

KELCH

FLEXIBORE

Chapter 4 of the Product Catalogue 2010/2011 Precision Tools



KFS Flexibore



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KELCH FLEXIBORE SYSTEM (KFS)

The Modular Tooling System for Boring and Milling Machines

The KELCH FLEXIBORE SYSTEM is a proven product range including insert holders and tool holders for flexible and individual machining tasks on all machining centres. The flexible assembly of all tools required makes it an ideal system, which is adaptable to the respective machining task.

Basic holders are available in all usual steep taper, hollow taper shank and polygonal taper shank versions. The diameter can be customized by the use of adapter elements.

The high degree of accuracy of component combinations results from the exact centering with insertion groove and the contact surface of the components, which are manufactured with the highest precision.

Axial Connection with Central Anti-fatigue Bolt

- Particularly frictional interlocking for the transmission of extremely high cutting forces
- Most suitable for high radial loads, e. g. for boring and milling
- Maximum rigidity in conjunction with a high extension ratio



Tightening Torque

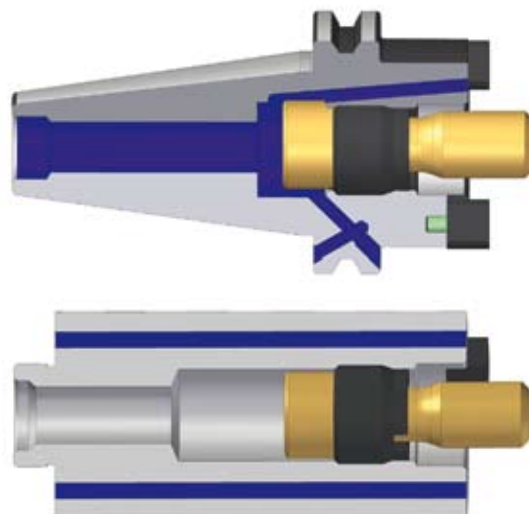
The use of the correct tightening torque guarantees perfect frictional interlocking and optimum concentricity.

Joint Ø d1	Thread	Torque
25	M 8	35 Nm
32	M 10	60 Nm
40	M 12	100 Nm
50	M 16	160 Nm
63	M 16	160 Nm
100	M 16	160 Nm

Coolant Supply

The components of the KELCH FLEXIBORE SYSTEMS such as basic holders, extensions, reducers and insert holders are always manufactured with coolant bores for central and lateral coolant supply.

Basic holder according to DIN 69 871 AD/B

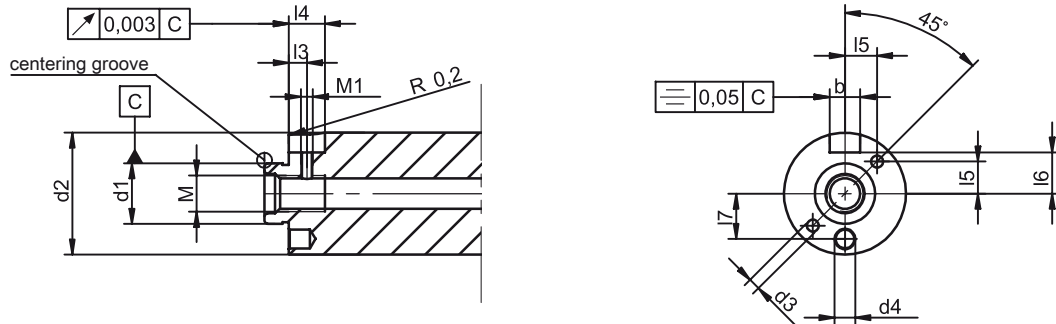


The transfer of the coolant to the interface of the modular tool is always effected via two coolant channels.

KELCH FLEXIBORE SYSTEM (KFS)

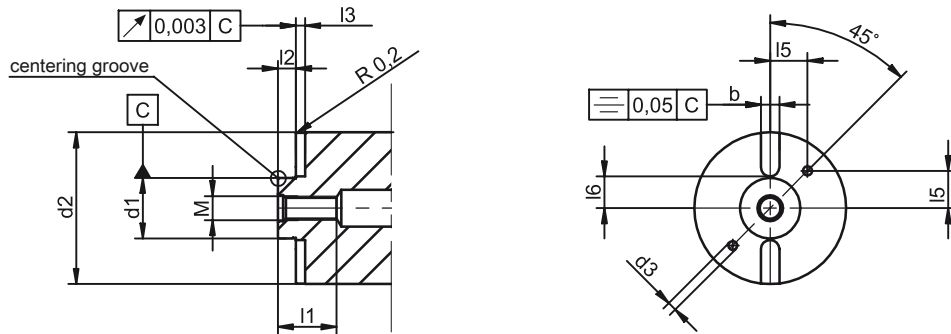
Technical Data and Tool Joint Dimensions

Type:
FLEXIBORE joint
Ø 25 - Ø 40



d2	d1	d3	d4	M	l1	l2	l3	l4	l5	l6	b	M1	l7	l8
g6			+ 0.2				± 0.1	+ 0.2	± 0.1	- 0.1	N9		± 0.1	
25	14	3	3.1	M 8	19	8	5	10	6.9	8.1	8	M 3	9.7	7
32	18	3	4.2	M10	20	8	5	10	8.5	10.6	8	M 3	12.5	7
40	20	4	6.2	M12	20	8	6	12	10.6	13.6	10	M 4	15	7

Type:
FLEXIBORE joint
Ø 50 - Ø 100



d2	d1	d3	M	l1	l2	l3	l5	l6	b
g6						± 0.5	± 0.1	- 0.2	+ 0.05
50	25	4	M16	27	10	6	13	13	10.2
63	25	4	M16	27	10	6	15	13.5	10.2
100	40	6	M16	27	12	6	24.7	21	10.2

Design

Hardened by means of a special low-tensile hardening process. Vickers hardness 670 ± 40 HV 30 (HRC 58 ± 2). Hardness depth Eht = min. 0.5 mm. Surface roughness index of cylinder diameter d1 and contact face $Rz \leq 0.001$ mm.

For details of concentricity between cylinder diameter and tool holder, refer to appropriate page of catalogue.

Material

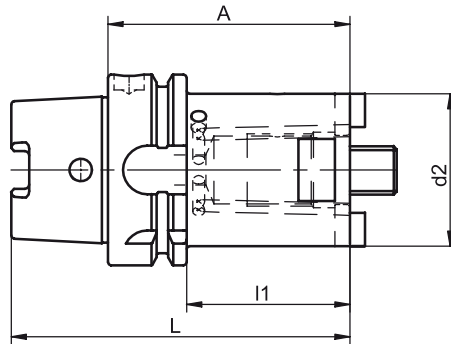
Case-hardened alloy steel with a core tensile strength after case hardening of min. 980 N/mm².

Note

Prices and delivery conditions are shown in the corresponding price list valid at the time in question.

Manufacturer reserves the right to make technical modifications.

HSK A Basic Holders



HSK-A	d2	A	Ref.no.	l1	L	kg
63	25	60	494.0001.322	34	92	0.9
63	32	70	494.0002.322	44	102	1.0
63	40	80	494.0003.322	54	112	1.2
63	50	80	494.0004.322	54	112	1.2
63	63	80	494.0005.322	54	112	1.3
100	25	70	494.0001.324	41	120	1.9
100	32	80	494.0002.324	51	130	2.4
100	40	80	494.0003.324	51	130	2.5
100	50	80	494.0004.324	51	130	2.7
100	63	80	494.0005.324	51	130	2.9
100	100	100	494.0006.324	71	150	4.0

For coolant tubes see accessories page 7.12.
 For anti-fatigue bolts see accessories page 7.19.
 For allen keys see accessories page 7.19.

Design

Permissible concentricity deviation of hollow taper shank to location hole 0.005 mm.
 Permissible axial runout deviation of hollow taper shank to contact face 0.003 mm.

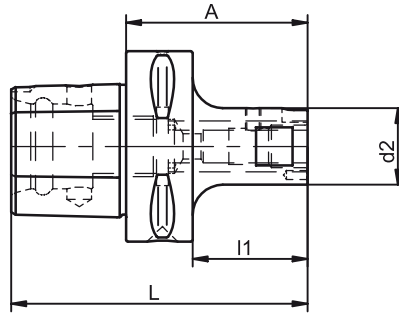
Standard Specification

Anti-fatigue bolt and tightened driving dogs included.

Note

For the assembly of the FLEXIBORE modules the coolant tube has to be removed. Other designs and sizes are available on request.

PSK Basic Holders



PSK	d_2	A	Ref.no.	l_1	L	kg
63	25	60	494.0001.384	38	98	0.9
63	32	70	494.0002.384	48	108	1.0
63	40	80	494.0003.384	58	118	1.2
63	50	80	494.0004.384	58	118	1.5
63	63	80	494.0005.384	55	118	2.0

For anti-fatigue bolts see accessories page 7.19.

For allen keys see accessories page 7.19.

Design

Permissible concentricity of PSK taper to location hole 0.005 mm.
Permissible axial runout of PSK taper to location hole 0.003 mm.

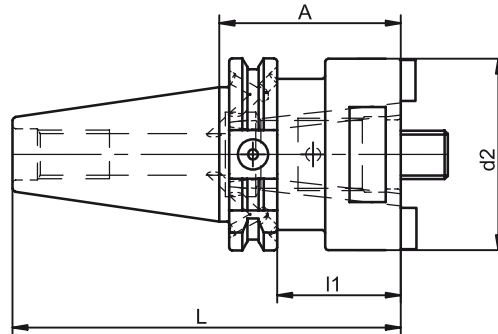
Standard Specification

Anti-fatigue bolt and tightened driving dogs included.

Note

Other designs and sizes are available on request.

ISO Basic Holders DIN 69 871



ISO	d2	A	Ref.no.	l1	L	kg
40	25	40	494.0301.292	21	108	0.8
40	32	40	494.0302.292	21	108	0.9
40	40	40	494.0303.292	21	108	1.0
40	50	40	494.0305.292	21	108	1.0
40	63	60	494.0304.292	41	128	1.5
50	25	40	494.0301.291	21	142	2.7
50	32	40	494.0302.291	21	142	2.7
50	40	40	494.0303.291	21	142	2.7
50	50	40	494.0306.291	21	142	2.8
50	63	40	494.0304.291	21	142	3.0
50	100	60	494.0305.291	41	162	4.5

For anti-fatigue bolts see accessories page 7.19.

For allen keys see accessories page 7.19.

Design

ISO according to DIN 69 871-1, type AD/B.
Permissible concentricity deviation of ISO taper to location hole 0.005 mm.
Permissible axial runout deviation of ISO taper to contact face 0.003 mm.

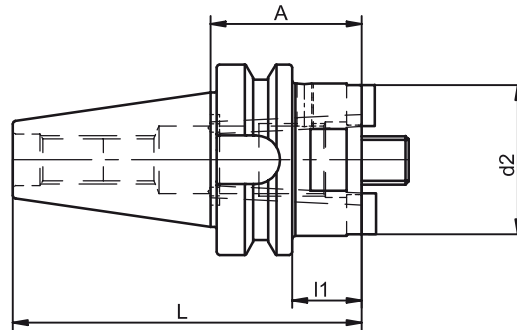
Standard Specification

Anti-fatigue bolt and tightened driving dogs included.

Note

Other designs and sizes are available on request.

ISO Basic Holders JIS B 6339



ISO	d2	A	Ref.no.	l1	L	kg
40	25	50	494.0103.265	23	115	1.0
40	32	50	494.0104.265	23	115	1.1
40	40	50	494.0101.265	23	115	1.1
40	50	50	494.0105.265	23	115	1.2
40	63	50	494.0102.265	23	115	1.4
50	25	60	494.0104.225	23	162	3.6
50	32	60	494.0105.225	23	162	3.7
50	40	60	494.0101.225	23	162	3.8
50	50	60	494.0106.225	22	162	3.9
50	63	60	494.0102.225	22	162	4.1
50	100	60	494.0103.225	32	162	4.8

For anti-fatigue bolts see accessories page 7.19.

For allen keys see accessories page 7.19.

Design

ISO according to JIS B 6339, type AD.
Permissible concentricity deviation of ISO taper to location hole 0.005 mm.
Permissible axial runout deviation of ISO taper to contact face 0.003 mm.

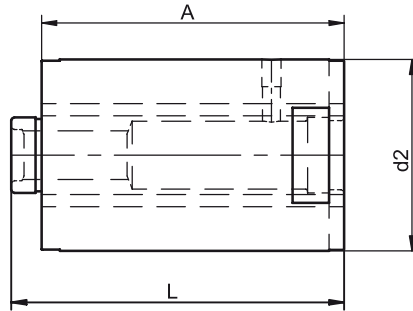
Standard Specification

Anti-fatigue bolt and tightened driving dogs included.

Note

Other designs and sizes are available on request.

Extensions



d2	A	L	Ref.no.	kg
25	60	68	201.107	0.2
32	60	68	201.108	0.3
32	100	108	201.109	0.7
40	60	68	201.101	0.5
40	100	108	201.110	0.9
40	150	158	201.102	1.3
50	60	70	201.112	0.9
50	100	110	201.113	1.4
50	150	160	201.114	2.1
63	60	70	201.103	1.4
63	100	110	201.111	2.2
63	150	160	201.104	3.4
100	100	112	201.105	5.9
100	150	162	201.106	5.0

For anti-fatigue bolts see accessories page 7.19.

For allen keys see accessories page 7.19.

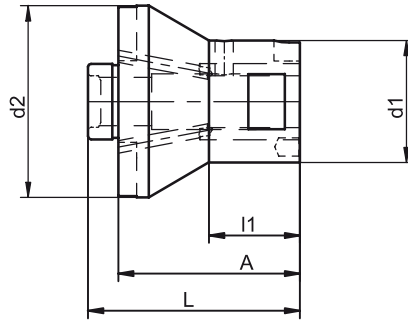
Design

Permissible concentricity deviation of centering pivot to bore 0.008 mm.

Standard Specification

Anti-fatigue bolt and tightened driving dogs included.

Reducers



d2	d1	A	Ref.no.	l1	L	kg
32	25	60	202.103	46	68	0.2
40	25	60	202.105	40	68	0.3
40	32	60	202.104	40	68	0.4
50	32	60	202.107	30	70	0.5
50	40	60	202.106	30	70	0.6
63	40	60	202.101	30	70	0.8
63	50	60	202.108	30	70	0.9
100	50	100	202.109	61	112	2.8
100	63	100	202.102	61	112	3.4

For anti-fatigue bolts see accessories page 7.19.

For allen keys see accessories page 7.19.

Design

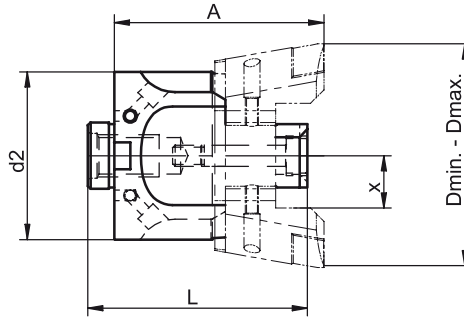
Permissible concentricity deviation of centering pivot to bore 0.008 mm.

Standard Specification

Anti-fatigue bolt and tightened driving dogs included.

Twin-blade Roughing Tools

Ø 29 - 250 mm



d2	Dmin. - Dmax.	A	Ref.no.	X	L	Type of insert	kg
25	29 - 38	60	092.161	5	68	0	0.3
32	38 - 48	60	092.162	8	68	0	0.4
40	48 - 60	60	092.163	8	68	1	0.5
50	60 - 75	70	092.164	10	80	10	0.9
63	75 - 105	80	092.165	12	90	10	1.5
63	100 - 130	80	092.165	12	90	10	1.5
100	130 - 180	80	092.167	12	90	3	1.7
100	180 - 250	80	092.167	12	90	3	1.7

For indexable insert holders see page 4.12.
 For fixing plates see accessories page 7.20.
 For fitting screws see accessories page 7.20.

Use
 For machining with double feed for bores from 29 to 250 mm diameter

Standard Specification
 1 base body, 1 fixing plate, 2 fitting screws

Special Features:

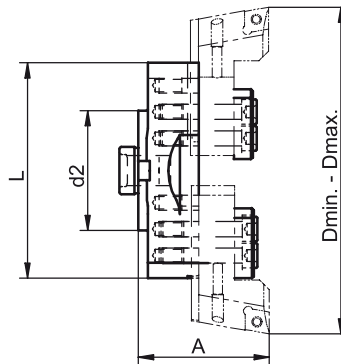
- Infinite radial adjustment of the indexable insert holders to the machining diameter.
- Precisely targeted supply of coolant to the cutting edges (some versions available with adjustable jets).

- Chip channels in the body for efficient chip removal, even at high cutting power
- Ground parallel guides of the indexable insert holders with trapezoid grooves.
- Rigid design using generously dimensioned contact faces between indexable insert holders and base body.
- High setting accuracy by using a fitting screw and an adjusting screw.
- Tool can be set directly or on a tool presetter.

Setting of Machining Diameter
 The indexable insert holders are set individually precisely to the required diameter using an adjusting screw. This is made easy by the scale on the side of the tool. The set machining diameter can be checked directly at the twin-blade cutter using a vernier calliper and readjusted accordingly. The dimension measured is from the carbide tip to the contact face of the fixing plate. The dimension X is subtracted, leaving the figure for the radius of the selected machining diameter.

Boring Bridges for Indexable Insert Holders

Ø 250 - 530 mm



d2	Dmin. - Dmax.	A	Ref.no.	L	Type of insert	kg
100	250 - 390	90	206.113	226	3	8.4
100	390 - 530	90	206.114	366	3	11.5

For indexable insert holders see page 4.12.

For fixing plate see accessories page 7.20.

For fitting screws see accessories page 7.20.

Use

Boring bridges for holding indexable insert holders for the 250 to 530 mm diameter range. In combination with FLEXIBORE basic holders with joint diameter 100 mm and extensions, a multiplicity of variations of tool length and diameter can be obtained.

Standard Specification

1 boring bridge, 2 fixing plates, 4 fitting screws

Special Features

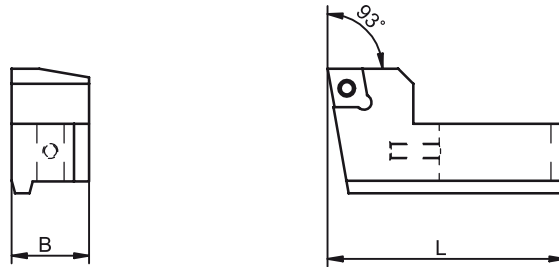
- Rigid design for high cutting power in the roughing area
- High rigidity using generously dimensioned contact faces between boring bridge and indexable insert holder
- Reliable torque transmission provided by precise prismatic guides
- High setting accuracy by using a fitting screw and an adjusting screw
- Rotationally symmetric cutting edges for double feed

Setting of machining diameter

The indexable insert holders are individually infinitely adjustable using an adjusting screw for each insert holder. This is made easy by the scale on the side of the tool. Precise cutting edge setting on changeover with the help of a tool presetter.

Holders for Indexable Inserts

93 Degree



d2	Boring range	B	Ref.no.	L	Type of insert
25	29 - 38	11.1	092.351	23.9	0
32	38 - 48	13.1	092.352	32.5	0
40	48 - 60	17.0	092.350	37.0	1
50	60 - 75	22.7	090.354	46.1	10
63	75 - 105	25.6	092.355	61.5	10
63	100 - 130	25.6	092.356	80.0	10
100	130 - 180	40.4	092.357	102.0	3
100	180 - 250	40.4	092.358	137.0	3

For indexable inserts see page 7.21.

For torx screws see accessories page 7.21.

For screwdrivers see accessories page 7.21.

Design

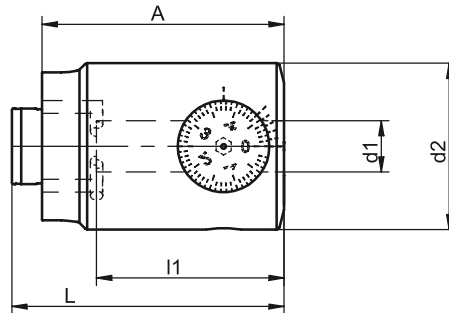
Indexable insert holders for holding indexable carbide inserts according to ISO 365 E (DIN 4967 draft).
Setting angle 90°.

Standard Specification

1 indexable insert holder including a torx screw and an adjusting screw.
Indexable inserts and screwdriver to be ordered separately.

Fine Boring Tools

Ø 3 - 88.1 mm



d2	d1	Boring range	A	Ref.no.	l1	L	kg
50	16	3 - 88.1	80	093.405	62	90	0.8

For boring bars see accessories page 7.21.

Use

For boring bars with a shank diameter of 16 mm. For precision boring with close tolerances and high surface finish quality in the 3 to 88.1 mm diameter range.

Design

- Setting accuracy of 0.01 mm or 0.002 mm using a vernier in diameter
- Micrometer spindle with a large scale for exact setting and easy reading
- Minimum backlash
- Variable overhang length of the boring bars
- Suitable for internal cooling

Standard Specification

Boring bars to be ordered separately.

FLEXIBORE boring set in a case



Small boring set

for Ø 3 - 30.1 mm

Contents: Fine boring head, 4 boring bars, screwdriver, adjusting key, 10 indexable inserts
Ref.no. 093.415

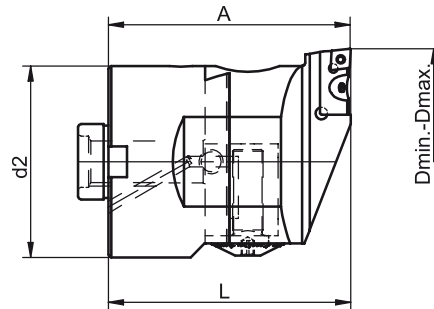
Large boring set

for Ø 3 - 88.1 mm

Contents: Fine boring head, 6 boring bars, screwdriver, adjusting key, 10 indexable inserts
Ref.no. 093.416

Fine Boring Heads

Ø 30 - 150 mm



d2	Boring range	A	Ref.no.	L	V	Type of Inserts	kg
25	30 - 40	60	093.200	59.5	5.0	0	0.2
32	40 - 53	60	093.211	59.5	6.5	0	0.3
40	50 - 66	60	093.212	59.5	8.0	0	0.5
50	60 - 84	70	093.216	69.5	12.0	0	0.8
63	75 - 110	80	093.214	79.5	17.5	0	1.5
63/100	100 - 150	80	093.215	79.5	25.0	0	2.3

For cassettes see accessories page 7.20.
 For fixing screws see accessories page 7.20.

KFS FLEXIBORE

Use

For precision boring with close tolerances and high surface finish quality in the 30 to 150 mm diameter range. Fine boring head art. no. 093.212 in combination with a boring bridge Ø 150 - 530 mm. Can be held in all FLEXIBORE basic holders and intermediate adapters with appropriate joint diameter d1.

Design

Fine boring head with exchangeable cassette for indexable carbide inserts

according to ISO 365 E (DIN 4967 draft).
 Setting angle 90°.

Standard Specification

Fine boring head complete with cassette and adjusting key. Indexable carbide inserts to be ordered separately.

Special Features

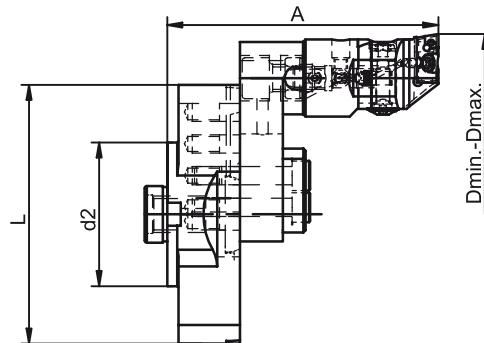
- High rigidity by means of a compact design and a dovetail guide ground free from backlash
- Fine adjustment by direct adjustment of

the boring head via a ground and precision fit micrometer spindle and clearly readable scale

- Setting accuracy 0.005 mm (1 scale division = 0.01/Ø)
- Presetting of machining diameter can be checked with a vernier in the mm range
- No change in the programming dimension "A" when used with radial adjustment
- Coolant supply through tool to cutting edge

Boring Bridges for Fine Boring Tools

Ø 150 - 530 mm



d2	Boring range	A	Ref.no.	L	Type of insert	kg
63	150 - 210	125	206.121	114	0	2.2
63	200 - 300	125	206.122	174	0	2.7
100	240 - 390	135	206.123	226	0	4.8
100	370 - 530	135	206.124	366	0	8.2

For fixing plates see accessories page 7.20.
For fitting screws see accessories page 7.20.

Use

With the boring bridges as base body the fine boring head art.no. 093.212 can be combined.
In combination with FLEXIBORE basic holders with a joint diameter of 63 to 100 mm and extensions, a multiplicity of

variations of tool length and diameter can be obtained.

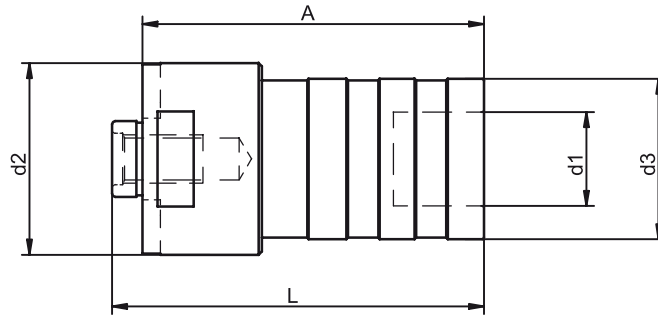
Standard Specification

1 boring bridge, 1 sliding tool holder plate, 1 fixing plate, 2 fitting screws.

Special Features

The machining diameter can be obtained by adjusting the sliding tool holder plate and/or by adjusting the insert carrier.

Quick Change Tapping Chucks



d2	Thread	A	Ref.no.	Threaded shank	d1	d3	L	kg
40	M 3 - M14	76	294.014	3.5 - 11	19	41	84	0.5
63	M 4.5 - M24	113	294.016	6 - 18	31	58	123	1.8

For quick change inserts see page 5.12 and page 5.14.

Use

For holding quick change inserts with or without safety clutch.

Design

Length compensation on compression and tension to compensate the difference

between feed and tap pitch.

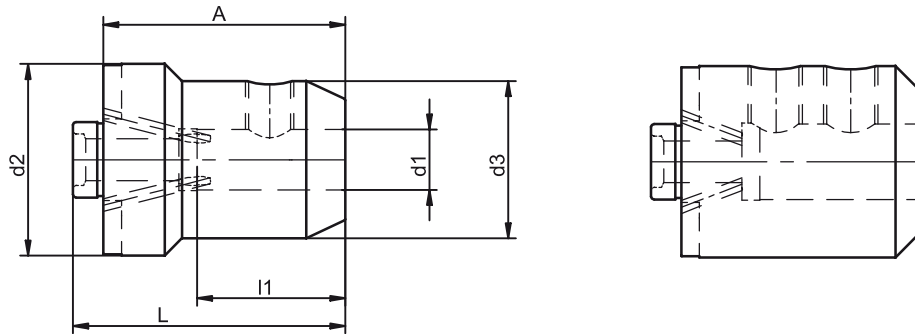
The pressure point mechanism guarantees that the tap immediately cuts the thread as soon as the permissible axial force is reached.

The tension lock protects the tapping chuck against damage as a result of high axial tensile load.

Note

Quick change tapping chucks with centrally sealed coolant supply available on request (50 bar).

Reduction Sleeves for Straight Shanks with Lateral Driving Surface (Weldon)



d2	d1	A	Ref.no.	d3	l1	L	d1 tolerance	kg
40	6	60	192.101	25	35	68	+ 0.005	0.4
40	8	60	192.102	28	35	68	+ 0.005	0.4
40	10	60	192.103	35	39	68	+ 0.005	0.5
40	12	60	192.104	40	44	68	+ 0.005	0.6
50	14	80	192.112	44	44	90	+ 0.005	1.0
50	16	80	192.110	48	47	90	+ 0.005	1.1
50	18	80	192.113	50	47	90	+ 0.005	1.1
50	20	80	192.111	52	49	90	+ 0.007	1.2
63	25	80	192.107	63	54	90	+ 0.007	1.6
63	32	80	192.108	72	58	90	+ 0.007	2.0
63	40	100	192.109	80	68	112	+ 0.007	2.9

For clamping screws see accessories page 7.16.

Use

For holding shank tools with lateral driving surface DIN 1835 type B and DIN 6535 type HB.

Design

Permissible concentricity deviation of arbor to bore d1 = 0.003 mm.

Standard Specification

Clamping screw included.
From location hole d1 = 25 mm
2 clamping screws are included.

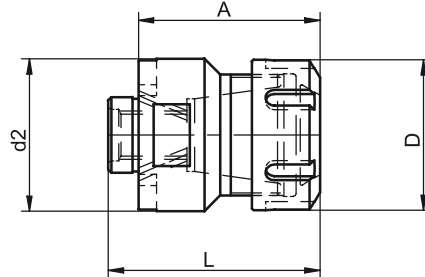
Note

For an increased machining accuracy the bore tolerance is much reduced compared to DIN 1835.

Other designs and sizes are available on request.

Collet Chucks

for ER/ESX ER-16/32 with Internal Thread



d2	Clamping range	A	Ref.no.	D	L	kg
32	0.5 - 10	50	205.301	28	58	0.2
50	2 - 20	60	205.302	50	70	0.8

For collets, clamping nuts and clamping keys see accessories from page 7.3 to page 7.8.

Use

For clamping tools with straight shank according to DIN ISO 15488 (DIN 6499) type A and B.

Design

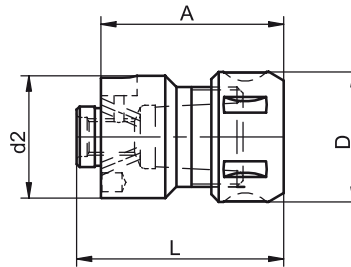
Permissible concentricity deviation of arbor to inner taper 0.003 mm.

Standard Specification

Collet chuck including clamping nut.

Collet Chucks

with Taper 1:10



d2	Clamping range	A	Ref.no.	D	L	kg
40	2 - 16	60	205.101	43	68	0.4
63	4 - 32	100	205.102	72	110	1.8

For collets, clamping nuts and clamping keys see accessories from page 7.8 to page 7.11.

Design

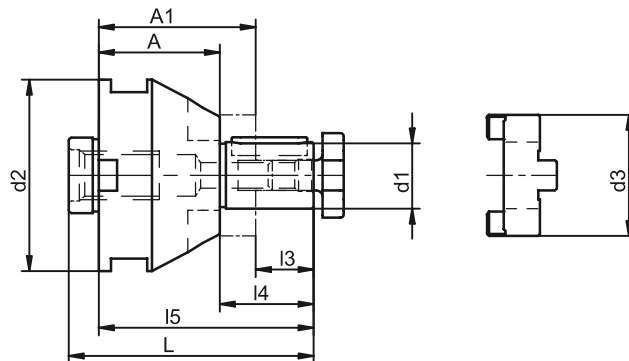
Permissible concentricity deviation of arbor to inner taper 0.008 mm.

Standard Specification

Collet chuck including clamping nut with ball bearing pressure ring.

Shell End Mill Arbors

for Milling Cutters with Longitudinal Slot or Tenon Drive



d2	d1	A	Ref.no.	d3	l3	l4	l5	L	A1	kg
50	16	40	197.006	32	17	27	67	77	50	0.6
50	22	40	197.007	40	19	31	71	81	52	0.8
63	27	40	197.003	48	21	33	73	83	52	1.1
63	32	40	197.004	58	24	38	78	88	54	1.3
63	40	40	197.005	70	27	41	81	91	54	1.8

For cutter retaining screws, keys, feather keys or drive rings see accessories from page 7.16 to page 7.17.

Use

For clamping shell end mills and milling cutters with longitudinal slot or tenon drive.

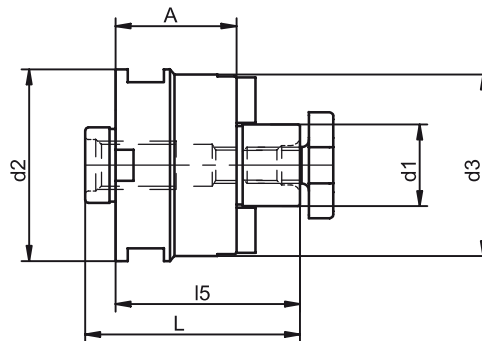
Design

Permissible concentricity deviation of arbor to milling cutter $d1 = 0.01$ mm.
Cutter drive according to DIN 138.

Standard Specification

Cutter retaining screw, feather key with withdrawal thread and drive ring included.

Shell End Mill Arbors with Enlarged Contact Diameter



d2	d1	A	Ref.no.	d3	l5	L	kg
40	22	24	197.010	40	43	51	0.3
63	27	40	197.013	60	61	71	1.0
63	32	40	197.014	80	64	74	1.7
100	40	40	197.018	90	67	79	2.6

For cutter retaining screws, keys or drive keys see accessories from page 7.16 to page 7.18.

Use

For clamping shell end mills and milling cutters with tenon drive.

Design

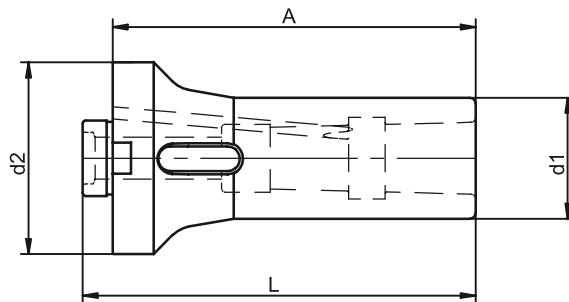
Permissible concentricity deviation of

arbor to milling cutter d1 = 0.01 mm.
Central boring for coolant supply.
Clamping Ø 40 with 4 threaded holes
for holding cutters with tool holding
according to DIN 2079.

Standard Specification

Cutter retaining screw and tightened
drive keys included.

Reduction Sleeves for Morse Taper with Tang

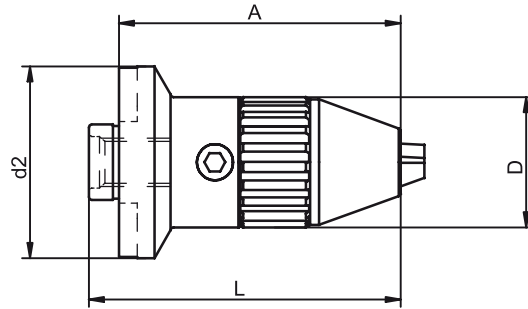


d2	MT	A	Ref.no.	d1	L	kg
40	MK 1	90	293.101	25	98	0.4
40	MK 2	100	293.102	32	108	0.6
63	MK 3	120	293.105	40	130	1.1
63	MK 4	160	293.106	48	170	1.8

Design

Permissible concentricity deviation of arbor to inner taper 0.008 mm.

Drill Chucks



d2	Clamping range	A	Ref.no.	D	L	kg
40	1 - 13	100	291.004	43	108	0.8

Use

For holding tools with straight shank for use in machining centres and NC machines.

Design

High precision and truth of running. For clockwise and anti-clockwise rotation. Simple to operate, clamping and releasing by an allen key.

Note

Central coolant supply for tools without internal cooling. Coolant passes out parallel to the tool's cutting edge.

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As of September 2010 · Technical and design modifications are subject to change without notice.



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