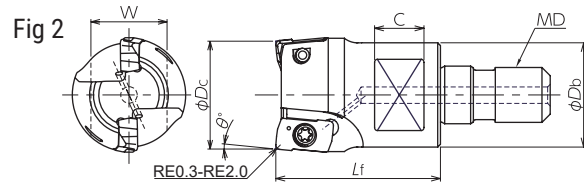
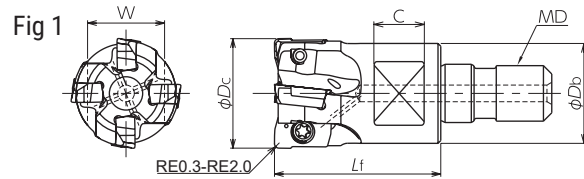


5-AXIS Series



High precision "QM MAX" MQT type

- 3 different angled bodies (0°, 3°, and 5°) that cover a range of tapered walls from 0° ~ 8°
- Possible to use even on 3 axis machine with 3° or 5° angled body ; A03 type or A05 type
- High tolerance insert-pocket for the ground inserts
- High efficiency with multi flutes

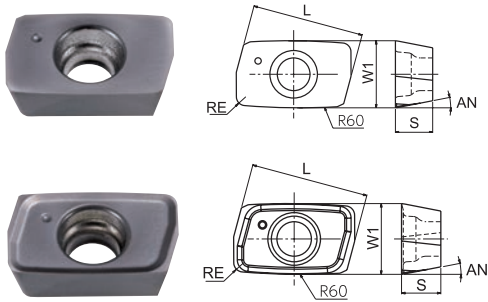


Inclination angle θ°	Cat.No.	Stock	No. of inserts	Dimensions (mm)						Parts		Inserts	Fig.	
				ϕD_c	L_f	ϕD_b	MD	C	W	Screws	Wrench			
0°	MQT-2016A00-M8	●	2	16	23	14	M8	8	12	TSW-2556H	A-08	XP**100308ZER-R; YPHW1003**Z*R-**; ZPMT1003**ZER-PL	1	
	MQT-4020A00-M10	●	4	20	30	18	M10	9	14					
	MQT-5025A00-M12	●	5	25	35	22.5	M12	10	17	DSW-2563H				
	MQT-6032A00-M16	●	6	32	43	29	M16	12	22					
	MQT-6035A00-M16	●		35			M16							
3°	MQT-2016A03-M8	●	2	16	23	14	M8	8	12	TSW-2556H	A-08	XP**100308ZER-R; YPHW1003**Z*R-**; ZPMT1003**ZER-PL	2	
	MQT-2020A03-M10	●		20	30	18	M10	9	14					
5°	MQT-2016A05-M8	●		16	23	14	M8	8	12					TSW-2556H
	MQT-2020A05-M10	●		20	30	18	M10	9	14					

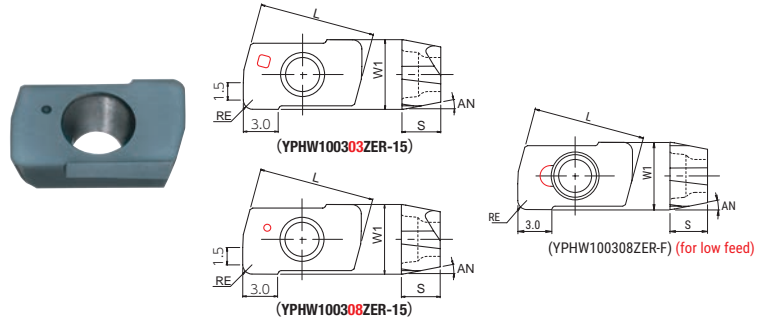
Clamp screw	Torque(N.m)
TSW-2556H	3.0
DSW-2563H	4.0

5-AXIS Series

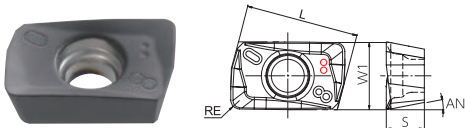
For tapered wall finishing
 (XPHW100308ZER-R)
 (XPHT100308RZER-R)



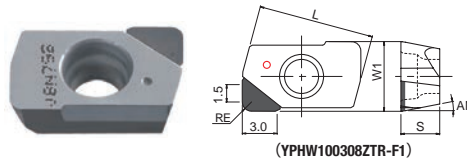
For finishing side face
 (YPHW1003**ZER-15)
 (YPHW100308ZER-F)
 (YPHW100308ZTR-F1)



Shoulder milling insert
 (from semi-finishing to finishing)
 ZPMT1003**ZER-PL*



CBN Insert



Type	Cat.No.	Tolerance	PVD Coating				Cermet	CBN	Dimensions (mm)			
			DH102	JC8015	JC8050	JC8118	CX75	JBN795	RE	L	W1	S
For tapered wall finishing	XPHW100308ZER-R	H	●	●			●	0.8	10.06	6	3.35	11°
	XPHT100308ZER-R						●					
For finishing side face	YPHW100303ZER-15	●	●			●	0.3					
	YPHW100308ZER-15	●				●						
	YPHW100308ZER-F		●			●						
	YPHW100308ZTR-F1					●						
Shoulder milling insert (from semi-finishing to finishing)	ZPMT100304ZER-PL	M	●		●	●	●	0.4				
	ZPMT100308ZER-PL		●		●	●	●		0.8			
	ZPMT100320ZER-PL		●		●	●	●			2		

5-AXIS Series

■ Recommended cutting conditions

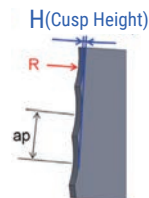
● KRM Type Side finishing



Material	Grade	Tool dia.(mm)							
		16				20			
		a_p (mm)	a_e (mm)	n (min^{-1})	V_f (mm/min)	a_p (mm)	a_e (mm)	n (min^{-1})	V_f (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	0.8	0.15	5,970	2,390	1	0.15	4,770	1,910
Cast steel (GM190, ICD5) below 285HB	JC8015	0.8	0.15	5,970	2,390	1	0.15	4,770	1,910
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	0.8	0.15	5,970	2,390	1	0.15	4,770	1,910
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	0.8	0.12	5,970	2,390	1	0.12	4,770	1,910
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	0.8	0.12	5,570	1,670	1	0.12	4,460	1,340
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102	0.6	0.1	4,970	750	0.7	0.1	3,980	600
Hardened die steel (SKD11, SL, DC11) 55-62HRC	DH102	0.5	0.1	3,980	600	0.7	0.1	3,180	480
Grey cast iron (FC250) 160-260HB	DH102	0.8	0.2	6,960	3,480	1	0.2	5,570	3,340
Nodular cast iron (FCD700) 170-300HB	DH102	0.8	0.2	6,960	3,480	1	0.2	5,570	3,340
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	0.8	0.12	5,570	2,230	1	0.12	4,460	1,780
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	0.8	0.12	5,570	2,230	1	0.12	4,460	1,780
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	0.5	0.1	1,990	480	0.6	0.1	1,590	380
Heat resistant alloy (INCO718) 35-43HRC	JC8015	0.5	0.1	1,590	380	0.6	0.1	1,270	300

Please refer to chart and formula below to calculate a_p .

$$a_p = 2 \sqrt{(R^2 - (R - H)^2)}$$



a_p (mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
KRM-160-R10-BR50	50	0.63	0.89	1.10	1.26	1.41	1.55	1.67	1.79	1.90	2.00
KRM-200-R10-BR60	60	0.69	0.98	1.20	1.39	1.55	1.70	1.83	1.96	2.08	2.19

Note

1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameters are for overhang length 3Dc. See right table for longer application.
3. In case of chatter occurring, recommended to reduce a_p or rpm and keep feed per tooth.
4. Use air blow.

Overhang (l/D_c)	n (min^{-1})	V_f (mm/min)
$\sim 3D_c$	100%	100%
$3D_c \sim 5D_c$	70%	70%
$5D_c \sim 10D_c$	50%	50%

5-AXIS Series

■ Definition of edge shape for programming

● When using taper holder (MQT-***A03/05 type)

Fig.1 XPHW/T

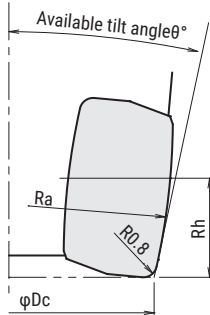
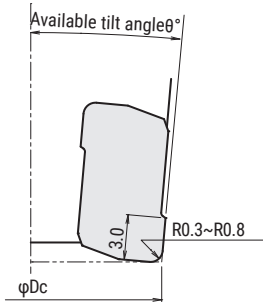


Fig.2 YPHW



● Dimensions when using XPHW / T insert

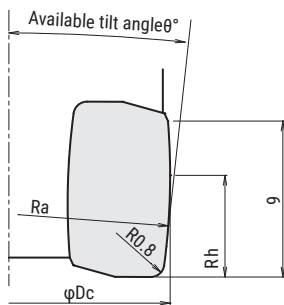
available tilt angle	Cat.No	Dimensions (mm)			Fig
		φDc	Ra	Rh	
1°~6°	MQT-2016A03-M8	15.5	R64.19	8.76	1
3°~8°	MQT-2016A05-M8	15.5	R64.34	10.98	1
1°~6°	MQT-2020A03-M10	19.5	R63.34	8.67	1
3°~8°	MQT-2020A05-M10	19.5	R63.46	10.85	1

● Dimensions when using YPHW insert

available tilt angle	Cat.No	Dimensions (mm)		Fig
		φDc		
3°	MQT-2016A03-M8	16		2
5°	MQT-2016A05-M8	16		2
3°	MQT-2020A03-M10	20		2
5°	MQT-2020A05-M10	20		2

● When using straight holder (MQT-***A00 type)

Fig.3 XPHW/T



● Dimensions when using XPHW/T insert

available tilt angle	Cat.No	Dimensions (mm)			Fig
		φDc	Ra	Rh	
0°~3°	MQT-2016A00-M8	16	R63.27	5.48	3
0°~3°	MQT-4020A00-M10	20	R64.29	5.48	3
0°~3°	MQT-5025A00-M12	25	R63.26	5.48	3
0°~3°	MQT-6032A00-M16	32	R62.41	5.48	3
0°~3°	MQT-6035A00-M16	35	R62.16	5.48	3

● Dimensions when using YPHW insert

available tilt angle	Cat.No	Dimensions (mm)		Fig
		φDc		
0°	MQT-2016A00-M8	16		-
0°	MQT-4020A00-M10	20		-
0°	MQT-5025A00-M12	25		-
0°	MQT-6032A00-M16	32		-
0°	MQT-6035A00-M16	35		-

5-AXIS Series

■ Recommended cutting conditions

MQT type with XPHT/XPHW insert for finishing side wall + MSN shank

Material	Grade	Tool dia.(mm)														
		16					20					20				
		2N					2N					4N				
		r (mm)	a _p (mm)	a _e (mm)	n (min ⁻¹)	V _f (mm/min)	r (mm)	a _p (mm)	a _e (mm)	n (min ⁻¹)	V _f (mm/min)	r (mm)	a _p (mm)	a _e (mm)	n (min ⁻¹)	V _f (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015 XPHT (XPHW)	~55	≤1.5	<0.12	12,000	4,800	~70	≤1.5	<0.12	9,600	3,840	~70	≤1.5	<0.12	9,600	7,680
	(CX75)	55~80	≤1.2	<0.10	9,000	3,600	70~100	≤1.2	<0.10	7,200	2,880	70~100	≤1.2	<0.10	7,200	5,760
		80~105	≤1.0	<0.10	7,200	2,880	100~130	≤1.0	<0.10	5,760	2,300	100~130	≤1.0	<0.10	5,760	4,600
		105~160	≤1.0	<0.10	6,000	2,400	130~200	≤1.0	<0.10	4,800	1,920	130~200	≤1.0	<0.10	4,800	3,840
Tool & die steel (SKD61, SKD11) below 255HB	JC8015 XPHT (XPHW)	~55	≤1.5	<0.12	10,000	4,000	~70	≤1.5	<0.12	8,000	3,200	~70	≤1.5	<0.12	8,000	6,400
	(CX75)	55~80	≤1.2	<0.10	7,500	3,000	70~100	≤1.2	<0.10	6,000	2,400	70~100	≤1.2	<0.10	6,000	4,800
		80~105	≤1.0	<0.10	6,000	2,400	100~130	≤1.0	<0.10	4,800	1,920	100~130	≤1.0	<0.10	4,800	3,840
		105~160	≤1.0	<0.10	5,000	2,000	130~200	≤1.0	<0.10	4,000	1,600	130~200	≤1.0	<0.10	4,000	3,200
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015 XPHT (XPHW)	~55	≤1.2	<0.12	9,000	3,600	~70	≤1.2	<0.12	7,200	2,880	~70	≤1.2	<0.12	7,200	5,760
	(DH102)	55~80	≤1.0	<0.10	6,800	2,720	70~100	≤1.0	<0.10	5,400	2,160	70~100	≤1.0	<0.10	5,400	4,320
		80~105	≤0.8	<0.10	5,400	2,160	100~130	≤0.8	<0.10	4,320	1,730	100~130	≤0.8	<0.10	4,320	3,460
		105~160	≤0.8	<0.10	4,500	1,800	130~200	≤0.8	<0.10	3,600	1,440	130~200	≤0.8	<0.10	3,600	2,880
Mold steel (NAK80, HPM1, P21) 38-43HRC	DH102 XPHW	~55	≤1.0	<0.12	8,000	3,200	~70	≤1.0	<0.12	6,400	2,560	~70	≤1.0	<0.12	6,400	5,120
	(JC8015)	55~80	≤0.8	<0.10	6,000	2,400	70~100	≤0.8	<0.10	4,800	1,920	70~100	≤0.8	<0.10	4,800	3,840
		80~105	≤0.6	<0.10	4,800	1,920	100~130	≤0.6	<0.10	3,840	1,540	100~130	≤0.6	<0.10	3,840	3,080
		105~160	≤0.6	<0.10	4,000	1,600	130~200	≤0.6	<0.10	3,200	1,280	130~200	≤0.6	<0.10	3,200	2,560
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102 XPHW	~55	≤1.0	<0.10	5,000	1,500	~70	≤1.0	<0.10	4,000	1,200	~70	≤1.0	<0.10	4,000	2,400
	(JC8015)	55~80	≤0.8	<0.08	3,750	1,130	70~100	≤0.8	<0.08	3,000	900	70~100	≤0.8	<0.08	3,000	1,800
		80~105	≤0.6	<0.08	3,000	900	100~130	≤0.6	<0.08	2,400	720	100~130	≤0.6	<0.08	2,400	1,440
		105~160	≤0.6	<0.08	2,500	750	130~200	≤0.6	<0.08	2,000	600	130~200	≤0.6	<0.08	2,000	1,200
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102 XPHW	~55	≤1.0	<0.10	3,600	720	~70	≤1.0	<0.10	2,860	570	~70	≤1.0	<0.10	2,860	1,140
		55~80	≤0.8	<0.08	2,700	540	70~100	≤0.8	<0.08	2,140	430	70~100	≤0.8	<0.08	2,140	860
		80~105	≤0.6	<0.08	2,160	430	100~130	≤0.6	<0.08	1,720	340	100~130	≤0.6	<0.08	1,720	680
		105~160	≤0.6	<0.08	1,800	360	130~200	≤0.6	<0.08	1,430	290	130~200	≤0.6	<0.08	1,430	580
Grey & Nodular cast iron (FC, FCD) below 300HB	JC8015 XPHW (XPHT)	~55	≤1.5	<0.12	12,000	6,000	~70	≤1.5	<0.12	9,600	4,800	~70	≤1.5	<0.12	9,600	9,600
	(DH102)	55~80	≤1.2	<0.10	9,000	4,500	70~100	≤1.2	<0.10	7,200	3,600	70~100	≤1.2	<0.10	7,200	7,200
		80~105	≤1.0	<0.10	7,200	3,600	100~130	≤1.0	<0.10	5,760	2,880	100~130	≤1.0	<0.10	5,760	5,760
		105~160	≤1.0	<0.10	6,000	3,000	130~200	≤1.0	<0.10	4,800	2,400	130~200	≤1.0	<0.10	4,800	4,800
Stainless steel (SUS304) below 250HB	JC8015 XPHT (XPHW)	~55	≤1.2	<0.12	10,000	4,000	~70	≤1.2	<0.12	8,000	3,200	~70	≤1.2	<0.12	8,000	6,400
		55~80	≤1.0	<0.10	7,500	3,000	70~100	≤1.0	<0.10	6,000	2,400	70~100	≤1.0	<0.10	6,000	4,800
		80~105	≤0.8	<0.10	6,000	2,400	100~130	≤0.8	<0.10	4,800	1,920	100~130	≤0.8	<0.10	4,800	3,840
		105~160	≤0.8	<0.10	5,000	2,000	130~200	≤0.8	<0.10	4,000	1,600	130~200	≤0.8	<0.10	4,000	3,200

Cusp height: XPHT/W

Cusp Height (μm)	a _p (mm)	Cusp Height (μm)	a _p (mm)
0.50	0.5	3.35	1.3
0.71	0.6	3.89	1.4
0.97	0.7	4.46	1.5
1.27	0.8	5.08	1.6
1.61	0.9	5.73	1.7
1.98	1.0	6.43	1.8
2.40	1.1	7.16	1.9
2.86	1.2	7.94	2.0

Note

- Figures to be adjusted according to machine rigidity or work rigidity.
- If chattering occurs, recommended to reduce a_p and a_e.
- Use air blow.

5-AXIS Series

■ Recommended cutting conditions

MQT type with XPHT/XPHW insert for finishing side wall + MSN shank

Material	Grade	Tool dia.(mm)									
		25					32/35				
		5N					6N				
		r (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)	r (mm)	ap (mm)	ae (mm)	n (min ⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015 XPHT (XPHW) (CX75)	~90	≤1.5	<0.12	7,640	7,640	~120	≤1.5	<0.12	5,460	6,550
		90~125	≤1.2	<0.10	5,730	5,730	120~175	≤1.2	<0.10	4,100	4,920
		125~160	≤1.0	<0.10	4,580	4,580	175~225	≤1.0	<0.10	3,280	3,940
		160~250	≤1.0	<0.10	3,820	3,820	225~320	≤1.0	<0.10	2,730	3,280
Tool & die steel (SKD61, SKD11) below 255HB	JC8015 XPHT (XPHW) (CX75)	~90	≤1.5	<0.12	6,400	6,400	~120	≤1.5	<0.12	4,550	5,460
		90~125	≤1.2	<0.10	4,800	4,800	120~175	≤1.2	<0.10	3,410	4,090
		125~160	≤1.0	<0.10	3,840	3,840	175~225	≤1.0	<0.10	2,730	3,280
		160~250	≤1.0	<0.10	3,200	3,200	225~320	≤1.0	<0.10	2,280	2,740
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015 XPHT (XPHW) (DH102)	~90	≤1.2	<0.12	5,730	5,730	~120	≤1.2	<0.12	4,090	4,910
		90~125	≤1.0	<0.10	4,300	4,300	120~175	≤1.0	<0.10	3,070	3,680
		125~160	≤0.8	<0.10	3,440	3,440	175~225	≤0.8	<0.10	2,450	2,940
		160~250	≤0.8	<0.10	2,870	2,870	225~320	≤0.8	<0.10	2,050	2,460
Mold steel (NAK80, HPM1, P21) 38-43HRC	DH102 XPHW (JC8015)	~90	≤1.0	<0.12	5,100	5,100	~120	≤1.0	<0.12	3,640	4,370
		90~125	≤0.8	<0.10	3,830	3,830	120~175	≤0.8	<0.10	2,730	3,280
		125~160	≤0.6	<0.10	3,060	3,060	175~225	≤0.6	<0.10	2,180	2,620
		160~250	≤0.6	<0.10	2,550	2,550	225~320	≤0.6	<0.10	1,820	2,180
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102 XPHW (JC8015)	~90	≤1.0	<0.10	3,180	2,380	~120	≤1.0	<0.10	2,280	2,050
		90~125	≤0.8	<0.08	2,380	1,780	120~175	≤0.8	<0.08	1,710	1,540
		125~160	≤0.6	<0.08	1,910	1,430	175~225	≤0.6	<0.08	1,370	1,230
		160~250	≤0.6	<0.08	1,590	1,190	225~320	≤0.6	<0.08	1,140	1,030
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102 XPHW	~90	≤1.0	<0.10	2,300	1,150	~120	≤1.0	<0.10	1,640	980
		90~125	≤0.8	<0.08	1,720	860	120~175	≤0.8	<0.08	1,230	740
		125~160	≤0.6	<0.08	1,380	690	175~225	≤0.6	<0.08	980	590
		160~250	≤0.6	<0.08	1,150	580	225~320	≤0.6	<0.08	820	490
Grey & Nodular cast iron (FC, FCD) below 300HB	JC8015 XPHW (XPHT) (DH102)	~90	≤1.5	<0.12	7,640	9,550	~120	≤1.5	<0.12	5,460	8,190
		90~125	≤1.2	<0.10	5,730	7,160	120~175	≤1.2	<0.10	4,100	6,150
		125~160	≤1.0	<0.10	4,580	5,720	175~225	≤1.0	<0.10	3,280	4,920
		160~250	≤1.0	<0.10	3,820	4,780	225~320	≤1.0	<0.10	2,730	4,100
Stainless steel (SUS304) below 250HB	JC8015 XPHT (XPHW)	~90	≤1.2	<0.12	6,400	6,400	~120	≤1.2	<0.12	4,550	5,460
		90~125	≤1.0	<0.10	4,800	4,800	120~175	≤1.0	<0.10	3,410	4,090
		125~160	≤0.8	<0.10	3,840	3,840	175~225	≤0.8	<0.10	2,730	3,280
		160~250	≤0.8	<0.10	3,200	3,200	225~320	≤0.8	<0.10	2,280	2,740

Cusp height: XPHT/W

Cusp Height (μm)	ap(mm)	Cusp Height (μm)	ap(mm)
0.50	0.5	3.35	1.3
0.71	0.6	3.89	1.4
0.97	0.7	4.46	1.5
1.27	0.8	5.08	1.6
1.61	0.9	5.73	1.7
1.98	1.0	6.43	1.8
2.40	1.1	7.16	1.9
2.86	1.2	7.94	2.0

Note

- Figures to be adjusted according to machine rigidity or work rigidity.
- If chattering occurs, recommended to reduce ap and ae.
- Use air blow.