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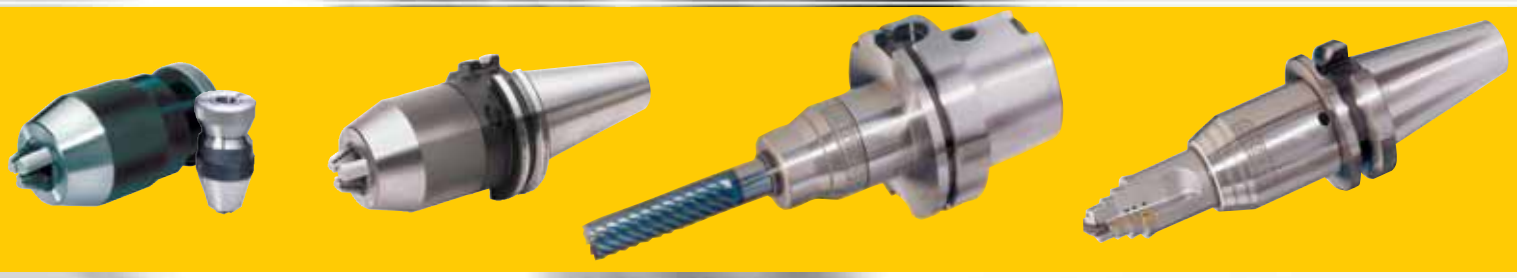
Quality Without Compromise



Outstanding Precision Chucks

Contents

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Good Reasons to use Albrecht Drill Chucks

Quality

- 2-phase quality control e.g. 100% run-out accuracy test (similar to DIN 10888)
- parts made to fit each other exactly
- working parts are case-hardened and ground

Precision

- precise hole sizing: only the optimum run-out of clamping system in connection with the tool produces precise hole sizing. This prevents unnecessary problems and costs caused by oversized holes.
- improved tool life: uniform wear increases the tool life considerably

Longevity

- case-hardened and ground working parts
- use of selected alloy steels that hold up even under the strongest pressure
- almost 100 years of experience in developing and producing high-performance drill chucks

Service

- Albrecht stocks a full range of replacement parts. As a special service, all repair work can be done at the Albrecht factory.
- represented world-wide
- solutions made to customer's specification

AMC Albrecht-Micro-Chuck with Cylindrical Shaft or Weldon-Shank

- as chuck extension
- for clamping of the smallest tools

Precision Chuck AMC

- as chuck extension with Albrecht Precision Milling Chuck APC or e.g. with a plain clamping chuck (Weldon) or collet chuck, respectively.
- operated from behind with the hex key (included)
- very slim version for operation areas not easily accessible
- the connection of the central tightening screw with the slow taper angle results in a very high run-out accuracy
- version 320 0015 816 0 as 3-jaw chuck with range 0,2 - 1,5 mm for smallest drills (needs no collet)

AMC (Dimensions in mm)

Ref. no.	Range	Taper		Shaft-Ø	L*
310 1006 814 0	1 - 6	DIN 6535-HA	Cylindrical shaft	14 h6	100
310 2006 814 0	1 - 6	DIN 6535-HA	Cylindrical shaft	14 h6	150
310 1006 820 0	1 - 6	DIN 6535-HB	Weldon	20 h6	100
310 2006 820 0	1 - 6	DIN 6535-HB	Weldon	20 h6	150
320 0015 816 0**	0,2 - 1,5	DIN 6535-HA	Cylindrical shaft	16 h6	160

*Total length
** Range 0,2 - 1,5 mm without collet

Collets for AMC

Ref. no.	Clamping Ø
136 0601 000 0	1 mm
136 0602 000 0	2 mm
136 0603 000 0	3 mm
136 0604 000 0	4 mm
136 0605 000 0	5 mm
136 0606 000 0	6 mm

We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.

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APC Precision Milling Chucks

Albrecht APC

Precision clamping chuck for highest clamping forces by means of an integrated worm gear

Clamping of cylindrical shafts tolerance h6 according to DIN 1835, Form A, B (Weldon) and DIN 6535 Form HA, HB as well as HE up to ø 20 mm

- Drilling, reaming and tapping
- Finish milling and heavy duty cutting
- Hard cutting
- HSC and HPC operations

Balancing quality

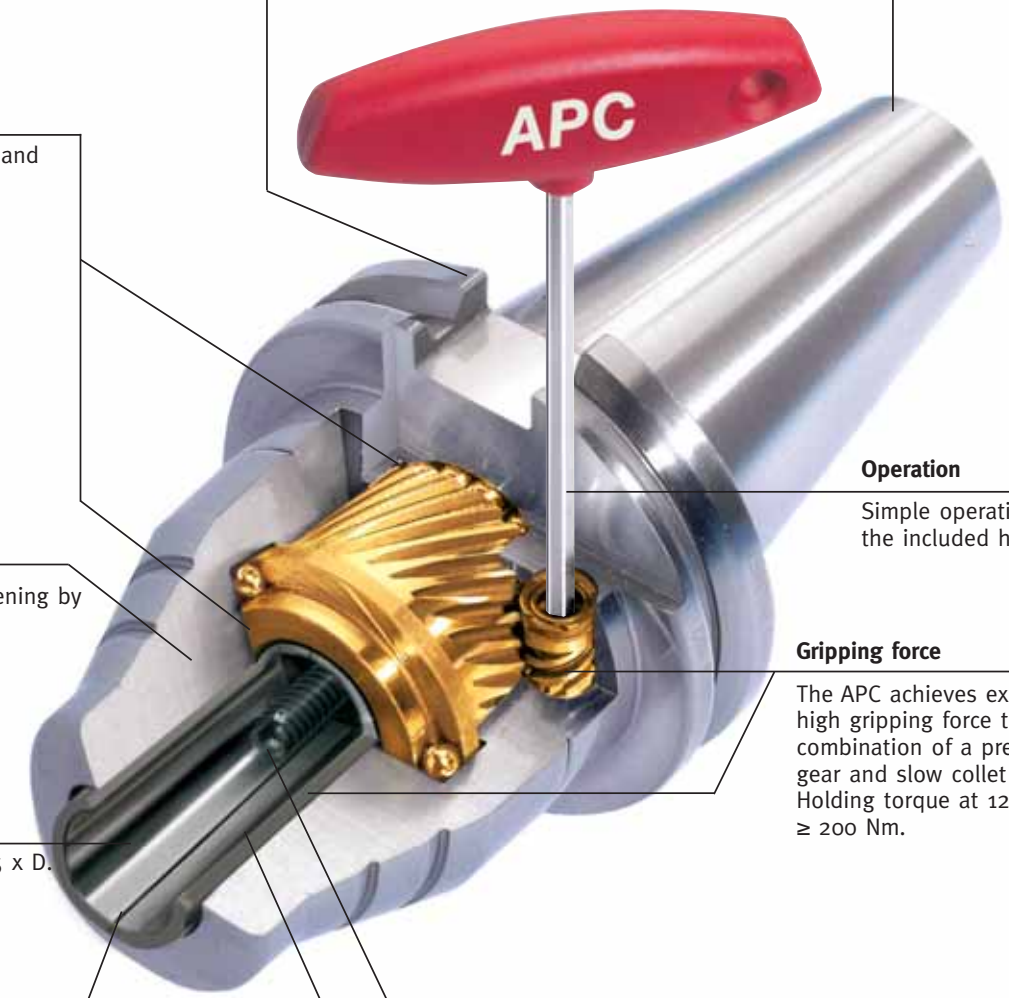
Serially balanced up to 15.000 1/min with G=6.3. Balancing to finer grade and higher RPM upon request.

Coolant

Through-coolant feature standard with form AD.

Seal

Sealed against coolant and dirt.



Operation

Simple operation by means of the included hex key.

Rigidity

High rigidity and dampening by design.

Gripping force

The APC achieves extremely high gripping force through the combination of a precision worm gear and slow collet taper angle. Holding torque at 12 mm diameter ≥ 200 Nm.

3 µm accuracy

Accuracy of 3 µm at 2.5 x D.

Capacity

Available with 3 – 14 mm, 12 – 20 mm and 20 – 32 mm.

Collet

Special surface coating on collets allows for easy loosening and fast collet changes. Collets include a depth-stop and can be used with standard and through-coolant cutting tools. Collets available in metric and „inch" sizes.

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Quality Without Compromise

Cost reduction by means of a more flexible production

6 reasons to use Albrecht APC

Reduction of tool costs

With the APC cutting tool life is increased up to 1.5 times over commercially available shrink-fit holders. This is due to the APC's rigidity, internal dampening capabilities, high accuracy and high-speed balance specifications.

More secure operation

The APC achieves extremely high gripping force through the combination of a precision worm gear and slow collet taper angle. Holding torque at 12 diameter ≥ 200 Nm.

Lower costs compared to other systems

You don't need an expensive shrinking device and you don't waste time waiting for the tool to heat and then to cool down.

- With other clamping systems you need a chuck for every tool diameter. The ability of the APC to accept multiple collet sizes enables it to take care of present and future demands in production.

Precise and quick tool changes

A conveniently located side-access hole for the included hex key enables tools to be changed even when mounted in the machine spindle. An internal stop screw enables cutting tool depth to be accurately preset (µm-range).

One system handles virtually all operations

- Finish milling and heavy duty cutting
- HSC - High Speed Cutting
- HPC - High Performance Cutting
- Hard cutting
- Drilling, reaming and tapping

Universal use

- available in different lengths
- a long and slim version is particularly suited for mold making operations
- capable of holding cutting tools ranging from 3 – 32 mm.
- tapered shanks are available according to DIN 69871, JIS B 6339 (MAS BT), ANSI CAT or DIN 69893 (HSK)

APC Versions for all standard operations

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Quality Without Compromise

Longer Tool life and Higher Gripping Force

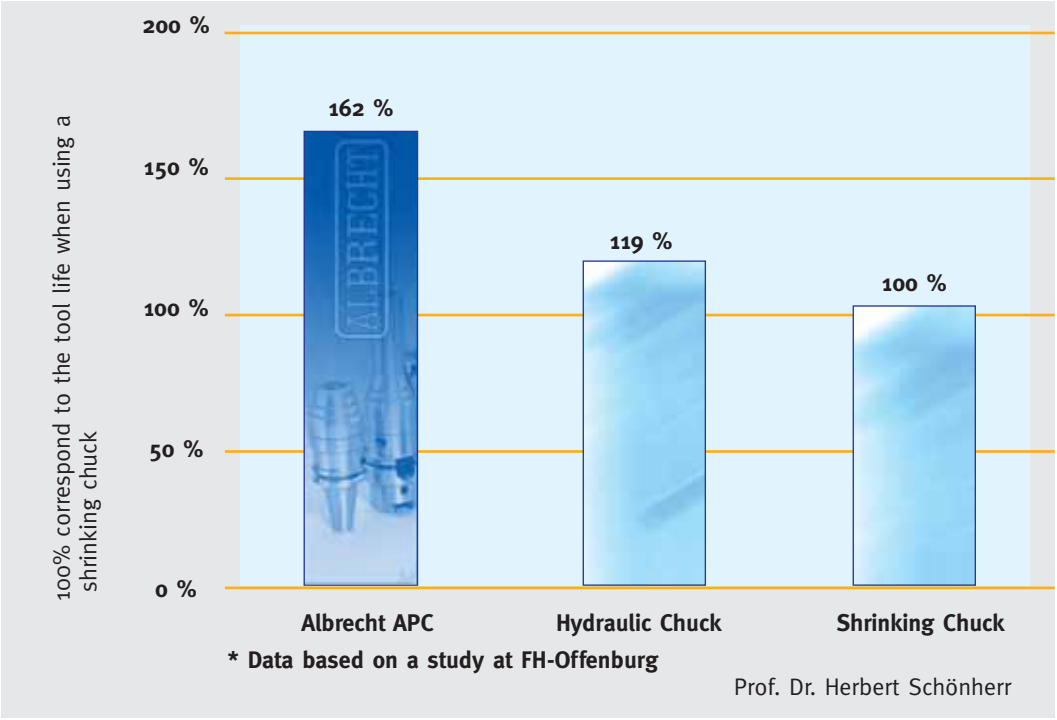
by means of best possible dampening of vibrations and design-based rigidity

in relation to
- **Hydraulic Chucks**
- **Shrinking Chucks**

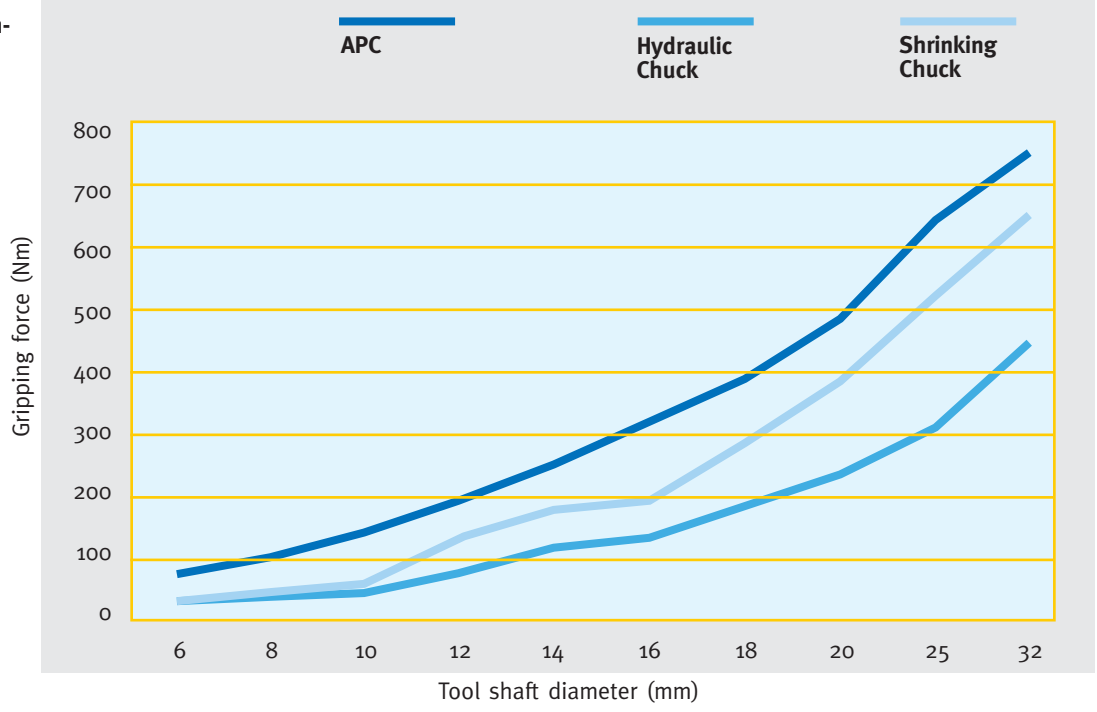
Influence of clamping system on cutting tool life

material	56 NiCrMoV7
processing	milling
operation	finishing
cutting material	HM
coating	TAX
diameter d1	12 mm
number of teeth z	6

working depth ae	1.2 mm
cutting depth ap	18 mm
cutting speed Vc	97 m/min
revolutions n	2584 1/min
teeth feed fz	0,110 mm
speed of feed vf	1698 mm/min
calculated tool life	110 m



Gripping force compared to shrinking chucks and hydraulic chucks



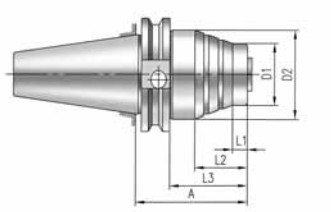
APC Versions DIN and JIS

(Dimensions in mm)

Short version

DIN 69871

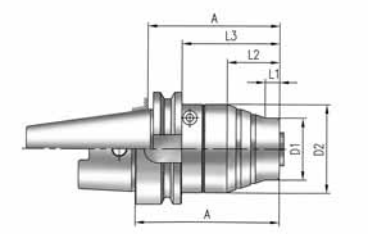
Ref. no.	Range/Form	A	D2	D1	L1	L2	L3
300 014Z 240 0	3 -14 DIN 69871-AD40	63	50	35	8	29.5	43.9
300 020Z 240 0	12-20 DIN 69871-AD40	63	50	41	16.5	29.5	43.9



Standard and long slim version

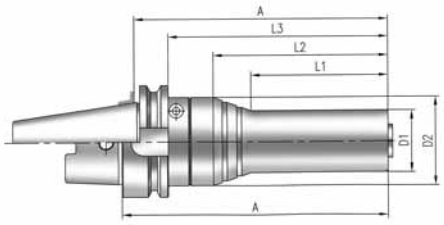
DIN 69871

Ref. no.	Range/Form	A	D2	D1	L1	L2	L3
300 114Z 230 0	3-14 DIN 69871-AD30	93	50	35	8	29.5	73.9
300 114Z 240 0	3-14 DIN 69871-AD40	74	50	35	8	29.5	54.9
300 214Z 240 0	3-14 DIN 69871-AD40	160	50	30	74.5	103	140.9
300 120Z 240 0	12-20 DIN 69871-AD40	74	50	41	16.5	29.5	54.9
300 132Z 240 0	25-32 DIN 69871-AD40	135	70	56	3	23	110.9
300 114Z 250 0	3-14 DIN 69871-AD50	74	50	35	8	29.5	54.9
300 214Z 250 0	3-14 DIN 69871-AD50	160	50	30	74.5	103	140.9
300 120Z 250 0	12-20 DIN 69871-AD50	74	50	41	16.5	29.5	54.9
300 132Z 250 0	20-32 DIN 69871-AD50	110	70	56	3	23	90.9



JIS B 6339 (MAS BT)

Ref. no.	Range/Form	A	D2	D1	L1	L2	L3
300 114Z 430 0	3-14 JIS B 6339-AD30	82	50	35	8	29.5	60
300 114Z 440 0	3-14 JIS B 6339-AD40	82	50	35	8	29.5	55
300 214Z 440 0	3-14 JIS B 6339-AD40	168	50	30	74.5	103	141
300 120Z 440 0	12-20 JIS B 6339-AD40	82	50	41	16.5	29.5	55
300 132Z 440 0	25-32 JIS B 6339-AD40	135	70	56	3	23	103
300 114Z 450 0	3-14 JIS B 6339-AD50	93	50	35	8	29.5	55
300 214Z 450 0	3-14 JIS B 6339-AD50	179	50	30	74.5	103	141
300 120Z 450 0	12-20 JIS B 6339-AD50	93	50	41	16.5	29.5	55
300 132Z 450 0	20-32 JIS B 6339-AD50	130	70	56	3	23	92



DIN 69893 (HSK)

Ref. no.	Range/Form	A	D2	D1	L1	L2	L3
300 114Z 663 0	3-14 DIN 69893-A63	90	50	35	8	29.5	64
300 214Z 663 0	3-14 DIN 69893-A63	176	50	30	74.5	103	150
300 120Z 663 0	12-20 DIN 69893-A63	90	50	41	16.5	29.5	64
300 132Z 663 0	25-32 DIN 69893-A63	140	70	56	3	23	109
300 114Z 610 0	3-14 DIN 69893-A100	100	50	35	8	29.5	71
300 214Z 610 0	3-14 DIN 69893-A100	186	50	30	74.5	103	157
300 120Z 610 0	12-20 DIN 69893-A100	100	50	41	16.5	29.5	71
300 132Z 663 0	20-32 DIN 69893-A100	135	70	56	3	23	106

Special lenghts on request

We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.

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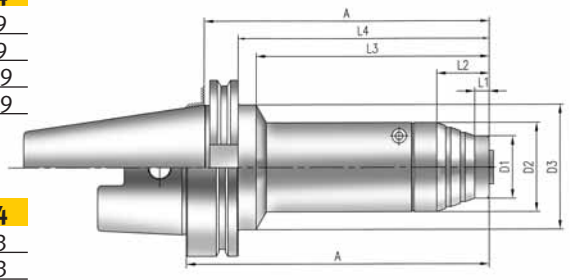
APC Versions DIN and JIS

Collets and accessories
(Dimensions in mm)

Long version

DIN 69871

Ref. no.	Range/Form	A	D3	D2	D1	L1	L2	L3	L4
300 314Z 240 0	3-14 DIN 69871-AD40	110	-	50	35	8	29.5	-	90.9
300 320Z 240 0	12-20 DIN 69871-AD40	110	-	50	41	16,5	29.5	-	90.9
300 414Z 250 0	3-14 DIN 69871-AD50	160	70	50	35	8	29.5	130	140.9
300 420Z 250 0	12-20 DIN 69871-AD50	160	70	50	41	16.5	29.5	130	140.9



Special lenghts on request

JIS B 6339 (MAS BT)

Ref. no.	Range/Form	A	D3	D2	D1	L1	L2	L3	L4
300 314Z 440 0	3-14 JIS B 6339-AD40	110	-	50	35	8	29.5	-	83
300 320Z 440 0	12-20 JIS B 6339-AD40	110	-	50	41	16.5	29.5	-	83
300 414Z 450 0	3-14 JIS B 6339-AD50	160	70	50	35	8	29.5	112	122
300 420Z 450 0	12-20 JIS B 6339-AD50	160	70	50	41	16.5	29.5	112	122

DIN 69893 (HSK)

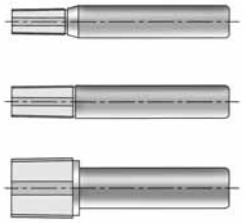
Ref. no.	Range/Form	A	D3	D2	D1	L1	L2	L3	L4
300 314Z 663 0	3-14 DIN 69893-A63	130	-	50	35	8	29.5	-	104
300 414Z 663 0	12-20 DIN 69893-A63	130	-	50	41	16.5	29.5	-	104
300 414Z 610 0	3-14 DIN 69893-A100	160	70	50	35	8	29.5	115	131
300 420Z 610 0	12-20 DIN 69893-A100	160	70	50	41	16.5	29.5	115	131

Collets

Clamping of cylindrical shafts (tolerance h6) according to DIN 1835, Form A, B (Weldon) and DIN 6535, Form HA, HB as well as HE up to Ø 20 mm (version T for tools with inner coolant flow)

Ref. no.	Ref. no. (T)	Clamp-Ø/Size	
136 1403 000 0		ø 3 mm	3-14
136 1404 000 0		ø 4 mm	3-14
136 1405 000 0		ø 5 mm	3-14
136 1406 000 0		ø 6 mm	3-14
136 1408 000 0	136 1408 000 T	ø 8 mm	3-14
136 1409 000 0	136 1409 000 T	ø 9 mm	3-14
136 1410 000 0	136 1410 000 T	ø 10 mm	3-14
136 1412 000 0	136 1412 000 T	ø 12 mm	3-14
136 1414 000 0	136 1414 000 T	ø 14 mm	3-14
136 2012 000 0	136 2012 000 T	ø 12 mm	12-20
136 2014 000 0	136 2014 000 T	ø 14 mm	12-20
136 2016 000 0	136 2016 000 T	ø 16 mm	12-20
136 2018 000 0	136 2018 000 T	ø 18 mm	12-20
136 2020 000 0	136 2020 000 T	ø 20 mm	12-20
136 3220 000 0	136 3220 000 T	ø 20 mm	20-32
136 3222 000 0	136 3222 000 T	ø 22 mm	20-32
136 3225 000 0	136 3225 000 T	ø 25 mm	20-32
136 3232 000 0	136 3232 000 T	ø 32 mm	20-32

Taper wipers



Ref. no.	Size	
139 0000 GR1 0	taper wiper	3 – 14
139 0000 GR2 0	taper wiper	12 – 20
139 0000 GR5 0	taper wiper	20 – 32

We reserve the right for changes in design due to technical improvements. Pictures and dimensions not binding.

APC Collets and Accessories

Collets

- Hardened, ground and coated for high gripping force and long life.
- Can be used with standard or through-coolant.
- Collets are easily changed by hand. No special tools are needed.
- An internal stop screw enables cutting tool to be µm-precisely set.
- No expensive and time consuming pre-setter is required.

Taper wipers

- Gripping force and longevity of the APC is enhanced by regularly cleaning the contact surfaces.
- Taper wipers are available for each APC model: 3 – 14 mm, 12 – 20 mm and 20 – 32 mm

Torque key

- for controlled clamping
- fixed at 14 Nm

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Quality Without Compromise

CNC Drill Chuck AKL

ASL Albrecht-Super-Lock self-tightening

- **designed for a quick tool change with single part production and/or NC-machines**
- **self-tightening, open and close manually**
- **or with key for additional clamping force (if necessary)**

CNC Drill Chuck ASL

The Albrecht CNC Drill Chuck ASL enables an easy and quick tool change. Thus, this chuck is especially suited for single part production with frequent tool change for NC-machines with taper shank SK40 and SK50 according to DIN 2080, DIN 69871 and JIS B 6339 (MAS BT and SK50).

The CNC drill chuck is distinguished by a special design, parts of very high precision as well as an assembly which is followed by a 100% quality check. This guarantees maximum clamping force and highest concentricity - and this leads to more precise bores and improved tool life.

With increasing cutting force the clamping force of the chuck increases automatically as well. This self-tightening effect only works with clock-wise operation. The clamping force can be increased via the supplied key. The chuck can easily be opened for tool change.
This is possible only because all parts are manufactured to fit each other and all working parts are case-hardened and ground.

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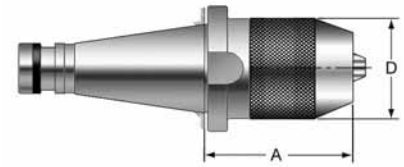
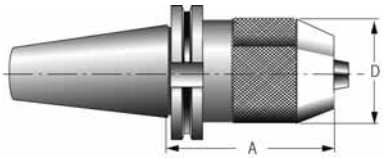
ASL Albrecht-Super-Lock, Versions

(Dimensions in mm)



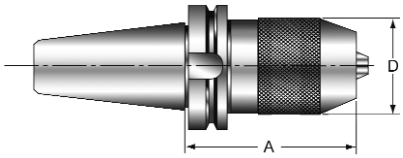
DIN 2080 Form A

Ref. no.	Range	Form	A	D
100 4130 140 0	1 - 13	DIN 2080-A40	82	50
100 4160 140 0	1,5 - 16	DIN 2080-A40	84	56
100 4160 150 0	1,5 - 16	DIN 2080-A50	83	56



DIN 69871 Form A

Ref. no.	Range	Form	A	D
100 4130 240 0	1 - 13	DIN 69871-A40	86	50
100 4160 240 0	1,5 - 16	DIN 69871-A40	89	56
100 4160 250 0	1,5 - 16	DIN 69871-A50	87	56



JIS B 6339 (MAS BT) Form A

Ref. no.	Range	Form	A	D
100 4130 440 0	1 - 13	JIS B 6339-A40	92	50
100 4160 440 0	1,5 - 16	JIS B 6339-A40	94	56
100 4160 450 0	1,5 - 16	JIS B 6339-A50	105	56

We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.

AKL Albrecht-Key-Lock key-operated

- **compact design**
- **high run-out accuracy**
- **flexible use**
- **balanced with G=6,3 up to 15.000 1/min**
- **suitable for clockwise and counter-clockwise operations**

AKL 1,5 – 16 mm
SK 50 – DIN 2080

AKL 1 – 13 mm
SK 50 – DIN 69871

AKL-Diamond 1 – 13 mm
BT 40 JIS B 6339

AKL 1 – 13 mm
SK 40 – DIN 69871

AKL-Ultra
1 – 13 mm
HSK 63
DIN 69893

AKL 0,5 – 10 mm
SK 30 DIN 69871

AKL 1 – 13 mm
VDI DIN 69880
with 3 nozzles

AKL 1 – 13 mm
MK 3 DIN 228 B

AKL 1 – 13 mm
cylindrical shaft Ø 20

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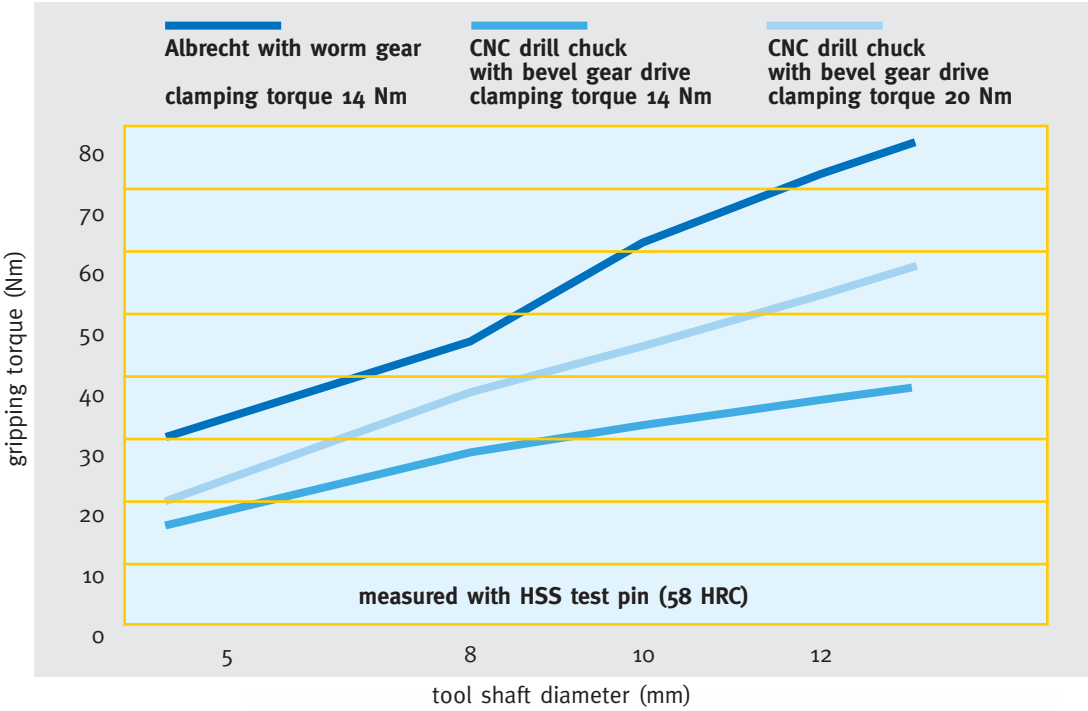
Quality Without Compromise

Higher gripping torque in comparison to versions with bevel gear drive

- integrated worm gear with a big transmission
- a self-locking device prevents the chuck from opening during operation

Comparison between Albrecht AKL with worm gear and CNC drill chuck with bevel gear drive (both with range 1-13 mm)



The Albrecht AKL was developed specifically for use with machining centres, CNC-machines and universal milling machines. This chuck offers high precision, high clamping force, reliability and run-out accuracy - thus, leading to more precise bores and improved tool life.

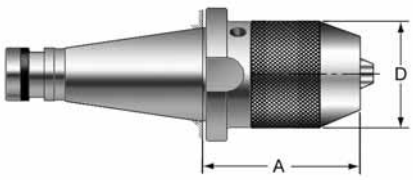
The CNC drill chuck is opened and closed by means of the supplied hex key. The especially high gripping torque is the result of the big transmission of the worm gear. An additional positive effect is the self-locking of the worm gear. This protects the chuck against opening during clockwise or counter-clockwise use as well as against vibrations. Another advantage is the conveniently located side access hole for the hex key. Thus, the tool can also be changed directly on the machine.

All AKL CNC drill chucks are balanced with G=6,3 up to 15.000 1/min. And here, as well as with the rest of the Albrecht-programme range special demands from our customers are fulfilled, e.g., a different balancing quality.

Easy tool change, even in the machine, by means of the added hex key.

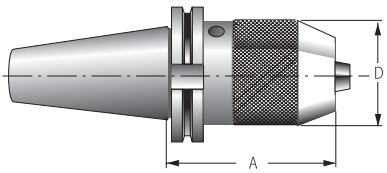
AKL Albrecht-Key-Lock, Versions

(Dimensions in mm)



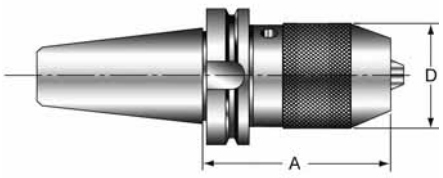
DIN 2080

Ref. no.	Range	Form	Coolant	A	D
800 5100 130 0	0,5 - 10	DIN 2080-A30	none	69	38
800 5130 140 0	1 - 13	DIN 2080-A40	none	73	50
800 5160 150 0	1,5 - 16	DIN 2080-A50	none	79	56



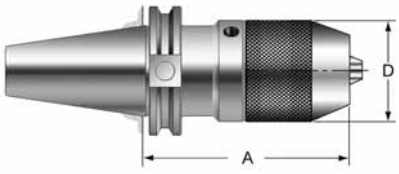
DIN 69871

Ref. no.	Range	Form	Coolant	A	D
800 5100 230 0	0,5 - 10	DIN 69871-A30	none	69	38
800 510Z 230 0	0,5 - 10	DIN 69871-AD30	central	69	38
800 5100 240 0	0,5 - 10	DIN 69871-A40	none	69	38
800 510Z 240 0	0,5 - 10	DIN 69871-AD40	central	69	38
800 5130 240 0	1 - 13	DIN 69871-A40	none	80	50
800 513Z 240 0	1 - 13	DIN 69871-AD40	central	80	50
800 513B 240 0	1 - 13	DIN 69871-B40	via flange	80	50
800 5160 240 0	1,5 - 16	DIN 69871-A40	none	90	56
800 516Z 240 0	1,5 - 16	DIN 69871-AD40	central	90	56
800 516B 240 0	1,5 - 16	DIN 69871-B40	via flange	90	56
800 5160 250 0	1,5 - 16	DIN 69871-A50	none	81	56
800 516Z 250 0	1,5 - 16	DIN 69871-AD50	central	81	56
800 516B 250 0	1,5 - 16	DIN 69871-B50	via flange	81	56



JIS B 6339 (MAS BT)

Ref. no.	Range	Form	Coolant	A	D
800 5100 430 0	0,5 - 10	JIS B 6339-A30	none	72	38
800 510Z 430 0	0,5 - 10	JIS B 6339-AD30	central	72	38
800 5100 440 0	0,5 - 10	JIS B 6339-A40	none	77	38
800 5130 440 0	1 - 13	JIS B 6339-A40	none	88	50
800 513Z 440 0	1 - 13	JIS B 6339-AD40	central	88	50
800 513B 440 0	1 - 13	JIS B 6339-B40	via flange	88	50
800 5160 440 0	1,5 - 16	JIS B 6339-A40	none	90	56
800 516Z 440 0	1,5 - 16	JIS B 6339-AD40	central	90	56
800 5160 450 0	1,5 - 16	JIS B 6339-A50	none	102	56
800 516Z 450 0	1,5 - 16	JIS B 6339-AD50	central	102	56



ANSI-CAT

Ref. no.	Range	Form	Coolant	A	D
80Z 5130 540 0	1 - 13	ANSI CAT 40-A	none	99	50
80Z 513Z 540 0	1 - 13	ANSI CAT 40-AD	central	99	50
80Z 5160 540 0	1,5 - 16	ANSI CAT 40-A	none	104	56
80Z 516Z 540 0	1,5 - 16	ANSI CAT 40-AD	central	104	56
80Z 5160 550 0	1,5 - 16	ANSI CAT 50-A	none	86	56
80Z 516Z 550 0	1,5 - 16	ANSI CAT 50-AD	central	86	56

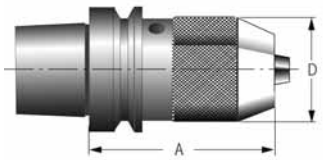
We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding

ALBRECHT

Quality Without Compromise

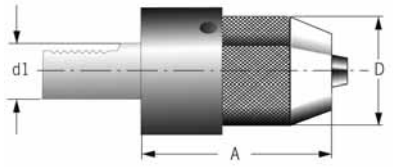
AKL Albrecht-Key-Lock, Versions

(Dimensions in mm)



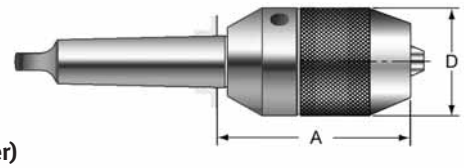
DIN 69893 (HSK)

Ref. no.	Range	Form	Coolant	A	D
800 513Z 663 0	1 - 13	DIN 69893-A63	central	98	50
800 516Z 663 0	1,5 - 16	DIN 69893-A63	central	100	56
800 513Z 610 0	1 - 13	DIN 69893-A100	central	104	50
800 516Z 610 0	1,5 - 16	DIN 69893-A100	central	107	56



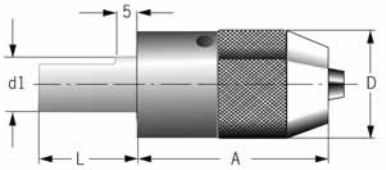
DIN 69880 (VDI)

Ref. no.	Range	Form - d1	Coolant	A	D
800 513Z 720 0	1 - 13	DIN 69880-20	central	87	50
800 513S 730 0	1 - 13	DIN 69880-30	3 Düsen	77	57
800 513Z 730 0	1 - 13	DIN 69880-30	central	87	50
800 516S 730 0	1,5 - 16	DIN 69880-30	3 Düsen	80	63
800 516Z 730 0	1,5 - 16	DIN 69880-30	central	90	56
800 513S 740 0	1 - 13	DIN 69880-40	3 Düsen	77	57
800 513Z 740 0	1 - 13	DIN 69880-40	central	87	50
800 516S 740 0	1,5 - 16	DIN 69880-40	3 Düsen	90	63
800 516Z 740 0	1,5 - 16	DIN 69880-40	central	90	56



DIN 228 B (morse taper)

Ref. no.	Range	Form	Coolant	A	D
800 5130 MK3 0	1 - 13	DIN 228 B-MT3	none	87	50



zylindrical shaft with clamping surface

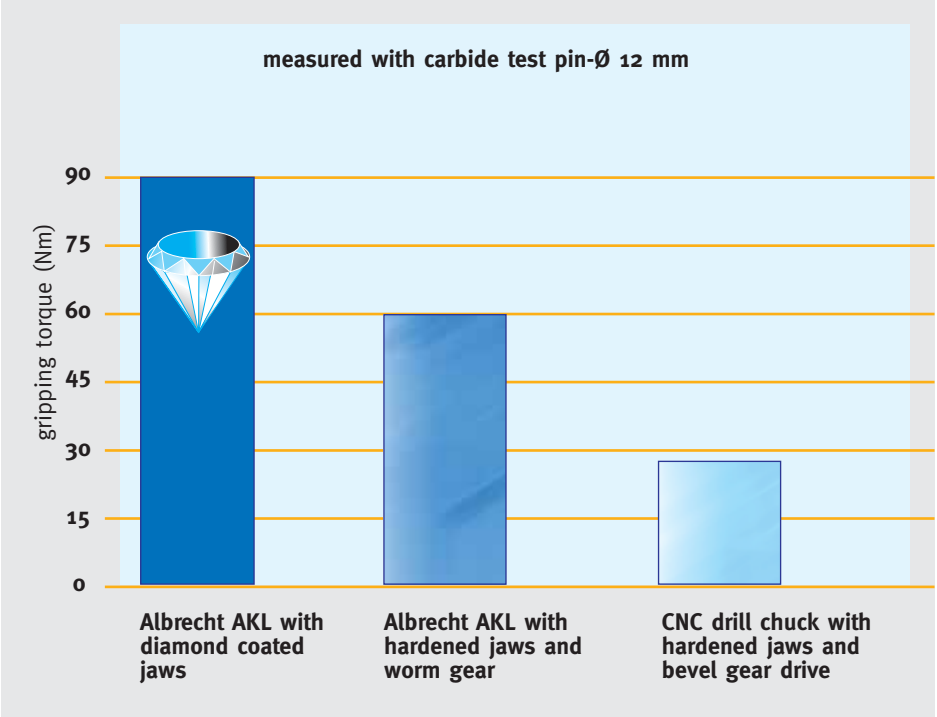
Ref. no.	Range	d1 x l	Coolant	A	D
800 513Z 824 0	1 - 13	20 x 40	central	87	50
800 513Z 825 0	1 - 13	25 x 50	central	87	50
800 513Z 812 0	1 - 13	1" x 2"	central	87	50

AKLD with diamond coated jaws

- for drills with through-hardened shaft
- for carbide tools

Comparison of gripping torque with carbide test pin ø 12 mm

Comparison of grpping torque Albrecht AKL with diamond coated jaws against short drill chuck with through-hardened jaws.



For drills with through-hardened shaft and/or carbide drills, Albrecht offers the AKL series with diamond coated jaws. This patented coating prevents the slipping of the tool by enabling the diamond dust to penetrate the tool shaft.

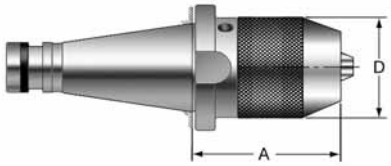
ALBRECHT

Quality Without Compromise

AKLD with diamond coated jaws, Versions

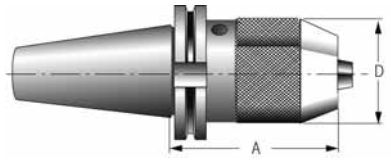
(Dimensions in mm)

DIN 2080



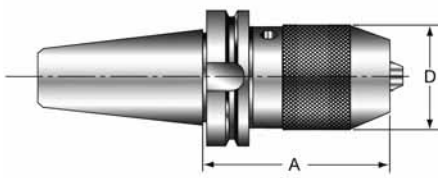
Ref. no.	Range	Form	Coolant	A	D
8Do 5130 140 0	1 - 13	DIN 2080-A40	none	73	50
8Do 5160 150 0	1,5 - 16	DIN 2080-A50	none	79	56

DIN 69871



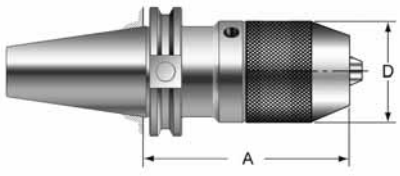
Ref. no.	Range	Form	Coolant	A	D
8Do 510Z 240 0	0,5 - 10	DIN 69871-AD40	central	69	38
8Do 5130 240 0	1 - 13	DIN 69871-A40	none	80	50
8Do 513Z 240 0	1 - 13	DIN 69871-AD40	central	80	50
8Do 516Z 240 0	1,5 - 16	DIN 69871-AD40	central	90	56
8Do 516Z 250 0	1,5 - 16	DIN 69871-AD50	central	81	56

JIS B 6339 (MAS BT)



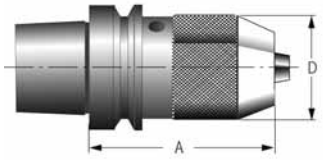
Ref. no.	Range	Form	Coolant	A	D
8Do 510Z 430 0	0,5 - 10	JIS B 6339-AD30	central	72	38
8Do 5130 440 0	1 - 13	JIS B 6339-A40	none	88	50
8Do 513Z 440 0	1 - 13	JIS B 6339-AD40	central	88	50
8Do 516Z 440 0	1,5 - 16	JIS B 6339-AD40	central	90	56
8Do 516Z 450 0	1,5 - 16	JIS B 6339-AD50	central	102	56

ANSI-CAT



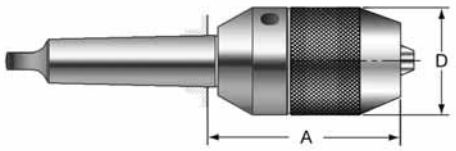
Ref. no.	Range	Form	Coolant	A	D
8DZ 513Z 540 0	1 - 13	ANSI CAT 40-AD	central	99	50

DIN 69893 (HSK)



Ref. no.	Range	Form	Coolant	A	D
8Do 513Z 663	01 - 13	DIN 69893-A63	central	98	50
8Do 516Z 663	01,5 - 16	DIN 69893-A63	central	100	56
8Do 513Z 610	01 - 13	DIN 69893-A100	central	104	50
8Do 516Z 610	01,5 - 16	DIN 69893-A100	central	107	56

DIN 228 B (morse taper)



Ref. no.	Range	Form	Coolant	A	D
8Do 5130 MK3	01 - 13	DIN 228 B-MT3	none	87	50

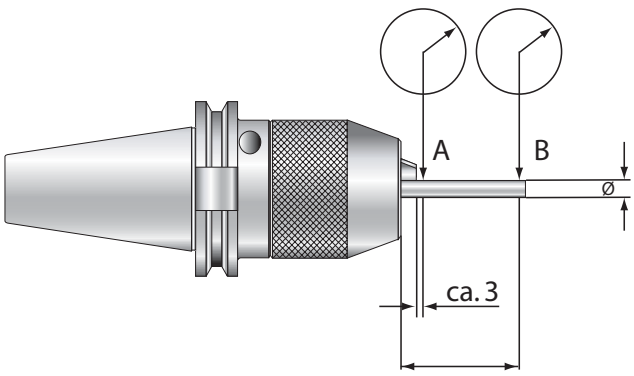
We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.

AKL-Ultra with highest run-out accuracy of ≤ 15 µm

Run-out accuracy

The AKL with a run-out accuracy of ≤ 0,015 mm for the whole clamping range is especially suited for operations demanding highest precision.

The very high precision improves the tool life even more.



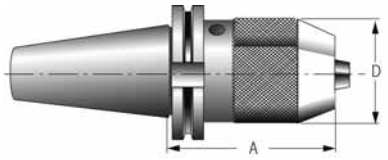
100% inspection with different test pin diameters at different measuring points similar to DIN ISO 10888.

ALBRECHT

Quality Without Compromise

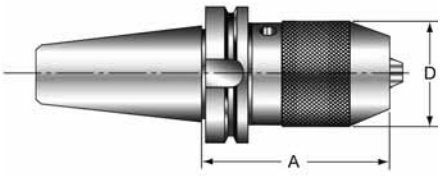
AKL-Ultra with highest run-out accuracy of ≤ 15 µm, Versions

(Dimensions in mm)



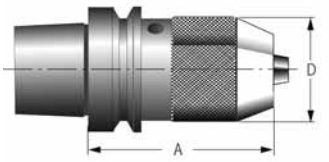
DIN 69871

Ref. no.	Range	Form	Coolant	A	D
800 5100 230 1	0,5 - 10	DIN 69871-A30	none	69	38
800 510Z 230 1	0,5 - 10	DIN 69871-AD30	central	69	38
800 5100 240 1	0,5 - 10	DIN 69871-A40	none	69	38
800 510Z 240 1	0,5 - 10	DIN 69871-AD40	central	69	38
800 5130 240 1	1 - 13	DIN 69871-A40	none	80	50
800 513Z 240 1	1 - 13	DIN 69871-AD40	central	80	50
800 513B 240 1	1 - 13	DIN 69871-B40	via flange	80	50
800 5160 240 1	1,5 - 16	DIN 69871-A40	none	90	56
800 516Z 240 1	1,5 - 16	DIN 69871-AD40	central	90	56
800 516B 240 1	1,5 - 16	DIN 69871-B40	via flange	90	56
800 5160 250 1	1,5 - 16	DIN 69871-A50	none	81	56
800 516Z 250 1	1,5 - 16	DIN 69871-AD50	central	81	56
800 516B 250 1	1,5 - 16	DIN 69871-B50	via flange	81	56



JIS B 6339 (MAS BT)

Ref. no.	Range	Form	Coolant	A	D
800 5100 430 1	0,5 - 10	JIS B 6339-A30	none	72	38
800 510Z 430 1	0,5 - 10	JIS B 6339-AD30	central	72	38
800 5100 440 1	0,5 - 10	JIS B 6339-A40	none	77	38
800 5130 440 1	1 - 13	JIS B 6339-A40	none	88	50
800 513Z 440 1	1 - 13	JIS B 6339-AD40	central	88	50
800 513B 440 1	1 - 13	JIS B 6339-B40	via flange	88	50
800 5160 440 1	1,5 - 16	JIS B 6339-A40	none	90	56
800 516Z 440 1	1,5 - 16	JIS B 6339-AD40	central	90	56
800 5160 450 1	1,5 - 16	JIS B 6339-A50	none	102	56
800 516Z 450 1	1,5 - 16	JIS B 6339-AD50	central	102	56



DIN 69893 (HSK)

Ref. no.	Range	Form	Coolant	A	D
800 513Z 663 1	1 - 13	DIN 69893-A63	central	98	50
800 516Z 663 1	1,5 - 16	DIN 69893-A63	central	100	56
800 513Z 610 1	1 - 13	DIN 69893-A100	central	104	50
800 516Z 610 1	1,5 - 16	DIN 69893-A100	central	107	56

We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.

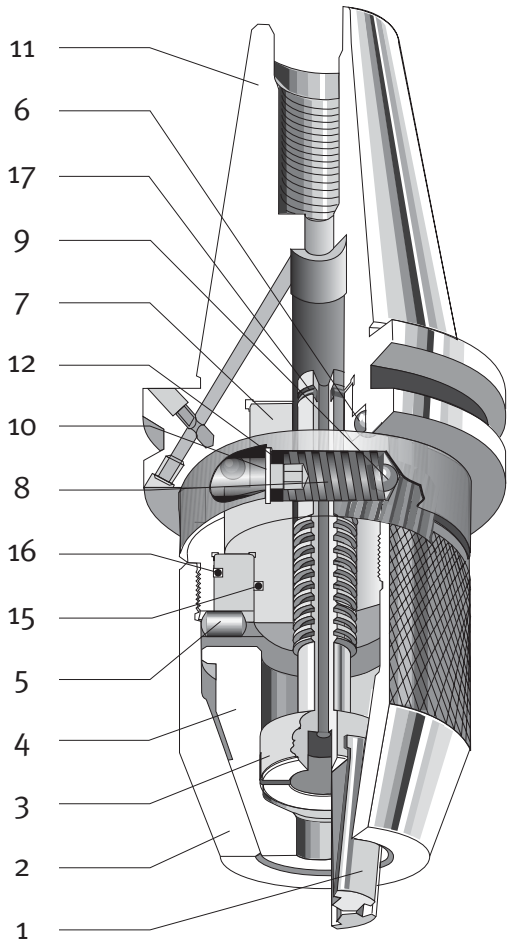
Spare parts for AKL, AKLD and AKL-Ultra

Albrecht products

Albrecht stocks a full range of replacement parts for all models and offers a comprehensive repair service wehre chucks can be reconditioned to like-new accuracies. All reconditioned AKL drill chucks undergo a 100% inspection process incorporating multiple test pins similar to DIN ISO 10888.

All parts are available as spares:

1 Set of jaws
2 Hood
3 Spindle
4 Jaw guide with pin
6 Set of balls
7 Worm body
8, 9, 10, 12 Worm set
11 taper
15, 16, 17 Set of O-rings



ALBRECHT

Quality Without Compromise

Super Keyless Drill Chuck SBF

SBF with Inner Taper or Thread

- **longevity due to hardened working parts**
- **highest run-out accurary and precision**
- **with diamond coated jaws on request**

Super Keyless Drill Chuck SBF

The Super Keyless Drill Chuck SBF, manufactured by ALBRECHT is well known as the world's most consistently accurate drill chuck. All SBF drill chucks are produced to very high standards and are 100% inspected for quality to ensure maximum clamping force and highest guaranteed concentricity, resulting in precise bore size and improved cutting tool life. Keyless Drill Chucks incorporate a unique self-tightening feature that automatically increases clamping force as the cutting force increases - however this works only with clockwise use. All components are hardened and ground to exact tolerances to ensure that the chucks can be easily opened by hand after use.

The SBF is available in 8 sizes ranging from 0 to 1.5 mm up to 1.5 to 16 mm capacity. Mount choices include tapers according to DIN 239 or Jacobs standards, and a variety of UNF threads are also available. With the 1.5 mm capacity chuck you will find a scale for presetting, thus even the smallest drill can be inserted and clamped with the highest precision.

All drill chucks can be balanced on demand. For EDM machines especially, the chuck can be assembled with a spindle through hole.

Albrecht products

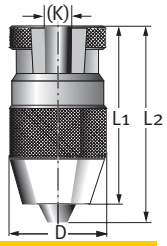
Albrecht stocks a full range of replacement parts for all models and offers a comprehensive repair service where chucks can be reconditioned to like-new accuracies. All reconditioned AKL drill chucks undergo a 100% inspection process incorporating multiple test pins similar to DIN ISO 10888.

ALBRECHT

Quality Without Compromise

SBF Versions

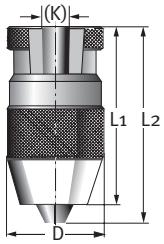
(Dimensions in mm)



Drill chuck according to DIN ISO 239 B-Taper

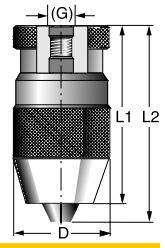
Ref. no.		Range	Taper	D	L1	L2	Weight kg
100 0015	B06 0	0 - 1,5	B6	19	35	37,5	0,05
100 1015	B06 0	1,5 - 3	B6	19	35	37,5	0,05
100 0030	B06 0	0 - 3	B6	24	44	47,5	0,1
100 0030	B10 0	0 - 3	B10	24	44	47,5	0,1
100 0050	B10 0	0 - 5	B10	30	56	61,5	0,2
100 0065	B10 0	0 - 6,5	B10	34	61,5	68	0,29
100 0080	B10 0	0 - 8	B10	38	69	77,5	0,42
100 0050	B12 0	0 - 5	B12	30	56	61,5	0,2
100 0065	B12 0	0 - 6,5	B12	34	61,5	68	0,29
100 0080	B12 0	0 - 8	B12	38	69	77,5	0,42
100 0100	B12 0	0 - 10	B12	43	80	91	0,61
100 0100	B16 0	0 - 10	B16	43	80	91	0,61
100 0130	B16 0	1 - 13	B16	50	90,5	103	0,945
100 0160	B16 0	3 - 16	B16	56	95,5	109	1,25
100 0160	B18 0*	3 - 16	B18	56	95,5	109	1,25

* 7mm short of DIN ISO 239



Drill chuck according to DIN ISO 239 J-Taper (Jacobs)

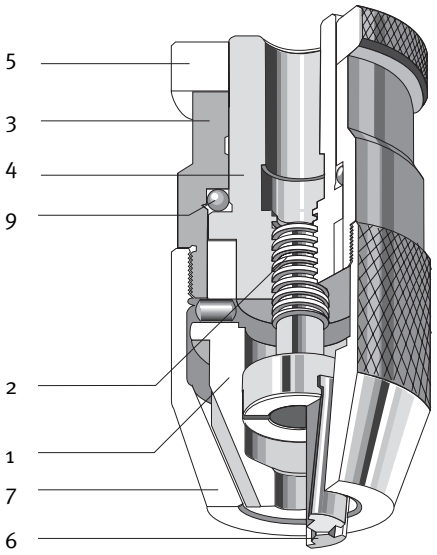
Ref. no.		Range	Taper	D	L1	L2	Weight kg
100 0015	B06 0	0 - 1,5	J0	19	35	37,5	0,05
100 1015	B06 0	1,5 - 3	J0	19	35	37,5	0,05
100 0030	B06 0	0 - 3	J0	24	44	47,5	0,1
100 0030	J01 0	0 - 3	J1	24	44	47,5	0,1
100 0050	J01 0	0 - 5	J1	30	56	61,5	0,2
100 0065	J01 0	0 - 6,5	J1	34	61,5	68	0,29
100 0080	J02 0	0 - 8	J2	38	69	77,5	0,42
100 0100	J02 0	0 - 10	J2	43	80	91	0,61
100 0130	J02 0	1 - 13	J2	50	90,5	103	0,945
100 0100	J33 0	0 - 10	J33	43	80	91	0,61
100 0130	J33 0	1 - 13	J33	50	90,5	103	0,945
100 0130	J06 0	1 - 13	J6	50	90,5	103	0,945
100 0160	J06 0	3 - 16	J6	56	95,5	109	1,25



Thread UNF

Ref. no.		Range	Taper	D	L1	L2	Weight kg
100 0050	G01 0	0 - 5	5/16-24	30	56	61,5	0,2
100 0065	G01 0	0 - 6,5	5/16-24	34	61,5	68	0,29
100 0065	G03 0	0 - 6,5	1/ 2-20	34	61,5	68	0,29
100 0080	G03 0	0 - 8	1/ 2-20	38	69	77,5	0,42
100 0100	G04 0	0 - 10	5/ 8-16	43	80	91	0,61
100 0130	G04 0	1 - 13	5/ 8-16	50	90,5	103	0,945

All parts are available as spares:



1 Jaw guide with pin
2+4 Body with spindle
3 Shell
5 Collar grip cpl.
6 Set of jaws
7 Hood
9 Set of balls

We reserve the right for changes in design due to technical improvements. Pictures and dimensions not binding.

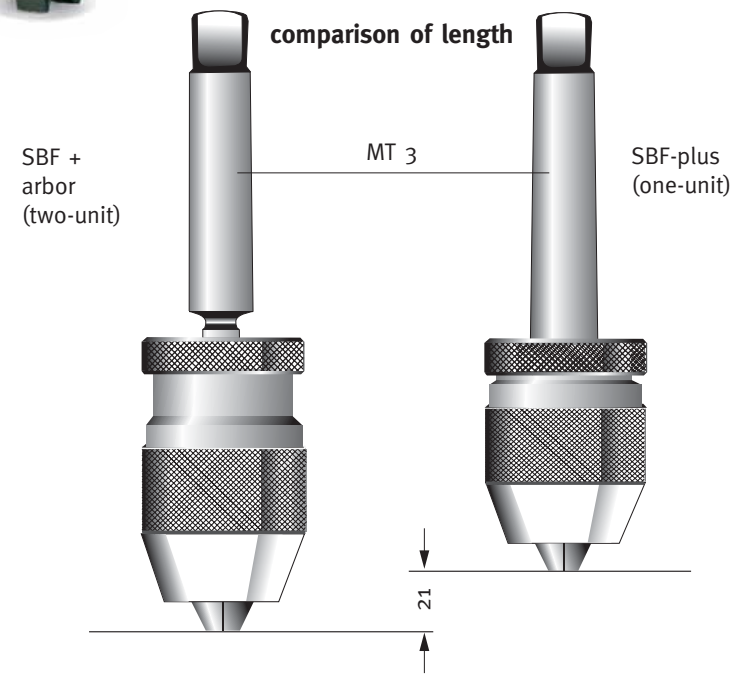
SBF-plus with Integral Shank (one unit)

(Dimensions in mm)

- **shorter by 21 mm than a chuck/arbor combination**
- **especially suitable for machines with a small work envelope**
- **higher rigidity and run-out accuracy**
- **with diamond coated jaws on request**

The integral shank is available as morse taper, cylindrical shaft or R8 taper for Bridgeport machines. The advantage against a chuck/taper combination is the shorter length -especially suitable for machines with a small work envelope. It also results in a higher rigidity and run-out accuracy.

The self-tightening function only works with clockwise operation.



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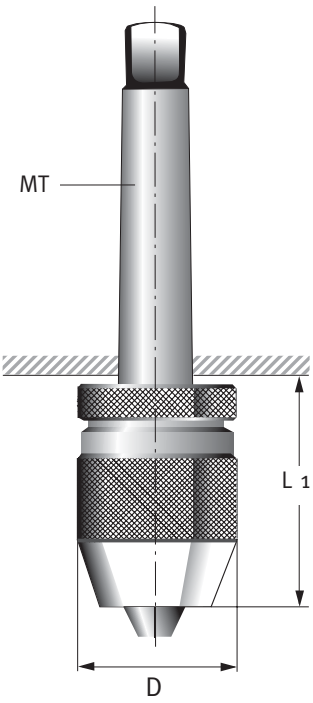
Quality Without Compromise

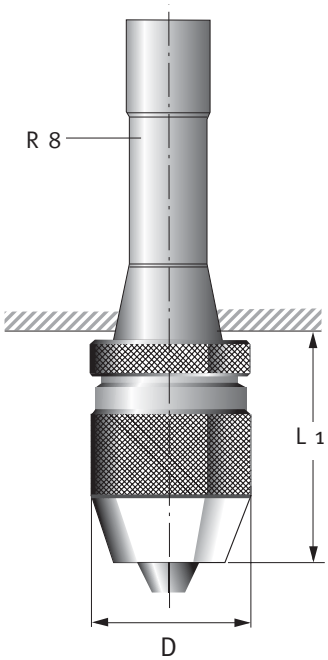
SBF-plus Versions

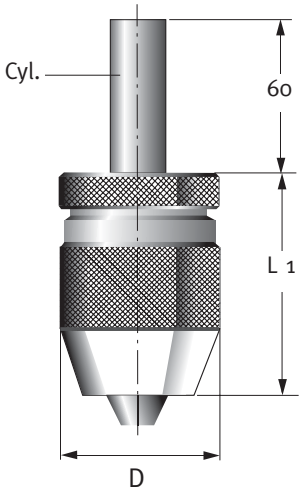
(Dimensions in mm)

Ref. no.	Range	Taper	D	L1	kg
100 0130 MK2 0	1-13	MT 2	50	85	1,03
100 0130 MK3 0	1-13	MT 3	50	85	1,17
100 0130 MK4 0	1-13	MT 4	50	86,5	1,48
100 0130 R08 0	1-13	R 8	50	84	1,25
100 0130 Z16 0	1-13	ø 16	50	79	1,00
100 0130 Z32 0	1-13	ø 32	50	70	1,16
100 0130 Z58 0	1-13	ø 5/8“	50	79	1,00
100 0130 Z14 0	1-13	ø 1¼ “	50	70	1,15
100 0160 MK2 0	3-16	MT 2	56	89	1,32
100 0160 MK3 0	3-16	MT 3	56	89	1,46
100 0160 MK4 0	3-16	MT 4	56	90	1,77
100 0160 R08 0	3-16	R 8	56	87	1,54

We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.







NCBF with reversing lock for NC-machines

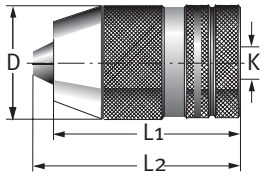
(Dimensions in mm)

- **no opening of the chuck due to e.g. quick spindle stop**
- **the self-tightening effect is held with position “CLOSE”**
- **with diamond coated jaws on request**

With this series the flexibility of the self-tightening drill chucks can be used for CNC-machines as well.

The reverse-locking system, developed by Albrecht, prevents an unwanted opening of the chuck which might be caused by centrifugal forces.

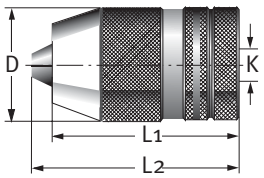
The clamping force is secured in position “CLOSE” with the set ring. The self-tightening function during clockwise operation is still working. Thus, the maximum clamping force is secured by this Albrecht system.



Taper according to DIN ISO 239 B-Taper

Ref. no.	Range	Taper	D	L1	L2	Weight kg
100 2100 B16 0	0 - 10	B16	43	80	91	0,7
100 2130 B16 0	1 - 13	B16	50	90,5	103	1,1
100 2160 B16 0	3 - 16	B16	56	95,5	109	1,4
100 2160 B18 0*	3 - 16	B18	56	95,5	109	1,4

*7 mm short of DIN ISO 239



Taper according to DIN ISO 239 J-Taper (Jacobs)

Ref. no.	Range	Taper	D	L1	L2	Weight kg
100 2100 J02 0	0 - 10	J02	43	80	91	0,7
100 2130 J02 0	1 - 13	J02	50	90,5	103	1,1
100 2130 J33 0	1 - 13	J33	50	90,5	103	1,1
100 2130 J06 0	1 - 13	J06	50	90,5	103	1,1
100 2160 J06 0	3 - 16	J06	56	95,5	109	1,4

We reserve the right for changes in design due to technical improvements. Pictures and dimensions not binding.

ALBRECHT

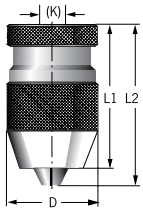
Quality Without Compromise

SBFD with diamond coated jaws

(Dimensions in mm)

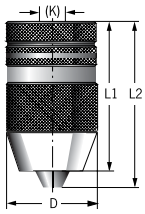
- especially suitable for carbide drills and drills with through-hardened shaft
- bigger transmission compared to drill chucks with hardened jaws

SBFD super keyless drill chuck with arbor according to DIN ISO 239 B- und J-Taper



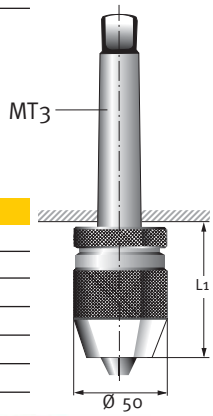
Ref. no.	Range	Taper	D	L1	L2	Weight kg
1Do 0030 B06 0	0 - 3	B6	24	44	47,5	0,1
1Do 0030 B10 0	0 - 3	B10	24	44	47,5	0,1
1Do 0065 B12 0	0 - 6,5	B12	34	61,5	68	0,29
1Do 0130 B16 0	1 - 13	B16	50	90,5	103	0,945
1Do 0160 B16 0	3 - 16	B16	56	95,5	109	1,25
1Do 0160 B18 0	3 - 16	B18	56	95,5	109	1,25
1Do 0030 J00 0	0 - 3	J0	24	44	47,5	0,1
1Do 0030 J01 0	0 - 3	J1	24	44	47,5	0,1
1Do 0065 J01 0	0 - 6,5	J1	34	61,5	68	0,29
1Do 0130 J33 0	1 - 13	J33	50	90,5	103	0,945
1Do 0130 J06 0	1 - 13	J6	50	90,5	103	0,945
1Do 0160 J06 0	3 - 16	J6	56	95,5	109	1,25

NCBFD super keyless drill chuck witht clamping protection and arbor according to DIN ISO 239 B- und J-Taper



Ref. no.	Range	Taper	D	L1	L2	Weight kg
1Do 2130 B16 0	1 - 13	B16	50	90,5	103	1,1
1Do 2130 J02 0	1 - 13	J2	50	90,5	103	1,1
1Do 2130 J33 0	1 - 13	J33	50	90,5	103	1,1
1Do 2130 J06 0	1 - 13	J6	50	90,5	103	1,1

SBFD plus with Taper (one-unit)



Ref. no.	Range	Taper	L1	kg
1Do 0130 MK2 0	1-13	MT 2	85	1,03
1Do 0130 MK3 0	1-13	MT 3	85	1,17
1Do 0130 MK4 0	1-13	MT 4	86,5	1,48
1Do 0130 R08 0	1-13	R 8	84	1,25
1Do 0130 Z16 0	1-13	ø 16	79	1,00
1Do 0130 Z58 0	1-13	ø 5/8“	79	1,00

We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.

For drills with through-hardened shaft and/or carbide drills, especially, the company Albrecht offers the SBF series with diamond-dust coated jaws. This patented coating prevents slippage of the tool by enabling the diamond dust to penetrate the tool shaft.

The self-tightening function only works with clockwise operation.

SBFN Stainless Steel Super Drill Chucks

For use
- **with aggressive materials**
- **in EDM**
- **in the area of medical and dental apllications**

ALBRECHT

Quality Without Compromise

SBFN Stainless Steel Super Drill Chucks

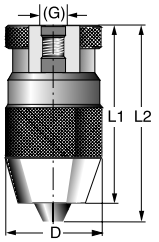
(Dimensions in mm)

The self-tightening design of this chuck enables an easy and quick operation. No key is necessary. Opening and closing can be done manually. The chucks have either a thread or taper and are only suitable for clockwise operations.

These drill chucks are mostly used in medical operations. As with the Super Drill Chuck all working parts are case-hardened and all contact surfaces are ground.
And here, as well as in the rest of the ALBRECHT-programme range, special demands from our customers are fulfilled, e.g. use of grease allowed by the NSF (registration no. 127241), electropolished surfaces, integrated reversing lock etc.

„Ergon-Grip-Design“

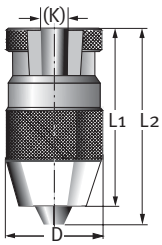
- easy to clean
- soft edges
- can be handled with hygienic gloves



Thread UNF

Ref. no.	Range	Taper	D	L1	L2
100 N030 G02 0	0 - 3	3/8"-24	24	46,5	50
100 N050 G02 0	0,8 - 6	3/8"-24	30	56	62,5
100 N050 G02 1*	0,6 - 7,4	3/8"-24	31,5	56	62,5
10S N050 G02 0**	0,8 - 6	3/8"-24	30	68	74,5

* with „Ergon-Grip-Design“
** with reversing lock (T-grip not included)



Inner Taper
according to DIN ISO 239 J-Taper (Jacobs)

Ref. no.	Range	Taper	D	L1	L2
100 N030 J01 0	0 - 3	J1	24	46,5	50
100 N050 J01 0	0,8 - 6	J1	30	56	62,5
100 N050 J01 1*	0,6 - 7,4	J1	31,5	56	62,5

* with „Ergon-Grip-Design“

Especially designed for the manual use with T-grip and integrated reversing lock. The reversing lock is opened by pulling the ring.

We reserve the right for changes in design due to technical improvements. Pictures and dimensions not binding.

Albrecht Arbors Precision

(Dimensions in mm)

- **highest run-out accuracy ≤ 2 µm**
- **optimum fit for Albrecht Drill Chucks**

The original Albrecht precision arbors are manufactured from high-quality steel and are hardened.

These arbors do have the highest run-out accuracy and are especially suitable for the use with Albrecht drill chucks of the Super series

The exact angle of inclination of the ground taper results in an optimum locking connection.

Morse Taper according to DIN 228 B

Arbor according to DIN ISO 239 B-Taper

Morse Taper

	B 6	B 10	B 12	B 16	B 18*	B 22	B 24
MT 0	210 0000 B06 0	210 0000 B10 0	210 0000 B12 0				
MT 1	210 0100 B06 0	210 0100 B10 0	210 0100 B12 0	210 0100 B16 0	210 0100 B18 0*		
MT 2	210 0200 B06 0	210 0200 B10 0	210 0200 B12 0	210 0200 B16 0	210 0200 B18 0*	210 0200 B22 0	
MT 3			210 0300 B12 0	210 0300 B16 0	210 0300 B18 0*	210 0300 B22 0	210 0300 B24 0
MT 4			210 0400 B12 0	210 0400 B16 0	210 0400 B18 0*	210 0400 B22 0	210 0400 B24 0
MT 5				210 0500 B16 0	210 0500 B18 0*	210 0500 B22 0	210 0500 B24 0

Arbor according to DIN ISO 239 J-Konus (Jacobs)

Morse Taper

	J 0	J 1	J 2	J 33	J 6
MT 0	215 0000 J00 0	215 0000 J01 0			
MT 1	215 0100 J00 0	215 0100 J01 0	215 0100 J02 0	215 0100 J33 0	215 0100 J06 0
MT 2	215 0200 J00 0	215 0200 J01 0	215 0200 J02 0	215 0200 J33 0	215 0200 J06 0
MT 3		215 0300 J01 0	215 0300 J02 0	215 0300 J33 0	215 0300 J06 0
MT 4			215 0400 J02 0	215 0400 J33 0	215 0400 J06 0

Morse Taper with thread DIN 228 A

Arbor according to DIN ISO 239 B-Taper

Morse Taper

	G	B 6	B 10	B 12	B 16	B 18*
MT 1/M 6		230 0106 B06 0	230 0106 B10 0	230 0106 B12 0		
MT 2/M 10			230 0210 B10 0	230 0210 B12 0	230 0210 B16 0	230 0210 B18 0*
MT 3/M 12				230 0312 B12 0	230 0312 B16 0	230 0312 B18 0*
MT 4/M 16					230 0416 B16 0	230 0416 B18 0*

Cylindrical Shaft

Arbor according to DIN ISO 239 B-Taper

Arbor

Dø	x L	B 6	B 10	B 12	B 16	B 18*
6	x 35	220 0635 B06 0				
6	x 60	220 0660 B06 0				
8	x 35		220 0835 B10 0			
10	x 50		220 1050 B10 0	220 1050 B12 0		
12	x 60				220 1260 B16 0	
14	x 60				220 1460 B16 0	
16	x 50				220 1650 B16 0	
16	x 70					220 1670 B18 0*
20	x 30				220 2030 B16 0	
20	x 60				220 2060 B16 0	
25	x 75				220 2575 B16 0	

*7 mm short of DIN ISO 239

We reserve the right for changes in design due to technical improvements.
Pictures and dimensions not binding.

ALBRECHT

Quality Without Compromise

Cylindrical Shank and Taper Shank

(Dimensions in mm)

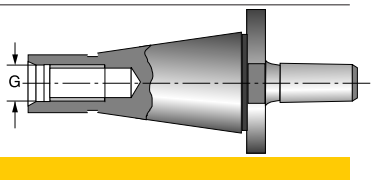
Cylindrical Shank

Inner Taper according to DIN ISO 239 J-Taper (Jacobs)

Dø x L	J 6
20 x 75	225 2075 J06 0
25 x 75	225 2575 J06 0
25 x 100	225 2510 J06 0
32 x 100	225 3210 J06 0

Taper Shank DIN 2080

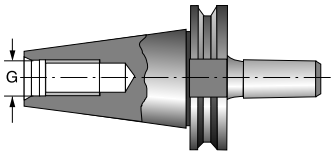
Inner Taper according to DIN ISO 239 B-Taper
Taper Shank /G



	B 12	B 16
SK 30/M 12	260 3012 B12 0	260 3012 B16 0
SK 40/M 16 mit Ringnut		260 4016 B16 0
SK 40/S 20 x 2 für Deckel		260 40SD B16 0
SK 50/M 24		260 5024 B16 0

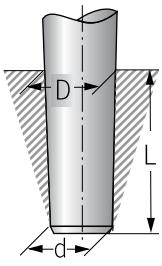
Steilkegel DIN 69871

Teil 1 Form A

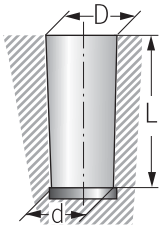


Inner Taper according to DIN ISO 239 B-Taper
Taper Shank /G

	B 16
SK 30/M 12	270 3012 B16 0
SK 40/M 16	270 4016 B16 0
SK 50/M 24	270 5024 B16 0



Outer Taper



Inner Taper

Dimensions for tapers according to DIN ISO 239

	B-Taper Dø	dø	L		J-Taper (Jacobs) Dø	dø	L
B 6	6,350	5,85	10	J 0	6,350	5,802	11,112
B 10	10,094	9,4	14,5	J 1	9,754	8,469	16,669
B 12	12,065	11,1	18,5	J 2	14,199	12,386	22,225
B 16	15,733	14,5	24	J 33	15,850	14,237	25,400
B 18	17,780	16,2	32	J 6	17,170	15,852	25,400
B 18*	17,431	16,2	25				
B 22	21,793	19,8	40,5				
B 24	23,825	21,3	50,5				

*7 mm short of DIN ISO 239

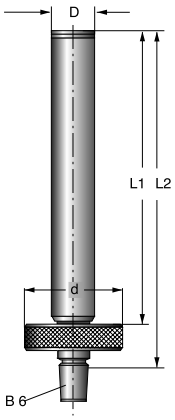
Accessories

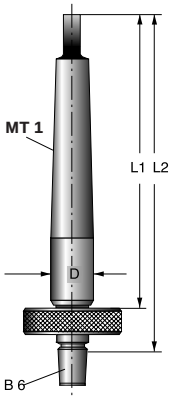
(Dimensions in mm)

FBH sensitive drill feed

This small drilling device offers a solution to problems of small bores for tool- and appliance manufacturers.

The sensitive drill feed can be held in a drill chuck, a collet, or the inner taper of a drilling machine. The feed is regulated manually via the knurled ring on the drill feed. An integrated spring returns the chuck to the home position. The stroke is 20 mm. This tool is suitable for our Super Drill Chuck with range 0-1,5 mm and available with cylindrical shank or morse taper MT1/DIN 228 B.





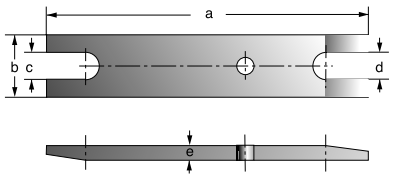
Dimensions

Ref. no.	Morse taper	Dø	dø	L1	L2	kg
200 Z130 000 0	–	13	30	66	80	0,105
200 Z127 000 0	–	1/2“	30	66	80	0,102
200 MK01 000 0	MT 1	12	30	82	96	0,094

ADG Taper Drift for Drill Chucks

The taper drift is designed for the easy separation of drill chuck and taper.

This tool prevents damage to the drill chuck, the machine spindle and the taper as it might occur when unsuitable tools are used. The taper drift is manufactured for the use with B-tapers and J-tapers.



for arbors according to DIN ISO 239 B- and J-Taper

Size	B 6/J 0	B 10/J 1 B 12	B 16/J 2/J 33 B 18/J 6
1	295 0600 001 0		
2		295 1012 002 0	
3			295 1618 003 0

Dimensions and weights

Size	a	b	c	d	e	kg
1	120	20	7	–	8	0,15
2	170	30	11	13	10	0,3
3	210	40	16,7	18,7	12	0,6

We reserve the right for changes in design due to technical improvements. Pictures and dimensions not binding.

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