

# CUTTING TOOLS

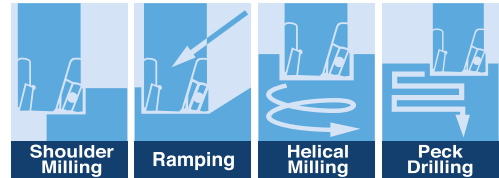
FULLCUT MILL FCR .....	P113
FULLCUT MILL FCM .....	P119
FULLCUT MILL FCM <b>for Arbor Type</b> .....	P127
C-CUTTER MINI .....	P129
C-CUTTER .....	P134
CENTER BOY .....	P135
<b>Application example</b> .....	P136



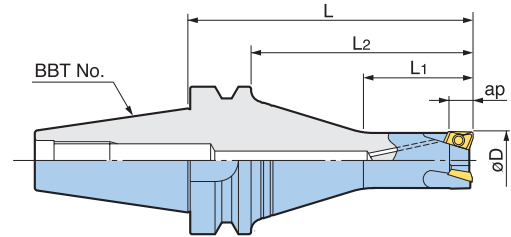
Ramping and Helical milling

## **FULLCUT MILL** PAT. **FCR** Cutter Dia. $\phi 16 - \phi 32$

Unique inserts designed for ramping make multi-functional cutting possible.



**BBT Standard type** JIS B 6339 (BIG-PLUS)



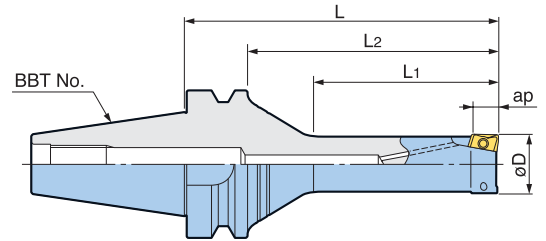
BIG-PLUS tools can be used in machining centers with conventional spindles.

Cutter Dia. $\phi D$	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>BBT30-FCR16082- 65</b>	8	65	28	43	2	BRG16	0.5
20	<b>-FCR20083- 65</b>		65	28	43	3	BRG20	0.5
25	<b>-FCR25083- 65</b>		65	33	43	3	BRG25	0.6
32	<b>-FCR32103- 65</b>	10	65	40	43	3	BRG32	0.6
16	<b>BBT40-FCR16082- 85</b>	8	85	25	58	2	BRG16	1.3
	<b>-120</b>		120	30	93			1.5
	<b>-135</b>		135	25	108			1.6
20	<b>-FCR20083- 85</b>	8	85	35	58	3	BRG20	1.2
	<b>-120</b>		120	30	93			1.6
	<b>-135</b>		135	30	108			1.7
25	<b>-FCR25083- 85</b>	8	85	40	58	3	BRG25	1.3
	<b>-120</b>		120	45	93			1.6
	<b>-135</b>		135	35	108			1.8
32	<b>-FCR32103- 85</b>	10	85	45	58	3	BRG32	1.4
	<b>-120</b>		120	50	93			1.7
	<b>-135</b>		135	40	108			1.9

For Insert : P117

For Cutting Condition : P118

**BBT Long nose type** JIS B 6339 (BIG-PLUS)



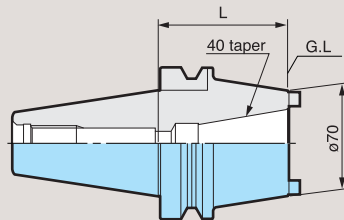
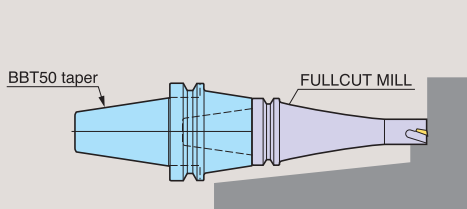
BIG-PLUS tools can be used in machining centers with conventional spindles.

Cutter Dia. øD	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>BBT30-FCR16082L- 85</b>	8	85	45	63	2	BRG16	0.5
20	<b>-FCR20082L- 85</b>		85	50	63			
25	<b>-FCR25082L- 85</b>		85	50	63			
32	<b>-FCR32102L- 85</b>	10	85	60	63	2	BRG32	0.7
16	<b>BBT40-FCR16082L-105</b>	8	105	45	78	2	BRG16	1.3
	<b>-120</b>		120	45	93			1.4
20	<b>-FCR20082L-120</b>	8	120	60	93	2	BRG20	1.4
	<b>-135</b>		135	60	108			1.5
25	<b>-FCR25082L-135</b>	8	135	75	108	2	BRG25	1.5
	<b>-150</b>		150	75	123			1.7
32	<b>-FCR32102L-135</b>	10	135	80	108	2	BRG32	1.7
	<b>-150</b>		150	90	123			1.9

☞ For Insert : P117

☞ For Cutting Condition : P118

**Adapter for BT50 taper shank (FCR & FCM)**



Model	L
<b>BBT50-BBT40-50</b>	50
<b>-90</b>	90

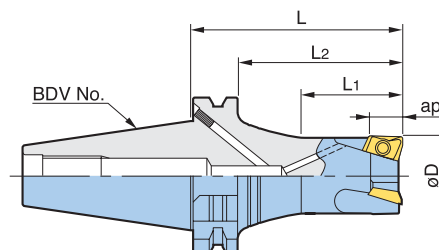
Ramping and Helical milling

## **FULLCUT MILL** PAT. **FCR** Cutter Dia. $\phi 16 - \phi 32$

Unique inserts designed for ramping make multi-functional cutting possible.



**BDV Standard type** DIN 69871 A/B (BIG-PLUS)



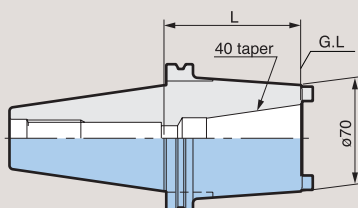
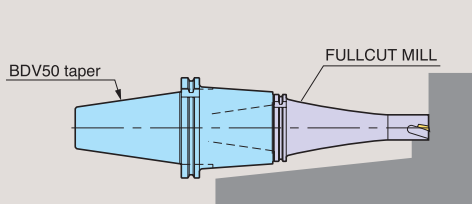
**BIG-PLUS tools can be used in machining centers with conventional spindles.**

Cutter Dia. $\phi D$	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>BDV40-FCR16082- 85</b>	8	85	25	65	2	BRG16	1.3
	<b>-120</b>		120	30	100			1.5
	<b>-135</b>		135	25	115			1.6
20	<b>-FCR20083- 85</b>	8	85	35	65	3	BRG20	1.2
	<b>-120</b>		120	30	100			1.6
	<b>-135</b>		135	30	115			1.7
25	<b>-FCR25083- 85</b>	8	85	40	65	3	BRG25	1.3
	<b>-120</b>		120	45	100			1.6
	<b>-135</b>		135	35	115			1.8
32	<b>-FCR32103- 85</b>	10	85	45	65	3	BRG32	1.4
	<b>-120</b>		120	50	100			1.7
	<b>-135</b>		135	40	115			1.9

For Insert : P117

For Cutting Condition : P118

### Adapter for SK50 taper shank (FCR & FCM)



Model	L
<b>BDV50-BDV40-50</b>	50
<b>-90</b>	90

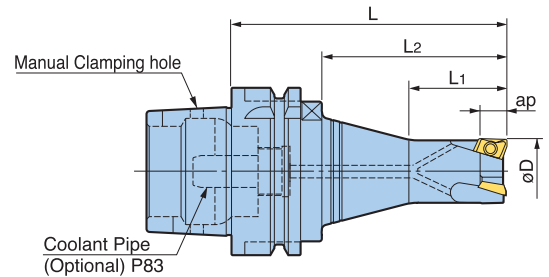


### Note

The integral version of the FULLCUT MILL provides increased rigidity as a result of the reduced gage length. It is particularly recommended for use in machines having a small spindle taper. Additionally, there is a cost saving as no chuck is necessary.

## HSK-A Standard type

ISO12164 & DIN 69893-1



Cutter Dia. øD	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>HSK-A50-FCR16082- 75</b>	8	75	27	41	2	BRG16	0.5
20	<b>-FCR20083- 75</b>		75	28	41	3	BRG20	0.6
25	<b>-FCR25083- 75</b>		75	33	41	3	BRG25	0.6
32	<b>-FCR32103- 75</b>	10	75	39	41	3	BRG32	0.7
16	<b>HSK-A63-FCR16082- 85</b>	8	85	25	51	2	BRG16	0.9
	<b>-120</b>		120	30	86			1.1
	<b>-135</b>		135	25	101			1.2
20	<b>-FCR20083- 85</b>	8	85	32	51	3	BRG20	1.0
	<b>-120</b>		120	30	86			1.2
	<b>-135</b>		135	30	101			1.3
25	<b>-FCR25083- 85</b>	8	85	35	51	3	BRG25	1.0
	<b>-120</b>		120	45	86			1.2
	<b>-135</b>		135	35	101			1.4
32	<b>-FCR32103- 85</b>	10	85	40	51	3	BRG32	1.1
	<b>-120</b>		120	50	86			1.4
	<b>-135</b>		135	40	101			1.5

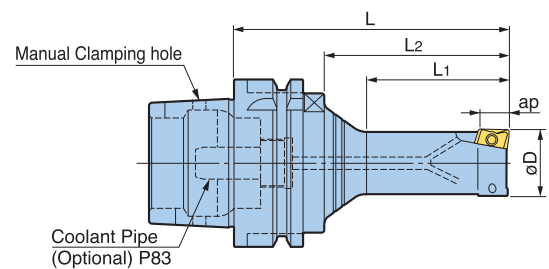
1. Coolant Pipe is ordered separately.

For Insert : P117

For Cutting Condition : P118

## HSK-A Long nose type

ISO12164 & DIN 69893-1



Cutter Dia. øD	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>HSK-A63-FCR16082L- 85</b>	8	85	40	51	2	BRG16	0.9
	<b>-120</b>		120	45	86			1.0
20	<b>-FCR20082L-105</b>	8	105	50	71	2	BRG20	1.1
	<b>-120</b>		120	60	86			1.2
25	<b>-FCR25082L-105</b>	8	105	55	71	2	BRG25	1.1
	<b>-120</b>		120	65	86			1.1
32	<b>-FCR32102L-120</b>	10	120	70	86	2	BRG32	1.4
	<b>-135</b>		135	80	101			1.4

1. Coolant Pipe is ordered separately.

For Insert : P117

For Cutting Condition : P118

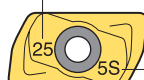
Ramping and Helical milling

## FULLCUT MILL PAT. FCR

### Indexable Inserts



Model Description  
**BRG16** **08** **08** **ACZ350S**  
 Grade  
 Nose Rd.  
 Effective Cutting Length  
 $\phi 16-25 \dots 08$   $\phi 32 \dots 10$

Marking Description  
  
 Insert Size  
 1: ACZ310  
 5S: ACZ350S  
 2: DC20 / DS20  
 grade

Cutter Dia	Insert Model	ap	Nose Red. r	P	M	K	N
				ACZ350S	ACZ310	DC20	DS20
$\phi 16$	<b>BRG160808</b>	8	0.8	○	○	○	○
$\phi 20$	<b>BRG200808</b>	8	0.8	○	○	○	○
$\phi 25$	<b>BRG250808</b>	8	0.8	○	○	○	○
$\phi 32$	<b>BRG321008</b>	10	0.8	○	○	○	○
	<b>BRG321032</b>	10	3.2			○	

※ Inserts are available in packets of 10 pcs.  
 Please clarify the insert type and grade when ordering.  
 For example, use ordering code: BRG160808ACZ350S.

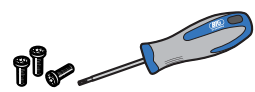


**Caution**

- It is important to use the correct insert for the diameter of FULLCUT MILL. Failure to use the correct insert will result in incorrect cutting conditions and poor results.
- There is no compatibility with those of FCM type.**

### Insert Classifications

ISO	Grade	Material	Coating
P30	<b>ACZ350S</b>	General steel	TiAlN / TiCN
M30		Stainless steel	
K10	<b>ACZ310</b>	Cast Iron	
N20	<b>DC20</b>	Aluminum	DLC
	<b>DS20</b>		

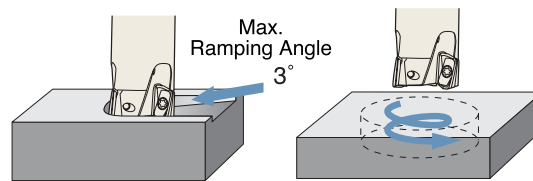
### Spare Parts

		Insert Clamping Screw Set	Wrench	Anti-seizure Lubricant
		 (10) screws & (1) wrench		 5g included
Cutter Dia	Insert	Model	Model	Model
$\phi 16$	<b>BRG1608</b>	<b>S2506DS</b>	<b>DA-T8</b>	<b>BN-5</b>
$\phi 20$	<b>BRG2008</b>			
$\phi 25$	<b>BRG2508</b>			
$\phi 32$	<b>BRG3210</b>	<b>S3508DS</b>	<b>DA-T15</b>	

**Note** It is recommended to regularly replace clamping screws and wrench to ensure the correct clamping force is maintained.

## FCR Recommended Cutting Condition

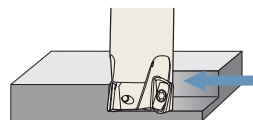
### Ramping and helical interpolation



Cutter Dia.	Flat Bottom		Through Hole
	Max. Hole Dia.	Min. Hole Dia.	Min. Hole Dia.
ø16	ø30	ø27	ø22
ø20	ø38	ø36	ø29
ø25	ø48	ø45	ø39
ø32	ø62	ø59	ø48

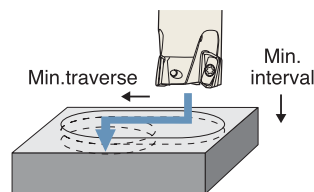
Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Prehardened steel <HRC40	Stainless steel	Die steel	Cast iron	Aluminium
	Insert Grade	ACZ350S					ACZ310	DS20
	Cutting fluid	Dry		Wet	Dry/Wet	Dry		Dry/Wet
ø16	Speed(m/min)	100 - 200	150 - 220	60 - 80	100 - 150	60 - 80	100 - 180	200 - 1,000
	Feed(mm/tooth)	0.06 - 0.12	0.06 - 0.12	0.05 - 0.08	0.08 - 0.16	0.06 - 0.1	0.08 - 0.18	0.06 - 0.24
ø20 ø25	Speed(m/min)	100 - 200	150 - 200	60 - 100	120 - 150	60 - 100	100 - 180	200 - 1,000
	Feed(mm/tooth)	0.08 - 0.2	0.08 - 0.2	0.05 - 0.1	0.12 - 0.2	0.06 - 0.1	0.02 - 0.18	0.1 - 0.35
ø32	Speed(m/min)	100 - 200	150 - 200	60 - 100	120 - 150	60 - 120	100 - 180	200 - 1,000
	Feed(mm/tooth)	0.08 - 0.2	0.08 - 0.2	0.05 - 0.1	0.12 - 0.2	0.08 - 0.12	0.06 - 0.2	0.1 - 0.35

### Shouldering and slotting



Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Prehardened steel <HRC40	Stainless steel	Die steel	Cast iron	Aluminium
	Insert Grade	ACZ350S					ACZ310	DS20
	Cutting fluid	Dry		Wet	Dry/Wet	Dry		Dry/Wet
ø16 ø20	Speed(m/min)	100 - 200	100 - 200	60 - 80	120 - 180	80 - 120	100 - 180	200 - 1,000
	Feed(mm/tooth)	0.08 - 0.18	0.08 - 0.18	0.05 - 0.1	0.12 - 0.18	0.08 - 0.12	0.08 - 0.18	0.1 - 0.3
ø25 ø32	Speed(m/min)	100 - 200	100 - 200	60 - 100	120 - 180	80 - 120	100 - 180	200 - 1,500
	Feed(mm/tooth)	0.08 - 0.2	0.08 - 0.2	0.05 - 0.1	0.12 - 0.2	0.08 - 0.12	0.08 - 0.2	0.1 - 0.35

### Plunge milling



Cutter Dia.	Min.interval	Min.traverse
ø16	0.5	14
ø20	1	18
ø25	1	23
ø32	2	30

Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Prehardened steel <HRC40	Stainless steel	Die steel	Cast iron	Aluminium
	Insert Grade	ACZ350S					ACZ310	DS20
	Cutting fluid	Air blow		Wet	Air/Wet	Air blow		Air/Wet
ø16	Speed(m/min)	80 - 120	80 - 120	60	80 - 120	60 - 80	80 - 160	200 - 350
	Feed(mm/rev)	0.06 - 0.1	0.06 - 0.1	0.04 - 0.06	0.05 - 0.08	0.05 - 0.08	0.06 - 0.1	0.06 - 0.1
ø20 ø25	Speed(m/min)	100 - 160	100 - 160	60 - 100	100 - 160	60 - 100	80 - 180	200 - 500
	Feed(mm/rev)	0.1 - 0.25	0.1 - 0.25	0.1 - 0.25	0.12 - 0.25	0.1 - 0.2	0.08 - 0.3	0.1 - 0.3
ø32	Speed(m/min)	100 - 160	100 - 160	60 - 100	100 - 160	60 - 100	80 - 180	200 - 600
	Feed(mm/rev)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	0.12 - 0.3	0.1 - 0.2	0.08 - 0.4	0.1 - 0.3



### Caution

- The table is just a reference to determine cutting conditions. It should be adjusted according to a condition of a machine tool or workpiece.
- When long projection length type is used, it is necessary to lower feed rate.
- Since chips may scatter, utilize safety enclosures.
- Do not use oil-based cutting fluid, or a fire may take place.

Square Shoulder and Slot milling

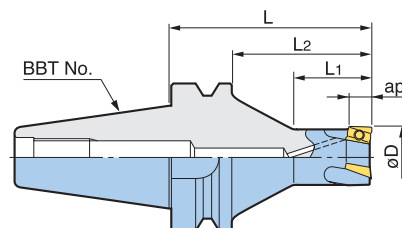
## **FULLCUT MILL** PAT. **FCM** Cutter Dia. $\phi 16 - \phi 50$

The indexable endmill that combines sharpness and rigidity has no match.



**BBT Standard type**

JIS B 6339 (BIG-PLUS)



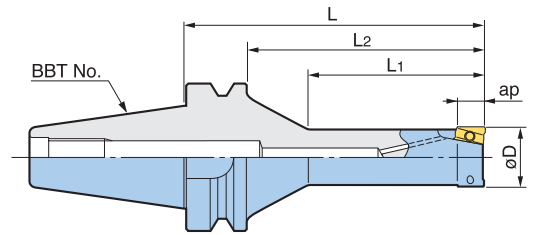
BIG-PLUS tools can be used in machining centers with conventional spindles.

Cutter Dia. $\phi D$	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>BBT30-FCM16092- 65</b>	9	65	23	43	2	ARG16	0.5
20	<b>-FCM20093- 65</b>			28	43	3	ARG20	0.5
25	<b>-FCM25093- 65</b>			33	43	3	ARG25	0.5
32	<b>-FCM32113- 65</b>	11	50	38	43	3	ARG32	0.6
40	<b>-FCM40114- 50</b>			25	28	4	ARG40	0.6
50	<b>-FCM50115- 50</b>			28		5		0.7
16	<b>BBT40-FCM16092- 85</b>	9	85	23	58	2	ARG16	1.2
	<b>-105</b>		105	30	78			1.3
	<b>-120</b>		120	25	93			1.4
	<b>-150</b>		150	123	1.7			
20	<b>-FCM20093- 85</b>	9	85	28	58	3	ARG20	1.2
	<b>-105</b>		105	35	78			1.3
	<b>-120</b>		120	93	1.4			
	<b>-150</b>		150	123	1.7			
25	<b>-FCM25093- 85</b>	9	85	33	58	3	ARG25	1.2
	<b>-120</b>		120	45	93			1.4
	<b>-135</b>		135	40	108			1.6
	<b>-165</b>		165	138	1.9			
32	<b>-FCM32113- 85</b>	11	85	38	58	3	ARG32	1.3
	<b>-120</b>		120	60	93			1.5
	<b>-135</b>		135	50	108			1.7
	<b>-165</b>		165	40	138			2.1
40	<b>-FCM40114- 85</b>	11	85	43	58	4	ARG40	1.4
	<b>-120</b>		120	65	93			1.7
	<b>-135</b>		135	60	108			2.0
	<b>-165</b>		165	50	138			2.4
50	<b>-FCM50115- 70</b>	11	70	38	43	5	ARG40	1.5
	<b>-120</b>		120	65	93			2.2
	<b>-135</b>		135	60	108			2.4
	<b>-165</b>		165	50	138			3.0

For Insert : P125

For Cutting Condition : P126

**BBT Long nose type** JIS B 6339 (BIG-PLUS)



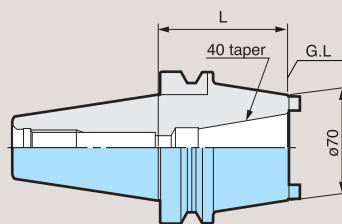
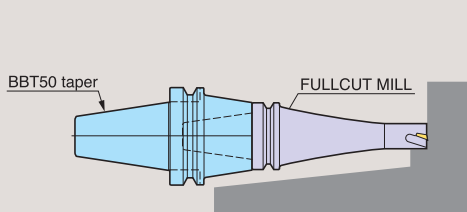
BIG-PLUS tools can be used in machining centers with conventional spindles.

Cutter Dia. øD	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>BBT30-FCM16092L- 85</b>	9	85	45	63	2	ARG16	0.5
20	<b>-FCM20092L- 85</b>			50	63		ARG20	0.5
25	<b>-FCM25092L- 85</b>			50	63		ARG25	0.6
32	<b>-FCM32112L- 85</b>	11		60	63		ARG32	0.7
16	<b>BBT40-FCM16092L-105</b>	9	105	45	78	2	ARG16	1.3
	<b>-120</b>		120		93			1.4
20	<b>-FCM20092L-120</b>	9	120	60	93	2	ARG20	1.4
	<b>-135</b>		135		108			1.5
25	<b>-FCM25092L-135</b>	9	135	75	108	2	ARG25	1.5
	<b>-150</b>		150		123			1.7
32	<b>-FCM32112L-135</b>	11	135	80	93	2	ARG32	1.7
	<b>-150</b>		150		123			1.9

For Insert : P125

For Cutting Condition : P126

**Adapter for BT50 taper shank (FCR & FCM)**



Model	L
<b>BBT50-BBT40-50</b>	50
<b>-90</b>	90

Square Shoulder and Slot milling

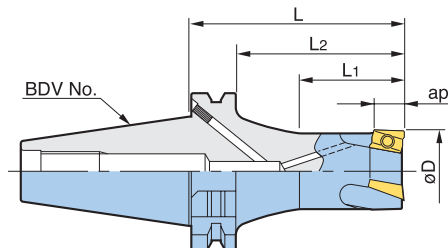
## FULLCUT MILL PAT. FCM Cutter Dia. $\phi 16 - \phi 50$

The indexable endmill that combines sharpness and rigidity has no match.



**BDV Standard type**

DIN 69871 A/B (BIG-PLUS)



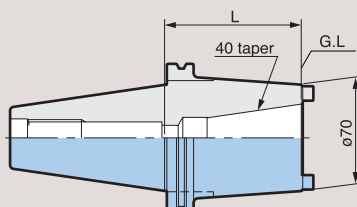
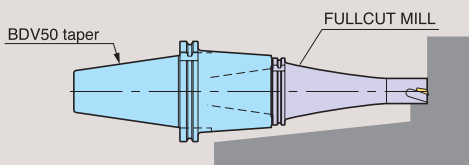
BIG-PLUS tools can be used in machining centers with conventional spindles.

Cutter Dia. $\phi D$	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>BDV40-FCM16092- 85</b>	9	85	23	58	2	ARG16	1.2
	<b>-105</b>		105	30	78			1.3
	<b>-120</b>		120	25	93			1.4
20	<b>-FCM20093- 85</b>	9	85	28	58	3	ARG20	1.2
	<b>-105</b>		105	35	78			1.3
	<b>-120</b>		120	30	93			1.4
25	<b>-FCM25093- 85</b>	9	85	33	58	3	ARG25	1.2
	<b>-120</b>		120	45	93			1.4
	<b>-135</b>		135	40	108			1.6
32	<b>-FCM32113- 85</b>	11	85	38	58	3	ARG32	1.3
	<b>-120</b>		120	60	93			1.5
	<b>-135</b>		135	50	108			1.7
40	<b>-FCM40114- 85</b>	11	85	43	58	4	ARG40	1.4
	<b>-120</b>		120	65	93			1.7
	<b>-135</b>		135	60	108			2.0
50	<b>-FCM50115- 70</b>	11	70	38	43	5	ARG40	1.5
	<b>-120</b>		120	65	93			2.2
	<b>-135</b>		135	60	108			2.4

For Insert : P125

For Cutting Condition : P126

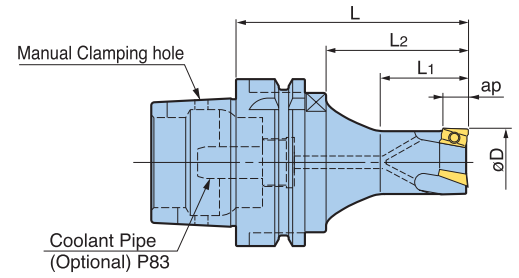
### Adapter for SK50 taper shank (FCR & FCM)



Model	L
<b>BDV50-BDV40-50</b>	50
<b>-90</b>	90

## HSK-A Standard type

ISO12164 & DIN 69893-1



Cutter Dia. øD	Model	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
16	<b>HSK-A40-FCM16092- 65</b>	9	65	23	37	2	ARG16	0.3
20	<b>-FCM20093- 65</b>			28			ARG20	0.3
25	<b>-FCM25093- 65</b>			35			ARG25	0.4
32	<b>-FCM32113- 65</b>	11	65	45	—	3	ARG32	0.5
40	<b>-FCM40114- 65</b>			—			ARG40	0.6
50	<b>-FCM50115- 65</b>			—			ARG40	0.7
16	<b>HSK-A50-FCM16092- 75</b>	9	75	23	41	2	ARG16	0.6
20	<b>-FCM20093- 75</b>			28			ARG20	0.6
25	<b>-FCM25093- 75</b>			33			ARG25	0.6
32	<b>-FCM32113- 75</b>	11	75	39	—	3	ARG32	0.7
40	<b>-FCM40114- 75</b>			—			ARG40	0.9
50	<b>-FCM50115- 75</b>			—			ARG40	1.0
16	<b>HSK-A63-FCM16092- 85</b>	9	85	23	51	2	ARG16	0.9
	<b>-105</b>		105	30	71			1.0
	<b>-120</b>		120	25	86			1.1
	<b>-150</b>		150	25	116			1.3
20	<b>-FCM20093- 85</b>	9	85	28	51	3	ARG20	1.0
	<b>-105</b>		105	35	71			1.1
	<b>-120</b>		120	30	86			1.2
	<b>-150</b>		150	30	116			1.4
25	<b>-FCM25093- 85</b>	9	85	33	51	3	ARG25	1.0
	<b>-120</b>		120	45	86			1.2
	<b>-135</b>		135	40	101			1.3
	<b>-165</b>		165	40	131			1.5
32	<b>-FCM32113- 85</b>	11	85	38	51	3	ARG32	1.1
	<b>-120</b>		120	60	86			1.3
	<b>-135</b>		135	50	101			1.4
	<b>-165</b>		165	40	131			1.7
40	<b>-FCM40114- 85</b>	11	85	43	51	4	ARG40	1.3
	<b>120</b>		120	65	86			1.5
	<b>135</b>		135	60	101			1.7
	<b>165</b>		165	50	131			2.1
50	<b>-FCM50115- 70</b>	11	70	28	28	5	ARG40	1.3
	<b>-120</b>		120	78	78			1.9
	<b>-135</b>		135	93	93			2.2
	<b>-165</b>		165	123	123			2.8

1. Coolant Pipe is ordered separately.

☞ For Insert : P125

☞ For Cutting Condition : P126

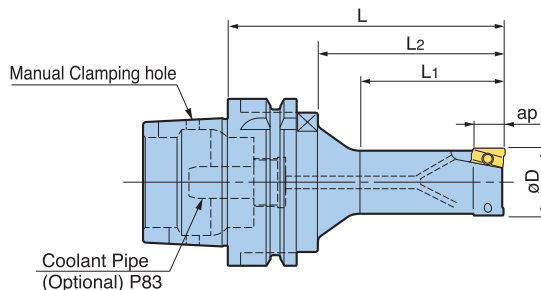
Square Shoulder and Slot milling

## **FULLCUT MILL** PAT. **FCM** Cutter Dia. $\phi 12 - \phi 50$

The indexable endmill that combines sharpness and rigidity has no match.



**HSK-A Long nose type** ISO12164 & DIN 69893-1



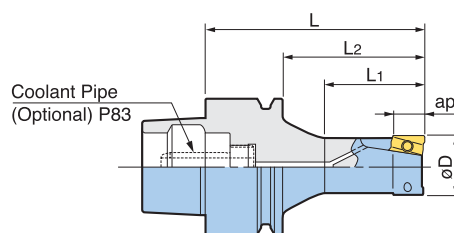
Cutter Dia. $\phi D$	Model	ap	L	L <sub>1</sub>	L <sub>2</sub>	No. of Insert	Insert Size	Weight (kg)
16	HSK-A63-FCM16092L- 85	9	85	40	51	2	ARG16	0.9
	-120		120	45	86			1.0
20	-FCM20092L-105	9	105	50	71	2	ARG20	1.1
	-120		120	60	86			1.2
25	-FCM25092L-105	9	105	55	71	2	ARG25	1.1
	-120		120	65	86			1.2
32	-FCM32112L-120	11	120	70	86	2	ARG32	1.3
	-135		135	80	101			1.4

1. Coolant Pipe is ordered separately.

For Insert : P125

For Cutting Condition : P126

**HSK-E Standard type** DIN 69893-5



Cutter Dia. $\phi D$	Model	ap	L	L <sub>1</sub>	L <sub>2</sub>	No. of Insert	Insert Size	Weight (kg)
16	HSK-E25-FCM16092-45	9	45	23	35	2	ARG16	0.17
	-E32-FCM16092-55		55	23	35			0.20
	-E40-FCM16092-65		65	28	45			0.45

1. Coolant Pipe is ordered separately.

For Insert : P125

For Cutting Condition : P126

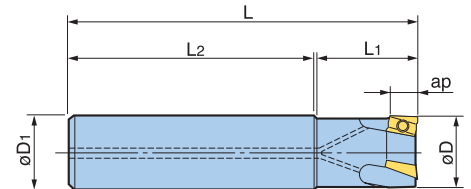
### Caution

As HSK-E type interface does not have drive key-ways, there is a possibility that it may slip in machine tool spindles if cutting load exceeds the gripping force of machine tools.  
Please try to choose proper cutting condition for our FullCut Mill because it is affected by machine tool performance.

## CYLINDRICAL Shank Type



Cutter Dia  
ø12 - ø50



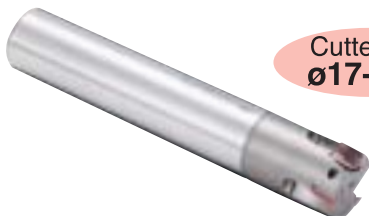
Cutter dia øD	Model	øD1	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)	
12	ST16-FCM12091- 90	16	9	90	15	70	1	ARG16	0.1	
14	-FCM14091- 90				17				0.1	
16	-FCM16092- 90				25	65			2	0.1
20	ST20-FCM20093-110	20	9	110	30	80	3	ARG20	0.2	
25	ST25-FCM25093-120	25	9	120	35	85	3	ARG25	0.4	
32	ST32-FCM32113-130	32	11	130	35	95	3	ARG32	0.7	
40	-FCM40114-130				40				90	4
50	-FCM50115-130				5	1.0				

For Insert : P125

For Cutting Condition : P126

"Trump card" at deep pocket & deep shoulder endmilling

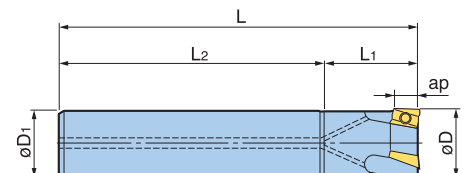
[OVER SIZE]



Cutter Dia  
ø17 - ø33

**POINT**  $\phi D = \phi D1 + 1mm$

1mm larger Cutter Dia. than shank Dia. avoids any interference with work-piece.



Cutter dia øD	Model	øD1	ap	L	L1	L2	No. of Insert	Insert Size	Weight (kg)
17	ST16-FCM17092-120	16	9	120	25	95	2	ARG16	0.2
21	ST20-FCM21092-165	20	9	165	30	135	2	ARG20	0.4
	-FCM21093-135			135		105			3
26	ST25-FCM26092-165	25	9	165	38	127	2	ARG25	0.6
	-FCM26093-150			150		112			3
33	ST32-FCM33112-180	32	11	180	48	132	2	ARG32	1.1
	-FCM33113-180			180		132			3

1. For long projection length and 3 tooth cutter's application, please reduce the cutting condition.

For Insert : P125

For Cutting Condition : P126

To suit FULLCUT MILL cylindrical shank type



**MEGA DOUBLE POWER CHUCK**

P25,49,63,81



**NEW Hi-POWER MILLING CHUCK**

P32,52,67

Material: C55 (S55C)



Model	ST32-FCM33112-180
Cutting Speed V (m/min.)	120
Feed Rate f (mm/tooth)	0.1
Axial DOC Ad (mm)	10mm x 10 steps
Radial DOC Rd (mm)	Max. 33mm

**Result**

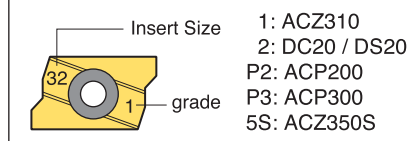
Deep shoulder endmilling is achieved with 110mm projection length and 10mm axial depth.

# FULLCUT MILL PAT. FCM

## Indexable Inserts



### Marking Description



Cutter Dia	Insert Model	ap	Nose Red. r	P		M	K	N	
				ACP200	ACP300	ACZ350S	ACZ310	DC20	DS20
ø12 - ø17	ARG160902	9	0.2		△	○	△	○	
	ARG160904		0.4	△	○	○	○	○	
ø20 - ø21	ARG200902	9	0.2		△	○	△	○	
	ARG200904		0.4	△	○	○	○	○	
ø25 - ø26	ARG250902	9	0.2		△	○	△	○	
	ARG250904		0.4	△	○	○	○	○	
ø32 - ø33	ARG321102	11	0.2		△	○	△	○	
	ARG321104		0.4	△	○	○	○	○	
ø40 - ø50	ARG401102	11	0.2		△	○	△	○	
	ARG401104		0.4	△	○	○	○	○	

※ Inserts are available in packets of 10 pcs.  
Please clarify the insert type and grade when ordering.  
For example, use ordering code: ARG160904ACP300.

### Caution

- It is important to use the correct insert for the diameter of FULLCUT MILL. Failure to use the correct insert will result in incorrect cutting conditions and poor results.
- There is no compatibility with those of FCR type.
- Nose radius 0.2 inserts are suitable for light cutting.

## Insert Classifications

ISO	Grade	Material	Coating
P20	ACP200	Prehardened steel	TiAlN / AlCrN
P30	ACP300	General steel	
M30	ACZ350S	Stainless steel	TiAlN / TiCN
K10	ACZ310	Cast Iron	
N20	DC20	Aluminum	DLC
	DS20		

### Selection between ACP300 and ACP200 for steel.

ACP200 is superior in anti-wear resistance, while ACP300 is superior in its anti-chipping property. ACP300 is the first recommendation for steel cutting. Choose ACP200 over ACP300 in cases where further speed or wear-resistance is needed. ACP200 is not, however, recommended for either heavily-interrupted or heavy-duty cutting.

## Spare Parts

		Insert Clamping Screw Set (10) screws & (1) wrench	Wrench	Anti-seizure Lubricant 5g included
Cutter Dia	Insert	Model	Model	Model
ø12	ARG1609	S2505DS	DA-T8	BN-5
ø14 ø16 ø17		S2506DS		
ø20 ø21	ARG2009			
ø25 ø26	ARG2509			
ø32 ø33	ARG3211			
ø40	ARG4011	S3508DS	DA-T15	
ø50				

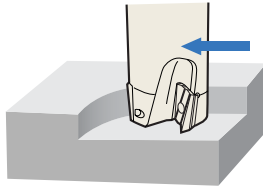


### Note

It is recommended to regularly replace clamping screws and wrench to ensure the correct clamping force is maintained.

## FCM Recommended Cutting Condition

### Shouldering and slotting



**Caution**  
FULLCUT MILL, FCM type, cannot be used for feeding in Z-axis such as ramping, plunging and boring.

### Finish-light cutting

Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Prehardened steel <HRC40	Stainless steel	Cast iron	Aluminium
	Insert Grade	ACP300		ACP200	ACZ350S	ACZ310	DC20 / DS20
	Cutting fluid	Dry			Dry/Wet	Dry	Dry/Wet
ø12 · ø14	Speed(m/min)	150 - 250	180 - 250	80 - 140	140 - 180	100 - 200	200 - 750
	Feed(mm/tooth)	0.1 - 0.2	0.1 - 0.2	0.08 - 0.12	0.12 - 0.18	0.1 - 0.2	0.10 - 0.3
ø16 - ø21	Speed(m/min)	150 - 250	180 - 250	80 - 140	140 - 180	100 - 200	200 - 1,000
	Feed(mm/tooth)	0.1 - 0.2	0.1 - 0.2	0.08 - 0.12	0.12 - 0.18	0.1 - 0.2	0.10 - 0.3
ø25 - ø33	Speed(m/min)	180 - 280	200 - 280	80 - 140	140 - 200	100 - 200	200 - 1,500
	Feed(mm/tooth)	0.1 - 0.24	0.1 - 0.22	0.08 - 0.14	0.12 - 0.2	0.1 - 0.2	0.10 - 0.35
ø40 · ø50	Speed(m/min)	180 - 280	200 - 280	80 - 140	140 - 200	80 - 200	200 - 1,500
	Feed(mm/tooth)	0.1 - 0.24	0.1 - 0.22	0.08 - 0.14	0.12 - 0.2	0.1 - 0.2	0.10 - 0.35

### Medium-heavy cutting

Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Stainless steel	Cast iron	Aluminium
	Insert Grade	ACP300		ACZ350S	ACZ310	DC20 / DS20
	Cutting fluid	Dry			Dry/Wet	Dry
ø12 · ø14	Speed(m/min)	100 - 200	150 - 200	120 - 180	100 - 180	200 - 750
	Feed(mm/tooth)	0.08 - 0.14	0.1 - 0.15	0.12 - 0.15	0.08 - 0.18	0.10 - 0.2
ø16 - ø21	Speed(m/min)	100 - 200	150 - 200	120 - 180	100 - 180	200 - 1,000
	Feed(mm/tooth)	0.08 - 0.14	0.1 - 0.15	0.12 - 0.15	0.08 - 0.18	0.10 - 0.2
ø25 - ø33	Speed(m/min)	100 - 200	160 - 220	120 - 180	100 - 200	200 - 1,500
	Feed(mm/tooth)	0.1 - 0.16	0.1 - 0.15	0.12 - 0.15	0.08 - 0.2	0.10 - 0.3
ø40 · ø50	Speed(m/min)	100 - 200	160 - 220	120 - 180	100 - 220	200 - 1,500
	Feed(mm/tooth)	0.1 - 0.16	0.1 - 0.15	0.12 - 0.15	0.08 - 0.2	0.10 - 0.3

**Caution**

- Nose radius 0.2 inserts are suitable for light cutting. Care should be taken in the selection of both axial & radial depth of cut as well as the feed rate.
- This table is a general guideline for cutting data. Please adjust according to machine and workpiece conditions, as well as width of cutting.
- For Long Type, reduce the feed rate.
- Dry cutting (including air blow) is recommended when cutting of steel, except for finishing.
- Dry cutting is recommended for stainless steel. However use soluble oil in a case where severe built-up edge occurs.

### Finish milling with axial DOC of 0.2mm or smaller.

Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Stainless steel	Cast iron
	Insert Grade	ACP200		ACZ310	
	Cutting fluid	Wet			
ø12 - ø50	Speed(m/min)	200 - 250			
	Feed(mm/tooth)	0.1 - 0.2			

**Caution**

- For Long Type, reduce the feed rate.
- For aluminium alloy, same conditions as "Finish-light cutting" shown above should be applied.
- For finishing of steel, wet cutting improves both surface finish and insert life. ACZ310 grade extends the life further.

Square Shoulder and Face milling

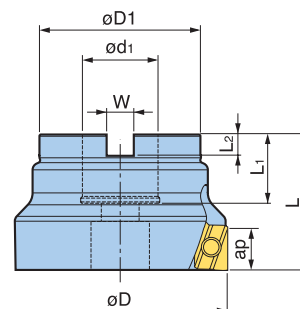
## FULLCUT MILL PAT. FCM

Corresponding to Form FMH of new standard face milling adaptor

**ARBOR type**



Cutter Dia  
ø50, ø63, ø80



### Form FMH / FMC

Cutter dia øD	Model	ap	ød	øD1	L	L1	L2	W	No. of Insert	Insert Size	Weight (kg)
50	FMH22-FCM50115-40	11	22	47	40	20	6	10.4	5	ARG40	0.5
63	-FCM63116-40		22	47	40	20	6	10.4	6	ARG63	0.7
80	FMH27-FCM80116-50		27	60	50	22	7	12.4	6	ARG80	1.2

For FMC Type BBT: P40

For FMC Type BDV: P53

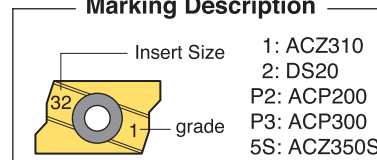
For FMH Type BBT: P41

For FMH Type HSK: P71

### Indexable Inserts



#### Marking Description



Cutter Dia	Insert Model	ap	Nose Red. r	P		M	K	N
				ACP200	ACP300	ACZ350S	ACZ310	DS20
ø50	ARG401104	11	0.4	○	○	○	○	○
ø63	ARG631108	11	0.8	○	○	○	○	○
ø80	ARG801108	11	0.8	○	○	○	○	○

※ Inserts are available in packets of 10 pcs.

Please clarify the insert type and grade when ordering.  
For example, use ordering code: ARG401104ACP300.



**Caution**  
• It is important to use the correct insert for the diameter of FULLCUT MILL. Failure to use the correct insert will result in incorrect cutting conditions and poor results.

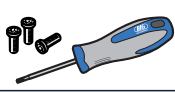


### Insert Classifications

ISO	Grade	Material	Coating
P20	ACP200	Prehardened steel	TiAlN / AlCrN
P30	ACP300	General steel	
M30	ACZ350S	Stainless steel	TiAlN / TiCN
K10	ACZ310	Cast Iron	
N20	DS20	Aluminum	DLC

#### Selection between ACP300 and ACP200 for steel.

ACP200 is superior in anti-wear resistance, while ACP300 is superior in its anti-chipping property. ACP300 is the first recommendation for steel cutting. Choose ACP200 over ACP300 in cases where further speed or wear-resistance is needed. ACP200 is not, however, recommended for either heavily-interrupted or heavy-duty cutting.

■ Spare Parts

		Insert Clamping Screw Set (10) screws & (1) wrench 	Wrench 	Anti-seizure Lubricant  5g included
Cutter Dia	Insert	Model	Model	Model
ø50	<b>ARG401104</b>	<b>S3508DS</b>	<b>DA-T15</b>	<b>BN-5</b>
ø63	<b>ARG631108</b>			
ø80	<b>ARG801108</b>			



**Note**

It is recommended to regularly replace clamping screws and wrench to ensure the correct clamping force is maintained.

**FCM ARBOR type Recommended Cutting Condition**

**Square Shoulder and Face milling**



**Caution**

FULLCUT MILL, FCM ARBOR type, cannot be used for feeding in Z-axis such as ramping, plunging and boring.

■ Finish-light cutting

Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Prehardened steel <HRC40	Stainless steel	Cast iron	Aluminium
	Insert Grade	<b>ACP300</b>		<b>ACP200</b>	<b>ACZ350S</b>	<b>ACZ310</b>	<b>DS20</b>
	Cutting fluid	<b>Dry</b>			<b>Dry/Wet</b>	<b>Dry</b>	<b>Dry/Wet</b>
ø50 ø63 ø80	Speed(m/min)	100 - 220	150 - 240	80 - 120	120 - 180	100 - 200	200 - 1500
	Feed(mm/tooth)	0.1 - 0.24	0.1 - 0.22	0.08 - 0.14	0.12 - 0.20	0.10 - 0.25	0.10 - 0.35

■ Medium-heavy cutting

Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Stainless steel	Cast iron	Aluminium
	Insert Grade	<b>ACP300</b>		<b>ACZ350S</b>	<b>ACZ310</b>	<b>DS20</b>
	Cutting fluid	<b>Dry</b>			<b>Dry/Wet</b>	<b>Dry</b>
ø50 ø63 ø80	Speed(m/min)	100 - 220	150 - 240	120 - 180	100 - 200	200 - 1500
	Feed(mm/tooth)	0.08 - 0.18	0.08 - 0.16	0.12 - 0.15	0.10 - 0.20	0.10 - 0.30



**Caution**

- This table is a general guideline for cutting data. Please adjust according to machine and workpiece conditions, as well as width of cutting.
- In case of long type arbor using, reduce the feed rate.
- Dry cutting (including air blow) is recommended when cutting of steel, except for finishing.
- Dry cutting is recommended for stainless steel. However use soluble oil in a case where severe built-up edge occurs.

**Indexable Insert Endmill, achieving the excellent squareness and fine surface finish.**



Machined by FULLCUT MILL model : FMH22-FCM63116-40  
Arbor model : BBT40-FMH22-27-45

**Squareness**

Cutting Speed V (m/min.)	150
Feed Rate f (mm/tooth)	0.1
Axial DOC Ad (mm)	5
Radial DOC Rd (mm)	0.1

	<b>10µm</b>
Other manufacture	40µm

**Wiper cutting edge**

Cutting Speed V (m/min.)	250
Feed Rate f (mm/tooth)	0.2
Axial DOC Ad (mm)	0.1
Radial DOC Rd (mm)	50

	<b>Ra=0.51µm</b>
Other manufacture	Ra=1.56µm