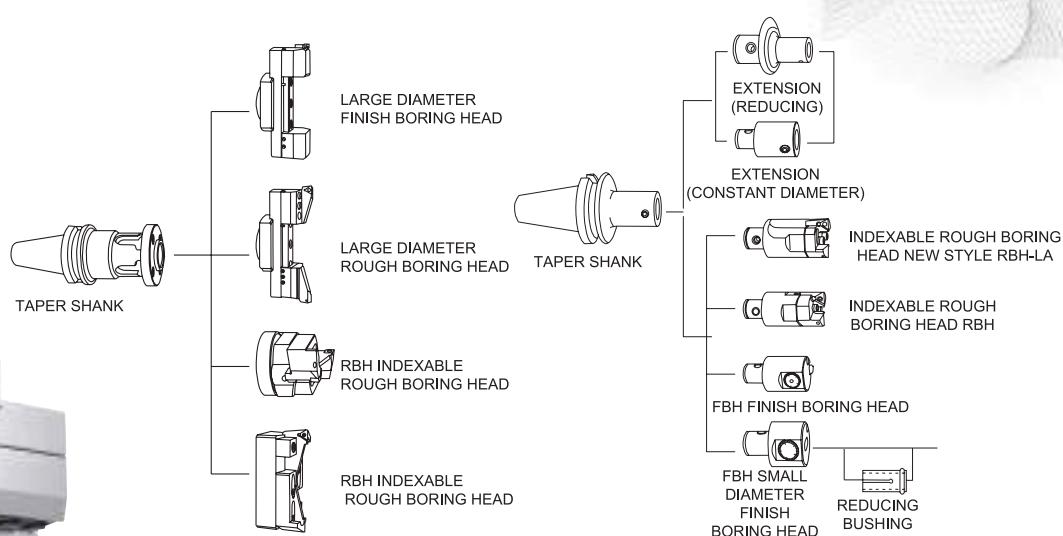


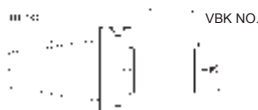


Taper Shank For Boring Heads Series BST, VBK

BST SERIES



VBK SERIES



ORDER NO.	Length (L)	External Diameter (D)	Applicable Boring Heads	Weight (kgs)	CODE NO.
BT40-VBK1-75	75	19	FBH20	1.2	3320-220
BT40-VBK2-85	85	23	RBH25 ; FBH25	1.2	3320-221
BT40-VBK3-95	95	30	RBH32 ; FBH32	1.45	3320-222
BT40-VBK4-85	85	38	RBH40 ; FBH40 ; CBI4	1.5	3320-223
BT40-VBK5-75	75	50	RBH52 ; FBH25 ; CBI5	1.8	3320-225
BT40-VBK6-65	65	64	RBH68 ; RBH90 ; FBH68 FBH100 ; FBH150 ; CBI6	2.15	3320-227
BT40-BST-70	70	95	RBH120 ; FBH200 RBH120 and above; FBH200 and above	3.2	3320-228
BT50-VBK1-115	115	19	FBH20	3.5	3320-229
BT50-VBK2-110	110	23	RBH25 ; FBH25	4	3320-230
BT50-VBK3-125	125	30	RBH32	4.4	3320-232
BT50-VBK4-115	115	38	RBH40	4.8	3320-234
BT50-VBK4-175	175			5.2	3320-235
BT50-VBK5-105	105	50	RBH52	5.4	3320-236
BT50-VBK5-180	180			6.2	3320-237
BT50-VBK5-240	240			6.4	3320-238
BT50-VBK6-95	95	64	RBH68 ; RBH90 ; FBH68 FBH100 ; FBH150 ; CBI6	5.9	3320-239
BT50-VBK6-170	170			6.5	3320-240
BT50-VBK6-230	230			6.9	3320-241
BT50-BST-100	100	95	RBH120 RBH120 and above; FBH200 and above; large diameter boring heads series	5.71	3320-242
BT50-BST-200	200			8.79	3320-244
BT50-BST-300	300			11.25	3320-246
BT50-BST-400	400				3320-247



Large Diameter Twin-bit Rough Boring

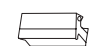
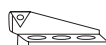


VERTEX

New Modular Style For Diameter Over 200mm

Boring diameter from $\varnothing 200$ - $\varnothing 1250$ mm



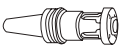
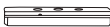
Boring Head Type	ORDER NO.		RBH 200LA	RBH 300LA	RBH 400LA	RBH 500LA	RBH 600LA	RBH 900LA	
	Length		130	130	130	130	150	150	
	(kgs) Total Weight Steel/Alloy		9.5/7.2	11.5/8.0	13.5/8.8	15.5/9.6	33/16	43/22.3	
	D(mm) Boring Diameter		200-310	300-410	400-510	500-610	600-950	900-1250	
Module	Taper Shank		BT50-BST / NT50-BST BT50-BST / NT50-BST Series				BT50-FMA-47.625		
	Flange (kgs)Weight Steel/Alloy		BR200 2.7				BR600	BR900	
							19kg/6.5kg	29kg/10kg	
	Extension Slide		RST200	RST300	RST400	RST500	RST300 x2pcs	RST400 x2pcs	
	(kg)Weight Steel/Alloy		3.4kg/1.1kg	5.4kg/1.9kg	7.4kg/2.7kg	9.4kg/3.5kg	10.8kg/3.8kg	14.8kg/5.4kg	
	Clamp Base (kg)Weight		RS200 0.98 kg						
	Height Seting Shim (kg)Weight		RS201 0.05 kg						
	Insert Holder		RB200C12		RB200T16		RB200T22		RB200S12
	Applicable Insert		CCMT120404		TCMT16T304		TCMT220404		SCMT120404
	(kg)Weight		0.68KG						
CODE NO.			3320-250	3320-251	3320-252	3320-253	3320-254	3320-255	



Large Diameter Finish Boring Head

New Modular Style For Diameter Over 200mm
Boring diameter from $\varnothing 200$ - $\varnothing 1250$ mm



Boring Head Type	ORDER NO.		FBH200	FBH300	FBH400	FBH500	FBH600	FBH900
	Length		130	130	130	130	150	150
	(kgs) Total Weight Steel/Alloy		9.4	11.4	13.4	15.4	17.4	22.1
	D(mm) Boring Diameter		200-310	300-410	400-510	500-610	600-950	900-1250
Module	Taper Shank		BT50-BST / NT50-BST BT50-BST / NT50-BST Series				BT50-FMA-47.625	
	Flange (kg)Weight Steel/Alloy		BR200 2.7 kg				BR600	BR900
							19kg/8.8kg	29kg/13.5kg
	Extension Slide		RST200	RST300	RST400	RST500	RST300 x2pcs	RST400 x2pcs
	(kgs)Weight		3.4kg	5.4kg	7.4kg	9.4kg	11.4kg	14.8kg
	Balance Weight (kg)Weight		RS200 1.6 kg					
	Finish Head (kgs)Weight		CB200 1.6kg					
	Applicable Insert		TP08/M2.2/T7, TP09/M2.5/T8, TC11/M2.5/T8					
CODE NO.			3320-260	3320-261	3320-262	3320-263	3320-264	3320-265



Indexable Twin-bit Rough Boring Head RBH



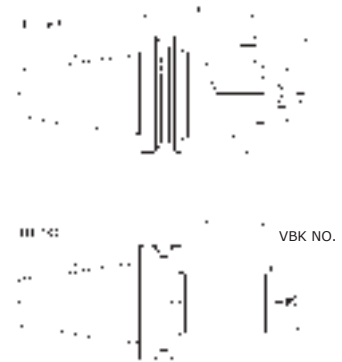
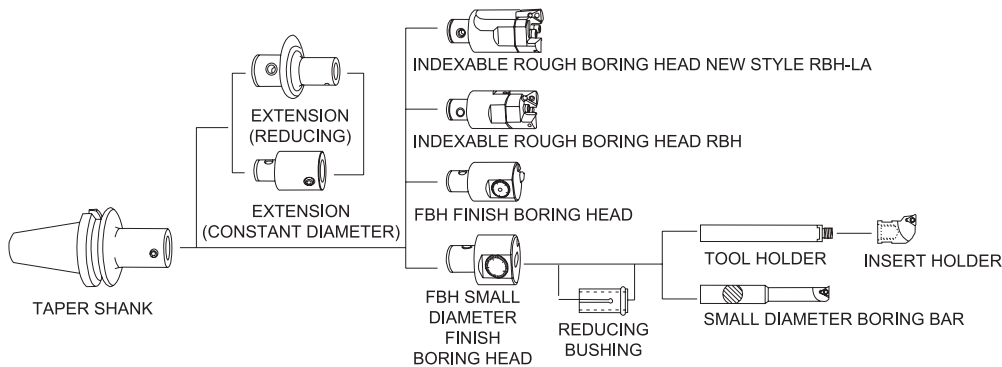
VMH-SYSTEM

Boring diameter from $\varnothing 25$ - $\varnothing 350$ mm



-C ◆
 ● INSERT STYLE -T ▲
 -S ■

	ORDER NO.	Tool connection	D(mm) Boring Range		L (mm)	C (mm)	Insert	Weight (g)	CODE NO.
	RBH25-33-C	VBK2	25	33	45	24	CCMT060204	0.15	3320-270
	RBH32-42-C	VBK3	32	42	55	31	CCMT060204	0.3	3320-271
	RBH32-42-T						TCMT110204		3320-272
	RBH40-55-C	VBK4	40	55	65	39	CCMT09T304	0.5	3320-273
	RBH40-55-T						TCMT16T304		3320-274
	RBH40-55-S						SCMT09T304		3320-275
	RBH52-70-C	VBK5	52	70	75	50	CCMT09T304	1	3320-276
	RBH52-70-T						TCMT16T304		3320-277
	RBH52-70-S						SCMT09T304		3320-278
	RBH68-92-C	VBK6	68	92	85	64	CCMT120408	2	3320-279
	RBH68-92-T						TCMT16T304		3320-280
	RBH68-92-S						SCMT120404		3320-281
	RBH90-122-C	VBK6	90	122	100	80	CCMT120408	2.9	3320-282
	RBH90-122-T						TCMT220408		3320-283
	RBH90-122-S						SCMT120404		3320-284
	RBH120-164-C	BST	120	164	95	100	CCMT120408	3.8	3320-285
	RBH120-164-T						TCMT220408		3320-286
	RBH120-164-S						SCMT120404		3320-287
	RBH160-204-C		160	204	95	130	CCMT120408	4.8	3320-288
	RBH160-204-T						TCMT220408		3320-289
	RBH160-204-S						SCMT120404		3320-290
	RBH200-300-C	BST Series	200	300	95	170	CCMT120408	6.5	3320-291A
	RBH200-300-T						TCMT220408		3320-292A
	RBH200-300-S						SCMT120404		3320-293A
	RBH300-400-C		300	400	95	260	CCMT120408	10	3320-297A
	RBH300-400-T						TCMT220408		3320-298A
	RBH300-400-S						SCMT120404		3320-299A



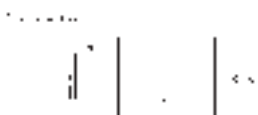
Extension (Reduced)



ORDER NO.	d1	d2	D1	D2	L	ℓ	Applicable Boring Heads	Weight (kg)	CODE NO.
VBK2-1-36L	14	24	11	19	36	30	FBH20	0.1	3320-301
VBK3-1-41L	18	31			41	30	FBH20	0.15	3320-302
VBK3-2-37L			14	24	37	25	RBH25 ; FBH25	0.15	3320-303
VBK4-1-58L	22	39	11	19	58	40	FBH20	0.3	3320-304
VBK4-2-50L			14	24	50	36	RBH25 ; FBH25	0.3	3320-305
VBK4-3-50L			18	31	50	37	RBH32 ; FBH32	0.35	3320-306
VBK5-1-60L	28	50	11	19	60	40	FBH20	0.45	3320-307
VBK5-2-54L			14	24	54	35	RBH25 ; FBH25	0.45	3320-308
VBK5-2-74L					74	55	RBH25 ; FBH25	0.5	3320-309
VBK5-3-47L			18	31	47	29	RBH32 ; FBH32	0.5	3320-310
VBK5-3-72L					72	54	RBH32 ; FBH32	0.6	3320-311
VBK5-4-42L			22	39	42	25	RBH40 ; FBH40	0.5	3320-312
VBK5-4-67L					67	50	RBH40 ; FBH40	0.7	3320-313
VBK6-1-70L	36	64	11	19	70	40	FBH20	0.9	3320-314
VBK6-2-63L			14	24	63	45	RBH25 ; FBH25	0.7	3320-315
VBK6-2-93L					93	75	RBH25 ; FBH25	0.8	3320-316
VBK6-3-56L			18	31	56	39	RBH32 ; FBH32	0.75	3320-317
VBK6-3-96L					96	79	RBH32 ; FBH32	0.95	3320-318
VBK6-4-51L			22	39	51	35	RBH40 ; FBH40	0.85	3320-319
VBK6-4-101L					101	85	RBH40 ; FBH40	1.3	3320-320
VBK6-5-41L			28	52	41	25	RBH52 ; FBH52	0.85	3320-321
VBK6-5-91L	91	75			RBH52 ; FBH52	1.45	3320-322		



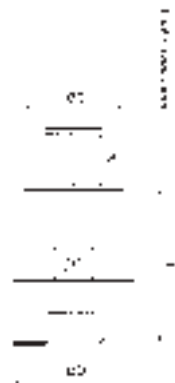
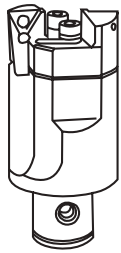
Extension (Constant Diameter)

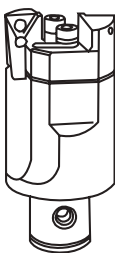
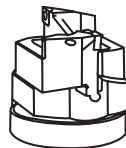


ORDER NO.	d	D	L	Applicable Boring Heads	Weight (kg)	CODE NO.
VBK1-1-30L	11	19	30	FBH20	0.07	3320-323
VBK2-2-30L	14	24	30	RBH25 ; FBH25	0.1	3320-324
VBK3-3-30L	18	31	30	RBH32 ; FBH32	0.15	3320-325
VBK4-4-45L	22	39	45	RBH40 ; FBH40 ; CBI4	0.4	3320-326
VBK5-5-60L	28	50	60	RBH52 ; FBH52 ; CBI5	0.8	3320-327
VBK6-6-60L	36	64	60	RBH68/RBH90 ; FBH68, 100, 150 ; CBI6	1.4	3320-328



Boring range from $\varnothing 25\text{mm}$ to $\varnothing 1250\text{mm}$;
a variety of tool holders and boring heads are for your selection.



	ORDER NO.	Tool connection	D(mm) Boring Range	L (mm)	C (mm)	Insert	Weight (g)	CODE NO.
	RBH25-35LA-C	VBK2	25~35	50	24	CCMT060204	0.15	3320-340
	RBH32-45LA-C	VBK3	32~45	60	31	CCMT060204	0.3	3320-341
	RBH32-45LA-T					TCMT110204		3320-342
	RBH40-55LA-C	VBK4	40~55	74	39	CCMT09T304	0.6	3320-343
	RBH40-55LA-T					TCMT16T304		3320-344
	RBH40-55LA-S					SCMT09T304		3320-345
	RBH52-75LA-C	VBK5	52~75	80	50	CCMT09T304	1	3320-346
	RBH52-75LA-T					TCMT16T304		3320-347
	RBH52-75LA-S					SCMT09T304		3320-348
	RBH68-100LA-C	VBK6	68~100	90	66	CCMT120408	2.5	3320-349
	RBH68-100LA-T					TCMT16T304		3320-350
	RBH68-100LA-S					SCMT120404		3320-351
	RBH90-130LA-C	VBK6	90~130	100	88	CCMT120408	3.1	3320-352
	RBH90-130LA-T					TCMT16T304		3320-353
	RBH90-130LA-S					SCMT120404		3320-354
	RBH120-164LA-C	BST	120~164	95	100	CCMT120408	3.8	3320-355
	RBH120-164LA-T					TCMT220408		3320-356
	RBH120-164LA-S					SCMT120404		3320-357
	RBH160-204LA-C		160~204		130	CCMT120408	4.8	3320-358
	RBH160-204LA-T					TCMT220408		3320-359
	RBH160-204LA-S					SCMT120404		3320-360
	RBH200-310LA	BST Series	200~310	130	180	Optional Inserts CCMT120408 TCMT16T304 TCMT220408 SCMT120404	9.5	3320-361
	RBH300-410LA		300~410		280		11.5	3320-362
	RBH400-510LA		400~510		380		13.5	3320-363
	RBH500-610LA		500~610		480		15.5	3320-364
	RBH600-950LA	FMA-47.625	600~950	150	580	33	3320-365	
	RBH900-1250LA		900~1250		680	43	3320-366	



FBH Finish Boring Head

Boring diameter from $\varnothing 20$ - $\varnothing 1250\text{mm}$



Ordering Example

FBH 52-75 — VBK5
Head Type Boring Diameter Tool Connection

FEATURES:

- FBH finish boring head is suitable for finish boring with working ranges from $\varnothing 20\text{mm}$ to $\varnothing 1250\text{mm}$ on diameter.
- The dial has been graduated into 50 divisions, each of which is 0.01mm on diameter. Available is a sub-dial for finer adjustment.
- High precision internal lead screw with inner lubrication is free from the effects of chip, featuring high durability.
- Coolant nozzle easily cools the insert and prolongs insert's working life.
- Cartridge unit is housed in a square structure with two face support, proving high stability and rigidity.

ORDER NO.	Tool Connection	ØD Boring Range	length	Weight (kg)	Insert Clamping Screw	CODE NO.
FBH20	VBK1	20-26	35	0.1	TB06/M2/T6 TP08/M2.2/T7 TC09/M2.2/T7	3320-370
FBH25	VBK2	25-33	40	0.2		3320-371
FBH32	VBK3	32-42		0.3		3320-372
FBH40	VBK4	40-55	50	0.5		3320-373
FBH52	VBK5	52-75	60	1	TP08/M2.2/T7 TP09/M2.5/T8 TC11/M2.5/T8	3320-374
FBH68	VBK6	68-102	70	2		3320-375
FBH100	VBK6	100-152		2.9		3320-376
FBH150	VBK6	150-202		4.2		3320-377
FBH200S	BST Series	200-310	130	9.7		3320-378
FBH300S		300-410		11.7		3320-379
FBH400S		400-510		13.7		3320-380
FBH500S		500-610		15.7		3320-381
FBH600S	FMA-47.625	600-900	150	33		3320-382
FBH900S		900-1250		43		3320-383



Boring diameter from Ø3 - Ø40mm



BORING CAPACITY
CBI4 Ø8 - Ø20 m/m
CBI5 Ø12 - Ø40 m/m
CBI6 Ø8 - Ø40/m/m

FEATURES:

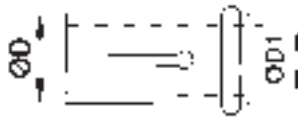
- Available are three different styles enabling small diameter boring from Ø8mm to Ø40mm. Boring range can be within Ø3mm to Ø10mm if small diameter solid carbide boring bar has been employed.
- The dial has been graduated into 50 divisions, each of which is 0.01mm on diameter. Available is a subdial for finer adjustment.
- High precision internal lead screw with inner lubrication is free from the effects of chip, featuring high durability.
- Cartridge unit is housed in a square structure with two face support, proving high stability and rigidity.



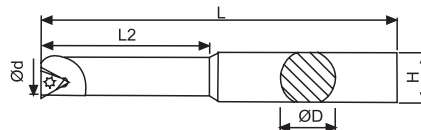
ORDER NO.	Tool Connection	ØD Internal Diameter	ØD External Dimeter	length	mm feed	Weight (kg)	CODE NO.
Boring Head Type							
CBI4	VBK4	10	39	32	0-2	0.4	3320-390
CBI5	VBK5	12	50	40	0-3.5	0.8	3320-391
CBI6	VBK6	16	64	50	0-5	1.4	3320-392

BORING BAR SLEEVE FOR CBI6

ORDER NO.	D mm	D1 mm	Applicable Carbide Tool Holder	CODE NO.
EC1608	16	8	ST08-W5-...,HC08	3320-393
EC1610	16	10	ST10-W6-...,HC10	3320-394
EC1612	16	12	ST12-W6-...,HC12	3320-395



Small Diameter Boring Head CBI4



FOR CBI4 BORING CAPACITY FROM Ø8 - Ø20MM

ORDER NO.	ØD mm	Ød mm	L mm	L2 mm	H mm	Insert	Clamp Screw	Wrench	CODE NO.
BJ1008-32	10	8	64	32	9	TBGT060104 KYOCERA	M2	T6	3320-400
BJ1010-40		10	72	40					3320-401
BJ1012-45		12	77	27		TPGB090204 KYOCERA	M2.5	T8	3320-402
BJ1016-45		16	77	27					3320-403
BJ1020-45		20	77	27		TPGB090204 KYOCERA	M2.5	T8	3320-404
※BJ10-5PCS/SET	BJ1008-32 BJ1010-40 BJ1012-45 BJ1016-45 BJ1020-45								3320-405

FOR CBI6 BORING CAPACITY FROM Ø8 - Ø40MM

ORDER NO.	ØD mm	Ød mm	L mm	L2 mm	H mm	Insert	Clamp Screw	Wrench	CODE NO.
BJ1608-32	16	8	74	32	15	TBGT060104 KYOCERA	M2	T6	3320-406
BJ1610-40		10	75	40					3320-407
BJ1612-53		12	85	53		TPGB090204 KYOCERA	M2.5	T8	3320-408
BJ1616-68		16	100	68					3320-409
BJ1620-83		20	115	83		TPGB090204 KYOCERA	M2.5	T8	3320-410
BJ1625-90		25	122	90					3320-411
BJ1630-90		30	122	90					3320-412
BJ1640-90		40	122	90					3320-413
※BJ16-8PCS/SET	BJ1608-32 BJ1610-40 BJ1612-53 BJ1616-68 BJ1620-83 BJ1625-90 BJ1630-90 BJ1640-90								3320-414

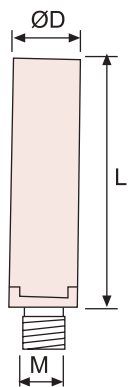


Carbide Tool Holder



Small Diameter Modular Boring Bar

Boring diameter from
Ø8 - Ø16mm

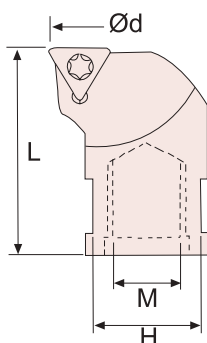


ORDER NO.	L mm	D mm	M mm	Applicable Insert Holder	Applicable Bushing	CODE NO.
ST08-W5-100	100	8	M5	BE09A, BE10.5A	EC1608	3320-420
ST10-W6-110	110	10	M6	BE12A	EC1610	3320-421
ST12-W6-120	120	12		BE14A, BE16A	EC1612	3320-424
ST16-W10-160	160	16	M10	BE18A, BE20A, BE22A, BE24A BE26A, BE28A, BE30A, BE32A BE34A, BE36A, BE38A, BE40A	---	3320-426



Insert Holder For Carbide Tool Holder

Boring diameter from Ø9 - Ø40mm



ORDER NO.	d(mm)	H(mm)	L(mm)	M(mm)	Insert	Clamping Screw	Wrench	CODE NO.
BE09A	9	7	18	M5	TPGT080204L SUMITOMO	M2.2	TF7	3320-430
BE10.5A	10.5	7	23	M6				3320-431
BE12A	12	8						3320-432
BE14A	14	10						3320-433
BE16A	16	10	27	M10				3320-434
BE18A	18	14						3320-435
BE20A	20	14						3320-436
BE22A	22	14						3320-437
BE24A	24	14						3320-438
BE26A	26	14						3320-439
BE28A	28	14						3320-440
BE30A	30	14						3320-441
BE32A	32	14						3320-442
BE34A	34	14						3320-443
BE36A	36	14						3320-444
BE38A	38	14						3320-445
BE40A	40	14						3320-446



RBH Indexable Twin-bit Rough Boring Head

Boring diameter from Ø25 - Ø350mm



- The head is suitable for single bit boring, twin-bit boring and step boring with working diameter from Ø25mm to Ø350mm on diameter.
- New cartridge style with built-up rib. The pressure imposed on both cartridges counteracts producing highest rigidity and cutting efficiency, most suitable for a variety of borings.
- Boring head can be easily adjusted to different boring needs for machining on demand. Boring depth can be extended by tool connection.
- Clear side division provides a convenient adjustment without using a tool pre-setter.
- Most suitable for boring on various machine centers or boring mills. Universal design accepts inserts of any brands, which will reduce tool grinding and greatly improve boring performance.
- Patented step boring design; suitable for both level boring and step boring.



Indexable Twin-bit Rough Boring Head RBH-LA

Boring diameter from Ø25 - Ø200mm



- Thickened cartridge with higher rigidity.
- Coolant nozzle easily cools the insert elongating its working life.
- Completed with chip pocket, improving chip flow of deep boring.
- Clamp plate solidifies cartridges and head, upgrading cutting rigidity.
- Patented step boring design; suitable for both level boring and step boring.

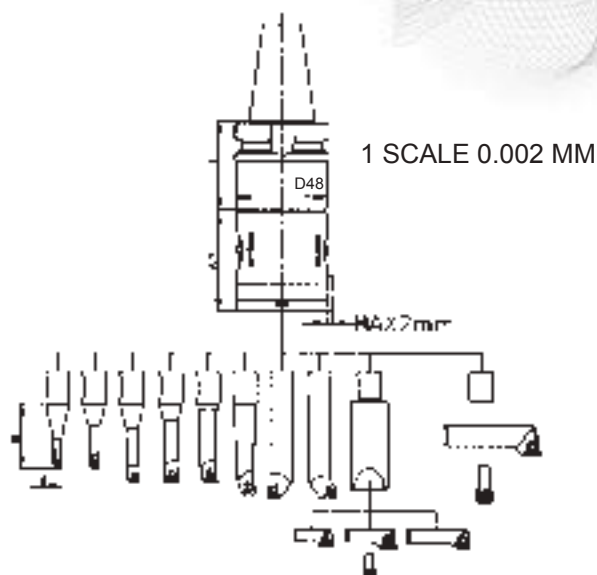


Large Diameter Modular Rough Boring Head With Diameter Over Ø200mm

Boring diameter from Ø200 - Ø810mm



- This type is suitable for large diameter boring with ranges from 200mm to 810mm.
- The structure includes common flange and extension slide for both rough and finish boring heads. Adjustment range is within 110mm on diameter.
- Options of various inserts for rough boring of different materials and boring styles.
- Available is the horizontal slide made of Aluminum alloy to reduce total weight.
- Options of external boring kit with boring range from Ø20mm to Ø300mm.


NEW


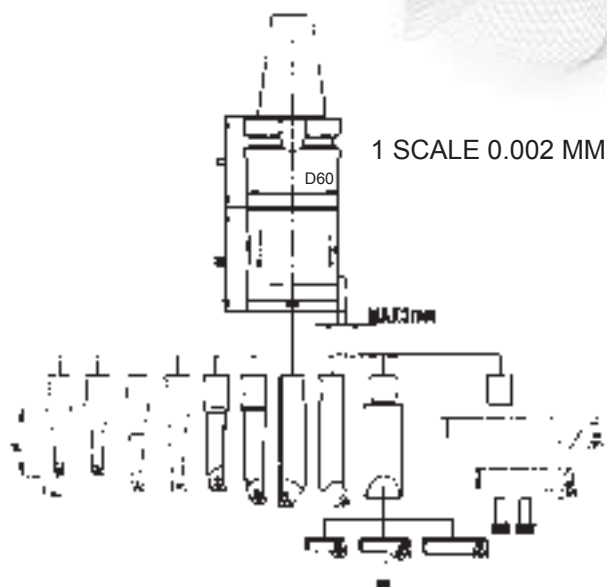
- Processing range Ød 6-90mm.
- This slim set allows customer to process boring work in the narrow space with high precision.
- Precisely ground and hardened shank integrating with boring head for routing and smooth operation.
- Please keep boring head clean and lubricate constantly.

SET TYPE

ORDER NO.	Boring Range Ø	Shank	L1	Head Dia. ØD	PCS/SET	CODE NO.
VBHD-BT-30	6-90	BT30-VCK4-45	45	48	14 PCS/SET	3320-450
VBHD-BT-40		BT40-VCK4-60	60			3320-451
VBHD-BT-50		BT50-VCK4-75	75			3320-452
VBHD-SK-40		SK40-VCK4-65	65			3320-453
VBHD-SK-50		SK50-VCK4-75	75			3320-454
VBHD-NT-40		NT40-40-VCK4-60	60			3320-455
VBHD-NT-50		NT50-50-VCK4-60	60			3320-456
VBHD-HSK63A		HSK63A-VCK4-75	75			3320-457
VBHD-HSK100A		HSK100A-VCK4-75	75			3320-458

ACCESSORIES: BORING BAR SIZE FOR SET TYPE

Boring Bar	Range d	Depth m	Insert	Screw	Wrench	Feed mm/REV.
BR-1606-20	6-9	20	WBGT060102L	TS2	T6	0.05-0.1
BR-1608-28	8-11	28	TBGT060102L			0.05-0.1
BR-1610-36	10-13	36	TBGT060104L			0.07-0.15
BR-1612-42	12-15	42	TPGT090202L	TS25	T8	0.05-0.1
BR-1614-50	14-17	50				
BR-1616-60	16-20	60				
BR-1620-63	20-24	63	TPGT090204L			0.07-0.15
BR-1624-64	24-28	64				
BM5		60+SRTP2838/SRTP3652/SRTP4470		M5 X15 CAP	4	0.05-0.1
SRTP2838	28-38	+10	TPGT090202L	TS25	T8	
SRTP3652	36-52	+12				
SRTP4470	44-70	+12	TPGT090204L			M5 X 15 CAP
BM8						
SRTP58-90	58-90	+20	TPGT090204L	TS25	T8	


NEW


- Processing range Ød 6-150mm.
- This slim set allows customer to process boring work in the narrow space with high precision.
- Please keep boring head clean and lubricate constantly.
- Precisely ground and hardened shank integrating with boring head for routing and smooth operation.

SET TYPE

ORDER NO.	Boring Range Ø	Shank	L1	Head Dia. ØD	PCS/SET	CODE NO.
VBHE-BT-40	6-150	BT40-VCK5-60	60	60	15 PCS/SET	3320-460
VBHE-BT-50		BT50-VCK5-75	75			3320-461
VBHE-SK-40		SK40-VCK5-65	65			3320-462
VBHE-SK-50		SK50-VCK5-75	75			3320-463
VBHE-NT-40		NT40-40-VCK5-60	60			3320-464
VBHE-NT-50		NT50-50-VCK5-75	75			3320-465
VBHE-HSK63A		HSK63A-VCK5-75	75			3320-466
VBHE-HSK100A		HSK100A-VCK5-75	75			3320-467

ACCESSORIES: BORING BAR SIZE FOR SET TYPE

Boring Bar	Range d	Depth m	Insert	Screw	Wrench	Feed mm/REV.
BR-1606-20	6-9	20	WBGT060102L	TS2	T6	0.05-0.1
BR-1608-28	8-11	28	TBGT060102L			0.05-0.1
BR-1610-36	10-13	36	TBGT060104L			0.07-0.15
BR-1612-42	12-15	42	TPGT090202L	TS25	T8	0.05-0.1
BR-1614-50	14-17	50				
BR-1616-60	16-20	60				0.07-0.15
BR-1620-63	20-24	63	TPGT090204L			
BR-1624-64	24-28	64				
BM5		60+SRTP2838/SRTP3652/SRTP4470		M5 X15 CAP	4	0.05-0.1
SRTP2838	28-38	+10	TPGT090202L	TS25	T8	
SRTP3652	36-52	+12				
SRTP4470	44-70	+12	TPGT090204L			0.07-0.15
BM8				M5 X 15 CAP	6	
SRTP70100	70-110	+20	TPGT090202L	TS25	T8	0.05-0.1
SRTP110150	110-150	+20	TPGT090204L			0.07-0.15



High Precision Boring Head Set



VERTEX

NEW

**1 SCALE 0.005mm
BORING CAPACITY Ø8-Ø46**



VBH 620

- Good for high speed, high precision boring work.
 - Made of tool steel, high rigidity, no deformation.
 - Each dividing scale is 0.005 mm, total stroke: 6mm.
 - Can choose any taper (BT40, BT50, SK40, SK50) shank.
 - Include 8 boring bars, range Ø8 ~ Ø46 mm.
- Boring bar size = Ø16 x 8 pcs
 - Insert locking screw 8 x 3 = 24 pcs
 - Wrench x 6 pcs
 - 4 mm T wrench x 1 pcs

SET TYPE

ORDER NO.	SHANK TYPE	DRAWBAR	THREAD	Weight (kgs)	CODE NO.
		S.A.E	METRIC		
VBH620-NT40	NT-40	5/8"-11W	M16X2.0P	6.5	3320-480
VBH620-NT50	NT-50	1"-8W	M24X3.0P	7.8	3320-481
VBH620-BT40	BT-40		M16X2.0P	6.5	3320-482
VBH620-BT50	BT-50		M24X3.0P	8	3320-483
VBH620-SK40	SK-40		M16X2.0P	6.5	3320-484
VBH620-SK50	SK-50		M24X3.0P	7.8	3320-485

BORING BAR FOR BORING HEAD

BORING BAR	RANGE d	DEPTH m	SHANK L	INSERT	SCREW	WRENCH
1608-32	8-11	32	80	TBGT060102L	SB-1STR-M2	T6
1610-40	10-13	40	87			
1612-53	12-15	53	98	TPGH090204L	SB-2STR-M2.5	T8
1616-68	16-21	68	110			
1620-83	20-26	83	124	TPGH110304L	SB-3STR-M3	T10
1625-90	25-31	90	128			
1630-90	30-36	90	128			
1640-90	40-46	90	128			



High Precision Boring Head Set



VERTEX

NEW

**1 SCALE 0.005mm
BORING CAPACITY Ø8-Ø280**



VBH 2084

- Good for high speed, high precision boring work.
- Made of tool steel, high rigidity, no deformation.
- Each dividing scale is 0.005 mm, total stroke: 27mm.
- Can choose any taper (BT40, BT50, SK40, SK50) shank.
- Include 8 boring bars, range Ø8 ~ Ø280 mm.
- Boring bar size = Ø20 x 8 pcs
- Insert locking screw 8 x 3 = 24 pcs
- Wrench x 6 pcs
- Hexa 6 wrench x 1 pcs

SET TYPE

ORDER NO.	SHANK TYPE	DRAWBAR	THREAD	Weight (kgs)	CODE NO.
		S.A.E	METRIC		
VBH2084-R8	R-8	7/16"-20UNF	n/a	6.6	3320-491
VBH2084-NT30	NT-30	1/2"-12W	M12X1.75P	6.6	3320-492
VBH2084-NT40	NT-40	5/8"-11W	M16X2.0P	7	3320-493
VBH2084-NT50	NT-50	1"-8W	M24X3.0P	9	3320-494
VBH2084-BT40	BT-40		M16X2.0P	8	3320-495
VBH2084-BT50	BT-50		M24X3.0P	10.4	3320-496
VBH2084-SK40	SK-40		M16X2.0P	8	3320-497
VBH2084-MT3	MT-3		M12X1.5P	6.6	3320-498
VBH2084-MT4	MT-4		M16X2.0P	7	3320-499
VBH2084-MT5	MT-5		M24X3.0P	8	3320-500

BORING BAR FOR BORING HEAD

BORING BAR	RANGE d	DEPTH m	SHANK L	INSERT	SCREW	WRENCH
2008-32	8-11	32	75	TBGT060102L	SB-1STR-M2	T6
2010-40	10-13	40	75			
2012-53	12-17	53	85	TPGH090204L	SB-2STR-M2.5	T8
2016-68	16-21	68	100			
2020-83	20-130	83	115	TPGH110304L	SB-3STR-M3	T10
2025-95	25-135	95	128			
2030-115	30-140	115	147			
2020-L	120-280	85+BT	98			



Universal Boring And Facing Master Head


VERTEX
BORING CAPACITY Ø5-Ø250
1 SCALE 0.01mm


ORDER NO.	SHANK TYPE	DRAWBAR THREAD		Weight (kg)	CODE NO.
		S.A.E	METRIC		
VBHU-202	MT-3	1/2"-12W	M12X1.5P	4.6	3401-001
VBHU-203	MT-4	5/8"-11W	M16X2.0P	5	3401-002
VBHU-204	MT-5	1"-8W	M24X3.0P	6	3401-003
VBHU-205	R-8	7/16"-20UNF	n/a	4.8	3401-004
VBHU-206	NT-30	1/2"-12W	M12X1.75P	4.5	3401-005
VBHU-207	NT-40	5/8"-11W	M16X2.0P	4.9	3401-006
VBHU-208	NT-50	1"-8W	M24X3.0P	7.6	3401-007
VBHU-209	BT-40		M16X2.0P	5.6	3401-008
VBHU-210	C-25			4.5	3401-009
VBHU-211	SK-40		M16X2.0P	5.6	3401-010
VBHU-212	SK-50		M24X3.0P	8.3	3401-011
VBHU-213	BT-50		M24X3.0P		3401-012

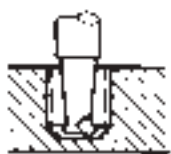


SPECIFICATION

Unit:mm

ACTUAL SIZE	OVERING BAR HOLE SIZE	BORING BAR HOLE SIZE	CENTER DIST BETWEEN HOLES.	CROSS HOLE DIA	OFFSET
78	100	18	23	18	15

It is construction with precision parts, freedom of selection feeding quantity, auto feed and stop. Processing range from 5mm to 250mm.



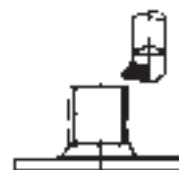
Boring with several different bits from 5Ø -250mm



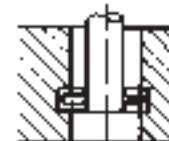
From inside outward



From inside inward



Outside turning



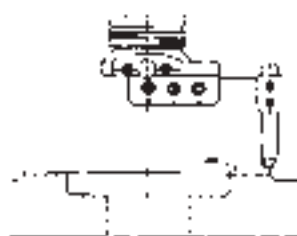
Recessing



Because of the small construction of the facing and boring heads deep bores can be made. In this case the boring bit is fixed directly in the side.



Facing in two areas with one boringbar and boringbar holder



Facing of large ø with long boringbar holden reinforced by rings and draw in screw



Facing of the reverse side by using boringbar holders contained in attachment.



Boring with long boringbar



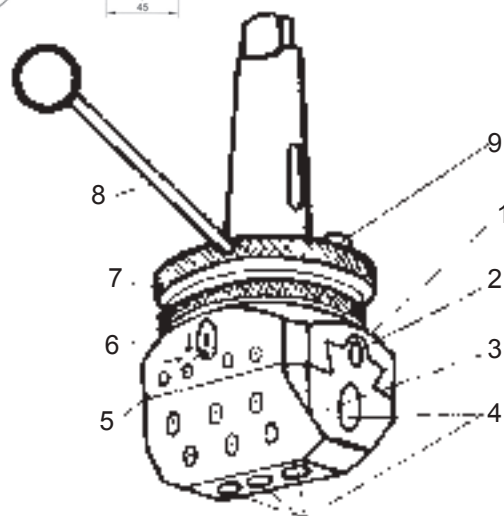
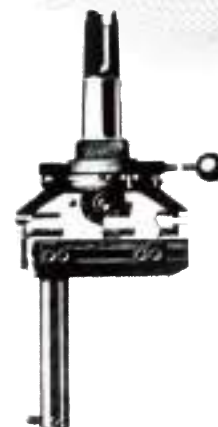
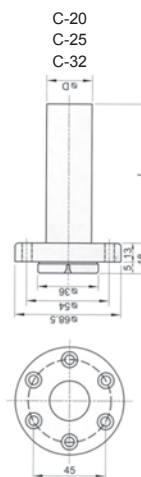
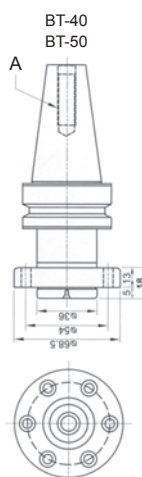
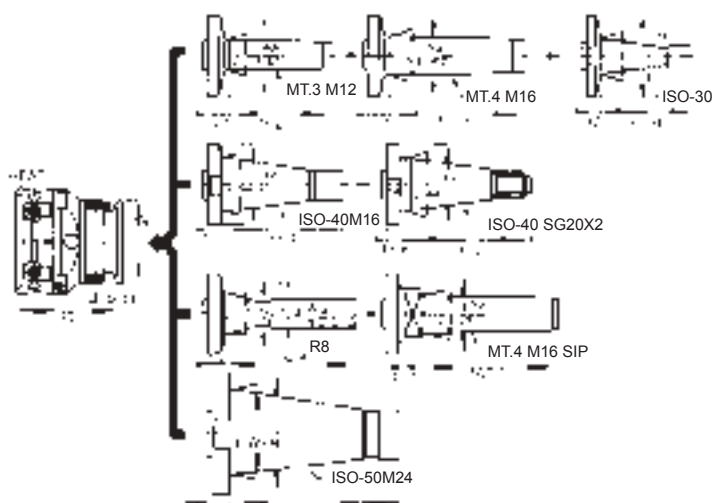
Facing with bit fixed directly in slide



Boring and facing with short boringbar holder and a boringbar



SHANK



Main part of the universal boring heads is the body(1), in which the tool slide (3) moves on dovetail guideways. The tool slide is provided with holes for accommodation of tools and tool holders(4). In boring holes or turning external cylindrical surfaces, the tool is adjusted with the aid of the graduated dial for fine setting of tool slide(5), one division of which means a change in diameter of bored hole by .0005".

On the types rapid adjustment of the tool slide(3) can be produced by rotating the graduated dial for quick adjustment of the tool slide(2).

During recessing, turning of front or rear facings or similar jobs calling for automatic transverse feed movement to the tool slide, the preselected feed movement to the tool slide is engaged with the aid of the engagement ring (6). After setting of tool, the automatic transverse feed movement to the tool slide is started by braking of the brake ring(7), by means of the handle(8).

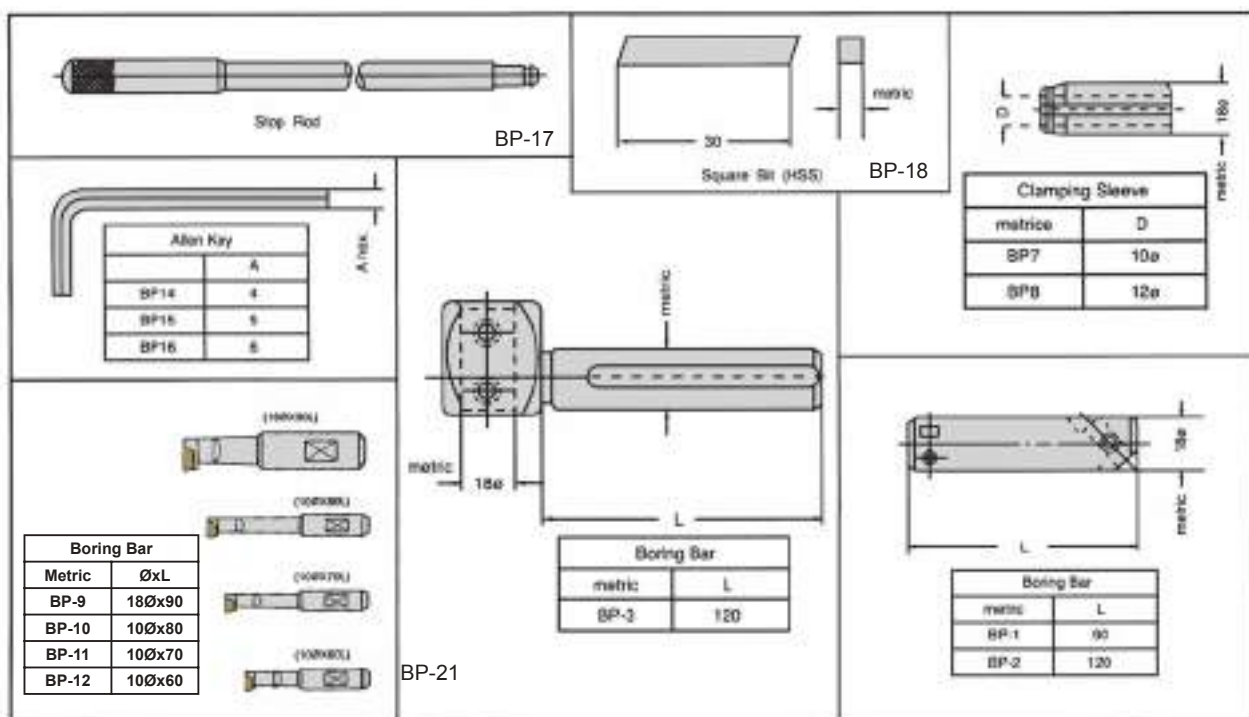
The clutch(9) provides for tripping of the automatic feed movement when cutting resistance increases or when the trip dog is approached.

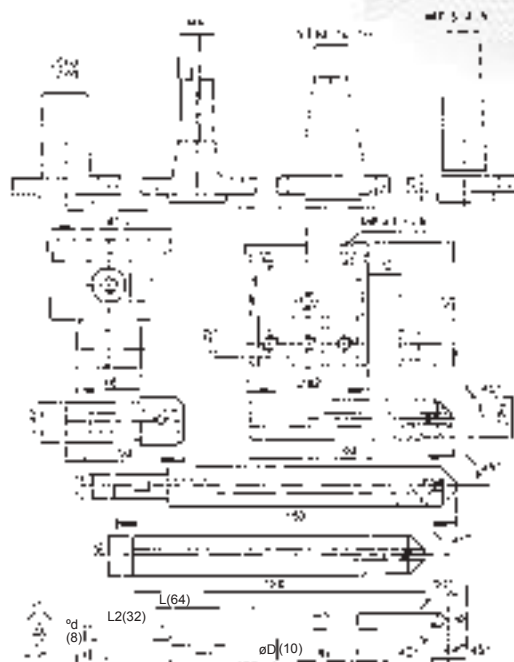
Mechanism of the boring heads has a lubrication circuit delivering oil from two lubricators to all friction surfaces.

All parts are hardened and working surfaces are ground.

SHANK FOR VBHU-

MT-3	MT-4	MT-5
NT-30	NT-40	NT-50
R-8		
C-20	C25	C-32
	BT-40	BT-50





INSERT NO.
TBGT060102L-W-T1200A FOR STEEL
TBGT060102L-W-G11 FOR CASTING
"SUMITOMO" BRAND

1 SCALE 0.01mm

Processing Range $\varnothing 10 \sim \varnothing 240\text{mm}$

Simple, extremely rigid construction, Finest materials and craftsmanship are employed to combine strength, flexibility and accuracy in a tool of unique design. 2 vertical boring tool holes: one centered and one offset. One cross hole for greater versatility and capacity. Dependable adjustment --- far spread graduation for closer reading. Perfectly balanced for high speed operation.

Precision ground & hardened shank are integrating with the head for routing and smoother operation.

FULL SET

ORDER NO.	SHANK TYPE	DRAWBAR THREAD		Weight (kgs)	CODE NO.
		S.A.E	METRIC		
VBH-102	MT-3		M12X1.75P	7	3401-101
VBH-103	MT-4		M16X2.0P	7	3401-102
VBH-104	MT-5		M20X3.0P	7	3401-103
VBH-105	R-8	7/16" ~20UNF		7	3401-104
VBH-106	NT-30	1/2"-12W or 1/2"-13W	M12X1.75P	7	3401-105
VBH-107	NT-40	5/8"-11W	M16X2.0P	7	3401-106
VBH-108	NT-50	1"-8W	M24X3.0P	10	3401-107
VBH-109	BT-40	-	M16X2.0P	10	3401-108
VBH-110	SK-40	-	M16X2.0P	-	3401-109
VBH-111	C-25	-	-	7	3401-110
VBH-112	BT-50		M24X3.0P		3401-111

SHANK FOR BORING HEAD

ORDER NO.	VBH-MT3	VBH-MT4	VBH-MT5	VBH-R8
WEIGHT (KG)	0.6	0.8	2.1	1
CODE NO.	3401-120	3401-121	3401-122	3401-123

ORDER NO.	VBH-NT30	VBH-NT40	VBH-NT50	VBH-BT40
WEIGHT (KG)	0.7	1	3.9	2.1
CODE NO.	3401-124	3401-125	3401-126	3401-127

ORDER NO.	VBH-SK40	VBH-C25	VBH-BT50	
WEIGHT (KG)	1.9	1.5	3.1	
CODE NO.	3401-128	3401-129	3401-130	





Boring Head Set C-Type



VERTEX

1 SCALE 0.01mm



VBHC-BC2
SET TYPE

Here is a sturdy unit of extended boring range, capable of peeling off heavy roughing cuts as well as a tool of extreme sensitivity. The use of a wide base bar holder, resting securely on the body, eliminates the need for a separate side plate. You will note this has now become an integral part of the body.

The direct reading adjusting screw is ground after hardening and a plainly marked dial face in nonreflecting satin chrome allows easy reading and adjustments of .001 or less.

All Criterion Boring Heads have threaded backs for use with a variety of shanks. This model takes a 1-1/2"-18 threaded shank.

SHANK SIZE: NT-30,40,50, MT-3,4,5,R8

BORING CAPACITY Ø10~Ø110

ORDER NO.	WEIGHT (kgs)	CODE NO.
VBHC-R-8-BC-2	2	3401-150
VBHC-MT-3-BC-2	1.9	3401-151
VBHC-MT-4-BC-2	2.1	3401-152
VBHC-NT-30-BC-2	2.2	3401-153
VBHC-NT-40-BC-2	2.8	3401-154
VBHC-BT-30-BC2		3401-155
VBHC-BT-40-BC2		3401-156
VBHC-BT-50-BC2		3401-157

BORING CAPACITY Ø10~Ø220

ORDER NO.	WEIGHT (kgs)	CODE NO.
VBHC-R-8-BC-3	4.2	3401-160
VBHC-MT-3-BC-3	4	3401-161
VBHC-MT-4-BC-3	4.3	3401-162
VBHC-NT-30-BC-3	4.1	3401-163
VBHC-NT-40-BC-3	4.7	3401-164
VBHC-NT-50-BC-3	6.9	3401-165
VBHC-BT-30-BC-3		3401-166
VBHC-BT-40-BC-3		3401-167
VBHC-BT-50-BC-3		3401-168



VBHC-BC3 SET TYPE

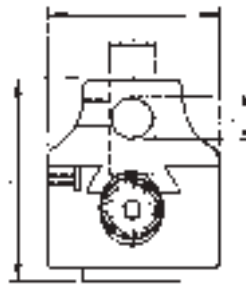


Boring Head Shank C-Type



The shanks are made for C-type boring head use. Also it can be replaced from time to time.

ORDER NO.	VBC-R8	VBC-NT30	VBC-NT40	VBC-MT3	VBC-MT4	VBC-MT5	VBC-BT40	VBC-BT50
WEIGHT (KG)	0.4	0.7	1.3	0.6	0.9	1.6	1.4	
CODE NO.	3401-210	3401-211	340-212	3401-213	3401-214	3401-215	3401-216	3401-217



Here is a small head that will be in constant demand in any shop.

Note the wide base bearing surface that assures maximum rigidity even when the bar holder is in an off-set position. This wide base design is a recent Criterion innovation that increases bearing surfaces by 50% over the older models.

A choice of either 3/8" or 1/2" double hole bar holder with a 1/2" cross hole is available.

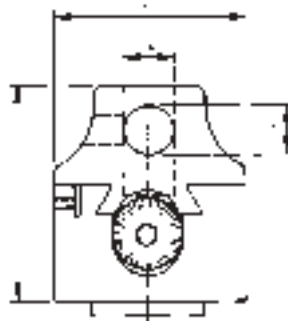
The unit has a 7/8"-20NC threaded back and also features a direct reading dial screw.

ORDER NO. VBC-2

SPECIFICATION

BORING CAPACITY Ø10-Ø100

ORDER NO.	ACTUAL SIZE	OVERALL LENGTH	BORING BAR HOLE SIZE	CENTER DIST BETWEEN HOLES.	CROSS HOLE DIA	OFFSET	WEIGHT (kg)	CODE NO.
VBC-2(m)	50	62	12	15	12	15	0.8	3401-302



Here is a sturdy unit of extended boring range, capable of peeling off heavy roughing cuts as well tool of extreme sensitivity. The use of a wide-base bar-holder resting securely on the body, eliminates the need for a separate side plate. You will notice it has now become an integral part of the body.

The direct reading adjusting screw is ground after hardening and a plainly marked dial face in non-reflecting satin chrome allows easy reading and adjustments of .0005 or less.

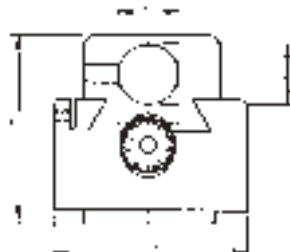
All Criterion Boring Heads have threaded backs for use with a variety of shanks. This model takes a 1-1/2"-18 threaded shank.

ORDER NO. VBC-3

SPECIFICATION

BORING CAPACITY Ø10-Ø220

ORDER NO.	ACTUAL SIZE	OVERALL LENGTH	BORING BAR HOLE SIZE	CENTER DIST BETWEEN HOLES.	CROSS HOLE DIA	OFFSET	WEIGHT (kg)	CODE NO.
VBC-3(m)	75	80	18	23	18	25	3	3401-304



This is a bigger boring head which can be put on large machine to process more as you want. The radius of boring hole can reach on about Ø 400mm long by a boring bar of 160mm.

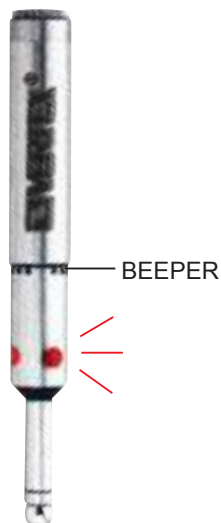
SPECIFICATION

BORING CAPACITY Ø10-Ø250

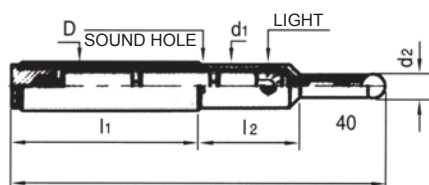
ORDER NO.	ACTUAL SIZE	OVERALL LENGTH	BORING BAR HOLE SIZE	CENTER DIST BETWEEN HOLES.	CROSS HOLE DIA	OFFSET	WEIGHT (kg)	CODE NO.
VBC-4(m)	100	90	25	32	25	25	4	3401-306



With beeper



- No need to rotate while measuring.
- The red light was sealed with setting red-glue; it can concentrate the light and resist water.
- The sensor beeps while the red light is on.
- The sensor will beep when the user couldn't see the reverse side or get a clear sight.
- Example. If sensor's light is working, visually you couldn't see inside of the inner hole, while probing the user can be warned by the beeper.
- When probe the deep hole, you can't see the red light, but you can hear the sound from beeper.
- Accuracy: within 0.005mm.



OPTICAL TYPE WITH BEEPER

Unit:mm

ORDER NO.	D	d1	d2	L	l1	l2	BATTERY TYPE	WEIGHT (kg)	CODE NO.
VPS-20B	Ø20	18	10	160	79	41	UM-5#(SP) x1PCS/12V	0.4	3402-001
VPS-32B	Ø32	18	10	160	79	41		0.7	3402-002



Touch Point Sensor

Optical Type



VPS-20



VPS-32

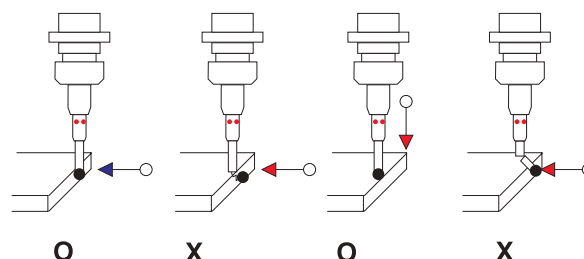
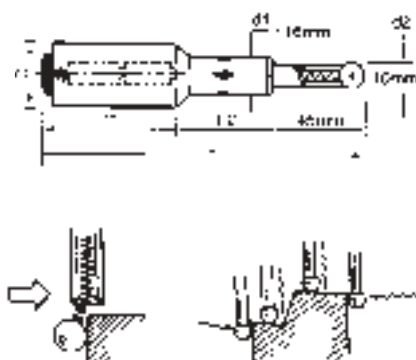
- High sensitivity position sensor.
- Red pilot can be seen clearly.
- Whole travel of red pilot is sparkling, detecting also can be done during turning while spindle stops.
- Location of end surface, outer circle dia., inner circle dia. of the work-piece for processing can be detected with full effect.
- Devised with safety line excess, ball supported by spring, so even line excess, it will be separated easily from the base shown as the fig.
- The precision will reach up to micrometer while the ball returns to center position.

OPTICAL TYPE

Unit:mm

ORDER NO.	D	d1	d2	L	l1	l2	BATTERY TYPE	WEIGHT (kg)	CODE NO.
VPS-20	20	16	10	157	77	35	UM-5#(SP) x2P/R1./1.5V	0.4	3402-003
VPS-32	32	16	10	157	71	41		0.7	3402-004

Fig.





VPS-201

This series is a high precision setting device for positioning the accurate center between tool spindle of machine and reference surface of working at low-cost and saving time.

Accuracy : within 0.005 mm

Made of tool steel, hardened and ground.

Suitable rotation speed : VPS-201 450 to 600rpm.

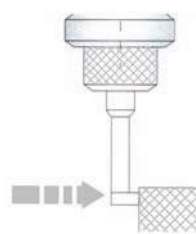
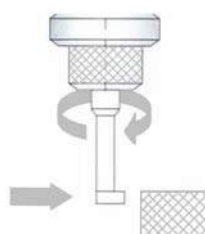
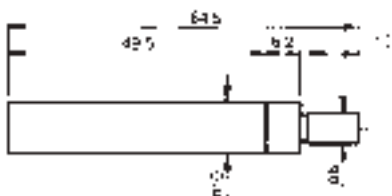
VPS-401 600 to 1,000 rpm



CREAMIC TYPE VPS-201C

MECHANICAL TYPE SIMPLE TYPE

ORDER NO.	VPS-201	VPS-201C
WEIGHT (KG)	0.1	0.1
CODE NO.	3402-005	3402-007



Touch Point Sensor

Deluxe Type



VPS-401



VPS-401C

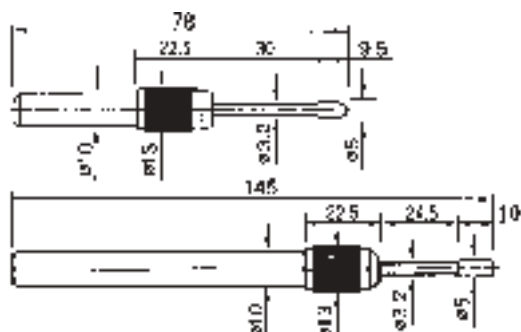
FEATURES:

- Material: high-carbon steel.
- Accuracy: within 0.003mm
- Hardness: HRC 58 $\pm$ 1°
- R.P.M. Within 600-1000
- Suitable for milling machine.
Drill machine and boring machine.

VPS-401 (2 PCS/SET)

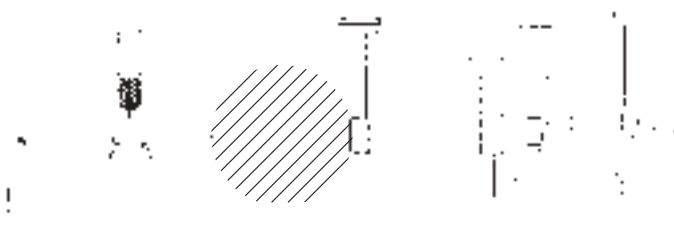
VPS-402A(LONG) SINGLE

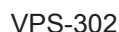
VPS-402B(SHORT) SINGLE



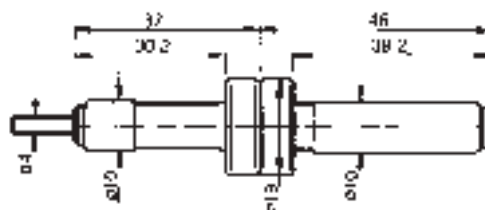
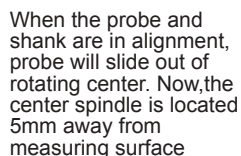
ORDER NO.	VPS-401	VPS-401C
PCS/SET	2PCS/SET	2PCS/SET
WEIGHT (KG)	0.3	0.3
CODE NO.	3402-006	3402-008

EXAMPLES-APPLICATION





-



ORDER NO.	MATERIAL	HARDNESS	WEIGHT (kg)	CODE NO.
VPS-301	ALLOY STEEL	HRC 56°	0.03	3402-100
VPS-302			0.03	3402-101
VPS-301S	STAINLESS	HRC 60°	0.03	3402-102
VPS-302S			0.03	3402-103
VPS-301C	CERAMIC	HRC 60°	0.03	3402-104

ORDER NO.VCI-170 CODE NO.3402-130



- RPM Within 800.
- Use for Internal or External.
- Use for Vertical or Horizontal.
- While Spindle Rotates, With Stop bar for Fixing The Head The Centering Indicator Always faces the operator.

Shank	ø10	m/m
Length	170	m/m
Internal	ø4~ø108	m/m
External	ø0~ø108	m/m
Min. Indicator	0.01	m/m
Indicator Range	0~6	m/m
Weight	0.8 kgs	



HP-50Z BATTERY
LR4476AG13
1SET/2PCS
HP-50ZM
LR44
1SET/2PCS



- Height 50mm.
- With Magnetic base.
- The red lamp will be lighted up when touched.
- Accuracy 0.005mm.
- Combined vertical and horizontal in a unit.
- Weight:0.7kgs

	STANDARD TYPE	WITH MAGNETIC BASE
ORDER NO.	HP-50Z	HP-50ZM
CODE NO.	3403-001	3403-002



Height Presetter (For Machining Center)

ORDER NO.HP-100 CODE NO.3403-010



- Locate the height presetter on a place suitable for a reference surface of work piece.
- Apply the cutter on the measuring surface and slowly lower the Z-axis. Then, cutter gets near to the measuring position.
- A distance from the reference surface to the tool tip can be measured easily and precisely so that this presetter is most suitable not only for machineing centers but for NC lathes and NC milling machines.

* Magnetic base function can be used in vertical position & horizontal position.

* HEIGHT:100mm±0.005

Height from reference surface	WEIGHT(kgs)
100mm	2.6



HP-50A



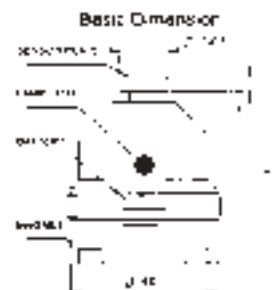
HP-50B

- Have the central measuring part of the zero setter presetter against a plain surface and aligned if with the outer reference surface. Turn the dial gauge for zero setting.
- Have the cutter touched against the z zero setter. Once the indicator position at zero, the distance between the tool tip to workpiece is 50mm.

ORDER NO.	H	STYLE	WEIGHT (kg)	CODE NO.
HP-50A	50mm	STANDARD TYPE	1.1	3403-020
HP-50B			1.7	3403-021
HP-50AM		WITH MAGNETIC BASE	1.2	3403-022
HP-50BM			1.7	3403-023



Electronic Tool Length Setter



Stainless Steel Base With Magnet



● HIGH ACCURACY ● EASY OPERATION

- Be sure to remove all chips and all from the sensor plate and the base of the HP-50E as well as from the workpiece and tool.
- To move the tool approaching the sensor plate slowly.
- When touching, the "LED" turns on immediately and "H" is just 50.00 mm.(or2")
- LED will not function if batteries are not set in correctly.
- Designed to be used on ferrous and non-ferrous materials.

ORDER NO.	H	STYLE	WEIGHT (kg)	CODE NO.
HP-50EM	50mm	WITH MAGNETIC BASE	0.3	3403-032
HP-100EM	100mm		1.2	3403-033

Stainless Steel Base With Magnet

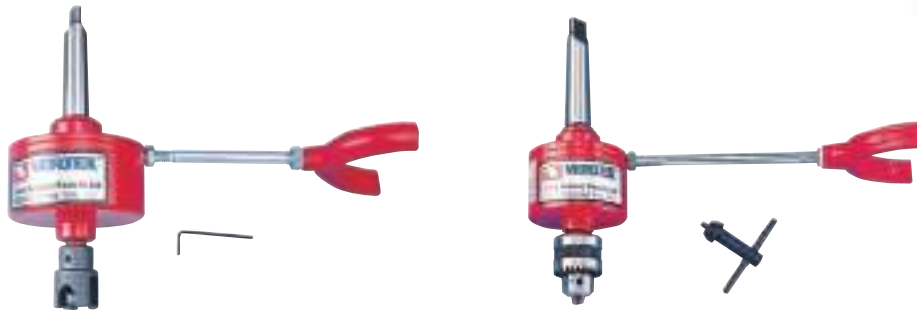
TOOL PRE-SETTER FOR MACHINING CENTERS.
CNC & STANDARD MILLING MACHINES AND
CNC & STANDARD LATHES



Reversible Tapping Attachment for Drilling & Milling Machine



VERTEX



ORDER NO.	TAPPING CAPACITY	SHANK	TO WORK WITH DRILLING MACHINE	WEIGHT (KG)	PACKING mm	SPEED	CODE NO.
K1-1/2	Ø3-8mm	1/2"	DRILLING MACHINE MUST EQUIPPED WITH DRILL CHUCK CAPACITY 13M/M	0.8	90X90X190	1 : 1	3404-001
K1-MT-2	Ø3-8mm	MT-2	DRILLING MACHINE MUST EQUIPPED WITH MT-2 HOLE	1	90X90X240	1 : 1	3404-002
K2-1/2	Ø5-10mm	1/2"	DRILLING MACHINE MUST EQUIPPED WITH DRILL CHUCK CAPACITY 13M/M	1.5	100X100X210	1 : 1	3404-003
K2-MT-2	Ø5-10mm	MT-2	DRILLING MACHINE MUST EQUIPPED WITH MT2 HOLE	1.6	100X100X260	1 : 1	3404-004
K3-MT-3	Ø6-14mm	MT-3	OTHERS LIKE MT-3 SHANK BORING HOLE DRILLING MACHINE N.T. AVAILABLE	3.1	125X125X300	1 : 1	3404-005
K4-MT-3	Ø12-25mm	MT-3	OTHERS LIKE MT-3 SHANK BORING HOLE DRILLING MACHINE N.T. AVAILABLE	5.4	160X160X360	1 : 1	3404-006

K1 TYPE USED CHUCK TO FIX THE TAP

K2, K3, K4 TYPE USED THE SLIDING PLATE OF THE SQUARE SHARP HOLE TO FIX THE TAP.



Drill Tapper



Including shank, full set of collets, wrench and case.
(Used for radial drilling, lathe and tapping machines.
1 Main body, 6 Tap Collet, 1 Drill Chuck Holder
Optional in Collets & Tapper Sleeves.)0.6CUFT.

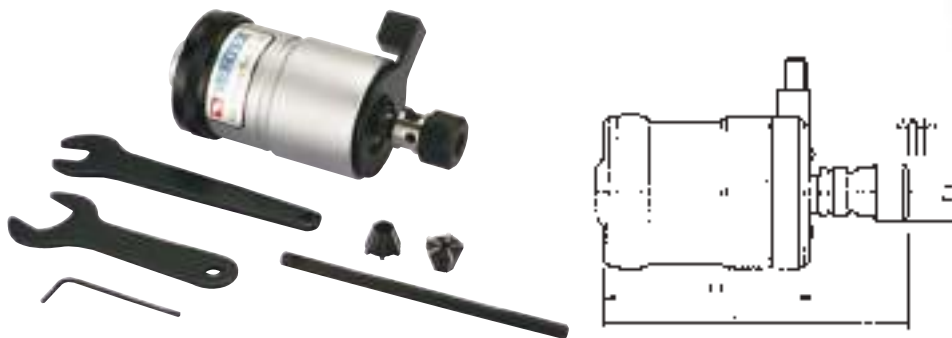
Unit:mm

ORDER NO.	STANDARD ASSEMBLY SPECIFICATION				G.W. kg	MEAS. CFT	CODE NO.
	MAIN BODY 1PC/SET	TAP COLLET 6PCS/SET	TAPER SLEEVE 2PCS/SET	DRILL CHUCK HOLDER 1PC/SET			
VDT-33	MT-3	M8, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33(MM)	33-MT1	33-JT6 With 1/2" Drill Chuck	11.9	0.6	3404-010
	MT-4	1, 1-1/8, 1-1/4(INCH)	33-MT2		12		3404-011
	MT-5	PT1/8, 1/4, 3/8, 1/2, 3/4, 1(INCH)	33-MT3		12.8		3404-012
			33-MT4				
VDT-24	MT-3	M4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24,(MM)	24-MT1	24-JT6 With 1/2" Drill Chuck	(W) 12	0.6	3404-013
	MT-4	W3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 7/8, 1(INCH)	24-MT2		13		3404-014
	MT-5	PT1/8, 1/4, 3/8, 1/2(INCH)	24-MT3				

Extra Purchase Welcome.



Reversible Tapping Attachments



- Radial Float is SELF-CENTERING to compensate for hole center misalignment.
- Unique Double Spring Mechanism produces Automatic Feed and Cushion Drive. There are two springs for the feed and two springs for the reversal. Each set gives you double smoothness for ULTRA accurate tapping applications (not possible with this type of tapping head in the past).
- Pre-set Torque Control Permits easy operation of tap brake torque control
- JACOBS RUBBER FLEX COLLETS are standard accessory.

Reversing Type

ATTACHMENT DESIGNATIONS ORDER NO.	FOR TAPS	SUITABLE ADAPTERS SIZE	REC. MAX SPEED	LENGTH COMPENSATION R.H. ROTATION NON ROTAT LH. ROTAT.				D DIA	D1 DIA	L	L1	WEIGHT (kgs)	CODE NO.
				COMP A	EXP. B	EXP. C	EXP. E						
VTA7-JT6	M2-M7	FC-10/FC-11	1500RPM	5	3.5	1.5	7.0	52	23	125.5	94.5	1.3	3404-020
VTA12-JT6	M3-M12	FC-20/FC-21	1000RPM	5	4.5	1.5	8.5	73.5	28	169	122	3.1	3404-021
VTA20-M20	M8-M20	FC-30/FC-31	600RPM	5.5	5	2.0	9.0	91	38	190	128	5.7	3404-022

Rubber Flex Collet For VTA Tapper

ORDER NO.	COLLETS CAPACITY	D4	L	CODE NO.
FC-10	Ø 2.5 - Ø 4.5	16	11	3404-030
FC-11	Ø 4.5 - Ø 6.5	16	11	3404-031
FC-20	Ø 4 - Ø 7	21.5	13	3404-032
FC-21	Ø 7.5 - Ø 10	21.5	13	3404-033
FC-30	Ø 8.0 - Ø 16	26.5	15	3404-034
FC-31	Ø 14 - Ø 19	26.5	15	3404-035



CONNECTING ARBOR FOR VTA20-M20	
MT3-M20	3404-036A
MT4-M20	3404-037A



Tap Chuck Series

VTA13-3
MT2



VTA13-1
JT6



TAP CHUCK WRENCH



- THE DESIGN CAN PREVENT THE TAPS CHUCK FROM LOOSENING AFTER TAPPING.
- SUIT FOR VARIOUS TAPS. LARGE TAPPING CAPACITY. HIGH POWER TORSION.

ORDER NO.	CONNECTING TAPER	TAPPING CAPABILITY	kgs	CODE NO.
VTA13-1	JT6	M3-M12 Ø1/8" - Ø1/2"	0.9	3404-000
VTA13-2	B16		1.1	3404-007
VTA13-3	MT2		0.8	3404-008
VTA16-1	JT3	M9-M18 Ø3/8" - Ø3/4"		3404-016
VTA16-2	B18		1.3	3404-017
VTA16-3	MT2		1.2	3404-018
VTA16-4	MT3		1.3	3404-019



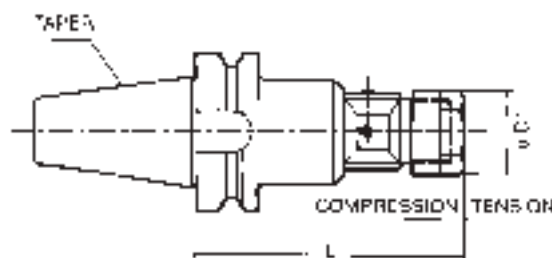
- It's suitable for various taps, so it is much more economic and efficient than other brands of taps chuck.
- The design can prevent the taps chuck from loosening after tapping.

Unit:mm

ORDER NO.	SIZE	TAPPING CAPACITY		Taper Mount NO. DIN or Jacobs	Length (m/m)	Outer Dia. (m/m)	Weight (g)	CODE NO.
		mm	inch					
VTA-35000	1/2	M4-M12	1/8-1/2	JT6	75	42	585	3404-056
VTA-35002	1/2	M4-M12	1/8-1/2	B16	75	42	585	3404-057



Expansible Tapping Holder



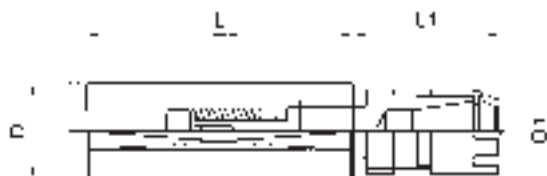
HOLDER-BT-TYPE

Unit:mm

ORDER NO.	COLLET	HOLDER (DXL)	L ₁	D ₁	TAPPING RANGE	WEIGHT (KGS)	CODE NO.
VET-271	ER20	BT40 20X110	110	34	M2-M16	2.2	3404-026
VET-272	ER20	BT50 20X95	95	34		4	3404-027
VET-273	ER32	BT40 32X110	110	50	M3-M25	2.4	3404-028
VET-274	ER32	BT50 32X110	110	50		4.5	3404-029



WITH SPANNER



HOLDER-MINI TYPE

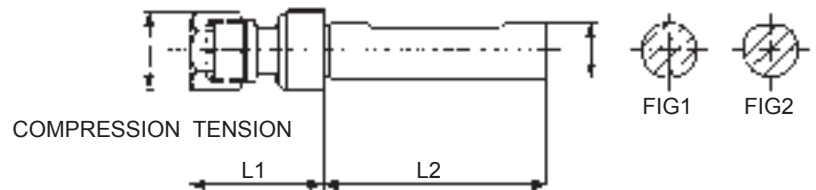
Unit:mm

ORDER NO.	COLLET	HOLDER (DXL)	L ₁	D ₁	TAPPING RANGE	WEIGHT (KG)	CODE NO.
VET-260	ER16	ER16M 20X70	35	22	M3-M10 1/8"-3/8"	0.2	3404-036
VET-261	ER16	ER16M 25X70	35	22		0.2	3404-037



- Floating and expansion design will reduce the differential of motor rotary speed and feeding speed so will extend the life of tap.
- Use ER High Spring Collet, you don't need to worry the few size will delay working, so their value is more than any other tapping system.
- Strong Vise clamping function which is controlled by one screw will keep the outlet which have been controlled by ER collet, so it can auto-center and you own the double lock and save in clamping.
- The series. can be fitted with ER20 collet as optional accessory.

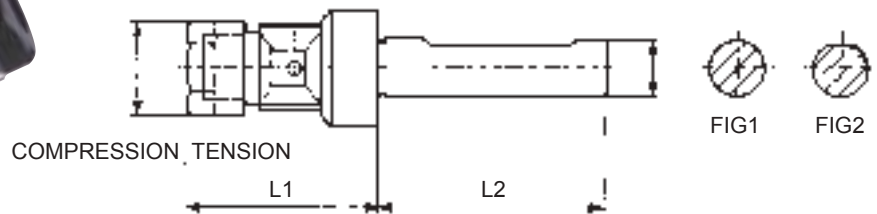
STRAIGHT SHANK



SINGLE HOLDER

Unit:mm

ORDER NO.	COLLET	HOLDER (D ₂ XL ₂)	FIG	L ₁	D ₁	TAPPING RANGE	WEIGHT (KG)	CODE NO.
VET-102	ER16	20X80	2	47	28	(1/8"-3/8")	0.4	3404-041



SINGLE HOLDER

Unit:mm

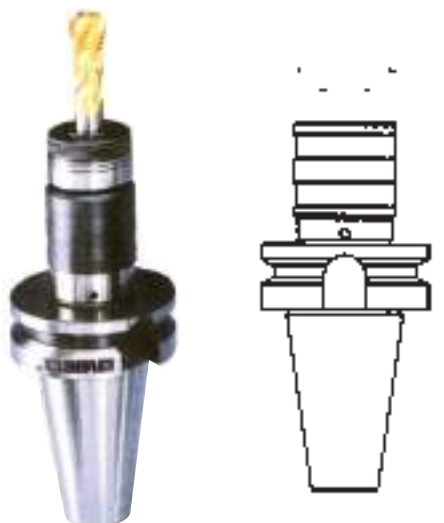
ORDER NO.	COLLET	HOLDER (D ₂ XL ₂)	FIG	L ₁	D ₁	TAPPING RANGE	WEIGHT (KG)	CODE NO.
VET-202	ER20	20X80	2	70	34	M3-M16	1	3404-043
VET-252	ER20	25X80	2	70	34	(1/8-5/8")	1.2	3404-044
VET-303	ER32	32X100		90	50	(M3-M25) (1/8-1")	2	3404-045



SETS TYPE

Unit:mm

ORDER NO.	COLLET	HOLDER (D ₂ XL ₂)	SET/PCS	WEIGHT (KG)	CODE NO.
VET-105	ER16	20X80	8	1	3404-046
VET-106	ER16	20X80	10	1.1	3404-047
VET-253	ER20	20X80	10	1.6	3404-048
VET-254	ER20	20X80	12	1.7	3404-049



WITH LENGTH COMPENSATION

CHUCK SHANK

ORDER NO.	Thread Size	L	ØD1	ØD2	Length Compensation		Collets	CODE NO.
					Compression	Tension		
BT30-WF12	M3-M12	67	19	39	7.5	7.5	TC-312	3404-181
BT30-WF20	M8-M20	94	31	55	12.5	12.5	TC-820	3404-182
BT40-WF12	M3-M12	72	19	39	7.5	7.5	TC-312	3404-183
BT40-WF20	M8-M20	94	31	55	12.5	12.5	TC-820	3404-184
BT50-WF12	M3-M12	83	19	39	7.5	7.5	TC-312	3404-185
BT50-WF20	M8-M20	105	31	55	12.5	12.5	TC-820	3404-186

NEW



SET TYPE

SHANK WITH 7 PCS/SET OVERLOAD CLUTCH
TAPPING COLLET DIN, ISO & JIS SYSTEMS:
PLEASE SEE PAGE 100.

Collets Size

TC-312	M3, M4, M5, M6, M8, M10, M12
TC-820	M8, M10, M12, M14, M16, M18, M20

SETS

ORDER NO.	SHANK Size	Thread Size	L	ØD1	ØD2	Length Compensation		Collets	PCS/ SET	CODE NO.
						Compression	Tension			
VQT-312	BT-30	M3-M12	67	19	39	7.5	7.5	TC-312	7PCS	3404-190
VQT-320	BT-30	M8-M20	94	31	55	12.5	12.5	TC-820	7PCS	3404-191
VQT-412	BT-40	M3-M12	72	19	39	7.5	7.5	TC-312	7PCS	3404-192
VQT-420	BT-40	M8-M20	94	31	55	12.5	12.5	TC-820	7PCS	3404-193
VQT-512	BT-50	M3-M12	83	19	39	7.5	7.5	TC-312	7PCS	3404-194
VQT-520	BT-50	M8-M20	105	31	55	12.5	12.5	TC-820	7PCS	3404-195

Please inform the collet size when ordering.

Please use following page as reference for collet size.

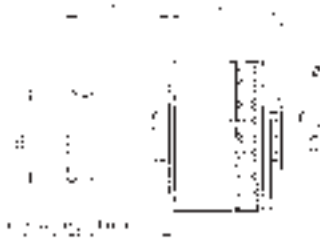


Quick Change Tapping Chucks



QUICK CHANGE TAP COLLETS

(with overload clutch)



1PC ≅ 0.18kg

JIS SYSTEM SIZE

Size	Thread	Tap Shank		Ø D1	L1	L2	ORDER NO.	CODE NO.
		ØD	□					
TC 312 (#1)	M3	4	3.2	19	21.5	25	312-01	3404-200
	M4	5	4				312-02	3404-201
	M5	5.5	4.5				312-03	3404-202
	M6	6	4.5				312-04	3404-203
	M7	6.2	5				312-05	3404-204
	M8	6.2	5				312-06	3404-205
	M9	7	5.5				312-07	3404-206
	M10	7	5.5				312-08	3404-207
	M11	8	6				312-09	3404-208
	M12	8.5	6.5				312-10	3404-209
	•M14	10.5	8				•312-11	3404-210
	•M15	10.5	8				•312-12	3404-211
	UNC 1/4	6	4.5				312-13	3404-212
	UNC 5/16	6.1	5				312-14	3404-213
	UNC 3/8	7	5.5				312-15	3404-214
	UNC 7/16	8	6				312-16	3404-215
	UNC 1/2	9	7				312-17	3404-216
	•UNC 9/16	10.5	8				•312-18	3404-217
	PT 1/8	8	6				312-19	3404-218
	PT 1/4	11	9				312-20	3404-219

1PC ≅ 0.6kg

Size	Thread	Tap Shank		Ø D1	L1	L2	ORDER NO.	CODE NO.
		ØD	□					
TC 820 (#2)	M7	6.2	5	31	35	34	820-01	3404-230
	M8	6.2	5				820-02	3404-231
	M9	7	5.5				820-03	3404-232
	M10	7	5.5				820-04	3404-233
	M11	8	6				820-05	3404-234
	M12	8.5	6.5				820-06	3404-235
	M14	10.5	8				820-07	3404-226
	M15	10.5	8				820-08	3404-237
	M16	12.5	10				820-09	3404-238
	M17	13	10				820-10	3404-239
	M18	14	11				820-11	3404-240
	M20	15	12				820-12	3404-241
	M22	17	13				820-13	3404-242
	UNC 3/8	7	5.5				820-14	3404-243
	UNC 7/16	8	6				820-15	3404-244
	UNC 1/2	9	7				820-16	3404-245
	UNC 9/16	10.5	8				820-17	3404-246
	UNC 5/8	12	9				820-18	3404-247
	UNC 3/4	14	11				820-19	3404-248
	UNC 7/8	17	13				820-20	3404-249
	PT 1/8	8	6				820-21	3404-250
	PT 1/4	11	9				820-22	3404-251
	PT 3/8	14	11				820-23	3404-252
	PT 1/2	18	14				820-24	3404-253



- Torque is factory-set to protect the tap for which a particular collet is designed. Small adjustments can be made by a trained user to accommodate tap strength and material variations.
- Collet stops driving when set torque is exceeded.
- A collet is necessary for each tap shank diameter.

1PC ≅ 1.8kg

Size	Thread	Tap Shank		Ø D1	L1	L2	ORDER NO.	CODE NO.
		ØD	□					
TC 1433 (#3)	M14	10.5	8	48	55.5	45	1433-01	3404-260
	M15	10.5	8				1433-02	3404-261
	M16	12.5	10				1433-03	3404-262
	M17	13	10				1433-04	3404-263
	M18	14	11				1433-05	3404-264
	M20	15	12				1433-06	3404-265
	M22	17	13				1433-07	3404-266
	M24	19	15				1433-08	3404-267
	M25	19	15				1433-09	3404-268
	M26	20	15				1433-10	3404-269
	M27	20	15				1433-11	3404-270
	M28	21	17				1433-12	3404-271
	M30	23	17				1433-13	3404-272
	M32	24	19				1433-14	3404-273
	M33	25	19				1433-15	3404-274
	M34	26	21				1433-16	3404-275
	M35	26	21				1433-17	3404-276
	M36	28	21				1433-18	3404-277
	UNC 9/16	10.5	8				V433-19	3404-278
	UNC 5/8	12	9				1433-20	3404-279
	UNC 3/4	14	11				1433-21	3404-280
	UNC 7/8	17	13				1433-22	3404-281
	UNC 1	20	15				1433-23	3404-282
	UNC 1 1/8	22	17				1433-24	3404-283
	UNC 1 1/4	24	19				1433-25	3404-284
	UNC 1 3/8	26	21				1433-26	3404-285
	UNC 1 1/2	11	9				1433-27	3404-286
	PT 3/8	14	11				1433-28	3404-287
	PT 1/2	18	14				1433-29	3404-288
	PT 3/4	23	17				1433-30	3404-289
	PT 1	26	21				1433-31	3404-290



- Torque is factory-set to protect the tap for which a particular collet is designed. Small adjustments can be made by a trained user to accommodate tap strength and material variations.
- Collet stops driving when set torque is exceeded.
- A collet is necessary for each tap shank diameter.

DIN 371 Type

ORDER NO.	Size	TC312 DIN 371 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
312-01D	TC 312 DIN 371	M1~M1.8	2.5	2.1	M3~M14	22.5	25	19	32	3404-501
312-02D		M2~M2.5	2.8	2.1						3404-502
312-03D		M3	3.5	2.7						3404-503
312-04D		M3.5	4.0	3.0						3404-504
312-05D		M4	4.5	3.4						3404-505
312-06D		M4.5	6.0	4.9						3404-506
312-07D		M5	6.0	4.9						3404-507
312-08D		M6	6.0	4.9						3404-508
312-09D		M8	8.0	6.2						3404-509
312-10D		M10	10.0	8.0						3404-510

ORDER NO.	Size	TC820 DIN 371 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
820-01D	TC 820 DIN 371	M5	6.0	4.9	M8~M24	35	30.5	31	50	3404-521
820-02D		M6	6.0	4.9						3404-522
820-03D		M8	8.0	6.2						3404-523
820-04D		M10	10.0	8.0						3404-524

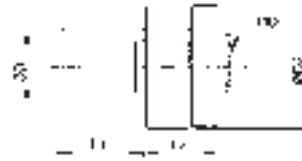
*Custom-built products are available on request.

DIN 376 Type

ORDER NO.	Size	TC312 DIN 376 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
312-21D	TC 312 DIN 376	M3.5	2.5	2.1	M3~M14	22.5	25	19	32	3404-531
312-22D		M4	2.8	2.1						3404-532
312-23D		M4.5	3.5	2.7						3404-533
312-24D		M5	3.5	2.7						3404-534
312-25D		M6	4.5	3.4						3404-535
312-26D		M7	5.5	4.3						3404-536
312-27D		M8	6.0	4.9						3404-537
312-28D		M10	7.0	5.5						3404-538
312-29D		M12	9.0	7.0						3404-539
312-30D		M14	11.0	9.0						3404-540
312-31D		M16	12.0	9.0						3404-541

ORDER NO.	Size	TC820 DIN 376 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
820-21D	TC 820 DIN 376	M8	6.0	4.9	M8~M24	35	30.5	31	50	3404-551
820-22D		M10	7.0	5.5						3404-552
820-23D		M12	9.0	7.0						3404-553
820-24D		M14	11.0	9.0						3404-554
820-25D		M16	12.0	9.0						3404-555
820-26D		M18	14.0	11.0						3404-556
820-27D		M20	16.0	12.0						3404-557
820-28D		M22	18.0	14.5						3404-558
820-29D		M24	18.0	14.5						3404-559

ORDER NO.	Size	TC1433 DIN 376 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
1433-01D	TC 1433 DIN 376	M14	11.0	9.0	M14~M36	55.5	45	48	72	3404-571
1433-02D		M16	12.0	9.0						3404-572
1433-03D		M18	14.0	11.0						3404-573
1433-04D		M20	16.0	12.0						3404-574
1433-05D		M22	18.0	14.5						3404-575
1433-06D		M24	18.0	14.5						3404-576
1433-07D		M27	20.0	16.0						3404-577
1433-08D		M30	22.0	18.0						3404-578
1433-09D		M33	25.0	20.0						3404-579
1433-10D		M36	28.0	22.0						3404-580



ISO 529 Type

ORDER NO.	Size	TC312 ISO 529 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
312-01I	TC 312 ISO 529	M1~M2	2.5	2.0	M3~M14	22.5	25	19	32	3404-601
312-02I		M2.2~M2.5	2.8	2.24						3404-602
312-03I		M3	3.15	2.5						3404-603
312-04I		M3.5	3.55	2.8						3404-604
312-05I		M4	4.0	3.15						3404-605
312-06I		M4.5	4.5	3.55						3404-606
312-07I		M5	5.0	4.0						3404-607
312-08I		M6	6.3	5.0						3404-608
312-09I		M7	7.1	5.6						3404-609
312-10I		M8	8.0	6.3						3404-610
312-11I		M9	9.0	7.1						3404-611
312-12I		M10	10.0	8.0						3404-612

ORDER NO.	Size	TC820 ISO 529 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
820-01I	TC 820 ISO 529	M6	6.3	5.0	M8~M24	35	30.5	31	50	3404-621
820-02I		M7	7.1	5.6						3404-622
820-03I		M8	8.0	6.3						3404-623
820-04I		M9	9.0	7.1						3404-624
820-05I		M10	10.0	8.0						3404-625

*Custom-built products are available on request.

ISO 529/2283 Type

ORDER NO.	Size	TC312 ISO 529/2283 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
312-21I	TC 312 ISO 529/2283	M3	2.24	1.8	M3~M14	22.5	25	19	32	3404-631
312-22I		M3.5	2.5	2.0						3404-632
312-23I		M4	3.15	2.5						3404-633
312-24I		M4.5	3.55	2.8						3404-634
312-25I		M5	4.0	3.15						3404-635
312-26I		M6	4.5	3.55						3404-636
312-27I		M7	5.6	4.5						3404-637
312-28I		M8	6.3	5.0						3404-638
312-29I		M9	7.1	5.6						3404-639
312-30I		M10	8.0	6.3						3404-640
312-31I		M12	9.0	7.1						3404-641
312-32I		M14	11.2	9.0						3404-642

ORDER NO.	Size	TC820 ISO 529/2283 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
820-21I	TC 820 ISO 529/2283	M8	6.3	5.0	M8~M24	35	30.5	31	50	3404-651
820-22I		M9	7.1	5.6						3404-652
820-23I		M10	8.0	6.3						3404-653
820-24I		M12	9.0	7.1						3404-654
820-25I		M14	11.2	9.0						3404-655
820-26I		M16	12.5	10.0						3404-656
820-27I		M18	14.0	11.2						3404-657
820-29I		M20	14.0	11.2						3404-658
820-30I		M22	16.0	12.5						3404-659
820-31I		M24	18.0	14.0						3404-660

ORDER NO.	Size	TC1433 ISO 529/2283 Tap	Tap Shank		Capacity	L1 (m/m)	L2 (m/m)	ØD1 (m/m)	ØD2 (m/m)	CODE NO.
			ØD	□						
1433-01I	TC 1433 ISO 529/2283	M14	11.2	9.0	M14~M36	55.5	45	48	72	3404-671
1433-02I		M16	12.5	10.0						3404-672
1433-03I		M18	14.0	11.2						3404-673
1433-04I		M20	14.0	11.2						3404-674
1433-05I		M22	16.0	12.5						3404-675
1433-06I		M24	18.0	14.0						3404-676
1433-07I		M27	20.0	16.0						3404-677
1433-08I		M30	20.0	16.0						3404-678
1433-09I		M33	22.4	18.0						3404-679
1433-10I		M36	25.0	20.0						3404-680



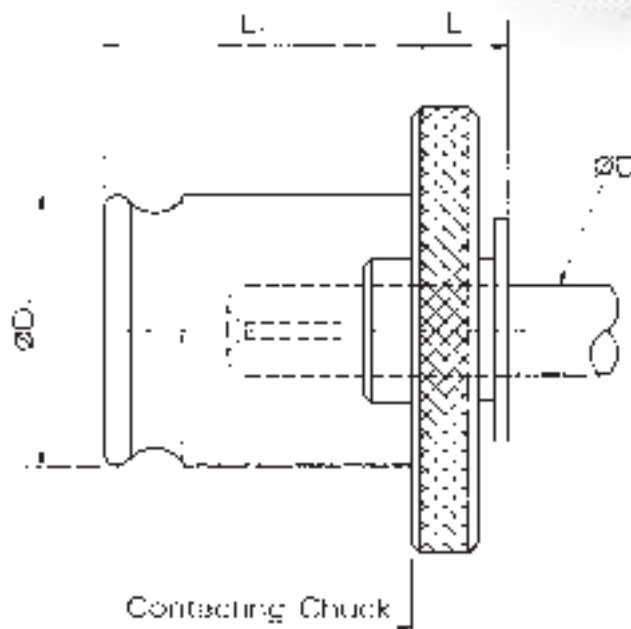
Quick Change Tapping Chucks



VERTEX

QUICK CHANGE TAP COLLETS

(without overload clutch)



JIS SYSTEM SIZE

1PC ≒ 0.08kg

Size	Thread	Tap Shank		Ø D1	L1	L2	ORDER NO.	CODE NO.
		ØD	□					
TC312B (#1)	M3	4	3.2	19	21.5	7	312B-01	3404-300
	M4	5	4				312B-02	3404-301
	M5	5.5	4.5				312B-03	3404-302
	M6	6	4.5				312B-04	3404-303
	UNC 5/16	6.1	5				312B-05	3404-304
	M7/M8	6.2	5				312B-06	3404-305
	M9/M10	7	5.5				312B-07	3404-306
	M11	8	6				312B-08	3404-307
	M12	8.5	6.5				312B-09	3404-308
	UNC 1/2	9	7				312B-10	3404-309
	M14	10.5	8				312B-11	3404-310
	PT 1/4	11	9				312B-20	3404-311

● A collet is necessary for each tap shank diameter.

1PC ≒ 0.8kg

Size	Thread	Tap Shank		Ø D1	L1	L2	ORDER NO.	CODE NO.
		ØD	□					
TC820B (#2)	M7/M8	6.2	5	31	35	11	820B-01	3404-330
	M9/M10	7	5.5				820B-02	3404-331
	M11	8	6				820B-03	3404-332
	M12	8.5	6.5				820B-04	3404-333
	UNC 1/2	9	7				820B-05	3404-334
	M14	10.5	8				820B-06	3404-335
	PT 1/4	11	9				820B-07	3404-336
	UNC 5/8	12	9				820B-08	3404-337
	M16	12.5	10				820B-09	3404-338
	M17	13	10				820B-10	3404-339
	M18	14	11				820B-11	3404-340
	M20	15	12				820B-12	3404-341
	M22	17	13				820B-13	3404-342
	PT 1/2	18	14				820B-14	3404-343

Size	Thread	Tap Shank		Ø D1	L1	L2	ORDER NO.	CODE NO.
		ØD	□					
TC1433B (#3)	M14/M15	10.5	8	48	55.5	14	1433B-01	3404-360
	PT 1/4	11	9				1433B-02	3404-361
	UNC 5/8	12	9				1433B-03	3404-362
	M16	12.5	10				1433B-04	3404-363
	M17	13	10				1433B-05	3404-364
	M18	14	11				1433B-06	3404-365
	M20	15	12				1433B-07	3404-366
	M22	17	13				1433B-08	3404-367
	PT 1/2	18	14				1433B-09	3404-368
	M24/M25	19	15				1433B-10	3404-369
	M26/M27	20	15				1433B-11	3404-370
	M28	21	17				1433B-12	3404-371
	UNC 11/8	22	17				1433B-13	3404-372
	M30	23	17				1433B-14	3404-373
	M32	24	19				1433B-15	3404-374
	M33	25	19				1433B-16	3404-375
	M34/M35	26	21				1433B-17	3404-376
	M36/M38	28	21				1433B-18	3404-377

For Tapping Chuck

[illegible]

JIS STANDARD PIPE THREAD

PT	PS	PF	Ød	□
1/8	1/8	1/8	8	6
1/4	1/4	1/4	11	9
3/8	3/8	3/8	14	11
1/2	1/2	1/2	18	14
		5/8	19	15
3/4	3/4	3/4	23	17
		7/8	24	19
1	1	1	26	21
	1 - 1/8	1 - 1/8	28	21
1 - 1/4	1 - 1/4	1 - 1/4	32	26
1 - 3/8	1 - 3/8	1 - 3/8	35	26
1 - 1/2	1 - 1/2	1 - 1/2	38	29

