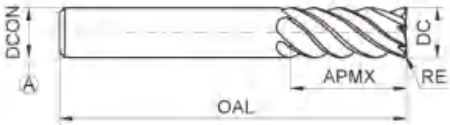
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

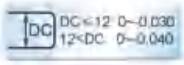
Code key B294 | Graphics category and identification B295 | Cutting parameters B625 | Non-standard customization B652-B653

5-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-5R





Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
TM-5R-D14.0R1.0	14.0	1.0	14	35	90	5	○
TM-5R-D14.0R1.5	14.0	1.5	14	35	90	5	○
TM-5R-D14.0R2.0	14.0	2.0	14	35	90	5	●
TM-5R-D14.0R2.5	14.0	2.5	14	35	90	5	○
TM-5R-D14.0R3.0	14.0	3.0	14	35	90	5	●
TM-5R-D16.0R0.2	16.0	0.2	16	35	90	5	○
TM-5R-D16.0R0.3	16.0	0.3	16	35	90	5	○
TM-5R-D16.0R0.5	16.0	0.5	16	35	90	5	○
TM-5R-D16.0R0.75	16.0	0.75	16	35	90	5	○
TM-5R-D16.0R1.0	16.0	1.0	16	35	90	5	●
TM-5R-D16.0R1.5	16.0	1.5	16	35	90	5	○
TM-5R-D16.0R2.0	16.0	2.0	16	35	90	5	○
TM-5R-D16.0R2.5	16.0	2.5	16	35	90	5	○
TM-5R-D16.0R3.0	16.0	3.0	16	35	90	5	○
TM-5R-D16.0R4.0	16.0	4.0	16	35	90	5	○
TM-5R-D20.0R0.2	20.0	0.2	20	45	100	5	○
TM-5R-D20.0R0.3	20.0	0.3	20	45	100	5	●
TM-5R-D20.0R0.5	20.0	0.5	20	45	100	5	○
TM-5R-D20.0R0.75	20.0	0.75	20	45	100	5	○
TM-5R-D20.0R1.0	20.0	1.0	20	45	100	5	●
TM-5R-D20.0R1.5	20.0	1.5	20	45	100	5	○
TM-5R-D20.0R2.0	20.0	2.0	20	45	100	5	○
TM-5R-D20.0R2.5	20.0	2.5	20	45	100	5	○
TM-5R-D20.0R3.0	20.0	3.0	20	45	100	5	●
TM-5R-D20.0R4.0	20.0	4.0	20	45	100	5	○
TM-5R-D25.0R1.0	25.0	1.0	25	50	110	5	○
TM-5R-D25.0R2.0	25.0	2.0	25	50	110	5	●
TM-5R-D25.0R3.0	25.0	3.0	25	50	110	5	○
TM-5R-D25.0R4.0	25.0	4.0	25	50	110	5	○
TM-5R-D25.0R5.0	25.0	5.0	25	50	110	5	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

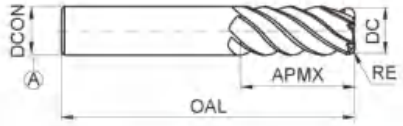
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B625 | Non-standard customization B652-B653

6-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-6R



Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
TM-6R-D10.0R1.0	10.0	1.0	10	25	75	6	○
TM-6R-D10.0R2.0	10.0	2.0	10	25	75	6	○
TM-6R-D12.0R1.0	12.0	1.0	12	30	75	6	○
TM-6R-D12.0R2.0	12.0	2.0	12	30	75	6	○
TM-6R-D12.0R3.0	12.0	3.0	12	30	75	6	○
TM-6R-D14.0R1.0	14.0	1.0	14	35	90	6	○
TM-6R-D14.0R2.0	14.0	2.0	14	35	90	6	○
TM-6R-D14.0R3.0	14.0	3.0	14	35	90	6	○
TM-6R-D16.0R1.0	16.0	1.0	16	35	90	6	○
TM-6R-D16.0R2.5	16.0	2.5	16	35	90	6	○
TM-6R-D16.0R4.0	16.0	4.0	16	35	90	6	○
TM-6R-D20.0R1.0	20.0	1.0	20	45	100	6	○
TM-6R-D20.0R2.5	20.0	2.5	20	45	100	6	○
TM-6R-D20.0R4.0	20.0	4.0	20	45	100	6	○
TM-6R-D25.0R1.0	25.0	1.0	25	50	110	6	○
TM-6R-D25.0R2.5	25.0	2.5	25	50	110	6	○
TM-6R-D25.0R4.0	25.0	4.0	25	50	110	6	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B626 | Non-standard customization B652-B653

NM series
for copper machining

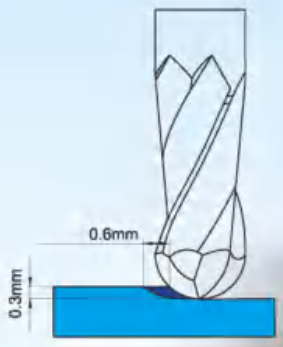
Outstanding NM series end mills bring you a gorgerous machining experience for copper & copper alloy

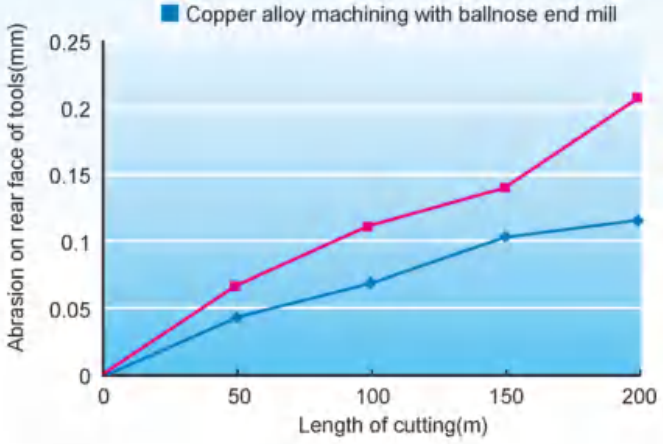
- With super sharp edge, most suitable for high precision machining of copper&alloy of copper.
- With CrN coating which own small fiction coefficient, can realize light cutting processing, long tool life and high quality machined surface.

Coat	Hardness(HV)	Fiction coefficient	Oxidizing temperature(C°)	Strengthness combined with substrate
CrN	1800	0.25	700	◎
TiN	2200	0.4	500	○
TiCN	2700	0.3	400	△
TiAlN	2800	0.3	800	◎

◎Excellent ○Normal

Tool: NM-2B-R3.0
Dimension: R3.0mm
workpiece material: C1100
Rotating speed: 8000r/min (150m/min)
Feed speed: 1200mm/min (0.15mm/r)
Axial cutting depth: a_p=0.3mm
Radial cutting depth: a_e=0.6mm
Cutting style: face milling(down milling)
Cooling system: air cooling
Machine: MIKRON UCP 1000





2-flute flattened end mills with straight shank

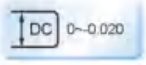

Side face

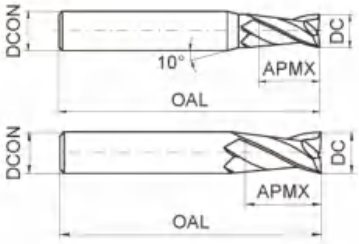

Step shoulder


Straight slot

NM-2E

- Very suitable for slotting.
- Sharp edge, can realize high quality surface.





Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
NM-2E-D1.0	1.0	4	3	50	2	Picture 1	○
NM-2E-D2.0	2.0	4	6	50	2	Picture 1	○
NM-2E-D3.0	3.0	6	8	50	2	Picture 1	○
NM-2E-D4.0	4.0	6	11	50	2	Picture 1	○
NM-2E-D5.0	5.0	6	13	50	2	Picture 1	○
NM-2E-D6.0	6.0	6	16	50	2	Picture 2	○
NM-2E-D8.0	8.0	8	20	60	2	Picture 2	○
NM-2E-D10.0	10.0	10	25	75	2	Picture 2	○
NM-2E-D12.0	12.0	12	30	75	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	○		

Code key B294
Graphics category and identification B295
Cutting parameters B627
Non-standard customization B652-B653

4-flute flattened end mills with straight shank

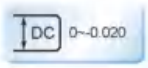

Side face

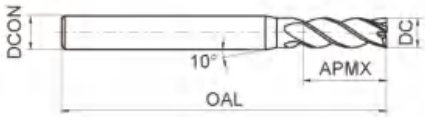

Step shoulder


Straight slot

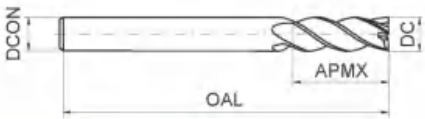
NM-4E

- Long edge design, suitable for precision milling of copper electrodes on the side.





Picture 1



Picture 2

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
NM-4E-D3.0	3.0	6	8	50	4	Picture 1	○
NM-4E-D4.0	4.0	6	11	50	4	Picture 1	○
NM-4E-D5.0	5.0	6	13	50	4	Picture 1	○
NM-4E-D6.0	6.0	6	16	50	4	Picture 2	○
NM-4E-D8.0	8.0	8	20	60	4	Picture 2	○
NM-4E-D10.0	10.0	10	25	75	4	Picture 2	○
NM-4E-D12.0	12.0	12	30	75	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	○		

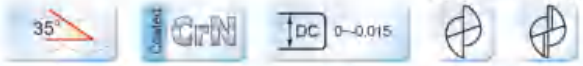
Code key B294 Graphics category and identification B295 Cutting parameters B628 Non-standard customization B652-B653

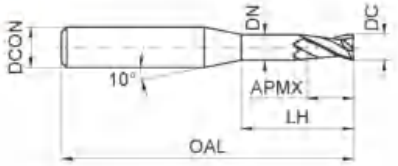
2-flute flattened end mills with straight shank, long neck and short cutting edge


Deep flattened slot

NM-2EP

- Long neck, short edge structure can avoid tool interference issues in deep cavity machining.





Type	Basic dimension(mm)						Number of teeth Z	Stock
	DC	DCON	APMX	LH	DN	OAL		
NM-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	○
NM-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	○
NM-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	○
NM-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	○
NM-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	○
NM-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	○
NM-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	○
NM-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	○
NM-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	○
NM-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	○
NM-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	○
NM-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	○
NM-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	○
NM-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	○
NM-2EP-D1.5-M16	1.5	4	2.3	16	1.45	50	2	○
NM-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	○
NM-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	○
NM-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	○
NM-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	○
NM-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	○
NM-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	○
NM-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	○
NM-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	○
NM-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	○
NM-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	○
NM-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	○
NM-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	○
NM-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	○
NM-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	○

Applicable workpiece material table

◎Very suitable ○Suitable

● Stock available ○ Make-to-order

Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	○		

Code key B294
Graphics category and identification B295
Cutting parameters B629
Non-standard customization B652-B653

2-flute ball nose end mills with straight shank


Profile

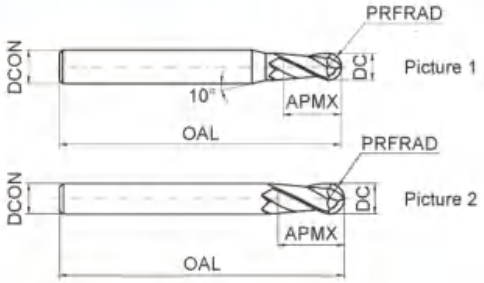

Cavity


Ball nose slot

NM-2B

- Suitable for profile milling.
- Workpiece surface is excellent after machining.

35° | Coated CrN | DC 0~-0.020 | PRFRAD PRFRAD±0.01



Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	PRFRAD	DCON	APMX	OAL			
NM-2B-R0.5	1.0	0.5	4	2	50	2	Picture 1	○
NM-2B-R0.75	1.5	0.75	4	3	50	2	Picture 1	○
NM-2B-R1.0	2.0	1.0	4	4	50	2	Picture 1	○
NM-2B-R1.25	2.5	1.25	4	5	50	2	Picture 1	○
NM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	○
NM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	○
NM-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	○
NM-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	○
NM-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	○
NM-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	○
NM-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	○
NM-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

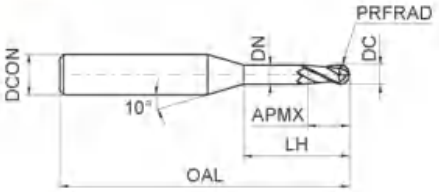
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	○		

Code key B294 | Graphics category and identification B295 | Cutting parameters B630 | Non-standard customization B652-B653

2-flute ball nose end mills with straight shank, long neck and short cutting edge


Deep ball nose slot

NM-2BP



● Very suitable for copper electrode three dimensional machining.

35° | Coated CrN | DC 0~-0.015 | PRFRAD PRFRAD ±0.005 PRFRAD<0.5 PRFRAD ±0.01 PRFRAD>0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	PRFRAD	APMX	DN	LH	DCON	OAL		
NM-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	○
NM-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	○
NM-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	○
NM-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	○
NM-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	○
NM-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	○
NM-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	○
NM-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	○
NM-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	○
NM-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	○
NM-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	○
NM-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	○
NM-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	○
NM-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	○
NM-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	○
NM-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

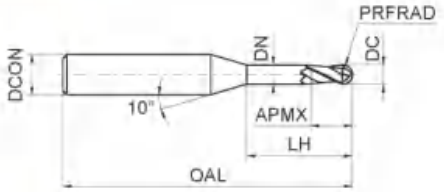
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	○		

Code key B294 | Graphics category and identification B295 | Cutting parameters B631 | Non-standard customization B652-B653

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

NM-2BP



- Very suitable for copper electrode three dimensional machining.

35° | Coated CrN | DC 0~-0.015 | PRFRAD PRFRAD±0.005 PRFRAD<0.5 PRFRAD±0.01 PRFRAD>0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	PRFRAD	APMX	DN	LH	DCON	OAL		
NM-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	○
NM-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	○
NM-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	○
NM-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	○
NM-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	○
NM-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	60	2	○
NM-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	○
NM-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	○
NM-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	○
NM-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	○
NM-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	○
NM-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	○
NM-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	○
NM-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	○		

Code key B294 | Graphics category and identification B295 | Cutting parameters B631 | Non-standard customization B652-B653

ALU series

High-efficiency end mills for aluminium

$\alpha_1 \neq \alpha_2 \neq \alpha_3$

High speed machining, roughing and finishing

- Special C-type chipbreaker
  Large chip space make Al chips curve quickly
- Small core diameter and big edge blade design is able to achieve the perfect combination of roughing to finishing
- Big cutting depth slotting can reach cutting speed over 450m/min

Good vibration resistance

Unequal teeth pitch structure reduces the vibrasion when machining, so high speed machining is more stable.

Low coefficient of friction and high hardness iridescent coating improves machining efficiency and tool durability

keep good edge sharpness
Super thin coating，0.2-0.5um，can keep good edge sharpness

Low friction coefficient
High resistance to sticking, low cutting forces

Strong binding force
Strong resistance to coating peeling, good processing stability

High hardness
Over HV6000

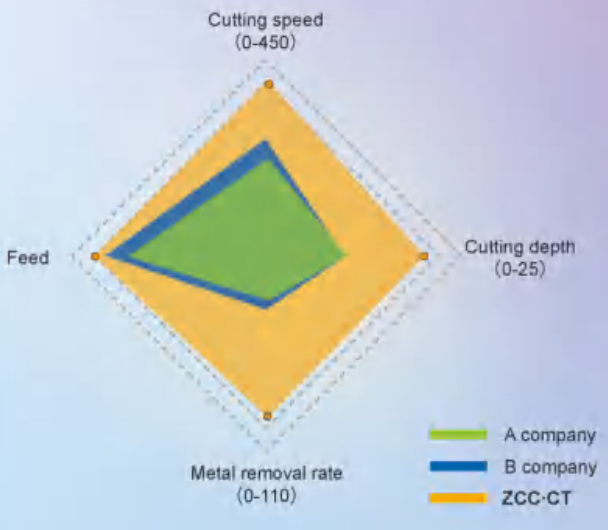
Iridescent coating
Has a bright appearance and is easy to identify

High speed and large cutting depth machining

Processing: sloting
Machined material: LC4, HB90
Machine: 5 axis CNC
Cutting tool: Φ10*25*75
3-flutes flat end mills
Cooling way: water cooling

Cutting parameters	A company	B company	ZCC·CT
Cutting speed(m/min)	250	300	450
Cutting depth(mm)	10	10	20
Metal removal rate (cm^3/min)	28.5	34.2	103
Feed (mm/z)	0.12	0.12	0.12

Comparision after Maximal slotting



Dry cut aluminium alloy

Cutting tool: Φ12*30*75 3-flutes flat end mills
Machined material: Al 7075, HB120
Cutting parameters: Vc=150m/min, fz=0.07mm/z,
Ap=10mm
Machine: CNC
Processing: sloting
Cooling way: gas cooling and dry cut

A company
Chip blocking

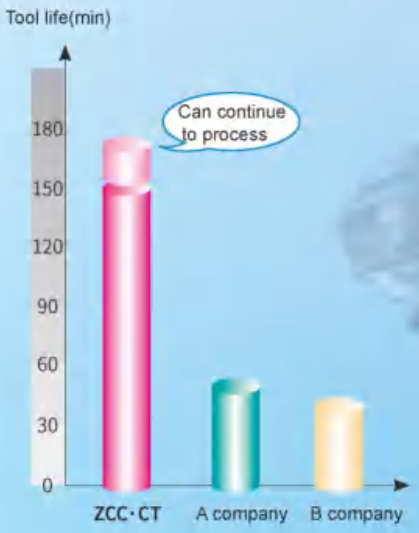
ZCC·CT
Cut ligtly
normal processing

B company
Tool broken

High speed dynamic milling

ALU serie is very suitable for dynamic Al-alloy milling. It greatly improves efficiency, ensures good surface quality of workpiece at the same time and realizes long tool life also.

Tool type: Φ10*25*75 3-flute flattened end mills
Machined material: LC4, HB90
Cutting parameters: Vc=400m/min, fz=0.12mm/z
Machine: 5 axis CNC UCP1000
Proceesing: dynamic milling Ap=15mm, Ae=3mm
Cooling way: Emulsion coolant



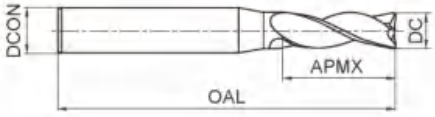
3-flute flattened end mills with straight shank


Side face

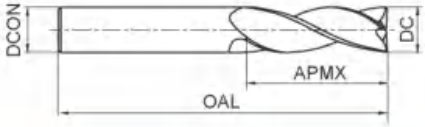

Step shoulder


Straight slot

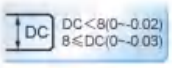
ALU-3E



Picture 1



Picture 2



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
ALU-3E-D3.0S	3	4	8	50	3	Picture 1	○
ALU-3E-D4.0S	4	4	10	50	3	Picture 2	○
ALU-3E-D5.0	5	6	13	50	3	Picture 1	○
ALU-3E-D6.0	6	6	16	50	3	Picture 2	○
ALU-3E-D8.0	8	8	20	60	3	Picture 2	○
ALU-3E-D10.0	10	10	25	75	3	Picture 2	○
ALU-3E-D12.0	12	12	30	75	3	Picture 2	○
ALU-3E-D16.0	16	16	40	100	3	Picture 2	○
ALU-3E-D20.0	20	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								○	◎		

Code key B294
Graphics category and identification B295
Cutting parameters B623
Non-standard customization B652-B653

AL series end mills for Al machining

- Chip pocket with unique shape exerts excellent performances even in slot and cavity machining.
- Sharp cutting edge and large helical angle design effectively prevent built-up edge.
- Anti-vibration design of whole edge can suppress the chattering during machining and improve surface quality.

Tool type: AL-3E-D6.0
Dimensions: Ø6.0mm
Workpiece material: LC4
Rotating speed: 13000r/min (250m/min)
Feed speed: 1950mm/min (0.15mm/r)
Axial cutting depth: a_p=9.0mm
Radial cutting depth: a_e=1.0mm
Cutting style: Complicated cavity machining
Cooling system: air blow
Machine tool: MIKRON UCP 1000

Even the complicated machining of thin-wall cavity parts can be achieved easily.

2-flute flattened end mills with straight shank

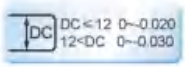

Side face

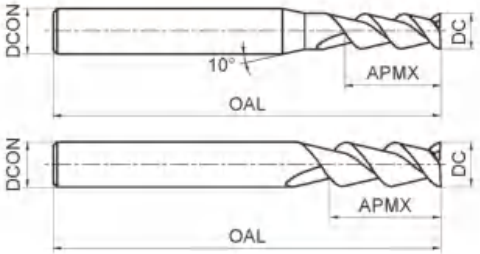

Step shoulder


Straight slot

AL-2E

- Good chip removal performance, high machining efficiency.





Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
AL-2E-D1.0	1.0	4	3	50	2	Picture 1	●
AL-2E-D1.5	1.5	4	4	50	2	Picture 1	●
AL-2E-D2.0	2.0	4	6	50	2	Picture 1	●
AL-2E-D2.5	2.5	4	7	50	2	Picture 1	●
AL-2E-D3.0	3.0	6	9	50	2	Picture 1	●
AL-2E-D4.0	4.0	6	12	50	2	Picture 1	●
AL-2E-D5.0	5.0	6	15	50	2	Picture 1	●
AL-2E-D6.0	6.0	6	18	60	2	Picture 2	●
AL-2E-D8.0	8.0	8	20	60	2	Picture 2	●
AL-2E-D10.0	10.0	10	30	75	2	Picture 2	●
AL-2E-D12.0	12.0	12	32	75	2	Picture 2	●
AL-2E-D16.0	16.0	16	45	100	2	Picture 2	●
AL-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294
Graphics category and identification B295
Cutting parameters B633
Non-standard customization B652-B653

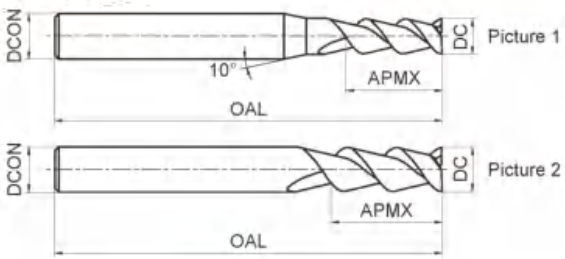
2-flute flattened end mills with straight shank and long cutting edge


Side face


Step shoulder


Straight slot

AL-2EL



● AL-2E series with long cutting edge.

55° | DC | DC≤12 0~-0.020 12<DC 0~-0.030

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
AL-2EL-D3.0	3.0	6	12	60	2	Picture 1	●
AL-2EL-D4.0	4.0	6	16	60	2	Picture 1	●
AL-2EL-D5.0	5.0	6	20	60	2	Picture 1	●
AL-2EL-D6.0	6.0	6	25	75	2	Picture 2	●
AL-2EL-D8.0	8.0	8	32	75	2	Picture 2	●
AL-2EL-D10.0	10.0	10	45	100	2	Picture 2	●
AL-2EL-D12.0	12.0	12	45	100	2	Picture 2	●
AL-2EL-D16.0	16.0	16	65	150	2	Picture 2	●
AL-2EL-D20.0	20.0	20	75	150	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294 | Graphics category and identification B295 | Cutting parameters B633 | Non-standard customization B652-B653

3-flute flattened end mills with straight shank

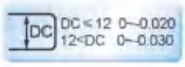

Side face

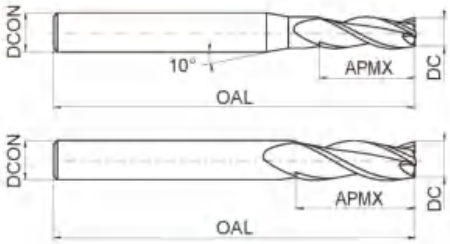

Step shoulder


Straight slot

AL-3E

● Outstanding cutting performance with no chattering, achieving high-precision machining.





Picture 1

Picture 2

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
AL-3E-D1.0	1.0	4	3	50	3	Picture 1	●
AL-3E-D1.5	1.5	4	4	50	3	Picture 1	●
AL-3E-D2.0	2.0	4	6	50	3	Picture 1	●
AL-3E-D2.5	2.5	4	7	50	3	Picture 1	●
AL-3E-D3.0	3.0	6	9	50	3	Picture 1	●
AL-3E-D4.0	4.0	6	12	50	3	Picture 1	●
AL-3E-D5.0	5.0	6	15	50	3	Picture 1	●
AL-3E-D6.0	6.0	6	18	60	3	Picture 2	●
AL-3E-D8.0	8.0	8	20	60	3	Picture 2	●
AL-3E-D10.0	10.0	10	30	75	3	Picture 2	●
AL-3E-D12.0	12.0	12	32	75	3	Picture 2	●
AL-3E-D16.0	16.0	16	45	100	3	Picture 2	●
AL-3E-D20.0	20.0	20	45	100	3	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294
Graphics category and identification B295
Cutting parameters B634
Non-standard customization B652-B653

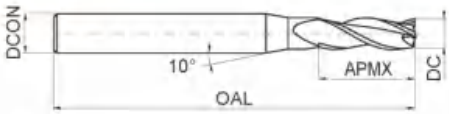
3-flute flattened end mills with straight shank and long cutting edge


Side face

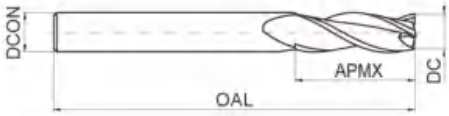

Step shoulder


Straight slot

AL-3EL

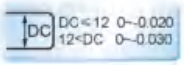


Picture 1



Picture 2

● AL-3E series with long cutting edge.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
AL-3EL-D3.0	3.0	6	12	60	3	Picture 1	●
AL-3EL-D4.0	4.0	6	16	60	3	Picture 1	●
AL-3EL-D5.0	5.0	6	20	60	3	Picture 1	●
AL-3EL-D6.0	6.0	6	25	75	3	Picture 2	●
AL-3EL-D8.0	8.0	8	32	75	3	Picture 2	●
AL-3EL-D10.0	10.0	10	45	100	3	Picture 2	●
AL-3EL-D12.0	12.0	12	45	100	3	Picture 2	●
AL-3EL-D16.0	16.0	16	65	150	3	Picture 2	●
AL-3EL-D20.0	20.0	20	75	150	3	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294
Graphics category and identification B295
Cutting parameters B634
Non-standard customization B652-B653

2-flute ball nose end mills with straight shank

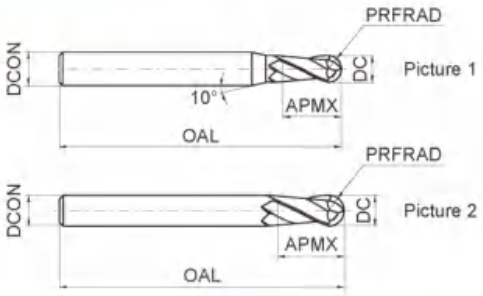

Profile

Cavity

Ball nose slot

AL-2B

- Suitable for profile milling aluminum alloy.



Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	PRFRAD	DCON	APMX	OAL			
AL-2B-R1.0	2.0	1.0	6	4	60	2	Picture 1	●
AL-2B-R1.5	3.0	1.5	6	6	60	2	Picture 1	●
AL-2B-R2.0	4.0	2.0	6	8	60	2	Picture 1	●
AL-2B-R2.5	5.0	2.5	6	10	60	2	Picture 1	●
AL-2B-R3.0	6.0	3.0	6	12	60	2	Picture 2	●
AL-2B-R4.0	8.0	4.0	8	16	75	2	Picture 2	●
AL-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
AL-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294
Graphics category and identification B295
Cutting parameters B635
Non-standard customization B652-B653

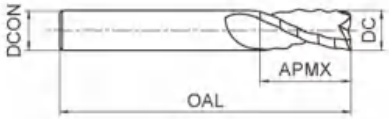
3-flute flattened end mills with straight shank and corrugated edges


Side face

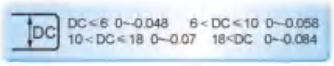

Step shoulder


Straight slot

AL-3W

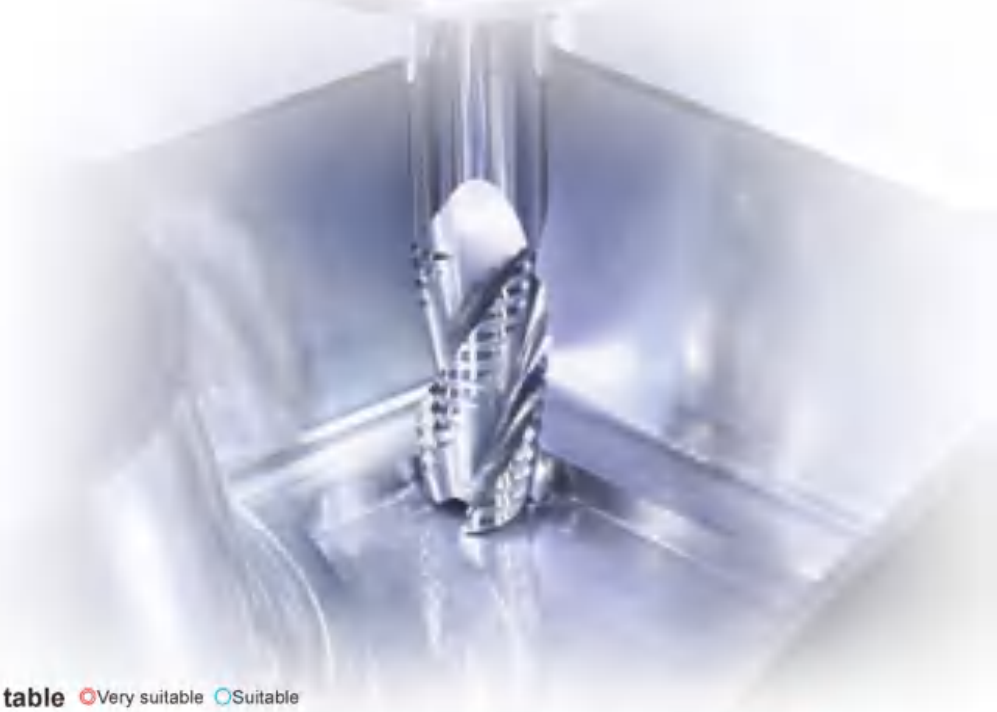


- For rough machining of Al alloy.



Type	Basic dimension(mm)				Number of teeth Z	Stock
	DC	DCON	APMX	OAL		
AL-3W-D6.0	6.0	6	16	50	3	●
AL-3W-D8.0	8.0	8	20	60	3	●
AL-3W-D10.0	10.0	10	25	75	3	●
AL-3W-D12.0	12.0	12	30	75	3	●
AL-3W-D16.0	16.0	16	45	100	3	●
AL-3W-D20.0	20.0	20	45	100	3	●

● Stock available ○ Make-to-order



Applicable workpiece material table ◎Very suitable ○Suitable

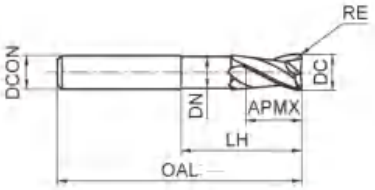
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294 Graphics category and identification B295 Cutting parameters B636 Non-standard customization B652-B653

2-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

super high speed **AL-2R-AIR**



- Very suitable for super high speed milling of Al workpiece.

30° | DC: DC≤12 0~-0.020, 12<DC 0~-0.030

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	LH	OAL		
AL-2R-D6.0R1.0- AIR	6.0	1.0	6	5.5	7	20	57	2	○
AL-2R-D8.0R1.0- AIR	8.0	1.0	8	7.4	9	26	63	2	○
AL-2R-D10.0R1.0- AIR	10.0	1.0	10	9.2	11	31	72	2	○
AL-2R-D10.0R2.0- AIR	10.0	2.0	10	9.2	11	31	72	2	○
AL-2R-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	37	83	2	○
AL-2R-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	37	83	2	○
AL-2R-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	37	83	2	○
AL-2R-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	43	92	2	○
AL-2R-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	53	104	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

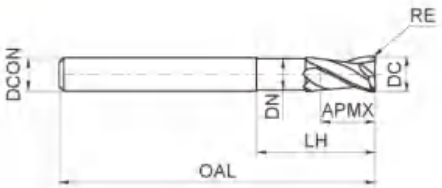
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294 | Graphics category and identification B295 | Cutting parameters B637 | Non-standard customization B652-B653

2-flute R end mills with straight and long shank

Radius shoulder | Profile | Radius corner slot

super high speed **AL-2RL-AIR**



- Very suitable for super high speed milling of Al workpiece.

30° | DC: DC≤12 0~-0.020, 12<DC 0~-0.030

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	LH	OAL		
AL-2RL-D6.0R1.0- AIR	6.0	1.0	6	5.5	7	43	80	2	○
AL-2RL-D8.0R1.0- AIR	8.0	1.0	8	7.4	9	53	90	2	○
AL-2RL-D10.0R1.0- AIR	10.0	1.0	10	9.2	11	59	100	2	○
AL-2RL-D10.0R2.0- AIR	10.0	2.0	10	9.2	11	59	100	2	○
AL-2RL-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	74	120	2	○
AL-2RL-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	74	120	2	○
AL-2RL-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	74	120	2	○
AL-2RL-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	84	140	2	○
AL-2RL-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	89	140	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

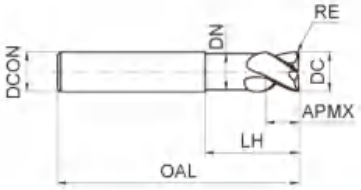
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294 | Graphics category and identification B295 | Cutting parameters B637 | Non-standard customization B652-B653

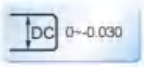
3-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

super high speed **AL-3R-AIR**



- Very suitable for super high speed milling of Al workpiece.



Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	LH	OAL		
AL-3R-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	37	83	3	○
AL-3R-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	37	83	3	○
AL-3R-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	37	83	3	○
AL-3R-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	43	92	3	○
AL-3R-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	53	104	3	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

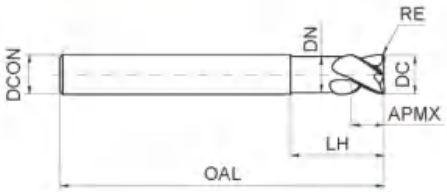
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294 | Graphics category and identification B295 | Cutting parameters B638 | Non-standard customization B652-B653

3-flute R end mills with straight and long shank

Radius shoulder | Profile | Radius corner slot

super high speed AL-3RL-AIR



- Very suitable for super high speed milling of Al workpiece.

30° | DC 0~-0.030

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	LH	OAL		
AL-3RL-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	74	120	3	○
AL-3RL-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	74	120	3	○
AL-3RL-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	74	120	3	○
AL-3RL-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	84	140	3	○
AL-3RL-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	89	140	3	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

Code key B294 | Graphics category and identification B295 | Cutting parameters B638 | Non-standard customization B652-B653

ALG series

Aluminum machining end mills

ALG series aluminum machining end mills are highly versatile and can achieve efficient cutting of aluminum alloy in various working conditions, with sharp edge design, light and fast cutting, excellent anti-bonding wear performance and high surface quality.

- Super fine grain carbide matrix, perfect combination of tool wear resistance and cutting edge strength;
- Special design of the chip pocket realizes the perfect unification of tool strength and chip removal performance, which greatly improves the cutting stability;
- Large rake angle and sharp cutting edge design, effectively avoiding the generation of chip tumors;
- Optimized design of the rear surface and special surface treatment, the parts are machined with excellent surface quality.

Two cutting edges

Three cutting edges

Application examples

Tool: ALG-3E-D8.0
Processing material: Aluminum alloy(HB110)
Machine: Machining center
Machining type: Side milling
Clamping type: Hydraulic toolholder
Cooling type: Emulsion
Cutting parameters: n=13000r/min, f=900mm/min, a_p=8mm, a_e=0.5mm

Machining surface quality comparison

ZCC·CT product

Company A's product

2-flute flattened end mills with straight shank

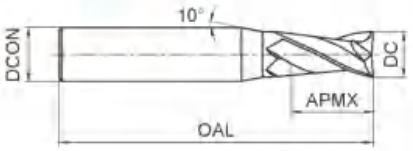

Side face


Step shoulder

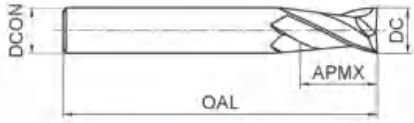

Straight slot

ALG-2E

- Good chip removal performance, high machining efficiency



Picture 1



Picture 2

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
ALG-2E-D1.0	1.0	4	3	50	2	Picture 1	○
ALG-2E-D1.5	1.5	4	4	50	2	Picture 1	○
ALG-2E-D2.0	2.0	4	6	50	2	Picture 1	○
ALG-2E-D2.5	2.5	4	8	50	2	Picture 1	○
ALG-2E-D3.0S	3.0	4	8	50	2	Picture 1	○
ALG-2E-D3.0	3.0	6	8	50	2	Picture 1	○
ALG-2E-D3.5S	3.5	4	10	50	2	Picture 1	○
ALG-2E-D3.5	3.5	6	10	50	2	Picture 1	○
ALG-2E-D4.0S	4.0	4	11	50	2	Picture 2	○
ALG-2E-D4.0	4.0	6	11	50	2	Picture 1	○
ALG-2E-D4.5	4.5	6	11	50	2	Picture 1	○
ALG-2E-D5.0	5.0	6	13	50	2	Picture 1	○
ALG-2E-D5.5	5.5	6	16	50	2	Picture 1	○
ALG-2E-D6.0	6.0	6	16	50	2	Picture 2	○
ALG-2E-D7.0	7.0	8	20	60	2	Picture 1	○
ALG-2E-D8.0	8.0	8	20	60	2	Picture 2	○
ALG-2E-D9.0	9.0	10	22	75	2	Picture 1	○
ALG-2E-D10.0	10.0	10	25	75	2	Picture 2	○
ALG-2E-D11.0	11.0	12	26	75	2	Picture 1	○
ALG-2E-D12.0	12.0	12	30	75	2	Picture 2	○
ALG-2E-D14.0	14.0	14	32	75	2	Picture 2	○
ALG-2E-D16.0	16.0	16	45	100	2	Picture 2	○
ALG-2E-D18.0	18.0	18	45	100	2	Picture 2	○
ALG-2E-D20.0	20.0	20	45	100	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	◎		

Code key B294 · Graphics category and identification B295 · Cutting parameters B639 · Non-standard customization B652-B653

3-flute flattened end mills with straight shank

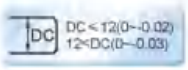

Side face

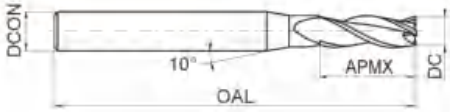

Step shoulder


Straight slot

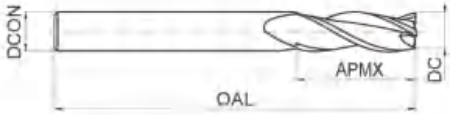
ALG-3E

- Good cutting performance, can achieve high-precision machining.





Picture 1



Picture 2

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
ALG-3E-D1.0	1.0	4	3	50	3	Picture 1	○
ALG-3E-D1.5	1.5	4	4	50	3	Picture 1	○
ALG-3E-D2.0	2.0	4	6	50	3	Picture 1	○
ALG-3E-D2.5	2.5	4	8	50	3	Picture 1	○
ALG-3E-D3.0S	3.0	4	8	50	3	Picture 1	○
ALG-3E-D3.0	3.0	6	8	50	3	Picture 1	○
ALG-3E-D4.0S	4.0	4	11	50	3	Picture 2	○
ALG-3E-D4.0	4.0	6	11	50	3	Picture 1	○
ALG-3E-D4.5	4.5	6	11	50	3	Picture 1	○
ALG-3E-D5.0	5.0	6	13	50	3	Picture 1	○
ALG-3E-D5.5	5.5	6	16	50	3	Picture 1	○
ALG-3E-D6.0	6.0	6	16	50	3	Picture 2	○
ALG-3E-D7.0	7.0	8	20	60	3	Picture 1	○
ALG-3E-D8.0	8.0	8	20	60	3	Picture 2	○
ALG-3E-D9.0	9.0	10	22	75	3	Picture 1	○
ALG-3E-D10.0	10.0	10	25	75	3	Picture 2	○
ALG-3E-D11.0	11.0	12	26	75	3	Picture 1	○
ALG-3E-D12.0	12.0	12	30	75	3	Picture 2	○
ALG-3E-D14.0	14.0	14	32	75	3	Picture 2	○
ALG-3E-D16.0	16.0	16	45	100	3	Picture 2	○
ALG-3E-D18.0	18.0	18	45	100	3	Picture 2	○
ALG-3E-D20.0	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

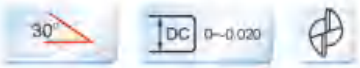
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	◎		

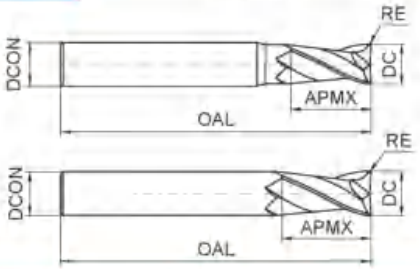
Code key B294
Graphics category and identification B295
Cutting parameters B640
Non-standard customization B652-B653

2-flute R end mills with straight shank

ALG-2R

- Very suitable for super high speed milling of Al workpiece.





Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	RE	DCON	APMX	OAL			
ALG-2R-D1.0R0.2S	1.0	0.2	4	3	50	2	Picture 1	○
ALG-2R-D1.5R0.2S	1.5	0.2	4	4	50	2	Picture 1	○
ALG-2R-D2.0R0.2S	2.0	0.2	4	6	50	2	Picture 1	○
ALG-2R-D2.0R0.5S	2.0	0.5	4	6	50	2	Picture 1	○
ALG-2R-D2.5R0.2S	2.5	0.2	4	8	50	2	Picture 1	○
ALG-2R-D2.5R0.5S	2.5	0.5	4	8	50	2	Picture 1	○
ALG-2R-D3.0R0.2S	3.0	0.2	4	8	50	2	Picture 1	○
ALG-2R-D3.0R0.5S	3.0	0.5	4	8	50	2	Picture 1	○
ALG-2R-D3.5R0.2S	3.5	0.2	4	10	50	2	Picture 1	○
ALG-2R-D3.5R0.5S	3.5	0.5	4	10	50	2	Picture 1	○
ALG-2R-D4.0R0.2S	4.0	0.2	4	11	50	2	Picture 2	○
ALG-2R-D4.0R0.5S	4.0	0.5	4	11	50	2	Picture 2	○
ALG-2R-D4.0R1.0S	4.0	1.0	4	11	50	2	Picture 2	○
ALG-2R-D6.0R0.3	6.0	0.3	6	16	50	2	Picture 2	○
ALG-2R-D6.0R0.5	6.0	0.5	6	16	50	2	Picture 2	○
ALG-2R-D6.0R1.0	6.0	1.0	6	16	50	2	Picture 2	○
ALG-2R-D8.0R0.3	8.0	0.3	8	20	60	2	Picture 2	○
ALG-2R-D8.0R0.5	8.0	0.5	8	20	60	2	Picture 2	○
ALG-2R-D8.0R1.0	8.0	1.0	8	20	60	2	Picture 2	○
ALG-2R-D10.0R0.3	10.0	0.3	10	25	75	2	Picture 2	○
ALG-2R-D10.0R0.5	10.0	0.5	10	25	75	2	Picture 2	○
ALG-2R-D10.0R1.0	10.0	1.0	10	25	75	2	Picture 2	○
ALG-2R-D10.0R1.5	10.0	1.5	10	25	75	2	Picture 2	○
ALG-2R-D10.0R2.0	10.0	2.0	10	25	75	2	Picture 2	○
ALG-2R-D12.0R0.3	12.0	0.3	12	30	75	2	Picture 2	○
ALG-2R-D12.0R0.5	12.0	0.5	12	30	75	2	Picture 2	○
ALG-2R-D12.0R1.0	12.0	1.0	12	30	75	2	Picture 2	○
ALG-2R-D12.0R1.5	12.0	1.5	12	30	75	2	Picture 2	○
ALG-2R-D12.0R2.0	12.0	2.0	12	30	75	2	Picture 2	○

Applicable workpiece material table

◎Very suitable ○Suitable

● Stock available ○ Make-to-order

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	◎		

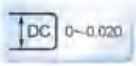
Code key B294
Graphics category and identification B295
Cutting parameters B641
Non-standard customization B652-B653

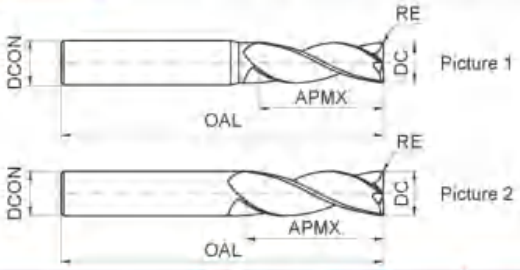
3-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

ALG-3R

- Very suitable for super high speed milling of Al workpiece.





Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	DC	RE	DCON	APMX	OAL			
ALG-3R-D1.0R0.2S	1.0	0.2	4	3	50	3	Picture 1	○
ALG-3R-D1.5R0.2S	1.5	0.2	4	4	50	3	Picture 1	○
ALG-3R-D2.0R0.2S	2.0	0.2	4	6	50	3	Picture 1	○
ALG-3R-D2.0R0.5S	2.0	0.5	4	6	50	3	Picture 1	○
ALG-3R-D2.5R0.2S	2.5	0.2	4	8	50	3	Picture 1	○
ALG-3R-D2.5R0.5S	2.5	0.5	4	8	50	3	Picture 1	○
ALG-3R-D3.0R0.2S	3.0	0.2	4	8	50	3	Picture 1	○
ALG-3R-D3.0R0.5S	3.0	0.5	4	8	50	3	Picture 1	○
ALG-3R-D3.5R0.2S	3.5	0.2	4	10	50	3	Picture 1	○
ALG-3R-D3.5R0.5S	3.5	0.5	4	10	50	3	Picture 1	○
ALG-3R-D4.0R0.2S	4.0	0.2	4	11	50	3	Picture 2	○
ALG-3R-D4.0R0.5S	4.0	0.5	4	11	50	3	Picture 2	○
ALG-3R-D4.0R1.0S	4.0	1.0	4	11	50	3	Picture 2	○
ALG-3R-D6.0R0.3	6.0	0.3	6	16	50	3	Picture 2	○
ALG-3R-D6.0R0.5	6.0	0.5	6	16	50	3	Picture 2	○
ALG-3R-D6.0R1.0	6.0	1.0	6	16	50	3	Picture 2	○
ALG-3R-D8.0R0.3	8.0	0.3	8	20	60	3	Picture 2	○
ALG-3R-D8.0R0.5	8.0	0.5	8	20	60	3	Picture 2	○
ALG-3R-D8.0R1.0	8.0	1.0	8	20	60	3	Picture 2	○
ALG-3R-D10.0R0.3	10.0	0.3	10	25	75	3	Picture 2	○
ALG-3R-D10.0R0.5	10.0	0.5	10	25	75	3	Picture 2	○
ALG-3R-D10.0R1.0	10.0	1.0	10	25	75	3	Picture 2	○
ALG-3R-D10.0R1.5	10.0	1.5	10	25	75	3	Picture 2	○
ALG-3R-D10.0R2.0	10.0	2.0	10	25	75	3	Picture 2	○
ALG-3R-D12.0R0.3	12.0	0.3	12	30	75	3	Picture 2	□
ALG-3R-D12.0R0.5	12.0	0.5	12	30	75	3	Picture 2	□
ALG-3R-D12.0R1.0	12.0	1.0	12	30	75	3	Picture 2	□
ALG-3R-D12.0R1.5	12.0	1.5	12	30	75	3	Picture 2	□
ALG-3R-D12.0R2.0	12.0	2.0	12	30	75	3	Picture 2	○

Applicable workpiece material table

◎Very suitable ○Suitable

● Stock available ○ Make-to-order

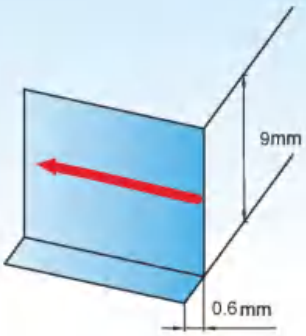
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								◎	◎		

Code key B294 | Graphics category and identification B295 | Cutting parameters B642 | Non-standard customization B652-B653

SM series end mills for machining of hard-to-cut materials such as stainless steel, heat-resistant alloy, etc.

- Large helical and rake angle, sharp cutting edge, unique edge geometry can restrain cutting-heat's influence on tool nose, and greatly improve wear resistance and heat resistance.
- The coating with good heat resistance can achieve stable machining even at high temperature.
- Very suitable for machining of hard-to-cut materials such as stainless steel, Ni substrate high temperature alloy, etc.

Tool type: SM-3E-D6.0
Dimensions: Ø6mm
Workpiece material: 1Cr18Ni9Ti
Rotating speed: 3700r/min (70m/min)
Feed speed: 555mm/min(0.15mm/r)
Axial cutting depth: a_p=9mm
Radial cutting depth: a_e=0.6mm
Cutting style: side milling (down milling)
Cooling system: air blow
Machine tool: MIKRON UCP 1000



End mills	SM-3E-D6.0	Similar product of company A
Cutting length	100m	100m
Abrasion of peripheral edge	Even abrasion on cutting edge, value is 0.08 mm	Cutting edge is flaked fully, value is 0.135mm

Abrasion condition of peripheral edge

VSM series

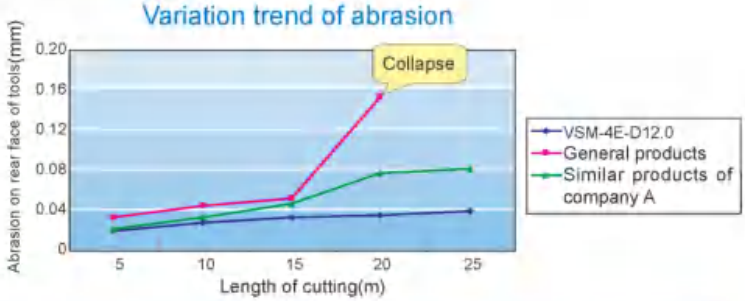
End mills with unequal pitch and variable inclined angle; Revolution on machining materials hard to cut: stainless steel, heat resistant alloy, etc.

VSM-4E VSM-4R
VSM-4EFP VSM-4RFP

VSM-4E-D12.0 slotting stainless steel

Machine: MIKRON UCP1000
Chuck: HSK63-A
Machined material: 1Cr18Ni9Ti
Cutting speed: 80m/min
Feed per tooth: 0.05mm/z
Axial cutting depth: 6mm
Radial cutting depth: 12mm
Cooling system: air cooling
Cutting style: slotting
Overhang: 35mm

Variation trend of abrasion



Note: ◆Compared with competitor's, VSM end mills can perform better on wear resistance and tool life.
◆Compared with common tools, unequal pitch end mills perform stronger on resisting broken.

3-flute flattened end mills with straight shank

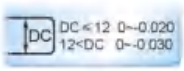

Side face

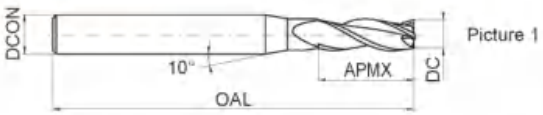

Step shoulder


Straight slot

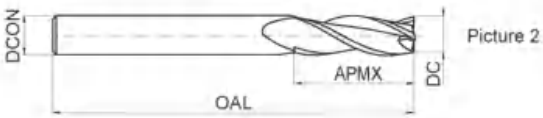
SM-3E

- Large helical angle, for machining of hard-to-cut materials such as Austenite stainless steel, heat-resistant alloy, etc.





Picture 1



Picture 2

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
SM-3E-D3.0	3.0	6	8	50	3	Picture 1	○
SM-3E-D4.0	4.0	6	11	50	3	Picture 1	○
SM-3E-D5.0	5.0	6	13	50	3	Picture 1	○
SM-3E-D6.0	6.0	6	16	50	3	Picture 2	○
SM-3E-D7.0	7.0	8	20	60	3	Picture 1	○
SM-3E-D8.0	8.0	8	20	60	3	Picture 2	○
SM-3E-D9.0	9.0	10	22	75	3	Picture 1	○
SM-3E-D10.0	10.0	10	25	75	3	Picture 2	○
SM-3E-D11.0	11.0	12	26	75	3	Picture 1	○
SM-3E-D12.0	12.0	12	30	75	3	Picture 2	○
SM-3E-D16.0	16.0	16	45	100	3	Picture 2	○
SM-3E-D20.0	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎					

Code key B294
Graphics category and identification B295
Cutting parameters B643
Non-standard customization B652-B653

4-flute unequal pitch end mills with straight shank

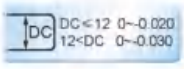

Side face

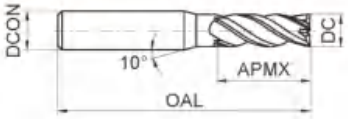

Step shoulder


Straight slot

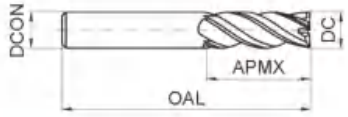
VSM-4E

- With variable helical angle design, great improved vibration resistance and surface quality after machining.
- Very suitable for machining materials hard to cut: such as stainless steel, heat resist alloy and Ti-base alloy.





Picture 1



Picture 2

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	DC	DCON	APMX	OAL			
VSM-4E-D4.0	4.0	6	11	50	4	Picture 1	●
VSM-4E-D5.0	5.0	6	13	50	4	Picture 1	●
VSM-4E-D6.0	6.0	6	16	50	4	Picture 2	●
VSM-4E-D8.0	8.0	8	20	60	4	Picture 2	●
VSM-4E-D10.0	10.0	10	25	75	4	Picture 2	●
VSM-4E-D12.0	12.0	12	30	75	4	Picture 2	●
VSM-4E-D16.0	16.0	16	45	100	4	Picture 2	●
VSM-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B644
Non-standard customization B652-B653

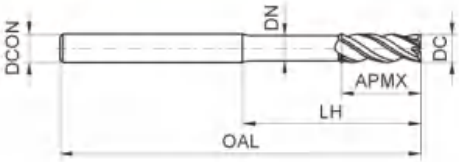
4-flute flattened end mills with straight shank, unequal pitch, long neck and short cutting edges


Side face

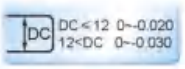

Step shoulder


Straight slot

VSM-4EFP



- With high rigidity short cutting edges design, suitable for deep cavity machining.
- With variable helical angle design, great improved vibration resistance and surface quality after machining.



Type	Basic dimension(mm)						Number of teeth Z	Stock
	DC	DCON	APMX	LH	DN	OAL		
VSM-4EFP-D6.0	6.0	6	9	27	5.7	75	4	●
VSM-4EFP-D8.0	8.0	8	12	36	7.7	100	4	●
VSM-4EFP-D10.0	10.0	10	14	42	9.5	100	4	●
VSM-4EFP-D12.0	12.0	12	16	48	11.5	100	4	●
VSM-4EFP-D16.0	16.0	16	20	60	15.5	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎				◎	◎

Code key B294
Graphics category and identification B295
Cutting parameters B644
Non-standard customization B652-B653

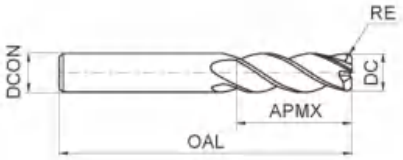
4-flute R end mills with straight shank


Radius shoulder

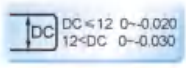

Profile


Radius corner slot

SM-4R



● Large helical angle and strong nose, for machining of hard-to-cut materials such as austenitic stainless steel, heat-resistant alloy, etc.



Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
SM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	○
SM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	○
SM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	○
SM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	○
SM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	○
SM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	○
SM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	○
SM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

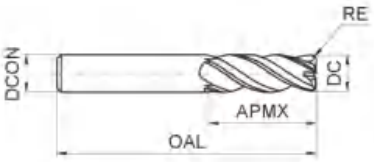
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎					

Code key B294
Graphics category and identification B295
Cutting parameters B645
Non-standard customization B652-B653

4-flute R end mills with straight shank and unequal pitch

Radius shoulder | Profile | Radius corner slot

VSM-4R



- With variable helical angle design, great improved vibration resistance and surface quality after machining.
- Very suitable for machining materials hard to cut: such as stainless steel, heat resist alloy and Ti-base alloy.

38°,41° | Coated AlTiN | DC: DC≤12 0~-0.020, 12<DC 0~-0.030

Type	Basic dimension(mm)					Number of teeth Z	Stock
	DC	RE	DCON	APMX	OAL		
VSM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	●
VSM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	●
VSM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	●
VSM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	●
VSM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	●
VSM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	●
VSM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	●
VSM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	●
VSM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	●
VSM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	●
VSM-4R-D16.0R1.0	16.0	1.0	16	45	100	4	●
VSM-4R-D16.0R2.0	16.0	2.0	16	45	100	4	●
VSM-4R-D16.0R3.0	16.0	3.0	16	45	100	4	●
VSM-4R-D20.0R1.0	20.0	1.0	20	45	100	4	●
VSM-4R-D20.0R2.0	20.0	2.0	20	45	100	4	●
VSM-4R-D20.0R3.0	20.0	3.0	20	45	100	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

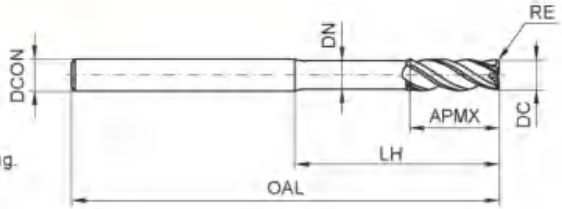
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B646 | Non-standard customization B652-B653

4-flute R end mills with straight shank, unequal pitch, long neck and short cutting edges

Radius shoulder | Profile | Radius corner slot

VSM-4RFP



- With high rigidity short cutting edges design, suitable for deep cavity machining.
- With variable helical angle design, great improved vibration resistance and surface quality after machining.

38°,41° | Coated AlTiN | DC DC≤12 0~-0.020 12<DC 0~-0.030

Type	Basic dimension(mm)							Number of teeth Z	Stock
	DC	RE	DCON	DN	APMX	M	OAL		
VSM-4RFP-D6.0R0.5	6.0	0.5	6	5.7	9	27	75	4	●
VSM-4RFP-D6.0R1.0	6.0	1.0	6	5.7	9	27	75	4	●
VSM-4RFP-D8.0R0.5	8.0	0.5	8	7.7	12	36	100	4	●
VSM-4RFP-D8.0R1.0	8.0	1.0	8	7.7	12	36	100	4	●
VSM-4RFP-D10.0R0.5	10.0	0.5	10	9.5	14	42	100	4	●
VSM-4RFP-D10.0R1.0	10.0	1.0	10	9.5	14	42	100	4	●
VSM-4RFP-D10.0R2.0	10.0	2.0	10	9.5	14	42	100	4	●
VSM-4RFP-D12.0R0.5	12.0	0.5	12	11.5	16	48	100	4	●
VSM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	16	48	100	4	●
VSM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	16	48	100	4	●
VSM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	20	60	150	4	●
VSM-4RFP-D16.0R2.0	16.0	2.0	16	15.5	20	60	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

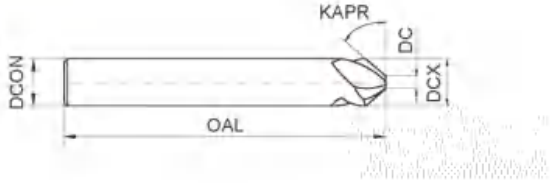
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎				◎	◎

Code key B294 | Graphics category and identification B295 | Cutting parameters B646 | Non-standard customization B652-B653

2-flute helical flute chamfer end mills with straight shank

Chamfering

CM-2E



Type	Basic dimension(mm)					Number of teeth Z	Stock
	KAPR	DC	DCX	DCON	OAL		
CM-2E-D3.0-A60	60°	0.2	3	3	50	2	○
CM-2E-D4.0-A60	60°	0.2	4	4	50	2	○
CM-2E-D6.0-A60	60°	0.2	6	6	50	2	○
CM-2E-D8.0-A60	60°	0.5	8	8	60	2	○
CM-2E-D10.0-A60	60°	0.5	10	10	75	2	○
CM-2E-D12.0-A60	60°	0.5	12	12	75	2	○
CM-2E-D16.0-A60	60°	0.7	16	16	100	2	○
CM-2E-D3.0-A90	45°	0.2	3	3	50	2	○
CM-2E-D4.0-A90	45°	0.2	4	4	50	2	○
CM-2E-D6.0-A90	45°	0.2	6	6	50	2	○
CM-2E-D8.0-A90	45°	0.5	8	8	60	2	○
CM-2E-D10.0-A90	45°	0.5	10	10	75	2	○
CM-2E-D12.0-A90	45°	0.5	12	12	75	2	○
CM-2E-D16.0-A90	45°	0.7	16	16	100	2	○
CM-2E-D3.0-A120	30°	0.2	3	3	50	2	○
CM-2E-D4.0-A120	30°	0.2	4	4	50	2	○
CM-2E-D6.0-A120	30°	0.2	6	6	50	2	○
CM-2E-D8.0-A120	30°	0.5	8	8	60	2	○
CM-2E-D10.0-A120	30°	0.5	10	10	75	2	○
CM-2E-D12.0-A120	30°	0.5	12	12	75	2	○
CM-2E-D16.0-A120	30°	0.7	16	16	100	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

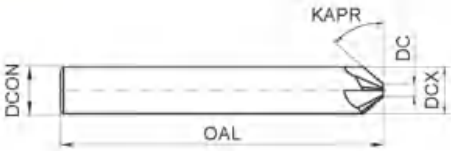
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	○		○	◎	◎	◎	○	○

Code key B294
Graphics category and identification B295
Non-standard customization B652-B653

4-flute helical flute chamfer end mills with straight shank

Chamfering

CM-4E



Type	Basic dimension(mm)					Number of teeth Z	Stock
	KAPR	DC	DCX	DCON(h6)	OAL		
CM-4E-D3.0-B60	60°	0.2	3	3	50	4	○
CM-4E-D4.0-B60	60°	0.2	4	4	50	4	○
CM-4E-D6.0-B60	60°	0.2	6	6	50	4	○
CM-4E-D8.0-B60	60°	0.5	8	8	60	4	○
CM-4E-D10.0-B60	60°	0.5	10	10	75	4	○
CM-4E-D12.0-B60	60°	0.5	12	12	75	4	○
CM-4E-D16.0-B60	60°	0.7	16	16	100	4	○
CM-4E-D3.0-B90	45°	0.2	3	3	50	4	○
CM-4E-D4.0-B90	45°	0.2	4	4	50	4	○
CM-4E-D6.0-B90	45°	0.2	6	6	50	4	○
CM-4E-D8.0-B90	45°	0.5	8	8	60	4	○
CM-4E-D10.0-B90	45°	0.5	10	10	75	4	○
CM-4E-D12.0-B90	45°	0.5	12	12	75	4	○
CM-4E-D16.0-B90	45°	0.7	16	16	100	4	○
CM-4E-D3.0-B120	30°	0.2	3	3	50	4	○
CM-4E-D4.0-B120	30°	0.2	4	4	50	4	○
CM-4E-D6.0-B120	30°	0.2	6	6	50	4	○
CM-4E-D8.0-B120	30°	0.5	8	8	60	4	○
CM-4E-D10.0-B120	30°	0.5	10	10	75	4	○
CM-4E-D12.0-B120	30°	0.5	12	12	75	4	○
CM-4E-D16.0-B120	30°	0.7	16	16	100	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	○		○	◎	◎	◎	○	○

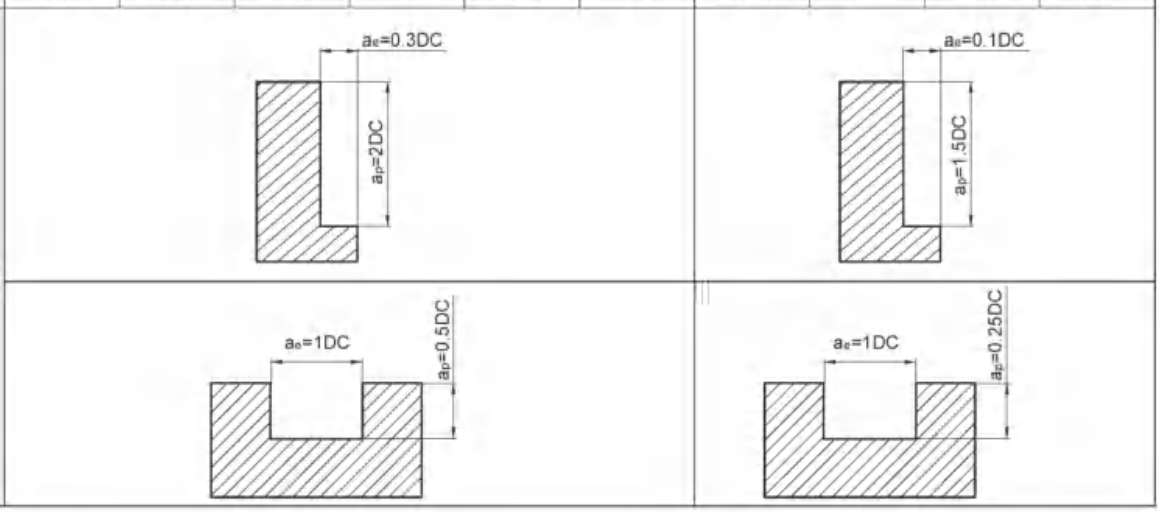
Code key B294
Graphics category and identification B295
Non-standard customization B652-B653

Cutting parameters for VPM series end mills

VPM-4E★VPM-4EBL/X★VPM-4EFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	15900	1220	8500	180	13270	950	10600	630	7430	360
4	11900	1260	6370	190	9950	970	8000	645	570	370
5	9500	1350	5060	190	7960	1010	6400	675	4460	390
6	7900	1330	4250	210	6630	1030	5300	690	3710	390
8	5900	1330	3180	210	4970	1020	4000	680	2785	405
10	4700	1310	2550	210	3980	1010	3200	675	2230	375
12	4000	1310	2120	210	3310	1010	2650	675	1855	375
14	3400	1220	1820	180	2840	945	2300	630	1590	360
16	3000	1220	1590	180	2480	945	2000	630	1390	360
18	2600	1200	1410	160	2210	930	1800	620	1240	350
20	2400	1200	1270	160	1990	930	1600	620	1115	350

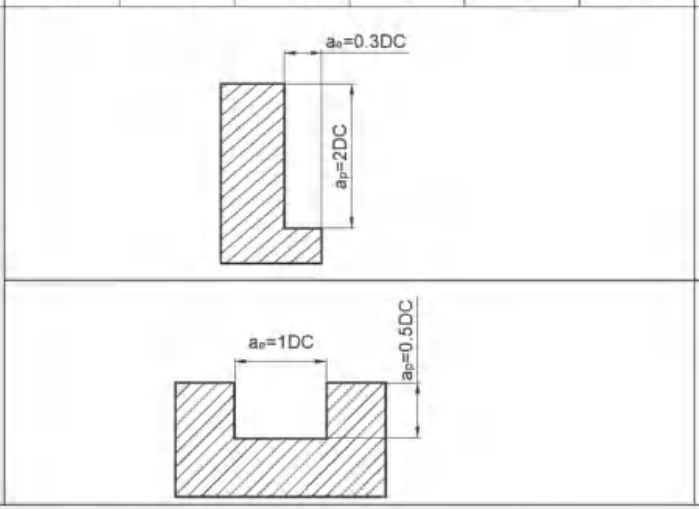
Maximum cutting depth



1. The above table shows the standard value of side milling. When milling slot, 60%~80% of rotating speed and 50%~70% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for VPM series end mills

VPM-4R★VPM-4RBL/X★VPM-4RFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	15900	1460	8500	215	13270	1140	10600	755	7430	430
4	11900	1510	6370	225	9950	1160	8000	770	570	440
5	9500	1620	5060	225	7960	1210	6400	810	4460	465
6	7900	1590	4250	250	6630	1235	5300	825	3710	465
8	5900	1590	3180	250	4970	1220	4000	815	2785	485
10	4700	1570	2550	250	3980	1210	3200	810	2230	450
12	4000	1570	2120	250	3310	1210	2650	810	1855	450
14	3400	1460	1820	215	2840	1130	2300	755	1590	430
16	3000	1460	1590	215	2480	1130	2000	755	1390	430
18	2600	1440	1410	190	2210	1115	1800	740	1240	420
20	2400	1440	1270	190	1990	1115	1600	740	1115	420
Maximum cutting depth										

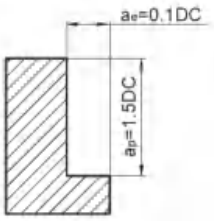
1. The above table shows the standard value of side milling. When milling slot, 60%~80% of rotating speed and 50%~70% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

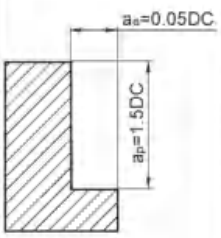
Cutting parameters for UM series end mills

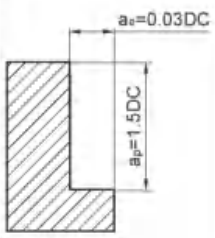
UM-4E★UM-4EL(general cutting)

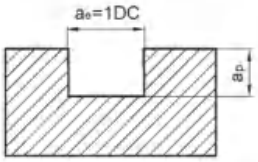
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4	10800	1000	5500	180	8000	770	6500	605	5570	440
5	8200	1050	4500	180	6400	810	5000	635	4460	465
6	7000	1080	3700	195	5300	825	4200	645	3710	465
8	5200	1065	2800	195	4000	815	3200	665	2785	485
10	4200	1050	2200	195	3200	810	2500	630	2230	450
12	3500	1050	1850	195	2650	810	2100	630	1855	450
14	3000	975	1600	180	2300	755	1800	595	1590	430
16	2600	975	1400	170	2000	755	1600	595	1390	430
18	2300	960	1250	150	1800	745	1400	580	1240	420
20	2050	960	1100	150	1600	745	1250	580	1115	420

Maximum cutting depth







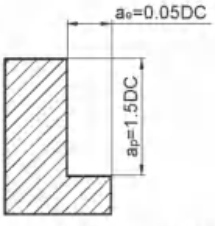
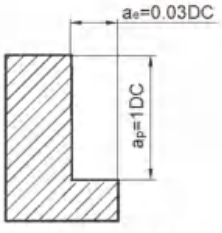


Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC≤Ø20	0.5DC

Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

UM-4E★UM-4EL(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	2045	13260	1700	10600	1360	7960	1020	5300	680
8	11935	2040	9950	1680	7960	1355	5970	1020	3980	680
10	9550	1990	7960	1655	6370	1330	4775	995	3180	660
12	7960	1990	6630	1655	5300	1330	3980	995	2650	660
14	6820	1850	5685	1545	4550	1235	3410	1080	2275	615
16	5970	1850	4975	1545	3980	1235	2985	1080	1990	615
18	5305	1850	4420	1545	3540	1235	2650	1080	1770	615
20	4775	1850	3980	1545	3180	1235	2390	1080	1590	615
Maximum cutting depth	 Maximum a_e=1.0mm						 Maximum a_e=0.5mm			

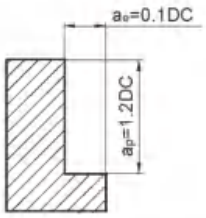
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

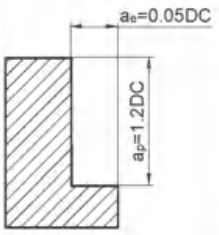
Cutting parameters for UM series end mills

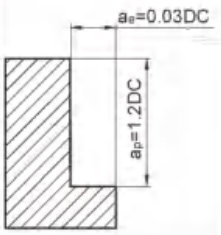
UM-4EFP(general cutting)

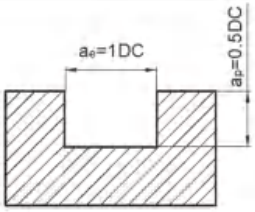
Workpiece material	Cast Iron, Nodular cast iron		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	1400	3700	250	5300	1080	4200	845	3710	610
8	5200	1385	2800	250	4000	1060	3200	865	2785	630
10	4200	1365	2200	250	3200	1050	2500	815	2230	585
12	3500	1365	1850	250	2650	1050	2100	815	1855	585
16	2600	1270	1400	220	2000	975	1600	770	1390	560
20	2050	1255	1100	195	1600	965	1250	755	1115	545

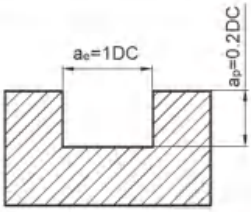
Maximum cutting depth





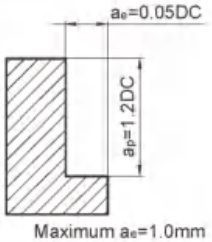
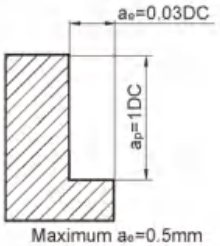






1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

UM-4EFP(high speed side milling)

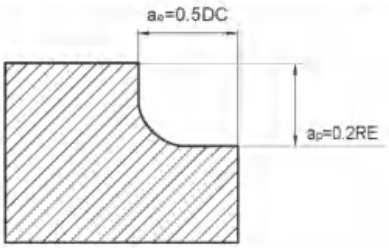
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	2655	13260	2210	10600	1770	7960	1325	5300	885
8	11935	2650	9950	2180	7960	1760	5970	1295	3980	885
10	9550	2590	7960	2150	6370	1730	4775	1295	3180	855
12	7960	2590	6630	2150	5300	1730	3980	1400	2650	855
16	5970	2410	4975	2015	3980	1605	2985	1400	1990	800
20	4775	2410	3980	2375	3180	1605	2390	1325	1590	800
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for UM series end mills

UM-4R★UM-4RL(Standard)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4.0×R0.3 4.0×R0.5	7950	3960	6350	2880	5550	2520	4000	1650	2400	755
5.0×R0.5 5.0×R1.0	6350	4200	5100	3060	4450	2670	3200	1710	1900	690
6.0×R0.5 6.0×R1.0	5300	4200	4250	3060	3700	2670	2650	1710	1600	690
8.0×R0.5 8.0×R1.0	4550	4200	3200	3060	2800	2670	2000	1710	1200	690
10.0×R0.5 10.0×R1.0 10.0×R2.0 10.0×R3.0	3200	4200	2550	3060	2250	2670	1600	1710	955	690
12.0×R0.5 12.0×R1.0 12.0×R2.0 12.0×R3.0	2650	4200	2100	3060	1850	2670	1350	1710	795	690
16.0×R1.0 16.0×R2.0 16.0×R3.0	2200	3485	1745	2540	1535	2215	1140	1420	660	570
20.0×R1.0 20.0×R2.0 20.0×R3.0	1825	2895	1450	2110	1275	1840	960	1180	550	475
Maximum cutting depth	Maximum a_p=0.5mm						Maximum a_p=0.4mm		Maximum a_p=0.2mm	



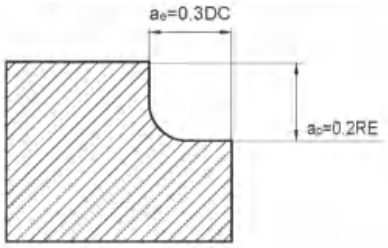
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

Overhang	Cutting speed(m/min)	Axial cutting depth (mm)	Feed speed (mm/min)
L/D≤4	100%	100%	100%
L/D=5	60% ~ 80%	60% ~ 80%	60% ~ 80%
L/D=6	40% ~ 60%	40% ~ 60%	40% ~ 60%

UM-4R★UM-4RL(High speed)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4.0×R0.3 4.0×R0.5	16000	7800	16000	7200	12000	5400	12000	4920	7950	2130
5.0×R0.5 5.0×R1.0	12500	8400	12500	7500	9550	5730	9550	5160	6350	2280
6.0×R0.5 6.0×R1.0	10600	8400	10600	7620	7950	5730	7950	5160	5300	2280
8.0×R0.5 8.0×R1.0	7950	8400	7950	7620	5950	5730	5950	5160	4000	2280
10.0×R0.5 10.0×R1.0 10.0×R2.0 10.0×R3.0	6350	8400	6350	7620	4750	5730	4750	5160	3200	2280
12.0×R0.5 12.0×R1.0 12.0×R2.0 12.0×R3.0	5300	8400	5300	7620	4000	5730	4000	5160	2650	2280
16.0×R1.0 16.0×R2.0 16.0×R3.0	3980	6970	3980	6320	2985	4755	2985	4280	1990	1890
20.0×R1.0 20.0×R2.0 20.0×R3.0	3185	5785	3185	5245	2385	3945	2385	3550	1590	1570
Maximum cutting depth	Maximum a_p=0.4mm						Maximum a_p=0.2mm		Maximum a_p=0.1mm	



1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

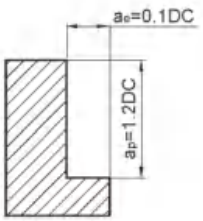
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D≤4	100%	100%	100%
L/D=5	60% ~ 80%	60% ~ 80%	60% ~ 80%
L/D=6	40% ~ 60%	40% ~ 60%	40% ~ 60%

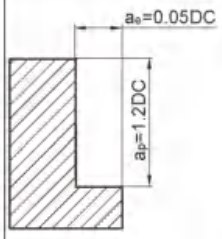
Cutting parameters for UM series end mills

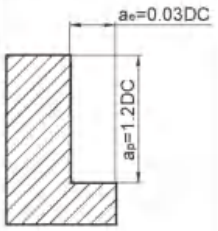
UM-4RFP

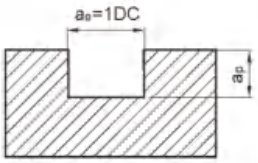
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4	10800	1210	5500	210	8000	925	6500	720	5570	530
5	8200	1265	4500	210	6400	965	5000	765	4460	560
6	7000	1295	3700	235	5300	995	4200	780	3710	560
8	5200	1285	2800	235	4000	975	3200	790	2785	580
10	4200	1265	2200	235	3200	965	2500	750	2230	540
12	3500	1265	1850	235	2650	965	2100	750	1855	540
16	2600	1180	1400	210	2000	925	1600	705	1390	520

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC≤Ø20	0.5DC

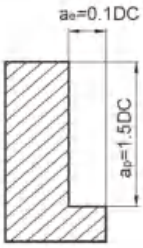
Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

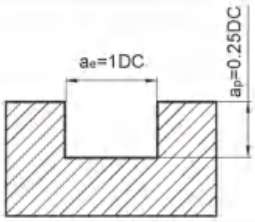
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

PMX-4E ★ PMX-4EBL/X ★ PMX-4EFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	300	20000	240	20000	180	20000	135
2	15000	480	15000	420	13000	270	11140	195
3	15900	1220	13270	950	10600	630	7430	360
4	11900	1260	9950	970	8000	645	570	370
5	9500	1350	7960	1010	6400	675	4460	390
6	7900	1330	6630	1030	5300	690	3710	390
8	5900	1330	4970	1020	4000	680	2785	405
10	4700	1310	3980	1010	3200	675	2230	375
12	4000	1310	3310	1010	2650	675	1855	375
14	3400	1220	2840	945	2300	630	1590	360
16	3000	1220	2480	945	2000	630	1390	360
18	2600	1200	2210	930	1800	620	1240	350
20	2400	1200	1990	930	1600	620	1115	350

Maximum cutting depth

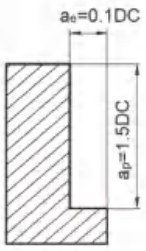
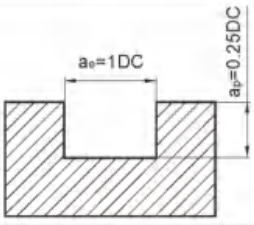




1. The above table shows the standard value of side milling. When milling slot, 60%~80% of rotating speed and 50%~70% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

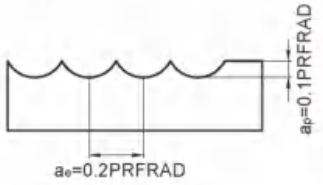
Cutting parameters for PMX series end mills

PMX-4R★PMX-4RBL/X★PMX-4RFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	15900	1460	13270	1140	10600	755	7430	430
4	11900	1510	9950	1160	8000	770	570	440
5	9500	1620	7960	1210	6400	810	4460	465
6	7900	1590	6630	1235	5300	825	3710	465
8	5900	1590	4970	1220	4000	815	2785	485
10	4700	157	3980	1210	3200	810	2230	450
12	4000	1570	3310	1210	2650	810	1855	450
14	3400	1460	2840	1130	2300	755	1590	430
16	3000	1460	2480	1130	2000	755	1390	430
18	2600	1440	2210	1115	1800	740	1240	420
20	2400	1440	1990	1115	1600	740	1115	420
Maximum cutting depth								
								

1. The above table shows the standard value of side milling. When milling slot, 60%~80% of rotating speed and 50%~70% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

PMX-2B★PMX-2BL/M/X★PMX-2BFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.5	40000	960	32000	385	25000	330	22280	295
R1.0	24000	1080	16000	480	13000	330	11140	295
R1.5	15500	1150	10600	545	8500	335	7430	295
R2.0	11500	1150	8000	665	6500	450	5570	385
R2.5	9500	1270	6400	665	5000	455	4455	405
R3.0	8000	1270	5300	700	4200	470	3715	420
R4.0	6000	1575	4000	850	3200	535	2785	465
R5.0	4800	1455	3200	785	2500	535	2230	465
R6.0	4000	1330	2650	740	2100	505	1855	450
R8.0	3000	1270	2000	725	1600	455	1395	395
R10.0	2400	1150	1600	675	1250	400	1115	360
Maximum cutting depth								

1.Please select high-precision machine and tool holder. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

2.Please use air blow or MQL(minimum oil mist cooling).

3.Make overhang of tool as short as possible in conditions of non-interference.

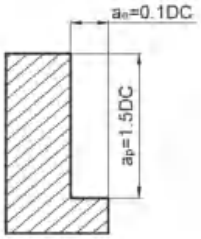
4.When cutting speed is small, rotating speed and feed can increase according same ratio.

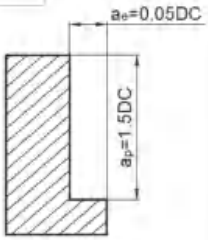
Cutting parameters for PML/PM series end mills

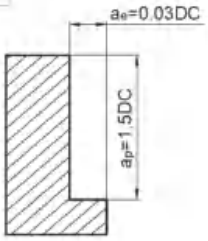
PML-2E★PM-2E★PML-2EL★PM-2EL★PM-2EBL/X

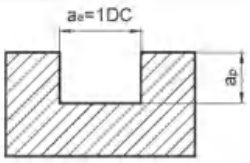
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	200	20000	60	20000	165	20000	120	20000	90
2	15000	320	11150	85	15000	285	13000	180	11140	130
3	14000	545	7500	120	10600	420	8500	330	7430	240
4	10800	560	5500	135	8000	425	6500	335	5570	245
5	8200	585	4500	135	6400	445	5000	355	4460	260
6	7000	600	3700	140	5300	465	4200	360	3710	260
8	5200	595	2800	140	4000	455	3200	365	2785	270
10	4200	585	2200	140	3200	445	2500	350	2230	250
12	3500	585	1850	140	2650	445	2100	350	1855	250
14	3000	545	1600	135	2300	420	1800	330	1590	240
16	2600	545	1400	120	2000	420	1600	330	1390	240
18	2300	535	1250	120	1800	415	1400	325	1240	235
20	2050	535	1100	120	1600	415	1250	325	1115	235

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC<Ø20	0.5DC

Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

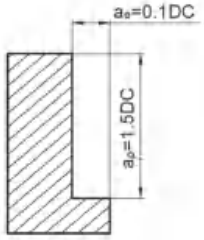
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

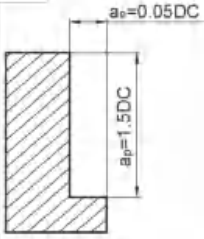
Cutting parameters for PML/PM series end mills

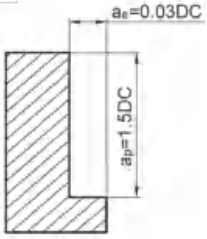
PML-2F★PM-2F★PML-2FL★PM-2FL

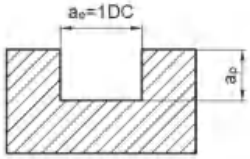
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	140	20000	45	20000	115	20000	85	20000	65
2	15000	225	11150	60	15000	200	13000	125	11140	90
3	14000	385	7500	85	10600	295	8500	230	7430	170
4	10800	390	5500	95	8000	300	6500	235	5570	170
5	8200	410	4500	95	6400	315	5000	245	4460	180
6	7000	420	3700	95	5300	325	4200	255	3710	180
8	5200	415	2800	95	4000	320	3200	255	2785	190
10	4200	410	2200	95	3200	315	2500	240	2230	175
12	3500	410	1850	95	2650	315	2100	240	1855	175
14	3000	385	1600	95	2300	295	1800	230	1590	170
16	2600	385	1400	85	2000	295	1600	230	1390	170
18	2300	375	1250	85	1800	290	1400	230	1240	165
20	2050	375	1100	85	1600	290	1250	230	1115	165

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC<Ø20	0.5DC

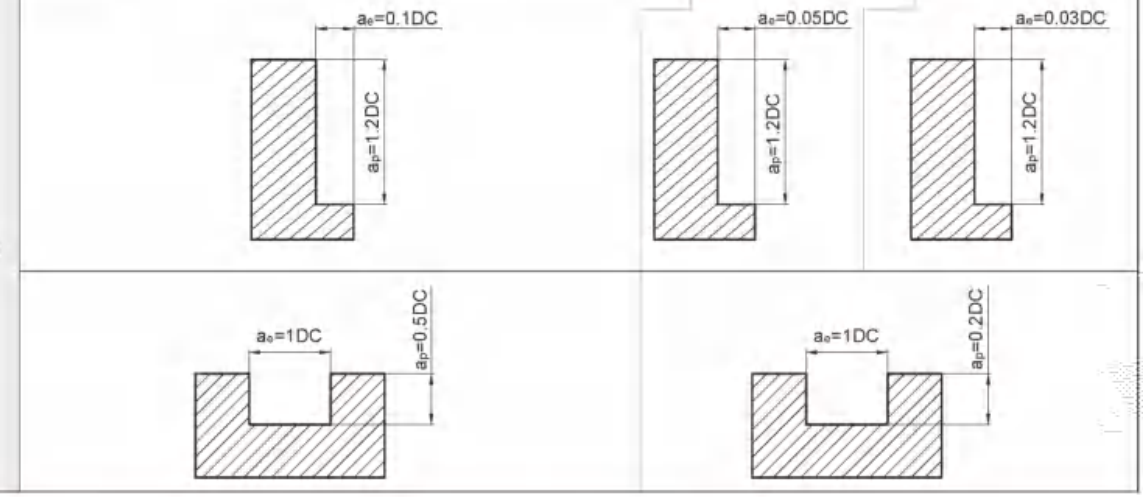
Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

PML-2EFP★PM-2EFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	780	3700	180	5300	600	4200	470	3710	340
8	5200	775	2800	180	4000	595	3200	475	2785	350
10	4200	755	2200	180	3200	575	2500	455	2230	325
12	3500	755	1850	180	2650	575	2100	455	1855	325
16	2600	710	1400	155	2000	545	1600	425	1390	310
20	2050	700	1100	155	1600	540	1250	420	1115	305

Maximum cutting depth

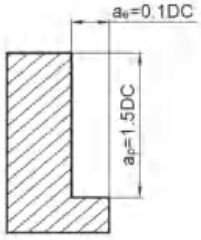


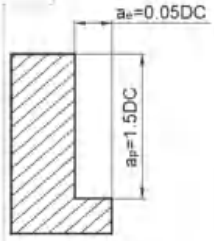
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

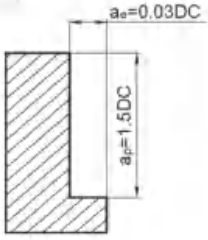
PML-3E-H★PM-3E-H★PML-3EL-H★PM-3EL-H

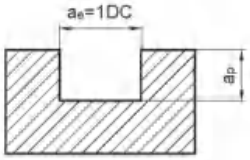
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	200	20000	75	20000	160	20000	100	20000	90
2	15000	325	11150	80	15000	285	13000	150	11140	130
3	14000	550	7500	100	10600	425	8500	280	7430	245
4	10800	565	5500	105	8000	430	6500	285	5570	250
5	8200	600	4500	105	6400	455	5000	300	4460	260
6	7000	605	3700	110	5300	465	4200	305	3710	260
8	5200	600	2800	110	4000	460	3200	310	2785	275
10	4200	600	2200	110	3200	455	2500	290	2230	255
12	3500	600	1850	110	2650	455	2100	290	1855	255
14	3000	550	1600	105	2300	425	1800	280	1590	245
16	2600	550	1400	100	2000	425	1600	280	1390	245
18	2300	540	1250	85	1800	415	1400	275	1240	240
20	2050	540	1100	85	1600	415	1250	275	1115	240

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC<Ø20	0.5DC

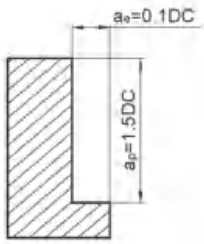
Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

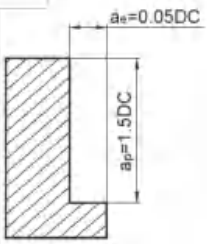
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

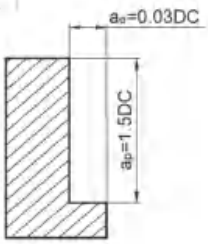
PML-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G★PM-4EBL/X-G
PML-4E-H★PM-4E-H★PML-4EL-H★PM-4EL-H(general cutting)

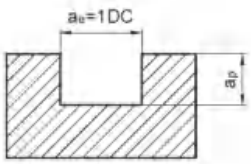
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	270	20000	95	20000	215	20000	135	20000	120
2	15000	435	11150	110	15000	380	13000	200	11140	175
3	14000	735	7500	135	10600	565	8500	370	7430	325
4	10800	755	5500	140	8000	575	6500	380	5570	335
5	8200	795	4500	140	6400	605	5000	400	4460	350
6	7000	810	3700	145	5300	620	4200	405	3710	350
8	5200	800	2800	145	4000	615	3200	415	2785	365
10	4200	795	2200	145	3200	605	2500	390	2230	340
12	3500	795	1850	145	2650	605	2100	390	1855	340
14	3000	735	1600	140	2300	565	1800	370	1590	325
16	2600	735	1400	135	2000	565	1600	370	1390	325
18	2300	720	1250	115	1800	555	1400	365	1240	315
20	2050	720	1100	115	1600	555	1250	365	1115	315

Maximum cutting depth







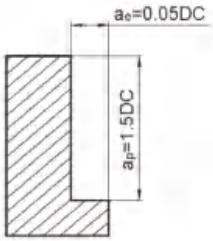
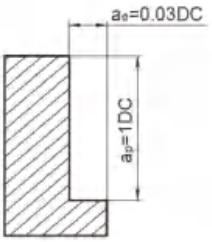


Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC<Ø20	0.5DC

Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

PML-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G★PM-4EBL/X-G
PML-4E-H★PM-4E-H★PML-4EL-H★PM-4EL-H(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	1535	13260	1280	10600	1020	7960	765	5300	515
8	11935	1530	9950	1260	7960	1020	5970	765	3980	515
10	9550	1450	7960	1245	6370	1000	4775	750	3180	495
12	7960	1450	6630	1245	5300	1000	3980	750	2650	495
14	6820	1390	5685	1160	4550	930	3410	810	2275	465
16	5970	1390	4975	1160	3980	930	2985	810	1990	465
18	5305	1390	4420	1160	3540	930	2650	810	1770	465
20	4775	1390	3980	1160	3180	930	2390	810	1590	465
Maximum cutting depth	 Maximum a_e=1.0mm						 Maximum a_e=0.5mm			

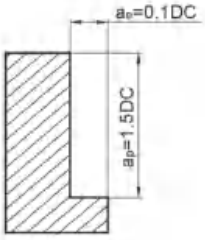
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

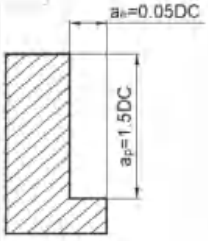
Cutting parameters for PML/PM series end mills

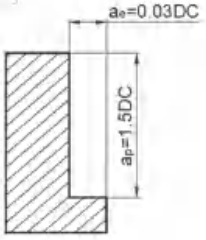
PML-4F-G★PM-4F-G★PML-4FL-G★PM-4FL-G(general cutting)

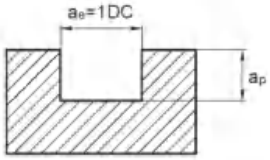
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	190	20000	70	20000	150	20000	95	20000	85
2	15000	305	11150	80	15000	265	13000	140	11140	125
3	14000	515	7500	95	10600	395	8500	260	7430	230
4	10800	530	5500	100	8000	4055	6500	265	5570	235
5	8200	555	4500	100	6400	425	5000	280	4460	245
6	7000	570	3700	100	5300	435	4200	283	3710	245
8	5200	560	2800	100	4000	430	3200	290	2785	255
10	4200	555	2200	100	3200	425	2500	275	2230	240
12	3500	555	1850	100	2650	425	2100	275	1855	240
14	3000	515	1600	100	2300	395	1800	260	1590	230
16	2600	515	1400	95	2000	395	1600	260	1390	230
18	2300	505	1250	80	1800	390	1400	255	1240	220
20	2050	505	1100	80	1600	390	1250	255	1115	220

Maximum cutting depth







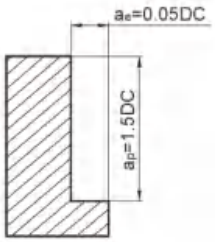
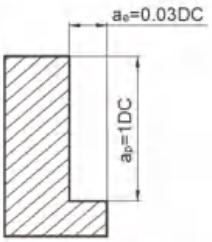


Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC<Ø20	0.5DC

Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

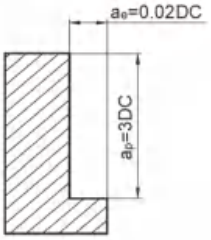
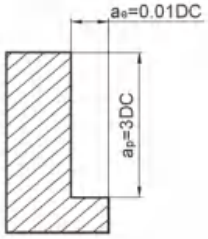
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

PML-4F-G★PM-4F-G★PML-4FL-G★PM-4FL-G(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	1075	13260	900	10600	715	7960	535	5300	360
8	11935	1070	9950	885	7960	715	5970	535	3980	360
10	9550	1015	7960	870	6370	700	4775	525	3180	345
12	7960	1015	6630	870	5300	700	3980	525	2650	345
14	6820	975	5685	815	4550	650	3410	570	2275	325
16	5970	975	4975	815	3980	650	2985	570	1990	325
18	5305	975	4420	815	3540	650	2650	570	1770	325
20	4775	975	3980	815	3180	650	2390	570	1590	325
Maximum cutting depth	 Maximum a_e=1.0mm						 Maximum a_e=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

PML-4EX-G★PM-4EX-G

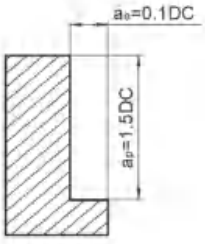
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	570	2650	85	4250	410	3600	345	3180	305
8	4400	570	2000	85	3180	410	2700	350	2390	310
10	3500	555	1600	85	2550	400	2150	340	1910	300
12	2900	555	1350	85	2120	400	1800	340	1590	300
16	2200	520	1000	80	1590	380	1350	315	1195	280
20	1750	510	800	75	1270	375	1050	310	955	280
Maximum cutting depth										

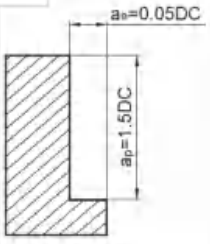
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

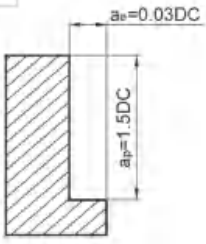
PML-4E★PM-4E★PML-4EL★PM-4EL★PM-4EBL/X(general cutting)

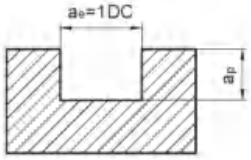
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	300	20000	108	20000	240	20000	180	20000	135
2	15000	480	11150	120	15000	420	13000	270	11140	195
3	14000	815	7500	145	10600	630	8500	495	7430	360
4	10800	840	5500	150	8000	645	6500	505	5570	370
5	8200	875	4500	150	6400	675	5000	530	4460	390
6	7000	900	3700	165	5300	690	4200	540	3710	390
8	5200	890	2800	165	4000	680	3200	555	2785	405
10	4200	875	2200	165	3200	675	2500	525	2230	375
12	3500	875	1850	165	2650	675	2100	525	1855	375
14	3000	815	1600	150	2300	630	1800	495	1590	360
16	2600	815	1400	145	2000	630	1600	495	1390	360
18	2300	805	1250	125	1800	620	1400	485	1240	350
20	2050	805	1100	125	1600	620	1250	485	1115	350

Maximum cutting depth







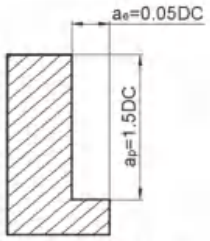
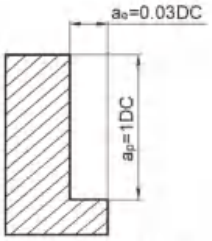


Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC≤Ø20	0.5DC

Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

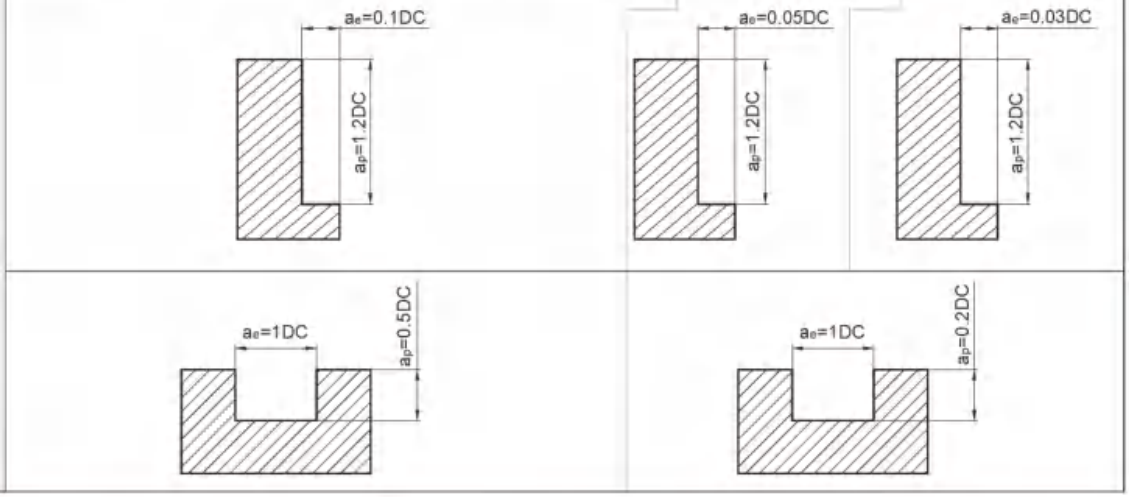
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

PML-4E★PM-4E★PML-4EL★PM-4EL★PM-4EBL/X(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	1705	13260	1420	10600	1135	7960	850	5300	570
8	11935	1700	9950	1400	7960	1130	5970	850	3980	570
10	9550	1660	7960	1380	6370	1110	4775	830	3180	550
12	7960	1660	6630	1380	5300	1110	3980	830	2650	550
14	6820	1545	5685	1290	4550	1030	3410	900	2275	515
16	5970	1545	4975	1290	3980	1030	2985	900	1990	515
18	5305	1545	4420	1290	3540	1030	2650	900	1770	515
20	4775	1545	3980	1290	3180	1030	2390	900	1590	515
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

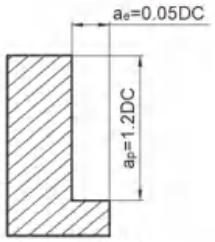
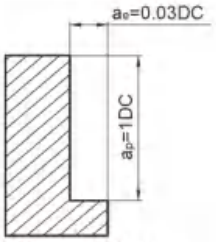
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

PML-4EFP★PM-4EFP(general cutting)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	1170	3700	210	5300	900	4200	705	3710	510
8	5200	1155	2800	210	4000	885	3200	720	2785	525
10	4200	1140	2200	210	3200	875	2500	680	2230	490
12	3500	1140	1850	210	2650	875	2100	680	1855	490
16	2600	1065	1400	185	2000	815	1600	645	1390	470
20	2050	1045	1100	165	1600	805	1250	630	1115	455
Maximum cutting depth										

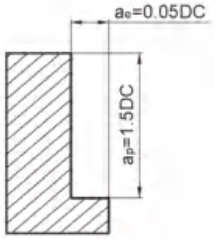
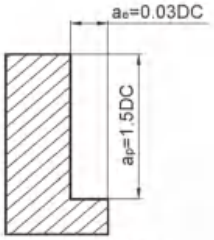
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

PML-4EFP★PM-4EFP(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	15915	2215	13260	1845	10600	1475	7960	1105	5300	740
8	11935	2210	9950	1820	7960	1470	5970	1080	3980	740
10	9550	2160	7960	1795	6370	1445	4775	1080	3180	715
12	7960	2160	6630	1795	5300	1445	3980	1170	2650	715
16	5970	2010	4975	1680	3980	1340	2985	1170	1990	670
20	4775	2010	3980	1980	3180	1340	2390	1105	1590	670
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

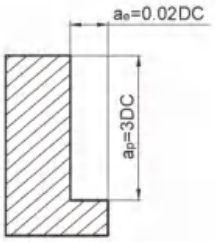
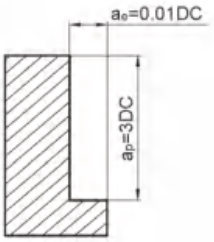
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

PML-6E★PM-6E

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	1070	3700	195	5300	815	4200	650	3710	470
8	5200	1070	2800	195	4000	815	3200	660	2785	485
10	4200	1035	2200	195	3200	800	2500	630	2230	450
12	3500	1035	1850	195	2650	800	2100	630	1855	450
16	2600	975	1400	180	2000	750	1600	590	1390	435
20	2050	960	1100	150	1600	740	1250	580	1115	420
Maximum cutting depth	 Maximum a_e=1.0mm						 Maximum a_e=0.5mm			

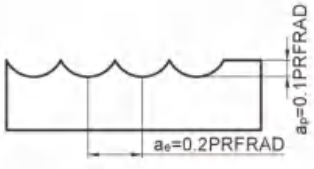
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

PML-6EL★PM-6EL

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	900	2650	140	4250	655	3600	555	3180	490
8	4400	900	2000	140	3180	655	2700	560	2390	495
10	3500	875	1600	140	2550	635	2150	530	1910	470
12	2900	875	1350	140	2120	635	1800	530	1590	470
16	2200	825	1000	125	1590	600	1350	500	1195	445
20	1750	810	800	110	1270	590	1050	495	955	440
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

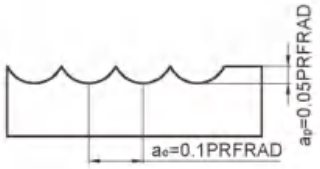
PML-2B★PM-2B★PML-2BL★PM-2BL/M/X★ PML-2BFP★PM-2BFP(general cutting)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.5	40000	960	22300	240	32000	385	25000	330	22280	295
R1.0	24000	1080	11150	275	16000	480	13000	330	11140	295
R1.5	15500	1150	7400	350	10600	545	8500	335	7430	295
R2.0	11500	1150	5550	445	8000	665	6500	450	5570	385
R2.5	9500	1270	4450	445	6400	665	5000	455	4455	405
R3.0	8000	1270	3700	470	5300	700	4200	470	3715	420
R4.0	6000	1575	2750	550	4000	850	3200	535	2785	465
R5.0	4800	1455	2200	520	3200	785	2500	535	2230	465
R6.0	4000	1330	1850	520	2650	740	2100	505	1855	450
R8.0	3000	1270	1350	455	2000	725	1600	455	1395	395
R10.0	2400	1150	1100	445	1600	675	1250	400	1115	360
Maximum cutting depth										

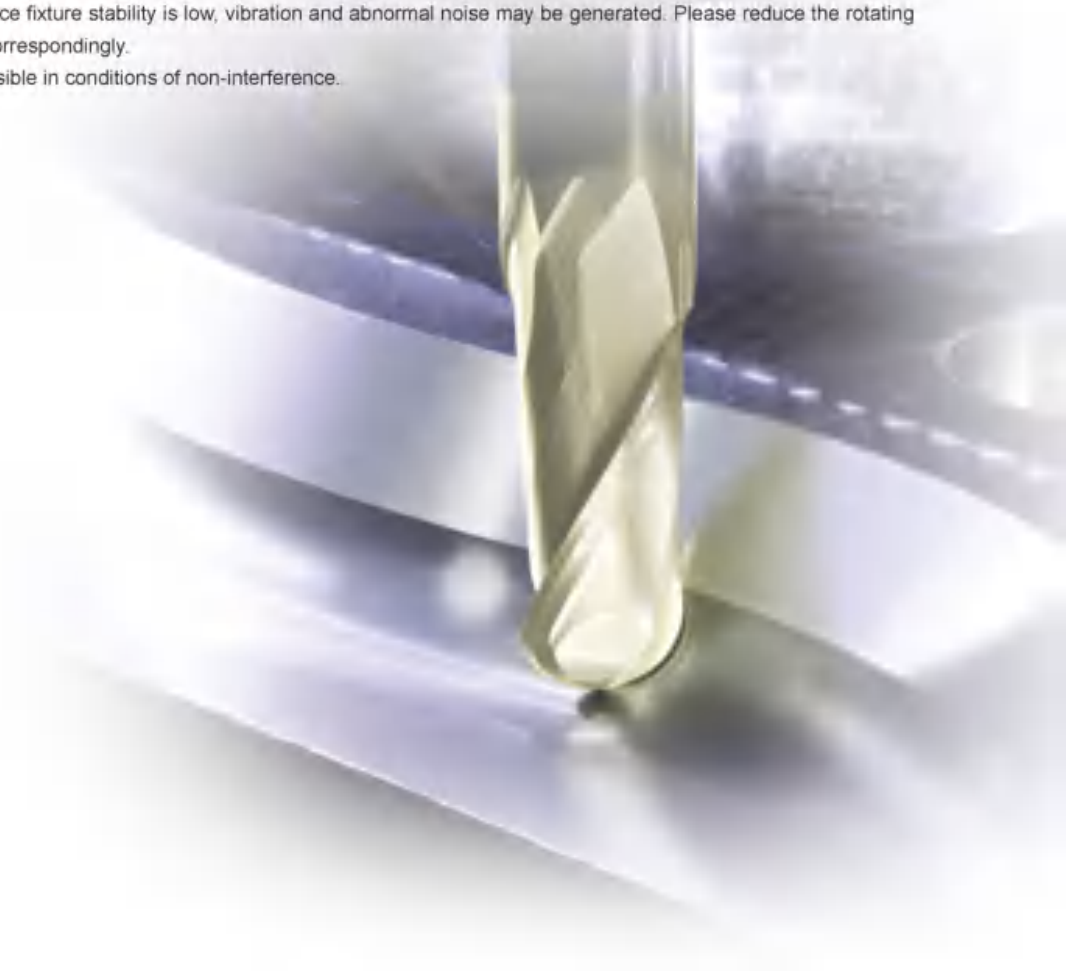
1. Please select high-precision machine and tool holder.
2. Please use air blow or cutting liquid with high mist retardant property.
3. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4. Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for PML/PM series end mills

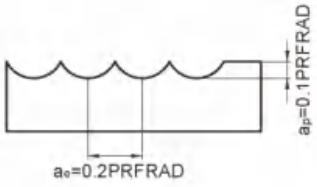
PML-2B★PM-2B★PML-2BL★PM-2BL/M/X★ PML-2BFP★PM-2BFP(high speed cutting)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~400HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R3.0	15000	4800	11500	2750	9500	2250	7960	1885	6370	1510
R4.0	11500	3650	8950	2100	7150	1700	5970	1420	4775	1135
R5.0	9500	3000	7150	1700	5700	1350	4775	1130	3820	905
R6.0	7950	2500	5950	1400	4750	1100	3980	920	3180	735
R8.0	5950	1900	4450	1050	3550	850	2985	760	2390	610
R10.0	4750	1500	3550	850	2850	680	2390	570	1910	455
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.



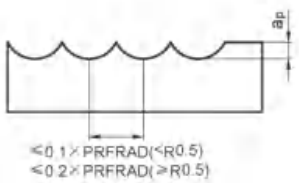
PML-4B★PM-4B★PML-4BL★PM-4BL/M/X

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R1.5	15500	2055	7400	625	10600	975	8500	600	7430	525
R2.0	11500	2055	5550	795	8000	1190	6500	800	5570	685
R2.5	9500	2270	4450	795	6400	1190	5000	810	4455	720
R3.0	8000	2270	3700	840	5300	1245	4200	840	3715	745
R4.0	6000	2810	2750	985	4000	1515	3200	950	2785	825
R5.0	4800	2595	2200	925	3200	1405	2500	950	2230	825
R6.0	4000	2375	1850	925	2650	1320	2100	905	1855	800
R8.0	3000	2270	1350	815	2000	1295	1600	810	1395	705
R10.0	2400	2055	1100	795	1600	1200	1250	715	1115	640
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4.Make overhang of tool as short as possible in conditions of non-interference.

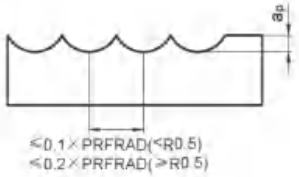
Cutting parameters for PML/PM series end mills

PM-2BC

Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Bullnose radius (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R0.25	0.5°	3	30000	300	0.03	30000	270	0.03	30000	240	0.03
		5	30000	250	0.02	30000	225	0.02	30000	200	0.02
	1.0°	3	30000	330	0.03	30000	300	0.03	30000	265	0.03
		5	30000	270	0.02	30000	245	0.02	30000	215	0.02
	1.5°	3	30000	350	0.03	30000	315	0.03	30000	280	0.03
		5	30000	300	0.02	30000	270	0.02	30000	240	0.02
R0.30	0.5°	5	30000	300	0.03	30000	270	0.03	30000	240	0.03
		8	30000	250	0.02	30000	225	0.02	30000	200	0.02
	1.0°	5	30000	350	0.03	30000	315	0.03	30000	280	0.03
		8	30000	300	0.02	30000	270	0.02	30000	240	0.02
		10	30000	270	0.02	30000	245	0.02	30000	215	0.02
		12	30000	250	0.015	30000	225	0.015	30000	200	0.015
		15	30000	250	0.01	30000	225	0.01	30000	200	0.01
	1.5°	8	30000	350	0.03	30000	315	0.03	30000	280	0.03
		15	30000	300	0.01	30000	270	0.01	30000	240	0.01
R0.40	0.5°	8	30000	350	0.05	30000	315	0.05	30000	280	0.05
		12	30000	300	0.04	30000	270	0.04	30000	240	0.04
	1.0°	8	30000	400	0.05	30000	360	0.05	30000	320	0.05
		12	30000	350	0.04	30000	315	0.04	30000	280	0.04
	1.5°	8	30000	450	0.05	30000	405	0.05	30000	360	0.05
		12	30000	400	0.04	30000	360	0.04	30000	320	0.04
R0.50	0.5°	10	22000	450	0.05	22000	405	0.05	22000	360	0.05
		15	22000	400	0.04	22000	360	0.04	22000	320	0.04
		20	22000	370	0.03	22000	335	0.03	22000	295	0.03
		25	22000	350	0.01	22000	315	0.01	22000	280	0.01
		30	22000	320	0.005	22000	290	0.005	22000	255	0.005
	1.0°	10	22000	500	0.05	22000	450	0.05	22000	400	0.05
		15	22000	450	0.04	22000	405	0.04	22000	360	0.04
		20	22000	430	0.02	22000	390	0.02	22000	345	0.02
		25	22000	400	0.015	22000	360	0.015	22000	320	0.015
		30	22000	360	0.01	22000	325	0.01	22000	290	0.01
		35	22000	320	0.005	22000	290	0.005	22000	255	0.005
Maximum cutting depth			 ≤0.1×PRFRAD(<R0.5) ≤0.2×PRFRAD(≥R0.5)								

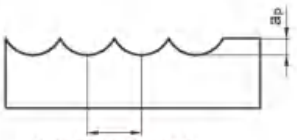
Cutting parameters for PML/PM series end mills

PM-2BC

Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Bullnose radius (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R0.50	1.5°	10	22000	530	0.05	22000	475	0.05	22000	425	0.05
		15	22000	500	0.04	22000	450	0.04	22000	400	0.04
		20	22000	460	0.02	22000	415	0.02	22000	370	0.02
	2°	15	22000	600	0.04	22000	540	0.04	22000	480	0.04
		20	22000	500	0.02	22000	450	0.02	22000	400	0.02
	3°	20	22000	550	0.03	22000	495	0.03	22000	440	0.03
	5°	20	22000	600	0.03	22000	540	0.03	22000	480	0.03
R0.60	0.5°	12	22000	500	0.05	22000	450	0.05	22000	400	0.05
		24	22000	400	0.02	22000	360	0.02	22000	320	0.02
	1.0°	12	22000	550	0.05	22000	495	0.05	22000	440	0.05
		24	22000	450	0.02	22000	405	0.02	22000	360	0.02
	1.5°	12	22000	600	0.05	22000	540	0.05	22000	480	0.05
		24	22000	550	0.02	22000	495	0.02	22000	440	0.02
R0.75	0.5°	10	20000	600	0.1	20000	540	0.1	20000	480	0.1
		15	20000	550	0.08	20000	495	0.08	20000	440	0.08
		30	20000	500	0.02	20000	450	0.02	20000	400	0.02
	1.0°	10	20000	650	0.1	20000	585	0.1	20000	520	0.1
		15	20000	600	0.08	20000	540	0.08	20000	480	0.08
		20	20000	550	0.05	20000	495	0.05	20000	440	0.05
		30	20000	530	0.02	20000	480	0.02	20000	425	0.02
	1.5°	10	20000	700	0.1	20000	630	0.1	20000	560	0.1
		15	20000	650	0.08	20000	585	0.08	20000	520	0.08
		30	20000	600	0.02	20000	540	0.02	20000	480	0.02
R1.0	0.5°	20	18000	800	0.05	18000	720	0.05	18000	640	0.05
		30	18000	650	0.03	18000	585	0.03	18000	520	0.03
		40	18000	500	0.02	18000	450	0.02	18000	400	0.02
	1.0°	20	18000	900	0.05	18000	810	0.05	18000	720	0.05
		25	18000	850	0.04	18000	765	0.04	18000	680	0.04
		30	18000	800	0.03	18000	720	0.03	18000	640	0.03
		35	18000	750	0.03	18000	675	0.03	18000	600	0.03
		40	18000	600	0.02	18000	540	0.02	18000	480	0.02
		50	18000	550	0.02	18000	495	0.02	18000	440	0.02
Maximum cutting depth											

Cutting parameters for PML/PM series end mills

PM-2BC

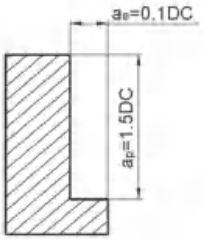
Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Bullnose radius (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R1.0	1.5°	20	18000	1000	0.05	18000	900	0.05	18000	800	0.05
		30	18000	900	0.03	18000	810	0.03	18000	720	0.03
		40	18000	750	0.03	18000	675	0.03	18000	600	0.03
	2°	30	18000	900	0.04	18000	810	0.04	18000	720	0.04
		40	18000	850	0.03	18000	765	0.03	18000	680	0.03
	3°	30	18000	1000	0.04	18000	900	0.04	18000	800	0.04
		40	18000	900	0.03	18000	810	0.03	18000	720	0.03
R1.5	0.5°	30	16000	1100	0.1	16000	990	0.1	16000	880	0.1
		40	16000	950	0.06	16000	855	0.06	16000	760	0.06
		50	16000	800	0.03	16000	720	0.03	16000	640	0.03
	1.0°	30	16000	1200	0.1	16000	1080	0.1	16000	960	0.1
		40	16000	1000	0.06	16000	900	0.06	16000	800	0.06
		50	16000	850	0.03	16000	765	0.03	16000	680	0.03
R1.5	1.5°	30	16000	1300	0.1	16000	1170	0.1	16000	1040	0.1
		40	16000	1100	0.06	16000	990	0.06	16000	880	0.06
		50	16000	950	0.03	16000	855	0.03	16000	760	0.03
R2.0	0.5°	60	14000	1100	0.1	14000	990	0.1	14000	880	0.1
	1.0°	60	14000	1100	0.1	14000	990	0.1	14000	880	0.1
Maximum cutting depth			 ≤0.1×PRFRAD(≤R0.5) ≤0.2×PRFRAD(>R0.5)								

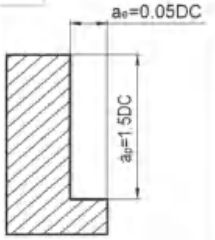
1. Please select high-precision machine and tool holder. When vibration and abnormal noise occur during machining, please reduce axial cutting depth ap.
2. Please use air blow or cutting liquid with high mist retardant property.
3. Reduce feed speed correspondingly when rotating speed is low.
4. Due to the differences of machines, allowance of machining and other working conditions, please adjust the parameters in above list according to your specific requirements.

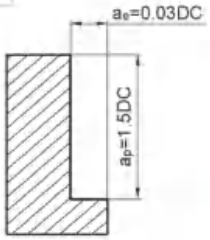
PML-2R★PM-2R

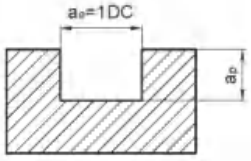
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	240	20000	75	20000	195	20000	145	20000	95
2	15000	385	11150	100	15000	335	13000	215	11140	130
3	14000	655	7500	145	10600	505	8500	395	7430	245
4	10800	675	5500	155	8000	515	6500	405	5570	245
5	8200	695	4500	155	6400	540	5000	425	4460	260
6	7000	720	3700	170	5300	555	4200	435	3710	260
8	5200	720	2800	170	4000	555	3200	440	2785	275
10	4200	695	2200	170	3200	535	2500	420	2230	255
12	3500	695	1850	170	2650	535	2100	420	1855	255

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC<Ø20	0.5DC

Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

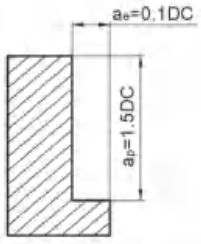
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

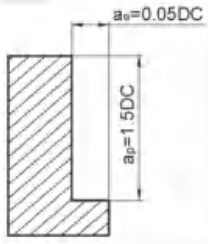
Cutting parameters for PML/PM series end mills

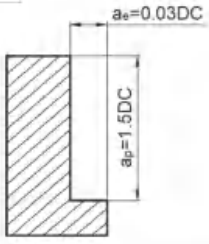
PML-4R★PML-4R-H★PM-4R★PM-4R-H★PML-4RFP PM-4RFP★PM-4RBL/M/X★PM-4RBL/M/X-H

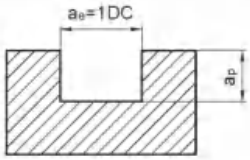
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	14000	985	7500	175	10600	755	8500	590	7430	435
4	10800	1010	5500	175	8000	770	6500	600	5570	445
5	8200	1055	4500	175	6400	805	5000	640	4460	470
6	7000	1080	3700	195	5300	830	4200	650	3710	470
8	5200	1070	2800	195	4000	815	3200	660	2785	485
10	4200	1055	2200	195	3200	805	2500	625	2230	450
12	3500	1055	1850	195	2650	805	2100	625	1855	450
16	2600	985	1400	175	2000	755	1600	590	1390	435

Maximum cutting depth









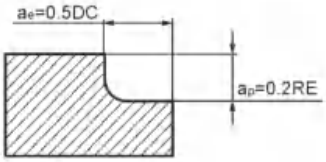
Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.15DC
Ø3≤DC<Ø6	0.3DC
Ø6≤DC<Ø20	0.5DC

Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.1DC
Ø3≤DC	0.2DC

1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

PM-4H★PM-4HL

Standard:

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3.0×R0.8	10500	6250	8500	4500	7450	3900	5300	2600	3200	995
4.0×R1.0	7950	6600	6350	4800	5550	4200	4000	2750	2400	1050
5.0×R1.2	6350	7000	5100	5100	4450	4450	3200	2850	1900	1150
6.0×R1.0 6.0×R1.5	5300	7000	4250	5100	3700	4450	2650	2850	1600	1150
8.0×R1.0 8.0×R2.0	4550	7000	3200	5100	2800	4450	2000	2850	1200	1150
10.0×R1.0 10.0×R2.0	3200	7000	2550	5100	2250	4450	1600	2850	955	1150
12.0×R2.0 12.0×R3.0	2650	7000	2100	5100	1850	4450	1350	2850	795	1150
Maximum cutting depth	Maximum a_p=0.5mm						Maximum a_p=0.4mm		Maximum a_p=0.2mm	
										

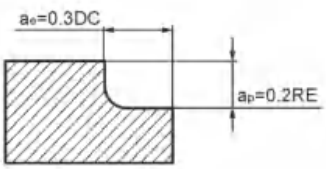
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

Overhang	Cutting speed(m/min)	Axial cutting depth (mm)	Feed speed (mm/min)
L/D≤4	100%	100%	100%
L/D=5	80%~90%	70%~90%	80%~90%
L/D=6	60%~80%	50%~70%	60%~80%

PM-4H★PM-4HL

High speed:

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3.0×R0.8	21000	12500	21000	12000	16000	8400	16000	7850	10500	3300
4.0×R1.0	16000	13000	16000	12000	12000	9000	12000	8200	7950	3550
5.0×R1.2	12500	14000	12500	12500	9550	9550	9550	8600	6350	3800
6.0×R1.0 6.0×R1.5	10600	14000	10600	12700	7950	9550	7950	8600	5300	3800
8.0×R1.0 8.0×R2.0	7950	14000	7950	12700	5950	9550	5950	8600	4000	3800
10.0×R1.0 10.0×R2.0	6350	14000	6350	12700	4750	9550	4750	8600	3200	3800
12.0×R2.0 12.0×R3.0	5300	14000	5300	12700	4000	9550	4000	8600	2650	3800
Maximum cutting depth	Maximum a_p=0.4mm						Maximum a_p=0.2mm		Maximum a_p=0.1mm	
										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

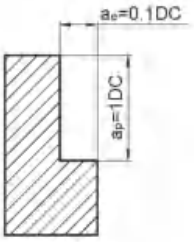
Different cutting parameters under different overhang of tool:

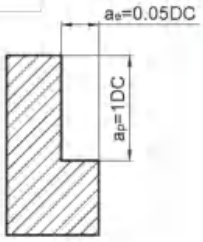
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D≤4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

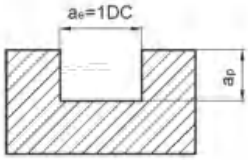
GM-2E★GM-2EL★GM-2EBL/X

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	165	20000	165	20000	135	20000	135	20000	50	20000	100
2	15000	265	15000	265	15000	240	15000	235	11150	70	13000	150
3	14000	455	14000	455	13000	420	10600	350	7500	100	8500	275
4	10800	465	10800	465	10000	430	8000	355	5500	110	6500	280
5	8200	485	8200	485	7600	450	6400	370	4500	110	5000	295
6	7000	500	7000	500	6400	460	5300	385	3700	115	4200	300
8	5200	495	5200	495	4800	455	4000	380	2800	115	3200	305
10	4200	485	4200	485	3800	450	3200	370	2200	115	2500	290
12	3500	485	3500	485	3200	450	2650	370	1850	115	2100	290
14	3000	455	3000	455	2700	420	2300	350	1600	110	1800	275
16	2600	455	2600	455	2400	420	2000	350	1400	100	1600	275
18	2300	445	2300	445	2100	410	1800	345	1250	100	1400	270
20	2050	445	2050	445	1900	410	1600	345	1100	100	1250	270

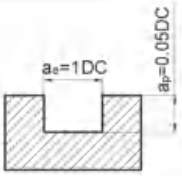
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



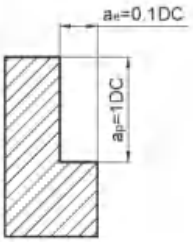
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

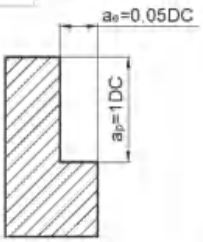
Cutting parameters for GM series end mills

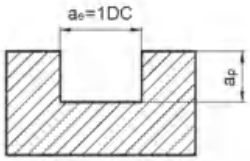
GM-2F★GM-2FL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	115	20000	115	20000	95	20000	95	20000	35	20000	70
2	15000	185	15000	185	15000	170	15000	165	11150	50	13000	105
3	14000	320	14000	320	13000	295	10600	245	7500	70	8500	190
4	10800	325	10800	325	10000	300	8000	250	5500	80	6500	195
5	8200	340	8200	340	7600	315	6400	260	4500	80	5000	205
6	7000	350	7000	350	6400	320	5300	270	3700	80	4200	210
8	5200	345	5200	345	4800	320	4000	265	2800	80	3200	210
10	4200	340	4200	340	3800	315	3200	260	2200	80	2500	200
12	3500	340	3500	340	3200	315	2650	260	1850	80	2100	200
14	3000	320	3000	320	2700	295	2300	245	1600	80	1800	190
16	2600	320	2600	320	2400	295	2000	245	1400	70	1600	190
18	2300	310	2300	310	2100	290	1800	240	1250	70	1400	190
20	2050	310	2050	310	1900	290	1600	240	1100	70	1250	190

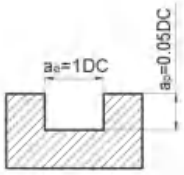
Maximum cutting depth





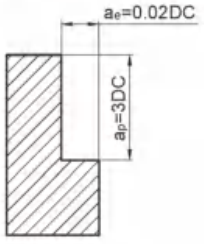


Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

GM-2EX

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	375	5800	375	5300	345	4250	275	2650	60	3600	230
8	4400	375	4400	375	4000	345	3180	275	2000	60	2700	235
10	3500	365	3500	365	3200	330	2550	265	1600	60	2150	220
12	2900	365	2900	365	2650	330	2120	265	1350	60	1800	220
16	2200	345	2200	345	2000	315	1590	250	1000	50	1350	210
20	1750	340	1750	340	1600	310	1270	245	800	45	1050	205
Maximum cutting depth												

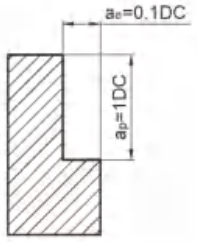
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

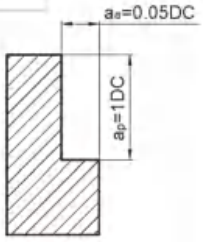
Cutting parameters for GM series end mills

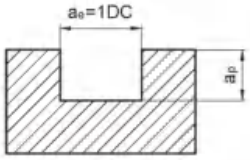
GM-2EFP

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	650	7000	650	6400	600	5300	500	3700	150	4200	390
8	5200	645	5200	645	4800	590	4000	495	2800	150	3200	395
10	4200	630	4200	630	3800	585	3200	480	2200	150	2500	380
12	3500	630	3500	630	3200	585	2650	480	1850	150	2100	380
16	2600	590	2600	590	2400	545	2000	455	1400	130	1600	355
20	2050	580	2050	580	1900	530	1600	450	1100	130	1250	350

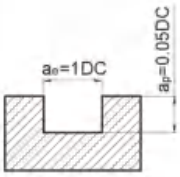
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC

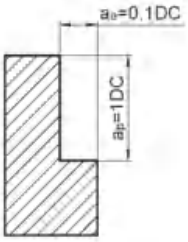


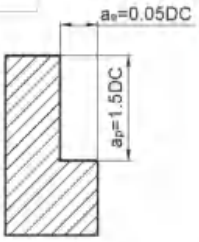
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

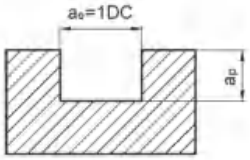
GM-3E★GM-3EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	215	20000	215	20000	175	20000	175	20000	65	20000	130
2	15000	345	15000	345	15000	310	15000	305	11150	90	13000	195
3	14000	590	14000	590	13000	546	10600	455	7500	130	8500	360
4	10800	600	10800	605	10000	560	8000	460	5500	145	6500	365
5	8200	630	8200	630	7600	585	6400	480	4500	145	5000	380
6	7000	650	7000	650	6400	600	5300	500	3700	150	4200	390
8	5200	645	5200	645	4800	590	4000	495	2800	150	3200	400
10	4200	630	4200	630	3800	585	3200	480	2200	150	2500	380
12	3500	630	3500	630	3200	585	2650	480	1850	150	2100	380
14	3000	590	3000	590	2700	545	2300	455	1600	145	1800	360
16	2600	590	2600	590	2400	545	2000	455	1400	130	1600	360
18	2300	580	2300	580	2100	530	1800	450	1250	130	1400	350
20	2050	580	2050	580	1900	530	1600	450	1100	130	1250	350

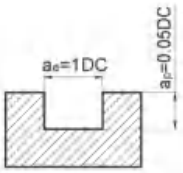
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



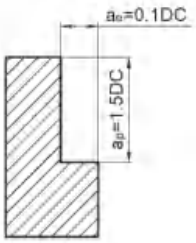
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

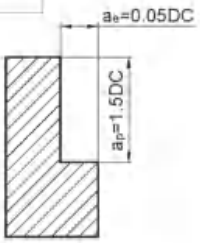
Cutting parameters for GM series end mills

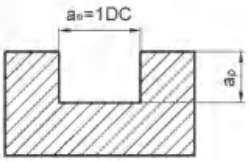
GM-4E-G★GM-4EL-G★GM-4EBL/X-G

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	225	20000	225	20000	180	20000	180	20000	80	20000	135
2	15000	360	15000	360	15000	325	15000	315	11150	90	13000	200
3	14000	610	14000	610	13000	570	10600	470	7500	110	8500	370
4	10800	630	10800	630	10000	575	8000	480	5500	115	6500	380
5	8200	660	8200	660	7600	600	6400	505	4500	115	5000	400
6	7000	675	7000	675	6400	620	5300	515	3700	120	4200	405
8	5200	665	5200	665	4800	610	4000	510	2800	120	3200	415
10	4200	660	4200	660	3800	600	3200	505	2200	120	2500	390
12	3500	660	3500	660	3200	600	2650	505	1850	120	2100	390
14	3000	610	3000	610	2700	570	2300	470	1600	115	1800	370
16	2600	610	2600	610	2400	570	2000	470	1400	110	1600	370
18	2300	600	2300	600	2100	560	1800	460	1250	95	1400	365
20	2050	600	2050	600	1900	560	1600	460	1100	95	1250	365

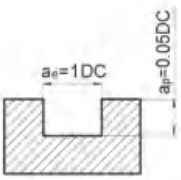
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC

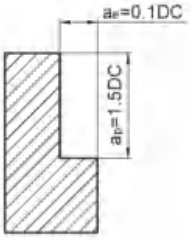


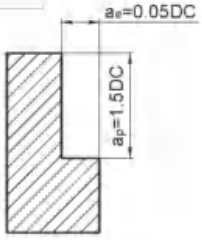
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

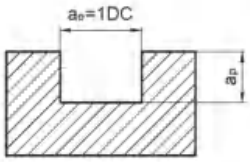
GM-4F-G★GM-4FL-G

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	160	20000	160	20000	125	20000	125	20000	55	20000	95
2	15000	250	15000	250	15000	230	15000	220	11150	65	13000	140
3	14000	430	14000	430	13000	400	10600	330	7500	80	8500	260
4	10800	440	10800	440	10000	400	8000	335	5500	80	6500	265
5	8200	460	8200	460	7600	420	6400	355	4500	80	5000	280
6	7000	470	7000	470	6400	435	5300	360	3700	85	4200	285
8	5200	465	5200	465	4800	430	4000	360	2800	85	3200	290
10	4200	460	4200	460	3800	420	3200	355	2200	85	2500	275
12	3500	460	3500	460	3200	420	2650	355	1850	80	2100	275
14	3000	430	3000	430	2700	400	2300	330	1600	80	1800	260
16	2600	430	2600	430	2400	400	2000	330	1400	80	1600	260
18	2300	420	2300	420	2100	390	1800	325	1250	70	1400	255
20	2050	420	2050	420	1900	390	1600	325	1100	70	1250	255

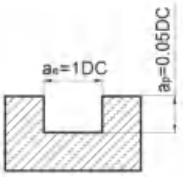
Maximum cutting depth







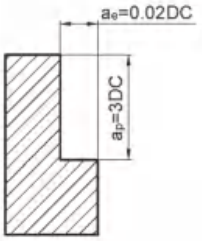
Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for GM series end mills

GM-4EX-G

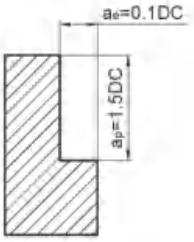
Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	475	5800	475	5300	430	4250	340	2650	70	3600	290
8	4400	475	4400	475	4000	430	3180	340	2000	70	2700	290
10	3500	460	3500	460	3200	420	2550	330	1600	70	2150	280
12	2900	460	2900	460	2650	420	2120	330	1350	70	1800	280
16	2200	430	2200	430	2000	390	1590	315	1000	65	1350	260
20	1750	430	1750	430	1600	385	1270	310	800	60	1050	255
Maximum cutting depth												

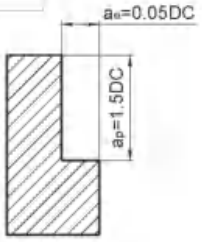
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

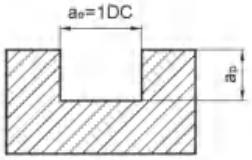
GM-4E★GM-4EL★GM-4EBL/X

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	250	20000	250	20000	200	20000	200	20000	90	20000	150
2	15000	400	15000	400	15000	360	15000	350	11150	100	13000	225
3	14000	680	14000	680	13000	630	10600	525	7500	120	8500	410
4	10800	700	10800	700	10000	640	8000	535	5500	125	6500	420
5	8200	730	8200	730	7600	670	6400	560	4500	125	5000	440
6	7000	750	7000	750	6400	690	5300	575	3700	135	4200	450
8	5200	740	5200	740	4800	680	4000	565	2800	135	3200	460
10	4200	730	4200	730	3800	670	3200	560	2200	135	2500	435
12	3500	730	3500	730	3200	670	2650	560	1850	135	2100	435
14	3000	680	3000	680	2700	630	2300	525	1600	125	1800	410
16	2600	680	2600	680	2400	630	2000	525	1400	120	1600	410
18	2300	670	2300	670	2100	620	1800	515	1250	105	1400	405
20	2050	670	2050	670	1900	620	1600	515	1100	105	1250	405

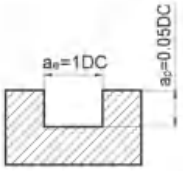
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



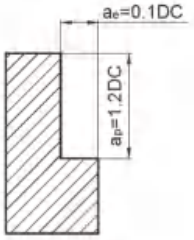
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

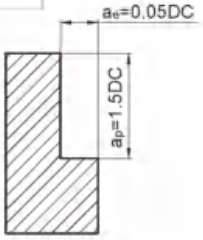
Cutting parameters for GM series end mills

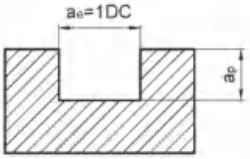
GM-4EFP

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	975	7000	975	6400	900	5300	750	3700	175	4200	585
8	5200	960	5200	960	4800	995	4000	735	2800	175	3200	600
10	4200	950	4200	950	3800	970	3200	730	2200	175	2500	565
12	3500	950	3500	950	3200	970	2650	730	1850	175	2100	565
16	2600	885	2600	885	2400	820	2000	680	1400	155	1600	535
20	2050	870	2050	870	1900	805	1600	670	1100	135	1250	525

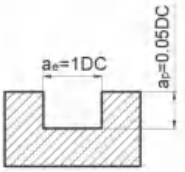
Maximum cutting depth





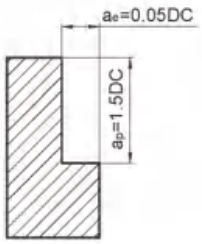


Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

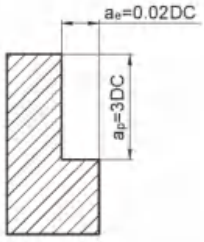
GM-6E

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	890	7000	890	6400	820	5300	680	3700	160	4200	540
8	5200	890	5200	890	4800	820	4000	680	2800	160	3200	550
10	4200	860	4200	860	3800	800	3200	665	2200	160	2500	520
12	3500	860	3500	860	3200	800	2650	665	1850	160	2100	520
14	3000	810	3000	810	2700	750	2300	625	1600	150	1800	490
16	2600	810	2600	810	2400	750	2000	625	1400	150	1600	490
18	2300	800	2300	800	2100	740	1800	615	1250	125	1400	485
20	2050	800	2050	800	1900	740	1600	615	1100	125	1250	485
Maximum cutting depth												

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

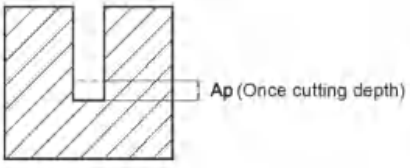
Cutting parameters for GM series end mills

GM-6EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	750	5800	750	5300	685	4250	545	2650	115	3600	460
8	4400	750	4400	750	4000	685	3180	545	2000	115	2700	465
10	3500	730	3500	730	3200	665	2550	530	1600	115	2150	440
12	2900	730	2900	730	2650	665	2120	530	1350	115	1800	440
14	2500	685	2500	685	2300	625	1820	500	1150	105	1550	415
16	2200	685	2200	685	2000	625	1590	500	1000	105	1350	415
18	1950	675	1950	675	1800	615	1420	490	900	90	1200	410
20	1750	675	1750	675	1600	615	1270	490	800	90	1050	410
Maximum cutting depth												

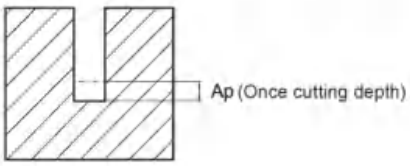
1. Please select high-precision machine and tool holder.
2. Please use air blow or cutting liquid with high mist retardant property.
3. Down milling is recommended in the case of side milling.
4. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5. Make overhang of tool as short as possible in conditions of non-interference.

GM-2EP

Workpiece material		Cast iron, Carbon steel, Alloy steel ~750N/mm²			Carbon steel, Alloy steel ~30HRC			Pre-hardened steel, quenched and tempered steel ~40HRC			Stainless steel		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
0.5	4	28000	500	0.023	28000	400	0.021	28000	250	0.018	25000	200	0.014
	6	22000	400	0.007	22000	350	0.06	22000	150	0.005	20000	150	0.004
	8	18000	300	0.005	18000	300	0.005	18000	150	0.004	20000	150	0.003
0.8	4	32000	900	0.057	32000	600	0.053	32000	600	0.044	25000	400	0.035
	6	26000	700	0.036	26000	450	0.034	26000	400	0.028	21000	300	0.022
	8	22000	500	0.026	22000	350	0.024	22000	300	0.02	18000	200	0.016
	10	22000	500	0.01	22000	350	0.01	22000	300	0.008	18000	200	0.006
1.0	4	2900	1300	0.08	27000	1000	0.08	26000	900	0.07	20000	600	0.05
	6	29000	1300	0.07	27000	1000	0.07	26000	900	0.06	20000	600	0.04
	8	24000	900	0.05	23000	800	0.04	22000	700	0.04	18000	400	0.03
	10	20000	700	0.03	19000	600	0.03	18000	500	0.03	15000	300	0.02
	12	20000	700	0.02	19000	600	0.02	18000	500	0.02	15000	300	0.01
	14	18000	500	0.015	15000	400	0.01	15000	360	0.01	12000	200	0.008
1.2	6	25000	1100	0.09	23000	1000	0.08	22000	900	0.07	17000	600	0.05
	8	21000	900	0.07	20000	700	0.07	19000	700	0.05	14000	400	0.04
	10	21000	900	0.06	20000	700	0.05	19000	700	0.04	14000	400	0.03
	12	18000	700	0.04	17000	600	0.04	16000	500	0.03	11000	300	0.02
1.5	6	20000	1200	0.15	18000	1000	0.14	18000	900	0.11	14000	600	0.09
	8	19000	900	0.11	16000	800	0.1	15000	700	0.08	12000	400	0.07
	10	19000	900	0.09	16000	800	0.08	15000	700	0.06	12000	400	0.05
	12	19000	900	0.07	16000	800	0.06	15000	700	0.05	12000	400	0.04
	14	19000	700	0.06	16000	650	0.05	15000	630	0.04	12000	360	0.03
2.0	6	16000	1300	0.34	15000	1100	0.31	14000	1000	0.26	11000	700	0.21
	8	16000	1300	0.29	15000	1100	0.26	14000	1000	0.22	11000	700	0.18
	10	14000	900	0.26	1300	800	0.24	12000	700	0.20	9000	500	0.16
	12	14000	900	0.14	13000	800	0.13	12000	700	0.11	9000	500	0.09
	14	14000	900	0.10	13000	800	0.11	12000	700	0.09	9000	500	0.07
	16	14000	900	0.08	13000	800	0.08	12000	700	0.07	9000	500	0.06
Maximum cutting depth		 Ap (Once cutting depth)											

Cutting parameters for GM series end mills

GM-2EP

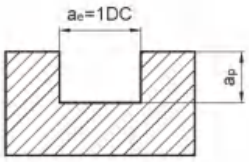
Workpiece material		Cast iron, Carbon steel, Alloy steel ~750N/mm²			Carbon steel, Alloy steel ~30HRC			Pre-hardened steel, quenched and tempered steel ~40HRC			Stainless steel		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
2.5	8	13000	1300	0.42	12000	1100	0.39	11000	1000	0.33	9000	700	0.26
	10	13000	1300	0.36	12000	1100	0.33	11000	1000	0.28	9000	700	0.22
	12	13000	1300	0.24	12000	1100	0.23	11000	1000	0.19	9000	700	0.15
	14	12000	900	0.18	10000	800	0.17	9000	700	0.14	7000	500	0.11
	16	12000	900	0.13	10000	800	0.12	9000	700	0.09	7000	500	0.08
	18	12000	800	0.11	10000	720	0.10	9000	630	0.07	7000	450	0.07
	20	12000	800	0.09	10000	720	0.08	9000	630	0.05	7000	450	0.05
3.0	6	11000	1300	0.42	10000	1100	0.39	10000	1000	0.32	8000	700	0.27
	8	11000	1300	0.39	10000	1100	0.36	10000	1000	0.30	8000	700	0.24
	10	11000	1300	0.31	10000	1100	0.29	10000	1000	0.24	8000	700	0.19
	12	11000	1100	0.29	10000	1000	0.27	10000	900	0.22	8000	650	0.16
	14	11000	1100	0.27	10000	1000	0.25	10000	900	0.20	8000	650	0.15
	16	10000	850	0.22	10000	750	0.20	9000	650	0.17	6000	450	0.13
	18	10000	850	0.16	10000	750	0.14	9000	650	0.12	6000	450	0.10
	20	10000	850	0.12	10000	750	0.10	9000	650	0.08	6000	450	0.07
4.0	12	8000	1300	0.42	7000	1100	0.38	7000	1000	0.32	6000	700	0.26
	16	8000	1100	0.39	7000	1000	0.35	7000	900	0.30	6000	650	0.24
	20	7000	900	0.34	7000	800	0.30	6000	700	0.27	5000	500	0.20
	25	7000	900	0.30	7000	800	0.27	6000	700	0.24	5000	500	0.15
5.0	16	6000	1200	0.49	6000	1000	0.45	5000	1000	0.38	5000	600	0.30
	25	5000	800	0.45	5000	720	0.42	5000	700	0.35	5000	600	0.25
Maximum cutting depth													

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

GM-2ES

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
0.3	32000	115	32000	115	32000	115	32000	80	32000	40
0.4	32000	125	32000	125	32000	125	32000	90	27500	50
0.5	32000	125	32000	125	29500	125	25000	90	22000	50
0.6	32000	125	32000	125	24500	125	21000	90	18500	50
0.7	32000	125	32000	125	24500	125	21000	90	18500	50
0.8	24500	125	24500	125	18500	125	15500	90	13500	50
0.9	24500	125	24500	125	18500	125	15500	90	13500	50
1.0	21000	140	25000	165	16800	130	14500	90	10000	50
1.5	13000	140	15000	165	11800	130	10000	90	7000	50
2.0	13000	160	15000	185	11800	145	10000	100	7000	60
2.5	8700	200	10000	240	8200	185	6600	100	4700	60
3.0	8700	235	10000	270	8200	220	6600	100	4700	75

Maximum cutting depth

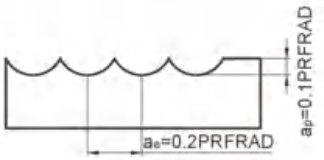
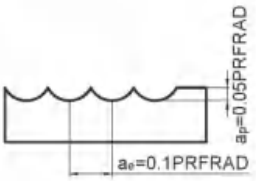


Diameter range	Cutting depth a_p
DC<Ø1	0.05DC
Ø1≤DC≤Ø3	0.15DC

1. Please select high-precision machine and tool holder.
2. Please use air blow or cutting liquid with high mist retardant property.
3. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4. Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for GM series end mills

GM-2B★GM-2BL/M/X★GM-2BFP

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.5	40000	800	40000	800	38000	700	32000	320	22300	200	25000	275
R1.0	24000	900	24000	900	19000	760	16000	400	11150	230	13000	275
R1.5	15500	950	15500	950	12750	760	10600	450	7400	290	8500	280
R2.0	11500	950	11500	950	9550	760	8000	550	5550	370	6500	370
R2.5	9500	1050	9500	1050	7650	800	6400	550	4450	370	5000	375
R3.0	8000	1050	8000	1050	6400	800	5300	580	3700	390	4200	390
R4.0	6000	1300	6000	1300	4800	950	4000	700	2750	455	3200	440
R5.0	4800	1200	4800	1200	3800	900	3200	650	2200	430	2500	440
R6.0	4000	1100	4000	1100	3200	840	2650	610	1850	430	2100	420
R8.0	3000	1050	3000	1050	2400	800	2000	600	1350	380	1600	375
R10.0	2400	950	2400	950	1900	680	1600	560	1100	370	1250	330
Maximum cutting depth												

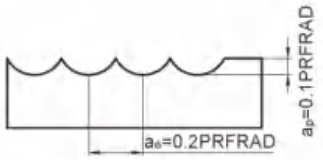
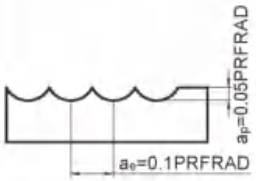
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

4.Make overhang of tool as short as possible in conditions of non-interference.

GM-4B★GM-4BL/M/X

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Cutting speed	150 m/min		150m/min		120m/min		100m/min		70m/min		80m/min	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R1.5	15500	1710	15500	1710	12750	1340	10600	810	7400	520	8500	500
R2.0	11500	1710	11500	1710	9550	1340	8000	990	5550	660	6500	665
R2.5	9500	1890	9500	1890	7650	1440	6400	990	4450	660	5000	675
R3.0	8000	1890	8000	1890	6400	1440	5300	1040	3700	700	4200	700
R4.0	6000	2340	6000	2340	4800	1710	4000	1260	2750	820	3200	790
R5.0	4800	2160	4800	2160	3800	1620	3200	1170	2200	770	2500	790
R6.0	4000	1980	4000	1980	3200	1510	2650	1100	1850	770	2100	755
R8.0	3000	1890	3000	1890	2400	1440	2000	1080	1350	680	1600	675
R10.0	2400	1710	2400	1710	1900	1220	1600	1000	1100	660	1250	595
Maximum cutting depth												

1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

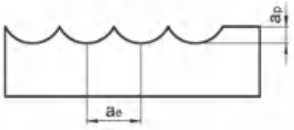
4.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for GM series end mills

GM-2BS

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.15	32000	300	32000	300	32000	270	32000	250	32000	150
R0.2	32000	380	32000	380	32000	320	32000	300	32000	175
R0.25	32000	460	32000	460	32000	410	32000	330	32000	205
R0.3	32000	535	32000	535	32000	500	32000	420	32000	265
R0.35	32000	550	32000	550	32000	520	32000	440	32000	270
R0.4	32000	610	32000	610	32000	560	32000	460	27500	285
R0.45	32000	700	32000	700	32000	600	25000	400	27500	285
R0.5	32000	765	32000	765	32000	640	25000	400	22000	285
R1.0	24000	900	24000	900	19000	760	16000	400	11150	230
R1.5	15500	950	15500	950	12750	760	10600	450	7400	290

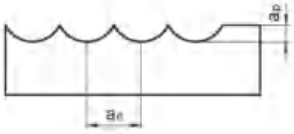
Maximum cutting depth



Diameter range	Cutting depth a_p	Cutting width a_e
DC<Ø1	0.05PRFRAD	0.2PRFRAD
Ø1≤DC≤Ø3	0.1PRFRAD	0.2PRFRAD

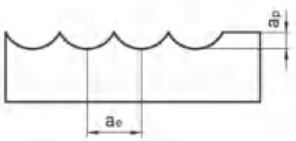
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

GM-2BP

Workpiece material		Cast iron, Carbon steel Alloy steel ~750N/mm²				Carbon steel, Alloy steel ~30HRC				Pre-hardened steel, quenched and tempered steel ~40HRC				Stainless steel			
Bullnose radius (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.25	4	27000	400	0.02	0.025	27000	380	0.02	0.025	27000	300	0.02	0.025	27000	200	0.02	0.025
	6	21000	200	0.01	0.015	21000	180	0.01	0.015	21000	160	0.01	0.015	21000	150	0.01	0.015
R0.3	4	27000	400	0.03	0.12	27000	380	0.03	0.12	25000	250	0.03	012	24000	200	0.03	0.12
	6	25000	300	0.03	0.12	25000	280	0.03	0.12	20000	150	0.03	0.12	20000	140	0.03	0.12
	8	25000	240	0.03	0.12	25000	225	0.03	0.12	20000	120	0.03	0.12	20000	110	0.03	0.12
R0.4	4	27000	600	0.04	0.16	27000	550	0.04	0.16	23000	450	0.04	0.16	21000	300	0.04	0.16
	6	24000	400	0.04	0.12	24000	360	0.04	0.12	21000	250	0.04	0.12	19000	200	0.04	0.12
	8	22000	300	0.04	0.12	22000	270	0.04	0.12	19000	150	0.04	0.12	19000	140	0.04	0.12
	10	22000	270	0.03	0.09	22000	250	0.03	0.09	19000	135	0.03	0.09	19000	120	0.03	0.09
R0.5	4	28000	600	0.05	0.20	28000	550	0.05	0.20	25000	500	0.05	0.20	21000	300	0.05	0.20
	6	21000	400	0.05	0.20	21000	360	0.05	0.20	19000	300	0.05	0.20	16000	200	0.05	0.2
	8	21000	360	0.05	0.15	21000	320	0.05	0.15	19000	270	0.05	0.15	16000	180	0.05	0.15
	10	18000	300	0.03	0.10	18000	270	0.03	0.10	17000	200	0.03	0.10	14000	150	0.03	0.10
	12	18000	270	0.03	0.10	18000	250	0.03	0.10	17000	180	0.03	0.10	14000	135	0.03	0.10
R0.6	6	20000	600	0.06	0.24	20000	540	0.06	0.24	17000	300	0.06	0.24	14000	200	0.06	0.24
	8	20000	540	0.06	0.24	20000	500	0.06	0.24	17000	270	0.06	0.24	14000	170	0.06	0.24
	12	16000	300	0.06	0.18	16000	270	0.06	0.18	14000	200	0.06	0.18	11000	150	0.06	0.18
	16	16000	270	0.03	0.12	16000	230	0.03	0.12	14000	175	0.03	0.12	11000	135	0.03	0.12
R0.75	8	17000	600	0.08	0.30	17000	540	0.08	0.30	15000	300	0.08	0.30	12000	250	0.08	0.30
	12	17000	540	0.06	0.24	17000	500	0.06	0.24	15000	275	0.06	0.24	12000	225	0.06	0.24
	16	13000	300	0.04	0.16	13000	275	0.04	0.16	12000	200	0.04	0.16	9500	150	0.04	0.16
R1.0	6	16500	800	0.10	0.40	16500	750	0.10	0.40	16500	560	0.10	0.40	13500	450	0.10	0.40
	8	16500	800	0.10	0.32	16500	750	0.10	0.32	16500	560	0.10	0.32	13500	450	0.10	0.32
	10	14000	630	0.08	0.30	14000	600	0.08	0.30	13000	450	0.08	0.30	10000	270	0.08	0.30
	12	14000	630	0.06	0.30	14000	600	0.06	0.30	13000	450	0.06	0.30	10000	270	0.06	0.30
	16	14000	550	0.06	0.24	14000	530	0.06	0.24	13000	400	0.06	0.24	10000	270	0.06	0.24
	20	11000	360	0.06	0.16	11000	330	0.06	0.16	10000	225	0.06	0.16	8000	175	0.06	0.16
Maximum cutting depth																	

Cutting parameters for GM series end mills

GM-2BP

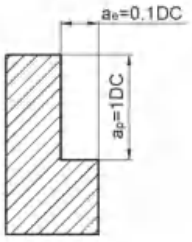
Workpiece material		Cast iron, Carbon steel, Alloy steel ~750N/mm²				Carbon steel, Alloy steel ~30HRC				Pre-hardened steel, quenched and tempered steel ~40HRC				Stainless steel			
Bullnose radius (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R1.25	8	14000	800	0.10	0.32	14000	750	0.10	0.32	14000	560	0.10	0.32	12500	450	0.10	0.32
	12	13000	630	0.06	0.30	13000	600	0.06	0.30	12000	450	0.06	0.30	10000	270	0.06	0.30
	16	13000	550	0.06	0.24	13000	530	0.06	0.24	12000	400	0.06	0.24	10000	270	0.06	0.24
	20	10000	360	0.06	0.16	10000	330	0.06	0.16	8000	225	0.06	0.16	7000	175	0.06	0.16
R1.5	10	12000	800	0.15	0.40	12000	720	0.15	0.40	9500	600	0.15	0.40	7500	400	0.15	0.40
	12	12000	720	0.15	0.40	12000	650	0.15	0.40	9500	540	0.15	0.40	7500	360	0.15	0.40
	16	10000	600	0.15	0.40	10000	540	0.15	0.40	8500	300	0.15	0.40	6500	250	0.15	0.40
	20	10000	600	0.10	0.32	10000	540	0.10	0.32	8500	300	0.10	0.32	6500	250	0.10	0.32
R2.0	10	9000	800	0.20	0.80	9000	720	0.20	0.80	7500	600	0.20	0.80	6000	400	0.20	0.80
	16	9000	800	0.20	0.60	9000	720	0.20	0.60	7500	600	0.20	0.60	6000	400	0.20	0.60
	20	7000	600	0.20	0.40	7000	540	0.20	0.40	6000	400	0.20	0.40	5000	250	0.20	0.40
	25	7000	600	0.15	0.40	7000	540	0.15	0.40	6000	400	0.15	0.40	5000	250	0.15	0.40
R2.5	16	7000	600	0.25	1.00	7000	540	0.25	0.10	6500	500	0.25	1.0	5000	400	0.25	1.00
	25	6000	500	0.25	1.00	6000	450	0.25	1.00	5000	500	0.25	1.00	4000	250	0.25	1.00
Maximum cutting depth																	

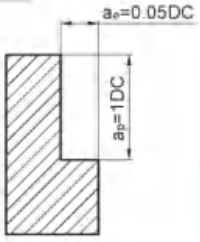
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

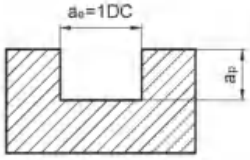
GM-2R

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	200	20000	200	20000	160	20000	160	20000	60	20000	120
2	15000	320	15000	320	15000	290	15000	280	11150	84	13000	180
3	14000	545	14000	545	13000	510	10600	420	7500	120	8500	330
4	10800	560	10800	560	10000	520	8000	430	5500	130	6500	335
5	8200	580	8200	580	7600	540	6400	450	4500	130	5000	355
6	7000	600	7000	600	6400	550	5300	460	3700	140	4200	360
8	5200	600	5200	600	4800	550	4000	460	2800	140	3200	365
10	4200	580	4200	580	3800	540	3200	445	2200	140	2500	350
12	3500	580	3500	580	3200	540	2650	445	1850	140	2100	350

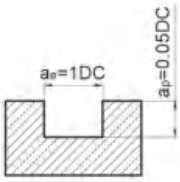
Maximum cutting depth







Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



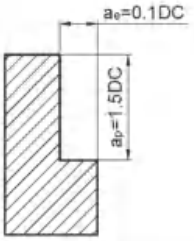
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

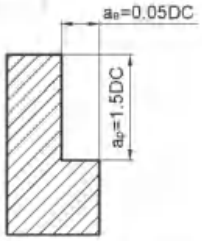
Cutting parameters for GM series end mills

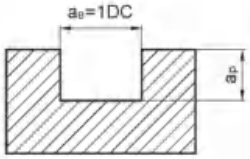
GM-4R★GM-4RL/M/X

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	14000	820	14000	820	13000	755	10600	630	7500	145	8500	490
4	10800	840	10800	840	10000	770	8000	640	5500	145	6500	500
5	8200	880	8200	880	7600	810	6400	670	4500	145	5000	530
6	7000	900	7000	900	6400	830	5300	690	3700	160	4200	540
8	5200	890	5200	890	4800	815	4000	680	2800	160	3200	550
10	4200	880	4200	880	3800	810	3200	670	2200	160	2500	520
12	3500	880	3500	880	3200	810	2650	670	1850	160	2100	520
16	2600	680	2600	680	2400	630	2000	525	1400	120	1600	490

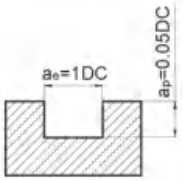
Maximum cutting depth





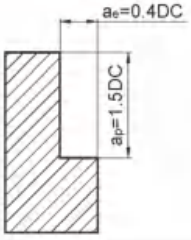
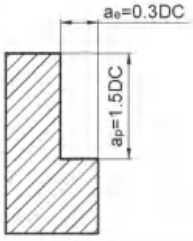


Diameter range	Cutting depth ap
Ø1≤DC<Ø3	0.15DC
Ø3≤DC	0.3DC



1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

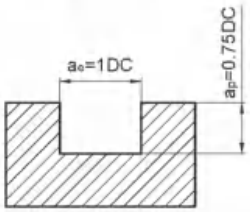
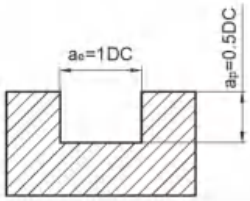
GM-4W—side cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	6350	760	5300	640	4500	360	3450	280	2650	210
7	5460	760	4550	640	3650	360	3000	280	2250	310
8	4750	760	4000	640	3400	410	2650	310	2000	240
9	4250	760	3540	640	2850	410	2300	310	1750	240
10	3800	760	3200	640	2700	430	2050	330	1600	260
11	3470	760	2900	640	2400	430	1850	330	1450	260
12	3200	770	2250	650	1950	470	1500	360	1150	280
16	2400	770	2000	640	1700	480	1300	360	1000	280
20	1900	760	1600	610	1350	470	1050	350	800	260
Maximum cutting depth										

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.

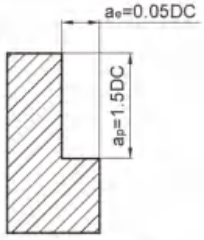
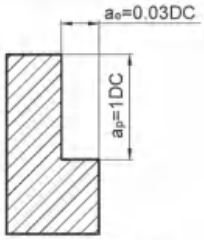
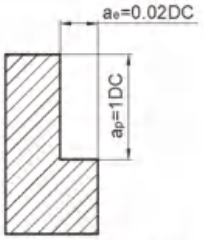
Cutting parameters for GM series end mills

GM-4W — slot cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Cutting speed	80~120 m/min		70~100m/min		60~90m/min		40~70m/min		30~60m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	640	4500	540	3700	300	2900	230	2400	190
7	4500	630	3800	540	3200	300	2500	230	2050	190
8	4000	640	3400	540	2800	340	2200	260	1800	220
9	3500	630	3000	540	2450	340	1950	260	1600	220
10	3200	640	2700	540	2250	360	1750	280	1450	230
11	3000	630	2450	540	2050	360	1600	280	1300	230
12	2650	640	2250	540	1850	370	1450	290	1200	240
16	2000	640	1700	540	1400	390	1100	310	900	250
20	1600	640	1350	510	1100	390	900	300	700	230
Maximum cutting depth	 Maximum a_p=12mm									

1. Please select high-precision machine and tool holder.
2. Please use air blow or cutting liquid with high mist retardant property.
3. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
4. Make overhang of tool as short as possible in conditions of non-interference.

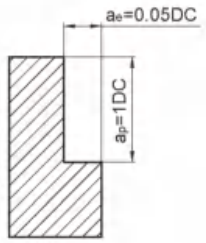
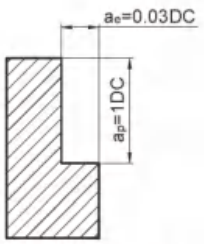
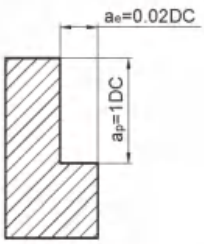
HMX-2E★HMX-2EBL/X

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	160	40000	160	32000	130
2	40000	400	24000	240	16000	160
3	32000	510	16000	255	11000	175
4	24000	625	12000	310	8000	210
5	19000	685	9500	340	6400	230
6	16000	770	8000	385	5300	255
8	12000	770	6000	385	4000	255
10	9600	770	4800	385	3200	255
12	8000	800	4000	400	2700	270
14	6800	680	3400	340	2300	230
16	6000	600	3000	300	2000	200
18	5300	530	2700	270	1800	180
20	4800	480	2400	240	1600	160
Maximum cutting depth	 Maximum a_e=1.0mm		 Maximum a_e=0.5mm		 Maximum a_e=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

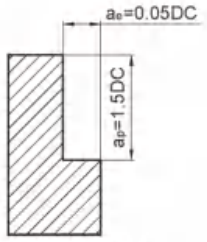
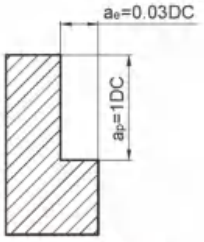
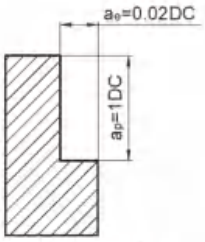
Cutting parameters for HMX series end mills

HMX-2EFP

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1155	8000	460	5300	305
8	12000	1155	6000	460	4000	305
10	9600	1155	4800	460	3200	305
12	8000	1200	4000	480	2700	325
16	6000	900	3000	360	2000	240
20	4800	720	2400	285	1600	195
Maximum cutting depth	 Maximum a_e=1.0mm		 Maximum a_e=0.5mm		 Maximum a_e=0.3mm	

1. Please select high-precision and rigidity machine and tool holder.
2. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3. Please use air blow or MQL(minimum oil mist cooling).
4. Down milling is recommended in the case of side milling.
5. Make overhang of tool as short as possible in conditions of non-interference.

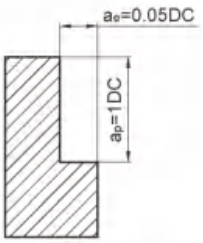
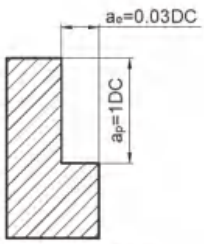
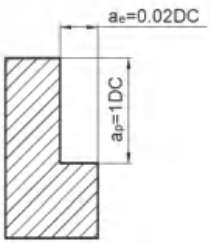
HMX-4E★HMX-4EL★HMX-4EBL/X

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	320	40000	320	32000	260
2	40000	800	24000	480	16000	320
3	32000	1020	16000	510	11000	350
4	24000	1250	12000	620	8000	420
5	19000	1360	9500	680	6400	460
6	16000	1540	8000	770	5300	510
8	12000	1540	6000	770	4000	510
10	9600	1540	4800	770	3200	510
12	8000	1600	4000	800	2700	540
14	6800	1340	3400	680	2300	460
16	6000	1200	3000	600	2000	400
18	5300	1060	2700	530	1800	360
20	4800	960	2400	480	1600	320
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

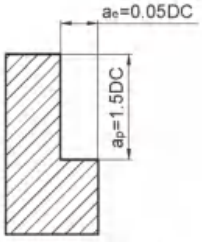
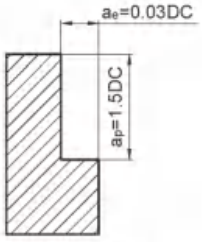
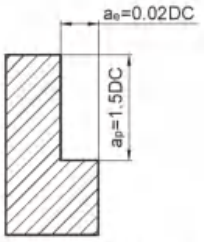
Cutting parameters for HMX series end mills

HMX-4EFP

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1730	8000	920	5300	610
8	12000	1730	6000	920	4000	610
10	9600	1730	4800	920	3200	610
12	8000	1800	4000	960	2700	650
16	6000	1350	3000	720	2000	480
20	4800	1080	2400	570	1600	390
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

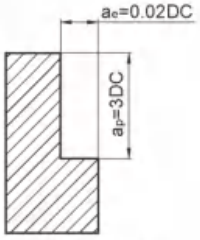
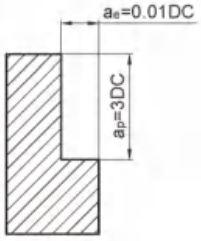
1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference

HMX-6E

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1850	8000	925	5300	610
8	12000	1850	6000	925	4000	610
10	9600	1850	4800	925	3200	610
12	8000	1920	4000	960	2700	650
14	6800	1600	3400	815	2300	550
16	6000	1440	3000	720	2000	480
18	5300	1270	2700	635	1800	430
20	4800	1150	2400	575	1600	385
Maximum cutting depth	 Maximum a_e=1.0mm		 Maximum a_e=0.5mm		 Maximum a_e=0.3mm	

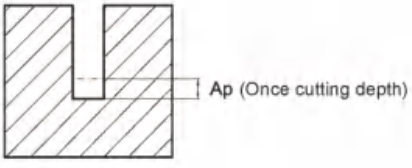
1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

HMX-6EL

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1300	8000	650	5300	430
8	12000	1300	6000	650	4000	430
10	9600	1300	4800	650	3200	430
12	8000	1350	4000	670	2700	460
14	6800	1150	3400	570	2300	380
16	6000	1000	3000	500	2000	340
18	5300	890	2700	450	1800	300
20	4800	800	2400	400	1600	270
Maximum cutting depth	 Maximum ae=0.3mm					

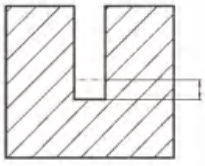
1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

HMX-2EP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC			Hardened steel 50~60HRC		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
0.5	4	21000	100	0.009	17000	50	0.009
	6	20000	75	0.006	15000	35	0.007
	8	20000	50	0.002	15000	20	0.003
0.8	4	20000	200	0.022	14000	100	0.011
	6	18000	150	0.014	14000	75	0.009
	8	18000	100	0.01	14000	50	0.006
	10	18000	75	0.007	14000	30	0.004
1.0	4	17000	400	0.035	12000	100	0.016
	6	17000	400	0.03	12000	100	0.014
	8	15000	300	0.02	10000	75	0.01
	10	15000	250	0.015	10000	50	0.008
	12	12000	150	0.01	10000	50	0.006
	14	12000	100	0.007	10000	30	0.004
1.2	6	14000	400	0.03	10000	100	0.017
	8	12000	300	0.03	10000	100	0.014
	10	12000	300	0.02	10000	75	0.01
	12	10000	200	0.01	10000	50	0.00
1.5	6	12000	400	0.06	8000	200	0.028
	8	10000	300	0.04	7000	150	0.021
	10	10000	300	0.03	7000	150	0.017
	12	10000	300	0.025	7000	100	0.01
	14	10000	250	0.02	7000	75	0.005
2.0	6	9000	400	0.13	6000	300	0.07
	8	9000	400	0.11	6000	300	0.06
	10	7000	300	0.10	6000	200	0.05
	12	7000	300	0.06	6000	200	0.03
	14	7000	250	0.04	6000	150	0.015
	16	7000	200	0.02	6000	100	0.008
Maximum cutting depth		 Ap (Once cutting depth)					

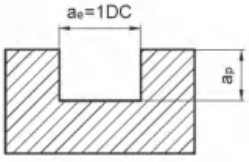
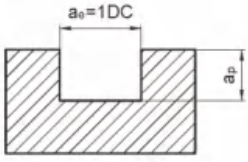
Cutting parameters for HMX series end mills

HMX-2EP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC			Hardened steel 50~60HRC		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
2.5	8	8000	400	0.16	5000	300	0.08
	10	8000	400	0.14	5000	300	0.07
	12	8000	400	0.09	5000	300	0.05
	14	6000	300	0.07	5000	200	0.03
	16	6000	300	0.05	5000	200	0.025
	18	6000	300	0.04	5000	150	0.02
	20	6000	300	0.02	5000	100	0.01
3.0	6	7000	400	0.18	5000	300	0.10
	8	7000	400	0.15	5000	300	0.08
	10	7000	400	0.12	5000	300	0.06
	12	7000	400	0.10	5000	300	0.05
	14	6000	300	0.08	5000	200	0.04
	16	6000	300	0.06	5000	200	0.03
	18	6000	300	0.05	5000	200	0.025
	20	6000	250	0.04	5000	150	0.01
4.0	12	4500	400	0.16	4000	300	0.08
	16	4500	400	0.14	4000	300	0.06
	20	4500	300	0.10	4000	300	0.04
	25	4500	300	0.08	4000	300	0.03
5.0	16	4000	400	0.19	3000	300	0.09
	25	4000	400	0.15	3000	300	0.06
Maximum cutting depth		 Ap (Once cutting depth)					

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

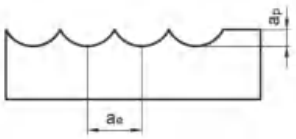
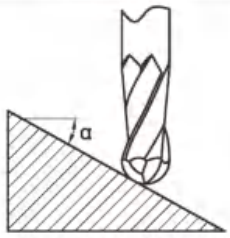
HMX-2ES

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
0.3	23000	30	16500	25
0.4	17500	30	12500	25
0.5	14000	30	10000	25
0.6	11500	30	8450	25
0.7	10000	30	7500	25
0.8	8750	30	6350	25
0.9	8000	30	5500	25
1.0	7000	30	5050	25
1.5	5050	40	3550	25
2.0	3950	40	2750	25
2.5	3500	45	2500	30
3.0	2750	45	2000	30
Maximum cutting depth		Diameter range / Cutting depth a_p: DC<Ø1 — 0.02DC; Ø1≤DC≤Ø3 — 0.05DC		Diameter range / Cutting depth a_p: DC<Ø1 — 0.01DC; Ø1≤DC≤Ø3 — 0.02DC

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for HMX series end mills

HMX-2B★HMX-2BL/M/X★HMX-2BFP

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC				Hardened steel 60~68HRC			
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.5	40000	1900	0.01	0.05	36000	1500	0.01	0.05	32000	1400	0.01	0.05
R1.0	33000	3100	0.02	0.075	26000	2100	0.02	0.075	24000	2000	0.02	0.075
R1.5	29000	4100	0.03	0.1	23000	2900	0.03	0.1	21000	2600	0.03	0.1
R2.0	22000	3900	0.04	0.15	17000	2500	0.04	0.15	15500	2100	0.04	0.15
R2.5	17500	3500	0.05	0.15	13500	2200	0.05	0.15	13000	2000	0.05	0.15
R3.0	15000	3100	0.06	0.2	11500	1700	0.06	0.2	10500	1500	0.06	0.2
R4.0	11000	2500	0.08	0.25	8600	1600	0.08	0.25	8000	1400	0.08	0.25
R5.0	9000	2000	0.1	0.3	7000	1400	0.1	0.3	6000	1200	0.1	0.3
R6.0	7500	1800	0.1	0.35	5700	1300	0.1	0.35	5300	1200	0.1	0.35
R8.0	5500	1800	0.1	0.4	4300	1300	0.1	0.4	4000	1200	0.1	0.4
R10.0	4500	1800	0.1	0.5	3500	1300	0.1	0.5	3200	1200	0.1	0.5
Maximum cutting depth												

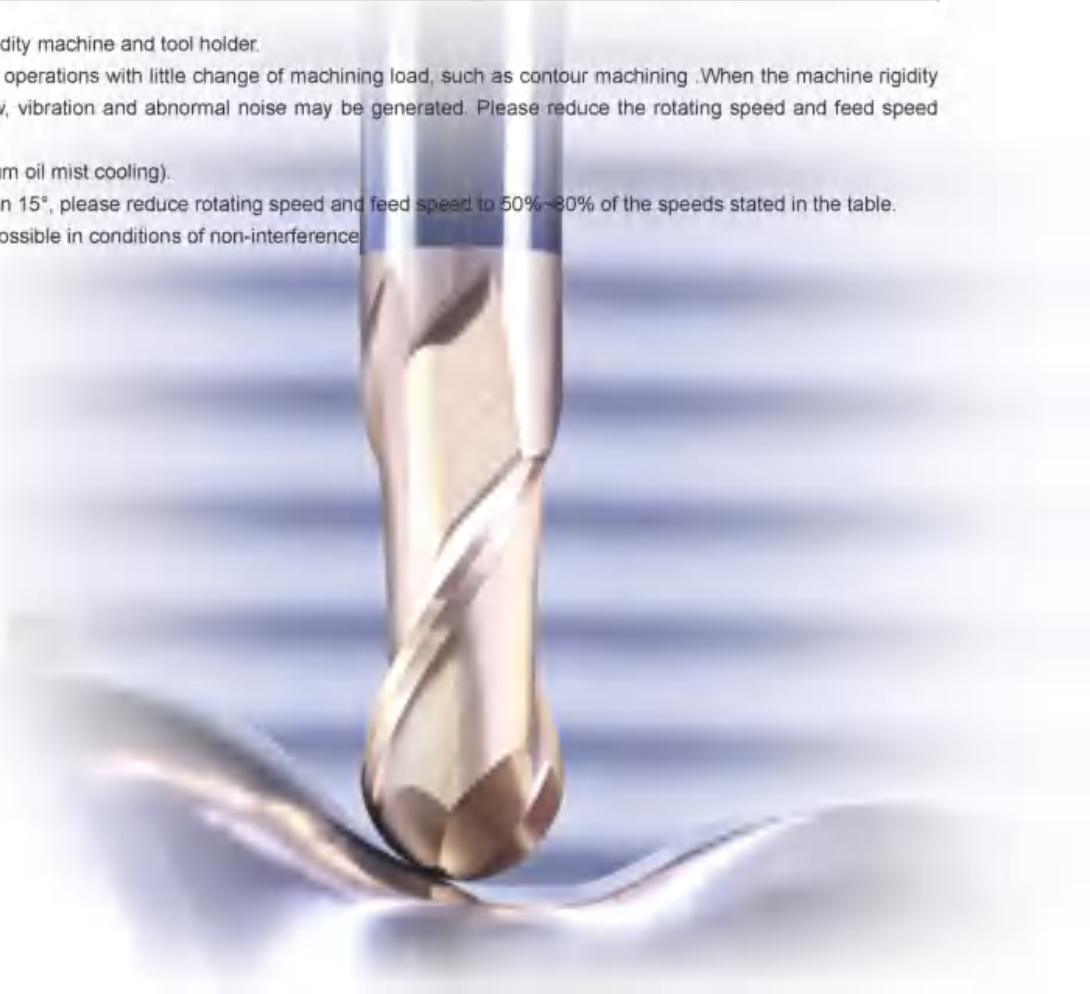
1.Please select high-precision and rigidity machine and tool holder.

2.Above table shows the standard for operations with little change of machining load, such as contour machining .When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

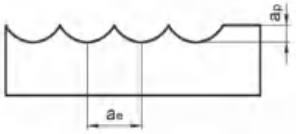
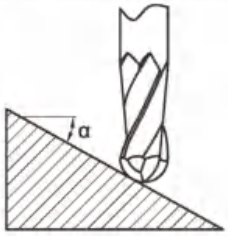
3.Please use air blow or MQL(minimum oil mist cooling).

4.When inclination angle α is more than 15°, please reduce rotating speed and feed speed to 50%~80% of the speeds stated in the table.

5.Make overhang of tool as short as possible in conditions of non-interference.



HMX-4B★HMX-4BL

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC				Hardened steel 60~68HRC			
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R1.5	29000	6560	0.03	0.1	22800	4560	0.03	0.1	21100	4240	0.03	0.1
R2.0	22000	6250	0.04	0.15	17100	4000	0.04	0.15	15800	3520	0.04	0.15
R2.5	17400	5600	0.05	0.15	13600	3520	0.05	0.15	12700	3200	0.05	0.15
R3.0	14500	5000	0.06	0.2	11400	3000	0.06	0.2	10600	2500	0.06	0.2
R4.0	10900	4200	0.08	0.25	8550	2500	0.08	0.25	7950	2250	0.08	0.25
R5.0	8700	3500	0.1	0.3	6850	2200	0.1	0.3	6350	2000	0.1	0.3
R6.0	7250	3000	0.1	0.35	5700	2000	0.1	0.35	5300	1900	0.1	0.35
R8.0	5450	3000	0.1	0.4	4280	2000	0.1	0.4	4000	1900	0.1	0.4
R10.0	4350	3000	0.1	0.5	3425	2000	0.1	0.5	3200	1900	0.1	0.5
Maximum cutting depth												

1.Please select high-precision and rigidity machine and tool holder.

2.Above table shows the standard for operations with little change of machining load, such as contour machining .When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

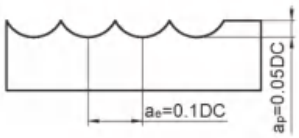
3.Please use air blow or MQL(minimum oil mist cooling).

4.When inclination angle α is more than 15°, please reduce rotating speed and feed speed to 50%~80% of the speeds stated in the table.

5.Make overhang of tool as short as possible in conditions of non-interference.

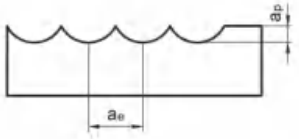
Cutting parameters for HMX series end mills

HMX-2BS

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.15	25000	135	25000	115
R0.2	25000	140	25000	120
R0.25	25000	150	25000	130
R0.3	25000	175	24000	150
R0.35	25000	190	24000	150
R0.4	24000	210	18000	140
R0.45	21000	210	15000	140
R0.5	19000	210	14000	140
R1.0	9500	210	7200	140
R1.5	6400	210	4800	140
Maximum cutting depth				

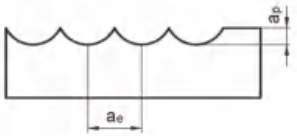
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

HMX-2BP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC			
Bullnose radius (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.25	4	27000	200	0.01	0.01	27000	100	0.01	0.01
	6	20000	150	0.005	0.01	20000	75	0.005	0.005
R0.3	4	24000	200	0.03	0.06	17000	150	0.02	0.04
	6	20000	150	0.02	0.03	17000	150	0.01	0.02
	8	20000	120	0.02	0.03	17000	120	0.01	0.02
R0.4	4	21000	300	0.04	0.08	14500	200	0.03	0.08
	6	19000	200	0.02	0.04	12000	150	0.02	0.04
	8	17000	150	0.02	0.04	12000	100	0.02	0.04
	10	17000	135	0.02	0.03	12000	75	0.01	0.02
R0.5	4	21000	300	0.05	0.10	14500	200	0.05	0.10
	6	16000	200	0.05	0.10	11500	150	0.05	0.10
	8	16000	180	0.03	0.05	11500	135	0.03	0.05
	10	14000	150	0.01	0.03	9800	100	0.01	0.03
	12	14000	135	0.01	0.03	9800	75	0.01	0.03
R0.6	6	14000	200	0.06	0.12	9500	175	0.06	0.12
	8	14000	180	0.06	0.12	9500	150	0.06	0.12
	12	11000	150	0.04	0.06	7500	100	0.03	0.06
	16	11000	135	0.02	0.04	7500	75	0.02	0.03
R0.75	8	12000	250	0.08	0.15	8000	200	0.08	0.15
	12	12000	225	0.06	0.15	8000	175	0.06	0.15
	16	9500	150	0.01	0.05	6500	100	0.01	0.03
R1.0	6	13500	400	0.10	0.20	7500	225	0.10	0.20
	8	13500	400	0.10	0.16	7500	225	0.10	0.16
	10	10000	275	0.08	0.16	5500	175	0.08	0.16
	12	10000	275	0.06	0.16	5500	175	0.06	0.16
	16	10000	250	0.02	0.10	5500	150	0.02	0.10
	20	8000	175	0.02	0.05	5500	125	0.01	0.05
Maximum cutting depth									

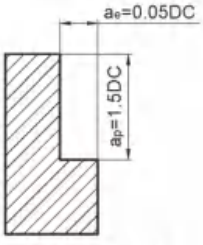
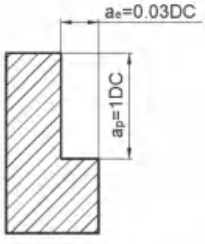
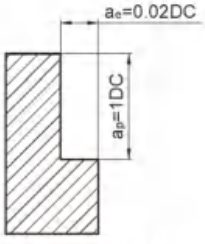
Cutting parameters for HMX series end mills

HMX-2BP

Workpiece material		Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC			
Bullnose radius (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R1.25	8	12500	400	0.10	0.16	7000	225	0.10	0.16
	12	9000	275	0.06	0.16	5000	175	0.06	0.16
	16	9000	250	0.02	0.10	5000	150	0.02	0.10
	20	5500	175	0.02	0.05	5000	125	0.01	0.05
R1.5	10	7500	400	0.10	0.30	4000	200	0.10	0.30
	12	7500	360	0.10	0.30	4000	180	0.10	0.30
	16	6500	250	0.05	0.20	3000	150	0.05	0.20
	20	6500	250	0.02	0.10	3000	150	0.02	0.05
R2.0	10	6000	400	0.20	0.40	3000	200	0.20	0.40
	16	6000	400	0.10	0.32	3000	200	0.20	0.20
	20	5000	250	0.10	0.20	2500	100	0.10	0.20
	25	5000	250	0.10	0.20	2500	100	0.10	0.10
R2.5	16	5000	400	0.25	0.50	3000	200	0.2	0.2
	25	4000	250	0.25	0.50	3000	100	0.20	0.2
Maximum cutting depth									

1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

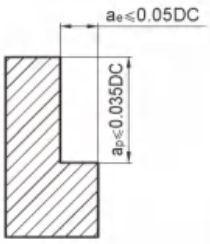
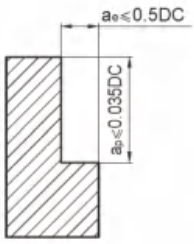
HMX-4R★HMX-4RBL/M/X★HMX-4RP★HMX-4RF

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	32000	1225	16000	610	11000	420
4	24000	1500	12000	745	8000	500
5	19000	1630	9500	815	6400	550
6	16000	1850	8000	925	5300	610
8	12000	1850	6000	925	4000	610
10	9600	1850	4800	925	3200	610
12	8000	1920	4000	960	2700	648
16	6000	1440	3000	720	2000	480
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in conditions of non-interference.

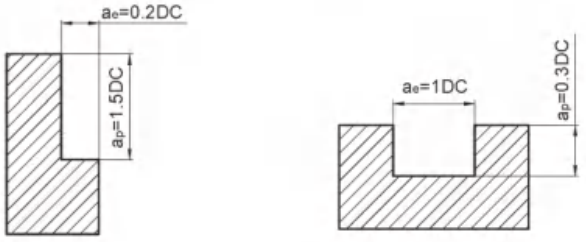
Cutting parameters for HMX series end mills

HMX-6R-MAX

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Cutting speed	100m/min		80m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	3200	4200	2600
8	4000	3200	3200	2600
10	3200	3200	2600	2600
12	2600	3200	2200	2600
16	2000	3600	1600	2800
20	1600	3600	1300	2800
Maximum cutting depth				

1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Make overhang of tool as short as possible in conditions of non-interference.

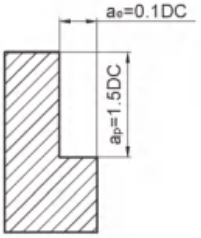
RM-4E★RM-5E

Workpiece material	Heat resistant alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
6	1592	0.012~0.025
8	1195	0.013~0.029
10	955	0.016~0.035
12	796	0.016~0.038
14	682	0.018~0.041
16	597	0.018~0.045
20	478	0.018~0.049
25	382	0.019~0.051
Maximum cutting depth		

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for RM series end mills

RM-6E

Workpiece material	Heat resistant alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
10	955	0.015~0.035
12	796	0.016~0.038
14	682	0.018~0.041
16	597	0.018~0.045
20	478	0.018~0.049
25	382	0.019~0.051
Maximum cutting depth		

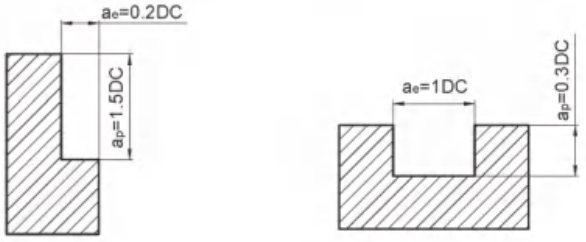
1.The above table shows the standard value of side milling. When milling slot, please apply end mills with 4 flutes or 5 flutes.

2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.

3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.

4.Make overhang of tool as short as possible in conditions of non-interference.

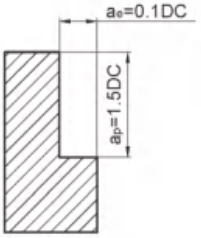
RM-4R★RM-5R

Workpiece material	Heat resistant alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
6	1592	0.012~0.025
8	1195	0.013~0.029
10	955	0.016~0.035
12	796	0.016~0.038
14	682	0.018~0.041
16	597	0.018~0.045
20	478	0.018~0.049
25	382	0.019~0.051
Maximum cutting depth		

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

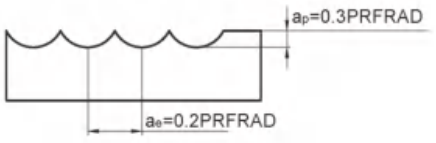
Cutting parameters for RM series end mills

RM-6R★RM-7R

Workpiece material	Heat resistant alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
10	955	0.015~0.035
12	796	0.016~0.038
14	682	0.018~0.041
16	597	0.018~0.045
20	478	0.018~0.049
25	382	0.019~0.051
Maximum cutting depth		

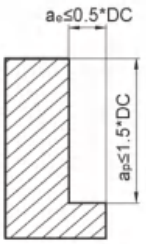
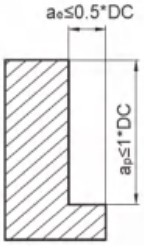
1.The above table shows the standard value of side milling. When milling slot, please apply end mills with 4 flutes or 5 flutes.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

RM-4B

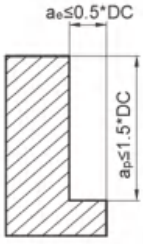
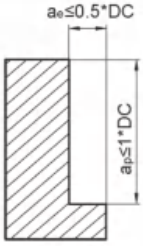
Workpiece material	Heat resistant alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
6	1858	0.02~0.05
8	1393	0.025~0.07
10	1115	0.03~0.08
12	928	0.032~0.085
16	696	0.04~0.12
20	557	0.041~0.13
Maximum cutting depth		

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

MM-4E★MM-4EF

Workpiece material	Carbon steel, alloy steel		Stainles steel	
Cutting parameters	80~250		70~120	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)	Rotating speed (min^{-1})	Feed speed (mm/z)
1	20000	800	20000	800
2	12700	760	12700	760
4	7960	800	7960	800
6	6400	830	5300	640
8	4800	810	4000	640
10	3800	800	3200	600
12	3200	800	2650	600
16	2400	760	2000	550
20	1900	740	1600	500
20	1900	400	1600	270
Maximum cutting depth				

MM-4R★MM-4RFP

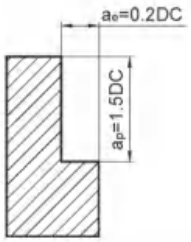
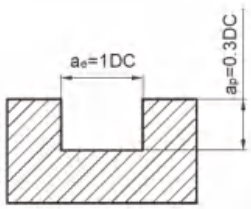
Workpiece material	Carbon steel, alloy steel		Stainles steel	
Cutting parameters	80~250		70~120	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)	Rotating speed (min^{-1})	Feed speed (mm/z)
1	20000	1000	20000	1000
2	12700	950	12700	950
4	7960	1000	7960	1000
6	6400	1000	5300	800
8	4800	1000	4000	800
10	3800	1000	3200	750
12	3200	1000	2650	750
16	2400	950	2000	680
20	1900	900	1600	620
Maximum cutting depth				

TM-4R★TM-4RP★TM-4B

Workpiece material	α phase titanium alloy(TA)		α+β phase titanium alloy(TC)		β phase titanium alloy(TB)	
Diameter (mm)	Cutting speed (m/min)	Feed (mm/r)	Cutting speed (m/min)	Feed (mm/r)	Cutting speed (m/min)	Feed (mm/r)
DC6.0~DC10.0	40~120	0.16~0.36	30~100	0.16~0.36	30~60	0.12~0.28
DC10.0~DC14.0		0.20~0.40		0.20~0.40		0.16~0.32
DC14.0~DC20.0		0.30~0.48		0.30~0.48		0.20~0.40
DC20.0~DC25.0		0.32~0.60		0.32~0.60		0.24~0.48

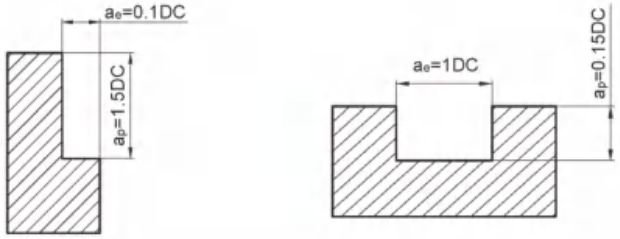
Note: High temperature alloy end mills' cutting data please referring to β phase titanium alloy recommended cutting data.

TM-4E

Workpiece material	Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
6	2654	0.03~0.05
8	1990	0.035~0.058
10	1592	0.036~0.061
12	1327	0.038~0.065
14	1137	0.038~0.065
16	995	0.04~0.072
20	796	0.041~0.09
25	637	0.043~0.10
Maximum cutting depth	 	

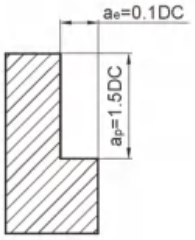
1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

TM-5R

Workpiece material	Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
6	4246	0.03~0.05
8	3185	0.035~0.058
10	2548	0.036~0.061
12	2123	0.038~0.065
14	1820	0.038~0.065
16	1592	0.04~0.072
20	1274	0.041~0.09
25	1019	0.043~0.10
Maximum cutting depth		

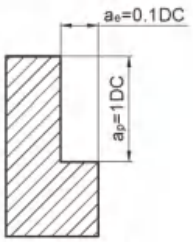
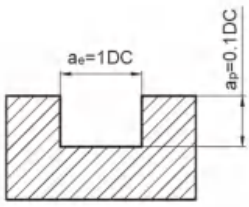
1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

TM-6R

Workpiece material	Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
10	1273	0.02~0.045
12	1061	0.028~0.048
14	910	0.03~0.055
16	796	0.04~0.07
20	636	0.042~0.08
25	510	0.045~0.09
Maximum cutting depth		

1.The above table shows the standard value of side milling. When milling slot, please apply end mills with 4 flutes or 5 flutes.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

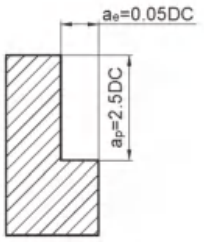
NM-2E

Workpiece material	Copper，Alloy of copper	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	1800
2	30000	2500
3	20000	2300
4	15000	2000
5	12000	1500
6	10000	1400
8	8000	1000
10	6500	900
12	5500	850
Maximum cutting depth	 Maximum a_e=1.0mm  Maximum a_p=1.0mm	

1.The above table shows the standard value of side milling. When milling slot,70% of feed speed stated above are recommend as standard.
2.Please select high-rigidity and high-precision machine and tool holder. When the machine rigidity and workpiece fixture stability is low,vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed above correspondingly.
3.When cutting depth is smaller, rotating speed and feed speed can be increased correspondingly.
4.Please select water-soluble cutting liquid.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in condition of non-interference.

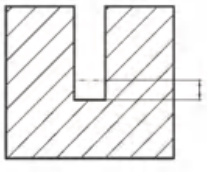
Cutting parameters for NM series end mills

NM-4E

Workpiece material	Copper，Alloy of copper	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	10600	250
4	8000	300
5	6500	400
6	5300	400
8	4000	450
10	3500	450
12	3000	450
Maximum cutting depth	 Maximum a_p=0.5mm	

1.Please select high-precision and rigidity machine and tool holder. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed above correspondingly.
2.When cutting depth is small, rotating speed and feed speed can be increased correspondingly.
3.Please select water-soluble cutting liquid.
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in condition of non-interference.

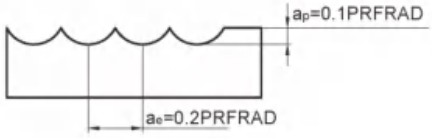
NM-2EP

Workpiece material		Copper、Alloy of copper		
Diameter (mm)	Effective length(mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
0.5	4	40000	800	0.004
	6	40000	700	0.002
	8	40000	500	0.001
0.8	4	40000	1000	0.02
	6	40000	1000	0.015
	8	40000	800	0.01
	10	40000	600	0.005
1.0	4	40000	1800	0.04
	6	40000	1500	0.04
	8	40000	1500	0.03
	10	30000	1000	0.02
	12	30000	800	0.015
	14	30000	600	0.01
1.5	8	40000	2000	0.09
	16	20000	1000	0.03
2.0	6	40000	2400	0.18
	8	40000	2200	0.15
	10	40000	2000	0.12
	12	30000	1500	0.10
	14	30000	1200	0.08
	16	30000	1000	0.06
2.5	10	40000	2500	0.15
	20	20000	1000	0.08
3.0	10	20000	2500	0.20
	20	20000	2000	0.12
4.0	16	15000	1800	0.25
	25	15000	1200	0.15
5.0	16	12000	2000	0.40
	25	12000	1500	0.35
Maximum cutting depth		 Ap（once cutting depth）		

1.Please select high-precision machine and tool holder.
2.Please select water-soluble cutting liquid.
3.Make overhang of tool as short as possible in condition of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for NM series end mills

NM-2B

Workpiece material	Copper，Alloy of copper	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.5	40000	900
R0.75	32000	800
R1.0	24000	870
R1.25	19000	800
R1.5	16000	850
R1.75	14000	850
R2.0	12000	900
R2.5	9600	900
R3.0	8000	1200
R4.0	7000	1500
R5.0	4800	1300
R6.0	4000	1200
Maximum cutting depth		

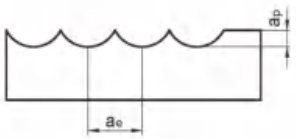
1.Please select high-precision and rigidity machine and tool holder. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed above correspondingly.

2.When cutting depth is small, rotating speed and feed speed can be increased correspondingly.

3.Please select water-soluble cutting liquid.

4.Make overhang of tool as short as possible in condition of non-interference.

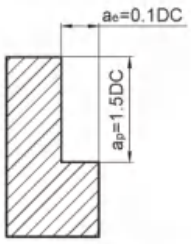
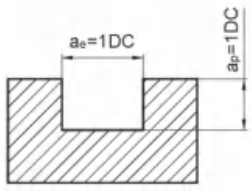
NM-2BP

Workpiece material		Copper, Alloy of copper			
Bullnose radius (mm)	Effective length(mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.25	4	40000	750	0.01	0.025
	6	36000	500	0.008	0.02
R0.3	4	40000	900	0.012	0.03
	6	40000	750	0.010	0.02
	8	30000	400	0.008	0.01
R0.4	4	40000	1050	0.016	0.04
	6	40000	800	0.012	0.03
	8	40000	500	0.01	0.02
	10	30000	400	0.008	0.01
R0.5	4	40000	1050	0.02	0.05
	6	40000	800	0.016	0.04
	8	40000	500	0.014	0.03
	10	33000	400	0.012	0.02
	12	35000	300	0.010	0.010
R0.75	8	40000	900	0.03	0.075
	16	20000	400	0.015	0.04
R1.0	6	40000	1100	0.04	0.10
	8	40000	900	0.034	0.08
	10	40000	750	0.028	0.065
	12	40000	500	0.022	0.05
	16	30000	400	0.018	0.04
	20	20000	300	0.012	0.03
R1.5	10	40000	1100	0.06	0.15
	20	32000	600	0.03	0.08
R2.0	10	32000	1100	0.08	0.20
	16	32000	900	0.06	0.16
	20	32000	600	0.04	0.12
	25	20000	400	0.02	0.08
R2.5	16	25000	1250	0.10	0.25
	25	20000	900	0.06	0.12
Maximum cutting depth					

1.Please select high-precision machine and tool holder.
2.Please select water-soluble cutting liquid.
3.Make overhang of tool as short as possible in condition of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

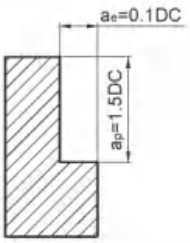
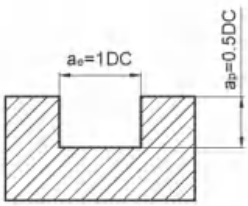
Cutting parameters for ALU series end mills

ALU-3E (water cooling)

Workpiece material	Aluminum alloy		Silicon aluminum alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	50000	800	50000	625
1.5	50000	1000	50000	920
2	40000	950	40000	930
2.5	31500	785	31500	720
3	29500	2000	23000	1420
4	21500	2150	18000	1680
5	18000	1960	14500	1450
6	14500	1670	11600	1310
8	11000	1815	9000	1450
10	9000	2100	7500	1730
12	7100	2050	5800	1680
16	5500	2100	4500	1700
20	4400	2150	3500	1730
Maximum cutting depth				

2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

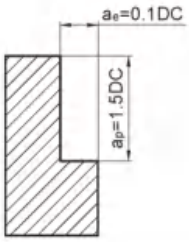
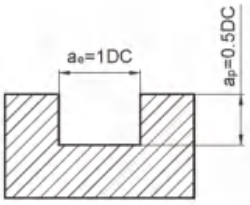
AL-2E★AL-2EL

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	650	40000	500
2	40000	950	32000	750
3	26500	1500	21000	1100
4	20000	1600	16000	1250
5	16000	1500	13000	1100
6	13000	1250	10600	1000
8	10000	1400	8000	1100
10	8000	1600	6500	1250
12	6600	1650	5300	1300
14	5700	1700	4600	1350
16	5000	1700	4000	1350
18	4400	1700	3500	1350
20	4000	1700	3200	1350
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table.
2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.
4.Please use water-soluble cutting liquid.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in conditions of non-interference.

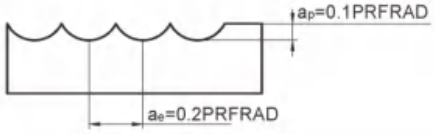
Cutting parameters for AL series end mills

AL-3E★AL-3EL

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	800	40000	600
2	40000	1200	32000	900
3	26500	1800	21000	1300
4	20000	2000	16000	1500
5	16000	1750	13000	1300
6	13000	1500	10600	1200
8	10000	1650	8000	1300
10	8000	1900	6500	1500
12	6600	1950	5300	1550
14	5700	2000	4600	1600
16	5000	2000	4000	1600
18	4400	2000	3500	1600
20	4000	2000	3200	1600
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table.
2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.
4.Please use water-soluble cutting liquid.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in conditions of non-interference.

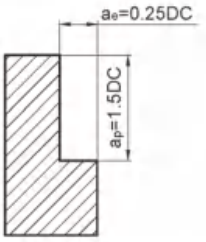
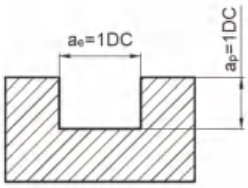
AL-2B

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Bullnose radius (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R1.0	40000	2000	32000	1600
R1.5	26500	1950	21000	1550
R2.0	20000	1950	16000	1550
R2.5	16000	1950	13000	1550
R3.0	13000	2000	10600	1600
R4.0	10000	2450	8000	2000
R5.0	8000	2200	6500	1750
R6.0	6600	2050	5300	1650
Maximum cutting depth				

1.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
2.If the cutting depth is low, it is possible to increase the rotating speed and feed speed correspondingly.
3.Please use water-soluble cutting liquid.
4.Make overhang of tool as short as possible in conditions of non-interference.

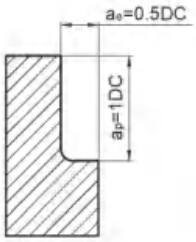
Cutting parameters for AL series end mills

AL-3W

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Cutting speed	250m/min		200m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	13000	3000	10600	1900
8	10000	3000	8000	1900
10	8000	2900	6500	1850
12	6600	2700	5300	1700
14	5700	2600	4600	1650
16	5000	2550	4000	1600
18	4400	2500	3500	1550
20	4000	2400	3200	1500
Maximum cutting depth				

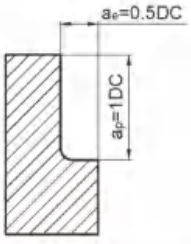
1. The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table, and feed rate 50%.
2. Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
3. It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.
4. Please use water-soluble cutting liquid.
5. Down milling is recommended in the case of side milling.
6. Make overhang of tool as short as possible in conditions of non-interference.

AL-2R-AIR

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Cutting speed	500~800m/min		500~800m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	35000	3500	35000	3500
8	26000	3800	26000	3800
10	21000	4000	21000	4000
12	18000	4300	18000	4300
16	15000	4800	15000	4800
20	12000	5500	12000	5500
Maximum cutting depth				

1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration.Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

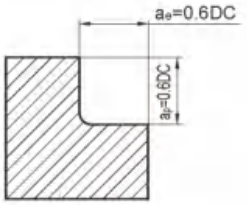
AL-2RL-AIR

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Cutting speed	500~800m/min		500~800m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	30000	3000	30000	3000
8	24000	3200	24000	3200
10	20000	3500	20000	3500
12	16000	3800	16000	3800
16	12000	4000	12000	4000
20	10000	4600	10000	4600
Maximum cutting depth				

1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration. Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

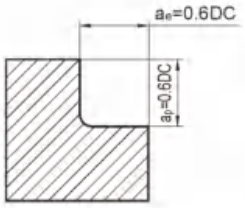
Cutting parameters for AL series end mills

AL-3R-AIR

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Cutting speed	800~1200m/min		800~1200m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
12	25000	6000	25000	6000
16	20000	6400	20000	6400
20	15000	7000	15000	7000
Maximum cutting depth				

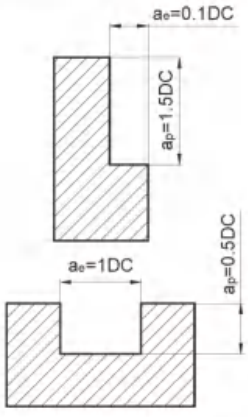
1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration. Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

AL-3RL-AIR

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Cutting speed	800~1200m/min		800~1200m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
12	22000	5300	22000	5300
16	18000	5700	18000	5700
20	13000	6000	13000	6000
Maximum cutting depth				

1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration. Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

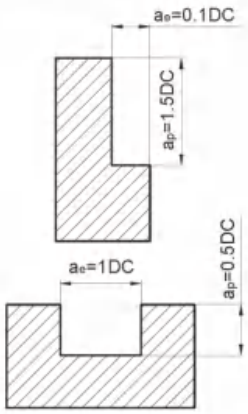
ALG-2E

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	650	40000	500
2	40000	950	32000	750
3	26500	1500	21000	1100
4	20000	1600	16000	1250
5	16000	1500	13000	1100
6	13000	1250	10600	1000
8	10000	1400	8000	1100
10	8000	1600	6500	1250
12	6600	1650	5300	1300
14	5700	1700	4600	1350
16	5000	1700	4000	1350
18	4400	1700	3500	1350
20	4000	1700	3200	1350
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot,70% of feed speed stated above are recommend as standard.
2.Please select high-rigidity and high-precision machine and tool holder. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed above correspondingly.
3.When cutting depth is smaller,rotating speed and feed speed can be increased correspondingly.
4.Please select water-soluble cutting liquid.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in condition of non-interference.

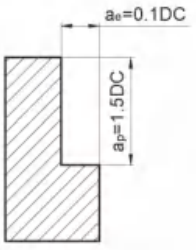
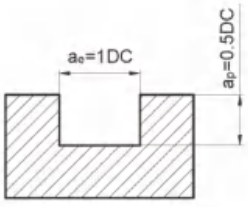
Cutting parameters for ALG series end mills

ALG-3E

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	800	40000	600
2	40000	1200	32000	900
3	26500	1800	21000	1300
4	20000	2000	16000	1500
5	16000	1750	13000	1300
6	13000	1500	10600	1200
8	10000	1650	8000	1300
10	8000	1900	6500	1500
12	6600	1950	5300	1550
14	5700	2000	4600	1600
16	5000	2000	4000	1600
18	4400	2000	3500	1600
20	4000	2000	3200	1600
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, 70% of feed speed stated above are recommend as standard.
2.Please select high-rigidity and high-precision machine and tool holder. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed above correspondingly.
3.When cutting depth is smaller, rotating speed and feed speed can be increased correspondingly.
4.Please select water-soluble cutting liquid.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in condition of non-interference.

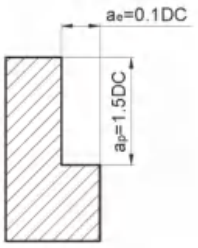
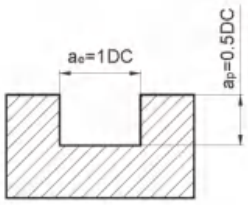
ALG-2R

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	710	40000	550
2	40000	1040	32000	820
3	26500	1650	21000	1210
4	20000	1760	16000	1370
6	13000	1370	10600	1100
8	10000	1540	8000	1210
10	8000	1760	6500	1370
12	6600	1810	5300	1430
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

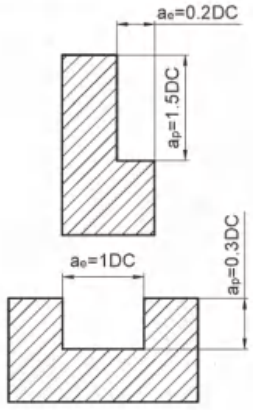
Cutting parameters for ALG series end mills

ALG-3R

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	880	40000	660
2	40000	1320	32000	990
3	26500	1980	21000	1430
4	20000	2200	16000	1650
6	13000	1650	10600	1320
8	10000	1810	8000	1430
10	8000	2090	6500	1650
12	6600	2140	5300	1700
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
4.Down milling is recommended in the case of side milling.
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6.Make overhang of tool as short as possible in conditions of non-interference.

SM-3E

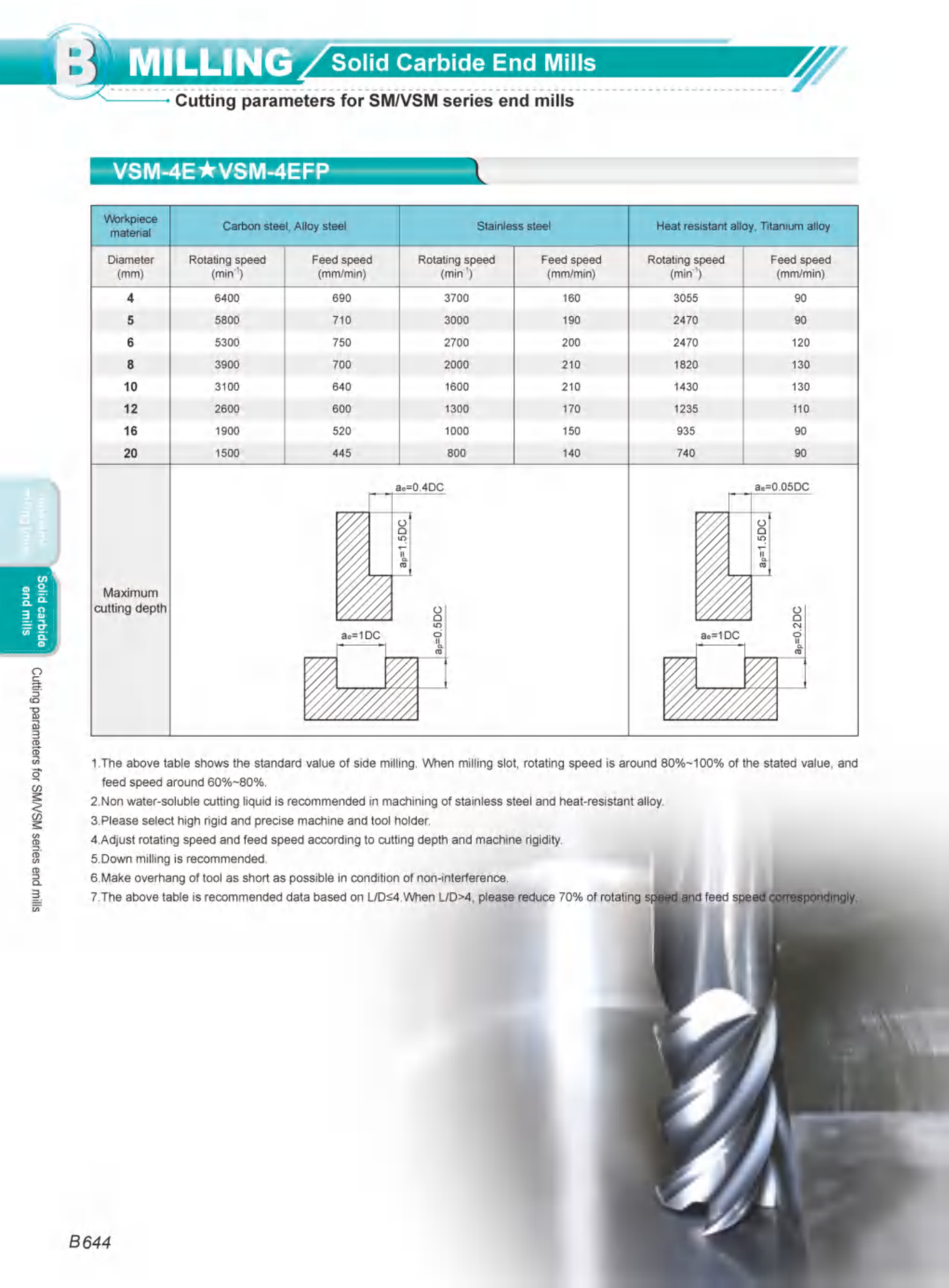
Workpiece material	Carbon steel, Alloy steel		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	8500	660	4400	100
4	6400	690	3700	160
5	5800	710	3000	190
6	5300	750	2700	200
8	3900	700	2000	210
10	3100	640	1600	210
12	2600	600	1300	170
16	1900	520	1000	130
20	1500	445	800	140
Maximum cutting depth				

1. The above table shows the standard value of side milling. When milling slot, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2. Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3. Please select high rigid and precise machine and tool holder.
4. Adjust rotating speed and feed speed according to cutting depth and machine rigidity.
5. Down milling is recommended in the case of side milling.
6. Make overhang of tool as short as possible in conditions of non-interference.

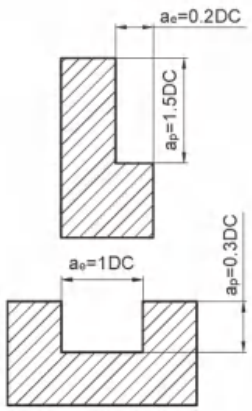
VSM-4E★VSM-4EFP

Workpiece material	Carbon steel, Alloy steel		Stainless steel		Heat resistant alloy, Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4	6400	690	3700	160	3055	90
5	5800	710	3000	190	2470	90
6	5300	750	2700	200	2470	120
8	3900	700	2000	210	1820	130
10	3100	640	1600	210	1430	130
12	2600	600	1300	170	1235	110
16	1900	520	1000	150	935	90
20	1500	445	800	140	740	90
Maximum cutting depth						

1.The above table shows the standard value of side milling. When milling slot, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2.Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3.Please select high rigid and precise machine and tool holder.
4.Adjust rotating speed and feed speed according to cutting depth and machine rigidity.
5.Down milling is recommended.
6.Make overhang of tool as short as possible in condition of non-interference.
7.The above table is recommended data based on L/D≤4.When L/D>4, please reduce 70% of rotating speed and feed speed correspondingly.

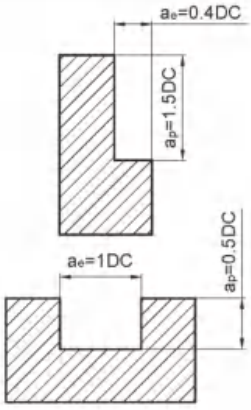
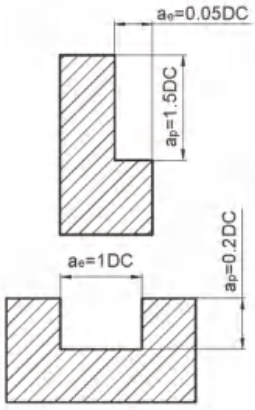


SM-4R

Workpiece material	Carbon steel, Alloy steel		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	900	2700	240
8	3900	840	2000	255
10	3100	770	1600	255
12	2600	720	1300	205
Maximum cutting depth				

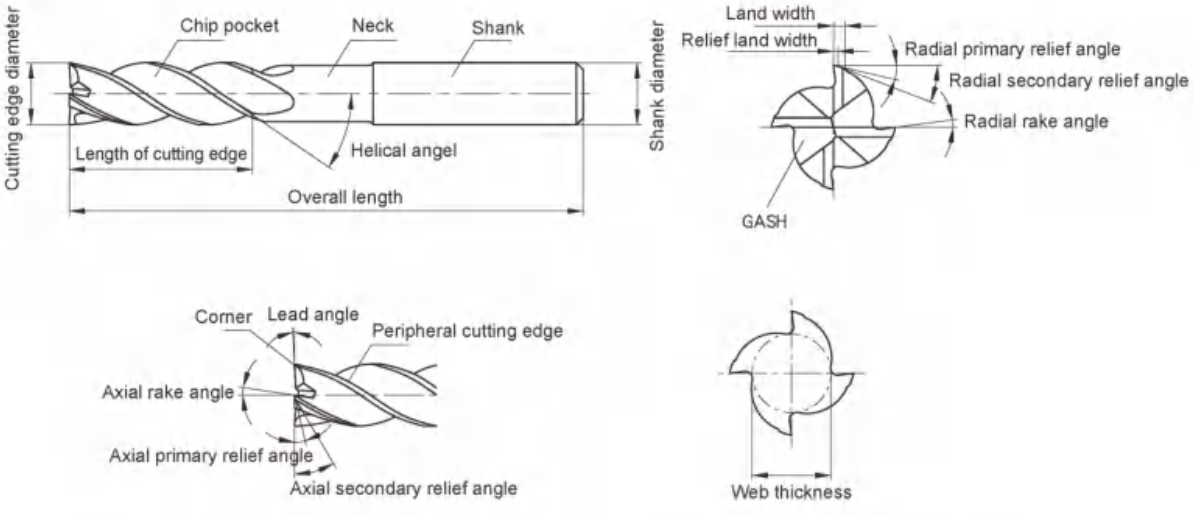
1.The above table shows the standard value of side milling. When milling slot, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2.Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3.Please select high rigid and precise machine and tool holder.
4.Adjust rotating speed and feed speed according to cutting depth and machine rigidity.
5.Down milling is recommended in the case of side milling.
6.Make overhang of tool as short as possible in conditions of non-interference.

VSM-4R★VSM-4RFP

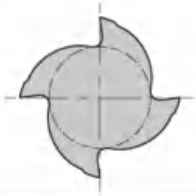
Workpiece material	Carbon steel, Alloy steel		Stainless steel		Heat resistant alloy, Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	900	2700	240	2470	145
8	3900	840	2000	255	1820	155
10	3100	770	1600	255	1430	155
12	2600	720	1300	205	1235	135
16	1900	625	1000	180	935	110
Maximum cutting depth						

1. The above table shows the standard value of side milling. When milling slot, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2. Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3. Please select high rigid and precise machine and tool holder.
4. Adjust rotating speed and feed speed according to cutting depth and machine rigidity.
5. Down milling is recommended.
6. Make overhang of tool as short as possible in condition of non-interference.
7. The above table is recommended data based on L/D≤4. When L/D>4, please reduce 70% of rotating speed and feed speed correspondingly.

Parts terminology of end mill

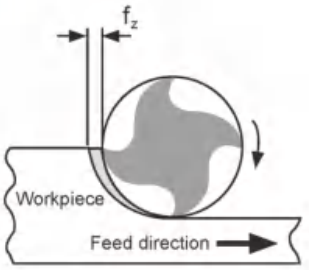


Number of teeth, chip pocket and tool rigidity

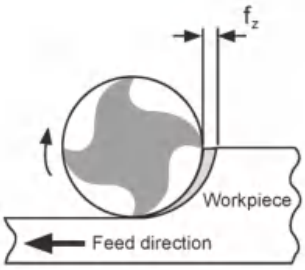
Number of teeth		2 Flutes	3 Flutes	4 Flutes
Profile of cross section				
Proportion of cross section		54%	56%	60%
Features	Advantages	● Large chip pocket ● Easy chip removal	● Easy chip removal ● Perfect surface finish	● Good rigidity ● Perfect surface finish
	Disadvantages	Low rigidity	Difficult to measure external diameter	Chip removal is not smooth
Functions		1. Slot machining 2. Side face machining 3. Hole machining	1. Slot machining 2. Side face machining 3. Heavy cutting 4. For finishing	1. Shallow slot machining 2. Side face machining 3. For finishing

Down milling and up milling

Side milling

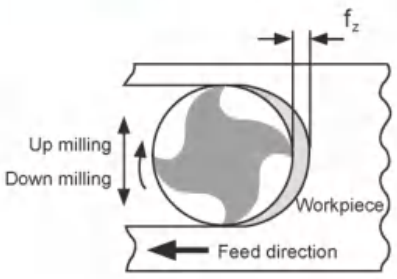


(a) up milling



(b) Down milling

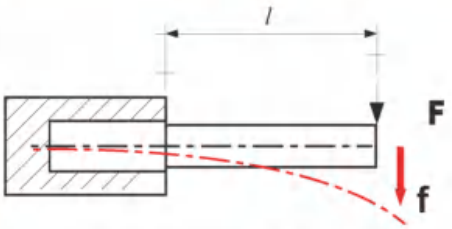
Slot milling



Length of cutting edge (overhang) and cutting edge diameter

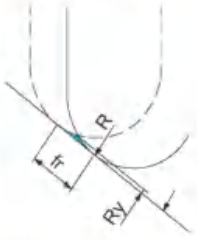
The shorter of overhang is, the higher the rigidity is. Thus it is not easy to bend or vibrate in the cutting process, and machining precision is improved. When length of cutting edge (overhang) doubles, the Deflection degree (f) will be 8 times of the original.

When the overhang is reduced by 20%, the Deflection degree (f) will decrease by 50%.
When the diameter increases by 20%, the Deflection degree (f) will decrease by 50%.



$$f = \frac{F \cdot l^3}{3 \cdot E \cdot I} = \frac{F \cdot l^3 \cdot 64}{3 \cdot E \cdot d^4 \cdot \pi}$$

Feed rate selection table in profile machining by ball nose and R end mills



$$Ry=R\times\{1-\cos[\arcsin(fr/2R)]\}$$

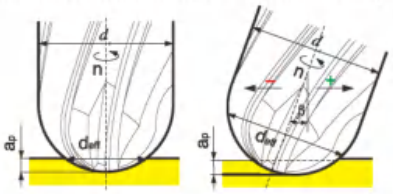
Ry: Theoretical value of surface roughness
fr: Feed rate
R: Ball nose radius or corner radius

Table of theoretical roughness formed by ball nose of end mill (corner radius of R end mill) and feed rate(mm)

Ry / RE	Feed rate fr									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.5	0.003	0.010	0.023	0.042	0.067	0.100				
1.0	0.001	0.005	0.011	0.020	0.032	0.046	0.063	0.083	0.107	
1.5	0.001	0.003	0.008	0.013	0.021	0.030	0.041	0.054	0.069	0.086
2.0	0.001	0.003	0.006	0.010	0.015	0.023	0.031	0.040	0.051	0.064
2.5	0.001	0.002	0.005	0.008	0.013	0.018	0.025	0.032	0.041	0.051
3.0		0.001	0.004	0.007	0.010	0.015	0.020	0.027	0.034	0.042
4.0		0.001	0.003	0.005	0.008	0.011	0.015	0.020	0.025	0.031
5.0		0.001	0.002	0.004	0.006	0.009	0.012	0.016	0.020	0.025
6.0			0.002	0.003	0.005	0.008	0.010	0.013	0.017	0.021
8.0			0.001	0.003	0.004	0.006	0.008	0.010	0.013	0.016
10.0			0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.013
12.5			0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010

Ry / RE	Feed rate fr									
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0.5										
1.0										
1.5	0.104									
2.0	0.077	0.092	0.109							
2.5	0.061	0.073	0.086	0.100						
3.0	0.051	0.061	0.071	0.083	0.095	0.109				
4.0	0.038	0.045	0.053	0.062	0.071	0.081	0.091	0.103		
5.0	0.030	0.036	0.042	0.049	0.057	0.064	0.073	0.082	0.091	0.101
6.0	0.025	0.030	0.035	0.041	0.047	0.054	0.061	0.068	0.076	0.084
8.0	0.019	0.023	0.026	0.031	0.035	0.040	0.045	0.051	0.057	0.063
10.0	0.015	0.018	0.021	0.025	0.028	0.032	0.036	0.041	0.045	0.050
12.5	0.012	0.014	0.017	0.020	0.023	0.026	0.029	0.032	0.036	0.040

Cutting parameters calculation

Symbol	Description	Formula
n	Rotating speed per minute n[min^{-1}]r/min	$n=\frac{v_c \cdot 1000}{d \cdot \pi}$
v_c	Cutting speed Vc[m/min]	$v_c=\frac{d \cdot \pi \cdot n}{1000}$
f_z	Amount of feed per tooth fz[mm/tooth]	$f_z=\frac{V_f}{z \cdot n}$
f	Amount of feed per rotation fz[mm/rev.]	$f=f_z \cdot z$
V_f	Feed rate Vf[mm/min]	$V_f=f_z \cdot z \cdot n=f \cdot n$
Q	Removal rate Q[cm^3/min]	$Q=\frac{a_e \cdot a_p \cdot v_f}{1000}$
d_{eff}	Effective diameter of ball nose end mill deff[mm] 	$\beta = 0$ $d_{eff}=2 \cdot \sqrt{d \cdot a_p - a_p^2}$ $\beta \neq 0$ $d_{eff}=d \cdot sin[\beta \pm arccos(\frac{d-2a_p}{d})]$
V_{eff}	Effective cutting speed of end mill Veff[m/min]	$V_{eff}=\frac{d_{eff} \cdot \pi \cdot n}{1000}$
a_e	Radial cutting width ae[mm]	
a_p	Axial cutting depth ap[mm]	
d	Milling diameter[mm]	
z	Number of teeth	
β	Inclined angle	

Common problems and solutions for end mill

Solutions / Common problems		Tool material	Cutting condition							Tool shape			Machine clamping				
							Cutting liquid										
		Select coated end mill	Cutting speed	Feed rate	Cutting depth	Cutting direction (down / up milling)	Increase the amount of cutting liquid	Water-insoluble cutting liquid	Dry or wet machining	Helical angle	Number of tooth	Milling diameter	Reduce the overhang length	Improve tool clamping precision	Change collet	Increase clamping force	Improve workpiece clamping rigidity
Tool fracture	Fracture of end mill			↓	↓						↓	↑	✓		✓	✓	
Damage of cutting edge	Rapid wear of cutting edge	✓	↓	↑		down		✓				↑					
	Breakage		↓	↓	↓	down			dry				✓		✓		✓
	Severe chips bond	✓					✓		wet	↑							
Machining precision	Poor surface quality		↑	↓	↓			✓	wet					✓			
	Uneven			↓	↓					↓	↑	↑		✓	✓		
	Uneven side face of workpiece			↓	↓	up		✓		↑	↑	↑	✓				
	Burrs, breakage and slice frittering			↓	↓					↓							
	Large vibration		↓	↑						↑	↓	↑	✓		✓	✓	✓
Chip control	obstructed chip removal			↓	↓		✓				↓						
Others		1.Large abrasion of cutting edge is easy to cause fracture of end mill or poor surface quality, so it is recommended to regrind the end mills. 2.Make overhang of tool as short as possible.															

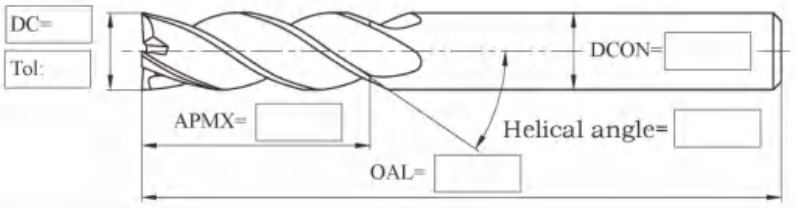
Customer name: Fax: Tel: E-MAIL:	ZCC·CT Huanghe south road, Tianyuan Zone, Zhuzhou, Hunan,P.R.China Fax: 0731-22882721 22885420 22887878 Post code: 412007 E-Mail:zccct@zccct.com

When the diameter specification or length specification on the catalogue cannot meet your requirements, we provide more professional and more accurate non-standard customization, you just need to choose the series the customization based on.

End mill series selection	
VPM series	
UM series	
PMX series	
PML series	
PM series	
GM series	
HMX series	
RM series	
TM series	
NM series	
ALU series	
AL/ALG series	
SM/VSM series	
CM series	

Diameter specification	Ø0.3~20.0mm
Number of teeth	

Selection of end mill types		
		
☐ Flattened end mill	☐ Ball nose end mill	☐ R end mill



Remark/Note:

Ordering quantities: pieces Expecting delivery date:

Quotation of supplier: Buyer confirmation:

Date:

Customer name: Fax: Tel: E-MAIL:	ZCC·CT Huanghe south road, Tianyuan Zone, Zhuzhou, Hunan,P.R.China Fax: 0731-22882721 22885420 22887878 Post code: 412007 E-Mail:zccct@zccct.com

Workpiece material information

☐ Carbon steel ☐ Grey cast iron
☐ Alloy steel ☐ Nodular cast iron
☐ Pre-hardened steel ☐ Copper alloy
☐ Hardened steel ☐ Aluminum alloy
☐ Stainless steel ☐ Titanium alloy
☐ Heat-resistant alloy

Workpiece material grade:

Tensile strength= N/mm²

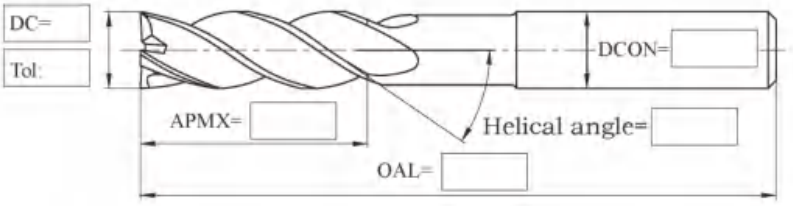
Hardness= Unit: (HRC,HB etc)

Diameter specification	Ø0.2~25.0mm	
Number of teeth		
Cutting edge cross the center of the end mill	☐ Yes	☐ No

End mill information

Selection of end mill types

☐ Flattened end mill with sharp edge ☐ Flattened end mill with corner protection edge ☐ Ball nose end mill ☐ R end mill



DIN6535 Shank type

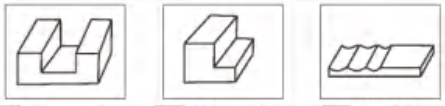
☐ Form HA

☐ Form HB

☐ Straight shank

Special design

Machining method



☐ Slot milling ☐ Side milling ☐ Profiling

Coating	
Yes	☐
No	☐

Remark/Note:

Ordering quantities: pieces Expecting delivery date:

Quotation of supplier: Buyer confirmation:

Date:

Selections of interchangeable modular end mills

Products picture

Product name

Product category

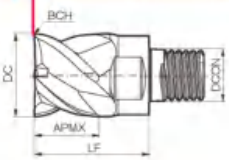
Processing type

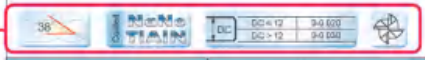
Products drawing

Interchangeable modular end mills
PM sries interchangeable modular end mills

4-flute unequal pitch flattened end mills with straight shank

PM-4E





Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications	Stock
	DC	DCON	LF	APMX	BCH				
Q07-PM-4E-D10.0	10	7.5	16.0	6.5	0.10×45°	Q07	4	QCH-7.5X8	●
Q08-PM-4E-D12.0	12	8.5	17.0	7.0	0.10×45°	Q08	4	QCH-10X13	●
Q10-PM-4E-D16.0	16	10.65	21.5	9.0	0.10×45°	Q10	4	QCH-10X13	●
Q12-PM-4E-D20.0	20	12.65	25.5	11.0	0.15×45°	Q12	4	QCH-16X20	●
Q14-PM-4E-D25.0	25	14.65	31.5	13.5	0.15×45°	Q14	4	QCH-16X20	●
Q18-PM-4E-D32.0	32	18.65	36.0	17.0	0.15×45°	Q18	4	QCH-26	●

● Stock available ○ Make-to-order

Applicable workpiece material table ○Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○	○		○	○			○	○

The corresponding toolholder B673-B676 Code key B658 Graphics category and identification B657 Cutting parameters B677

Applicable material table

Helical angle, coating, flute diameter tolerance

Products Specifications showing order number,basic dimensions, teeth number, stock

Code key, cutting parametersPicture types and indentification, order to customerize

MILLING

Interchangeable modular end mills

Interchangeable module end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel: Below 55HRC	High hardness steel: Above 55HRC	Specification	Cutting parameters
High-performance general milling	Flattened	4	PM-4E		Ø10~Ø32	◎	◎	○	◎			○	◎		B660	B677
	Ball nose	2/4	PM-2B/4B		R5.0~R16.0	◎	◎	○	◎			○	◎		B661	B677
	Radius	4	PM-4R		Ø10~Ø32	◎	◎	○	◎			○	◎		B662	B677
	Flattened	4	VPM-4E		Ø10~Ø32	◎	◎	○	◎			○	◎		B663	B677
	Radius		VPM-4R		Ø10~Ø32	◎	◎	○	◎			○	◎		B664	B677
Machining high hardness steel	Flattened	4	HMX-4E		Ø10~Ø32				○				◎	◎	B665	B678
	Ball nose	2/4	HMX-2B/4B		R5.0~R16.0				○				◎	◎	B666	B678
	Radius	4	HMX-4R		Ø10~Ø32				○				◎	◎	B667	B678
Economical general machining	Flattened	2	XM-2E		Ø10~Ø16	◎	◎	○	◎			○	◎		B668	B679
	Radius		XM-2R		Ø10~Ø16	◎	◎	○	◎			○	◎		B669	B679
	Ball nose		XM-2B		R5.0~R8.0	◎	◎	○	◎			○	◎		B670	B678
	Chamfer type		XM-2C		Ø10~Ø16	◎	◎	○	◎			○	◎		B671	B678
	Honing and chamfer type		XM-2CR		Ø10~Ø16	◎	◎	○	◎			○	◎		B672	B678

◎Very suitable ○Suitable

Interchangeable modular end mills picture types and indentification

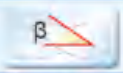
Coating of mills

Coated AlCrXN	AlCrXN coating
Coated NaNo TiAlXN	Heat resistant super crystal nano TiAlXN base coating
Coated NaNo TiAlN	Nano TiAlN coating

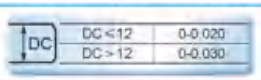
End tooth type of mills

	2-flute flattened end mills
	2-flute ball nose end mills
	2-flute ball nose end mills
	2-flute R end mills
	4-flute flattened end mills
	4-flute ball nose end mills
	4-flute R end mills
	Chamfer mills
	Chamfer mills with radius
	High feed mills

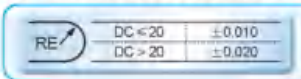
Helical angle

	β is helical angle: 30° ,35° ,38° ,45°

Cutting diameter tolerance

	Cutting diameter tolerance

Radius tolerance of ball nose end mills

	Radius tolerance

Machining operation

 Side face	Flattened end mills for side machining
 Step shoulder	Flattened end mills for shoulder machining
 Straight slot	Flattened end mills for straight slot machining
 Profile	Ball nose end mills for profile machining
 Cavity	Ball nose end mills for cavity machining
 Ball nose slot	Ball nose end mills for slot machining
 Radius shoulder	R end mills for side machining
 Radius corner slot	R end mills for slot machining
 Profile	R end mills for profile machining
 Chamfering	Chamfering by chamfer mills
 Radial chamfering	Chamfering mills with radius processing radiu chamfer
 Pilot hole machining	High feed mills machining pilot hole

Interchangeable

modular end mills series

New series of interchangeable modular end mill combines the advantages of both solid carbide end mills and indexable toolholders together to achieve high-precision, high-rigidity, and high-efficiency machining.

- Solid carbide cutting head with high precision and consistency;
- The self-centering screw thread ensures the quick replacement, high security and high strength;
- Double positioning from both radial and axial direction guarantees the high rigidity, high stablity and high-precision coupling;
- Quick mounting on the machine tool would reduce the non-cutting time which would increase the productivity significantly;
- Three cutting head series can share the shanks with the indexable inserts interchangeable series which can satisfy face milling, slot milling, shoulder milling, profile milling, ramping and plunging from roughing to finishing different working conditions.

Interchangeable milling cutter

G — Round shank

16 — Shank diameter: 10-32mm

QCH — Interchangeable milling series

Q10 — Corresponding tool bit connector code

Q07	Q08
Q10	Q12
Q14	Q18

150 — Overall length

C — Material

C	Cemented Carbide
S	Steel

ZJ32 — Length of taper

Interchangeable milling bits code

Q10 — Connector code / Diameter

Connector code	Diameter
Q07	10mm
Q08	12mm
Q10	16mm
Q12	20mm
Q14	25mm
Q18	32mm

XM — Chip breaker / Applications

Chip breaker	Applications
PM	General machining
HMX	High hardness machining
XM	Economical machining

2 — Number of flutes

E — Nose shape code / Types of cutter

Nose shape code	Types of cutter
E	Flat
R	Circular
B	Ball
C	Chamfered
CR	Fillet
H	Deep-feed

D16.0 — Bit diameter (10-32mm)

R3.0

R	Radius
H	Length of chamfer

Chamfer code / Chamfer angle

Chamfer code	Chamfer angle
C60	60°
C90	90°
C120	120°

Tungsten carbide interchangeable cutting heads
Flattened end mills, Ball end mills, Radius end mills.

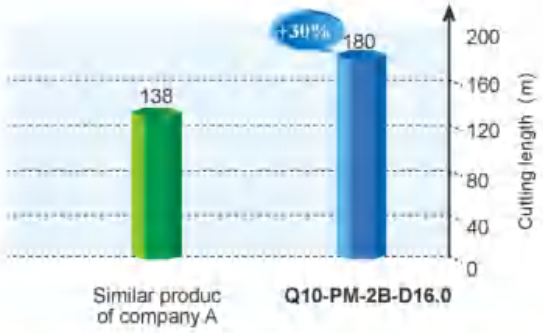
Interchangeable shank
Selections of steel shank, carbide shank, and tooling system are suitable for long overhang, high feed rate and other working conditions.

Screw thread
The screw thread with abundant surface contact at the curved surface with high precision which provides the outstanding precision performance and stablity.

High-precision positioning surface
Assurance of the perfect combination of the shank and cutting heads.

Good rigidity, longer tool life

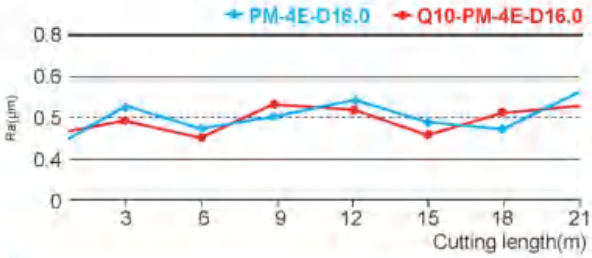
Workpiece material: NAK80(HRC40)
Machining methods: Profile milling
Interchangeable head: Q10-PM-2B-D16.0
Toolholder: G16-QCH-Q10-150C
Cutting method: Down milling, wet cut
Machining requirement: Ra≤0.6μm,
When Ra > 0.6μm tool failure.
Machine tool: Vertical Machining Center
Cutting parameters: Vc=250m/min, fz=0.06mm/z,
ap=0.5mm, ae=0.5mm



Result: The interchangeable modular end mill has good rigidity and anti-vibration performance. Comparing with the similar product from company A, it has longer tool life and better efficiency.

High-precision and extraodinary surface quality

Workpiece material: 718H(HRC35)
Machining methods: Side milling
Interchangeable head: Q10-PM-4E-D16.0
Toolholder: G16-QCH-Q10-120C
Cutting method: Down milling, wet cut
Machine tool: Vertical Machining Center
Cutting parameters: V_c=200m/min, f_z=0.06mm/z,
a_p=8mm, a_e=0.4mm



New series of interchangeable modular end mill with high precision and surface quality which has almost the same performance as the solid carbide end mill.

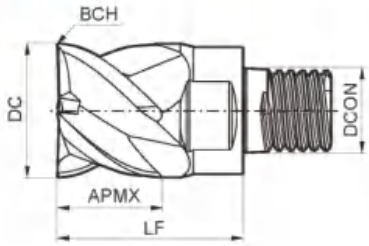
4-flute unequal pitch flattened end mills with straight shank

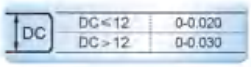

Side face


Step shoulder


Straight slot

PM-4E





Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	BCH					
Q07-PM-4E-D10.0	10	7.5	16.0	6.5	0.10×45°	Q07	4	QCH-7.5X8		●
Q08-PM-4E-D12.0	12	8.5	17.0	7.0	0.10×45°	Q08	4	QCH-10X13		●
Q10-PM-4E-D16.0	16	10.65	21.5	9.0	0.10×45°	Q10	4	QCH-10X13		●
Q12-PM-4E-D20.0	20	12.65	25.5	11.0	0.15×45°	Q12	4	QCH-16X20		●
Q14-PM-4E-D25.0	25	14.65	31.5	13.5	0.15×45°	Q14	4	QCH-16X20		●
Q18-PM-4E-D32.0	32	18.65	36.0	17.0	0.15×45°	Q18	4	QCH-26		●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Illustration

1. APMX, if the number of teeth, radius and size in the table are different, can be customized.
2. APMX is smaller than or equal to the size in the table and has better cost performance.

Applicable workpiece material table ◎Very suitable ○Suitable

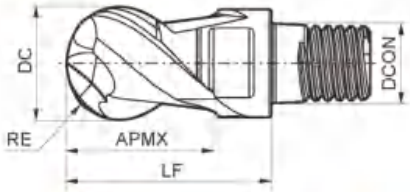
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B677

2/4-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

PM-2B/4B



38° | 30° | Coated NaNo TiAlN

DC	DC<12	0-0.020
	DC>12	0-0.030

RE	DC≤20	±0.010
	DC>20	±0.020

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-PM-2B-D10.0	10	7.5	16.0	6.0	5.0	Q07	2	QCH-7.5X8		●
Q07-PM-4B-D10.0	10	7.5	16.0	6.5	5.0		4			●
Q08-PM-2B-D12.0	12	8.5	17.0	7.0	6.0	Q08	2	QCH-10X13		●
Q08-PM-4B-D12.0	12	8.5	17.0	7.0	6.0		4			●
Q10-PM-2B-D16.0	16	10.65	21.5	9.0	8.0	Q10	2			●
Q10-PM-4B-D16.0	16	10.65	21.5	9.0	8.0		4			●
Q12-PM-2B-D20.0	20	12.65	25.5	11.0	10.0	Q12	2	QCH-16X20		●
Q12-PM-4B-D20.0	20	12.65	25.5	11.0	10.0		4			●
Q14-PM-2B-D25.0	25	14.65	31.5	13.5	12.5	Q14	2			●
Q14-PM-4B-D25.0	25	14.65	31.5	13.5	12.5		4			●
Q18-PM-2B-D32.0	32	18.65	36.0	17.0	16.0	Q18	2	QCH-26		●
Q18-PM-4B-D32.0	32	18.65	36.0	17.0	16.0		4			●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Illustration

1. APMX, if the number of teeth, radius and size in the table are different, can be customized.
2. APMX is smaller than or equal to the size in the table and has better cost performance.

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676 | Code key B658 | Graphics category and identification B657 | Cutting parameters B677

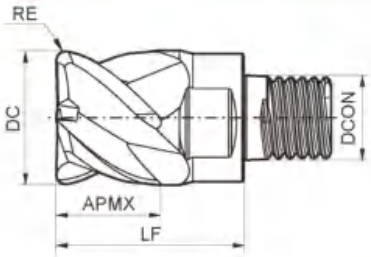
4-flute R end mills with straight shank


Radius shoulder


Profile


Radius corner slot

PM-4R



Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-PM-4R-D10.0R1.0	10	7.5	16.0	6.5	1.0	Q07	4	QCH-7.5X8		●
Q08-PM-4R-D12.0R1.0	12	8.5	17.0	7.0	1.0	Q08	4	QCH-10X13		●
Q10-PM-4R-D16.0R1.5	16	10.65	21.5	9.0	1.5	Q10	4	QCH-10X13		●
Q12-PM-4R-D20.0R2.0	20	12.65	25.5	11.0	2.0	Q12	4	QCH-16X20		●
Q14-PM-4R-D25.0R2.5	25	14.65	31.5	13.5	2.5	Q14	4	QCH-16X20		●
Q18-PM-4R-D32.0R3.0	32	18.65	36.0	17.0	3.0	Q18	4	QCH-26		●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Illustration

1. APMX, if the number of teeth, radius and size in the table are different, can be customized.
2. APMX is smaller than or equal to the size in the table and has better cost performance.

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B677

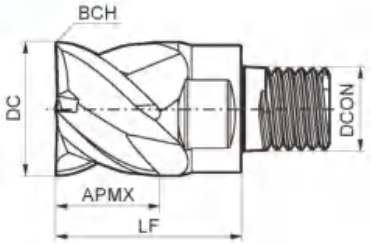
4-flute unequal pitch flattened end mills with straight shank

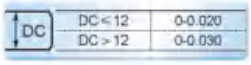

Side face


Step shoulder


Straight slot

VPM-4E





Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	BCH					
Q07-VPM-4E-D10.0	10	7.5	16.0	6.0	0.10×45°	Q07	4	QCH-7.5X8		●
Q08-VPM-4E-D12.0	12	8.5	17.0	7.0	0.10×45°	Q08	4	QCH-10X13		●
Q10-VPM-4E-D16.0	16	10.65	21.5	9.0	0.10×45°	Q10	4	QCH-10X13		●
Q12-VPM-4E-D20.0	20	12.65	25.5	11.0	0.15×45°	Q12	4	QCH-16X20		●
Q14-VPM-4E-D25.0	25	14.65	31.5	13.5	0.15×45°	Q14	4	QCH-16X20		●
Q18-VPM-4E-D32.0	32	18.65	36.0	17.0	0.15×45°	Q18	4	QCH-26		●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B677

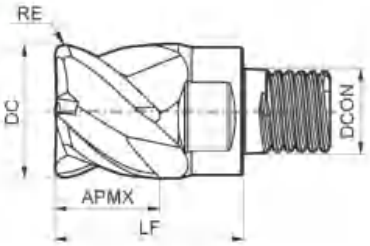
4-flute R end mills with straight shank


Radius shoulder


Profile


Radius corner slot

VPM-4R



38°

Coated AlCrXN

DC	
DC≤12	0-0.020
DC>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-VPM-4R-D10.0R0.3	10	7.5	16.0	6.0	0.3	Q07	4	QCH-7.5X8		○
Q07-VPM-4R-D10.0R0.5	10	7.5	16.0	6.0	0.5	Q07	4			●
Q07-VPM-4R-D10.0R1.0	10	7.5	16.0	6.0	1.0	Q07	4			●
Q07-VPM-4R-D10.0R1.5	10	7.5	16.0	6.0	1.5	Q07	4			○
Q08-VPM-4R-D12.0R0.3	12	8.5	17.0	7.0	0.3	Q08	4	QCH-10X13		○
Q08-VPM-4R-D12.0R0.5	12	8.5	17.0	7.0	0.5	Q08	4			●
Q08-VPM-4R-D12.0R1.0	12	8.5	17.0	7.0	1.0	Q08	4			●
Q08-VPM-4R-D12.0R1.5	12	8.5	17.0	7.0	1.5	Q08	4			○
Q08-VPM-4R-D12.0R2.0	12	8.5	17.0	7.0	2.0	Q08	4			○
Q10-VPM-4R-D16.0R0.5	16	10.65	21.5	9.0	0.5	Q10	4			○
Q10-VPM-4R-D16.0R1.0	16	10.65	21.5	9.0	1.0	Q10	4			●
Q10-VPM-4R-D16.0R1.5	16	10.65	21.5	9.0	1.5	Q10	4			●
Q10-VPM-4R-D16.0R2.0	16	10.65	21.5	9.0	2.0	Q10	4			○
Q10-VPM-4R-D16.0R3.0	16	10.65	21.5	9.0	3.0	Q10	4			○
Q12-VPM-4R-D20.0R1.0	20	12.65	25.5	11.0	1.0	Q12	4	QCH-16X20		●
Q12-VPM-4R-D20.0R1.5	20	12.65	25.5	11.0	1.5	Q12	4			●
Q12-VPM-4R-D20.0R2.0	20	12.65	25.5	11.0	2.0	Q12	4			●
Q12-VPM-4R-D20.0R3.0	20	12.65	25.5	11.0	3.0	Q12	4			○
Q14-VPM-4R-D25.0R1.5	25	14.65	31.5	13.5	1.5	Q14	4			●
Q14-VPM-4R-D25.0R2.0	25	14.65	31.5	13.5	2.0	Q14	4			●
Q14-VPM-4R-D25.0R2.5	25	14.65	31.5	13.5	2.5	Q14	4			●
Q14-VPM-4R-D25.0R3.0	25	14.65	31.5	13.5	3.0	Q14	4			○
Q18-VPM-4R-D32.0R2.0	32	18.65	36.0	17.0	2.0	Q18	4	QCH-26		●
Q18-VPM-4R-D32.0R2.5	32	18.65	36.0	17.0	2.5	Q18	4			○
Q18-VPM-4R-D32.0R3.0	32	18.65	36.0	17.0	3.0	Q18	4			●
Q18-VPM-4R-D32.0R4.0	32	18.65	36.0	17.0	4.0	Q18	4			○

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B677

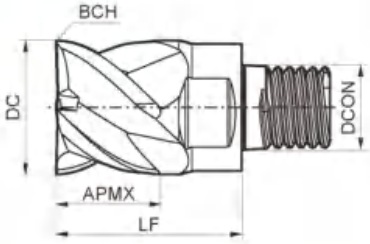
4-flute unequal pitch flattened end mills with straight shank

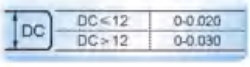

Side face


Step shoulder


Straight slot

HMX-4E





Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	BCH					
Q07-HMX-4E-D10.0	10	7.5	16.0	6.5	0.06×45°	Q07	4	QCH-7.5X8		●
Q08-HMX-4E-D12.0	12	8.5	17.0	7.0	0.1×45°	Q08	4	QCH-10X13		●
Q10-HMX-4E-D16.0	16	10.65	21.5	9.0	0.1×45°	Q10	4			●
Q12-HMX-4E-D20.0	20	12.65	25.5	11.0	0.15×45°	Q12	4	QCH-16X20		●
Q14-HMX-4E-D25.0	25	14.65	31.5	13.5	0.15×45°	Q14	4			●
Q18-HMX-4E-D32.0	32	18.65	36.0	17.0	0.15×45°	Q18	4	QCH-26		●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Illustration

1. APMX, if the number of teeth, radius and size in the table are different, can be customized.
2. APMX is smaller than or equal to the size in the table and has better cost performance.

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B678

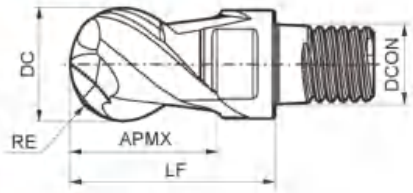
2/4-flute ball nose end mills with straight shank


Profile

Cavity

Ball nose slot

HMX-2B/4B



35°

Coated NaNo TiAlN

DC	DC≤12	0-0.020
	DC>12	0-0.030

RE	DC≤20	±0.010
	DC>20	±0.020

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-HMX-2B-D10.0	10	7.5	16.0	6.0	5.0	Q07	2	QCH-7.5X8		●
Q07-HMX-4B-D10.0	10	7.5	16.0	6.5	5.0		4			●
Q08-HMX-2B-D12.0	12	8.5	17.0	7.0	6.0	Q08	2	QCH-10X13		●
Q08-HMX-4B-D12.0	12	8.5	17.0	7.0	6.0		4			●
Q10-HMX-2B-D16.0	16	10.65	21.5	9.0	8.0	Q10	2			●
Q10-HMX-4B-D16.0	16	10.65	21.5	9.0	8.0		4			●
Q12-HMX-2B-D20.0	20	12.65	25.5	11.0	10.0	Q12	2	QCH-16X20		●
Q12-HMX-4B-D20.0	20	12.65	25.5	11.0	10.0		4			●
Q14-HMX-2B-D25.0	25	14.65	31.5	13.5	12.5	Q14	2			●
Q14-HMX-4B-D25.0	25	14.65	31.5	13.5	12.5		4			●
Q18-HMX-2B-D32.0	32	18.65	36.0	17.0	16.0	Q18	2	QCH-26		●
Q18-HMX-4B-D32.0	32	18.65	36.0	17.0	16.0		4			●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Illustration

1. APMX, if the number of teeth, radius and size in the table are different, can be customized.
2. APMX is smaller than or equal to the size in the table and has better cost performance.

Applicable workpiece material table ◎Very suitable ○Suitable

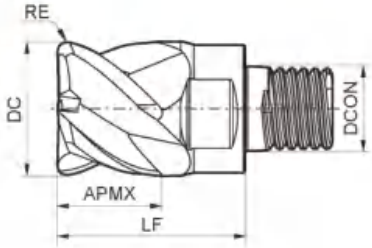
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B678

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

HMX-4R



35° | Coated NaNo TiAlXN | DC: DC≤12 0-0.020; DC>12 0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-HMX-4R-D10.0R1.0	10	7.5	16	6.5	1.0	Q07	4	QCH-7.5X8		●
Q08-HMX-4R-D12.0R1.0	12	8.5	17.0	7.0	1.0	Q08	4	QCH-10X13		●
Q10-HMX-4R-D16.0R1.5	16	10.65	21.5	9.0	1.5	Q10	4			●
Q12-HMX-4R-D20.0R2.0	20	12.65	25.5	11.0	2.0	Q12	4	QCH-16X20		●
Q14-HMX-4R-D25.0R2.5	25	14.65	31.5	13.5	2.5	Q14	4			●
Q18-HMX-4R-D32.0R3.0	32	18.65	36.0	17.0	3.0	Q18	4	QCH-26		●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Illustration

1. APMX, if the number of teeth, radius and size in the table are different, can be customized.
2. APMX is smaller than or equal to the size in the table and has better cost performance.

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

The corresponding toolholder B673-B676 | Code key B658 | Graphics category and identification B657 | Cutting parameters B678

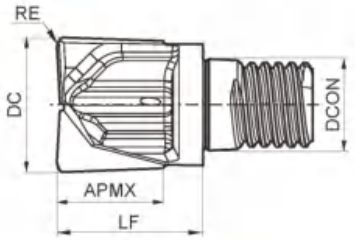
XM series of interchangeable flat end mills


Side face


Step shoulder


Straight slot

XM-2E



Coated NaNo TiAlN

DC	
DC≤12	0-0.020
DC>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-XM-2E-D10.0R0.3	10	7.5	12.5	9.0	R0.3	Q07	2	QCH-5X6.5		●
Q08-XM-2E-D12.0R0.4	12	8.5	15.3	11.5	R0.4	Q08	2			●
Q10-XM-2E-D16.0R0.5	16	10.65	18.0	14.0	R0.5	Q10	2	QCH-7.5X8		●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B679

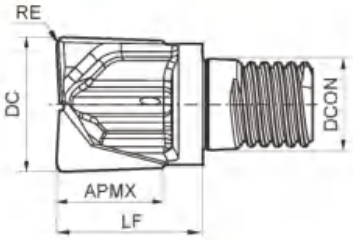
XM series of interchangeable R end mills


Radius shoulder


Profile


Radius corner slot

XM-2R



Coated AlCrXN

DC	
DC≤12	0-0.020
DC>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-XM-2R-D10.0R1.0	10	7.5	12.5	9.0	1	Q07	2	QCH-5X6.5		●
Q07-XM-2R-D10.0R2.0	10	7.5	12.5	9.0	2	Q07	2			○
Q08-XM-2R-D12.0R1.0	12	8.5	15.3	11.5	1	Q08	2			●
Q08-XM-2R-D12.0R2.0	12	8.5	15.3	11.5	2	Q08	2			○
Q08-XM-2R-D12.0R3.0	12	8.5	15.3	11.5	3	Q08	2			○
Q10-XM-2R-D16.0R1.0	16	10.65	18	14	1	Q10	2	QCH-7.5X8		●
Q10-XM-2R-D16.0R2.0	16	10.65	18	14	2	Q10	2			○
Q10-XM-2R-D16.0R3.0	16	10.65	18	14	3	Q10	2			○
Q10-XM-2R-D16.0R4.0	16	10.65	18	14	4	Q10	2			○

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B679

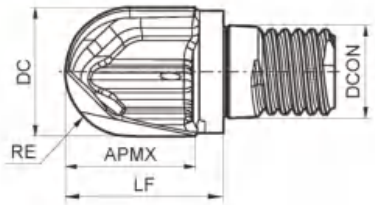
XM series of interchangeable ball nose end mills


Profile

Cavity

Ball nose slot

XM-2B



Coated AlCrXN

DC	
DC≤12	0-0.020
DC>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	LF	APMX	RE					
Q07-XM-2B-D10.0	10	8.5	12.5	10.2	5	Q07	2	QCH-5X6.5		●
Q08-XM-2B-D12.0	12	8.5	15.3	11.5	6	Q08	2			●
Q10-XM-2B-D16.0	16	8.5	18.0	14.0	8	Q10	2	QCH-7.5X8		●

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

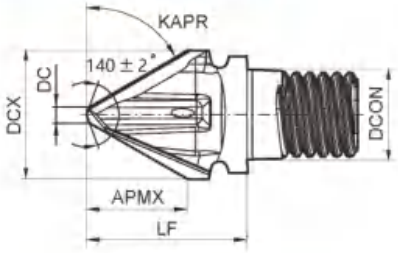
The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B678

XM series of interchangeable chamfered end mills


Chamfering


Centering hole processing

XM-2C



Coated NaNo TiAlN

DC	
DC≤12	0-0.020
DC>12	0-0.030

Type	Basic dimension(mm)						Interface	Number of teeth Z	Wrench specifications		Stock
	DCX	DCON	DC	LF	APMX	KAPR					
Q07-XM-2C60-D10H7.6	10	7.5	1.5	12.0	7.6	60°	Q07	2	QCH-5X6.5		○
Q07-XM-2C90-D10H4.5	10	7.5	1.5	12.0	4.5	45°	Q07	2			○
Q07-XM-2C120-D10H2.7	10	7.5	1.5	12.0	2.7	30°	Q07	2			○
Q08-XM-2C60-D12H9.2	12	8.5	1.5	16.0	9.2	60°	Q08	2			○
Q08-XM-2C90-D12H5.3	12	8.5	1.5	16.0	5.3	45°	Q08	2			○
Q08-XM-2C120-D12H3.5	12	8.5	1.5	16.0	3.5	30°	Q08	2			○
Q10-XM-2C60-D16H12.1	16	10.65	2.5	18.0	12.1	60°	Q10	2	QCH-7.5X8		○
Q10-XM-2C90-D16H7.4	16	10.65	1.5	18.0	7.4	45°	Q10	2			○
Q10-XM-2C120-D16H4.4	16	10.65	1.5	18.0	4.4	30°	Q10	2			○

● Stock available ○ Make-to-order

Remark:The wrench need to be purchased separately

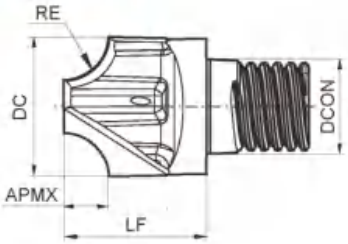
Applicable workpiece material table ◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B678

XM series of interchangeable fillet end mills

XM-2CR



Coated NaNo TiAlN

DC	DC≤12	0-0.020
	DC>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Wrench specifications		Stock
	DC	DCON	RE	LF	APMX					
Q07-XM-2CR-D10.0R1.0	10	7.5	1	14.0	1.0	Q07	2	QCH-5X6.5		○
Q07-XM-2CR-D10.0R2.0	10	7.5	2	14.0	2.0	Q07	2	QCH-5X6.5		○
Q08-XM-2CR-D12.0R1.0	12	8.5	1	16.0	1.0	Q07	2	QCH-5X6.5		○
Q08-XM-2CR-D12.0R3.0	12	8.5	3	16.0	3.0	Q07	2	QCH-5X6.5		○
Q08-XM-2CR-D12.0R4.0	12	8.5	4	16.0	4.0	Q08	2	QCH-5X6.5		○
Q10-XM-2CR-D16.0R1.0	16	10.65	1	18.0	1.0	Q08	2	QCH-5X6.5		○
Q10-XM-2CR-D16.0R3.0	16	10.65	3	18.0	3.0	Q08	2	QCH-5X6.5		○
Q10-XM-2CR-D16.0R4.0	16	10.65	4	18.0	4.0	Q10	2	QCH-7.5X8		○
Q10-XM-2CR-D16.0R5.0	16	10.65	5	18.0	5.0	Q10	2	QCH-7.5X8		○

Remark:The wrench need to be purchased separately

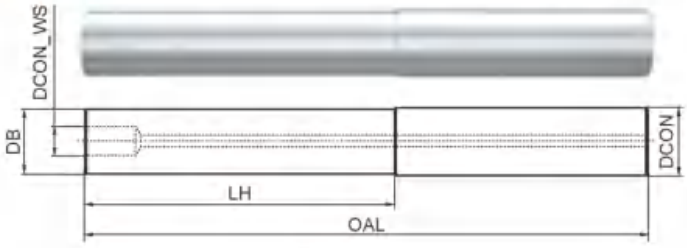
● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

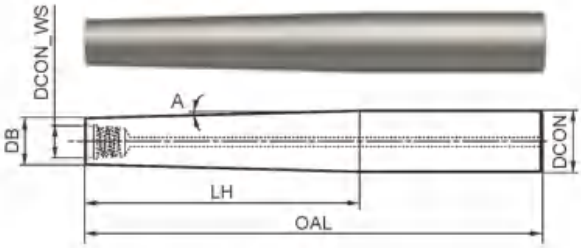
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel, Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B673-B676
Code key B658
Graphics category and identification B657
Cutting parameters B678

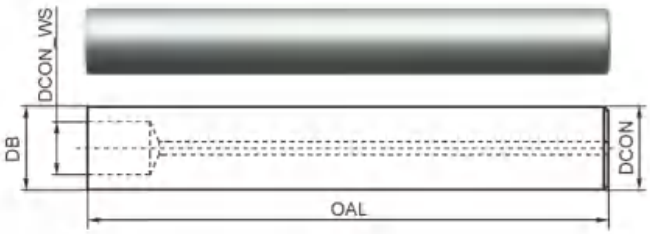
Selections of interchangeable straight shank



Picture 1



Picture 2



Picture 3

h6	12≤D4≤16	20≤D4≤25	25≤D4≤32
	0-0.011	0-0.013	0-0.016

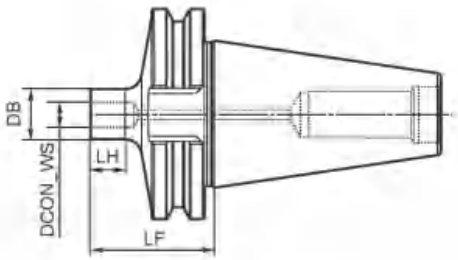
Steel holder

Inteface DCON_WS	Type	Stock	Weight	Basic dimension(mm)					Picture
				OAL	LH	DCON	DB	DCON_WS	
Q07	G10-QCH-Q07-65S	●	0.04	65	14	10	9.5	7.5	Picture 1
	G10-QCH-Q07-75S	●	0.05	75	24				
	G10-QCH-Q07-85S	●	0.06	85	34				
Q08	G12-QCH-Q08-65S	●	0.05	65	20	12	11.5	8.5	
	G12-QCH-Q08-80S	●	0.06	80	35				
	G12-QCH-Q08-90S	●	0.07	90	45				
	G16-QCH-Q08-60S	●	0.08	60	7	16			
Q10	G16-QCH-Q10-80S	●	0.11	80	26.5	16	15.2	10.65	
	G16-QCH-Q10-100S	●	0.14	100	42.5				
	G16-QCH-Q10-110S	●	0.15	110	58.5				
	G20-QCH-Q10-65S	●	0.14	65	10.5	20			
Q12	G20-QCH-Q12-90S	●	0.19	90	34.5	20	19	12.65	
	G20-QCH-Q12-110S	●	0.23	110	54.5				
	G20-QCH-Q12-125S	●	0.26	125	74.5				
	G25-QCH-Q12-75S	●	0.24	75	14.5	25			
Q14	G25-QCH-Q14-100S	●	0.34	100	43.5	25	24	14.65	
	G25-QCH-Q14-125S	●	0.42	125	68.5				
	G25-QCH-Q14-150S	●	0.5	150	93.5				
	G32-QCH-Q14-80S	●	0.42	80	18.5	32			
Q18	G32-QCH-Q18-125S	●	0.69	125	60	32	30	18.65	
	G32-QCH-Q18-160S	●	0.88	160	92				
	G32-QCH-Q18-185S	●	1.01	185	124				
	G40-QCH-Q18-100S	●	0.81	100	28	40			

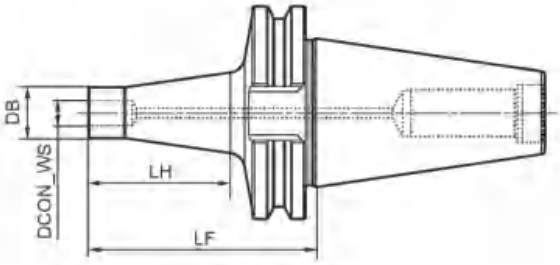
Carbide holder

Inteface DCON_WS	Type	Stock	Weight	Basic dimension(mm)					Picture
				OAL	LH	DCON	DB	DCON_WS	
Q07	G10-QCH-Q07-55C	●	0.06	55	5	10	9.5	7.5	Picture 1
	G10-QCH-Q07-75C	●	0.1	75	25				
	G10-QCH-Q07-85C	●	0.13	85	35				
	G10-QCH-Q07-105C	●	0.19	105	55				
	G10-QCH-Q07-125C	●	0.25	125	75		10		Picture 3
	G10-QCH-Q07-145C	●	0.17	145	–				
	G12-QCH-Q07-120C-ZJ70	●	0.18	120	70	12	9.5		Picture 2
Q08	G12-QCH-Q08-55C	●	0.08	55	5	12	11.5	8.5	Picture 2
	G12-QCH-Q08-80C	●	0.11	80	30				
	G12-QCH-Q08-100C	●	0.14	100	50				
	G12-QCH-Q08-120C	●	0.17	120	70	12	11.5		Picture 1
	G12-QCH-Q08-155C	●	0.22	155	–		12		Picture 3
	G12-QCH-Q08-165C	●	0.24	165	–				
	G16-QCH-Q08-140C-ZJ90	●	0.25	140	90	16	11.5		Picture 2
Q10	G16-QCH-Q10-55C	●	0.13	55	5	16	15.2	10.65	Picture 1
	G16-QCH-Q10-90C	●	0.22	90	40				
	G16-QCH-Q10-120C	●	0.3	120	70				
	G16-QCH-Q10-150C	●	0.37	150	100				
	G16-QCH-Q10-190C	●	0.46	190	–		16		Picture 3
	G16-QCH-Q10-205C	●	0.5	205	–				
	G20-QCH-Q10-200C-ZJ140	●	0.69	200	140	20	15.2		Picture 2
Q12	G20-QCH-Q12-65C	●	0.25	65	5	20	19	12.65	Picture 1
	G20-QCH-Q12-100C	●	0.38	100	40				
	G20-QCH-Q12-140C	●	0.53	140	80				
	G20-QCH-Q12-180C	●	0.68	180	120				
	G20-QCH-Q12-235C	●	0.87	235	–		20		Picture 3
	G20-QCH-Q12-255C	●	0.94	255	–				
	G25-QCH-Q12-250C-ZJ180	●	1.323	250	180	–	19		Picture 2
Q14	G25-QCH-Q14-75C	●	0.47	75	5	25	24	14.65	Picture 1
	G25-QCH-Q14-120C	●	0.74	120	50				
	G25-QCH-Q14-170C	●	1.04	170	100				
	G25-QCH-Q14-220C	●	1.35	220	150				
	G25-QCH-Q14-290C	●	1.78	290	–		25		Picture 3
	G25-QCH-Q14-310C	●	1.91	310	–				
	G32-QCH-Q14-270C-ZJ200	●	2.38	270	200	32	24		Picture 2
Q18	G32-QCH-Q18-75C	●	0.77	75	5	32	30	18.65	Picture 1
	G32-QCH-Q18-140C	●	1.39	140	70				
	G32-QCH-Q18-200C	●	1.96	200	130				
	G32-QCH-Q18-260C	●	2.55	260	190				
	G32-QCH-Q18-320C	●	3.13	320	250				
	G32-QCH-Q18-355C	●	3.47	355	–		32		Picture 3
	G32-QCH-Q18-385C	●	3.76	385	–				

Selections of interchangeable taper shank



Picture 1

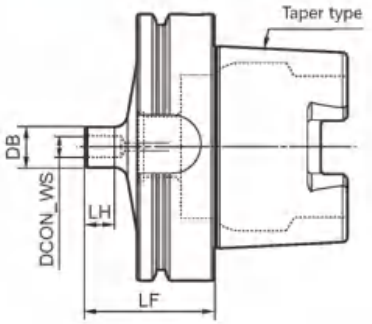


Picture 2

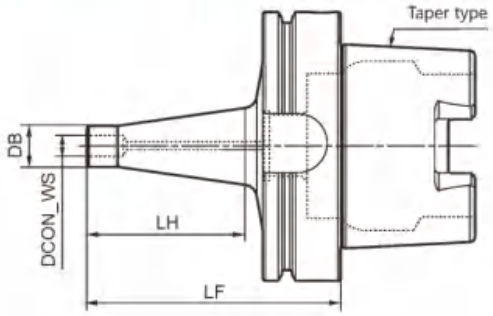
Inteface DCON_WS	Specification	LF	LH	BD	Picture	Weight (Kg)
Q08	BT30-QCH-Q08-35S	35.63	7	11.5	Picture 1	0.4
	BT40-QCH-Q08-42S	42.13	7		Picture 1	1.01
	BT50-QCH-Q08-56S	56.3	7		Picture 1	3.8
	BT30-QCH-Q08-46S	46.66	19		Picture 2	0.41
	BT40-QCH-Q08-64S	64.86	31		Picture 2	1.05
	BT50-QCH-Q08-90S	90.73	43		Picture 2	3.86
Q10	BT30-QCH-Q10-38S	38.8	10.5	15.2	Picture 1	0.41
	BT40-QCH-Q10-45S	45.3	10.5		Picture 1	1.02
	BT50-QCH-Q10-59S	59.48	10.5		Picture 1	3.8
	BT30-QCH-Q10-53S	53.73	26.5		Picture 2	0.44
	BT40-QCH-Q10-75S	75.83	42.5		Picture 2	1.1
	BT50-QCH-Q10-105S	105.61	58.5		Picture 2	3.96
Q12	BT30-QCH-Q12-42S	42.47	14.5	19	Picture 1	0.42
	BT40-QCH-Q12-48S	48.97	14.5		Picture 1	1.03
	BT50-QCH-Q12-63S	63.14	14.5		Picture 1	3.81
	BT30-QCH-Q12-61S	61.3	34.5		Picture 2	0.48
	BT40-QCH-Q12-87S	87.3	54.5		Picture 2	1.18
	BT50-QCH-Q12-120S	120.98	74.5		Picture 2	4.1
Q14	BT30-QCH-Q14-46S	46.03	18.5	24	Picture 1	0.45
	BT40-QCH-Q14-52S	52.53	18.5		Picture 1	1.06
	BT50-QCH-Q14-66S	66.7	18.5		Picture 1	3.84
	BT30-QCH-Q14-69S	69.8	43.5		Picture 2	0.57
	BT40-QCH-Q14-100S	100.61	68.5		Picture 2	1.37
	BT50-QCH-Q14-139S	139.16	93.5		Picture 2	4.41
Q18	BT40-QCH-Q18-61S	61.5	28	30	Picture 1	1.14
	BT50-QCH-Q18-75S	75.67	28		Picture 1	3.92
	BT40-QCH-Q18-122S	122.44	92		Picture 2	1.74
	BT50-QCH-Q18-168S	168.62	124		Picture 2	5.07

Inteface DCON_WS	Specification	LF	LH	BD	Picture	Weight (Kg)
Q08	JT30-QCH-Q08-33S	33.26	7	11.5	Picture 1	0.4
	JT40-QCH-Q08-34S	34.49	7		Picture 1	0.87
	JT50-QCH-Q08-37S	37.32	7		Picture 1	2.79
	JT30-QCH-Q08-44S	44.28	19		Picture 2	0.41
	JT40-QCH-Q08-57S	57.22	31		Picture 2	0.9
	JT50-QCH-Q08-71S	71.74	43		Picture 2	2.85
Q10	JT30-QCH-Q10-36S	36.43	10.5	15.2	Picture 1	0.41
	JT40-QCH-Q10-37S	37.67	10.5		Picture 1	0.88
	JT50-QCH-Q10-40S	40.49	10.5		Picture 1	2.79
	JT30-QCH-Q10-51S	51.36	26.5		Picture 2	0.43
	JT40-QCH-Q10-68S	68.2	42.5		Picture 2	0.96
	JT50-QCH-Q10-86S	86.62	58.5		Picture 2	2.95
Q12	JT30-QCH-Q12-40S	40.1	14.5	19	Picture 1	0.42
	JT40-QCH-Q12-41S	41.33	14.5		Picture 1	0.89
	JT50-QCH-Q12-44S	44.15	14.5		Picture 1	2.8
	JT30-QCH-Q12-58S	58.92	34.5		Picture 2	0.48
	JT40-QCH-Q12-79S	79.66	54.5		Picture 2	1.04
	JT50-QCH-Q12-101S	101.99	74.5		Picture 2	3.09
Q14	JT30-QCH-Q14-43S	43.66	18.5	24	Picture 1	0.45
	JT40-QCH-Q14-44S	44.89	18.5		Picture 1	0.92
	JT50-QCH-Q14-47S	47.71	18.5		Picture 1	2.84
	JT30-QCH-Q14-67S	67.36	43.5		Picture 2	0.57
	JT40-QCH-Q14-92S	92.97	68.5		Picture 2	1.22
	JT50-QCH-Q14-120S	120.18	93.5		Picture 2	3.4
Q18	JT40-QCH-Q18-53S	53.86	28	30	Picture 1	1.0
	JT50-QCH-Q18-56S	56.68	28		Picture 1	2.91
	JT40-QCH-Q18-115S	115.6	92		Picture 2	1.61
	JT50-QCH-Q18-149S	149.63	124		Picture 2	4.07

Selections of interchangeable HSK shank



Picture 1



Picture 2

Inteface DCON_ WS	Specification	Basic dimension(mm)			Picture	quality
		LF	LH	DB		
Q08	HSK63-QCH-Q08-40S	40	7	11.5	Picture 1	0.66
	HSK63-QCH-Q08-64S	64	31		Picture 2	0.71
	HSK100-QCH-Q08-43S	43	7		Picture 1	2.0
	HSK100-QCH-Q08-82S	82	43		Picture 2	2.16
Q10	HSK63-QCH-Q10-43S	43	10.5	15.2	Picture 1	0.64
	HSK63-QCH-Q10-74S	74	42.5		Picture 2	0.75
	HSK100-QCH-Q10-48S	48	10.5		Picture 1	2.05
	HSK100-QCH-Q10-94S	94	58.5		Picture 2	2.2
Q12	HSK63-QCH-Q12-46S	46	14.5	19	Picture 1	0.69
	HSK63-QCH-Q12-86S	86	54.5		Picture 2	0.84
	HSK100-QCH-Q12-48S	48	14.5		Picture 1	2.02
	HSK100-QCH-Q12-112S	112	74.5		Picture 2	2.42
Q14	HSK63-QCH-Q14-51S	51	18.5	24	Picture 1	0.74
	HSK63-QCH-Q14-100S	100	68.5		Picture 2	1.03
	HSK100-QCH-Q14-55S	55	18.5		Picture 1	2.13
	HSK100-QCH-Q14-130S	130	93.5		Picture 2	2.73
Q18	HSK63-QCH-Q18-59S	59	28	30	Picture 1	0.79
	HSK63-QCH-Q18-120S	120	92		Picture 2	1.38
	HSK100-QCH-Q18-60S	60	28		Picture 1	2.15
	HSK100-QCH-Q18-155S	155	124		Picture 2	3.28

Recommended cutting parameters for interchangeable module end mills

PM-4E★PM-2B★PM-4B★PM-4R

Recommended cutting speed

Workpiece material / Cutting speed Vc	P	M	K	N	S	H
Vc(m/min)	70 ~ 280	60 ~ 160	80 ~ 280	270 ~ 840	20 ~ 70	30 ~ 80

Cutting parameters: (mm)

Machining methods / Edge diameter	Slotting			Side, Face milling			Profiling		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.03 ~ 0.09	1D	0.1 ~ 0.5D	0.03 ~ 0.09	0.03~ 0.05D	0.1 ~ 0.5D	0.03 ~ 0.09	0.1 ~ 0.3R	0.05 ~ 0.15R
12	0.04 ~ 0.10			0.03 ~ 0.11			0.03 ~ 0.11		
16	0.05 ~ 0.12			0.05 ~ 0.13			0.05 ~ 0.13		
20	0.05 ~ 0.15			0.05 ~ 0.17			0.05 ~ 0.17		
25	0.06 ~ 0.15			0.06 ~ 0.18			0.06 ~ 0.18		
32	0.06 ~ 0.18			0.06 ~ 0.22			0.06 ~ 0.22		

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed (%)	Feed rate (%)	Cutting width (%)
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10
>9	10	40	10

VPM-4E★VPM-4R

Recommended cutting speed

Workpiece material / Cutting speed Vc	P	M	K	N	S	H
Vc(m/min)	75 ~ 290	65~ 170	85 ~ 290	285 ~ 880	20 ~ 70	30 ~ 80

Cutting parameters: (mm)

Machining methods / Edge diameter	Slotting			Side, Face milling			Profiling		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.03 ~ 0.09	1D	0.1 ~ 0.5D	0.03 ~ 0.09	0.03~ 0.05D	0.1 ~ 0.5D	0.03 ~ 0.09	0.1 ~ 0.3R	0.05 ~ 0.15R
12	0.04 ~ 0.10			0.03 ~ 0.11			0.03 ~ 0.11		
16	0.05 ~ 0.12			0.05 ~ 0.13			0.05 ~ 0.13		
20	0.05 ~ 0.15			0.05 ~ 0.17			0.05 ~ 0.17		
25	0.06 ~ 0.15			0.06 ~ 0.18			0.06 ~ 0.18		
32	0.06 ~ 0.18			0.06 ~ 0.22			0.06 ~ 0.22		

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed (%)	Feed rate (%)	Cutting width (%)
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10
>9	10	40	10

Recommended cutting parameters for interchangeable module end mills

HMX-4E★HMX-2B★HMX-4B★HMX-4R

Recommended cutting speed

Workpiece material / Cutting speed Vc	H（40 - 50HRC）	H（50 - 60HRC）	H（60 - 68HRC）
Vc(m/min)	260 ~ 320	150 ~ 220	100 ~ 200

Cutting parameters: (mm)

Machining methods / Edge diameter	Side, Face milling			Profiling		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.025-0.06	0.02 ~ 0.05D	0.1 ~ 0.5D	0.04-0.10	0.25R	0.1R
12	0.03 ~ 0.07			0.05 ~ 0.15	0.3R	0.1R
16	0.03 ~ 0.07			0.08 ~ 0.18	0.35R	0.1R
20	0.04 ~ 0.08			0.10 ~ 0.22	0.4R	0.1R
25	0.04 ~ 0.08			0.12 ~ 0.25	0.5R	0.12R
32	0.05 ~ 0.10			0.15 ~ 0.30	0.6R	0.12R

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed（%）	Feed rate（%）	Cutting width（%）
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10
>9	10	40	10

XM-2B★XM-2H★XM-2C/2CR

Recommended cutting speed

Workpiece material / Cutting speed Vc	P	M	K	N	S	H
Vc(m/min)	70 ~ 280	60 ~ 160	80 ~ 280	270 ~ 840	20 ~ 70	30 ~ 80

Cutting parameters: (mm)

Machining methods / Edge diameter	XM-2B			XM-2H			XM-2C/2CR		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.03 ~ 0.11	0.3R	0.1R	0.4 ~ 0.8	0.65D	0.25R	0.07 ~ 0.12	0.1D	0.1D
12	0.04 ~ 0.12			0.5 ~ 0.9			0.08 ~ 0.12		
16	0.05 ~ 0.13			0.6 ~ 1.0			0.1 ~ 0.12		

1. Please adopt high precision machining center and shank holder.
2. Climb milling is recommended on side milling.
3. Please reduce the rev and feed rate if there are vibrations and abnormal noise under the circumstances of the bad rigidity of machine.
4. In the condition of interference-free, the extended length of milling cutter should be short as much as possible.

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed（%）	Feed rate（%）	Cutting width（%）
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10
>9	10	40	10

Recommended cutting parameters for interchangeable module end mills

XM-2E★XM-2R

Recommended cutting speed

Workpiece material / Cutting speed Vc	P	M	K	N	S	H
Vc(m/min)	70 ~ 280	60 ~ 160	80 ~ 280	270 ~ 840	20 ~ 70	30 ~ 80

Cutting parameters: (mm)

Machining methods / Edge diameter	Side, Face milling						Slotting					
	XM-2E			XM-2R			XM-2E			XM-2R		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.035-0.09	0.1-0.15D	0.75D	0.035-0.09	0.2D	0.4D	0.02-0.045	1D	0.3D	0.02-0.045	1D	0.3D
12	0.04-0.1			0.04-0.1			0.02-0.05			0.02-0.05		
16	0.05-0.12			0.05-0.12			0.025-0.06			0.025-0.06		

1.The cutting speed should be 50%~70% of above recommenddations when doing slot milling.

2. Please adopt high precision machining center and shank holder.

4. Climb milling is recommended on side milling.

4. Please reduce the rev and feed rate if there are vibrations and abnormal noise under the circumstances of the bad rigidity of machine.

5. In the condition of interference-free, the extended length of milling cutter should be short as much as possible.

Adjustments of the cutting parameters for different xD shanks

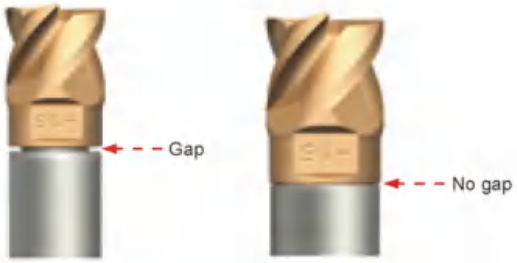
Cutting parameters / Overhang xD	Cutting speed (%)	Feed rate (%)	Cutting width (%)
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10
>9	10	40	10

Tolerance of shank (mm)

Diameter (mm)	10	12/16	20	25	32
radial runout	0.015	0.015	0.015	0.02	0.02
total runout	0.01	0.01	0.01	0.01	0.01

Cutting head installation instructions

- 1.Use the clean cotton to remove the oil and dust on the interface cone, end face, and threads.
- 2.While you are using your hands directly contact the cutting edges during clamping. It may cause injury, please use protective equipment.
- 3.After installing the cutting head, if there is a gap between the cutting head and the end face of the shank, please use the wrench to tighten it until it fits completely.
- 4.For strict operation requirements, please use the recommended torque to install the cutting head.



Interface type	Installation torque（NM）
Q07	10N•M
Q08	16N•M
Q10	20N•M
Q12	30N•M
Q14	40N•M
Q18	50N•M