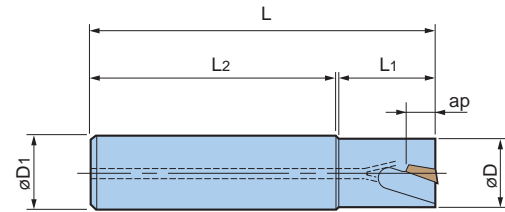


Cylindrical shank version

FULLCUT MILL Type FCM Cutter Dia. $\phi 12 - \phi 50$



Model	Cutter dia ϕD	$\phi D1$	ap	L	L1	L2	No. of Insert	Insert Model
ST16-FCM12091- 90	12	16	9	90	15	70	1	ARG160904
-FCM14091- 90	14				17			
-FCM16092- 90	16				25			
ST20-FCM20093-110	20	20	9	110	30	80	3	ARG200904
ST25-FCM25093-120	25	25	9	120	35	85	3	ARG250904
ST32-FCM32113-130	32	32	11	130	35	95	3	ARG321104
-FCM40114-130	40				40			
-FCM50115-130	50				40			

ap=The Length of Effective Cutting Edge

1. Inserts are ordered separately.

For Insert : P13

To suit FULLCUT MILL cylindrical shank type



MEGA DOUBLE POWER CHUCK PAT.

The nut contacts the flange to offer close to integral rigidity. Advanced technology for high speed & heavy cutting.

For further information of MEGA CHUCK SERIES : Catalog No. 4

Clamping range: $\phi 16 - \phi 50$

BIG-PLUS
SPINDLE SYSTEM PAT.
DUAL CONTACT



Contact



BIG
BIG DAISHOWA

Indexable Insert Endmill

PAT.

FULLCUT MILL Type FCR / FCM

BIG DAISHOWA SEIKI CO LTD

CATALOG No.

EXm134-3



The revolutionary ramping endmill for multi-functional cutting.

FULLCUT MILL
Type **FCR**

Cutter Dia. $\phi 16 - \phi 32$
BBT, BDV, HSK Shank Type

BIG-PLUS
SPINDLE SYSTEM PAT.
DUAL CONTACT



"Excellent Sharpness"

Indexable Insert Endmill offering both accuracy and toughness

NEW Long Type for improved reach!!
(Integral body with BIG-PLUS or HSK)



The sharpness and toughness that you have never seen before.

FULLCUT MILL
Type **FCM**

Cutter Dia. $\phi 12 - \phi 50$
BBT, BDV, HSK, Cylindrical Shank Type

BIG-PLUS
SPINDLE SYSTEM PAT.
DUAL CONTACT



BIG
BIG DAISHOWA

BIG DAISHOWA SEIKI CO LTD

Takaramachi 5-2, Higashiosakashi
Osaka 579-8025 JAPAN
Phone : (+81)-72-982-8277 Fax : (+81)-72-982-8370
http://www.big-daishowa.com E-mail: export@big-net.ne.jp



JQA-QMA11602
AWAJI No.1 Factory
JQA-QM3913
FA Dept.

CATALOG No. EXm134-3-0807-1

Subject to technical changes by further developments.

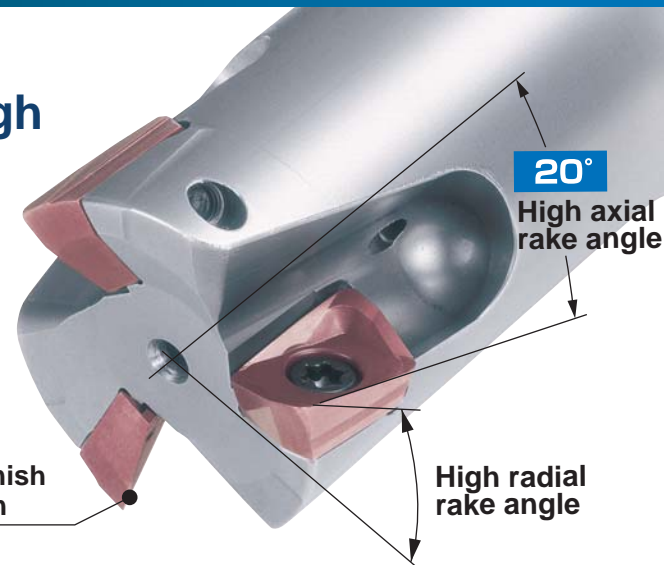
Indexable insert endmills with both excellent sharpness and toughness, achieving the performance of solid endmills

Sharp cutting edge by both high radial and axial rake angles

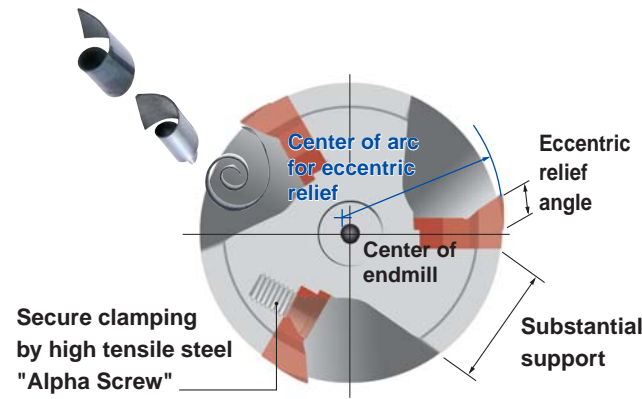
Positive high rake cutting edge for both radial and axial directions achieves smooth and quiet endmilling.

Low cutting resistance

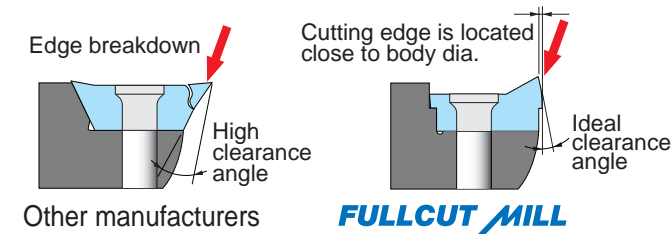
Excellent surface finish by wide wiper action



Positive rake angle offering high toughness



Strong cutting edge reduces edge chipping.



■ Eccentric relief angle
Providing eccentric to the cutting edge has been standard for solid endmills since the 1970's. It has become the traditional technique in solid endmills. The relief angle is kept small so providing increased strength to the cutting edge without reducing the top rake and hence sharpness.

Amazing cutting performance, brought by integral & face contact body!!

Integral style with taper shank and flange contact with the machine spindle provides higher precision and rigidity thus achieving cutting conditions only otherwise available on larger machines.

BIG-PLUS SPINDLE SYSTEM PAT. DUAL CONTACT

BBT and BDV type

BIG-PLUS SPINDLE SYSTEM PAT. DUAL CONTACT

HSK type

SIMULTANEOUS DUAL CONTACT SYSTEM

- Higher rigidity due to larger contact diameter.
- Improved ATC repeatability.
- Elimination of axial movement at high speeds

NEW Newly introduced Long Type!!
Ideal for avoiding interference.
Offered with BIG-PLUS or HSK shank.

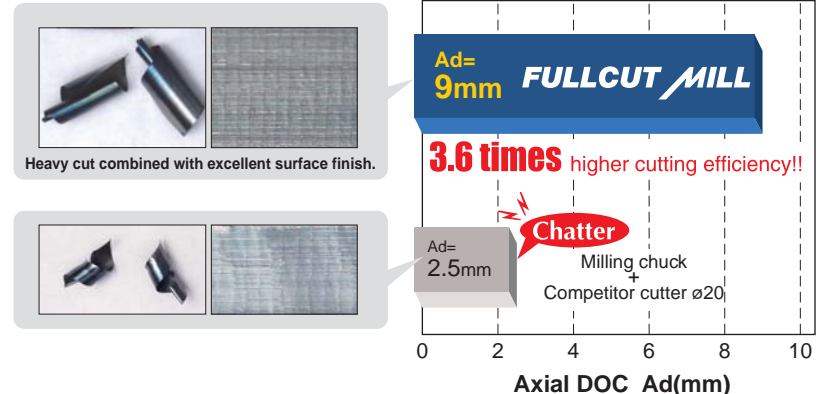
Long reach



Amazing cutting performance even on #40 taper machine!!

Comparison of axial DOC between integral type with face contact and straight shank type. 3.6 times higher cutting performance than other manufacturer.

Cutting condition
Machine : BT40(BIG PLUS)
Hole dia : ø20mm
Work material : S50C
Spindle speed : 2,400min⁻¹
Speed : V=150m/min
Feed : 0.12mm/tooth



Ramping & Helical milling cutter

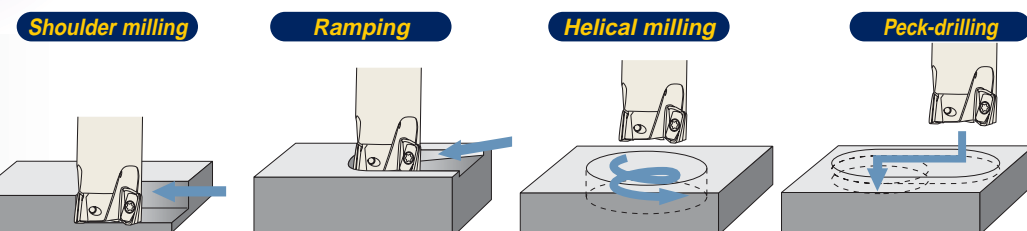
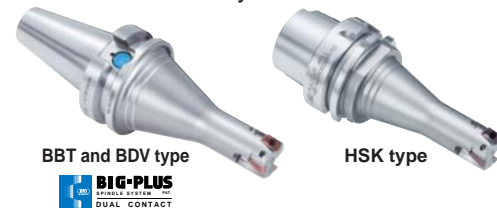
FULLCUT MILL Type FCR

Cutter Dia. ø16 - ø32



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

Higher rigidity with integral body with dual contact system.



For multi-functional cutting

Square Shoulder and slot milling cutter

FULLCUT MILL Type FCM

Cutter Dia. ø12 - ø50



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

A variety of shanks including simultaneous fit with integral body.



Tough cutting edge of FULLCUT MILL is proven.

An evaluation of cutting length/life as measured when machining the most arduous workpiece by milling over a continuous series of holes. This is the condition most likely to cause edge chipping.

Application Examples

FULLCUT MILL Type **FCR**

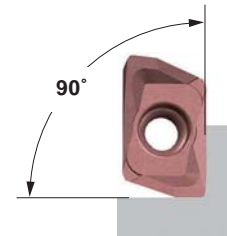
(All the following application examples are achieved with dry cutting.)

■ Bore Dia. 38 with Helical milling



For carbon steel of C50, very smooth cutting with feed rate of 1,100mm/min and excellent squareness are achieved.

Fullcut Mill	BBT40-FCR20083-120
Insert	BRG200808(ACZ350S)
Work Material	C50(S50C) / Air blow
Cutting Speed V (m/min.)	150
Feed Rate f (mm/min.)	1,100
Axial DOC Ad (mm)	2mm × 3 times
Hole dia.	ø38

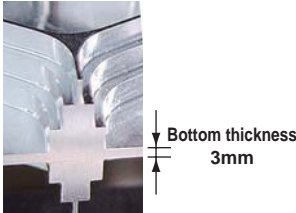


■ Honeycombed Pocket with Ramping

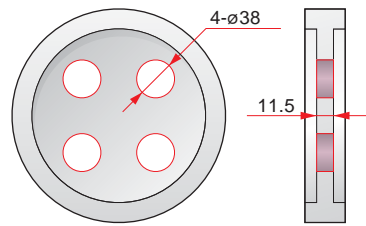


For low rigid workpiece with 3mm thickness clamped by a vise, feed rate of 4,300mm/min on both sides of the workpiece is achieved.

Fullcut Mill	BBT40-FCR20083-85
Insert	BRG200808(DC20)
Work Material	A2017 Duralumin / Air blow
Cutting Speed V (m/min.)	750
Feed Rate f (mm/min.)	4,300
Axial DOC Ad (mm)	6mm × 3 times
Radial DOC Rd (mm)	MAX20



■ Helical milling



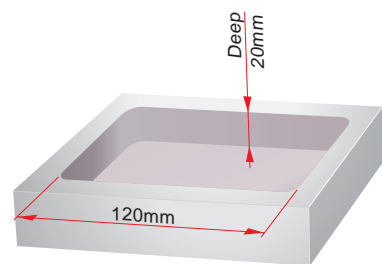
Stable helical milling with 4mm axial DOC on less-rigid workpiece.

Fullcut Mill	BBT40-FCR20083-120
Insert	BRG200808(ACZ350S)
Work Material	15CrMo5(SCM415)
Cutting Speed V (m/min.)	150
Feed Rate f (mm/min.)	480
Axial DOC Ad (mm)	4mm × 3times
Hole dia.	ø38

Compared to another manufacturer

Axial DOC → **1.3times**
Insert life → **2times**

■ Ramping



Example of use of BBT50-BBT40 Adapter.
An improved result is obtained compared to the product from another manufacturer.

Fullcut Mill	BBT50-BBT40-50 BBT40-FCR16082-120
Insert	BRG160808(ACZ350S)
Work Material	C50(S50C)
Cutting Speed V (m/min.)	120
Feed Rate f (mm/min.)	480
Axial DOC Ad (mm)	4mm × 5times

Compared to another manufacturer

No chatter even at higher resistance corner.
Smooth chip evacuation eliminates re-cutting of the swarf and edge chipping of the inserts.

FULLCUT MILL Type **FCM**

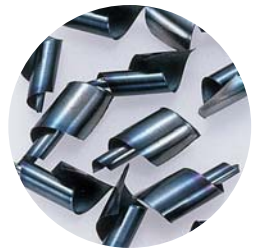
(All the following application examples are achieved with dry cutting.)

■ Slot Milling



Only the FULLCUT MILL was capable of achieving this data in a No.40 spindle taper machine.

Fullcut Mill	BBT40-FCM32113-85
Insert	ARG321104(ACP300)
Work Material	C50(S50C)
Cutting Speed V (m/min.)	150
Feed Rate f (mm/tooth)	0.12
Axial DOC Ad (mm)	9

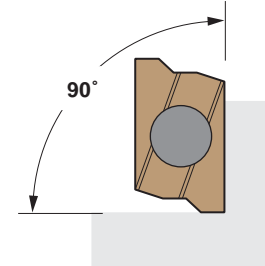


■ Edge Milling



Excellent perpendicularity is achieved.

Fullcut Mill	BBT40-FCM32113-85
Insert	ARG321104(ACP300)
Work Material	C50(S50C)
Cutting Speed V (m/min.)	200
Feed Rate f (mm/tooth)	0.15
Axial DOC Ad (mm)	11
Radial DOC Rd (mm)	5



■ Face Milling



Finishing surface roughness was Ry=2.53 at V=200, F=0.15 cutting data.

Fullcut Mill	BBT40-FCM50115-70
Insert	ARG401104(ACP300)
Work Material	C50(S50C)
Cutting Speed V (m/min.)	200
Feed Rate f (mm/tooth)	0.15
Axial DOC Ad (mm)	1
Radial DOC Rd (mm)	30

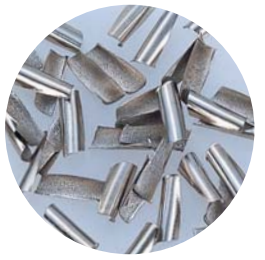
	Surface Roughness Ry
	2.53
Manufacturer A	3.75
Manufacturer B	4.32

■ Material of Low Machineability

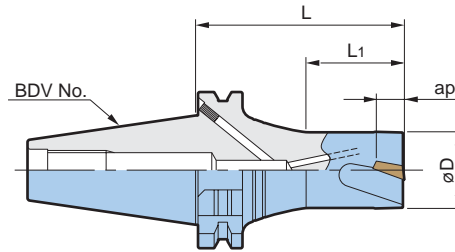
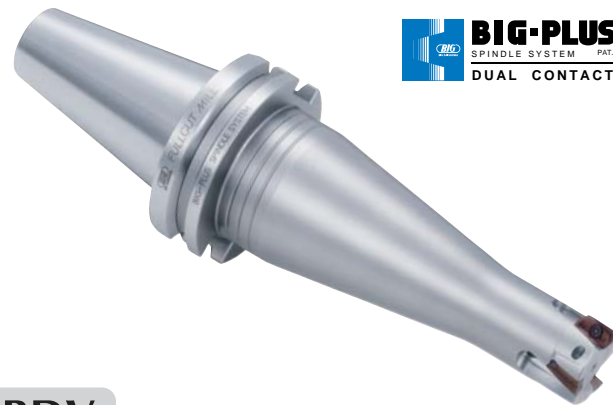


High efficiency and stable milling (F=1,140mm/min.) is achieved.

Fullcut Mill	ST25-FCM25093-120
Holder	BBT50-MEGA25D-105
Insert	ARG250904(ACZ350S)
Work Material	SUS304 Stainless steel
Cutting Speed V (m/min.)	150
Feed Rate f (mm/tooth)	0.2
Axial DOC Ad (mm)	9
Radial DOC Rd (mm)	3



FULLCUT MILL Type FCR Cutter Dia. $\phi 16 - \phi 32$



BDV DIN 69871 A/B BIG-PLUS

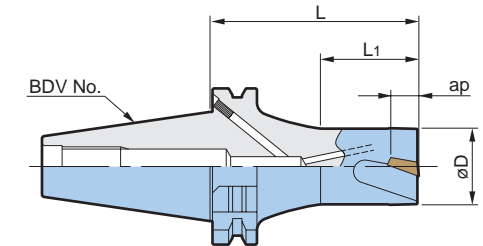
Model	Cutter Dia. ϕD	ap	L	L1	No. of Insert	Insert Model
BDV40-FCR16082- 85	16	8	85	25	2	BRG1608□□
-120			120	30		
-135			135	25		
-FCR20083- 85	20	8	85	35	3	BRG2008□□
-120			120	30		
-135			135	30		
-FCR25083- 85	25	8	85	40	3	BRG2508□□
-120			120	45		
-135			135	35		
-FCR32103- 85	32	10	85	45	3	BRG3210□□
-120			120	50		
-135			135	40		

ap=The Length of Effective Cutting Edge

1. Inserts are ordered separately.
2. BIG-PLUS tools can be used in machining centers with conventional spindles.

For Insert : P11

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



BDV DIN 69871 A/B BIG-PLUS

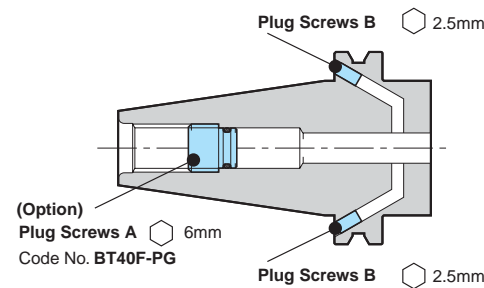
Model	Cutter Dia. ϕD	ap	L	L1	No. of Insert	Insert Model
BDV40-FCM16092- 85	16	9	85	23	2	ARG160904
-105			105	30		
-120			120	25		
-FCM20093- 85	20	9	85	28	3	ARG200904
-105			105	35		
-120			120	30		
-FCM25093- 85	25	9	85	33	3	ARG250904
-120			120	45		
-135			135	40		
-FCM32113- 85	32	11	85	38	3	ARG321104
-120			120	60		
-135			135	50		
-FCM40114- 85	40	11	85	43	4	ARG401104
-120			120	65		
-135			135	60		
-FCM50115- 70	50	11	70	38	5	ARG401104
-120			120	65		
-135			135	60		

ap=The Length of Effective Cutting Edge

1. Inserts are ordered separately.
2. BIG-PLUS tools can be used in machining centers with conventional spindles.

For Insert : P13

Plug Screw for flange through coolant

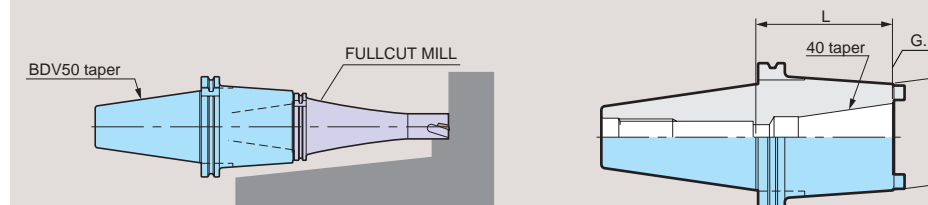


This Plug Screw A(option) prevents coolant leakage through retention knobs.

Bores on form B are sealed with Plug Screw B.

- *Remove 2 pcs Plug Screws B from end face of flange.
- *Failure to use the Plug Screw "A" or other sealing method may result in coolant contamination of spindle and lead to it's premature failure or accidents.

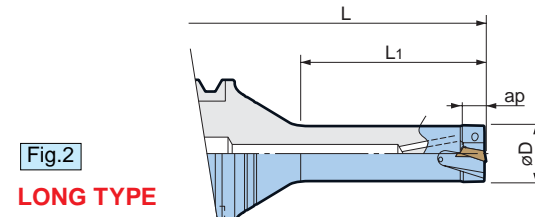
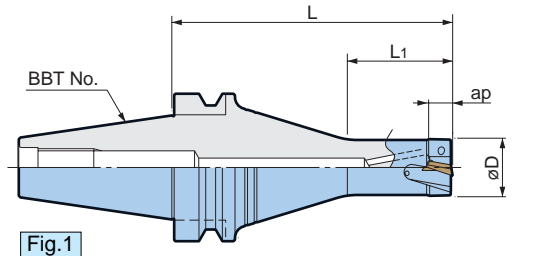
Adapter for SK50 taper shank (FCR & FCM)



Model	L
BDV50-BDV40-50	50
-90	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.

FULLCUT MILL Type FCR Cutter Dia. $\phi 16 - \phi 32$



LONG TYPE

● in the table indicates Long Type.

BBT MAS403 BIG-PLUS

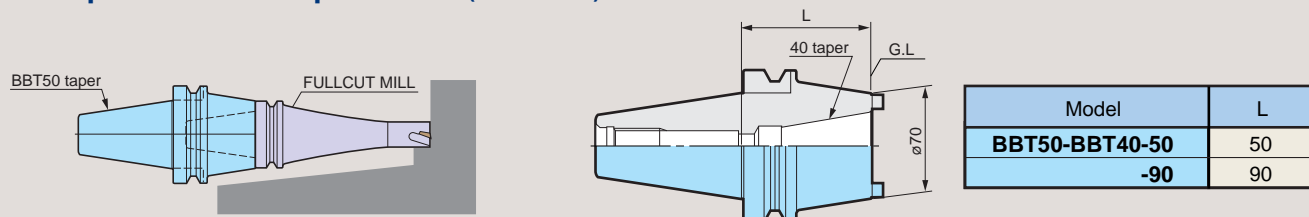
Model	Fig	Cutter Dia. ϕD	ap	L	L1	No. of Insert	Insert Model
BBT30-FCR16082 - 65	1	16	8	65	28	2	BRG1608□□
-FCR16082L- 85 ●	2			85	45		
-FCR20083 - 65	1	20	8	65	28	3	BRG2008□□
-FCR20082L- 85 ●	2			85	50		
-FCR25083 - 65	1	25	8	65	33	3	BRG2508□□
-FCR25082L- 85 ●	2			85	50		
-FCR32103 - 65	1	32	10	65	40	3	BRG3210□□
-FCR32102L- 85 ●	2			85	60		
BBT40-FCR16082 - 85	1	16	8	85	25	2	BRG1608□□
-120				120	30		
-135				135	25		
-FCR16082L-105 ●	2	16	8	105	45	2	BRG1608□□
-120 ●				120	30		
-FCR20083 - 85	1	20	8	85	35	3	BRG2008□□
-120				120	30		
-135				135	30		
-FCR20082L-120 ●	2	20	8	120	60	2	BRG2008□□
-135 ●				135	30		
-FCR25083 - 85	1	25	8	85	40	3	BRG2508□□
-120				120	45		
-135				135	35		
-FCR25082L-135 ●	2	25	8	135	75	2	BRG2508□□
-150 ●				150	35		
-FCR32103 - 85	1	32	10	85	45	3	BRG3210□□
-120				120	50		
-135				135	40		
-FCR32102L-135 ●	2	32	10	135	80	2	BRG3210□□
-150 ●				150	90		

ap=The Length of Effective Cutting Edge

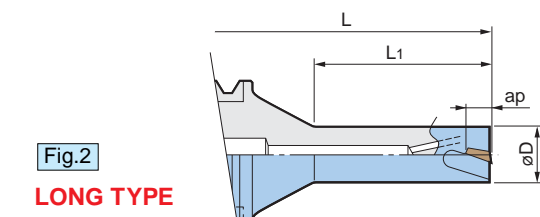
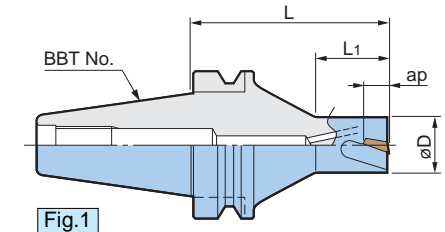
1. Inserts are ordered separately.
2. BIG-PLUS tools can be used in machining centers with conventional spindles.

For Insert : P11

Adapter for BT50 taper shank (FCR & FCM)



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



LONG TYPE

● in the table indicates Long Type.

BBT MAS403 BIG-PLUS

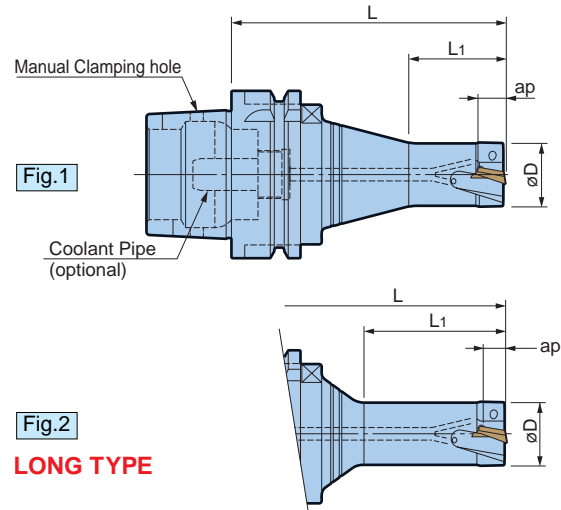
Model	Fig	Cutter Dia. ϕD	ap	L	L1	No. of Insert	Insert Model
BBT30-FCM16092 - 65	1	16	9	65	23	2	ARG160904
-FCM16092L- 85 ●	2			85	45		
-FCM20093 - 65	1	20	9	65	28	3	ARG200904
-FCM20092L- 85 ●	2			85	50		
-FCM25093 - 65	1	25	9	65	33	3	ARG250904
-FCM25092L- 85 ●	2			85	50		
-FCM32113 - 65	1	32	11	65	38	3	ARG321104
-FCM32112L- 85 ●	2			85	60		
-FCM40114 - 50	1	40	11	50	25	4	ARG401104
-FCM50115 - 50		50		28			
BBT40-FCM16092 - 85	1	16	9	85	23	2	ARG160904
-105				105	30		
-120				120	25		
-150				150	25		
-FCM16092L-105 ●	2	16	9	105	45	2	ARG160904
-120 ●				120	30		
-FCM20093 - 85	1	20	9	85	28	3	ARG200904
-105				105	35		
-120				120	30		
-150				150	30		
-FCM20092L-120 ●	2	20	9	120	60	2	ARG200904
-135 ●				135	30		
-FCM25093 - 85	1	25	9	85	33	3	ARG250904
-120				120	45		
-135				135	40		
-165				165	40		
-FCM25092L-135 ●	2	25	9	135	75	2	ARG250904
-150 ●				150	30		
-FCM32113 - 85	1	32	11	85	38	3	ARG321104
-120				120	60		
-135				135	50		
-165				165	40		
-FCM32112L-135 ●	2	32	11	135	80	2	ARG321104
-150 ●				150	90		
-FCM40114 - 85	1	40	11	85	43	4	ARG401104
-120				120	65		
-135				135	60		
-165				165	50		
-FCM50115 - 70	1	50	11	70	38	5	ARG401104
-120				120	65		
-135				135	60		
-165				165	50		

ap=The Length of Effective Cutting Edge

1. Inserts are ordered separately.
2. BIG-PLUS tools can be used in machining centers with conventional spindles.

For Insert : P13

FULLCUT MILL Type FCR Cutter Dia. $\phi 16 - \phi 32$



HSK ISO12164 & DIN69893-1

● in the table indicates Long Type.

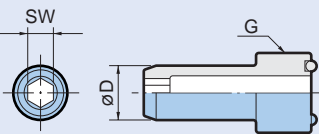
Model	Fig	Cutter Dia. ϕD	ap	L	L1	No. of Insert	Insert Model
HSK-A50-FCR16082 - 75	1	16	8	75	27	2	BRG1608□□
-FCR20083 - 75		20			28	3	BRG2008□□
-FCR25083 - 75		25			33		BRG2508□□
-FCR32103 - 75		32			39		BRG3210□□
HSK-A63-FCR16082 - 85	1	16	8	85	25	2	BRG1608□□
-120				120	30		
-135				135	25		
-FCR16082L- 85 ●	2	16	8	85	40	2	BRG1608□□
-120 ●				120	45		
-FCR20083 - 85	1	20	8	85	32	3	BRG2008□□
-120				120	30		
-135				135	30		
-FCR20082L-105 ●	2	20	8	105	50	2	BRG2008□□
-120 ●				120	60		
-FCR25083 - 85	1	25	8	85	35	3	BRG2508□□
-120				120	45		
-135				135	35		
-FCR25082L-105 ●	2	25	8	105	55	2	BRG2508□□
-120 ●				120	65		
-FCR32103 - 85	1	32	10	85	40	3	BRG3210□□
-120				120	50		
-135				135	40		
-FCR32102L-120 ●	2	32	10	120	70	2	BRG3210□□
-135 ●				135	80		

ap=The Length of Effective Cutting Edge
1. Inserts are ordered separately.
2. Coolant Pipe is ordered separately.

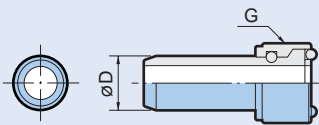
For Insert : P11

COOLANT PIPE for Form A

● Mono block Type



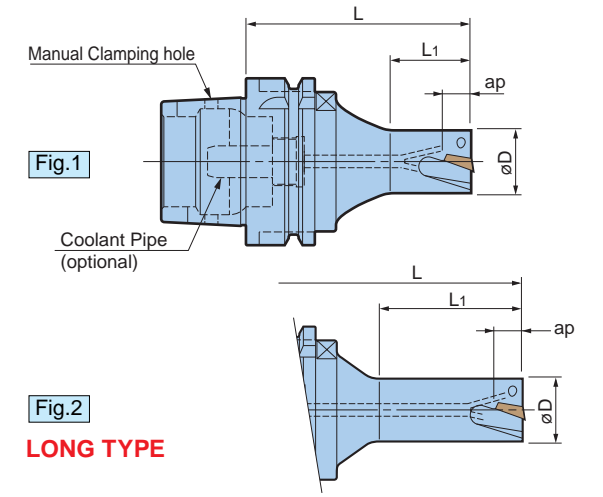
● 1° swing type



Model	ϕD	G	SW(mm)
HSK 40-CP	8	M12×P1	4
50-CP	10	M16×P1	5
63-CP	12	M18×P1	6
100-CP	16	M24×P1.5	8

Model	ϕD	G	Wrench(optional)
HSK 40-CPM	8	M12×P1	CPW 40
50-CPM	10	M16×P1	CPW 50
63-CPM	12	M18×P1	CPW 63
100-CPM	16	M24×P1.5	CPW100

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



HSK ISO12164 & DIN69893-1

● in the table indicates Long Type.

Model	Fig	Cutter Dia. ϕD	ap	L	L1	No. of Insert	Insert Model
HSK-A40-FCM16092 - 65	1	16	9	65	23	2	ARG160904
-FCM20093 - 65		28			3	ARG200904	
-FCM25093 - 65		35				ARG250904	
-FCM32113 - 65		39				ARG321104	
-FCM40114 - 65		40			4	ARG401104	
-FCM50115 - 65	50	5					
HSK-A50-FCM16092 - 75	1	16	9	75	23	2	ARG160904
-FCM20093 - 75		28			3	ARG200904	
-FCM25093 - 75		33				ARG250904	
-FCM32113 - 75		39				ARG321104	
-FCM40114 - 75		40			4	ARG401104	
-FCM50115 - 75	50	5					
HSK-A63-FCM16092 - 85	1	16	9	85	23	2	ARG160904
-105				105	30		
-120				120	25		
-150				150	25		
-FCM16092L- 85 ●				85	40		
-120 ●	120	45					
-FCM20093 - 85	1	20	9	85	28	3	ARG200904
-105				105	35		
-120				120	30		
-150				150	30		
-FCM20092L-105 ●	2	20	9	105	50	2	ARG200904
-120 ●				120	60		
-FCM25093 - 85	1	25	9	85	33	3	ARG250904
-120				120	45		
-135				135	40		
-165				165	40		
-FCM25092L-105 ●				105	55		
-120 ●	120	65					
-FCM32113 - 85	1	32	11	85	38	3	ARG321104
-120				120	60		
-135				135	50		
-165				165	40		
-FCM32112L-120 ●	2	32	11	120	70	2	ARG321104
-135 ●				135	80		
-FCM40114 - 85	1	40	11	85	43	4	ARG401104
120				120	65		
135				135	60		
165				165	50		
-FCM50115 - 70	1	50	11	70	28	5	ARG401104
-120				120	78		
-135				135	93		
-165				165	123		

ap=The Length of Effective Cutting Edge
1. Inserts are ordered separately. 2. Coolant Pipe is ordered separately.

For Insert : P13

FULLCUT MILL Type **FCR**



Model Description
BRG16 | **08** | **08** | **ACZ350S**
 Grade: ACZ350S
 Nose Rd.: 08
 Effective Cutting Length: φ16-25...08 φ32...10

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

Cutter Dia.	Insert	Effective Cutting Length	Nose Rad.	Insert Grade		
				ACZ350S (for general steel)	ACZ310 (for cast iron)	DC20 (for aluminum)
φ16	BRG160808	8	0.8	○	○	○
φ20	BRG200808	8		○	○	○
φ25	BRG250808	8		○	○	○
φ32	BRG321008	10	3.175	○	○	○
	BRG321032	10		—	—	○

※ 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

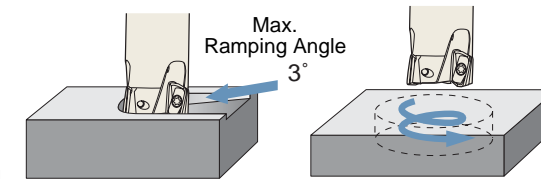
ACZ350S	ACZ310	DC20
Tough carbide substrate with high anti-chipping and heat & peel resistance properties. Dry cutting is recommended, though wet cutting is also possible in various applications.	For cast iron and ductile cast iron. Ultra PVD multi-layer coating on super fine grain carbide base for superior anti-abrasive properties and high resistance to mechanical shock.	For non-ferrous materials. Special diamond coating (diamond-like carbon) on K20 class carbide base achieves a high resistance to adherence and low friction.

Spare Parts

Cutter Dia.	Insert	Insert Clamping Screw Set	Wrench	Anti-seizure Lubricant
φ16	BRG1608 □ □	(10) screws & (1) wrench	DA-T8	5g included
φ20	BRG2008 □ □			
φ25	BRG2508 □ □	S2506DS	DA-T8	BN-5
φ32	BRG3210 □ □	S3508DS	DA-T15	

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

FCR Cutting Data

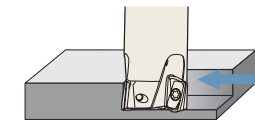


Cutter Dia.	Flat Bottom		Through Hole
	Max. Hole Dia.	Min. Hole Dia.	Min. Hole Dia.
φ16	φ30	φ27	φ22
φ20	φ38	φ36	φ29
φ25	φ48	φ45	φ39
φ32	φ62	φ59	φ48

Ramping and helical interpolation

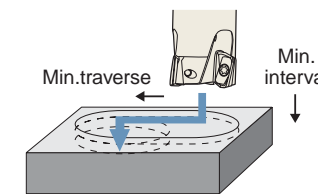
Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Prehardened steel <HRC40	Stainless steel	Die steel	Cast iron	Aluminum
	Insert Grade	ACZ350S					ACZ310	DC20
	Cutting fluid	Dry		Wet	Dry/Wet	Dry		Dry/Wet
φ16	Speed(m/min)	100 - 200	150 - 220	60 - 80	100 - 150	60 - 80	100 - 180	200 - 1,000
	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
φ20	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
φ32	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	Aluminum
	Insert Grade	ACZ350S					ACZ310	DC20
	Cutting fluid	Dry		Wet	Dry/Wet	Dry		Dry/Wet
φ16	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
φ20	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
φ16	0.5	14
φ20	1	18
φ25	1	23
φ32	2	30

Cutter Dia.	Work Material	Carbon steel Alloy steel	Unalloyed steel	Prehardened steel <HRC40	Stainless steel	Die steel	Cast iron	Aluminum
	Insert Grade	ACZ350S					ACZ310	DC20
	Cutting fluid	Air blow		Wet	Air/Wet	Air blow		Air/Wet
φ16	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
φ20	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
φ32	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.

FULLCUT MILL Type FCM



Model Description
ARG16 **09** **04** **ACP200**
 Grade: ACP200
 Nose Rd.: 0.4
 Effective Cutting Length: $\phi 12 - 25 \dots 09$ $\phi 32 - 50 \dots 11$

Marking Description
 Insert Size: 1: ACZ310, 2: DC20
 P2: ACP200, P3: ACP300, 5S: ACZ350S
 grade: 32, 1

Cutter Dia.	Insert	Effective Cutting Length	Nose Rad.	Insert Grade				
				ACP300 (for steel)	ACP200 (for pre-hardened steel)	ACZ350S (for stainless steel)	ACZ310 (for cast iron)	DC20 (for aluminum)
$\phi 12, 14, 16$	ARG160904	9	0.4	○	○	○	○	○
$\phi 20$	ARG200904	9		○	○	○	○	○
$\phi 25$	ARG250904	9		○	○	○	○	○
$\phi 32$	ARG321104	11		○	○	○	○	○
$\phi 40, 50$	ARG401104	11		○	○	○	○	○

※ 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.

Insert Classifications

ACP300	ACP200	ACZ350S	ACZ310	DC20
For general steel and stainless steel. Ultra PVD multi-layer coating on extremely tough base prevents edge chipping and heat cracking, and provides excellent edge sharpness.	Super multilayer coating of TiAlN and AlCrN having nanometer-order thickness. Excellent wear resistance is achieved for pre-hardened steel applications.	PVD multi-layer coating is given to the tough substrate and suitable for stainless steel. Excellent performance against heat combined strong cutting edge and long life.	For cast iron and ductile cast iron. Ultra PVD multi-layer coating on super fine grain carbide base for superior anti-abrasive properties and high resistance to mechanical shock.	For non-ferrous materials. Special diamond coating (diamond-like carbon) on K20 class carbide base achieves a high resistance to adherence and low friction.

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.

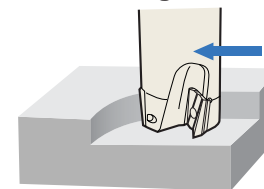
Spare Parts

Cutter Dia.	Insert	Insert Clamping Screw Set (10) screws & (1) wrench	Wrench	Anti-seizure Lubricant 5g included
		Model	Model	Model
$\phi 12$	ARG160904	S2505DS	DA-T8	BN-5
$\phi 14$		S2506DS		
$\phi 16$				
$\phi 20$	ARG200904	S3508DS	DA-T15	
$\phi 25$	ARG250904			
$\phi 32$	ARG321104			
$\phi 40$	ARG401104			
$\phi 50$				

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	Aluminum
	Insert Grade	ACP300		ACP200	ACZ350S	ACZ310	DC20
	Cutting fluid	Dry			Dry/Wet	Dry	Dry/Wet
$\phi 12$ $\phi 14$	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
$\phi 16$ $\phi 20$	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
$\phi 25$ $\phi 32$	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
$\phi 40$ $\phi 50$	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	Aluminum
	Insert Grade	ACP300		ACZ350S	ACZ310	DC20
	Cutting fluid	Dry			Dry/Wet	Dry
$\phi 12$ $\phi 14$	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
$\phi 16$ $\phi 20$	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
$\phi 25$ $\phi 32$	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
$\phi 40$ $\phi 50$	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
 • 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			
$\phi 12 - \phi 50$	Speed(m/min)	200 - 250			
	Feed(mm/tooth)	0.1 - 0.2			

Caution
 • For Long Type, reduce the feed rate.
 • For aluminum 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.