

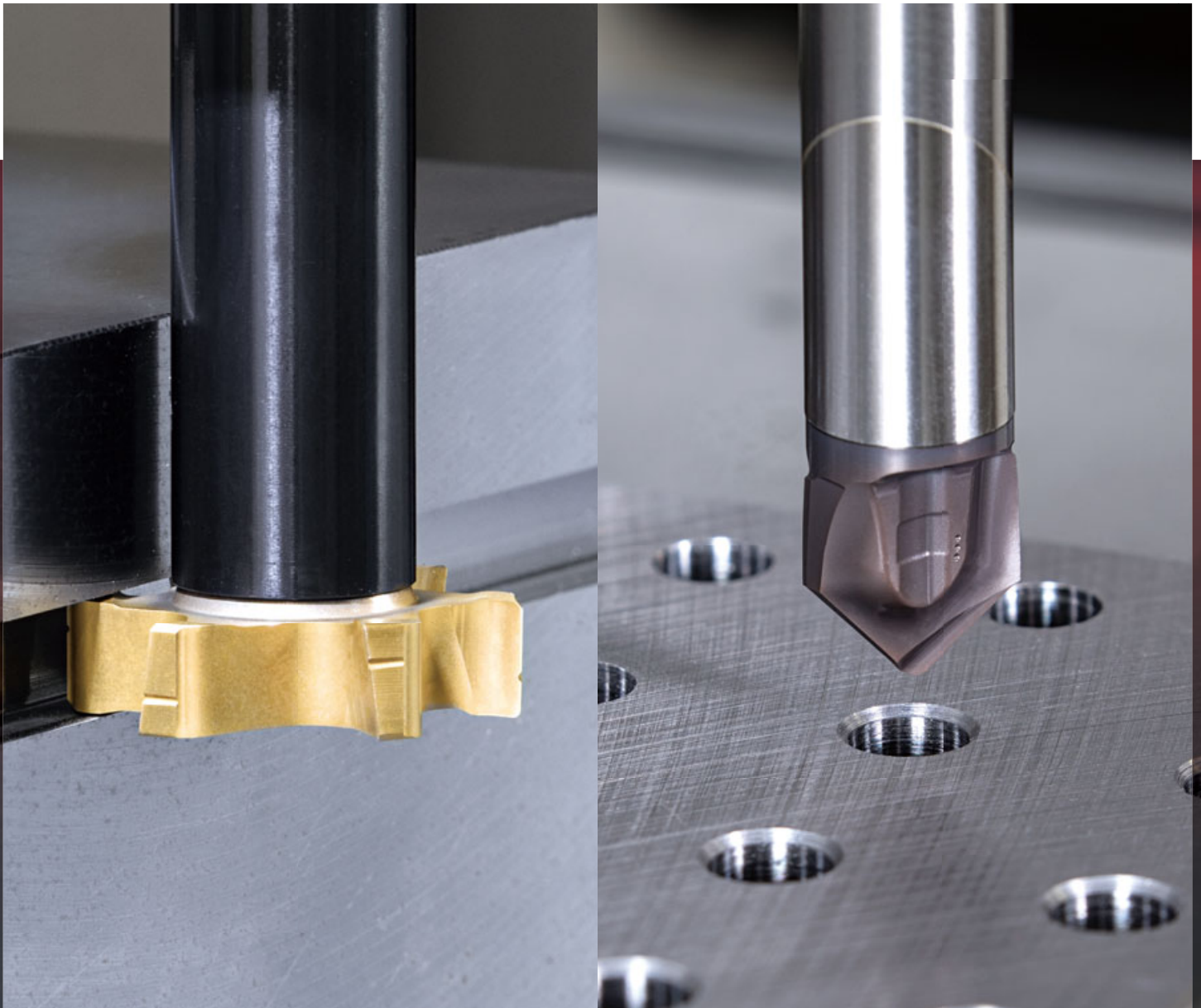


Exchangeable head endmill

TUNGMEISTER

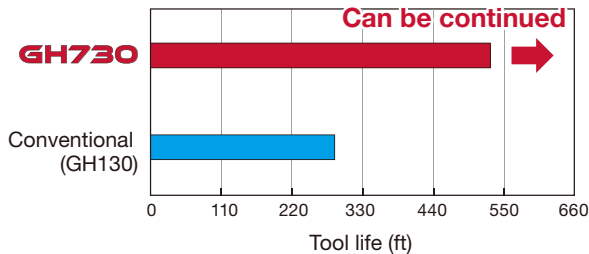
Tungaloy Report No. 381S5-US

Introduction of **GH730 grade for slot milling heads** and
Expansion of **chamfering and rough shoulder milling**
head lines



Latest PVD coating technology which provides significant increase of tool life

GH730 P M K S H

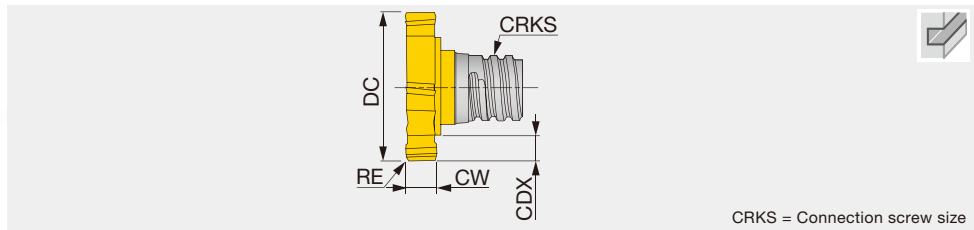


Shank : VST050L375S08US
 Head : VST217W2.00R020-4S08
 Workpiece material : SCM440 /42CrMo4 (300HB)
 Cutting speed : $V_c = 295$ sfm
 Feed per tooth : $f_z = 0.003$ ipr
 Depth of cut : $a_p = 0.071$ "
 Width of cut : $a_e = 0.079$ "
 Machine : Vertical M/C, CAT40

- Good balance between wear and chipping resistance
- First choice for slotting of various materials

VTB**-06...

6 flute, for T-slotting



CRKS = Connection screw size

Inch	GH730	AH735	GH130	NOF	FHA	DC - 0.002 ⁰	CW ±0.0008 [±]	CDX	CRKS	RE	Wrench	Torque
VTB05W125R016-U06S05	●	▲	▲	6	0°	0.500	0.125	0.088	S05	0.016	KEYV-T20	5.16
VTB06W056R016-U06S06	●		▲	6	0°	0.625	0.056	0.125	S06	0.016	KEYV-T20	7.38
VTB06W063R016-U06S06	●		▲	6	0°	0.625	0.063	0.125	S06	0.016	KEYV-T20	7.38
VTB06W068R016-U06S06	●		▲	6	0°	0.625	0.068	0.125	S06	0.016	KEYV-T20	7.38
VTB06W078R016-U06S06	●		▲	6	0°	0.625	0.078	0.125	S06	0.016	KEYV-T20	7.38
VTB06W086R016-U06S06	●		▲	6	0°	0.625	0.086	0.125	S06	0.016	KEYV-T25	7.38
VTB06W105R016-U06S06	●		▲	6	0°	0.625	0.105	0.125	S06	0.016	KEYV-T25	7.38
VTB06W125R016-U06S06	●		▲	6	0°	0.625	0.125	0.125	S06	0.016	KEYV-T25	7.38
VTB06W156R016-U06S06	●		▲	6	0°	0.625	0.156	0.125	S06	0.016	KEYV-T25	7.38
VTB07W156R016-U06S08	●		▲	6	0°	0.750	0.156	0.120	S08	0.016	KEYV-T30L	11.06
VTB07W187R016-U06S08	●		▲	6	0°	0.750	0.187	0.120	S08	0.016	KEYV-T30L	11.06
VTB07W250R016-U06S08	●		▲	6	0°	0.750	0.250	0.120	S08	0.016	KEYV-T30L	11.06
VTB08W187R016-U06S08	●	▲	▲	6	0°	0.875	0.187	0.190	S08	0.015	KEYV-T40L	11.06
VTB08W250R016-U06S08	●		▲	6	0°	0.875	0.250	0.190	S08	0.015	KEYV-T40L	11.06
VTB08W312R016-U06S08	●		▲	6	0°	0.875	0.312	0.190	S08	0.015	KEYV-T40L	11.06
VTB10W187R016-U06S10	●		▲	6	0°	1.000	0.187	0.177	S10	0.015	KEYV-T50L	20.65
VTB10W250R016-U06S10	●		▲	6	0°	1.000	0.250	0.177	S10	0.015	KEYV-T50L	20.65

Torque: Recommended clamping torque: lbs-ft
 2 pieces per package

● : New product
 ▲ : To be discontinued

Metric	GH730	AH735	GH130	NOF	FHA	DC -0.05^0	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

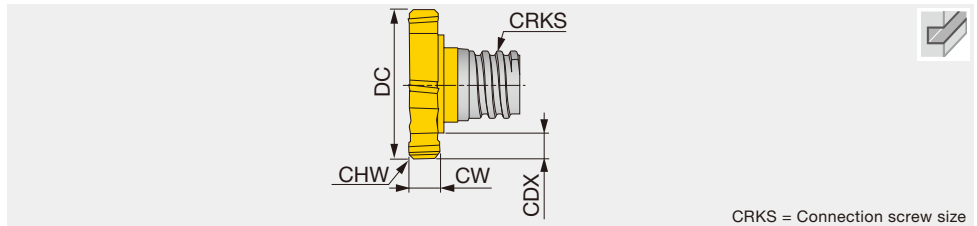
Torque: Recommended clamping torque: N·m
2 pieces per package

● : New product
▲ : To be discontinued

VTB**C15-06...

6 flute, for T-slotting with 45° chamfer

Slotting



CRKS = Connection screw size

Inch	GH730	GH130	NOF	FHA	DC -0.002^0	CW $\pm 0.0008^0$	CDX	CRKS	CHW	Wrench	Torque
VTB05W062C006-U06S05	●	▲	6	0°	0.500	0.062	0.089	S05	0.006	KEYV-T20	5.16
VTB05W078C006-U06S05	●	▲	6	0°	0.500	0.078	0.089	S05	0.006	KEYV-T20	5.16

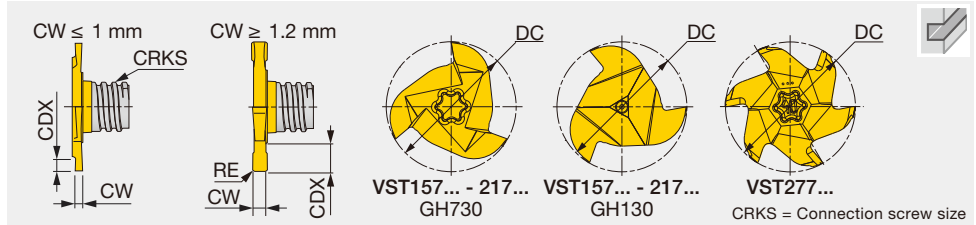
Metric	GH730	GH130	NOF	FHA	DC -0.05^0	CW ± 0.02	CDX	CRKS	CHW	Wrench	Torque*
VTB135W2.00C15-06S05	●	▲	6	0°	13.5	2	2.65	S05	0.15	KEYV-T20	7

Torque: Recommended clamping torque: lbs-ft (*N·m)
2 pieces per package

● : New product
▲ : To be discontinued

VST**-3/4/6...

3, 4, 6 flute, for slotting



Metric	GH730	AH735	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 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST157W1.57R020-3S06	●		▲	3	0°	15.7	1.57	0.2	S06	2.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST157W2.00R020-3S06	●		▲	3	0°	15.7	2	0.2	S06	2.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST157W2.39R020-3S06	●		▲	3	0°	15.7	2.39	0.2	S06	2.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST157W2.50R020-3S06	●		▲	3	0°	15.7	2.5	0.2	S06	2.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST157W3.00R020-3S06	●		▲	3	0°	15.7	3	0.2	S06	2.8	KEYV-177 ⁽²⁾ / KEYV-T25 ⁽³⁾	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 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST177W1.40R005-3S06	●		▲	3	0°	17.7	1.4 ⁽¹⁾	0.05	S06	3.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST177W1.50R010-3S06	●		▲	3	0°	17.7	1.5	0.1	S06	3.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST177W1.57R020-3S06	●		▲	3	0°	17.7	1.57	0.2	S06	3.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST177W1.70R005-3S06	●		▲	3	0°	17.7	1.7 ⁽¹⁾	0.05	S06	3.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST177W2.00R020-3S06	●		▲	3	0°	17.7	2	0.2	S06	3.8	KEYV-177 ⁽²⁾ / KEYV-T20 ⁽³⁾	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 ⁽²⁾ / KEYV-T20 ⁽³⁾	10
VST177W3.00R020-3S06	●	▲	▲	3	0°	17.7	3	0.2	S06	3.8	KEYV-177 ⁽²⁾ / KEYV-T25 ⁽³⁾	10
VST177W3.17R020-3S06			▲	3	0°	17.7	3.17	0.2	S06	3.8	KEYV-177	10
VST217W0.76R000-4S08	●		▲	4	0°	21.7	0.76 ⁽¹⁾	-	S08	1.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W0.86R000-4S08			▲	4	0°	21.7	0.86 ⁽¹⁾	-	S08	1.7	KEYV-217	15
VST217W0.96R000-4S08	●		▲	4	0°	21.7	0.96 ⁽¹⁾	-	S08	1.9	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W1.00R005-4S08	●		▲	4	0°	21.7	1	0.05	S08	2	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W1.20R005-4S08	●		▲	4	0°	21.7	1.2 ⁽¹⁾	0.05	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W1.40R005-4S08	●		▲	4	0°	21.7	1.4 ⁽¹⁾	0.05	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W1.57R000-4S08	●		▲	4	0°	21.7	1.57	-	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W1.70R010-4S08	●		▲	4	0°	21.7	1.7 ⁽¹⁾	0.1	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W1.95R020-4S08	●		▲	4	0°	21.7	1.95 ⁽¹⁾	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W2.00R020-4S08	●		▲	4	0°	21.7	2	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W2.25R020-4S08	●		▲	4	0°	21.7	2.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W2.39R020-4S08	●		▲	4	0°	21.7	2.39	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W2.50R020-4S08	●	▲	▲	4	0°	21.7	2.5	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W2.75R020-4S08	●		▲	4	0°	21.7	2.75 ⁽¹⁾	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T25 ⁽³⁾	15
VST217W3.00R020-4S08	●	▲	▲	4	0°	21.7	3	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T30L ⁽³⁾	15
VST217W3.17R020-4S08	●		▲	4	0°	21.7	3.17	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T30L ⁽³⁾	15
VST217W3.25R020-4S08	●		▲	4	0°	21.7	3.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T30L ⁽³⁾	15
VST217W4.00R020-4S08	●		▲	4	0°	21.7	4	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T30L ⁽³⁾	15
VST217W4.25R020-4S08	●		▲	4	0°	21.7	4.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T30L ⁽³⁾	15
VST217W4.75R020-4S08	●		▲	4	0°	21.7	4.75	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T30L ⁽³⁾	15
VST217W5.25R020-4S08	●		▲	4	0°	21.7	5.25 ⁽¹⁾	0.2	S08	4.5	KEYV-217 ⁽²⁾ / KEYV-T30L ⁽³⁾	15
VST277W2.50R020-6S10	●		▲	6	0°	27.7	2.5	0.2	S10	6	KEYV-T40L	28
VST277W5.25R020-6S10	●		▲	6	0°	27.7	5.25 ⁽¹⁾	0.2	S10	6	KEYV-T40L	28
VST277W10.0R020-6S10	●		▲	6	0°	27.7	10	0.2	S10	6	KEYV-T40L	28

(1) CW is based on DIN471 / 472

(2) Applicable for GH130, AH735

(3) Applicable for GH730

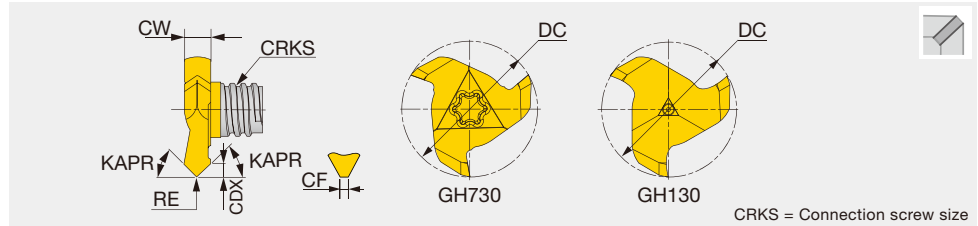
Torque: Recommended clamping torque: N·m

2 pieces per package

● : New product
▲ : To be discontinued

VST**A45...

3, 4 flute, for slotting with 45° chamfer



Metric	GH730	GH130	NOF	FHA	DC	CW	KAPR	CRKS	CDX	CF	RE	Wrench	Torque
VST177L01.40A45-3S06	●	▲	3	0°	17.7	3.4	45°	S06	1.4	-	0.1	KEYV-177 ⁽¹⁾ / KEYV-T25 ⁽²⁾	10
VST217L01.70A45-4S08	●	▲	4	0°	21.7	5.5	45°	S08	1.7	1.5	-	KEYV-217 ⁽¹⁾ / KEYV-T30L ⁽²⁾	15

(1) Applicable for GH130

(2) Applicable for GH730

Torque: Recommended clamping torque: N·m

2 pieces per package

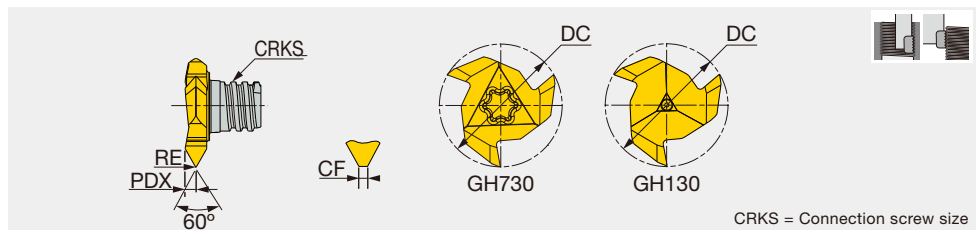
● : New product

▲ : To be discontinued

60° partial profile

VTR**IS...

3, 4 flute, partial profile, for internal/external thread



Metric	GH730	GH130	TP		Smallest Possible thread	DC	NOF	RE	CF	PDX	CRKS	Wrench	Torque
			TPN	TPX									
VTR160L12IS05-3S06	●	▲	0.5	2	M20	15.7	3	-	0.05	1.4	S06	KEYV-177 ⁽¹⁾ / KEYV-T25 ⁽²⁾	10
VTR160L12IS15-3S06	●	▲	1.5	2	M22	15.7	3	0.05	-	1.4	S06	KEYV-177 ⁽¹⁾ / KEYV-T25 ⁽²⁾	10
VTR220L28IS30-4S08	●	▲	3	4.5	M36	21.7	4	0.2	-	2.8	S08	KEYV-217 ⁽¹⁾ / KEYV-T30L ⁽²⁾	15

(1) Applicable for GH130

(2) Applicable for GH730

Torque: Recommended clamping torque: N·m

2 pieces per package

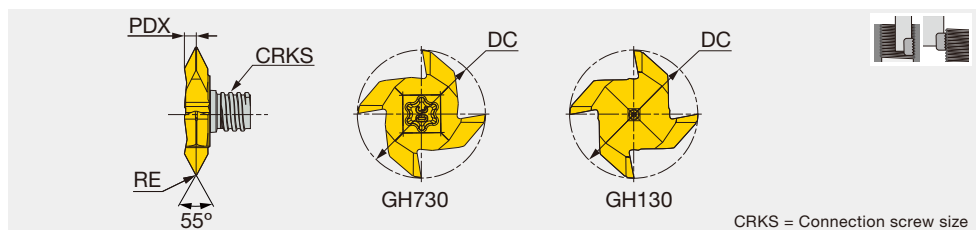
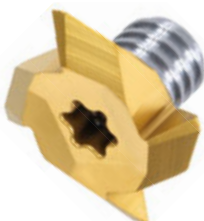
● : New product

▲ : To be discontinued

55° partial profile

VTR**W...

4 flute, partial profile, for internal/external thread



Metric	GH730	GH130	TPI		Smallest Possible thread	DC	NOF	RE	PDX	CRKS	Wrench	Torque
			TPIN	TPIX								
VTR220L24W14-4S08	●	▲	14	11	3/4	21.7	4	0.2	2.4	S08	KEYV-217 ⁽¹⁾ / KEYV-T30L ⁽²⁾	15

(1) Applicable for GH130

(2) Applicable for GH730

Torque: Recommended clamping torque: N·m

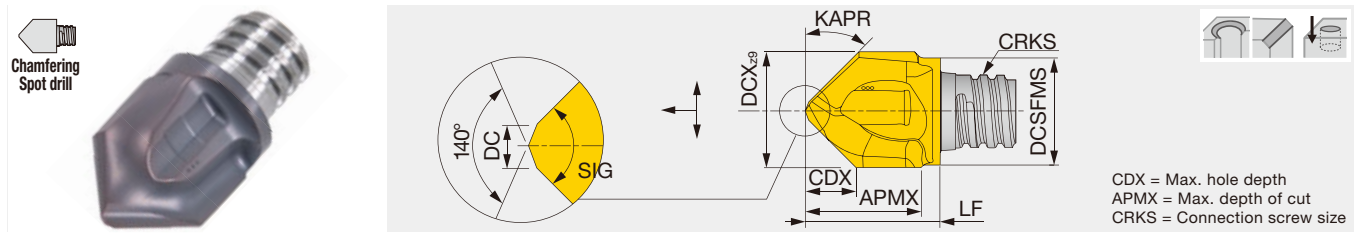
2 pieces per package

● : New product

▲ : To be discontinued

VCP** -02...

2 flute, chamfering angle: 30°, 45°, 60°



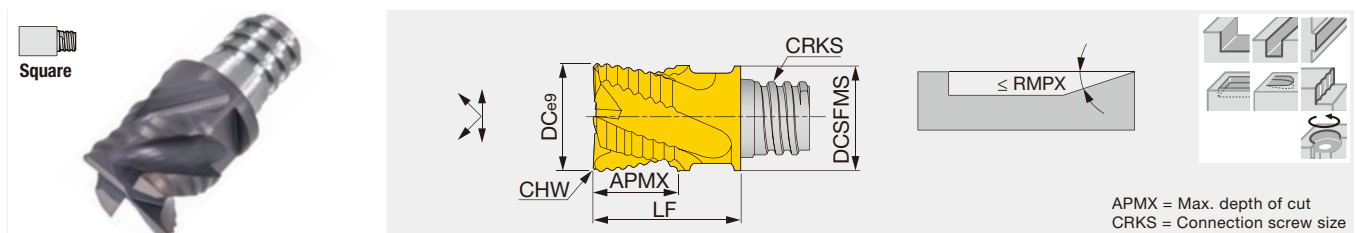
Metric	AH715	AH725	SIG	NOF	FHA	DCX	DCSFMS	APMX	CDX	CRKS	LF	DC	KAPR	Wrench	Torque
VCP100L09.5A30-02S06		●	60°	2	0°	10	9.5	8.5	7.5	S06	11.75	1.5	60°	KEYV-S06	10
VCP120L12.0A30-02S08	●	●	60°	2	0°	12	11.5	11	9.2	S08	15.4	1.5	60°	KEYV-S08	15
VCP160L15.0A30-02S10	●	●	60°	2	0°	16	15.2	16	12	S10	20.2	2.5	60°	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	30°	KEYV-S06	10
VCP120L12.0A60-02S08	●	●	120°	2	0°	12	11.5	11.5	3.3	S08	15.2	1.5	30°	KEYV-S08	15
VCP160L15.5A60-02S10	●	●	120°	2	0°	16	15.2	16	4.4	S10	19.9	1.5	30°	KEYV-S10	28

Torque: Recommended clamping torque: N·m
2 pieces per package

● : New product
● : Line up

VEE**R...

4, 5, 6 flute, roughing, serrated cutting edge



Inch	AH725	NOF	FHA	DC	DCSFMS	APMX	CHW	CRKS	LF	RMPX	Wrench	Torque
VEE031L20C012RU04S05	●	4	45°	0.312	0.300	0.200	0.010	S05	0.390	-	KEYV-S05	5.16
VEE037L27C012RU04S06	●	4	45°	0.375	0.360	0.270	0.012	S06	0.512	-	KEYV-S06	7.38
VEE050L37C016RU04S08	●	4	45°	0.500	0.488	0.374	0.014	S08	0.650	-	KEYV-S08	11.06
VEE062L47C024RU05S10	●	5	45°	0.625	0.600	0.470	0.016	S10	0.800	-	KEYV-S10	20.65
VEE075L59C024RU06S12	●	6	45°	0.750	0.720	0.590	0.016	S12	1.000	3°	KEYV-S12	20.65
VEE100L86C020RU06S15	●	6	45°	1.000	0.941	0.866	0.020	S15	1.457	3°	KEYV-W15	29.50

Metric	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	5°	KEYV-S05	7
VEE100L07.0C30R04S06	●	●	4	45°	10	9.7	7	0.3	S06	13	5°	KEYV-S06	10
VEE120L09.0C35R04S08	●	●	4	45°	12	11.7	9	0.35	S08	16.5	5°	KEYV-S08	15
VEE160L12.0C40R05S10	●	●	5	45°	16	15.3	12	0.4	S10	20.5	5°	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 clamping torque: lbs·ft (*N·m)
VEE031 - VEE075 / VEE080 - VEE200: 2 pieces per package
VEE100 / VEE250: 1 piece per package

● : New product
● : Line up

STANDARD CUTTING CONDITIONS

VTR

Threading

ISO	Material	Condition	Tensile strength [N/mm ²]	Hardness HB	Cutting speed Vc (sfm)	Tool dia. : DC (in)		
						Feed per tooth: fz (ipt)	Feed per tooth: fz (ipt)	
						ø15.7 (0.618")	ø21.7 (0.787")	
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	328 - 820	0.0047	0.0059
		≥ 0.25 %C	Annealed	650	190	262 - 689	0.0047	0.0059
	Low alloy steel and cast steel (less than 5% of alloying elements)	< 0.55 %C	Quenched and tempered	850	250	213 - 558		
		≥ 0.55 %C	Annealed	750	220	361 - 591	0.0039	0.0047
			Quenched and tempered	1000	300	312 - 525	0.0039	0.0047
			Annealed	600	200	295 - 525	0.0028	0.0031
	High alloyed steel, cast steel, and tool steel		Annealed	930	275	213 - 656	0.0028	0.0031
			Quenched and tempered	1000	300	230 - 689	0.0028	0.0031
	Stainless steel and cast steel		Annealed	1200	350	312 - 525	0.0028	0.0031
			Quenched and tempered	680	200	427 - 558	0.0028	0.0031
		Ferritic/martensitic	1100	325	246 - 328	0.0028	0.0031	
		Martensitic	680	200	361 - 558	0.0028	0.0031	
			820	240	230 - 509	0.0028	0.0031	
M	Stainless steel	Annealed	600	180	279 - 328	0.0028	0.0031	
K	Cast iron nodular (GGG)	Ferritic/martensitic		180	394 - 525	0.0047	0.0059	
		Pearlitic		260	246 - 525	0.0047	0.0059	
	Gray cast iron (GG)	Ferritic		160	230 - 492	0.0047	0.0059	
		Pearlitic		250	361 - 459	0.0047	0.0059	
	Malleable cast iron	Ferritic		130	394 - 525	0.0047	0.0059	
		Pearlitic		230	361 - 459	0.0083	0.0059	
N	Aluminum-wrought alloy	Not cureable		60	525 - 984	0.0047	0.0059	
		Cured		100				
	Aluminum-cast, alloyed	≤12% Si	Not cureable		75	492 - 1148	0.0047	0.0059
		>12% Si	Cured		90			
	Copper alloys	>1% Pb	High temperature		130	328 - 820	0.0028	0.0031
			Free cutting		110			
Non-metallic		Duroplastics, fiber plastics			328 - 1312	0.0059	0.0071	
		Hard rubber						
S	High temp. alloys	Fe based	Annealed		200			
			Cured		280			
		Ni or Co based	Annealed		250	66 - 262	0.0016	0.0016
			Cured		350			
		Cast		320				
Titanium Ti alloys		Alpha+beta alloys cured	RM 400 RM 1050		66 - 262	0.0016	0.0016	
H	Hardened steel	Hardened		55 HRC	180 - 213			
		Hardened		60 HRC	148 - 180			
	Chilled cast iron	Cast		400	295 - 344			
	Cast iron	Hardened		55 HRC	180 - 213			

VST, VTB

Slotting

ISO	Workpiece material	Hardness	VST		VTB	
			Cutting speed Vc (sfm)	Feed per tooth fz (ipt)	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Low carbon steels 1045, 1055, etc.	- 300 HB	262 - 591	0.002 - 0.006	262 - 591	0.003 - 0.007
	High carbon steels 4140, etc.	- 300 HB	197 - 394	0.002 - 0.005	197 - 394	0.002 - 0.006
M	Stainless steels 304, 316, etc.	- 200 HB	164 - 394	0.002 - 0.005	164 - 394	0.002 - 0.006
K	Gray cast irons 250, 300, etc.	150 - 250 HB	328 - 656	0.002 - 0.006	328 - 656	0.003 - 0.007
	Ductile cast irons 400-15S, etc.	150 - 250 HB	328 - 656	0.002 - 0.005	328 - 656	0.002 - 0.006
N	Aluminum alloys Si < 13%	-	656 - 1969	0.002 - 0.006	656 - 1969	0.003 - 0.007
	Aluminum alloys Si ≥ 13%	-	328 - 984	0.001 - 0.005	328 - 984	0.002 - 0.006
S	Titanium alloys Ti-6Al-4V, etc.	-	131 - 197	0.002 - 0.003	131 - 197	0.002 - 0.006
	Heat-resistant alloys Inconel 718, etc.	-	49 - 115	0.001 - 0.004	49 - 115	0.001 - 0.004

VCP

Spot drill

ISO	Workpiece material	Hardness	Cutting speed Vc (sfm)	Feed f (ipr)
P	Carbon steel 1045, 1055, etc.	- 300 HB	197 - 328	0.0024 - 0.0047
	Alloy steel 4140, 8620, etc.	- 300 HB	164 - 262	0.0024 - 0.0047
	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	131 - 230	0.0024 - 0.0047
M	Stainless steels 304, 316, etc.	- 200 HB	98 - 164	0.0024 - 0.0047
K	Gray cast irons 250, 300, etc.	150 - 250 HB	262 - 394	0.0024 - 0.0047
	Ductile cast irons 400-15S, etc.	150 - 250 HB	262 - 394	0.0024 - 0.0047
N	Aluminum alloys	-	328 - 656	0.0031 - 0.0063
S	Titanium alloys Ti-6Al-4V, etc.	-	98 - 164	0.002 - 0.0039
	Heat-resistant alloys Inconel 718, etc.	-	66 - 131	0.0016 - 0.0031
H	Hardened steel H13, etc.	40 - 50 HRC	98 - 164	0.002 - 0.0039
	Hardened steel D2, etc.	50 - 60 HRC	66 - 131	0.0016 - 0.0031

VEE-R

Shoulder milling

ISO	Workpiece material	Hardness	Cutting speed Vc (sfm)	Feed per tooth: fz (ipt)						Depth of cut ap (in)	Width of cut ae (in)
				Tool diameter: DC (in)							
				0.312"	0.375"	0.500"	0.625"	0.750"	1.000"		
P	Low carbon steels 1045, 1055, etc.	- 300 HB	260 - 590	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
	High carbon steels 4140, 5120, etc.	- 300 HB	200 - 460	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
M	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	200 - 400	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
	Stainless steels S30400, S31600, etc.	- 200 HB	130 - 330	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
K	Gray cast irons No.250B, No.300B, etc.	150 - 250 HB	260 - 660	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
	Ductile cast irons 60-40-18, etc.	150 - 250 HB	260 - 660	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
N	Aluminum alloys Si < 13%	-	660 - 2297	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
	Aluminum alloys Si ≥ 13%	-	330 - 980	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
S	Titanium alloys Ti-6Al-4V, etc.	-	130 - 260	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
	Heat-resistant alloys Inconel 718, etc.	-	66 - 130	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
H	Hardened steel H13, etc.	40 - 50 HRC	130 - 260	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC
	Hardened steel D2, etc.	50 - 60 HRC	66 - 200	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.004 - 0.007	0.6 x DC	0.25 x DC

Slotting

ISO	Workpiece material	Hardness	Cutting speed Vc (sfm)	Feed per tooth: fz (ipt)						Depth of cut ap (in)
				Tool diameter: DC (in)						
				0.312"	0.375"	0.500"	0.625"	0.750"	1.000"	
P	Low carbon steels 1045, 1055, etc.	- 300 HB	260 - 590	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
	High carbon steels 4140, 5120, etc.	- 300 HB	200 - 460	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
M	Prehardened steel PX5, NAK80, etc.	30 - 40 HRC	200 - 400	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
	Stainless steels S30400, S31600, etc.	- 200 HB	130 - 330	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
K	Gray cast irons No.250B, No.300B, etc.	150 - 250 HB	260 - 660	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
	Ductile cast irons 60-40-18, etc.	150 - 250 HB	260 - 660	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
N	Aluminum alloys Si < 13%	-	660 - 2297	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
	Aluminum alloys Si ≥ 13%	-	330 - 980	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
S	Titanium alloys Ti-6Al-4V, etc.	-	130 - 260	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
	Heat-resistant alloys Inconel 718, etc.	-	66 - 130	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
H	Hardened steel H13, etc.	40 - 50 HRC	130 - 260	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC
	Hardened steel D2, etc.	50 - 60 HRC	66 - 200	0.001 - 0.004	0.003 - 0.005	0.003 - 0.005	0.004 - 0.006	0.004 - 0.007	0.003 - 0.004	0.5 x DC



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