QEJ082

How to use AQX endmill

1. Features

①The AQX is designed with a center cutting edge , therefore it is possible to conduct drilling , without the need of a prepared hole , through to end milling with only the need for one tool.

②Tool management is made easier by only employing one insert geometry . Additionally by rotating the inserts it is possible to use the inserts twice.

③The cutting edge diameter has been designed so that it is 1mm larger than the shank diameter, making it possible to machine vertical faces without interfering with the work piece.

④The body of the tool is made from a special alloy steel that has high heat resistant properties. A special surface treatment is used to increase wear and corrosion resistance.

⑤Coolant holes are designed into the body of the tool to improve cooling and chip disposal properties.

2. How to locate the insert

①Prior to locating the insert , ensure that the insert seat is clean. Use high pressure air or a brush to clean.

②When locating the insert , hold it down firmly while tightening the clamp screw with the provided wrench.

③To prevent the screw from seizing, use an anti-seize cream. Additionally ensure that the clamping forces are not exceeded. (Refer to Table 1.)

④When changing the inserts do so as shown in (Fig.1 and Fig.2). By changing the inserts in this manner the inserts can be used twice. If corner change is not carried out as shown then it will result in machining using a spent cutting edge.

⑤Please note that the insert sizes vary with the diameter of the endmill. Table 1 shows the suitable inserts , screws and wrenches.

Table 1. Suitable insert,screw,clamping torque and wrench.

Order Number	Dia. D1(mm)	Insert	Screw	Torque	Wrench
AQXR16※	16	QOOT0830R-OO	TS2A	0.5 Nm	TKY06F
AQXR17※	17				
AQXR20※	20	QOOT1035R-OO	TS25	1.0 Nm	TKY08F
AQXR21※	21				
AQXR25※	25	QOOT1342R-OO	TS33	1.5 Nm	TKY08D
AQXR26※	26				
AQXR32※	32	QOOT1651R-OO	TS407	3.5 Nm	TKY15D
AQXR33※	33				
AQXR35※	35	QOOT1856R-OO			
AQXR40※	40	QOOT2062R-OO	TS55	7.5 Nm	TKY25D
AQXR50※	50	QOOT2576R-OO	TS6S	20.0 Nm	TKY30T

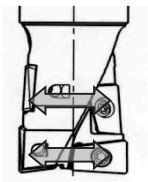


Fig.1 Side way

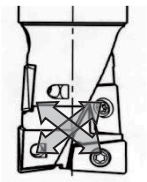
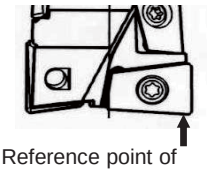


Fig.2 Cross way

3. How to attach the tool

①Before attaching to a milling holder , ensure that all locating faces have been cleaned and are free of any obstructions.



Reference point of height measurement

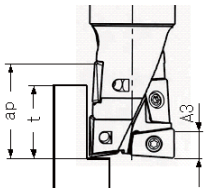
②To improve the drilling performance, the height of the inserts varies. The centre cutting edge insert shown has a lower corner height. Therefore when setting the cutting edge height for machining set using the corner shown to the left.

4. Notes of the depth of cut

①A3 is the depth of cut for the dual blade point at the end of the cutting edge.

②Beyond the range of A3 where the cutting edge becomes single bladed, not forming full dual blade configuration. As such, please pay special attention to the relationship between depth of cut and feed.

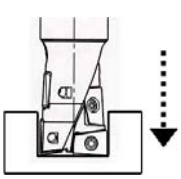
③In general, the edge at the border of cut tends to suffer from damages. For large depth of cut operations, applying the following depth of cut (t), at which the edge is full dual bladed at the border of cut , is recommended to prevent damage to the cutting edge.



Order Number	A3 (mm)	t (mm)	ap (mm)
AQXR164※	4.5	12-14	17.6
AQXR174※			
AQXR204※	6.0	14-17	22.0
AQXR214※			
AQXR254※	7.5	17-22	27.5
AQXR264※			
AQXR324※	9.5	22-28	35.2
AQXR334※			
AQXR354※	11.0	25-32	40.0
AQXR404※	12.0	28-35	44.0
AQXR504※	15.0	35-45	55.0

5. Notes of the drilling

①The recommended drilling depth is less than 0.5D1.



②Use step feed when drilling to ensure that the chips are effectively broken.

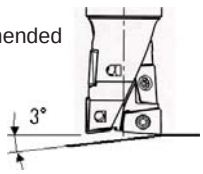
③Use internal or external air or coolant to ensure that the chips disposal is sufficiently achieved.

④The chips generated can dispel in any direction, so ensure that adequate safety precautions are taken.

6. Notes of the ramping

①When machining steel the recommended ramping angle is less than 3deg.

②When conducting ramping it is recommended to reduce the feed rate by 40%.



7. Recommended cutting conditions

■Cutting conditions for shoulder milling

Workpiece	Hardness	Grade	Cutting Speed (m/min)	φ 16,17			φ 20,21			φ 25,26			φ 32,33			φ 35			φ 40			φ 50		
				Depth of cut (mm)	Width of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Width of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Width of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Width of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Width of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Width of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Width of cut (mm)	Feed (mm/rev)
Mild Steel	<180HB	VP15TF	180 (150-220)	~4.5	~8	0.25	~6	~10	0.30	~7.5	~12.5	0.35	~9.5	~16	0.40	~11	~17.5	0.45	~12	~20	0.50	~15	~26	0.60
				4.5~12	~5	0.16	6~14	~7	0.25	7.5~17	~8	0.28	9.5~22	~11	0.32	11~25	~12	0.35	12~28	~13	0.40	15~35	~16	0.50
				12~17	~3	0.10	14~22	~4	0.18	17~27	~5	0.20	22~35	~6	0.25	25~40	~6.5	0.28	28~44	~7	0.30	35~55	~10	0.35
Carbon Steel Alloy Steel	180-350HB	VP15TF	160 (120-200)	~4.5	~8	0.20	~6	~10	0.25	~7.5	~12.5	0.30	~9.5	~16	0.35	~11	~17.5	0.37	~12	~20	0.40	~15	~25	0.50
				4.5~12	~4	0.14	6~14	~6	0.20	7.5~17	~7	0.25	9.5~22	~10	0.28	11~25	~11	0.30	12~28	~12	0.32	15~35	~14	0.40
				12~17	~2	0.08	14~22	~3	0.16	17~27	~4	0.18	22~35	~5	0.20	25~40	~5.5	0.22	28~44	~6	0.25	35~55	~8	0.30
Hardened Steel	40-55HRC	VP15TF	80 (50-120)	~4.5	~5	0.16	~6	~6	0.20	~7.5	~7	0.22	~9.5	~8	0.25	~11	~9	0.28	~12	~10	0.30	~15	~14	0.35
				4.5~12	~3	0.10	6~14	~4	0.16	7.5~17	~4	0.18	9.5~22	~5	0.20	11~25	~5.5	0.22	12~28	~6	0.24	15~35	~8	0.30
				12~17	~1	0.06	14~22	~2	0.12	17~27	~2	0.14	22~35	~2	0.16	25~40	~2	0.17	28~44	~2	0.18	35~55	~4	0.22
Stainless Steel	<270HB	VP15TF	150 (120-180)	~4.5	~8	0.20	~6	~10	0.25	~7.5	~12.5	0.30	~9.5	~16	0.35	~11	~17.5	0.37	~12	~20	0.40	~15	~25	0.50
				4.5~12	~4	0.14	6~14	~6	0.20	7.5~17	~7	0.25	9.5~22	~10	0.28	11~25	~12	0.30	12~28	~12	0.32	15~35	~14	0.40
				12~17	~2	0.08	14~22	~3	0.16	17~27	~4	0.18	22~35	~5	0.20	25~40	~6.5	0.22	28~44	~6	0.25	35~55	~8	0.30
Cast Iron	<450 N/mm2	VP15TF	180 (150-220)	~4.5	~8	0.25	~6	~10	0.30	~7.5	~12.5	0.35	~9.5	~16	0.40	~11	~17.5	0.45	~12	~20	0.50	~15	~25	0.60
				4.5~12	~5	0.16	6~14	~7	0.25	7.5~17	~8	0.28	9.5~22	~11	0.32	11~25	~12	0.35	12~28	~13	0.40	15~35	~16	0.50
				12~17	~3	0.10	14~22	~4	0.18	17~27	~5	0.20	22~35	~6	0.25	25~40	~6.5	0.28	28~44	~7	0.30	35~55	~8	0.35
Alminum Alloy	-	HTi10 (G1)	500 (200-800)	~4.5	~11	0.30	~6	~14	0.35	~7.5	~17.5	0.40	~9.5	~23	0.45	~11	~24.5	0.50	~12	~28	0.55	~15	~35	0.65
				4.5~12	~8	0.21	6~14	~10	0.30	7.5~17	~12.5	0.33	9.5~22	~16	0.37	11~25	~17.5	0.40	12~28	~20	0.45	15~35	~25	0.55
				12~17	~5	0.15	14~22	~6	0.23	17~27	~7.5	0.25	22~35	~10	0.30	25~40	~10.5	0.32	28~44	~12	0.35	35~55	~15	0.40

■Cutting conditions for slotting

Workpiece	Hardness	Grade	Cutting Speed (m/min)	φ 16,17		φ 20,21		φ 25,26		φ 32,33		φ 35		φ 40		φ 50	
				Depth of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Feed (mm/rev)	Depth of cut (mm)	Feed (mm/rev)
Mild Steel	<180HB	VP15TF	180 (150-220)	~4.5	0.16	~6	0.18	~7.5	0.20	~9.5	0.25	~11	0.27	~12	0.30	~15	0.35
				4.5~12	0.10	6~14	0.14	7.5~17	0.16	9.5~22	0.20	11~25	0.22	12~28	0.25	15~35	0.30
				12~17	0.07	14~22	0.10	17~27	0.12	22~35	0.14	25~40	0.16	28~44	0.18	35~55	0.22
Carbon Steel Alloy Steel	180-350HB	VP15TF	160 (120-200)	~4.5	0.14	~6	0.16	~7.5	0.18	~9.5	0.20	~11	0.22	~12	0.25	~15	0.30
				4.5~12	0.09	6~14	0.12	7.5~17	0.14	9.5~22	0.16	11~25	0.18	12~28	0.20	15~35	0.25
				12~17	0.05	14~22	0.10	17~27	0.10	22~35	0.12	25~40	0.13	28~44	0.14	35~55	0.16
Hardened Steel	40-55HRC	VP15TF	80 (50-120)	~4.5	0.10	~6	0.12	~7.5	0.14	~9.5	0.16	~11	0.17	~12	0.18	~15	0.22
				4.5~12	0.07	6~14	0.10	7.5~17	0.12	9.5~22	0.12	11~25	0.13	12~28	0.14	15~35	0.16
Stainless Steel	<270HB	VP15TF	150 (120-180)	~4.5	0.14	~6	0.16	~7.5	0.18	~9.5	0.20	~11	0.22	~12	0.25	~15	0.30
				4.5~12	0.09	6~14	0.12	7.5~17	0.14	9.5~22	0.16	11~25	0.18	12~28	0.20	15~35	0.25
				12~17	0.05	14~22	0.10	17~27	0.10	22~35	0.12	25~40	0.13	28~44	0.14	35~55	0.16
Cast Iron	<450 N/mm2	VP15TF	180 (150-220)	~4.5	0.16	~6	0.18	~7.5	0.20	~9.5	0.25	~11	0.27	~12	0.30	~15	0.35
				4.5~12	0.10	6~14	0.14	7.5~17	0.16	9.5~22	0.20	11~25	0.22	12~28	0.25	15~35	0.30
				12~17	0.07	14~22	0.10	17~27	0.12	22~35	0.14	25~40	0.16	28~44	0.18	35~55	0.22
Alminum Alloy	-	HTi10 (G1)	500 (200-800)	~4.5	0.18	~6	0.20	~7.5	0.22	~9.5	0.27	~11	0.30	~12	0.32	~15	0.37
				4.5~12	0.12	6~14	0.16	7.5~17	0.18	9.5~22	0.22	11~25	0.25	12~28	0.27	15~35	0.32
				12~17	0.09	14~22	0.12	17~27	0.14	22~35	0.16	25~40	0.18	28~44	0.20	35~55	0.25

①Figures shown above are general cutting conditions.Please reduce the conditions considering your machine.
②Please pay special attention to the depth of cut when using the short edge type.
③When using the G1 breaker (VP15TF) please reduce the feed rate by 20%.
④If more information is required, please look [MITSUBISHI TOOLS NEWS B021].

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