



**ALLIED MACHINE
& ENGINEERING**

WOHLHAUPTER®

Holemaking Solutions for Today's Manufacturing

Precision Boring Heads

with **VARIOBORE 3^ETECH**



Boring

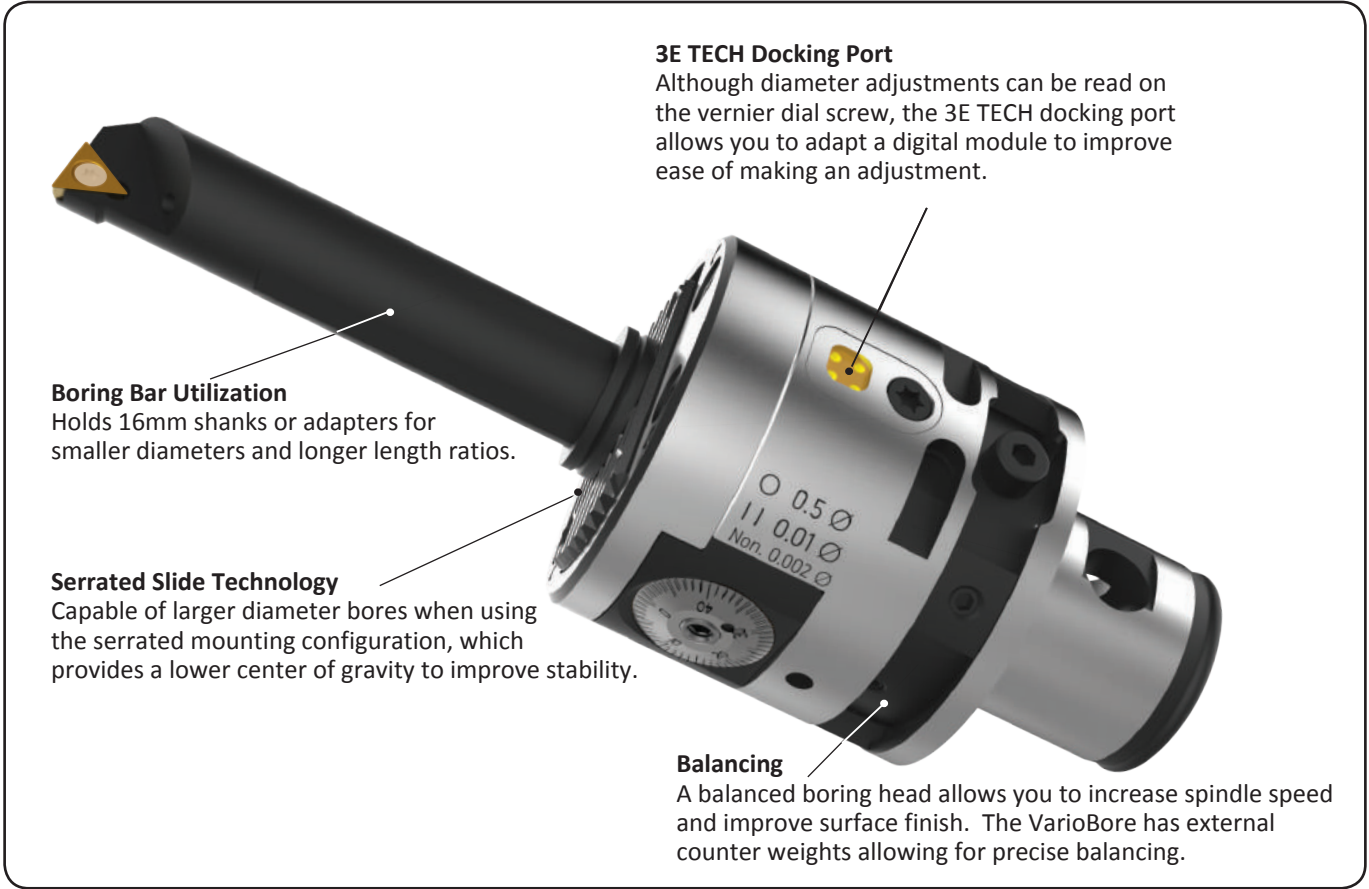
▶ *Wohlhaupter® VarioBore*

VARIO BORE

The VarioBore Head offers versatility and precision even without integrating the 3E TECH digital readout module.

- Boring Range:
0.016" – 5.984" (0.4mm – 152mm)
- Accuracy:
.0001" (0.002mm) vernier adjust on diameter
- Radial Stroke Adjustment:
.098" (2.5mm)
- Speeds:
Approaching 25,000 rpm when balanced
- Balancing:
Manual mechanism
- Coolant:
Internal throughout the system, up to IP 65
- MVS connection:
Can be used on any machine
(see master shanks on page 19)





3E TECH Docking Port

Although diameter adjustments can be read on the vernier dial screw, the 3E TECH docking port allows you to adapt a digital module to improve ease of making an adjustment.

Boring Bar Utilization

Holds 16mm shanks or adapters for smaller diameters and longer length ratios.

Serrated Slide Technology

Capable of larger diameter bores when using the serrated mounting configuration, which provides a lower center of gravity to improve stability.

Balancing

A balanced boring head allows you to increase spindle speed and improve surface finish. The VarioBore has external counter weights allowing for precise balancing.

3E TECH

Easy. External. Electronic.

Accurate – to .0001" (0.002mm) on diameter

Adjustments – easier to read while keeping the tool inside the machine (no cable or blue-tooth connection needed)

Backlash – becomes irrelevant through direct measurement of digital readout

Cost Savings – one digital readout module can be used on many VarioBore heads

Damage Protection – The module is automatically released from the tool preventing accidental damage at 500 rpm

Battery Life – allows up to 5,000 settings and automatically turns itself off after 30 seconds of inactivity



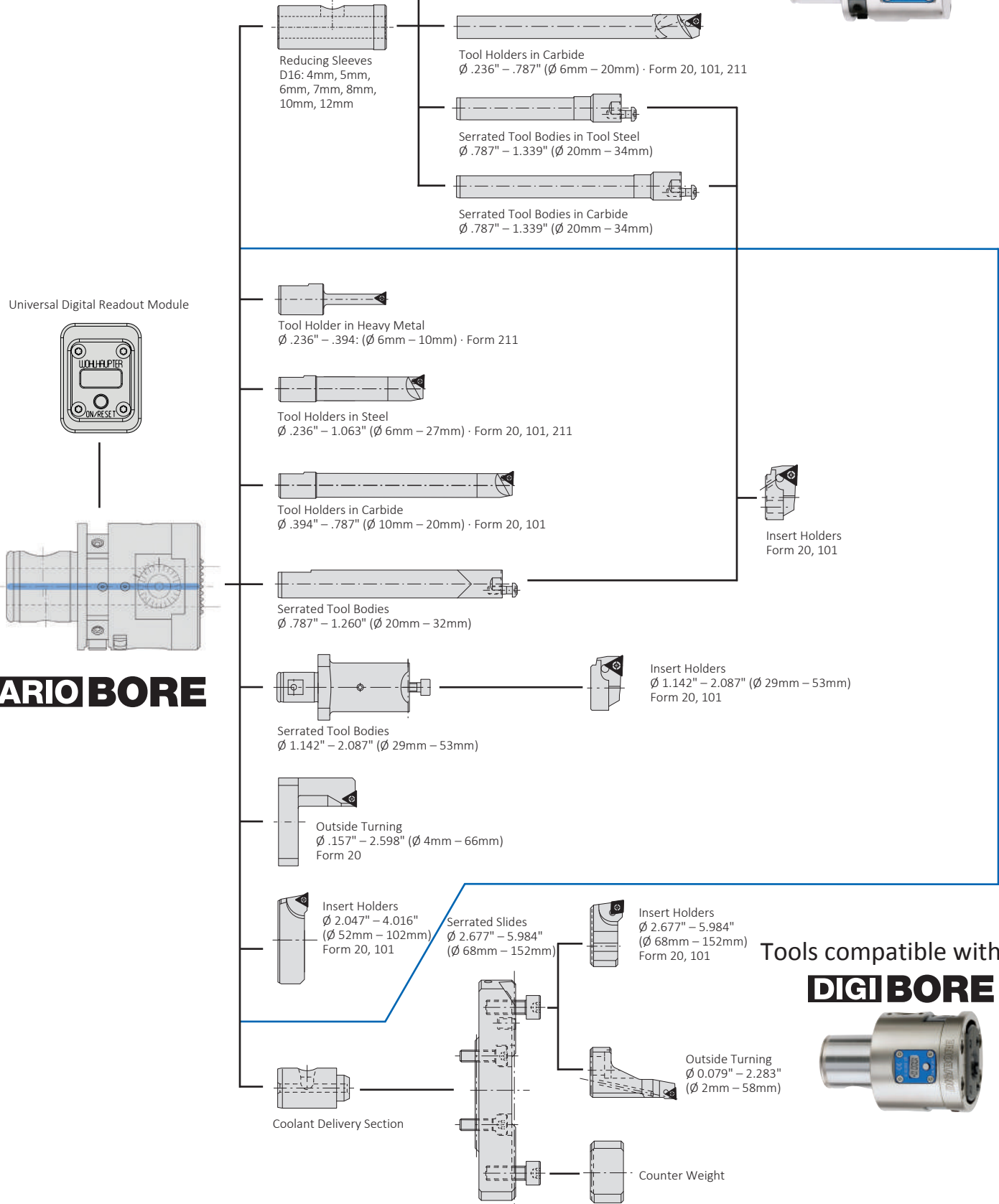
3E TECH Docking Port

Magnetic Locating Slots

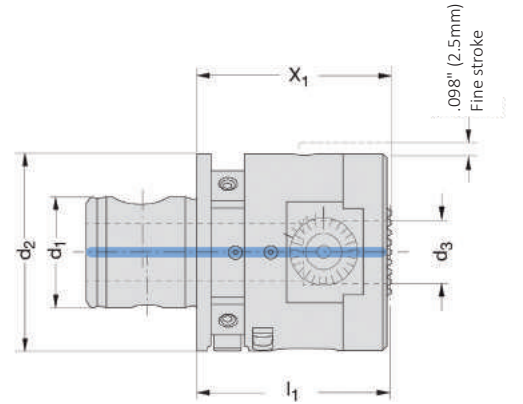
Compatibility

Tools compatible with...

MINI BORE



VARIO BORE Boring Head



Head Type	MVS Connection		Dimensions								Weight		Order No.	
	d ₂	d ₂	in	mm	in	mm	in	mm	Boring Range		lbs	kg	in	mm
Standard	50 - 28	50 - 28	.63	16	1.969	50	1.949	49.5	0.016 - 5.984	0.4 - 152	1.543	0.7	563 001	536 001
3E TECH	50 - 28	50 - 28	.63	16	1.969	50	1.949	49.5	0.016 - 5.984	0.4 - 152	1.543	0.7	563 002	536 002

Compatible with Kaiser master shanks

3E TECH

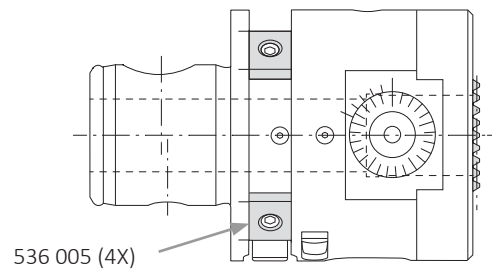
Easy. External. Electronic.
Digital Readout Module



*3E TECH Digital Readout Module

Order No.	
in	mm
563 010	536 010

Balance Compensation



Insert Holding Body

Nominal Size	Key Size / Type	Order No.
M8 x 8	1,2 x 6,6 / K	536 005

VARIO BORE STARTER KITS

Ø.394" to 1.181" (Ø10mm – 30mm)

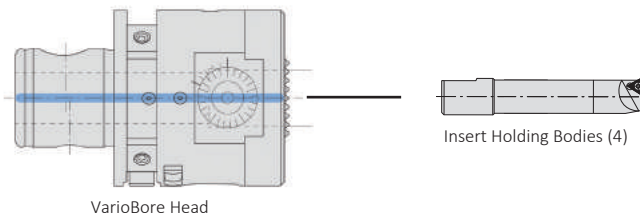
Insert Style: CC..0602..



Head Type	Dial Screw Units	Head Part No. (included in kit)	Kit Order No.
Standard	in	563 001	104 050
Standard	mm	536 001	103 050
with 3E TECH	in	563 002	104 046
with 3E TECH	mm	536 002	103 046

Digital readout module sold separately. See page 5.
Master shanks sold separately. See page 19.

Contents



Kit Boring Tools (CC..0602..)

Insert Holding Body		
in	mm	Part No.
.394 - .591	10 - 15	218 048
.591 - .787	15 - 20	081 041
.787 - .984	20 - 25	081 043
.984 - 1.181	25 - 30	081 043

Driver / Wrenches	
Type	Part No.
s2,5	115 575
s4,0	215 403
T7	115 591

Ø.394" to 4.016" (Ø10mm – 102mm)

Insert Style: CC..0602..

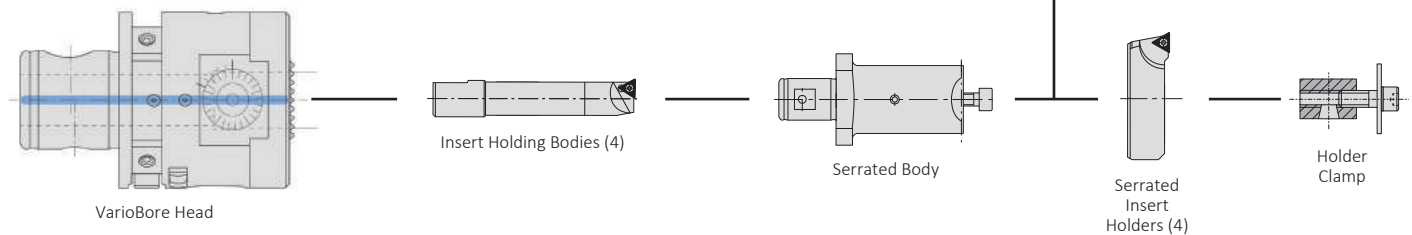
VARIO BORE STARTER KITS

Head Type	Dial Screw Units	Head Part No. (included in kit)	Kit Order No.
Standard	in	563 001	104 052
Standard	mm	536 001	103 052
with 3E TECH	in	563 002	104 048
with 3E TECH	mm	536 002	103 048

Digital readout module sold separately. See page 5.
Master shanks sold separately. See page 19.



Contents

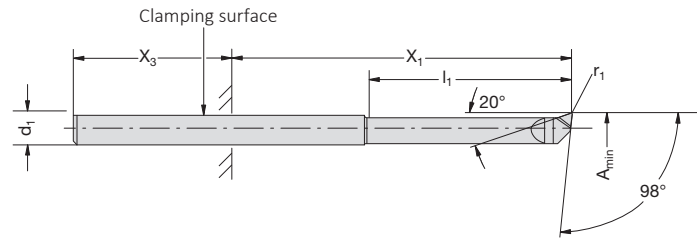


Kit Boring Tools (CC..0602..)

Insert Holding Body			Serrated Body	Serrated Insert			Holder Clamp	Driver / Wrenches	
in	mm	Part No.		in	mm	Part No.		Type	Part No.
.394 - .591	10 - 15	218 048	236 021	1.142 - 1.614	29 - 41	236 023	236 020	s2,5	115 575
.591 - .787	15 - 20	081 041		1.575 - 2.087	40 - 53	236 025		s4,0	215 403
.787 - .984	20 - 25	081 042		2.047 - 3.031	52 - 77	236 027		s5,0	215 521
.984 - 1.181	25 - 30	081 043		2.992 - 4.016	76 - 102	236 029		T8	115 590

Ø .016" – .256" (Ø 0.4mm – 6.5mm)

Mini Boring Tools, Coated Carbide



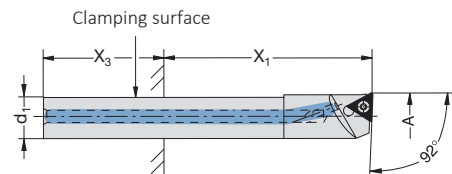
Boring Range		Dimensions										Order No.
A _{min}		d ₁		X ₁		X _{3 min}		l ₁		r ₁		
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	
.016	.04	.157	4*	.118 - .669	3.0 - 170	.98	25	.079	2.0	.001	0.03	081401 WHC126
.024	0.6	.157	4*	.157 - .709	4.0 - 18.0	.98	25	.118	3.0	.002	0.04	081402 WHC126
.031	0.8	.157	4*	.197 - .748	5.0 - 19.0	.98	25	.157	4.0	.002	0.04	081403 WHC126
.039	1.0	.157	4*	.236 - .787	6.0 - 20.0	.98	25	.197	5.0	.0025	0.05	081404 WHC126
.059	1.5	.157	4*	.335 - .886	8.5 - 22.5	.98	25	.295	7.5	.0025	0.05	081405 WHC126
.079	2.0	.157	4*	.433 - .984	11.0 - 25.0	.98	25	.394	10.0	.0025	0.05	081406 WHC126
.098	2.5	.157	4*	.531 - 1.083	13.5 - 27.5	.98	25	.492	12.5	.0025	0.05	081407 WHC126
.110	2.8	.157	4*	.591 - 1.142	15.0 - 29.0	.98	25	.551	14.0	.003	0.07	081408 WHC126
.138	3.5	.157	4*	.748 - 1.299	19.0 - 33.0	.98	25	.689	17.5	.004	0.10	081409 WHC126
.157	4.0	.157	4*	.827 - 1.378	21.0 - 35.0	.98	25	.787	20.0	.004	0.10	081410 WHC126
.197	5.0	.197	5*	1.043 - 1.614	26.5 - 41.0	.98	25	.984	25.0	.005	0.12	081411 WHC126

* Fixture through reducing sleeves

Other versions are available on request.

Ø .236" – .787" (Ø 6mm – 20mm)

Steel Boring Bars with 92° Approach Angle



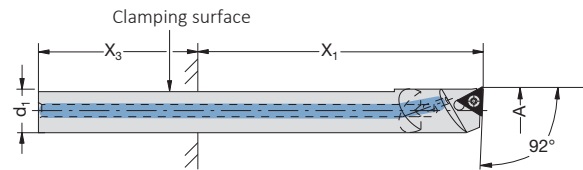
Boring Range		Dimensions								Insert Form		Insert Form	
A		d ₁		X ₁		X _{3 min}		Weight		Order No.	Order No.	Order No.	Order No.
in	mm	in	mm	in	mm	in	mm	lbs	kg				
.236 - .315	6 - 8	.197*	5*	.492 - 1.772	12.5 - 45.0	.984	25	.022	0.01	-	-	211	514 032
.315 - .394	8 - 10	.276*	7*	.689 - 2.205	17.5 - 56.0	.984	25	.044	0.02	-	-	211	514 033
.394 - .472	10 - 12	.315*	8*	.787 - 2.362	20.0 - 60.0	.984	25	.066	0.03	101	514 003	20	514 004
.472 - .551	12 - 14	.394*	10*	.984 - 2.953	25.0 - 75.0	.984	25	.110	0.05	101	514 005	20	514 006
.551 - .630	14 - 16	.472*	12*	1.181 - 3.307	30.0 - 84.0	1.181	30	.198	0.09	101	514 007	20	514 008
.630 - .709	16 - 18	.551*	14*	2.205 - 3.583	56.0 - 91.0	1.181	30	.287	0.13	101	514 009	20	514 010
.709 - .787	18 - 20	.551*	14*	2.205 - 3.583	56.0 - 91.0	1.181	30	.287	0.13	101	514 011	20	514 012

* Fixture through reducing sleeves

Other versions available on request

Ø .236" – .787" (Ø 6mm – 20mm)

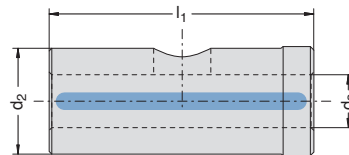
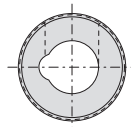
Carbide Boring Bars with 92° Approach Angle



Boring Range		Dimensions								Insert Form		Insert Form	
A		d ₁		X ₁		X _{3 min}		Weight		Order No.		Order No.	
in	mm	in	mm	in	mm	in	mm	lbs	kg				
.236 - .315	6 - 8	.197*	5*	.492 - 1.772	12.5 - 65.0	.984	25	.044	0.02	-	-	211	514 034
.315 - .394	8 - 10	.276*	7*	.827 - 3.307	21.0 - 84.0	.984	25	.110	0.05	-	-	211	514 035
.394 - .472	10 - 12	.315*	8*	.866 - 3.622	22.0 - 92.0	.984	25	.154	0.07	101	514 015	20	514 016
.472 - .551	12 - 14	.394*	10*	2.008 - 4.528	51.0 - 115.0	.984	25	.287	0.13	101	514 017	20	514 018
.551 - .630	14 - 16	.472*	12*	2.677 - 5.197	68.0 - 132.0	1.181	30	.485	0.22	101	514 019	20	514 020
.630 - .709	16 - 18	.551*	14*	3.301 - 4.409	77.0 - 112.0	1.181	30	.573	0.26	101	514 021	20	514 022
.630 - .709	16 - 18	.551*	14*	4.409 - 5.787	112.0 - 147.0	1.181	30	.827	0.33	101	514 023	20	514 024
.709 - .787	18 - 20	.551*	14*	3.031 - 4.409	77.0 - 112.0	1.181	30	.573	0.26	101	514 025	20	514 026
.709 - .787	18 - 20	.551*	14*	4.409 - 5.787	112.0 - 147.0	1.181	30	.827	0.33	101	514 027	20	514 028

* Fixture through reducing sleeves

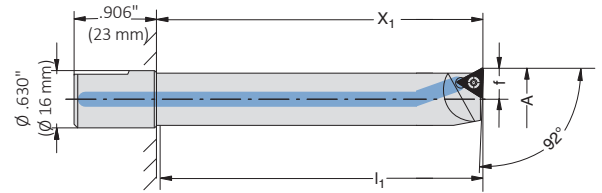
Reducing Sleeves



Dimensions						Order No.
d ₂		d ₃		l ₁		
in	mm	in	mm	in	mm	
.630	16	.157	4	1.260	32	450 129
.630	16	.197	5	1.260	32	450 130
.630	16	.276	7	1.260	32	450 132
.630	16	.315	8	1.260	32	450 133
.630	16	.397	10	1.260	32	450 134
.630	16	.472	12	1.260	32	450 135
.630	16	.556	14	1.260	32	450 136

Ø .236" – 1.063" (Ø 6mm – 27mm)

Tool Steel Boring Bars with 16mm Shanks

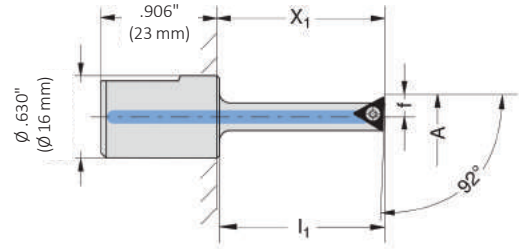


Boring Range		Dimensions								Insert Form		Insert Form	
A		X ₁		l ₁		f		Weight			Order No.		Order No.
in	mm	in	mm	in	mm	in	mm	lbs	kg				
.236 - .315	6 - 8	.866	22	.748	19	.110	2.8	.07	0.03	-	-	211	081 053
.315 - .394	8 - 10	1.181	30	1.063	27	.150	3.8	.09	0.04	-	-	211	218 071
.394 - .472	10 - 12	1.772	45	1.654	42	.189	4.8	.11	0.05	-	-	20	081 044
.394 - .472	10 - 12	.984	25	.866	22	.189	4.8	.09	0.04	101	218 047	20	218 058
.394 - .472	10 - 12	1.378	35	1.260	32	.189	4.8	.11	0.05	101	218 048	20	218 059
.472 - .551	12 - 14	1.181	30	1.063	27	.228	5.8	.11	0.05	101	218 012	20	218 014
.472 - .551	12 - 14	1.772	45	1.654	42	.228	5.8	.13	0.06	101	218 049	20	218 060
.551 - .630	14 - 16	1.378	35	1.260	32	.268	6.8	.13	0.06	101	218 050	20	218 061
.551 - .630	14 - 16	1.969	50	1.850	47	.268	6.8	.18	0.08	101	218 051	20	218 062
.591 - .669	15 - 17	1.457	37	1.339	34	.291	7.4	.13	0.06	-	-	20	081 048
.591 - .669	15 - 17	2.362	60	2.244	57	.291	7.4	.18	0.08	101	081 041	20	081 045
.630 - .709	16 - 18	1.575	40	1.457	37	.307	7.8	.18	0.08	101	218 052	20	218 063
.630 - .709	16 - 18	2.362	60	2.244	57	.307	7.8	.20	0.09	101	218 053	20	218 064
.787 - .866	20 - 22	1.457	37	1.299	33	.386	9.8	.15	0.07	-	-	20	081 049
.787 - .866	20 - 22	2.756	70	2.480	63	.386	9.8	.24	0.11	101	081 042	20	081 046
.984 - 1.063	25 - 27	1.457	37	1.299	33	.484	12.3	.15	0.07	-	-	20	081 050
.984 - 1.063	25 - 27	2.756	70	2.638	67	.484	12.3	.24	0.11	101	081 043	20	081 047

Other tool holders are available on request.

Ø .236" - .394" (Ø 6mm - 10mm)

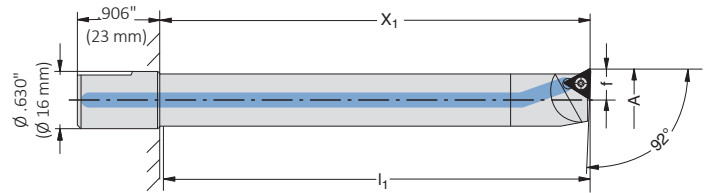
HEAVY METAL Tool Holders with 16mm Shanks
with 92° Lead Angle for Deeper Boring Depths



Boring Range		Dimensions								Insert Form	
A		X ₁		l ₁		f		Weight			Order No.
in	mm	in	mm	in	mm	in	mm	lbs	kg		
.236 - .315	6 - 8	1.260	32	1.142	29	.110	2.8	.176	0.08	211	081 055
.315 - .394	8 - 10	1.772	45	1.654	42	.150	3.8	.198	0.09	211	218 072

Ø .394" - .787" (Ø 10mm - 20mm)

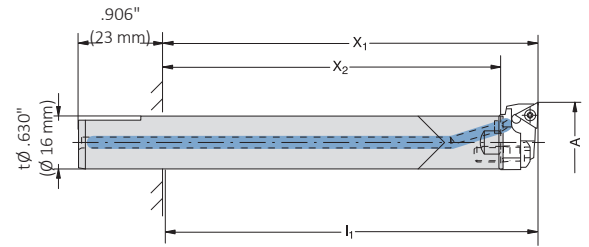
Carbide Boring Bars with 16mm Shanks



Boring Range		Dimensions								Insert Form		Insert Form	
A		X ₁		l ₁		f		Weight			Order No.		Order No.
in	mm	in	mm	in	mm	in	mm	lbs	kg				
.394 - .472	10 - 12	2.165	55	2.047	52	.189	4.8	.154	0.07	101	218 042	20	218 037
.394 - .472	10 - 12	2.953	75	2.835	72	.189	4.8	.198	0.09	101	218 032	20	218 029
.472 - .551	12 - 14	2.756	70	2.638	67	.228	5.8	.220	0.10	101	218 043	20	218 038
.472 - .551	12 - 14	3.543	90	3.425	87	.228	5.8	.331	0.15	101	218 033	20	218 030
.551 - .630	14 - 16	2.953	75	2.835	72	.268	6.8	.353	0.16	101	218 044	20	218 039
.551 - .630	14 - 16	3.937	100	3.819	97	.268	6.8	.441	0.20	101	218 045	20	218 040
.630 - .787	16 - 20	3.543	90	3.425	87	.307	7.8	.573	0.26	101	218 046	20	218 041
.630 - .787	16 - 20	4.724	120	4.606	117	.307	7.8	.728	0.33	101	218 034	20	218 031

Ø .787" – 1.260" (Ø 20mm – 32mm)

Carbide Serrated Tool Bodies with 16mm Shanks



Serrated Tool Body	Boring Range		Dimension								Order No.
	A		X ₁		X ₂		l ₁		Weight		
	in	mm	in	mm	in	mm	in	mm	lbs	kg	
Carbide	.787 - 1.260	20 - 32	4.724	120	4.252	108	4.606	117	.882	0.4	236 091

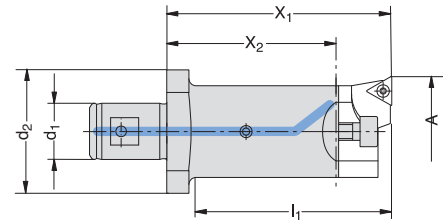
Insert holder is sold separately. See following chart.

Insert Holder with 92° Lead Angle

Boring Range		Dimensions						Insert Form		Insert Form	
A		X ₁		f		Weight		Order No.	Order No.		
in	mm	in	mm	in	mm	lbs	kg				
.787 - .866	20 - 22	.472	12	.386	9.8	.022	0.01	101	502 052	20	502 046
.866 - .945	22 - 24	.472	12	.425	10.8	.022	0.01	101	502 053	20	502 047
.945 - 1.024	24 - 26	.472	12	.465	11.8	.022	0.01	101	502 054	20	502 048
1.024 - 1.102	26 - 28	.472	12	.504	12.8	.022	0.01	101	502 055	20	502 049
1.102 - 1.181	28 - 30	.472	12	.543	13.8	.022	0.01	101	502 056	20	502 050
1.181 - 1.260	30 - 32	.472	12	.583	14.8	.022	0.01	101	502 057	20	502 051

Ø 1.142" – 2.087" (Ø 29mm – 53mm)

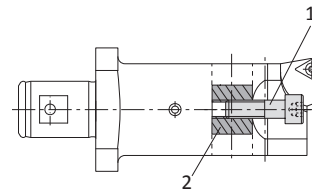
Serrated Tool Bodies



Connection				Boring Range		Dimension						Order No.		
d ₁		d ₂		A		X ₁		X ₂		l ₁			Weight	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm		lbs	kg
.630	16	1.379	35	1.142 - 2.087	29 - 53	2.520	64	1.890	48	2.205	56	.441	0.2	236 021
.630	16	1.379	35	1.142 - 2.087	29 - 53	3.937	100	3.307	84	3.622	92	.661	0.3	236 031

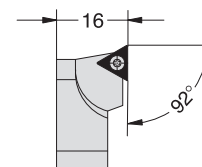
Insert holder and clamping pieces are sold separately. See following chart.

Cap Screw (1) Order No.	Hex Size	Clamping Piece (2) Order No.
027 154	s4	145 184



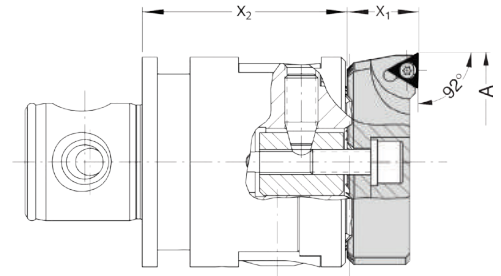
Insert Holders

Turning Range			Weight		Insert Form	
A			lbs	kg	Order No.	
in	mm					
1.142 - 1.614	29 - 41		.088	0.04	101	236 023
1.142 - 1.614	29 - 41		.088	0.04	20	236 022
1.575 - 2.087	40 - 53		.132	0.06	101	236 025
1.575 - 2.087	40 - 53		.132	0.06	20	236 024



Ø 2.047" - 4.016" (Ø 52mm - 102mm)

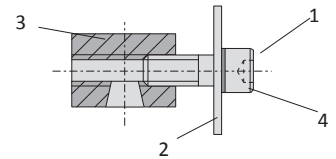
Insert Holders



Boring Range		Dimensions						Insert Form	
A		X ₁		X ₂		Weight			Order No.
in	mm	in	mm	in	mm	lbs	kg		
1.142 - 1.614	29 - 41	2.598	66	1.949	49.5	.132	0.06	101	236 027
1.142 - 1.614	29 - 41	2.598	66	1.949	49.5	.132	0.06	20	236 026
1.575 - 2.087	40 - 53	2.598	66	1.949	49.5	.220	0.10	101	236 029
1.575 - 2.087	40 - 53	2.598	66	1.949	49.5	.220	0.10	20	236 028

Clamping element is sold separately. See following chart.

Clamping Elements for Insert Holders

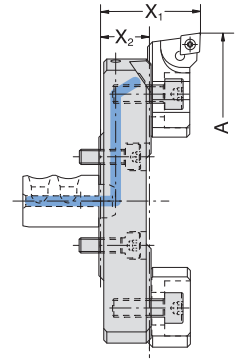


Boring Range		Cap Screw (1)	Hex Size	Washer (2)	Clamping Piece (3)	Locking Washer (4)	Complete Set (includes 1, 2, 3, & 4)
A		Order No.	mm	Order No.	Order No.	Order No.	Order No.
in	mm						
.157 - 1.181	4 - 30	070 153	s5	315 155	236 120	215 254	236 088
1.142 - 2.598	29 - 66	070 153	s5	315 156	236 120	215 254	236 089
2.047 - 4.016	52 - 102	115 147	s5	115 725	236 120	-	236 020

Ø 2.677" - 5.984" (Ø 68mm - 152mm)

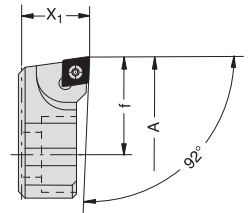
Serrated Slides

Boring Range		Dimensions						Weight		Order No.
A		X ₁		X ₂		Weight		lbs	kg	
in	mm	in	mm	in	mm	lbs	kg			
2.677 - 3.780	68 - 96	.630	16	1.280	32.5	.220	0.10			501 054
3.780 - 4.881	98 - 124	.630	16	1.280	32.5	.220	0.10			501 055
4.881 - 5.984	124 - 152	.630	16	1.280	32.5	.441	0.20			501 056



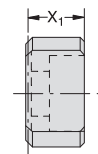
Insert Holders

Boring Range		Dimensions						Weight		Insert Form	
A		X ₁		f		Weight		lbs	kg	101	Order No.
in	mm	in	mm	in	mm	lbs	kg				
2.677 - 8.189	68 - 208	.650	16.5	.776	19.7	.110	0.05				502 064
2.677 - 8.189	68 - 208	.650	16.5	.776	19.7	.110	0.05			20	502 069



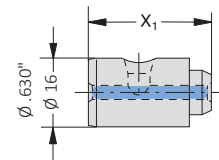
Counter Weight

Dimensions				Weight		Order No.
X ₁		Weight		lbs	kg	
in	mm	lbs	kg			
.528	13.4	.110	0.05			502 165



Coolant Delivery Section

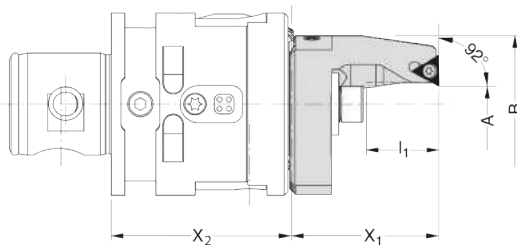
Dimensions				Weight		Order No.
X ₁		Weight		lbs	kg	
in	mm	lbs	kg			
1.004	25.5	.022	0.01			450 137



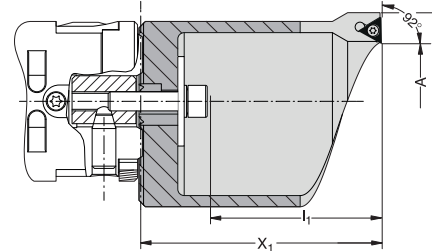
Ø 0.157" - 2.598" (Ø 4mm - 66mm)

Insert Holders for Outside Turning

Type A



Type B



With through-the-tool coolant

Turning Range		Dimensions										Type	Insert Form*	
A		X ₁		X ₂		l ₁		B		Weight		Type	20	Order No.
in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg			
.157 - .689	4 - 17.5	3.543	90	1.949	49.5	.787	20	1.772	45.0	.220	0.1	A	20	236 081
.650 - 1.181	16.5 - 30	3.937	100	1.949	49.5	1.181	30	2.067	52.5	.220	0.1	A	20	236 082
1.142 - 1.732	29 - 44	4.921	125	1.949	49.5	2.126	54	2.482	63.5	.661	0.3	B	20	236 083
1.693 - 2.598	43 - 66	5.905	150	1.949	49.5	3.110	79	3.366	85.5	.882	0.4	B	20	236 084

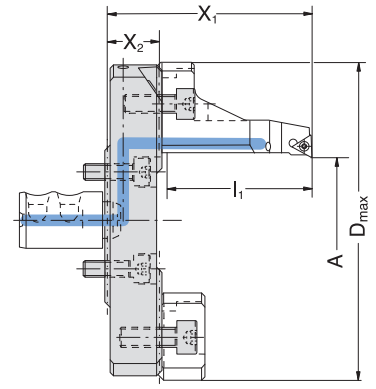
* Clockwise and neutral execution

Clamping element sold separately, see page 13

Ø .079" – 2.283" (Ø 2mm – 58mm)

Serrated Slides

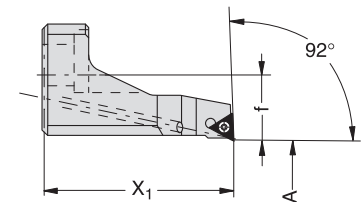
Outside Turning Range		Dimensions								Interfering ϕ		Order No.
A		X_1		X_2		l_1		Weight		D_{max}		
in	mm	in	mm	in	mm	in	mm	lbs	kg	in	mm	
.079 - 1.181	2 - 30	.630	16	2.874	73	2.165	55	.220	0.10	3.976	101	501 055
1.181 - 2.283	30 - 58	.630	16	2.874	73	2.165	55	.441	0.20	5.079	129	501 056



Insert Holder

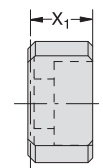
Outside Turning Range		Dimensions						Insert Form*		Order No.
A		X_1		f		Weight		20		
in	mm	in	mm	in	mm	lbs	kg			
.079 - 4.488	2 - 114	2.244	57.0	.776	19.7	.331	0.15		502 082	

* Clockwise and neutral execution



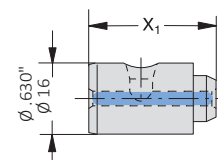
Counter Weight


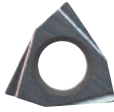









Dimensions					Order No.
X_1		Weight			
in	mm	lbs	kg		
.945	24.0	.331	0.15	502 183	





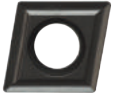

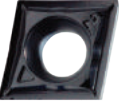






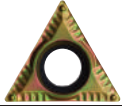









Coolant Delivery Section

Dimensions					Order No.
X_1		Weight			
in	mm	lbs	kg		
1.004	25.5	.022	0.01	450 137	

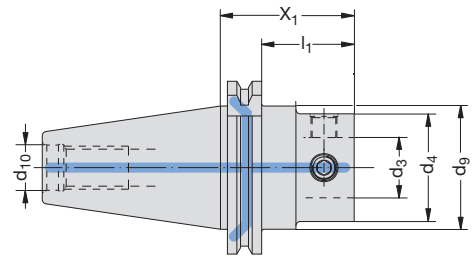


ISO Material Groups	Form 211	Nose Radius	Item Number	Order Number
P		.004" (0.1mm)	F211 01GN121 WHC19	397675WHC19
		.008" (0.2mm)	F211 02GN121 WHC19	397676WHC19
		.004" (0.1mm)	F211 01GL650 WHT12	097755WHT12
		.008" (0.2mm)	F211 02GL650 WHT12	097454WHT12
M		.004" (0.1mm)	F211 01GN121 WHC19	397675WHC19
		.008" (0.2mm)	F211 02GN121 WHC19	397676WHC19
		.004" (0.1mm)	F211 01GN121 WHC111	397675WHC111
		.008" (0.2mm)	F211 02GN121 WHC111	397676WHC111
K		.004" (0.1mm)	F211 01GL650 WHC136	097755WHC136
		.008" (0.2mm)	F211 02GL650 WHC136	097454WHC136
		.004" (0.1mm)	F211 01GN121 WHC111	397675WHC111
		.008" (0.2mm)	F211 02GN121 WHC111	397676WHC111
N		.004" (0.1mm)	F211 01GL650 WHC18	097755WHC18
		.008" (0.2mm)	F211 02GL650 WHC18	097454WHC18
		.004" (0.1mm)	F211 01GL650 WHC18	097755WHC18
		.008" (0.2mm)	F211 02GL650 WHC18	097454WHC18
S		.004" (0.1mm)	F211 01GN121 WHC19	397675WHC19
		.008" (0.2mm)	F211 02GN121 WHC19	397676WHC19
		.004" (0.1mm)	F211 01GN121 WHC111	397675WHC111
		.008" (0.2mm)	F211 02GN121 WHC111	397676WHC111
H		.004" (0.1mm)	F211 01GN121 WHC111	397675WHC111
		.008" (0.2mm)	F211 02GN121 WHC111	397676WHC111

ISO Material Groups	Form 101	Nose Radius	Item Number	Order Number	
P	Non/Low Alloyed		.008" (0.2mm)	F101 02GN112 WHT32	297485WHT32
			.016" (0.4mm)	F101 04MN112 WHT32	297434WHT32
	High Alloyed		.008" (0.2mm)	F101 02MN199 WHC114	397164WHC114
			.016" (0.4mm)	F101 04MN199 WHC114	397165WHC114
M	Ferritic		.008" (0.2mm)	F101 02MN192 WHC19	297531WHC19
			.016" (0.4mm)	F101 04MN192 WHC19	297658WHC19
	Austenitic		.008" (0.2mm)	F101 02MN199 WHC114	397164WHC114
			.016" (0.4mm)	F101 04MN199 WHC114	397165WHC114
K	Grey Cast		.008" (0.2mm)	F101 02MN158 WHC79	297248WHC79
			.016" (0.4mm)	F101 04MN158 WHC79	297377WHC79
	Nodular		.008" (0.2mm)	F101 02MN158 WHC111	297248WHC111
			.016" (0.4mm)	F101 04MN158 WHC111	297377WHC111
N	Aluminum		.002" (0.05mm)	F101 005GN129 WHW16	397738WHW16
			.004" (0.1mm)	F101 01GN129 WHW16	397737WHW16
			.008" (0.2mm)	F101 02GN129 WHW16	297545WHW16
			.016" (0.4mm)	F101 04GN129 WHW16	297546WHW16
	Non-Ferrous		.008" (0.2mm)	F101 02GN127 WHW16	097529WHW16
			.016" (0.4mm)	F101 04GN127 WHW16	097445WHW16
S	Superalloys		.008" (0.2mm)	F101 02MN199 WHC114	397164WHC114
			.016" (0.4mm)	F101 04MN199 WHC114	397165WHC114
	Titanium Alloys		.008" (0.2mm)	F101 02GN200 WHC111	397585WHC111
			.016" (0.4mm)	F101 04GN200 WHC111	397586WHC111
H	Hard Materials		.008" (0.2mm)	F101 02GN200 WHC111	397585WHC111
			.016" (0.4mm)	F101 04GN200 WHC111	397586WHC111

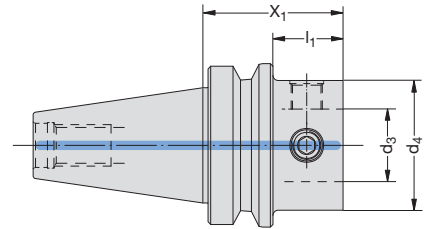
ISO Material Groups		Form 20	Nose Radius	Item Number	Order Number
P	Non / Low-alloyed		.008" (0.2mm)	F020 02MN155 WTC15	397688WTC15
			.016" (0.4mm)	F020 04MN155 WTC15	397689WTC15
	High Alloyed		.004" (0.1mm)	F020 01GL650 WHT12	097153WHT12
			.008" (0.2mm)	F020 02GL650 WHT12	097546WHT12
			.016" (0.4mm)	F020 04GL650 WHT12	097599WHT12
M	Ferritic		.004" (0.1mm)	F020 01GN121 WHC19	397672WHC19
			.008" (0.2mm)	F020 02GN121 WHC19	397673WHC19
			.016" (0.4mm)	F020 04GN121 WHC19	397674WHC19
	Austenitic		.004" (0.1mm)	F020 01GN121 WHC111	397672WHC111
			.008" (0.2mm)	F020 02GN121 WHC111	397673WHC111
			.016" (0.4mm)	F020 04GN121 WHC111	397674WHC111
K	Grey Cast		.004" (0.1mm)	F020 01GL650 WHC136	097153WHC136
			.008" (0.2mm)	F020 02GL650 WHC136	097546WHC136
			.004" (0.1mm)	F020 03GL650 WHC136	097154WHC136
			.016" (0.4mm)	F020 04GL650 WHC136	097599WHC136
			.004" (0.1mm)	F020 08GL650 WHC136	397764WHC136
	Nodular		.004" (0.1mm)	F020 01GN121 WHC111	397672WHC111
			.008" (0.2mm)	F020 02GN121 WHC111	397673WHC111
.016" (0.4mm)			F020 04GN121 WHC111	397674WHC111	
N	Aluminum		.008" (0.2mm)	F020 02GN128 WHW16	297541WHW16
			.016" (0.4mm)	F020 04GN128 WHW16	297542WHW16
	Non-Ferrous		.008" (0.2mm)	F020 02GN128 WHW16	297541WHW16
			.016" (0.4mm)	F020 04GN128 WHW16	297542WHW16
S	Superalloys		.004" (0.1mm)	F020 01GN121 WHC19	397672WHC19
			.008" (0.2mm)	F020 02GN121 WHC19	397673WHC19
			.016" (0.4mm)	F020 04GN121 WHC19	397674WHC19
	Titanium Alloys		.004" (0.1mm)	F020 01GN121 WHC111	397672WHC111
			.008" (0.2mm)	F020 02GN121 WHC111	397673WHC111
			.016" (0.4mm)	F020 04GN121 WHC111	397674WHC111
H	Hard Materials		.004" (0.1mm)	F020 01GN121 WHC111	397672WHC111
			.008" (0.2mm)	F020 02GN121 WHC111	397673WHC111
			.016" (0.4mm)	F020 04GN121 WHC111	397674WHC111

Master Shanks



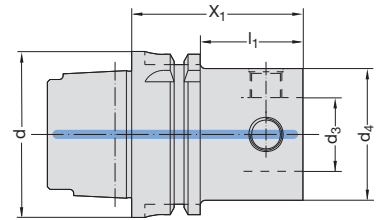
CAT

Size	MVS Connection		Dimensions								Order No.	
	d ₄	d ₃	X ₁		l ₁		d ₉		d ₁₀	Weight		
			in	mm	in	mm	in	mm	in	lbs.	kg	
40	50 - 28		2.441	62	1.69	42.9	1.75	44.55	5/8 - 11	2.9	1.3	353 004
50	50 - 28		2.441	62	1.69	42.9	2.75	69.95	1 - 8	7.3	3.3	353 007



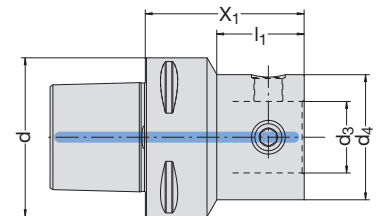
BT TAPER

Size	MVS Connection		Dimensions						Order No.
	d ₄	d ₃	X ₁		l ₁		Weight		
			in	mm	in	mm	lbs.	kg	
40	50 - 28		2.126	54	1.06	27.0	3.1	1.4	327 019
50	50 - 28		2.559	65	1.06	26.8	8.6	3.9	327 021



HSK - A

Size	MVS Connection		Dimensions						Order No.
	d ₄	d ₃	X ₁		l ₁		Weight		
			in	mm	in	mm	lbs.	kg	
63	50 - 28		2.559	65	1.54	39	3.5	1.6	245 012
100	50 - 28		2.559	65	1.42	36	5.3	2.4	245 014

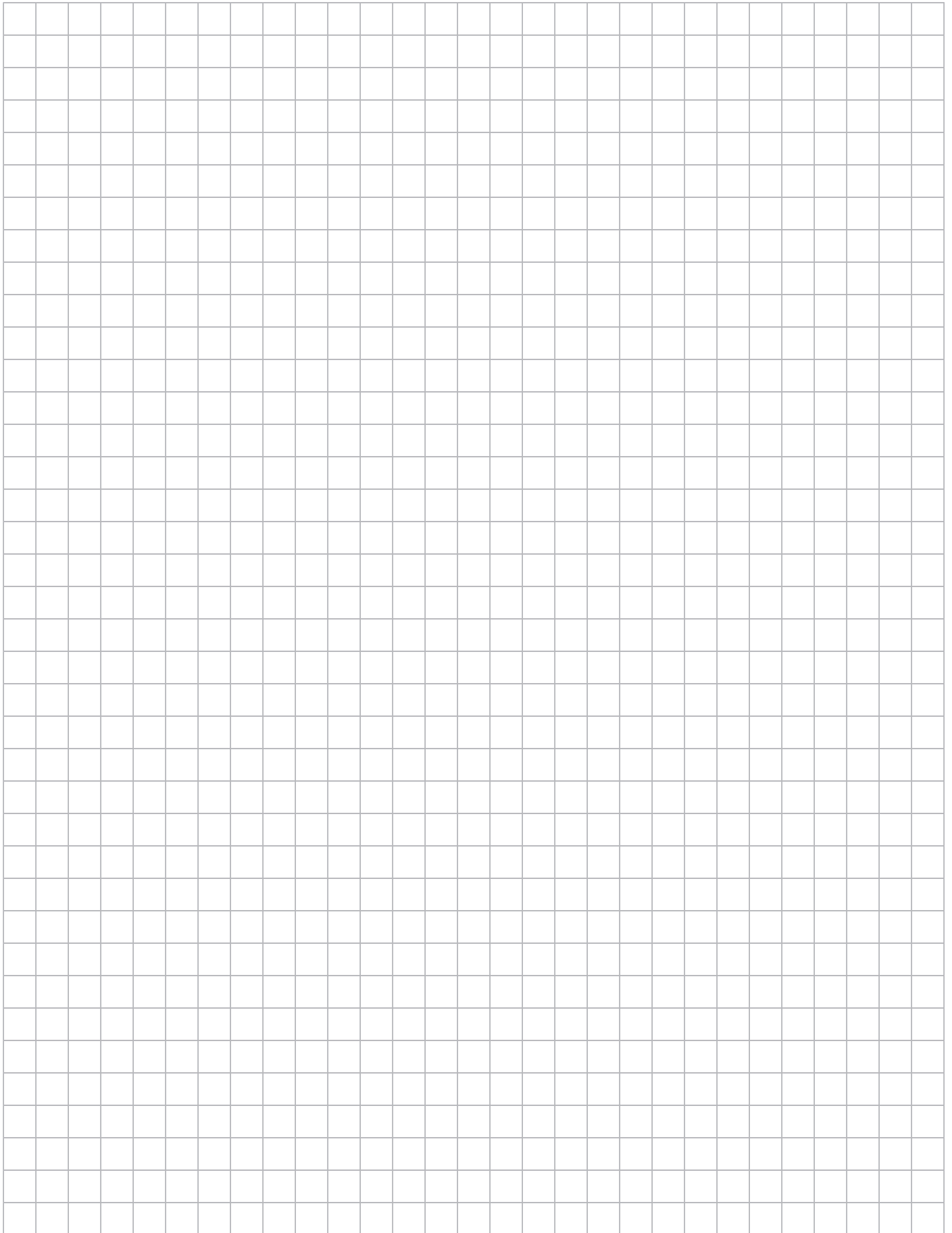


PSC (Capto®)

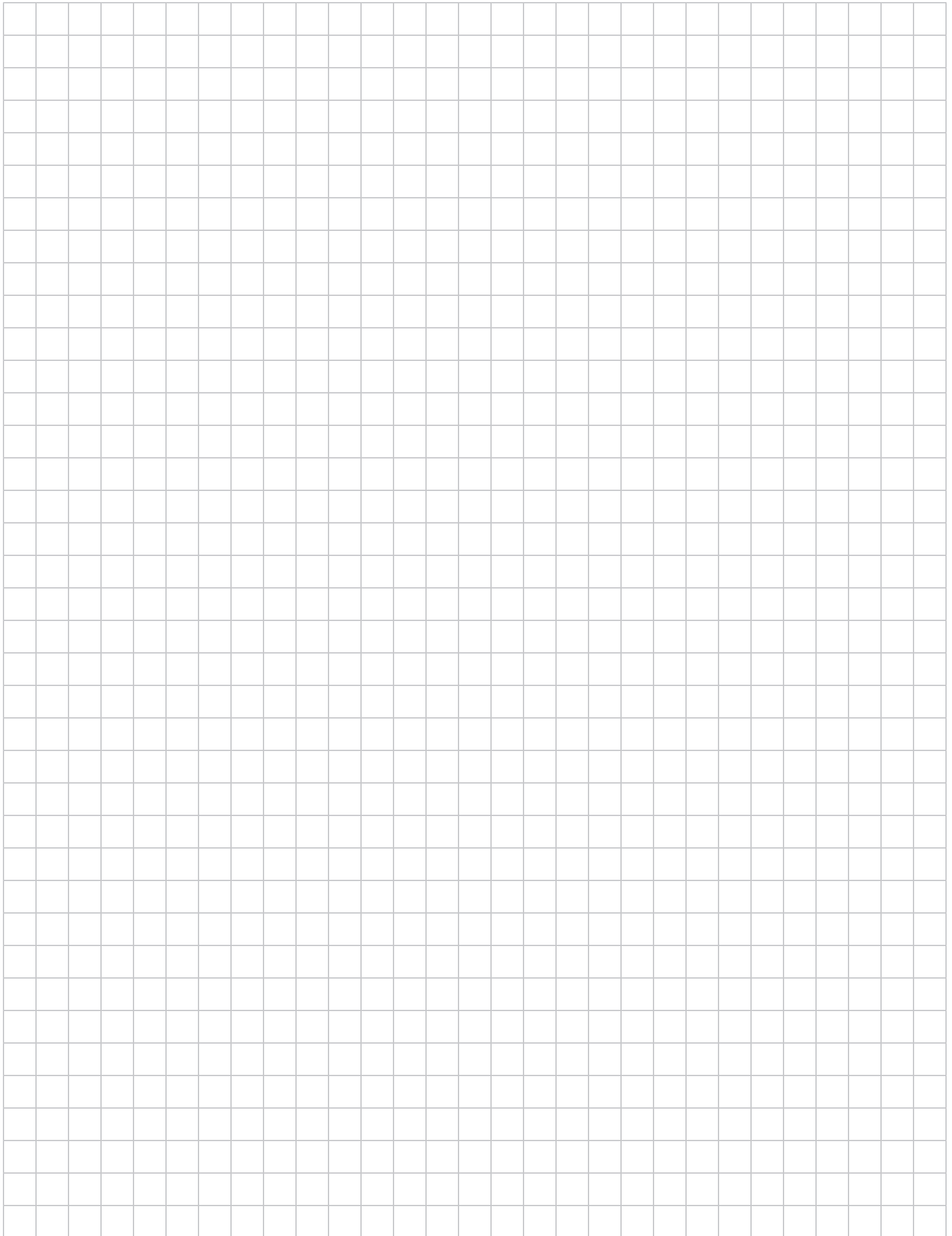
Size	MVS Connection		Dimensions						Order No.
	d ₄	d ₃	X ₁		l ₁		Weight		
			in	mm	in	mm	lbs.	kg	
63	50 - 28		2.559	65	1.555	39.5	2.866	1.3	227 003

Additional master shanks are available on request.

Notes



Notes



Warranty Information

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