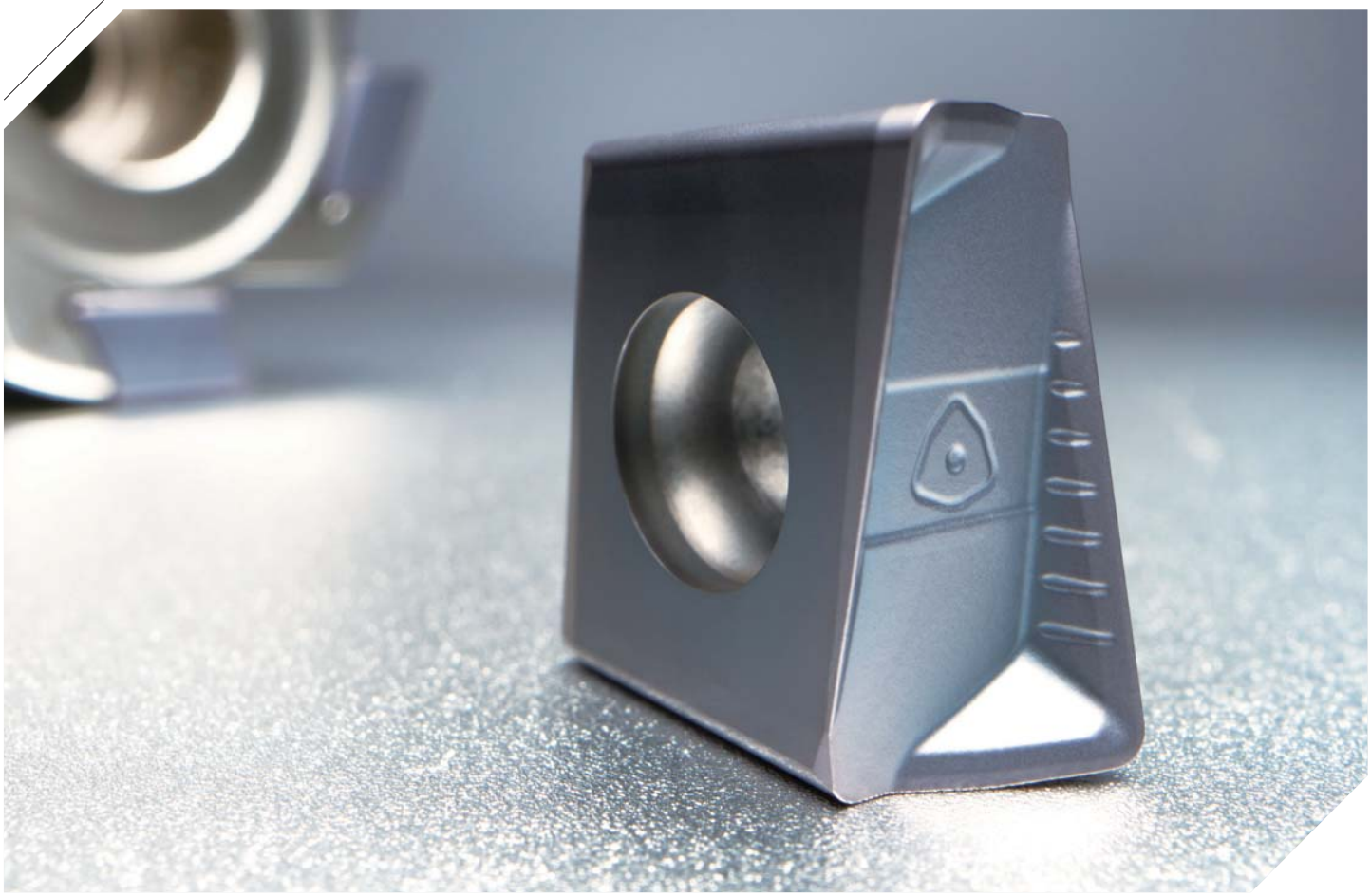
KORLOY
TECH-NEWS

TP4P

Tangen-Pro series

Tangential Double-Sided 4-Corner Shoulder Milling Tool

- High depth-of-cut (up to 0.472 inch) shoulder milling by high helix chip-breaking double-sided inserts
- Enhanced productivity through strong clamping force of the tangential type and multi-insert application



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Tangential Double-Sided 4-Corner Shoulder Milling Tool

TP4P (Tangen-Pro series)

Based on KORLOY's differentiated manufacturing technology, we have launched Tangen-Pro TP4P, a tangential double-sided and 4-corner shoulder milling cutter.

Generally, the tangential type makes it easier to secure chip pocket space compared to the radial type, offers excellent clamping stability, and enables multi-insert clamping for the same cutting diameter, resulting in improved productivity through high table feed rates.

TP4P is equipped with the advantages of the tangential type but also features a chip-breaking edge design that effectively reduces vibration and cutting forces, providing superior machinability. Its optimized wide base and side clamping structure maintain strong clamping force even in high-speed/high-feed machining, ensuring stable machining.

In addition, the combination with KORLOY's various specialized grades makes it applicable not only to steel and cast iron but also to various workpieces such as stainless steel and titanium alloys. It demonstrates outstanding performance, especially in roughing.

Thus, TP4P provides over 30% productivity improvement compared to the radial type through high speed / high feed machining by increasing table feed, stable clamping, and a chip-breaking edge.

» Excellent cutting performance

- Application of High Helix and Chip-breaking Chip Breakers

» Various holder lineup

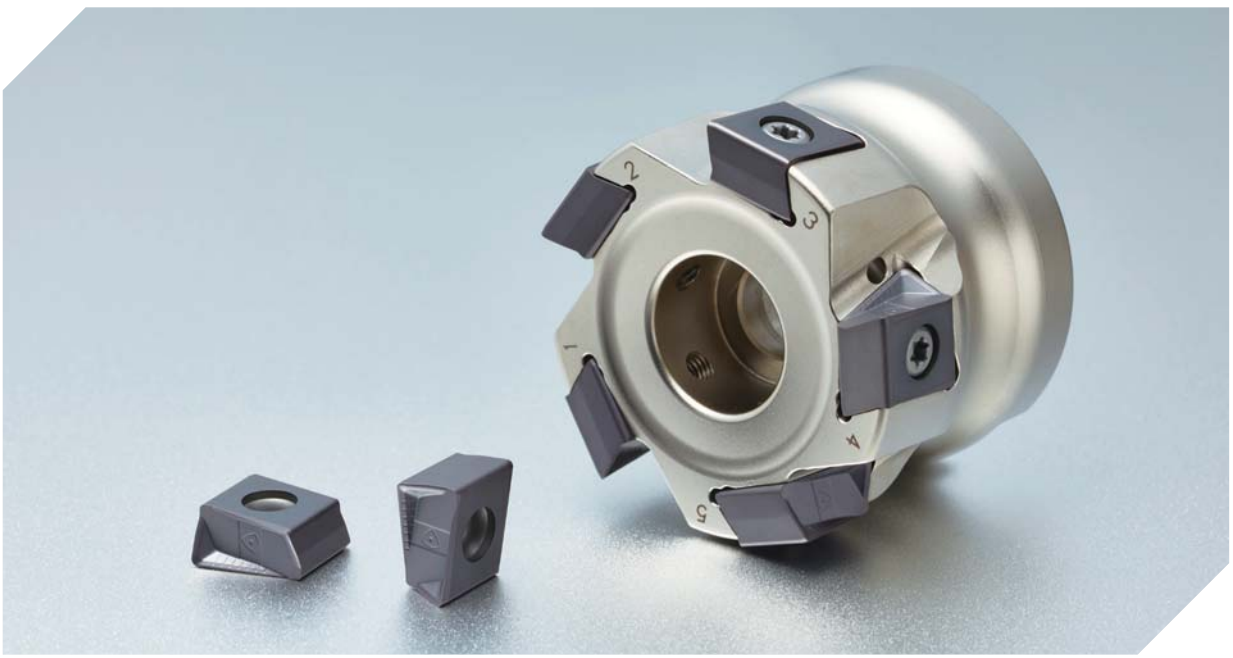
- Enhanced adaptability through a diverse lineup of holders

» Stable clamping

- Ensures wide clamping side

» Excellent Economical Efficiency

- Up to 4 usable corners due to double-sided design



Code system

Cutter type (Single-edge)

TP4	P	C	A	200	R	-	075	-	6	-	LN13

- **TP4** (Tangen-Pro)
- **KAPR** P: 90°
- **Type** C: Cutter
- **Arbor** A: Inch, None: Asia, M: Metric
- **Machining diameter** 200: Ø2 inch
- **Oil hole & hand** R: With oil hole, right-handed; NR: Without oil hole, right-handed
- **Internal diameter** 075: Ø0.75 inch
- **No. of tooth** 6: 6 tooth
- **Available insert** LN13: LNGX13

Shank type

TP4	P	S	A	125	R	-	3	W	125	-	450	-	LN13

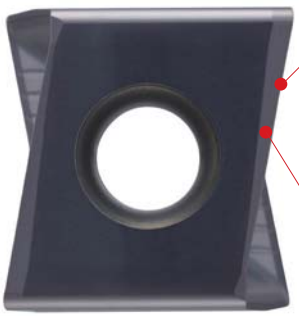
- **TP4** (Tangen-Pro)
- **KAPR** P: 90°
- **Type** S: Shank
- **Type** A: Inch, None: Metric
- **Machining diameter** 125: Ø1.25 inch
- **Oil hole & hand** R: With oil hole, right-handed; NR: Without oil hole, right-handed
- **No. of tooth** 3: 3 tooth
- **Shank type** W: Weldon, C: Cylinder
- **Shank diameter** 125: Ø1.25 inch
- **Overall length** 450: Ø4.5 inch
- **Available insert** LN13: LNGX13

Features

Heat Dispersion Chip Breaker Structure
- Installation of multiple dimples
- Prevents thermal cracks and Increases tool life

Excellent Clamping Stability
- Ensures a large clamping surface area

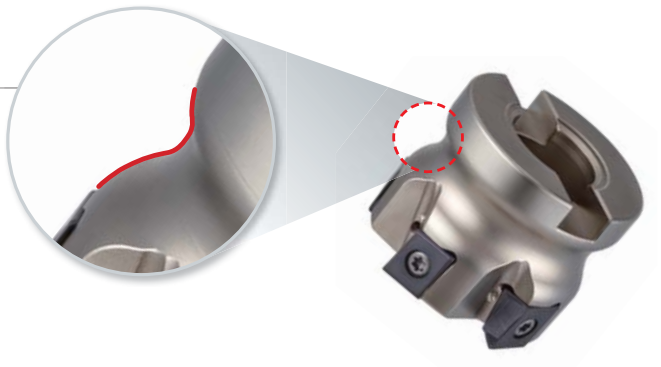
KORLOY Identity symbol mark



High Depth-of-Cut Structure and Optimized Perpendicularity
- APMX 0.472 inch
- Perpendicularity within 30 ㎛

Reinforced Edge Geometry
- Double Negative-Positive Edge Structure
- Improves chipping resistance and Prevents from sudden breakage

Streamlined holder Structure
- Smooth chip evacuation



Application and features of chip breakers

Chip breaker		Cutting edge	Application	Feature
ML			For HRSA and Titanium	Guarantees high quality of performance from applying suitable for low cutting resistance chip breaker for HRSA cutting and high hardness cutting edge
MM			For general cutting	Suitable for general cutting range from design structure for general high feed cutting

Recommended grade and cutting edge

Recommended grade and cutting edge (●: 1st recommendation)							
P		M		K		S	
Chip breaker	Grade	Chip breaker	Grade	Chip breaker	Grade	Chip breaker	Grade
● MM ○ ML	● PC3700 ○ PC5300	● ML	● PC5535 ○ PC5300	● ML ○ MM	● PC6100 ○ PC5535	● ML	● UPC830 ○ PC5300

Recommended cutting conditions

Workpiece				Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	Chip breaker		Grade	Chip breaker		MM/ML
ISO	Workpiece meterial	AISI	ISO			PC3700	MM	ML	PC5300	MM	ML	
						vc (sfm)	fz (ipt)		vc (sfm)	fz (ipt)		APMX (inch)
P	Non-ferrous alloy steel Mn < 1.65	1025	C25	1500	125	755	0.012	0.012	689	0.012	0.012	0.472
						1001	**0.008**	**0.008**	**919**	**0.008**	**0.008**	
						1247	0.004	0.004	1148	0.004	0.004	
		1045	C45	1700	190	689	0.012	0.012	623	0.012	0.012	
						919	**0.008**	**0.008**	**837**	**0.008**	**0.008**	
						1148	0.004	0.004	1050	0.004	0.004	
	Low alloy steel ≤ 5%	4140	42CrMo4	1700	175	525	0.012	0.012	492	0.012	0.012	
						705	**0.008**	**0.008**	**640**	**0.008**	**0.008**	
						886	0.004	0.004	787	0.004	0.004	
	High alloy steel > 5%	D2, H13	X40CrMoV5-1	1950	200	394	0.012	0.012	361	0.012	0.012	
						525	**0.008**	**0.008**	**492**	**0.008**	**0.008**	
						656	0.004	0.004	623	0.004	0.004	

Workpiece				Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	Chip breaker		Grade	Chip breaker		MM/ML
ISO	Workpiece meterial	AISI	ISO			PC5535	MM	ML	PC5300	MM	ML	
						vc (sfm)	fz (ipt)		vc (sfm)	fz (ipt)		APMX (inch)
M	Ferritic/ martensitic	405,430	X6CrAl13 X6Cr17	1800	200	394	0.008	0.008	427	0.008	0.008	0.472
						525	**0.006**	**0.006**	**558**	**0.006**	**0.006**	
						656	0.004	0.004	689	0.004	0.004	
		416,434	X12CrS13 X6CrMo17-1	2850	330	361	0.008	0.008	394	0.008	0.008	
						492	**0.006**	**0.006**	**525**	**0.006**	**0.006**	
						623	0.004	0.004	656	0.004	0.004	
		403, 410	X12Cr13	2350	330	361	0.008	0.008	394	0.008	0.008	
						492	**0.006**	**0.006**	**525**	**0.006**	**0.006**	
						623	0.004	0.004	656	0.004	0.004	
	Austenitic	304, 316	X5CrNI18-9 X2CrNI18-9 X5CrNiMo17-12-2 XCrNiMo17-12-3	2000	180	328	0.008	0.008	344	0.008	0.008	
						443	**0.006**	**0.006**	**459**	**0.006**	**0.006**	
						558	0.004	0.004	574	0.004	0.004	
	Austenitic/ ferritic (Duplex)	S31803, S32750	-	2450	260	246	0.008	0.008	262	0.008	0.008	
						344	**0.006**	**0.006**	**361**	**0.006**	**0.006**	
						443	0.004	0.004	459	0.004	0.004	

Recommended cutting conditions

Workpiece				Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	Chip breaker		Grade	Chip breaker		MM/ML
ISO	Workpiece meterial	AISI	ISO			PC6100	MM	ML	PC5535	MM	ML	
						vc (sfm)	fz (ipt)		vc (sfm)	fz (ipt)		APMX (inch)
K	Gray cast iron	No 30 B	200	900	180	591	0.012	0.012	492	0.012	0.012	0.472
						787	**0.008**	**0.008**	**656**	**0.008**	**0.008**	
						984	0.004	0.004	820	0.004	0.004	
	Nodular graphite cast iron	80-55-06	500-7	870	155	394	0.012	0.012	328	0.012	0.012	
						525	**0.008**	**0.008**	**492**	**0.008**	**0.008**	
						656	0.004	0.004	656	0.004	0.004	

Workpiece				Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	Chip breaker		MM/ML
ISO	Workpiece meterial	AISI	ISO			UPC830	MM	ML	
						vc (sfm)	fz (ipt)		APMX (inch)
S	Nickel based	15156-3	15156-3	2650	250	98	0.008	0.008	0.472
						131	**0.006**	**0.006**	
						164	0.004	0.004	
		9723	9723	3000	320	82	0.008	0.008	
						115	**0.006**	**0.006**	
						148	0.004	0.004	
	Cobalt based alloy	Stellite	Stellite	3000 ~ 3100	300 ~ 320	82	0.008	0.008	
						115	**0.006**	**0.006**	
						148	0.004	0.004	
	Titanium alloy steel	ASTM B265	5832-3	1400	320	148	0.008	0.008	
						180	**0.006**	**0.006**	
						213	0.004	0.004	

Performance evaluation

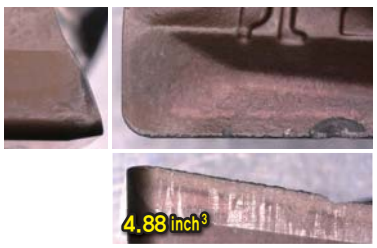
Chipping resistance

Workpiece Titanium alloy (ASTM B265), 3.937 (L) × 3.937 (W) × 3.937 (H), Steel rectangular tube

Cutting condition vc (sfm) = 164, fz (ipt) = 0.006, ap (inch) = 0.394, ae (inch) = 0.197, wet

Tool Insert LNGX130608PNR-ML (PC5300) Holder TP4PCA200R-075-5-LN13

[TP4P]



[Competitor]

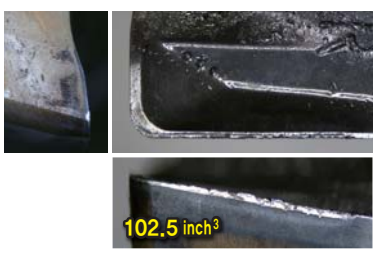
Wear resistance

Workpiece Alloy steel (SCM4140), 11.8 (L) × 7.87 (W) × 3.937 (H), Steel rectangular tube

Cutting condition vc (sfm) = 656, fz (ipt) = 0.006, ap (inch) = 0.276, ae (inch) = 0.394, dry

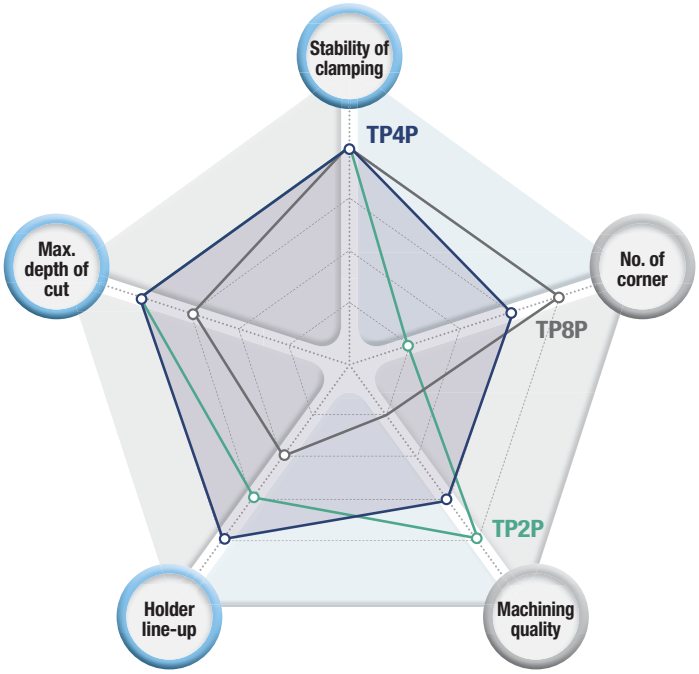
Tool Insert LNGX130608PNR-MM (PC5300) Holder TP4PCA200R-075-5-LN13

[TP4P]



[Competitor]

Tool selection guide



TP4P New!

- Standard Type
- Excellent machinability
- High clamping stability

TP8P

- Maximum no. of corners
- Highly stable clamping

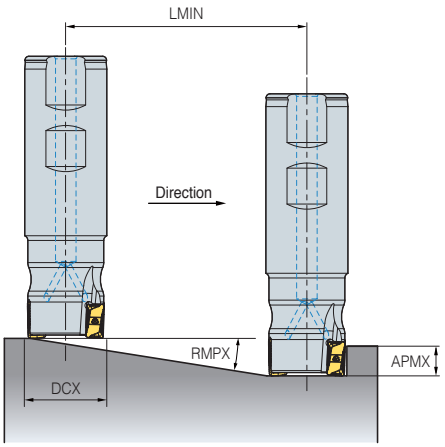
TP2P

- Highly stable clamping
- Good cutting performance
- Excellent surface finish

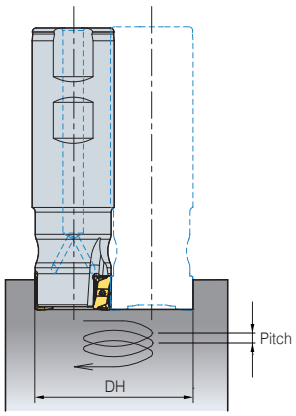
Tools	Stability of clamping	No. of corner	Machining quality	Holder line-up	Max. depth of cut
TP4P New!	★★★★	★★★	★★★	★★★★	★★★★
TP8P	★★★★	★★★★	★	★★	★★★
TP2P	★★★★	★	★★★★	★★★	★★★★

Ramping and helical cutting

Ramping



Helical cutting



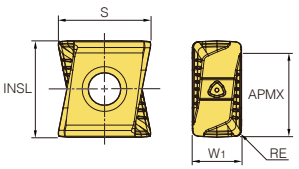
(inch)

Designation		DCX	APMX	Ramping		Helical cutting			
				RMPX(°)	LMIN	Min diameter (DHmin)	Max pitch	Max diameter (DHmax)	Max pitch
LNGX13	Shank	1	0.472	1.4	19.29	1.68	0.052	1.937	0.072
		1.25	0.472	0.96	28.14	2.18	0.049	2.437	0.063
		1.5	0.472	0.8	33.75	2.68	0.052	2.937	0.063
	Cutter	1.5	0.472	0.64	42.23	2.68	0.041	2.937	0.051
		2	0.472	0.45	59.62	3.68	0.042	3.937	0.048
		2.5	0.472	0.35	77.34	4.68	0.042	4.937	0.047
		3	0.472	0.29	94.65	5.703	0.042	5.961	0.046
		4	0.472	0.21	128.9	7.68	0.042	7.937	0.045
		5	0.472	0.17	163.07	9.68	0.043	9.937	0.045

- When ramping and helical milling, table feed, vf (ipm) should belowerthan 70% ofthe recommended cutting conditions.
- When helical milling, Max. pitch, DHmax should belower than max. depthofcut, APMX.
- When ramping, the depth of cut should belower than max. depth of cut, APMX.

- **Lmin** = APMX/tan (RMPX) (inch)
- **Lmin:** Min.length of ramping
- **APMX:** depth of cut Maximum
- **RMPX:** Max. rake angle in ramping

Inserts

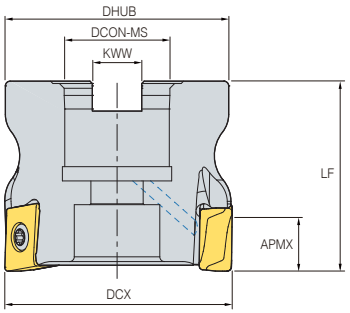
Picture	Designation		Coated						Dimension(inch)					Geometry
			PC3700	PC6100	PC5300	PC5535	PC5400	UPC830	INSL	S	W1	RE	APMX	
	LNGX	130608PNR-ML	●	●	●	●	●	●	0.526	0.512	0.268	0.031	0.472	
	LNGX	130608PNR-MM	●	●	●	●	●	●	0.526	0.512	0.268	0.031	0.472	

●: Stock item

TP4PCA-LN13 (Single-edge)

KAPR 90°

- **GAMP** : -6°
- **GAMF** : -19° ~ -17°



(inch)

	Designation	DCX	CICT	DCON-MS	DHUB	LF	KWW	APMX
TP4PCA	150R-050-4-LN13	1.5	4	0.5	1.42	1.5	0.252	0.472
	150R-050-5-LN13	1.5	5	0.5	1.42	1.5	0.252	0.472
	200R-075-5-LN13	2	5	0.75	1.772	1.75	0.315	0.472
	200R-075-6-LN13	2	6	0.75	1.772	1.75	0.315	0.472
	250R-100-6-LN13	2.5	6	1	2.205	1.75	0.374	0.472
	250R-100-8-LN13	2.5	8	1	2.205	1.75	0.374	0.472
	300R-100-7-LN13	3	7	1	2.205	2	0.374	0.472
	300R-100-10-LN13	3	10	1	2.205	2	0.374	0.472
	400R-125-8-LN13	4	8	1.25	2.874	2	0.5	0.472
	400R-125-13-LN13	4	13	1.25	2.874	2	0.5	0.472
	500R-150-9-LN13	5	9	1.5	3.937	2.5	0.626	0.472
	500R-150-17-LN13	5	17	1.5	3.937	2.5	0.626	0.472

Available inserts

LNGX-ML

LNGX-MM

	Designation	Coated					
		PC3700	PC6100	PC5300	PC5535	PC5400	UPC830
LNGX	130608PNR-ML	●	●	●	●	●	●
	130608PNR-MM	●	●	●	●	●	●

●: Stock item

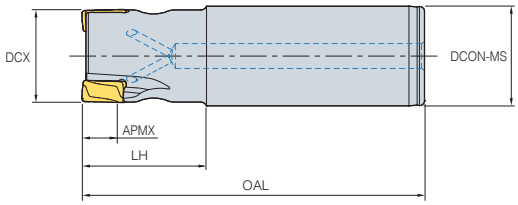
Parts

Specification \ Parts	Screw	Wrench
Ø1.5	FTKA0410	TW15S
Ø2 ~ Ø5	FTKA0412B	TW15S

TP4PSA-LN13

KAPR 90°

- **GAMP** : -6°
- **GAMF** : -32° ~ -21°



(inch)

	Designation	DCX	CICT	DCON-MS	OAL	LH	APMX
TP4PSA	100R-2C100-500-LN13	1	2	1	5	1.378	0.472
	100R-2W100-400-LN13	1	2	1	4	1.378	0.472
	125R-2C125-1000-LN13	1.25	2	1.25	10	1.969	0.472
	125R-2W125-450-LN13	1.25	2	1.25	4.5	1.575	0.472
	125R-3C125-1000-LN13	1.25	3	1.25	10	1.969	0.472
	125R-3W125-450-LN13	1.25	3	1.25	4.5	1.575	0.472
	150R-3C125-1000-LN13	1.5	3	1.25	10	1.969	0.472
	150R-3W125-450-LN13	1.5	3	1.25	4.5	1.575	0.472
	150R-4C125-1000-LN13	1.5	4	1.25	10	1.969	0.472
	150R-4W125-450-LN13	1.5	4	1.25	4.5	1.575	0.472

Available inserts

LNGX-ML

LNGX-MM

	Designation	Coated					
		PC3700	PC6100	PC5300	PC5535	PC5400	UPC830
LNGX	130608PNR-ML	●	●	●	●	●	●
	130608PNR-MM	●	●	●	●	●	●

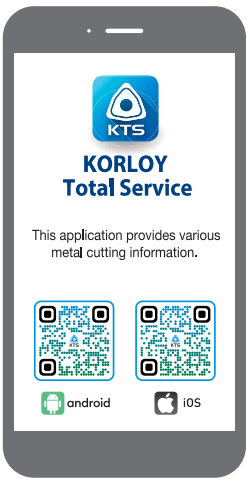
●: Stock item

Parts

Specification \ Parts	Screw	Wrench
Ø1	FTKA0410	TW15S
Ø1.25 ~ Ø1.5	FTKA0412B	TW15S

⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasses or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the tools can be pulled out due to centrifugal force while high speed machining.



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