

**GÜHRING**

Sharp extra short for 40% higher milling performance

new

1D 超短刃長 提升40%銑削加工效率



**RF100 SHARP**

Solid carbide milling cutter for top performance  
in soft, tough and high-alloyed materials

特別適用於軟質、韌性高及高合金鋼銑削，能展現最佳性能

# OUR SHARPEST MILLING CUTTER

## Specialist for soft, tough and high-alloyed materials

Milling soft, tough and high-alloyed materials presents particular challenges when it comes to the tool. If you choose the wrong one, you will end up with chips that stick and jam – causing the tool to break. With our sharpest solid carbide milling cutter to date, you don't have to worry as you'll achieve high-quality machining results.

如果您對於銑削軟質、堅韌及高合金材料是一種挑戰，如果您選擇了錯誤的刀具，最終會產生刃口粘屑，從而導致刀具斷裂。請使用我們迄今為止最鋒利的鎢鋼銑刀，您無需擔心，因為您將獲得高品質的加工結果。



exceptionally easy cutting

**in soft, tough & high-alloyed materials with a tensile strength of 300–900 N/mm<sup>2</sup>**

在軟質、韌性高及高合金材料、非常容易銑削  
適用拉伸強度在 300 – 900 N/mm<sup>2</sup>



full flexibility in milling operations

**slotting, roughing, ramping, helical, finishing**

各種銑削加工皆可彈性應用

開槽、粗加工、斜向進刀工、螺旋下刀、精加工



powerful & smooth  
**on all machines**

銑削強而有力而且平順  
幾乎所有機器皆適用



application-oriented construction dimensions  
**for cost-efficient machining**

應用於結構尺寸要求加工  
經濟效益高

# RF100 SHARP

各種鋼材 **Steel**



不銹鋼 **Stainless steel**



鋁合金 **Aluminium**



特殊合金 **Special alloys**



# FROM UNSTABLE TO HPC

MTC 工況不穩定 及 HPC 高速度、高效率加工皆適用

## Powerful on all machines

The RF 100 Sharp solid carbide milling cutter is designed to cover all of the different operating conditions – and always achieves outstanding results.

RF 100 Sharp 鎢鋼銑刀，滿足所有不同的操作條件 – 並且始終得到優異的加工成果。



### Application example

Effective, quiet milling on weaker machines and unstable clamping.

應用實例

對於較差的機器與不穩定的工件夾持一樣可以有效地達到平順的銑削。



<b>Machine</b>	Spinner TC 600 CNC lathe CNC車床
<b>Milling tool</b>	RF 100 Sharp, art. no. 6478, Ø 10 mm, Z=4
<b>Operating conditions</b>	MTC 工況不穩定
<b>Milling operation</b>	Hexagonal milling 六角型銑削
<b>Tool holder</b>	BMT Life Tool ER 25 collet chuck ER 25筒夾夾持
<b>Material/component</b>	1.7131 or 16MnCr5/shaft 合金鋼

<b>Cutting parameters</b>	切削速度 <b>v<sub>c</sub></b>	130 m/min
	轉速 <b>S</b>	4,138 rpm
	每刃進給 <b>f<sub>z</sub></b>	0.07 mm
	每分鐘進給 <b>v<sub>f</sub></b>	1,158 mm/min
	切寬 <b>a<sub>e</sub></b>	8 mm
	切深 <b>a<sub>p</sub></b>	3.8 mm
<b>Metal removal rate Q</b>	35 cm <sup>3</sup> /min 每分鐘移除量	
<b>Tool life</b>	78 min 刀具壽命	

## Short machining times and long tool lives

加工時間縮短及高壽命表現

- **tough carbide** 堅韌的鎢鋼材質  
prevents tool breakage even under very unstable conditions  
即使在非常不穩定的加工狀況，也能避免刀具崩裂
- **AlCrN coating** AlCrN 鍍層  
provides optimum wear protection at all cutting speeds  
在任何的切削情況下提供最佳的磨耗保護
- **optimised facet grinding** 最佳化的端面研磨  
dampens vibrations and increases smoothness and service life  
抑制振動並提高平順度和使用壽命
- **corner protection chamfer** 刃口倒角保護  
provides more stability and edge strength  
提供更高的穩定性和刃口強度

HPC

### Application example

High-performance milling with extremely high cutting speeds under stable operating conditions.

#### 應用實例

高性能銑削、在極高的切削速度下與穩定的運轉條件下。



<b>Machine</b>	CNC BAZ DMG DMU 100 P
<b>Milling tool</b>	RF 100 Sharp, art. no. 6479, Ø 16 mm, Z=4
<b>Operating conditions</b>	HPC 高效率銑削
<b>Milling operation</b>	Contour roughing 輪廓粗加工
<b>Tool holder</b>	HSK 100 A GührJet Weldon tool holder HSK 100 A 側固式刀桿
<b>Material/component</b>	1.0503 or C45 / block 中碳鋼 C45
<b>Cutting parameters</b>	切削速度 <b>v<sub>c</sub></b> 180 m/min 轉速 <b>S</b> 3,580 rpm 每刃進給 <b>f<sub>z</sub></b> 0.1 mm 每分鐘進給 <b>v<sub>f</sub></b> 1,430 mm/min 切寬 <b>a<sub>e</sub></b> 6 mm 切深 <b>a<sub>p</sub></b> 34 mm
<b>Metal removal rate Q</b>	291 cm <sup>3</sup> /min 每分鐘移除量
<b>Tool life</b>	134 min 刀具壽命

# THE EXTRA SHORT

## 超短刃長型



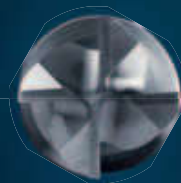
**Resource-efficient and economical thanks to lower material consumption**

資源使用效率高且經濟  
材料消耗較低

銑削性能提高 40%

**new**

**40% HIGHER MILLING PERFORMANCE**  
thanks to more compact dimensions



**SPECIAL FRONT END** 特殊端刃刃口  
for slot drilling and high ramping angles  
適合開槽與斜向進刀使用

**1D短刃刃口**

■ **1XD CUTTING EDGE LENGTH**  
maximum feed rate when slotting  
開槽可以最大進給率

■ **AlCrN COATING** AlCrN 鍍層  
for highest wear resistance  
最佳磨耗保護

■ **2xD THE REACH** 含頸部加工長達2D  
for more flexibility  
with deeper contours  
可更彈性應用於較深的銑削

**超短設計**

■ **EXTRA SHORT DESIGN**  
maximum stability and  
hardly any radial deflection  
最大穩定性  
幾乎沒有任何徑向偏轉

**堅韌的鎢鋼材質**

■ **EXTRA-TOUGH CUTTING MATERIAL**  
prevents damage to cutting edges  
even under unstable conditions  
保護切削刃口  
即使在不穩定的工況下

**RF100 SHARP**  
EXTRA SHORT

## EXTRA SHORT

### Application example

HSC slot drilling in the micro range with  $\varnothing$  1 mm in stainless steel and high-performance slotting  $\varnothing$  10 mm in C45 steel.



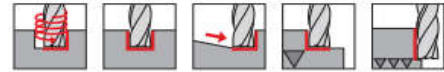
應用實例  
微小範圍內的 HSC 開槽銑削  
 $\psi$  1 mm 不鏽鋼材質，  
以及高性能開槽  $\psi$  10 mm  
C45 中碳鋼銑削。

<b>Machine</b>	Core micro
<b>Milling tool</b>	RF 100 Sharp extra short, art. no. 6938, $\varnothing$ 1 mm, Z=4
<b>Milling operation</b>	Plunging + slotting (slot drilling) 鑽銑與開槽
<b>Tool holder</b>	HSK-E40 precision collet chuck holders HSK-E40 筒夾夾持
<b>Cooling</b>	Emulsion 水溶性切削液
<b>Material</b>	INOX 1.4301 不鏽鋼 SUS304
<b>Cutting parameters</b>	切削速度 <b>v<sub>c</sub></b> 70 m/min 轉速 <b>S</b> 22,282 rpm 開槽每刃進給 <b>f<sub>z</sub></b> Slotting 0.01 mm 開槽每分鐘進給 <b>v<sub>f</sub></b> Slotting 891 mm/min 鑽銑每刃進給 <b>f<sub>z</sub></b> Plunging 0.002 mm 鑽銑每分鐘進給 <b>v<sub>f</sub></b> Plunging 178 mm/min 切寬 <b>a<sub>e</sub></b> 1 mm 切深 <b>a<sub>p</sub></b> 0.8 mm
<b>Metal removal rate Q</b>	Slotting 0.7 cm <sup>3</sup> /min 每分鐘移除量
刀具壽命 <b>Tool life</b>	1,850 slots (10.5 mm long each)

<b>Machine</b>	MAG NBV 700
<b>Milling tool</b>	RF 100 Sharp extra short, art. no. 6938, $\varnothing$ 10 mm, Z=4
<b>Milling operation</b>	Slotting 開槽銑削
<b>Tool holder</b>	HPC clamping chuck HSK-A 63 HPC HSK-A 63
<b>Cooling</b>	Air 吹空氣
<b>Material</b>	C45 中碳鋼
<b>Cutting parameters</b>	切削速度 <b>v<sub>c</sub></b> 180 m/min 轉速 <b>S</b> 5,730 rpm 每刃進給 <b>f<sub>z</sub></b> 0.08 mm 每分鐘進給 <b>v<sub>f</sub></b> 1,833 mm/min 切深 <b>a<sub>e</sub></b> 10 mm 切寬 <b>a<sub>p</sub></b> 10 mm
<b>Metal removal rate Q</b>	183.3 cm <sup>3</sup> /min 每分鐘移除量
刀具壽命 <b>Tool life</b>	113 min

RF 100 Sharp extra short 四刃 1D短刃型 銑削性能提高 40%

編號：6938



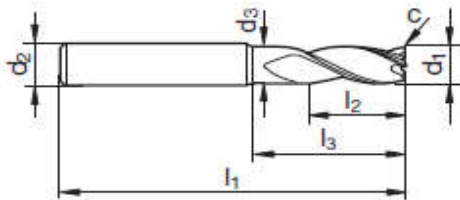
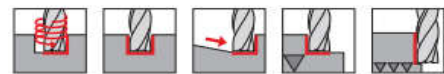
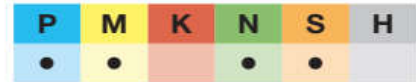
especially for soft, tough and high-alloyed materials • neck clearance • centre cutting • 40% higher milling performance thanks to short stable design • with special front end

特別適用於軟質、堅韌和高合金材料 • 頸部離隙 • 底刃過中心可切削

短刃穩定型設計使銑削性能提高 40% • 前端底刃經特殊設計

RF 100 Sharp extra short 四刃 1D短刃型 銑削性能提高 40%

編號：6939

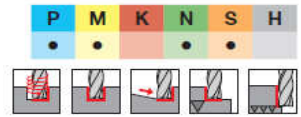


編號： 6938 6939

d1(e8) 刃徑	d2(h6) 柄徑	d3 頸部	全長 l <sub>1</sub>	刃長 l <sub>2</sub>	可切削長 l <sub>3</sub>	端刃倒角	刃數	價格	價格
mm	mm	mm	mm	mm	mm	mm x 45°	Z		
0.80	4.00	0.75	40.00	0.80	1.70	0.00	4	1,040	
1.00	4.00	0.92	40.00	1.00	2.10	0.01	4	1,040	
1.20	4.00	1.12	40.00	1.20	2.50	0.01	4	1,040	
1.40	4.00	1.32	40.00	1.40	2.90	0.01	4	1,040	
1.50	4.00	1.40	40.00	1.50	3.20	0.01	4	1,040	
1.60	4.00	1.50	40.00	1.60	3.40	0.01	4	1,040	
1.80	4.00	1.70	40.00	1.80	3.80	0.01	4	1,040	
2.00	6.00	1.85	50.00	2.00	4.20	0.02	4	1,040	
2.50	6.00	2.35	50.00	2.50	5.30	0.02	4	1,040	
2.80	6.00	2.65	50.00	2.80	5.90	0.02	4	1,040	
3.00	6.00	2.85	50.00	3.00	6.30	0.03	4	1,040	
3.50	6.00	3.30	50.00	3.50	7.40	0.03	4	1,040	1,080
3.80	6.00	3.60	50.00	3.80	8.00	0.03	4	1,040	1,080
4.00	6.00	3.80	50.00	4.00	8.40	0.04	4	1,040	1,080
4.50	6.00	4.30	50.00	4.50	9.50	0.04	4	1,040	1,080
4.80	6.00	4.60	50.00	4.80	10.10	0.04	4	1,040	1,080
5.00	6.00	4.80	50.00	5.00	10.50	0.05	4	1,040	1,080
5.50	6.00	5.30	50.00	5.50	12.00	0.05	4	1,040	1,080
5.70	6.00	5.50	50.00	5.70	12.00	0.05	4	1,040	1,080
6.00	6.00	5.70	50.00	6.00	12.00	0.06	4	1,040	1,080
6.70	8.00	6.40	55.00	6.70	16.00	0.06	4	1,400	1,480
7.00	8.00	6.70	55.00	7.00	16.00	0.07	4	1,400	1,480
7.70	8.00	7.40	55.00	7.70	16.00	0.07	4	1,400	1,480
8.00	8.00	7.70	55.00	8.00	16.00	0.08	4	1,400	1,480
9.00	10.00	8.70	61.00	9.00	20.00	0.09	4	2,140	2,210
9.70	10.00	9.40	61.00	9.70	20.00	0.09	4	2,140	2,210
10.00	10.00	9.50	61.00	10.00	20.00	0.10	4	2,140	2,210
11.00	12.00	10.50	70.00	11.00	24.00	0.11	4	2,770	2,830
11.70	12.00	11.20	70.00	11.70	24.00	0.11	4	2,770	2,830
12.00	12.00	11.50	70.00	12.00	24.00	0.12	4	2,770	2,830
14.00	14.00	13.50	75.00	14.00	28.00	0.14	4	3,650	3,750
15.60	16.00	15.10	82.00	15.60	32.00	0.15	4	4,770	4,890
16.00	16.00	15.50	82.00	16.00	32.00	0.16	4	4,770	4,890

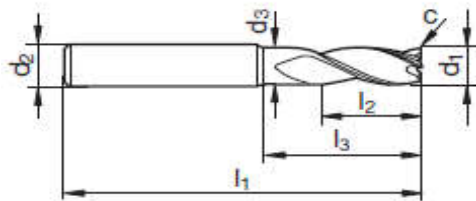
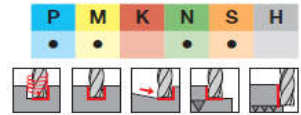
RF 100 Sharp 四刃 不等分割 標準長

編號：6478



RF 100 Sharp 四刃 不等分割 標準長

編號：6479

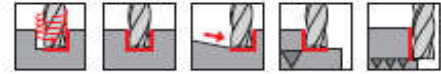
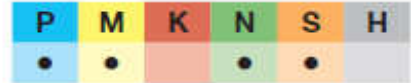


編號： 6478 6479

d1(e8) 刃徑	d2(h6) 柄徑	d3 頸部	全長 $l_1$	刃長 $l_2$	可切削長 $l_3$	端刃倒角	刃數	價格	價格
mm	mm	mm	mm	mm	mm	mm x 45°	Z		
1.00	4.00	0.92	50.00	3.00	4.00	0.02	4	1,100	
1.50	4.00	1.40	50.00	4.50	6.00	0.03	4	1,100	
2.00	6.00	1.85	50.00	6.00	8.00	0.04	4	1,200	
2.50	6.00	2.35	50.00	7.50	10.00	0.05	4	1,200	
3.00	6.00	2.85	57.00	10.00	15.00	0.06	4	1,200	
4.00	6.00	3.80	57.00	14.00	18.00	0.08	4	1,200	1,300
5.00	6.00	4.80	57.00	15.00	20.00	0.10	4	1,200	1,300
6.00	6.00	5.70	57.00	16.00	20.00	0.12	4	1,200	1,300
8.00	8.00	7.70	63.00	21.00	26.00	0.16	4	1,700	1,700
10.00	10.00	9.50	72.00	25.00	31.00	0.20	4	2,500	2,600
12.00	12.00	11.50	83.00	28.00	37.00	0.24	4	3,300	3,300
14.00	14.00	13.50	83.00	28.00	37.00	0.28	4	4,300	4,400
16.00	16.00	15.50	92.00	36.00	43.00	0.32	4	5,600	5,800
20.00	20.00	19.50	104.00	41.00	53.00	0.40	4	8,600	8,800

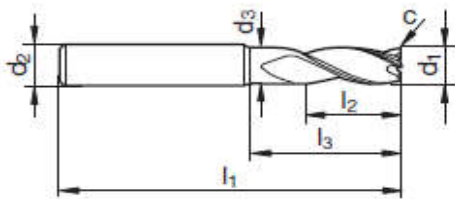
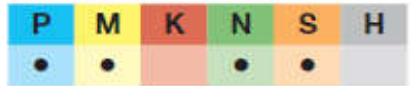
RF 100 Sharp 4刃不等分割 頸部加長型

編號：6480



RF 100 Sharp 4刃不等分割 頸部加長型

編號：6481

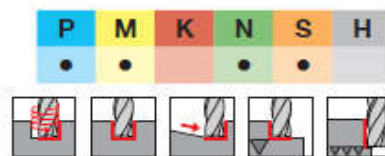


編號： 6480 6481

d1(e8) 刃徑	d2(h6) 柄徑	d3 頸部	全長 $l_1$	刃長 $l_2$	可切削長 $l_3$	端刃倒角	刃數	價格	價格
mm	mm	mm	mm	mm	mm	mm x 45°	Z		
1.00	4.00	0.92	50.00	3.00	5.50	0.02	4	1,500	
1.50	4.00	1.40	50.00	4.50	8.50	0.03	4	1,500	
2.00	6.00	1.85	57.00	6.00	11.50	0.04	4	1,550	
2.50	6.00	2.35	57.00	7.50	14.50	0.05	4	1,550	
3.00	6.00	2.85	65.00	10.00	20.00	0.06	4	1,600	
4.00	6.00	3.80	65.00	14.00	27.00	0.08	4	1,600	1,650
5.00	6.00	4.80	65.00	15.00	28.00	0.10	4	1,600	1,650
6.00	6.00	5.70	75.00	19.00	38.00	0.12	4	1,600	1,650
8.00	8.00	7.70	80.00	21.00	43.00	0.16	4	2,110	2,160
10.00	10.00	9.50	93.00	26.00	52.00	0.20	4	3,130	3,230
12.00	12.00	11.50	100.00	28.00	54.00	0.24	4	4,070	4,180
14.00	14.00	13.50	100.00	28.00	54.00	0.28	4	5,320	5,460
16.00	16.00	15.50	123.00	38.00	74.00	0.32	4	7,030	7,180
20.00	20.00	19.50	126.00	41.00	75.00	0.40	4	10,730	10,890

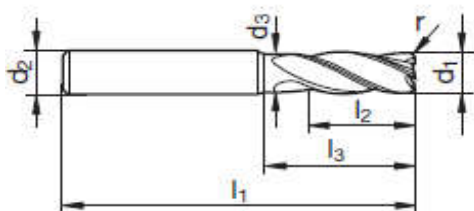
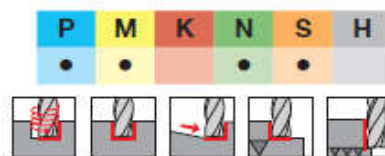
RF 100 Sharp 4刃不等分割 標準長 圓鼻型

編號：6962



RF 100 Sharp 4刃不等分割 標準長 圓鼻型

編號：6963



									編號：	
									6962	6963
d1(e8) 刃徑	d2(h6) 柄徑	d3 頸部	全長 l <sub>1</sub>	刃長 l <sub>2</sub>	可切削長 l <sub>3</sub>	r	刃數	Code	價格	價格
mm	mm	mm	mm	mm	mm	mm	Z			
3.00	6.00	2.85	57.00	8.00	15.00	0.20	4	3.002	1,820	1,870
3.00	6.00	2.85	57.00	8.00	15.00	0.50	4	3.005	1,820	1,870
4.00	6.00	3.80	57.00	11.00	18.00	0.20	4	4.002	1,790	1,840
4.00	6.00	3.80	57.00	11.00	18.00	0.50	4	4.005	1,790	1,840
4.00	6.00	3.80	57.00	11.00	18.00	1.00	4	4.010	1,790	1,840
5.00	6.00	4.80	57.00	13.00	18.00	0.20	4	5.002	1,740	1,790
5.00	6.00	4.80	57.00	13.00	18.00	0.50	4	5.005	1,740	1,790
5.00	6.00	4.80	57.00	13.00	18.00	1.00	4	5.010	1,740	1,790
6.00	6.00	5.70	57.00	13.00	20.00	0.20	4	6.002	1,690	1,740
6.00	6.00	5.70	57.00	13.00	20.00	0.50	4	6.005	1,690	1,740
6.00	6.00	5.70	57.00	13.00	20.00	1.00	4	6.010	1,690	1,740
6.00	6.00	5.70	57.00	13.00	20.00	1.50	4	6.015	1,690	1,740
8.00	8.00	7.70	63.00	19.00	26.00	0.30	4	8.003	2,280	2,390
8.00	8.00	7.70	63.00	19.00	26.00	0.50	4	8.005	2,280	2,390
8.00	8.00	7.70	63.00	19.00	26.00	1.00	4	8.010	2,280	2,390
8.00	8.00	7.70	63.00	19.00	26.00	1.50	4	8.015	2,280	2,390
8.00	8.00	7.70	63.00	19.00	26.00	2.00	4	8.020	2,280	2,390
10.00	10.00	9.50	72.00	22.00	31.00	0.30	4	10.003	3,190	3,270
10.00	10.00	9.50	72.00	22.00	31.00	0.50	4	10.005	3,190	3,270
10.00	10.00	9.50	72.00	22.00	31.00	1.00	4	10.010	3,190	3,270
10.00	10.00	9.50	72.00	22.00	31.00	1.50	4	10.015	3,190	3,270
10.00	10.00	9.50	72.00	22.00	31.00	2.00	4	10.020	3,190	3,270
10.00	10.00	9.50	72.00	22.00	31.00	2.50	4	10.025	3,190	3,270
12.00	12.00	11.50	83.00	26.00	37.00	0.30	4	12.003	4,130	4,210
12.00	12.00	11.50	83.00	26.00	37.00	0.50	4	12.005	4,130	4,210
12.00	12.00	11.50	83.00	26.00	37.00	1.00	4	12.010	4,130	4,210
12.00	12.00	11.50	83.00	26.00	37.00	1.50	4	12.015	4,130	4,210
12.00	12.00	11.50	83.00	26.00	37.00	2.00	4	12.020	4,130	4,210
12.00	12.00	11.50	83.00	26.00	37.00	2.50	4	12.025	4,130	4,210
12.00	12.00	11.50	83.00	26.00	37.00	3.00	4	12.030	4,130	4,210
16.00	16.00	15.50	92.00	32.00	43.00	0.50	4	16.005	6,490	6,700
16.00	16.00	15.50	92.00	32.00	43.00	1.00	4	16.010	6,490	6,700
16.00	16.00	15.50	92.00	32.00	43.00	1.50	4	16.015	6,490	6,700
16.00	16.00	15.50	92.00	32.00	43.00	2.00	4	16.020	6,490	6,700
16.00	16.00	15.50	92.00	32.00	43.00	2.50	4	16.025	6,490	6,700
16.00	16.00	15.50	92.00	32.00	43.00	3.00	4	16.030	6,490	6,700
16.00	16.00	15.50	92.00	32.00	43.00	4.00	4	16.040	6,490	6,700
20.00	20.00	19.50	104.00	38.00	53.00	0.50	4	20.005	9,920	10,070
20.00	20.00	19.50	104.00	38.00	53.00	1.00	4	20.010	9,920	10,070
20.00	20.00	19.50	104.00	38.00	53.00	1.50	4	20.015	9,920	10,070
20.00	20.00	19.50	104.00	38.00	53.00	2.00	4	20.020	9,920	10,070
20.00	20.00	19.50	104.00	38.00	53.00	2.50	4	20.025	9,920	10,070
20.00	20.00	19.50	104.00	38.00	53.00	3.00	4	20.030	9,920	10,070
20.00	20.00	19.50	104.00	38.00	53.00	4.00	4	20.040	9,920	10,070



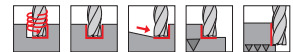
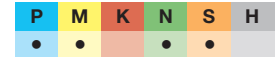
# RF 100 Sharp

Ratio end mill sets RF 100 Sharp extra short

Article no. **6468**



especially for soft, tough and high-alloyed materials • 40% higher milling performance thanks to short stable design • neck clearance • special front end • consisting of art. no. 6938



Article no. **6468**

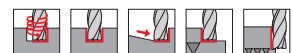
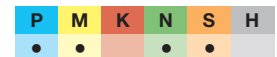
Ø-range mm	Pieces/set	Order no.	價格
6/8/10/12	4	6468 1.000	6,500

Ratio end mill sets RF 100 Sharp extra short

Article no. **6469**



especially for soft, tough and high-alloyed materials • 40% higher milling performance thanks to short stable design • neck clearance • special front end • consisting of art. no. 6939



Article no. **6469**

Ø-range mm	Pieces/set	Order no.	價格
6/8/10/12	4	6469 1.000	6,600

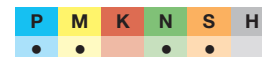


Ratio end mill sets RF 100 Sharp

Article no. 6482



especially for soft, tough and high-alloyed materials • longer cutting edge than DIN 6527 L • neck clearance • centre cutting • consisting of item no. 6478



Article no. **6482**

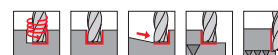
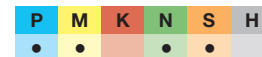
Ø-range mm	Pieces/set	Order no.	價格
6/8/10/12/16	5	6482 1.000	12,500
6/8/10/12	4	6482 2.000	7,600

Ratio end mill sets RF 100 Sharp

Article no. 6483



especially for soft, tough and high-alloyed materials • longer cutting edge than DIN 6527 L • neck clearance • centre cutting • consisting of item no. 6479



Article no. **6483**

Ø-range mm	Pieces/set	Order no.	價格
6/8/10/12/16	5	6483 1.000	12,800
6/8/10/12	4	6483 2.000	7,800



## RF 100 Sharp

### Milling conditions:

<b>HPC</b>	HPC : High Performance Cutting stable machining conditions high drive power	穩定的機械加工條件 主軸具有高驅動馬力
<b>MTC</b>	unstable machining conditions low drive power	機械與工件夾持不佳 主軸馬力不足
	long tools	
	long (DIN)+ tools	

### Correction factors:

	加工深度 $a_p$ 大於1.5D時·切削速度 $V_c$ 與每刃進給 $F_z$ 必須降低25% $a_p$ roughing > 1.5 x D	$v_c$ -25 %	$f_z$ -25 %
	長刃型 medium length tools	$v_c$ -40 %	$f_z$ -40 %
	1D 短刃型 extra short tools		$f_z$ +40 %



Machining group	Application	$V_c$ (m/min)	$a_p$ max.	$f_z$ (mm/z) with nom. 0								
				1	3	4	6	8	10	12	16	20
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB	Slotting	180	1xD	0.005	0.016	0.020	0.030	0.040	0.060	0.070	0.095	0.120
	Roughing	205	0.75xD	0.007	0.021	0.030	0.040	0.055	0.070	0.085	0.110	0.140
	Finishing	360	0.02xD	0.007	0.020	0.025	0.040	0.055	0.065	0.080	0.105	0.130
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB	Slotting	160	1xD	0.005	0.015	0.020	0.030	0.040	0.055	0.065	0.090	0.110
	Roughing	185	0.75xD	0.006	0.019	0.025	0.040	0.050	0.065	0.075	0.100	0.125
	Finishing	320	0.02xD	0.006	0.018	0.025	0.035	0.050	0.060	0.075	0.095	0.120
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB	Slotting	135	1xD	0.004	0.013	0.020	0.025	0.035	0.050	0.060	0.080	0.100
	Roughing	155	0.75xD	0.006	0.017	0.025	0.035	0.045	0.060	0.070	0.090	0.115
	Finishing	270	0.02xD	0.006	0.017	0.020	0.035	0.045	0.055	0.065	0.090	0.110
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB	Slotting	120	1xD	0.004	0.013	0.020	0.025	0.035	0.050	0.060	0.080	0.100
	Roughing	140	0.75xD	0.006	0.017	0.025	0.035	0.045	0.060	0.070	0.090	0.115
	Finishing	240	0.02xD	0.006	0.017	0.020	0.035	0.045	0.055	0.065	0.090	0.110
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB	Slotting	90	1xD	0.004	0.012	0.015	0.025	0.030	0.045	0.055	0.070	0.090
	Roughing	100	0.75xD	0.005	0.016	0.020	0.030	0.040	0.050	0.060	0.085	0.105
	Finishing	175	0.02xD	0.005	0.015	0.020	0.030	0.040	0.050	0.060	0.080	0.100
M2.1.1 Stainless steel, austenitic, quenched, 180 HB	Slotting	80	1xD	0.004	0.012	0.015	0.025	0.030	0.045	0.055	0.070	0.090
	Roughing	100	0.6xD	0.005	0.016	0.020	0.030	0.045	0.055	0.065	0.085	0.110
	Finishing	160	0.01xD	0.005	0.014	0.020	0.025	0.035	0.045	0.055	0.070	0.090
M2.2.1 Duplex steel, high-strength stainless steels	Slotting	60	1xD	0.003	0.010	0.015	0.020	0.030	0.040	0.045	0.065	0.080
	Roughing	75	0.6xD	0.005	0.014	0.020	0.030	0.040	0.045	0.055	0.075	0.095
	Finishing	120	0.01xD	0.004	0.012	0.015	0.025	0.030	0.040	0.045	0.065	0.080
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB												
K1.3.1 Malleable cast iron, ferritic, 130 HB K1.3.2 Malleable cast iron, pearlitic, 230 HB												
K2.1.1 Vermicular graphite cast iron (GJV) K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)												
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB N1.1.2 Wrought aluminium alloys, hardened, 100 HB	Slotting	500	1xD	0.007	0.021	0.030	0.040	0.055	0.080	0.095	0.130	0.160
	Roughing	575	0.75xD	0.009	0.028	0.035	0.055	0.075	0.090	0.110	0.145	0.185
	Finishing	1000	0.02xD	0.009	0.026	0.035	0.055	0.070	0.090	0.105	0.140	0.175
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB	Slotting	230	1xD	0.005	0.016	0.020	0.030	0.040	0.060	0.070	0.095	0.120
	Roughing	265	0.75xD	0.007	0.021	0.030	0.040	0.055	0.070	0.085	0.110	0.140
	Finishing	460	0.02xD	0.007	0.020	0.025	0.040	0.055	0.065	0.080	0.105	0.130
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB	Slotting	180	1xD	0.005	0.016	0.020	0.030	0.040	0.060	0.070	0.095	0.120
	Roughing	180	0.75xD	0.006	0.018	0.025	0.035	0.050	0.060	0.070	0.095	0.120
	Finishing	365	0.02xD	0.007	0.020	0.025	0.040	0.055	0.065	0.080	0.105	0.130



Machining group	Application	Vc (m/min)	ae max.	fz (mm/z) with nom. Ø								
				1	3	4	6	8	10	12	16	20
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 % N3.1.2 Copper and copper alloys: CuZn, CuSnZn	Slotting	250	1xD	0.005	0.016	0.020	0.030	0.040	0.060	0.070	0.095	0.120
	Roughing	290	0.75xD	0.007	0.021	0.030	0.040	0.055	0.070	0.085	0.110	0.140
	Finishing	500	0.02xD	0.007	0.020	0.025	0.040	0.055	0.065	0.080	0.105	0.130
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte	Slotting	195	1xD	0.005	0.015	0.020	0.030	0.040	0.055	0.065	0.090	0.110
	Roughing	225	0.75xD	0.006	0.019	0.025	0.040	0.050	0.065	0.075	0.100	0.125
	Finishing	390	0.02xD	0.006	0.018	0.025	0.035	0.050	0.060	0.075	0.095	0.120
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics	Slotting	150	1xD	0.006	0.017	0.020	0.035	0.045	0.065	0.075	0.100	0.125
	Roughing	175	0.75xD	0.007	0.022	0.030	0.045	0.060	0.070	0.085	0.115	0.145
	Finishing	300	0.02xD	0.007	0.021	0.030	0.040	0.055	0.070	0.085	0.110	0.140
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.	Slotting	200	1xD	0.005	0.015	0.020	0.030	0.040	0.055	0.065	0.090	0.110
	Roughing	230	0.75xD	0.006	0.019	0.025	0.040	0.050	0.065	0.075	0.105	0.130
	Finishing	400	0.02xD	0.006	0.019	0.025	0.035	0.050	0.060	0.075	0.100	0.125
N4.1.3 Non-metallic materials: Graphite	Slotting	240	1xD	0.007	0.021	0.030	0.040	0.055	0.080	0.095	0.130	0.160
	Roughing	275	0.75xD	0.009	0.028	0.035	0.055	0.075	0.090	0.110	0.145	0.185
	Finishing	480	0.02xD	0.009	0.026	0.035	0.055	0.070	0.090	0.105	0.140	0.175
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB	Slotting	30	1xD	0.004	0.011	0.015	0.020	0.030	0.040	0.050	0.065	0.080
	Roughing	40	0.6xD	0.005	0.014	0.020	0.030	0.040	0.050	0.060	0.075	0.095
	Finishing	60	0.01xD	0.004	0.012	0.015	0.025	0.030	0.040	0.050	0.065	0.080
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB	Slotting	25	1xD	0.004	0.011	0.015	0.020	0.030	0.040	0.050	0.065	0.080
	Roughing	30	0.6xD	0.005	0.014	0.020	0.030	0.040	0.050	0.060	0.075	0.095
	Finishing	50	0.01xD	0.004	0.012	0.015	0.025	0.030	0.040	0.050	0.065	0.080
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB	Slotting	15	1xD	0.003	0.009	0.010	0.015	0.025	0.030	0.040	0.050	0.065
	Roughing	20	0.6xD	0.004	0.012	0.015	0.025	0.030	0.040	0.045	0.060	0.080
	Finishing	35	0.01xD	0.003	0.010	0.015	0.020	0.025	0.030	0.040	0.050	0.065
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB	Slotting	15	1xD	0.003	0.008	0.010	0.015	0.020	0.030	0.035	0.050	0.060
	Roughing	15	0.6xD	0.004	0.011	0.015	0.020	0.030	0.035	0.045	0.060	0.075
	Finishing	25	0.01xD	0.003	0.009	0.010	0.020	0.025	0.030	0.035	0.050	0.060
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB	Slotting	15	1xD	0.003	0.009	0.010	0.015	0.025	0.030	0.040	0.050	0.065
	Roughing	20	0.6xD	0.004	0.012	0.015	0.025	0.030	0.040	0.045	0.060	0.080
	Finishing	30	0.01xD	0.003	0.010	0.015	0.020	0.025	0.030	0.040	0.050	0.065
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>	Slotting	70	1xD	0.004	0.013	0.020	0.025	0.035	0.050	0.060	0.080	0.100
	Roughing	90	0.6xD	0.006	0.018	0.025	0.035	0.050	0.060	0.070	0.095	0.120
	Finishing	140	0.02xD	0.006	0.017	0.020	0.035	0.045	0.055	0.065	0.090	0.110
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>	Slotting	60	1xD	0.004	0.012	0.015	0.025	0.030	0.045	0.055	0.070	0.090
	Roughing	75	0.6xD	0.005	0.016	0.020	0.030	0.045	0.055	0.065	0.085	0.110
	Finishing	120	0.02xD	0.005	0.015	0.020	0.030	0.040	0.050	0.060	0.080	0.100
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC	Slotting											
	Roughing											
	Finishing											
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC	Slotting											
	Roughing											
	Finishing											
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC	Slotting											
	Roughing											
	Finishing											
H2.1.1 Chilled cast iron, 400 HB	Slotting											
	Roughing											
	Finishing											
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC	Slotting											
	Roughing											
	Finishing											



## Solid carbide milling cutter RF 100 Sharp

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Company  
QR Code