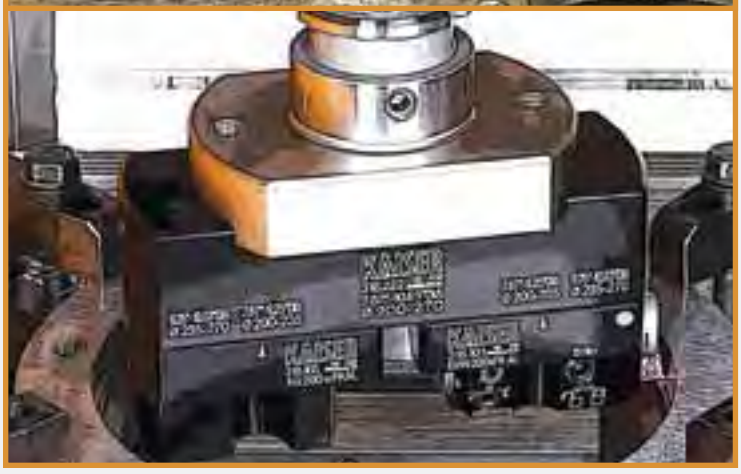
308A

KAISER®

PRECISION MODULAR TOOLING SYSTEM



A PRODUCT OF:

BIG KAISER®

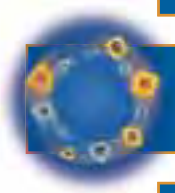
PRECISION TOOLING INC.

Higher Performance. Guaranteed.

OVER 60 YEARS OF

KAISER®

PRECISION



KA/KAB MODULAR TOOL SYSTEM OVERVIEW

The Kaiser KA connection consists of a cylindrical male pilot ① and female receptacle ②. The connection is made by means of a radial locking screw ③ with a 15 degree taper. The screw engages in the respective offset pocket of the male pilot with a cam action.

The locking screw force (Fr) creates a 3.3 to 3.5 times larger axial force which rigidly clamps the faces of the two components together. This face-to-face clamping builds up a friction force between the two components. Additionally, the thrust (Fr) of the screw locks and pushes the male pilot securely into line contact against the opposite wall of the female connection.

The torsional cutting forces are primarily transmitted by the friction between the faces. Any remaining torque results in additional wedge action between the locking screw and the male member, which is transformed into a very strong additional axial clamping force (Fa).

There are many advantages to this simple but effective design:

A. Maximum rigidity due to the very strong face-to-face clamping forces over the full cross section of the modular connections. This allows stacking up to five components without detrimental effects.

B. Repeatable seating precision of the modular components of .0001" radial, due to radial line contact clamping.

C. 90° offset location of the locking screws to cutting edge guarantees spindle orientation irrespective of the number of components assembled.

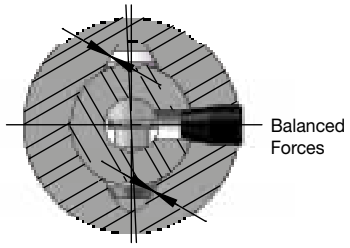
D. Moderate vibration dampening effect due to the friction created between the mating components.

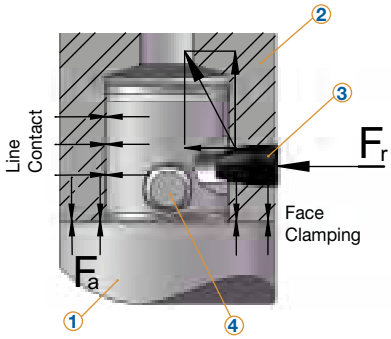
E. The components do not jam up. The simple design makes it easy to keep clean, assemble and disassemble without the need for special wrenches, fixtures and vises.

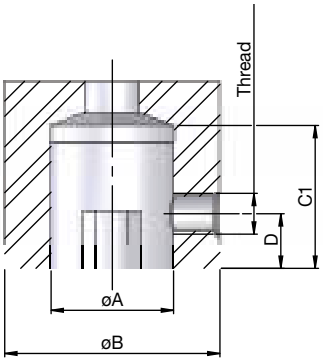
The Kaiser KAB connection is derived from the KA connection without loss of all technical and dimensional features or interchangeability and ease of maintenance.

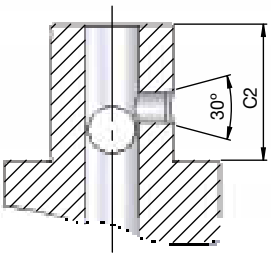
The KAB connection is equipped with a floating drive pin ④ which engages on both sides into respective pockets in the mating part. The tapers on the pins and the angles on the pockets are engineered to permit an automatic balancing of the two resulting torsional forces.

The drive pin is retained with a simple spring ring. Adaptation to the KA connection is made by pushing the drive pin out of the male pilot.









KA Locking Screws ③

Catalog Number	Adapter Size	Wrench	Hex Size	Torque (in-lbs.)
10.690.431	KA1	**10.690.811**	2	22
10.690.432	KA2	**10.690.812**	2.5	26
10.690.433	KA3	**10.690.813**	3	45
10.690.434	KA4	**10.690.814**	4	85
10.690.435	KA5	**10.690.816**	5	175
10.690.436	KA6	**10.690.817**	6	350
10.690.437	KA7	**10.690.808**	10	875

Drive Pin ④

Catalog Number	Adapter Size
10.691.501	KA1
10.691.502	KA2
10.691.503	KA3
10.691.504	KA4
10.691.505	KA5
10.691.506	KA6
10.691.507	KA7

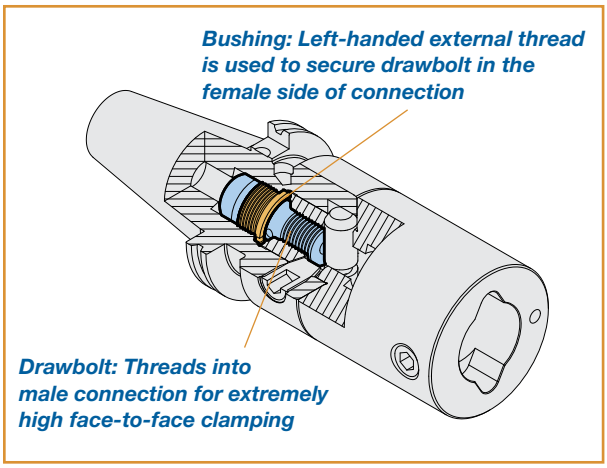
Dimensions

Adapter Size	øA	øB	C1	C2	D	Thread
KA1	.433	.748	.551	.512	.199	M4x.5
KA2	.551	.945	.689	.630	.258	M5x.5
KA3	.709	1.220	.866	.787	.317	M6x.75
KA4	.866	1.535	1.024	.945	.396	M8x.75
KA5	1.102	1.969	1.260	1.181	.514	M10x1.0
KA6	1.417	2.490	1.654	1.575	.632	M12x1.0
KA7	1.811	3.543	2.047	1.968	.750	M20x1.5

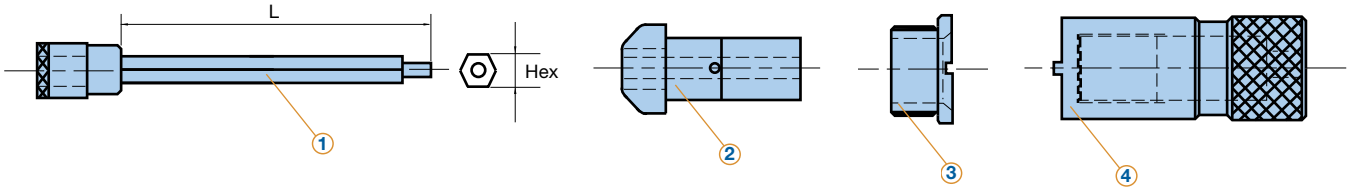
The KAD modular tool and clamping system meets the requirements for high performance under all conditions, as well as the demand for optional versatility.

Through systematic development combined with countless practical tests, the well known KAB system can be easily upgraded to cope with the requirements of today's high performance tools. Designed with the need for complete compatibility of existing KAB tools, and for the highest possible rigidity, key components have been redesigned to include an axial tension screw (drawbolt) for heavy duty milling.

KAD compatible components include shanks, reductions, extensions, and tool holders which are ready to be equipped with drawbolts and threaded bushings. Clamping of the system components with the drawbolt is required only for extreme cutting conditions. Therefore, the KAD compatible components are supplied without drawbolts and threaded bushings, and must be ordered separately and assembled by the user.



Tightening the drawbolt generates an enormous preloading force which amplifies the face-to-face clamping forces of corresponding components. This results in an extremely rigid tool connection, making the tool better suited to meet the demands of modern milling operations.



KAD Components

KAD Component	KAD Size	① Drawbolt Wrench	Hex Size	L	② Drawbolt	Thread	Torque (ft-lbs.)	③ Bushing	④ Bushing Wrench
40 Taper Shanks	KAD4	**10.690.847**	8	5.512	**10.690.126**	M12	90	**10.690.654**	**10.690.851**
	KAD5	**10.690.847**	8	5.512	**10.690.127**	M14	90	**10.690.655**	**10.690.852**
	KAD6	**10.690.848**	10	5.512	**10.690.128**	M18	120	**10.690.656**	**10.690.853**
50 Taper Shanks	KAD4	**10.690.847**	8	5.512	**10.690.126**	M12	90	**10.690.654**	**10.690.851**
	KAD5	**10.690.847**	8	5.512	**10.690.127**	M14	90	**10.690.655**	**10.690.852**
	KAD6	**10.690.855**	12	7.087	**10.690.129**	M18	150	**10.690.656**	**10.690.853**
	KAD7	**10.690.850**	14	5.906	**10.690.130**	M24	180	**10.690.657**	**10.690.854**
HSK-A63 Shanks	KAD4	**10.690.847**	8	5.512	**10.690.126**	M12	90	**10.690.654**	**10.690.851**
	KAD5	**10.690.847**	8	5.512	**10.690.127**	M14	90	**10.690.655**	**10.690.852**
	KAD6	**10.690.847**	8	5.512	**10.690.167**	M18	90	**10.690.656**	**10.690.853**
HSK-A100 Shanks	KAD5	**10.690.847**	8	5.512	**10.690.127**	M14	90	**10.690.655**	**10.690.852**
	KAD6	**10.690.848**	10	5.512	**10.690.128**	M18	120	**10.690.656**	**10.690.853**
	KAD7	**10.690.848**	10	5.512	**10.690.168**	M24	120	**10.690.657**	**10.690.854**
Extensions & Reductions	KAD4	**10.690.847**	8	5.512	**10.690.126**	M12	90	**10.690.654**	**10.690.851**
	KAD5	**10.690.847**	8	5.512	**10.690.127**	M14	90	**10.690.655**	**10.690.852**
	KAD6	**10.690.849**	12	5.512	**10.690.129**	M18	150	**10.690.656**	**10.690.853**
	KAD7	**10.690.850**	14	5.906	**10.690.130**	M24	180	**10.690.657**	**10.690.854**

BIG-PLUS® OVERVIEW

The BIG-PLUS® spindle and tooling system surpasses all other spindle concepts due to simultaneous taper and flange contact between the machine spindle and tool holder, and complete interchangeability with existing machines and tools.

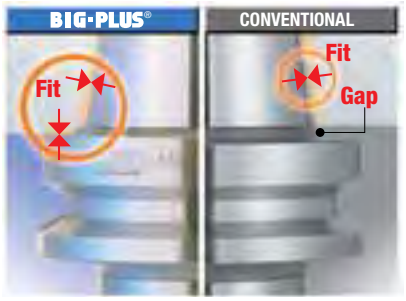
Working Principle

Mounting the tool holder into the machine spindle, taper contact occurs prior to clamping. Due to the retention force, the taper of the tool holder expands the machine spindle in the elastic range. The tool is pulled further in until the tool flange touches the spindle face.

Features:

- Improved cutting performance due to higher vibration dampening and rigidity
- Better repeat accuracy for tool changes
- No change of tool length at high RPM
- Cost efficient due to further use of existing tool holders

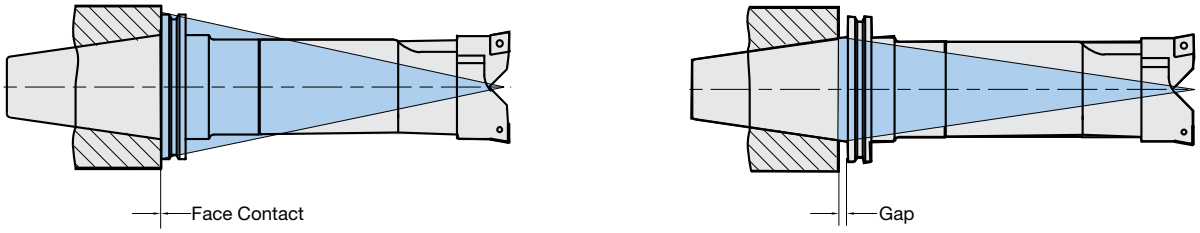
Simultaneous Taper and Flange Fit



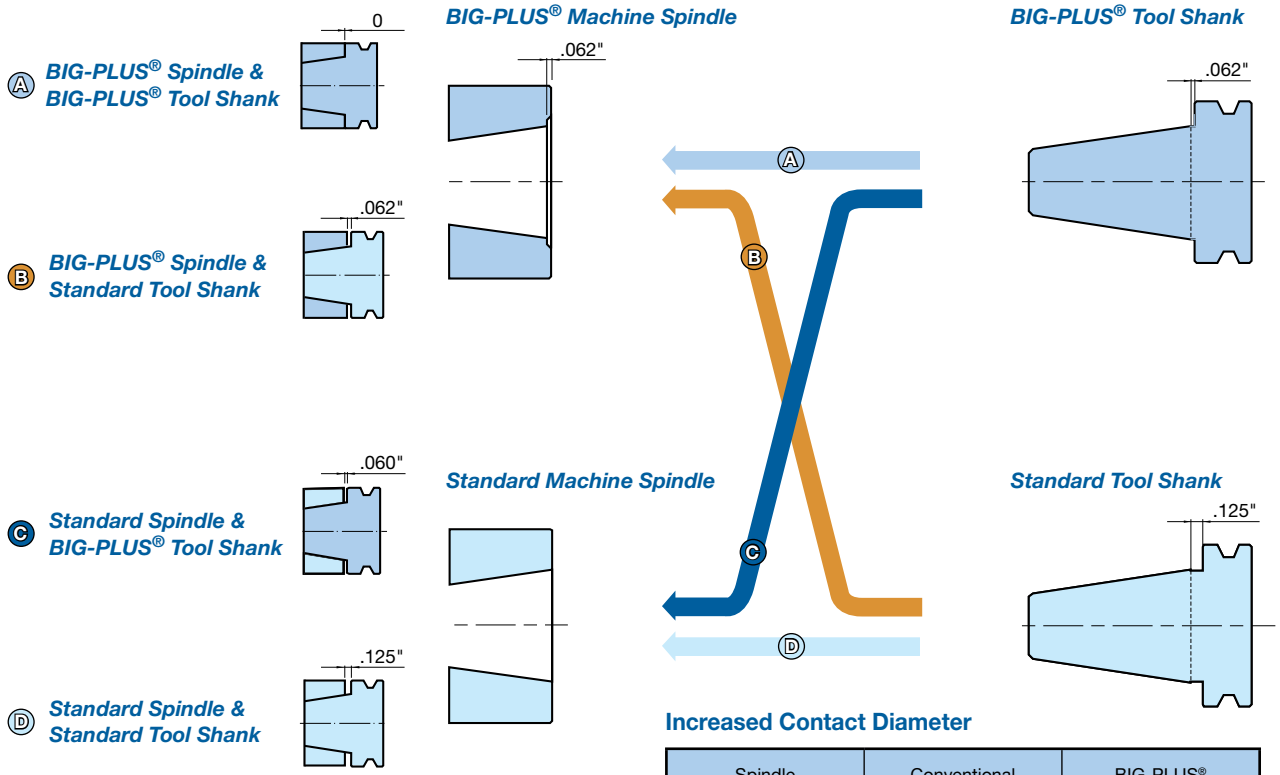
BIG-PLUS® SPINDLE SYSTEM PAT. DUAL CONTACT

Recognized in World Markets

Comparison of Rigidity

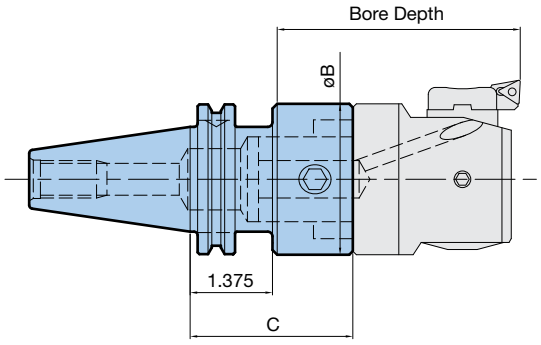


Interchangeability of Tool Shanks



Increased Contact Diameter

Spindle Taper	Conventional Taper	BIG-PLUS® Taper
CV50	ø2.750	ø3.875
CV40	ø1.750	ø2.500



CAT40 KAB Shanks

Adapter Size	Bore Depth	Standard Taper	BIG-PLUS® Taper	øB	C
KAB1	1.570	**11.326.410**	–	.750	1.870
KAB1	3.150	**11.326.411**	–	.750	3.562
KAB2	1.970	**11.326.420**	–	.944	2.067
KAB2	3.150	**11.326.421**	–	.944	3.327
KAB2	3.937	**11.326.422**	–	.944	4.114
KAB3	2.165	**11.326.430**	–	1.220	2.126
KAB3	3.150	**11.326.431**	–	1.220	3.150
KAB3	5.118	**11.326.433**	–	1.220	5.118
KAB4	1.970	**11.326.440**	–	1.535	1.496
KAB4	3.150	**11.326.441**	**11.368.441**	1.535	2.874
KAB4	6.300	**11.326.444**	**11.368.444**	1.535	6.024
KAB5	3.150	**11.326.451**	**11.368.451**	1.968	2.480
KAB5	6.300	**11.326.454**	**11.368.454**	1.968	5.630
KAB6	3.937	**11.326.462**	**11.368.462**	2.491	2.716
KAB6	6.300	**11.326.464**	**11.368.464**	2.491	5.079

CAT45 KAB Shanks

Adapter Size	Bore Depth	Catalog Number	øB	C
KAB4	3.937	**11.326.542**	1.535	3.611
KAB5	3.937	**11.326.552**	1.968	3.268
KAB6	3.937	**11.326.562**	2.491	2.716
KAB7	6.300*	**11.326.574**	3.543	3.268

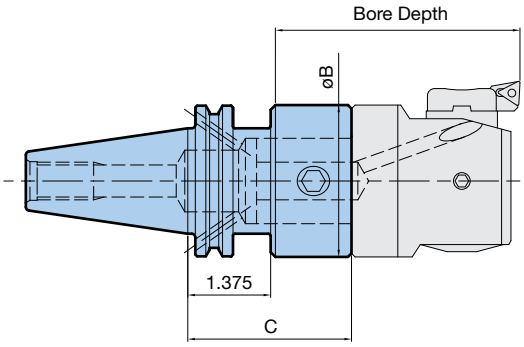
CAT50 KAB Shanks

Adapter Size	Bore Depth	Standard Taper	BIG-PLUS® Taper	øB	C
KAB1	1.570	**11.326.610**	–	.750	1.870
KAB1	3.150	**11.326.611**	–	.750	3.562
KAB2	1.970	**11.326.620**	–	.944	2.067
KAB2	3.937	**11.326.622**	–	.944	4.114
KAB2	5.118	**11.326.623**	–	.944	5.295
KAB3	2.165	**11.326.630**	–	1.220	2.126
KAB3	3.937	**11.326.632**	–	1.220	3.937
KAB3	5.118	**11.326.633**	–	1.220	5.118
KAB3	6.300	**11.326.634**	–	1.220	6.300
KAB4	3.937	**11.326.642**	**11.368.642**	1.535	3.611
KAB4	6.300	**11.326.644**	**11.368.644**	1.535	6.023
KAB4	7.875	**11.326.645**	**11.368.645**	1.535	7.598
KAB5	3.937	**11.326.652**	**11.368.652**	1.968	3.268
KAB5	6.300	**11.326.654**	**11.368.654**	1.968	5.630
KAB5	7.875	**11.326.655**	**11.368.655**	1.968	7.205
KAB5	10.236	**11.326.656**	**11.368.656**	1.968	9.567
KAB6	3.937	**11.326.662**	**11.368.662**	2.491	2.716
KAB6	6.300	**11.326.664**	**11.368.664**	2.491	5.079
KAB6	7.875	**11.326.665**	**11.368.665**	2.491	6.654
KAB6	10.236	**11.326.666**	**11.368.666**	2.491	9.016
KAB6	12.598	**11.326.667**	**11.368.667**	2.491	11.378
KAB7	6.300*	**11.326.674**	**11.368.674**	3.543	3.268
KAB7	8.546*	**11.326.675**	**11.368.675**	3.543	5.315
KAB7	10.236*	**11.326.676**	**11.368.676**	3.543	7.205

*For KAB7, Bore Depth applies for boring heads with length of 4.606"

CAT KAB Shanks with Coolant Bores in Accordance to DIN 69871/Form B

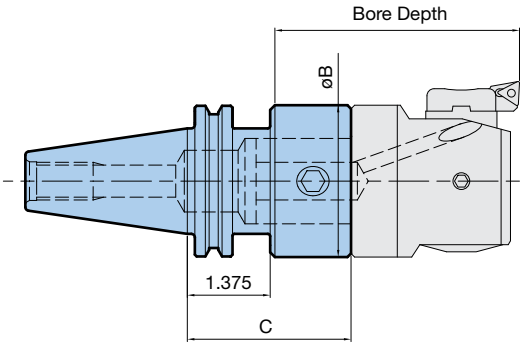
DIN B Coolant Holes



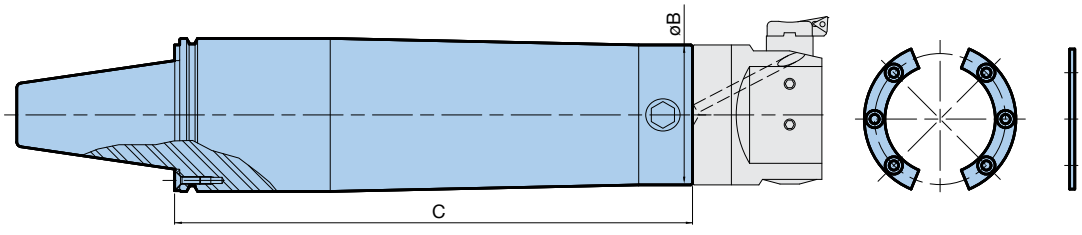
Taper	Adapter Size	Bore Depth	Catalog Number	øB	C
CAT60	KAB5	10.212	**11.360.556**	1.968	9.656
CAT60	KAB6	4.200	**11.360.562**	2.491	3.100
CAT60	KAB6	6.200	**11.360.564**	2.491	5.100
CAT60	KAB6	8.200	**11.360.565**	2.491	7.100
CAT60	KAB6	12.200	**11.360.567**	2.491	11.100
CAT60	KAB7	8.215*	**11.360.575**	3.543	5.300
CAT60	KAB7	10.215*	**11.360.576**	3.543	7.300
CAT60	KAB7	14.215*	**11.360.578**	3.543	11.300
CAT40/DIN B	KAB3	3.150	**11.326.831**	1.220	3.150
CAT40/DIN B	KAB4	3.150	**11.326.841**	1.535	2.874
CAT40/DIN B	KAB5	3.150	**11.326.851**	1.968	2.480
CAT40/DIN B	KAB6	3.937	**11.326.862**	2.491	2.716
CAT50/DIN B	KAB6	3.937	**11.326.962**	2.491	2.716
CAT50/DIN B	KAB7	6.300*	**11.326.974**	3.543	3.268
CAT50/90°	KAB6	3.937	**11.363.762**	2.491	2.716
CAT50/90°	KAB6	6.300	**11.363.764**	2.491	5.079
CAT50/90°	KAB7	6.300*	**11.363.774**	3.543	3.268
CAT50/SF**	KAB7	17.320*	**11.326.776**	3.543	13.110

*For KAB7, Bore Depth applies for boring heads with length of 4.606"
**Simultaneous fit shanks are supplied with removable shims to be ground for flange/spindle face contact, not compatible with most ATC's, please consult BIG Kaiser's Engineering Department

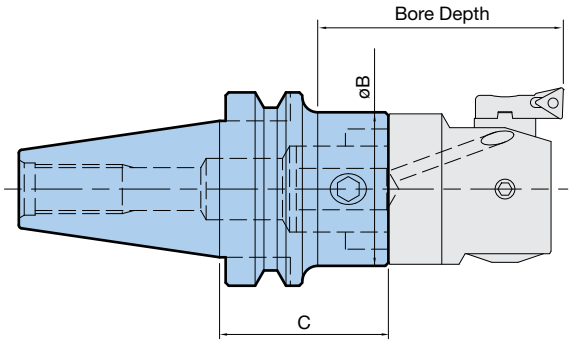
CAT50 KAB Shanks, 90° Orientation



CAT50/SF KAB Shanks



Shims included to be ground to match gap between spindle face and taper flange.



BT30 KAB Shanks

Adapter Size	Bore Depth	Standard Taper	BIG-PLUS® Taper	øB	C
KAB3	2.086	–	**11.368.030**	1.220	1.535
KAB4	2.283	–	**11.368.040**	1.535	1.496
KAB5	2.677	**10.329.866**	–	1.968	1.496
KAB5	3.661	–	**11.368.051**	1.968	2.480
KAB6	3.661	–	**11.368.061**	2.520	2.520

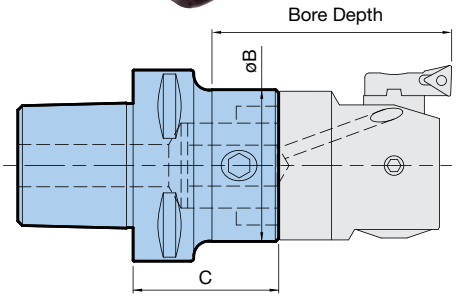
BT40 KAB Shanks

Adapter Size	Bore Depth	Standard Taper	BIG-PLUS® Taper	øB	C
KAB2	3.465	**10.326.122**	–	.945	3.248
KAB3	4.055	**10.326.132**	–	1.220	3.701
KAB4	3.150	**10.326.141**	–	1.535	2.560
KAB4	4.055	–	**11.368.142**	1.535	3.465
KAB5	3.150	**10.326.151**	–	1.968	2.165
KAB5	4.055	–	**11.368.152**	1.968	3.071
KAB6	3.346	**10.326.161**	–	2.491	1.811
KAB6	4.000	–	**11.368.162**	2.520	2.520

BT50 KAB Shanks

Adapter Size	Bore Depth	Standard Taper	BIG-PLUS® Taper	øB	C
KAB4	2.441	**10.326.342**	–	1.535	2.283
KAB4	4.803	–	**11.368.343**	1.535	4.646
KAB5	3.937	**10.326.352**	–	1.968	3.385
KAB5	4.803	–	**11.368.353**	1.968	4.252
KAB6	3.937	**10.326.362**	–	2.491	2.835
KAB6	4.803	–	**11.368.363**	2.520	3.701
KAB7	6.300*	**10.326.374**	–	3.543	3.385
KAB7	6.772*	–	**11.368.374**	3.543	3.661

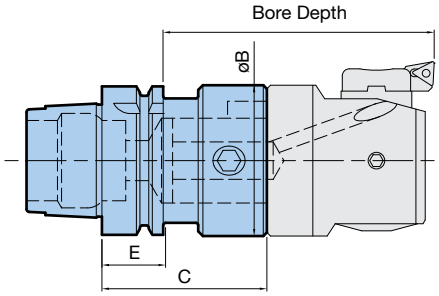
*For KAB7, Bore Depth applies for boring heads with length of 4.606"

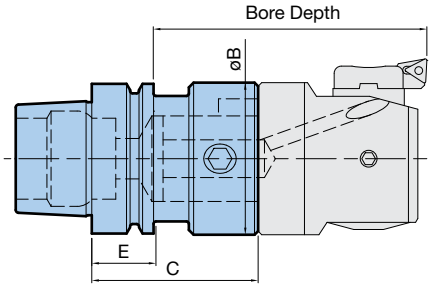


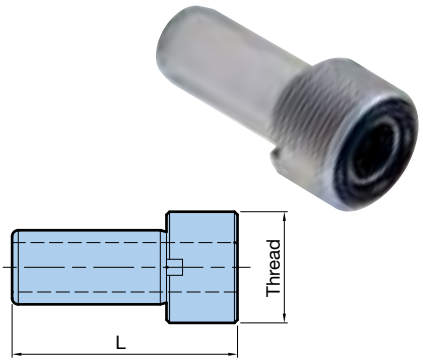
BIG Coromant Capto KAB Shanks

Taper	Adapter Size	Bore Depth	Catalog Number	øB	C
C5	KAB3	2.750	**C5-CKB3-55**	1.220	2.165
	KAB4	2.750	**C5-CKB4-48**	1.535	1.870
	KAB5	3.150	**C5-CKB5-50**	1.969	1.968
	KAB6	3.930	**C5-CKB6-50**	2.480	1.968
C6	KAB3	3.150	**C6-CKB3-65**	1.220	2.559
	KAB4	3.150	**C6-CKB4-58**	1.535	2.283
	KAB5	3.150	**C6-CKB5-48**	1.969	1.890
	KAB6	3.930	**C6-CKB6-59**	2.480	2.323
C8	KAB6	5.110	**C8-CKB6-74**	2.480	2.913
	KAB7	–	**C8-CKB7-73**	3.543	2.874
	FK135	–	**10.328.086**	5.315	1.811

HSK KAB SHANKS (DIN 69893)







HSK-A KAB Shanks

Taper	Adapter Size	Bore Depth	Catalog Number	øB	C	E
HSK-A40	KAB3	2.165	**10.324.132**	1.220	1.575	.984
HSK-A40	KAB4	2.835	**10.324.142**	1.535	1.938	.984
HSK-A50	KAB3	2.086	**10.324.232**	1.220	1.732	1.220
HSK-A50	KAB4	4.330	**10.324.242**	1.535	3.700	1.220
HSK-A50	KAB5	4.330	**10.324.252**	1.968	3.306	1.220
HSK-A63	KAB3	3.150	**10.324.331**	1.220	2.795	1.220
HSK-A63	KAB3	5.118	**10.324.332**	1.220	4.764	1.220
HSK-A63	KAB4	4.330	**10.324.341**	1.535	3.700	1.220
HSK-A63	KAB4	5.118	**10.324.342**	1.535	4.488	1.220
HSK-A63	KAB5	3.346	**10.324.352**	1.968	2.323	1.220
HSK-A63	KAB5	4.527	**10.324.353**	1.968	3.504	1.220
HSK-A63	KAB6	4.331	**10.324.361**	2.520	2.756	1.220
HSK-A63	KAB6	5.512	**10.324.362**	2.520	3.937	1.220
HSK-A80	KAB6	4.528	**10.324.461**	2.520	2.953	1.220
HSK-A100	KAB5	5.512	**10.324.551**	1.968	4.213	1.339
HSK-A100	KAB6	4.528	**10.324.561**	2.520	3.071	1.339
HSK-A100	KAB6	5.709	**10.324.563**	2.520	4.252	1.339
HSK-A100	KAB7	6.693*	**10.324.571**	3.543	3.425	1.339
HSK-A100	KAB7	8.268*	**10.324.572**	3.543	5.000	1.339

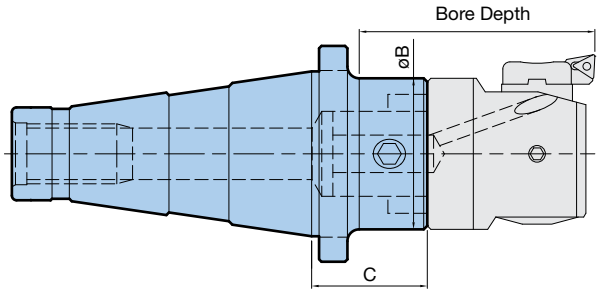
*For KAB7, Bore Depth dimension applies for boring heads with length of 4.606"

HSK-E & HSK-F KAB Shanks

Taper	Adapter Size	Bore Depth	Catalog Number	øB	C	E
HSK-E40	KAB3	2.165	**10.324.131**	1.220	1.575	.984
HSK-E40	KAB4	2.835	**10.324.141**	1.535	1.968	.984
HSK-E50	KAB3	2.086	**10.324.231**	1.220	1.732	1.220
HSK-E50	KAB4	4.331	**10.324.241**	1.535	3.700	1.220
HSK-E50	KAB5	4.331	**10.324.251**	1.968	3.306	1.220
HSK-E63	KAB6	4.331	**10.324.365**	2.520	2.756	1.220
HSK-F63	KAB6	4.331	**10.324.366**	2.520	2.756	1.220

HSK Coolant Tubes

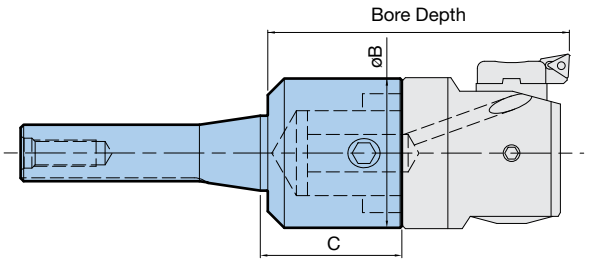
Taper Size	Catalog Number	Thread	L
HSK-A40/E40	**10.324.901**	M12x1.0	1.161
HSK-A50/E50	**10.324.902**	M16x1.0	1.299
HSK-A63	**10.324.903**	M18x1.0	1.437
HSK-A100	**HSK100-CP**	M24x1.5	1.732



NMTB KAB Shanks

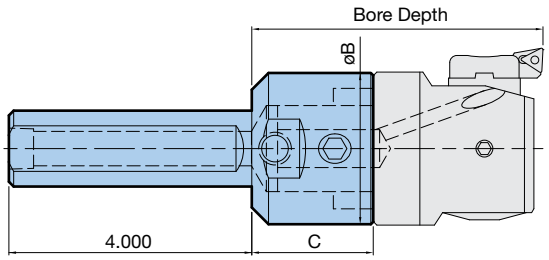
Taper	Adapter Size	Bore Depth	Catalog Number	øB	C	Draw Bolt Thread
NMTB40	KAB4	3.200	**11.321.541**	1.535	1.929	5/8"-11
NMTB40	KAB5	3.600	**11.321.551**	1.968	1.935	
NMTB40	KAB6	4.134	**11.321.562**	2.491	1.772	
NMTB40	KAB6	6.100	**11.321.564**	2.491	4.134	
NMTB50	KAB5	3.940	**11.321.952**	1.968	2.480	1"-8
NMTB50	KAB6	3.940	**11.321.962**	2.491	1.929	
NMTB50	KAB6	6.300	**11.321.964**	2.491	4.291	
NMTB50	KAB6	7.875	**11.321.965**	2.491	5.866	
NMTB50	KAB7	5.865*	**11.321.974**	3.543	2.480	

*For KAB7, Bore Depth dimension applies for boring heads with length of 4.606"



Manual Taper KAB Shanks

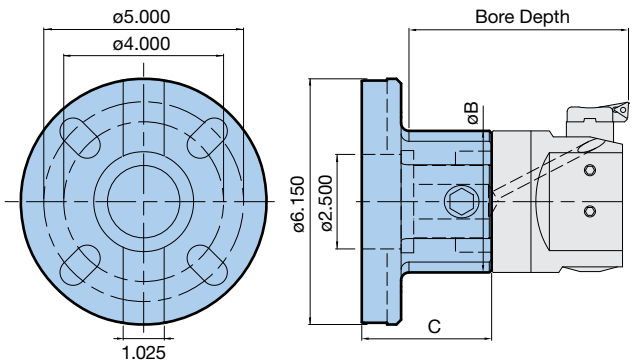
Taper	Adapter Size	Bore Depth	Catalog Number	øB	C
MORSE #4	KAB6	5.118	**11.362.163**	2.520	3.189
MORSE #5	KAB6	5.118	**10.323.563**	2.520	2.756
R8	KAB5	3.750	**11.362.251**	1.968	1.750
R8	KAB6	5.100	**11.362.261**	2.490	2.362
SIP #4	KAB6	5.118	**10.322.563**	2.520	3.189



Straight Shank KAB Shanks

Shank Size	Adapter Size	Bore Depth	Catalog Number	øB	C
ø1.00 x L4.0	KAB5	4.244	**11.361.052**	1.968	2.000
ø1.25 x L4.0	KAB6	4.800	**11.361.162**	2.520	2.000
ø1.50 x L4.0	KAB6	4.800	**11.361.262**	2.520	2.000
ø2.00 x L4.0	KAB6	4.800	**11.361.462**	2.520	2.000
ø2.00 x L4.0	KAB7	7.875*	**11.361.474**	3.543	3.268

*For KAB7, Bore Depth dimension applies for boring heads with length of 4.606"

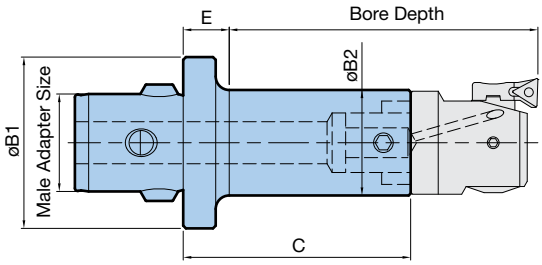


Boring Mill KAB Adapter

Type	Adapter Size	Bore Depth	Catalog Number	øB	C
6" Flange	KAB7	6.560*	**11.366.774**	3.543	3.250

*For KAB7, Bore Depth dimension applies for boring heads with length of 4.606"

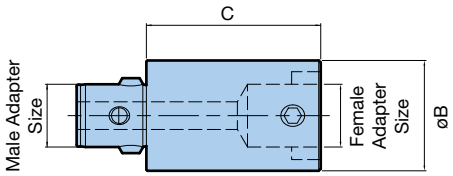
KAB REDUCTION ADAPTERS



KAB Reductions

Male Adapter	Female Adapter	Bore Depth	Catalog Number	øB1	øB2	C	E
KAB2	KAB1	2.165	**10.332.210**	.945	.748	1.417	.413
KAB3	KAB1	2.362	**10.332.310**	1.220	.748	1.594	.394
KAB3	KAB2	2.362	**10.332.320**	1.220	.945	1.358	.394
KAB4	KAB1	2.953	**10.332.410**	1.535	.748	2.264	.472
KAB4	KAB2	2.953	**10.332.420**	1.535	.945	2.028	.472
KAB4	KAB3	2.953	**10.332.430**	1.535	1.220	1.850	.472
KAB5	KAB1	2.756	**10.332.511**	1.968	.748	2.264	.669
KAB5	KAB1	3.937	**10.332.510**	1.968	.748	3.445	.669
KAB5	KAB2	2.756	**11.332.521**	1.968	.945	2.028	.669
KAB5	KAB2	3.937	**11.332.520**	1.968	.945	3.209	.669
KAB5	KAB3	2.756	**10.332.531**	1.968	1.220	1.850	.669
KAB5	KAB3	3.937	**10.332.530**	1.968	1.220	3.031	.669
KAB5	KAB4	2.756	**11.332.541**	1.968	1.535	1.575	.669
KAB5	KAB4*	3.937	**11.332.540**	1.968	1.535	2.756	.669
KAB6	KAB1	2.559	**10.332.611**	2.500	.748	2.618	1.220
KAB6	KAB1	3.937	**11.332.610**	2.500	.748	3.996	1.220
KAB6	KAB2	3.150	**11.332.621**	2.500	.945	2.382	.630
KAB6	KAB2	4.528	**11.332.620**	2.500	.945	3.760	.630
KAB6	KAB3	3.150	**11.332.631**	2.500	1.220	2.205	.630
KAB6	KAB3	4.528	**11.332.630**	2.500	1.220	3.583	.630
KAB6	KAB3	6.300	**11.332.632**	2.500	1.220	5.354	.630
KAB6	KAB4	3.150	**11.332.641**	2.500	1.535	1.929	.630
KAB6	KAB4*	4.528	**11.332.640**	2.500	1.535	3.307	.630
KAB6	KAB4*	6.300	**11.332.642**	2.500	1.535	5.079	.630
KAB6	KAB5	3.150	**11.332.651**	2.500	1.968	1.535	.630
KAB6	KAB5*	4.528	**11.332.650**	2.500	1.968	2.913	.630
KAB6	KAB5*	6.300	**11.332.652**	2.500	1.968	4.685	.630
KAB7	KAB3	3.150	**10.332.731**	3.543	1.220	2.244	.669
KAB7	KAB4	3.937	**10.332.741**	3.543	1.535	2.756	.669
KAB7	KAB5*	3.937	**10.332.751**	3.543	1.969	2.362	.669
KAB7	KAB5*	6.300	**10.332.750**	3.543	1.969	4.724	.669
KAB7	KAB6	5.118	**11.332.761**	3.543	2.520	2.992	.669
KAB7	KAB6*	6.300	**11.332.760**	3.543	2.520	4.173	.669

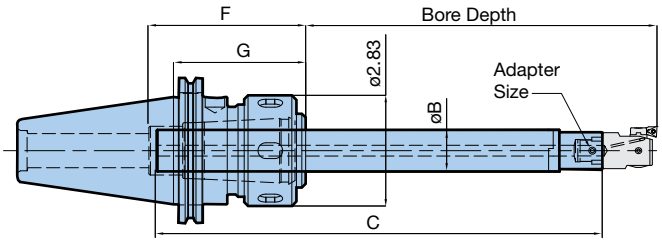
*KAD compatible



KAB Extensions

Male Adapter	Female Adapter	Catalog Number	øB	C
KAB1	KAB1	**10.331.110**	.748	.787
KAB1	KAB1	**10.331.111**	.748	1.181
KAB2	KAB2	**11.331.220**	.945	1.181
KAB2	KAB2	**11.331.221**	.945	1.772
KAB3	KAB3	**11.331.330**	1.220	1.181
KAB3	KAB3	**11.331.331**	1.220	1.772
KAB4	KAB4	**11.331.440**	1.535	1.575
KAB4	KAB4*	**11.331.441**	1.535	2.362
KAB5	KAB5	**11.331.550**	1.968	2.362
KAB5	KAB5*	**11.331.551**	1.968	3.543
KAB6	KAB6	**11.331.660**	2.491	2.362
KAB6	KAB6*	**11.331.661**	2.491	3.937
KAB7	KAB7	**11.331.770**	3.543	3.937
KAB7	KAB7*	**11.331.771**	3.543	6.299

*KAD compatible

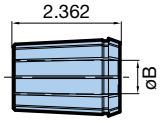


KAB Carbide Bars

Adapter Size	øB	Bore Depth	Catalog Number	C	Bore Diameter	
					Min	Max
KAB1	19mm	5.000	**10.335.320**	5.511	.787	1.417
KAB1	19mm	7.000	**10.335.321**	7.480	.787	1.417
KAB1	19mm	8.920	**10.335.322**	9.449	.787	1.417
KAB1	21mm	5.000	**10.335.380**	5.511	.866	1.417
KAB1	21mm	7.000	**10.335.381**	7.480	.866	1.417
KAB1	21mm	8.920	**10.335.382**	9.449	.866	1.417
KAB1	23mm	5.000	**10.335.383**	5.511	.945	1.417
KAB1	23mm	7.000	**10.335.384**	7.480	.945	1.417
KAB1	23mm	8.920	**10.335.385**	9.449	.945	1.417
KAB2	24mm	5.510	**10.335.323**	6.299	.984	1.850
KAB2	24mm	7.870	**10.335.324**	8.661	.984	1.850
KAB2	24mm	10.630	**10.335.325**	11.417	.984	1.850
KAB2	27mm	5.510	**10.335.386**	6.299	1.102	1.850
KAB2	27mm	7.870	**10.335.387**	8.661	1.102	1.850
KAB2	27mm	10.630	**10.335.388**	11.417	1.102	1.850
KAB2	29mm	5.510	**10.335.389**	6.299	1.181	1.850
KAB2	29mm	7.870	**10.335.390**	8.661	1.181	1.850
KAB2	29mm	10.630	**10.335.391**	11.417	1.181	1.850
KAB3	31mm	7.090	**10.335.326**	7.874	1.260	2.362
KAB3	31mm	9.450	**10.335.331**	10.236	1.260	2.362
KAB3	31mm	12.990	**10.335.327**	13.780	1.260	2.362

Collet Chucks

Taper	Catalog Number	F	G	Wrench
CAT40	**11.335.345**	3.940	3.390	**FK 68-75**
CAT50	**11.335.355**	3.940	3.390	
BBT40	**10.335.344**	3.940	3.390	
HSK-A63	**10.335.342**	3.150	4.090	



Collets

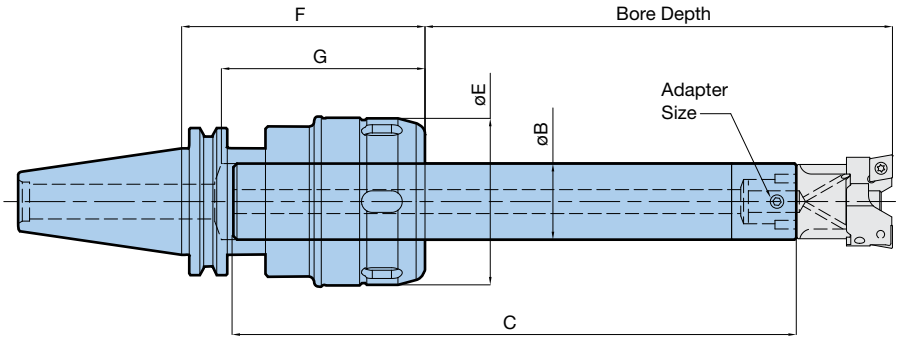
Catalog Number	øB
10.951.100	19mm
10.951.101	21mm
10.951.102	23mm
10.951.103	24mm
10.951.104	27mm
10.951.105	29mm
10.951.106	31mm

Seal Discs

Catalog Number
10.951.110
10.951.111
10.951.112
10.951.113
10.951.114
10.951.115
10.951.116

KAB Heavy Metal Bars

Adapter Size	øB	Bore Depth	Catalog Number	C	Bore Diameter	
					Min	Max
KAB1	.750	7.000	**11.370.321**	7.480	.787	1.220
KAB1	.750	8.920	**11.370.322**	9.450	.787	1.220
KAB2	24mm	7.800	**11.370.324**	8.580	.984	1.575
KAB2	24mm	10.630	**11.370.325**	11.420	.984	1.575
KAB3	1.250	8.150	**11.370.328**	9.250	1.260	2.008
KAB3	1.250	12.680	**11.370.327**	13.780	1.260	2.008
KAB4	1.500	8.940	**11.370.330**	10.000	1.614	2.598
KAB4	1.500	13.690	**11.370.101**	14.750	1.614	2.598

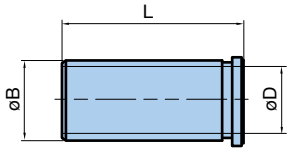


Tool combinations with heavy metal boring bars give higher rigidity and dampening of vibration over conventional steel shank tools when machining long bores over 5:1. Their dense structure and machinability gives higher toughness over carbide.

Heavy metal bars available in KAB1, KAB2, KAB3 and KAB4.

Heavy Metal Bar Holders

Taper	Catalog Number	øB	øE	F	G	Wrench
CAT40	**CV40-HMC1.250-4**	1.250	2.750	4.000	3.340	**FK68-75**
CAT50	**CV50-HMC1.250-4**	1.250	3.140	4.000	4.130	**FK80-90**
CAT50	**CV50-HMC1.500-4.5**	1.500	3.890	4.500	4.210	**FK92-100**
BT40	**BT40-HMC1.250-4.125**	1.250	2.750	4.130	3.540	**FK68-75**
BT50	**BT50-HMC1.250-4.125**	1.250	3.150	4.130	4.130	**FK80-90**

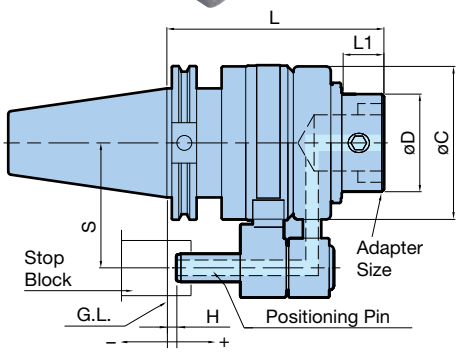


Reduction Sleeves

Catalog Number	øB	øD	L
C1.250-3/4	1.250	.750	2.913
11.613.639	1.250	24mm	2.913

Optional Mega Chuck
See BIG-PLUS® catalog EXi48-4

Hi-Jet Holder



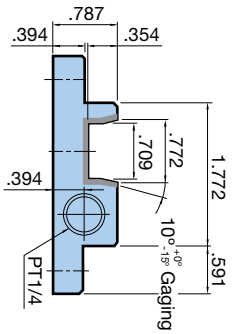
Hi-Jet Holder coolant inducers are for machines without coolant through the spindle. Suitable for automatic tool changer.

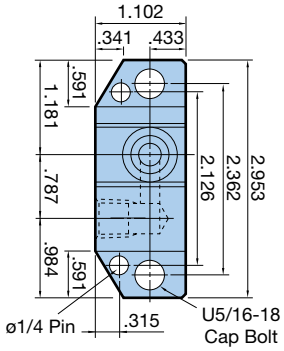
Features:

- Sturdy one-piece design of shank and tool holder
- KA6 or KA7 connection for universal use with boring, milling, internal turning and thread-cutting tools
- Various design features and special coated seal rings enable the coolant inducer to be used with a maximum coolant pressure of 284 PSI and speeds up to 6,000 RPM
- Positioning ring is adjustable from 0° to 360°; therefore the coolant connection can be located in any position
- Three different positioning pins with various setting dimensions allow simple installation of the stop block on the machine tool
- The check valve built into the positioning pin prevents coolant leakage during tool change
- Positive groove location guarantees against leakage between the stop block and the positioning pin

Catalog Number	Adapter Size	øD	L	L1	øC	S	Max RPM	Merit Set
CV40-OCK6N-144	KAB6	2.520	5.669	1.102	3.921	2.559	5,000	**MES-65**
CV50-OCK6N-142	KAB6	2.520	5.591	1.063	3.921	3.150	5,000	**MES-65**
CV50-OCK7N-165	KAB7	3.543	6.496	1.358	5.102	3.150	4,000	**MES-90**

Catalog Number	Adapter Size	øD	L	L1	øC	S	Max RPM	Merit Set
BBT40-OCK6N-149	KAB6	2.520	5.866	1.102	3.921	2.559	6,000	**MES-65**
BBT50-OCK6N-139	KAB6	2.520	5.472	1.063	3.921	3.150	6,000	**MES-65**
BBT50-OCK7N-165	KAB7	3.543	6.496	1.358	5.102	3.150	4,000	**MES-90**



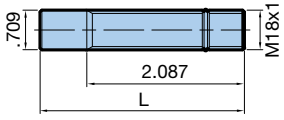


Stop Block

A semi-finished stop block has the proper groove form for use with the Hi-Jet Holder coolant inducer, as well as additional material to allow the customer to machine the block to the correct height.

If a pre-made stop block is unobtainable from the machine tool builder, a semi-finished stop block can be used.

Please consult with the machine tool builder for selection, machining, and mounting of the semi-finished stop block.



Positioning Pins

Catalog Number	CV/BT40 H (-/+)	CV/BT50 H (-/+)	L
LP-A	-.236/+.354	-.354/+.236	3.661
LP-B	+.354/+.945	+.236/+.827	3.071
LP-C	+.945/+1.535	+.827/+1.417	2.480

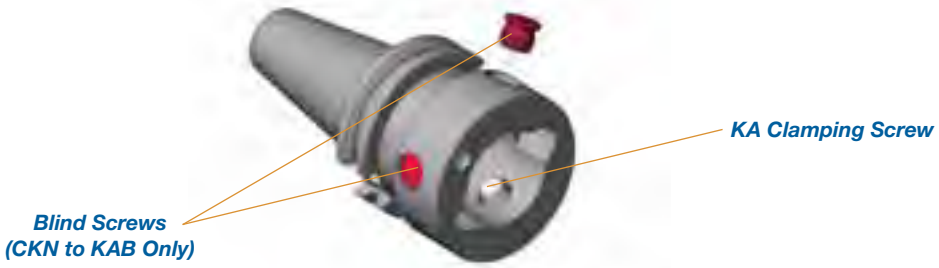
Setting dimension H depends on the length of the positioning pin (see above) and is measured from the gage line of the taper.

Maximum Torque Transmission with Aluminum Tool Components

The new CKN connection is almost 100% compatible with KAB and is based on a 3 screw connection with double connector steel couplings and aluminum tubes as extensions, allowing the highest torque transmission. By tightening the 3 screws, the slotted male connection expands and gives additional rigidity to the tool connection.

Features:

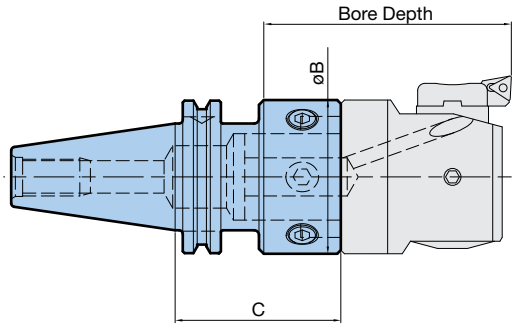
- Double connector couplings and aluminum extensions for the transmission of high torque
- Weight reductions up to 50% with equal cutting performance compared to tool combinations made of steel
- Reduced weight allows easier handling and eliminates manual tool change in many cases
- Maximum rigidity of the tool connection due to high clamping force and expansion of the slotted tool connector
- Vibration dampening due to the use of different materials
- Various lengths of steel couplings & aluminum extensions allow optimized tool length



CAT CKN Shanks (ASME B5.50)

Taper	Adapter Size	Bore Depth	Standard Taper	BIG-PLUS® Taper	øB	C
CAT40	CKN6	3.937	**11.326.462N**	**11.368.462N**	2.500	2.716
CAT50	CKN6	3.937	**11.326.662N**	**11.368.662N**	2.500	2.716
CAT50	CKN7	6.300*	**11.326.674N**	**11.368.674N**	3.543	3.268

*For CKN7, Bore Depth applies for boring heads with length of 4.606"



BT CKN Shanks (MAS 403)

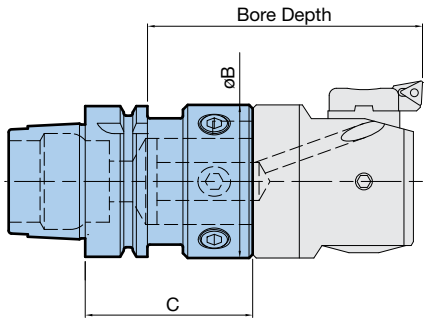
Taper	Adapter Size	Bore Depth	Standard Taper	BIG-PLUS® Taper	øB	C
BT40	CKN6	3.346	—	**10.323.835N**	2.500	1.811
BT40	CKN6	3.937	**10.323.731N**	—	2.500	2.402
BT50	CKN6	3.937	**10.323.770N**	**10.323.870N**	2.500	2.835
BT50	CKN7	6.300*	**10.323.771N**	**10.323.871N**	3.543	3.386

*For CKN7, Bore Depth applies for boring heads with length of 4.606"

HSK-A CKN Shanks (DIN 69893)

Taper	Adapter Size	Bore Depth	Catalog Number	øB	C
HSK-A63	CKN6	4.331	**10.324.361N**	2.500	2.756
HSK-A100	CKN6	4.528	**10.324.561N**	2.500	3.071
HSK-A100	CKN6	5.709	**10.324.563N**	2.500	4.252
HSK-A100	CKN7	6.693*	**10.324.571N**	3.543	3.425
HSK-A100	CKN7	8.268*	**10.324.572N**	3.543	5.000

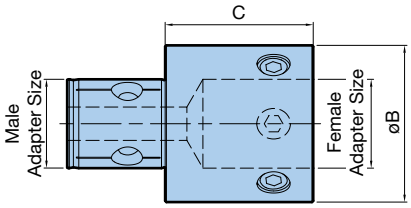
*For CKN7, Bore Depth applies for boring heads with length of 4.606"



Blind Screws

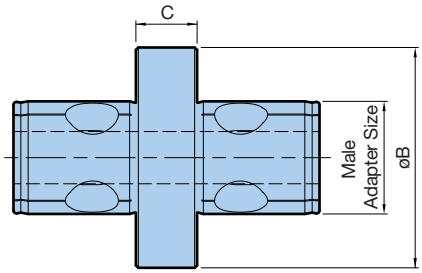
Catalog Number	Designation
10.690.666	CKN6xB5M12x1.0
10.690.667	CKN7xBSM20x1.5

CKN Shanks are supplied with only one KA screw, and the remaining two screws are supplied with all mating CKN components. For CKN to KAB assemblies, two blind screws are required.



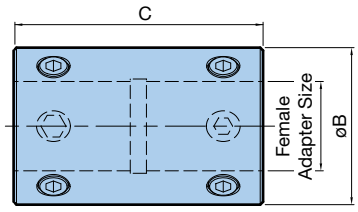
Steel CKN Extensions

Male Adapter	Female Adapter	Catalog Number	øB	C
CKN6	CKN6	**10.331.660N**	2.500	2.362
CKN6	CKN6	**10.331.665N**	2.500	3.937
CKN7	CKN7	**10.331.775N**	3.543	3.937
CKN7	CKN7	**10.331.776N**	3.543	6.299



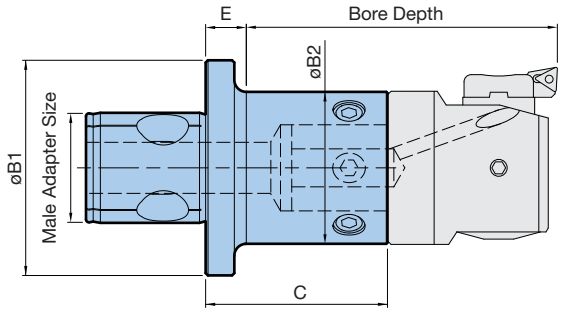
Steel CKN Double Connector Couplings

Male Adapter	Catalog Number	øB	C
CKN6	**10.331.864N**	2.500	0
CKN6	**10.331.865N**	2.500	.787
CKN7	**10.331.874N**	3.543	0
CKN7	**10.331.875N**	3.543	.984
CKN7	**10.331.876N**	3.543	1.968



Aluminum CKN Extension Tubes

Female Adapter	Catalog Number	øB	C
CKN6	**10.331.867N**	2.500	3.150
CKN6	**10.331.868N**	2.500	4.724
CKN7	**10.331.877N**	3.543	3.937
CKN7	**10.331.879N**	3.543	5.905
CKN7	**10.331.878N**	3.543	7.874



Steel CKN Reductions

Male Adapter	Female Adapter	Bore Depth	Catalog Number	øB1	øB2	C	E
CKN7	CKN6	5.118	**10.332.765N**	3.543	2.500	2.992	.669

INDEXABLE INSERT DRILLS OVERVIEW

SERIES 336

Insert Drill Features:

- Large, helical flutes reinforced at the edges provide highest strength and chip space
- Through the tool coolant, directed on both sides at the cutting edges to guarantee optimum cooling and chip evacuation
- Case hardened steel construction for maximum rigidity and toughness

KAB6 and KAB7 Connection Provides:

- Highest stability by clamping the drill to the shank both axially and radially at the largest seating diameter
- Lowest amount of drill runout
- Minimum gauge lengths
- Versatile KAB6 connection for all diameters 3/4" to 2-1/2" allows more flexibility on smaller machines
- Widest range of shanks and coolant inducers

Carbide Inserts:

- ISO standard WCMX inserts for both inside and outside cutting edges provide 3 indexes
- Positive cutting geometry for reduced cutting forces
- Different grades optimize cutting conditions

Insert Drill Sizes:

- KAB6 connection, ø3/4" to ø2-1/2" and ø31mm to ø61mm
- KAB7 connection, ø2-5/8" to ø2-7/8"

Insert Drill Lengths:

- 2xD and 3xD for all sizes

APPLICATION GUIDELINES PG. 27

SERIES 337

Insert Drill Features:

- Straight flute design guarantees a short distance for chip evacuation, high radial and torsional rigidity, and very high cutting performance
- Clockwise cutting, with 4-edge inserts, also suitable to enlarge pre-drilled holes
- Through tool coolant supply to the cutting edge
- Suitable for use as rotating or stationary
- With adjustable drill holder for hole diameters with fractional sizes such as core bores or rough bores before finishing (adjustment range according to table)

KAB6 Connection Provides:

- Very high clamping force, a short gauge length and a large seating diameter
- Suitable for drilling under extreme conditions such as inclined surfaces, semi-circle bores and transverse bores

Carbide Inserts:

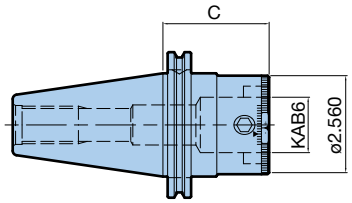
- Same insert type for inner and outer insert
- Indexable inserts for all kinds of workpiece materials, with 4 true cutting edges

Insert Drill Sizes:

- KAB6 connection, ø16mm to ø30mm

Insert Drill Lengths:

- 3xD and 4xD for all sizes



KAB6 Integral Shank Drill Holders for Diameter Adjustment of Indexable Insert Drills

- Accurate, easy-to-read adjusting collar gives ø.004"/div. adjusting precision which can be split for ø.002"/div. or better
- Extremely compact and rigid design for drilling under all conditions
- One holder suitable for ø.748"-2.500"
- Wide adjustment range: Nominal drill +ø.040", -ø.008"

Off-Axis Use of Indexable Insert Drills Series 336

Insert Size	Drill Dia.	Adjustable Range		Bore Diameter	
		-Z	+Z	Min	Max
WC..03	.750	.010	.060	.730	.870
	.781	.010	.050	.761	.881
	.812	.010	.040	.792	.892
WC..04	.845	.010	.080	.825	1.005
	.875	.010	.070	.855	1.015
	.906	.010	.060	.886	1.026
	.938	.010	.050	.918	1.038
	.968	.010	.040	.948	1.048
	1.000	.010	.030	.980	1.060
WC..05	1.031	.010	.100	1.011	1.231
	1.063	.010	.090	1.043	1.243
	1.094	.010	.080	1.074	1.254
	1.125	.010	.070	1.105	1.265
	1.156	.010	.060	1.136	1.276
	1.188	.010	.050	1.168	1.288
WC..06	1.219	.010	.140	1.199	1.499
	1.250	.010	.130	1.230	1.510
	1.312	.010	.120	1.292	1.552
	1.375	.010	.100	1.355	1.575
	1.438	.010	.080	1.418	1.598
	1.500	.010	.070	1.480	1.640
	1.563	.010	.050	1.543	1.663
	1.625	.010	.040	1.605	1.705
	1.688	.010	.020	1.668	1.728
WC..08	1.750	.020	.150	1.710	2.050
	1.812	.020	.140	1.772	2.092
	1.875	.020	.130	1.835	2.135
	1.938	.020	.120	1.898	2.178
	2.000	.020	.100	1.960	2.200
	2.063	.020	.080	2.023	2.223
	2.125	.020	.070	2.085	2.265
	2.188	.020	.050	2.148	2.288
	2.250	.020	.040	2.210	2.330
	2.312	.020	.020	2.272	2.352
	2.375	.020	.010	2.335	2.395
WC..10	2.438	.020	.160	2.398	2.758
	2.500	.020	.150	2.460	2.800
	2.625	.020	.120	2.585	2.865
	2.750	.020	.090	2.710	2.930
	2.875	.020	.060	2.835	2.995
	3.000	.020	.030	2.960	3.060

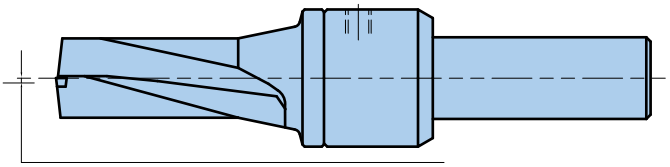
CAT40/50 KAB Holder (ASME B5.50)

Taper	Adapter Size	Catalog Number	C
CV40	KAB6	**11.336.311**	3.189
CV50	KAB6	**11.336.313**	2.716
CV50/DIN B	KAB6	**11.336.315**	2.716

Off-Axis Use of Indexable Insert Drills Series 337

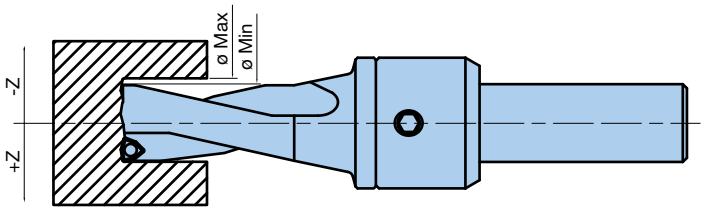
Insert Size	Drill Dia.	Adjustable Range		Bore Diameter	
		–Z	+Z	Min	Max
WP 337-1	16mm	N/A	1.7mm	16mm	19.4mm
	17mm		1.5mm	17mm	20mm
	18mm		1.3mm	18mm	20.6mm
	19mm		1mm	19mm	21mm
	20mm		.8mm	20mm	21.6mm
WP 337-2	21mm		2mm	21mm	25mm
	22mm		1.7mm	22mm	25.4mm
	23mm		1.5mm	23mm	26mm
	24mm		1.2mm	24mm	26.4mm
	25mm		1mm	25mm	27mm
WP 337-3	26mm		1.7mm	26mm	29.4mm
	27mm		1.4mm	27mm	29.8mm
	28mm		1.2mm	28mm	30.4mm
	29mm		.9mm	29mm	30.8mm
	30mm		.7mm	30mm	31.4mm

Stationary Drilling



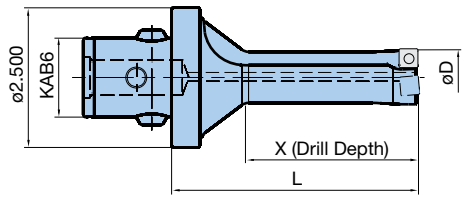
Max .0015" to the middle axis of the spindle

Kaiser Indexable Insert Drills rotate clockwise. Check direction of rotation.

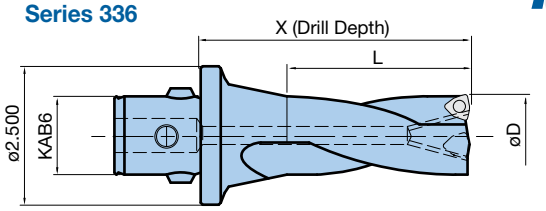


METRIC

Series 337



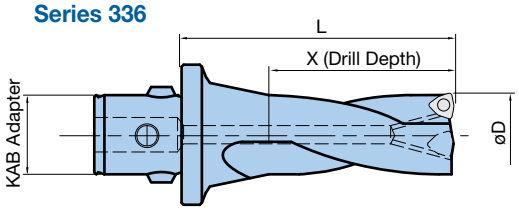
Series 336



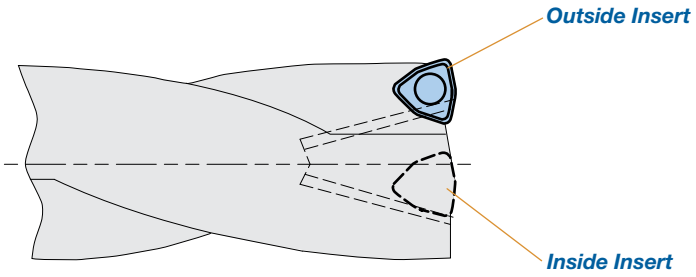
øD	Series	Indexable Drills 3xD			Indexable Drills 4xD			Insert
		Catalog Number	X	L	Catalog Number	X	L	
16	337	**10.337.316**	48	85	**10.337.416**	64	101	WP 337-1
17		**10.337.317**	51	88	**10.337.417**	68	105	
18		**10.337.318**	54	91	**10.337.418**	72	109	
19		**10.337.319**	57	94	**10.337.419**	76	113	
20		**10.337.320**	60	97	**10.337.420**	80	117	
21		**10.337.321**	63	100	**10.337.421**	84	121	WP 337-2
22		**10.337.322**	66	103	**10.337.422**	88	125	
23		**10.337.323**	69	106	**10.337.423**	92	129	
24		**10.337.324**	72	109	**10.337.424**	96	133	
25		**10.337.325**	75	112	**10.337.425**	100	137	
26		**10.337.326**	78	118	**10.337.426**	104	146	WP 337-3
27		**10.337.327**	81	121	**10.337.427**	108	150	
28		**10.337.328**	84	124	**10.337.428**	112	154	
29		**10.337.329**	87	127	**10.337.429**	116	158	
30		**10.337.330**	90	130	**10.337.430**	120	162	
		Indexable Drills 2xD			Indexable Drills 3xD			
31	336	**10.336.631**	62	100	**10.336.731**	93	130	WC..06
32		**10.336.632**	64		**10.336.732**	96		
33		**10.336.633**	66	110	**10.336.733**	99	140	
34		**10.336.634**	68		**10.336.734**	102		
35		**10.336.635**	70		**10.336.735**	105	150	
36		**10.336.636**	72		**10.336.736**	108		
37		**10.336.637**	74		**10.336.737**	111		
38		**10.336.638**	76	125	**10.336.738**	114	160	
39		**10.336.639**	78		**10.336.739**	117		
40		**10.336.640**	80		**10.336.740**	120	165	
41		**10.336.641**	82		**10.336.741**	123		
42		**10.336.642**	84		**10.336.742**	126		
43		**10.336.643**	86	140	**10.336.743**	129	180	
44		**10.336.644**	88		**10.336.744**	132		
45		**10.336.645**	90		**10.336.745**	135		WC..08
47		**10.336.647**	94		**10.336.747**	141	190	
49		**10.336.649**	98	150	**10.336.749**	147	200	
51		**10.336.651**	102		**10.336.751**	153		
53		**10.336.653**	106	160	**10.336.753**	159	215	
55		**10.336.655**	110		**10.336.755**	165		
57		**10.336.657**	114	165	**10.336.757**	171	220	
59		**10.336.659**	118		**10.336.759**	177		
61		**10.336.661**	122		**10.336.761**	183		WC..10

INCH

Series 336

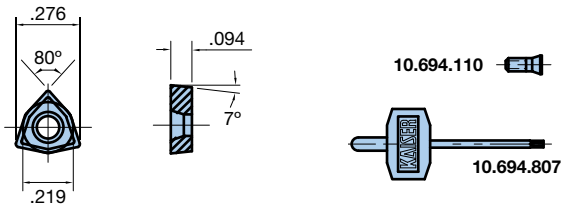


øD	Adapter Size	Indexable Drills 2xD			Indexable Drills 3xD			Inside Insert	Outside Insert
		Catalog Number	X	L	Catalog Number	X	L		
.750	KAB6	**10.336.001**	1.500	2.952	**10.336.050**	2.250	3.543	WC..04	WC..03
.781		**10.336.002**	1.562		**10.336.051**	2.343			
.812		**10.336.003**	1.625		**10.336.052**	2.436			
.845		**10.336.004**	1.690	3.150	**10.336.053**	2.535	3.937	WC..05	WC..04
.875		**10.336.005**	1.750		**10.336.054**	2.625			
.906		**10.336.006**	1.812		**10.336.055**	2.718			
.938		**10.336.007**	1.875	3.543	**10.336.056**	2.815	4.331		
.968		**10.336.008**	1.938		**10.336.057**	2.907			
1.000		**10.336.009**	2.000		**10.336.058**	3.000			
1.031		**10.336.010**	2.062		**10.336.059**	3.093	4.528	WC..05	
1.063		**10.336.011**	2.125		**10.336.060**	3.189			
1.094		**10.336.012**	2.188	3.937	**10.336.061**	3.282	4.921		
1.125		**10.336.013**	2.250		**10.336.062**	3.375			
1.156		**10.336.014**	2.312		**10.336.063**	3.468			
1.188		**10.336.015**	2.375		**10.336.064**	3.564	5.118		
1.219		**10.336.016**	2.438		**10.336.065**	3.657		WC..06	
1.250		**10.336.017**	2.500		**10.336.066**	3.750			
1.312		**10.336.018**	2.625	4.331	**10.336.067**	3.938	5.512		
1.375		**10.336.019**	2.750		**10.336.068**	4.125	5.906		
1.438		**10.336.020**	2.875		**10.336.069**	4.314			
1.500		**10.336.021**	3.000	4.921	**10.336.070**	4.500	6.299		
1.563		**10.336.022**	3.125		**10.336.071**	4.688	6.496		
1.625		**10.336.023**	3.250		**10.336.072**	4.875			
1.688		**10.336.024**	3.375	5.512	**10.336.073**	5.064	7.087		
1.750		**10.336.025**	3.500		**10.336.074**	5.250		WC..08	
1.812		**10.336.026**	3.625		**10.336.075**	5.436			
1.875		**10.336.027**	3.750		**10.336.076**	5.625	7.480		
1.938		**10.336.028**	3.875	5.906	**10.336.077**	5.814	7.874		
2.000		**10.336.029**	4.000		**10.336.078**	6.000			
2.063		**10.336.030**	4.125		**10.336.079**	6.188			
2.125		**10.336.031**	4.250	6.299	**10.336.080**	6.375	8.465		
2.188		**10.336.032**	4.375		**10.336.081**	6.564			
2.250		**10.336.033**	4.500	6.496	**10.336.082**	6.750	8.661		
2.312		**10.336.034**	4.625		**10.336.083**	6.936			
2.375		**10.336.035**	4.750		**10.336.084**	7.125			
2.438		**10.336.036**	4.875		**10.336.085**	7.314	9.252	WC..10	
2.500		**10.336.037**	5.000		**10.336.086**	7.500			
2.625	KAB7	**10.336.038**	5.250	7.480	**10.336.087**	7.875	10.039		
2.750		**–**	–		**10.336.088**	8.250	10.236		
2.875		**10.336.040**	5.750	8.268	**10.336.089**	8.625	11.024		



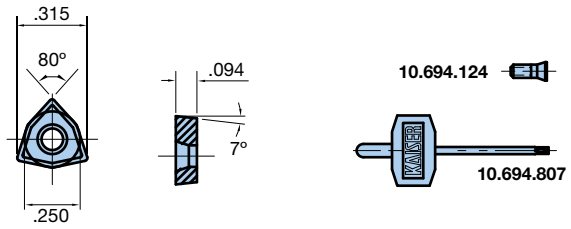
Insert Selection

Material	Inside/Outside Insert — Series 336						Inside/Outside Insert — Series 337		
	WC..03	WC..04	WC..05	WC..06	WC..08	WC..10	WP 337-1	WP 337-2	WP 337-3
Carbon Steels 10XX-15XX 1018, 1212, 1551	**11.658.620**	**11.658.630**	**11.658.640**	**11.658.650**	**11.658.660**	**10.655.670**	**10.655.910**	**10.655.920**	**10.655.930**
Alloy Steels 21XX-92XX 4130, 4340, 8620	**11.658.620**	**11.658.630**	**11.658.640**	**11.658.650**	**11.658.660**	**10.655.670**	**10.655.910**	**10.655.920**	**10.655.930**
300 Series Stainless Steels 304, 316, 17-4Ph	**11.658.626**	**11.658.634** **11.658.636**	**11.658.644** **11.658.646**	**11.658.654** **11.658.656**	**11.658.664** **11.658.666**	**10.655.671**	**10.655.911**	**10.655.921**	**10.655.931**
400 Series Stainless Steels Martensitic	**11.658.626**	**11.658.634** **11.658.636**	**11.658.644** **11.658.646**	**11.658.654** **11.658.656**	**11.658.664** **11.658.666**	**10.655.671**	**10.655.912**	**10.655.922**	**10.655.932**
Cast Iron Grey	**11.658.624**	**11.658.634**	**11.658.644**	**11.658.654**	**11.658.664**	**10.655.671** **10.655.670**	**10.655.912**	**10.655.922**	**10.655.932**
Cast Iron Ductile/Nodular	**11.658.624**	**11.658.634**	**11.658.644**	**11.658.654**	**11.658.664**	**10.655.671** **10.655.670**	**10.655.911**	**10.655.921**	**10.655.931**
Exotics Titanium, Inconel, etc.	**11.658.626**	**11.658.634** **11.658.636**	**11.658.644** **11.658.646**	**11.658.654** **11.658.656**	**11.658.664** **11.658.666**	**10.655.671**	**10.655.913**	**10.655.923**	**10.655.933**
Brass and Bronze	**11.658.624**	**11.658.634**	**11.658.644**	**11.658.654**	**11.658.664**	**10.655.671**	**10.655.913**	**10.655.923**	**10.655.933**
Aluminum and Non-Ferrous	**11.658.624**	**11.658.634**	**11.658.644**	**11.658.654**	**11.658.664**	**10.655.671**	**10.655.913**	**10.655.923**	**10.655.933**



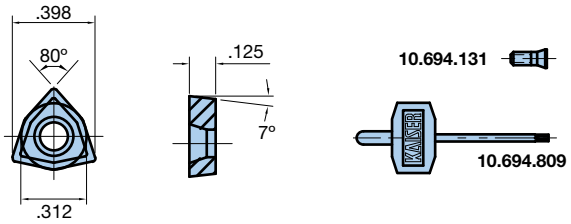
WC..03

Catalog Number	Designation	Rake Angle	Radius	Grade
11.658.620	WC033115C6TNP15	15°	.031	TN15
11.658.624	WC033115C2P	15°	.031	C2
11.658.626	WC033115C5TNP12	15°	.031	TN12



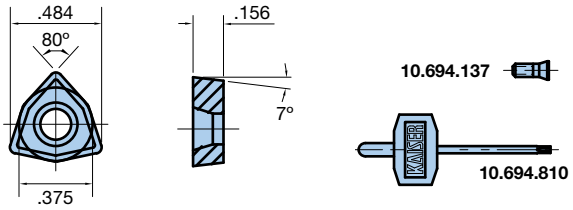
WC..04

Catalog Number	Designation	Rake Angle	Radius	Grade
11.658.630	WC043115C6TNP15	15°	.031	TN15
11.658.634	WC043115C2P	15°	.031	C2
11.658.636	WC043115C5TNP12	15°	.031	TN12



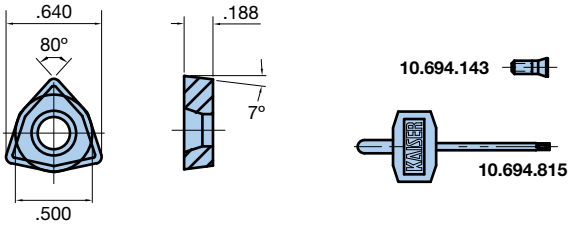
WC..05

Catalog Number	Designation	Rake Angle	Radius	Grade
11.658.640	WC053115C6TNP15	15°	.031	TN15
11.658.644	WC053115C2P	15°	.031	C2
11.658.646	WC053115C5TNP12	15°	.031	TN12



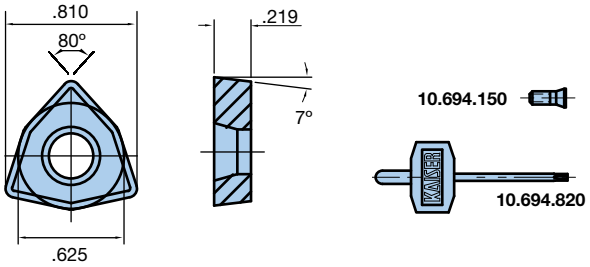
WC..06

Catalog Number	Designation	Rake Angle	Radius	Grade
11.658.650	WC063115C6TNP15	15°	.031	TN15
11.658.654	WC063115C2P	15°	.031	C2
11.658.656	WC063115C5TNP12	15°	.031	TN12



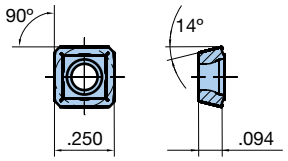
WC..08

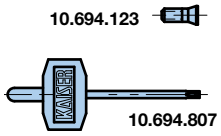
Catalog Number	Designation	Rake Angle	Radius	Grade
11.658.660	WC084715C6TNP15	15°	.047	TN15
11.658.664	WC084715C2P	15°	.047	C2
11.658.666	WC084715C5TNP12	15°	.047	TN12



WC..10

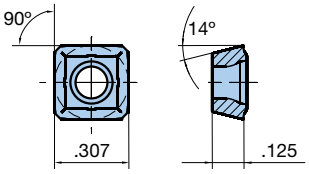
Catalog Number	Designation	Rake Angle	Radius	Grade
10.655.670	WC104715C6TNP15	15°	.047	TN15
10.655.671	WC104715C2P	15°	.047	C2

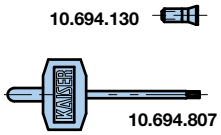




WP 337-1

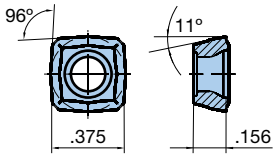
Catalog Number	Designation	Rake Angle	Grade
10.655.910	WP 337-1 16/20	15°	TNP11
10.655.911	WP 337-1 16/20	15°	TNP12
10.655.912	WP 337-1 16/20	15°	TNP16
10.655.913	WP 337-1 16/20	15°	C2P

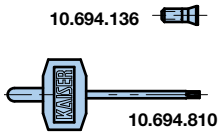




WP 337-2

Catalog Number	Designation	Rake Angle	Grade
10.655.920	WP 337-2 21/25	15°	TNP11
10.655.921	WP 337-2 21/25	15°	TNP12
10.655.922	WP 337-2 21/25	15°	TNP16
10.655.923	WP 337-2 21/25	15°	C2P





WP 337-3

Catalog Number	Designation	Rake Angle	Grade
10.655.930	WP 337-3 26/30	15°	TNP11
10.655.931	WP 337-3 26/30	15°	TNP12
10.655.932	WP 337-3 26/30	15°	TNP16
10.655.933	WP 337-3 26/30	15°	C2P

Cutting Data

Material	Cutting Speed SFM		Feed IPR				
	Coolant Delivery		Drill Diameter				
	Flood	Through Tool	≤ø.812"	ø.845"-1.000"	ø1.031"-1.188"	ø1.219"-1.688"	ø1.750" & Over
Carbon Steel 10XX-15XX, 1018, 1212, 1551	250-400	575-800	.0020	.0040	.0050	.006	.0080
Alloy Steel 21XX-92XX, 4130, 4340, 8620	230-350	550-700	.0020	.0040	.0050	.006	.0080
300 Series Stainless Steel 304, 316, 17-4Ph	230-350	450-580	.0025	.0030	.0035	.004	.0045
400 Series Stainless Steel 410, 430	230-350	490-620	.0025	.0030	.0035	.004	.0045
Grey Cast Iron	250-360	600-750	.0040	.0055	.0060	.007	.0080
Ductile/Nodular Cast Iron	230-270	460-590	.0040	.0055	.0060	.007	.0080
Aluminum & Non-Ferrous	325-400	650-1150	.0060	.0085	.0085	.010	.0120

Cutting Speed:

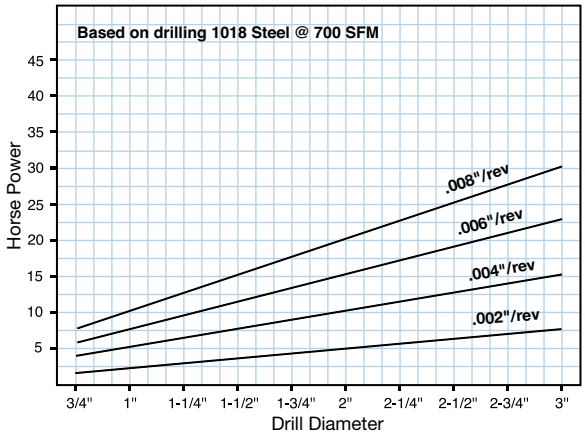
$$RPM = \frac{SFM \times 3.82}{Drill\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$

$$hP = \frac{(.785)(D^2)(RPM)(IPR)}{K}$$

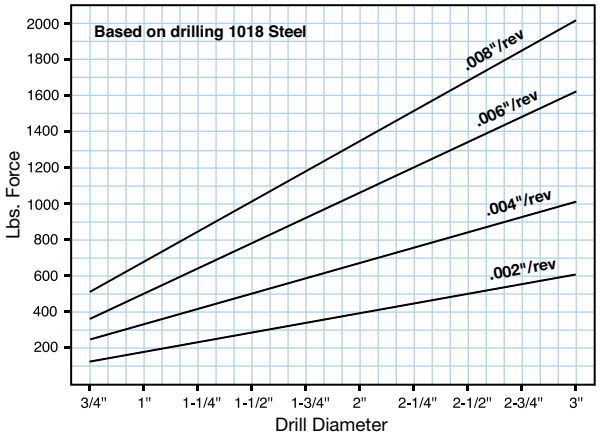
Horse Power Requirements



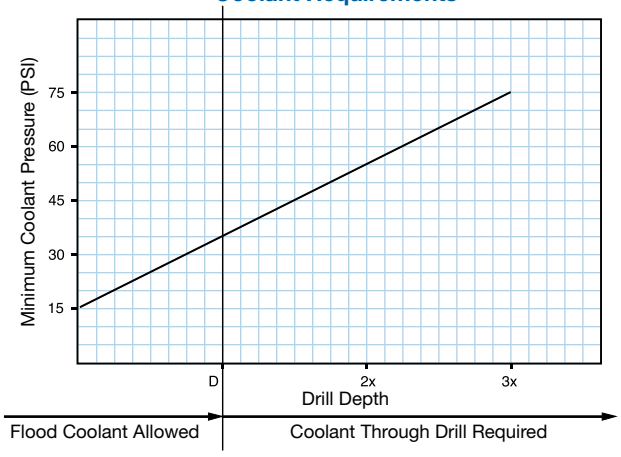
K Values

Carbon Steel	1.6
Alloy Steel	1.3
Stainless Steel	1
Grey Cast Iron	1.7
Ductile/Nodular Cast Iron	1.5
Aluminum & Non-Ferrous	3.4

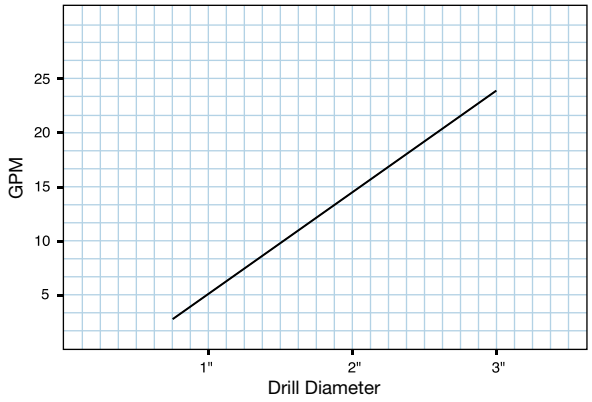
Thrust Requirements



Coolant Requirements*



Coolant Volume*



*For coolant requirements and coolant volume, add 10-20% for vertical drilling operations

A disc is generated during through-boring operations. In case of rotating workpieces, there is an accident hazard due to the development of centrifugal force. Therefore, always work with safety guards.

The Kaiser Spade Drill Program

Kaiser Spade Drills utilize the KAB modular tool system, a proven and effective connection providing the highest possible rigidity and accuracy. With today's emphasis in modern machine shops being placed on modular and semi-modular tooling, Kaiser has taken the concept one step further by incorporating Spade Drill technology into the system. Kaiser Spade Drills are high performance, high production drills, with production levels exceeding uncoated HSS drills by at least 50%.

Eight KAB6 holders are offered to cover a drilling range of ø.531"-2.500" in drill depths of 2-1/2x, 4x, and 6x drill diameter. Replaceable blades are offered in two grades, TiN coated, and ground to exact dimensions and tolerances on CNC equipment.

The KAB System

Kaiser's KAB modular tool system allows for unique and versatile tool configurations in conjunction with Spade Drill use. Coolant induced, extended length and obsolete design shanks, along with extensions and reductions, can all be incorporated into the system to give users the best design possible for optimum tool rigidity and length. Our application engineers can assist with your application needs and can offer a complete tool drawing to show all pertinent information.

Blades

HSS grade can be used to cover up to 80% of all applications. Offered in drill diameters of ø.719"-2.500", HSS blades are made from tough, fine grain tool steel (CPM-M4HSS) allowing them to be very forgiving in high production situations.

SC (Super Cobalt) grade contains a higher cobalt content to provide higher wear resistance when drilling materials such as alloy and high strength alloy steel, high temperature alloys, and structural steels whose hardness is Rc 25+. Consult our recommended speeds and feeds table for complete application guidelines.

Solid carbide (C2 and C5) grades are also available upon request for drill diameters of ø.531"-1.375" for applications requiring the highest wear resistance. Consult our engineering department for details and information.

Material	Material Hardness (BHN)	SFM	Feed IPR				
			ø.531"-.688"	ø.688"-1.000"	ø1.000"-1.250"	ø1.250"-2.000"	ø2.000"-2.500"
Free Machining Steel 1118, 1215, 12L14, etc.	100-150	200	.010	.013	.016	.020	.025
	150-200	180	.010	.013	.016	.020	.025
	200-250	160	.010	.013	.016	.020	.025
Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85-125	170	.009	.012	.015	.020	.025
	125-175	160	.009	.012	.015	.020	.025
	175-225	150	.008	.010	.014	.018	.022
	225-275	140	.008	.010	.014	.018	.022
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125-175	160	.009	.012	.015	.020	.025
	175-225	150	.008	.010	.014	.018	.022
	225-275	140	.008	.010	.014	.018	.022
	275-325*	130	.007	.009	.012	.016	.020
Alloy Steel 4140, 5140, 8640, etc.	125-175	150	.008	.010	.014	.017	.020
	175-225	140	.008	.010	.014	.017	.020
	225-275	130	.007	.010	.014	.017	.020
	275-325*	120	.006	.009	.012	.015	.018
	325-375*	110	.006	.009	.012	.015	.018
High Strength Alloy 4340, 4330V, 300M, etc.	225-300*	80	.007	.009	.010	.014	.018
	300-350*	60	.007	.009	.010	.014	.018
	350-400*	50	.006	.008	.009	.012	.016
Structural Steel A36, A285, A516, etc.	100-150	140	.010	.012	.014	.018	.022
	150-250	120	.009	.010	.012	.016	.020
	250-350*	100	.008	.009	.010	.014	.017
High Temp. Alloy Hastelloy B, Inconel 600, etc.	140-220*	30	.007	.008	.010	.012	.015
	220-310*	25	.006	.007	.080	.010	.012
Stainless Steel 310, 316, 330, 17-4 PH, etc.	135-185	75	.008	.009	.011	.014	.016
	185-275	60	.007	.008	.010	.012	.014
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	150-200	80	.006	.008	.010	.012	.015
	200-250	60	.006	.008	.010	.012	.015
Aluminum	30	600	.013	.016	.022	.030	.035
	180	300	.013	.016	.022	.030	.035
Cast Iron (TiN Coated HSS Tools)	120-150	170	.012	.016	.020	.024	.028
	150-200	150	.011	.014	.018	.022	.026
	200-220	130	.009	.012	.016	.018	.022
	220-260*	110	.007	.009	.012	.014	.017
	260-320*	90	.006	.007	.009	.011	.014

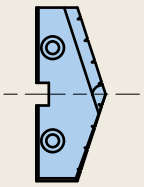
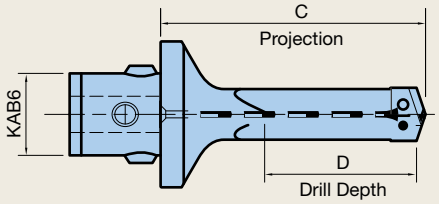
*SC grade recommended
- Reductions in speed may be required due to excessive tool wear
- Always use an ample supply of coolant through the tool

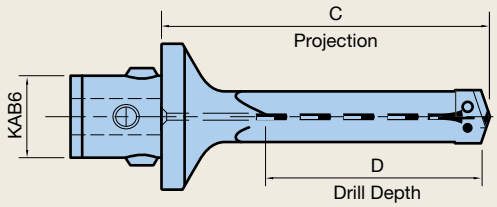
Formulas: $IPM = RPM \times IPR$ $SFM = \frac{RPM \times Drill\ ø}{3.82}$ $RPM = \frac{SFM \times 3.82}{Drill\ ø}$

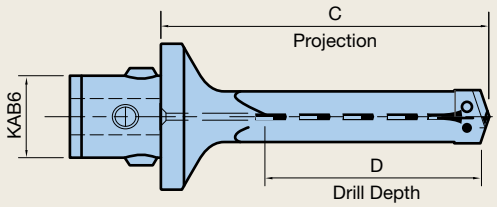
The speeds and feeds listed above are only a starting point! Contact our engineering department if you require assistance. Please have item number, hole diameter, depth, material grade, BHN hardness and coolant pressure information available when you call. Additional information such as part and machine rigidity, horse power and thrust limits, vertical or horizontal spindle, revolving or stationary tool, flood or through holder coolant are also very helpful to our Application Engineers when you require their best recommendation.

The above recommendations are based on adequate coolant flow, machine rigidity, horse power and thrust capability.

Wear protective eye glasses and use machine protective shields.

+.005 -.000					
Drill Diameter	HSS Grade	SC Grade	2 1/2xD	±.016 C	D Max
.531	–	**11.341.025**	**11.340.602 Designation KSD 0x13-17/39xKA6 Insert Screws 11.341.901**	3.890	1.531
.562	–	**11.341.026**			
.594	–	**11.341.027**			
.625	–	**11.341.028**	**11.340.612 Designation KSD 0.5x15-17/39xKA6 Insert Screws 11.341.902**	3.890	1.531
.656	–	**11.341.029**			
.688	–	**11.341.030**			
.719	**11.341.101**	**11.341.125**	**11.340.622 Designation KSD 1x18-24/52xKA6 Insert Screws 11.341.903**	4.550	2.062
.750	**11.341.102**	**11.341.126**			
.781	**11.341.103**	**11.341.127**			
.812	**11.341.104**	**11.341.128**			
.844	**11.341.105**	**11.341.129**			
.875	**11.341.106**	**11.341.130**	**11.340.632 Designation KSD 1.5x22-24/52xKA6 Insert Screws 11.341.904**	4.550	2.062
.906	**11.341.107**	**11.341.131**			
.934	**11.341.108**	**11.341.132**			
1.000	**11.341.202**	**11.341.226**	**11.340.642 Designation KSD 2x25-35/75xKA6 Insert Screws 11.341.905**	5.430	2.938
1.062	**11.341.204**	**11.341.228**			
1.125	**11.314.206**	**11.341.230**			
1.188	**11.341.208**	**11.341.232**	**11.340.652 Designation KSD 2.5x30-35/75xKA6 Insert Screws 11.341.905**	5.430	2.938
1.250	**11.341.210**	**11.341.234**			
1.312	**11.341.212**	**11.341.236**			
1.375	**11.341.214**	**11.341.238**			
1.438	**11.341.302**	**11.341.326**	**N/A**	–	–
1.500	**11.341.304**	**11.341.328**			
1.562	**11.341.306**	**11.341.330**			
1.625	**11.341.308**	**11.341.332**			
1.688	**11.341.310**	**11.341.334**			
1.750	**11.341.312**	**11.341.336**			
1.812	**11.341.314**	**11.341.338**			
1.875	**11.341.316**	**11.341.340**			
2.000	**11.341.404**	**11.341.428**	**N/A**	–	–
2.125	**11.341.408**	**11.341.432**			
2.250	**11.341.412**	**11.341.436**			
2.375	**11.341.416**	**11.341.440**			
2.500	**11.341.420**	**11.341.444**			





	4xD	±.016 C	D Max	6xD	±.016 C	D Max
	11.340.604 Designation KSD 0x13-17/62xKA6 Insert Screws 11.341.901	4.790	2.438	**N/A**	—	—
	11.340.614 Designation KSD 0.5x15-17/62xKA6 Insert Screws 11.341.902	4.790	2.438	**N/A**	—	—
	11.340.624 Designation KSD 1x18-24/84xKA6 Insert Screws 11.341.903	5.800	3.312	**N/A**	—	—
	11.340.634 Designation KSD 1.5x22-24/84xKA6 Insert Screws 11.341.904	5.800	3.312	**N/A**	—	—
	11.340.644 Designation KSD 2x25-35/119xKA6 Insert Screws 11.341.905	7.180	4.688	**11.340.646 Designation KSD 2x25-35/187xKA6 Insert Screws 11.341.905**	9.805	7.375
	11.340.654 Designation KSD 2.5x30-35/119xKA6 Insert Screws 11.341.905	7.180	4.688	**11.340.656 Designation KSD 2.5x30-35/187xKA6 Insert Screws 11.341.905**	9.805	7.375
	11.340.664 Designation KSD 3x36-47/167xKA6 Insert Screws 11.341.906	9.650	6.562	**11.340.665 Designation KSD 3x36-47/210xKA6**	11.086	8.250
	11.340.674 Designation KSD 4x48-65/227xKA6 Insert Screws 11.341.906	12.060	8.938	**N/A**	—	—

Twin Cutter Rough Boring Heads Series 319 & 315 – Boring Range ø.787"-8.000" (ø20mm-203mm)

Kaiser 319 and 315 twin cutter boring heads are designed for heavy duty rough boring and semi-finishing operations. Their compact, sturdy design and positive geometry allow almost chatter free operation even in interrupted cuts and high cutting speeds. Twin cutter boring heads can outperform single cutter finishing heads by a factor of up to 4 times. Large stock allowances and high feed rates permit high production while assuring optimum bore roundness and location, two important quality features for today's tighter control of part geometry. In many cases, these tools can eliminate the need for semi-finishing cuts due to the superb balance of cutting forces, even under the most severe casting core shift.

Kaiser 319 and 315 series tools use ISO standard inserts with positive cutting geometry for reduced cutting forces. The top clamp-free mounting of the inserts and wide open chip spaces between the insert holders allows perfect chip formation and evacuation. Different grades and geometry's of carbide and silicon nitride inserts are available to optimize all application criteria.

Through spindle coolant capability is standard on all 319 and 315 heads.

Primary applications include:

- Castings, grey iron and steel
- Weldments
- Precision bore location and roundness
- Forgings
- Ideal alternative to circular milling

Twin cutter bore tolerances: .004" (.10mm) with tool presetter

Repeatability of bore size: .0002" (.005mm) w/out insert wear

Location of bore and roundness: .0005" (.012mm)

- Tolerances, location, and roundness all assume rigid machine tool and workpiece

Series 319 "SW" Twin Cutter Boring Heads

Boring Range: ø.787"-8.000" (ø20mm-203mm) ..... Pg. 33-35

The new Series 319 "SW" heads were designed with ultimate performance and versatility in mind. These heads can perform balanced or stepped cutting without additional accessories or adjustments simply by switching the mounting locations of the insert holders that have varied heights.

Series 315 "TWN" Twin Cutter Boring Heads

Boring Range: ø.787"-8.000" (ø20mm-203mm) ..... Pg. 36-38

"TWN" roughing heads are ideal for heavy duty, economical rough boring for most applications without height adjustment. They offer a setting scale for coarse diameter adjustment and adjustable coolant ports (ø2.087" and larger).

Features:

- Different roughing methods without additional components and without length adjustment
- Rotationally symmetrical roughing (RSS), for stock removal up to 10% of the final bore diameter with high feed rates
- Double offset roughing (DVS), cutting edges displaced in diameter and lengths, for stock removal up to 20% of the final bore diameter with half the feed rate
- Both methods without additional components such as spacers or special insert holders and without length adjustment
- Length accuracy due to ground serrations on both ends between tool body and insert holder
- Presetting of the tool in diameter and length without presetter thanks to fixed tool lengths and diameter scale
- Diameter adjustment in both directions over one adjustment screw with defined pitch for accurate incremental adjustment

  SW20-SW32, P = .25mm (.010")

  SW41-SW148, P = .5mm (.020")
- High quality coated tool body and insert holder for complete protection against corrosion
- Insert holder with extended boring range for additional chip space for blind hole roughing

Remark:

If the reference line marking on one of the holders is aligned to the RSS marking on the tool body and on the other one to DVS, then there is a wrong pair of insert holders mounted. In this configuration the boring head may not be used.

Fig. 1

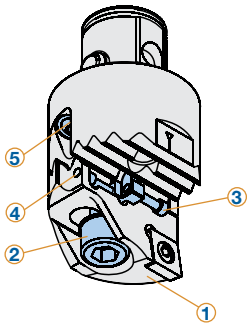


Fig. 2

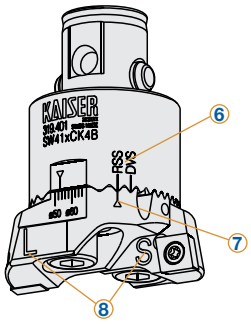


Fig. 3

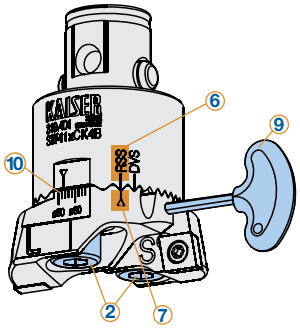
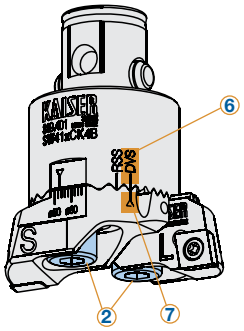


Fig. 4



Operating Instructions:

Fig. 1

The insert holders ① are fixed with clamp screws ② on the tool body. A special mechanism with adjustment screw ③ mounted on the tool body, serves for diameter setting in both directions. On the insert holders, opposite of the cutting edge, a small hole ④ allows access for an Allen wrench to the adjustment screw.

The rough boring heads SW53 (10.319.501) and bigger are equipped with an adjustable coolant nozzle ⑤. By means of a small bar, the nozzle can be adjusted to the cutting edge.

Fig. 2

The tool body is marked with “RSS” and “DVS” ⑥. On the insert holders there is a reference line marking ⑦. The shorter of the two insert holders is marked with “S” ⑧ and the longer one with “L” ⑧.

Make sure that the boring head is always used with a short insert holder “S” and a long insert holder “L”.

Fig. 3 — Balanced Cutting (RSS)

Mount the insert holders on the tool body in such a way that on both insert holders, the reference line marking ⑦ is aligned to the RSS markings ⑥ on the tool body.

Adjust both cutting edges to the same diameter by means of an Allen wrench ⑨. The scale ⑩ on the insert holder serves for the rough diameter setting. Tighten both clamp screws ② with the given torque (See Pg. 39).

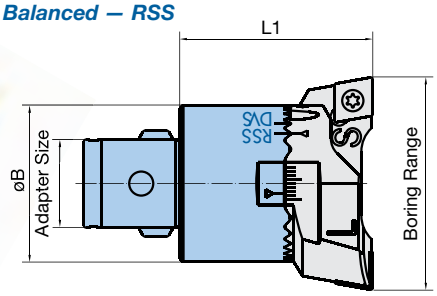
Fig. 4 — Stepped Cutting (DVS)

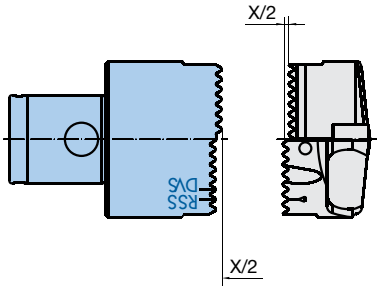
Mount the insert holders on the tool body in such a way that the reference line marking ⑦ on both insert holders is aligned to the DVS markings ⑥ on the tool body.

Adjust the cutting edge on insert holder “L” to half of the stock allowance and the cutting edge on insert holder “S” to the final diameter. Tighten both clamp screws ② with the given torque (See Pg. 39).

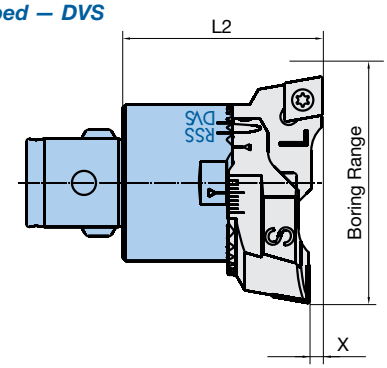
NEW!

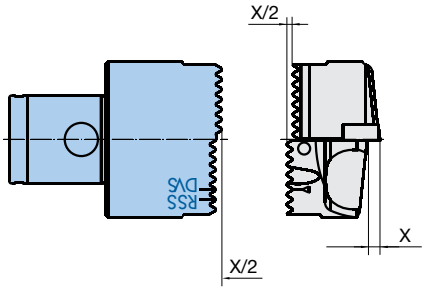
Balanced — RSS





Stepped — DVS





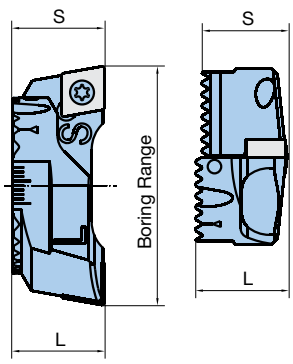
KAB Boring Heads

Head Type	Adapter Size	Catalog Number	Boring Range		øB	L1	L2	X (Step)
			Min	Max				
SW20	KAB1	**10.319.101**	.787	1.220	.748	1.280	1.284	.008
SW25	KAB2	**10.319.201**	.984	1.575	.945	1.398	1.402	
SW32	KAB3	**10.319.301**	1.260	2.008	1.220	1.575	1.579	
SW41	KAB4	**10.319.401**	1.614	2.598	1.535	1.850	1.858	.016
SW53	KAB5	**10.319.501**	2.087	3.386	1.969	2.244	2.252	
SW68	KAB6	**10.319.601**	2.677	4.331	2.500	2.795	2.803	
SW98	KAB6	**10.319.602**	3.858	6.024	3.543	2.795	2.803	
SW148	KAB6	**10.319.603**	5.827	8.000	5.512	2.795	2.803	
SW98	KAB7	**10.319.701**	3.858	6.024	3.543	3.425	3.433	
SW98L	KAB7	**10.319.702**	3.858	6.024	3.543	4.606	4.614	
SW148	KAB7	**10.319.703**	5.827	8.000	5.512	4.606	4.614	

CKN Boring Heads

Head Type	Adapter Size	Catalog Number	Boring Range		øB	L1	L2	X (Step)
			Min	Max				
SW68	CKN6	**10.319.601N**	2.677	4.331	2.500	2.795	2.803	.016
SW98	CKN6	**10.319.602N**	3.858	6.024	3.543	2.795	2.803	
SW148	CKN6	**10.319.603N**	5.827	8.000	5.512	2.795	2.803	
SW98	CKN7	**10.319.701N**	3.858	6.024	3.543	3.425	3.433	
SW98L	CKN7	**10.319.702N**	3.858	6.024	3.543	4.606	4.614	
SW148	CKN7	**10.319.703N**	5.827	8.000	5.512	4.606	4.614	

SPARE PARTS PG. 39

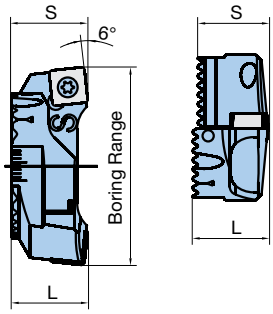


CC Insert Holders (Sold in Pairs)

Head Type	Catalog Number	Boring Range		S	L	Insert	Insert Screw	Insert Screw Wrench
		Min	Max					
SW20	**10.639.413**	.787	1.024	.520	.524	CC..06	**10.694.122**	**10.694.807**
	10.639.417	.984	1.220	.520	.524			
SW25	**10.639.423**	.984	1.299	.591	.595	CC..06	**10.694.122**	**10.694.807**
	10.639.427	1.260	1.575	.591	.595			
SW32	**10.639.433**	1.260	1.654	.736	.740	CC..09	**10.694.141**	**10.694.815**
	10.639.437	1.614	2.008	.736	.740			
SW41	**10.639.443**	1.614	2.126	.795	.803	CC..09	**10.694.141**	**10.694.815**
	10.639.447	2.087	2.598	.795	.803			
SW53	**10.639.453**	2.087	2.756	1.079	1.087	CC..12	**10.694.150**	**10.694.820**
	10.639.457	2.717	3.386	1.079	1.087			
SW68	**10.639.463**	2.677	3.543	1.374	1.382	CC..12	**10.694.150**	**10.694.820**
	10.639.467	3.465	4.331	1.374	1.382			
SW98	**10.639.473**	3.858	4.961	1.472	1.480	CC..12	**10.694.150**	**10.694.820**
	10.639.477	4.921	6.024	1.472	1.480			
SW148	**10.639.483**	5.827	6.929	1.472	1.480	CC..12	**10.694.150**	**10.694.820**
	10.639.487	6.890	8.000	1.472	1.480			

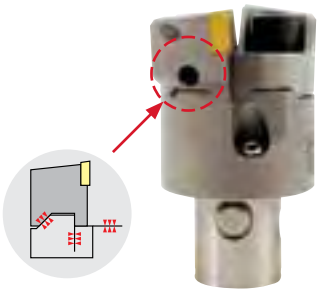
Additional Insert Holders — CC..16

SW68	**10.639.563**	2.677	3.543	1.374	1.382	CC..16	**10.694.150**	**10.694.820**
	10.639.567	3.465	4.331	1.374	1.382			
SW98	**10.639.573**	3.858	4.961	1.472	1.480	CC..16	**10.694.150**	**10.694.820**
	10.639.577	4.921	6.024	1.472	1.480			
SW148	**10.639.583**	5.827	6.929	1.472	1.480	CC..16	**10.694.150**	**10.694.820**
	10.639.587	6.890	8.000	1.472	1.480			



SP & SC Insert Holders (Sold in Pairs)

Head Type	Catalog Number	Boring Range		S	L	Insert	Insert Screw	Insert Screw Wrench
		Min	Max					
SW20	**10.639.113**	.787	1.024	.520	.524	SP..06	**10.694.122**	**10.694.807**
SW25	**10.639.123**	.984	1.299	.591	.595	SP..06	**10.694.122**	**10.694.807**
SW32	**10.639.133**	1.260	1.654	.736	.740	SC..09	**10.694.141**	**10.694.815**
	10.639.137	1.614	2.008	.736	.740			
SW41	**10.639.143**	1.614	2.126	.795	.803	SC..09	**10.694.141**	**10.694.815**
	10.639.147	2.087	2.598	.795	.803			
SW53	**10.639.153**	2.087	2.756	1.079	1.087	SC..12	**10.694.150**	**10.694.820**
	10.639.157	2.717	3.386	1.079	1.087			
SW68	**10.639.163**	2.677	3.543	1.374	1.382	SC..12	**10.694.150**	**10.694.820**
	10.639.167	3.465	4.331	1.374	1.382			
SW98	**10.639.173**	3.858	4.961	1.472	1.480	SC..12	**10.694.150**	**10.694.820**
	10.639.177	4.921	6.024	1.472	1.480			
SW148	**10.639.183**	5.827	6.929	1.472	1.480	SC..12	**10.694.150**	**10.694.820**
	10.639.187	6.890	8.000	1.472	1.480			

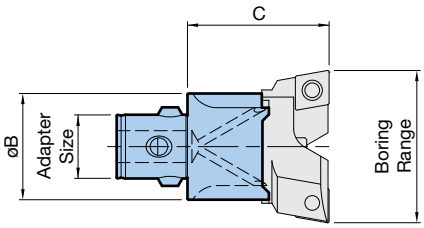


Precision Ground Mating Surfaces

Program "TWN" — No Variable Insert Height

- Diameter range of ø.787"-8.000" (ø20mm-203mm)
- High stability and rigid tool assembly for large stock allowances and feed rates
- Coolant through standard with directional coolant ports

US Patent No. 6,183,174

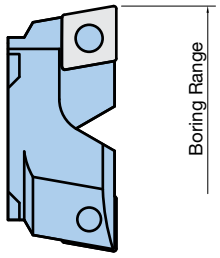


KAB Boring Heads

Head Type	Adapter Size	Catalog Number	Boring Range		øB	C
			Min	Max		
TWN20	KAB1	**10.315.101**	.787	1.220	.728	1.280
TWN25	KAB2	**10.315.201**	.984	1.575	.921	1.398
TWN32	KAB3	**10.315.301**	1.260	2.008	1.181	1.575
TWN41	KAB4	**10.315.401**	1.614	2.598	1.535	1.850
TWN53	KAB5	**10.315.501**	2.087	3.386	1.929	2.244
TWN68	KAB6	**10.315.601**	2.677	4.331	2.480	2.795
TWN98	KAB6	**10.315.602**	3.858	6.024	3.543	2.795
TWN148	KAB6	**10.315.603**	5.827	8.000	5.512	2.795
TWN98	KAB7	**10.315.701**	3.858	6.024	3.543	3.425
TWN98L	KAB7	**10.315.702**	3.858	6.024	3.543	4.606
TWN148	KAB7	**10.315.703**	5.827	8.000	5.512	4.606

SPARE PARTS PG. 39

CC Insert Holders (Sold in Pairs)

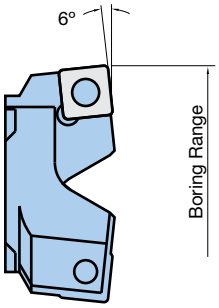


Head Type	Insert Holder Size	Catalog Number	Boring Range		Insert	Insert Screw	Insert Screw Wrench
			Min	Max			
TW20	11	**10.638.411**	.787	1.024	CC..06	**10.694.122**	**10.694.807**
	12	**10.638.412**	.984	1.220			
TW25	21	**10.638.421**	.984	1.300	CC..06	**10.694.122**	**10.694.807**
	22	**10.638.422**	1.260	1.575			
TW32	31	**10.638.431**	1.260	1.654	CC..09	**10.694.141**	**10.694.815**
	32	**10.638.432**	1.614	2.008			
TW41	41	**10.638.441**	1.614	2.126	CC..09	**10.694.141**	**10.694.815**
	42	**10.638.442**	2.087	2.598			
TW53	51	**10.638.451**	2.087	2.756	CC..12	**10.694.150**	**10.694.820**
	52	**10.638.452**	2.717	3.386			
TW68	61	**10.638.461**	2.677	3.543	CC..12	**10.694.150**	**10.694.820**
	62	**10.638.462**	3.465	4.331			
TW98	71	**10.638.471**	3.858	4.961	CC..12	**10.694.150**	**10.694.820**
	72	**10.638.472**	4.921	6.024			
TW148	71	**10.638.471**	5.827	6.929	CC..12	**10.694.150**	**10.694.820**
	72	**10.638.472**	6.890	8.000			

Additional Insert Holders — CC..16

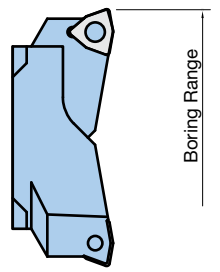
TW68	61	**10.638.561**	2.677	3.543	CC..16	**10.694.150**	**10.694.820**
	62	**10.638.562**	3.465	4.331			
TW98	71	**10.638.571**	3.858	4.961	CC..16	**10.694.150**	**10.694.820**
	72	**10.638.572**	4.921	6.024			
TW148	71	**10.638.571**	5.827	6.929	CC..16	**10.694.150**	**10.694.820**
	72	**10.638.572**	6.890	8.000			

SP & SC Insert Holders (Sold in Pairs)



Head Type	Insert Holder Size	Catalog Number	Boring Range		Insert	Insert Screw	Insert Screw Wrench
			Min	Max			
TW20	11	**10.638.111**	.787	1.024	SP..06	**10.694.122**	**10.694.807**
TW25	21	**10.638.121**	.984	1.300	SP..06	**10.694.122**	**10.694.807**
TW32	31	**10.638.131**	1.260	1.654	SC..09	**10.694.141**	**10.694.815**
	32	**10.638.132**	1.614	2.008			
TW41	41	**10.638.141**	1.614	2.126	SC..09	**10.694.141**	**10.694.815**
	42	**10.638.142**	2.087	2.598			
TW53	51	**10.638.151**	2.087	2.756	SC..12	**10.694.150**	**10.694.820**
	52	**10.638.152**	2.717	3.386			
TW68	61	**10.638.161**	2.677	3.543	SC..12	**10.694.150**	**10.694.820**
	62	**10.638.162**	3.465	4.331			
TW98	71	**10.638.171**	3.858	4.961	SC..12	**10.694.150**	**10.694.820**
	72	**10.638.172**	4.921	6.024			
TW148	71	**10.638.171**	5.827	6.929	SC..12	**10.694.150**	**10.694.820**
	72	**10.638.172**	6.890	8.000			

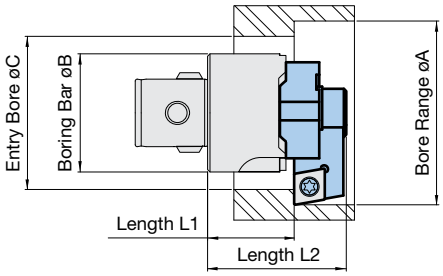
WC Insert Holders (Sold in Pairs)



Head Type	Insert Holder Size	Catalog Number	Boring Range		Insert	Insert Screw	Insert Screw Wrench
			Min	Max			
TW41	41	**10.638.241**	1.929	2.441	WC..04	**10.694.124**	**10.694.807**
TW53	51	**10.638.251**	2.323	2.992	WC..05	**10.694.131**	**10.694.809**
	52	**10.638.252**	2.717	3.386			
TW68	61	**10.638.261**	2.874	3.740	WC..06	**10.694.137**	**10.694.810**
	62	**10.638.262**	3.543	4.409			
TW98	71	**10.638.271**	4.173	5.276			
	72	**10.638.272**	5.157	6.260			
TW148	71	**10.638.271**	6.142	7.244		**10.694.137**	**10.694.810**
	72	**10.638.272**	7.126	8.228			

• Full profile roughing only — height adjustment not required

The 315 program back boring insert holders attach to KA3-KA6 rough boring heads and compliment the back boring capabilities of the 310 finish boring program.



Back Bore & Entry Bore Diameters

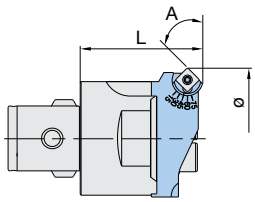
Maximum Body Diameter 'B'	B max = (2xC) - A
Maximum Back Bore Diameter 'A'	A max = (2xC) - B
Minimum Entry Bore Diameter 'C'	C min = (A+B)/2

Back Boring Insert Holders

Head Type	Insert Holder Size	Catalog Number	Boring Range		Insert	Insert Screw	øB	Length L1	Length L2
			Min	Max					
TW32	31	**11.689.903***	1.260	1.654	CC..09	**10.694.141**	1.181	.984	1.516
	32	**11.689.904**	1.614	2.008					
TW41	41	**11.689.905**	1.614	2.126	CC..09	**10.694.141**	1.535	1.142	1.772
	42	**11.689.906**	2.087	2.598					
TW53	51	**11.689.907**	2.087	2.756	CC..12	**10.694.150**	1.929	1.417	2.220
	52	**11.689.908**	2.717	3.386					
TW68	61	**11.689.909**	2.677	3.543	CC..12	**10.694.150**	2.480	1.772	2.795
	62	**11.689.910**	3.465	4.331**					

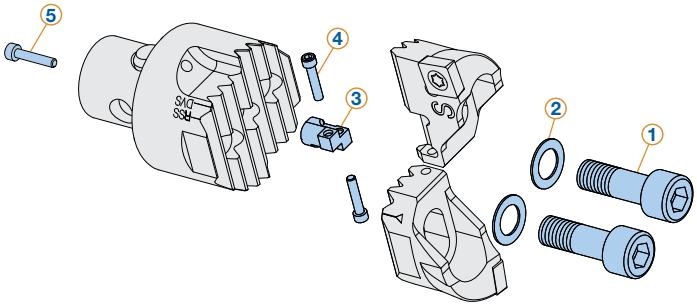
*Non-stock standard
Maximum of ø5.669" with one set of cap screws (requires **10.690.471 set screw)

These insert holders are made for front chamfering on the twin cutter boring heads TW41-TW148 and cover the diameter range from ø1.142"-8.190". The desired chamfering angle is adjustable from 15° to 75°. Sold individually.



Chamfering Insert Holders with Adjustable Chamfering Angle

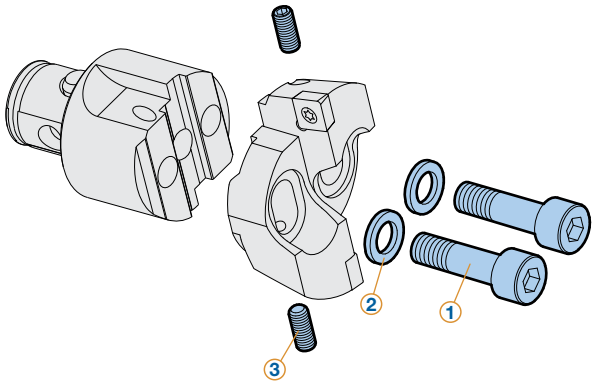
Head Type	Catalog Number	Insert	A = 15°		A = 30°		A = 45°		A = 60°		A = 75°		L (45°)
			ø Min	ø Max	ø Min	ø Max	ø Min	ø Max	ø Min	ø Max	ø Min	ø Max	
TW41	**10.638.104**	SC..09	1.693	2.205	1.732	2.244	1.772	2.283	1.772	2.283	1.732	2.244	2.008
TW53	**10.638.105**	SC..09	2.244	2.913	2.283	2.953	2.283	2.953	2.283	2.953	2.283	2.953	2.283
TW68	**10.638.106**	SC..09	2.913	3.780	2.953	3.819	2.992	3.858	2.992	3.858	2.953	3.819	2.677
TW98	**10.638.107**	SC..12	3.858	4.916	3.858	4.961	3.937	5.039	3.937	5.039	3.898	5.000	2.913 (KA6)
TW98	**10.638.108**	SC..12	5.000	6.102	5.079	6.181	5.118	6.220	5.118	6.22	5.079	6.181	3.543 (KA7)
TW148	**10.638.107**	SC..12	5.787	6.890	5.827	6.929	5.906	7.008	5.906	7.008	5.866	6.969	2.913 (KA6)
TW148	**10.638.108**	SC..12	6.969	8.071	7.008	8.110	7.087	8.190	7.087	8.190	7.008	8.110	4.724 (KA7)
Radial Chamfer Length		SC..09	.301		.270		.221		.156		.081		
		SC..12	.422		.378		.309		.219		.113		



Spare Parts Series 319 SW

Head Type	① Clamping Screw	② Washer	Torque (ft-lbs.)	Clamping Screw Wrench	Coolant Port	③ Adjusting Housing	④ Adjusting Screw	Adjusting Screw Wrench	⑤ Housing Screw
SW20	**10.690.188**	**10.693.175**	3	**10.690.803**	–	**10.319.150**	**10.690.191**	**10.690.819**	**10.690.184**
SW25	**10.690.157**	**10.693.176**	5	**10.690.804**	–	**10.319.250**	**10.690.192**	**10.609.819**	**10.690.186**
SW32	**10.690.108**	**10.693.177**	9	**10.690.805**	–	**10.319.350**	**10.690.193**	**10.690.811**	**10.690.145**
SW41	**10.690.163**	**10.693.178**	18	**10.690.806**	–	**10.319.450**	**10.690.194**	**10.690.812**	**10.690.145**
SW53	**10.690.105**	**10.693.179**	44	**10.690.807**	**10.692.409**	**10.319.550**	**10.690.195**	**10.690.812**	**10.690.189**
SW68	**10.690.106**	**10.693.179**	44	**10.690.807**	**10.692.406**	**10.319.650**	**10.690.196**	**10.690.813**	**10.690.101**
SW98/148	**10.690.970**	**10.693.187**	59	**10.690.810**	**10.692.406**	**10.319.750**	**10.690.197**	**10.690.814**	**10.690.108***

*For KAB7/CKN7 heads, use **10.690.173**



Spare Parts, Series 315 TWN

Head Type	① Clamping Screw		Clamping Screw Wrench	② Washer	③ Adjusting Screw	
	Catalog Number	Torque (in-lbs.)			Catalog Number	Torque (in-lbs.)
TW20	**10.315.160**	35	**10.690.803**	**10.693.180**	**10.690.529**	1.5
TW25	**10.315.250**	62	**10.690.804**	**10.693.181**	**10.690.538**	1.8
TW32	**10.315.350**	106	**10.690.805**	**10.693.182**	**10.690.426**	3
TW41	**10.315.450**	265	**10.690.806**	**10.693.183**	**10.690.537**	7
TW53	**10.315.550**	530	**10.690.807**	**10.693.184**	**10.690.586**	13
TW68	**10.315.650**	530	**10.690.807**	**10.693.184**	**10.690.584/587**	18
TW98	**10.315.750**	710	**10.690.810**	**10.693.185**	**10.690.585/588**	18
TW148	**10.315.750**	710	**10.690.810**	**10.693.185**	**10.690.585/588**	18

Recommended Inserts & Cutting Data for Rough Boring Under Optimal Conditions

- Rigid fixturing and workpiece
- Good machine spindle with adequate hp and thrust
- Setup not chatter prone

Material	Nose Radius	CC..06 (1/4" I.C.)					CC..09 (3/8" I.C.)					CC..12 (1/2" I.C.)				
		Catalog Number	Balanced Cutting		Stepped Cutting		Catalog Number	Balanced Cutting		Stepped Cutting		Catalog Number	Balanced Cutting		Stepped Cutting	
			Feed IPR	Max ø D.O.C.	Feed IPR	Max ø D.O.C.		Feed IPR	Max ø D.O.C.	Feed IPR	Max ø D.O.C.		Feed IPR	Max ø D.O.C.	Feed IPR	Max ø D.O.C.
Mild Steels 10XX-15XX 1018, 1020, 1551	.016	**11.654.850**	.012	.200	.006	.300	**11.654.940**	.014	.300	.008	.500	**11.654.993**	.014	.350	.008	.600
	.031	**11.654.860**	.014	.200	.007	.300	**11.654.952**	.018	.300	.010	.500	**11.654.990**	.020	.400	.012	.800
High Carbon Alloy Steels 23XX-92XX 4130, 4340, 8620	.016	**11.654.850**	.010	.200	.005	.300	**11.654.940**	.012	.300	.006	.500	**11.654.993**	.012	.350	.008	.600
	.031	**11.654.860**	.012	.200	.006	.300	**11.654.952**	.016	.300	.008	.500	**11.654.990**	.018	.400	.012	.800
300 Series Stainless Steel 304, 316, 17-4ph	.016	**11.654.853**	.010	.170	.005	.250	**11.654.943**	.012	.250	.006	.450	—	—	—	—	—
	.031	**11.654.869**	.012	.170	.006	.250	**11.654.953**	.016	.250	.008	.450	**11.654.983**	.018	.325	.010	.600
400 Series Stainless Steel Martensitic	.016	**11.654.850**	.010	.200	.005	.300	**11.654.940**	.012	.300	.006	.500	**11.654.993**	.012	.350	.008	.600
	.031	**11.654.860**	.012	.200	.006	.300	**11.654.952**	.016	.300	.008	.500	**11.654.990**	.018	.400	.012	.800
Grey Cast Iron Class 30	.016	**11.654.854**	.012	.250	.006	.400	**11.654.940**	.014	.400	.008	.750	**11.654.993**	.014	.500	.008	.800
	.031	**11.654.860**	.014	.250	.007	.400	**11.654.956**	.018	.400	.010	.750	**11.654.971**	.020	.600	.012	1.000
Silicon Nitride	—	**11.654.841**	.010	.200	.005	.350	**11.654.951**	.016	.350	.008	.650	**11.654.980**	.018	.500	.010	.800
Ductile/Nodular Cast Iron	.016	**11.654.854**	.010	.225	.005	.350	**11.654.940**	.012	.350	.006	.625	**11.654.993**	.012	.450	.008	.700
	.031	**11.654.860**	.012	.225	.006	.350	**11.654.956**	.016	.350	.008	.625	**11.654.971**	.018	.500	.012	.900
High Temp. Alloys Titanium, Inconel, Monel, etc.	.016	**11.654.868**	.008	.140	.004	.200	**11.654.968**	.010	.180	.005	.350	—	—	—	—	—
	.031	—	—	—	—	—	**11.654.969**	.012	.200	.006	.400	**11.654.978**	.014	.280	.007	.500
Brass and Bronze	.016	**11.654.858**	.012	.250	.006	.400	**11.654.957**	.014	.400	.008	.750	**11.654.989**	.014	.500	.008	.800
	.031	**11.654.864**	.014	.250	.007	.400	**11.654.958**	.018	.400	.010	.750	**11.654.991**	.020	.600	.012	1.000
Aluminum and Non-Ferrous	.016	**10.654.888**	.012	.300	.006	.500	**10.654.977**	.014	.500	.008	.900	**10.654.995**	.016	.550	.010	1.000
	.031	**11.654.898**	.014	.300	.008	.500	**10.654.987**	.018	.500	.010	.900	**10.654.992**	.022	.650	.012	1.250

Maximum cutting speed: 4,000 SFM

All cutting data without guarantee

Cutting Speed:

$$RPM = \frac{SFM \times 3.82}{Bore\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$

	CC..16 (5/8" I.C.)					SP..08 (5/16" I.C.)			SC..09 (3/8" I.C.)			SC..12/SD..12 (1/2" I.C.)			Speed SFM
	Catalog Number	Balanced Cutting		Stepped Cutting		Catalog Number	Balanced Cutting		Catalog Number	Balanced Cutting		Catalog Number	Balanced Cutting		
		Feed IPR	Max ø D.O.C.	Feed IPR	Max ø D.O.C.		Feed IPR	Max ø D.O.C.		Feed IPR	Max ø D.O.C.		Feed IPR	Max ø D.O.C.	
	—	—	—	—	—	**10.654.183**	.014	.175	**11.654.240**	.016	.280	**11.654.340**	.016	.350	850-1200
	11.654.996	.024	.600	.014	1.120	**—**	—	—	**11.654.250**	.020	.280	**11.654.350**	.022	.380	
	—	—	—	—	—	**10.654.183**	.012	.175	**11.654.240**	.014	.280	**11.654.340**	.014	.350	700-1000
	11.654.996	.022	.600	.012	1.120	**—**	—	—	**11.654.250**	.018	.280	**11.654.350**	.020	.380	
	—	—	—	—	—	**10.654.183**	.012	.125	**11.654.247**	.014	.230	**—**	—	—	375-600
	10.654.996	.022	.400	.012	.800	**—**	—	—	**11.654.200**	.018	.230	**11.654.353**	.020	.300	
	—	—	—	—	—	**10.654.183**	.012	.175	**11.654.240**	.014	.280	**11.654.340**	.014	.350	500-750
	10.654.996	.022	.600	.012	1.120	**—**	—	—	**11.654.250**	.018	.280	**11.654.350**	.020	.380	
	—	—	—	—	—	**10.654.128**	.014	.200	**11.654.240**	.016	.380	**11.654.340**	.016	.480	450-750
	11.654.994	.024	.750	.014	1.400	**—**	—	—	**11.654.252**	.020	.380	**11.654.352**	.022	.580	
	—	—	—	—	—	**—**	—	—	**—**	—	—	**10.688.619**	.018	.500	1000-2000
	—	—	—	—	—	**10.654.128**	.012	.175	**11.654.240**	.014	.330	**11.654.340**	.014	.420	300-425
	11.654.994	.022	.675	.012	1.250	**—**	—	—	**11.654.252**	.018	.330	**11.654.352**	.020	.480	
	—	—	—	—	—	**—**	—	—	**11.654.249**	.010	.160	**11.654.344**	.010	.200	100-225
	10.654.997	.016	.380	.008	.700	**—**	—	—	**11.654.259**	.012	.180	**11.654.359**	.014	.250	
	—	—	—	—	—	**10.654.128**	.014	.200	**11.654.249**	.016	.380	**11.654.344**	.016	.480	750-1000
	10.654.997	.024	.750	.014	1.400	**—**	—	—	**11.654.259**	.020	.380	**11.654.359**	.022	.580	
	—	—	—	—	—	**10.654.187**	.014	.250	**10.654.277**	.016	.500	**—**	—	—	1100-1600
	10.654.998	.030	.900	.015	1.625	**—**	—	—	**10.654.287**	.020	.500	**10.654.387**	.022	.650	

ROUGH BORING GUIDELINES

Insert Selection & Stock Allowance

Kaiser indexable inserts outlined in the Insert Selection & Cutting Data tables have been selected to give optimum results. Grades and geometry do not have to be specified at time of order.

Insert radius is based upon 2 major factors:

1. Length/Diameter ratio of tool
2. Depth of cut or material allowance
   - Select the largest nose radius available for cutting edge strength & higher feeds
   - Use small nose radius for light depth of cut & extreme L/D ratio

Nose Radius	Minimum D.O.C.	Maximum D.O.C.	L/D Ratio
.008 (0)	.010	.060	>6:1
.016 (1)	.020	.120	≤5:1
.031 (2)	.040	.200	≤4:1
.047 (3)	.060	.325	≤4:1

• D.O.C. is stock allowance/side (radius)

Feed

1. Feed: Based on effective number of inserts, depending on roughing method
   - Balanced Cutting: 2 effective inserts
   - Stepped Cutting: 1 effective insert
   - Full Profile Cutting: 1 effective insert
2. Under normal rough boring operations, the effective feed rate is about 50% of nose radius

Nose Radius	Feed IPR	
	Balanced Cutting	Stepped Cutting
.008 (0)	.008-.012	.004-.006
.016 (1)	.014-.016	.006-.008
.031 (2)	.020-.026	.012-.016
.047 (3)	.020-.030	.012-.020

Power Consumption

The power curve of the machine should be consulted and cutting data values adjusted accordingly.

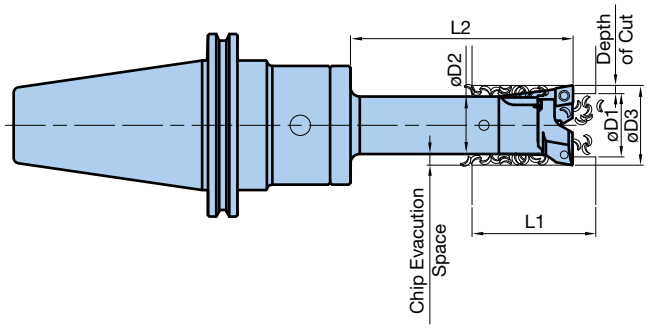
- HP Requirements = MRR x K
- MRR = d x SFM x IPR x 12
- MRR = metal removal rate, inches^3
- d = radial depth of cut, inches
- SFM = surface feet/minute
- IPR = inches/rev

Material	K Factor*
Steel	.750
Alloy Steel	1.000
Cast Iron	.650
Aluminum	.430
High Temp Alloys	2.000

*With positive cutting geometry only

It is very important to allow for clearance between boring bar and rough bore diameter.

General Rule: Boring bar should always be smaller than original hole size.



Under certain conditions, it may be necessary to modify or adapt recommended cutting data and/or tooling configurations of the application. Below are general solutions to common problems.

Problem	Possible Cause	Remedy
Poor Chip Control	Feed rate too low	Increase feed rate
	Excessive height variation of inserts	Preset tool to max. .0002" variation of both inserts
	Width of chip excessive (D.O.C.)	Preset tool for stepped cutting method
	Excessive stock allowance	Consult cutting data tables
Chatter & Vibration	Excessive speed	Reduce SFM, check cutting data tables
	Extreme length/diameter ratio	Shorten tool to increase stiffness
		Increase boring bar diameter to larger size
		Change boring bar to carbide or heavy metal
	Insert radius too large	Reduce nose radius of insert
	Unstable workpiece	Improve fixture and clamping support
	Lead angle on insert holders	Change to 90 degree insert holders (type CC)
Inserts Chipping or Breaking	Wrong insert	Change to tougher grade of carbide insert
		Use larger radius if available
	Severe interruption	Increase speed, decrease feed
	Chips packing and re-cutting	Check for boring bar/bore diameter clearance
		Improve chip control, increase feed
Poor Tool Life	Wrong insert	Change to higher wear resistant grade
	Excessive cutting speed	Reduce speed
	Inserts chipping	Check stock allowance and feed rate
	Coolant pressure too low	Increase through tool coolant pressure
		Adjust coolant ports of head if available
Chips Not Evacuating	Boring bar diameter too large	Reduce to smaller head and extended range holder
	Excessive stock allowance	Reset tool for stepped cutting
	Inadequate space below bore	Elevate workpiece from table more
	Poor chip control	See above problem
Insufficient Machine Power	Excessive feed rate	Reduce feed; minimum 25% of insert radius
	Stock allowance excessive	Reset tool for stepped cutting method
	Low machine torque	RPM in area of low spindle torque; increase speed
		RPM in area of gear change; adjust RPM
		Change insert to higher rake angle
		Reduce depth of cut
Excessive Exit Burr	Excessive feed rate	Reduce feed rate
	CC type insert holders	Use square insert holders with 6 degree lead
	Cutting forces too high	Reduce depth of cut
		Reduce insert radius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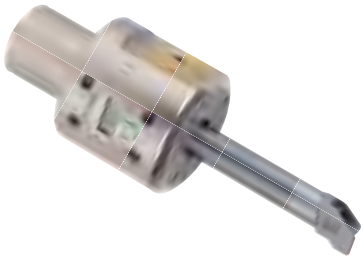
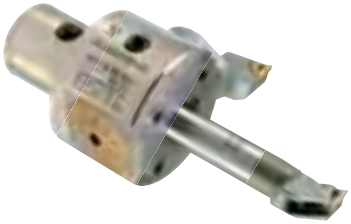


KA6 Digital

Boring Range: ø.079"-2.126" (ø2mm-54mm)

KA6 & Integral Shank

Boring Range: ø.079"-2.126" (ø2mm-54mm) &
ø3.150"-6.000" (ø80mm-152mm)

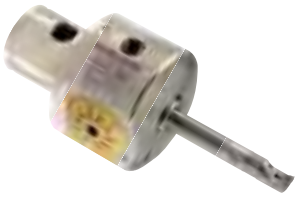


KA6

Boring Range: ø.079"-1.969" (ø2mm-50mm)

KA5/ER32

Boring Range: ø.079"-1.260" (ø2mm-32mm)



KA4/ER25

Boring Range: ø.016"-.866" (ø.4mm-22mm)

KA3

Boring Range: ø.016"-.590" (ø.4mm-15mm)

KA1

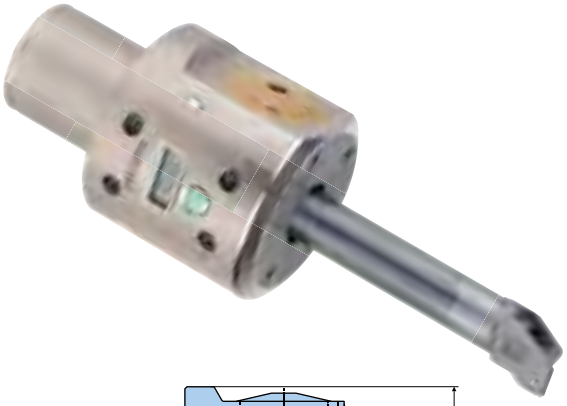
Boring Range: ø.016"-.276" (ø.4mm-7mm)

EWD 2-54 x KA6

- Setting accuracy 1 µm/ø or .00005"/ø
- Max. spindle speed 20,000 RPM

The EWD 2-54 precision boring head features absolute setting accuracy which is shown on a built-in digital display. The boring head with KA6 connection features an electronic measurement system on the tool carrier which provides ultra precise diameter adjustments for the boring range of ø.079"-2.126".

With one single button for the functions “on” and “reset”, operating errors are practically eliminated.

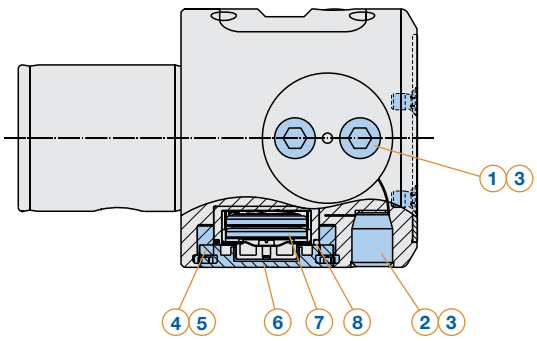


Catalog Number	øD
10.112.119 (in)	5/8"
10.112.109 (mm)	16mm

Features:

- Diameter corrections are shown on large and high contrast LCD display with a resolution of .001mm/ø or .00005"/ø
- The measuring system for the tool carrier shows the effective movement of the cutting edge and permits diameter corrections in both directions
- Power management for optimized battery life
- Automatic switch-off function which automatically stores the last displayed value
- Same accessories as for the precision boring head EWN 2-50XL
- Variable length adjustment of the tool holder ensures optimized tool lengths in the diameter range from ø.079"-2.126"
- Coated tool body for a complete protection against corrosion
- Fine balancing with a screw-fit balancing ring
- Max speed: 20,000 RPM
- Radial adjustment range: -.020"/+.100"
- Through-tool coolant supply up to 580 PSI
- IP 69K seal rating (highest possible)

Spare Parts



1 **10.690.457**
7 T (ft-lbs.)

5 **10.690.843**

2 **10.690.469**
7 T (ft-lbs.)

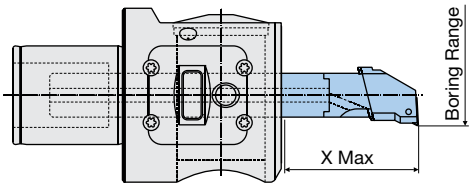
6 **10.195.090**

3 **10.690.816**

7 **10.718.201**
CR 2032

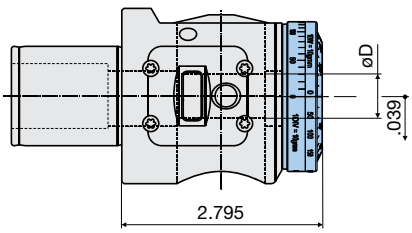
4 **10.690.320**
3 T (ft-lbs.)

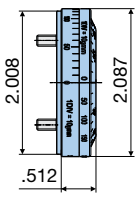
8 **10.692.296**

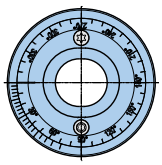


Insert Holders – Boring Range: ø.079"-2.126"

Reduction Bushings		Reduction Sleeves		Tool Holders			Insert Holders	Boring Range		Insert
Catalog Number	øD-ød	Catalog Number	øD-ød	Catalog Number	ød	X Max	Catalog Number	Balanceable	Max	
10.613.524 **10.613.424**	5/8"-4mm 16mm-4mm	**10.613.504** **10.613.404**	5/8"-4mm 16mm-4mm	**10.611.155**	4mm	.354	–	.079-.118	.276	–
				10.611.156		.551	–	.118-.157	.315	–
10.613.522 **10.613.422**	5/8"-3.5mm 16mm-3.5mm	–	–	**10.615.203**	3.5mm	1.575	–	.154-.193	.354	–
10.613.523 **10.613.423**	5/8"-4.5mm 16mm-4.5mm	–	–	**10.615.204**	4.5mm	1.969	–	.193-.232	.394	–
10.613.525 **10.613.425**	5/8"-5mm 16mm-5mm	**10.613.505** **10.613.405**	5/8"-5mm 16mm-5mm	**10.615.201**	5mm	2.362	–	.228-.287	.433	WC..02
10.613.526 **10.613.426**	5/8"-6mm 16mm-6mm	**10.613.506** **10.613.406**	5/8"-6mm 16mm-6mm	**10.615.202**	6mm	2.559	–	.287-.346	.472	WC..02
10.613.527 **10.613.427**	5/8"-7mm 16mm-7mm	**10.613.507** **10.613.407**	5/8"-7mm 16mm-7mm	**10.615.207**	7mm	1.969	–	.307-.386	.512	TP..07
				10.615.205		3.346				
10.613.529 **10.613.429**	5/8"-9mm 16mm-9mm	**10.613.509** **10.613.409**	5/8"-9mm 16mm-9mm	**10.615.374**	9mm	2.756	**10.615.365**	.386-.472	.669	TP..07
				10.615.369		3.937				
–	–	**10.613.511** **10.613.411**	5/8"-11mm 16mm-11mm	**10.615.376**	11mm	3.543	**10.615.366**	.465-.551	.748	TP..07
				10.615.371		4.724				
–	–	**10.613.513** **10.613.413**	5/8"-13mm 16mm-13mm	**10.615.378**	13mm	2.756	**10.615.367**	.543-.669	.866	TP..07
				10.615.373		5.118				
–	–	–	–	**10.615.254**	5/8"	3.937	**10.615.301** **10.615.302** **10.615.303**	.661-.866 .858-1.063 1.055-1.299	1.063 1.260 1.496	TC..11
				10.615.255	5/8"	6.299				
				10.615.252	16mm	3.937				
				10.615.253	16mm	6.299				
–	–	–	–	**10.615.259**	5/8"	4.331	**10.615.304** **10.615.305**	1.252-1.575 1.567-2.126	1.772 2.323	TC..11
				10.615.260	5/8"	6.299				
				10.615.257	16mm	4.331				
				10.615.258	16mm	6.299				







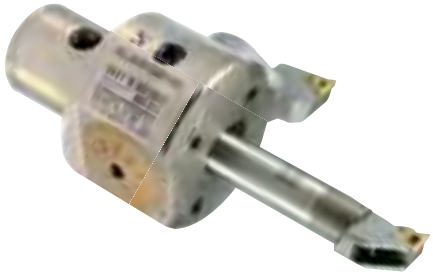
Balancing Ring

Catalog Number
10.112.806

After removing the front cover plate, the balancing ring can be mounted on to the boring head. The imbalance has to be measured on a balancing machine. The correction of the imbalance is done by moving the scale rings.

SERIES 112 EWN 2-50XL PRECISION FINISH BORING HEAD

The Kaiser EWN 2-50XL boring heads offer the unique combination of precision and versatility. The boring heads are available with the modular KA6 connection to adapt to almost any spindle configuration, or as an integral version to offer the highest rigidity for the most common spindle tapers. A variety of accessories are available for the standard range of ø.079"-2.126", and outward-mounted insert holders add an extended range of ø3.150"-6.000". Additional accessories offer options for balanced assemblies, back boring, O.D. turning, and chamfering while boring.



EWN 2-50XL x KA6
Catalog Number: 10.112.118 Inch
10.112.108 Metric

EWN 2-50XL x CAT40
Catalog Number: 10.112.134 Inch

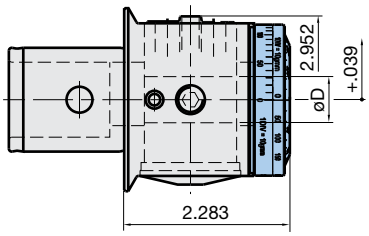
EWN 2-50XL x BT40
Catalog Number: 10.112.132 Inch
10.112.122 Metric

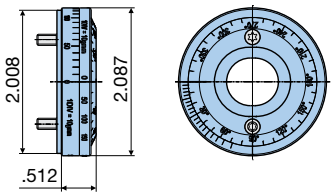
EWN 2-50XL x HSK-A63
Catalog Number: 10.112.133 Inch
10.112.123 Metric

EWN 2-50XL x C6
Catalog Number: 10.470.118 Inch
10.470.108 Metric

Technical Data:

- Boring Range: ø.079"-2.126" (ø2mm-54mm)
- Extended Range: ø3.150"-6.000" (ø80mm-152mm)
- Tool Holder Size (øD): ø5/8" or ø16mm
- Dial Precision: 1 Div = ø.0002" (ø.005mm)
  Vernier Precision: ø.00005" (ø.001mm)
- Maximum Through-Tool Coolant Pressure: 300 PSI





Balancing Ring

Catalog Number
10.112.806

These rings allow fine balancing of EWN 2-50XL boring heads for the entire range of ø.079"-2.126". Allowing compensation up to 200 gram-millimeters (g-mm), small diameter assemblies up to ø.394" can be balanced using standard bars and insert holders from Pg. 50. For larger diameters, unbalance can only be corrected when the tool holder is in the center position, therefore the use of radial adjustment insert holders is required.

Correction of imbalance max. = 200g-mm, 1 Div = 10g-mm

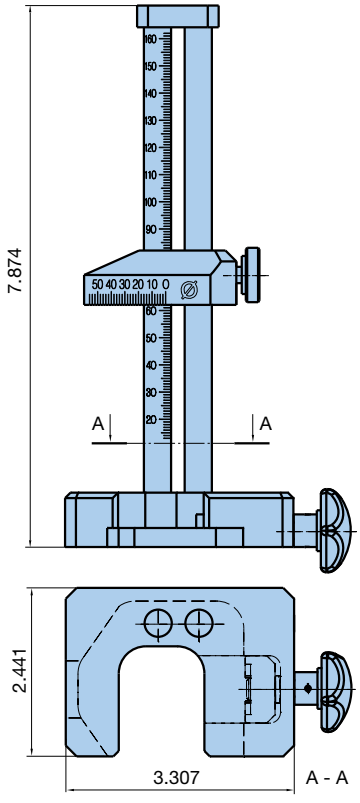
The Kaiser EWB 2-50 boring heads maximize performance on small diameter bores due to an integrated counterweight which allows for precision balancing of the tool assembly. Balance charts are supplied with the head to give the correct setting of the graduated scale ring to fine balance the assembly for all of the various combinations possible with this versatile system.

Technical Data:

- Boring Range: ø.079"-1.969" (ø2mm-50mm)
- Tool Holder Size: ø5/8" or ø16mm
- Maximum Unbalance: 100g-mm
- Dial Precision: 1 Div = ø.0002" (ø.005mm)
- Vernier Precision: ø.00005" (ø.001mm)
- Maximum Through-Tool Coolant Pressure: 300 PSI

EWB 2-50 x KA6

Catalog Number: 10.112.117 Inch
10.112.107 Metric



Setting Jig

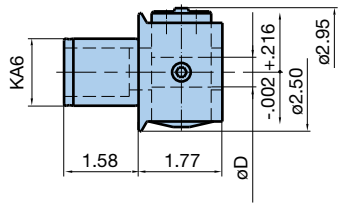
The setting jig can be easily assembled on the front face of the boring heads EWN/EWB 2-50.

Set the measuring slide to the required projection length. Pull the tool holder until the cutting edge touches the lower end of the measuring slide. Align the cutting edge with the edge of the measuring slide.

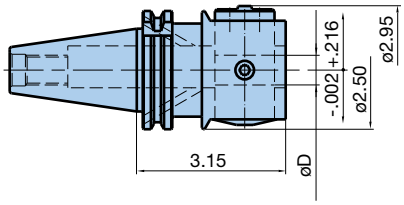
The scale on the measuring slide provides a coarse diameter setting.

Catalog Number	Description
10.112.817	Setting Jig EWN 2-50
10.112.819	Setting Jig EWN 2-50 Inch

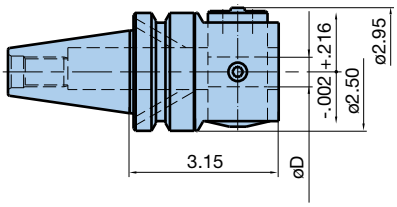
EWN 2-50XL x KA6
Catalog Number: 10.112.118 Inch (øD=5/8")
10.112.108 Metric (øD=16mm)



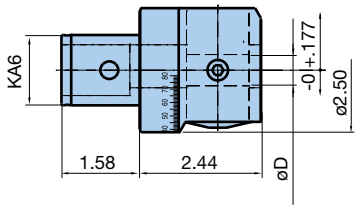
EWN 2-50XL x CAT40
Catalog Number: 10.112.134 Inch (øD=5/8")



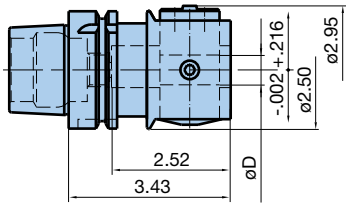
EWN 2-50XL x BT40
Catalog Number: 10.112.132 Inch (øD=5/8")
10.112.122 Metric (øD=16mm)



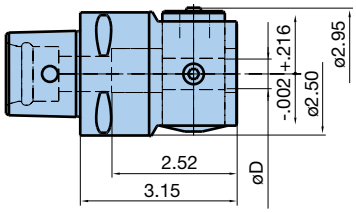
EWB 2-50 x KA6
Catalog Number: 10.112.117 Inch (øD=5/8")
10.112.107 Metric (øD=16mm)

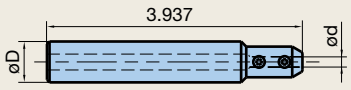
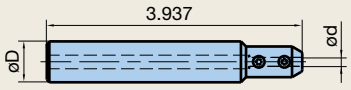
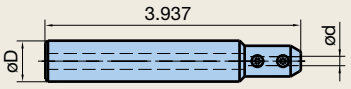
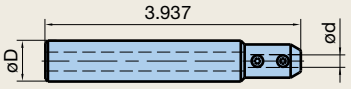
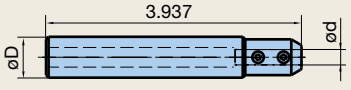
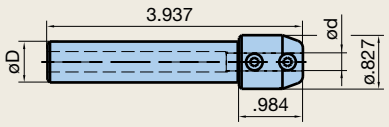
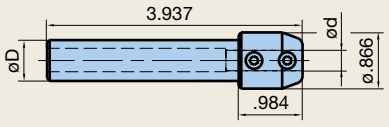
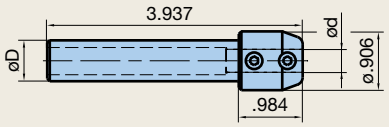
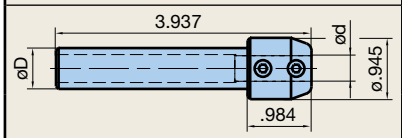


EWN 2-50XL x HSK-A63
Catalog Number: 10.112.133 Inch (øD=5/8")
10.112.123 Metric (øD=16mm)



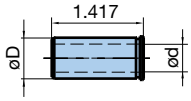
EWN 2-50XL x C6
Catalog Number: 10.470.118 Inch (øD=5/8")
10.470.108 Metric (øD=16mm)



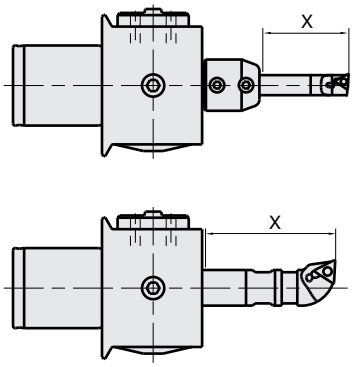
Reduction Bushings	Catalog Number	øD-ød	Reduction Sleeves	
			Catalog Number	øD-ød
	**10.613.524*** **10.613.424***	5/8"-4mm 16mm-4mm	**10.613.504** **10.613.404**	5/8"-4mm 16mm-4mm
	**10.613.522*** **10.613.422***	5/8"-3.5mm 16mm-3.5mm	–	–
	**10.613.523*** **10.613.423***	5/8"-4.5mm 16mm-4.5mm	–	–
	**10.613.525*** **10.613.425***	5/8"-5mm 16mm-5mm	**10.613.505** **10.613.405**	5/8"-5mm 16mm-5mm
	**10.613.526*** **10.613.426***	5/8"-6mm 16mm-6mm	**10.613.506** **10.613.406**	5/8"-6mm 16mm-6mm
	**10.613.527*** **10.613.427***	5/8"-7mm 16mm-7mm	**10.613.407**	16mm-7mm
	**10.613.528*** **10.613.428***	5/8"-8mm 16mm-8mm	**10.613.508** **10.613.408**	5/8"-8mm 16mm-8mm
	**10.613.529*** **10.613.429***	5/8"-9mm 16mm-9mm	**10.613.509** **10.613.409**	5/8"-9mm 16mm-9mm
	**10.613.530*** **10.613.430***	5/8"-10mm 16mm-10mm	**10.613.510** **10.613.410**	5/8"-10mm 16mm-10mm
			10.613.511* **10.613.411***	5/8"-11mm 16mm-11mm
			10.613.511* **10.613.411***	5/8"-11mm 16mm-11mm
			10.613.512* **10.613.412***	5/8"-12mm 16mm-12mm
			10.613.513* **10.613.413***	5/8"-13mm 16mm-13mm
			10.613.513* **10.613.413***	5/8"-13mm 16mm-13mm

*Accessories for balanceable (EWB) boring heads

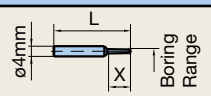
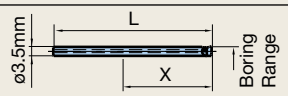
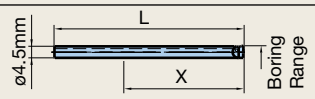
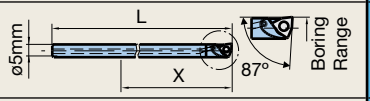
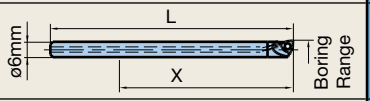
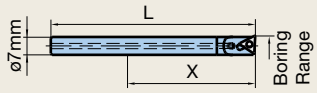
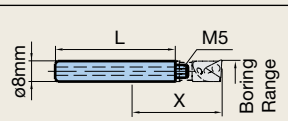
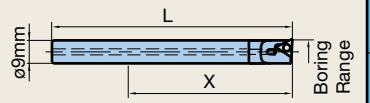
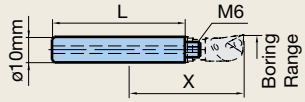
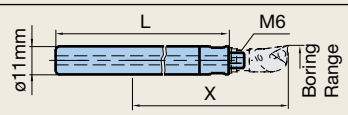
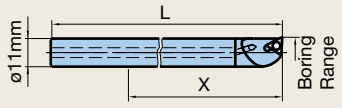
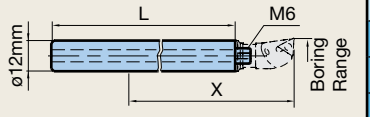
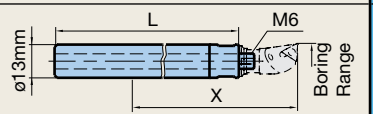
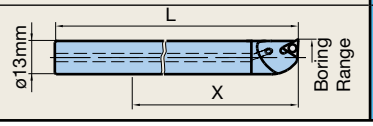
Reduction Sleeves



X=Boring Depth



Carbide Tool Holders

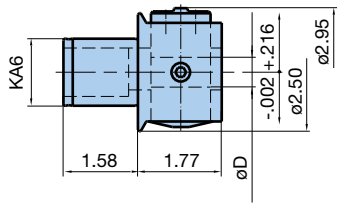
Tool Holders	Catalog Number	L	X Max	Insert Holders		Boring Range	Inserts
	**10.611.155***	1.181	.354	Solid Carbide Boring Cutters		.079-.138	Solid Carbide Boring Cutters
	10.611.156*	1.378	.551			.118-.177	
	**10.615.203***	2.441	1.575			.154-.236	
	**10.615.204***	2.913	1.969			.193-.275	
	**10.615.201***	3.346	2.362	–	–	.228-.287	WC..02 
	**10.615.202***	3.740	2.756	–	–	.287-.346	
	**10.615.207***	3.150	1.969	–	–	.307-.464	TP..07 
	10.615.205*	4.528	3.346				
	**10.615.211**	1.850	1.378	.709 Boring Range	**10.615.271* (E9)**	.346-.492	
	10.615.212*	2.835	2.362				
	10.615.222*	3.425	2.953				
	**10.615.208***	3.937	2.756	–	–	.386-.531	
	10.615.206*	5.315	4.134				
	**10.615.214**	2.047	1.772	.906 Boring Range	**10.615.272* (E12)**	.465-.571	
	10.615.215*	3.031	2.756				
	10.615.223*	3.819	3.543				
	**10.615.250**	5.000	4.724				
	**10.615.209***	5.315	4.134	–	–		
	**10.615.218**	3.031	2.756	.906 87° Boring Range	**10.615.273* (E14)**	.543-.650	
	10.615.225	3.819	3.543				
	10.615.219*	4.213	3.937				
	10.615.224*	5.394	5.118				
	**10.615.251***	5.787	5.315				
	**10.615.210***	5.512	4.134	–	–		

*Accessories for balanceable (EWB) boring heads

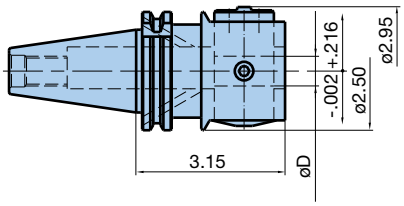
OPTIONAL 90° INSERT HOLDERS PG. 52

SPARE PARTS PG. 65

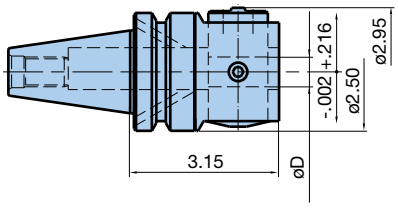
EWN 2-50XL x KA6
Catalog Number: 10.112.118 Inch (øD=5/8")
10.112.108 Metric (øD=16mm)



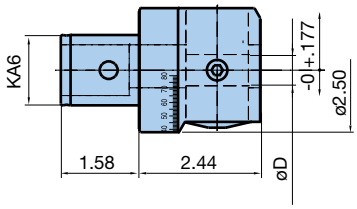
EWN 2-50XL x CAT40
Catalog Number: 10.112.134 Inch (øD=5/8")



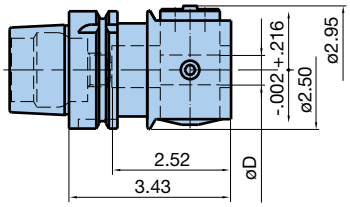
EWN 2-50XL x BT40
Catalog Number: 10.112.132 Inch (øD=5/8")
10.112.122 Metric (øD=16mm)



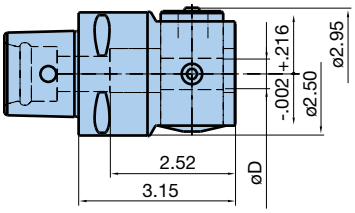
EWB 2-50 x KA6
Catalog Number: 10.112.117 Inch (øD=5/8")
10.112.107 Metric (øD=16mm)

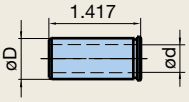


EWN 2-50XL x HSK-A63
Catalog Number: 10.112.133 Inch (øD=5/8")
10.112.123 Metric (øD=16mm)



EWN 2-50XL x C6
Catalog Number: 10.470.118 Inch (øD=5/8")
10.470.108 Metric (øD=16mm)



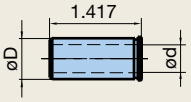
Reduction Sleeves	Reduction Sleeves		
	Catalog Number	øD-ød	
	**10.613.514** **10.613.414**	5/8"-14mm 16mm-14mm	

*Accessories for balanceable (EWB) boring heads

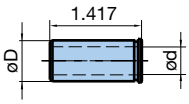
Carbide Tool Holders

SPARE PARTS PG. 65

Adjustable Tool Holders (EWN Only)

Reduction Sleeves	Reduction Sleeves		
	Catalog Number	øD-ød	
	**10.613.509**	5/8"-9mm	
	10.613.409	16mm-9mm	
	10.613.511	5/8"-11mm	
	10.613.411	16mm-11mm	
	10.613.513	5/8"-13mm	
	10.613.413	16mm-13mm	

Optional Accessories

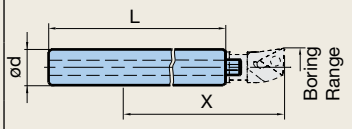
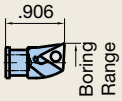
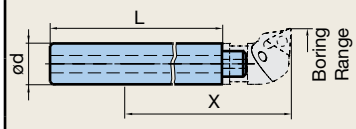
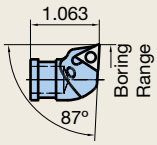
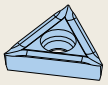


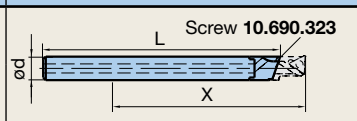
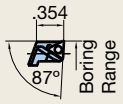
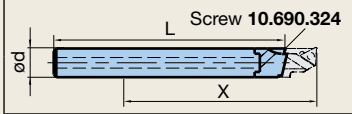
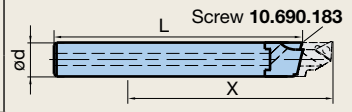
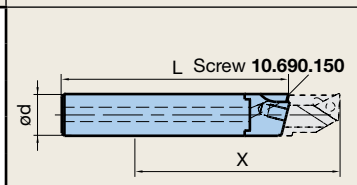
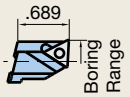
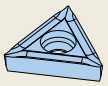
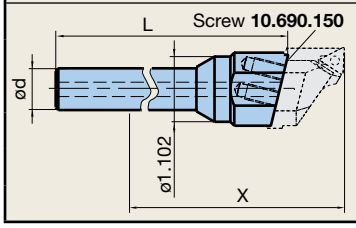
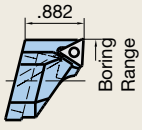
90° Insert Holders

Type	Catalog Number	Inserts
E12	**11.689.810**	CC..06 (1/4" I.C.)
E14	**11.689.811**	
E16	**11.689.812**	
E18	**11.689.813**	CC..09 (3/8" I.C.)
E20	**11.689.814**	
E22	**11.689.815**	
E24	**11.689.816**	
E25	**11.689.817**	
E26	**11.689.818**	
E28	**11.689.819**	
E30	**11.689.820**	
E32	**11.689.821**	
E36	**11.689.822**	
E40	**11.689.823**	
E45	**11.689.824**	

Inch Reduction Sleeves

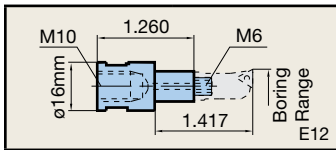
øD	ød	Catalog Number
.625	.125	**11.613.543**
.625	.156	**11.613.544**
.625	.187	**11.613.545**
.625	.250	**11.613.546**
.625	.312	**11.613.548**
.625	.375	**11.613.550**
.625	.438	**11.613.551**
.625	.500	**11.613.552**

Tool Holders	Catalog Number	ød	L	X Max	Insert Holders		Boring Range	Inserts
	**10.615.232**	14mm	3.425	2.953		**10.615.280* (E15)** **10.615.281* (E16)**	.582-.689 .622-.728	
	10.615.233*		4.606	4.134				
	10.615.221*		5.787	5.315				
	**10.615.236**	5/8"	3.465	3.150		**10.615.282* (E18)** **10.615.289* (E20)** **10.615.283* (E22)** **10.615.290* (E24)** **10.615.288* (E25)** **10.615.291* (E26)** **10.615.284* (E28)** **10.615.285* (E32)** **10.615.286* (E36)** **10.615.287* (E40)** **10.615.292* (E45)**	.700-.807 .780-.886 .858-.965 .937-1.004 .976-1.083 1.016-1.122 1.094-1.280 1.252-1.437 1.409-1.594 1.567-1.772 1.764-2.126	TC..11 
	10.615.237*	5/8"	4.252	3.937				
	10.615.238*		6.614	6.299				
	10.615.226	16mm	3.465	3.150				
	10.615.227*		4.252	3.937				
	10.615.229*		6.614	6.299				

Adjustable Tool Holders	Catalog Number	ød	L	X Max	Insert Holders		Boring Range	Inserts
	**10.615.374** **10.615.369**	9mm	4.764	2.756 3.937		**10.615.365**	.386-.472	
	**10.615.376** **10.615.371**	11mm	5.512	3.543 4.724		**10.615.366**	.465-.551	TP..07 
	**10.615.378** **10.615.373**	13mm	6.120	2.756 5.118		**10.615.367**	.543-.669	
	**10.615.261**	5/8"	3.858	3.150		**10.615.301** **10.615.302** **10.615.303**	.661-.866 .858-1.063 1.055-1.299	TC..11 
	10.615.254	5/8"	4.645	3.937				
	10.615.255	5/8"	7.008	6.299				
	10.615.262	16mm	3.858	3.150				
	10.615.252	16mm	4.645	3.937				
	10.615.253	16mm	7.008	6.299				
	**10.615.263**	5/8"	4.055	3.543		**10.615.304** **10.615.305**	1.252-1.575 1.567-2.126	
	10.615.259	5/8"	5.197	4.331				
	10.615.260	5/8"	6.811	6.299				
	10.615.264	16mm	4.055	3.543				
	10.615.257	16mm	5.197	4.331				
	10.615.258	16mm	6.811	6.299				

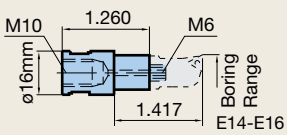
*Accessories for balanceable (EWB) boring heads

Bar Extensions & Reductions



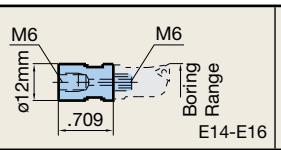
E12

Boring Range	Catalog Number
.465-.571	**10.615.230**



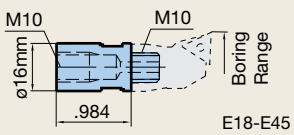
E14-E16

Boring Range	Catalog Number
.543-.728	**10.615.231**



E14-E16

Boring Range	Catalog Number
.543-.650	**10.615.220**

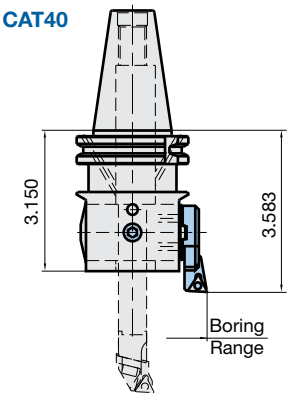


E18-E45

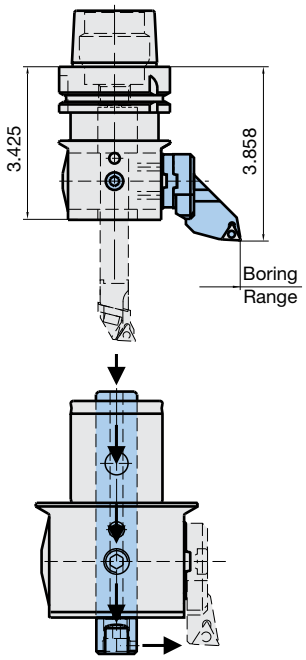
Boring Range	Catalog Number
.701-1.969	**10.615.228**

SERIES 112 EWN 2-50 XL PRECISION FINISH BORING HEADS

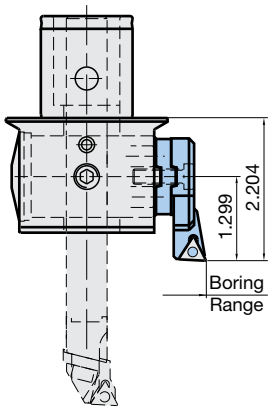
CAT40



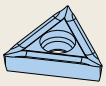
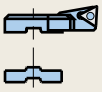
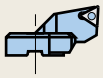
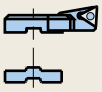
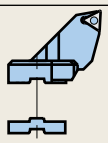
HSK-A63



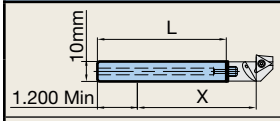
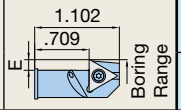
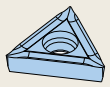
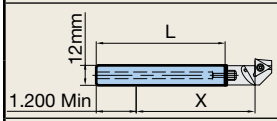
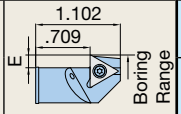
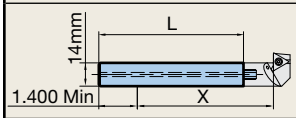
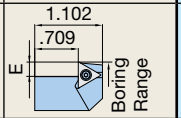
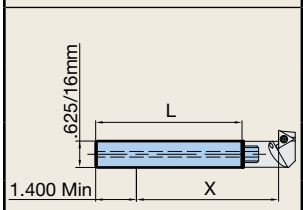
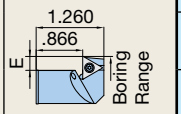
KA6

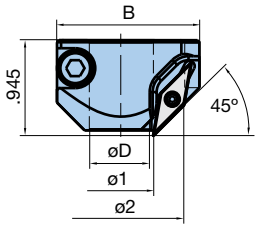


Accessories

	Catalog Number	Boring Range	Insert
	**10.626.908**	3.150-3.622	TC..11 
	**10.626.908 10.626.907**	3.622-4.094	
	**10.626.909**	4.094-4.567	
	**10.626.909 10.626.907**	4.567-5.039	
	10.626.910	5.039-5.512	
	**10.626.910 10.626.907**	5.512-6.000	
Coolant Bar (5/8")	**10.615.236**		
Coolant Bar (16mm)	**10.615.226**		
Coolant Nozzle	**10.615.392**		

Back Boring

Tool Holders	Catalog Number	X Max	Insert Holders	Catalog Number	Min Entry Diameter	E	Boring Range	Insert
	**10.615.214 10.615.215 10.615.223**	1.575 2.559 3.346		**11.689.801**	.512	.113	.622 - .728	TC..11 
				11.689.802	.547	.151	.701 - .807	
	**10.615.218 10.615.219 10.615.224**	2.559 3.740 4.921		**11.689.803**	.626	.152	.780 - .898	
				11.689.804	.685	.212	.898 - 1.016	
	**10.615.232 10.615.233 10.615.224**	2.756 3.937 5.118		**11.689.805**	.783	.237	1.016 - 1.134	
	**(5/8") 10.615.236 10.615.237 10.615.238 (16mm) 10.615.226 10.615.227 10.615.229**	2.953 3.740 6.102		**11.689.806**	.882	.248	1.134 - 1.319	
				11.689.807	.941	.307	1.252 - 1.437	
				11.689.808	1.020	.385	1.409 - 1.594	
				11.689.809	1.098	.464	1.567 - 1.752	



Chamfer Rings

øD	Catalog Number	ø1	ø2	B
12mm	**10.615.394**	.496	1.091	1.378
5/8"	**10.615.393**	.654	1.248	1.555
16mm	**10.615.395**	.654	1.248	1.555

	Catalog Number	Type
Inserts	**10.655.821 (ST)**	VC..11 (.250" I.C.)
	10.655.822 (AL)	
Insert Screw	**10.694.125**	M2.5 x T8 IP

Diameter Range: ø.350"-1.000"

Kaiser's 112 series high precision boring head kit contains all components needed for small diameter bores from ø.350" to ø1.000", including inserts and wrenches. The entire kit, including molded plastic carrying case with foam inlay to protect the precision instruments, provides considerable savings over what the boring head, reduction bushings, shanks and other components cost when ordered separately.

Adapter Size	Kit Number	Boring Head
KA6	**12.303.111***	**10.112.118**
BT40	**12.303.114**	**10.112.132**
CAT40	**12.303.113**	**10.112.134**
HSK-A63	**12.303.112**	**10.112.133**

*Order shank separately for this kit only

Contents

Reduction Bushings
10.613.508
10.613.510
10.613.512
10.613.514

Steel Boring Bars
10.615.211
10.615.214
10.615.218
10.615.232
10.615.236

Insert Holders
10.615.271
10.615.272
10.615.273
10.615.281
10.615.282
10.615.283

Inserts (5 Pieces)
10.651.802
11.655.322

Diameter Range: ø.472"-6.000"

The tool kit in a form fitted wooden case contains the precision boring heads 112.118 and 310.511 as well as the complete accessories for the diameter range ø.472"-6.000" including wrenches and inserts. The case offers additional space for two shank adapters, CAT40 or BT40 and for further accessories. Tool shanks are not included with this kit and must be ordered separately. Please consult Pg. 7-11 for available KAB5 and KAB6 shanks.

Kit Number
11.112.091

Contents

Boring Heads
10.310.511 (KAB5)
10.112.118 (KA6)

Outboard Insert Holders
10.626.907
10.626.908
10.626.909
10.626.910
10.626.151
10.626.152

Case
10.671.116

Reduction Sleeves
10.613.510
10.613.512
10.613.514

Steel Boring Bars
10.615.214
10.615.218
10.615.232
10.615.236

Inserts (5 Pieces)
10.651.735
10.655.383

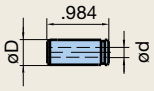
Center Insert Holders
10.615.272
10.615.273
10.615.281
10.615.282
10.615.283
10.615.288
10.615.284
10.615.286
10.615.292

SERIES 112 EWN 04-22 PRECISION FINISH BORING HEADS

The Kaiser EWN 04-22 boring heads offer high precision machining of small diameter bores. These heads are designed for small-sized machines with spindle tapers such as BT30, HSK-40, and HSK-50. Additionally, screw-on type heads are available to adapt to turning centers with live tool turrets.

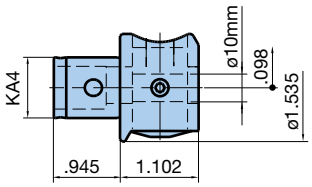
Technical Data:

- Boring Range: ø.016"-.866" (ø2mm-22mm)
- Tool Holder Size: ø10mm
- Dial Precision: 1 Div = ø.0005" (ø.01mm)
  Vernier Precision: ø.0001" (ø.002mm)
- Maximum Through-Tool Coolant Pressure: 300 PSI

Reduction Sleeves	Catalog Number	øD-ød	
	**10.613.204**	10mm-4mm	
	10.613.202	10mm-3.5mm	
	10.613.203	10mm-4.5mm	
	10.613.205	10mm-5mm	
	10.613.206	10mm-6mm	
	10.613.207	10mm-7mm	
	10.613.208	10mm-8mm	

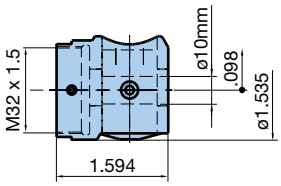
EWN 04-22E x KA4
Catalog Number: 10.112.216 Inch

EWN 04-22 x KA4
Catalog Number: 10.112.206 Metric



EWN 04-22E x ER25
Catalog Number: 10.112.215 Inch

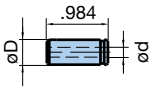
EWN 04-22 x ER25
Catalog Number: 10.112.205 Metric



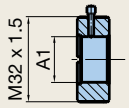
Optional 90º Insert Holders

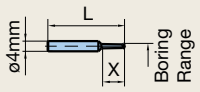
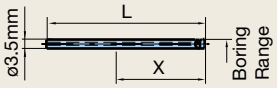
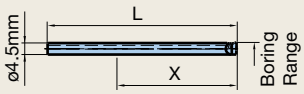
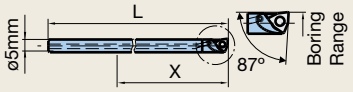
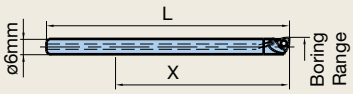
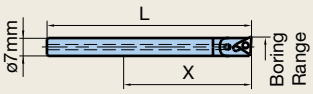
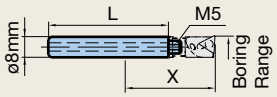
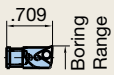
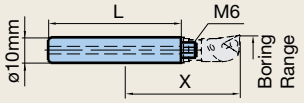
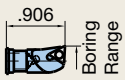
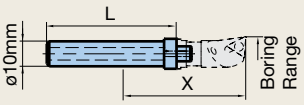
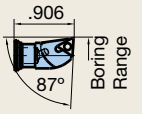
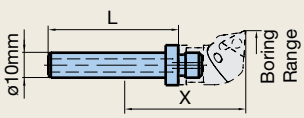
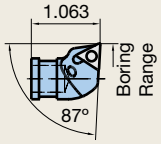
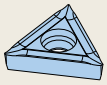
Type	Catalog Number	Inserts
E12	**11.689.810**	CC..06 (1/4" I.C.)
E14	**11.689.811**	
E16	**11.689.812**	
E18	**11.689.813**	CC..09 (3/8" I.C.)
E20	**11.689.814**	

Optional Inch Reduction Sleeves



øD	ød	Catalog Number
10mm	.125	**11.613.213**
10mm	.156	**11.613.214**
10mm	.187	**11.613.215**
10mm	.250	**11.613.216**
10mm	.312	**11.613.218**

Screw-In Sleeves		Thread A1	Catalog Number
	ER25/ER20	M25 x 1.5	**10.112.271**
	ER25/ER16	M22 x 1.5	**10.112.272**

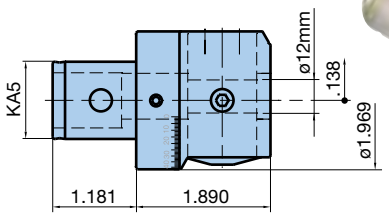
Tool Holders	Catalog Number	L	X	Insert Holders		Boring Range	Inserts
	**10.611.155**	1.181	.354	Solid Carbide Boring Cutters		.079-.138	Solid Carbide Boring Cutters
	10.611.156	1.378	.551			.118-.177	
	**10.615.203**	2.441	1.575			.154-.236	
	**10.615.204**	2.913	1.969			.193-.275	
	**10.615.201**	3.346	2.362	–	–	.228-.307	WC..02 
	**10.615.202**	3.740	2.756	–	–	.287-.374	
	**10.615.207**	3.150	1.969	–	–	.307-.413	TP..07 
	10.615.205	4.528	3.346				
	**10.615.211**	2.047	1.772		**10.615.271 (E9)**	.346-.492	
	10.615.212	3.031	2.756				
	10.615.222	3.819	3.543				
	**10.615.214**	2.047	1.772		**10.615.272 (E12)**	.465-.571	
	10.615.215	3.031	2.756				
	10.615.223	3.819	3.543				
	**10.615.216**	2.047	1.772		**10.615.273 (E14)**	.543-.650	
					10.615.280 (E15)	.583-.661	TC..11
					10.615.281 (E16)	.622-.728	
	**10.615.217**	2.047	1.929		**10.615.282 (E18)**	.701-.807	
					10.615.289 (E20)	.779-.886	

Carbide Tool Holders

SPARE PARTS PG. 65

EWB 2-32E x KA5
Catalog Number: 10.112.315 Inch

EWB 2-32 x KA5
Catalog Number: 10.112.306 Metric

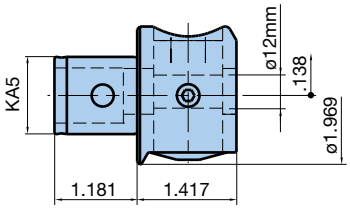


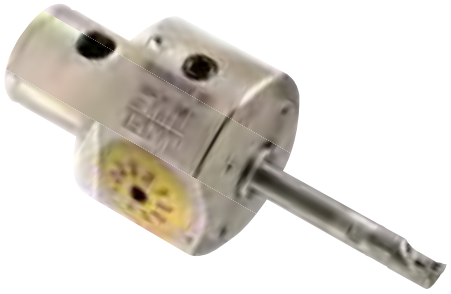
Technical Data:

- Boring Range: ø.079"-1.260" (ø2mm-32mm)
- Tool Holder Size: ø12mm
- Maximum Unbalance: 50g-mm
- Dial Precision: 1 Div = ø.0002" (ø.01mm)
  Vernier Precision: ø.00005" (ø.002mm)
- Maximum Through-Tool Coolant Pressure: 300 PSI
  Only carbide boring bars are to be used with balanceable (EWB) boring heads

EWN 2-32E x KA5
Catalog Number: 10.112.313 Inch

EWB 2-32 x KA5
Catalog Number: 10.112.301A Metric





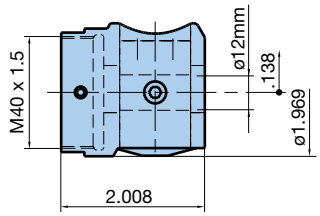
Technical Data:

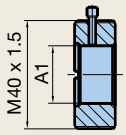
- Boring Range: ø.079"-1.260" (ø2mm-32mm)
- Tool Holder Size: ø12mm
- Dial Precision: 1 Div = ø.0002" (ø.01mm)
  Vernier Precision: ø.00005" (ø.002mm)

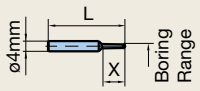
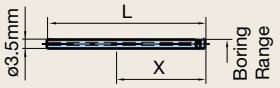
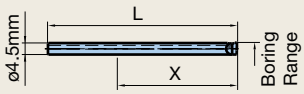
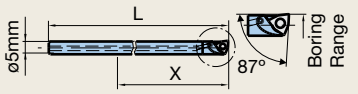
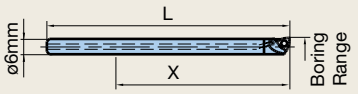
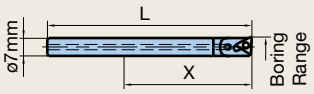
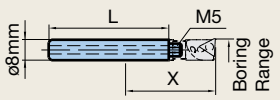
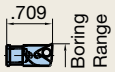
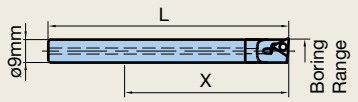
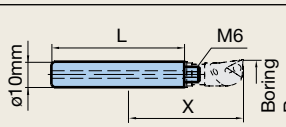
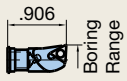
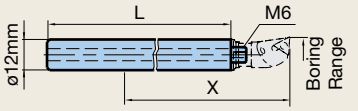
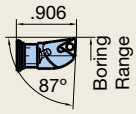
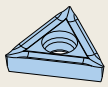
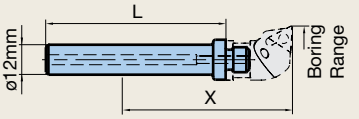
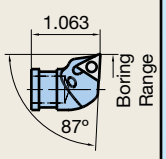
EWN 2-32 Reducers		Type*	
Catalog Number	øD-ød*		
10.613.324	12mm-4mm	1	
10.613.323	12mm-3.5mm	1	
10.613.326	12mm-4.5mm	1	
10.613.325	12mm-5mm	1	
10.613.327	12mm-6mm	2	
10.613.307	12mm-7mm	3	
10.613.308	12mm-8mm	3	
10.613.309	12mm-9mm	3	
10.613.310	12mm-10mm	3	

*See bottom of Pg. 59

EWN 2-32 x ER32
Catalog Number: 10.112.304A Metric



Screw-In Sleeves		Thread A1	Catalog Number
	ER32/ER25	M32 x 1.5	**10.112.353**
	ER32/ER16	M22 x 1.5	**10.112.385**

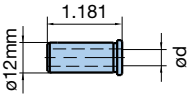
Tool Holders	Catalog Number	L	X	Insert Holders		Boring Range	Inserts
	**10.611.155**	1.181	.354	Solid Carbide Boring Cutters		.079-.138	Solid Carbide Boring Cutters
	10.611.156	1.378	.551			.118-.177	
	**10.615.203**	2.441	1.575			.154-.236	
	**10.615.204**	2.913	1.969			.193-.275	
	**10.615.201**	3.346	2.362	–	–	.228-.307	WC..02 
	**10.615.202**	3.740	2.756	–	–	.287-.374	
	**10.615.207**	3.150	1.969	–	–	.307-.413	
	10.615.205	4.528	3.346				
	**10.615.211**	2.047	1.772		**10.615.271 (E9)**	.346-.492	
	10.615.212	3.031	2.756				
	10.615.222	3.819	3.543				
	**10.615.208**	3.937	2.756	–	–	.386-.531	TP..07 
	10.615.206	5.315	4.134				
	**10.615.214**	2.047	1.772		**10.615.272 (E12)**	.465-.571	
	10.615.215	3.031	2.756				
	10.615.223	3.819	3.543				
	**10.615.218**	3.031	2.756		**10.615.273 (E14)**	.543-.650	
	10.615.225	3.819	3.543		**10.615.280 (E15)** **10.615.281 (E16)**	.583-.661 .622-.728	TC..11 
	10.615.219	4.213	3.937				
	10.615.224	5.394	5.118				
	**10.615.234**	2.835	2.756		**10.615.282 (E18)** **10.615.289 (E20)** **10.615.283 (E22)** **10.615.290 (E24)** **10.615.288 (E25)** **10.615.291 (E26)** **10.615.284 (E28)**	.701-.807 .779-.886 .858-.965 .937-1.004 .976-1.083 1.016-1.122 1.094-1.280	
	10.615.243	3.622	3.543				
	10.615.239	4.409	4.331				
	10.615.240	5.591	5.512				

Carbide Tool Holders

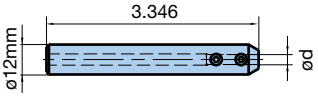
SPARE PARTS PG. 65

EWN 2-32 Reducers

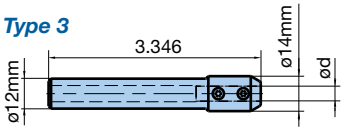
Type 1



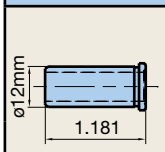
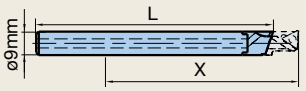
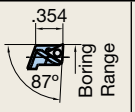
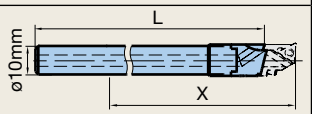
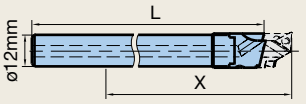
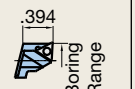
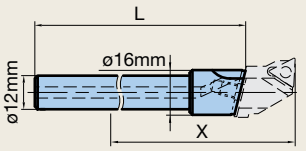
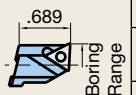
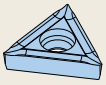
Type 2



Type 3



Adjustable Tool Holders

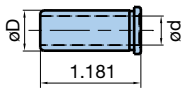
EWN 2-32 Reducers	Catalog Number	Adjustable Tool Holders	Catalog Number	L	X	Insert Holders		Boring Range	Inserts
	**10.613.309**		**10.615.369**	4.764	3.937	**10.615.365**		.386-.472	
	10.613.310		**10.615.370**	4.724	3.937	**10.615.366**		.465-.551	
			**10.615.372**	5.512	4.724	**10.615.367**		.543-.669	
			**10.615.256**	4.764	3.937	**10.615.301**		.661-.866	
						10.615.302		.858-1.063	
						10.615.303		1.055-1.299	

Carbide Tool Holders

Optional 90º Insert Holders

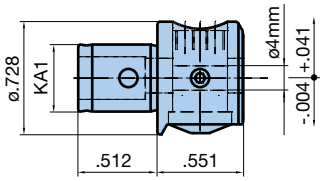
Type	Catalog Number	Inserts
E12	**11.689.810**	CC..06 (1/4" I.C.)
E14	**11.689.811**	
E16	**11.689.812**	
E18	**11.689.813**	CC..09 (3/8" I.C.)
E20	**11.689.814**	
E22	**11.689.815**	
E24	**11.689.816**	
E25	**11.689.817**	
E26	**11.689.818**	
E28	**11.689.819**	

Optional Reduction Sleeves

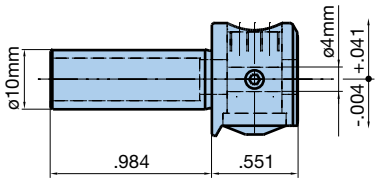


øD	ød	Catalog Number
12mm	4mm	**11.613.304**
12mm	5mm	**11.613.305**
12mm	.125	**11.613.313**
12mm	.156	**11.613.314**
12mm	.187	**11.613.315**
12mm	.250	**11.613.316**
12mm	.312	**11.613.318**

EWN 04-7 x KA1
Catalog Number: 10.112.513 Inch
10.112.503 Metric



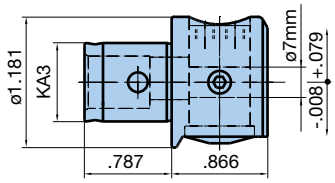
EWN 04-7 x ST10
Catalog Number: 10.112.514 Inch
10.112.504 Metric



Technical Data:

- Boring Range: ø.016"-.275" (ø.4mm-7mm)
- Tool Holder Size: ø4mm
- Dial Precision: 1 Div = ø.0005" (ø.01mm)
  Vernier Precision: ø.0001" (ø.002mm)
- Maximum Through-Tool Coolant Pressure: 300 PSI

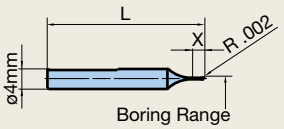
EWN 04-15 x KA3
Catalog Number: 10.112.515 Inch
10.112.505 Metric



Technical Data:

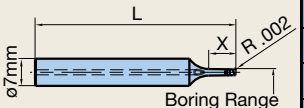
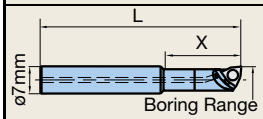
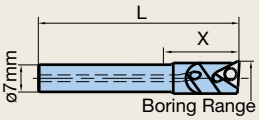
- Boring Range: ø.016"-.590" (ø.4mm-15mm)
- Tool Holder Size: ø7mm
- Dial Precision: 1 Div = ø.0005" (ø.01mm)
  Vernier Precision: ø.0001" (ø.002mm)
- Maximum Through-Tool Coolant Pressure: 300 PSI

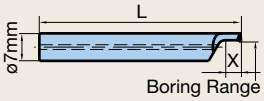
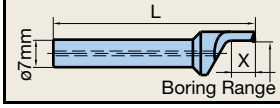
Solid Carbide Boring Cutters

Solid Carbide Boring Cutters	Catalog Number	L	X	Type	Boring Range
	**10.615.541**	1.181	.098	Coated ALCR10	.016-.035
	10.615.542		.157		.035-.055
	10.615.543		.236		.055-.078
	10.615.544		.275		.075-.118
	10.615.545		.394		.114-.157
	10.615.546		.512		.154-.197
	10.615.547		.630		.193-.275

EWN 04-7 – The World's Smallest Precision Boring Head

Indexable Carbide & Solid Boring Cutters

Boring Cutters	Catalog Number	L	X	Type	Boring Range
	**10.615.522**	2.047	.098	Coated ALCR10	.016-.039
	10.615.524		.157		.035-.059
	10.615.525		.236		.055-.079
	10.615.501		.275		.075-.118
	10.615.502		.394		.114-.157
	10.615.503		.512		.154-.197
	10.615.504		.630		.193-.236
	**10.615.505**		.787	WC..02	.228-.276
	10.615.506				.268-.315
	**10.615.507**		1.181	TP..07	.307-.354
	10.615.508				.346-.394
	10.615.509				.386-.472
	10.615.511				.465-.590

Solid Carbide For Pin Turning	Catalog Number	L	X	Type	Boring Range
	**10.615.530**	2.047	.157	Coated ALCR10	0-.118
	**10.615.531**		.236		.079-.236

Carbide Tool Holders

SMALL DIAMETER FINISH BORING INSERT SELECTION & CUTTING DATA

Optimal Conditions:

- Length to diameter ratio less than 4:1
- Rigid fixture and workpiece
- Good machine spindle

Critical Conditions:

- Length to diameter ratio over 4:1
- Unstable fixture and/or workpiece
- Worn machine spindle/poor runout

Boring Range ø.228"-.650"

Material	Insert Radius	Stock Allow "/Dia.	Inserts & Cutting Speeds						Feed (IPR)
			Optimal Conditions			Critical Conditions			
			WC..02	TP..07	Speed (SFM)	WC..02	TP..07	Speed (SFM)	
Mild, Low-Carbon Steels 10XX-15XX 1018, 1020, 1551, A36	.004	.004-.008	**10.655.604**	**10.651.824**	500-800	**10.655.604**	**10.651.824**	300-450	.0015-.0020
	.008	.008-.012	**10.655.600**	**10.651.802**		**10.655.601**	**10.651.835**		.0020-.0030
	.016	.012-.016	**11.655.606**	**10.651.702**		–	**10.651.736**		.0025-.0030
High Carbon Alloy Steels 23XX-92XX, Tool Steel 4140, 4340, 8620	.004	.004-.008	**10.655.604**	**10.651.824**	400-650	**10.655.604**	**10.651.824**	250-400	.0015-.0020
	.008	.008-.012	**10.655.600**	**10.651.802**		**10.655.601**	**10.651.835**		.0020-.0030
	.016	.012-.016	**11.655.606**	**10.651.702**		–	**10.651.736**		.0025-.0030
300 Stainless Steels Austenitic 303, 304, 316, 17-4ph	.004	.004-.008	**10.655.606**	–	250-500	**10.655.606**	–	200-300	.0010-.0015
	.008	.008-.012	**10.655.602**	**10.651.837**		**10.655.602**	**10.651.837**		.0015-.0020
	.012	.012-.016	–	**10.651.737**		–	**10.651.737**		.0020-.0250
400 Stainless Steels Martensitic 403, 410, 416, 430	.004	.004-.008	**10.655.604**	**10.651.824**	500-750	**10.655.606**	–	250-400	.0015-.0020
	.008	.008-.012	**10.655.600**	**10.651.802**		**10.655.602**	**10.651.837**		.0020-.0030
	.016	.012-.016	**11.655.606**	**10.651.702**		–	**10.651.737**		.0025-.0030
Grey Cast Iron Malleable Class 20, 30	.004	.004-.008	**10.655.605**	**10.651.824**	500-750	**10.655.605**	**10.651.824**	300-450	.0015-.0020
	.008	.008-.012	**10.655.603**	–		**10.655.603**	**10.651.833**		.0020-.0030
	.012	.012-.016	–	**10.651.735**		–	**10.651.735**		.0025-.0030
CBN-CH, CBN-CHN	–	.008-.012	**11.938.863**	**11.938.872**	750-1000	–	–	–	.0020-.0030
Cast Iron Ductile/Nodular/Chilled	.004	.004-.008	**10.655.605**	**10.651.824**	375-650	**10.655.605**	**10.651.824**	250-400	.0015-.0020
	.008	.008-.012	**11.655.607**	–		**10.655.603**	–		.0020-.0030
	.012	.012-.016	–	**10.651.632**		–	**10.651.632**		.0025-.0030
High Temp. Alloys Titanium, Inconel, Monel	.004	.003-.006	**10.655.606**	–	200-325	**10.655.606**	–	150-225	.0010-.0015
	.008	.006-.010	**10.655.602**	**10.651.837**		**10.655.602**	**10.651.837**		.0010-.0020
	.012	.008-.012	–	**10.651.737**		–	**10.651.737**		.0015-.0025
Copper Alloys Brass, Bronze	.004	.004-.008	–	–	600-1000	–	–	350-500	.0015
	.008	.008-.012	**11.655.607**	–		**10.655.605**	–		.0020
	.012	.012-.016	–	**10.651.623**		–	**10.651.623**		.0030
Aluminum/Magnesium 6061, 7075 Carbide Inserts	.004	.004-.008	**10.655.605**	**10.651.823**	600-1000	**10.655.605**	**10.651.823**	350-600	.0015-.0025
	.008	.008-.012	**10.655.603**	**10.651.825**		**10.655.603**	**10.651.825**		.0020-.0030
	.012	.012-.016	–	**10.651.723**		–	**10.651.723**		.0030-.0040
	.016	.016-.020	–	**10.651.725**		–	**10.651.725**		.0035-.0045
Aluminum/Magnesium 6061, 7075 PCD Inserts	.008	.010-.014	**11.938.845**	–	800-1350	–	–	–	.0020-.0030
	.012	.016-.020	–	**10.938.840**		–	–		.0030-.0040
Tool Steel (Min 50 Rc) CBN Inserts	.008	.004-.008	**11.938.846**	–	150-225	–	–	–	.0008-.0012
	.012	.004-.008	–	**10.938.837**		–	–		.0010-.0015

All cutting data without guarantee

Cutting Speed:
$RPM = \frac{SFM \times 3.82}{Bore\ ø}$

Feed Rate:
$IPM = RPM \times IPR$

Optimal Conditions:

- Length to diameter ratio less than 4:1
- Rigid fixture and workpiece
- Good machine spindle

Critical Conditions:

- Length to diameter ratio over 4:1
- Unstable fixture and/or workpiece
- Worn machine spindle/poor runout

Boring Range ø.583"-2.125"

Material	Insert Radius	Stock Allow "/Dia.	Inserts & Cutting Speeds								Feed (IPR)
			Optimal Conditions				Critical Conditions				
			TC..11	CC..06	CC..09	Speed (SFM)	TC..11	CC..06	CC..09	Speed (SFM)	
Mild, Low-carbon Steels 10XX-15XX 1018, 1020,1551, A36	.008	.008-.012	**11.656.352**	**11.654.856**	–	1000-1450	**10.655.372**	**11.654.840**	–	525-675	.0015-.0025
	.016	.016-.020	**11.655.322**	**11.654.865**	**11.654.959**		**10.655.381**	**11.654.850**	**11.654.940**		.0030-.0040
	.031	.024-.040	**11.655.332**	**11.654.867**	**11.654.960**		–	–	–		.0050-.0060
High Carbon Alloy Steels 23XX-92XX, Tool Steel 4140, 4340, 8620	.008	.008-.012	**11.656.352**	**11.654.856**	–	800-1100	**10.655.372**	**11.654.840**	–	400-550	.0015-.0025
	.016	.016-.020	**11.655.322**	**11.654.865**	**11.654.959**		**10.655.381**	**11.654.850**	**11.654.940**		.0030-.0040
	.031	.024-.040	**11.655.332**	**11.654.867**	**11.654.960**		–	–	–		.0050-.0060
300 Stainless Steels Austenitic 303, 304, 316, 17-4ph	.008	.008-.012	**10.655.379**	**11.654.856**	–	550-800	**10.655.379**	–	–	350-525	.0015-.0025
	.016	.016-.020	**10.655.389**	**11.654.865**	**11.654.959**		**10.655.389**	**11.654.845**	**11.654.968**		.0030-.0040
	.031	.024-.040	**10.655.399**	**11.654.867**	**11.654.960**		–	–	–		.0050-.0060
400 Stainless Steels Martensitic 403, 410, 416, 430	.008	.008-.012	**11.656.352**	**11.654.856**	–	650-875	**10.655.379**	–	–	425-550	.0015-.0025
	.016	.016-.020	**11.655.322**	**11.654.865**	**11.654.959**		**10.655.389**	**11.654.845**	**11.654.968**		.0030-.0040
	.031	.024-.040	**11.655.332**	**11.654.867**	**11.654.960**		–	–	–		.0050-.0060
Grey Cast Iron Malleable Class 20, 30	.008	.008-.012	**10.655.373**	**11.654.840**	–	650-1000	**10.655.373**	–	–	350-500	.0015-.0025
	.016	.016-.020	**10.655.383**	**11.654.850**	**11.654.940**		**10.655.383**	**11.654.868**	**11.654.968**		.0030-.0040
	.031	.024-.050	**10.655.393**	**11.654.860**	**11.654.952**		–	–	–		.0050-.0060
CBN-CH, CBN-CHN	–	.016-.030	**11.938.833**	**11.938.835**	**11.938.838**	1500-2000	–	–	–	–	.0020-.0030
Silicon Nitride Si3N4	–	.016-.030	–	**11.654.841**	**11.654.951**	1000-1200	–	–	–	–	.0030-.0040
Cast Iron Ductile/Nodular/Chilled	.008	.008-.012	**10.655.301**	**11.654.840**	–	375-625	**10.655.373**	–	–	250-350	.0015-.0025
	.016	.016-.020	**10.655.302**	**11.654.850**	**11.654.940**		**10.655.383**	**11.654.868**	**11.654.968**		.0030-.0040
	.031	.024-.040	**10.655.303**	**11.654.860**	**11.654.952**		–	–	–		.0050-.0060
High Temp. Alloys Titanium, Inconel, Monel	.008	.008-.012	**10.655.379**	–	–	200-325	**10.655.379**	–	–	125-250	.0010-.0020
	.016	.016-.020	**10.655.389**	**11.654.868**	**11.654.968**		**10.655.389**	**11.654.963**	**11.654.957**		.0020-.0030
	.031	.024-.040	**10.655.399**	–	**11.654.969**		–	–	–		.0030-.0040
Copper Alloys Brass, Bronze	.008	.008-.012	**11.655.315**	–	–	1100-1800	**11.655.315**	–	–	400-700	.0015-.0025
	.016	.016-.020	**11.655.325**	**11.654.858**	**11.654.957**		**11.655.325**	**11.654.858**	**11.654.957**		.0030-.0040
	.031	.024-.040	**11.655.335**	**11.654.864**	**11.654.958**		–	–	–		.0050-.0060
Aluminum/Magnesium 6061, 7075 Carbide Inserts	.008	.008-.012	**10.655.378**	**10.654.877**	–	1200-1600	**10.655.378**	**10.654.877**	–	600-1100	.0015-.0025
	.016	.016-.020	**10.655.388**	**10.654.888**	**10.654.977**		**10.655.388**	**10.654.888**	**11.654.977**		.0030-.0040
	.031	.024-.040	**10.655.398**	**10.654.898**	**10.654.987**		–	–	–		.0050-.0060
Aluminum/Magnesium 6061, 7075 PCD Inserts	.008	.016-.020	**11.938.861**	**11.938.847**	–	2000-4000	–	–	–	–	.0015-.0025
	.016	.016-.020	**10.938.841**	**11.938.842**	**11.938.843**		–	–	–		.0030-.0040
	.031	.024-.050	**11.938.860**	–	**11.938.851**		–	–	–		.0050-.0060
Tool Steel (Min 50 Rc) CBN Inserts	.016	.016-.020	**10.938.834**	**11.938.835**	**11.938.838**	200-300	–	–	–	–	.0015-.0020
	.031	.024-.040	**10.938.865**	–	–		–	–	–		.0020-.0025

All cutting data without guarantee

Cutting Speed:

$$RPM = \frac{SFM \times 3.82}{Bore\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$

EWN 2-50XL EXTENDED RANGE INSERT SELECTION & CUTTING DATA

Boring Range ø3.150"-6.000"

Material	Insert Radius	Inserts & Cutting Speeds			
		Insert	Stock Allow "/Dia.	Speed (SFM)	Feed (IPR)
Mild, Low-carbon Steels 10XX-15XX 1018, 1020,1551, A36	.008	**11.656.352**	.008-.012	450-800	.0020
	.016	**11.655.322**	.016-.020		.0040
	.031	**11.655.332**	.024-.040		.0060
High Carbon Alloy Steels 23XX-92XX, Tool Steel 4140, 4340, 8620	.008	**11.656.352**	.008-.012	400-700	.0020
	.016	**11.655.322**	.016-.020		.0040
	.031	**11.655.332**	.024-.040		.0060
300 Stainless Steels Austenitic 303, 304, 316, 17-4ph	.008	**10.655.379**	.008-.012	350-550	.0020
	.016	**10.655.389**	.016-.020		.0040
	.031	**10.655.399**	.024-.040		.0060
400 Stainless Steels Martensitic 403, 410, 416, 430	.008	**11.656.352**	.008-.012	400-650	.0020
	.016	**11.655.322**	.016-.020		.0040
	.031	**11.655.332**	.024-.040		.0060
Grey Cast Iron Malleable Class 20, 30	.008	**10.655.373**	.008-.012	450-750	.0020
	.016	**10.655.383**	.016-.020		.0040
	.031	**10.655.393**	.024-.050		.0060
Cast Iron Ductile/Nodular/Chilled	.008	**10.655.301**	.008-.012	300-550	.0020
	.016	**10.655.302**	.016-.020		.0040
	.031	**10.655.303**	.024-.040		.0060
High Temp. Alloys Titanium, Inconel, Monel	.008	**10.655.379**	.008-.012	150-300	.0015
	.016	**10.655.389**	.016-.020		.0020
	.031	**10.655.399**	.024-.040		.0030
Copper Alloys Brass, Bronze	.008	**11.655.315**	.008-.012	550-800	.0020
	.016	**11.655.325**	.016-.020		.0040
	.031	**11.655.335**	.024-.040		.0060
Aluminum/Magnesium 6061, 7075 Carbide Inserts	.008	**10.655.378**	.008-.012	650-1000	.0020
	.016	**10.655.388**	.016-.020		.0040
	.031	**10.655.398**	.024-.040		.0060
Tool Steel (Min 50 Rc) CBN Inserts	.016	**10.938.834**	.016-.020	200-300	.0015
	.031	**10.938.865**	.024-.040		.0020

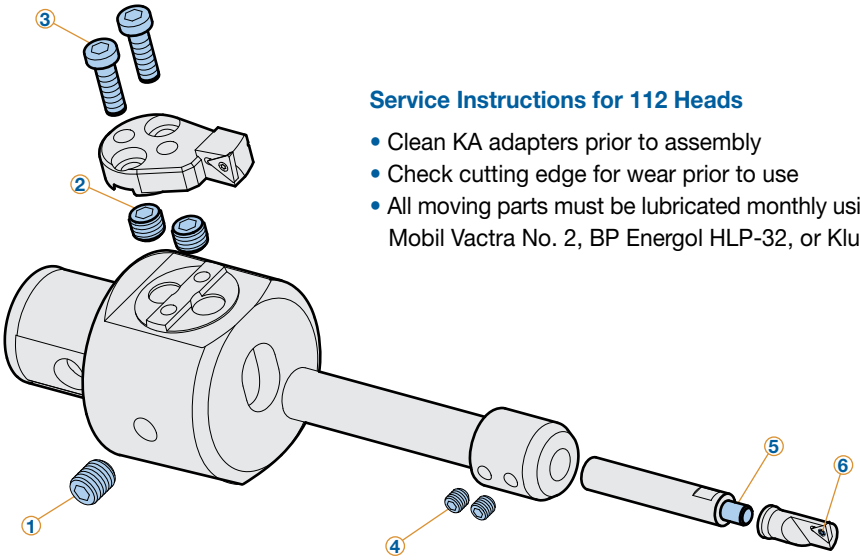
All cutting data without guarantee

Cutting Speed:

$$RPM = \frac{SFM \times 3.82}{Bore\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$



Service Instructions for 112 Heads

- Clean KA adapters prior to assembly
- Check cutting edge for wear prior to use
- All moving parts must be lubricated monthly using a light machine oil such as Mobil Vactra No. 2, BP Energol HLP-32, or Klueber Isoflex PDP94

Lubrication Gun
Catalog Number: 10.692.404A

Boring Heads

Catalog Number	① Locking Screw	Torque (in-lbs.)	② Bar Locking Screw	Torque (in-lbs.)	③ Mounting Screw	Torque (in-lbs.)
EWN 2-50XL	**10.690.452**	90	**10.690.595**	90	**10.690.156**	105
EWN 2-32	**10.690.449**	45	**10.690.460**	45	–	–
EWN 04-22	**10.690.489**	22	**10.690.421**	22		
EWN 04-15	**10.690.418**	13	**10.690.440**	13		
EWN 04-7	**10.690.978**	7	**10.690.538**	7		

Reduction Bushings

ød	④ Reduction Set Screw	Torque (in-lbs.)
3.5mm	**10.690.459**	4.5
4mm		
4.5mm		
5mm		
6mm		
7mm	**10.690.489**	22
8mm		
9mm		
10mm		

Insert Screws

Insert Type	⑥ Insert Screw	Wrench
WC..02	**10.694.101**	**10.694.806**
TP..07	**10.694.103***	**10.694.806**
TC..11	**10.694.122**	**10.694.807**
CC..06	**10.694.122**	**10.694.807**
CC..09	**10.694.141**	**10.694.815**

*For boring bars **10.615.205/207/507** use insert screw **10.694.102**

Bars, Extensions & Reductions

ød	Component	Thread	⑤ Boring Bar Screw
8mm	**10.615.211**	M5	**10.690.486**
	10.615.212		
	10.615.222		
10mm	**10.615.214**	M6	**10.690.487**
	10.615.215		
	10.615.223		
11mm	**10.615.250**	M6	**10.690.487**
12mm	**10.615.218**	M6	**10.690.487**
	10.615.219		
	10.615.224		
	10.615.225		
13mm	**10.615.251**	M6	**10.690.487**
14mm	**10.615.232**	M6	**10.690.487**
5/8"	**10.615.236**	M10	**10.690.488**
16mm	**10.615.226**	M10	**10.690.488**
10mm-12mm	**10.615.216**	M6	**10.690.487**
10mm-16mm	**10.615.217**	M6	**10.690.487**
12mm-16mm	**10.615.239**	M10	**10.690.488**
12mm-16mm	**10.615.240**	M10	**10.690.488**
12mm-16mm	**10.615.243**	M10	**10.690.488**
12mm	**10.615.220**	M6	**10.690.487**
16mm-10mm	**10.615.230**	M6	**10.690.487**
16mm-10mm	**10.615.231**	M6	**10.690.487**

Series 309

EWB-UP Balanceable ..... Pg. 68

Boring Range: ø.984"-3.937" (ø25mm-100mm)

Series 310

EWB Automatic Balance ..... Pg. 69

Boring Range: ø1.260"-4.134" (ø32mm-105mm)

Series 310

EWB-AL Automatic Balance ..... Pg. 69

Boring Range: ø3.937"-8.000" (ø100mm-203mm)

Series 310

EWN ..... Pg. 70-72

Boring Range: ø.787"-8.000" (ø20mm-203mm)

Series 310

EW Thread Connection ..... Pg. 73

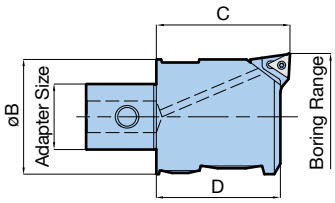
Boring Range: ø.590"-.866" (ø15mm-22mm)

SERIES 309 EWB-UP
ULTRA PRECISION FINISH BORING HEADS ø.984"-3.937"

HIGHEST ACCURACY & SPEED!

Series 309 EWB-UP — Peak Performance and Precision Uniquely Combined

The revolutionary new EWB-UP series sets new standards for boring head adjustment accuracy and balance quality. Diameter adjustments in the sub-micron range and balance qualities of G6.3 are requirements for tight tolerance bores with maximum RPM's.



Inch Graduated Heads, 1 Div = .00005"/ø, ø.984"-3.937"

Head Type	Adapter Size	Catalog Number	Boring Range		øB	C	D	Inserts
			Min	Max				
EWB25UP	KA2	**10.309.211**	.984	1.299	1.280	1.398	1.358	TP..07
EWB32UP	KA3	**10.309.311**	1.260	1.654	1.181	1.575	1.457	TC..11
EWB41UP	KA4	**10.309.411**	1.614	2.126	1.496	1.850	1.693	TC..11
EWB53UP	KA5	**10.309.511**	2.087	2.756	1.929	2.244	2.087	TC..11
EWB68UP	KA6	**10.309.611**	2.677	3.937	2.520	2.795	2.646	TC..11

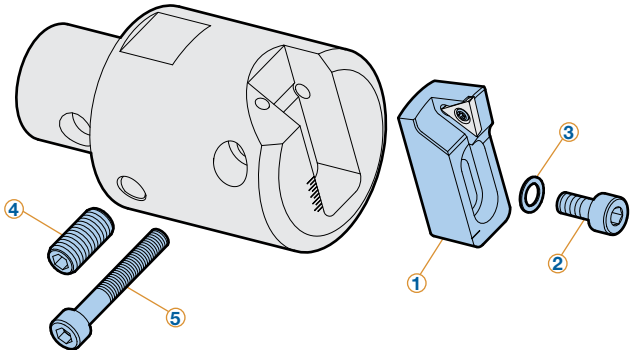
Metric Graduated Heads, 1 Div = .001mm/ø, ø25mm-100mm

Head Type	Adapter Size	Catalog Number	Boring Range		øB	C	D	Inserts
			Min	Max				
EWB25UP	KA2	**10.309.201**	25	33	23.4	35.5	32.5	TP..07
EWB32UP	KA3	**10.309.301**	32	42	30	40	37	TC..11
EWB41UP	KA4	**10.309.401**	41	54	38	47	43	TC..11
EWB53UP	KA5	**10.309.501**	53	70	49	57	53	TC..11
EWB68UP	KA6	**10.309.601**	68	100	64	71	67.2	TC..11

• Insert holders are included with EWB-UP boring heads

Spare Parts

Type	① Insert Holder	② Mounting Screw	③ Washer	Torque (in-lbs.)	④ Locking Screw	Torque (in-lbs.)	⑤ Head Clamping Screw	Torque (in-lbs.)
EWB25UP	**10.627.121**	**10.690.182**	**10.693.289**	9	–	9	**10.690.940**	9
EWB32UP	**10.627.131**	**10.690.179**	**10.693.186**	13	**10.690.550**	13	**10.690.180**	13
EWB41UP	**10.627.141**	**10.690.176**	**10.693.175**	22	**10.690.943**	22	**10.690.115**	22
EWB53UP	**10.627.151**	**10.690.177**	**10.693.176**	35	**10.690.658**	35	**10.690.178**	35
EWB68UP	**10.627.161**	**10.690.953**	**10.693.177**	44	**10.690.591**	44	**10.690.156**	58



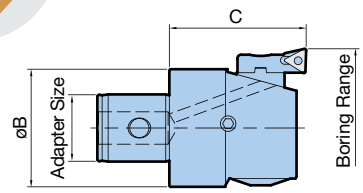
KAISER®

HIGH SPEED!

Series 310 EWB — Cutting Speeds up to 6600 SFM! — ***U.S. Patent #5,909,986***

Features:

- Automatic precision balance over entire work range
- Combines clamping of tool carrier & counterweight; will not change diameter setting
- Same dimensions as program EWN
- Smooth, play-free micrometer spindle with inch or metric graduations
- Through spindle coolant
- ISO standard insert pockets



Lightweight aluminum boring heads cover the range ø3.937"-8.000" (ø100mm-203mm)

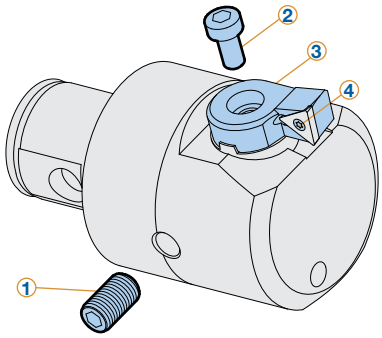
Inch Graduated Heads, 1 Div = .0005"/ø (.0001"/ø Vernier), ø1.260"-8.000"

Head Type	Adapter Size	Catalog Number	Boring Range		øB	C	Inserts
			Min	Max			
EWB32	KA3	**10.310.315A**	1.260	1.654	1.181	1.575	TP..07
EWB41	KA4	**10.310.415A**	1.614	2.126	1.496	1.850	TC..11
EWB53	KA5	**10.310.515A**	2.087	2.756	1.929	2.244	TC..11
EWB68	KA6	**10.310.615A**	2.677	3.465	2.480	2.795	TC..11
EWB85	KA6	**10.310.616A**	3.346	4.134	2.480	2.795	TC..11
EWB100	KA6	**10.310.617**	3.937	6.024	3.543	2.795	TC..11
EWB150	KA6	**10.310.618**	5.906	8.000	4.960	2.795	TC..11
EWB100	KA7	**10.310.715**	3.937	6.024	3.543	3.425	TC..11
EWB150	KA7	**10.310.716**	5.906	8.000	4.960	3.425	TC..11

Metric Graduated Heads, 1 Div = .01mm/ø (.002mm/ø Vernier), ø32mm-203mm

Head Type	Adapter Size	Catalog Number	Boring Range		øB	C	Inserts
			Min	Max			
EWB32	KA3	**10.310.305A**	32	42	30	40	TP..07
EWB41	KA4	**10.310.405A**	41	54	38	47	TC..11
EWB53	KA5	**10.310.505A**	53	70	49	57	TC..11
EWB68	KA6	**10.310.605A**	68	88	63	71	TC..11
EWB85	KA6	**10.310.606A**	85	105	63	71	TC..11
EWB100	KA6	**10.310.607**	100	153	90	71	TC..11
EWB150	KA6	**10.310.608**	150	203	126	71	TC..11
EWB100	KA7	**10.310.705**	100	153	90	87	TC..11
EWB150	KA7	**10.310.706**	150	203	126	87	TC..11

- Insert holders are included with 310 EWB heads



Spare Parts

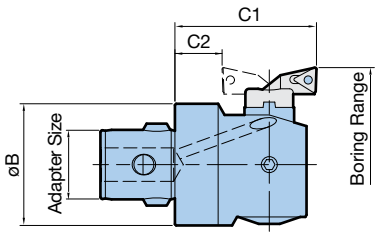
Head Type	① Locking Screw		② Mounting Screw		Boring Head Wrench	③ Insert Holders	④ Insert Screws
	Catalog Number	Torque (in-lbs.)	Catalog Number	Torque (in-lbs.)			
EWB32	**10.690.577**	20	**10.690.137**	20	**10.690.812**	**10.626.231**	**10.694.103**
EWB41	**10.690.578**	25	**10.690.138**	25	**10.690.813**	**10.626.241**	**10.694.122**
EWB53	**10.690.579**	50	**10.690.139**	50	**10.690.814**	**10.626.251**	**10.694.122**
EWB68	**10.690.580**	105	**10.690.140**	105	**10.690.816**	**10.626.261**	**10.694.122**
EWB85	**10.690.580**	105	**10.690.140**	105	**10.690.816**	**10.626.261**	**10.694.122**
EWB100	**10.690.580**	105	**10.690.140**	105	**10.690.816**	**10.626.261**	**10.694.122**
EWB150	**10.690.580**	105	**10.690.140**	105	**10.690.816**	**10.626.261**	**10.694.122**

DO NOT substitute insert holders from program EWN.

Series 310 EWN Heads — High Precision Vernier Setting to .0001"! ***U.S. Patent #5,857,811***

Features:

- Largest work range of any system by using 3 insert holders for each head
- Balanced at midpoint of travel for high cutting speeds and improved bore quality
- Insert holder can be mounted in opposite direction for back bore applications
- Through spindle coolant capability is standard, with directional coolant ports, size EWN41 and larger

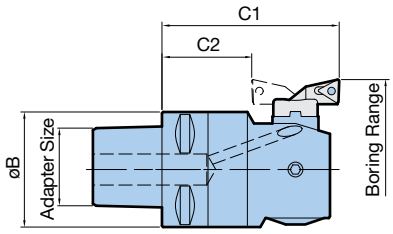


Inch Graduated Heads, 1 Div = .0005"/ø (.0001"/ø Vernier), ø.787"-8.000"

Head Type	Adapter Size	Catalog Number	Boring Range		Back Boring		øB	C1	C2
			Min	Max	Min	Max			
EWN20	KAB1	**10.310.111**	.787	1.417	1.102	1.417	.728	1.28	.413
EWN25	KAB2	**10.310.211**	.984	1.850	1.417	1.850	.921	1.398	.453
EWN32	KAB3	**10.310.311**	1.260	2.362	1.811	2.362	1.181	1.575	.394
EWN41	KAB4	**10.310.411**	1.614	2.913	2.087	2.913	1.496	1.850	.551
EWN53	KAB5	**10.310.511**	2.087	3.740	2.441	3.740	1.929	2.244	.748
EWN68	KAB6	**10.310.611**	2.677	5.906	3.071	5.906	2.520	2.795	.866
EWN100	KAB6	**10.310.612**	3.937	8.000	4.331	8.000	3.543	2.795	.866
EWN100	KAB7	**10.310.711**	3.937	8.000	4.331	8.000	3.543	3.425	1.496
EWN100	KAB7	**10.310.718**	3.937	8.000	4.331	8.000	3.543	4.606	2.677

Metric Graduated Heads, 1 Div = .01mm/ø (.002mm/ø Vernier), ø20mm-203mm

Head Type	Adapter Size	Catalog Number	Boring Range		Back Boring		øB	C1	C2
			Min	Max	Min	Max			
EWN20	KAB1	**10.310.101**	20	36	28	36	18.5	32.5	10.5
EWN25	KAB2	**10.310.201**	25	47	36	47	23.4	35.5	11.5
EWN32	KAB3	**10.310.301**	32	60	46	60	30	40	10
EWN41	KAB4	**10.310.401**	41	74	53	74	38	47	14
EWN53	KAB5	**10.310.501**	53	95	62	95	49	57	19
EWN68	KAB6	**10.310.601**	68	150	78	150	64	71	22
EWN100	KAB6	**10.310.602**	100	203	110	203	90	71	22
EWN100	KAB7	**10.310.701**	100	203	110	203	90	87	38
EWN100	KAB7	**10.310.708**	100	203	110	203	90	117	68



Polygon Taper - Inch Graduated Heads
1 Div = .0005"/ø (.0001"/ø Vernier), ø1.260"-8.000"

Head Type	Adapter Size	Catalog Number	Boring Range		Back Boring		øB	C1	C2
			Min	Max	Min	Max			
EWN32	C3	**10.470.311**	1.260	2.362	1.811	2.362	1.260	2.165	.984
EWN41	C4	**10.470.411**	1.614	2.913	2.087	2.913	1.575	2.638	1.339
EWN53	C5	**10.470.511**	2.087	3.74	2.441	3.740	1.969	3.031	1.535
EWN68	C6	**10.470.611**	2.677	5.906	3.071	5.906	2.520	3.622	1.693
EWN100	C6	**10.470.612**	3.937	8.000	4.331	8.000	2.520	3.622	1.693

Polygon Taper - Metric Graduated Heads
1 Div = .01mm/ø (.002mm/ø Vernier), ø32mm-203mm

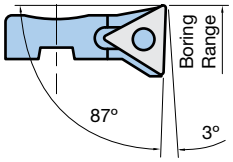
Head Type	Adapter Size	Catalog Number	Boring Range		Back Boring		øB	C1	C2
			Min	Max	Min	Max			
EWN32	C3	**10.470.301**	32	60	46	60	32	55	25
EWN41	C4	**10.470.401**	41	74	53	74	40	67	34
EWN53	C5	**10.470.501**	53	95	62	95	50	77	39
EWN68	C6	**10.470.601**	68	150	78	150	64	92	43
EWN100	C6	**10.470.602**	100	203	110	203	64	92	43

INSERT HOLDERS PG. 71 SPARE PARTS PG. 72



Triangular Insert Holders

SIZE 1



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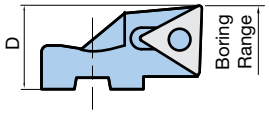

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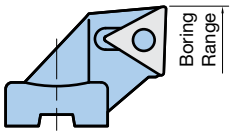
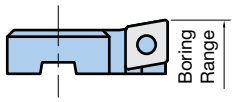


Head Type	Catalog Number	Insert Holder Size	Boring Range		Back Boring Range		D	Inserts	Insert Screws
			Min	Max	Min	Max			
EWN20	**10.626.111**	11	.787	1.024	–	–	.183	TP..07	**10.694.103**
	10.626.112	12	.984	1.220	1.102	1.220	.281		
	10.626.113	13	1.181	1.417	1.181	1.417	.380		
EWN25	**10.626.121**	21	.984	1.299	–	–	.215	TP..07	**10.694.103**
	10.626.122	22	1.260	1.575	1.417	1.575	.352		
	10.626.123	23	1.535	1.850	1.535	1.850	.490		
EWN32	**10.626.131**	31	1.260	1.654	–	–	.291	TC..11	**10.694.122**
	10.626.132	32	1.614	2.008	1.811	2.008	.469		
	10.626.133	33	1.969	2.362	1.969	2.362	.646		
EWN41	**10.626.141**	41	1.614	2.126	–	–	.319	TC..11	**10.694.122**
	10.626.142	42	1.969	2.480	2.087	2.480	.496		
	10.626.143	43	2.402	2.913	2.402	2.913	.713		
EWN53	**10.626.151**	51	2.087	2.756	2.441	2.756	.394	TC..11	**10.694.122**
	10.626.152	52	2.559	3.228	2.717	3.228	.630		
	10.626.153	53	3.070	3.740	3.070	3.740	.886		
EWN68	**10.626.161**	61	2.677	3.937	3.151	3.937	.492	TC..11	**10.694.122**
	10.626.162	62	3.700	4.960	3.700	4.960	1.004		
	10.626.163	63	4.646	5.906	4.646	5.906	1.476		
EWN100	**10.626.161**	61	3.937	6.024	4.409	6.024	.492	TC..11	**10.694.122**
	10.626.162	62	4.960	7.047	4.960	7.047	1.004		
	10.626.163	63	5.906	8.000	5.906	8.000	1.476		

90° Square Shoulder Insert Holders

SIZE 1



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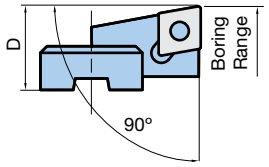

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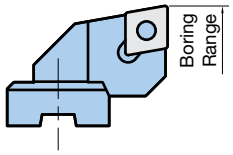
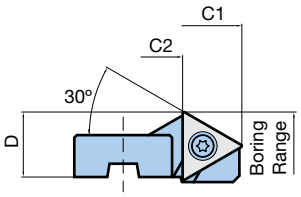
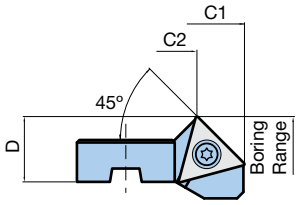


Head Type	Catalog Number	Insert Holder Size	Boring Range		Back Boring Range		D	Inserts	Insert Screws
			Min	Max	Min	Max			
EWN25	**10.626.322**	22	1.299	1.614	1.417	1.614	.372	CC..06	**10.694.122**
	10.626.323	23	1.535	1.850	1.535	1.850	.490		
EWN32	**11.626.331**	31	1.260	1.654	–	–	.291	CC..06	**10.694.122**
	10.626.332	32	1.614	2.008	1.811	2.008	.469		
	10.626.333	33	1.969	2.362	1.969	2.362	.646		
EWN41	**11.626.341**	41	1.614	2.126	–	–	.319	CC..06	**10.694.122**
	10.626.342	42	1.969	2.480	2.087	2.480	.496		
	10.626.343	43	2.402	2.913	2.402	2.913	.713		
EWN53	**11.626.351**	51	2.087	2.756	2.441	2.756	.394	CC..06	**10.694.122**
	10.626.352	52	2.441	3.110	2.756	3.110	.571	CC..09	**10.694.141**
	10.626.353	53	3.070	3.740	3.070	3.740	.886		
EWN68	**11.626.361**	61	2.677	3.937	3.151	3.937	.492	CC..09	**10.694.141**
	10.626.364	62	3.700	4.960	3.700	4.960	1.004		
	10.626.363	63	4.252	5.512	4.252	5.512	1.208		
EWN100	**11.626.361**	61	3.937	6.024	4.409	6.024	.492	CC..09	**10.694.141**
	10.626.364	62	4.960	7.047	4.960	7.047	.689		
	10.626.363	63	5.512	7.600	5.512	7.600	1.280		



30° Triangular Insert Holders

Head Type	Catalog Number	Insert Holder Size	Boring Range		Length		D	Insert	Insert Screw
			Min	Max	C1	C2			
EWN25	**11.380.321**	21	1.102	1.417	1.398	1.173	.274	TP..07	**10.694.103**
EWN32	**11.380.322**	31	1.417	1.811	1.654	1.311	.370	TC..11	**10.694.122**
EWN41	**11.380.323**	41	1.772	2.283	1.929	1.587	.398	TC..11	**10.694.122**
EWN53	**11.380.324**	51	2.205	2.874	2.244	1.906	.453	TC..11	**10.694.122**
EWN68	**11.380.325**	61	2.677	3.937	2.795	2.453	.492	TC..11	**10.694.122**
EWN100	**11.380.325**	61	3.937	6.024	3.425	3.083	.492	TC..11	**10.694.122**



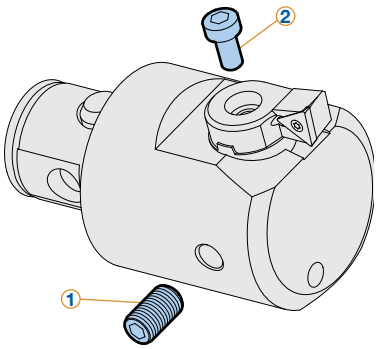
45° Triangular Insert Holders

Head Type	Catalog Number	Insert Holder Size	Boring Range		Length		D	Insert	Insert Screw
			Min	Max	C1	C2			
EWN25	**11.380.326**	21	1.102	1.417	1.398	1.213	.274	TP..07	**10.694.103**
EWN32	**11.380.327**	31	1.417	1.811	1.654	1.370	.370	TC..11	**10.694.122**
EWN41	**11.380.328**	41	1.772	2.283	1.929	1.646	.398	TC..11	**10.694.122**
EWN53	**11.380.329**	51	2.205	2.874	2.244	1.961	.453	TC..11	**10.694.122**
EWN68	**11.380.330**	61	2.677	3.937	2.795	2.512	.492	TC..11	**10.694.122**
EWN100	**11.380.330**	61	3.937	6.024	3.425	3.142	.492	TC..11	**10.694.122**

Service Instructions for 310 Heads

- Clean KA adapters prior to assembly
- Check cutting edge for wear prior to use
- All moving parts must be lubricated monthly using a light machine oil such as Mobil Vactra No. 2, BP Energol HLP-32, or Klueber Isoflex PDP94

Lubrication Gun
Catalog Number: 10.692.404A



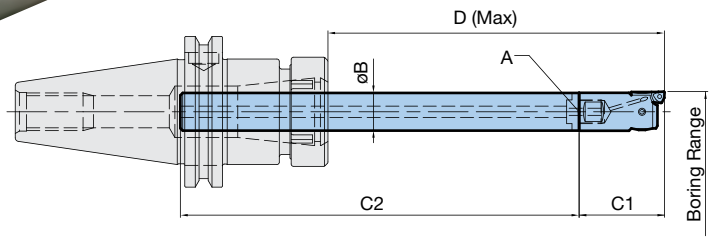
Spare Parts

Head Type	① Locking Screws		② Mounting Screws		Wrench
	Catalog Number	Torque (in-lbs.)	Catalog Number	Torque (in-lbs.)	
EWN20	**10.690.410**	5	**10.690.135**	10	**10.690.811**
EWN25	**10.690.549**	5	**10.690.136**	10	**10.690.811**
EWN32	**10.690.550**	15	**10.690.137**	20	**10.690.812**
EWN41	**10.690.551**	20	**10.690.138**	25	**10.690.813**
EWN53	**10.690.552**	50	**10.690.139**	50	**10.690.814**
EWN68	**10.690.553**	90	**10.690.141**	135	**10.690.816**
EWN100	**10.690.553**	90	**10.690.141**	135	**10.690.816**

KAISER 310 EW series boring heads are designed for precision production boring on machining centers, boring mills, and jig borers. Their compact and well balanced design makes them suitable for small diameter bores in confined areas, as well as easily accessible bores.

Features:

- Smooth, play-free micrometer spindle with inch or metric graduations
- Easy to adapt to any machine via straight shank boring bar
- ISO standard insert pockets with replaceable insert holders
- No diameter change after locking tool
- Through spindle coolant
- Minimal unbalance of tool



Inch Graduated Heads, 1 Div = .0005"/ø (.0001"/ø Vernier)

Head Type	Thread A	Catalog Number	Boring Range		øB	C1	Insert Holders
			Min	Max			
EW15	M6	**10.310.021**	.590	.728	.551	1.181	**10.625.020**
EW18	M10	**10.310.031**	.708	.866	.630	1.417	

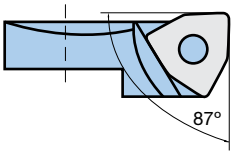
Metric Graduated Heads, 1 Div = .01mm/ø (.002mm/ø Vernier)

Head Type	Thread A	Catalog Number	Boring Range		øB	C1	Insert Holders
			Min	Max			
EW15	M6	**10.310.020**	15	18.5	14	30	**10.625.020**
EW18	M10	**10.310.030**	18	22	16	36	

Boring Bars

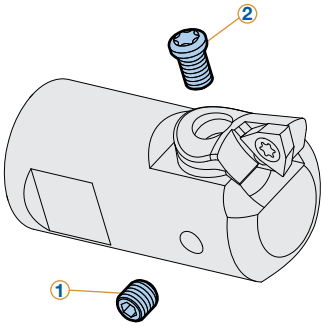
Head Type	Thread A	øB	Catalog Number	C2	Bore Depth D
EW15	M6	.551	**10.615.232**	3.425	3.230
			10.615.233	4.606	4.410
			10.615.221	5.787	5.590
EW18	M10	.625	**10.615.236**	3.464	3.500
			10.615.237	4.251	4.290
			10.615.238	6.614	6.650

Carbide Tool Holders

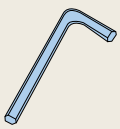


Insert Holders (Sold Separately)

Head Type	Catalog Number	Inserts	Insert Screws
EW15	**10.625.020**	WC..02	**10.694.101**
EW18			

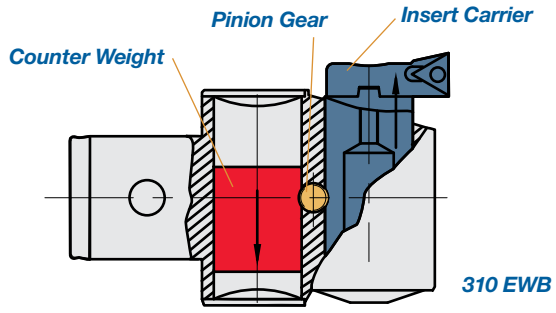


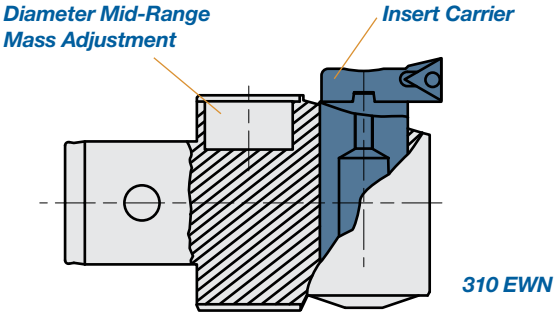
Spare Parts

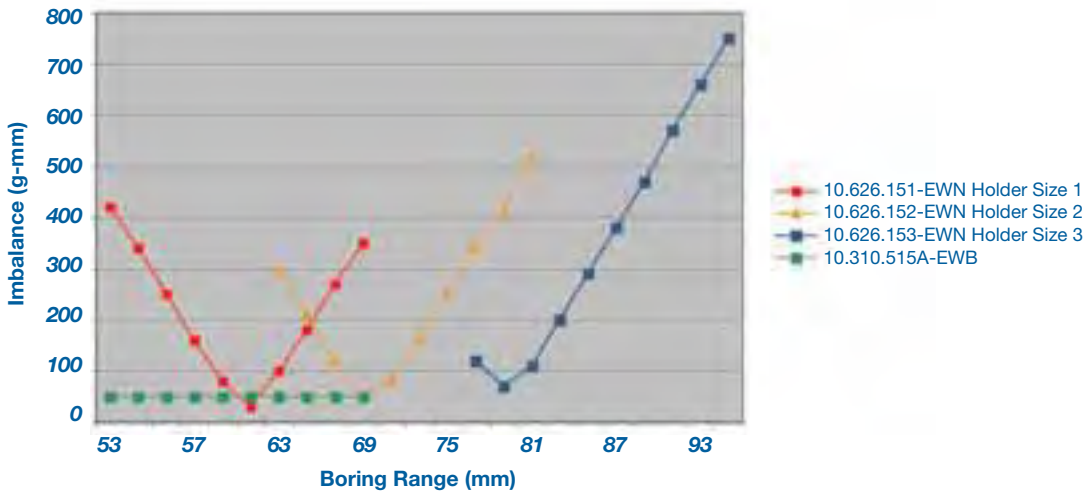
Type				
	① Locking Screw	② Mounting Screw	Torx Wrench	Hex Wrench
10.310.021/.020	**10.690.414**	**10.690.610**	**10.690.835**	**10.690.800**
10.310.031/.030	**10.690.416**	**10.690.610**	**10.690.835**	**10.690.800**

Autobalance boring heads, Series 310 EWB, maintain perfect balance throughout the work range due to the integrated counter-balance mechanism. The counter-weight can only compensate for one size insert holder, so the work range is similar to EWN with Size 1 insert holder.

Series 310 EWN boring heads are pre-balanced at one position only; the mid-range of the tool carrier travel with Size 1 insert holder. Adjustment of bore diameter from this position and/or use of Size 2 and 3 insert holders will require reduction of cutting speed values due to increased unbalance forces.







Back Boring

Adequate clearance between the boring tool and the entry bore must be assured to prevent tool or workpiece damage.

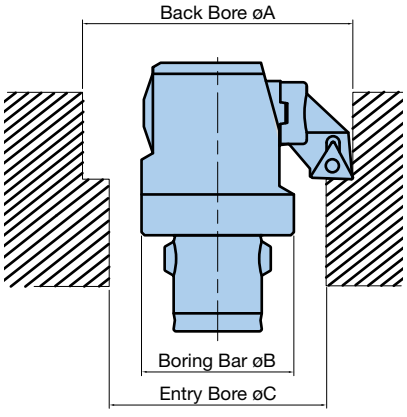
Example:

Minimum entry bore diameter “C” of 2.750"
Back bore diameter “A” of 3.250"

Solution:

Maximum body diameter of tool “B”:
B max = (2xC)-A
= (2x2.750)-3.250
= 2.250"

Largest boring head less than 2.250" body diameter is EWN53, 10.310.511 with KAB5 tool connection, body diameter of 1.929". Insert holder selection is determined by back bore diameter of 3.250". Size 3 insert holder must be specified.
For insert type TC..11: 10.626.153
For insert type CC..09: 10.626.353



Back Bore & Entry Bore Diameter

Maximum Body Diameter “B”	B Max = (2xC) - A
Maximum Back Bore Diameter “A”	A Max = (2xC) - B
Minimum Entry Bore Diameter “C”	C Min = (A+B)/2

Under certain conditions, it may be necessary to modify or adapt recommended cutting data and/or tooling configurations of the application. Below are general solutions to common problems.

Problem	Possible Cause	Remedy
Poor Tool Life	Wrong insert grade	Change to higher wear resistant grade
	Excessive speed	Reduce SFM
	Poor cooling of insert	Apply through tool coolant
	Excessive stock allowance	Decrease depth of cut
Chatter & Vibration	Excessive speed	Reduce SFM, check cutting data tables
	Extreme length/diameter ratio	Shorten tool to increase stiffness
		Increase boring bar diameter to larger size
		Change boring bar to carbide or heavy metal
	Wrong insert	Reduce nose radius of insert
		Use ground geometry inserts (ie: TAN18 grade)
	Incorrect stock allowance	Check cutting data tables
Poor Size Repeatability	Inaccurate tool changes	Worn and/or damaged tool shank; replace
		Clean spindle and tool shank
	Variation of stock allowance	Semi-finish with twin insert boring head
	Excessive spindle looseness	Use ground geometry inserts (ie: TAN18 grade)
Unacceptable Roundness	Excessive boring tool imbalance	Change to auto-balance or balanceable head
		Balance tool assembly
		Reduce speed
	Excessive cutting forces	Check stock allowance and feed rate
	Insufficient workpiece clamping	Check for uniform workpiece clamping
	Workpiece non-symmetrical	Reduce cutting forces; change to ground insert
		Increase cutting speed, reduce feed
Unacceptable Position	Original bore off position	Semi-finish with twin insert boring head
	Excessive stock allowance	Decrease depth of cut
		Decrease insert radius
		Reduce cutting forces; change to ground insert
Poor Surface Finish	Wrong insert radius	Use larger insert radius
	Excessive feed rate	Reduce feed; maximum 25% of insert radius
	Poor chip evacuation	Increase bore to boring bar clearances
		Apply through tool coolant; adjust nozzles
		Change insert to higher rake angle
		Check depth of cut
Taper	Premature insert wear	Change to higher wear resistance insert grade
		Increase insert radius
		Change from ground to pressed geometry insert
		Increase coolant flow

FINISH BORING INSERT SELECTION & CUTTING DATA

Recommended Under Optimal Conditions

- Length to diameter ratio less than 4:1
- Rigid fixture and workpiece
- Good machine spindle
- Setup not chatter prone
- Insert holder Size 1 (EWN)

Optimal Conditions

Material	Insert Radius	Insert Type & Size				Stock Allow On Dia.	Feed IPR	Speed SFM
		TP..07	TC..11	CC..06	CC..09			
Mild, Low-carbon Steel 10xx-15xx 1018,1020,1551, A36	.008	**10.651.802**	**11.656.352**	**11.654.856**	–	.008-.012	.0020	1000-1450
	.016	**10.651.702**	**11.655.322**	**11.654.865**	**11.654.959**	.016-.020	.0040	
	.031	–	**11.655.332**	**11.654.867**	**11.654.960**	.024-.040	.0060	
High Carbon Alloy Steel 23xx-92xx, Tool Steel 4140, 4340, 8620	.008	**10.651.802**	**11.656.352**	**11.654.856**	–	.008-.012	.0020	800-1100
	.016	**10.651.702**	**11.655.322**	**11.654.865**	**11.654.959**	.016-.020	.0040	
	.031	–	**11.655.332**	**11.654.867**	**11.654.960**	.024-.040	.0060	
300 Stainless Steel Austenitic 303, 304, 316, 17-4ph	.008	**10.651.802**	**11.656.352**	**11.654.856**	–	.008-.012	.0020	550-800
	.016	**10.651.702**	**11.655.322**	**11.654.865**	**11.654.959**	.016-.020	.0040	
	.031	–	**11.655.332**	**11.654.867**	**11.654.960**	.024-.040	.0060	
400 Stainless Steel Martensitic 403, 410, 416, 430	.008	**10.651.802**	**11.656.352**	**11.654.856**	–	.008-.012	.0020	650-875
	.016	**10.651.702**	**11.655.322**	**11.654.865**	**11.654.959**	.016-.020	.0040	
	.031	–	**11.655.332**	**11.654.867**	**11.654.960**	.024-.040	.0060	
Grey Cast Iron Malleable Class 20, 30	.008	–	**10.655.373**	**11.654.840**	–	.008-.012	.0020	650-1000
	.012	**10.651.735**	–	–	–	.010-.014	.0030	
	.016	–	**10.655.383**	**11.654.850**	**11.654.940**	.016-.020	.0040	
	.031	–	**10.655.393**	**11.654.860**	**11.654.952**	.024-.050	.0060	
CBN-CH, CBN-CHN	–	**11.938.872**	**11.938.833**	**11.938.835**	**11.938.838**	.008-.016	.0030	1500-2000
Silicon Nitride Si3N4	–	–	–	**11.654.841**	**11.654.951**	.016-.026	.0050	1000-1200
Cast Iron Ductile/Nodular/Chilled	.008	–	**10.655.301**	**11.654.840**	–	.008-.012	.0020	375-625
	.012	**10.651.632**	–	–	–	.010-.014	.0030	
	.016	–	**10.655.302**	**11.654.850**	**11.654.940**	.016-.020	.0040	
	.031	–	**10.655.303**	**11.654.860**	**11.654.952**	.024-.040	.0060	
High Temp. Alloys Titanium, Inconel, Monel	.008	**10.651.837**	**10.655.379**	–	–	.006-.010	.0015	200-325
	.012	**10.651.737**	–	–	–	.008-.012	.0020	
	.016	–	**10.655.389**	**11.654.868**	**11.654.968**	.012-.016	.0020	
	.031	–	**10.655.399**	**11.654.869**	**11.654.969**	.018-.032	.0030	
Copper Alloys Brass, Bronze	.008	–	**11.655.315**	–	–	.008-.012	.0020	1100-1800
	.012	**10.651.623**	–	–	–	.010-.014	.0030	
	.016	–	**11.655.325**	**11.654.858**	**11.654.957**	.016-.020	.0040	
	.031	–	**11.655.335**	**11.654.864**	**11.654.958**	.024-.050	.0060	
Aluminum/Magnesium 6061, 7075	.008	**10.651.825**	**10.655.378**	**10.654.877**	–	.008-.012	.0020	1200-1600
	.016	**10.651.725**	**10.655.387**	**10.654.888**	**10.654.977**	.016-.020	.0040	
	.031	**11.651.923**	**10.655.397**	**10.654.898**	**10.654.987**	.024-.040	.0060	
Aluminum/Magnesium 6061, 7075 PCD Inserts	.008	–	**11.938.861**	**11.938.847**	–	.008-.012	.0020	2000-4000
	.012	**10.938.840**	–	–	–	.010-.014	.0030	
	.016	–	**10.938.841**	**11.938.842**	**11.938.843**	.016-.020	.0040	
	.031	**11.938.830**	**11.938.860**	–	**11.938.851**	.024-.050	.0060	
Hardened Steel Min. 50HRc CBN Inserts	.008	–	–	–	–	.004-.008	.0010	200-300
	.012	**10.938.837**	–	–	–	.004-.008	.0010	
	.016	–	**10.938.834**	**11.938.835**	**11.938.838**	.005-.010	.0015	
	.031	–	**10.938.865**	–	–	.006-.012	.0020	

All cutting data without guarantee

Cutting Speed:

$$RPM = \frac{SFM \times 3.82}{Bore\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$

Recommended Under Critical Conditions

- Length to diameter ratio over 5:1
- Unstable fixture and/or workpiece
- Excessive spindle looseness
- Setup chatter prone
- Insert holder Size 2 and 3 (EWN)

Critical Conditions

Material	Insert Radius	Insert Type And Size				Stock Allow On Dia.	Feed IPR	Speed SFM
		TP..07	TC..11	CC..06	CC..09			
Mild, Low-carbon Steel 10xx-15xx 1018,1020,1551, A36	.004	**10.651.824**	**10.655.363**	–	–	.003-.006	.0010	525-675
	.008	**10.651.835**	**10.655.372**	**11.654.840**	–	.006-.010	.0015	
	.012	**10.651.736**	–	–	–	.010-.014	.0020	
	.016	–	**10.655.386**	**11.654.850**	**11.654.940**	.014-.020	.0020	
High Carbon Alloy Steel 23xx-92xx, Tool Steel 4140, 4340, 8620	.004	**10.651.824**	**10.655.363**	–	–	.003-.006	.0010	400-550
	.008	**10.651.835**	**10.655.372**	**11.654.840**	–	.006-.010	.0015	
	.012	**10.651.736**	–	–	–	.010-.014	.0020	
	.016	**10.651.734**	**10.655.386**	**11.654.850**	**11.654.940**	.014-.020	.0020	
300 Stainless Steel Austenitic 303, 304, 316, 17-4ph	.004	**10.651.824**	**10.655.363**	–	–	.003-.006	.0010	350-525
	.008	**10.651.837**	**10.655.379**	–	–	.006-.010	.0015	
	.012	**10.651.737**	–	–	–	.010-.014	.0020	
	.016	**10.651.734**	**10.655.389**	**11.654.845**	**11.654.968**	.014-.020	.0020	
400 Stainless Steel Martensitic 403, 410, 416, 430	.004	**10.651.824**	**10.655.363**	–	–	.003-.006	.0010	425-550
	.008	**10.651.837**	**10.655.379**	–	–	.006-.010	.0015	
	.012	**10.651.737**	–	–	–	.010-.014	.0020	
	.016	**10.651.734**	**10.655.389**	**11.654.845**	**11.654.968**	.014-.020	.0020	
Grey Cast Iron Malleable Class 20, 30	.004	**10.651.824**	**10.655.363**	–	–	.003-.006	.0010	350-500
	.008	**10.651.833**	**10.655.373**	–	–	.006-.010	.0020	
	.012	**10.651.735**	–	–	–	.010-.014	.0020	
	.016	**10.651.734**	**10.655.383**	**11.654.868**	**11.654.968**	.014-.020	.0030	
Cast Iron Ductile/Nodular/Chilled	.004	**10.651.824**	**10.655.363**	–	–	.003-.006	.0010	250-350
	.008	–	**10.655.373**	–	–	.006-.010	.0020	
	.012	**10.651.623**	–	–	–	.010-.014	.0020	
	.016	–	**10.655.383**	**11.654.868**	**11.654.968**	.014-.020	.0030	
High Temp. Alloys Titanium, Inconel, Monel	.008	**10.651.837**	**10.655.379**	–	–	.006-.010	.0020	125-250
	.012	**10.651.737**	–	–	–	.010-.014	.0020	
	.016	–	**10.655.389**	**11.654.963**	**11.654.957**	.014-.020	.0030	
Copper Alloys Brass, Bronze	.008	–	**11.655.315**	–	–	.006-.010	.0015	400-700
	.012	**10.651.623**	–	–	–	.010-.014	.0020	
	.016	–	**11.655.325**	**11.654.858**	**11.654.957**	.014-.020	.0020	
Aluminum/Magnesium 6061, 7075	.004	**10.651.823**	–	–	–	.003-.006	.0010	600-1100
	.008	**10.651.825**	**10.655.378**	**10.654.877**	–	.006-.010	.0020	
	.012	**10.651.723**	–	–	–	.010-.014	.0020	
	.016	**10.651.725**	**10.655.388**	**10.654.888**	**10.654.977**	.014-.020	.0030	

All cutting data without guarantee

Maximum speed of 310 EWB: 6,600 SFM

Maximum speed of 310 EWN: 4,000 SFM

Cutting Speed:

$$RPM = \frac{SFM \times 3.82}{Bore\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$

Light Weight Large Diameter Boring Tool System

Series 318..... Pg. 80-85

Boring Range:

ø7.76"-13.39" for ISO40/HSK-A63 tapers
ø7.76"-24.49" for ISO50/HSK-A100 and larger tapers (extendable up to 118")

Features:

- Cutting speeds up to 6600 SFM
- Versatile system for various applications such as roughing, finishing, pin turning and face grooving
- Coolant supply through all components to the cutting edge
- Absolutely safe mounting of the components on the extension slide for highest safety in operation
- Flanges with CKN connection for highest torque transmission with light weight tools
- High strength and hard coated aluminum, and nickel coated steel components for scratch resistant and rust protected surfaces
- Accurate balancing without balancing machine by means of two-piece counter weight with slide and scale

Standard Large Diameter Boring Tool System

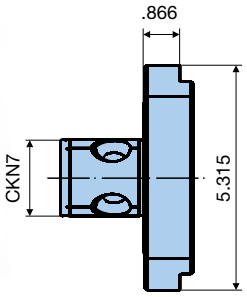
Series 317.....Pg. 86-89

Boring Range:

ø5.91"-46.46"

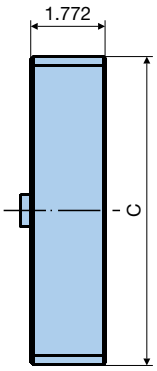
Features:

- Modular system provides versatile performance for heavy roughing, precision finishing and pin turning operations
- Rough boring assemblies can be run in balanced- or stepped-cut configurations and use ISO standard carbide inserts
- Finish boring tools feature micrometer setting precision of .0005" on diameter and adjustable counterweights permit fine balancing of the assembly



Flange Adapters

Adapter Size	Orientation	Catalog Number
KAB7	0°	**10.318.201**
CKN7	0°	**10.318.201N**
KAB7	90°	**10.318.202**
CKN7	90°	**10.318.202N**

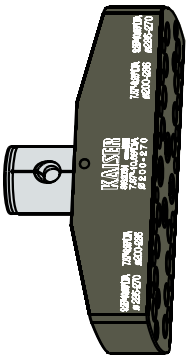


Extension Slides ø7.87"-24.41"

Boring Range	Catalog Number	C
7.87-10.63	**10.318.222**	7.205
10.63-13.39	**10.318.223**	9.961
13.39-16.14	**10.318.224**	12.717
16.14-18.90	**10.318.225**	15.472
19.90-21.65	**10.318.226**	18.228
21.65-24.41	**10.318.227**	20.984

CKN6 Flange Adapters with Extension Slide — ø7.87"-13.39"

The flange with extension slide is made of two pieces. In case of limited space in the tool magazine, it is possible to disassemble the CKN-connector and mount it again with 90° orientation.

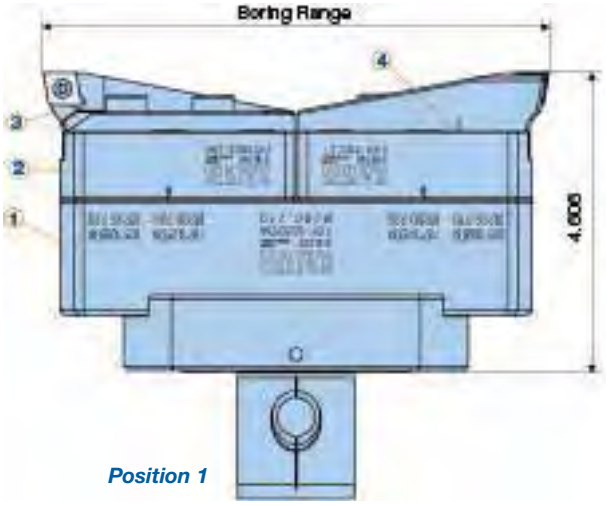


Rough Boring

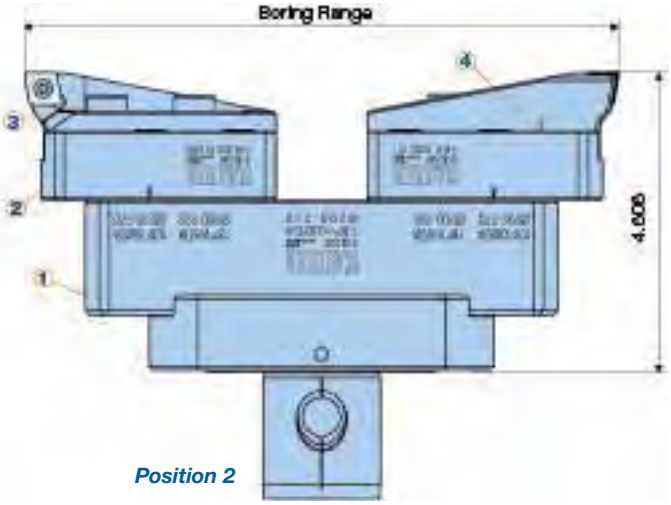
Finish Boring

Boring Range	Adapter Size	Catalog Number	C
7.87-10.63	KAB6	**10.318.205**	7.283
7.87-10.63	CKN6	**10.318.205N**	7.283
10.63-13.39	KAB6	**10.318.206**	9.252
10.63-13.39	CKN6	**10.318.206N**	9.252

Component Selection, Assembly & Adjustment for Roughing Tools



Position 1



Position 2

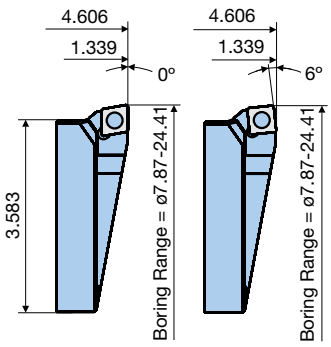
The table below determines the components such as extensions slide ①, clamp base ② and insert holders ③ for each boring diameter range and shows in which position the clamp bases have to be mounted on the extension slide.

Further, this table also serves for the coarse diameter setting of the cutting edges by means of the scale on the clamp base and the marking ④ on the insert holder ③. The required scale value is calculated by the difference between bore diameter and correction factor α. The insert holder has to be adjusted to the scale value. See example below.

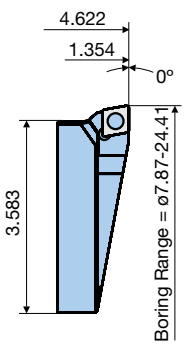
Boring Range	Position	Scale Factor α	① Extension Slides	② Clamping Bases	③ Insert Holders
7.756-9.252	1	7.874	**10.318.222/10.318.205N**	**10.318.250 (inch) 10.318.240 (metric)**	**10.637.9xx (See Below)**
9.134-10.630	2	9.252			
10.512-12.008	1	10.630	**10.318.223/10.318.206N**		
11.890-13.386	2	12.008			
13.268-14.764	1	13.386	**10.318.224**		
14.646-16.142	2	14.764			
16.024-17.520	1	16.142	**10.318.225**		
17.402-18.898	2	17.520			
18.780-20.276	1	18.898	**10.318.226**		
20.157-21.654	2	20.276			
21.535-23.031	1	21.654	**10.318.227**		
22.913-24.409	2	23.031			

Example: Diameter setting according to scale

ø: 18.020 Extension slide: 10.318.225 Position: 2 Correction factor α: 17.520
Scale value: ø-α = 18.020-17.520 = .500



Standard Length:
Sold in Pairs

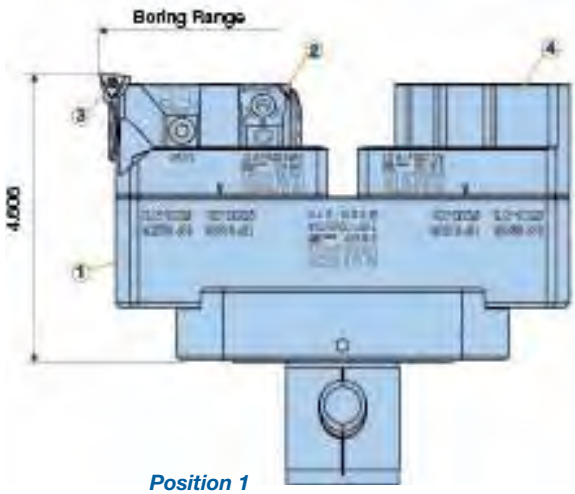


Extended Length:
Sold Individually
(Used for Stepped Cutting Only)

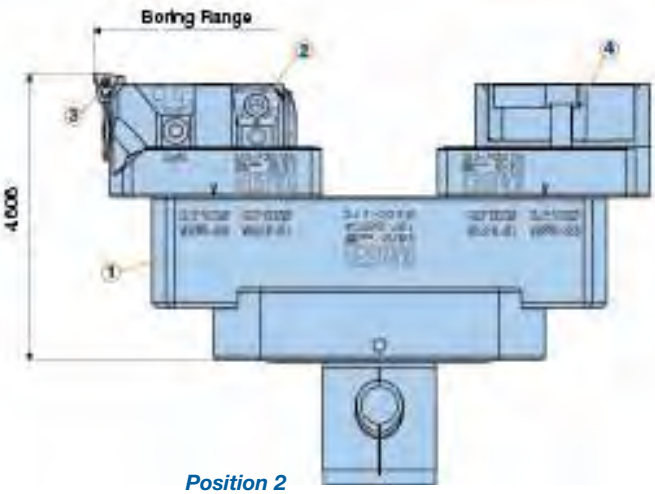
Insert Holders

Type	CC..12	CC..16	SC..12
Standard Length	**10.637.940**	**10.637.941**	**10.637.942**
Extended Length	**10.637.951**	**10.637.953**	–

Component Selection, Assembly & Balancing for Finishing Tools



Position 1



Position 2

The table below determines the components such as extension slide ①, boring head ②, insert holder ③ and counter weight ④ for each diameter range and shows in which position the boring head and counter weight have to be mounted on the extension slide.

Balancing of the tool combination takes place by adjusting the slide on the counter weight according to the scale. The correction factor α is shown in the table. See example below.

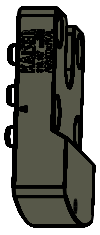
Boring Range	Position	Balance Factor	① Extension Slides	② Boring Heads	③ Insert Holders	④ Counter Weights
7.795-9.331	1	7.874	**10.318.222/10.318.205N**	**10.318.111 (inch) 10.318.101 (metric)**	**10.626.271 (TC..11) or 10.626.371 (CC..09)**	**10.318.107 (fixed) or 10.318.115 (inch) 10.318.105 (metric)**
9.173-10.709	2	9.252				
10.551-12.087	1	10.630	**10.318.223/10.318.206N**			
11.929-13.465	2	12.008				
13.307-14.843	1	13.386	**10.318.224**			
14.685-16.220	2	14.764				
16.063-17.598	1	16.142	**10.318.225**			
17.441-18.976	2	17.520				
18.819-20.354	1	18.898	**10.318.226**			
20.197-21.732	2	20.276				
21.575-23.110	1	21.654	**10.318.227**			
22.953-24.488	2	23.031				

Example: Diameter setting according to scale

ø: 10.880 Extension slide: 10.318.223 Position: 1 Balance factor α: 10.630
Scale: ø-α = 10.880-10.630 = .250

Counter Weight

There are two different counter weights available. Type 1 is made of steel and is used for coarse balancing. Type 2 is made of aluminum and contains a slide with a graduated scale for fine balancing of the tool assembly. The scale value is calculated from the balance factor, shown in the table.

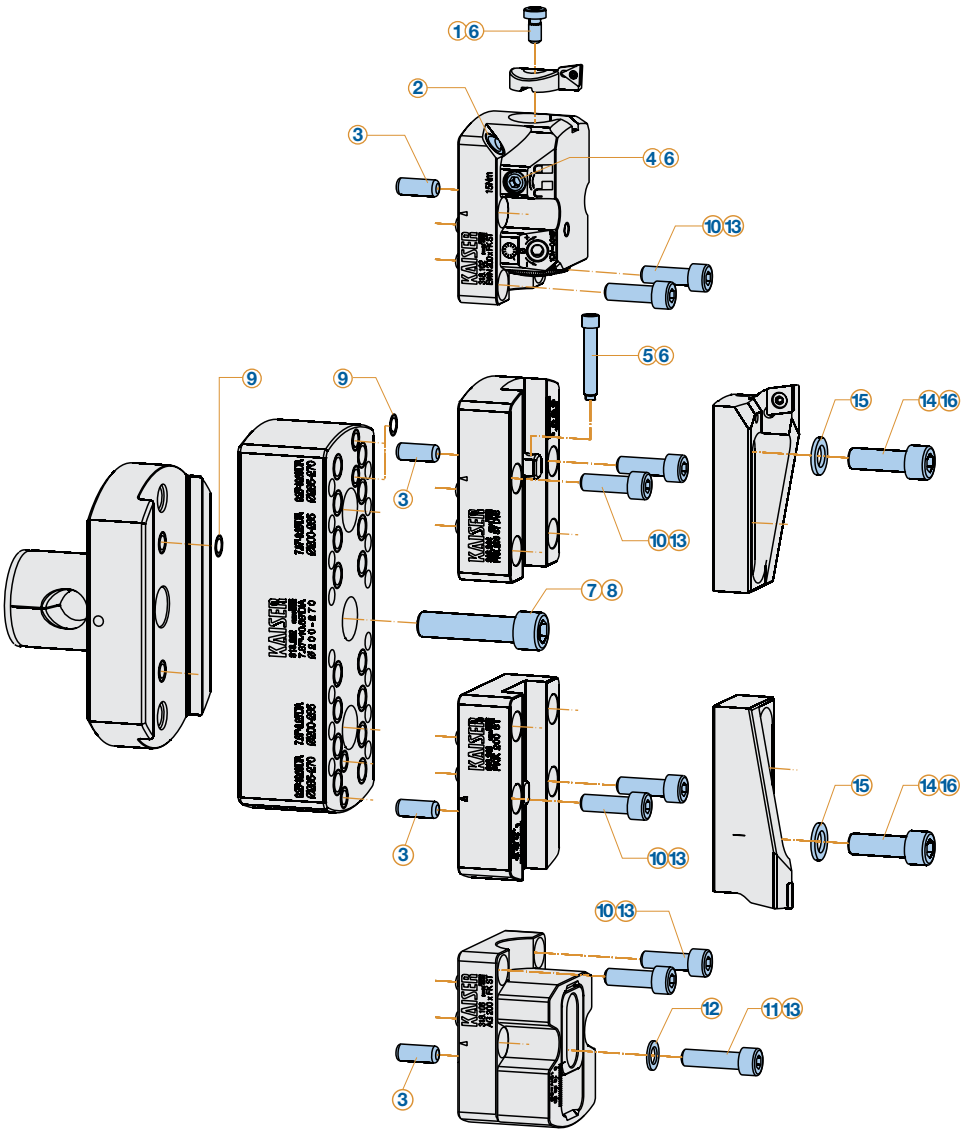


Type 1

Catalog Number
10.318.107

Type 2

Catalog Number
10.318.115 (inch)
10.318.105 (metric)



1 **10.690.140**
Torque: 11 ft-lbs.

2 **10.692.406**

3 **40.691.390**

4 **10.690.553**
Torque: 11 ft-lbs.

5 **10.317.193**

6 **10.690.816**

7 **10.690.121**
Torque: 88 ft-lbs.

8 **10.690.134**

9 **10.692.295**

10 **10.690.140**
Torque: 18 ft-lbs.

11 **10.690.124**
Torque: 18 ft-lbs.

12 **10.693.183**

13 **10.690.817**

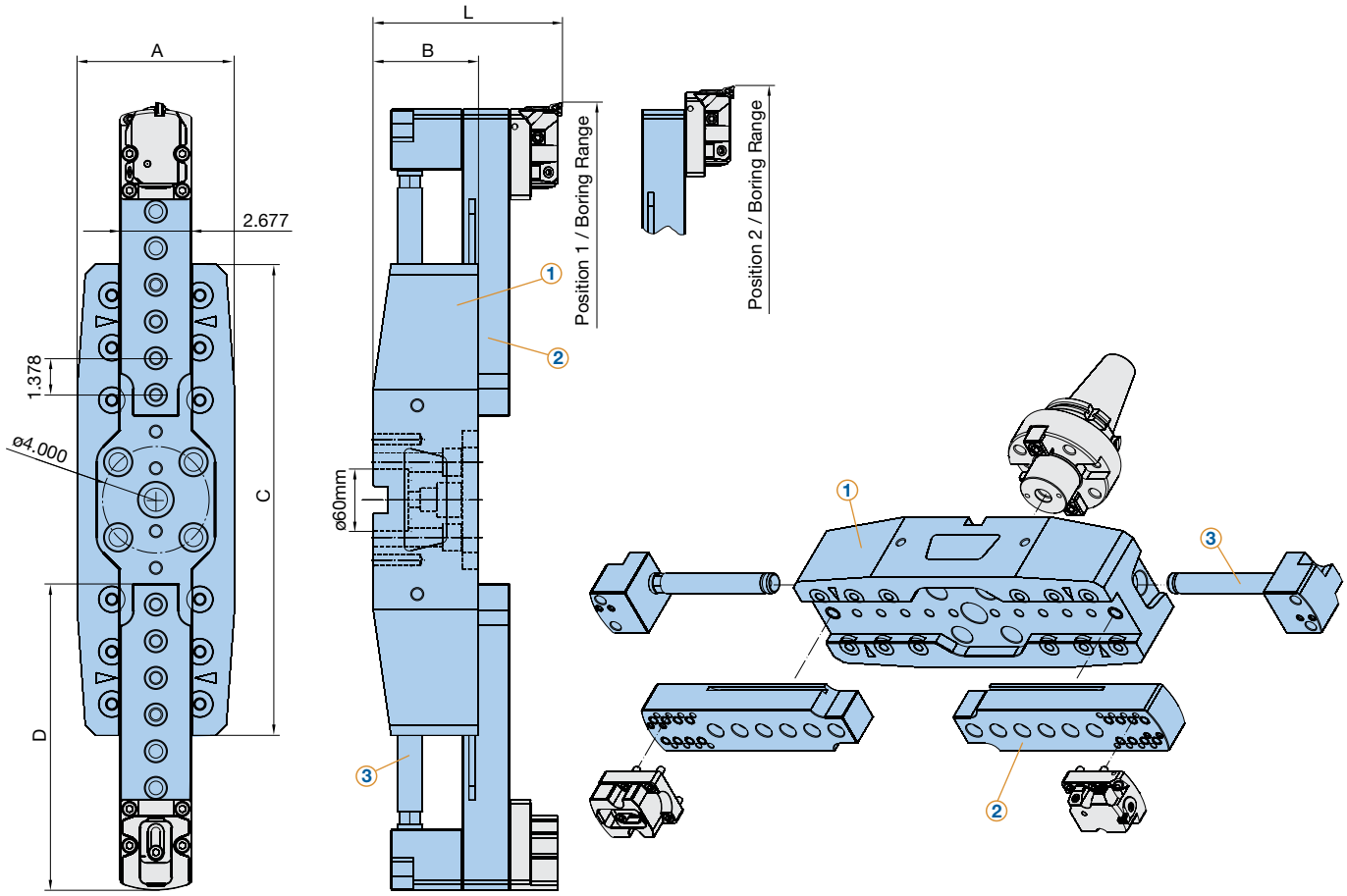
14 **10.690.105**
Torque: 30 ft-lbs.

15 **10.693.184**

16 **10.690.807**

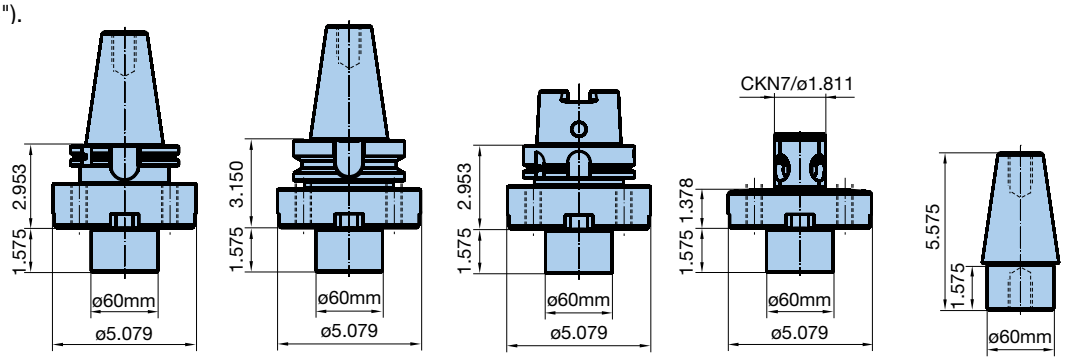
Precision Boring System for Diameters up to 118"

Five aluminum bridges and five sets of extension slides can be combined in different configurations to offer boring assemblies for the range of ø24.47"-118.15". Rough boring clamp bases and insert holders, as well as finish boring heads and counter weights, are used from the light weight boring system Series 318. Optional coolant pipes offer through-tool coolant supply directly to the cutting edge.



Spindle Mounting Options

Face mill arbors with ø60mm pilot are available in BIG-PLUS® tapers as well as HSK-A100. The CKN7 modular connection is also available, as well as a 50 taper centering plug, for use when the bridge is bolted directly onto the machine spindle (recommended for diameters over 43").



Taper	BDV/BCV50	BBT50	HSK-A100	CKN7	ISO50
Catalog Number	**10.328.215**	**10.328.213**	**10.328.214**	**10.328.217**	**10.328.216**

• Special taper support rings are available upon request

Assembly Component Selection

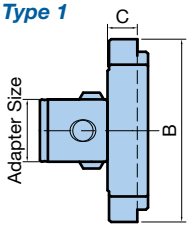
The table below is used to determine the components required for a specific diameter. The rough and finish boring components (see pages 81-82) can be mounted in two different positions on the extension slide, and the slides can be mounted in several positions on the bridge.

Coolant pipes are optional and supply through-tool coolant directly to the cutting edge.

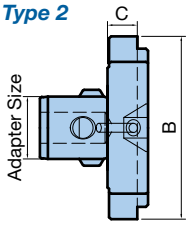
Please consult BIG Kaiser's Engineering Department for component availability.

Boring Range		① Bridge				② Extension Slide		③ Coolant Pipes
Position 1	Position 2	Catalog Number	A	B	C	Catalog Number	D	Catalog Number
24.37-25.83	25.75-27.20							
27.13-28.58	28.50-29.96	**10.318.421**	5.91	3.94	17.72	**10.318.431**	11.52	**10.318.441**
29.88-31.34	31.26-32.72							
32.64-34.09	34.02-35.47							
35.39-36.85	36.77-38.23	**10.318.422**	5.91	3.94	25.98	**10.318.432**	15.65	**10.318.441**
38.15-39.61	39.53-40.98							
40.91-42.36	42.28-43.74							
43.66-45.12	45.04-46.50							
46.42-47.87	47.80-49.25							
49.17-50.63	50.55-52.01	**10.318.423**	5.91	3.94	37.01	**10.318.433**	21.16	**10.318.442**
51.93-53.39	53.31-54.76							
54.69-56.14	56.06-57.52							
57.44-58.90	58.82-60.28							
60.20-61.65	51.57-63.03							
62.95-64.41	64.33-65.79							
65.71-67.17	67.09-68.54							
68.46-69.92	69.84-71.30	**10.318.424**	6.69	4.72	53.54	**10.318.434**	25.30	**10.318.443**
71.22-72.68	72.60-74.06							
73.98-75.43	75.35-76.81							
76.73-78.19	78.11-79.57							
79.49-80.94	80.87-82.32							
82.24-83.70	83.62-85.08							
85.00-86.46	86.38-87.83							
87.76-89.21	89.13-90.59	**10.318.425**	7.48	5.12	72.83	**10.318.434**	25.30	**10.318.443**
90.51-91.97	91.89-93.35							
93.27-94.72	94.65-96.10							
96.02-97.48	97.40-98.86							
98.78-100.24	100.16-101.61							
101.54-102.99	102.91-104.37							
104.29-105.75	105.67-107.13							
107.05-108.50	108.43-109.88	**10.318.425**	7.48	5.12	72.83	**10.318.435**	45.96	**10.318.444**
109.80-111.26	111.18-112.64							
112.56-114.02	113.94-115.39							
115.31-116.77	116.69-118.15							

Type 1



Type 2



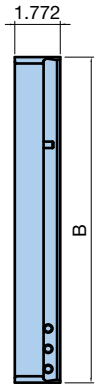
Flange Adapters

Boring Range	Catalog Number	Adapter Size	Type	B	C	Application Description
5.91-29.92	**10.317.202†**	KAB7	1	5.315	.866	Mid-size to large machines. Taper size: 45, 50, 50SF, 60
5.91-29.92	**10.317.204**	KAB7	2	5.315	.866	Same as 10.317.202 except with coolant ports
5.91-29.92	**10.317.206**	KAB7	1	5.315	.866	Same as 10.317.202 except with 90º orientation
7.87-24.41	**10.317.261**	KAB7	1	5.315	.866	Aluminum construction–finishing only
7.87-29.92	**10.328.086**	C8	1	5.315	1.811	Taper size: C8

- Boring range is our recommendation only
- Larger diameters may be possible
- Items marked † are preferred first

Extension Slides — ø5.91"-24.41"

Aluminum (Finishing Only)



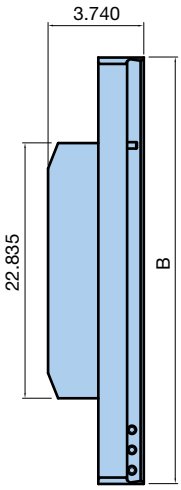
Boring Range	Catalog Number	B	Max Speed (RPM)
7.87-10.63	**10.317.252**	7.205	1600
10.63-13.39	**10.317.253**	9.961	1200
13.39-16.14	**10.317.254**	12.717	900
16.14-18.90	**10.317.255**	15.472	750
18.90-21.65	**10.317.256**	18.228	650
21.65-24.41	**10.317.257**	20.984	600

Steel

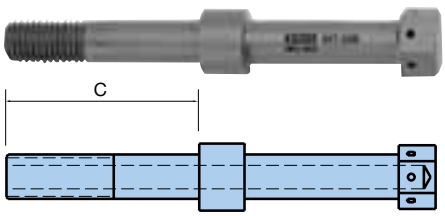
Boring Range	Catalog Number	B	Max Speed (RPM)
5.91-7.87	**10.317.221**	5.316	2000
7.87-10.63	**10.317.222**	7.205	1600
10.63-13.39	**10.317.223**	9.961	1200
13.39-16.14	**10.317.224**	12.717	900
16.14-18.90	**10.317.225**	15.472	750
18.90-21.65	**10.317.226**	18.228	650
21.65-24.41	**10.317.227**	20.984	600

Extension Slides — ø24.41"-46.46"

Steel



Boring Range	Catalog Number	B	Max Speed (RPM)
24.41-27.16	**10.317.231**	23.74	500
27.16-29.92	**10.317.232**	26.50	450
29.92-32.68	**10.317.233**	29.25	400
32.68-35.43	**10.317.234**	32.00	375
35.43-38.19	**10.317.235**	34.76	350
38.19-40.95	**10.317.236**	37.52	300
40.95-43.70	**10.317.237**	40.28	275
43.70-46.46	**10.317.238**	43.03	250

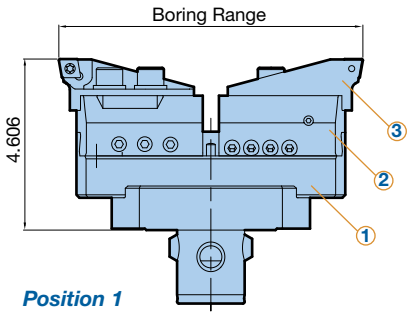


Coolant Nozzles

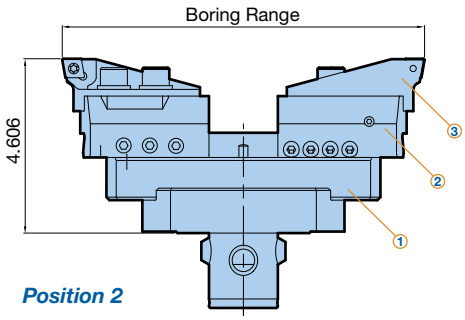
Rough Boring Range	Finish Boring Range	Catalog Number	C
5.91-24.41	7.46-24.41	**10.317.205**	2.165
24.41-46.46	24.41-46.46	**10.389.221**	4.134

Component Selection & Assembly for Roughing Tools

For each extension slide, the boring range is covered by locating clamping bases within 2 positions. Fine adjustment of the insert holders and a graduated scale (inch or metric) permits fast & easy setting of bore diameter.



Position 1



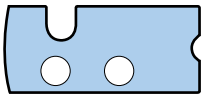
Position 2

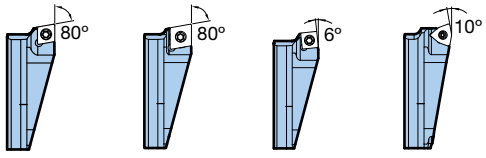
Boring Range		① Extension Slide	② Clamp Base	
Position 1	Position 2		Inch	Metric
5.91-7.40	7.32-7.87	**10.317.221**	**10.317.290**	**10.317.288**
7.76-9.25	9.13-10.63	**10.317.222**	**10.317.291**	**10.317.289**
10.51-12.00	11.89-13.39	**10.317.223**		
13.27-14.76	14.65-16.14	**10.317.224**		
16.02-17.52	17.40-18.90	**10.317.225**		
18.78-20.28	20.16-21.65	**10.317.226**		
21.54-23.03	22.91-24.41	**10.317.227**		
24.29-25.79	25.67-27.16	**10.317.231**		
27.05-28.54	28.43-29.92	**10.317.232**		
29.80-31.30	31.18-32.68	**10.317.233**		
32.56-34.06	33.94-35.43	**10.317.234**		
35.31-36.81	36.69-38.19	**10.317.235**		
38.07-39.57	39.45-40.95	**10.317.236**		
40.83-42.32	42.20-43.70	**10.317.237**		
43.58-45.08	44.96-46.46	**10.317.238**		

SPARE PARTS PG. 89

Height Setting Shims for Stepped Cutting Method

ø5.906"-7.870" 10.317.286
ø7.756"-46.46" 10.317.287





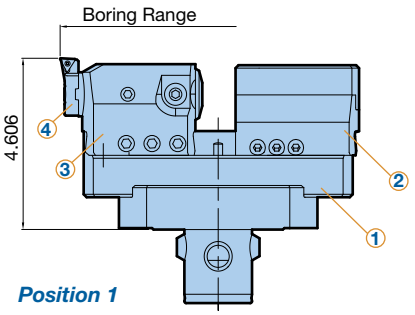
Insert Holders ③

Boring Range	CC..12	CC..16	SC..12	WC..08
5.91-7.40	**10.637.829**	**10.637.833**	**10.637.813**	**10.637.845**
7.75-46.46	**10.637.830**	**10.637.834**	**10.637.814**	**10.637.846**
	10.694.150	**10.694.150**	**10.694.150**	**10.694.143**

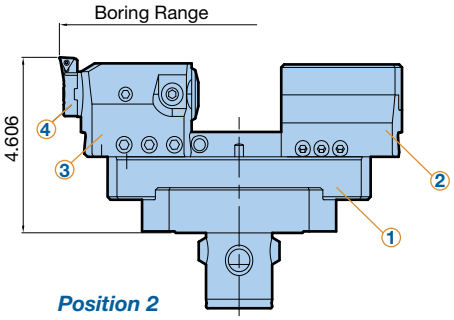
Clamping Screws
(10 screws and 1 wrench per package)

Component Selection, Assembly & Balancing for Finishing Tools

For each extension slide, the boring range is covered by 2 positions of finish head and 2 insert holders. Back boring is arranged by reversing direction of insert holder. Additional insert holders, such as CC type, can be located on pages 71 & 72.



Position 1



Position 2

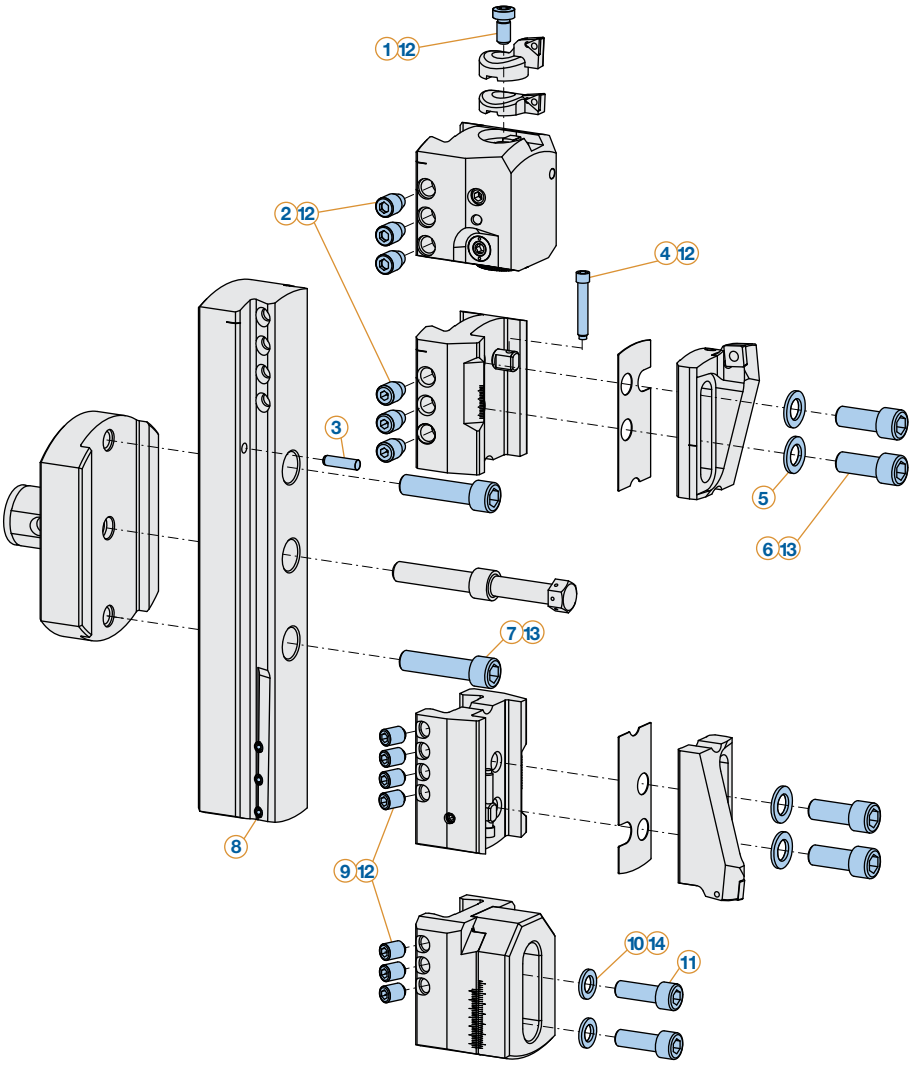
④ TC..11 Insert Holders & Ranges		Position	① Extension Slides	Balance Factor α	② Counter Weights		③ Finish Heads	
10.626.161	**10.626.162**				Inch	Metric	Inch	Metric
5.906-7.087	6.890-7.870	1	**10.317.221**	5.906	**10.317.114**	**10.317.104**		
7.795-8.976	8.819-10.000	1	**10.317.222**	7.874				
9.173-10.354	10.197-11.378	2						
10.551-11.732	11.575-12.756	1	**10.317.223**	10.630				
11.929-13.110	12.953-14.134	2						
13.307-14.488	14.331-15.512	1	**10.317.224**	13.380				
14.685-15.866	15.709-16.890	2						
16.063-17.244	17.089-18.268	1	**10.317.225**	16.142				
17.441-18.622	18.465-19.646	2						
18.819-20.000	19.843-21.024	1	**10.317.226**	18.898				
20.197-21.378	21.220-22.402	2						
21.575-22.756	22.598-23.780	1	**10.317.227**	21.654				
22.953-24.134	23.976-25.157	2						
24.331-25.512	25.354-26.535	1	**10.317.231**	24.409				
25.709-26.890	26.732-27.913	2						
27.087-28.268	28.110-29.291	1	**10.317.232**	27.165				
28.465-29.646	29.488-30.669	2						
29.843-31.024	30.866-32.047	1	**10.317.233**	29.921				
31.220-32.402	32.244-33.425	2						
32.598-33.780	33.622-34.803	1	**10.317.234**	32.677				
33.976-35.157	35.000-36.181	2						
35.354-36.535	36.378-37.559	1	**10.317.235**	35.433				
36.732-37.913	37.756-38.937	2						
38.110-39.291	39.134-40.315	1	**10.317.236**	38.189				
39.488-40.669	40.512-41.693	2						
40.866-42.047	41.890-43.071	1	**10.317.237**	40.945				
42.244-43.425	43.268-44.449	2						
43.622-44.803	44.646-45.827	1	**10.317.238**	43.701				
45.000-46.181	46.024-47.205	2						
					10.317.115	**10.317.105**	**10.317.112A**	**10.317.102A**

10.694.122 Clamping Screws (10 screws and 1 wrench per package)

SPARE PARTS PG. 89

Example: Diameter setting according to scale

ø: 10.880 Extension slide: 10.317.223 Position: 1 Balance factor α: 10.630
Scale: ø-α = 10.880-10.630 = .250



1 **10.690.141**
Torque: 11 ft-lbs.

8 **10.317.274**

2 **10.690.596**
Torque: 7 ft-lbs.

9 **10.690.469**
Torque: 15 ft-lbs.

3 **10.691.373**

10 **10.693.184**

4 **10.317.193**

11 **10.690.105**
Torque: 52 ft-lbs.

5 **10.693.185**

12 **10.690.816**

6 **10.690.172**
Torque: 74 ft-lbs.

13 **10.690.808**

7 **10.690.121**
Torque: 88 ft-lbs.

14 **10.690.807**

Lubrication Gun
Catalog Number: 10.692.404A

WARNING: Do not exceed maximum RPM as marked on the extension slide!

Finish boring head and counter weight can also mount on the former extension slides without bores for the safety screws. Remove the safety screws ② and align the respective graduation mark on the tool holder with the one on the extension slide.

The coolant nozzle cannot be used for the boring range of ø7.32"-7.48".

For ø5.90", the stop pins have to be removed from the slide. These pins are required when tools without safety screws ② are used.

Finish Boring Notes

Take note that the adjustment range of the tool carrier is limited. Do not use force when adjusting. Periodic lubrication via the lubrication gun ensures high precision combined with long life. A light machine oil is recommended; e.g. Mobile Vactra Oil No. 2, BP Energol HPL-32, Klueber Isoflex PDP 94.

For back boring, counter-clockwise spindle rotation is required.

SERIES 318/317 LARGE DIAMETER BORING SYSTEMS
ROUGH BORING INSERT SELECTION & CUTTING DATA

For ø5.96"-24.41"

Material	Insert Radius	CC..12 (1/2" I.C.)					CC..16 (5/8" I.C.)					SC..12 (1/2" I.C.)			Speed SFM
		Catalog Number	Balanced Cutting		Stepped Cutting		Catalog Number	Balanced Cutting		Stepped Cutting		Catalog Number	Balanced Cutting		
			Feed IPR	Max ø D.O.C.	Feed IPR	Max ø D.O.C.		Feed IPR	Max ø D.O.C.	Feed IPR	Max ø D.O.C.		Feed IPR	Max ø D.O.C.	
Mild Steels 10XX-15XX 1018, 1020, 1551	.016	**11.654.993**	.014	.350	.008	.600	–	–	–	–	–	**11.654.340**	.016	.350	400-825
	.031	**11.654.990**	.020	.400	.012	.800	**11.654.996**	.024	.600	.014	1.120	**11.654.350**	.022	.380	
High Carbon Alloy Steels 23XX-92XX 4140, 4340, 8620	.016	**11.654.993**	.012	.350	.008	.600	–	–	–	–	–	**11.654.340**	.014	.350	350-750
	.031	**11.654.990**	.018	.400	.012	.800	**11.654.996**	.022	.600	.012	1.120	**11.654.350**	.020	.380	
300 Series Stainless Steel 304, 316, 17-4ph	.016	–	–	–	–	–	–	–	–	–	–	–	–	–	200-450
	.031	**11.654.983**	.018	.325	.010	.600	**10.654.996**	.022	.400	.012	.800	**11.654.353**	.020	.300	
400 Series Stainless Steel Martensitic	.016	**11.654.993**	.012	.350	.008	.600	–	–	–	–	–	**11.654.340**	.014	.350	250-550
	.031	**11.654.990**	.018	.400	.012	.800	**10.654.996**	.022	.600	.012	1.120	**11.654.350**	.020	.380	
Grey Cast Iron Class 30	.016	**11.654.993**	.014	.500	.008	.800	–	–	–	–	–	**11.654.340**	.016	.480	300-600
	.031	**11.654.971**	.020	.600	.012	1.000	**11.654.971**	.024	.750	.014	1.400	**11.654.352**	.022	.580	
Silicon Nitride	–	**11.654.980**	.018	.500	.010	.800	–	–	–	–	–	–	–	–	800-1650
Cast Iron Ductile/Nodular	.016	**11.654.993**	.012	.450	.008	.700	–	–	–	–	–	**11.654.340**	.014	.420	250-550
	.031	**11.654.971**	.018	.500	.500	.900	**11.654.971**	.022	.675	.012	1.250	**11.654.352**	.020	.480	
High Temp. Alloys Titanium, Inconel, Monel, etc.	.016	–	–	–	–	–	–	–	–	–	–	**11.654.344**	.010	.200	100-225
	.031	**11.654.978**	.014	.280	.007	.500	**10.654.997**	.016	.380	.008	.700	**11.654.359**	.014	.250	
Copper Alloys Brass & Bronze	.016	**11.654.989**	.014	.500	.008	.800	–	–	–	–	–	**11.654.344**	.016	.480	550-800
	.031	**11.654.991**	.020	.600	.012	1.000	**10.654.997**	.024	.750	.014	1.400	**11.654.359**	.022	.580	
Aluminum & Non-Ferrous	.016	**10.654.995**	.016	.550	.010	1.000	–	–	–	–	–	–	–	–	825-1300
	.031	**10.654.992**	.022	.650	.012	1.250	**10.654.998**	.030	.900	.015	1.625	**10.654.387**	.022	.650	

Do not exceed maximum RPM as marked on the extension slide!

All cutting data without guarantee

Cutting Speed:

$$RPM = \frac{SFM \times 3.82}{Bore\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$

For ø5.96"-24.41"

Material	Insert Radius	Insert Type & Size		Stock Allow on Dia.	Feed IPR	Speed SFM
		TC..11	CC..09			
Mild, Low-carbon Steel 10XX-15XX 1018, 1020, 1551, A36	.016	**11.655.322**	**11.654.959**	.016-.020	.0040	600-1100
	.031	**11.655.332**	**11.654.960**	.024-.040	.0060	
High Carbon Alloy Steels 23XX-92XX, Tool Steel 4140, 4340, 8620	.016	**11.655.322**	**11.654.959**	.016-.020	.0040	500-900
	.031	**11.655.332**	**11.654.960**	.024-.040	.0060	
300 Series Stainless Steel Austenitic 303, 304, 316, 17-4ph	.016	**11.655.322**	**11.654.959**	.016-.020	.0040	400-750
	.031	**11.655.332**	**11.654.960**	.024-.040	.0060	
400 Series Stainless Steel Martensitic 403, 410, 416, 430	.016	**11.655.322**	**11.654.959**	.016-.020	.0040	450-800
	.031	**11.655.332**	**11.654.960**	.024-.040	.0060	
Grey Cast Iron Malleable Class 20, 30	.016	**10.655.383**	**11.654.940**	.016-.020	.0040	500-1000
	.031	**10.655.393**	**11.654.952**	.024-.050	.0060	
CBN-CH, CBN-CHN	–	**11.938.833**	**11.938.838**	.008-.016	.0030	1300-1650
Silicon Nitride Si3N4	–	**11.654.951**	**–**	.016-.026	.0050	1500-2000
Cast Iron Ductile/Nodular/Chilled	.016	**10.655.302**	**11.654.940**	.016-.020	.0040	350-600
	.031	**10.655.303**	**11.654.952**	.024-.040	.0060	
High Temp. Alloys Titanium, Inconel, Monel, etc.	.016	**10.655.389**	**11.654.968**	.012-.016	.0020	200-325
	.031	**10.655.399**	**11.654.969**	.018-.032	.0030	
Copper Alloys Brass & Bronze	.016	**11.655.325**	**11.654.957**	.016-.020	.0040	900-1400
	.031	**11.655.335**	**11.654.958**	.024-.050	.0060	
Aluminum/Magnesium 6061, 7075	.016	**10.655.387**	**10.654.977**	.016-.020	.0040	1000-1600
	.031	**10.655.397**	**10.654.987**	.024-.040	.0060	
Aluminum/Magnesium 6061, 7075 PCD Inserts	.016	**10.938.841**	**11.938.843**	.016-.020	.0040	1500-3000
	.031	**11.938.860**	**11.938.851**	.024-.050	.0060	
Hardened Steel Min. 50HRc CBN Inserts	.016	**10.938.834**	**11.938.838**	.005-.010	.0015	200-300
	.031	**10.938.865**	**–**	.006-.012	.0020	

Do not exceed maximum RPM as marked on the extension slide!

All cutting data without guarantee

Cutting Speed:

$$RPM = \frac{SFM \times 3.82}{Bore\ ø}$$

Feed Rate:

$$IPM = RPM \times IPR$$

O.D. TURNING SYSTEMS OVERVIEW

The Kaiser modular tooling system also offers standard solutions for O.D. pin turning on machining centers. The intermediate and large diameter systems allow the use of two TW series heads for balanced roughing and all finish turning assemblies have counter weights available to balance the assembly for higher speed operation.

Series 112 Small Diameter System

Turning adapter for EWN 2-50XL heads .....Pg. 93

Turning Range: ø.039"-1.260" (ø1mm-32mm)

Series 310/315 Intermediate Diameter System

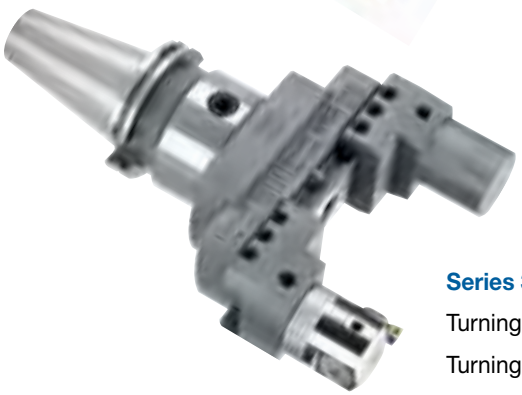
Modular adapters for EWN/TWN heads.....Pg. 94

Turning Range: ø.630"-4.724" (ø16mm-120mm)

Series 318 Light Weight Large Diameter System

Turning adapters for Series 318 .....Pg. 95

Turning Range: ø1.929"-18.740" (ø49mm-476mm)



Series 317 Large Diameter System

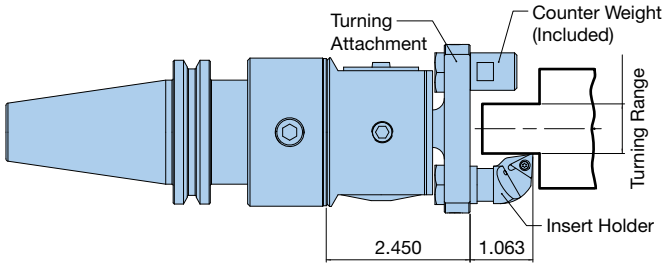
Turning adapters for Series 317 .....Pg. 96-97

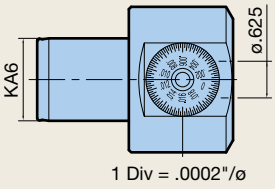
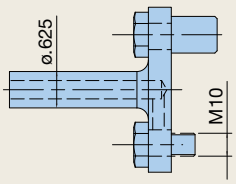
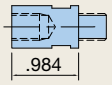
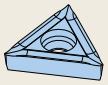
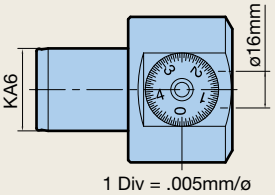
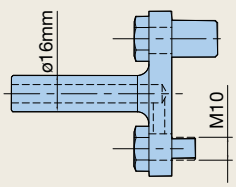
Turning Range: ø.827"-40.197" (ø30mm-1021mm)

Through the use of an eccentric turning adapter, the EWN 2-50XL boring head, along with standard insert holders, can turn outside diameters up to ø1.260" on machining centers. Radial adjustment of the insert holder and counter weight allows for concentric location of the turning attachment, resulting in balance of the assembly for high speed operation.

Features:

- Balanced tool assembly for entire work range of ø.039"-1.260"
- Through-tool coolant to insert holder
- Fine adjustment of diameter with precision graduated head
- Short, light weight assembly



Precision Finish Boring Heads	Turning Attachments	Turning Range	Insert Holders	Extension Pieces	*Counter Weights (Included)	Inserts
Inch Boring Head, 10.112.118 	**10.615.391** 	.039-.236	**10.615.292**	**10.615.228** 	**10.615.903** 	TC..11 
		.236-.433	**10.615.287**			
		.433-.591	**10.615.286**			
		.591-.787	**10.615.285**			
Metric Boring Head, 10.112.108 	**10.615.390** 	.787-.945	**10.615.291**			**10.694.122** 
		.945-1.102	**10.615.283**			
		1.102-1.260	**10.615.282**			

*Counter weight included with each turning attachment pre-assembled

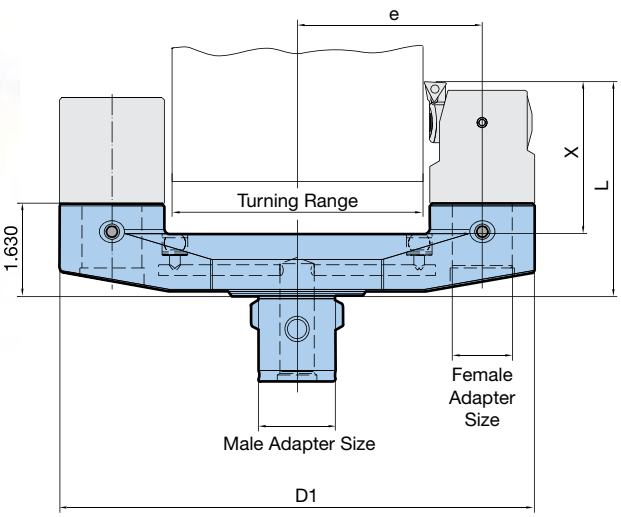
Attention: Counter-clockwise spindle rotation required

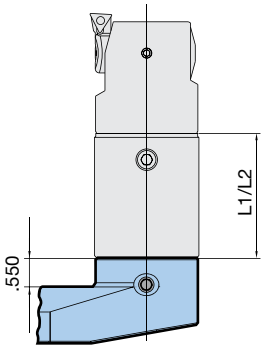
Modular Adapters for Pin Turning

This program consists of five adapters with KAB5 & KAB6 connectors, made for different turning ranges and with tool connections in the sizes KAB3, KAB4 and KAB5. The corresponding precision or rough boring heads and counter weights can be mounted on the adapter either directly or by means of an extension. With this program, outer diameters in the range from ø.630"-4.724" can be machined.

Features:

- Simple and cost effective execution
- Through-tool coolant supply
- Modular construction, extendable for long workpieces
- Suitable for boring operations





Turning Adapters

Male Adapter Size	Female Adapter Size	Catalog Number	Dimensions				Extensions			
			D1	e	L	X	Catalog Number	L1	Catalog Number	L2
KAB5	KAB3	**10.335.906**	4.213	1.496	3.268	2.008	**11.331.330**	1.181	**11.331.331**	1.771
KAB6	KAB3	**10.335.905**	4.213	1.496	3.268	2.008	**11.331.330**	1.181	**11.331.331**	1.771
KAB6	KAB4	**10.335.904**	5.787	2.126	3.543	2.283	**11.331.440**	1.575	**11.331.441**	2.362
KAB6	KAB4	**10.335.903**	6.693	2.579	3.543	2.283	**11.331.440**	1.575	**11.331.441**	2.362
KAB6	KAB5	**10.335.902**	8.740	3.406	3.937	2.677	**11.331.550**	2.362	**11.331.551**	3.543

Finishing

Turning Adapters	Counter Weights	Boring Heads	Insert Holders	Turning Range
10.335.905/ 10.335.906	**10.335.915**	**10.310.311**	**10.626.133**	.630-1.024
			10.626.132	.984-1.378
			10.626.131	1.339-1.732
10.335.904	**10.335.913**	**10.310.411**	**10.626.143**	1.339-1.850
			10.626.142	1.772-2.283
			10.626.141	2.126-2.638
10.335.903	**10.335.913**	**10.310.411**	**10.626.143**	2.244-2.756
			10.626.142	2.677-3.189
			10.626.141	3.031-3.543
10.335.902	**10.335.912**	**10.310.511**	**10.626.153**	3.071-3.740
			10.626.152	3.583-4.252
			10.626.151	4.055-4.724

Attention: Counter-clockwise spindle rotation required

Roughing

Turning Adapters	Boring Heads*	Insert Holders	Turning Range
10.335.905/ 10.335.906	**10.315.301**	**10.638.432**	.984-1.378
		10.638.431	1.339-1.732
10.335.904	**10.315.401**	**10.638.442**	1.654-2.165
		10.638.441	2.126-2.638
10.335.903	**10.315.401**	**10.638.442**	2.559-3.071
		10.638.441	3.031-3.543
10.335.902	**10.315.501**	**10.638.452**	3.425-4.094
		10.638.451	4.055-4.724

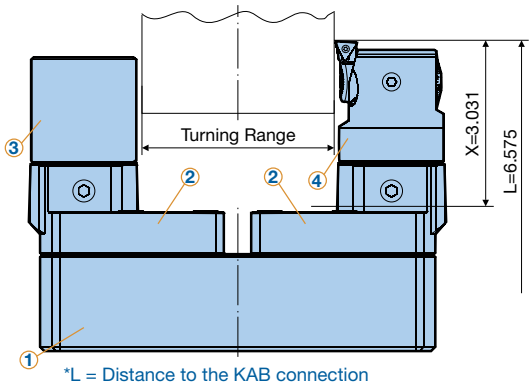
*For twin roughing, 2 boring heads & 1 pair of insert holders are required

KAISER®

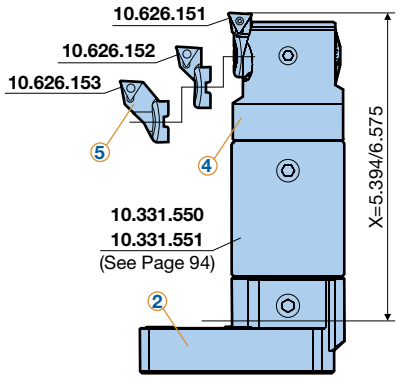
NEW!

Modular Slides & Adapters for Pin Turning Large Diameters

The turning adapter with KA5 connection can be mounted on any extension slide. For pin turning, it is required to connect the precision boring head EWN53 x KA5 either directly to the adapter or by means of an extension to the adapter. To compensate the unbalance, a second turning adapter and a special counter weight have to be mounted on the opposite side of the extension slide.



*L = Distance to the KAB connection



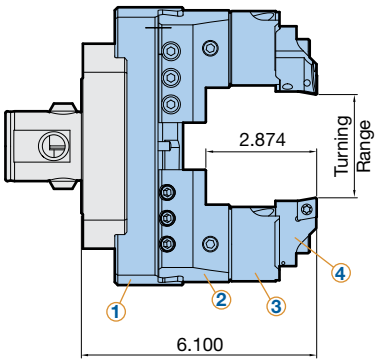
⑤ TC..11 Insert Holders & Ranges			Position	① Extension Slides	② Turning Adapter	③ Counter Weight	④ Boring Heads
10.626.153	**10.626.152**	**10.626.151**					
1.929-2.598	2.441-3.110	2.913-3.583	1	**10.318.222/ 10.317.205N**	**10.318.261 (2 Req'd)**	**10.317.285**	**10.310.511 (inch) 10.310.501 (metric)**
3.307-3.976	3.819-4.488	4.291-4.961	2				
4.685-5.354	5.197-5.866	5.669-6.339	1	**10.318.223/ 10.317.206N**			
6.063-6.732	6.575-7.244	7.047-7.717	2				
7.441-8.110	7.953-8.622	8.425-9.094	1	**10.318.224**			
8.819-9.488	9.331-10.000	9.803-10.472	2				
10.197-10.866	10.709-11.378	11.181-11.850	1	**10.318.225**			
11.575-12.244	12.087-12.756	12.559-13.228	2				
12.953-13.622	13.465-14.134	13.937-14.606	1	**10.318.226**			
14.331-15.000	14.843-15.512	15.315-15.984	2				
15.709-16.378	16.220-16.890	16.693-17.362	1	**10.318.227**			
17.087-17.756	17.598-18.268	18.071-18.740	2				

Attention: Counter-clockwise spindle rotation required

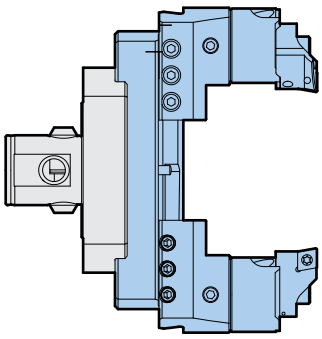
FLANGE ADAPTERS & EXTENSION SLIDES PG. 80

SERIES 317 O.D. TURNING LARGE DIAMETER SYSTEM
ROUGH TURNING ø1.181"-40.197"

Position 1



Position 2



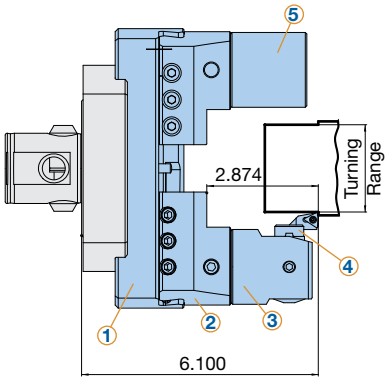
④ CC..12 Insert Holders & Ranges		Position	① Extension Slides	② Turning Adapter	③ Boring Head
10.638.452	**10.638.451**				
1.181-1.850	1.811-2.480	2	**10.317.221**	**10.317.284 (2 Req'd)**	**10.315.501 (2 Req'd)**
1.693-2.362	2.323-2.992	1	**10.317.222**		
3.071-3.740	3.701-4.370	2			
4.449-5.118	5.079-5.748	1	**10.317.223**		
5.827-6.496	6.457-7.126	2			
7.205-7.874	7.835-8.504	1	**10.317.224**		
8.583-9.252	9.213-9.882	2			
9.961-10.630	10.591-11.260	1	**10.317.225**		
11.339-12.008	11.969-12.638	2			
12.717-13.386	13.346-14.016	1	**10.317.226**		
14.094-14.764	14.724-15.394	2			
15.472-16.142	16.102-16.772	1	**10.317.227**		
16.850-17.520	17.480-18.150	2			
18.228-18.898	15.858-19.528	1	**10.317.231**		
19.606-20.276	20.236-20.906	2			
20.984-21.654	21.614-22.283	1	**10.317.232**		
22.362-23.031	22.992-23.661	2			
23.740-24.409	24.370-25.039	1	**10.317.233**		
25.118-25.787	25.748-26.417	2			
26.496-27.165	27.126-27.795	1	**10.317.234**		
27.874-28.543	28.504-29.173	2			
29.252-29.921	29.882-30.551	1	**10.317.235**		
30.630-31.299	31.260-31.929	2			
32.008-32.677	32.638-33.307	1	**10.317.236**		
33.386-34.055	34.016-34.685	2			
34.764-35.433	35.394-36.063	1	**10.317.237**		
36.142-36.811	36.772-37.441	2			
37.520-38.189	38.150-38.819	1	**10.317.238**		
38.898-39.567	39.528-40.197	2			

- Length of assembly is increased to 8.070" for diameters over ø17.870"
- Length of turning operation can be increased with extension adapters as follows:
  L1=2.362" ..... **10.331.550** (See Page 94)
  L2=3.543" ..... **10.331.551** (See Page 94)

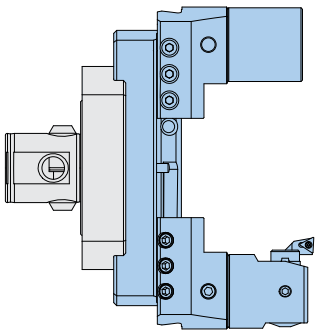
FLANGE ADAPTERS & EXTENSION SLIDES PG. 86

Attention: Counter-clockwise spindle rotation required

Position 1



Position 2



④ TC..11 Insert Holders & Ranges			Position	① Extension Slides	② Turning Adapter	③ Boring Heads	⑤ Counter Weight
10.626.153	**10.626.152**	**10.626.151**					
.827-1.496	1.339-2.008	1.811-2.480	2	**10.317.221**	**10.317.284 (2 Req'd)**	**10.310.511 (inch) 10.310.501 (metric)**	**10.317.285**
1.339-2.008	1.850-2.520	2.323-2.992	1	**10.317.222**			
2.717-3.386	3.228-3.898	3.701-4.370	2				
4.094-4.764	4.606-5.276	5.079-5.748	1	**10.317.223**			
5.472-6.142	5.984-6.654	6.457-7.126	2				
6.850-7.520	7.362-8.031	7.835-8.504	1	**10.317.224**			
8.228-8.898	8.740-9.409	9.213-9.882	2				
9.606-10.276	10.118-10.787	10.591-11.260	1	**10.317.225**			
10.984-11.654	11.496-12.165	11.969-12.638	2				
12.362-13.031	12.874-13.543	13.346-14.016	1	**10.317.226**			
13.740-14.409	14.252-14.921	14.724-15.394	2				
15.118-15.787	15.630-16.299	16.102-16.772	1	**10.317.227**			
16.496-17.165	17.008-17.677	17.480-18.150	2				
17.874-18.543	18.386-19.055	18.858-19.528	1	**10.317.231**			
19.252-19.921	19.764-20.433	20.236-20.906	2				
20.630-21.299	21.142-21.811	21.614-22.283	1	**10.317.232**			
22.008-22.677	22.520-23.189	22.992-23.661	2				
23.386-24.055	23.898-24.567	24.370-25.039	1	**10.317.233**			
24.764-25.433	25.276-25.945	25.748-26.417	2				
26.142-26.811	26.654-27.323	27.126-27.795	1	**10.317.234**			
27.520-28.189	28.031-28.701	28.504-29.173	2				
28.898-29.567	29.409-30.079	29.882-30.551	1	**10.317.235**			
30.276-30.945	30.787-31.457	31.260-31.929	2				
31.654-32.323	32.165-32.835	32.638-33.307	1	**10.317.236**			
33.031-33.701	33.543-34.213	34.016-34.685	2				
34.409-35.079	34.921-35.591	35.394-36.063	1	**10.317.237**			
35.787-36.457	36.299-36.969	36.772-37.441	2				
37.165-37.835	37.677-38.346	38.150-38.819	1	**10.317.238**			
38.543-39.213	39.055-39.724	39.528-40.197	2				

- Length of assembly is increased to 8.070" for diameters over ø17.870"
- Length of turning operation can be increased with extension adapters as follows:
  L1=2.362" ..... **10.331.550** (See Page 94)
  L2=3.543" ..... **10.331.551** (See Page 94)

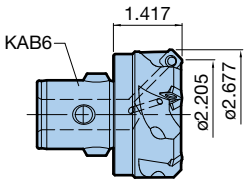
FLANGE ADAPTERS & EXTENSION SLIDES PG. 86

Attention: Counter-clockwise spindle rotation required

Features

- Especially designed for deep pocket or long reach milling
- Through-tool coolant capability for higher speeds/feeds
- High positive geometry design for reduced vibration & precision cutting

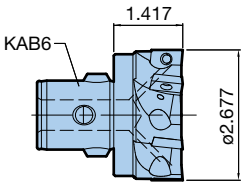
45° Face Milling Cutter



10.694.141

- Utilizes five SDHT09T3 inserts
- 45° geometry for face milling & chamfering

90° Square Shoulder Cutter

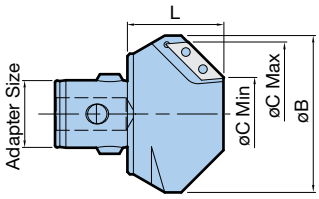


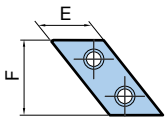
10.694.143

- Utilizes six APHT1604 inserts
- 90° square shoulder milling
- Cutting depth up to .590" possible

Cutters & Inserts

Cutter Type	Catalog Number	Insert Types	Catalog Number	Material
45°	**10.335.801**	SDHT 09T3AE EN	**10.654.230**	Steel
		SDHT 09T3AE FN	**10.654.231**	Aluminum
		SDHW 09T3AE EN	**10.654.232**	Cast Iron
90°	**10.335.802**	APHT 1604PD SR	**10.655.800**	Steel
		APHT 1604PD FR	**10.655.801**	Aluminum
		APHW 1604PD ER	**10.655.802**	Cast Iron





C-Cutter 45º Chamfer Mill

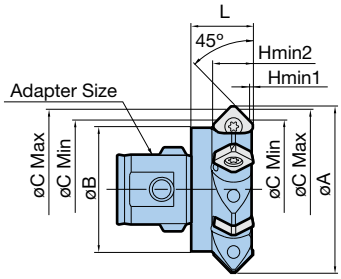
Type	Adapter Size	Catalog Number	øC Min	øC Max	L	øB	Number of Inserts
C0525	KAB2	**CKB2-C0525**	.197	.984	.984	1.122	1
C1040	KAB4	**CKB4-C1040**	.394	1.575	1.378	1.772	2
C3060	KAB5	**CKB5-C3060**	1.181	2.362	1.575	2.559	3
C50100	KAB6	**CKB6-C50100**	1.969	3.937	2.559	4.173	3

C-Cutter Inserts (Sold Individually)

Type	Catalog Number	E	F	Max Chamfer Width	Cutting Speed (SFM)			Feed (IPR)	Insert Screws
					Cast Iron	Steel	Aluminum		
C0525	**CW1206A**	.250	.500	.079x45°	30-100	65-130	65-130	.004-.006	**10.335.035**
C1040	**CW1909A**	.375	.750	.118x45°	65-165	130-250	165-300	.004-.012	**10.335.036**
C3060	**CW1909A**	.375	.750	.157x45°	250-500	250-500	300-600	.008-.016	**10.335.036**
C50100	**CW3115A**	.375	1.250	.157x45°	250-500	250-500	300-600	.008-.016	**10.335.037**

- All insert types available with ZX coating; add ZX after catalog number when ordering
- Replacement insert screws available (10 screws and 1 wrench included per package)

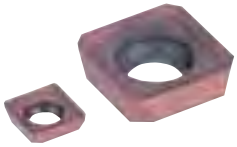
NEW!

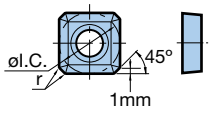


C-Cutter Mini 45° Chamfer Mill

Adapter Size	Catalog Number	øC (Min-Max)	øA	øB	L	Hmin1	Hmin2	No. of Inserts	Insert Type
KAB1	**CKB1-C2232-45B-20**	.866-1.260	1.287	.748	.787	.012	.488	4	CM10…
KAB3	**CKB3-C3242-45B-20**	1.260-1.654	1.681	1.220				4	
KAB4	**CKB4-C4252-45B-20**	1.654-2.047	2.075	1.220				6	
KAB3	**CKB3-C5262-45B-20**	2.047-2.441	2.469	1.535				6	
KAB5	**CKB5-C5262-45B-20**	2.047-2.441	2.469	2.008				6	

• Light face milling possible





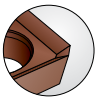
C-Cutter Mini Inserts

Catalog Number	øI.C.	Radius r	Insert Grade		Insert Screws	Anti-Seize Lubricant
			ACP200	DS20		
CM10C1	.394	.008	O	O	**S4S-T15**	**BN-5**
CM10C1SE			O	—		

• Inserts are available in packages of 10 pcs.
• Insert screw packages contain 10 screws and 1 wrench
• Order example: CM10C1-ACP200

Insert Classifications

ACP200	DS20
For all steel & stainless steel materials	***For aluminum & non-ferrous materials***
Multi-layer PVD coating on carbide base with nanoscale TiAlN & AlCrN. Excellent performance and wear resistance.	DLC coating on carbide base with very smooth surface for a low coefficient of friction. Excellent performance against built-up edge.



Newly Introduced SE (Sharp Edge) Type

Sharp edge prevents burrs. Recommended for stainless steel & mild steel.

Cutting Conditions

Material	Insert Grade	Cutting Speed (SFM)	Feed (IPT)		Coolant
			Chamfering	Face Milling	
Carbon Steel	ACP200	330-1150	.002-.016	.002-.008	Dry
Pre-hardened Steel <HRC40		200-330	.002-.004	.002-.004	Wet
Stainless Steel		330-825	.003-.012	.003-.008	Dry/Wet
Cast Iron		330-1150	.004-.020	.002-.010	Dry
Aluminum/Non-ferrous	DS20	330-2650	.004-.020	.002-.012	Dry/Wet

Figure 1

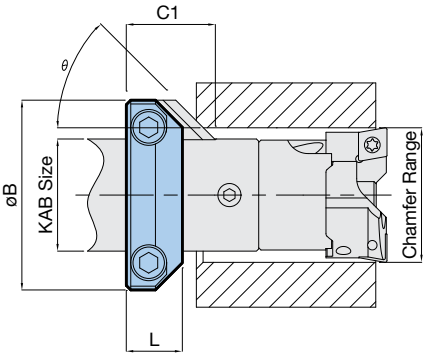
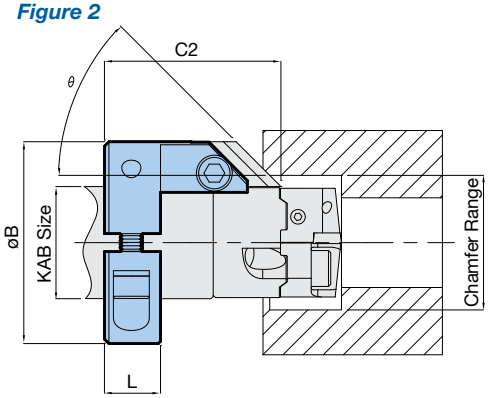
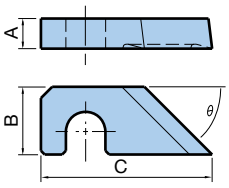


Figure 2



Chamfer Rings

Adapter Size	Chamfer Range	Catalog Number		θ	C1	C2	L	øB	Insert Size
		Figure 1	Figure 2						
KAB1	.79-1.38	**10.663.110**	–	30°	1.083	–	.511	1.378	1
				45°	.925	–			
KAB2	.98-1.57	**10.663.120**	**10.663.121**	30°	1.083	2.146	.590	1.654	
				45°	.925	1.988			
KAB3	1.26-1.85	**10.663.130**	**10.663.131**	30°	1.083	2.322	.590	2.008	
				45°	.925	2.165			
KAB4	1.61-2.17	**10.663.140**	**10.663.141**	30°	1.083	2.600	.590	2.244	
				45°	.925	2.441			
KAB5	2.09-3.54	**10.663.150**	**10.663.151**	30°	2.047	3.582	.984	3.543	2
				45°	1.693	3.228			
KAB6	2.68-4.09	**10.663.160**	**10.663.161**	30°	2.047	4.134	.984	4.094	
				45°	1.693	3.780			



Chamfer Ring Inserts

Insert Size	θ	Catalog Number	A	B	C
1	30˚	**10.663.181**	.157	.354	1.083
1	45˚	**10.663.191**	.157	.354	.925
2	30˚	**10.663.185**	.315	.787	2.047
2	45˚	**10.663.195**	.315	.787	1.693

Spare Parts

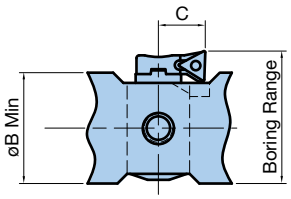
Adapter Size			
	① Clamp Screws	② Washers	③ Hex Wrench
KAB1	**10.690.101**	**10.693.175**	**10.690.803**
KAB2	**10.690.102**	**10.693.176**	**10.690.804**
KAB3	**10.690.103**	**10.693.176**	**10.690.804**
KAB4	**10.690.104**	**10.693.176**	**10.690.804**
KAB5	**10.690.105**	**10.693.131**	**10.690.807**
KAB6	**10.690.106**	**10.693.131**	**10.690.807**

Cartridges with Micrometer Adjustment for Special, Multi-Diameter Solutions

Special tools with the requirement of high precision adjustment cartridges can be easily designed and manufactured. Five cartridges, offered with either inch (ø.0005"/div.) or metric (ø.01mm/div.) graduated dials cover the diameter work range from ø.906"-4.216" (ø23mm-107mm) by application of two different insert holders.

Cartridges are made with a highly accurate and ground micrometer spindle and tool carrier locking system which will not change diameter setting. Cartridges easily assemble into a precision bore and lock securely into place with a threaded locating screw. The locking screw for the tool carrier is an integral part of the locating screw.

Two insert holders for each cartridge are offered and use ISO standard type inserts. Insert holders can be assembled for either forward or back boring without rotating the cartridges. A grease fitting is also provided to ensure long lasting and accurate diameter setting.



Inch Cartridges, 1 Div = .0005"/ø, ø.906"-4.216"

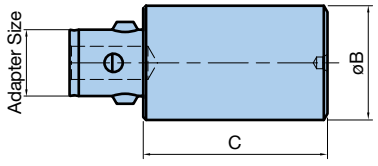
Type	Catalog Number	øB Min	C	Boring Range	Insert Holder	Insert Type
1/1	**10.456.011**	.827	.433	.906-1.142	**10.626.111**	TP..07
				1.102-1.339	**10.626.112**	TP..07
1/2	**10.456.012**	1.102	.433	1.299-1.654	**10.626.111**	TP..07
				1.496-1.811	**10.626.112**	TP..07
2/1	**10.456.013**	1.535	.650	1.772-2.283	**10.626.141**	TC..11
				2.126-2.638	**10.626.142**	TC..11
2/2	**10.456.014**	2.362	.650	2.559-3.071	**10.626.141**	TC..11
				2.913-3.425	**10.626.142**	TC..11
2/3	**10.456.015**	3.150	.650	3.346-3.858	**10.626.141**	TC..11
				3.701-4.216	**10.626.142**	TC..11

Metric Cartridges, 1 Div = .01mm/ø, ø23mm-107mm

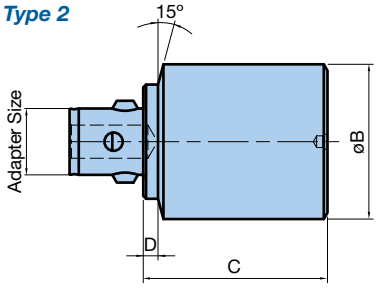
Type	Catalog Number	øB Min	C	Boring Range	Insert Holder	Insert Type
1/1	**10.456.001**	21	11	23mm-29mm	**10.626.111**	TP..07
				28mm-34mm	**10.626.112**	TP..07
1/2	**10.456.002**	28	11	33mm-42mm	**10.626.111**	TP..07
				38mm-46mm	**10.626.112**	TP..07
2/1	**10.456.003**	39	16.5	45mm-58mm	**10.626.141**	TC..11
				54mm-67mm	**10.626.142**	TC..11
2/2	**10.456.004**	60	16.5	65mm-78mm	**10.626.141**	TC..11
				74mm-87mm	**10.626.142**	TC..11
2/3	**10.456.005**	80	16.5	85mm-98mm	**10.626.141**	TC..11
				94mm-107mm	**10.626.142**	TC..11

Hardened & Ground Steel KAB Adapters (Steel Blank Machinable RC28-32)

Type 1



Type 2

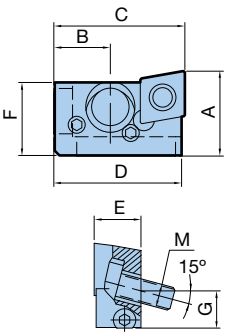


Adapter Size	Type	Catalog Number	øB	C	D
KAB3	1	**10.335.531**	1.220	2.560	–
KAB3	2	**10.335.532**	1.654	1.968	.157
KAB4	1	**10.335.541**	1.535	3.150	–
KAB4	2	**10.335.542**	2.125	1.968	.157
KAB5	1	**11.335.551**	1.968	3.937	–
KAB5	2	**10.335.552**	2.756	2.360	.197
KAB5	2	**11.335.553**	3.000	6.000	.197
KAB6	1	**11.335.563**	2.520	8.858	–
KAB6	1	**11.335.565**	2.520	10.240	–
KAB6	2	**11.335.562**	3.820	2.760	.394
KAB6	2	**11.335.564**	4.000	8.000	.394
KAB7	1	**11.335.571**	3.543	7.087	–
KAB7	2	**11.335.572**	4.500	8.000	.394

ADJUSTABLE SHELF MOUNT CARTRIDGES — TYPE "ASM"

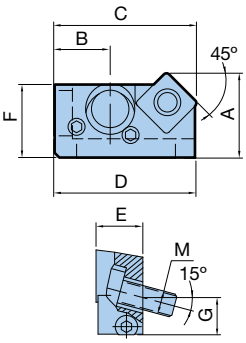
Radial and axial adjustment cartridges allow quick and easy insert adjustments for diameter and length. Especially suitable for use on special multiple diameter roughing and finish boring tools where the highest cutting capacity at high speed and feed can be realized.

The compact design features a unique pivot pin which maintains line contact to the boring bar pocket at all times through the entire range of travel. Adjustments are easily made by turning the screw conveniently located on the front face of the cartridge. Each cartridge can be adjusted in either direction (radially or axially) by up to .024".



CC..90°

Insert Size	Min. Bore	Catalog Number	A*	B	C*	D	E	F	G	M	Gage Insert
CC..06 (1/4" I.C.)	1.260 (32mm)	**11.382.316**	.512 (13mm)	.335 (8.5mm)	.787 (20mm)	.768 (19.5mm)	.315 (8mm)	.457 (11.6mm)	.225 (5.7mm)	M3x.5	CC..060202
CC..09 (3/8" I.C.)	1.570 (40mm)	**11.382.326**	.709 (18mm)	.472 (12mm)	1.102 (28mm)	1.075 (27.3mm)	.394 (10mm)	.614 (15.6mm)	.323 (8.2mm)	M5x.8	CC..09T304
CC..12 (1/2" I.C.)	1.970 (50mm)	**11.382.346**	.866 (22mm)	.472 (12mm)	1.22 (31mm)	1.189 (30.2mm)	.472 (12mm)	.751 (19mm)	.422 (10.7mm)	M6x1	CC..120408
CC..16 (5/8" I.C.)	2.205 (56mm)	**11.382.356**	1.102 (28mm)	.591 (15mm)	1.496 (38mm)	1.476 (37.5mm)	.472 (12mm)	.992 (25.2mm)	.512 (13mm)	M6x1	CC..160508

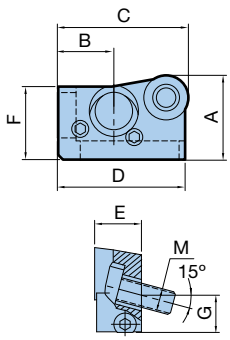


SC..45°

Insert Size	Min. Bore	Catalog Number	A*	B	C*	D	E	F	G	M	Gage Insert
SC..09 (3/8" I.C.)	1.570 (40mm)	**11.382.223**	.709 (18mm)	.472 (12mm)	1.200 (30.5mm)	1.173 (29.8mm)	.394 (10mm)	.622 (15.8mm)	.323 (8.2mm)	M5x.8	SC..09T304

SC..30°

Insert Size	Min. Bore	Catalog Number	A*	B	C*	D	E	F	G	M	Gage Insert
SC..09 (3/8" I.C.)	1.570 (40mm)	**11.382.224**	.709 (18mm)	.472 (12mm)	1.200 (30.5mm)	1.173 (29.8mm)	.394 (10mm)	.622 (15.8mm)	.323 (8.2mm)	M5x.8	SC..09T304
SC..12 (1/2" I.C.)	1.970 (50mm)	**11.382.244**	1.024 (26mm)	.472 (12mm)	1.378 (35mm)	1.366 (34.7mm)	.472 (12mm)	.835 (21.2mm)	.500 (12.7mm)	M6x1	SC..120408



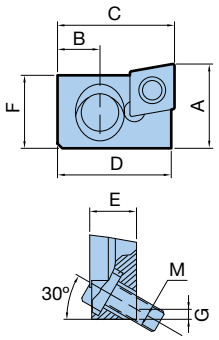
RC

Insert Size	Min. Bore	Catalog Number	A	B	C	D	E	F	G	M	Gage Insert
RC..12 (1/2" I.C.)	1.970 (50mm)	**11.382.366**	.866 (22mm)	.472 (12mm)	1.220 (31mm)	1.189 (30.2mm)	.472 (12mm)	.751 (19mm)	.422 (10.7mm)	M6x1	RC..120400

*Dimensions based on .016" nose radius for 1/4" & 3/8" I.C. inserts; 1/2" & 5/8" I.C. insert cartridges based on .031" nose radius

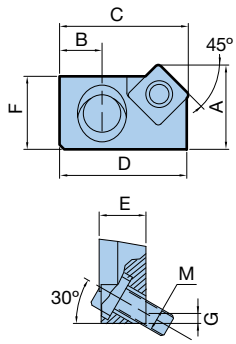
These compact and rigid insert cartridges are best utilized for special multi-diameter roughing and chamfering tools. Combined with other Kaiser boring tool components, they can optimize high production boring, facing, or chamfering. Other typical applications are for dedicated core drilling/rough boring operations requiring fixed diameter and length.

Type "FSM" — .030" (.8mm) Adjustment with Shim



CC..90°

Insert Size	Min. Bore	Catalog Number	A*	B	C*	D	E	F	G	M	Gage Insert
CC..06 (1/4" I.C.)	1.260 (32mm)	**11.381.316**	.433 (11mm)	.276 (7mm)	.787 (20mm)	.768 (19.5mm)	.315 (8mm)	.377 (9.6mm)	.035 (0.9mm)	M3x.5	CC..060202
CC..09 (3/8" I.C.)	1.570 (40mm)	**11.381.326**	.670 (17mm)	.295 (7.5mm)	.984 (25mm)	.961 (24.4mm)	.394 (10mm)	.583 (14.8mm)	.084 (2.1mm)	M5x.8	CC..09T304
CC..12 (1/2" I.C.)	1.89 (48mm)	**11.381.346**	.866 (22mm)	.315 (8mm)	1.181 (30mm)	1.154 (29.3mm)	.472 (12mm)	.751 (19mm)	.151 (3.8mm)	M6x1	CC..120408



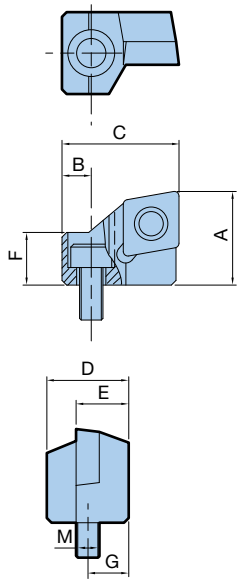
SC..45°

Insert Size	Min. Bore	Catalog Number	A*	B	C*	D	E	F	G	M	Gage Insert
SC..09 (3/8" I.C)	1.570 (40mm)	**11.381.223**	.670 (17mm)	.295 (7.5mm)	1.023 (26mm)	1.000 (25.4mm)	.394 (10mm)	.583 (14.8mm)	.084 (2.1mm)	M5x.8	SC..09T304
SC..12 (1/2" I.C.)	1.890 (48mm)	**11.381.243**	.866 (22mm)	.315 (8mm)	1.260 (32mm)	1.232 (31.3mm)	.472 (12mm)	.751 (19mm)	.151 (3.8mm)	M6x1	SC..120408

SC..30°

Insert Size	Min. Bore	Catalog Number	A*	B	C*	D	E	F	G	M	Gage Insert
SC..09 (3/8" I.C)	1.570 (40mm)	**11.381.224**	.670 (17mm)	.295 (7.5mm)	1.023 (26mm)	1.000 (25.4mm)	.394 (10mm)	.583 (14.8mm)	.084 (2.1mm)	M5x.8	SC..09T304
SC..12 (1/2" I.C.)	1.890 (48mm)	**11.381.244**	.866 (22mm)	.315 (8mm)	1.260 (32mm)	1.232 (31.3mm)	.472 (12mm)	.751 (19mm)	.151 (3.8mm)	M6x1	SC..120408

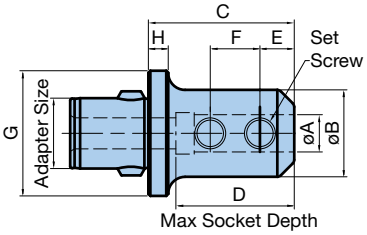
Type "TSM" — No Adjustment



CC..90°

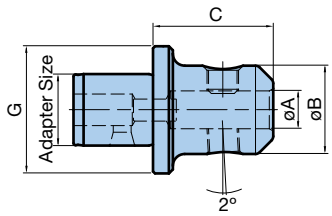
Insert Size	Min. Bore	Catalog Number	A*	B	C*	D	E	F	G	M	Gage Insert
CC..06 (1/4" I.C.)	1.181 (30mm)	**11.381.416**	.394 (10mm)	.157 (4mm)	.591 (15mm)	.394 (10mm)	.276 (7mm)	.197 (5mm)	.197 (5mm)	M3x.5	CC..060204
CC..09 (3/8" I.C.)	1.496 (38mm)	**11.381.426**	.630 (16mm)	.197 (5mm)	.787 (20mm)	.551 (14mm)	.354 (9mm)	.354 (9mm)	.276 (7mm)	M4x.7	CC..09T308
CC..12 (1/2" I.C.)	1.890 (48mm)	**11.381.446**	.787 (20mm)	.236 (6mm)	.984 (25mm)	.630 (16mm)	.394 (10mm)	.472 (12mm)	.315 (8mm)	M6x1	CC..120408

*Dimensions based on .016" nose radius for 1/4" & 3/8" I.C. inserts; 1/2" I.C. insert cartridges based on .031" nose radius



End Mill Adapters — Inch Size

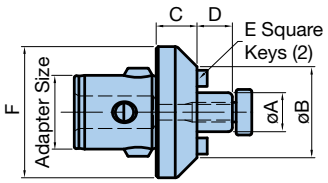
øA	Adapter Size	Catalog Number	øB	C	D	E	F	Set Screws	G	H
.1875	KAB4	**11.335.220**	.68	1.28	—	.44	—	**11.690.517**	1.53	.4
.2500	KAB4	**11.335.221**	.88	1.28	—	.44	—	**11.690.517**	1.53	.4
.3750	KAB4	**11.335.222**	1.00	1.78	—	.75	—	**11.690.518**	1.53	.4
.5000	KAB4	**11.335.223**	1.25	1.90	1.70	.88	—	**11.690.519**	1.53	.4
.1875	KAB5	**11.335.226**	.68	1.28	—	.44	—	**11.690.517**	1.97	.4
.2500	KAB5	**11.335.227**	.88	1.28	—	.44	—	**11.690.517**	1.97	.4
.3750	KAB5	**11.335.228**	1.00	1.78	—	.75	—	**11.690.518**	1.97	.4
.5000	KAB5	**11.335.229**	1.25	1.90	1.79	.88	—	**11.690.519**	1.97	.4
.7500	KAB5	**11.335.231**	1.75	3.03	2.75	.94	—	**11.690.520**	1.97	.4
.1875	KAB6	**11.335.201**	.68	1.28	—	.44	—	**11.690.517**	2.52	.4
.2500	KAB6	**11.335.202**	.88	1.28	—	.44	—	**11.690.517**	2.52	.4
.3750	KAB6	**11.335.203**	1.00	1.78	—	.75	—	**11.690.518**	2.52	.4
.5000	KAB6	**11.335.204**	1.25	1.90	—	.88	—	**11.690.519**	2.52	.4
.6250	KAB6	**11.335.205**	1.50	3.03	—	.94	—	**11.690.520**	2.52	.4
.7500	KAB6	**11.335.206**	1.75	3.03	2.75	1.00	—	**11.690.521**	2.52	.4
.8750	KAB6	**11.335.207**	1.88	3.03	2.75	1.00	.81	**11.690.521 (2)**	2.52	.4
1.000	KAB6	**11.335.208**	2.00	3.28	2.88	1.12	1.00	**11.690.522 (2)**	2.52	.4
1.250	KAB6	**11.335.209**	2.52	3.28	3.00	1.12	1.00	**11.690.522 (2)**	2.52	—
1.250	KAB7	**11.335.216**	2.50	3.25	3.00	1.12	1.00	**11.690.522 (2)**	3.54	.5
1.500	KAB7	**11.335.217**	2.62	3.25	2.83	1.12	1.00	**11.690.522 (2)**	3.54	.5
2.000	KAB7	**11.335.218**	3.75	4.88	3.75	1.41	1.50	**11.690.523 (2)**	3.54	—



End Mill Adapters — Metric Size

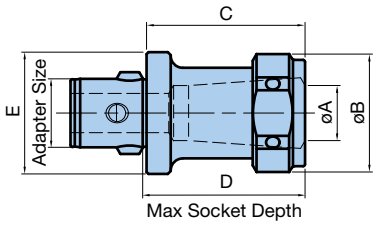
øA	Adapter Size	Catalog Number	øB	C	Set Screws	G
6	KA4	**10.335.230**	24	50	**10.690.477**	39
8	KA4	**10.335.231**	26	50	**10.690.478**	
10	KA4	**10.335.232**	32	55	**10.690.479**	
12	KA4	**10.335.233**	39	60	**10.690.480**	
6	KA5	**10.335.234**	24	50	**10.690.477**	50
8	KA5	**10.335.235**	26	50	**10.690.478**	
10	KA5	**10.335.236**	32	55	**10.690.479**	
12	KA5	**10.335.237**	38	60	**10.690.480**	
14	KA5	**10.335.238**	40	60	**10.690.480**	
16	KA5	**10.335.239**	45	62	**10.690.481**	
6	KA6	**10.335.240**	24	45	**10.690.477**	
8	KA6	**10.335.241**	26	45	**10.690.478**	63.5
10	KA6	**10.335.242**	32	45	**10.690.479**	
12	KA6	**10.335.243**	38	50	**10.690.480**	
14	KA6	**10.335.244**	40	50	**10.690.480**	
16	KA6	**10.335.245**	45	50	**10.690.481**	
18	KA6	**10.335.246**	47	50	**10.690.481**	
20	KA6	**10.335.247**	48	55	**10.690.482**	
25	KA6	**10.335.248**	63	65	**10.690.483**	
32	KA7	**10.335.250****	72	80	**10.690.484**	90
40	KA7	**10.335.251****	80	90	**10.690.484**	

• Metric size end mill adapters according to both DIN 1835B (Weldon System) and DIN 1835E (Whistle Notch System)
**Weldon System only



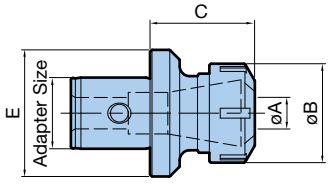
Shell Mill Adapters

øA	Adapter Size	Catalog Number	øB	C	D	E	F	Lock Screws
.50	KAB4	**11.335.445**	1.53	.71	.56	.25	1.53	**11.690.709**
.75	KAB4	**11.335.446**	1.75	.71	.68	.31	—	**11.690.710**
.50	KAB5	**11.335.454**	1.44	.78	.56	.25	1.97	**11.690.709**
.75	KAB5	**11.335.455**	1.97	.78	.68	.31	1.97	**11.690.710**
1.00	KAB5	**11.335.456**	2.25	.78	.68	.38	—	**11.690.711**
.50	KAB6	**11.335.401**	1.44	.78	.56	.25	2.52	**11.690.709**
.75	KAB6	**11.335.402**	1.75	.78	.68	.31	2.52	**11.690.710**
1.00	KAB6	**11.335.403**	2.25	.78	.68	.38	2.52	**11.690.711**
1.25	KAB6	**11.335.404**	2.75	1.03	.68	.50	2.52	**11.690.712**
1.50	KAB6	**11.335.405**	3.75	1.53	.93	.62	—	**11.690.713**
1.00	KAB7	**11.335.413**	2.25	.98	.68	.38	3.54	**11.690.711**
1.25	KAB7	**11.335.414**	2.75	.98	.68	.50	3.54	**11.690.712**
1.50	KAB7	**11.335.415**	3.75	.98	.93	.62	—	**11.690.713**
2.00	KAB7	**11.335.416**	4.88	.98	.93	.75	—	**11.691.714**



TG Style Angle Collet Chucks

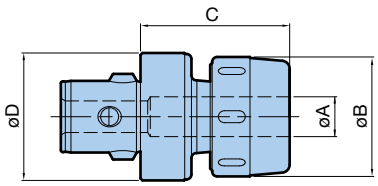
Collet Series	øA Collet Clamping Range	Adapter Size	Catalog Number	øB	C	D	E	Collet Nuts
75TG	.062-.750	KAB6	**11.335.106**	2.10	2.78	2.20	2.52	**11.335.185**
100TG	.093-1.000	KAB6	**11.335.107**	2.50	3.28	2.72	2.52	**11.335.186**
150TG	.500-1.500	KAB6	**11.335.108**	3.50	3.78	3.30	2.52	**11.335.187**
150TG	.500-1.500	KAB7	**11.335.114**	3.50	4.00	3.50	3.54	**11.335.187**
200TG	1.000-2.000	KAB7	**11.335.115**	4.25	4.50	4.06	3.54	**11.335.188**



ER Collet Chucks

Collet Series	øA Collet Clamping Range	Adapter Size	Catalog Number	øB	C	E
ER25	1mm-16mm	KA4	**10.335.140**	42	~36	39
ER25	1mm-16mm	KA5	**10.335.142**	42	~36	50
ER32	2mm-20mm	KA6	**10.335.164**	50	~53	64
ER40	6mm-25mm	KA6	**10.335.165**	63	~65	64

Milling Chuck with Needle-Bearing Chucking Nut for Maximum Clamping Force & High Concentricity

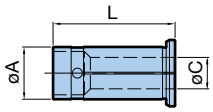


Milling Chuck Adapters — Inch Size

Type	Adapter Size	Catalog Number	Clamping Range	øA	øB	C	øD
HMC.750	KAB6	**11.335.067**	.25-.75	.75	2.36	2.95	2.52
HMC1.250	KAB7	**11.335.078**	.25-1.25	1.25	3.15	4.13	3.54

Milling Chuck Adapters — Metric Size

Type	Adapter Size	Catalog Number	Clamping Range	øA	øB	C	øD
HMC20	KAB6	**10.335.066**	6mm-20mm	20mm	60mm	75mm	64mm
HMC32	KAB7	**10.335.077**	6mm-32mm	32mm	80mm	105mm	90mm



Reduction Sleeves HMC.750 (Inch)

A	øC Clamping Size	Catalog Number	L
.75	.250	**C.750-1/4**	2.36
	.312	**C.750-5/16**	2.36
	.375	**C.750-3/8**	2.36
	.438	**C.750-7/16**	2.36
	.500	**C.750-1/2**	2.36
	.562	**C.750-9/16**	2.36
	.625	**C.750-5/8**	2.36

Reduction Sleeves HMC1.250 (Inch)

øA	øC Clamping Size	Catalog Number	L
1.25	.250	**C1.250-1/4**	2.91
	.312	**C1.250-5/16**	2.91
	.375	**C1.250-3/8**	2.91
	.438	**C1.250-7/16**	2.91
	.500	**C1.250-1/2**	2.91
	.562	**C1.250-9/16**	2.91
	.625	**C1.250-5/8**	2.91
	.688	**C1.250-11/16**	2.91
	.750	**C1.250-3/4**	2.91
	.812	**C1.250-13/16**	2.91
	.875	**C1.250-7/8**	2.91
	.938	**C1.250-15/16**	2.91
	1.000	**C1.250-1**	2.91

Reduction Sleeves HMC20 (Metric)

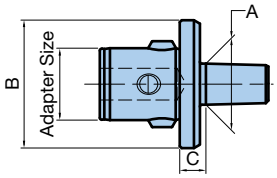
øA	øC Clamping Size	Catalog Number	L
20	6	**AC20-6**	68
	8	**AC20-8**	68
	10	**AC20-10**	68
	12	**AC20-12**	68
	16	**AC20-16**	68

Reduction Sleeves HMC32 (Metric)

øA	øC Clamping Size	Catalog Number	L
32	6	**AC32-6**	90
	8	**AC32-8**	90
	10	**AC32-10**	90
	12	**AC32-12**	90
	16	**AC32-16**	90
	20	**AC32-20**	90
	25	**AC32-25**	90

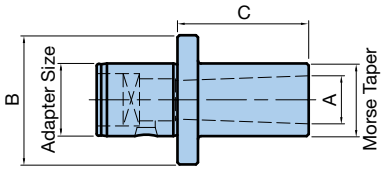
Wrench

Type	Catalog Number
HMC.750, HMC20	**FK58-62**
HMC1.250, HMC32	**FK80-90**



Jacobs Arbor Adapters

Jacobs Taper	Adapter Size	Catalog Number	A	B	C
33	KAB6	**11.335.002**	.624	2.520	.534
3	KAB6	**11.335.004**	.811	2.520	.534

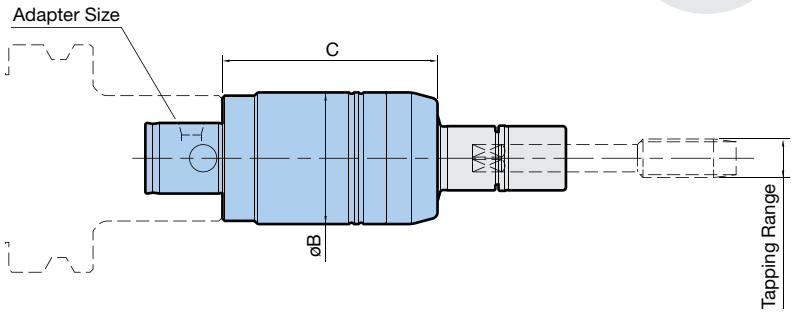


Morse Taper Adapters

Morse Taper	Adapter Size	Catalog Number	A	B	C
2	KA6	**10.335.362**	1.260	2.520	1.732
3	KA6	**10.335.363**	1.575	2.520	2.560
3	KA7	**10.335.373**	1.417	3.543	2.165
4	KA7	**10.335.374**	1.890	3.543	3.228
5	KA7	**10.335.375**	2.480	3.543	7.087

NEW!

Compensates for Synchronization Errors During Rigid Tapping Improving Thread Quality & Tap Life



KAB Mega Synchro Tapping Holder

Tapping Range	Adapter Size	Catalog Number	Tap Holder Type	øB	C	MGT Set Screw
No.2-No.12	KAB4	**CK4-MGT6-62**	MGT6	1.417	2.441	**MGT6SS**
AU1/4-AU7/16*	KAB4	**CK4-MGT12-67**	MGT12	1.614	2.638	**MGT12SS**
AU1/2-AU3/4, AP1/8-AP1/4	KAB5	**CK5-MGT20-87**	MGT20	2.126	3.425	**MGT20SS**

- Tap Holder and wrench must be ordered separately
- Rigid tapping function is required on the machine tool

*AU3/8 is included in the MGT20 series

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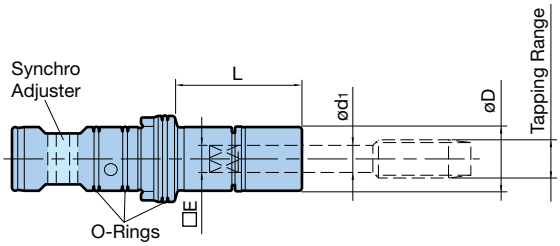

Tap Holder

Type	Tapping Range	L	Catalog Number	ød1	□E	Clamping Nut	Wrench	Synchro Adjuster	O-Ring Set
MGT6 (øD = .472)	No.2-6	1.250	**MGT6-No.6-1.25**	.141	.110	**MGN6T**	**MGR16**	**MGT6SA**	**MGT6OR**
		3.000	**MGT6-No.6-3**						
		4.000	**MGT6-No.6-4**						
		6.000	**MGT6-No.6-6**						
	No.8	1.250	**MGT6-No.8-1.25**	.168	.131				
		3.000	**MGT6-No.8-3**						
		4.000	**MGT6-No.8-4**						
		6.000	**MGT6-No.8-6**						
	No.10	1.250	**MGT6-No.10-1.25**	.194	.152				
		3.000	**MGT6-No.10-3**						
		4.000	**MGT6-No.10-4**						
		6.000	**MGT6-No.10-6**						
		8.000	**MGT6-No.10-8**						
	No.12	1.250	**MGT6-No.12-1.25**	.220	.165				
		3.000	**MGT6-No.12-3**						
		4.000	**MGT6-No.12-4**						
		6.000	**MGT6-No.12-6**						
		8.000	**MGT6-No.12-8**						

Type	Tapping Range	L	Catalog Number	ød1	□E	Clamping Nut	Wrench	Synchro Adjuster	O-Ring Set
MGT12 (øD = .787)	AU1/4	1.250	**MGT12-AU1/4-1.25**	.255	.191	**MGN12T**	**MGR20**	**MGT12SA**	**MGT12OR**
		3.000	**MGT12-AU1/4-3**						
		4.000	**MGT12-AU1/4-4**						
		6.000	**MGT12-AU1/4-6**						
		8.000	**MGT12-AU1/4-8**						
	AU5/16	1.250	**MGT12-AU5/16-1.25**	.318	.238				
		3.000	**MGT12-AU5/16-3**						
		4.000	**MGT12-AU5/16-4**						
		6.000	**MGT12-AU5/16-6**						
		8.000	**MGT12-AU5/16-8**						
	AU7/16	1.250	**MGT12-AU7/16-1.25**	.323	.242				
		3.000	**MGT12-AU7/16-3**						
		4.000	**MGT12-AU7/16-4**						
		6.000	**MGT12-AU7/16-6**						
		8.000	**MGT12-AU7/16-8**						
MGT20 (øD = 1.181)	AU3/8	1.500	**MGT20-AU3/8-1.5**	.381	.286	**MGN20T**	**MGR30**	**MGT20SA**	**MGT20OR**
		3.500	**MGT20-AU3/8-3.5**						
		4.500	**MGT20-AU3/8-4.5**						
		6.000	**MGT20-AU3/8-6**						
	AU1/2	1.500	**MGT20-AU1/2-1.5**	.367	.275				
		3.500	**MGT20-AU1/2-3.5**						
		4.500	**MGT20-AU1/2-4.5**						
		6.000	**MGT20-AU1/2-6**						
	AU9/16	1.500	**MGT20-AU9/16-1.5**	.429	.322				
		3.500	**MGT20-AU9/16-3.5**						
		4.500	**MGT20-AU9/16-4.5**						
		6.000	**MGT20-AU9/16-6**						
	AU5/8	1.500	**MGT20-AU5/8-1.5**	.480	.360				
		3.500	**MGT20-AU5/8-3.5**						
		4.500	**MGT20-AU5/8-4.5**						
		6.000	**MGT20-AU5/8-6**						
	AU11/16	1.500	**MGT20-AU11/16-1.5**	.542	.406				
		3.500	**MGT20-AU11/16-3.5**						
		4.500	**MGT20-AU11/16-4.5**						
		6.000	**MGT20-AU11/16-6**						
	AU3/4	1.500	**MGT20-AU3/4-1.5**	.590	.442				
		3.500	**MGT20-AU3/4-3.5**						
		4.500	**MGT20-AU3/4-4.5**						
		6.000	**MGT20-AU3/4-6**						
	AP1/8	1.500	**MGT20-AP1/8-1.5**	.437	.328				
		3.500	**MGT20-AP1/8-3.5**						
		4.500	**MGT20-AP1/8-4.5**						
		6.000	**MGT20-AP1/8-6**						
	AP1/4	1.500	**MGT20-AP1/4-1.5**	.562	.421				
		3.500	**MGT20-AP1/4-3.5**						
		4.500	**MGT20-AP1/4-4.5**						
		6.000	**MGT20-AP1/4-6**						

- Nut is included
- Wrench must be ordered separately
- Tap Holders with other standards such as JIS or DIN are available from stock upon request

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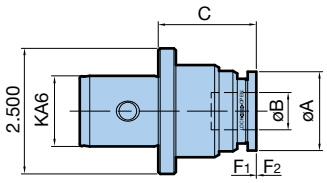
Tension & Compression Tapping Chucks

Heavy-duty tapping attachments for high production thread cutting on machine tools and machining centers.

Features:

- Extremely short, rigid design
- Large-length compensation in response to tension and compression
- Quick-change clutch for tap holders with or without torque control
- Bilz and Tapmatic compatible



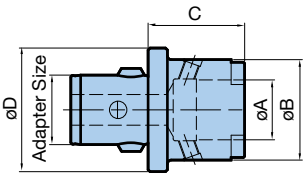
Tapping Chucks — No Through-Spindle Coolant

Tapping Range	Tap Adapter Size	Catalog Number	øA	øB	C	F1	F2
0-9/16	1	**10.335.762**	1.850	.748	1.969	.197	.394
5/16-7/8	2	**10.335.763**	2.520	1.220	3.150	.275	.551

Tapping Attachment for Rigid Tapping

Features:

- Extremely short and compact tapping chuck without axial float
- For tapping on machine tools with speed and feed synchronization
- For quick-change tap holders with or without torque clutch
- Bilz and Tapmatic compatible



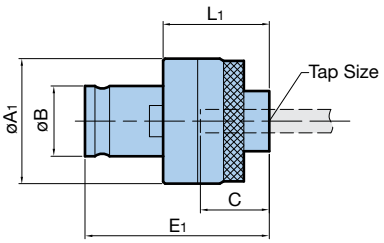
Rigid Tapping Attachments

Tapping Range	Tap Adapter	Adapter Size	Catalog Number	øA	øB	C	øD
0-9/16	1	KAB5	**11.335.760**	.748	1.535	1.181	1.968
0-9/16	1	KAB6	**10.335.761**	.748	1.535	1.181	2.500
5/16-7/8	2	KAB6	**11.335.765**	1.220	2.047	1.968	2.500
13/16-1-3/8	3	KAB6	**11.335.769**	1.890	2.756	2.756	2.500

Torque Control Tap Adapter

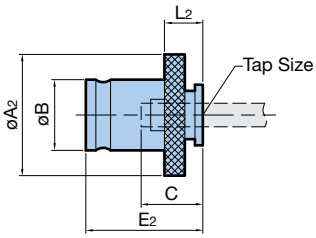
Quick-change tap adapter with torque clutch for right hand threads. The overload torque is pre-set according to the thread size and tap standard, and protects the tap against breakage.

Application Use: Blind hole tapping



Positive Drive Tap Adapter

Quick-change tap adapter without torque clutch (positive drive) for left and right hand threads.



Tap Adapter — Size 1

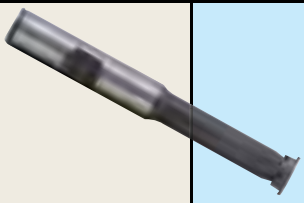
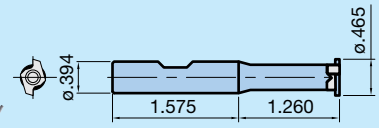
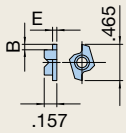
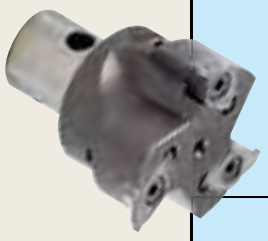
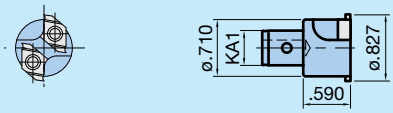
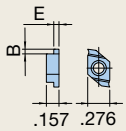
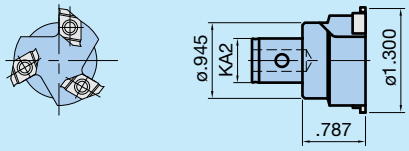
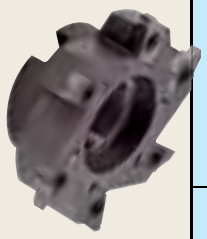
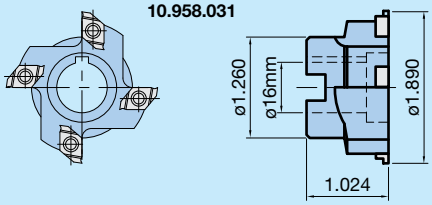
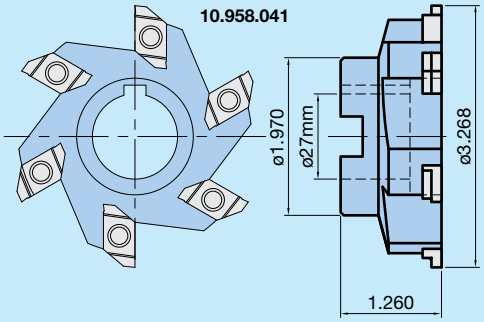
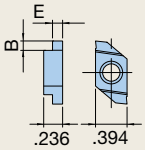
Tap Size	Torque Control Adapter	Positive Drive Adapter	øA1	øA2	øB	C	E1	E2	L1	L2
0–6	**10.335.660**	**10.335.630**	1.260	1.181	.748	.669	1.830	1.122	.984	.276
8	**10.335.661**	**10.335.631**								
10	**10.335.662**	**10.335.632**								
12	**10.335.663**	**10.335.633**								
1/4	**10.335.664**	**10.335.634**								
5/16	**10.335.665**	**10.335.635**								
3/8	**10.335.666**	**10.335.636**								
7/16	**10.335.667**	**10.335.637**								
1/2	**10.335.668**	**10.335.638**								
9/16	**10.335.669**	**10.335.639**								
1/8 SS	**10.335.671**	**10.335.641**								
1/8 LS	**10.335.672**	**10.335.642**								

Tap Adapter — Size 2

Tap Size	Torque Control Adapter	Positive Drive Adapter	øA1	øA2	øB	C	E1	E2	L1	L2
5/16	**10.335.675**	**10.335.645**	1.970	1.890	1.220	1.181	2.717	1.811	1.339	.433
3/8	**10.335.676**	**10.335.646**								
7/16	**10.335.677**	**10.335.647**								
1/2	**10.335.678**	**10.335.648**								
9/16	**10.335.679**	**10.335.649**								
5/8	**10.335.680**	**10.335.650**								
11/16	**10.335.681**	**10.335.651**								
3/4	**10.335.682**	**10.335.652**								
13/16	**10.335.683**	**10.335.653**								
7/8	**10.335.684**	**10.335.654**								
1/4 P	**10.335.686**	**10.335.656**								
3/8 P	**10.335.687**	**10.335.657**								
1/2 P	**10.335.688**	**10.335.658**								

Designed for Circular Milling of Internal or External Grooves

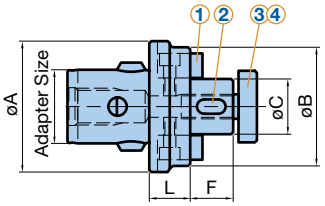
Groove Milling Cutters with Carbide Inserts

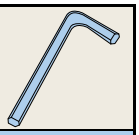
	Catalog Number	Insert Type	E	B	Bore Range	Application Code	Catalog Number
	**10.958.008** 	Type 0 	.045	.027	.472-.945	ST	**10.958.051**
						CI	**10.958.052**
						AL	**10.958.053**
			.053	.039	.472-.945	ST	**10.958.055**
						CI	**10.958.056**
						AL	**10.958.057**
			–	–	–		**10.958.048**
	**10.958.010** 	Type 1 	.045	.027	.866-1.340	ST	**10.958.061**
						CI	**10.958.062**
						AL	**10.958.063**
			.053	.039	.866-1.340	ST	**10.958.065**
						CI	**10.958.066**
						AL	**10.958.067**
			–	–	–		**10.958.048**
	10.958.021 		.065	.043	1.340-1.970	ST	**10.958.071**
						CI	**10.958.072**
						AL	**10.958.073**
			.075	.055	1.340-1.970	ST	**10.958.075**
						CI	**10.958.076**
						AL	**10.958.077**
			–	–	–		**10.958.048**
	**10.958.031** 		.087	.063	1.970-3.350	ST	**10.958.081**
						CI	**10.958.082**
						AL	**10.958.083**
			.106	.075	1.970-3.350	ST	**10.958.085**
						CI	**10.958.086**
						AL	**10.958.087**
			–	–	–		**10.958.048**
	10.958.041 	Type 2 	.126	.082	3.350-8.270	ST	**10.958.091**
						CI	**10.958.092**
						AL	**10.958.093**
			.165	.098	3.350-8.270	ST	**10.958.095**
						CI	**10.958.096**
						AL	**10.958.097**
			–	–	–		**10.958.049**

Application Codes
CI .....Cast Iron
ST .....Steel
AL .....Aluminum
....Clamping Screw (10 screws & 1 wrench)

Groove Milling Tool Adapters

For Groove Mills without KAB tool connection.

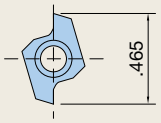
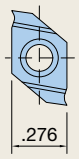
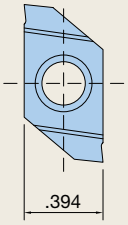


Type				
	1 Drive Key	2 Slotting Key	3 Mounting Screw	4 Hex Wrench
16	**10.691.605**	**10.691.600**	**10.690.703**	**10.690.805**
27	**10.690.607**	**10.691.602**	**10.690.705**	**10.690.807**

Catalog Number	Type	Adapter Size	øA	øB	øC	L	F
10.335.420	16	KAB4	1.535	1.456	16mm	.709	.669
10.335.423		KAB5	1.970	1.575	16mm	.787	.669
10.335.430		KAB6	2.500	1.575	16mm	.787	.669
10.335.425	27	KAB5	1.970	2.087	27mm	.787	.827
10.335.432		KAB6	2.500	2.283	27mm	.787	.827

Blank Inserts

Periphery ground without rake angle and chip breakers.

Type 0	Grade	Catalog Number	Type 1	Grade	Catalog Number	Type 2	Grade	Catalog Number
E max .157 B max .039 	C3	**10.958.313**	E max .157 B max .075 	C3	**10.958.157**	E max .236 B max .098 	C3	**10.958.155**
	C5	**10.958.314**		C5	**10.958.158**		C5	**10.958.156**

Technical Information:

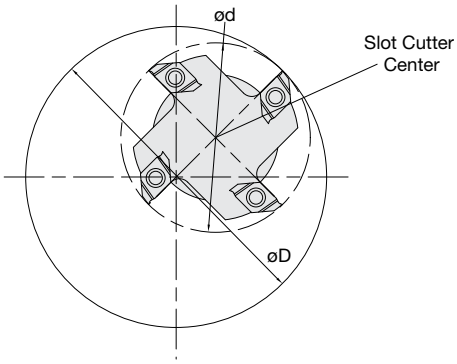
In all circular milling operations the programmed feed rate S applies to the center of the milling cutter.
This may be computed as follows:

$$S = S1 \times \frac{D-d}{D}$$

Where:
S = Feed rate for cutter center to be programmed in in/min
S1 = Circumferential feed in in/min from table
D = Bore diameter

Speeds & Feeds

Cutter Dia.		Cutter Speed & Feed		
		Steel: 328 SFM	Cast Iron: 427 SFM	Alum: 591 SFM
.827	Speed	1500 RPM	2000 RPM	2700 RPM
	S1	11.8 IPM	15.7 IPM	21.3 IPM
1.299	Speed	1000 RPM	1300 RPM	1800 RPM
	S1	11.8 IPM	15.4 IPM	21.3 IPM
1.890	Speed	650 RPM	850 RPM	1200 RPM
	S1	10.2 IPM	13.4 IPM	18.9 IPM
3.268	Speed	380 RPM	500 RPM	700 RPM
	S1	9.0 IPM	11.8 IPM	16.5 IPM



These values relate to the milling cutter circumference and apply under normal working conditions. Climb-cut milling is recommended with helical or tangential plunging to groove depth assuming a continuous program cycle without feed interruption.

Kaiser boring tools are designed with replaceable insert holders which permit the use of ISO standard inserts. This feature permits the use of the most varied forms, grades, and geometries offered from a wide variety of manufacturers.

Our insert selection on the following pages contains a large assortment of indexable inserts specially selected for boring with single cutter and twin cutter boring tools. Each insert has been tested and evaluated under the most diverse conditions to meet specific application requirements.

Optimal Conditions:

- Length to diameter ratio less than 4:1
- Good machine spindle
- Rigid fixture and workpiece
- Setup not chatter-prone

Critical Conditions:

- Interrupted cut
- Unstable fixture and/or workpiece
- Excessive spindle looseness
- Setup chatter-prone

Grade Selection

Material	Finish Boring				Rough Boring			
	Optimal Conditions		Critical Conditions		Optimal Conditions		Critical Conditions	
	1st Choice	2nd Choice	1st Choice	2nd Choice	1st Choice	2nd Choice	1st Choice	2nd Choice
Mild Steels 10XX-15XX 1018, 1020, 1551	CT51	TN11	ALCR10	TAN18	TN11	TN12	TN11	TN12
High Carbon–Alloy Steels 23XX-92XX, 4130, 4340, 8620	CT51	TN11	ALCR10	RB10	TN11	TN12	TN12	C2
300 Series Stainless Steel 304, 316, 17-4ph	ALCR10	RB10	TAN18	C2	TN12	RB10	TAN17	C2
400 Series Stainless Steel Martensitic	ALCR10	TN11	TAN18	C2	TN11	RB10	TAN17	C2
Grey Cast Iron Class 30	CBN-CH	CBN-CHN	TAN18	C2	TN14	TAN17	TN14	TAN17
Ductile/Nodular Cast Iron	TAN18	TN11	TAN18	C2	TN14	TAN17	TN14	TAN17
High Temp. Alloys Titanium, Inconel, Monel, etc.	ALCR10	TAN17	ALCR10	C2	TAN17	C2	TAN17	C2
Brass and Bronze	ALCR10	TAN18	C2	C3	C2	—	C2	—
Aluminum	PCD	TAN18	TAN18	C3	C3	—	C3	—
Hardened Steel	CBN	RB10	—	—	—	—	—	—

Insert Grade Descriptions

Grade	Remarks
C2/6	Tough substrate for heavy interruption
C3	Uncoated micro grain with high positive ground/polished chip breaker
TN11	TiCN, Al2O3, TiN—Superb general purpose roughing & finishing grade
TN12	TiN, TiC, TiN—Extremely tough grade for heavy interruption and stainless steels
TN14	TiCN, Al2O3, TiN—Excellent toughness for heavy roughing and interruption in cast iron
TN15	TiC, Al2O3, TiN—Optimal tool life for outer insert of I.C. drills in carbon steels
TN16	TiC, Al2O3—Optimal tool life for outer insert of I.C. drills in cast irons
TAN17	TiAlN—Good wear resistance in high nickel alloys, i.e. titanium, inconel
TAN18	TiAlN—Excellent wear resistance in steel/cast iron combined w/ ideal edge prep in optimal/critical conditions
ALCR10	ALCrN (Alcrona)—Excellent wear resistance in stainless steel/high nickel alloys combined w/ ideal edge prep in optimal/critical conditions
CT51	Cermet—Highest wear resistance for general purpose boring
RB10	Highest achievable hardness, coating gives outstanding life in hardened carbon steels (30-50Rc)
CBN-CH/CBN-CHN	Cubic Boron Nitride—High speed finishing of cast iron combined with excellent wear resistance
PCD	Poly-Crystalline Diamond—High speed finishing of aluminum combined with excellent wear resistance
CBN	Finishing hardened materials >50Rc
Si3N4	Silicon Nitride—Roughing/finishing grey cast iron, speeds in excess of 3000 SFM achievable
ALG10	Aluminum Oxide—For most cast irons

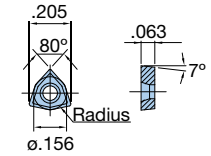
Grade & Material Group	Application Codes	Finish Boring			Rough Boring					
		WC..02	TP..07	TC..11	CC..06	CC..09	CC..12	CC..16	SC..09	SC..12
Grade: C2 Uncoated Carbide Cast Iron, Brass, High Temp. Alloys	4, 6	**11.655.605** R=.008	–	**11.655.315** R=.008	**11.654.858** R=.008	**11.654.957** R=.016	**11.654.989** R=.016	**10.654.997** R=.031	**11.654.249** R=.016	**11.654.344** R=.016
				11.655.325 R=.016	**11.654.864** R=.031	**11.654.958** R=.031	**11.654.991** R=.031		**11.654.259** R=.031	**11.654.359** R=.031
				11.655.335 R=.031						
Grade: C3 Uncoated Carbide Aluminum, Magnesium	1, 5	**10.655.605** R=.004	**10.651.823** R=.004	**10.655.378** R=.008	**10.654.877** R=.008	**10.654.977** R=.016	**10.654.995** R=.016	**10.654.998** R=.031	**10.654.277** R=.016	**10.654.387** R=.031
			10.651.723 R=.012	**10.655.388** R=.016	**10.654.888** R=.016					
		10.655.601 R=.008	**11.651.923** R=.031	**10.655.398** R=.031	**11.658.898** R=.031	**10.654.987** R=.031	**10.654.992** R=.031		**10.654.287** R=.031	
Grades: TN11/TN15 Coated Carbide Steel, Cast Iron	1, 2	**11.655.607** R=.008	**11.651.909** R=.012	**11.655.311** R=.008	**11.654.840** R=.008	**11.654.940** R=.016	**11.654.993** R=.016	**11.654.996** R=.031	**11.654.240** R=.016	**11.654.350** R=.016
				11.655.321 R=.016	**11.654.850** R=.016					
				11.655.331 R=.031	**11.654.860** R=.031	**11.654.952** R=.031	**11.654.990** R=.031		**11.654.250** R=.031	**11.654.360** R=.031
Grade: TN12 Coated Carbide Steel, Stainless Steel	3, 4	–	–	**11.655.316** R=.016	**11.654.853** R=.016	**11.654.943** R=.016	**11.654.983** R=.031	–	**11.654.247** R=.016	**11.654.353** R=.031
				11.655.336 R=.031	**11.654.869** R=.031	**11.654.953** R=.031			**11.654.200** R=.031	
Grade: TN14 Coated Carbide Cast Iron	4, 6	–	–	–	**11.654.854** R=.016	**11.654.956** R=.031	**11.654.971** R=.031	**11.654.994** R=.031	**11.654.252** R=.031	**11.654.352** R=.031
Grades: CT51/52 Cermet Steel, Stainless Steel, Cast Iron	1, 2	**10.655.600** R=.008	**10.651.802** R=.008	**11.656.352** R=.008	**11.654.856** R=.008	**11.654.959** R=.016	**11.654.984** R=.031	–	–	–
		11.655.606 R=.016	**10.651.702** R=.016	**11.655.322** R=.016	**11.654.865** R=.016	**11.654.960** R=.031				
				11.655.332 R=.031	**11.654.867** R=.031					
Grades: TAN17/TN16 Coated Carbide Cast Iron	5, 6	–	**11.651.907** R=.012	**11.655.356** R=.008	**11.654.868** R=.016	**11.654.968** R=.016	**11.654.978** R=.031	**11.656.370** R=.031	–	**11.654.364** R=.031
				11.655.355 R=.016		**11.654.969** R=.031				
Grade: TAN18 Coated Carbide Steel, Stainless Steel, Cast Iron, Aluminum	1, 3	**10.655.605** R=.004	**10.651.824** R=.004	**10.655.373** R=.008	**11.654.845** R=.016	**11.654.974** R=.031	**11.654.979** R=.031	–	–	–
		10.655.603 R=.008	**10.651.833** R=.008	**10.655.383** R=.016						
			10.651.734 R=.016	**10.655.393** R=.031						
Grade: ALCR10 Coated Carbide Stainless Steel, High Temp. Alloys	1, 9	**10.655.606** R=.004	**10.651.837** R=.008	**10.655.379** R=.008	–	–	–	–	–	–
		10.655.602 R=.008	**10.651.737** R=.012	**10.655.389** R=.016						
				10.655.399 R=.031						
Grades: PCD, PCD-CB Poly-Crystalline Diamond Aluminum, Magnesium	1, 10	**11.938.845** R=.008	**10.938.840** R=.012	**10.938.841** R=.016	**11.938.847** R=.008	**10.938.843** R=.016	**10.938.871** R=.031	–	–	**11.654.364** R=.031
			11.938.831 R=.012	**11.938.860** R=.031	**11.938.842** R=.016	**10.938.851** R=.031				
Grades: CBN, CBN-CH Cubic Boron Nitride Cast Iron, Hardened Steel	7, 10	**11.938.846** R=.008	**10.938.837** R=.012	**10.938.834** R=.016	**11.938.835** R=.016	**11.938.838** R=.016	**10.938.862** R=.031	–	–	–
		11.938.863 R=.008	**10.938.836** R=.012	**10.938.865** R=.031						
Grade: Si3N4 Silicon Nitride — Cast Iron	2, 10	–	–	–	**11.654.841**	**11.654.951**	**11.654.980**	–	–	**10.688.619**

Application Codes

1. Normal working conditions, rigid tool combination, workpiece well clamped
2. High production boring at high speed under favorable conditions
3. Unfavorable conditions, long tools, unstable workpiece or fixtures
4. Boring with interrupted cutting, impact loading
5. Boring or drilling of non-ferrous materials
6. Boring cast iron, nickel based, or high temp. alloys
7. Boring of hardened steel alloys (min. Rc50)
8. Boring of structural and alloyed steels
9. Boring of stainless steels and long chipping materials
10. High speed boring

WC..02

Form 1

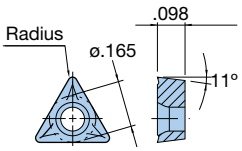


Form 2

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
CT51	.008	**10.655.600**	WC020815C8CTP51	15	1	1, 2
CT51	.016	**11.655.606**	WC021615C8CTP51	15	1	1, 2
TN11	.008	**11.655.607**	WC020815C7TNP11	15	1	1, 2
C7	.008	**11.655.605**	WC020815C7P	15	1	4, 6
RB10	.008	**11.655.610**	WC020815C7RBP10	15	1	6, 9
Chip Breakers Ground						
CT51	.004	**10.655.604**	WC020423C8CTG51	23	1	3
CT51	.008	**10.655.601**	WC020823C8CTG51	23	1	1, 3
TAN18	.004	**10.655.605**	WC020423C3TAN18	23	1	3
TAN18	.008	**10.655.603**	WC020823C3TAN18	23	1	1, 2
ALCR10	.004	**10.655.606**	WC020423C2ALCR10	23	1	3
ALCR10	.008	**10.655.602**	WC020823C2ALCR10	23	1	1, 9
PCD & CBN						
PCD	.008	**11.938.845**	WC020800PCD	0	2	1, 10
CBN	.008	**11.938.846**	WC020800CBN	0	2	7
CBN-CHN	.008	**11.938.863**	WC020800CBN-CHN	0	2	5, 10

TP..07

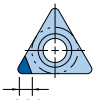
Form 1



Form 2

Form 3

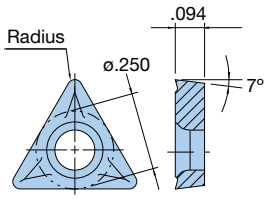
Form 4



Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
CT51	.008	**10.651.802**	TP070815C8CTP51	15	1	1, 2
CT51	.016	**10.651.702**	TP071615C8CTP51	15	1	1, 2
Chip Breakers Ground						
C3	.004	**10.651.823**	TP070425C3G	25	2	3
C3	.008	**10.651.825**	TP070825C3G	25	2	10
C3	.012	**10.651.723**	TP071225C3G	25	2	1, 5
C3	.016	**10.651.725**	TP071625C3G	25	2	10
C3	.031	**11.651.923**	TP073125C3G	25	2	2, 4
CT51	.008	**10.651.835**	TP070815CTG51	15	2	3
CT51	.012	**10.651.736**	TP071218CTG51	18	2	3, 4
TAN18/C8	.008	**10.651.833**	TP070815C8TAN18	15	2	3, 8
TAN18/C8	.016	**10.651.734**	TP071615C8TAN18	15	2	1, 8
TAN18/C3	.004	**10.651.824**	TP070425C3TAN18	25	2	3
TAN18/C3	.012	**10.651.735**	TP071225C3TAN18	25	2	1, 6
ALCR10	.008	**10.651.837**	TP070823C2ALCR10	23	2	3
ALCR10	.012	**10.651.737**	TP071223C2ALCR10	23	2	1, 9
TAN17	.012	**11.651.907**	TP071210C6TAN17	10	2	6
RB10	.012	**10.651.841**	TP071225C3RBG10	25	2	4, 7
Without Chip Breakers						
C3	.012	**10.651.623**	TP071205C3G	0	3	1, 4
TAN18/C3	.012	**10.651.632**	TP071205C3TAN18	0	3	1, 2
PCD & CBN						
PCD	.012	**10.938.840**	TP071205PCD	0	4	1, 5
PCD	.031	**11.938.830**	TP073100PCD	0	4	1, 5
PCD-CB	.012	**11.938.831**	TP071225PCD-CB	25	4	5, 10
CBN	.012	**10.938.837**	TP071205CBN	0	4	7
CBN-CH	.012	**10.938.836**	TP071205CBN-CH	0	4	1
CBN-CHN	.012	**11.938.872**	TP071200CBN-CHN	0	4	3

KAISER®

Form 1



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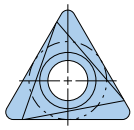

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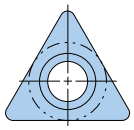

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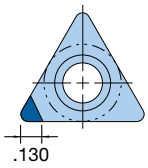


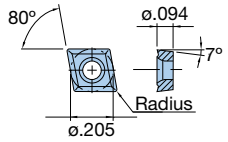
Application Codes

1. Normal working conditions, rigid tool combination, workpiece well clamped
2. High production boring at high speed under favorable conditions
3. Unfavorable conditions, long tools, unstable workpiece or fixtures
4. Boring with interrupted cutting, impact loading
5. Boring or drilling of non-ferrous materials
6. Boring cast iron, nickel based, or high temp. alloys
7. Boring of hardened steel alloys (min. Rc50)
8. Boring of structural and alloyed steels
9. Boring of stainless steels and long chipping materials
10. High speed boring

TC..11

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C2	.008	**11.655.315**	TC110815C2P	15	1	3, 6
C2	.016	**11.655.325**	TC111615C2P	15	1	4, 6
C2	.031	**11.655.335**	TC113115C2P	15	1	4, 6
CT51	.008	**11.656.352**	TC110815C8CTP51	15	1	3, 8
CT51	.016	**11.655.322**	TC111615C8CTP51	15	1	2
CT51	.031	**11.655.332**	TC113115C8CTP51	15	1	2
CT51	.016	**11.655.327**	TC111615C8CTP51W	15	1	1, 2
TN11	.008	**11.655.311**	TC110815C7TNP11	15	1	3, 8
TN11	.016	**11.655.321**	TC111615C7TNP11	15	1	1, 8
TN11	.031	**11.655.331**	TC113115C7TNP11	15	1	1, 8
TN12	.016	**11.655.316**	TC111615C5TNP12	15	1	4
TN12	.031	**11.655.336**	TC113115C5TNP12	15	1	4
TAN17	.008	**11.655.356**	TC110815C2TAN17	15	1	6
TAN17	.016	**11.655.355**	TC111615C2TAN17	15	1	6
RB10	.016	**11.655.370**	TC111615C2RBP10	15	1	4, 7
Chip Breakers Ground						
C3	.008	**10.655.378**	TC110823C3G	23	2	3
C3	.016	**10.655.388**	TC111623C3G	23	2	3
C3	.016	**10.655.387**	TC111620C3G	20	2	10
C3	.031	**10.655.398**	TC113123C3G	23	2	1
C3	.031	**10.655.397**	TC113120C3G	20	2	10
CT51	.008	**10.655.372**	TC110815CTG51	15	2	3
CT51	.016	**10.655.386**	TC111618CTG51	18	2	3, 4
TAN18/C8	.008	**10.655.371**	TC110815C8TAN18	15	2	3, 8
TAN18/C8	.016	**10.655.381**	TC111615C8TAN18	15	2	1, 8
TAN18/C3	.004	**10.655.363**	TC110423C3TAN18	23	2	3
TAN18/C3	.008	**10.655.373**	TC110823C3TAN18	23	2	1, 6
TAN18/C3	.016	**10.655.383**	TC111623C3TAN18	23	2	2
TAN18/C3	.031	**10.655.393**	TC113123C3TAN18	23	2	2
ALCR10	.008	**10.655.379**	TC110823C2ALCR10	23	2	3
ALCR10	.016	**10.655.389**	TC111623C2ALCR10	23	2	1, 9
ALCR10	.031	**10.655.399**	TC113123C2ALCR10	23	2	1, 9
RB10	.016	**11.655.371**	TC111623C3RBG10	23	2	3, 7
Without Chip Breakers						
C3	.016	**10.655.305**	TC111600C3G	0	3	1, 4
C3	.031	**10.655.306**	TC113100C3G	0	3	1
AL10	.008	**10.655.301**	TC110800C3ALG10	0	3	3
AL10	.016	**10.655.302**	TC111600C3ALG10	0	3	1
AL10	.031	**10.655.303A**	TC113100C3ALG10	0	3	2
PCD & CBN						
PCD	.008	**11.938.861**	TC110805PCD	0	4	1, 5
PCD	.016	**10.938.841**	TC111605PCD	0	4	1, 5
PCD	.031	**11.938.860**	TC113100PCD	0	4	2, 10
PCD-CB	.016	**11.938.832**	TC111625PCD-CB	25	4	5, 10
PCD	.031	**11.938.873**	TC113100PCDW	0	4	2, 10
CBN	.016	**10.938.834**	TC111605CBN	0	4	7
CBN	.031	**10.938.865**	TC113100CBN	0	4	7
CBN-CH	.016	**11.938.833**	TC111605CBN-CH	0	4	1
CBN-CH	.031	**11.938.849**	TC113100CBN-CH	0	4	1
CBN-CHN	.016	**11.938.864**	TC111600CBN-CHN	0	4	3

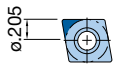
Form 1



Form 2

Form 3

Form 4

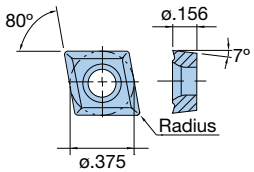


Form 5

CC..06

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C2	.016	**11.654.858**	CC061615C2P	15	1	4, 6
C2	.031	**11.654.864**	CC063115C2P	15	1	4, 6
CT52	.008	**11.654.856**	CC060815C7CTP52	15	1	3, 8
CT51	.016	**11.654.865**	CC061615C8CTP51	15	1	2
CT51	.031	**11.654.867**	CC063115C8CTP51	15	1	2
TN11	.008	**11.654.840**	CC060815C7TNP11	15	1	3, 8
TN11	.016	**11.654.850**	CC061615C7TNP11	15	1	1, 8
TN11	.031	**11.654.860**	CC063115C7TNP11	15	1	1, 8
TN12	.016	**11.654.853**	CC061615C5TNP12	15	1	4
TN12	.031	**11.654.869**	CC063115C5TNP12	15	1	4
TN14	.016	**11.654.854**	CC061615C2TNP14	15	1	4, 6
TAN17	.016	**11.654.868**	CC061615C2TAN17	15	1	6
RB10	.016	**11.654.963**	CC061615C2RBP10	15	1	4, 7
Chip Breakers Ground						
C3	.008	**10.654.877**	CC060823C3G	23	2	3
C3	.016	**10.654.888**	CC061623C3G	23	2	1
C3	.031	**11.654.898**	CC063123C3G	23	2	1
TAN18/C3	.016	**11.654.845**	CC061623C3TAN18	23	2	2
Without Chip Breakers						
Si3N4	.016	**11.654.841**	CC061600Si3N4	0	3	1, 6
PCD & CBN						
PCD	.008	**11.938.847**	CC060800PCD	0	4	3, 5
PCD	.016	**11.938.842**	CC061600PCD	0	4	1, 5
PCD-FB	.008	**11.938.823**	CC060800PCD-FB	0	5	3, 5
PCD-FB	.016	**11.938.824**	CC061600PCD-FB	0	5	1, 5
CBN-CH	.016	**11.938.835**	CC061600CBN-CH	0	4	1

Form 1



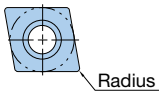
Form 2

CC..09

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C2	.016	**11.654.957**	CC091615C2P	15	1	4, 6
C2	.031	**11.654.958**	CC093115C2P	15	1	4, 6
CT51	.016	**11.654.959**	CC091615C8CTP51	15	1	2
CT51	.031	**11.654.960**	CC093115C8CTP51	15	1	2
TN11	.016	**11.654.940**	CC091615C7TNP11	15	1	1, 8
TN11	.031	**11.654.952**	CC093115C7TNP11	15	1	1, 8
TN12	.016	**11.654.943**	CC091615C5TNP12	15	1	4
TN12	.031	**11.654.953**	CC093115C5TNP12	15	1	4
TN14	.031	**11.654.956**	CC093115C2TNP14	15	1	4, 6
TAN17	.016	**11.654.968**	CC091615C2TAN17	15	1	6
TAN17	.031	**11.654.969**	CC093115C2TAN17	15	1	6
RB10	.031	**11.654.964**	CC093115C2RBP10	15	1	4, 7
Chip Breakers Ground						
C3	.016	**10.654.977**	CC091623C3G	23	2	1
C3	.031	**10.654.987**	CC093123C3G	23	2	1
TAN18/C3	.031	**11.654.974**	CC093123C3TAN18	23	2	2

CC..09 Cont.

Form 3



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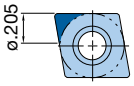
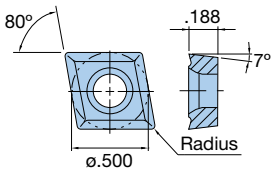


Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Without Chip Breakers						
Si3N4	.031	**11.654.951**	CC093100Si3N4	0	3	1, 6
PCD & CBN						
PCD	.016	**11.938.843**	CC091600PCD	0	4	1, 5
PCD	.031	**11.938.851**	CC093100PCD	0	4	1, 5
CBN-CH	.016	**11.938.838**	CC091600CBN-CH	0	4	1

CC..12

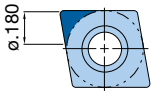
Form 1



Form 2

Form 3

Form 4



Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C2	.016	**11.654.989**	CC121615C2P	15	1	4, 6
C2	.031	**11.654.991**	CC123115C2P	15	1	4, 6
CT52	.031	**11.654.984**	CC123115C7CTP52	15	1	1, 8
TN11	.016	**11.654.993**	CC121615C7TNP11	15	1	1, 8
TN11	.031	**11.654.990**	CC123115C7TNP11	15	1	1, 8
TN12	.031	**11.654.983**	CC123115C5TNP12	15	1	4
TN14	.031	**11.654.971**	CC123115C2TNP14	15	1	4, 6
TAN17	.031	**11.654.978**	CC123115C2TAN17	15	1	6
RB10	.031	**11.654.965**	CC123115C2RBP10	15	1	4, 7
Chip Breakers Ground						
C3	.016	**10.654.995**	CC123123C3G	23	2	1
C3	.031	**10.654.992**	CC123123C3G	23	2	1
TAN18/C3	.031	**11.654.979**	CC123123C3TAN18	23	2	2
Without Chip Breakers						
Si3N4	.031	**10.654.980**	CC123100Si3N4	0	3	1, 6
PCD & CBN						
PCD	.031	**10.938.871**	CC123100PCD	0	4	2
CBN	.031	**10.938.862**	CC123100CBN	0	4	1, 6

CC..16

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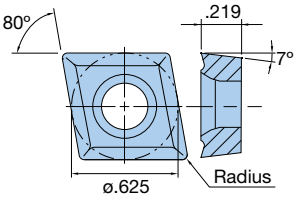

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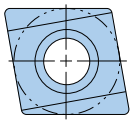
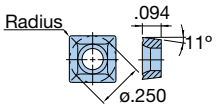


Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C3	.031	**10.654.997**	CC163115C3P	15	1	4, 6
C6	.031	**10.654.999**	CC163115C6P	15	1	3, 9
TN11	.031	**11.654.996**	CC163115C7TNP11	15	1	1, 8
TN14	.031	**10.654.996**	CC163115C6TNP14	15	1	1, 9
TN14	.031	**11.654.994**	CC163115C2TNP14	15	1	4, 6
TN16	.031	**11.656.370**	CC163115C6TNP16	15	1	4
Chip Breakers Ground						
C3	.031	**10.654.998**	CC163123C3G	23	2	1

Application Codes

1. Normal working conditions, rigid tool combination, workpiece well clamped
2. High production boring at high speed under favorable conditions
3. Unfavorable conditions, long tools, unstable workpiece or fixtures
4. Boring with interrupted cutting, impact loading
5. Boring or drilling of non-ferrous materials
6. Boring cast iron, nickel based, or high temp. alloys
7. Boring of hardened steel alloys (min. Rc50)
8. Boring of structural and alloyed steels
9. Boring of stainless steels and long chipping materials
10. High speed boring

Form 1

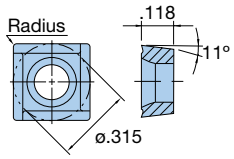


Form 2

SP..06

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
TN11	.008	**10.654.140**	SP060815C7TNP11	15	1	3, 8
TN11	.016	**10.654.150**	SP061615C7TNP11	15	1	1, 8
TN16	.016	**10.654.152**	SP061615C2TNP16	15	1	4
C2	.016	**10.654.158**	SP061615C2P	15	1	4, 6
Chip Breakers Ground						
C3	.016	**10.654.168**	SP061623C3G	23	2	1

Form 1

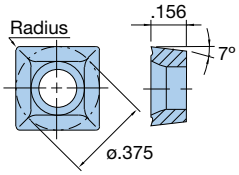


Form 2

SP..08

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C3	.020	**10.654.187**	SP082023C3G	23	1	1
C6	.020	**10.654.183**	SP082010C6G	10	1	1, 8
Chip Breakers Ground						
C2	.020	**10.654.128**	SP082005C2G	0	2	1

Form 1



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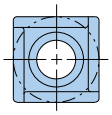
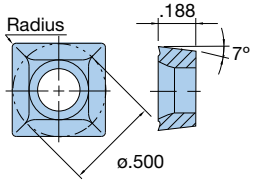


SC..09

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C2	.016	**11.654.249**	SC091615C2P	15	1	4, 6
C2	.031	**11.654.259**	SC093115C2P	15	1	4, 6
TN11	.016	**11.654.240**	SC091615C7TNP11	15	1	1, 8
TN11	.031	**11.654.250**	SC093115C7TNP11	15	1	4
TN12	.016	**11.654.247**	SC091615C5TNP12	15	1	4
TN12	.031	**11.654.200**	SC093115C5TNP12	15	1	4
TN14	.031	**11.654.252**	SC093115C2TNP14	15	1	4, 6
Chip Breakers Ground						
C3	.016	**10.654.277**	SC091623C3G	23	2	3
C3	.031	**10.654.287**	SC093123C3G	23	2	1

Form 1



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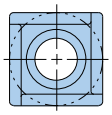
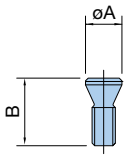
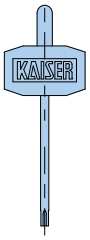


SC..12

Grade	Radius	Catalog Number	Designation	Rake Angle	Form	Application Codes
Chip Breakers Pressed						
C2	.031	**11.654.359**	SC123115C2P	15	1	4, 6
TN11	.016	**11.654.340**	SC121615C7TNP11	15	1	1, 8
TN11	.031	**11.654.350**	SC123115C7TNP11	15	1	1, 8
TN11	.047	**11.654.360**	SC124715C7TNP11	15	1	4
TN12	.031	**11.654.353**	SC123115C5TNP12	15	1	4
TN14	.031	**11.654.352**	SC123115C2TNP14	15	1	4, 6
RB10	.031	**11.654.365**	SC123115C2RBP10	15	1	4, 7
Chip Breakers Ground						
C3	.031	**10.654.387**	SC123123C3G	23	2	1

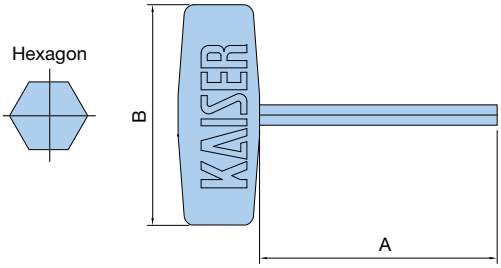




Insert Style & Size	Insert Screws*	Thread Size	øA	B	Torx Wrench	Torx Size	Screws Per Package
TPGT07	**10.694.103**	M2.0	.106	.189	**10.694.806**	T6 IP	10
TCMT11	**10.694.122**	M2.5	.138	.256	**10.694.807**	T7 IP	10
CCMT06	**10.694.122**	M2.5	.138	.256	**10.694.807**	T7 IP	10
CCMT09	**10.694.141**	M4.0	.200	.362	**10.694.815**	T15 IP	10
CCMT12	**10.694.150**	M5.0	.276	.512	**10.694.820**	T20 IP	10
CCMT16	**10.694.150**	M5.0	.276	.512	**10.694.820**	T20 IP	10
SPGT08	**10.694.121**	M2.5	.169	.216	**10.694.807**	T7 IP	10
SCMT09	**10.694.141**	M4.0	.200	.362	**10.694.815**	T15 IP	10
SCMT12**	**10.694.144**	M4.0	.251	.591	**10.694.820**	T20 IP	10
WCMT02	**10.694.101**	M2.0	.106	.142	**10.694.806**	T6 IP	10
WCMT03	**10.694.110**	M2.2	.138	.236	**10.694.807**	T7 IP	10
WCMT04	**10.694.124**	M2.5	.138	.248	**10.694.807**	T7 IP	10
WCMT05	**10.694.131**	M3.0	.173	.323	**10.694.809**	T9 IP	10
WCMT06	**10.694.137**	M3.5	.189	.362	**10.694.810**	T10 IP	10
WCMT08	**10.336.905**	M4.0	.224	.323	**10.690.843**	T15	10
WCMT10	**10.694.150**	M5.0	.276	.512	**10.694.820**	T20 IP	10

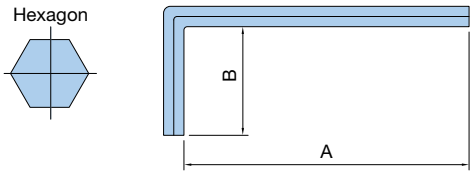
*One wrench supplied per package of insert screws
For **10.637.151 insert holders, use insert screw **10.694.142**

T-Handle Hex-Allen Wrenches



Catalog Number	Hex Size	A	B
10.690.811	2mm	2.000	1.770
10.690.812	2.5mm	2.000	1.770
10.690.813	3mm	2.000	1.770
10.690.814	4mm	2.000	1.770
10.690.816	5mm	2.750	2.560
10.690.817	6mm	2.750	2.560

Hex-Allen Wrenches



Catalog Number	Hex Size	A	B
10.690.833	1.3mm	1.650	.550
10.690.800	1.5mm	2.000	.550
10.690.801	2mm	2.000	.620
10.690.802	2.5mm	2.200	.710
10.690.803	3mm	2.500	.780
10.690.804	4mm	2.800	1.000
10.690.805	5mm	3.100	1.100
10.690.806	6mm	3.500	1.200
10.690.807	8mm	4.000	1.400
10.690.810	10mm	4.400	1.570
10.690.808	10mm	7.800	1.570
10.690.809	12mm	4.900	1.800

The MAGIS is a new line of tool presetting and measuring systems & controls which revolutionizes the way one uses software in tool measuring. In today's world, software companies add screens, windows and menus in order to give the user more features. Speroni's MAGIS control for tool presetting and measuring combines all of the needed features and functions in a user friendly, clean and trouble free single screen user interface.

Specifications	MAGIS 400	MAGIS 500	MAGIS 600
Z Axis	400mm/15.75"	500mm/19.69"	600mm/23.62"
X Axis	400mm/15.75"	400mm/15.75"	400mm/15.75"
Max ø	350mm/13.78"	350mm/13.78"	350mm/13.78"
Axis Resolution	1µ	1µ	1µ
T.I.R. @ 300mm	<5µ	<5µ	<5µ
Spindle Concentricity	1µ	1µ	1µ
Axis Positioning Repeatability (+/-)	2µ	2µ	2µ

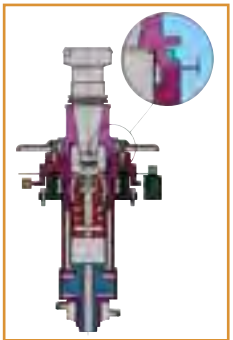
Ergonomically designed fine adjustment hand wheels allow for micron precise smooth adjustments of both X (diameter) and Z (height) axis throughout the system's range of travel.

The integrated high precision vertical rotating spindle is designed according to Speroni's world famous standards of robustness, reliability and unmatched precision - 1µ concentricity. A pneumatically activated spindle disk brake and an ergonomic hand wheel are included for optimum focusing and adjustment of the tool cutting edge.

Mounted directly on the system's structure, micron precise Heidenhain® glass scales, state of the art Schneeberger® guideways, together with the largest and toughest recirculating ball bearing contact surface in its class, guarantee the highest precision and repeatability along the system's entire measuring range. Integrated cable carriers are present in both the X axis (base) and Z axis (column).

The Esperia line of tool presetters represents over 45 years of experience in the manufacturing of high quality tool presetting and measuring equipment. As with all of Speroni's tool presetters, the structure is made completely of aged pearlitic cast iron in order to guarantee the best thermal stability. These tool presetting and measuring machines are the most rugged, dependable machines on the market. Designed for shop floor use, these machines provide tool presetting, tool inspection, and tool management along with unmatched repeatability and precision.

Quick-change adapter system allows the changing of adapters in less then 8 seconds, guaranteeing unmatched precision and accuracy.



The uniquely designed "simultaneous fit" adapter clamping system allows for an adapter mount repeatability of .00016" (.004mm).

Optional dual monitors and 17" industrial grade touch screen monitor can be integrated with the keyboard and mouse operation for increased flexibility and ease of use.

TOOL PRO®

A Safer Tool-Assembly Device

The Tool Pro is a unique tool holding device for the assembly and disassembly of tapered V-flange tooling and modular tooling systems. The head can be rotated 360° and locked in 45° increments, allowing convenient access for all operations in one setup.

Steep Taper

Size	Catalog Number
30	**31.300.001**
40	**31.300.002**
45	**31.300.003**
50	**31.300.004**
60	**31.300.020**

HSK Taper

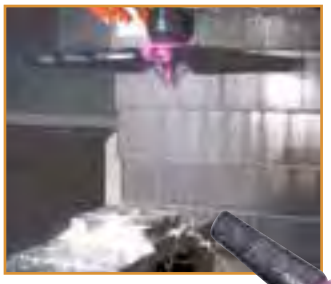
Size	Catalog Number
32A	**31.300.017**
40A	**31.300.015**
50A	**31.300.008**
63A	**31.300.006**
100A	**31.300.005**
125A	**31.300.029**

• HSK Type E/F, VDI and Polygon Taper also available

Chip and Coolant Fans – FAST...SAFE...AUTOMATIC — *In-Process Cleaning Without Stopping Production!*

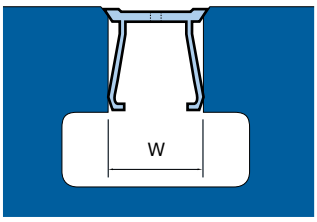
For blowing and rinsing of workpieces and work surfaces quickly and efficiently.

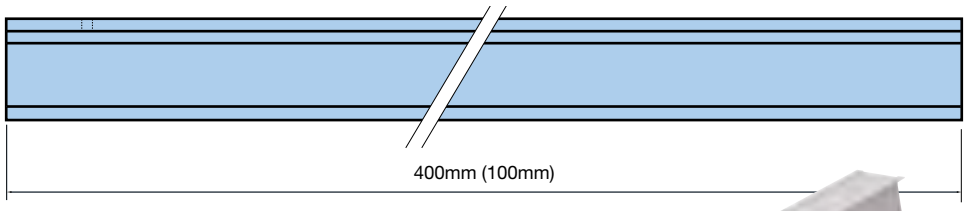
Shank ø	Catalog Number	Description	Blade ø	Speed (RPM)	
				Min	Max
20mm	**24.303.202**	Chip Fan 20mm x 160mm	160mm	6,000	12,000
	24.303.203	Chip Fan 20mm x 260mm	260mm	5,000	8,000
	24.303.201	Chip Fan 20mm x 330mm	330mm	5,000	8,000
3/4"	**24.313.202**	Chip Fan 3/4" x 160mm	6.3"	6,000	12,000
	24.313.203	Chip Fan 3/4" x 260mm	10.2"	5,000	8,000
	24.313.201	Chip Fan 3/4" x 330mm	13.0"	5,000	8,000
Repair Kits	**24.303.206**	Chip Fan Repair Kit 160	6.3" (160mm)	–	–
	24.303.207	Chip Fan Repair Kit 260	10.2" (260mm)	–	–
	24.303.205	Chip Fan Repair Kit 330	13.0" (330mm)	–	–
Springs	**24.303.210**	Replacement Springs (10/pack)	–	–	–



As the machine spindle turns, the blades deploy to provide high volume air cleaning power!

LANG CLEAN-TEC

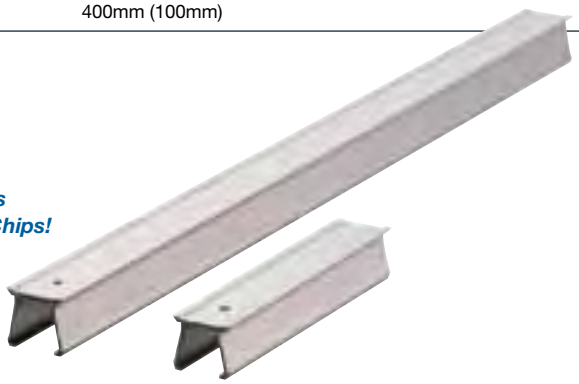




T-SLOT CLEAN PAT.P

Type	Catalog Number	Width W	Contents
Metric	**TS14-S**	14mm	400mm x 4 pieces 100mm x 4 pieces
	TS18-S	18mm	
	TS22-S	22mm	

Keep T-Slots Free From Chips!



• Cost saving sets, long sets and extra long sets also available

Catalog Number	Page Number	Weight (lbs.)
11.112.091	55	11.33
10.112.107	49	3.01
10.112.108	48	2.42
10.112.109	46	2.88
10.112.117	49	3.01
10.112.118	48	2.42
10.112.119	46	2.88
10.112.122	48	4.16
10.112.123	48	3.76
10.112.132	48	4.40
10.112.133	48	3.74
10.112.134	48	3.96
10.112.205	56	.57
10.112.206	56	.58
10.112.215	56	.57
10.112.216	56	.58
10.112.271	56	.06
10.112.272	56	.08
10.112.301A	58	1.19
10.112.304A	58	1.19
10.112.306	58	1.47
10.112.313	58	1.19
10.112.315	58	1.47
10.112.317	58	1.19
10.112.353	58	.11
10.112.385	58	.21
10.112.503	61	.07
10.112.505	61	.29
10.112.513	61	.57
10.112.515	61	.28
10.112.806	48	.35
10.112.817	49	1.98
10.112.819	49	1.98
10.195.081	46	.05
10.195.090	46	.05
31.300.001	123	17.45
31.300.002	123	17.95
31.300.003	123	19.65
31.300.004	123	22.50
31.300.005	123	26.45
31.300.006	123	24.40
31.300.008	123	22.20
31.300.015	123	19.80
31.300.017	123	18.90
31.300.020	123	31.00
12.303.111	55	5.27

Catalog Number	Page Number	Weight (lbs.)
12.303.112	55	6.59
12.303.113	55	6.81
12.303.114	55	7.31
24.303.201	123	.70
24.303.202	123	.55
24.303.203	123	.65
24.303.205	123	.20
24.303.206	123	.10
24.303.207	123	.15
10.309.201	68	.26
10.309.211	68	.26
10.309.301	68	.48
10.309.311	68	.48
10.309.401	68	.88
10.309.411	68	.88
10.309.501	68	1.87
10.309.511	68	1.87
10.309.601	68	3.96
10.309.611	68	3.96
10.310.020	73	.07
10.310.021	73	.07
10.310.030	73	.11
10.310.031	73	.11
10.310.101	70	.17
10.310.111	70	.17
10.310.201	70	.29
10.310.211	70	.29
10.310.301	70	.46
10.310.305A	69	.48
10.310.311	70	.46
10.310.315A	69	.48
10.310.401	70	.88
10.310.405A	69	.90
10.310.411	70	.88
10.310.415A	69	.90
10.310.501	70	1.82
10.310.505A	69	1.78
10.310.511	70	1.82
10.310.515A	69	1.78
10.310.601	70	3.63
10.310.602	70	5.28
10.310.605A	69	3.74
10.310.606A	69	3.85
10.310.607	69	2.97
10.310.608	69	3.89
10.310.611	70	3.63

Catalog Number	Page Number	Weight (lbs.)
10.310.612	70	5.28
10.310.615A	69	3.74
10.310.616A	69	3.85
10.310.617	69	3.74
10.310.618	69	3.74
10.310.701	70	8.47
10.310.705	69	3.74
10.310.706	69	4.97
10.310.708	70	11.79
10.310.711	70	8.47
10.310.715	69	3.74
10.310.716	69	4.97
10.310.718	70	11.79
24.313.201	123	.70
24.313.202	123	.55
24.313.203	123	.65
10.315.101	36	.11
10.315.160	39	.01
10.315.201	36	.22
10.315.250	39	.01
10.315.301	36	.36
10.315.350	39	.02
10.315.401	36	.75
10.315.450	39	.04
10.315.501	36	1.40
10.315.550	39	.07
10.315.601	36	2.84
10.315.602	36	4.07
10.315.603	36	5.54
10.315.650	39	.08
10.315.701	36	6.82
10.315.702	36	9.90
10.315.703	36	12.32
10.315.750	39	.13
10.317.102A	88	3.96
10.317.104	88	2.85
10.317.105	88	4.16
10.317.112A	88	3.96
10.317.114	88	2.85
10.317.115	88	4.16
10.317.193	89	.002
10.317.202	86	6.05
10.317.204	86	6.05
10.317.205	86	.20
10.317.206	86	6.05
10.317.221	86	5.39

Catalog Number	Page Number	Weight (lbs.)
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10.317.224	86	13.64
10.317.225	86	16.94
10.317.226	86	20.02
10.317.227	86	23.32
10.317.231	86	59.40
10.317.232	86	63.80
10.317.233	86	66.00
10.317.234	86	70.40
10.317.235	86	72.60
10.317.236	86	77.00
10.317.237	86	79.20
10.317.238	86	81.40
10.317.252	86	2.73
10.317.253	86	3.83
10.317.254	86	4.97
10.317.255	86	6.07
10.317.256	86	7.19
10.317.257	86	8.36
10.317.261	86	2.52
10.317.274	89	.002
10.317.284	97	2.17
10.317.285	97	1.86
10.317.286	87	.02
10.317.287	87	.03
10.317.288	87	3.78
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10.317.291	87	4.84
10.318.101	82	1.80
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10.318.107	82	1.78
10.318.111	82	1.80
10.318.115	82	1.85
10.318.201N	80	5.50
10.318.202N	80	6.01
10.318.205N	80	4.03
10.318.206N	80	5.10
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10.318.225	80	7.06
10.318.226	80	8.36
10.318.227	80	9.68
10.318.240	81	1.08

Catalog Number	Page Number	Weight (lbs.)
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10.318.421	85	34.30
10.318.422	85	49.30
10.318.423	85	72.60
10.318.424	85	148.70
10.318.425	85	251.20
10.318.431	85	4.84
10.318.432	85	6.60
10.318.433	85	9.02
10.318.434	85	11.20
10.318.435	85	20.90
10.318.441	85	2.86
10.318.442	85	3.30
10.318.443	85	3.52
10.318.444	85	7.48
10.319.101	34	.12
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10.319.201	34	.24
10.319.250	34	.003
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10.319.501	34	1.45
10.319.550	34	.01
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10.319.650	34	.02
10.319.701	34	6.34
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10.319.702N	34	9.06
10.319.703	34	11.33
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10.319.750	34	.07
11.321.541	11	2.50
11.321.551	11	2.60
11.321.562	11	3.00
11.321.564	11	6.00
11.321.952	11	7.00
11.321.962	11	7.00

Catalog Number	Page Number	Weight (lbs.)
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11.321.974	11	8.50
10.322.563	11	4.00
10.323.563	11	4.50
10.323.731N	18	2.86
10.323.770N	18	8.69
10.323.771N	18	10.67
10.323.835N	18	2.09
10.323.870N	18	8.58
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10.324.131	10	.58
10.324.132	10	.56
10.324.141	10	.80
10.324.142	10	.75
10.324.231	10	1.02
10.324.232	10	.97
10.324.241	10	1.14
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10.324.251	10	1.56
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10.324.331	10	1.87
10.324.332	10	2.46
10.324.341	10	2.53
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10.324.361	10	2.75
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10.324.563	10	7.59
10.324.563N	18	7.37
10.324.571	10	8.91
10.324.571N	18	9.02
10.324.572	10	12.76
10.324.572N	18	12.65
10.324.901	10	.04
10.324.902	10	.04
10.324.903	10	.06
10.326.122	9	2.40

Catalog Number	Page Number	Weight (lbs.)
10.326.132	9	2.60
10.326.141	9	3.00
10.326.151	9	3.00
10.326.161	9	2.50
10.326.342	9	9.00
10.326.352	9	9.50
10.326.362	9	9.20
10.326.374	9	11.70
11.326.410	6	2.20
11.326.411	7	2.50
11.326.420	7	2.30
11.326.421	7	2.50
11.326.422	7	3.00
11.326.430	7	2.50
11.326.431	7	3.00
11.326.433	7	3.50
11.326.440	7	2.50
11.326.441	7	3.00
11.326.444	7	5.00
11.326.451	7	3.00
11.326.454	7	6.00
11.326.462	7	3.00
11.326.462N	18	3.00
11.326.464	7	6.50
11.326.542	7	4.50
11.326.552	7	5.00
11.326.562	7	5.00
11.326.574	7	7.80
11.326.610	7	6.20
11.326.611	7	7.00
11.326.620	7	6.50
11.326.622	7	7.50
11.326.623	7	7.60
11.326.630	7	7.00
11.326.632	7	7.50
11.326.633	7	7.80
11.326.634	7	8.00
11.326.642	7	8.00
11.326.644	7	8.30
11.326.645	7	8.80
11.326.652	7	7.50
11.326.654	7	9.20
11.326.655	7	11.00
11.326.656	7	12.80
11.326.662	7	7.60
11.326.662N	18	7.60

Catalog Number	Page Number	Weight (lbs.)
11.326.664	7	10.50
11.326.665	7	13.00
11.326.666	7	15.80
11.326.667	7	18.50
11.326.674	7	9.80
11.326.674N	18	9.80
11.326.675	7	15.70
11.326.676	7	21.00
11.326.776	8	41.50
11.326.831	8	3.00
11.326.841	8	2.90
11.326.851	8	2.90
11.326.862	8	2.90
11.326.962	8	7.60
11.326.974	8	9.80
10.328.086	9	8.14
10.328.213	84	17.16
10.328.214	84	14.52
10.328.215	84	16.94
10.328.216	84	5.28
10.328.217	84	9.68
10.329.866	9	.90
10.331.110	13	.11
10.331.111	13	.15
11.331.220	13	.22
11.331.221	13	.33
11.331.330	13	.35
11.331.331	13	.35
11.331.440	13	.77
11.331.441	13	1.00
11.331.550	13	1.90
11.331.551	13	2.70
11.331.660	13	3.00
10.331.660N	19	2.99
11.331.661	13	4.40
10.331.665N	19	4.84
11.331.770	13	9.70
11.331.771	13	16.00
10.331.775N	19	9.68
10.331.776N	19	15.95
10.331.864N	19	.99
10.331.865N	19	2.09
10.331.867N	19	1.14
10.331.868N	19	1.80
10.331.874N	19	2.09
10.331.875N	19	4.40

Catalog Number	Page Number	Weight (lbs.)
10.331.876N	19	6.82
10.331.877N	19	3.37
10.331.878N	19	6.60
10.331.879N	19	4.95
10.332.210	12	.20
10.332.310	12	.33
10.332.320	12	.35
10.332.410	12	.51
10.332.420	12	.55
10.332.430	12	.66
10.332.510	12	.97
10.332.511	12	.97
11.332.520	12	1.20
11.332.521	12	.92
10.332.530	12	1.50
10.332.531	12	.97
11.332.540	12	1.60
11.332.541	12	1.20
11.332.610	12	2.00
10.332.611	12	1.70
11.332.620	12	1.80
11.332.621	12	1.50
11.332.630	12	2.10
11.332.631	12	1.70
11.332.632	12	2.60
11.332.640	12	2.30
11.332.641	12	1.80
11.332.642	12	3.20
11.332.650	12	2.70
11.332.651	12	1.90
11.332.652	12	4.30
10.332.731	12	2.80
10.332.741	12	3.30
10.332.750	12	5.30
10.332.751	12	3.60
11.332.760	12	6.60
11.332.761	12	5.20
10.332.765N	19	4.64
11.335.002	107	1.30
11.335.004	107	1.40
10.335.066	106	4.36
11.335.067	106	4.65
10.335.077	106	10.45
11.335.078	106	9.15
11.335.106	105	2.10
11.335.107	105	2.95

Catalog Number	Page Number	Weight (lbs.)
11.335.108	105	5.75
11.335.113	105	4.20
11.335.114	105	6.70
11.335.115	105	9.60
10.335.140	105	1.30
10.335.142	105	1.63
10.335.164	105	2.53
10.335.165	105	3.74
11.335.185	105	.35
11.335.186	105	.75
11.335.187	105	1.75
11.335.188	105	2.30
11.335.201	104	1.45
11.335.202	104	1.35
11.335.203	104	1.50
11.335.204	104	1.65
11.335.205	104	2.25
11.335.206	104	2.55
11.335.207	104	2.75
11.335.208	104	3.10
11.335.209	104	4.40
11.335.216	104	5.40
11.335.217	104	5.30
11.335.218	104	12.25
11.335.220	104	.65
11.335.221	104	.55
11.335.222	104	.80
11.335.223	104	.80
11.335.226	104	.90
11.335.227	104	.95
11.335.228	104	1.15
11.335.229	104	1.10
10.335.230	104	.62
11.335.231	104	2.00
10.335.231	104	.66
10.335.232	104	.86
10.335.233	104	1.21
10.335.234	104	.90
10.335.235	104	.94
10.335.236	104	1.18
10.335.237	104	1.47
10.335.238	104	1.52
10.335.239	104	1.74
10.335.240	104	1.34
10.335.241	104	1.39
10.335.242	104	1.52

Catalog Number	Page Number	Weight (lbs.)
10.335.243	104	1.80
10.335.244	104	1.85
10.335.245	104	1.98
10.335.246	104	2.02
10.335.247	104	2.31
10.335.248	104	3.65
10.335.250	104	6.38
10.335.251	104	7.48
10.335.320	14	1.03
10.335.321	14	1.63
10.335.322	14	2.09
10.335.323	14	1.89
10.335.324	14	2.42
10.335.325	14	3.85
10.335.326	14	3.98
10.335.327	14	8.03
10.335.331	14	5.50
10.335.342	14	3.52
10.335.344	14	3.19
11.335.345	14	3.10
11.335.355	14	7.90
10.335.362	107	1.54
10.335.363	107	1.54
10.335.373	107	2.75
10.335.374	107	3.19
10.335.375	107	7.70
10.335.380	14	1.25
10.335.381	14	1.78
10.335.382	14	2.21
10.335.383	14	1.54
10.335.384	14	2.13
10.335.385	14	2.86
10.335.386	14	2.31
10.335.387	14	3.37
10.335.388	14	4.51
10.335.389	14	2.71
10.335.390	14	3.89
10.335.391	14	5.28
11.335.401	105	1.85
11.335.402	105	1.75
11.335.403	105	2.00
11.335.404	105	2.90
11.335.405	105	5.75
11.335.413	105	3.95
11.335.414	105	4.30
11.335.415	105	5.25

Catalog Number	Page Number	Weight (lbs.)
11.335.416	105	7.65
10.335.420	113	.58
10.335.423	113	.92
10.335.425	113	1.41
10.335.430	113	1.54
10.335.432	113	2.05
11.335.445	105	.60
11.335.446	105	.75
11.335.454	105	1.00
11.335.455	105	1.15
11.335.456	105	1.45
11.335.531	101	1.00
11.335.532	101	1.30
11.335.541	101	1.30
11.335.542	101	2.10
11.335.551	101	3.75
11.335.552	101	4.15
11.335.553	101	11.95
11.335.562	101	8.85
11.335.563	101	13.50
11.335.564	101	28.35
11.335.565	101	15.05
11.335.571	101	21.25
11.335.572	101	50.60
10.335.630	111	.12
10.335.631	111	.12
10.335.632	111	.11
10.335.633	111	.11
10.335.634	111	.11
10.335.635	111	.12
10.335.636	111	.12
10.335.637	111	.11
10.335.638	111	.12
10.335.639	111	.12
10.335.641	111	.11
10.335.642	111	.11
10.335.645	111	.56
10.335.646	111	.55
10.335.647	111	.54
10.335.648	111	.53
10.335.649	111	.54
10.335.650	111	.48
10.335.651	111	.46
10.335.652	111	.46
10.335.653	111	.44
10.335.654	111	.42

Catalog Number	Page Number	Weight (lbs.)
10.335.656	111	.40
10.335.657	111	.40
10.335.658	111	.38
10.335.660	111	.44
10.335.661	111	.44
10.335.662	111	.33
10.335.663	111	.33
10.335.664	111	.33
10.335.665	111	.33
10.335.666	111	.33
10.335.667	111	.33
10.335.668	111	.33
10.335.669	111	.33
10.335.671	111	.33
10.335.672	111	.33
10.335.675	111	1.30
10.335.676	111	1.10
10.335.677	111	1.28
10.335.678	111	1.11
10.335.679	111	1.10
10.335.680	111	1.05
10.335.681	111	1.05
10.335.682	111	1.05
10.335.683	111	1.05
10.335.684	111	1.01
10.335.686	111	1.01
10.335.687	111	1.01
10.335.688	111	1.00
11.335.760	110	.90
10.335.761	110	1.80
10.335.762	110	1.91
10.335.763	110	3.41
11.335.765	110	2.10
11.335.769	110	3.25
10.335.801	98	2.09
10.335.802	98	2.20
10.335.902	94	6.05
10.335.903	94	4.62
10.335.904	94	3.85
10.335.905	94	3.19
10.335.906	94	5.94
10.335.912	94	1.87
10.335.913	94	.88
10.335.915	94	.44
10.336.001	23	1.56
10.336.002	23	1.56

Catalog Number	Page Number	Weight (lbs.)
10.336.003	23	1.56
10.336.004	23	1.61
10.336.005	23	1.61
10.336.006	23	1.63
10.336.007	23	1.72
10.336.008	23	1.71
10.336.009	23	1.72
10.336.010	23	1.76
10.336.011	23	1.77
10.336.012	23	1.90
10.336.013	23	1.90
10.336.014	23	1.91
10.336.015	23	1.94
10.336.016	23	2.00
10.336.017	23	2.02
10.336.018	23	2.20
10.336.019	23	2.24
10.336.020	23	2.27
10.336.021	23	2.51
10.336.022	23	2.57
10.336.023	23	2.62
10.336.024	23	2.93
10.336.025	23	3.04
10.336.026	23	3.10
10.336.027	23	3.17
10.336.028	23	3.45
10.336.029	23	3.59
10.336.030	23	3.70
10.336.031	23	3.96
10.336.032	23	4.07
10.336.033	23	4.40
10.336.034	23	4.62
10.336.035	23	4.73
10.336.036	23	4.84
10.336.037	23	4.95
10.336.038	23	7.92
10.336.040	23	8.14
10.336.050	23	1.57
10.336.051	23	1.58
10.336.052	23	1.58
10.336.053	23	1.66
10.336.054	23	1.67
10.336.055	23	1.67
10.336.056	23	1.78
10.336.057	23	1.76
10.336.058	23	1.78

Catalog Number	Page Number	Weight (lbs.)
10.336.059	23	1.87
10.336.060	23	1.88
10.336.061	23	2.01
10.336.062	23	2.01
10.336.063	23	2.02
10.336.064	23	2.11
10.336.065	23	2.19
10.336.066	23	2.22
10.336.067	23	2.40
10.336.068	23	2.62
10.336.069	23	2.64
10.336.070	23	2.78
10.336.071	23	2.97
10.336.072	23	3.04
10.336.073	23	3.34
10.336.074	23	3.48
10.336.075	23	3.59
10.336.076	23	3.85
10.336.077	23	4.16
10.336.078	23	4.36
10.336.079	23	4.47
10.336.080	23	4.95
10.336.081	23	5.06
10.336.082	23	5.39
10.336.083	23	5.72
10.336.084	23	5.83
10.336.085	23	6.27
10.336.086	23	6.82
10.336.087	23	9.68
10.336.088	23	10.34
10.336.089	23	11.88
11.336.311	21	2.85
11.336.313	21	7.70
11.336.315	21	7.70
10.336.631	22	2.05
10.336.632	22	2.02
10.336.633	22	2.20
10.336.634	22	2.16
10.336.635	22	2.11
10.336.636	22	2.27
10.336.637	22	2.53
10.336.638	22	2.51
10.336.639	22	2.55
10.336.640	22	2.55
10.336.641	22	2.62
10.336.642	22	2.68

Catalog Number	Page Number	Weight (lbs.)
10.336.643	22	2.93
10.336.644	22	2.97
10.336.645	22	3.08
10.336.647	22	3.21
10.336.649	22	3.50
10.336.651	22	3.85
10.336.653	22	3.89
10.336.655	22	4.73
10.336.657	22	4.40
10.336.659	22	4.60
10.336.661	22	4.99
10.336.731	22	2.18
10.336.732	22	2.22
10.336.733	22	2.29
10.336.734	22	2.42
10.336.735	22	2.62
10.336.736	22	2.73
10.336.737	22	2.75
10.336.738	22	2.79
10.336.739	22	3.08
10.336.740	22	3.01
10.336.741	22	3.04
10.336.742	22	3.52
10.336.743	22	3.34
10.336.744	22	3.43
10.336.745	22	3.52
10.336.747	22	3.85
10.336.749	22	4.22
10.336.751	22	4.40
10.336.753	22	5.28
10.336.755	22	5.50
10.336.757	22	5.72
10.336.759	22	6.49
10.336.761	22	6.25
10.336.905	121	.04
10.337.316	22	1.65
10.337.317	22	1.65
10.337.318	22	1.67
10.337.319	22	1.68
10.337.320	22	1.73
10.337.321	22	1.73
10.337.322	22	1.75
10.337.323	22	1.80
10.337.324	22	1.85
10.337.325	22	1.88
10.337.326	22	1.95

Catalog Number	Page Number	Weight (lbs.)
10.337.327	22	2.02
10.337.328	22	2.06
10.337.329	22	2.11
10.337.330	22	2.18
10.337.416	22	1.65
10.337.417	22	1.65
10.337.418	22	1.72
10.337.419	22	1.74
10.337.420	22	1.76
10.337.421	22	1.77
10.337.422	22	1.83
10.337.423	22	1.88
10.337.424	22	1.93
10.337.425	22	1.99
10.337.426	22	2.11
10.337.427	22	2.19
10.337.428	22	2.24
10.337.429	22	2.32
10.337.430	22	2.41
11.340.602	30	1.80
11.340.604	31	1.80
11.340.612	30	1.90
11.340.614	31	1.90
11.340.622	30	1.90
11.340.624	31	1.95
11.340.632	30	2.00
11.340.634	31	2.40
11.340.642	30	2.25
11.340.644	31	2.60
11.340.646	31	2.70
11.340.652	30	2.70
11.340.654	31	3.20
11.340.656	31	3.70
11.340.664	31	4.00
11.340.665	31	4.55
11.340.674	31	7.35
11.341.025	30	.01
11.341.026	30	.01
11.341.027	30	.01
11.341.028	30	.01
11.341.029	30	.01
11.341.030	30	.01
11.341.101	30	.02
11.341.102	30	.02
11.341.103	30	.02
11.341.104	30	.02

Catalog Number	Page Number	Weight (lbs.)
11.341.105	30	.02
11.341.106	30	.02
11.341.107	30	.02
11.341.108	30	.03
11.341.125	30	.02
11.341.126	30	.02
11.341.127	30	.02
11.341.128	30	.02
11.341.129	30	.02
11.341.130	30	.02
11.341.131	30	.02
11.341.132	30	.02
11.341.202	30	.03
11.341.204	30	.03
11.341.206	30	.03
11.341.208	30	.03
11.341.210	30	.03
11.341.212	30	.04
11.341.214	30	.04
11.341.226	30	.03
11.341.228	30	.03
11.341.230	30	.03
11.341.232	30	.03
11.341.234	30	.03
11.341.236	30	.03
11.341.238	30	.04
11.341.302	30	.06
11.341.304	30	.06
11.341.306	30	.06
11.341.308	30	.07
11.341.310	30	.07
11.341.312	30	.07
11.341.314	30	.08
11.341.316	30	.08
11.341.326	30	.06
11.341.328	30	.08
11.341.330	30	.08
11.341.332	30	.08
11.341.334	30	.08
11.341.336	30	.08
11.341.338	30	.09
11.341.340	30	.09
11.341.404	30	.15
11.341.408	30	.16
11.341.412	30	.16
11.341.416	30	.16

Catalog Number	Page Number	Weight (lbs.)
11.341.420	30	.17
11.341.428	30	.15
11.341.432	30	.16
11.341.436	30	.16
11.341.440	30	.17
11.341.444	30	.17
11.341.901	30	.01
11.341.902	30	.01
11.341.903	30	.01
11.341.904	30	.02
11.341.905	30	.03
11.341.906	30	.03
11.360.556	8	28.00
11.360.562	8	23.50
11.360.564	8	26.00
11.360.565	8	28.00
11.360.567	8	33.00
11.360.575	8	30.50
11.360.576	8	35.50
11.360.578	8	45.00
11.361.052	11	2.00
11.361.162	11	3.50
11.361.262	11	4.00
11.361.462	11	5.00
11.361.474	11	11.00
11.362.163	11	4.00
11.362.251	11	2.00
11.362.261	11	2.40
11.363.762	8	7.50
11.363.764	8	10.50
11.363.774	8	9.80
11.366.774	11	9.40
11.368.030	9	1.00
11.368.040	9	1.00
11.368.051	9	1.80
11.368.061	9	2.90
11.368.142	9	3.00
11.368.152	9	3.50
11.368.162	9	3.70
11.368.343	9	9.90
11.368.353	9	10.20
11.368.363	9	10.50
11.368.374	9	12.60
11.368.441	7	3.00
11.368.444	7	5.00
11.368.451	7	3.00

Catalog Number	Page Number	Weight (lbs.)
11.368.454	7	6.00
11.368.462	7	3.00
11.368.462N	18	3.10
11.368.464	7	6.50
11.368.642	7	8.00
11.368.644	7	8.30
11.368.645	7	8.80
11.368.652	7	7.50
11.368.654	7	9.20
11.368.655	7	11.00
11.368.656	7	12.80
11.368.662	7	7.60
11.368.662N	18	7.80
11.368.664	7	10.50
11.368.665	7	13.00
11.368.666	7	15.80
11.368.667	7	18.50
11.368.674	7	9.80
11.368.674N	18	10.00
11.368.675	7	15.70
11.368.676	7	21.00
11.370.101	15	13.30
11.370.321	15	1.60
11.370.322	15	2.10
11.370.324	15	2.40
11.370.325	15	4.00
11.370.327	15	8.00
11.370.328	15	5.80
11.370.330	15	8.80
11.380.321	72	.03
11.380.322	72	.03
11.380.323	72	.04
11.380.324	72	.06
11.380.325	72	.10
11.380.326	72	.03
11.380.327	72	.03
11.380.328	72	.04
11.380.329	72	.06
11.380.330	72	.10
11.381.223	103	.08
11.381.224	103	.08
11.381.243	103	.13
11.381.244	103	.11
11.381.316	103	.04
11.381.326	103	.08
11.381.346	103	.13

Catalog Number	Page Number	Weight (lbs.)
11.381.416	103	.06
11.381.426	103	.06
11.381.446	103	.10
11.382.223	102	.09
11.382.224	102	.09
11.382.244	102	.15
11.382.316	102	.05
11.382.326	102	.09
11.382.346	102	.13
11.382.356	102	.18
11.382.366	102	.12
10.389.221	86	.31
10.456.001	101	.07
10.456.002	101	.07
10.456.003	101	.23
10.456.004	101	.37
10.456.005	101	.51
10.456.011	101	.07
10.456.012	101	.07
10.456.013	101	.23
10.456.014	101	.37
10.456.015	101	.51
10.470.108	48	4.27
10.470.118	48	4.27
10.470.301	70	.65
10.470.311	70	.65
10.470.401	70	1.29
10.470.411	70	1.29
10.470.501	70	2.48
10.470.511	70	2.48
10.470.601	70	4.82
10.470.602	70	6.36
10.470.611	70	4.82
10.470.612	70	6.36
10.611.155	51	.01
10.611.156	51	.01
10.613.202	56	.03
10.613.203	56	.02
10.613.204	56	.03
10.613.205	56	.02
10.613.206	56	.02
10.613.207	56	.02
10.613.208	56	.01
11.613.213	56	.03
11.613.214	56	.03
11.613.215	56	.03

Catalog Number	Page Number	Weight (lbs.)
11.613.216	56	.02
11.613.218	56	.02
10.613.304	60	.04
10.613.305	60	.04
10.613.307	58	.04
10.613.308	58	.03
10.613.309	58	.04
10.613.310	58	.02
11.613.313	60	.06
11.613.314	60	.06
11.613.315	60	.06
11.613.316	60	.05
11.613.318	60	.04
10.613.323	58	.14
10.613.324	58	.14
10.613.325	58	.13
10.613.326	58	.13
10.613.327	58	.13
10.613.404	50	.11
10.613.405	50	.11
10.613.406	50	.10
10.613.407	50	.10
10.613.408	50	.09
10.613.409	50	.09
10.613.410	50	.08
10.613.411	50	.06
10.613.412	50	.06
10.613.413	50	.04
10.613.414	52	.03
10.613.422	50	.28
10.613.423	50	.26
10.613.424	50	.29
10.613.425	50	.29
10.613.426	50	.26
10.613.427	50	.26
10.613.428	50	.33
10.613.429	50	.26
10.613.430	50	.29
10.613.504	50	.11
10.613.505	50	.11
10.613.506	50	.10
10.613.508	50	.09
10.613.509	50	.08
10.613.510	50	.07
10.613.511	50	.06
10.613.512	50	.06

Catalog Number	Page Number	Weight (lbs.)
10.613.513	50	.04
10.613.514	52	.03
10.613.522	50	.28
10.613.523	50	.26
10.613.524	50	.26
10.613.525	50	.28
10.613.526	50	.26
10.613.527	50	.26
10.613.528	50	.33
10.613.529	50	.30
10.613.530	50	.29
11.613.543	52	.11
11.613.544	52	.11
11.613.545	52	.11
11.613.546	52	.11
11.613.548	52	.09
11.613.550	52	.08
11.613.551	52	.07
11.613.552	52	.05
11.613.639	15	.31
10.615.201	51	.04
10.615.202	51	.09
10.615.203	51	.02
10.615.204	51	.03
10.615.205	51	.04
10.615.206	51	.25
10.615.207	51	.10
10.615.208	51	.19
10.615.209	51	.35
10.615.210	51	.52
10.615.211	51	.04
10.615.212	51	.10
10.615.214	51	.06
10.615.215	51	.15
10.615.216	56	.06
10.615.217	56	.09
10.615.218	51	.13
10.615.219	51	.31
10.615.220	53	.03
10.615.221	53	.66
10.615.222	51	.13
10.615.223	51	.22
10.615.224	51	.44
10.615.225	51	.31
10.615.226	53	.28
10.615.227	53	.57

Catalog Number	Page Number	Weight (lbs.)
10.615.228	53	.08
10.615.229	53	.88
10.615.230	53	.07
10.615.231	53	.08
10.615.232	53	.20
10.615.233	53	.55
10.615.234	59	.14
10.615.236	53	.68
10.615.237	53	.55
10.615.238	53	.92
10.615.239	59	.37
10.615.240	59	.47
10.615.243	59	.30
10.615.250	51	.31
10.615.251	51	.55
10.615.252	53	.66
10.615.253	53	.99
10.615.254	53	.64
10.615.255	53	.97
10.615.256	60	.40
10.615.257	53	.81
10.615.258	53	1.14
10.615.259	53	.85
10.615.260	53	1.14
10.615.261	53	.31
10.615.262	53	.31
10.615.263	53	.53
10.615.264	53	.46
10.615.271	51	.02
10.615.272	51	.03
10.615.273	51	.03
10.615.280	53	.03
10.615.281	53	.04
10.615.282	53	.06
10.615.283	53	.07
10.615.284	53	.08
10.615.285	53	.09
10.615.286	53	.09
10.615.287	53	.11
10.615.288	53	.07
10.615.289	53	.07
10.615.290	53	.07
10.615.291	53	.07
10.615.292	53	.08
10.615.301	53	.03
10.615.302	53	.04

Catalog Number	Page Number	Weight (lbs.)
10.615.303	53	.04
10.615.304	53	.12
10.615.305	53	.13
10.615.365	53	.01
10.615.366	53	.02
10.615.367	53	.03
10.615.369	53	.23
10.615.370	60	.26
10.615.371	53	.37
10.615.372	60	.44
10.615.373	53	.57
10.615.374	53	.15
10.615.376	53	.29
10.615.378	53	.48
10.615.390	93	.75
10.615.391	93	.75
10.615.392	54	.03
10.615.393	54	.11
10.615.394	54	.11
10.615.395	54	.11
10.615.501	61	.05
10.615.502	61	.05
10.615.503	61	.05
10.615.504	61	.05
10.615.505	61	.04
10.615.506	61	.05
10.615.507	61	.05
10.615.508	61	.05
10.615.509	61	.05
10.615.511	61	.07
10.615.522	61	.04
10.615.524	61	.04
10.615.525	61	.04
10.615.530	61	.04
10.615.531	61	.07
10.615.541	61	.07
10.615.542	61	.07
10.615.543	61	.07
10.615.544	61	.07
10.615.545	61	.07
10.615.546	61	.09
10.615.547	61	.09
10.615.903	93	.06
10.625.020	73	.02
10.626.111	71	.02
10.626.112	71	.02

Catalog Number	Page Number	Weight (lbs.)
10.626.113	71	.02
10.626.121	71	.02
10.626.122	71	.02
10.626.123	71	.02
10.626.131	71	.02
10.626.132	71	.02
10.626.133	71	.02
10.626.141	71	.03
10.626.142	71	.03
10.626.143	71	.04
10.626.151	71	.04
10.626.152	71	.06
10.626.153	71	.07
10.626.161	71	.10
10.626.162	71	.15
10.626.163	71	.18
10.626.231	69	.02
10.626.241	69	.03
10.626.251	69	.05
10.626.261	69	.08
10.626.271	82	.07
10.626.322	71	.02
10.626.323	71	.02
11.626.331	71	.03
10.626.332	71	.02
10.626.333	71	.03
11.626.341	71	.04
10.626.342	71	.03
10.626.343	71	.04
11.626.351	71	.06
10.626.352	71	.07
10.626.353	71	.08
11.626.361	71	.10
10.626.363	71	.20
10.626.364	71	.20
10.626.371	82	.07
10.626.907	54	.06
10.626.908	54	.12
10.626.909	54	.20
10.626.910	54	.24
10.627.121	68	.01
10.627.131	68	.02
10.627.141	68	.04
10.627.151	68	.09
10.627.161	68	.11
10.637.813	87	1.65

Catalog Number	Page Number	Weight (lbs.)
10.637.814	87	1.87
10.637.829	87	1.62
10.637.830	87	1.88
10.637.833	87	1.60
10.637.834	87	1.87
10.637.845	87	1.58
10.637.846	87	1.89
10.637.940	81	.79
10.637.941	81	.77
10.637.942	81	.79
10.637.951	81	.79
10.637.953	81	.77
10.638.104	38	.15
10.638.105	38	.28
10.638.106	38	.43
10.638.107	38	.69
10.638.108	38	.94
10.638.111	37	.03
10.638.121	37	.05
10.638.131	37	.12
10.638.132	37	.16
10.638.141	37	.22
10.638.142	37	.31
10.638.151	37	.42
10.638.152	37	.59
10.638.161	37	.75
10.638.162	37	1.03
10.638.171	37	1.28
10.638.172	37	1.83
10.638.241	37	.24
10.638.251	37	.44
10.638.252	37	.50
10.638.261	37	.77
10.638.262	37	.99
10.638.271	37	1.33
10.638.272	37	1.77
10.638.411	37	.03
10.638.412	37	.04
10.638.421	37	.05
10.638.422	37	.06
10.638.431	37	.11
10.638.432	37	.15
10.638.441	37	.21
10.638.442	37	.29
10.638.451	37	.39
10.638.452	37	.55

Catalog Number	Page Number	Weight (lbs.)
10.638.461	37	.72
10.638.462	37	.99
10.638.471	37	1.23
10.638.472	37	1.72
10.638.561	37	.70
10.638.562	37	.99
10.638.571	37	1.22
10.638.572	37	1.69
10.639.113	35	.04
10.639.123	35	.08
10.639.133	35	.13
10.639.137	35	.18
10.639.143	35	.20
10.639.147	35	.25
10.639.153	35	.40
10.639.157	35	.60
10.639.163	35	.95
10.639.167	35	1.18
10.639.173	35	1.80
10.639.177	35	2.40
10.639.183	35	2.60
10.639.187	35	3.10
10.639.413	35	.04
10.639.417	35	.08
10.639.423	35	.20
10.639.427	35	.25
10.639.433	35	.14
10.639.437	35	.18
10.639.443	35	.20
10.639.447	35	.26
10.639.453	35	.40
10.639.457	35	.60
10.639.463	35	.95
10.639.467	35	1.18
10.639.473	35	1.80
10.639.477	35	2.40
10.639.483	35	2.60
10.639.487	35	3.10
10.639.563	35	.94
10.639.567	35	1.16
10.639.573	35	1.70
10.639.577	35	2.30
10.639.583	35	2.50
10.639.587	35	3.00
10.651.xxx	116	—
11.651.xxx	116	—

Catalog Number	Page Number	Weight (lbs.)
10.654.230	98	.01
10.654.231	98	.004
10.654.232	98	.004
10.654.xxx	118-120	—
11.654.xxx	118-120	—
10.655.370	25	.002
10.655.671	25	.04
10.655.800	98	.02
10.655.801	98	.02
10.655.802	98	.02
10.655.821	54	.002
10.655.822	54	.002
10.655.910	26	.004
10.655.911	26	.004
10.655.912	26	.004
10.655.913	26	.004
10.655.920	26	.004
10.655.921	26	.004
10.655.922	26	.004
10.655.923	26	.004
10.655.930	26	.01
10.655.931	26	.01
10.655.932	26	.01
10.655.933	26	.01
10.655.xxx	116-117	—
11.655.xxx	116-117	—
11.658.620	25	.04
11.658.624	25	.04
11.658.626	25	.04
11.658.630	25	.05
11.658.634	25	.05
11.658.636	25	.05
11.658.640	25	.08
11.658.644	25	.08
11.658.646	25	.08
11.658.650	25	.11
11.658.654	25	.11
11.658.656	25	.11
11.658.660	25	.23
11.658.664	25	.23
11.658.666	25	.23
10.663.110	100	.10
10.663.120	100	.15
10.663.121	100	.31
10.663.130	100	.20
10.663.131	100	.40

Catalog Number	Page Number	Weight (lbs.)
10.663.140	100	.22
10.663.141	100	.46
10.663.150	100	1.10
10.663.151	100	2.09
10.663.160	100	1.41
10.663.161	100	2.75
10.663.181	100	.02
10.663.185	100	.09
10.663.191	100	.01
10.663.195	100	.07
10.671.116	55	4.40
11.689.801	54	.04
11.689.802	54	.04
11.689.803	54	.04
11.689.804	54	.06
11.689.805	54	.08
11.689.806	54	.08
11.689.807	54	.09
11.689.808	54	.12
11.689.809	54	.15
11.689.810	52	.03
11.689.811	52	.04
11.689.812	52	.05
11.689.813	52	.07
11.689.814	52	.08
11.689.815	52	.08
11.689.816	52	.08
11.689.817	52	.08
11.689.818	52	.09
11.689.819	52	.09
11.689.820	52	.09
11.689.821	52	.09
11.689.822	52	.10
11.689.823	52	.10
11.689.824	52	.11
11.689.903	38	.06
11.689.904	38	.12
11.689.905	38	.19
11.689.906	38	.23
11.689.907	38	.36
11.689.908	38	.43
11.689.909	38	.58
11.689.910	38	.75
10.690.101	39	.004
10.690.102	100	.01
10.690.103	100	.01

Catalog Number	Page Number	Weight (lbs.)
10.690.104	100	.01
10.690.105	39	.06
10.690.106	39	.07
10.690.108	39	.01
10.690.115	68	.01
10.690.121	89	.12
10.690.124	83	.07
10.690.126	5	.07
10.690.127	5	.12
10.690.128	5	.22
10.690.129	5	.21
10.690.130	5	.53
10.690.135	72	.002
10.690.136	72	.002
10.690.137	72	.01
10.690.138	72	.01
10.690.139	72	.004
10.690.140	69	.01
10.690.141	72	.02
10.690.145	39	.001
10.690.156	65	.01
10.690.157	39	.006
10.690.163	39	.07
10.690.172	89	.10
10.690.173	39	.01
10.690.176	68	.01
10.690.177	68	.01
10.690.178	68	.01
10.690.179	68	.002
10.690.180	68	.01
10.690.182	68	.01
10.690.184	39	.001
10.690.186	39	.001
10.690.188	39	.003
10.690.189	39	.002
10.690.191	39	.001
10.690.192	39	.001
10.690.193	39	.001
10.690.194	39	.002
10.690.195	39	.003
10.690.196	39	.005
10.690.197	39	.01
10.690.320	46	.01
10.690.410	72	.002
10.690.414	73	.002
10.690.416	73	.002

Catalog Number	Page Number	Weight (lbs.)
10.690.418	65	.002
10.690.421	65	.002
10.690.426	39	.002
10.690.431	4	.002
10.690.432	4	.002
10.690.433	4	.004
10.690.434	4	.01
10.690.435	4	.01
10.690.436	4	.02
10.690.437	4	.11
10.690.440	65	.002
10.690.449	65	.004
10.690.452	65	.01
10.690.457	46	.01
10.690.459	65	.002
10.690.460	65	.004
10.690.469	46	.01
10.690.477	104	.004
10.690.478	104	.01
10.690.479	104	.01
10.690.480	104	.02
10.690.481	104	.04
10.690.482	104	.04
10.690.483	104	.08
10.690.484	104	.10
10.690.486	65	.002
10.690.487	65	.02
10.690.488	65	.02
10.690.489	65	.002
11.690.517	104	.002
11.690.518	104	.01
11.690.519	104	.01
11.690.520	104	.03
11.690.521	104	.03
11.690.522	104	.06
11.690.523	104	.08
10.690.529	39	.002
10.690.537	39	.002
10.690.538	65	.002
10.690.549	72	.002
10.690.550	72	.002
10.690.551	72	.002
10.690.552	72	.01
10.690.553	72	.01
10.690.577	69	.002
10.690.578	69	.004

Catalog Number	Page Number	Weight (lbs.)
10.690.579	69	.01
10.690.580	69	.01
10.690.584	39	.004
10.690.585	39	.01
10.690.586	39	.01
10.690.587	39	.01
10.690.588	39	.01
10.690.591	68	.01
10.690.595	65	.01
10.690.596	89	.03
10.690.610	73	.002
10.690.654	5	.02
10.690.655	5	.07
10.690.656	5	.08
10.690.657	5	.18
10.690.658	68	.01
10.690.666	18	.01
10.690.667	18	.07
11.690.709	105	.04
11.690.710	105	.08
11.690.711	105	.15
11.690.712	105	.31
11.690.713	105	.51
11.690.714	105	.90
10.690.800	121	.002
10.690.801	121	.002
10.690.802	121	.002
10.690.803	121	.01
10.690.804	121	.02
10.690.805	121	.04
10.690.806	121	.07
10.690.807	121	.13
10.690.808	121	.35
10.690.809	121	.37
10.690.810	121	.22
10.690.811	121	.03
10.690.812	121	.03
10.690.813	121	.04
10.690.814	121	.04
10.690.816	121	.11
10.690.817	121	.10
10.690.819	39	.12
10.690.833	121	.002
10.690.843	121	.02
10.690.847	5	.28
10.690.848	5	.37

Catalog Number	Page Number	Weight (lbs.)
10.690.849	5	.48
10.690.850	5	.66
10.690.851	5	.24
10.690.852	5	.44
10.690.853	5	.72
10.690.854	5	1.50
10.690.855	5	.55
10.690.940	68	.002
10.690.943	68	.01
10.690.953	68	.01
10.690.970	39	.11
10.690.978	65	.002
10.690.981	46	.006
10.691.373	89	.01
10.691.390	83	.02
10.691.501	4	.002
10.691.502	4	.004
10.691.503	4	.01
10.691.504	4	.02
10.691.505	4	.05
10.691.506	4	.11
10.691.507	4	.24
10.691.600	113	.002
10.691.602	113	.01
10.691.605	113	.03
10.691.607	113	.10
10.690.703	113	.04
10.690.705	113	.18
10.692.295	83	.001
10.692.296	46	.001
10.692.404A	65	.81
10.692.406	39	.01
10.692.409	39	.004
10.693.131	100	.002
10.693.175	39	.002
10.693.176	39	.002
10.693.177	39	.002
10.693.178	39	.002
10.693.179	39	.002
10.693.180	39	.002
10.693.181	39	.01
10.693.182	39	.01
10.693.183	39	.04
10.693.184	39	.05
10.693.185	39	.01
10.693.186	68	.01

Catalog Number	Page Number	Weight (lbs.)
10.693.187	39	.01
10.693.289	68	.002
10.694.101	121	.01
10.694.103	121	.01
10.694.110	121	.01
10.694.121	121	.01
10.694.122	121	.01
10.694.124	121	.01
10.694.125	54	.79
10.694.131	121	.01
10.694.137	121	.01
10.694.141	121	.01
10.694.144	121	.01
10.694.150	121	.01
10.694.806	121	.004
10.694.807	121	.01
10.694.809	121	.004
10.694.810	121	.004
10.694.815	121	.004
10.694.820	121	.004
10.718.201	46	.07
10.938.xxx	116-119	—
11.938.xxx	116-119	—
10.951.100	14	.07
10.951.101	14	.07
10.951.102	14	.07
10.951.103	14	.07
10.951.104	14	.04
10.951.105	14	.04
10.951.106	14	.04
10.951.108	14	.04
10.951.110	14	.07
10.951.111	14	.07
10.951.112	14	.07
10.951.113	14	.04
10.951.114	14	.04
10.951.115	14	.02
10.951.116	14	.02
10.958.008	112	.10
10.958.010	112	.08
10.958.021	112	.18
10.958.031	112	.24
10.958.041	112	1.10
10.958.048	112	.02
10.958.049	112	.13
10.958.051	112	.004

Catalog Number	Page Number	Weight (lbs.)
10.958.052	112	.004
10.958.053	112	.004
10.958.055	112	.004
10.958.056	112	.004
10.958.057	112	.004
10.958.061	112	.004
10.958.062	112	.004
10.958.063	112	.004
10.958.065	112	.004
10.958.066	112	.004
10.958.067	112	.004
10.958.071	112	.004
10.958.072	112	.004
10.958.073	112	.004
10.958.075	112	.004
10.958.076	112	.004
10.958.077	112	.004
10.958.081	112	.004
10.958.082	112	.004
10.958.083	112	.004
10.958.085	112	.004
10.958.086	112	.004
10.958.087	112	.004
10.958.091	112	.02
10.958.092	112	.02
10.958.093	112	.02
10.958.095	112	.02
10.958.096	112	.02
10.958.097	112	.02
10.958.155	113	.03
10.958.156	113	.03
10.958.157	113	.004
10.958.158	113	.01
10.958.313	113	.004
10.958.314	113	.004
AC20-10	106	.22
AC20-12	106	.21
AC20-16	106	.15
AC20-6	106	.25
AC20-8	106	.23
AC32-10	106	.82
AC32-12	106	.78
AC32-16	106	.72
AC32-20	106	.68
AC32-25	106	.62
AC32-6	106	.90

Catalog Number	Page Number	Weight (lbs.)
AC32-8	106	.87
BBT40-OCK6N-149	16	11.90
BBT50-OCK6N-139	16	15.80
BBT50-OCK7N-165	16	27.00
BT40-HMC1.250-4.125	15	5.70
BT50-HMC1.250-4.125	15	12.50
C.750-1/2	106	.16
C.750-1/4	106	.19
C.750-3/8	106	.19
C.750-5/16	106	.18
C.750-5/8	106	.10
C.750-7/16	106	.17
C.750-9/16	106	.14
C1.250-1	106	.42
C1.250-1/2	106	.70
C1.250-1/4	106	.70
C1.250-11/16	106	.60
C1.250-13/16	106	.57
C1.250-15/16	106	.48
C1.250-3/4	15	.48
C1.250-3/8	106	.71
C1.250-5/16	106	.69
C1.250-5/8	106	.66
C1.250-7/16	106	.70

Catalog Number	Page Number	Weight (lbs.)
C1.250-7/8	106	.53
C1.250-9/16	106	.66
C5-CKB3-55	9	1.55
C5-CKB4-48	9	1.70
C5-CKB5-50	9	1.95
C5-CKB6-50	9	2.25
C6-CKB3-65	9	2.35
C6-CKB4-58	9	2.45
C6-CKB5-48	9	2.60
C6-CKB6-59	9	3.35
C8-CKB6-74	9	5.65
C8-CKB7-73	9	7.00
CK4-MGT12-67	108	1.32
CK4-MGT6-62	108	1.10
CK5-MGT20-87	108	2.80
CKB1-C2232-45B-20	99	.20
CKB2-C0525	98	.30
CKB3-C3242-45B-20	99	.40
CKB3-C5262-45B-20	99	.70
CKB4-C1040	98	.60
CKB4-C4252-45B-20	99	.80
CKB5-C3060	98	1.65
CKB5-C5262-45B-20	99	1.05
CKB6-C50100	98	3.10

Catalog Number	Page Number	Weight (lbs.)
CM10C1	99	.10
CM10C1SE	99	.10
CV40-HMC1.250-4	15	4.70
CV40-OCK6N-144	16	13.40
CV50-HMC1.250-4	15	8.90
CV50-HMC1.500-4.5	15	13.20
CV50-OCK6N-142	16	15.90
CV50-OCK7N-165	16	27.00
CW1206A	98	.10
CW1909A	98	.15
CW3115A	98	.30
FK58-62	106	.50
FK68-75	14	.65
FK80-90	106	.85
HSK100-CP	10	.11
LP-A	16	.35
LP-B	16	.30
LP-C	16	.25
MES-65	16	.25
MES-90	16	.35
MGR16	108	.25
MGR20	109	.30
MGR30	109	.60
MGT12-AU1/4-1.25	109	.50

Catalog Number	Page Number	Weight (lbs.)
MGT12-AU1/4-3	109	.75
MGT12-AU1/4-4	109	.85
MGT12-AU1/4-6	109	1.15
MGT12-AU1/4-8	109	1.45
MGT12-AU5/16-1.25	109	.50
MGT12-AU5/16-3	109	.75
MGT12-AU5/16-4	109	.85
MGT12-AU5/16-6	109	1.15
MGT12-AU5/16-8	109	1.45
MGT12-AU7/16-1.25	109	.50
MGT12-AU7/16-3	109	.75
MGT12-AU7/16-4	109	.85
MGT12-AU7/16-6	109	1.15
MGT12-AU7/16-8	109	1.45
MGT20-AP1/4-1.5	109	1.25
MGT20-AP1/4-3.5	109	1.90
MGT20-AP1/4-4.5	109	2.15
MGT20-AP1/4-6	109	2.60
MGT20-AP1/8-1.5	109	1.30
MGT20-AP1/8-3.5	109	1.90
MGT20-AP1/8-4.5	109	2.20
MGT20-AP1/8-6	109	2.65
MGT20-AU1/2-1.5	109	1.30
MGT20-AU1/2-3.5	109	1.95

Catalog Number	Page Number	Weight (lbs.)
MGT20-AU1/2-4.5	109	2.25
MGT20-AU1/2-6	109	2.70
MGT20-AU11/16-1.5	109	1.25
MGT20-AU11/16-3.5	109	1.85
MGT20-AU11/16-4.5	109	2.15
MGT20-AU11/16-6	109	2.60
MGT20-AU3/4-1.5	109	1.25
MGT20-AU3/4-3.5	109	1.85
MGT20-AU3/4-4.5	109	2.15
MGT20-AU3/4-6	109	2.60
MGT20-AU3/8-1.5	109	1.25
MGT20-AU3/8-3.5	109	2.00
MGT20-AU3/8-4.5	109	2.25
MGT20-AU3/8-6	109	2.70
MGT20-AU5/8-1.5	109	1.25
MGT20-AU5/8-3.5	109	1.90
MGT20-AU5/8-4.5	109	2.20
MGT20-AU5/8-6	109	2.65
MGT20-AU9/16-1.5	109	1.30
MGT20-AU9/16-3.5	109	1.90
MGT20-AU9/16-4.5	109	2.25
MGT20-AU9/16-6	109	2.65
MGT6-No.10-1.25	108	.35
MGT6-No.10-3	108	.55

Catalog Number	Page Number	Weight (lbs.)
MGT6-No.10-4	108	.60
MGT6-No.10-6	108	.80
MGT6-No.10-8	108	1.05
MGT6-No.12-1.25	108	.35
MGT6-No.12-3	108	.55
MGT6-No.12-4	108	.60
MGT6-No.12-6	108	.80
MGT6-No.12-8	108	1.00
MGT6-No.6-1.25	108	.35
MGT6-No.6-3	108	.55
MGT6-No.6-4	108	.65
MGT6-No.6-6	108	.85
MGT6-No.8-1.25	108	.35
MGT6-No.8-3	108	.55
MGT6-No.8-4	108	.60

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