

MillLine

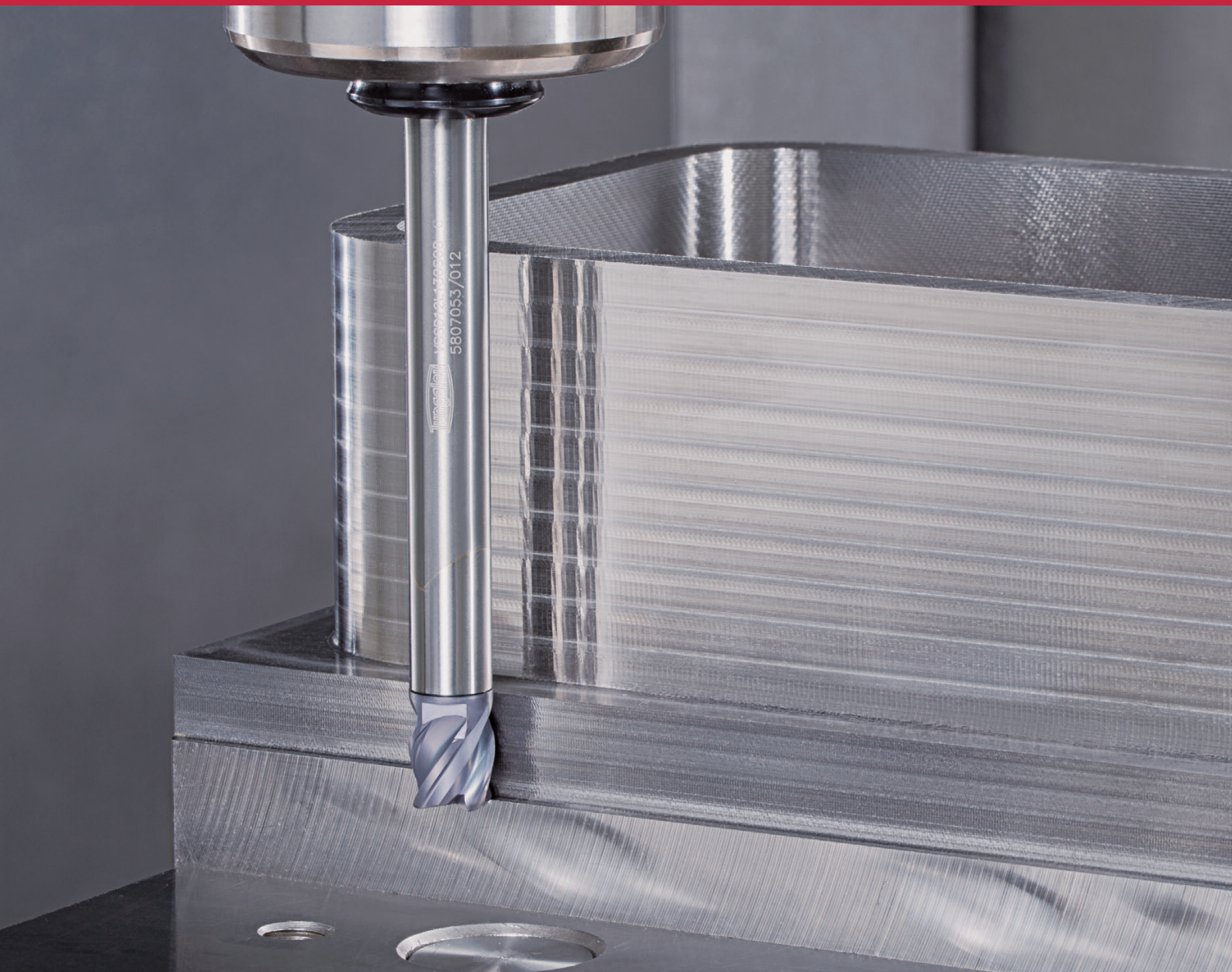


TUNGMEISTER

www.tungaloy.com

Tungaloy Report No. 381-G

New endmilling innovation!!



INDUSTRY 4.0
FEED the SPEED!



ACCELERATED MACHINING



**The most effective tooling solution with the
option of hundreds of tools!**

Tool changeover times can be measurably reduced!

“Choose the best head-shank combination for your endmilling operation!”

“Minimize setup time while maximizing your productivity”

Reduces tool changeover times drastically!!

- Machine downtime is decreased considerably.
- Enables users to only change cutting head, simplifying set-ups.

Increases productivity by 90%

Exchange Time / Piece

TUNGMEISTER Solid endmill **less than 1 minute**

10 minutes

The weight of the tool to be disposed is reduced

- Reduces tool disposal

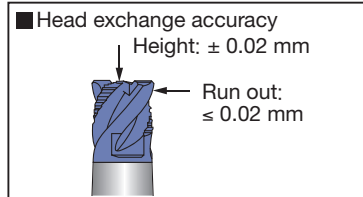
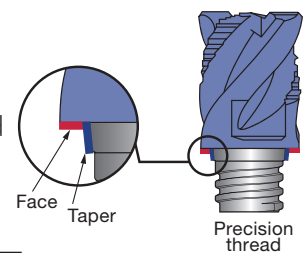
For example: $\varnothing 12$ mm / square endmill

TUNGMEISTER: OAL 20 mm → weight 20 g

Conventional solid endmill: OAL 80 mm → weight 140 g

Highly accurate repeatability

- Accuracy can be maintained by touching the taper and face.
- Repeatability is guaranteed and is not a concern for machine operators.



No regrinding cost

- No laborious endmill regrinding required.
- Easily replaceable heads eliminate the use of worn cutting edges.
- All tools can be used to breakage point or maximum wear point as no regrinding is necessary.

1 Wide range of cutting heads

23 kinds of cutting heads are available. The head exchange is easy and highly accurate with the precision thread.

Flexible combinations

TungMeister can be applied to all kinds of endmill machining applications.

2 Three kinds of shank material

Users can choose the most suitable combination according to the machining parameters, length and rigidity required.



Head

Head	Square	High-feed Toroidal	Ball	Drilling (Centering drill)	Chamfering	Slotting	Indexable
Appearance							
Page	P. 8 ~ 15	P. 16 ~ 20	P.21 ~ 25	P. 26, 27	P. 29, 30	P. 31 ~ 34	P. 35

Shank

Shank	Straight	Weldon	Straight	Straight	Adaptor for TungFlex	ER collet
Neck	Straight	Straight	Taper	(Slotting)		
Appearance						
Steel	●	●	●	●	●	●
Carbide	●	-	●	●	-	-
Carbide (with coolant hole)	-	-	-	●	-	-
Tungsten (with coolant hole)	●	-	●	-	-	-
Page	P. 38, 39	P. 40	P. 41	P. 42	P. 42	P. 43

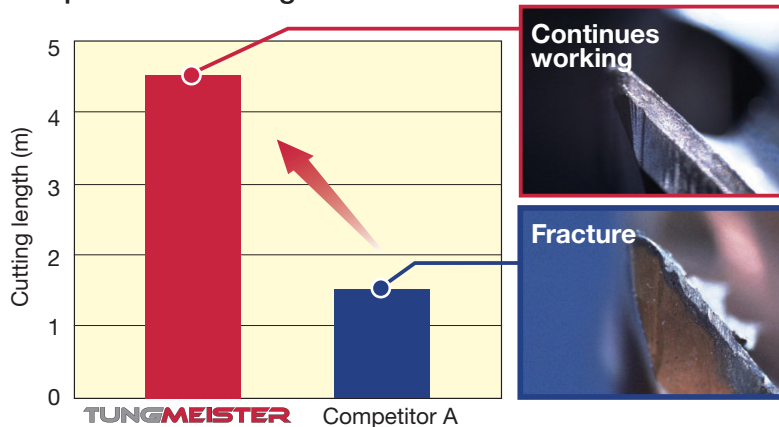
CUTTING PERFORMANCE

Workpiece : SUS304 / X5CrNi18-10 (200HB)
 Head : VEE100L07.0R05-04S06
 (ø10 mm, square type, 4 flutes)

Grade: AH725
 Shank: VSSD10L075S06-S
 (Straight shank & neck, steel)

Machine : Horizontal M/C BT40
 Holder : Collet chuck
 Coolant : Dry

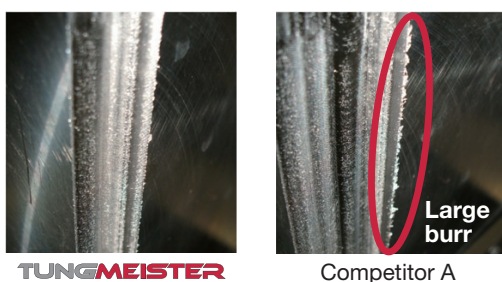
Comparison of milling for stainless steels



Cutting speed : $V_c = 100$ m/min
 Feed per tooth : $f_z = 0.07$ mm/t
 Depth of cut : $a_p = 5$ mm
 Width of cut : $a_e = 1.5$ mm

- Competitor A cutting edges fractured after 1.7 minutes machining and 1.5 m cutting length.
- The TungMeister cutting edges maintain operation after 5 minutes machining.

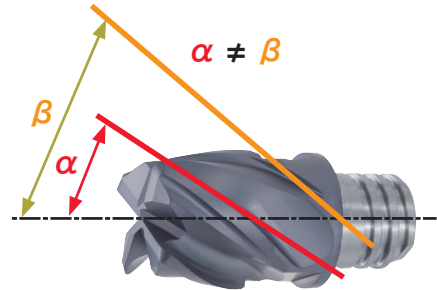
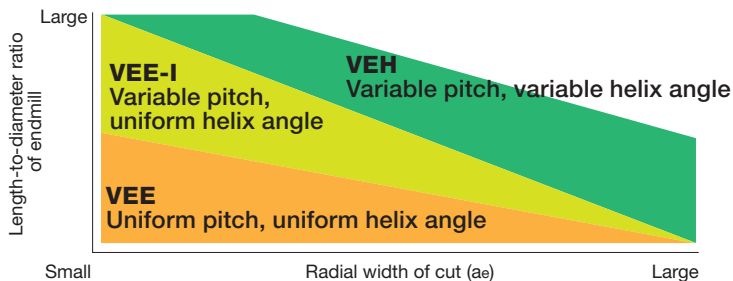
Comparison of milling surface on stainless steels



Cutting speed : $V_c = 130$ m/min
 Feed per tooth : $f_z = 0.05$ mm/t
 Depth of cut : $a_p = 5$ mm
 Width of cut : $a_e = 2$ mm

- When machining tough stainless steel the burr with the TungMeister is minimal. However, competitor A has a large burr when working under the same conditions.

VEH type: Variable pitch + Variable helix angle



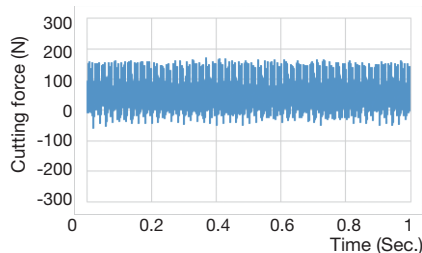
Variable helix angle

Different helix angles between flutes.

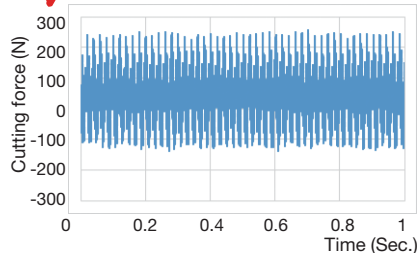
Effect: The axial and radial approach to the workpiece varies from edge to edge. This feature is especially effective when end-milling large radial width of cut (ae). The basic principle of chatter dampening approach is the same as that of variable pitch flutes. Different chip formations promote excellent chip flow.

Cutting forces analysis

✓ Variable pitch + variable helix



✗ Uniform pitch + uniform helix



Tool dia.	: $\phi D_c = 16 \text{ mm}$
Cutting speed	: $V_c = 150 \text{ m/min}$
Feed per tooth:	: $f_z = 0.1 \text{ mm/t}$
Number of revolutions	: $n = 2986 \text{ min}^{-1}$
Depth of cut	: $a_p = 12 \text{ mm}$
Cutting width	: $a_e = 0.5 \text{ mm}$
Feed speed	: $V_f = 1194 \text{ mm/min}$
Overhang	: 40.5 mm
Machine	: Vertical M/C, HSKA63

Variable geometry resulted less cutting force and thrust force

→ **Amplification of vibration is suppressed, providing machining stability**

ER collet conversion adaptor

Wide application area by integration design of holder and collet

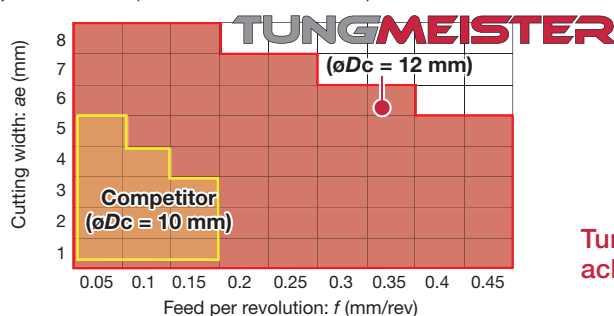
→ Larger tool diameter is available than conventional one! Robust connection make expanded application area and high rigidity!

Optimized tool overhang for improved chatter stability

→ Tool overhang is designed to ensure maximum rigidity, while eliminating tooling interference, making it ideal for the use in Swiss-type machines.



Application area (Stainless steel, SUS304)



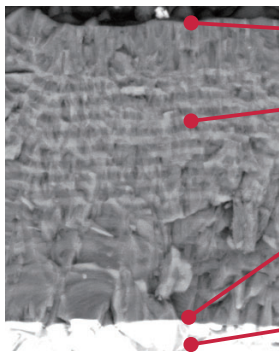
Head	: VEE120L09.0R00-03S08 AH725
Shank	: VER16CL006S08-S
Cutting speed	: $V_c = 40 \text{ m/min}$
Depth of cut	: $a_p = 3 \text{ mm}$
Machine	: Automatic lathe
Coolant	: Wet

TungMeister connection make larger diameter available, achieved wider application area than solid carbide end mill!

The new grade provides longer tool life thanks to the latest coating layer

AH715

- Unique nano-multilayered coating is made possible by Tungaloy's latest coating technology, providing 3 principal features



Feature 1: Resistance to builtup-edge

Coating layer to resist builtup-edge

Feature 2: Resistance to wear, oxidation, and fracture

2 coating layers for wear and oxidation resistance
Layered alternatively to prevent crack from propagating to fracture

Feature 3: Strong coating-substrate adhesion

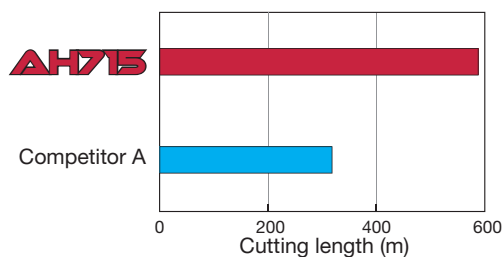
Coating is provided with strong adhesion between the coating layer and carbide substrate to prevent coating delamination

Substrate

Carbide substrate features wear and fracture resistance

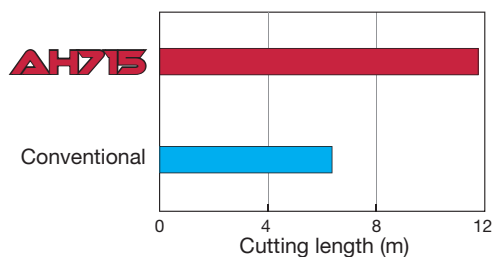
Tool life comparison in steel milling

AH715 provides longer tool life than existing grade



Steel

Shank : VSSD16L100S10-S
Head : VED160L12.0R05-04S10
Workpiece material : C55 (1055)
Cutting speed : $V_c = 150$ m/min
Feed per tooth : $f_z = 0.12$ mm/t
Depth of cut : $a_p = 5$ mm
Width of cut : $a_e = 1.5$ mm
Machine : V M/C, BT40

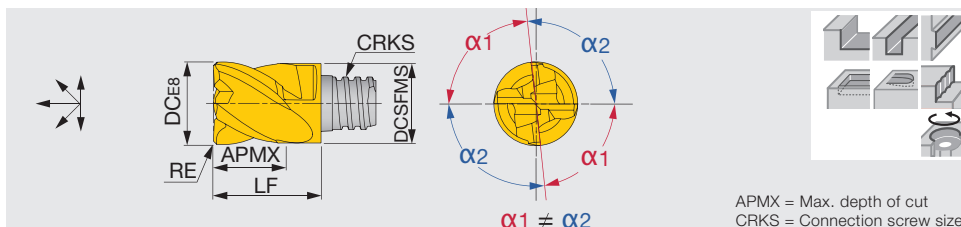


Steel

Shank : VSSD16L100S10-S
Head : VED160L12.0R05-04S10
Workpiece material : SKD11(D2) (HRC58)
Cutting speed : $V_c = 60$ m/min
Feed per tooth : $f_z = 0.05$ mm/t
Depth of cut : $a_p = 5$ mm
Width of cut : $a_e = 0.5$ mm
Machine : V M/C, BT40

VEH...

TungMeister square head, with 4 flutes, variable pitch, variable helix (chatter dampening)



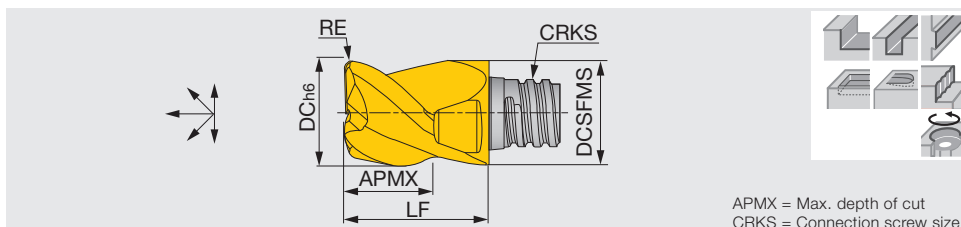
Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VEH080L05.0R05I04S05	●	4	35 - 39°	8	7.7	5	0.5	S05	10	KEYV-S05	7
VEH080L05.0R10I04S05	●	4	35 - 39°	8	7.7	5	1	S05	10	KEYV-S05	7
VEH100L07.0R05I04S06	●	4	35 - 39°	10	9.7	7	0.5	S06	13	KEYV-S06	10
VEH100L07.0R10I04S06	●	4	35 - 39°	10	9.7	7	1	S06	13	KEYV-S06	10
VEH120L09.0R05I04S08	●	4	35 - 39°	12	11.7	9	0.5	S08	16.5	KEYV-S08	15
VEH120L09.0R10I04S08	●	4	35 - 39°	12	11.7	9	1	S08	16.5	KEYV-S08	15
VEH160L12.0R05I04S10	●	4	35 - 39°	16	15.3	12	0.5	S10	20.5	KEYV-S10	28
VEH160L12.0R10I04S10	●	4	35 - 39°	16	15.3	12	1	S10	20.5	KEYV-S10	28
VEH200L15.0R05I04S12	●	4	35 - 39°	20	18.3	15	0.5	S12	25.5	KEYV-S12	28
VEH200L15.0R10I04S12	●	4	35 - 39°	20	18.3	15	1	S12	25.5	KEYV-S12	28

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VEE**-03

TungMeister square head with 3 flutes for general purpose



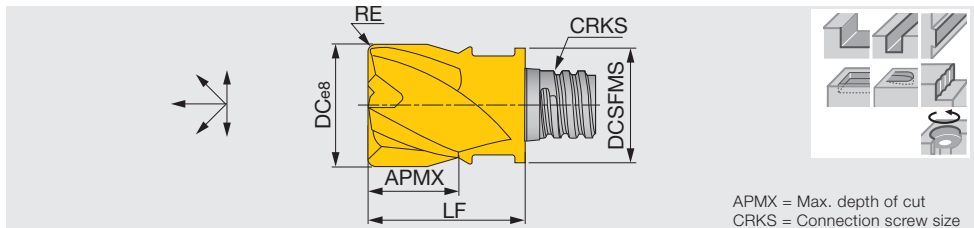
Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VEE080L05.0R00-03S05	●	3	45°	8	7.7	5	-	S05	10	KEYV-S05	7
VEE100L07.0R00-03S06	●	3	45°	10	9.7	7	-	S06	13	KEYV-S06	10
VEE120L09.0R00-03S08	●	3	45°	12	11.7	9	-	S08	16.5	KEYV-S08	15

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VEE**-04..., VED**-04...

TungMeister square head with 4 flutes for general purposes



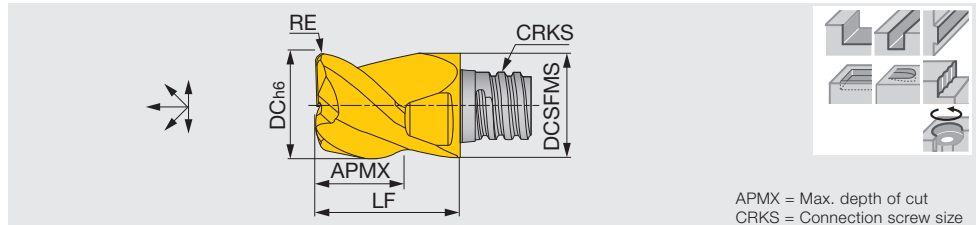
Designation	AH715	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VEE060L05.0R00-04S05	●		4	45°	6	8	5	-	S05	10	KEYV-S05	7
VEE080L05.0R00-04S05	●		4	45°	8	7.7	5	-	S05	10	KEYV-S05	7
VED080L05.0R05-04S05	●		4	30°	8	7.7	5	0.5	S05	10	KEYV-S05	7
VED080L05.0R10-04S05	●		4	30°	8	7.7	5	1	S05	10	KEYV-S05	7
VED080L05.0R15-04S05	●		4	30°	8	7.7	5	1.5	S05	10	KEYV-S05	7
VEE100L07.0R00-04S06	●		4	45°	10	9.7	7	-	S06	13	KEYV-S06	10
VED100L07.0R05-04S06	●		4	30°	10	9.7	7	0.5	S06	13	KEYV-S06	10
VEE100L07.0R05-04S06	●		4	45°	10	9.7	7	0.5	S06	13	KEYV-S06	10
VED100L07.0R10-04S06	●		4	30°	10	9.7	7	1	S06	13	KEYV-S06	10
VEE100L07.0R10-04S06	●		4	45°	10	9.7	7	1	S06	13	KEYV-S06	10
VEE120L09.0R00-04S08	●		4	45°	12	11.7	9	-	S08	16.5	KEYV-S08	15
VED120L09.0R05-04S08	●		4	30°	12	11.7	9	0.5	S08	16.5	KEYV-S08	15
VEE120L09.0R05-04S08	●		4	45°	12	11.7	9	0.5	S08	16.5	KEYV-S08	15
VED120L09.0R10-04S08	●		4	30°	12	11.7	9	1	S08	16.5	KEYV-S08	15
VEE120L09.0R10-04S08	●		4	45°	12	11.7	9	1	S08	16.5	KEYV-S08	15
VEE160L12.0R00-04S10	●	●	4	45°	16	15.3	12	-	S10	20.5	KEYV-S10	28
VED160L12.0R05-04S10	●	●	4	30°	16	15.3	12	0.5	S10	20.5	KEYV-S10	28
VEE160L12.0R05-04S10	●		4	45°	16	15.3	12	0.5	S10	20.5	KEYV-S10	28
VED160L12.0R10-04S10	●		4	30°	16	15.3	12	1	S10	20.5	KEYV-S10	28
VEE160L12.0R10-04S10	●		4	45°	16	15.3	12	1	S10	20.5	KEYV-S10	28
VED160L12.0R15-04S10	●		4	30°	16	15.3	12	1.5	S10	20.5	KEYV-S10	28
VEE160L12.0R15-04S10	●		4	45°	16	15.3	12	1.5	S10	20.5	KEYV-S10	28
VED160L12.0R20-04S10	●		4	30°	16	15.3	12	2	S10	20.5	KEYV-S10	28
VEE160L12.0R20-04S10	●		4	45°	16	15.3	12	2	S10	20.5	KEYV-S10	28
VED160L12.0R30-04S10	●		4	30°	16	15.3	12	3	S10	20.5	KEYV-S10	28
VEE160L12.0R30-04S10	●		4	45°	16	15.3	12	3	S10	20.5	KEYV-S10	28
VED160L12.0R40-04S10	●		4	30°	16	15.3	12	4	S10	20.5	KEYV-S10	28
VEE160L12.0R40-04S10	●		4	45°	16	15.3	12	4	S10	20.5	KEYV-S10	28
VEE200L15.0R00-04S12	●		4	45°	20	18.3	15	-	S12	25.5	KEYV-S12	28
VED200L15.0R05-04S12	●		4	30°	20	18.3	15	0.5	S12	25.5	KEYV-S12	28
VED200L15.0R10-04S12	●		4	30°	20	18.3	15	1	S12	25.5	KEYV-S12	28
VED200L15.0R20-04S12	●		4	30°	20	18.3	15	2	S12	25.5	KEYV-S12	28
VED200L15.0R30-04S12	●		4	30°	20	18.3	15	3	S12	25.5	KEYV-S12	28

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VEE**-03...

TungMeister square head with 3 flutes for key way



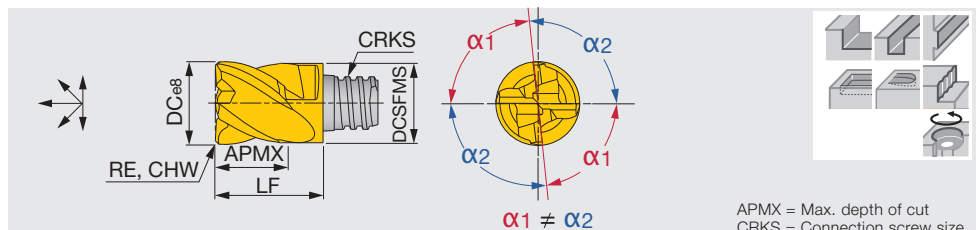
Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VEE077L04.0R02-03S05	●	3	38°	7.7	7.7	4	0.2	S05	10	KEYV-S05	7
VEE097L05.0R03-03S06	●	3	38°	9.7	9.7	5	0.3	S06	13	KEYV-S06	10
VEE117L07.0R03-03S08	●	3	38°	11.7	11.7	7	0.3	S08	16.5	KEYV-S08	15
VEE157L08.0R03-03S10	●	3	38°	15.7	15.3	8	0.3	S10	20.5	KEYV-S10	28
VEE197L12.0R04-03S12	●	3	38°	19.7	18.3	12	0.4	S12	25.5	KEYV-S12	28

*Torque: Recommended torque (N-m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VEE**-I...

TungMeister square head with irregular pitch flute for chatter free cutting



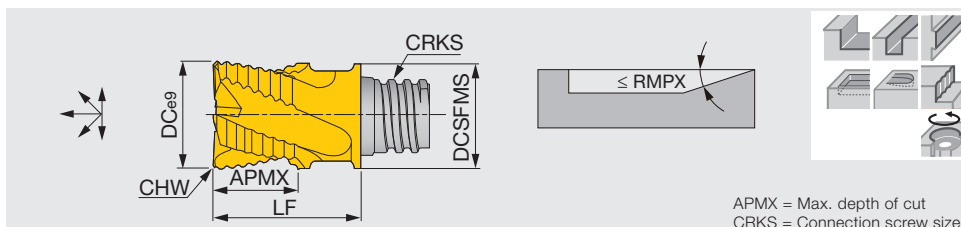
Designation	AH715	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CHW	CRKS	LF	Wrench	Torque*
VEE080L05.0C30I04S05	●		4	38°	8	7.7	5	-	0.3	S05	10	KEYV-S05	7
VEE100L07.0C40I04S06	●		4	38°	10	9.7	7	-	0.4	S06	13	KEYV-S06	10
VEE120L09.0C50I04S08	●		4	38°	12	11.7	9	-	0.5	S08	16.5	KEYV-S08	15
VEE160L12.0C60I04S10	●	●	4	38°	16	15.3	12	-	0.6	S10	20.5	KEYV-S10	28
VEE200L15.0C60I04S12	●		4	38°	20	18.3	15	-	0.6	S12	25.5	KEYV-S12	28
VEE250L22.0C60I04S15	●		4	38°	25	23.9	22	-	0.6	S15	37	KEYV-W20	40
VEE250L22.0R00I04S15	●		4	38°	25	23.9	22	-	-	S15	37	KEYV-W20	40
VEE250L22.0R05I04S15	●		4	38°	25	23.9	22	0.5	-	S15	37	KEYV-W20	40
VEE250L22.0R10I04S15	●		4	38°	25	23.9	22	1	-	S15	37	KEYV-W20	40
VEE250L22.0R20I04S15	●		4	38°	25	23.9	22	2	-	S15	37	KEYV-W20	40
VEE250L22.0R30I04S15	●		4	38°	25	23.9	22	3	-	S15	37	KEYV-W20	40

*Torque: Recommended torque (N-m) for clamping.
VEE080 ~ VEE200: Packing quantity = 2 pcs.
VEE250: Packing quantity = 1pc.

●: Line up

VEE**R...

TungMeister square head with serated edges for roughing



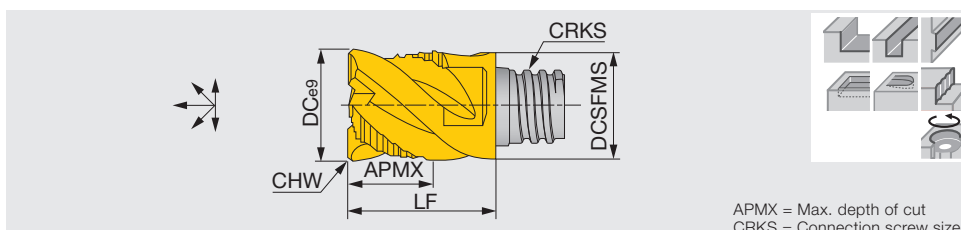
Designation	AH715	AH725	NOF	FHA	DC	DCSFMS	APMX	CHW	CRKS	LF	RMPX	Wrench	Torque*
VEE080L05.0C25R04S05	●		4	45°	8	7.7	5	0.25	S05	10	90°	KEYV-S05	7
VEE100L07.0C30R04S06	●		4	45°	10	9.7	7	0.3	S06	13	90°	KEYV-S06	10
VEE120L09.0C35R04S08	●		4	45°	12	11.7	9	0.35	S08	16.5	90°	KEYV-S08	15
VEE160L12.0C40R05S10	●	●	5	45°	16	15.3	12	0.4	S10	20.5	7°	KEYV-S10	28
VEE200L15.0C40R06S12	●		6	45°	20	18.3	15	0.4	S12	25.5	3°	KEYV-S12	28
VEE250L22.0C50R06S15	●		6	45°	25	23.9	22	0.5	S15	37	3°	KEYV-W20	40

*Torque: Recommended torque (N·m) for clamping.
VEE080 ~ VEE200: Packing quantity = 2 pcs.
VEE250: Packing quantity = 1 pc.

●: Line up

VEE**C...

TungMeister square head with combined edges for finishing & roughing



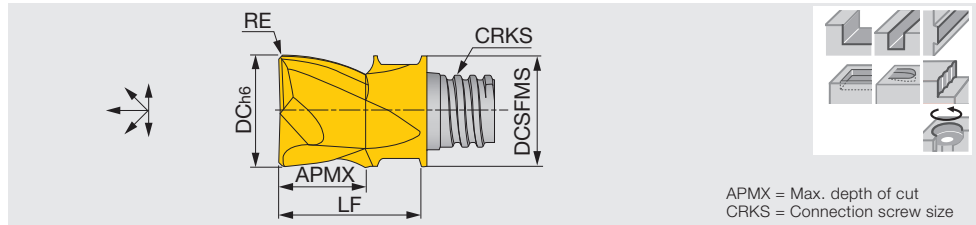
Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	CHW	CRKS	LF	Wrench	Torque*
VEE080L05.0C30C04S05	●	4	45°	8	7.7	5	0.3	S05	10	KEYV-S05	7
VEE100L07.0C30C04S06	●	4	45°	10	9.7	7	0.3	S06	13	KEYV-S06	10
VEE120L09.0C40C04S08	●	4	45°	12	11.7	9	0.4	S08	16.5	KEYV-S08	15
VEE160L12.0C60C04S10	●	4	45°	16	15.3	12	0.6	S10	20.5	KEYV-S10	28
VEE200L15.0C60C04S12	●	4	45°	20	18.3	15	0.6	S12	25.5	KEYV-S12	28
VEE250L22.0C60C04S15	●	4	45°	25	23.9	22	0.6	S15	37	KEYV-W20	40

*Torque: Recommended torque (N·m) for clamping.
VEE080 ~ VEE200: Packing quantity = 2 pcs.
VEE250: Packing quantity = 1 pc.

●: Line up

VEE**A02...

TungMeister square head with 2 flutes for aluminium machining



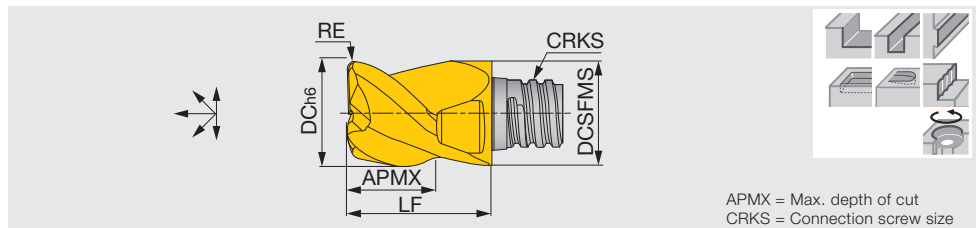
Designation	KS15F	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VEE100L07.0R05A02S06	●	2	45°	10	9.7	7	0.5	S06	13	KEYV-S06	10
VEE100L07.0R10A02S06	●	2	45°	10	9.7	7	1	S06	13	KEYV-S06	10
VEE120L09.0R05A02S08	●	2	45°	12	11.7	9	0.5	S08	16.5	KEYV-S08	15

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VEE**A03...

TungMeister square head with 3 flutes for aluminium machining



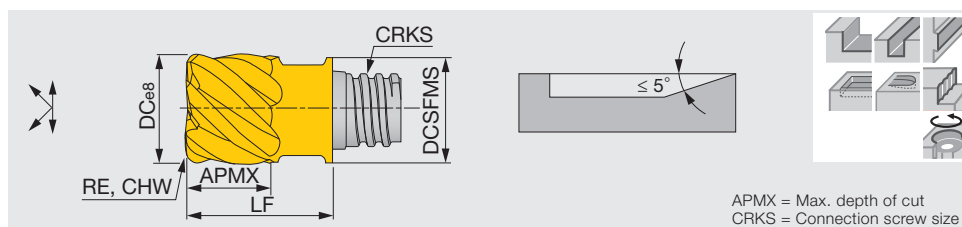
Designation	KS15F	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VEE080L05.0R05A03S05	●	3	45°	8	7.7	5	0.5	S05	10	KEYV-S05	7
VEE100L06.0R05A03S06	●	3	45°	10	9.7	6	0.5	S06	13	KEYV-S06	10
VEE100L06.0R10A03S06	●	3	45°	10	9.7	6	1	S06	13	KEYV-S06	10
VEE120L08.0R05A03S08	●	3	45°	12	11.7	8	0.5	S08	16.5	KEYV-S08	15
VEE120L08.0R10A03S08	●	3	45°	12	11.7	8	1	S08	16.5	KEYV-S08	15
VEE160L10.0R00A03S10	●	3	45°	16	15.3	10	-	S10	20.5	KEYV-S10	28
VEE160L10.0R10A03S10	●	3	45°	16	15.3	10	1	S10	20.5	KEYV-S10	28
VEE160L10.0R20A03S10	●	3	45°	16	15.3	10	2	S10	20.5	KEYV-S10	28
VEE200L12.0R05A03S12	●	3	45°	20	18.3	12	0.5	S12	25.5	KEYV-S12	28
VEE200L12.0R10A03S12	●	3	45°	20	18.3	12	1	S12	25.5	KEYV-S12	28
VEE200L12.0R20A03S12	●	3	45°	20	18.3	12	2	S12	25.5	KEYV-S12	28

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VED**-06..., VEE**-06

TungMeister square head with 6 flutes for difficult-to-cut material machining



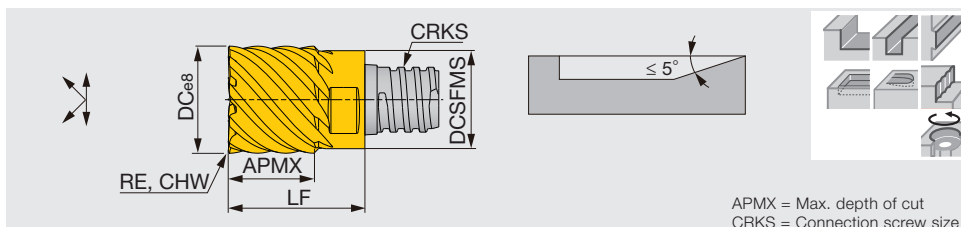
Designation	Grade				DC	DCSFMS	APMX	RE	CHW	CRKS	LF	Wrench	Torque*
	AH725	AH750	NOF	FHA									
VEE080L05.0R05-06S05	●		6	45°	8	7.7	5	0.5	-	S05	10	KEYV-S05	7
VEE080L05.0R10-06S05	●		6	45°	8	7.7	5	1	-	S05	10	KEYV-S05	7
VEE080L05.0R15-06S05	●		6	45°	8	7.7	5	1.5	-	S05	10	KEYV-S05	7
VEE080L05.0C10-06S05		●	6	50°	8	7.7	5	-	0.1	S05	10	KEYV-S05	7
VEE100L07.0R00-06S06	●		6	45°	10	9.7	7	-	-	S06	13	KEYV-S06	10
VED100L07.0R05-06S06	●		6	30°	10	9.7	7	0.5	-	S06	13	KEYV-S06	10
VEE100L07.0R05-06S06	●		6	45°	10	9.7	7	0.5	-	S06	13	KEYV-S06	10
VED100L07.0R10-06S06	●		6	30°	10	9.7	7	1	-	S06	13	KEYV-S06	10
VEE100L07.0R10-06S06	●		6	45°	10	9.7	7	1	-	S06	13	KEYV-S06	10
VED100L07.0R15-06S06	●		6	30°	10	9.7	7	1.5	-	S06	13	KEYV-S06	10
VEE100L07.0R15-06S06	●		6	45°	10	9.7	7	1.5	-	S06	13	KEYV-S06	10
VEE100L07.0C10-06S06		●	6	50°	10	9.7	7	-	0.1	S06	13	KEYV-S06	10
VEE120L09.0R00-06S08	●		6	45°	12	11.7	9	-	-	S08	16.5	KEYV-S08	15
VED120L09.0R05-06S08	●		6	30°	12	11.7	9	0.5	-	S08	16.5	KEYV-S08	15
VED120L09.0R10-06S08	●		6	30°	12	11.7	9	1	-	S08	16.5	KEYV-S08	15
VEE120L09.0R10-06S08	●		6	45°	12	11.7	9	1	-	S08	16.5	KEYV-S08	15
VEE120L09.0R15-06S08	●		6	45°	12	11.7	9	1.5	-	S08	16.5	KEYV-S08	15
VEE120L09.0C10-06S08		●	6	50°	12	11.7	9	-	0.1	S08	16.5	KEYV-S08	15

*Torque: Recommended torque (N-m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VED**-08,10..., VEE**-08,10

TungMeister square head with 8, 10 flutes for difficult-to-cut material machining



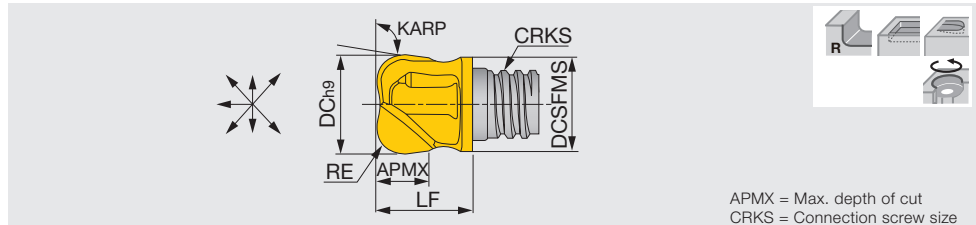
Designation	Grade				DC	DCSFMS	APMX	RE	CHW	CRKS	LF	Wrench	Torque*
	AH725	AH750	NOF	FHA									
VED160L12.0R05-08S10	●		8	30°	16	15.3	12	0.5	-	S10	20.5	KEYV-S10	28
VED160L12.0R10-08S10	●		8	30°	16	15.3	12	1	-	S10	20.5	KEYV-S10	28
VED160L12.0R16-08S10	●		8	30°	16	15.3	12	1.6	-	S10	20.5	KEYV-S10	28
VED160L12.0R20-08S10	●		8	30°	16	15.3	12	2	-	S10	20.5	KEYV-S10	28
VEE160L12.0C20-08S10		●	8	50°	16	15.3	12	-	0.2	S10	20.5	KEYV-S10	28
VED200L15.0R10-10S12	●		10	30°	20	18.3	15	1	-	S12	25.5	KEYV-S12	28
VED200L15.0R20-10S12	●		10	30°	20	18.3	15	2	-	S12	25.5	KEYV-S12	28
VEE200L15.0C20-10S12		●	10	50°	20	18.3	15	-	0.2	S12	25.5	KEYV-S12	28
VED250L22.0R10-10S15	●		10	30°	25	23.9	22	1	-	S15	37	KEYV-W20	40
VED250L22.0R20-10S15	●		10	30°	25	23.9	22	2	-	S15	37	KEYV-W20	40

*Torque: Recommended torque (N-m) for clamping.
 VEE / VED160 - 200: Packing quantity = 2 pcs.
 VED250: Packing quantity = 1 pc.

●: Line up

VRB**-02..., VRC**-02

TungMeister radius head with 2 pressed flutes



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	KARP	CRKS	LF	Wrench	Torque*
VRC100L07.0R05-02S06	●	2	15°	10	9.5	7	0.5	95°	S06	12.4	KEYV-S06	10
VRC100L07.0R10-02S06	●	2	15°	10	9.5	7	1	95°	S06	12.4	KEYV-S06	10
VRB100L06.0R20-02S06	●	2	0°	10	9.2	6	2	97°	S06	12.4	KEYV-S06	10
VRB120L05.7R30-02S06	●	2	0°	12	9.5	5.7	3	97°	S06	9.1	**KEYV-S08	10
VRB120L05.4R40-02S06	●	2	0°	12	9.5	5.4	4	97°	S06	9.1	**KEYV-S08	10
VRB120L06.3R16-02S08	●	2	0°	12	11.5	5.9	1.6	97°	S08	11.1	KEYV-S08	15
VRB120L06.2R20-02S08	●	2	0°	12	11.5	6.2	2	97°	S08	11.1	KEYV-S08	15
VRB120L06.1R25-02S08	●	2	0°	12	11.5	5.8	2.5	97°	S08	11.1	KEYV-S08	15
VRB120L06.1R30-02S08	●	2	0°	12	11.5	5.7	3	97°	S08	11.1	KEYV-S08	15
VRB120L05.9R40-02S08	●	2	0°	12	11.5	5.5	4	97°	S08	11.1	KEYV-S08	15
VRB160L08.0R50-02S10	●	2	0°	16	15.2	8	5	97°	S10	20.2	KEYV-S10	28
VRB200L11.1R30-02S12	●	2	0°	20	18.3	11	3	97°	S12	17	KEYV-S12	28
VRB200L11.5R40-02S12	●	2	0°	20	18.3	11.3	4	97°	S12	17.3	KEYV-S12	28
VRB200L11.5R50-02S12	●	2	0°	20	18.3	11.3	5	97°	S12	17.3	KEYV-S12	28
VRB200L11.4R60-02S12	●	2	0°	20	18.3	11.2	6	97°	S12	17.3	KEYV-S12	28
VRB200L11.3R80-02S12	●	2	0°	20	18.3	11.1	8	97°	S12	17.3	KEYV-S12	28

Note: Suitable for contouring operation. Some heads require different wrench sizes.

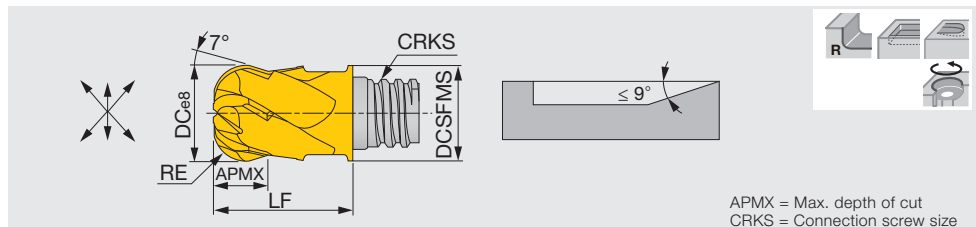
*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VRD**-06...

TungMeister radius head with 6 ground flutes



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VRD080L04.0R20-06S05	●	6	30°	8	7.7	4	2	S05	10	KEYV-S05	7
VRD100L05.0R30-06S06	●	6	30°	10	9.7	5	3	S06	13	KEYV-S06	10
VRD120L07.0R40-06S08	●	6	30°	12	11.7	7	4	S08	16.5	KEYV-S08	15
VRD160L09.0R50-06S10	●	6	30°	16	15.3	9	5	S10	20.5	KEYV-S10	28

*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

STANDARD CUTTING CONDITIONS

Shoulder milling (VEH, VEE: 3 flutes, VED/VEE: 4 flutes, VEE-A, VEE-I, VEE-R, VEE-C, VRB, VRC, VRD)

ISO	Workpiece material	Hard- ness	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)							Depth of cut ap (mm)	Pick feed Pf (mm)
				Tool diameter: DC (mm)								
				6	8	10	12	16	20	25		
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	80 - 180	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.25 x øDc
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	60 - 140	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.25 x øDc
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	60 - 120	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.25 x øDc
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	40 - 100	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.25 x øDc
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	80 - 200	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.25 x øDc
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	80 - 200	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x Dc	0.25 x øDc
N	Aluminium alloys Si < 13%	-	200 - 700	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.25 x øDc
	Aluminium alloys Si ≥13%	-	100 - 300	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.25 x øDc
S	Titanium alloys Ti-6Al-4V, etc.	-	40 - 80	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.05 x øDc
	Heat-resistant alloys Inconel 718, etc.	-	20 - 40	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.10 - 0.17	0.1 - 0.17	0.6 x øDc	0.05 x øDc
H	Hardened steel SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	40 - 50 HRC	40 - 80	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.05 x øDc
	Hardened steel SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	20 - 60	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.05 x øDc

Slot milling (VEH, VEE: 3 flutes, VED/VEE: 4 flutes, VEE-A, VEE-I, VEE-R, VEE-C, VRB, VRC, VRD)

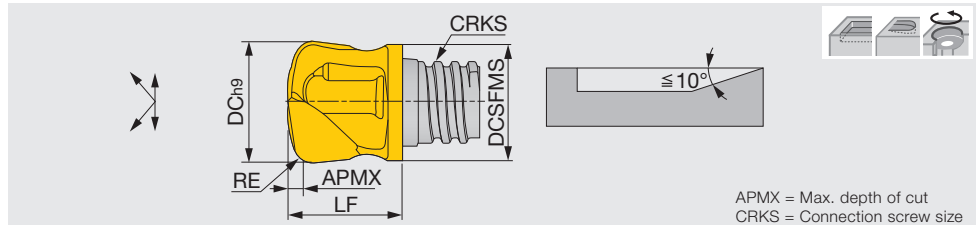
ISO	Workpiece material	Hard- ness	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)							Depth of cut ap (mm)
				Tool diameter: DC (mm)							
				6	8	10	12	16	20	25	
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	80 - 180	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	60 - 140	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	60 - 120	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	40 - 100	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	80 - 200	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	80 - 200	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.10	0.5 x øDc
N	Aluminium alloys Si < 13%	-	200 - 700	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
	Aluminium alloys Si ≥13%	-	100 - 300	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
S	Titanium alloys Ti-6Al-4V, etc.	-	40 - 80	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
	Heat-resistant alloys Inconel 718, etc.	-	20 - 40	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.5 x øDc
H	Hardened steel SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	40 - 50 HRC	40 - 80	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.2 x øDc
	Hardened steel SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	20 - 60	0.03 - 0.07	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.07 - 0.1	0.2 x øDc

Shoulder milling (VED / VEE: 6 flutes, VED / VEE: 8, 10 flutes)

ISO	Workpiece material	Hard- ness	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)						Depth of cut ap (mm)	Pick feed Pf (mm)
				Tool diameter: DC (mm)							
				8	10	12	16	20	25		
S	Titanium alloys Ti-6Al-4V, etc.	-	60 - 120	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.02 x øDc
	Heat-resistant alloys Inconel 718, etc.	-	30 - 60	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.02 x øDc
H	Hardened steel SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	40 - 50 HRC	80 - 160	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.02 x øDc
	Hardened steel SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	40 - 90	0.05 - 0.09	0.07 - 0.12	0.08 - 0.13	0.09 - 0.15	0.1 - 0.17	0.1 - 0.17	0.6 x øDc	0.02 x øDc

VFX**-02...

TungMeister radius head with 2 flutes for super high-feed milling



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE ⁽¹⁾	CRKS	LF	Wrench	Torque*	fz(mm/t)
VFX100L00.6R20-02S06	●	2	0°	10	9.6	0.6	2	S06	12.5	KEYV-S06	10	0.3 - 0.6
VFX120L01.0R25-02S08	●	2	0°	12	11.5	1.0	2.5	S08	11.1	KEYV-S08	15	0.5 - 1
VFX160L01.1R30-02S10	●	2	0°	16	15.2	1.1	3	S10	13.5	KEYV-S10	28	0.55 - 1.1
VFX200L01.5R33-02S12	●	2	0°	20	18.3	1.5	3.3	S12	17.5	KEYV-S12	28	0.75 - 1.5

(1) Corner radius for CAM programing

Note: For VFX head, taper neck shank or Tungsten shank should be recommended.

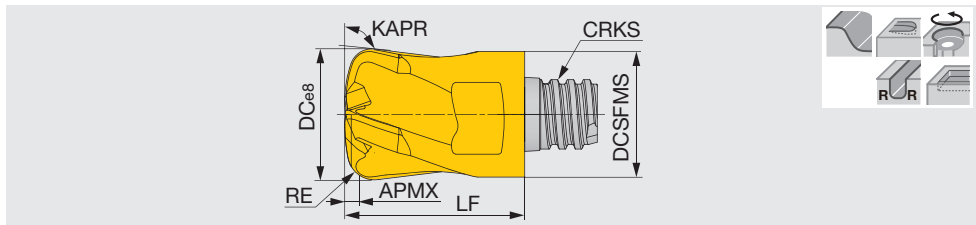
*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VFX**-04...

TungMeister radius head with 4 flutes for super high-feed milling



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	KAPR	CRKS	LF	Wrench	Torque*	fz(mm/t)
VFX120L0.60R18H04S08	●	4	20°	12	11.5	0.6	1.8	97°	S08	16.5	KEYV-S08	15	0.16 - 0.67
VFX160L0.80R22H04S10	●	4	20°	16	15.4	0.8	2.2	97°	S10	20.5	KEYV-S10	28	0.2 - 0.75

*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

STANDARD CUTTING CONDITIONS

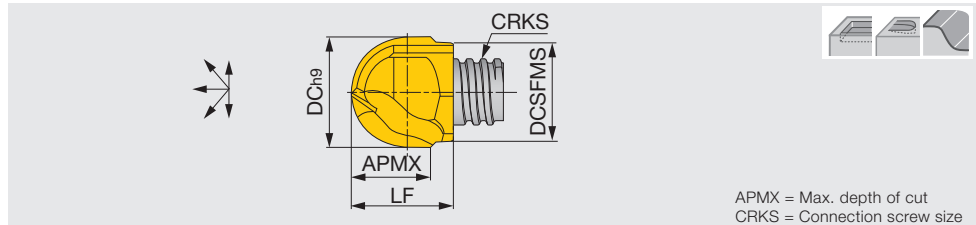
High feed milling (VFX)

ISO	Workpiece material	Hardness	Cutting speed V _c (m/min)	ø10		ø12		ø16		ø20		Width of cut a _e (mm)
				Feed per tooth f _z (mm/t)	Depth of cut a _p (mm)	Feed per tooth f _z (mm/t)	Depth of cut a _p (mm)	Feed per tooth f _z (mm/t)	Depth of cut a _p (mm)	Feed per tooth f _z (mm/t)	Depth of cut a _p (mm)	
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	100 - 200	0.3 - 0.7	0.5	0.4 - 0.8	0.5	0.5 - 0.9	0.75	0.6 - 1	1	0.6 x øD _c
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	80 - 180	0.2 - 0.6	0.5	0.3 - 0.7	0.5	0.4 - 0.8	0.75	0.5 - 0.9	1	0.6 x øD _c
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	80 - 160	0.2 - 0.5	0.4	0.2 - 0.5	0.4	0.3 - 0.6	0.5	0.3 - 0.6	0.75	0.6 x øD _c
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	60 - 100	0.2 - 0.6	0.4	0.2 - 0.6	0.4	0.3 - 0.7	0.5	0.3 - 0.7	0.75	0.6 x øD _c
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	100 - 220	0.3 - 0.7	0.5	0.4 - 0.8	0.75	0.5 - 0.9	0.75	0.6 - 1	1	0.6 x øD _c
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	100 - 220	0.2 - 0.6	0.5	0.3 - 0.7	0.75	0.4 - 0.8	0.75	0.5 - 0.9	1	0.6 x øD _c
S	Titanium alloys Ti-6Al-4V, etc.	-	40 - 80	0.2 - 0.5	0.4	0.2 - 0.5	0.4	0.2 - 0.6	0.5	0.2 - 0.6	0.5	0.25 x øD _c
	Heat-resistant alloys Inconel 718, etc.	-	20 - 40	0.1 - 0.3	0.3	0.1 - 0.3	0.3	0.1 - 0.3	0.4	0.1 - 0.3	0.4	0.25 x øD _c
H	Hardened steel SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	40 - 50 HRC	40 - 80	0.2 - 0.4	0.3	0.2 - 0.4	0.3	0.3 - 0.5	0.4	0.3 - 0.5	0.4	0.45 x øD _c
	Hardened steel SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	20 - 60	0.1 - 0.2	0.2	0.1 - 0.2	0.2	0.1 - 0.3	0.3	0.1 - 0.3	0.3	0.25 x øD _c

Please note that the feed per tooth should not exceed the maximum feed per tooth for each product.

VBB**-BM...

TungMeister ball nose head with pressed edge for roughing



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	CRKS	LF	Wrench	Torque*
VBB080L08.0-BM-02S05	●	2	0°	8	7.6	8	S05	10	KEYV-S05	7
VBB100L10.0-BM-02S06	●	2	0°	10	9.5	10	S06	12.4	KEYV-S06	10
VBB120L12.0-BM-02S08	●	2	0°	12	11.5	11.5	S08	15.3	KEYV-S08	15
VBB160L16.0-BM-02S10	●	2	0°	16	15.2	16	S10	19.1	KEYV-S10	28

• For roughing

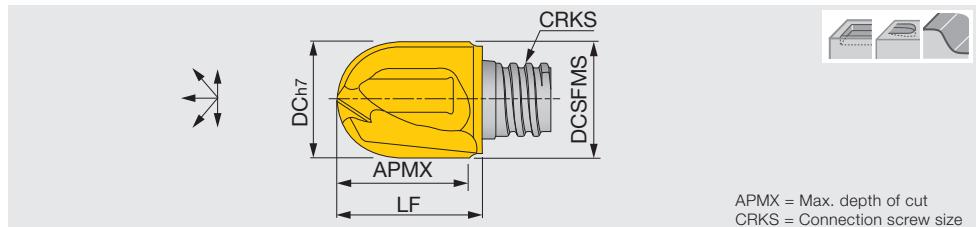
*Torque: Recommended torque (N-m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VBB**-BG...

TungMeister ball nose head with ground edge for semi-finishing



Designation	AH750	NOF	FHA	DC	DCSFMS	APMX	CRKS	LF	Wrench	Torque*
VBB080L08.0-BG-02S05	●	2	0°	8	7.6	8	S05	10	KEYV-S05	7
VBB100L10.0-BG-02S06	●	2	0°	10	9.6	10	S06	12.4	KEYV-S06	10
VBB120L12.0-BG-02S08	●	2	0°	12	11.5	12	S08	15.3	KEYV-S08	15
VBB160L16.0-BG-02S10	●	2	0°	16	15.2	16	S10	19.1	KEYV-S10	28

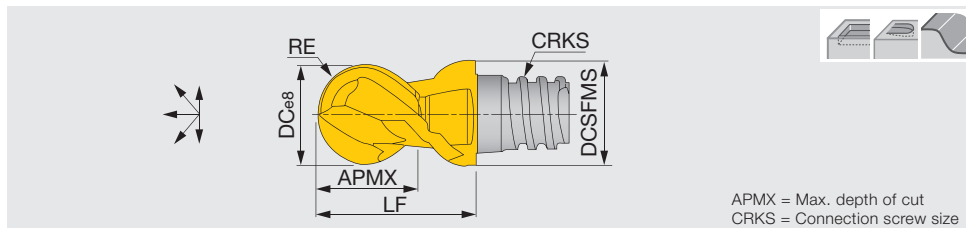
*Torque: Recommended torque (N-m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VBD**-BG...

TungMeister ball nose head with 2 flutes and helical ground edge for finishing



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VBD080L05.0-BG-02S05	●	2	30°	8	7.7	5	3.982 ⁽¹⁾	S05	10	KEYV-S05	7
VBD100L07.0-BG-02S06	●	2	30°	10	9.7	7	4.982 ⁽¹⁾	S06	13	KEYV-S06	10
VBD120L09.0-BG-02S08	●	2	30°	12	11.7	9	5.978 ⁽²⁾	S08	16.5	KEYV-S08	15
VBD160L09.5-BG-02S10	●	2	30°	16	15.3	9	7.978 ⁽²⁾	S10	20.5	KEYV-S10	28

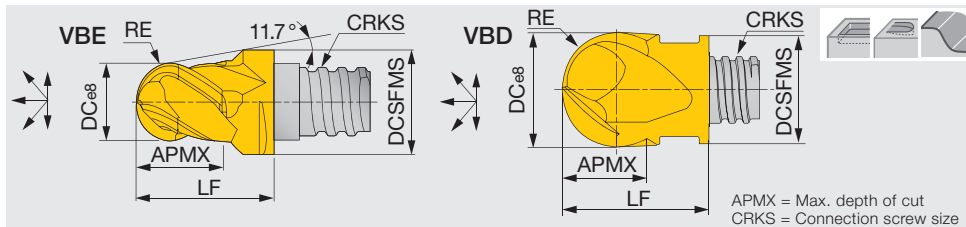
• The tolerance of R: (1) ± 0.01 (2) ± 0.012

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VBD**-BG..., VBE**-BG...

TungMeister ball nose head with 4 flutes and helical ground edge for finishing



Designation	AH715	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VBE060L05.5-BG-04S05	●	●	4	38°	6	8	5.5	2.987 ⁽¹⁾	S05	10	KEYV-S05	7
VBD080L05.0-BG-04S05	●	●	4	30°	8	7.7	5	3.982 ⁽¹⁾	S05	10	KEYV-S05	7
VBD100L07.0-BG-04S06	●	●	4	30°	10	9.7	7	4.982 ⁽¹⁾	S06	13	KEYV-S06	10
VBD120L09.0-BG-04S08	●	●	4	30°	12	11.7	9	5.978 ⁽²⁾	S08	16.5	KEYV-S08	15
VBD160L12.0-BG-04S10	●	●	4	30°	16	15.3	12	7.978 ⁽²⁾	S10	20.5	KEYV-S10	28
VBD200L15.0-BG-04S12	●	●	4	30°	20	18.3	15	9.972 ⁽²⁾	S12	25.5	KEYV-S12	28
VBD250L22.0-BG-04S15	●	●	4	30°	25	23.9	22	12.470 ⁽³⁾	S15	37	KEYV-W20	40

• The tolerance of R: (1) ± 0.01 (2) ± 0.012 (3) ± 0.02

*Torque: Recommended torque (N·m) for clamping.

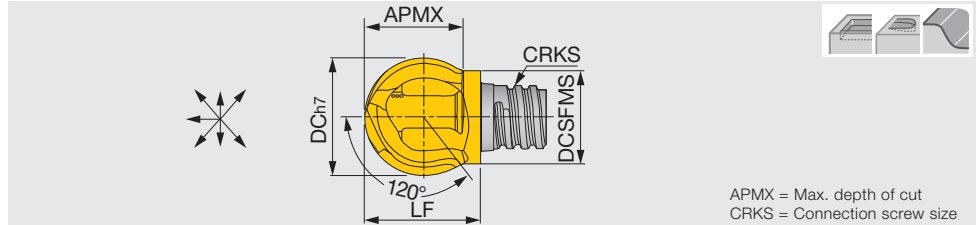
VBE060/VBD080 ~ VBD200: Packing quantity = 2 pcs.

VBD250: Packing quantity = 1 pc.

●: Line up

VBB**-SG...

TungMeister ball nose head with spherical designed edge, available for pull-cutting on the wall



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	CRKS	LF	Wrench	Torque*
VBB100L08.0-SG-02S05	●	2	0°	10	7.6	7.5	S05	10	KEYV-S05	7
VBB120L09.6-SG-02S06	●	2	0°	12	9.5	9	S06	11.6	*KEYV-S08	10
VBB160L12.9-SG-02S08	●	2	0°	16	12.2	12	S08	15.4	*KEYV-S10	15
VBB200L16.1-SG-02S10	●	2	0°	20	15.2	15	S10	18.4	KEYV-S10	28

● For pull-cutting on the vertical wall

* Some heads require different size of wrench.

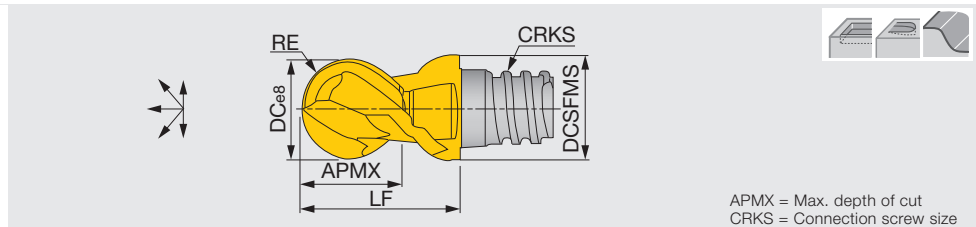
**Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VBE**-BGA

TungMeister ball nose head with 2 flutes and helical ground edge for Al machining



Designation	KS15F	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VBE080L05.0-BGA02S05	●	2	45°	8	7.7	5	3.982 ⁽¹⁾	S05	10	KEYV-S05	7
VBE100L07.0-BGA02S06	●	2	45°	10	9.7	7	4.982 ⁽¹⁾	S06	13	KEYV-S06	10
VBE120L09.0-BGA02S08	●	2	45°	12	11.7	9	5.987 ⁽²⁾	S08	16.5	KEYV-S08	15
VBE160L12.0-BGA02S10	●	2	45°	16	15.3	12	7.978 ⁽²⁾	S10	20.5	KEYV-S10	28
VBE200L15.0-BGA02S12	●	2	45°	20	18.3	15	9.972 ⁽²⁾	S12	25.5	KEYV-S12	28

● The tolerance of R : (1) ± 0.01 (2) ± 0.012

*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

STANDARD CUTTING CONDITIONS

Standard cutting conditions: Roughing (VBB-BM / BG / SG, VBD-BG, VBE-BGA)

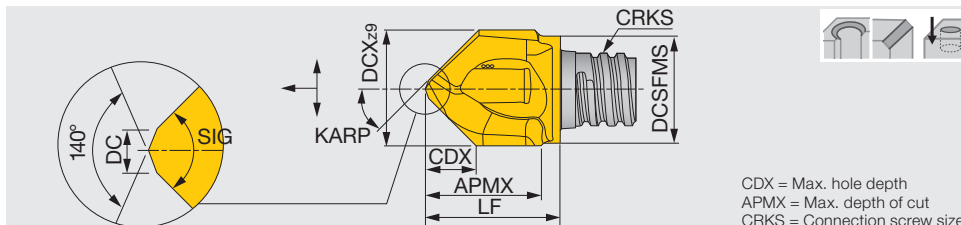
ISO	Workpiece material	Hardness	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)							Depth of cut ap (mm)	Pick feed Pf (mm)
				Tool diameter: DC (mm)								
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	100 - 200	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	80 - 180	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	80 - 160	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	60 - 100	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	100 - 220	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	100 - 220	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
N	Aluminium alloys Si < 13%	-	200 - 700	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
	Aluminium alloys Si ≥13%	-	100 - 300	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.4 x øDc
S	Titanium alloys Ti-6Al-4V, etc.	-	40 - 80	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.2 x øDc
	Heat-resistant alloys Inconel 718, etc.	50 - 60 HRC	20 - 40	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.2 x øDc
H	Hardened steel SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	-	40 - 80	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.2 x øDc
	Hardened steel SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	20 - 60	0.03 - 0.07	0.04 - 0.08	0.05 - 0.10	0.06 - 0.11	0.07 - 0.13	0.08 - 0.15	0.08 - 0.15	0.3 x øDc	0.2 x øDc

Standard cutting conditions: Profiling for semi-finishing and finishing
(VBB-BM / BG / SG, VBD-BG, VBE-BGA)

ISO	Workpiece material	Hard- ness	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)							Depth of cut ap (mm)	Pick feed Pf (mm)
				Tool diameter: DC (mm)								
				6	8	10	12	16	20	25		
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	120 - 250	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	100 - 220	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	100 - 200	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	80 - 120	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	120 - 280	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	120 - 280	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
N	Aluminium alloys Si < 13%	-	300 - 1000	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
	Aluminium alloys Si ≥13%	-	150 - 400	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.1 x øDc	0.15 x øDc
S	Titanium alloys Ti-6Al-4V, etc.	-	50 - 100	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.08 x øDc	0.1 x øDc
	Heat-resistant alloys Inconel 718, etc.	50 - 60 HRC	30 - 50	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.08 x øDc	0.1 x øDc
H	Hardened steel SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	-	50 - 100	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.08 x øDc	0.1 x øDc
	Hardened steel SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	30 - 80	0.04 - 0.09	0.06 - 0.11	0.07 - 0.12	0.08 - 0.13	0.09 - 0.16	0.1 - 0.18	0.1 - 0.18	0.08 x øDc	0.1 x øDc

VCP**-02...

TungMeister head with 2 pressed flutes for spot drilling and chamfering



Designation	AH725	SIG	NOF	FHA	DCX	DCSFMS	APMX	CDX	CRKS	LF	DC	KAPR	Wrench	Torque*
VCP100L09.5A30-02S06	●	60	2	0°	10	9.5	8.5	7.5	S06	11.75	1.5	30°	KEYV-S06	10
VCP120L12.0A30-02S08	●	60	2	0°	12	11.5	11	9.2	S08	15.4	1.5	30°	KEYV-S08	15
VCP160L15.0A30-02S10	●	60	2	0°	16	15.2	16	12	S10	20.2	2.5	30°	KEYV-S10	28
VCP080L07.7A45-02S05	●	90	2	0°	8	7.6	7.5	3.7	S05	9.75	1	45°	KEYV-S05	7
VCP083L07.9A45-02S05	●	90	2	0°	8.3	7.6	7.5	3.8	S05	10	1	45°	KEYV-S05	7
VCP100L09.0A45-02S06	●	90	2	0°	10	9.5	9.5	4.4	S06	11.75	1.5	45°	KEYV-S06	10
VCP104L09.0A45-02S06	●	90	2	0°	10.4	9.5	9.5	4.6	S06	11.75	1.5	45°	KEYV-S06	10
VCP120L12.0A45-02S08	●	90	2	0°	12	11.5	11.5	5.4	S08	15.4	1.5	45°	KEYV-S08	15
VCP124L12.0A45-02S08	●	90	2	0°	12.4	11.5	11.5	5.6	S08	15.4	1.5	45°	KEYV-S08	15
VCP160L15.0A45-02S10	●	90	2	0°	16	15.2	15	7.1	S10	18.8	1.5	45°	KEYV-S10	28
VCP165L15.0A45-02S10	●	90	2	0°	16.5	15.2	15	7.1	S10	18.8	1.5	45°	KEYV-S10	28
VCP100L09.5A60-02S06	●	120	2	0°	10	9.5	9.5	2.7	S06	12.7	1.5	60°	KEYV-S06	10
VCP120L12.0A60-02S08	●	120	2	0°	12	11.5	11.5	3.3	S08	15.2	1.5	60°	KEYV-S08	15
VCP160L15.5A60-02S10	●	120	2	0°	16	15.2	16	4.4	S10	19.9	1.5	60°	KEYV-S10	28

● Min. chamfering: ø1.5 mm

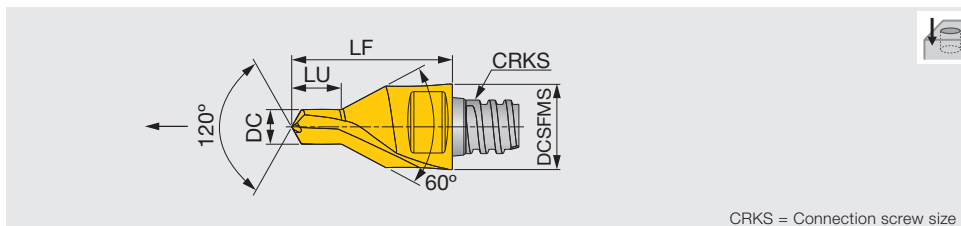
*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VDP**-02...

TungMeister head for center drilling



Designation	AH725	NOF	FHA	DC±0.02	DCSFMS	LU	CRKS	LF	Wrench	Torque*
VDP328L04.6A30-02S05	●	2	0°	3.28	8	4.6	S05	15	KEYV-S05	7
VDP412L05.9A30-02S06	●	2	0°	4.12	10	5.9	S06	19	KEYV-S06	10
VDP513L07.2A30-02S08	●	2	0°	5.13	12	7.2	S08	23	KEYV-S08	15
VDP646L08.9A30-02S10	●	2	0°	6.46	16	8.9	S10	28	KEYV-S10	28

*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

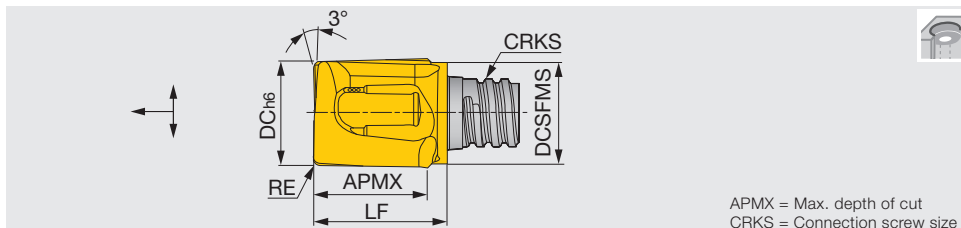
STANDARD CUTTING CONDITIONS

Drilling (VCP, VDP)

ISO	Workpiece material	Hardness	Cutting speed Vc (m/min)	Feed: f (mm/rev)				
				VDP328	VDP412	VDP513	VDP646	VCP
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	40 - 80	0.04 - 0.08	0.05 - 0.10	0.05 - 0.10	0.06 - 0.12	0.06 - 0.12
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	30 - 50	0.04 - 0.08	0.05 - 0.10	0.05 - 0.10	0.06 - 0.12	0.06 - 0.12
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	20 - 30	0.04 - 0.08	0.05 - 0.10	0.05 - 0.10	0.06 - 0.12	0.06 - 0.12
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	15 - 25	0.04 - 0.08	0.05 - 0.10	0.05 - 0.10	0.06 - 0.12	0.06 - 0.12
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	60 - 100	0.05 - 0.09	0.07 - 0.12	0.07 - 0.12	0.12 - 0.18	0.12 - 0.18
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	60 - 100	0.04 - 0.08	0.05 - 0.10	0.05 - 0.10	0.10 - 0.15	0.10 - 0.15
S	Titanium alloys Ti-6Al-4V, etc.	-	15 - 25	0.04 - 0.07	0.04 - 0.07	0.04 - 0.07	0.04 - 0.07	0.04 - 0.07
	Heat-resistant alloys Inconel 718, etc.	-	10 - 20	0.03 - 0.06	0.03 - 0.06	0.03 - 0.06	0.03 - 0.06	0.03 - 0.06
H	Hardened steel	SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	40 - 50 HRC	15 - 25	0.04 - 0.07	0.04 - 0.07	0.04 - 0.07	0.04 - 0.07
		SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	10 - 20	0.03 - 0.06	0.03 - 0.06	0.03 - 0.06	0.03 - 0.06

VGC**-02...

TungMeister head for counter boring



Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	RE	CRKS	LF	Wrench	Torque*
VGC078L08.0R02-02S05	●	2	10°	7.8	7.6	8	0.2	S05	10	KEYV-S05	7
VGC080L08.0R04-02S05	●	2	10°	8	7.6	8	0.4	S05	10	KEYV-S05	7
VGC080L08.0R10-02S05	●	2	10°	8	7.6	8	1	S05	10	KEYV-S05	7
VGC080L08.0R20-02S05	●	2	10°	8	7.6	8	2	S05	10	KEYV-S05	7
VGC098L09.0R03-02S06	●	2	10°	9.8	9.5	9.5	0.3	S06	12.4	KEYV-S06	10
VGC100L09.0R04-02S06	●	2	10°	10	9.5	9.5	0.4	S06	12.4	KEYV-S06	10
VGC100L09.0R10-02S06	●	2	10°	10	9.5	9.5	1	S06	12.4	KEYV-S06	10
VGC100L09.0R20-02S06	●	2	10°	10	9.5	9.5	2	S06	12.4	KEYV-S06	10
VGC117L10.0R03-02S08	●	2	10°	11.7	11.5	10	0.3	S08	14.2	KEYV-S08	15
VGC120L10.0R04-02S08	●	2	10°	12	11.5	10	0.4	S08	14.2	KEYV-S08	15
VGC120L10.0R10-02S08	●	2	10°	12	11.5	10	1	S08	14.2	KEYV-S08	15
VGC120L10.0R20-02S08	●	2	10°	12	11.5	10	2	S08	14.2	KEYV-S08	15
VGC157L15.0R03-02S10	●	2	10°	15.7	15.2	15	0.3	S10	19	KEYV-S10	28
VGC160L15.0R04-02S10	●	2	10°	16	15.2	15	0.4	S10	19	KEYV-S10	28
VGC160L15.0R08-02S10	●	2	10°	16	15.2	15	0.8	S10	19	KEYV-S10	28

• Can drill with step feed

*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

STANDARD CUTTING CONDITIONS

Counter boring (VGC)

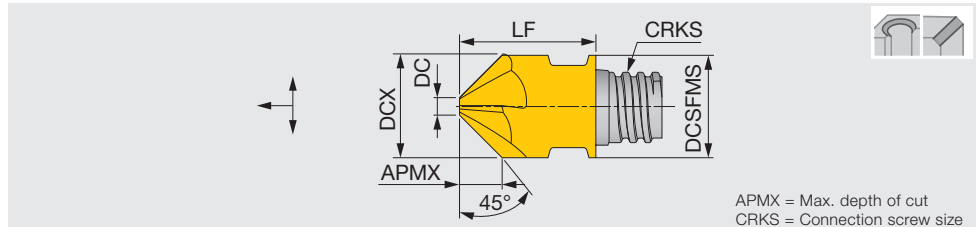
ISO	Workpiece material	Hardness	Cutting speed Vc (m/min)	Feed per tooth fz(mm/t)
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	40 - 80	0.04 - 0.08
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	30 - 50	0.04 - 0.08
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	20 - 30	0.04 - 0.08
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	15 - 25	0.04 - 0.08
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	60 - 100	0.05 - 0.09
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	60 - 100	0.04 - 0.08
S	Titanium alloys Ti-6Al-4V, etc.	-	15 - 25	0.04 - 0.07
	Heat-resistant alloys Inconel 718, etc.	-	10 - 20	0.03 - 0.06
H	Hardened steel			
	SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	40 - 50 HRC	15 - 25	0.04 - 0.07
	SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	50 - 60 HRC	10 - 20	0.03 - 0.06

• When drilling, the step feed (woodpeckering feed) operation should be applied with the depth of 0.3 - 0.5 mm per step.

• Apply the same cutting conditions as the VEE type head when conducting shoulder milling or slotting operations.

VCA**-04, 06...

TungMeister head with 4 or 6 flutes for countersinking and chamfering



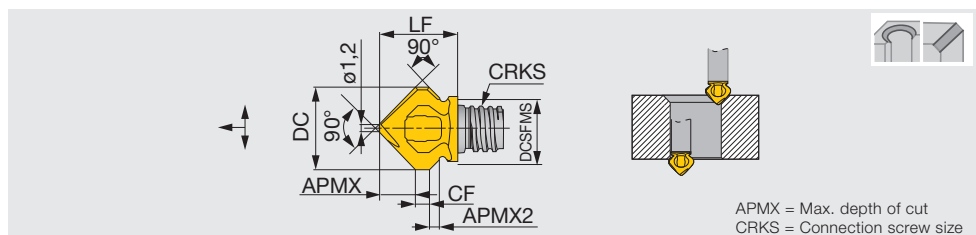
Designation	AH715	AH725	NOF	FHA	DCX	DCSFMS	APMX	DC	CRKS	LF	Wrench	Torque*
VCA100L04.0A45-04S06	●		4	0°	10	10	4	1.95	S06	13	KEYV-S06	10
VCA120L05.0A45-04S08	●		4	0°	12	12	5	1.95	S08	16.5	KEYV-S08	15
VCA127L05.3A45-04S08	●		4	0°	12.7	12.7	5.3	1.98	S08	16.5	KEYV-S08	15
VCA160L06.5A45-06S10	●	●	6	0°	16	16	6.5	3	S10	20.3	KEYV-S10	28
VCA200L07.5A45-06S12	●		6	0°	20	18.3	7.5	5	S12	25.5	KEYV-S12	28

**Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VCW**-02

TungMeister head for countersinking, top and bottom chamfering



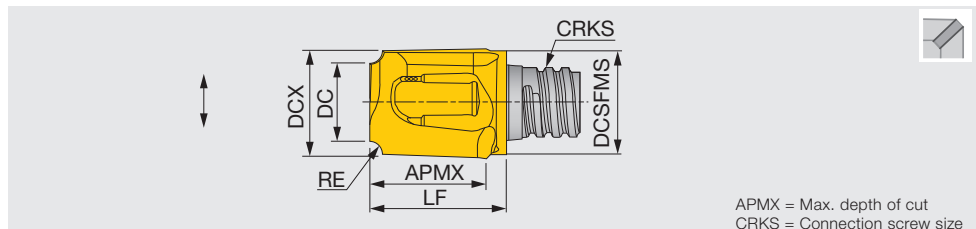
Designation	AH725	NOF	FHA	DC	DCSFMS	APMX	APMX2	CF	CRKS	LF	Wrench	Torque*
VCW118L05.0A45-02S06	●	2	0°	11.8	9.3	5	1.2	2	S06	11.2	KEYV-S06	10

• Available for chamfering of reverse side
* Some heads require different wrench sizes.
**Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VCR**-02

TungMeister head with 2 pressed flutes for concave radius chamfering



Designation	AH725	NOF	FHA	DCX	DCSFMS	DC	APMX	RE	CRKS	LF	Wrench	Torque*
VCR080L07.5R10-02S05	●	2	0°	8	7.6	5.8	7.5	1	S05	10.5	KEYV-S05	7
VCR100L09.5R16-02S06	●	2	0°	10	9.5	6.8	9.5	1.6	S06	12.5	KEYV-S06	10
VCR100L09.5R25-02S06	●	2	0°	10	9.5	5.1	9.5	2.5	S06	12.5	KEYV-S06	10
VCR127L12.0R30-02S08	●	2	0°	12.7	12.2	6.5	12	3	S08	15.6	KEYV-S08	15
VCR127L12.0R40-02S08	●	2	0°	12.7	12.2	4.7	12	4	S08	15.6	KEYV-S08	15
VCR160L15.0R50-02S10	●	2	0°	16	15.2	6.2	15	5	S10	19.1	KEYV-S10	28
VCR200L07.0R60-02S12	●	2	0°	20	18.3	8	7	6	S12	17.4	KEYV-S12	28

**Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

STANDARD CUTTING CONDITIONS

Chamfering and countersinking (VCA, VCW, VCR, VCP)

ISO	Workpiece material	Hardness	Cutting speed V _c (m/min)	Feed f (mm/rev)
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300 HB	60 - 100	0.06 - 0.12
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300 HB	50 - 80	0.06 - 0.12
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	40 - 70	0.06 - 0.12
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	30 - 50	0.06 - 0.12
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250 HB	80 - 120	0.06 - 0.12
	Ductile cast irons FC250, FC300, etc. 400-15S, etc.	150 - 250 HB	80 - 120	0.06 - 0.12
N	Aluminium alloys	-	100 - 200	0.08 - 0.15
S	Titanium alloys Ti-6Al-4V, etc.	-	30 - 50	0.05 - 0.1
	Heat-resistant alloys Inconel 718, etc.	-	20 - 40	0.04 - 0.08
H	Hardened steel	SKD61, SKT4, etc. X40CrMoV5 1, 55NiCrMoV6, etc.	30 - 50	0.05 - 0.1
		SKD11, SKH, etc. X153CrMoV12, HS18-0-1, etc.	20 - 40	0.04 - 0.08

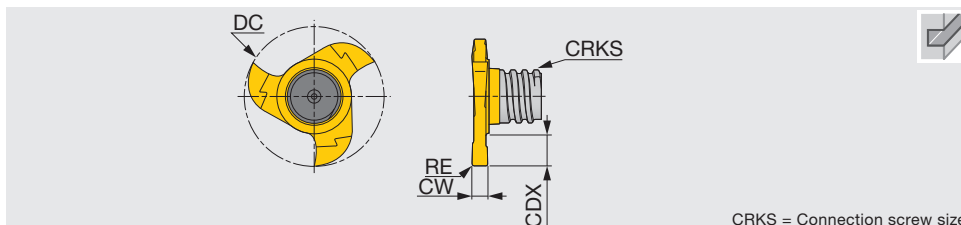
TOLERANCE OF TOOL DIAMETER

Basic dimensions (mm)		Permissible dimensional deviations (μm)						
>	≤	e8	e9	h6	h7	h9	h10	z9
6	10	-25 -47	-25 -61	0 -9	0 -15	0 -36	0 -58	+78 +42
10	14	-32 -59	-32 -75	0 -11	0 -18	0 -43	0 -70	+93 +50
14	18	-32 -59	-32 -75	0 -11	0 -18	0 -43	0 -70	+103 +60
18	30	-40 -73	-40 -92	0 -13	0 -21	0 -52	0 -84	-

● JISB0401-2: 1998 (ISO286-2: 1988) extract

VST**-3...

TungMeister head for slotting of 1.5 - 3.17mm width with 3 teeth



CRKS = Connection screw size

Designation	GH130	NOF	FHA	DC	CW±0.02	RE	CRKS	CDX	Wrench	Torque*
VST157W1.50R010-3S06	●	3	0°	15.7	1.5	0.1	S06	2.8	KEYV-177	10
VST157W1.57R020-3S06	●	3	0°	15.7	1.57	0.2	S06	2.8	KEYV-177	10
VST157W2.00R020-3S06	●	3	0°	15.7	2	0.2	S06	2.8	KEYV-177	10
VST157W2.39R020-3S06	●	3	0°	15.7	2.39	0.2	S06	2.8	KEYV-177	10
VST157W2.50R020-3S06	●	3	0°	15.7	2.5	0.2	S06	2.8	KEYV-177	10
VST157W3.00R020-3S06	●	3	0°	15.7	3	0.2	S06	2.8	KEYV-177	10
VST157W3.17R020-3S06	●	3	0°	15.7	3.17	0.2	S06	2.8	KEYV-177	10
VST177W1.20R005-3S06	●	3	0°	17.7	1.2 ⁽¹⁾	0.05	S06	3.8	KEYV-177	10
VST177W1.40R005-3S06	●	3	0°	17.7	1.4 ⁽¹⁾	0.05	S06	3.8	KEYV-177	10
VST177W1.50R010-3S06	●	3	0°	17.7	1.5	0.1	S06	3.8	KEYV-177	10
VST177W1.57R020-3S06	●	3	0°	17.7	1.57	0.2	S06	3.8	KEYV-177	10
VST177W1.70R005-3S06	●	3	0°	17.7	1.7 ⁽¹⁾	0.05	S06	3.8	KEYV-177	10
VST177W2.00R020-3S06	●	3	0°	17.7	2	0.2	S06	3.8	KEYV-177	10
VST177W2.20R110-3S06	●	3	0°	17.7	2.20	1.1	S06	3.8	KEYV-177	10
VST177W2.39R020-3S06	●	3	0°	17.7	2.39	0.2	S06	3.8	KEYV-177	10
VST177W2.50R020-3S06	●	3	0°	17.7	2.5	0.2	S06	3.8	KEYV-177	10
VST177W3.00R020-3S06	●	3	0°	17.7	3	0.2	S06	3.8	KEYV-177	10
VST177W3.17R020-3S06	●	3	0°	17.7	3.17	0.2	S06	3.8	KEYV-177	10

(1) W is based on DIN471 / 472

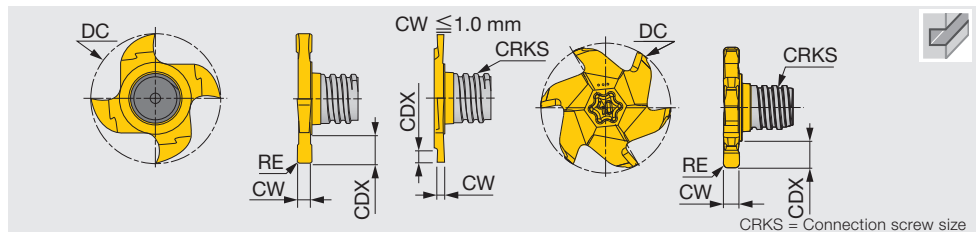
*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VST**-4, 6...

TungMeister head for slotting of 0.76 - 10mm width with 4, 6 teeth



Designation	GH130	FHA	NOF	DC	CW±0.02	RE	CRKS	CDX	Wrench	Torque*
VST217W0.76R000-4S08	●	0°	4	21.7	0.76 ⁽¹⁾	-	S08	1.5	KEYV-217	15
VST217W0.86R000-4S08	●	0°	4	21.7	0.86 ⁽¹⁾	-	S08	1.7	KEYV-217	15
VST217W0.96R000-4S08	●	0°	4	21.7	0.96 ⁽¹⁾	-	S08	1.9	KEYV-217	15
VST217W1.00R005-4S08	●	0°	4	21.7	1	0.05	S08	2	KEYV-217	15
VST217W1.20R005-4S08	●	0°	4	21.7	1.2 ⁽¹⁾	0.05	S08	4.5	KEYV-217	15
VST217W1.40R005-4S08	●	0°	4	21.7	1.4 ⁽¹⁾	0.05	S08	4.5	KEYV-217	15
VST217W1.57R000-4S08	●	0°	4	21.7	1.57	-	S08	4.5	KEYV-217	15
VST217W1.70R010-4S08	●	0°	4	21.7	1.7 ⁽¹⁾	0.1	S08	4.5	KEYV-217	15
VST217W1.95R020-4S08	●	0°	4	21.7	1.95 ⁽¹⁾	0.2	S08	4.5	KEYV-217	15
VST217W2.00R020-4S08	●	0°	4	21.7	2	0.2	S08	4.5	KEYV-217	15
VST217W2.25R020-4S08	●	0°	4	21.7	2.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217	15
VST217W2.39R020-4S08	●	0°	4	21.7	2.39	0.2	S08	4.5	KEYV-217	15
VST217W2.50R020-4S08	●	0°	4	21.7	2.5	0.2	S08	4.5	KEYV-217	15
VST217W2.75R020-4S08	●	0°	4	21.7	2.75 ⁽¹⁾	0.2	S08	4.5	KEYV-217	15
VST217W3.00R020-4S08	●	0°	4	21.7	3	0.2	S08	4.5	KEYV-217	15
VST217W3.17R020-4S08	●	0°	4	21.70	3.17	0.2	S08	4.5	KEYV-217	15
VST217W3.25R020-4S08	●	0°	4	21.7	3.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217	15
VST217W4.00R020-4S08	●	0°	4	21.7	4	0.2	S08	4.5	KEYV-217	15
VST217W4.25R020-4S08	●	0°	4	21.7	4.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217	15
VST217W4.75R020-4S08	●	0°	4	21.7	4.75	0.2	S08	4.5	KEYV-217	15
VST217W5.25R020-4S08	●	0°	4	21.7	5.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217	15
VST277W2.50R020-6S10	●	0°	6	27.7	2.5	0.2	S10	6	KEYV-T40L	28
VST277W5.25R020-6S10	●	0°	6	27.7	5.25	0.2	S10	6	KEYV-T40L	28
VST277W10.0R020-6S10	●	0°	6	27.7	10	0.2	S10	6	KEYV-T40L	28

(1) W is based on DIN471 / 472

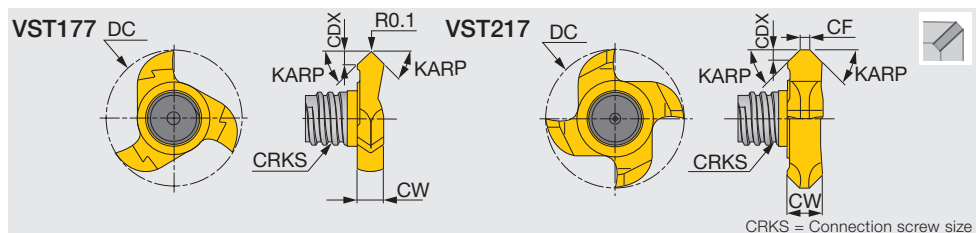
*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VST**-A45...

TungMeister head for chamfering on slots



Designation	GH130	NOF	FHA	DC	CW	KARP	CRKS	CDX	CF	Wrench	Torque*
VST177L01.40A45-3S06	●	3	0°	17.7	3.4	45°	S06	1.4	-	KEYV-177	10
VST217L01.70A45-4S08	●	4	0°	21.7	5.5	45°	S08	1.7	1.5	KEYV-217	15

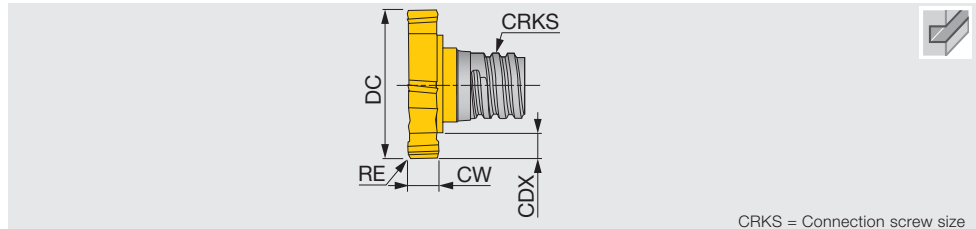
*Torque: Recommended torque (N·m) for clamping.

Packing quantity = 2 pcs.

●: Line up

VTB**-06...

TungMeister head for T-slotting of 3 - 8mm width



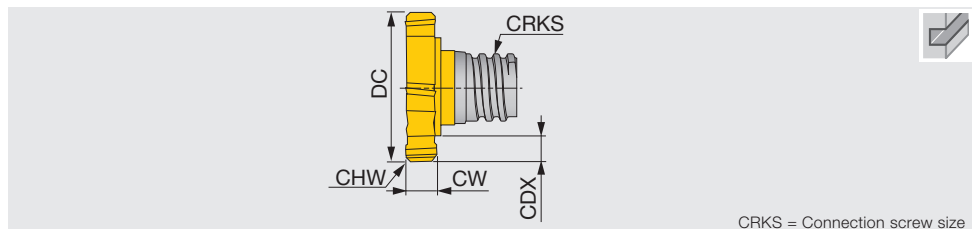
Designation	GH130	NOF	FHA	DC ^{-0.05}	CW ± 0.02	CDX	CRKS	RE	Wrench	Torque*
VTB135W3.00R04-06S05	●	6	0°	13.5	3	2.65	S05	0.4	KEYV-T20	7
VTB135W4.00R04-06S05	●	6	0°	13.5	4	2.65	S05	0.4	KEYV-T20	7
VTB160W2.00R04-06S06	●	6	0°	16	2	2.9	S06	0.4	KEYV-T20	10
VTB160W3.00R04-06S06	●	6	0°	16	3	2.9	S06	0.4	KEYV-T25	10
VTB160W4.00R04-06S06	●	6	0°	16	4	2.9	S06	0.4	KEYV-T25	10
VTB165W2.00R04-06S06	●	6	0°	16.5	2	3.15	S06	0.4	KEYV-T20	10
VTB165W3.00R04-06S06	●	6	0°	16.5	3	3.15	S06	0.4	KEYV-T25	10
VTB165W4.00R04-06S06	●	6	0°	16.5	4	3.15	S06	0.4	KEYV-T25	10
VTB195W4.00R04-06S08	●	6	0°	19.5	4	3.45	S08	0.4	KEYV-T30L	15
VTB195W5.00R04-06S08	●	6	0°	19.5	5	3.45	S08	0.4	KEYV-T30L	15
VTB195W6.00R04-06S08	●	6	0°	19.5	6	3.45	S08	0.4	KEYV-T30L	15
VTB225W5.00R04-06S08	●	6	0°	22.5	5	4.95	S08	0.4	KEYV-T40L	15
VTB225W6.00R04-06S08	●	6	0°	22.5	6	4.95	S08	0.4	KEYV-T40L	15
VTB225W8.00R04-06S08	●	6	0°	22.5	8	4.95	S08	0.4	KEYV-T40L	15
VTB250W6.00R04-06S08	●	6	0°	25	6	5.9	S08	0.4	KEYV-T50L	15
VTB250W8.00R04-06S08	●	6	0°	25	8	5.9	S08	0.4	KEYV-T50L	15
VTB250W5.00R04-06S10	●	6	0°	25	5	4.3	S10	0.4	KEYV-T50L	28
VTB250W6.00R04-06S10	●	6	0°	25	6	4.3	S10	0.4	KEYV-T50L	28
VTB250W8.00R04-06S10	●	6	0°	25	8	4.3	S10	0.4	KEYV-T50L	28

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

VTB**-C15-06...

TungMeister head for T-slotting of 2 mm width with chamfered edges



Designation	GH130	NOF	FHA	DC ^{-0.05}	CW ± 0.02	CDX	CRKS	CHW	Wrench	Torque*
VTB135W2.00C15-06S05	●	6	0°	13.5	2	2.65	S05	0.15	KEYV-T20	7

*Torque: Recommended torque (N·m) for clamping.
Packing quantity = 2 pcs.

●: Line up

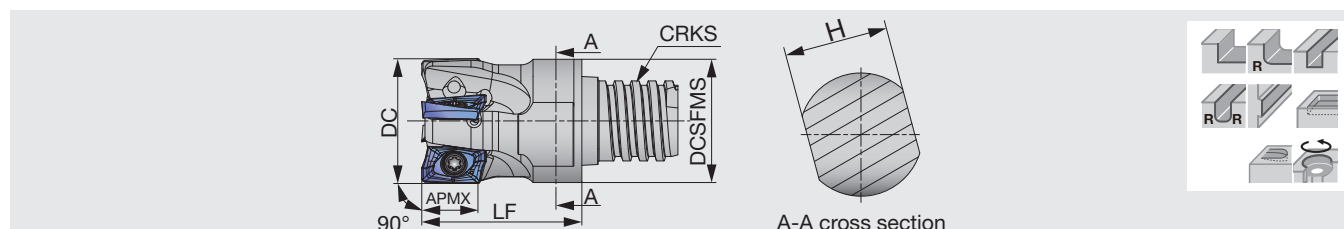
STANDARD CUTTING CONDITIONS

Slotting (VST, VTB)

ISO	Workpiece material	Hardness HB	VST type		VTB type	
			Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Low carbon steels S45C, S55C, etc. C45, C55, etc.	- 300	80 - 180	0.05 - 0.15	80 - 180	0.08 - 0.18
	High carbon steels SCM440, SCr415, etc. 42CrMo4, 15Cr3, etc.	- 300	60 - 120	0.04 - 0.12	60 - 120	0.05 - 0.15
M	Stainless steels SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200	50 - 120	0.04 - 0.12	50 - 120	0.05 - 0.15
K	Grey cast irons FC250, FC300, etc. 250, 300, etc.	150 - 250	100 - 200	0.05 - 0.15	100 - 200	0.08 - 0.18
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250	100 - 200	0.04 - 0.12	100 - 200	0.05 - 0.15
N	Aluminium alloys Si < 13%	-	200 - 600	0.05 - 0.15	200 - 600	0.08 - 0.18
	Aluminium alloys Si ≥ 13%	-	100 - 300	0.03 - 0.13	100 - 300	0.05 - 0.15
S	Titanium alloys Ti-6Al-4V, etc.	-	40 - 60	0.04 - 0.12	40 - 60	0.05 - 0.15
	Heat-resistant alloys Inconel 718, etc.	-	15 - 35	0.02 - 0.1	15 - 35	0.02 - 0.1

TUNG^{FORCE}**FREC**
HPAV06-S...

Square shoulder milling cutter in small diameter; Modular head with TungMeister threaded adaptation



Designation	APMX	DC	CICT	LF	H	DCSFMS	CRKS	WT(kg)	Insert
HPAV06M010S06R02	6	10	2	16	8	9.8	S06	0.01	AVGT06...
HPAV06M012S08R02	6	12	2	18	10	11.7	S08	0.02	AVGT06...
HPAV06M012S08R03	6	12	3	18	10	11.7	S08	0.02	AVGT06...
HPAV06M016S10R03	6	16	3	20	13	15.4	S10	0.03	AVGT06...
HPAV06M016S10R04	6	16	4	20	13	15.4	S10	0.03	AVGT06...

- Shank types: VSSD, VTSD, VSC, VSTD

- For connections between metric shank and TungMeister thread, please use VAD-M type connector

Spanner for clamping	Cat. No.	Connection screw size
	KEYV-S06	S06
	KEYV-S08	S08
	KEYV-S10	S10

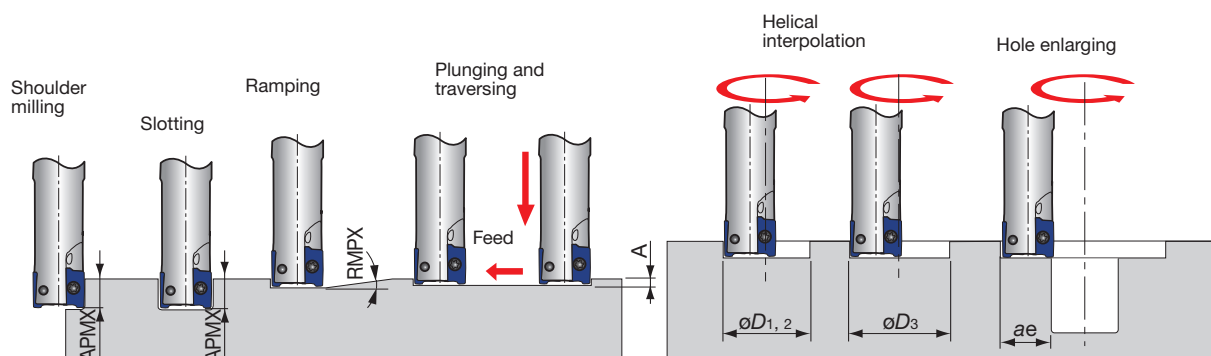
Optional- to be ordered separately.

SPARE PARTS

Designation	Clamping screw	Lubricant	Wrench
HPAV06M...	CSPB-2H	M-1000	IP-6DB

TUNG^{FORCE}**FREC**

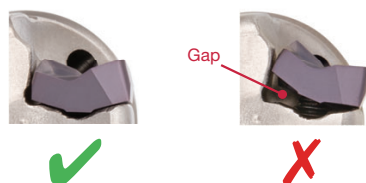
MACHINING APPLICATIONS



Designation	DC	Max. depth of cut APMX	Max. ramping angle RMPX	Max. plunging A	Min. machining ϕD_1	Max. machining ϕD_2	Max. machining ϕD_3^*	Max. cutting width in enlarging ae
EPAV06_008...	8	6	-	-	-	-	-	-
EPAV/HPAV06_010...	10	6	3°	0.3	15	19	18	9.5
EPAV/HPAV06_012...	12	6	3°	0.3	18	23	22	11.5
EPAV/HPAV06_014...	14	6	2.3°	0.3	22	27	26	13.5
EPAV/HPAV06_016...	16	6	2°	0.3	28	31	30	15.5
EPAV/HPAV06_018...	18	6	1.6°	0.3	30	35	34	17.5
EPAV/HPAV06_020...	20	6	1.4°	0.3	34	39	38	19.5
EPAV/HPAV06_025...	25	6	1.1°	0.3	44	49	48	24.5
EPAV/HPAV06_032...	32	6	0.8°	0.3	58	63	62	31.5
TPAV06_040...	40	6	0.6°	0.3	74	79	78	39.5

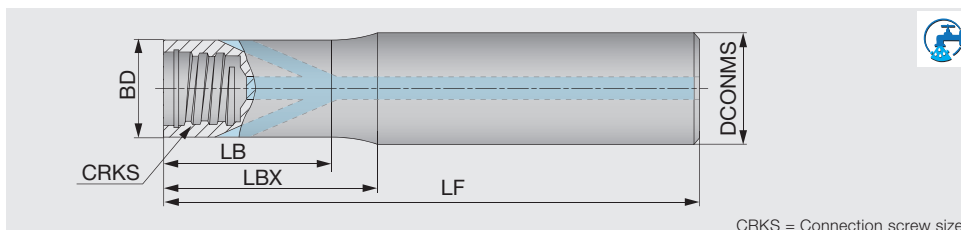
*Flat bottom hole

When clamping the insert, please confirm that there is no gap between the cutter body and the insert as shown in the picture.



VSSD**-W-A...

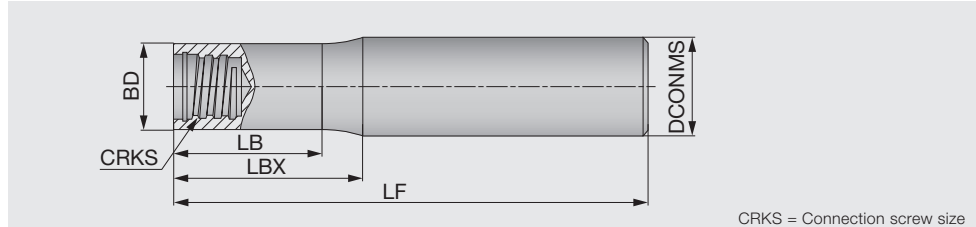
TungMeister, straight shank and neck with coolant hole



Designation	DCONMS	BD	LF	LBX	LB	CRKS	Material
VSSD10L070S06-W-A	10	9.6	70	20	19	S06	TUNGSTEN
VSSD10L090S06-W-A	10	9.6	90	40	39	S06	TUNGSTEN
VSSD10L110S06-W-A	10	9.6	110	60	59	S06	TUNGSTEN
VSSD12L070S08-W-A	12	11.5	70	20	19	S08	TUNGSTEN
VSSD12L090S08-W-A	12	11.5	90	40	39	S08	TUNGSTEN
VSSD12L110S08-W-A	12	11.5	110	60	59	S08	TUNGSTEN
VSSD12L130S08-W-A	12	11.5	130	80	79	S08	TUNGSTEN
VSSD16L070S10-W-A	16	15.2	70	20	18.5	S10	TUNGSTEN
VSSD16L090S10-W-A	16	15.2	90	40	36.5	S10	TUNGSTEN
VSSD16L110S10-W-A	16	15.2	110	60	58.5	S10	TUNGSTEN
VSSD16L130S10-W-A	16	15.2	130	80	78.5	S10	TUNGSTEN
VSSD20L090S12-W-A	20	18.3	90	40	37	S12	TUNGSTEN
VSSD20L130S12-W-A	20	18.3	130	80	77	S12	TUNGSTEN

VSSD...

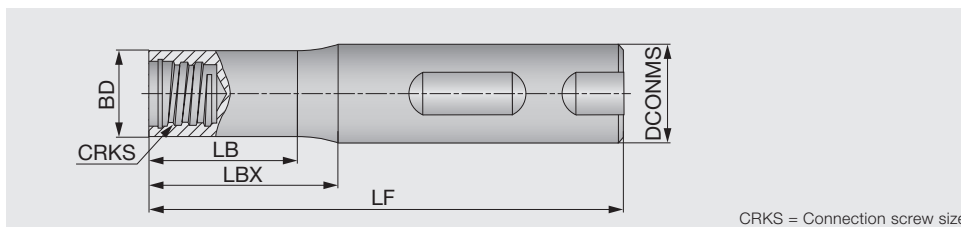
TungMeister, straight neck and cylindrical shank



Designation	DCONMS	BD	LF	LBX	LB	CRKS	Type	Material
VSSD08L060S05-S	8	7.6	60	15	12.80	S05	CYLINDRICAL	STEEL
VSSD08L070S05-C	8	7.6	70	20	19	S05	CYLINDRICAL	CARBIDE
VSSD08L090S05-C	8	7.6	90	40	39	S05	CYLINDRICAL	CARBIDE
VSSD08L110S05-C	8	7.6	110	60	59	S05	CYLINDRICAL	CARBIDE
VSSD10L070S06-C	10	9.6	70	20	18.5	S06	CYLINDRICAL	CARBIDE
VSSD10L075S06-S	10	9.6	75	20	19.4	S06	CYLINDRICAL	STEEL
VSSD10L090S06-C	10	9.6	90	40	38.5	S06	CYLINDRICAL	CARBIDE
VSSD10L110S06-C	10	9.6	110	60	58.5	S06	CYLINDRICAL	CARBIDE
VSSD10L150S06-C	10	9.6	150	100	98.5	S06	CYLINDRICAL	CARBIDE
VSSD12L070S08-C	12	11.5	70	20	17	S08	CYLINDRICAL	CARBIDE
VSSD12L090S08-C	12	11.5	90	40	37	S08	CYLINDRICAL	CARBIDE
VSSD12L090S08-S	12	11.5	90	16	13.6	S08	CYLINDRICAL	STEEL
VSSD12L110S08-C	12	11.5	110	60	57	S08	CYLINDRICAL	CARBIDE
VSSD12L130S08-C	12	11.5	130	80	77	S08	CYLINDRICAL	CARBIDE
VSSD16L090S10-C	16	15.2	90	40	38	S10	CYLINDRICAL	CARBIDE
VSSD16L100S10-S	16	15.2	100	20	18	S10	CYLINDRICAL	STEEL
VSSD16L110S10-C	16	15.2	110	60	58	S10	CYLINDRICAL	CARBIDE
VSSD16L130S10-C	16	15.2	130	80	78	S10	CYLINDRICAL	CARBIDE
VSSD16L150S10-C	16	15.2	150	100	98	S10	CYLINDRICAL	CARBIDE
VSSD20L090S12-C	20	18.3	90	40	37	S12	CYLINDRICAL	CARBIDE
VSSD20L120S12-S	20	18.3	120	25	20.5	S12	CYLINDRICAL	STEEL
VSSD20L130S12-C	20	18.3	130	80	77	S12	CYLINDRICAL	CARBIDE
VSSD20L200S12-C	20	18.3	200	120	117	S12	CYLINDRICAL	CARBIDE
VSSD25L120S15-C	25	23.9	120	60	58	S15	CYLINDRICAL	CARBIDE
VSSD25L135S15-S	25	23.9	135	35	33	S15	CYLINDRICAL	STEEL
VSSD25L170S15-C	25	23.9	170	100	98	S15	CYLINDRICAL	CARBIDE
VSSD25L250S15-C	25	23.9	250	150	148	S15	CYLINDRICAL	CARBIDE

VSSD**-W...

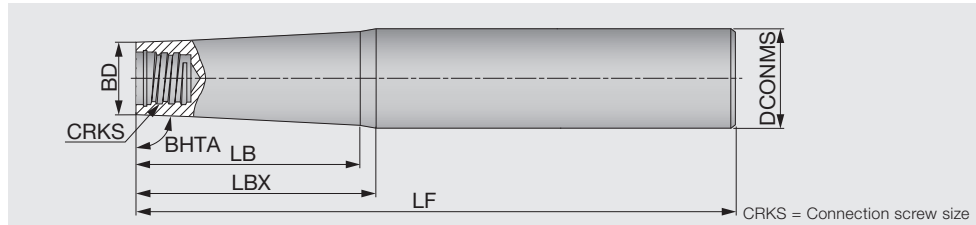
TungMeister, straight neck and weldon shank



Designation	DCONMS	BD	LF	LBX	LB	CRKS	Shank	Material
VSSD12L055W05-S	12	7.6	55	3.8	-	S05	WELDON	STEEL
VSSD16L065W06-S	16	9.6	65	6	-	S06	WELDON	STEEL
VSSD16L065W08-S	16	11.5	65	4	-	S08	WELDON	STEEL
VSSD20L070W10-S	20	15.2	70	4	-	S10	WELDON	STEEL
VSSD25L075W12-S	25	18.3	75	6	-	S12	WELDON	STEEL

VTSD...

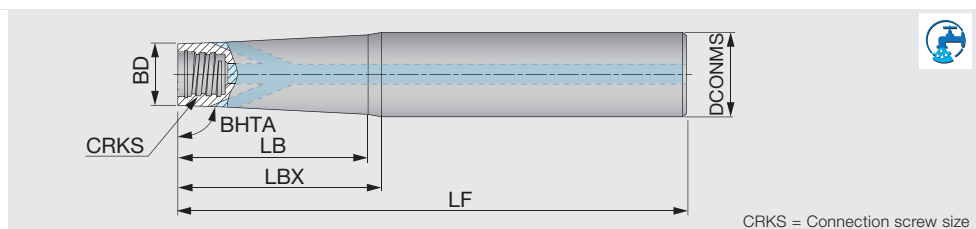
TungMeister, straight shank and taper neck



Designation	BHTA	DCONMS	BD	LF	LBX	LB	CRKS	Material
VTSD12L080S05-S	85°	12	7.6	80	25	-	S05	STEEL
VTSD12L100S05-S	89°	12	7.6	100	35	29	S05	STEEL
VTSD12L110S05-C	89°	12	7.6	110	60	56	S05	CARBIDE
VTSD12L130S05-C	89°	12	7.6	130	80	77	S05	CARBIDE
VTSD16L125S06-S	85°	16	9.6	125	34	31	S06	STEEL
VTSD16L130S08-C	89°	16	11.5	130	80	76.5	S08	CARBIDE
VTSD16L140S08-S	85°	16	11.5	140	22	19	S08	STEEL
VTSD16L150S05-C	89°	16	7.6	150	100	91	S05	CARBIDE
VTSD16L150S06-C	89°	16	9.6	150	100	94.5	S06	CARBIDE
VTSD16L150S08-C	89°	16	11.5	150	100	98	S08	CARBIDE
VTSD16L160S06-S	89°	16	9.6	160	55	46.5	S06	STEEL
VTSD16L170S06-C	89°	16	9.6	170	120	116.5	S06	CARBIDE
VTSD20L140S10-S	85°	20	15.2	140	27.5	-	S10	STEEL
VTSD20L170S08-C	89°	20	11.5	170	120	112	S08	CARBIDE
VTSD20L170S08-S	89°	20	11.5	170	80	69.5	S08	STEEL
VTSD20L170S10-C	89°	20	15.2	170	120	119	S10	CARBIDE
VTSD20L190S10-C	89°	20	15.2	190	140	-	S10	CARBIDE
VTSD20L190S10-S	89°	20	15.2	190	80	73	S10	STEEL
VTSD20L210S10-C	89°	20	15.2	210	160	-	S10	CARBIDE
VTSD25L160S12-S	85°	25	18.3	160	40	-	S12	STEEL
VTSD25L170S10-S	85°	25	15.2	170	56	-	S10	STEEL
VTSD25L180S12-C	89°	25	18.3	180	120	115	S12	CARBIDE
VTSD25L210S12-S	89°	25	18.3	210	100	94.5	S12	STEEL
VTSD25L250S12-C	89°	25	18.3	250	140	136.5	S12	CARBIDE
VTSD32L155S15-S	85°	32	23.9	155	45	-	S15	STEEL
VTSD32L190S12-S	85°	32	18.3	190	80	-	S12	STEEL
VTSD32L220S15-S	85°	32	23.9	220	100	-	S15	STEEL
VTSD32L250S15-C	89°	32	23.9	250	150	145	S15	CARBIDE
VTSD32L300S15-C	89°	32	23.9	300	200	198	S15	CARBIDE

VTSD**-W-A...

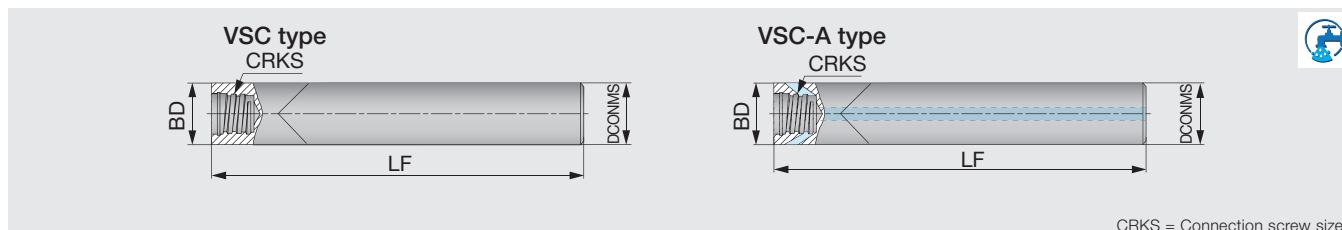
TungMeister, straight shank and taper neck with coolant hole



Designation	BHTA	DCONMS	BD	LF	LBX	LB	CRKS	Material
VTSD12L110S06-W-A	89°	12	9.6	110	60	59	S06	TUNGSTEN
VTSD16L170S06-W-A	89°	16	9.6	170	120	116	S06	TUNGSTEN

VSC...

TungMeister, straight shank for VST type slotting heads

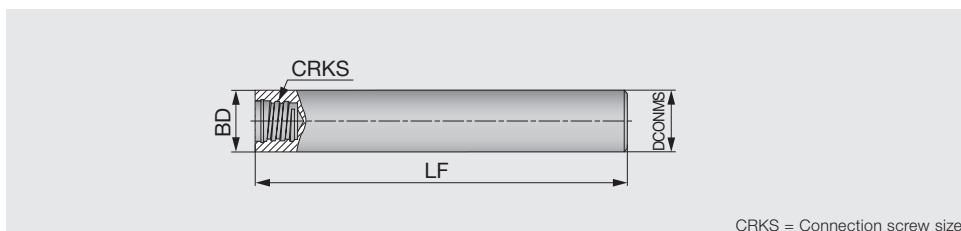


Designation	DCONMS	BD	LF	CRKS	Air hole	Material
VSC100L100S06-C	10	10	100	S06	without	CARBIDE
VSC120L100S08-C-A	12	12	100	S08	with	CARBIDE

Note: • For VSC-C type shank, just VST slotting head is recommended.
If other heads are used on the VSC-C shank, the depth of cut must be smaller than the max. ap in each head.
The VSC-C type shank does not have external clearance, so the shank may interfere with the work piece.

VSTD...

TungMeister, straight shank for VTB type slotting heads

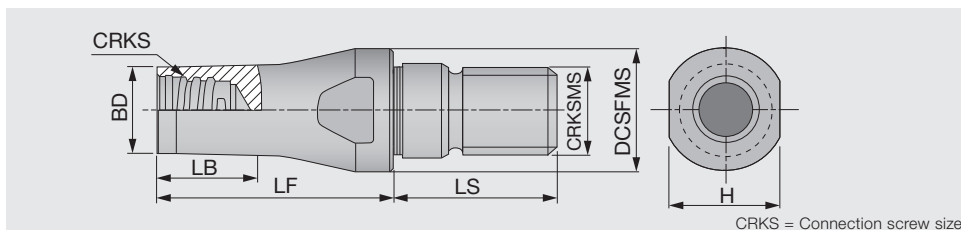


Designation	DCONMS	BD	LF	CRKS	Material
VSTD08L070S05-S	8	8	70	S05	STEEL
VSTD10L080S06-S	10	10	80	S06	STEEL
VSTD12L090S08-S	12	12	90	S08	STEEL
VSTD16L100S10-S	16	16	100	S10	STEEL

Note: • For VSTD type shank, just VTB grooving head is recommended.
If other heads are used on the VSTD shank, the depth of cut must be smaller than the max. ap in each head.
The VSTD type shank does not have external clearance, so the shank may interfere with the work piece.

VAD**-M...

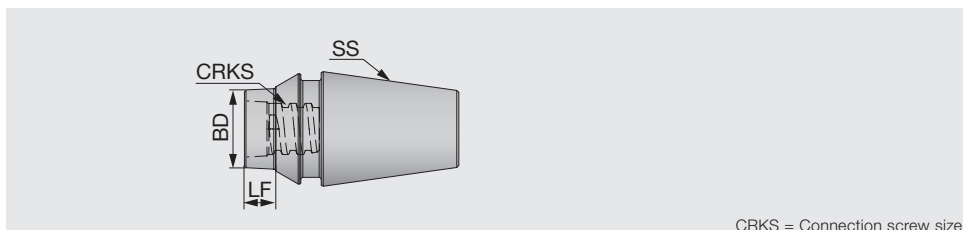
TungFlex conversion adaptor with TungMeister



Designation	BD	DCSFMS	LF	LS	LB	CRKS	CRKSMS	H
VAD130L016S08-S-M8	11.7	13	16	17.5	6	S08	M8	11
VAD130L025S08-S-M8	11.7	13	25	17.5	20	S08	M8	11
VAD180L020S08-S-M10	11.7	18	20	20	12	S08	M10	13
VAD180L025S08-S-M10	11.7	18	25	20	15	S08	M10	11
VAD210L020S08-S-M12	11.7	21	20	20	10	S08	M12	12.75
VAD210L025S08-S-M12	11.7	21	25	20	13	S08	M12	12.75

VER...

ER collet chucks conversion adaptor with TungMeister



Designation	SS	BD	LF	CRKS
VER11CL006S05-S	ER11	7.92	6	S05
VER11CL020S05-S	ER11	7.92	20	S05
VER16CL012S05-S	ER16	7.92	12	S05
VER16CL020S05-S	ER16	7.92	20	S05
VER16CL010S06-S	ER16	9.92	10	S06
VER16CL020S06-S	ER16	9.92	20	S06
VER16CL006S08-S	ER16	11.6	6	S08
VER16CL020S08-S	ER16	11.6	20	S08

DESIGNATION SYSTEM

Shank

V **SS** **D10** **L070** **S** **06** - **W** - **A**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

1 Series	V TungMeister	3 Shank diameter (mm)	D08 ø8	4 Length (mm)	L070 70	7 Shank material	S Steel
2 Shank type	SS Straight neck	D10 ø10	D12 ø12	5 Shape of shank	S Cylindrical	C Carbide	W Tungsten
	TS Taper neck	D16 ø16	D20 ø20	W Weldon			
	SC Slotting	D25 ø25	D32 ø32	6 Connection screw size	05 S05	8 Additional feature	A with coolant hole
	ST for T-Slotting	VSC, VAD type			06 S06	M Thread size (TungFlex adapters)	
	AD TungFlex adapter	100 ø10	120 ø12		08 S08		
	ER ER collet holder	130 ø13	180 ø18		10 S10		
		210 ø21			12 S12		
		VER type			15 S15		
		11C Collet size					
		16C Collet size					

Head

• Square endmill

V **E** **E** **080** **L05.0** **R00** - **03** **S05**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

• Ball nose endmill

V **B** **D** **200** **L15.0** - **BG** - **04** **S12**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

1 Series	V TungMeister	3 Helix angle / Rake face	B 0°	6 Corner shape / Angle	Nose radius	7 Additional feature	I Irregular pitch
2 Cutting edge	E Square	C 15°	D 30°	R00 Sharp edge	R005 R0.05	A for aluminium	R for roughing
	B Ball	E 38° ~ 50°	F 60°	R01 R0.1	R05 R0.5	R for roughing	C Combined edge
	R Radius	T Land		R10 R1.0			
FX for high feed		4 Diameter (mm)	060 ø6	Chamfer type		8 The number of flutes	
CA for chamfering		200 ø20		C15 0.15 x 45°	C30 0.3 x 45°	General	
CP Spot drilling				C60 0.6 x 45°		02 2	06 6
CW for chamfering (front and back)		5 Cutting edge length (mm)	L07.0 7	Chamfering head		Grooving head VST type	
CR for R chamfering		Length	L15.0 15	A30 30°	A60 60°	3 3	4 4
GC for counter boring		Groove width	W1.50 1.5	R chamfering head		9 Connection screw size	
DP for center drilling			W1.57 1.57	R10 R1.0	R16 R1.6	S05 S05	S06 S06
S for slotting			W10.0 10	Ball nose		S08 S08	S10 S10
T for T-slot milling				SG Sphere / high precision	BM Ball / general purpose	S12 S12	S15 S15
				BG Ball / high precision			

WRENCH

Appearance	Designation	Connection screw size	Torque (N·m)	Applicable head
	KEYV-S05	S05	7	Square Ball Radius Drilling Chamfering Counter boring
	KEYV-S06	S06	10	
	KEYV-S08	S08	15	
	KEYV-S10	S10	28	
	KEYV-S12	S12	28	
	KEYV-W20	S15	40	
	KEYV-177	S06	10	Slotting VST type
	KEYV-217	S08	15	
	KEYV-T40L	S08	15	Slotting VST, VTB type
		S10	28	
	KEYV-T20	S05	7	Slotting VTB type
		S06	10	
	KEYV-T25	S06	10	
	KEYV-T30L	S08	15	
	KEYV-T50L	S08	15	
		S10	28	

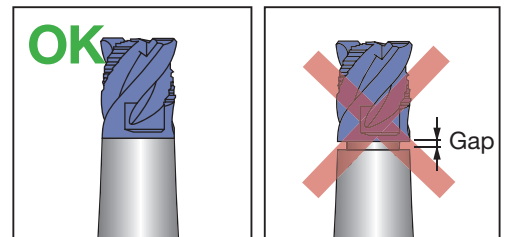
Note: Optional parts

TORQUE WRENCHES

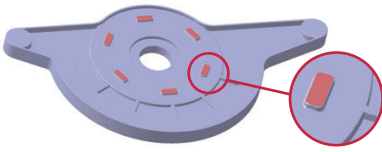
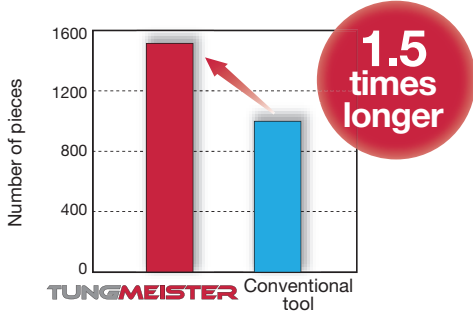
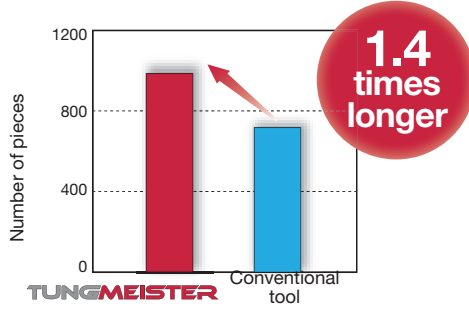
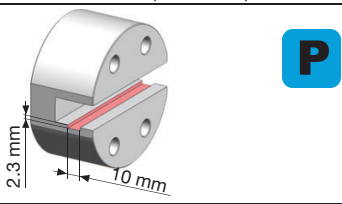
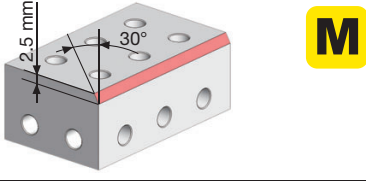
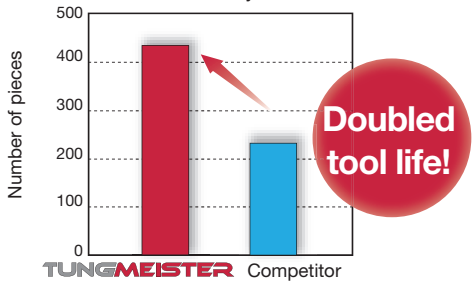
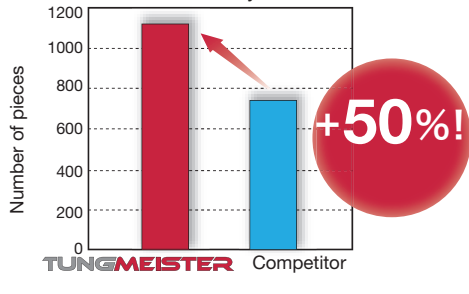
Appearance	Description	Stock	Connection	TM Head description	Torque (N-m)
Handle 	TORQUEWRENCH5-50NM9x12	●	-	-	-
Open wrenches for cylindrical heads 	TM-WRENCH-6-05	●	S05	VED, VEE VEE-I, VEE-R VEE-C, VEE-A VRD, VBD-BG VBE-BGA VDP, VCA	7
	TM-WRENCH-8-06	●	S06		10
	TM-WRENCH-10-08	●	S08		15
	TM-WRENCH-13-10	●	S10		28
	TM-WRENCH-16-12	●	S12		28
	TM-WRENCH-20-15	●	S15		40
Open wrenches for 2 flute heads 	TM-WRENCH-4E-05	●	S05	VRB, VRC VFX, VBB-BM VBB-BG VCP, VGC VCW, VCR, VBB-SG	7
	TM-WRENCH-5E-06	●	S06		10
	TM-WRENCH-7E-08	●	S08		15
	TM-WRENCH-8E-10	●	S10		28
	TM-WRENCH-9E-12	●	S12		28
90° adaptor for Torx bits 	INSERT-TOOL-9X12MM	●	-	-	-
Torx bits sockets 	BIT-SOCKET-T20-DRIVE	●	S05, S06	VTB135 VTB160W2.00 VTB165W2.00	7, 10
	BIT-SOCKET-T25-DRIVE	●	S06	VTB160W3.00 VTB160W4.00	10
	BIT-SOCKET-T30-DRIVE	●	S08	VTB165W3.00	15
	BIT-SOCKET-T40-DRIVE	●	S08, S10	VTB165W4.00 VTB195	15, 28
	BIT-SOCKET-T50-DRIVE	●	S08, S10	VST277 VTB225 VTB250	15, 28

CAUTIONARY POINTS IN USE

- The cutting heads specified by Tungaloy must be used. Avoid using alternate heads that are not Tungaloy products as this will damage the shank and can cause severe accident or injury.
- Before setting the head, clean the connection screw with an air blast or a wiping cloth to remove chips and other foreign matter that may remain.
- Do not apply the lubricant to the connection screw.
- Please use the correct "Wrench" with the correct cutting head. Tighten the head slowly until the face of the head contacts the shank. (Please refer to the picture shown on the right.) Do not re-tightening or over-tightening. Excessive tightening may cause the cutting head to break.
- Do not apply excessive force or a hammer when tightening or exchanging the cutting heads.



PRACTICAL EXAMPLES

Workpiece type		Cover	Bolt sheat
Shank		VSSD16L100S10-S (Steel, $\phi 16$)	VSSD16L100S10-S (Steel, $\phi 16$)
Head		VED160L12.0R05-04S10 ($\phi 16$)	VED160L12.0C60I04S10 ($\phi 16$)
Grade		AH715 FC250	AH715 FCD400
Workpiece material			
Cutting conditions	Cutting speed :Vc (m/min)	250	60
	Feed per tooth :fz (mm/t)	0.12	0.08
	Depth of cut :ap (mm)	1	2
	Width of cut :ae (mm)	10	16
	Coolant	Dry	Wet
Results		 AH715 adopted latest coating layer, so it was improved wear and chipping resistance. The result was 1.5 times longer and more stable tool life than conventional tool.	 AH715 adopted latest coating layer, so it was improved wear resistance. The result was 1.4 times longer tool life than conventional tool, and surface finish was kept good longer time.
Workpiece type		Machine parts	Machine parts
Shank		VSTD10L080S06-S (Steel, $\phi 10$)	VSSD16L100S10-S (Steel, $\phi 16$)
Head		VTB160W4.00R04-06S06 ($\phi 16$)	VCP160L15.0A30-02S10 ($\phi 16$)
Grade		GH130 Alloy steels SCM440 (42CrMo4)	AH725 Stainless steels SUS316 (X5CrNiMo17-12-2)
Workpiece material			
Cutting conditions	Cutting speed :Vc (m/min)	110	160
	Feed per tooth :fz (mm/t)	0.07	0.1
	Depth of cut :ap (mm)	2.3	2.5
	Width of cut :ae (mm)	4 + 4 + 2	1.4
	Coolant	Dry	Dry
Results		 TungMeister eliminates any need for regrinding.	 TungMeister reduces changeover time to 1/10 compared to competitor's solid endmill.

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