



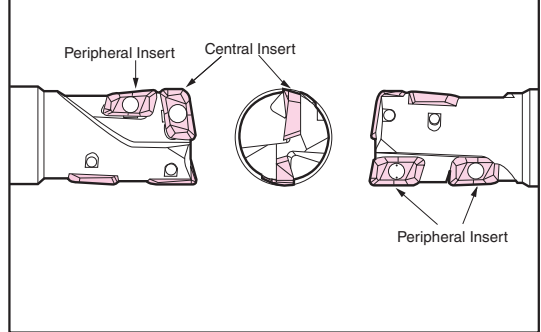
■ **General Features**

A single WaveMill performs a variety of operations such as grooving, shoulder milling, ramping, pocketing, drilling, helical cutting, etc., and eliminate the need to stock a variety of application specific tools.

■ **Characteristics and Applications**

- Multi-functional cutter efficiently performs a number of cutting operations
- Excellent for ramping, helical cutting and pocketing
- Uses standard inserts interchangeable with those used on other WaveMill cutters
- Strong high rake insert gives smooth cutting
- Easy to manage with one style of insert
- Best suited for Stainless Steel machining

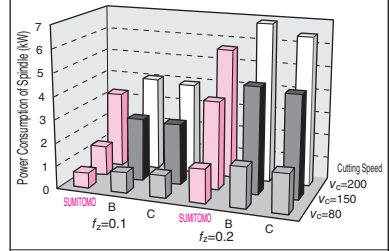
● **Insert Orientation of WMM Type Cutter**



■ **Product Range**

Type	Description	Diameter (mm)		
		ø20	ø30	ø40
2000E	Standard Type	20	30	
2000EL	Long Type	20	30	
2000ELH	Long Type w / Oil Hole	20	30	
2000EXLH	Extra-Long Type w / Oil Hole	22	30	
3000E	Standard Type		32	40
3000EL	Long Type		32	40
3000ELH	Long Type w / Oil Hole		32	40
3000EXLH	Extra-Long Type w / Oil Hole		35	40

● **Performance Comparison (Groove Milling)**

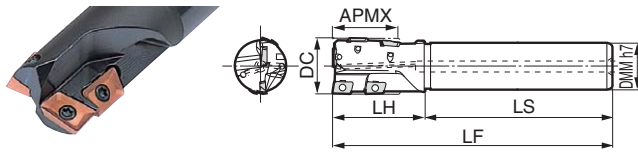


Cutting Diameter: Work Material: S50C
Cutting Conditions: $v_c=80, 150, 200$ m/min, $f_z=0.1, 0.2$ mm/rev
 $a_p=15$ mm, Overhanging Length of Tool=40 mm

■ **Application Examples Tool: WMM2025E**

<p>● Shoulder Milling</p> <p>SUS304</p> <p>Cutting of stainless steel tool!</p> <p>Cutting Diameter: ø25 Insert: APMT103504PDER(ACZ350) D.O.C.: $a_p=25$ mm, $a_d=5$ mm Cutting Speed: $v_c=120$ m/min, Feed Rate: $f_z=0.15$ mm/rev Air Blow</p>	<p>● Grooving</p> <p>FC250</p> <p>Deep grooving can be performed easily. Easy chip removal</p> <p>Cutting Diameter: ø25 Insert: APMT103504PDER(ACZ310) D.O.C.: $a_p=15$ mm, $a_d=25$ mm Cutting Speed: $v_c=180$ m/min, Feed Rate: $f_z=0.12$ mm/rev Air Blow</p>	<p>● Taper Milling</p> <p>S50C Block Material</p> <p>Capable of tapered recess cutting of a prepared hole</p> <p>Cutting Diameter: ø25 Insert: APMT103504PDER(ACZ350) Cutting Width: $a_d=25$ mm, Depth: $a_p=15$ mm Cutting Speed: $v_c=200$ m/min, Feed Rate: $f_z=0.1$ mm/rev Flank Angle: $P=15^\circ$ Air Blow</p>
<p>● Pocketing</p> <p>S50C Block Material</p> <p>Capable of pocketing with continuous lateral feed from initial drilling or taper milling process</p> <p>Cutting Diameter: ø25 Insert: APMT103504PDER(ACZ350) The following process was done in succession from a deep drilling process of 15mm depth. D.O.C.: $a_p=25$ mm, $a_d=15$ mm Cutting Speed: $v_c=200$ m/min, Feed Rate: $f_z=0.1$ mm/rev Air Blow</p>	<p>● Drilling</p> <p>S50C Block Material</p> <p>Capable of easy chip removal and drilling without tool damage</p> <p>Cutting Diameter: ø25 Insert: APMT103504PDER(ACZ350) Hole Size: ø25 mm, Depth: $a_p=15$ mm Cutting Speed: $v_c=200$ m/min, Feed Rate: $f=0.1$ mm/rev Step-Feed: 0.5 mm Air Blow</p>	<p>● Helical Milling</p> <p>S50C Block Material</p> <p>Capable of large boring in diameter of 1.2-1.8 times the cutter diameter without prepared hole</p> <p>Cutting Diameter: ø25 Insert: APMT103504PDER(ACZ350) Hole Size: ø40 mm, Depth: $a_p=20$ mm Cutting Speed: $v_c=300$ m/min, Feed Rate: $f=0.1$ mm/rev Axial Feed: 15 mm/Pitch Air Blow</p>

WMM 2000^{E/EL}_{ELH/EXLH} Type



Body (Standard Type / WMM 2000E Type) Dimensions (mm)

Cat. No.	Stock	Diameter DC	Shank DMM	Max. Depth of Cut APMX	Head Length LH	Shank Length LS	Total Length LF	Total Teeth	Effective Teeth
WMM 2020E	●	20	20	17	35	95	130	3	1
2021E	●	21	20	17	35	95	130	3	1
2025E	●	25	25	26	40	100	140	4	1
2026E	●	26	25	26	40	100	140	4	1
2030E	●	30	25	35	50	100	150	5	1

(Long Type)

WMM 2020EL	●	20	20	17	60	125	185	3	1
2021EL	●	21	20	17	35	150	185	3	1
2025EL	●	25	25	26	75	145	220	4	1
2026EL	●	26	25	26	40	180	220	4	1
2030EL	●	30	25	35	50	180	230	5	1

(Long Type with Coolant Hole)

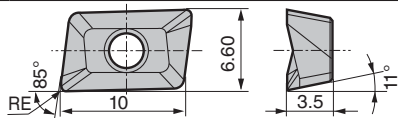
WMM 2020ELH	●	20	20	17	60	125	185	3	1
2021ELH	●	21	20	17	35	150	185	3	1
2025ELH	●	25	25	26	75	145	220	4	1
2026ELH	●	26	25	26	40	180	220	4	1
2030ELH	●	30	25	35	50	180	230	5	1

(Extra Long Type with Coolant Hole)

WMM 2022EXLH	●	22	20	17	35	215	250	3	1
2027EXLH	●	27	25	26	40	280	320	4	1
2030EXLH	●	30	25	35	50	300	350	5	1

Inserts are not included.

Inserts **P** Steel **M** Stainless Steel **K** Cast Iron **N** Non-Ferrous Metal **S** Exotic Alloy **H** Hardened Steel



Application	Grade		Coated Carbide		Carbide DLC	
	High Speed/Light	General Purpose	M	P	K	N
Roughing						
Cat. No.	ACZ350	ACZ330	ACZ310	H1	DL1000	Corner Radius RE
APMT 103504PDER	●	●	●	—	—	0.4
103508PDER	●	●	●	—	—	0.8
103512PDER	●	●	●	—	—	1.2
APMT 103504PDER-H	●	●	●	—	—	0.4
103508PDER-H	●	●	●	—	—	0.8
103512PDER-H	●	●	●	—	—	1.2
APET 103504PDER-F	●	●	●	—	—	0.4
APET 103504PDER-S	—	—	—	●	●	0.4

-H: Strong Edge Type, F: Ground Insert, S: For Aluminum Alloy

Parts (Common)

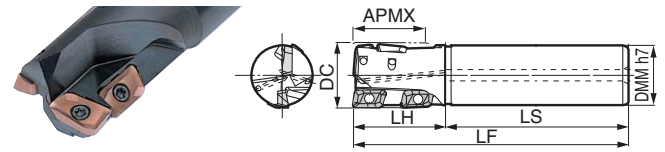
Screw	Wrench	Anti-seizure Cream	Applicable Endmill
BFTX02506N τ_{max} 1.5	TRD08	SUMI-P	WMM2000 Type
BFTX03584 τ_{max} 3.0	TRD15		WMM3000 Type

τ_{max} Recommended Tightening Torque (N·m)

Recommended Cutting Conditions (Common) Diameter ϕ 20 to ϕ 26mm (Not for extra long type)

ISO	Work Material	Hardness	Cutting Speed v_c (m/min) Min. - Optimum - Max.	Feed Rate f_z (mm/t) Min. - Optimum - Max.	Grade
P	Carbon Steel	180 to 280HB	80-120-160	Shoulder Milling	0.05-0.13-0.20
				Grooving	0.05-0.09-0.12
				Drilling	0.05-0.12-0.18
M	Stainless Steel	—	80-100-120	Shoulder Milling	0.05-0.10-0.15
				Grooving	0.05-0.08-0.10
				Drilling	0.05-0.09-0.12
K	Cast Iron	250HB	70-150-180	Shoulder Milling	0.05-0.13-0.20
				Grooving	0.05-0.09-0.12
				Drilling	0.05-0.12-0.18
N	Non-Ferrous Metal	—	200-300-500	Shoulder Milling	0.10-0.15-0.20
				Grooving	0.05-0.08-0.10
				Drilling	0.05-0.08-0.10

WMM 3000^{E/EL}_{ELH/EXLH} Type



Body (Standard Type / WMM 3000E Type) Dimensions (mm)

Cat. No.	Stock	Diameter DC	Shank DMM	Max. Depth of Cut APMX	Head Length LH	Shank Length LS	Total Length LF	Total Teeth	Effective Teeth
WMM 3032E	●	32	32	39	50	100	150	4	1
3033E	●	33	32	39	50	100	150	4	1
3035E	●	35	32	39	50	100	150	4	1
3040E	●	40	32	39	55	105	160	4	1

(Long Type)

WMM 3032EL	●	32	32	39	90	140	230	4	1
3033EL	●	33	32	39	50	180	230	4	1
3035EL	●	35	32	39	50	180	230	4	1
3040EL	●	40	32	39	55	185	240	4	1

(Long Type with Coolant Hole)

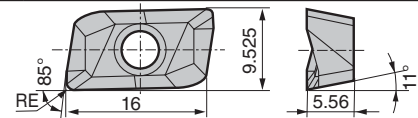
WMM 3032ELH	●	32	32	39	90	140	230	4	1
3033ELH	●	33	32	39	50	180	230	4	1
3035ELH	●	35	32	39	50	180	230	4	1
3040ELH	●	40	32	39	55	185	240	4	1

(Extra Long Type with Coolant Hole)

WMM 3035EXLH	●	35	32	39	50	320	370	4	1
3040EXLH	●	40	32	39	55	365	420	4	1

Inserts are not included.

Inserts **P** Steel **M** Stainless Steel **K** Cast Iron **N** Non-Ferrous Metal **S** Exotic Alloy **H** Hardened Steel



Application	Grade		Coated Carbide		Carbide DLC	
	High Speed/Light	General Purpose	M	P	K	N
Roughing						
Cat. No.	ACZ350	ACZ330	ACZ310	H1	DL1000	Corner Radius RE
APMT 160508PDER	●	●	●	—	—	0.8
160512PDER	●	●	●	—	—	1.2
160516PDER	●	●	●	—	—	1.6
APMT 160508PDER-H	●	●	●	—	—	0.8
160512PDER-H	●	●	●	—	—	1.2
160516PDER-H	●	●	●	—	—	1.6
160520PDER-H*	●	●	●	—	—	2.0
160530PDER-H*	●	●	●	—	—	3.0
160540PDER-H*	●	●	●	—	—	4.0
160550PDER-H*	●	●	●	—	—	5.0
160560PDER-H*	●	●	●	—	—	6.0
APET 160508PDER-F	●	●	●	—	—	0.8
APET 160508PDER-S	—	—	—	●	●	0.8

-H: Strong Edge Type, F: Ground Insert, S: For Aluminum Alloy

* Cutter body modification is required.

* Correct the tool diameter by +0.5mm before use.

Recommended Cutting Conditions (Common) Diameter ϕ 30 to ϕ 40mm (Not for extra long type)

ISO	Work Material	Hardness	Cutting Speed v_c (m/min) Min. - Optimum - Max.	Feed Rate f_z (mm/t) Min. - Optimum - Max.	Grade
P	Carbon Steel	180 to 280HB	80-120-160	Shoulder Milling	0.05-0.15-0.25
				Grooving	0.05-0.10-0.15
				Drilling	0.05-0.13-0.20
M	Stainless Steel	—	80-100-120	Shoulder Milling	0.05-0.13-0.20
				Grooving	0.05-0.09-0.12
				Drilling	0.05-0.12-0.18
K	Cast Iron	250HB	70-150-180	Shoulder Milling	0.05-0.15-0.25
				Grooving	0.05-0.10-0.15
				Drilling	0.05-0.13-0.20
N	Non-Ferrous Metal	—	200-300-500	Shoulder Milling	0.10-0.15-0.20
				Grooving	0.05-0.08-0.10
				Drilling	0.05-0.08-0.10

Note The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, cutting depth, and other factors.