

Multi-functional Indexable Cutter

APX3000/4000

Item
Expansion

**A new generation of
high performance cutters.**

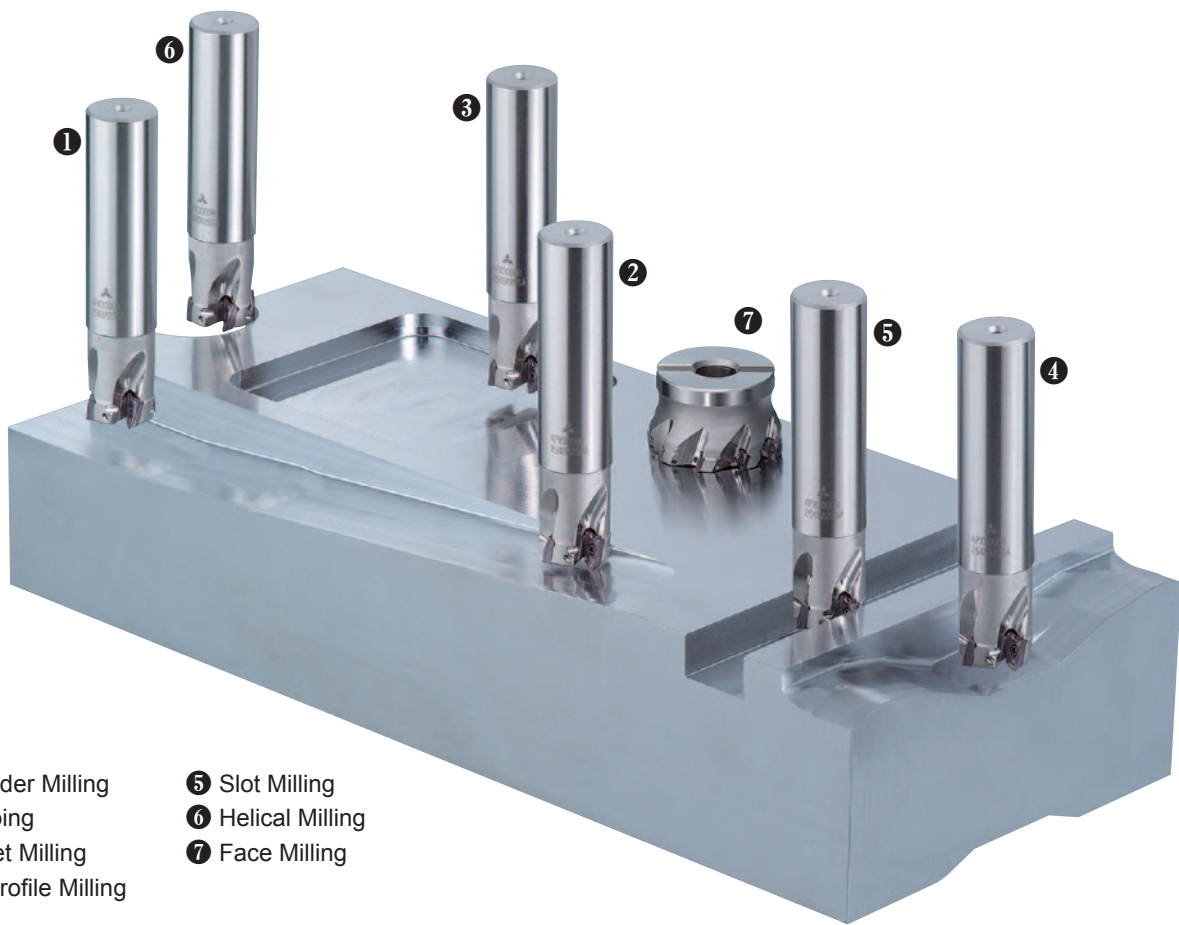


Multi-functional Indexable Cutter

APX3000/4000

Multi-functional

The APX is highly effective in various 3-D machining operations including excellent ramping capabilities.



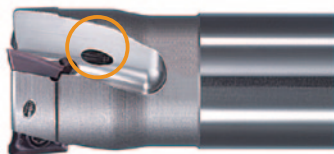
- ① Shoulder Milling
- ② Ramping
- ③ Pocket Milling
- ④ 3-D Profile Milling
- ⑤ Slot Milling
- ⑥ Helical Milling
- ⑦ Face Milling

High Rigidity Cutter Bodies

Rigidity has been increased by using a larger amount of backing metal behind the insert.

Resistance to corrosion and abrasion on the cutter bodies made possible by using a superior highly heat resistant alloy and a special surface treatment.

The cutter bodies are designed with through coolant holes to improve cooling and chip disposal.



Effective Deep Hole Machining

APX3000/4000, an extra long shank type is now available for difficult to reach applications.

(Long, Extra Long Shank Type)

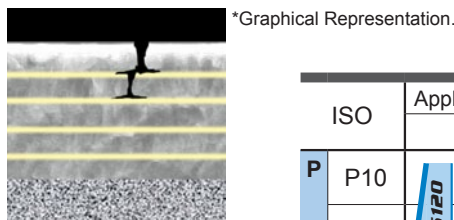
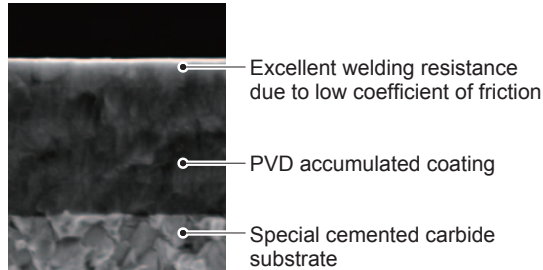


(Standard Shank Type)

Insert Grades for a Wide Range of Materials

MP6100, MP7100, MP9100 - With Accumulated Al-Ti-Cr-N Based PVD Coating

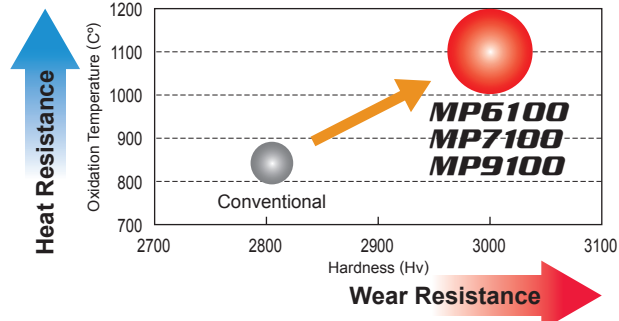
PVD coatings have properties such as toughness, low coefficient of friction and excellent welding, wear and heat resistance. This results in tough, precision grades such as MP6100, MP7100 and MP9100.



Multi-layering of the coating prevents any cracks penetrating through to the substrate.

TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering realizes extra toughness.



ISO			Application Range		ISO			Application Range		ISO			Application Range	
			PVD					PVD					PVD	
Steel	P	P10			Stainless Steel	M	M10		Heat Resistant Alloy • Ti Alloy	S	S10			
		P20					M20				S20			
		P30					M30				S30			
		P40					M40				S40			

CVD Coated MC5020

With high wear resistance and outstanding fracture resistance, MC5020 is ideal for milling for cast irons.

MIRACLE Coated VP15TF

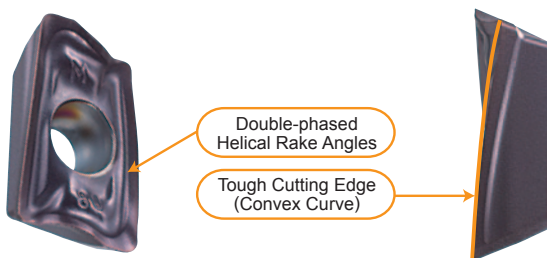
Stable machining properties are enabled when the coating is combined with a high wear and fracture resistant carbide substrate.

MIRACLE Coated VP20RT

Ideal for heavy interrupted cutting of stainless and general steels because of the excellent fracture resistance properties.

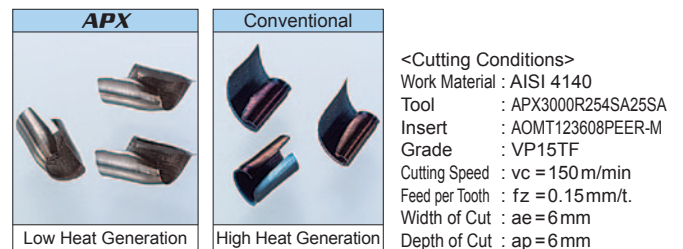
Low Cutting Resistance Inserts

Advanced simulation technology has been utilized to develop the inserts. Efficient machining on low rigidity machines and work material is now possible and is ideal for thin wall or extended reach applications.



Ideal Heat Disposal and Chip Control

Heat generated during cutting has been reduced due to the APX's special geometry. Ideal chip shape formed by the insert for easy disposal.



Insert Size

APX4000	APX3000
Max. Depth of Cut 15mm	Max. Depth of Cut 10mm

Insert Chip Breaker

General Use M Breaker (APX3000, APX4000)	Strong Cutting Edge Type H Breaker (APX3000, APX4000)	Aluminum Alloy Machining (Ground & Polished) GM Breaker (APX3000)
Rake Angle: 25°	Rake Angle: 7°	Rake Angle: 25°

(Note 1) Rake angle when the insert is set in the cutter body.

Multi-functional Indexable Cutter

MULTI-FUNCTIONAL MILLING

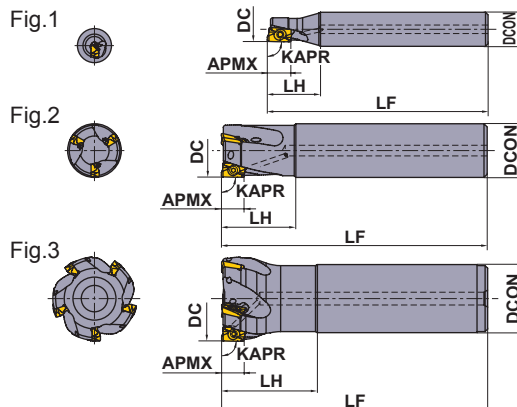


APX3000

P M K N S H



- High accuracy, high quality vertical wall.
- Low cutting force insert.



Right hand tool holder only.

Shank Type

With Coolant Hole

(mm)

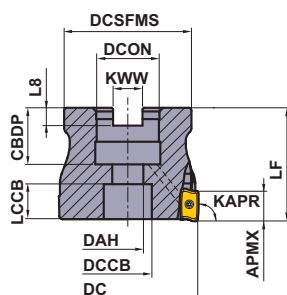
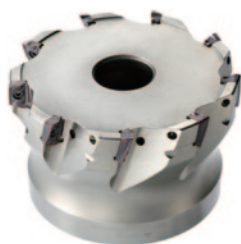
DC	Order Number	Stock	No.T	* DCON	LF	LH	WT (kg)	APMX	RMPX	RPMX (min ⁻¹)	Fig.	Insert Type
		R										
12	APX3000R121SA16SA	●	1	16	85	25	0.10	10	6.0°	10500	1	AO○T12
14	APX3000R141SA16SA	●	1	16	85	25	0.11	10	6.0°	9000	1	AO○T12
16	APX3000R162SA16SA	●	2	16	85	25	0.11	10	11.3°	20900	2	AO○T12
18	APX3000R182SA16SA	●	2	16	85	25	0.11	10	8.6°	19600	3	AO○T12
18	APX3000R182SA16LA	●	2	16	120	25	0.16	10	8.6°	19600	3	AO○T12
18	APX3000R182SA16ELA	●	2	16	180	25	0.25	10	8.6°	19600	3	AO○T12
20	APX3000R202SA20SA	●	2	20	100	30	0.21	10	6.9°	18500	2	AO○T12
20	APX3000R203SA20SA	●	3	20	100	30	0.21	10	6.9°	18500	2	AO○T12
20	APX3000R202SA20LA	●	2	20	150	60	0.32	10	6.9°	18500	2	AO○T12
20	APX3000R202SA20ELA	●	2	20	200	70	0.42	10	6.9°	18500	2	AO○T12
22	APX3000R223SA20SA	●	3	20	115	30	0.25	10	5.7°	17600	3	AO○T12
22	APX3000R222SA20LA	●	2	20	150	30	0.34	10	5.7°	17600	3	AO○T12
22	APX3000R222SA20ELA	●	2	20	200	30	0.45	10	5.7°	17600	3	AO○T12
25	APX3000R252SA25SA	●	2	25	115	35	0.38	10	4.6°	16400	2	AO○T12
25	APX3000R253SA25SA	●	3	25	115	35	0.38	10	4.6°	16400	2	AO○T12
25	APX3000R254SA25SA	●	4	25	115	35	0.38	10	4.6°	16400	2	AO○T12
25	APX3000R252SA25LA	●	2	25	170	70	0.51	10	4.6°	16400	2	AO○T12
25	APX3000R253SA25LA	●	3	25	170	70	0.51	10	4.6°	16400	2	AO○T12
25	APX3000R252SA25ELA	●	2	25	220	80	0.75	10	4.6°	16400	2	AO○T12
25	APX3000R253SA25ELA	●	3	25	220	80	0.75	10	4.6°	16400	2	AO○T12
28	APX3000R284SA25SA	●	4	25	115	35	0.40	10	3.8°	15500	3	AO○T12
28	APX3000R282SA25LA	●	2	25	170	35	0.61	10	3.8°	15500	3	AO○T12
28	APX3000R283SA25LA	●	3	25	170	35	0.61	10	3.8°	15500	3	AO○T12
28	APX3000R282SA25ELA	●	2	25	220	35	0.80	10	3.8°	15500	3	AO○T12
28	APX3000R283SA25ELA	●	3	25	220	35	0.79	10	3.8°	15500	3	AO○T12
30	APX3000R304SA32SA	●	4	32	125	45	0.64	10	3.4°	14900	2	AO○T12
32	APX3000R323SA32SA	●	3	32	125	45	0.68	10	3.1°	14400	2	AO○T12
32	APX3000R324SA32SA	●	4	32	125	45	0.67	10	3.1°	14400	2	AO○T12
32	APX3000R325SA32SA	●	5	32	125	45	0.68	10	3.1°	14400	2	AO○T12
32	APX3000R322SA32LA	●	2	32	190	90	1.07	10	3.1°	14400	2	AO○T12
32	APX3000R323SA32LA	●	3	32	190	90	1.05	10	3.1°	14400	2	AO○T12
32	APX3000R322SA32ELA	●	2	32	260	100	1.47	10	3.1°	14400	2	AO○T12
32	APX3000R323SA32ELA	●	3	32	260	100	1.45	10	3.1°	14400	2	AO○T12
35	APX3000R352SA32LA	●	2	32	190	45	1.12	10	2.7°	13700	3	AO○T12
35	APX3000R353SA32LA	●	3	32	190	45	1.11	10	2.7°	13700	3	AO○T12
35	APX3000R352SA32ELA	●	2	32	260	45	1.53	10	2.7°	13700	3	AO○T12
35	APX3000R353SA32ELA	●	3	32	260	45	1.52	10	2.7°	13700	3	AO○T12
40	APX3000R403SA32SA	●	3	32	125	45	0.75	10	2.2°	12800	3	AO○T12
40	APX3000R405SA32SA	●	5	32	125	45	0.75	10	2.2°	12800	3	AO○T12
40	APX3000R406SA32SA	●	6	32	125	45	0.76	10	2.2°	12800	3	AO○T12
50	APX3000R507SA32SA	●	7	32	125	45	0.90	10	1.7°	11300	3	AO○T12
63	APX3000R638SA32SA	●	8	32	125	45	1.04	10	1.3°	10000	3	AO○T12

* Number of Teeth

(Note 1) When using inserts with corner radius $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page 6.

(Note 2) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.

(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.



Right hand tool holder only.

Arbor Type

GAMP: +7°—+21° T: +15°—+27°
GAMF: +15°—+27° I: +7°—+21°

DC=mm, DCON=Inch, **DCON=mm**
With Coolant Hole

DC	Set Bolt	Geometry
32, 40	HSC08030H	
50, 63	HSC10030H	
80	HSC12035H	
100	HSC16040H	

DC	Order Number	Stock	* No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min ⁻¹)	Insert Type
32	APX3000-032A05RA	●	5	40	16	0.2	10	3.1°	14400	AO○T12
40	APX3000-040A06RA	●	6	40	16	0.3	10	2.2°	12800	AO○T12
50	APX3000-050A07RA	●	7	40	22	0.4	10	1.7°	11300	AO○T12
63	APX3000-063A08RA	●	8	40	22	0.7	10	1.3°	10000	AO○T12
80	APX3000R08009CA	●	9	50	25.4	1.3	10	1.0°	8800	AO○T12
80	APX3000-080A09RA	●	9	50	27	1.3	10	1.0°	8800	AO○T12
100	APX3000R10011DA	●	11	63	31.75	2.2	10	0.8°	7800	AO○T12
100	APX3000-100A11RA	●	11	63	32	2.2	10	0.8°	7800	AO○T12

* Number of Teeth

(Note 1) When using inserts with corner radius $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page 6.

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Mounting Dimensions

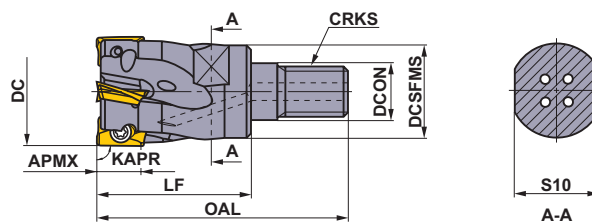
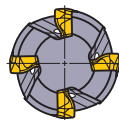
DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
32	APX3000-032A05RA	16	18	9	14	10.22	30	8.4	5.6
40	APX3000-040A06RA	16	18	9	14	10.35	34	8.4	5.6
50	APX3000-050A07RA	22	20	11	17	12.35	45	10.4	6.3
63	APX3000-063A08RA	22	20	11	17	12.35	55	10.4	6.3
80	APX3000R08009CA	25.4	26	13	20	15.35	70	9.5	6
80	APX3000-080A09RA	27	23	13	20	16.35	70	12.4	7
100	APX3000R10011DA	31.75	32	17	26	20.35	80	12.7	8
100	APX3000-100A11RA	32	26	17	26	26.35	80	14.4	8

Spare Parts

DC	Tool Holder Type	DC	Tool Holder Type	*		
				Clamp Screw	Wrench	Anti-seize Lubricant
12	APX3000R12	14	APX3000R14	TPS25	TIP07F	MK1KS
16	APX3000R16	18	APX3000R18	TPS25	TIP07F	MK1KS
20	APX3000R20			TPS25	TIP07F	MK1KS
22	APX3000R22	25	APX3000R25	TPS25-1	TIP07F	MK1KS
28	APX3000R28	30	APX3000R30	TPS25-1	TIP07F	MK1KS
32	APX3000R32	32	APX3000-032	TPS25-1	TIP07F	MK1KS
35	APX3000R35			TPS25-1	TIP07F	MK1KS
40	APX3000R40	40	APX3000-040	TPS25-1	TIP07F	MK1KS
50	APX3000R50	50	APX3000-050	TPS25-1	TIP07F	MK1KS
63	APX3000R63	63	APX3000-063	TPS25-1	TIP07F	MK1KS
80	APX3000R80	80	APX3000-080	TPS25-1	TIP07F	MK1KS
100	APX3000R100	100	APX3000-100	TPS25-1	TIP07F	MK1KS

* Clamp Torque (N · m) : TPS25 = 1.0, TPS25-1 = 1.0

Multi-functional Indexable Cutter



Right hand tool holder only.

Screw-in Type

With Coolant Hole

(mm)

DC	Order Number	Stock	* No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (kg)	APMX	RMPX	Insert Type
		R											
16	APX3000R162M08A30	●	2	8.5	13	48	30	10	M8	0.1	10	11.3°	AO-T12
18	APX3000R182M08A30	●	2	8.5	13	48	30	10	M8	0.1	10	8.6°	AO-T12
20	APX3000R203M10A30	●	3	10.5	18	49	30	14	M10	0.1	10	6.9°	AO-T12
22	APX3000R223M10A30	●	3	10.5	18	49	30	14	M10	0.1	10	5.7°	AO-T12
25	APX3000R254M12A35	●	4	12.5	21	57	35	19	M12	0.2	10	4.6°	AO-T12
28	APX3000R284M12A35	●	4	12.5	21	57	35	19	M12	0.2	10	3.8°	AO-T12
30	APX3000R304M16A40	●	4	17	29	63	40	24	M16	0.3	10	3.4°	AO-T12
32	APX3000R325M16A40	●	5	17	29	63	40	24	M16	0.3	10	3.1°	AO-T12
35	APX3000R355M16A40	●	5	17	29	63	40	24	M16	0.3	10	2.7°	AO-T12
40	APX3000R406M16A40	●	6	17	29	63	40	24	M16	0.3	10	2.2°	AO-T12

* Number of Teeth

(Note 1) When using inserts with corner radius $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page 6.

(Note 2) For screw-in type arbors, refer to pages 21—22.

Spare Parts

(mm)

DC	Tool Holder Type	* Clamp Screw	Wrench	Anti-seize Lubricant
16	APX3000R16	TPS25	TIP07F	MK1KS
18	APX3000R18	TPS25	TIP07F	MK1KS
20	APX3000R20	TPS25	TIP07F	MK1KS
22	APX3000R22	TPS25-1	TIP07F	MK1KS
25	APX3000R25	TPS25-1	TIP07F	MK1KS
28	APX3000R28	TPS25-1	TIP07F	MK1KS
30	APX3000R30	TPS25-1	TIP07F	MK1KS
32	APX3000R32	TPS25-1	TIP07F	MK1KS
35	APX3000R35	TPS25-1	TIP07F	MK1KS
40	APX3000R40	TPS25-1	TIP07F	MK1KS

* Clamp Torque (N · m) : TPS25 = 1.0, TPS25-1 = 1.0

● : Inventory maintained in Japan. (10 inserts in one case)

Inserts

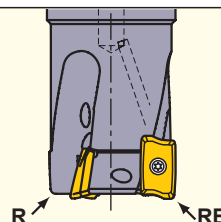
(mm)

Work Material	P	Steels																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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* Corner radius RE is different from the work material of R shape depending on the axial rake angle of the body.

Note on Use of Inserts with Large Corner Radii

When using inserts with corner radius $RE \geq R2.4\text{mm}$, please machine the holder with a radius form as shown on the right table.



RE (mm)	R (mm)
2.4	1.9
3.0	2.5
3.2	2.7

R : Holder End Radius
RE : Insert Corner Radius

Multi-functional Indexable Cutter

Recommended Cutting Conditions

Cutting Speed

(mm)

Work Material	Properties	Insert				ae			
		Grade Priority		Chip Breaker		≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC (Slot)
		1st	2nd						
P	Mild Steels	≤180HB	MP6120	VP15TF	M H	230(180—270)	220(170—260)	180(140—210)	180(140—210)
			MP6130	VP20RT	M H	200(150—240)	190(140—230)	150(110—180)	150(110—180)
	Carbon Steels Alloy Steels	180—350HB	MP6120	VP15TF	M H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
			MP6130	VP20RT	M H	150(110—180)	140(100—170)	110(80—130)	110(80—130)
M	Stainless Steels	≤270HB	MP7130	VP20RT	M H	180(140—210)	170(130—200)	140(110—160)	140(110—160)
K	Gray Cast Irons	≤350MPa	MC5020	VP15TF	H	250(200—300)	240(190—290)	210(160—260)	140(110—160)
	Ductile Cast Irons	≤800MPa	MC5020	VP15TF	H	130(100—150)	120(90—140)	100(80—120)	100(80—120)
N	Aluminum Alloys	—	TF15		GM	500(200—1000)	500(200—1000)	500(200—1000)	500(200—1000)
S	Titanium Alloys	≤350HB	MP9120	VP15TF	M H	50(40—70)			50(40—70)
			MP9130	VP20RT	M H	40(30—60)			40(30—60)
	Heat Resistant Alloys	—	MP9120	VP15TF	M H	40(30—60)			40(30—60)
			MP9130	VP20RT	M H	30(20—40)			30(20—40)
H	Hardened Steels	40—55HRC	VP15TF		H	90(70—100)	85(60—100)	70(50—80)	70(50—80)

Depth of Cut / Feed per Tooth

(mm)

Work Material	Properties	ae	DC						
			ø12—ø16		ø18—ø25		ø28—ø100		
			ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)	
P	Mild Steels Carbon Steels Alloy Steels	≤180HB 180—350HB	≤0.25DC	≤4	0.15	≤5	0.25	≤5	0.20
				4—7	0.10	5—7	0.20	5—7	0.15
						7—8.5	0.15	7—8.5	0.10
						8.5—10	0.10	8.5—10	0.07
			0.25—0.5DC	≤2	0.15	≤3	0.25	≤3	0.20
				2—5	0.10	3—5.5	0.20	3—5.5	0.15
						5.5—8	0.15	5.5—8	0.10
						8—10	0.10	8—10	0.07
			0.5—0.75DC	≤4	0.10	≤4	0.15	≤3	0.10
						4—10	0.10	3—7	0.07
DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10			
			4—7	0.07	3—5	0.07			
M	Stainless Steels	≤270HB	≤0.25DC	≤4	0.15	≤5	0.20	≤5	0.20
				4—7	0.10	5—7	0.15	5—7	0.15
						7—8.5	0.10	7—8.5	0.10
						8.5—10	0.07	8.5—10	0.07
			0.25—0.5DC	≤2	0.15	≤3	0.20	≤3	0.20
				2—5	0.10	3—5.5	0.15	3—5.5	0.15
						5.5—8	0.10	5.5—8	0.10
						8—10	0.07	8—10	0.07
			0.5—0.75DC	≤4	0.10	≤4	0.10	≤3	0.10
						4—10	0.07	3—7	0.07
DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10			
			4—7	0.07	3—5	0.07			
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤0.25DC	≤4	0.15	≤5	0.25	≤5	0.20
				4—7	0.10	5—7	0.20	5—7	0.15
						7—8.5	0.15	7—8.5	0.10
						8.5—10	0.10	8.5—10	0.07
			0.25—0.5DC	≤2	0.15	≤3	0.25	≤3	0.20
				2—5	0.10	3—5.5	0.20	3—5.5	0.15
						5.5—8	0.15	5.5—8	0.10
						8—10	0.10	8—10	0.07
			0.5—0.75DC	≤4	0.10	≤4	0.15	≤3	0.10
						4—10	0.10	3—7	0.07
			DC (Slot)	≤3	0.10	≤4	0.10	≤3	0.10
						4—7	0.07	3—5	0.07
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤0.25DC	≤4	0.10	≤5	0.20	≤5	0.20
				4—7	0.07	5—7	0.15	5—7	0.15
						7—8.5	0.10	7—8.5	0.10
						8.5—10	0.07	8.5—10	0.07
			0.25—0.5DC	≤2	0.10	≤3	0.20	≤3	0.20
				2—5	0.07	3—5.5	0.15	3—5.5	0.15
			5.5—8	0.10	5.5—8	0.10			
			8—10	0.07	8—10	0.07			
0.5—0.75DC	≤4	0.07	≤4	0.10	≤3	0.10			
			4—10	0.07	3—7	0.07			
DC (Slot)	≤3	0.07	≤4	0.10	≤3	0.10			
			4—7	0.07	3—5	0.07			

(mm)

Work Material	Properties	ae	DC						
			ø12—ø16		ø18—ø25		ø28—ø100		
			ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)	
N	Aluminum Alloys	—	≤0.25DC	≤4	0.15	≤4	0.25	≤4	0.20
			4—7	0.10	4—7	0.15	4—7	0.10	
			0.25—0.5DC	≤4	0.15	≤4	0.20	≤4	0.20
			4—7	0.10	4—7	0.10	4—7	0.10	
			0.5—0.75DC	≤5	0.10	≤5	0.15	≤5	0.10
DC (Slot)	≤5	0.10	≤5	0.20	≤5	0.15			
S	Titanium Alloys	≤350HB	≤0.25DC	≤4	0.15	≤4	0.15	≤4	0.10
			4—7	0.10	4—7	0.10	4—7	0.07	
			0.25—0.5DC	≤3	0.05	≤3	0.05	≤3	0.05
	Heat Resistant Alloys	—	0.5—0.75DC	≤2	0.10	≤2	0.05	≤2	0.05
			DC (Slot)	≤1	0.05	≤1	0.05	≤1	0.05
H	Hardened Steels	40—55HRC	≤0.25DC	≤4	0.10	≤5	0.15	≤5	0.15
			4—7	0.07	5—7	0.10	5—7	0.10	
					7—8.5	0.07			
			0.25—0.5DC	≤2	0.10	≤3	0.15	≤3	0.15
			2—5	0.07	3—5.5	0.10			
			0.5—0.75DC	≤4	0.07	≤4	0.07	≤3	0.07
			DC (Slot)	≤3	0.07	≤4	0.07	≤3	0.07

(Note 1) These cutting conditions are a guide to the standard shank type and the arbor type.

Please make adjustments according to the machining conditions.

(Note 2) Vibration is liable to occur in certain cases. Please reduce the depth of cut and / or reduce cutting conditions in the following cases.

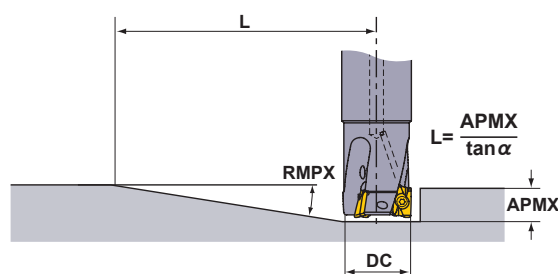
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.

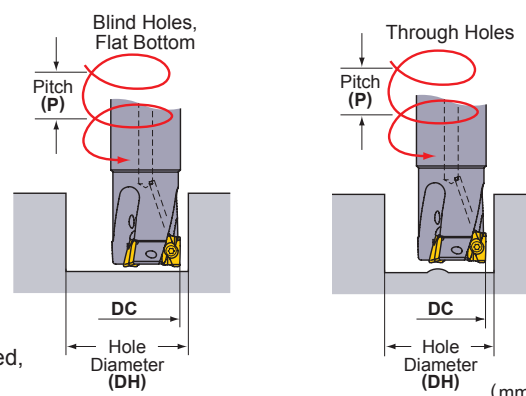
(Note 4) For heavy interrupted and unstable cutting, the H breaker is first recommendation.

Ramping / Helical Milling

Ramping



Helical Milling



Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

DC	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
	RMPX	L *1	DH max. *2	P max.	DH min.	P max.	DH min.	P max.
12	6.0°	95	22	2.5	20.5	2	14	0.5
14	6.0°	95	26	2.5	24.5	2	18	1
16	11.3°	50	30	9	28	7	21	2
18	8.6°	66	34	5	32	4.5	25	2
20	6.9°	83	38	5	36	4.5	29	2
22	5.7°	100	42	5	40	4.5	33	2
25	4.6°	124	48	6	46	5	39	3
28	3.8°	151	54	4.5	52	4	45	2
30	3.4°	168	58	4.5	56	4	49	2
32	3.1°	185	62	4.5	60	4	53	2
35	2.7°	212	68	4	66	3.5	59	2
40	2.2°	260	78	4	76	3.5	69	2
50	1.7°	337	98	2	96	2	89	2
63	1.3°	441	124	2	122	2	115	2
80	1.0°	573	158	2	156	2	149	2
100	0.8°	716	198	1	196	1	189	1

(Note 1) When machining highly ductile materials with ramping angles above, chips could be continuous.

In this case, decrease the ramping angle or feed per tooth.

*1 L (=10 / tan α). Cutters' moving distance until depth of cut reaches 10mm at a maximum ramping angle.

*2 In case corner radius of 0.8mm. Other than that, find with the below formula.

$$\{(Cutting\ Edge\ Diameter\ DC) - (Corner\ Radius) - 0.2\} \times 2$$

Multi-functional Indexable Cutter

DEEP SHOULDER MILLING



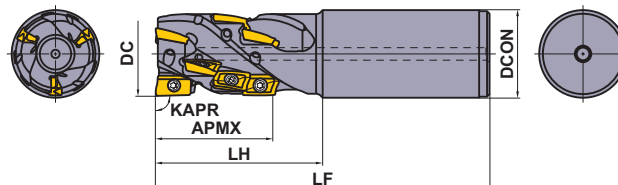
APX3000

Long Cutting Edge

P M K N S H



- High accuracy, high quality vertical wall.
- Low cutting force insert.



Right hand tool holder only.

Shank Type

(mm)

DC	Order Number	Stock	Coolant Hole	*		DCON	LF	LH	WT (kg)	APMX	Insert Type
		R		No.F	Total						
20	APX3KR2004SN20S028A	●	—	1	4	20	125	45	0.27	28	AO-T12
25	APX3KR2506SA25S028A	●	○	2	6	25	125	45	0.40	28	AO-T12
25	APX3KR2508SA25M037A	●	○	2	8	25	130	50	0.41	37	AO-T12
32	APX3KR3208SA32S037A	●	○	2	8	32	130	50	0.70	37	AO-T12
32	APX3KR3210SA32M046A	●	○	2	10	32	140	60	0.74	46	AO-T12
32	APX3KR3212SA32S037A	●	○	3	12	32	130	50	0.67	37	AO-T12
32	APX3KR3215SA32M046A	●	○	3	15	32	140	60	0.71	46	AO-T12
40	APX3KR4015SA42S046A	●	○	3	15	42	140	60	1.24	46	AO-T12
40	APX3KR4018SA42M055A	●	○	3	18	42	150	70	1.31	55	AO-T12

* Number of Flutes

(Note 1) When using inserts with corner radius $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page 6.

(Note 2) Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).

Inserts RE 0.2mm and 0.4mm can also be used.

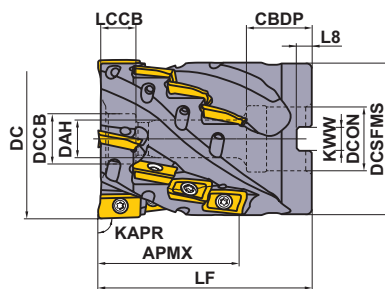
Spare Parts

(mm)

DC	Tool Holder Type	*		
		Clamp Screw	Wrench	Anti-seize Lubricant
20	APX3KR20	TPS25	TIP07F	MK1KS
25	APX3KR25	TPS25-1	TIP07F	MK1KS
32	APX3KR32	TPS25-1	TIP07F	MK1KS
40	APX3KR40	TPS25-1	TIP07F	MK1KS
40	APX3K-040	TPS25-1	TIP07F	MK1KS
50	APX3K-050	TPS25-1	TIP07F	MK1KS

* Clamp Torque (N · m) : TPS25 = 1.0, TPS25-1 = 1.0

● : Inventory maintained in Japan.



Right hand tool holder only.

DC	Set Bolt	Geometry
40	HSC08040	
50	HSC10045	

Shell Type

DC=mm, DCON=Inch, **DCON=mm**
With Coolant Hole

GAMP: +12°
GAMF: +6°

(mm)

DC	Order Number	Stock	* No.F	Total	LF	DCON	WT (kg)	APMX	
		R							Insert Type
40	APX3K-040A16A037RA	●	4	16	50	16	0.25	37	AO-T12
50	APX3K-050A20A046RA	●	4	20	60	22	0.54	46	AO-T12

* Number of Flutes

(Note 1) When using inserts with corner radius $RE \geq 2.4\text{mm}$, machining of the holder is required as shown on page 6.

(Note 2) Corner radius RE 0.8mm is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).

Inserts RE 0.2mm and 0.4mm can also be used.

(Note 3) Coolant can be supplied from the end face of the centering location bore in the arbor. However, cannot be supplied from the set bolt.

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	APX3K-040A16A037RA	16	18	9	14	9.9	38.5	8.4	5.6
50	APX3K-050A20A046RA	22	20	11	17	11.9	48.4	10.4	6.3

Multi-functional Indexable Cutter

Recommended Cutting Conditions

Cutting Speed

(mm)

Work Material		Insert			ae			
		Grade Priority		Chip Breaker	≤0.25DC	0.25—0.75DC	DC (Slot)	
		1st	2nd					
P	Mild Steels	MP6120	VP15TF	M	H	180(140—220)	150(110—180)	120(100—140)
		MP6130	VP20RT	M	H	160(120—200)	130(100—160)	100(80—120)
	Carbon Steels Alloy Steels, Alloy Tool Steels	MP6120	VP15TF	M	H	150(100—200)	120(90—150)	100(80—120)
		MP6130	VP20RT	M	H	130(90—170)	90(70—110)	80(60—100)
	Pre-hardened Steels	MP6120	VP15TF	M	H	120(80—160)	100(70—130)	90(50—120)
		MP6130	VP20RT	M	H	100(70—130)	90(60—120)	70(50—100)
M	Stainless Steels	MP7130		M		150(120—180)	120(100—140)	100(80—120)
K	Gray Cast Irons	MC5020		H		200(150—250)	180(150—210)	
		VP15TF		M	H	180(120—240)	150(100—200)	100(60—140)
	Ductile Cast Irons	VP15TF		M	H	160(120—200)	140(100—180)	80(60—100)
N	Aluminum Alloys	TF15	MP9120	GM	M	400(200—800)	400(200—800)	400(200—800)
S	Titanium Alloys	MP9130		M		40(30—60)		40(30—60)
		MP9120		M		50(40—70)		50(40—70)
	Heat Resistant Alloys	MP9120	VP15TF	M	H	40(30—60)		40(30—60)
		MP9130	VP20RT	M	H	30(20—40)		30(20—40)

Depth of Cut / Feed per Tooth

(mm)

Work Material	Properties	ae	DC					
			ø20		ø25		ø32—ø50	
			ap	fz (mm/t.)	ap	fz (mm/t.)	ap	fz (mm/t.)
P	Mild Steels	≤180HB	≤0.25DC	≤28	0.15	≤37	0.17	≤55
			0.25-0.75DC	≤28	0.12	≤37	0.15	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Carbon Steels Alloy Steels	180—280HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Tool Alloy Steels	≤350HB (Annealing)	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Pre-hardened Steels	35—45HRC	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
M	Ferritic and Martensitic Stainless Steels	—	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Duplex Stainless Steels	≤280HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
	Precipitation Hardening Stainless Steels	<450HB	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤0.25DC	≤28	0.15	≤37	0.17	≤55
			0.25-0.75DC	≤28	0.12	≤37	0.15	≤55
			DC (Slot)	≤18	0.1	≤18	0.1	≤18
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤0.25DC	≤28	0.12	≤37	0.15	≤55
			0.25-0.75DC	≤28	0.1	≤37	0.12	≤55
			DC (Slot)	≤18	0.08	≤18	0.08	≤18
N	Aluminum Alloys		≤0.25DC	≤28	0.15	≤37	0.17	≤55
			0.25-0.75DC			≤9	0.17	≤9
			DC (Slot)			≤9	0.17	≤9
S	Titanium Alloys	≤350HB	≤0.25DC	≤28	0.1	≤37	0.1	≤55
			0.25-0.75DC					
			DC (Slot)	≤18	0.06	≤18	0.06	≤18
	Heat Resistant Alloys	—	≤0.25DC	≤28	0.08	≤37	0.08	≤55
			0.25-0.75DC					
			DC (Slot)	≤18	0.05	≤18	0.05	≤18

(Note 1) The above cutting conditions are determined based on high rigidity machine and work materials, where no vibration occurred.
Please adjust processing conditions if the vibration is generated.

This image shows a full page of a document template designed as a memo or notebook page. At the top left, the word "Memo" is written in a large, bold, black sans-serif font. A thick, solid black horizontal line runs across the entire width of the page directly beneath the title. The remainder of the page is filled with thin, light gray horizontal lines spaced evenly apart, creating a ruled surface for writing. There are no vertical margin lines, bullet points, or other markings present.

Multi-functional Indexable Cutter

MULTI-FUNCTIONAL MILLING



APX4000

P M K N S H



- High accuracy, high quality vertical wall.
- Low cutting force insert.

Fig.1

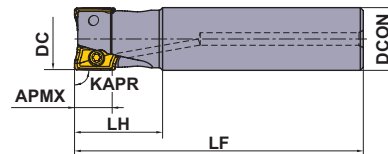
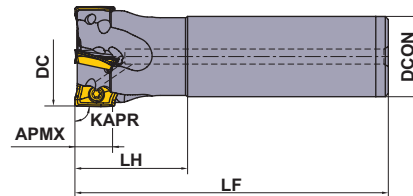
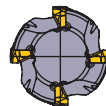


Fig.2



Right hand tool holder only.

Shank Type

With Coolant Hole

(mm)

DC	Order Number	Stock	* No.T	DCON	LF	LH	WT (kg)	APMX	RMPX	RPMX (min ⁻¹)	Fig.	Insert Type
		R										
25	APX4000R252SA25SA	●	2	25	115	35	0.40	15	11.0°	18900	1	AO○T18
25	APX4000R252SA25LA	●	2	25	170	35	0.61	15	11.0°	18900	1	AO○T18
25	APX4000R252SA25ELA	●	2	25	220	80	0.76	15	11.0°	18900	1	AO○T18
28	APX4000R282SA25LA	●	2	25	170	35	0.63	15	9.0°	17700	2	AO○T18
28	APX4000R282SA25ELA	●	2	25	220	35	0.81	15	9.0°	17700	2	AO○T18
32	APX4000R322SA32SA	●	2	32	125	45	0.71	15	7.0°	16300	1	AO○T18
32	APX4000R323SA32SA	●	3	32	125	45	0.71	15	7.0°	16300	1	AO○T18
32	APX4000R322SA32LA	●	2	32	190	45	1.11	15	7.0°	16300	1	AO○T18
32	APX4000R323SA32LA	●	3	32	190	45	1.11	15	7.0°	16300	1	AO○T18
32	APX4000R322SA32ELA	●	2	32	260	100	1.49	15	7.0°	16300	1	AO○T18
32	APX4000R323SA32ELA	●	3	32	260	100	1.49	15	7.0°	16300	1	AO○T18
35	APX4000R352SA32LA	●	2	32	190	45	1.14	15	6.0°	15400	2	AO○T18
35	APX4000R353SA32LA	●	3	32	190	45	1.14	15	6.0°	15400	2	AO○T18
35	APX4000R352SA32ELA	●	2	32	260	45	1.57	15	6.0°	15400	2	AO○T18
35	APX4000R353SA32ELA	●	3	32	260	45	1.57	15	6.0°	15400	2	AO○T18
40	APX4000R403SA32SA	●	3	32	125	45	0.80	15	6.0°	14200	2	AO○T18
40	APX4000R404SA32SA	●	4	32	125	45	0.80	15	6.0°	14200	2	AO○T18
40	APX4000R402SA32LA	●	2	32	190	45	1.19	15	6.0°	14200	2	AO○T18
40	APX4000R403SA32LA	●	3	32	190	45	1.19	15	6.0°	14200	2	AO○T18
40	APX4000R404SA32LA	●	4	32	190	45	1.19	15	6.0°	14200	2	AO○T18
40	APX4000R402SA32ELA	●	2	32	260	45	1.62	15	6.0°	14200	2	AO○T18
40	APX4000R403SA32ELA	●	3	32	260	45	1.62	15	6.0°	14200	2	AO○T18
40	APX4000R404SA32ELA	●	4	32	260	45	1.62	15	6.0°	14200	2	AO○T18
50	APX4000R504SA32SA	●	4	32	125	45	0.93	15	4.0°	12400	2	AO○T18
50	APX4000R505SA32SA	●	5	32	125	45	0.93	15	4.0°	12400	2	AO○T18
63	APX4000R634SA32SA	●	4	32	125	45	1.15	15	3.0°	10800	2	AO○T18
63	APX4000R636SA32SA	●	6	32	125	45	1.15	15	3.0°	10800	2	AO○T18

* Number of Teeth

(Note 1) When using inserts with corner radius $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page 16.

(Note 2) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.

(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

Spare Parts

(mm)

DC	Tool Holder Type	DC	Tool Holder Type			
				Clamp Screw	Wrench	Anti-seize Lubricant
25	APX4000R25	28	APX4000R28	TPS4	TIP15W	MK1KS
32	APX4000R32	35	APX4000R35	TPS4	TIP15W	MK1KS
40	APX4000R40	40	APX4000-040	TPS43	TIP15W	MK1KS
50	APX4000R50	50	APX4000-050	TPS43	TIP15W	MK1KS
63	APX4000R63	63	APX4000-063	TPS43	TIP15W	MK1KS
80	APX4000R080	80	APX4000-080	TPS43	TIP15W	MK1KS
100	APX4000R100	100	APX4000-100	TPS43	TIP15W	MK1KS
125	APX4000R125	125	APX4000-125	TPS43	TIP15W	MK1KS
160	APX4000R160	160	APX4000-160	TPS43	TIP15W	MK1KS

* Clamp Torque (N · m) : TPS4 = 4.0, TPS43 = 4.0



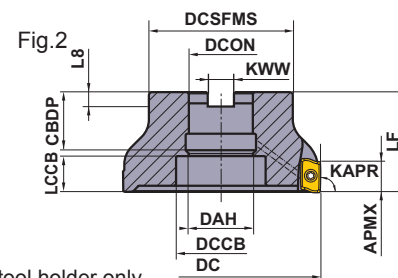
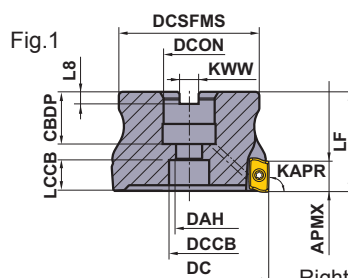
Arbor Type

GAMP: +15°—+22° T: +21°—+28°

GAMF: +21°—+28° I: +15°—+22°

DC=mm, DCON=Inch, DCON=mm

With Coolant Hole



Right hand tool holder only.

DC	Set Bolt	Geometry	
40	HSC08030H	①	
50, 63	HSC10030H		
80	HSC12035H		
100	HSC16040H		
125	MBA20040H	②	
160	MBA24045H		

(mm)

DC	Order Number	Stock	* No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min ⁻¹)	Fig.	
		R									
40	APX4000-040A04RA	●	4	40	16	0.2	15	6.0°	14200	1	AO-T18
50	APX4000-050A05RA	●	5	40	22	0.3	15	4.0°	12400	1	AO-T18
63	APX4000-063A06RA	●	6	40	22	0.5	15	3.0°	10800	1	AO-T18
80	APX4000R08007CA	●	7	50	25.4	1.2	15	2.0°	9300	1	AO-T18
80	APX4000-080A07RA	●	7	50	27	1.2	15	2.0°	9300	1	AO-T18
100	APX4000R10008DA	●	8	63	31.75	2.1	15	1.5°	8100	1	AO-T18
100	APX4000-100A08RA	●	8	50	32	2.1	15	1.5°	8100	1	AO-T18
125	APX4000R12509EA	●	9	63	38.1	3.3	15	1.0°	7100	2	AO-T18
125	APX4000-125A09RA	●	9	63	40	3.3	15	1.0°	7100	2	AO-T18
160	APX4000-160A10RA	●	10	63	40	4.8	15	1.0°	6100	2	AO-T18
160	APX4000R16010FA	●	10	63	50.8	4.8	15	1.0°	6100	2	AO-T18

* Number of Teeth

(Note 1) When using inserts with corner radius $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page 16.

(Note 2) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.

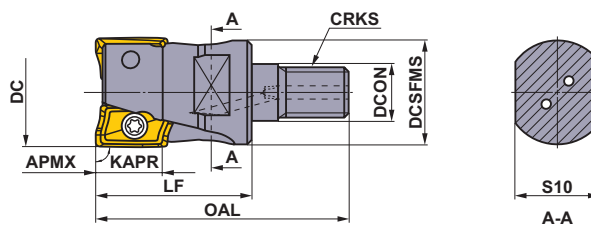
(Note 3) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	APX4000-040A04RA	16	18	9	14	10.08	34	8.4	5.6
50	APX4000-050A05RA	22	20	11	17	12.26	45	10.4	6.3
63	APX4000-063A06RA	22	20	11	17	12.35	50	10.4	6.3
80	APX4000R08007CA	25.4	26	13	20	15.35	70	9.5	6
80	APX4000-080A07RA	27	23	13	20	15.35	60	12.4	7
100	APX4000R10008DA	31.75	32	17	26	20.35	80	12.7	8
100	APX4000-100A08RA	32	26	17	27	17.35	70	14.4	8
125	APX4000R12509EA	38.1	40	40	56	22.35	100	15.9	10
125	APX4000-125A09RA	40	40	42	56	22.35	90	16.4	9
160	APX4000-160A10RA	40	40	42	72	22.35	100	16.4	9
160	APX4000R16010FA	50.8	40	53	72	19.35	100	19.1	11

Multi-functional Indexable Cutter



Screw-in Type

With Coolant Hole

Right hand tool holder only.

(mm)

DC	Order Number	Stock	* No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (kg)	APMX	RMPX	 Insert Type
		R											
25	APX4000R252M12A35	●	2	12.5	23.5	57	35	19	M12	0.2	15	11.0°	AO-T18
28	APX4000R282M12A35	●	2	12.5	23.5	57	35	19	M12	0.2	15	9.0°	AO-T18
32	APX4000R322M16A40	●	2	17	28.5	63	40	24	M16	0.3	15	7.0°	AO-T18
32	APX4000R323M16A40	●	3	17	28.5	63	40	24	M16	0.3	15	7.0°	AO-T18
35	APX4000R352M16A40	●	2	17	28.5	63	40	24	M16	0.3	15	6.0°	AO-T18
35	APX4000R353M16A40	●	3	17	28.5	63	40	24	M16	0.3	15	6.0°	AO-T18
40	APX4000R403M16A40	●	3	17	28.5	63	40	24	M16	0.3	15	6.0°	AO-T18
40	APX4000R404M16A40	●	4	17	28.5	63	40	24	M16	0.3	15	6.0°	AO-T18

* Number of Teeth

(Note 1) When using inserts with corner radius $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page 16.

(Note 2) For screw-in type arbors, refer to pages 21—22.

Spare Parts

(mm)

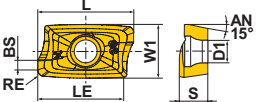
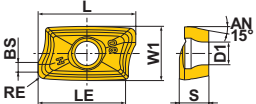
DC	Tool Holder Type	* 		
		Clamp Screw	Wrench	Anti-seize Lubricant
25	APX4000R25	TPS4	TIP15W	MK1KS
28	APX4000R28	TPS4	TIP15W	MK1KS
32	APX4000R32	TPS4	TIP15W	MK1KS
35	APX4000R35	TPS4	TIP15W	MK1KS
40	APX4000R40	TPS43	TIP15W	MK1KS

* Clamp Torque (N · m) : TPS4 = 4.0, TPS43 = 4.0

● : Inventory maintained in Japan. (10 inserts in one case)

Inserts

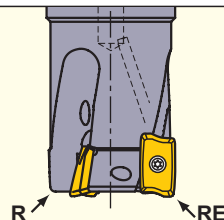
(mm)

Work Material	P	Steels		●	✱	●		●	●	✱	●	✱	Cutting Conditions (Guide) :							
	M	Stainless Steels											● : Stable Cutting	● : General Cutting	✱ : Unstable Cutting					
	K	Cast Irons											Edge Preparation :							
	S	Heat Resistant Alloys, Titanium Alloys											E : Honing							
	H	Hardened Steels																		
Shape	Order Number	Class	Edge Preparation	Coated								L	LE	W1	S	BS	RE *	D1	Geometry	
				MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	VP20RT									
	AOMT184804PEER-M	M	E		●	●	●	●	●	●	●	●	18	15	9	4.8	1.8	0.4	4.7	
	AOMT184808PEER-M	M	E		●	●	●	●	●	●	●	●	18	15	9	4.8	1.4	0.8	4.7	
	AOMT184810PEER-M	M	E		●				●	●	●	●	18	15	9	4.8	1.0	1.0	4.7	
	AOMT184812PEER-M	M	E		●				●	●	●	●	18	15	9	4.8	0.8	1.2	4.7	
	AOMT184816PEER-M	M	E		●	●	●	●	●	●	●	●	18	15	9	4.8	0.4	1.6	4.7	
	AOMT184820PEER-M	M	E		●				●	●	●	●	18	15	9	4.8	0.4	2.0	4.7	
	AOMT184804PEER-H	M	E	●	●	●	●	●	●	●	●	●	18	15	9	4.8	1.8	0.4	4.7	
	AOMT184808PEER-H	M	E	●	●	●	●	●	●	●	●	●	18	15	9	4.8	1.4	0.8	4.7	
	AOMT184816PEER-H	M	E	●	●	●	●	●	●	●	●	●	18	15	9	4.8	0.4	1.6	4.7	
	AOMT184832PEER-H	M	E			●	●				●	●	18	15	9	4.8	0.4	3.2	4.7	
	AOMT184840PEER-H	M	E			●	●				●	●	18	15	9	4.8	0.4	4.0	4.7	
	AOMT184850PEER-H	M	E			●	●				●	●	18	15	9	4.8	—	5.0	4.7	
	AOMT184864PEER-H	M	E			●	●				●	●	18	15	9	4.8	—	6.35	4.7	

* Corner radius RE is different from the work material of R shape depending on the axial rake angle of the body.

Note on Use of Inserts with Large Corner Radii

When using inserts with corner radius $RE \geq R3.2\text{mm}$, please machine the holder with a radius form as shown on the right table.



RE (mm)	R (mm)
3.2	2.0
4.0	2.5
5.0	3.5
6.35	5.0

R : Holder End Radius
RE : Insert Corner Radius

Multi-functional Indexable Cutter

Recommended Cutting Conditions

Cutting Speed

(mm)

Work Material	Properties	Insert			ae			
		Grade Priority		Chip Breaker	≤0.25DC	0.25—0.5DC	0.5—0.75DC	DC (Slot)
		1st	2nd		vc (m/min)			
P	Mild Steels	≤180HB	MP6120	VP15TF	M H	230(180—270)	220(170—260)	180(140—210)
			MP6130	VP20RT	M H	200(150—240)	190(140—230)	150(110—180)
	Carbon Steels Alloy Steels	180—350HB	MP6120	VP15TF	M H	180(140—210)	170(130—200)	140(110—160)
			MP6130	VP20RT	M H	150(110—180)	140(100—170)	110(80—130)
M	Stainless Steels	≤270HB	MP7130	VP20RT	M H	180(140—210)	170(130—200)	140(110—160)
K	Gray Cast Irons	≤350MPa	MC5020	VP15TF	H	250(200—300)	240(190—290)	210(160—260)
	Ductile Cast Irons	≤800MPa	MC5020	VP15TF	H	130(100—150)	120(90—140)	100(80—120)
S	Titanium Alloys	≤350HB	MP9120	VP15TF	H M	50(40—70)		50(40—70)
			MP9130	VP20RT	H M	40(30—60)		40(30—60)
	Heat Resistant Alloys	—	MP9120	VP15TF	H M	40(30—60)		40(30—60)
			MP9130	VP20RT	H M	30(20—40)		30(20—40)
H	Hardened Steels	40—55HRC	VP15TF		H	90(70—100)	85(60—100)	70(50—80)

Depth of Cut / Feed per Tooth

(mm)

Work Material	Properties	ae	ap	fz (mm/t.)		
				DC		
				ø25—ø40	ø50—ø80	ø100—ø160
P	Mild Steels Carbon Steels Alloy Steels	≤180HB 180—350HB	≤0.5DC	≤5	0.30	0.30
				5—7.5	0.25	0.25
				7.5—10	0.20	0.20
				10—12.5	0.15	0.15
				12.5—15	0.10	0.10
			0.5—0.75DC	≤5	0.20	0.20
				5—10	0.15	0.15
				10—15	0.10	0.10
			DC (Slot)	≤5	0.15	0.15
				5—7.5	0.10	0.10
				7.5—10	0.07	0.07
M	Stainless Steels	≤270HB	≤0.5DC	≤5	0.30	0.25
				5—7.5	0.25	0.20
				7.5—10	0.20	0.15
				10—12.5	0.15	0.10
				12.5—15	0.10	0.07
			0.5—0.75DC	≤5	0.20	0.15
				5—10	0.15	0.10
				10—15	0.10	0.07
			DC (Slot)	≤5	0.15	0.15
				5—7.5	0.10	0.10
				7.5—10	0.07	0.07
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤0.5DC	≤5	0.30	0.30
				5—7.5	0.25	0.25
				7.5—10	0.20	0.20
				10—12.5	0.15	0.15
				12.5—15	0.10	0.07
			0.5—0.75DC	≤5	0.20	0.20
				5—10	0.15	0.15
				10—15	0.10	0.10
			DC (Slot)	≤5	0.15	0.15
				5—7.5	0.10	0.10
				7.5—10	0.07	0.07
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤0.5DC	≤5	0.25	0.25
				5—7.5	0.20	0.20
				7.5—10	0.15	0.15
				10—12.5	0.10	0.10
				12.5—15	0.07	0.07
			0.5—0.75DC	≤5	0.20	0.20
				5—10	0.15	0.15
				10—15	0.10	0.10
			DC (Slot)	≤5	0.15	0.15
				5—7.5	0.10	0.10
				7.5—10	0.07	0.07

(mm)

Work Material		Properties	ae	ap	fz (mm/t.)		
					DC		
					ø25—ø40	ø50—ø80	ø100—ø160
S	Titanium Alloys	≤350HB	≤0.25DC	≤5	0.15	0.10	0.10
				5—7.5	0.10	0.05	0.05
				7.5—10	0.05	—	—
			DC (Slot)	≤5	0.05	0.05	0.05
	Heat Resistant Alloys	—	≤0.25DC	≤2	0.10	0.05	0.05
DC (Slot)			≤1	0.05	0.05	0.05	
H	Hardened Steels	40—55HRC	≤0.25DC	≤5	0.15	0.15	0.15
				5—7.5	0.10	0.10	0.10
				7.5—10	0.07	0.07	0.07
			0.25—0.5DC	≤5	0.10	0.10	0.10
				5—7.5	0.07	0.07	0.07
			0.5—0.75DC	≤5	0.07	0.07	0.07
				DC (Slot)	≤5	0.07	0.07

(Note 1) These cutting conditions are a guide to the standard shank type and the arbor type.

Please make adjustments according to the machining conditions.

(Note 2) Vibration is liable to occur in certain cases. Please reduce the depth of cut and / or reduce cutting conditions in the following cases.

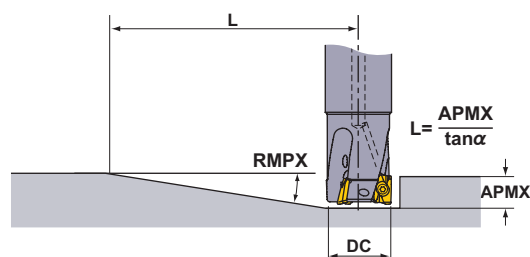
- When using the long shank type and extra long shank type.
- When using long tool overhang with the standard or arbor type.
- When the application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) In case of coarse and fine pitch cutters, the coarse pitch type is recommended to prevent vibration.

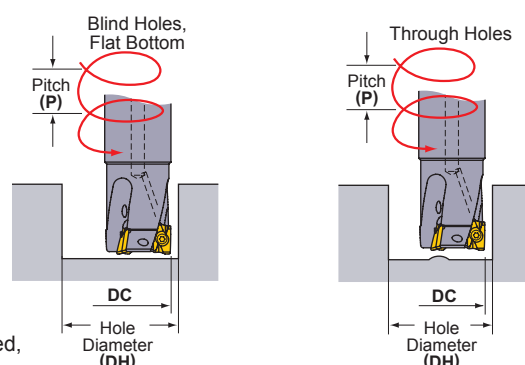
(Note 4) For heavy interrupted and unstable cutting, the H breaker is first recommendation.

Ramping / Helical Milling

Ramping



Helical Milling



Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

DC	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
	RMPX	L *1	DH max. *2	P max.	DH min.	P max.	DH min.	P max.
25	11°	85	48	14	45	12	32	4
28	9°	105	54	12	51	11	38	4
32	7°	135	62	11	59	10	46	5
35	6°	158	68	10	65	9	52	5
40	6°	158	78	12	75	11	62	7
50	4°	238	98	10	95	9	82	7
63	3°	318	124	10	121	9	108	7
80	2°	477	158	8	155	8	142	6
100	1.5°	636	198	8	195	7	182	6
125	1°	954	248	6	245	6	232	5
160	1°	954	318	8	315	8	302	7

(Note 1) When machining highly ductile materials with ramping angles above, chips could be continuous.

In this case, decrease the ramping angle or feed per tooth.

*1 $L = 15 / \tan \alpha$. Cutters' moving distance until depth of cut reaches 15mm at a maximum ramping angle.

*2 In case corner radius of 0.8mm. Other than that, find with the below formula.

$$\{(\text{Cutting Edge Diameter DC}) - (\text{Corner Radius}) - 0.2\} \times 2$$

Multi-functional Indexable Cutter

DEEP SHOULDER MILLING



APX4000

Long Cutting Edge

P M K N S H



- High accuracy, high quality vertical wall.
- Low cutting force insert.

Fig.1

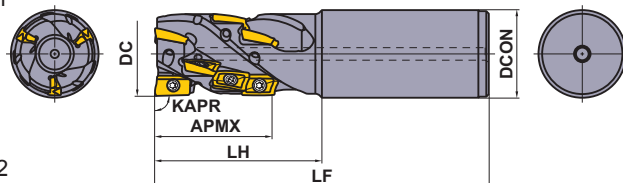
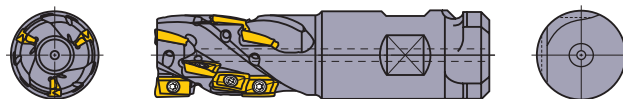


Fig.2



Right hand tool holder only.

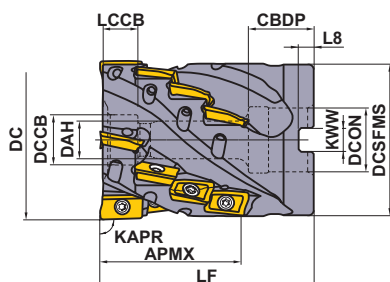
(mm)

DC	Order Number	Stock	No.F	Total	DCON	LF	LH	WT (kg)	APMX	Fig.	Insert Type
		R									
40	APX4KR4008SA42S056A	●	2	8	42	160	80	1.54	56	1	AO-T18
40	APX4KR4012SA42S056A	●	3	12	42	160	80	1.54	56	1	AO-T18
50	APX4KR5012WA508S056A	●	3	12	50.8	160	80	1.76	56	2	AO-T18
50	APX4KR5018WA508M084A	●	3	18	50.8	190	110	2.18	84	2	AO-T18

* Number of Flutes

(Note 1) When using inserts with corner radius $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page 16.

(Note 2) Only corner radius RE 0.4mm and 0.8mm can be used for the peripheral cutting edges except the bottom cutting edge (the end cutting edge).



Right hand tool holder only.

DC	Set Bolt	Geometry
50	HSC10050	
63	HSC12070	

Shell Type

DC=mm, DCON=Inch, DCON=mm
With Coolant Hole

GAMP: +12°
GAMF: +6°

(mm)

DC	Order Number	Stock	No.F	Total	LF	DCON	WT (kg)	APMX	Insert Type
		R							
50	APX4K-050A09A042RA	●	3	9	65	22	0.75	42	AO-T18
63	APX4KR06316CA056A	●	4	16	85	25.4	1.66	56	AO-T18
63	APX4K-063A16A056RA	●	4	16	85	27	1.63	56	AO-T18

* Number of Flutes

(Note 1) When using inserts with corner radius $RE \geq 3.2\text{mm}$, machining of the holder is required as shown on page 16.

(Note 2) Only corner radius RE 0.4mm and 0.8mm can be used for the peripheral cutting edges except the bottom cutting edge (the end cutting edge).

(Note 3) Coolant can be supplied from the end face of the centering location bore in the arbor. However, cannot be supplied from the set bolt.

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDB	DAH	LCCB	DCSFMS	KWW	L8
50	APX4K-050A09A042RA	22	22	11	12.5	48	10.4	6.3
63	APX4KR06316CA056A	25.4	26	13	14	60.7	9.5	6
63	APX4K-063A16A056RA	27	28	13	14	60.7	12.4	7

Spare Parts

	*		
Clamp Screw		Wrench	Anti-seize Lubricant
TPS43		TIP15W	MK1KS

* Clamp Torque (N · m) : TPS43 = 4.0

Recommended Cutting Conditions

Cutting Speed

(mm)

Work Material	Properties	Insert				ae		
		Grade Priority		Chip Breaker		≤0.15DC	0.15—0.3DC	DC (Slot)
		1st	2nd					
P	Mild Steels	≤180HB	MP6120	VP15TF	M H	200(160—250)	160(120—200)	140(120—160)
			MP6130	VP20RT	M H	170(130—220)	130(90—170)	110(90—130)
	Carbon Steels Alloy Steels	180—350HB	MP6120	VP15TF	M H	160(120—200)	120(100—140)	100(80—120)
			MP6130	VP20RT	M H	130(90—170)	90(70—110)	70(50—90)
M	Stainless Steels	≤270HB	MP7130	VP15TF	M H	160(120—200)	120(100—140)	100(80—120)
K	Gray Cast Irons	≤350MPa	MC5020	VP15TF	H	230(180—280)	190(140—240)	190(140—240)
	Ductile Cast Irons	≤800MPa	MC5020	VP15TF	H	190(140—220)	170(120—220)	170(120—220)
S	Titanium Alloys	≤350HB	MP9120	VP15TF	H M	50(40—70)		50(40—70)
			MP9130	VP20RT	H M	40(30—60)		40(30—60)
	Heat Resistant Alloys	—	MP9120	VP15TF	H M	40(30—60)		40(30—60)
			MP9130	VP20RT	H M	30(20—40)		30(20—40)

Depth of Cut / Feed per Tooth

(mm)

Work Material	Properties	ae	ap	fz (mm/t.)		
				DC		
				ø40 Length of Cut 56mm ø50 Length of Cut 42mm	ø50 Length of Cut 56mm ø63 Length of Cut 56mm	ø50 Length of Cut 84mm
P	Mild Steels	≤180HB	≤20	0.25	0.25	0.20
				20—50	0.20	0.15
			50—80			0.10
			DC (Slot)	≤20	0.20	0.15
	Carbon Steels Alloy Steels	180—350HB	20—50	0.15	0.15	
			≤20	0.25	0.25	0.20
			20—50	0.20	0.20	0.15
			50—80			0.10
M	Stainless Steels	≤270HB	≤0.3DC	≤20	0.25	0.20
			20—50	0.20	0.20	0.15
			50—80			0.10
			DC (Slot)	≤10	0.10	0.07
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤0.15DC	≤10	0.30	0.25
				10—50	0.25	0.20
				50—80		0.15
			0.15—0.3DC	≤10	0.25	0.20
				10—50	0.20	0.15
				50—80		0.10
			DC (Slot)	≤10	0.25	0.20
				10—50	0.20	0.15
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤0.15DC	≤20	0.25	0.20
				20—50	0.20	0.15
				50—80		0.10
			0.15—0.3DC	≤20	0.20	0.15
				20—50	0.15	0.10
				50—80		0.07
S	Titanium Alloys	≤350HB	≤0.15DC	≤20	0.10	
				20—50	0.10	
			DC (Slot)	≤50	0.08	
			≤0.15DC	≤10	0.07	
S	Heat Resistant Alloys	—	DC (Slot)	≤20	0.05	

(Note 1) The above cutting conditions are determined based on high rigidity machine and work materials, where no vibration occurred.
Please adjust processing conditions if the vibration is generated.

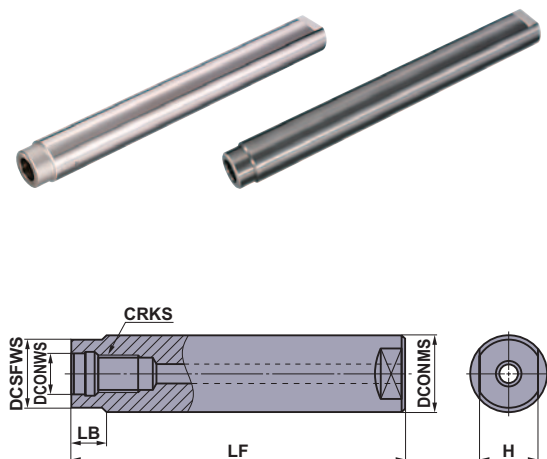
ARBORS

Holders for Screw-in Tools

Straight Shank Arbor

(mm)

Type	Order Number	Stock	DCONWS	DCONMS	DCSFWS	LF	LB	H	CRKS
Steel Shank Type	SC16M08S100S	●	8.5	16	14.5	100	10	10	M8
	SC16M08S200L	●	8.5	16	14.5	200	10	10	M8
	SC20M10S120S	●	10.5	20	18.5	120	10	14	M10
	SC20M10S220L	●	10.5	20	18.5	220	10	14	M10
	SC25M12S125S	●	12.5	25	23.5	125	10	19	M12
	SC25M12S245L	●	12.5	25	23.5	245	10	19	M12
	SC32M16S140S	●	17	32	28.5	140	15	24	M16
	SC32M16S280L	●	17	32	28.5	280	15	24	M16
Carbide Shank Type	SC16M08S100SW	●	8.5	16	14.5	100	10	10	M8
	SC16M08S200LW	●	8.5	16	14.5	200	10	10	M8
	SC20M10S120SW	●	10.5	20	18.5	120	10	14	M10
	SC20M10S220LW	●	10.5	20	18.5	220	10	14	M10
	SC25M12S125SW	●	12.5	25	23.5	125	10	19	M12
	SC25M12S245LW	●	12.5	25	23.5	245	10	19	M12
	SC32M16S140SW	●	17	32	28.5	140	15	24	M16
	SC32M16S280LW	●	17	32	28.5	280	15	24	M16



How to Install the Screw-in Head

- ① Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.
- ② Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

(mm)

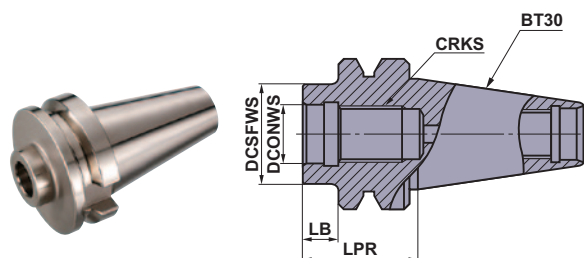
Screw Size	Recommended Torque (N · m)	Wrench Size
M8	23	10
M10	46	14
M12	80	19
M16	90	24



- Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this may produce risk of injuries or burns.
- Do not handle the cutting tools with bare hands as this may cause injuries.

BT30 Shank Arbor

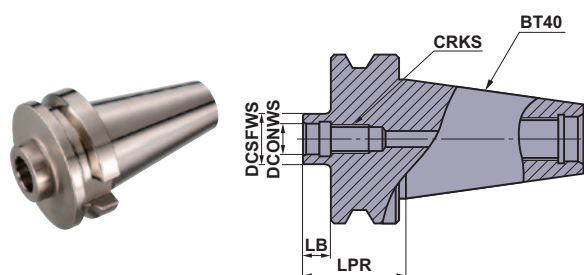
(mm)



Order Number	Stock	DCONWS	DCSFWS	LPR	LB	CRKS
SC16M08S10-BT30	●	8.5	14.5	32	10	M8
SC20M10S10-BT30	●	10.5	18.5	32	10	M10
SC25M12S10-BT30	●	12.5	23.5	32	10	M12
SC32M16S10-BT30	●	17.0	28.5	32	10	M16

BT40 Shank Arbor

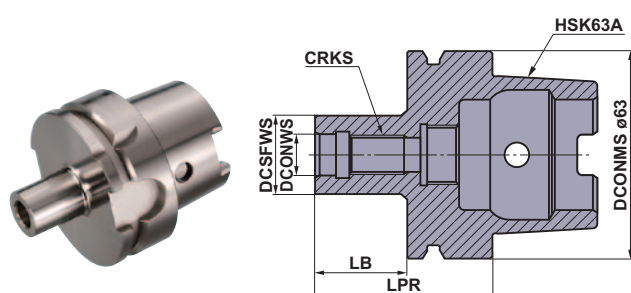
(mm)



Order Number	Stock	DCONWS	DCSFWS	LPR	LB	CRKS
SC16M08S10-BT40	●	8.5	14.5	37	10	M8
SC20M10S10-BT40	●	10.5	18.5	37	10	M10
SC25M12S10-BT40	●	12.5	23.5	37	10	M12
SC32M16S10-BT40	●	17.0	28.5	37	10	M16

HSK63A Shank Arbor

(mm)



Order Number	Stock	DCONWS	DCSFWS	LPR	LB	CRKS
SC16M08S22-HSK63A	●	8.5	14.5	48	22	M8
SC20M10S24-HSK63A	●	10.5	18.5	50	24	M10
SC25M12S27-HSK63A	●	12.5	23.5	53	27	M12
SC32M16S28-HSK63A	●	17.0	28.5	54	28	M16

Caution for Use

- Only use the inserts and parts provided by Mitsubishi Materials with this tool.
- Clamp the inserts at a specified torque of only.
- The maximum spindle speeds **RPMX** are shown in Table 1. Ensure that the cutter operates under the maximum spindle speed.
The maximum spindle speeds **RPMX** for safety purposes are determined in accordance with ISO15641
(Milling Cutters for high speed machining—Safety requirements).

Table 1 Max. Spindle Speed RPMX

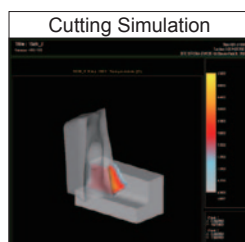
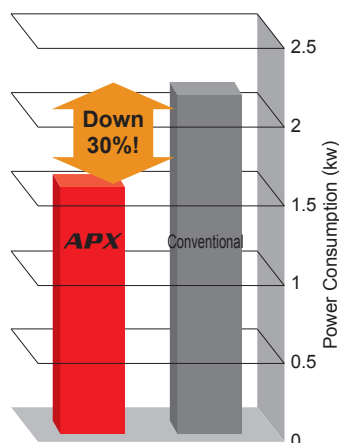
									(mm)
Cutting Edge Diameter DC	ø12	ø14	ø16	ø18	ø20	ø22	ø25	ø28	ø30
Max. Spindle Speed RPMX (min ⁻¹)	—	—	19500	17000	15000	14000	12000	11000	10000

Cutting Edge Diameter DC	ø32	ø35	ø40	ø50	ø63	ø80	ø100	ø125	ø160
Max. Spindle Speed RPMX (min ⁻¹)	9500	9000	7500	6000	5000	3500	3000	2500	1500

It is recommended that flank wear does not exceed 0.3mm.

Cutting Performance

Power Consumption Comparison



<Cutting Conditions>

Work Material : AISI 4140
Tool : APX3000R254SA25SA
Insert : AOMT123608PEER-M
Grade : VP15TF
Cutting Speed : $vc = 160$ m/min
Feed per Tooth : $fz = 0.2$ mm/t.
Width of Cut : $ae = 6$ mm
Depth of Cut : $ap = 9$ mm
Cutting Mode : Single Insert

Wall Surface Accuracy

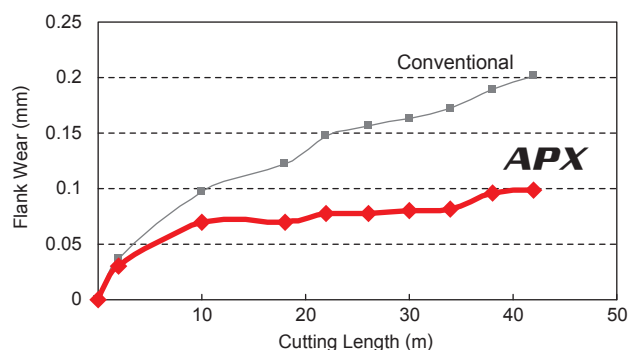
High wall accuracy can be produced by this body and unique insert geometry.

<Cutting Conditions>

Work Material : AISI 4140
Tool : APX3000R253SA25SA
Insert : AOMT123608PEER-M
Grade : VP15TF
Cutting Speed : $vc = 160$ m/min
Feed per Tooth : $fz = 0.15$ mm/t.
Width of Cut : $ae = 2$ mm
Depth of Cut : $ap = 6$ mm



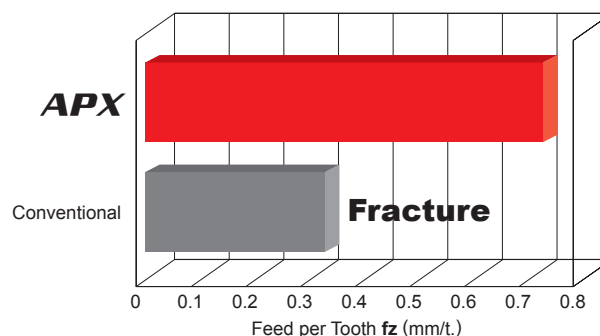
Wear Resistance



<Cutting Conditions>

Work Material : AISI 4140
Tool : APX3000R253SA25SA
Insert : AOMT123608PEER-M
Grade : VP15TF
Cutting Speed : $vc = 200$ m/min
Feed per Tooth : $fz = 0.2$ mm/t.
Width of Cut : $ae = 3$ mm
Depth of Cut : $ap = 5$ mm
Cutting Mode : Air Blow

Fracture Resistance



<Cutting Conditions>

Work Material : AISI 1055
Tool : APX3000R253SA25SA
Insert : AOMT123608PEER-M
Grade : VP15TF
Cutting Speed : $vc = 160$ m/min
Width of Cut : $ae = 5$ mm
Depth of Cut : $ap = 5$ mm
Cutting Mode : Air Blow

Cutting Performance

Application Examples in Ti-6Al-4V

Achieved a longer and more stable tool life due to excellent resistance to chipping.

MP9130



Cutting Length 1.2m

Conventional



Cutting Length 0.75m

<Cutting Conditions>

Tool : APX3000R323SA32SA
Insert : AOMT123608PEER-M
Grade : MP9130
Cutting Speed : $vc = 60 \text{ m/min}$
Feed per Tooth : $fz = 0.1 \text{ mm/t.}$
Width of Cut : $ae = 8 \text{ mm}$
Depth of Cut : $ap = 8 \text{ mm}$
Cutting Mode : Wet Cutting

Application Examples in Inconel718

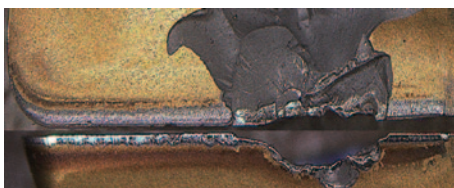
Superior wear and chipping resistance.

MP9130



Cutting Length 1.5m

Conventional



Cutting Length 1.2m

<Cutting Conditions>

Tool : APX3000R324SA32SA
Insert : AOMT123608PEER-M
Grade : MP9130
Cutting Speed : $vc = 30 \text{ m/min}$
Feed per Tooth : $fz = 0.15 \text{ mm/t.}$
Width of Cut : $ae = 8 \text{ mm}$
Depth of Cut : $ap = 5 \text{ mm}$
Cutting Mode : Wet Cutting

Application Examples in AISI 1055

Excellent wear resistance!

MP6120



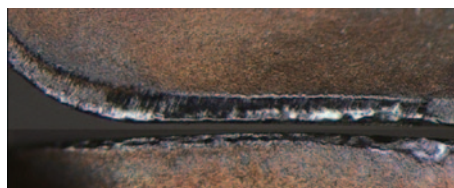
Cutting Length 28m
Can Continue Machining Up to 46m

Conventional A



Cutting Length 28m

Conventional B

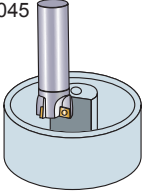
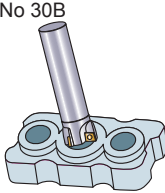
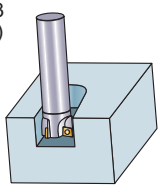
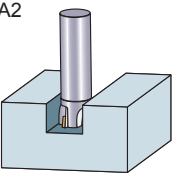


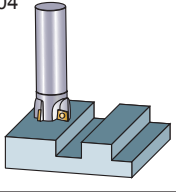
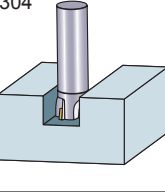
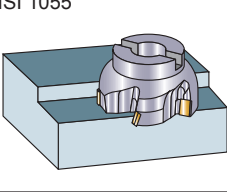
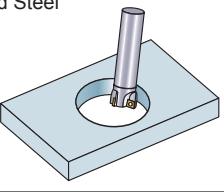
Cutting Length 15m

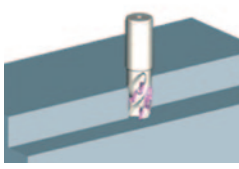
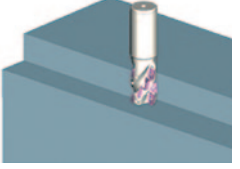
<Cutting Conditions>

Tool : APX3000R324SA32SA
Insert : AOMT123608PEER-M
Grade : MP6120
Cutting Speed : $vc = 200 \text{ m/min}$
Feed per Tooth : $fz = 0.1 \text{ mm/t.}$
Width of Cut : $ae = 2 \text{ mm}$
Depth of Cut : $ap = 2 \text{ mm}$
Cutting Mode : Dry Cutting

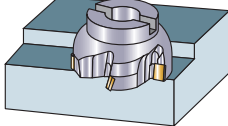
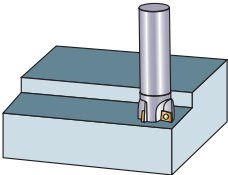
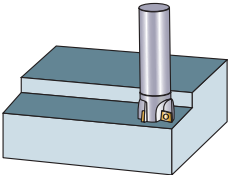
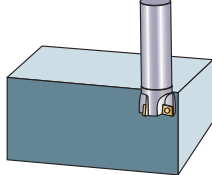
Application Examples

Tool		APX3000R162SA16SA	APX3000R405SA32SA	APX3000R254SA25SA	APX3000R203SA20SA
Insert (Grade)		AOMT123616PEER-M(VP15TF)	AOMT123608PEER-M(VP15TF)	AOMT123608PEER-M(VP15TF)	AOMT123608PEER-H(VP15TF)
Workpiece		AISI 1045 	AISI No 30B 	AISI H13 (45HRC) 	AISI A2 
Cutting Conditions	Cutting Speed vc (m/min)	150	150	150	244
	Feed per Tooth fz (mm/t.)	0.05	0.05	0.12	0.13
	Depth of Cut (mm)	ap=1.5, ae=1.5	ap=5, ae=30	ap=3, ae=10–25	ap=3, ae=20
Cutting Mode		Wet Cutting	Dry Cutting	Dry Cutting	Wet Cutting
Machine		Vertical MC(BT30)	Vertical MC(BT50)	Vertical MC(BT50)	Vertical MC(BT50)
Result		Lower cutting noise and double tool life compared to a conventional products.	Reduced cutting noise, better surface finish and double the tool life compared to a conventional product.	Improved cutting performance and lower cutting resistance.	Tool life has been improved by 30% compared to a conventional product.

Tool		APX3000R325SA32SA	APX3000R325SA32SA	APX4000R08007CA	APX4000R404SA32SA
Insert (Grade)		AOMT123608PEER-M(VP20RT)	AOMT123608PEER-H(VP20RT)	AOMT184808PEER-M(VP15TF)	AOMT184808PEER-M(VP15TF)
Workpiece		AISI 304 	AISI 304 	AISI 1055 	Mild Steel 
Cutting Conditions	Cutting Speed vc (m/min)	130	160	165	190
	Feed per Tooth fz (mm/t.)	0.2	0.06	0.15	0.25
	Depth of Cut (mm)	ap=0.25, ae=28	ap=2, ae=25	ap=3, ae=50	ap=10, ae=5
Cutting Mode		Wet Cutting	Wet Cutting	Wet Cutting	Wet Cutting
Machine		Horizontal MC(BT50)	Vertical MC(BT50)	Horizontal MC(BT50)	Horizontal MC(BT50)
Result		Lower cutting resistance enabled stable machining even at 6 times higher cutting conditions. 12 times longer tool life.	Double tool life compared to a conventional product.	Better cutting performance and lower cutting resistance compared to a conventional product.	Cutting resistance is lower than the conventional product, thus allowing a stable machining performance.

Tool		APX4K-050A09A042RA	APX4K-050A09A042RA	APX4KR4012SA42S056A	APX4KR4012SA42S056A
Insert (Grade)	Bottom	AOMT184832PEER-H(VP20RT)	AOMT184832PEER-H(VP20RT)	AOMT184832PEER-H(VP20RT)	AOMT184832PEER-H(VP20RT)
	Peripheral	AOMT184808PEER-H(VP20RT)	AOMT184808PEER-H(VP20RT)	AOMT184808PEER-H(VP20RT)	AOMT184808PEER-H(VP20RT)
Workpiece		Titanium Alloy 	Stainless Steel 	Gray Cast Iron 	Alloy Steel 
Cutting Conditions	Cutting Speed vc (m/min)	35	80	125	100
	Feed per Tooth fz (mm/t.)	0.08	0.1	0.3	0.25
	Depth of Cut (mm)	ap=12–40, ae=10–15	ap=35, ae=35	ap=52, ae=8	ap=45, ae=5
Cutting Mode		Wet Cutting	Wet Cutting	Dry Cutting	Dry Cutting
Machine		Vertical MC(BT50)	Vertical MC(BT50)	Vertical MC(BT50)	Horizontal MC(BT50)
Result		Triple tool life compared to a conventional tool.	2.5 times machining efficiency compared to a conventional tool by shortening cycle times.	Triple efficiency compared to a conventional tool.	For stable, deep shoulder milling without vibration.

The above application examples are customer's applications, so it can be different from the recommended conditions.

Tool		APX3000-040A06RA	APX3000R203SA20SA	APX3000R254SA25SA	APX3000R254SA25SA
Insert (Grade)		AOMT123608PEER-M(MP9130)	AOMT123608PEER-M(MP7130)	AOMT123608PEER-M(MP7130)	AOMT123616PEER-M(MP6130)
Workpiece		WASPALOY 	AISI 420 	AISI 304 	AISI 4137 
Cutting Conditions	Cutting Speed vc (m/min)	30	122	140	200
	Feed per Tooth fz (mm/t.)	0.033	0.1	0.1	0.12
	Depth of Cut (mm)	ap=1.4, ae=16	ap=2.54, ae=5.08	ap=2, ae=25	ap=2.5
Cutting Mode		Wet Cutting	Dry Cutting	Dry Cutting	Dry Cutting
Result		Double tool life compared to conventional products which enabled to cut continuously without interruption.	Actual cutting time has been nearly doubled compared to conventional products.	Tool life has been improved by 25% compared to conventional products because of the superior fracture resistance.	1.5 times longer tool life provided 140% processing efficiency.

The above application examples are customer's applications, so it can be different from the recommended conditions.

For Your Safety

●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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