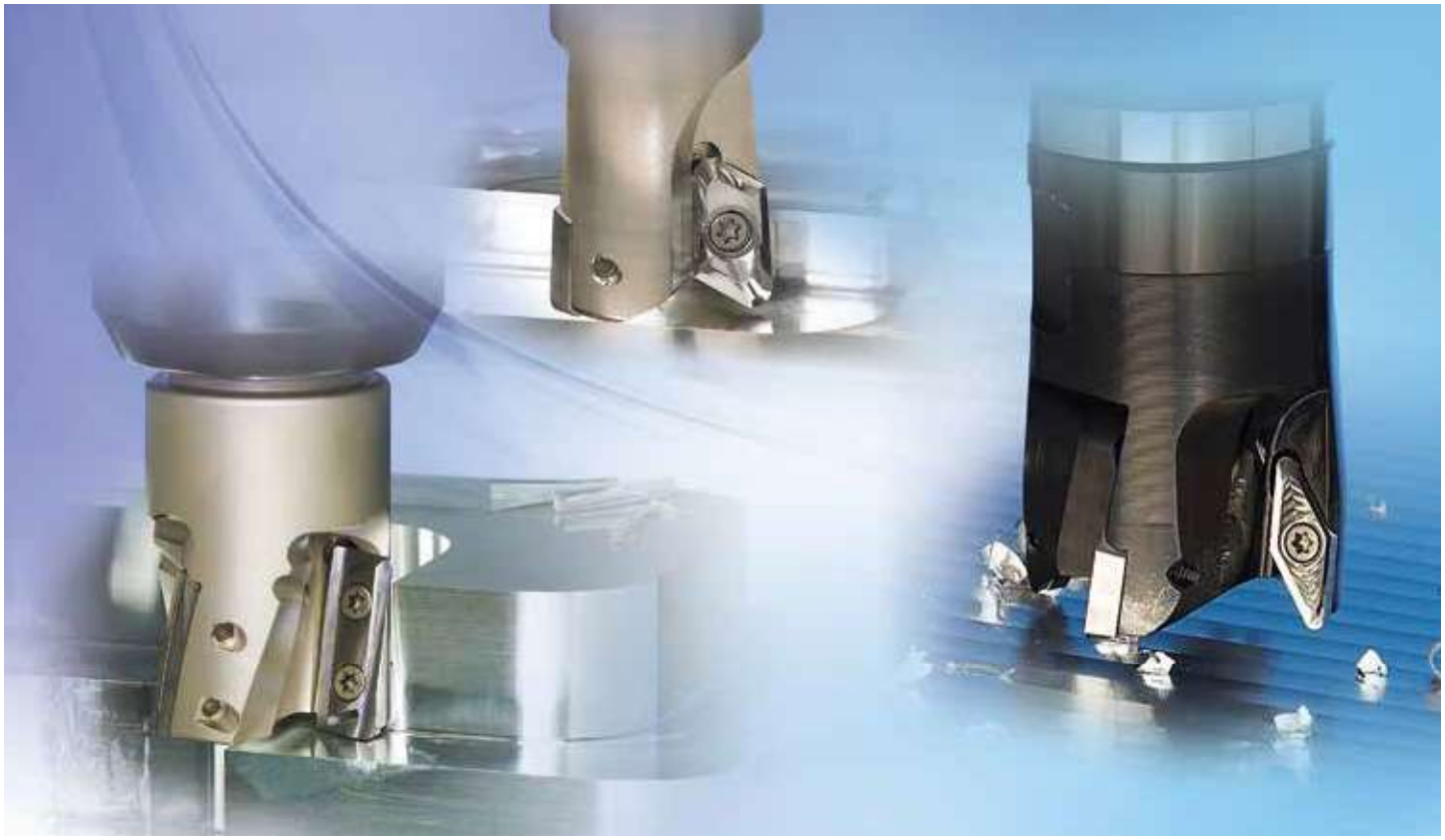
KORLOY
TECH-NEWS

Milling Tool Series for Aluminum

Pro-A/X/L Mill Series

Milling Tool Series for High Quality Aluminum Machining

- **Pro-A Mill**
  Insert top face buffed for good chip control and reduced built-up edge
- **Pro-X Mill**
  Strong clamping due to the concave design of insert bottom
- **Pro-L Mill**
  New indexable milling tool for high quality machining



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CONTENTS

Pro-A / Pro-X / Pro-L Mill Series for Aluminum Milling

Pro-A Mill

Pro-X Mill

Pro-L Mill

Aluminum is the third most abundant element in the Earth's crust, and is remarkable for its light weight and ability to resist corrosion. Its hardness is relatively low and not applicable for use for machinery parts. Many other compounds are therefore mixed to form an alloy with Al. The most commonly used additives are Si, Cu, Mg, Ni, Mn, and others in order to make aluminum harder or stickier according to the necessity.

These ductile metals tend to cause built-up edges and poor chip control during machining. Once these problems start, the workpiece surface can be seriously damaged. This is the main contributing factor to deteriorating tool life. KORLOY understands this problem and has launched a new aluminum milling lineup, **Pro-A / Pro-X / Pro-L Mill**, which help reduce or eliminate these problems.

KORLOY milling tool series for aluminum, the Pro-A / Pro-X / Pro-L Mill inserts have a buffed top face to achieve a mirror finish and avoid any chip sticking even at the high temperatures produced by aluminum cutting. Similarly, high rake cutting edges were engineered for better chip low and low cutting resistance, which significantly extend tool life and produce amazing surface finishes.

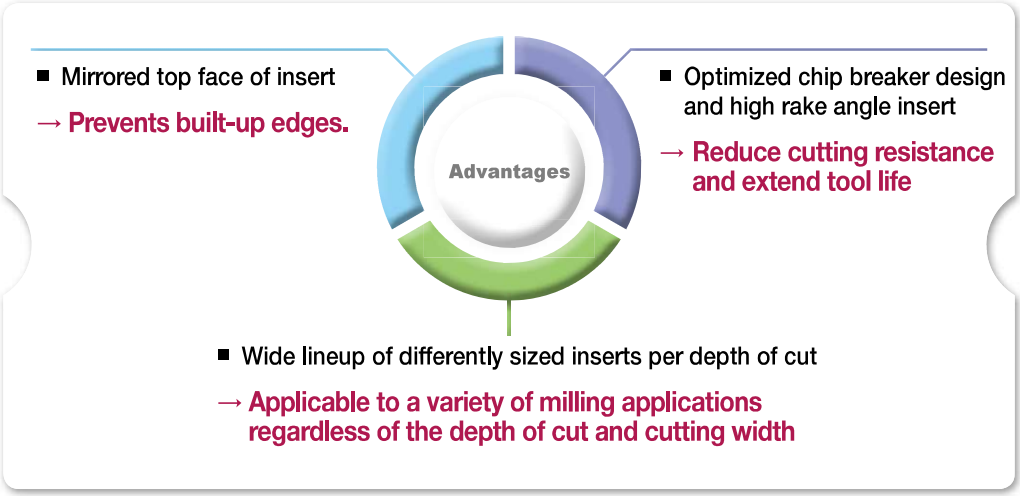
The Series is made up of Pro-A Mill for small diameters and low depths of cut, Pro-X Mill for general purpose, and Pro-L Mill for high depths of cut. The Pro-A / Pro-X / Pro-L Mill Series was designed to serve as a total solution for all aluminum milling operations, ranging from small and thin to wide and deep applications.

The Pro-A Mill is especially useful for small and deep milling because of V type insert with its high rake angle cutting edges and wide chip pockets. The Pro-A shows excellent performance in multi-purpose milling, notably in copy milling.

The Pro-X Mill features a concave shape on the insert bottom, which functions as a stopper to prevent the inserts from being dispersed. The high rake angle Pro-X Mill inserts were specially designed for general aluminum milling applications, with insert depth of cut variations of max. ap=17mm and 23mm.

The Pro-L Mill takes advantage of long type inserts with 2 insert screws for secure deep milling, up to max. ap=25mm / 34mm. A set of differently sized inserts significantly increases accuracy to the degree of solid carbide end mills. The Pro-L Mill produces excellent results in high quality aluminum milling.

KORLOY's Pro-A / Pro-X / Pro-L Mill Series is the best choice for solving unstable tool life problems associated with built-up edge and poor chip control when machining many Aluminum compounds.

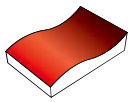
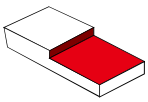
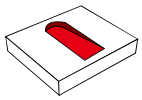


Pro-A Mill

Insert Top Face Buffed for Good Chip Control and Reduced Built-up Edge

- Buffed top face of insert ensures good chip control and reduces built-up edge
- Small size modular type for aluminum machining
- Various line up of modular system for aluminum machining
- For shouldering, curved surface and ramping
- High rake angle chip breakers ensure excellent surface roughness, and improved cooling and chip control by the through coolant system, even in deep pocket machining

Available Milling Applications

Copying	Shouldering	Ramping	Through coolant system
			

Pro-A Mill Series

- Application of small-sized Aluminum machining
- General application of Aluminum machining

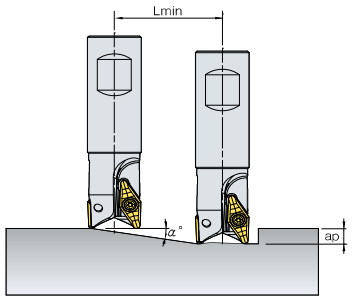
Series	Pro-A mill		Through Coolant System
Pro-A 2000		• Modular Ø12 - Ø42 • Shank Ø12 - Ø42 • Insert VDKT11T210N-MA VDKT11T220N-MA	○
Pro-A 4000		• Cutter Ø40 - Ø100 • Shank Ø32 - Ø40 • Insert VCKT220530N-MA	○

Recommended cutting condition

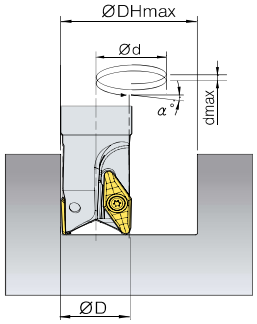
Workpiece		Cutting speed vc(m/min)
Aluminum alloy	Rm < 280 MPa	1000
	Rm > 280 MPa	800
Copper alloy	Long chip	250
Thermo plastic	-	300
Aluminum alloy	Si < 12%	800
Copper alloy	Short chip	400
Magnesium alloy	-	400
Duroplastics	-	150

Pro-A Mill Ramping & Helical Cutting Technical Data

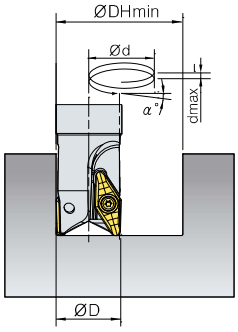
1. Ramping



2. Blind hole helical cutting



3. Through hole helical cutting



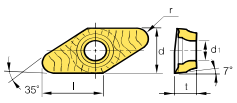
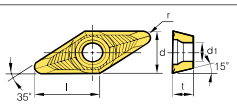
(mm)

Designation	ØD(mm)	Ramping		Blind hole Helical cutting				Through hole Helical cutting	
		α°(max)	Lmin(mm)	ØDHmax(mm)	dmax(mm)	ØDHmin(mm)	dmax(mm)	ØDHmin(mm)	dmax(mm)
PAS2012HR	12	11.9	38	23	4.8	21	4.4	19	4.0
PAS2016HR	16	12.5	36	31	6.9	29	6.4	27	6.0
PAS2020HR	20	9.7	47	39	6.7	37	6.3	35	6.0
PAS2025HR	25	7.6	60	49	6.5	47	6.3	45	6.0
PAS2032HR	32	5.8	79	63	6.4	61	6.2	59	6.0
PAS2042HR	42	4.3	105	83	6.3	81	6.2	79	6.0
PAS4032HR	32	24.4	22	59	26.8	54	24.5	40	18.2
PAS4040HR	40	18.4	30	75	25.0	70	23.3	56	18.7
PAS4050HR	50	14.0	40	95	23.8	90	22.5	76	19.0
PAS4063HR	63	10.7	53	121	22.8	116	21.9	102	19.2
PACM4080HR	80	8.1	70	155	22.1	150	21.4	136	19.4
PACM4100HR	100	6.3	90	195	21.7	190	21.1	176	19.6

- Lmin: when ap=8mm
- Lmin: Minimum inclination cutting length
  α°: Max. rampig angle
  ap: Depth of cut

$$Lmin = \frac{ap}{\tan \alpha^{\circ}} \text{ (mm)}$$

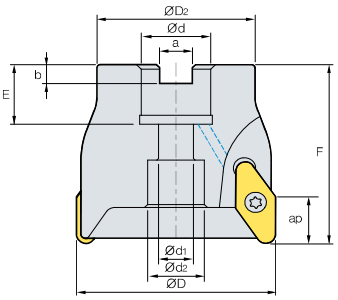
Inserts

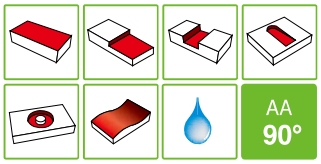
Insert shape	Designation		Stock			Dimensions (mm)					Geometries
			H01	ND2000	PD2000	l	d	t	r	d1	
	VCCT	220530N-MA	▲			15.60	12.7	5.56	3	5.60	
	VCKT	220530N-MA	▲		O	15.60	12.7	5.56	3	5.60	
	VDKT	11T210N-MA	▲	O	O	8.80	6.35	2.87	1	2.80	
		11T220N-MA*	▲		O	6.70	6.35	2.87	2	2.80	

* Requires special holders PAS2016HR-R2.0 / PAS2020HR-R2.0

▲: Available in Europe ●: Available in Korea O: Order-made item

PACM4000





· AR: 0°
· RR: -3°

(mm)

Designation		Stock		ØD	ØD2	Ød	Ød1	Ød2	a	b	E	F	ap	kg
PACM	4040HR	▲	3	40	32	16	9	11.50	8.40	5.60	20	55	15	0.20
	4050HR	▲	3	50	40	22	11	18	10.40	6.30	20	55	15	0.30
	4063HR	▲	4	63	50	22	11	18	10.40	6.30	20	60	15	0.60
	4080HR	▲	4	80	60	27	14	20	12.40	7	25	60	15	1
	4100HR	▲	5	100	80	32	18	26	14.40	8	26	60	15	1.60

▲: Available in Europe ●: Available in Korea O: Order-made item

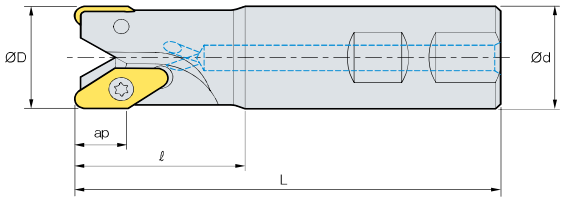
Inserts

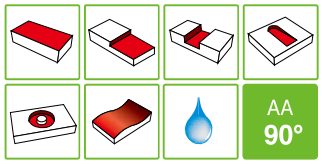
VCKT-MA

Parts

Specification	Screw	Wrench
Ø40 - Ø100	FTNC04509 (Ø40) FTNC04511	TW20S

PAS2000 / 4000





· AR: 0° - 7°
· RR: -21° - -3°

(mm)

Designation		Stock		ØD	Ød	ℓ	L	ap	kg
PAS	2012HR	▲	1	12	16	25	85	8	0.1
	2016HR	▲	2	16	16	25	90	8	0.11
	2020HR	▲	2	20	20	30	100	8	0.2
	2025HR	▲	3	25	25	35	115	8	0.36
	2032HR	▲	4	32	32	40	125	8	0.66
	2042HR	○	5	42	32	42	130	8	0.84
	4032HR	▲	2	32	32	50	125	15	0.6
	4040HR	▲	3	40	32	50	140	15	0.8
	4040HR-S40	▲	3	40	40	60	150	15	1.2

▲: Available in Europe ●: Available in Korea ○: Order-made item

Inserts

VDKT-MA

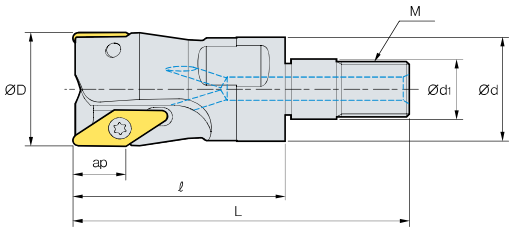
VCKT-MA

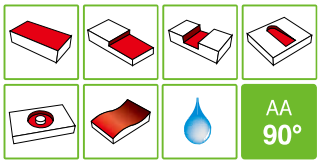
Parts

Specification	Screw	Wrench
Ø12 - Ø42	ETNA02505*	TS07S
	ETNA02506	
Ø32 - Ø40	FTNC04509	TW20S

* PAM 2012 · 2016

PAM2000





- AR: 7° - 10°
- RR: -21° - -9°

(mm)

Designation		Stock		ØD	Ød	Ød1	ℓ	L	M	ap	kg
PAM	2012HR-M06	▲	1	12	11.0	6.5	33	48	M6	8	0.02
	2016HR-M08	▲	2	16	14.5	8.5	36	53	M8	8	0.04
	2020HR-M10	▲	2	20	18.0	10.5	36	57	M10	8	0.06
	2025HR-M12	▲	3	25	22.5	12.5	41	65	M12	8	0.1
	2032HR-M16	▲	4	32	28.5	17.0	45	72	M16	8	0.18
	2042HR-M16	▲	5	42	28.5	17.0	45	72	M16	8	0.27

▲: Available in Europe ●: Available in Korea ○: Order-made item

Inserts

VDKT-MA

Available Adaptors

Designation		Available Adaptor
PAM	2012HR-M06	MAT - M06
	2016HR-M08	MAT - M08
	2020HR-M10	MAT - M10
	2025HR-M12	MAT - M12
	2032HR-M16	MAT - M16
	2042HR-M16	MAT - M16

Designation: PAM2012HR-M06
Modular Head Threading Measure size(M06)

II

Adaptor Spec.: MAT-M06-030-S20S
Adaptor Threading Measure(M06)

Parts

Specification	Screw	Wrench
Ø12 - Ø42	ETNA02505*	TW07S
	ETNA02506	

* PAM 2012 · 2016

Pro-X Mill

Strong Clamping due to the Concave Design of Insert Bottom

- Strong clamping from the concave design of the insert bottom
- Good chip flow and reduced built-up edge achieved by the insert's buffed surface
- High rake angle of insert provides good surface finish and low cutting load
- Specially designed for high speed machining of aluminum
- Suitable for square shouldering and curved surface machining

Code System

[Cutter / Shank type]

PAX	C	M	6	063	H	R	-	A
Pro-X Mill series	Tool type C: Cutter S: Shank M: Modular	Arbor type M: Metric	Insert I/C	Tool diameter ISO: mm	Coolant type H: Through-hole Unmarked: No through-hole	Hand of tool R: Right L: Left		Nose R A: 0.4 - 3.2 B: 4.0 - 5.0

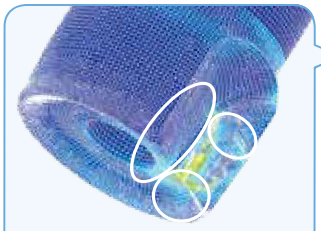
[Modular type]

PAX	M	M	6	050	H	R	-	A	-	M16
Pro-X Mill series	Tool type M: Modular	Arbor type M: Metric	Insert I/C	Tool diameter ISO: mm	Coolant type H: Through-hole Unmarked: No through-hole	Hand of tool R: Right L: Left		Nose R A: 0.4 - 3.2 B: 4.0 - 5.0		Screw Size

[Modular Adaptors]

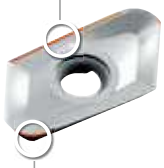
MAT	M08	080	S16	S	C	[150]
Modular Adaptor	Scew Size	Neck Length	Shank dia(ø)	Neck Shape S: Straight T: Taper	Shank Material S: Steel C: Carbide	Shank Length

Clamping System for High Speed

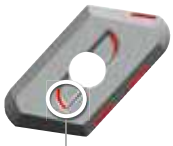


- Clamping design as per FEM analysis
- Strong clamping of insert

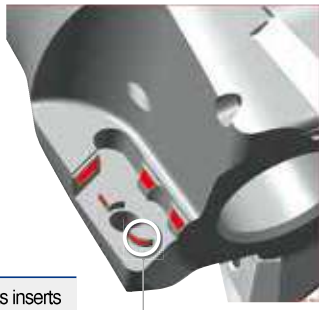
3 dimensional chip breaker design for low cutting load



Various insert corner radius are available (R0.4 - R5.0)



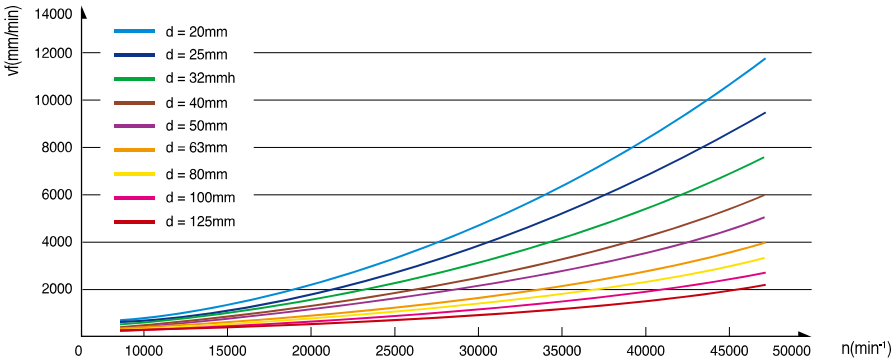
Special design for strong clamping that prevents inserts from being dispersed in high speed machining



Centrifugal Force as per RPM

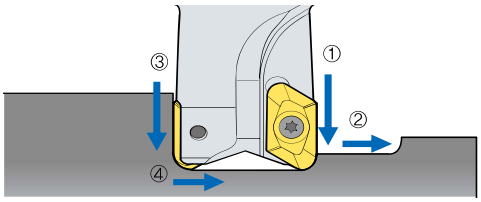
[Marking]

- Designation
- Max. RPM



※ Screw Torque = 4N•m ※ Indexable insert: 6.8g

Plunging, Slotting, Drilling Technical Data



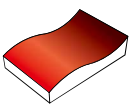
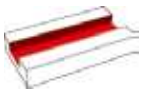
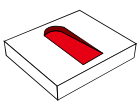
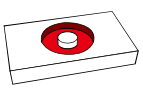
1. When drilling or grooving, follow the machining sequence in the pic.
   ① → ② → ③ → ④
2. When drilling or grooving, decrease the feed and cutting speed 30% - 50% from the recommended data

• Cutting Condition for Drilling

Holder	ap(mm)	
	5000 Type	6000 Type
Ø20	8	-
Ø25	4	11
Ø32	4	6
Ø40 - 125	4	6

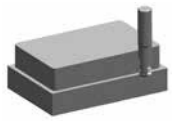
Insert	ap(mm)
XETK19	4
XETK25	6

Available Milling Applications

Copying	Slotting & Shouldering	Ramping	Hellcal Cutting
			

Application Examples

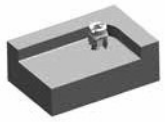
PAXSA5125HR-A



Workpiece	Cutting condition			
	vc(m/min)	fz(mm/t)	ap(mm)	ae(mm)
A6061	1300	0.20	8	16

Chip evacuation and good surface roughness

PAXCA5200HR-A

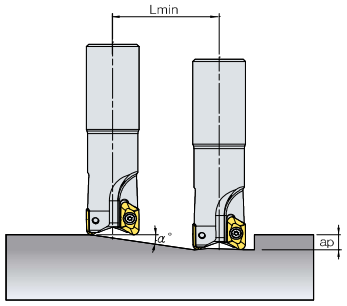


Workpiece	Cutting condition			
	vc(m/min)	fz(mm/t)	ap(mm)	ae(mm)
A6061	1300	0.25	10	25

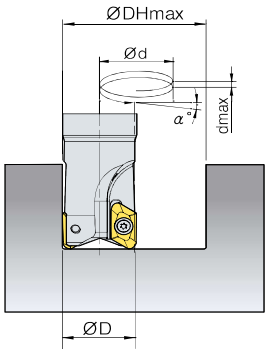
Long tool life and no built-up edge & chipping

Pro-X Mill Ramping & Helical Cutting Technical Data

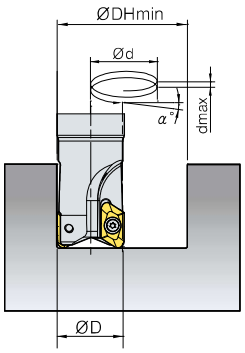
1. Ramping



2. Blind hole helical cutting



3. Through hole helical cutting



(mm)

Designation	ØD(mm)	Ramping		Blind hole Helical cutting				Thrugh hole Helical cutting	
		α°(max)	Lmin(mm)	ØDHmax(mm)	dmax(mm)	ØDHmin(mm)	dmax(mm)	ØDHmin(mm)	dmax(mm)
PAXS5020HR	20	8.4	68	34	5.0	32	4.7	27	4.0
PAXS5025HR	25	13.2	43	44	10.4	42	9.9	34	8.0
PAXS5032HR	32	9.5	60	58	9.7	56	9.3	48	8.0
PAXS5040HR	40	7.1	80	74	9.3	72	9.0	64	8.0
PAXCM5050HR	50	5.4	105	94	9.0	92	8.8	84	8.0
PAXCM5063HR	63	4.2	138	120	8.7	118	8.6	110	8.0
PAXCM5080HR	80	3.2	180	154	8.6	152	8.4	144	8.0
PAXCM5100HR	100	2.5	230	194	8.4	192	8.3	184	8.0
PAXCM5125HR	125	2.0	293	244	8.3	242	8.3	234	8.0
PAXS6025HR	25	9.0	63	44	6.9	42	6.6	38	6.0
PAXS6032HR	32	6.6	87	58	6.7	56	6.5	52	6.0
PAXS6040HR	40	12.1	47	74	15.9	72	15.4	56	12.0
PAXCM6050HR	50	9.0	63	94	14.8	92	14.5	76	12.0
PAXCM6063HR	63	6.7	85	120	14.1	118	13.9	102	12.0
PAXCM6080HR	80	5.0	113	154	13.6	152	13.4	136	12.0
PAXCM6100HR	100	3.9	147	194	13.2	192	13.1	176	12.0
PAXCM6125HR	125	3.0	188	244	13.0	242	12.8	226	12.0

- Lmin: when ap=10mm
- Lmin: Minimum inclination cutting length
  α°: Max. rampig angle
  ap: Depth of cut

$$Lmin = \frac{ap}{\tan \alpha^{\circ}} \text{ (mm)}$$

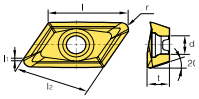
Max. RPM as per Cutting Diameter

Cutting diameter ØD(mm)	5000 type		6000 type	
	n(min-1)	vc(m/min)	n(min-1)	vc(m/min)
20	14,000	940	-	940
25	28,000	2,559	10,000	2,559
32	25,000	2,894	8,900	2,894
40	22,000	3,240	19,000	3,240
50	20,000	3,611	16,000	3,611
63	18,000	4,055	15,000	4,055
80	16,000	4,572	13,000	4,572
100	14,000	5,118	11,000	5,118
125	13,000	5,731	10,000	5,731

Recommended Cutting Conditions

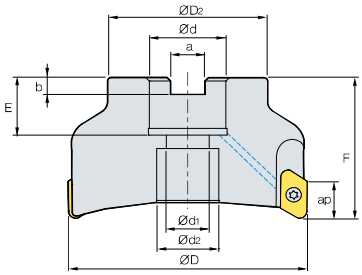
Workpiece		Cutting Speed vc(m/min)	Feed fz(mm/t)
Aluminum alloy	Rm280 < MPa Rm280 > MPa	1,200 1,000	0.30 0.25
Copper alloy Thermo plastic	Long chipping -	400 350	0.20 0.15
Aluminum alloy	Si <12% Si ≥12%	1,000 -	0.25 -
Copper alloy	Short chipping	500	0.20
Magnesium alloy	-	450	0.20
Duroplastics	-	200	0.15

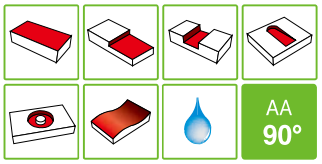
Inserts

Insert shape	Designation		Stock					Dimensions (mm)						Geometries
			ND2000	PD2000	PC5300	G10	H01	l	l2	l1	t	r	d1	
	XEKT	19M504FR-MA		▲			▲	18	16.4	1.4	-	0.4	4.4	
		19M508FR-MA		▲	O	O	▲	18	16.4	1.0	-	0.8	4.4	
		19M512FR-MA		▲			▲	18	16.4	0.6	-	1.2	4.4	
		19M516FR-MA		▲		O	▲	17.5	16.4	0.5	-	1.6	4.4	
		19M518FR-MA		▲			▲	17.5	16.4	0.5	-	1.8	4.4	
		19M520FR-MA		▲			▲	17.5	16.4	0.5	-	2	4.4	
		19M524FR-MA					▲	17.5	16.4	0.5	-	2.4	4.4	
		19M525FR-MA					▲	17.5	16.4	0.5	-	2.5	4.4	
		19M530FR-MA		▲			▲	17	16.4	0.7	-	3	4.4	
		19M532FR-MA	O	▲			▲	17	16.4	0.5	-	3.2	4.4	
		19M540FR-MA		▲			▲	16.5	16.4	0.5	-	4	4.4	
		19M550FR-MA		▲			▲	16	16.4	0.4	-	5	4.4	
		250604FR-MA					▲	24.5	21.9	1.5	-	0.4	6.0	
		250608FR-MA	O	▲	O		▲	24.5	21.9	1.2	-	0.8	6.0	
		250612FR-MA					▲	24.5	21.9	0.8	-	1.2	6.0	
		250616FR-MA					▲	24.5	21.9	0.4	-	1.6	6.0	
		250620FR-MA					▲	24	21.9	0.5	-	2	6.0	
		250630FR-MA					▲	23.7	21.9	0.6	-	3	6.0	
		250632FR-MA					▲	23.7	21.9	0.4	-	3.2	6.0	
		250640FR-MA					▲	22.8	21.9	1.2	-	4	6.0	
		250650FR-MA					▲	22.7	21.9	0.4	-	5	6.0	

▲: Available in Europe ●: Available in Korea O: Order-made item

PAXCM5000





- AR: 8° - 17.5°
- RR: -9.5° - -5°

(mm)

Designation		Stock	⊙	ØD	ØD2	Ød	Ød1	Ød2	a	b	E	F	Max U/min	ap	kg
PAXCM	5040HR-A, B	▲	3	40	34	16	9	14	8.4	5.6	19	40	25,800	17	0.15
	5050HR-A, B	▲	4	50	42	22	11	18	10.4	6.3	21	50	23,000	17	0.3
	5063HR-A, B	▲	4	63	49	22	11	18	10.4	6.3	21	50	20,500	17	0.56
	5080HR-A, B	▲	5	80	57	27	14	20	12.4	7	23	50	18,200	17	1.0
	5100HR-A, B	▲	6	100	67	32	18	26	14.4	8	26	63	16,300	17	2.3
	5125HR-A, B	▲	7	125	87	40	22	32	116.4	9	29	63	14,600	17	3.2

• A type: Insert NoseR 0.4 - 3.2, B type: Insert NoseR 4.0 - 5.0

▲: Available in Europe ●: Available in Korea ○: Order-made item

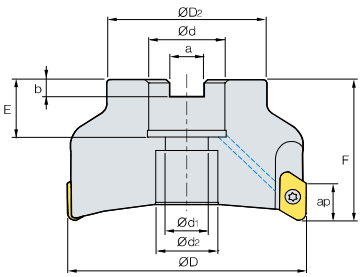
Inserts

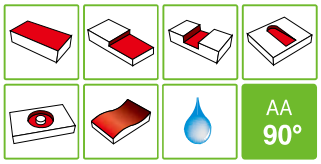
XEKT-MA

Parts

Specification	Screw	Wrench
Ø40 - Ø125	PTKA0408	TW15S

PAXCM6000





· AR: 8° - 17.5°
· RR: -9.5° - -5°

(mm)

Designation		Stock		ØD	ØD2	Ød	Ød1	Ød2	a	b	E	F	Max U/min	ap	kg
PAXCM	6050HR-A, B	▲	2	50	42	16	9	14	8.4	5.6	18	50	23,000	23	0.32
	6063HR-A, B	▲	3	63	49	22	11	18	10.4	6.3	21	50	20,500	23	0.53
	6080HR-A, B	▲	4	80	57	27	14	20	12.4	7	23	50	18,200	23	0.73
	6100HR-A, B	▲	5	100	67	32	18	26	14.4	8	26	63	16,300	23	1.7
	6125HR-A, B	▲	6	125	87	40	22	32	16.4	9	29	63	14,600	23	3.06

•A type: Insert NoseR 0.4 - 3.2, B type: Insert NoseR 4.0 - 5.0

▲: Available in Europe ●: Available in Korea O: Order-made item

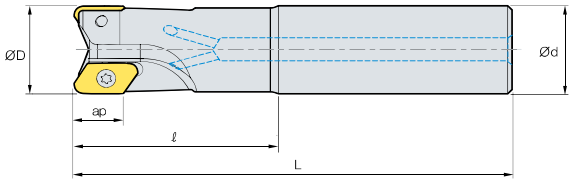
Inserts

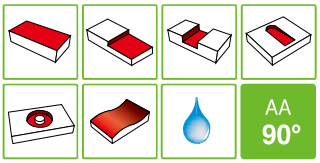
XEKT-MA

Parts

Specification	Screw	Wrench
Ø50 - Ø125	FTGA0513-P	TW20-100

PAXS5000





- AR: 5° - 10°
- RR: -14° - -5°

(mm)

Designation		Stock		ØD	Ød	ℓ	L	Max U/min	ap	kg
PAXS	5020HR-A, B	▲	1	20	20	60	130	15,000	17	0.24
	5025HR-A, B	▲	2	25	25	60	140	32,600	17	0.4
	5025HR-A, B-L200	▲	2	25	25	60	200	32,600	17	0.63
	5032HR-A, B	▲	2	32	32	70	150	28,800	17	0.74
	5032HR-A, B-L220	▲	2	32	32	70	220	28,800	17	1.2
	5040HR-A, B-S32	▲	3	40	32	70	160	25,800	17	1.0
	5040HR-A, B-L220	▲	3	40	32	70	220	25,800	17	1.4
	5040HR-A, B-S40	▲	3	40	40	70	160	25,800	17	1.3
	5040HR-A, B-S42	▲	3	40	42	70	160	25,800	17	1.4

• A type: Insert NoseR 0.4 - 3.2, B type: Insert NoseR 4.0 - 5.0

▲: Available in Europe ●: Available in Korea ○: Order-made item

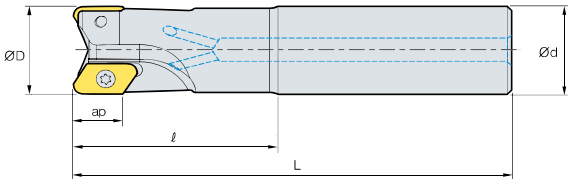
Inserts

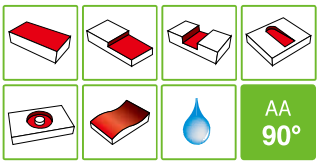
XEKT-MA

Parts

Specification	Screw	Wrench
Ø20 - Ø40	PTKA0408	TS15S

PAXS6000





- AR: 5° - 10°
- RR: -14° - -5°

(mm)

Designation		Stock		ØD	Ød	ℓ	L	Max U/min	ap	kg
PAXS	6025HR-A, B	▲	1	25	25	60	140	32,600	23	0.42
	6025HR-A, B-L200	▲	1	25	25	60	200	32,600	23	0.63
	6032HR-A, B	▲	1	32	32	70	150	28,800	23	0.72
	6032HR-A, B-L220	▲	1	32	32	70	220	28,800	23	1.14
	6040HR-A, B-S32	▲	2	40	32	70	160	25,800	23	0.88
	6040HR-A, B-L220	▲	2	40	32	70	220	25,800	23	1.23
	6040HR-A, B-S40	▲	2	40	40	70	160	25,800	23	1.2

•A type: Insert NoseR 0.4 - 3.2, B type: Insert NoseR 4.0 - 5.0

▲: Available in Europe ●: Available in Korea ○: Order-made item

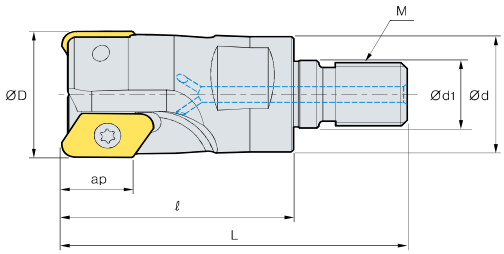
Inserts

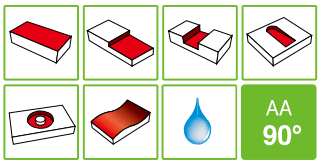
XEKT-MA

Parts

Specification	Screw	Wrench	
Ø25 - Ø40	FTGA0510-P (Ø25.4 - Ø31.75) FTGA0513-P (Ø38)	TW20S-100	

PAXM5000





- AR: 6° - 8°
- RR: -7° - -5°

(mm)

Designation		Stock		ØD	Ød	Ød1	ℓ	L	M	ap	kg
PAXM	5025HR-A, B-M12	▲	2	25	23	12.5	55	79	M12	17	0.12
	5032HR-A, B-M16	▲	2	32	29	17.0	55	82	M16	17	0.2
	5040HR-A, B-M16	▲	3	40	29	17.0	55	82	M16	17	0.4

• A type: Insert NoseR 0.4 - 3.2, B type: Insert NoseR 4.0 - 5.0

▲: Available in Europe ●: Available in Korea ○: Order-made item

Inserts

XEKT-MA

Available Adaptors

Designation		Available Adaptor
PAXMA	5025HR-A, B-M12	MAT - M12
	5032HR-A, B-M16	MAT - M16
	5040HR-A, B-M16	

Designation: PAXM5025HR-M12
Modular Head Threading Measure size(M12)

II

Adaptor Spec.: MAT-M12-030-S25S
Adaptor Threading Measure(M12)

Parts

Specification	Screw	Wrench
Ø25 - Ø40	PTKA0407	TW15S
	PTKA0480	

Pro-L Mill

New Indexable Milling Tool for High Quality Machining

- Improved perpendicularity and lower cutting resistance resulting from the composition of the clearance face and High Helix edge
- Improved productivity due to more than twice depth of cut compared to Pro-A and Pro-X Mill
- Strong clamping design by use of double screw on system design
- Improved chip flow produced from coolant delivered by the helical type design of the chip pocket

Code System

[Shank Type]

PAL	S	M	050	H	R	- 3	S	40
Pro-L Mill	Tool type	Unit	Tool Dia.	Coolant type	Hand	No. of tooth	Tool Length.	Shank Dia.
	S: Shank	M: Metric	050: Ø50	Unmarked: None H: Through-hole	R: Right L: Left M: Multi edge	3: 3 teeth	S: Standard type M: Middle type L: Long type	40: Ø40

[Cutter Type]

PAL	C	M	063	H	R
Pro-L Mill	Tool type	Unit	Tool Dia.	Coolant type	Chip breaker
	C: Cutter	M: Metric	063: Ø63	H: Through-hole Unmarked: No Through-hole	R: Right L: Left M: Multi edge

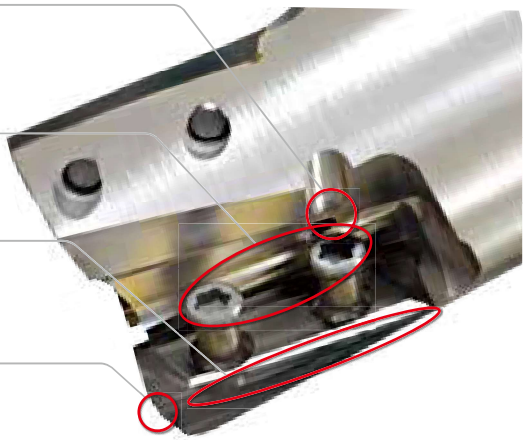
Features

Through coolant system
···› Long tool life

2 Screw On System
···› Strong clamping

High helix cutting edge application
···› Decreased cutting resistance

Set of various Nose-R



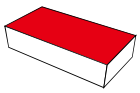
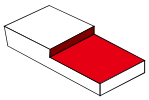
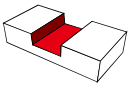
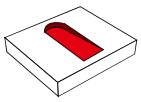
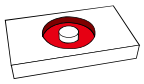
Chip Breaker Features

Applications	Chip breaker		Cutting edge	Features
Aluminum	MA			Application of the edge optimized for Aluminum machining and buffed finish ensure excellent machining quality
Hard-to-cut material	ML			Design of Low cutting resistance Chip Breaker ensures excellent machining quality for light cutting and Hard-to-cut material

Selection of Grade and Chip Breaker

Category	M (STS)	N (Non-feerous metal-Al)	S (HRSA)
Grade	PC5300 / PC5400	H01	PC5300 / PC5400
MA	-	○	-
ML	○	-	○

Available Milling Applications

Facing	Shouldering	Slotting	Ramping	Hellical Cutting
				

Cutting Performance

Multi functional machining

- Workpiece — Al6061 (HRC30)
- Cutting conditions — vc(m/min) = 500, fz(mm/t) = 60, ap(mm) = 30 - 60, ae(mm) = 1 - 5, z = 3

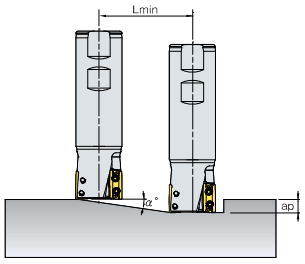
Cutting conditions

(mm)

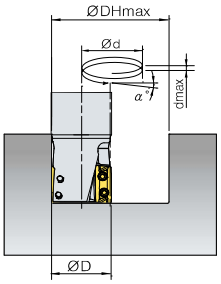
ISO	Designation	Grade	vc (m/min)	fz (mm/t)	ap (mm)
N	LXET2504PEFR-32-MA	H01	750 (500 - 1000)	0.2 (0.1 - 0.3)	20 (3.0 - 25.0)
M	LXET2504PEER-32-ML	PC5300	120 (100 - 150)	0.2 (0.1 - 0.3)	20 (3.0 - 25.0)
		PC5400	100 (80 - 120)	0.2 (0.1 - 0.3)	20 (3.0 - 25.0)
S		PC5300	50 (30 - 70)	0.15 (0.05 - 0.2)	20 (3.0 - 25.0)
		PC5400	50 (20 - 60)	0.15 (0.05 - 0.2)	20 (3.0 - 25.0)
N	LXET2504PEFR-40-MA	H01	750 (500 - 1000)	0.2 (0.1 - 0.3)	20 (3.0 - 25.0)
M	LXET2504PEER-40-ML	PC5300	120 (100 - 150)	0.2 (0.1 - 0.3)	20 (3.0 - 25.0)
		PC5400	100 (80 - 120)	0.2 (0.1 - 0.3)	20 (3.0 - 25.0)
S		PC5300	50 (30 - 70)	0.15 (0.05 - 0.2)	20 (3.0 - 25.0)
		PC5400	50 (20 - 60)	0.15 (0.05 - 0.2)	20 (3.0 - 25.0)
N	LXET3405PEFR-50-MA	H01	750 (500 - 1000)	0.2 (0.1 - 0.3)	25 (3.0 - 25.0)
M	LXET3405PEER-50-ML	PC5300	120 (100 - 150)	0.2 (0.1 - 0.3)	25 (3.0 - 25.0)
		PC5400	100 (80 - 120)	0.2 (0.1 - 0.3)	25 (3.0 - 25.0)
S		PC5300	50 (30 - 70)	0.15 (0.05 - 0.2)	25 (3.0 - 25.0)
		PC5400	50 (20 - 60)	0.15 (0.05 - 0.2)	25 (3.0 - 25.0)
N	LXET3405PEFR-63-MA	H01	750 (500 - 1000)	0.2 (0.1 - 0.3)	25 (3.0 - 25.0)
M	LXET3405PEER-63-ML	PC5300	120 (100 - 150)	0.2 (0.1 - 0.3)	25 (3.0 - 25.0)
		PC5400	100 (80 - 120)	0.2 (0.1 - 0.3)	25 (3.0 - 25.0)
S		PC5300	50 (30 - 70)	0.15 (0.05 - 0.2)	25 (3.0 - 25.0)
		PC5400	50 (20 - 60)	0.15 (0.05 - 0.2)	25 (3.0 - 25.0)

Pro-L Mill Ramping & Helical Cutting Technical Data

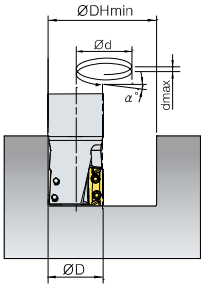
1. Ramping



2. Blind hole helical cutting



3. Through hole helical cutting



(mm)

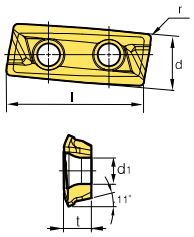
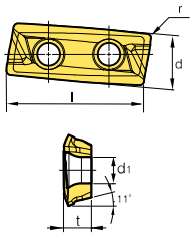
Designation	ØD(mm)	Ramping		Blind hole Helical cutting				Through hole Helical cutting	
		α°(max)	Lmin(mm)	ØDHmax (mm)	dmax (mm)	ØDHmin (mm)	dmax (mm)	ØDHmin (mm)	dmax (mm)
PALS032HR-2S20	32	3.37	170	62	3.6	60	3.5	55	3.2
PALS032HR-2S25	32	3.37	170	62	3.6	60	3.5	55	3.2
PALS032HR-2S32	32	3.37	170	62	3.6	60	3.5	55	3.2
PALS040HR-2S32	40	2.12	270	78	2.9	76	2.8	71	2.6
PALS040HR-2S40	40	2.12	270	78	2.9	76	2.8	71	2.6
PALS040HR-2S42	40	2.12	270	78	2.9	76	2.8	71	2.6
PALS040HR-3S32	40	2.12	270	78	2.9	76	2.8	71	2.6
PALS040HR-3S40	40	2.12	270	78	2.9	76	2.8	71	2.6
PALS040HR-3S42	40	2.12	270	78	2.9	76	2.8	71	2.6
PALS050HR-3S32	50	2.08	275	98	3.6	96	3.5	91	3.3
PALS050HR-3S40	50	2.08	275	98	3.6	96	3.5	91	3.3
PALS050HR-3S42	50	2.08	275	98	3.6	96	3.5	91	3.3
PALS063HR-4S32	63	1.76	325	124	3.8	122	3.8	117	3.6
PALS063HR-4S40	63	1.76	325	124	3.8	122	3.8	117	3.6
PALS063HR-4S42	63	1.76	325	124	3.8	122	3.8	117	3.6
PALS063HM-4S32	63	1.76	325	124	3.8	122	3.8	117	3.6
PALS063HM-4S40	63	1.76	325	124	3.8	122	3.8	117	3.6
PALS063HM-4S42	63	1.76	325	124	3.8	122	3.8	117	3.6
PALCM063HR	63	1.76	325	124	3.8	122	3.8	117	3.6

- Lmin: when ap=10mm
- Lmin: Minimum inclination cutting length
  α°: Max. rampig angle
  ap: Depth of cut

$$Lmin = \frac{ap}{\tan \alpha^{\circ}} \text{ (mm)}$$

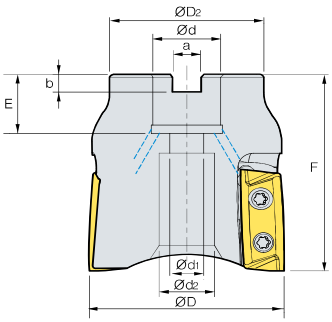
Inserts

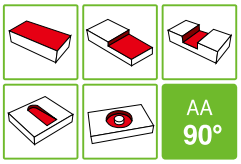
(mm)

Insert shape	Type	Designation		Stock PC5300	Stock PC5400	Stock H01	Dimensions (mm) l	d	t	r	d1	Geometries
	Ø32	LXET	250404PEFR-32-MA			▲	25	10.775	4.76	0.4	4.5	
			250412PEFR-32-MA			▲	25	10.775	4.76	1.2	4.5	
			250416PEFR-32-MA			▲	25	10.775	4.76	1.6	4.5	
			2504PEFR-32-MA			▲	25	10.775	4.76	0.8	4.5	
			340530PEFR-32-MA			O	34	13.803	5.56	0.3	5.56	
	Ø40		250404PEFR-40-MA			▲	25	10.618	4.76	0.4	4.5	
			250412PEFR-40-MA			▲	25	10.618	4.76	1.2	4.5	
			250416PEFR-40-MA			▲	25	10.618	4.76	1.6	4.5	
			2504PEFR-40-MA			▲	25	10.618	4.76	0.8	4.5	
	Ø50		340504PEFR-50-MA			▲	34	13.765	5.56	0.4	5.56	
			340512PEFR-50-MA			▲	34	13.765	5.56	1.2	5.56	
			340516PEFR-50-MA			▲	34	13.765	5.56	1.6	5.56	
			3405PEFR-50-MA			▲	34	13.765	5.56	0.8	5.56	
	Ø63		340504PEFR-63-MA			▲	34	13.803	5.56	0.4	5.56	
			340512PEFR-63-MA			▲	34	13.803	5.56	1.2	5.56	
			340516PEFR-63-MA			▲	34	13.803	5.56	1.6	5.56	
			3405PEFR-63-MA			▲	34	13.803	5.56	0.8	5.56	
			340530PEFR-63-MA			O	34	13.803	5.56	0.3	5.56	
	Ø32	LXET	250404PEER-32-ML	O	▲		25	10.775	4.76	0.4	4.5	
			250412PEER-32-ML	O	▲		25	10.775	4.76	1.2	4.5	
			250416PEER-32-ML	O	▲		25	10.775	4.76	1.6	4.5	
			2504PEER-32-ML	O	▲		25	10.775	4.76	0.8	4.5	
	Ø40		250404PEER-40-ML	O	▲		25	10.618	4.76	0.4	4.5	
			250412PEER-40-ML	O	▲		25	10.618	4.76	1.2	4.5	
			250416PEER-40-ML	O	▲		25	10.618	4.76	1.6	4.5	
			2504PEER-40-ML	O	▲		25	10.618	4.76	0.8	4.5	
	Ø50		340504PEER-50-ML	O	▲		34	13.765	5.56	0.4	5.56	
			340512PEER-50-ML	O	▲		34	13.765	5.56	1.2	5.56	
			340516PEER-50-ML	O	▲		34	13.765	5.56	1.6	5.56	
			3405PEER-50-ML	O	▲		34	13.765	5.56	0.8	5.56	
	Ø63		340504PEER-63-ML	O	▲		34	13.803	5.56	0.4	5.56	
			340512PEER-63-ML	O	▲		34	13.803	5.56	1.2	5.56	
			340516PEER-63-ML	O	▲		34	13.803	5.56	1.6	5.56	
			3405PEER-63-ML	O	▲		34	13.803	5.56	0.8	5.56	

▲: Available in Europe ●: Available in Korea O: Order-made item

PALCM





- AR: 16°
- RR: -8°

(mm)

Designation		Stock		ØD	ØD2	Ød	Ød1	Ød2	Ød3	a	b	E	E1	F	ap	kg
PALCM	063HR	▲	4	63	50	22	11	18	-	10.4	6.3	21	28	70	34	0.57

▲: Available in Europe ●: Available in Korea O: Order-made item

Inserts

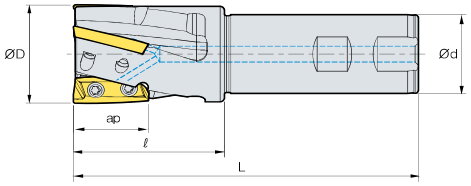
LXET-MA

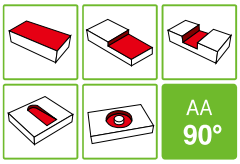
LXET-ML

Parts

Specification	Screw	Wrench
Ø63	FTGA0511-P	TS20-100

PALS (Single Edge)





- AR: 12° - 16°
- RR: -5° - -8°

(mm)

Designation		Stock		ØD	Ød	ℓ	L	ap	kg
PALS	032HR-2S20	▲	2	32	20	50	140	25	0.36
	032HR-2S25	▲	2	32	25	50	140	25	0.48
	032HR-2S32	▲	2	32	32	50	140	25	0.71
	040HR-2S32	▲	2	40	32	50	140	25	0.85
	040HR-2S40	▲	2	40	40	50	140	25	1.16
	040HR-3S32	▲	3	40	32	50	140	25	0.80
	040HR-3S40	▲	3	40	40	50	140	25	1.10
	050HR-3S32	▲	3	50	32	70	160	34	1.10
	050HR-3S40	▲	3	50	40	70	160	34	1.40
	063HR-4S32	▲	4	63	32	70	160	34	1.60
	063HR-4S40	▲	4	63	40	70	160	34	1.92

▲: Available in Europe ●: Available in Korea ○: Order-made item

Inserts

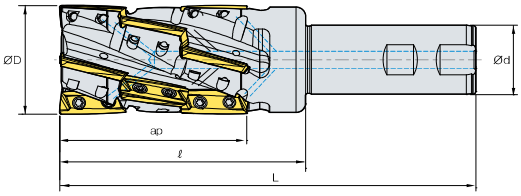
LXET-MA

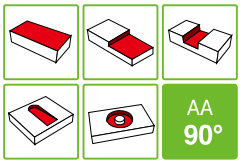
LXET-ML

Parts

Specification	Screw	Wrench	Wrench
Ø32	FTKA0408	TW15S	-
Ø40	FTKA0410		-
Ø50	FTGA0510-P	-	TW20-100
Ø63	FTGA0511-P	-	

PALS (Multi Edge)





- AR: 16°
- RR: --8°

(mm)

Designation		Stock		ØD	Ød	ℓ	L	ap	kg
PALS	063HM-4S32	▲	12	63	32	130	220	96	160
	063HM-4S40	▲	12	63	40	130	220	96	192

▲: Available in Europe ●: Available in Korea ○: Order-made item

Inserts

LXET-MA

LXET-ML

Parts

Specification	Screw	Wrench
Ø63	FTGA0511-P	TS20-100

MAT (Steel Shank type)

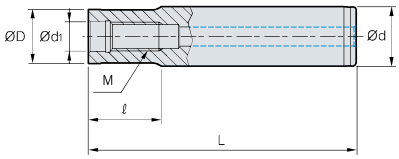


Fig. 1

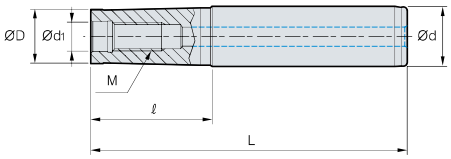


Fig. 2

(mm)

Designation		ØD	Ød	Ød1	ℓ	L	M	Fig.
MAT	M06-020-S10S	9.5	10	6.5	20	70	M6	1
	M6B-020-S12S	11.0	12	6.5	20	76	M6	1
	M6B-040-S12S	11.0	12	6.5	40	96	M6	1
	M08-020-S16S	14.5	16	8.5	20	80	M8	1
	M10-030-S20S	18.0	20	10.5	30	100	M10	1
	M12-030-S25S	22.5	25	12.5	29	110	M12	1
	M16-035-S32S	28.5	32	17.0	35	125	M16	1
	M06-040-S12T	9.5	12	6.5	40	96	M6	2
	M06-065-S16T	9.5	16	6.5	65	125	M6	2
	M6B-065-S16T	11.0	16	6.5	65	125	M6	2
	M6B-080-S16T	11.0	16	6.5	80	140	M6	2
	M08-040-S16T	14.5	16	8.5	40	100	M8	2
	M08-065-S16T	14.5	16	8.5	65	125	M8	2
	M08-080-S20T	14.5	20	8.5	80	150	M8	2
	M08-110-S25T	14.5	25	8.5	110	190	M8	2
	M10-050-S20T	18.0	20	10.5	50	120	M10	2
	M10-070-S20T	18.0	20	10.5	70	140	M10	2
	M10-090-S25T	18.0	25	10.5	90	170	M10	2
	M10-110-S25T	18.0	25	10.5	110	190	M10	2
	M10-130-S32T	18.0	32	10.5	130	220	M10	2
	M12-050-S25T	22.5	25	12.5	50	130	M12	2
	M12-070-S25T	22.5	25	12.5	70	150	M12	2
	M12-090-S25T	22.5	25	12.5	90	170	M12	2
	M12-110-S32T	22.5	32	12.5	110	200	M12	2
	M12-175-S40T	22.5	40	12.5	175	300	M12	2
	M16-055-S32T	28.5	32	17.0	55	145	M16	2
	M16-080-S32T	28.5	32	17.0	80	170	M16	2
	M16-120-S32T	28.5	32	17.0	120	210	M16	2
	M16-175-S40T	28.5	40	17.0	175	300	M16	2

- S: Straight Neck Adapter
- T: Taper Neck Adapter

MAT-C (Carbide Shank type)

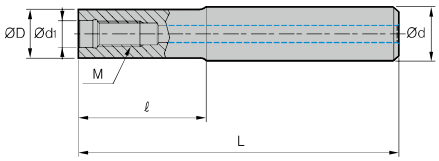


Fig. 1

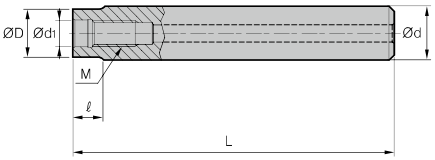
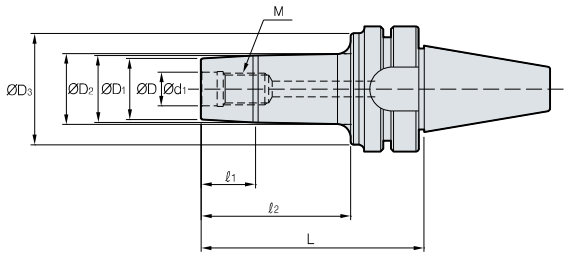


Fig. 2

(mm)

	Designation	ØD	Ød	Ød1	ℓ	L	M	Fig.
MAT	**M08-080-S16S-C**	14.5	16	8.5	80	150	M8	1
	M08-110-S16S-C	14.5	16	8.5	110	180	M8	1
	M08-150-S16S-C	14.5	16	8.5	150	250	M8	1
	M08-010-S16S-C-150	14.5	16	8.5	10	150	M8	2
	M08-010-S16S-C-180	14.5	16	8.5	10	180	M8	2
	M08-010-S16S-C-250	14.5	16	8.5	10	250	M8	2
	M10-090-S20S-C	18.0	20	10.5	90	170	M10	1
	M10-110-S20S-C	18.0	20	10.5	110	200	M10	1
	M10-175-S20S-C	18.0	20	10.5	175	300	M10	1
	M10-010-S20S-C-170	18.0	20	10.5	10	170	M10	2
	M10-010-S20S-C-200	18.0	20	10.5	10	200	M10	2
	M10-010-S20S-C-300	18.0	20	10.5	10	300	M10	2
	M12-090-S25S-C	22.5	25	12.5	90	170	M12	1
	M12-110-S25S-C	22.5	25	12.5	110	200	M12	1
	M12-175-S25S-C	22.5	25	12.5	175	300	M12	1
	M12-015-S25S-C-170	22.5	25	12.5	15	170	M12	2
	M12-015-S25S-C-200	22.5	25	12.5	15	200	M12	2
	M12-015-S25S-C-300	22.5	25	12.5	15	300	M12	2
	M16-090-S32S-C	28.5	32	17.0	90	180	M16	1
	M16-120-S32S-C	28.5	32	17.0	120	210	M16	1
	M16-175-S32S-C	28.5	32	17.0	175	300	M16	1
	M16-020-S32S-C-180	28.5	32	17.0	20	180	M16	2
	M16-020-S32S-C-210	28.5	32	17.0	20	210	M16	2
	M16-020-S32S-C-300	28.5	32	17.0	20	300	M16	2

BT30 / BT40 / BT50

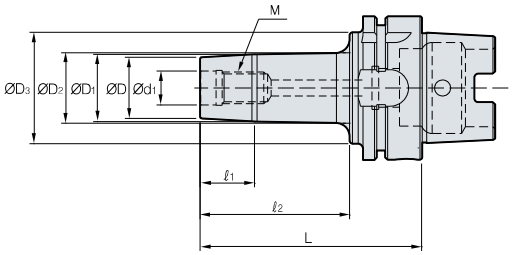


* Also available as **SK** type

(mm)

Designation		ØD	ØD1	ØD2	ØD3	Ød1	ℓ1	ℓ2	L	M
BT30	**MAT-M06-053**	11	11.7	13	30	6.5	5	21	53	M6x1.0
	MAT-M08-057	14.5	15.7	17.5	35	8.5	7	25	57	M8x1.25
	MAT-M10-062	18	19.7	24	38	10.5	7	30	62	M10x1.5
	MAT-M12-067	23	24.7	27.5	41	12.5	10	35	67	M12x1.75
	MAT-M16-067	29	31.7	33.5	41	17	10	35	67	M16x2.0
BT40	**MAT-M06-062**	11	11.7	14	40	6.5	5	25	62	M6x1.0
	MAT-M06-077	11	11.7	14	40	6.5	5	40	77	M6x1.0
	MAT-M06-092	11	11.7	14	40	6.5	5	55	92	M6x1.0
	MAT-M08-067	14.5	15.7	19	44	8.5	7	30	67	M8x1.25
	MAT-M08-082	14.5	15.7	19	44	8.5	7	45	82	M8x1.25
	MAT-M08-097	14.5	15.7	19	44	8.5	7	60	97	M8x1.25
	MAT-M10-072	18	19.7	23	50	10.5	10	35	72	M10x1.5
	MAT-M10-087	18	19.7	23	50	10.5	10	50	87	M10x1.5
	MAT-M10-102	18	19.7	23	50	10.5	10	65	102	M10x1.5
	MAT-M12-077	23	24.7	30	55	12.5	10	40	77	M12x1.75
	MAT-M12-092	23	24.7	30	55	12.5	13	55	92	M12x1.75
	MAT-M12-107	23	24.7	30	55	12.5	13	70	107	M12x1.75
	MAT-M16-077	29	31.7	37	55	17	13	40	77	M16x2.0
	MAT-M16-092	29	31.7	37	55	17	13	55	92	M16x2.0
	MAT-M16-107	29	31.7	37	55	17	13	70	107	M16x2.0
BT50	**MAT-M06-083**	11	11.7	15	40	6.5	5	35	83	M6x1.0
	MAT-M06-098	11	11.7	15	40	6.5	5	50	98	M6x1.0
	MAT-M06-113	11	11.7	15	40	6.5	5	65	113	M6x1.0
	MAT-M08-088	14.5	15.7	20	45	8.5	7	40	88	M8x1.25
	MAT-M08-103	14.5	15.7	20	45	8.5	7	55	103	M8x1.25
	MAT-M08-118	14.5	15.7	20	45	8.5	7	70	118	M8x1.25
	MAT-M10-093	18	19.7	25	55	10.5	10	45	93	M10x1.5
	MAT-M10-113	18	19.7	25	55	10.5	10	65	113	M10x1.5
	MAT-M10-128	18	19.7	25	55	10.5	10	80	128	M10x1.5
	MAT-M12-103	23	24.7	33	65	12.5	10	55	103	M12x1.75
	MAT-M12-118	23	24.7	33	65	12.5	13	70	118	M12x1.75
	MAT-M12-133	23	24.7	33	65	12.5	13	85	133	M12x1.75
	MAT-M16-103	29	31.7	41	85	17	13	55	103	M16x2.0
	MAT-M16-118	29	31.7	41	85	17	13	70	118	M16x2.0
	MAT-M16-133	29	31.7	41	85	17	13	85	133	M16x2.0

HSK63A / HSK100A



(mm)

Designation		ØD	ØD1	ØD2	ØD3	Ød1	ℓ1	ℓ2	L	M
HSK63A	MAT-M06-061	11	11.7	27	40	6.5	5	25	61	M6x1.0
	MAT-M06-076	11	11.7	27	40	6.5	5	40	76	M6x1.0
	MAT-M06-091	11	11.7	27	40	6.5	5	55	91	M6x1.0
	MAT-M08-066	14.5	15.7	30.5	44	8.5	7	30	66	M8x1.25
	MAT-M08-081	14.5	15.7	30.5	44	8.5	7	45	81	M8x1.25
	MAT-M08-096	14.5	15.7	30.5	44	8.5	7	60	96	M8x1.25
	MAT-M10-071	18	19.7	34	50	10.5	10	35	71	M10x1.5
	MAT-M10-086	18	19.7	34	50	10.5	10	50	86	M10x1.5
	MAT-M10-101	18	19.7	34	50	10.5	10	65	101	M10x1.5
	MAT-M12-076	23	24.7	36.5	55	12.5	10	40	76	M12x1.75
	MAT-M12-091	23	24.7	36.5	55	12.5	13	55	91	M12x1.75
	MAT-M12-106	23	24.7	36.5	55	12.5	13	70	106	M12x1.75
	MAT-M16-076	29	31.7	38.5	55	17	13	40	76	M16x2.0
	MAT-M16-091	29	31.7	38.5	55	17	13	55	91	M16x2.0
	MAT-M16-106	29	31.7	38.5	55	17	13	70	106	M16x2.0
HSK100A	MAT-M06-074	11	11.7	15	40	6.5	5	35	74	M6x1.0
	MAT-M06-089	11	11.7	15	40	6.5	5	50	89	M6x1.0
	MAT-M06-104	11	11.7	15	40	6.5	5	65	104	M6x1.0
	MAT-M08-079	14.5	15.7	20	45	8.5	7	40	79	M8x1.25
	MAT-M08-094	14.5	15.7	20	45	8.5	7	55	94	M8x1.25
	MAT-M08-109	14.5	15.7	20	45	8.5	7	70	109	M8x1.25
	MAT-M10-084	18	19.7	25	55	10.5	10	45	84	M10x1.5
	MAT-M10-104	18	19.7	25	55	10.5	10	65	104	M10x1.5
	MAT-M10-119	18	19.7	25	55	10.5	10	80	119	M10x1.5
	MAT-M12-094	23	24.7	33	65	12.5	10	55	94	M12x1.75
	MAT-M12-109	23	24.7	33	65	12.5	13	70	109	M12x1.75
	MAT-M12-124	23	24.7	33	65	12.5	13	85	124	M12x1.75
	MAT-M16-094	29	31.7	41	85	17	13	55	94	M16x2.0
	MAT-M16-109	29	31.7	41	85	17	13	70	109	M16x2.0
	MAT-M16-124	29	31.7	41	85	17	13	85	124	M16x2.0

Notes

Notes

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