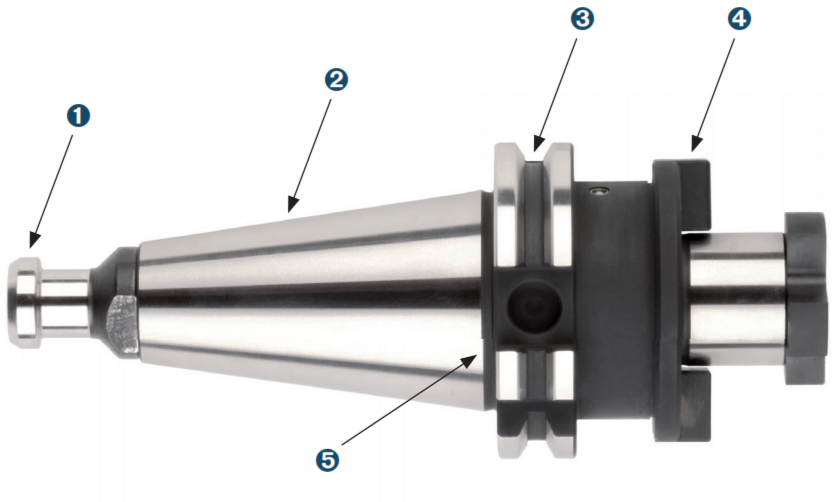
Large manual machines and CNC machines use toolholders that have been precisely ground with a male taper that mates with the machine's specific female taper. There is also a way to secure the toolholder in place with a pull stud or a draw bar thread. With CNC machines, the pull stud is more popular because it allows for easier automatic tool changing.

A toolholder consists of five basic components:



❶ Pull Stud
❷ Tapered Shank
❸ Gripper groove: circular groove
❹ Adapter
❺ Opposed Slot

Tapered shank

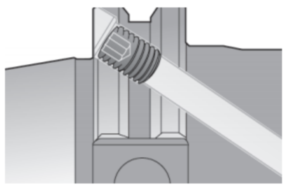
The standard defines six basic taper shank sizes including SK 30, SK 35, SK 40, SK 45, SK 50, and SK 60.

The proper Taper Shank for the Type of Machine

ISO 60 Very large machines
ISO 50 Medium size machines
ISO 40 Small size machines
ISO 30 Very small machines

Coolant supply form AD/B

Toolholders form AD/B have internal coolant supply. To use form B (coolant supply through the collar) the two headless screws must be removed and a sealed pull stud must be inserted. To use form AD (central coolant supply) the two headless screws must remain at the collar and a pull stud with drill through must be inserted.

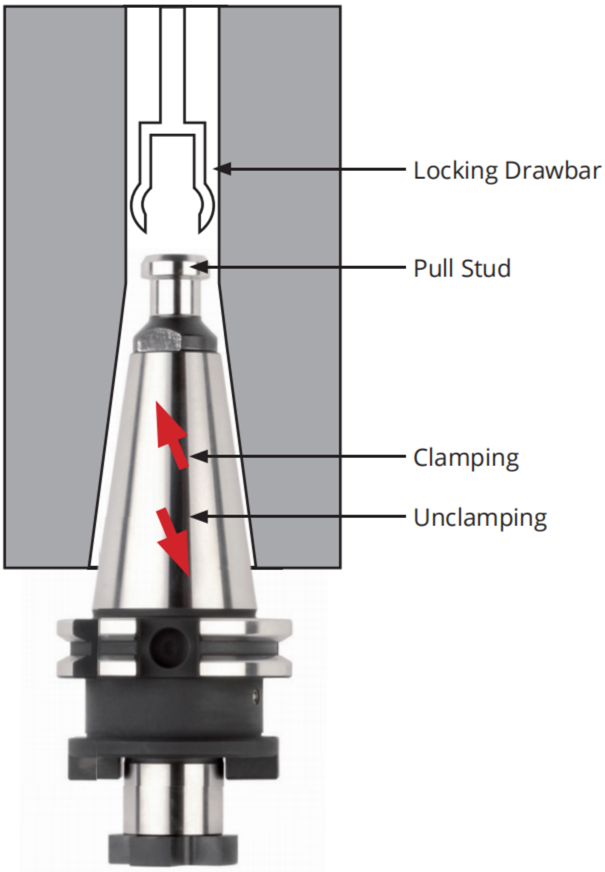


Pull studs are an important link between machine and tool.
The tightening bolt allows the clamping gripper of the spindle to pull the tool holder firmly into the spindle and eject it automatically.

Pull studs / Retention knobs come in different designs and sizes. They are not interchangeable. In addition to the pull studs according to DIN ISO 7388-3 (formerly DIN 69872), there are a variety of factory standards specified by the respective machine tool manufacturer.

Application:
- For tools with steep taper shank ISO 7388-1 and ISO 7388-2 [formerly DIN 69871 and JIS B 6339 (MAS-BT)]
- In machining centres (machines with automatic tool changer)
- In NC machines (machines without automatic tool changer)
- For tools with axial coolant supply
- For tools with or without axial coolant supply

Only use the pull studs that are specified by the machine tool manufacturer.



Recommended torque for pull stud tightening:

SK / BT / ISO 30	20 Nm
SK / BT / ISO 40	50 Nm
SK / BT / ISO 50	100 Nm

Normative references:

DIN ISO 7388 consists of the following parts, under the general title Tool shanks with 7/24 taper for automatic tool changers:
- Part 1: Dimensions and designation of shanks of forms A, AD, AF, U, UD and UF
- Part 2: Dimensions and designation of shanks of forms J, JD, and JF
- Part 3: Retention knobs for shanks of forms AC, AD, AF, UC, UD, UF, JD, and JF

DIN ISO 7388-3
Tool shanks with 7/24 taper for automatic tool changers –
Part 3: Retention knobs for shanks of forms AC, AD, AF, UC, UD, UF, JD and JF (ISO 7388-3:2013), English translation of DIN ISO 7388-3:2015-03

DIN ISO 7388-3 is a replacement for DIN 69872:1988-07

HSK-toolholders DIN 69893

The hollow taper shank (HSK) has prevailed since its standardization as an interface between machine and tool.

HSK benefits to the user include:

- High static and dynamic rigidity
- High precision axial and radial reproducibility
- High tool change accuracy and repeatability
- High speed machining performance
- Short tool changing times
- Coding and identification
- Coolant feed

Balancing recommendations and r.p.m. limits

Kemmler HSK-toolholders are generally pre-balanced to G 6.3/15,000 rev./min.

Fine balancing on request is possible.

Because the rotational speed is the largest influencing factor together with the limits regarding the spindle or spindle bearing interface, the following r.p.m. limits for HSK interfaces have been recommended as guidelines within the HSK standards:

HSK-A/C 32 to 30,000 rev./min

HSK-A/C 40 to 30,000 rev./min

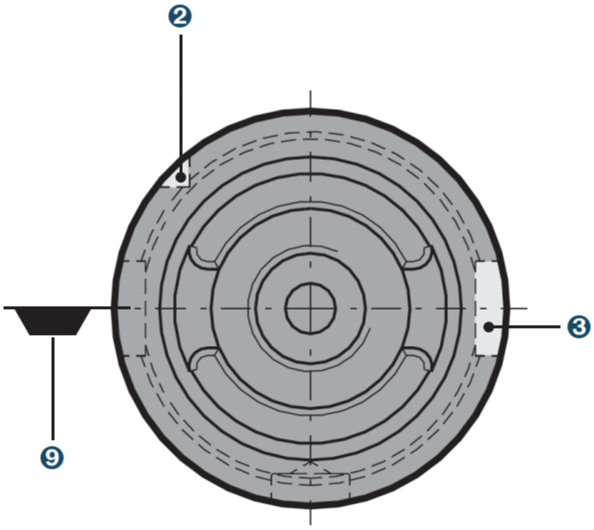
HSK-A/C 50 to 30,000 rev./min

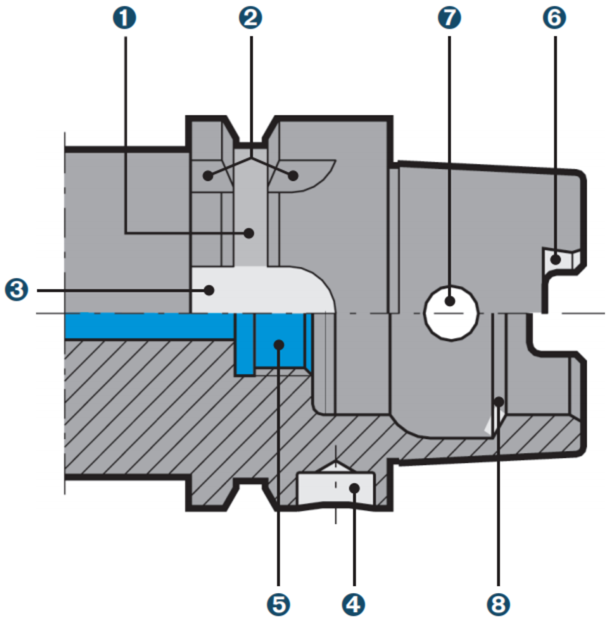
HSK-A/C 63 to 25,000 rev./min

HSK-A/C 80 to 20,000 rev./min

HSK-A/C 100 to 16,000 rev./min

Depending on the tool, it may be necessary to balance both the tool holder and tool when applying the maximum r.p.m. Exact limits can only be determined if machine and spindle manufacturers are taken into consideration and it is possible to define tools and projecting lengths.





Term definitions of HSK-A interface for automatic tooling systems

❶ Gripper groove: circular groove

❷ Index notch: sickle-shaped notch across gripper groove

❸ Keyway on collar:
index notch or for attachment in tool magazine or grippers.
With HSK-B/D also provides form closed torque transmission to spindle.

❹ Coding/identification:
bore in collar for attachment of identification system (coding chip)

❺ Thread for coolant: for attachment of coolant supply set

❻ Keyway on taper shank: form closed torque transmission to spindle

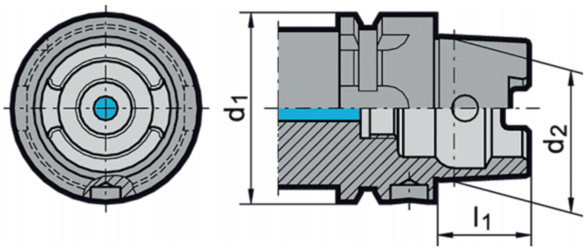
❼ Radial bore in taper shank: necessary for manual clamping systems

❽ Clamping shoulder: circular chamfer for drawing in the tool

❾ Position of the tool edge of single-edged tools

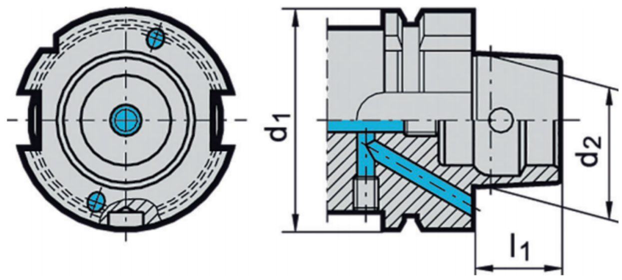
DIN 69063-1 (ISO 12164-1) Form A

Standard type for machining centres and milling machines.
HSK for automatic tool change with gripper groove and index notch. Manual operation is via access hole in taper. Form B relies on driving dogs on the joint face as shank isn't slotted. Torque is transmitted through highly
accurate connnection.



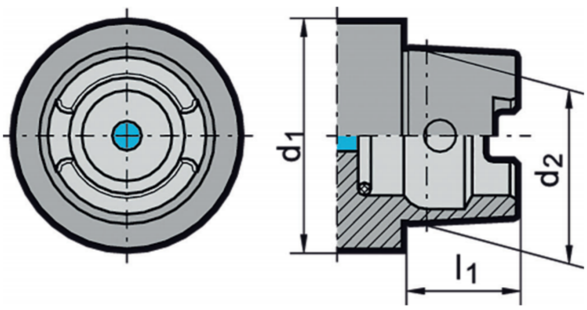
DIN 69063-2 (ISO 12164-1) Form B

For machining centres, milling and turning machines. With enlarged flange size for rigid machining. For automatic tool change. Coolant supply through the flange. Drive keys at the flange. Hole for data carrier DIN STD 69873 at the flange.



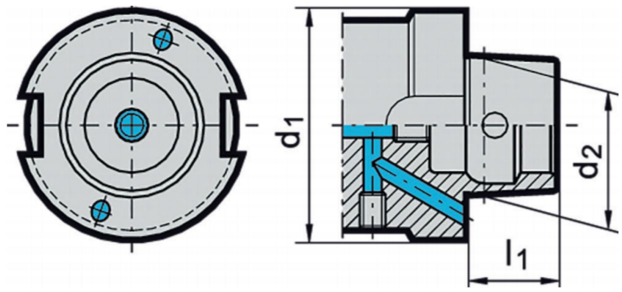
DIN 69063-1 (ISO 12164-1) Form C

For transfer lines, special machines and modular mould systems. Hollow shank taper for manual tool change. Actuation via access hole in the taper. As all Form A holders are equipped with side holes for manual tool changes, they can also be used as Form C holders. The torque is transmitted positively and non-positively.



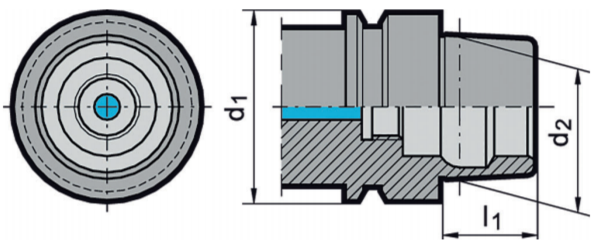
DIN 69063-2 (ISO 12164-2) Form D

For special machines. With enlarged flange size for rigid machining. For manual tool change. Coolant supply through the flange. Drive keys at the flange.



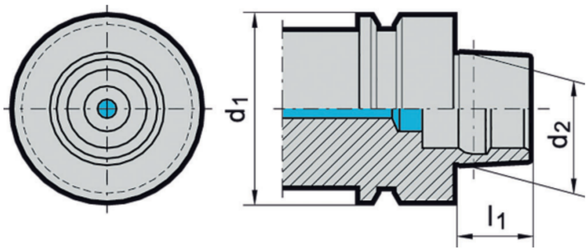
DIN 69063-5 Form E

For high-speed applications. For automatic tool change. HSK for automatic tool change. Torque is transmitted through highly accurate connnection. Version with access hole acc. to DIN 69893-1 by arrangement.



DIN 69063-6 Form F

For high-speed applications mainly in woodworking industries. HSK for automatic tool change. Torque is transmitted through highly accurate connnection. Version with access hole acc. to DIN 69893-1 by arrangement.



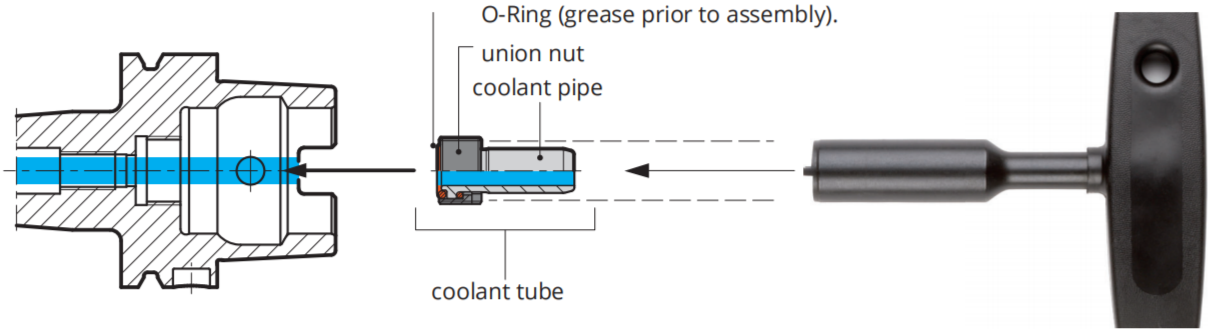
HSK form A, -B or -D holders must be equipped with a coolant tube.

Using holders without a coolant tube could cause unseen machine spindle damage.

DIN 69893 Form C, -E and -F do not require a coolant tube. Through coolant and sealing functions are provided by the locking unit.

The coolant tube is ideally mounted in vertical direction – from the bottom to the top. In this manner the sealing ring is prevented from being compressed during location which would cause the loss of its sealing function.

After mounting, the coolant pipe can be moved only to a minimum degree according to DIN (± 1°).

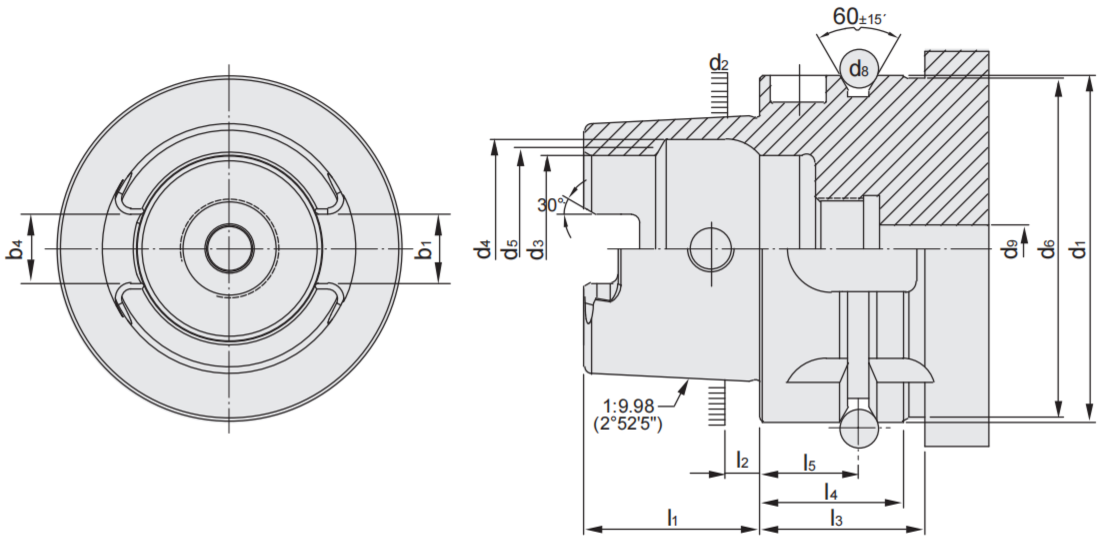


Installation

1. The HSK holder must be clean, free of swarf and undamaged.
2. Grease the O-rings prior to assembly.
3. Centraly insert the complete coolant tube (coolant pipe, union nut and 2 O-rings) in the HSK with the assistance of the socket spanner.
4. Screw in the coolant tube and tighten (see table for torque figures)
5. Check coolant pipe for radial mobility.

Torque figures
Cooling lubricant pipe with threaded bushing for hollow taper shafts to ISO 22402-1 (formerly DIN 69895)

Size / Typ	TQX (torque)
HSK 32	7 Nm
HSK 40	11 Nm
HSK 50	15 Nm
HSK 63	20 Nm
HSK 80	25 Nm
HSK 100	30 Nm



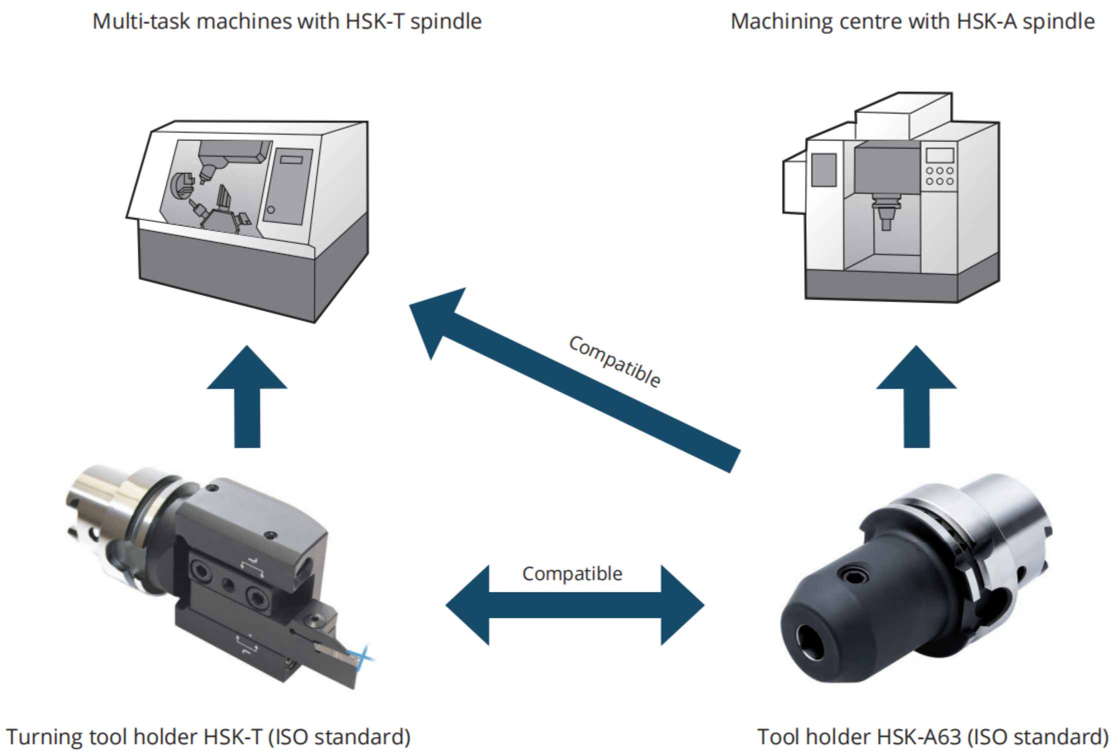
HSK	d_1	d_2	d_3	d_4	d_5	d_6	d_8	d_9	l_1	l_2	l_3	l_4	l_5	b_1	b_2	b_4
	h10		H10	H11		max		max	0 -0,2		min	0 -0,1	±0,1	±0,04	H10	+0,03 0
32	32	24,007	17	20,5	19	31	4	4,2	16	3,2	23	20	16	7,05	7	9
40	40	30,007	21	25,5	23	39	4	5	20	4	23	20	16	8,05	9	11
50	50	38,009	26	32	29	49	7	6,8	25	5	30	26	18	10,54	12	14
63	63	48,010	34	40	37	62	7	8,4	32	6,3	30	26	18	12,54	16	18
80	80	60,012	42	50	46	79	7	10,2	40	8	30	26	18	16,04	18	20
100	100	75,013	53	63	58	99	7	12	50	10	34	29	20	20,02	20	22

Material: Alloyed case-hardened steel, tensile core strength of min. 1000 N / mm².
Case hardened HRC 60 ± 2 (HV 700 ± 50), hardening depth 0.8 mm ± 0.2 mm,
black-finished and precisely grinded.

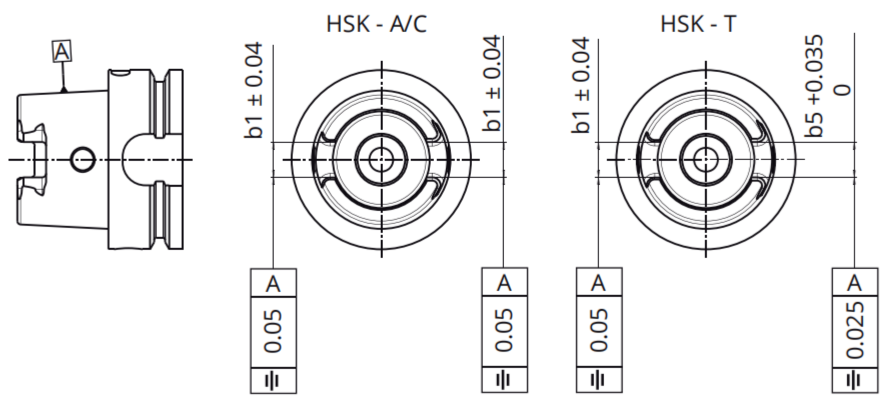
Normative references:

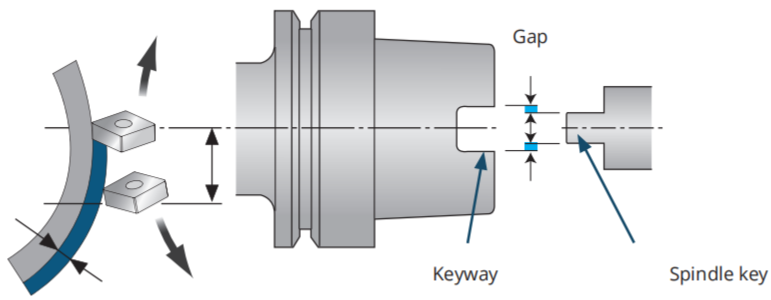
ISO 12164-3:2014-12 [CURRENT]
Hollow taper interface with face contact -
Part 3: Dimensions of shanks for stationary tools

The HSK-T (T = Turning) standard was specially developed for the use of stationary tools on lathes. Compared to the other HSK variants, the driver play is restricted and the influence on the position of the cutting edge is minimised. In addition, it is possible to accommodate driven tools on the HSK-T space without having to make any modifications to the turret.



Improved keyway tolerance according to ICTM standard

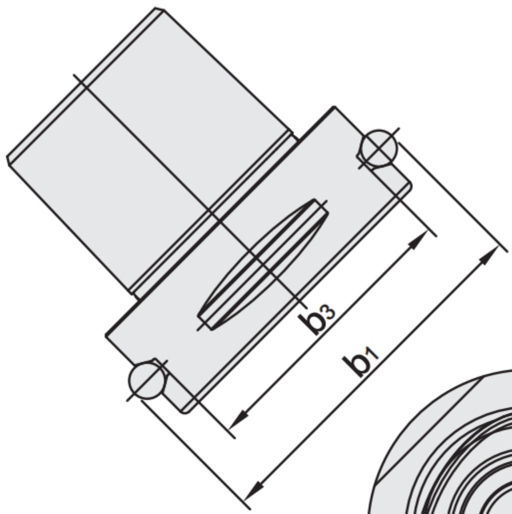


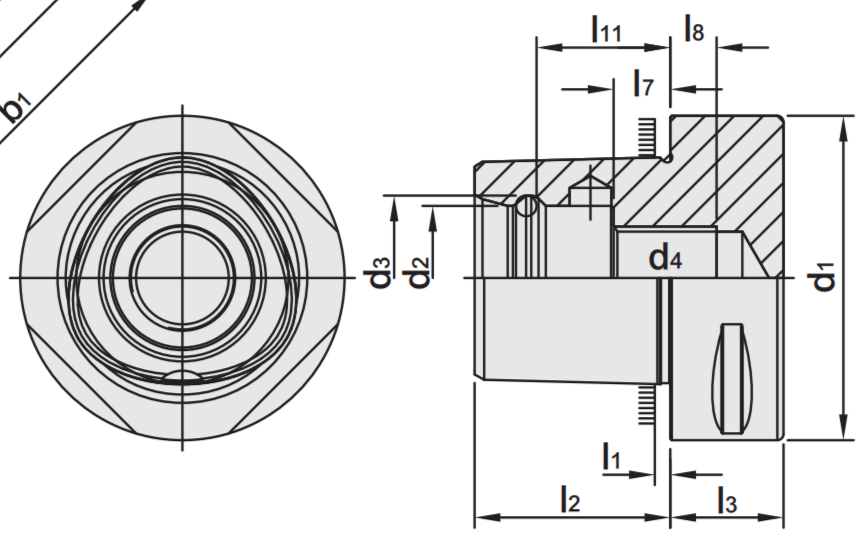


The gap causes variant cutting diameters. Example at Ø50.
HSK63T=3µm - HSK63A=14µm

Pre-balanced

G 2,5 25.000 min⁻¹





PSK	b_1 ±0,1	b_3 ±0,1	d_1 ±0,1	d_2 +0,1 -0,05	d_3 ±0,05	d_4	l_1	l_2 ±0,1	l_3 min	l_7 ±0,15	l_8 min	l_{11} ±0,1
32	39,0	27,9	32	15	16,5	M12 x 1,5P	2,5	19	15	6	6	13,5
40	46,0	34,9	40	18	20,0	M14 x 1,5P	2,5	24	20	9	6	17,5
50	59,3	44,0	50	21	24,0	M16 x 1,5P	3	30	20	10	7	22,0
63	70,7	55,4	63	28	32,0	M20 x 2,0P	3	38	22	11	9	26,0
80	86,0	70,7	80	32	38,0	M20 x 2,0P	3	48	30	20	10	34,0
100	110,0	88,3	100	43	50,5	M24 x 2,0P	3	60	32	20	10	42,5

Material: Alloyed case-hardened steel, tensile core strength of min. 950 N / mm².
Case hardened HRC 60 ± 2 (HV 700 ± 50), hardening depth 0.8 mm ± 0.2 mm, black-finished and precisely grinded.

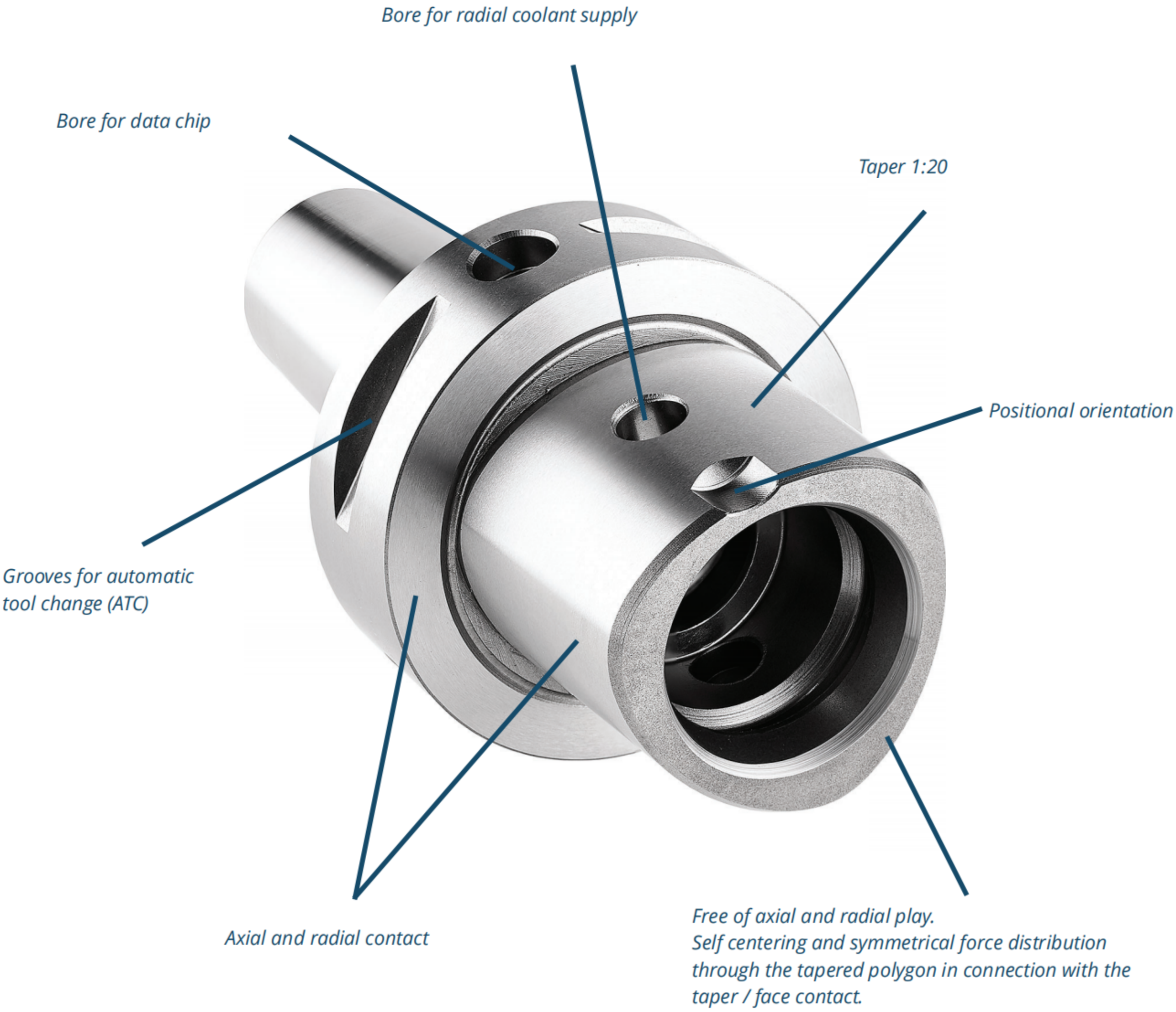
Normative references:

ISO 26623-1:2020
Polygonal taper interface with flange contact surface
- Part 1: Dimensions and designation of shanks
- Part 2: Dimensions and designation of receivers

In 1990 (patent application 1988), Sandvik Coromant presented a polygonal hollow shank taper with face contact under the brand name Coromant Capto®, developed for all types of application - turning, milling and drilling.

Then standardised in 2008 as the ISO/DIS 26623 standard for 'Polygonal taper interfaces with a flange contact surface' [ISO 26623-1:2008]. The standard previously covered flange sizes 32 to 80 (C3 to C8) and was extended in July 2013 to include polygonal shank size 100 (C10) [ISO 26623-1:2014]. In ISO 26623-1:2020-11, fluid transfer units for tool interfaces according to ISO 22402-2:2022-02 were added.

The tapered polygon in conjunction with the tight tolerance provides backlash-free centering also acts as pull back.
The PSC cone has very high rigidity and bending strength. The main advantages of this interface are the transmittable torque stability, the resistance against radial forces acting on the tool and the exact center height.
This means high feed rates can be achieved on large material cross sections.
The PSC interface is ideally suited for all machining operations such as drilling, turning and milling.



Effects of imbalance on machine spindles, toolholders and tools

Imbalance

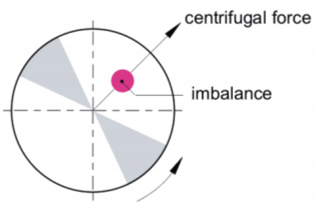
An imbalance produces a centrifugal force during the rotation of the spindle impeding the smooth running of the tool. This imbalance influences the working process and the life span of the spindle bearings.
The centrifugal force F increases linear with the imbalance U and squared with the number of revolutions according to the formula below.

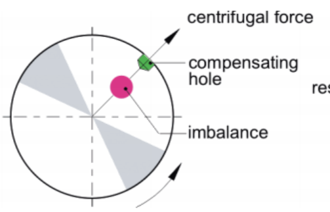
Counter balancing

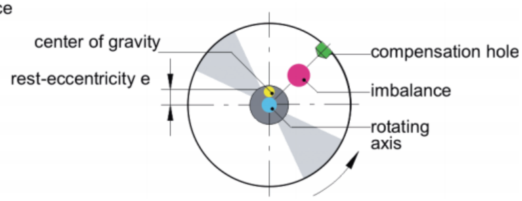
To compensate for unwanted centrifugal forces, the symmetrical distribution of mass must be restored with the aim of eliminating any centrifugal forces influencing the spindle bearing. Tool holders generally have compensation holes or areas which assist in directing the total amount of all centrifugal forces influencing the axis towards zero (see DIN ISO 1940).

Eccentricity of center of gravity

The imbalance of a spindle causes its center of gravity to deviate a certain distance from the rotating axis in direction of the imbalance. This distance is called rest-eccentricity e or eccentricity of center of gravity. The heavier the weight of the balance body mass m, the greater the restimbalance U permissible.







Calculation imbalance

Imbalance is a measure, specifying how much unsymmetrical distributed mass deviates radially from the rotating axis. Imbalance is measured in gmm. The measure of distance e determines the distance of the center of gravity of an element to the rotating axis.

Imbalance is calculated as follows:

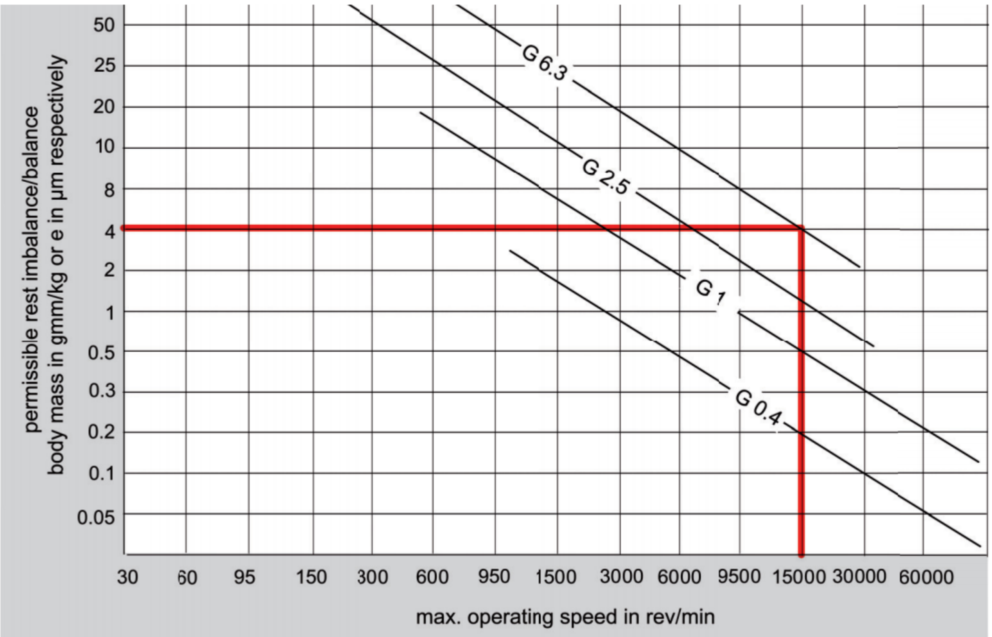
U = m × r

U = imbalance in gmm
e = eccentricity of center of gravity in µm
m = mass in kg

Balancing limits

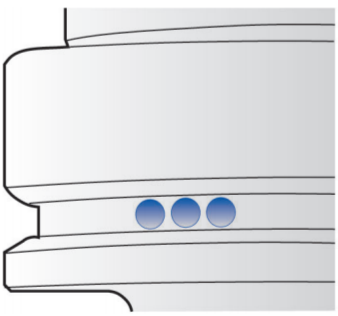
In accordance with DIN ISO 1940 the balance grade is denoted with G as well as the units gmm/kg or µm respectively and is relative to the number of revolutions. At a speed of 15,000 rev./min and a weight of 1 kg, G 6.3 corresponds with a permissible center deviation between rotational axis and center of gravity axis of the spindle of 4 µm. At twice the speed of 30,000 rev./min it would be 2 µm. If the tool holder was only half the weight, i.e. 0.5 kg, the permissible counter balancing tolerance is also halved. Aim of counter balancing is to find a compromise between the technically feasible and the economically efficient. Because the radial interchange accuracy for a brand-new HSK holder can be 2 to 3 µm and for an ISO taper shank holder can be 5 to 10 µm, it means an initial quality limit of G 2.5 or G 6.3 respectively at 10,000 rev./min.

The following diagram shows the quality grades to DIN ISO 1940-1, i.e. the permissible rest imbalance in relation to the balance body mass for different counter balance qualities G relative to the maximum operating speed.

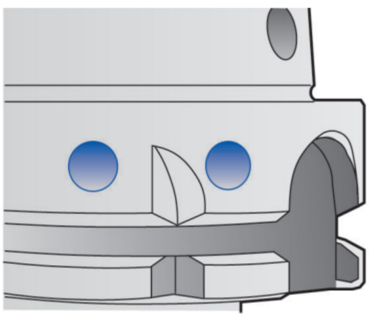


KEMMLER tool holders are balanced to G 6.3/15,000 rev/min.

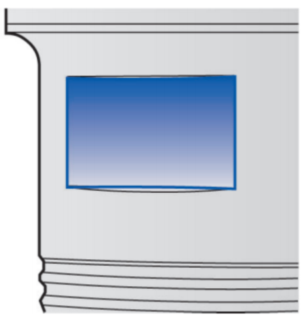
Fine-balanced with balancing bores in the flange



Pre-balanced with balancing bores at the collar



Pre-balanced with balancing flat at the tool body



13

Hydraulic expansion chucks

Modern machining processes place heavy demands on tool holding. Hydraulic expansion chucks provide excellent clamping characteristics combined with precise concentricity. Furthermore, they enable a simple and fast tool change.

Turning the pressure screw generates sufficient pressure in the pressure chamber resulting in an elastic deformation of the clamping bush, providing powerful tool clamping and precise concentricity. A safe and powerful fit is guaranteed.
If reduction sleeves are applied that are able to hold varying tool diameters, the tool application may be extended without problem. If such sleeves are not applied, it is essential to observe the minimum clamping length!

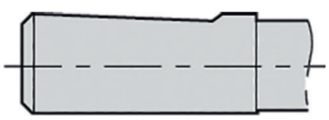
Advantages

- precise tool clamping with a maximum 3 µm deviation from concentricity
- transmission of high torque through (excellent clamping) optimised bush clamping system
- high speed compatibility (no centrifugal forces from clamping segments)
- precise concentricity, therefore excellent surface qualities and dimensional accuracy of the workpiece
- rapid tool change thanks to simple operation of the clamping screw
- optimal tool life
- hydraulic cushioning has vibration absorbing effect

Chart of technical data

Clamping Ø	Tightening torque	Minimum Clamping depth	Permissible transmissible torque with shaft minimum dimension h6	Tolerance of the shank tools	Max. Speed [min-1]	
[mm]	[Nm]	[mm]	[Nm]		LPR = 125	LPR > 125
6	10	27	12	h6	40.000	20.000
8	10	27	30	h6	40.000	20.000
10	10	31	40	h6	40.000	20.000
12	10	36	70	h6	40.000	20.000
14	10	36	100	h6	40.000	20.000
16	10	39	135	h6	40.000	20.000
18	10	39	180	h6	40.000	20.000
20	10	41	220	h6	40.000	20.000
25	10	47	500	h6	20.000	10.000
32	10	51	700	h6	20.000	10.000

Usable shank types

DIN 6535 | DIN 1835-1	Ø 6 - 20 mm	Ø 25 - 32 mm	Using Reduction sleeves
 Form HA	✓	✓	✓
 Form HB/ E	✓	✗	✓
 Form HE/ E	✗	✗	✓
Run out (↗)	≤ 0,003 mm		≤ 0,005 mm

To ensure a flawless function of the hydraulic expansion chucks, please observe the following instructions:

Usage of straight shank tools according to DIN 1835 and DIN 6535 form (HA) and B (HB) up to Ø 20 mm shaft diameter with tolerance h_6, precision grinded Ra_{min} = 0.3.

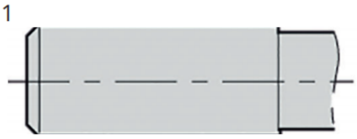
Shafts according to DIN 6535 form HE (Whistle Notch) can only be clamped by using reduction sleeves. All hydraulic expansion chucks are standard balanced to G 6.3 15,000 rev/min.

Clamping and unclamping the tool

1. Clean the holding fixture bore and the tool shaft of grease and dirt. Insert tools up to the end stop. Observe the minimum clamping depth and the length adjustment range.
2. Clamp the shaft by turning the clamping screw up to the end stop. The tool is clamped. To avoid breaking of the hydraulic sleeve, do not carry out clamping action without a tool.
3. To unclamp the tool, turn the screw approx. 5 to 6 revs. counter clockwise and remove the tool.

   Note: Never clamp **without** a clamped tooling!

1



DIN 1835 A/DIN 6535 HA

2

DIN 1835 B/DIN 6535 HB up to Ø 20 mm

Cleaning

Attention should be paid to the cleanliness of the holding fixture bore and the tool shaft.

Temperature

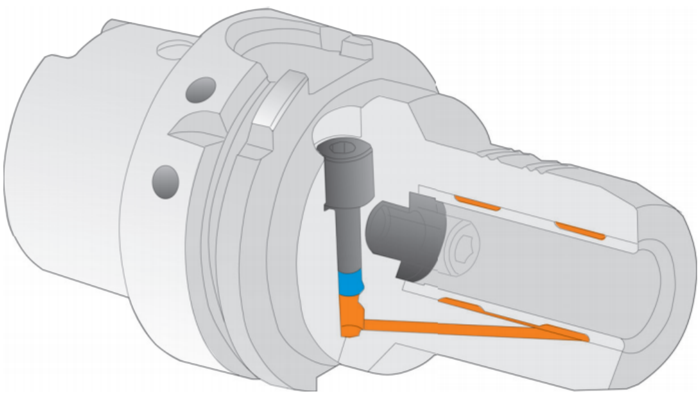
Optimal temperature range between 10 – 50°. Do not use with temperatures above 80°.

Storage

Store the hydraulic expansion chuck untensioned, cleaned and lightly oiled.

Clamping shafts

Clamp only tool shafts conforming to the requirements of DIN 1835 form A and form B (up to 20 mm).



Torques for clamping end-mills in end mill holders DIN 6359

Highest concentricity by using defined torques with Weldon shafts:

Torques for DIN 1835

Bore	Screw		Torque
Ø 6 mm	M 6	SW 3	10 Nm
Ø 8 mm	M 8	SW 4	10 Nm
Ø 10 mm	M 10	SW 5	16 Nm
Ø 12 mm	M 12	SW 6	28 Nm
Ø 14 mm	M 12	SW 6	28 Nm
Ø 16 mm	M 14	SW 6	42 Nm
Ø 18 mm	M 14	SW 6	42 Nm
Ø 20 mm	M 16	SW 8	50 Nm
Ø 25 mm	M 18 × 2	SW 10	60 Nm
Ø 32 mm	M 20 × 2	SW 10	72 Nm
Ø 40 mm	M 20 × 2	SW 10	72 Nm
Ø 50 mm	M 24 × 2	SW 12	90 Nm
Ø 63 mm	M 24 × 2	SW 12	90 Nm

The load limits of the spindle mount must be complied with.
Operating temperature: + 20 °C ... + 50 °C
Max. coolant pressure: 80 bar

Clamp-Ø	max. Speed in m^{-1}		Max. Tightening torque of the clamping screw	Clamping screw	SW	Shank-Ø in mm
	LPR to 125mm	LPR about 125mm				
Ø 6 mm	50.000	30.000	10 Nm	M 6	SW 3	Ø 6 h6
Ø 8 mm	50.000	30.000	10 Nm	M 8	SW 4	Ø 8 h6
Ø 10 mm	50.000	30.000	16 Nm	M 10	SW 5	Ø 10 h6
Ø 12 mm	50.000	30.000	28 Nm	M 12	SW 6	Ø 12 h6
Ø 14 mm	50.000	30.000	28 Nm	M 12	SW 6	Ø 14 h6
Ø 16 mm	50.000	30.000	42 Nm	M 14	SW 6	Ø 16 h6
Ø 18 mm	50.000	30.000	42 Nm	M 14	SW 6	Ø 18 h6
Ø 20 mm	50.000	30.000	50 Nm	M 16	SW 8	Ø 20 h6
Ø 25 mm	25.000	20.000	60 Nm	M 18 × 2	SW 10	Ø 25 h6
Ø 32 mm	25.000	20.000	72 Nm	M 20 × 2	SW 10	Ø 32 h6

Use clamping and unclamping of tools

To guarantee error-free function of the CNC-drill chuck 08/ 13/ 16, please follow the next instructions.

picture 1

Attention:

Clamping or releasing only at standstill of machine spindle or outside the machine.

The CNC-drill chuck (pos. 1) is clamped by means of an Allen-T-wrench (pos. 3) on side of the drill chuck actuating a vevel gear. Turn the Allen-T-wrench counter clockwise to open the drill chuck, clockwise to close it.

1st step

Open the jaw of the drill chuck wide enough to insert the cutting tool. (pos. 2)

2nd step

Fit cutting tool (pos. 2) to the stud into the CNC-drill chuck (pos. 1) so that the tool shank is fit closely to the whole length of the clamping jaws. (picture 1)

3rd step

Turn the Allen-T-wrench (pos. 3) clockwise to clamp the cutting tool using a torque of 15 Nm (10 Nm for 0,5-8) to clamp the tool properly. (picture 2)

picture 2

Note:

Do not use any kind of extensions for clamping. By using a torque higher than mentioned the bevel gear can be damaged. In this case the bevel pinion will be the rated break point to protect the drill chuck against damage.

4th step

Test the concentricity after clamping and meke sure that the tool is clamped safely.

Note:

Do not clamp tools with tapered shafts.

5th step

The CNC-drill chuck is ready for work and can be clamped into the machine spindle. (picture 3)

6th step

To release the cutting tool please turn the Allen-T-wrench counter clockwise and remove the cutting tool. (picture 3)


picture 3

Maintenance and Cleaning

The CNC-drill chucks 08 / 13 / 16 are maintenance-free.
The CNC-drill chucks 08 / 13 / 16 should be cleaned after use with a clean cloth to prevent corrosions.
Before storing the drill chucks please spray oil on the survace to prevent corrosion.

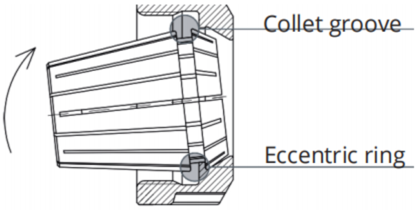
Repair

In case of a damage of the CNC-drill chuck, please send it back tu us. We will principally exchange the complete drill chuck head.

With this procedure you will get the quickest possible a replacement and only on this way a proper function and a run-out accuracy of < 0.03 mm can be guaranteed.

Assembling instructions:

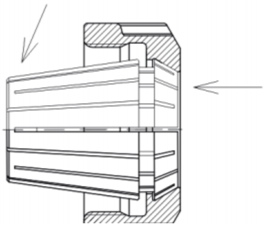
Insert groove of collet into eccentric ring of the clamping nut at the mark on the bottom of the nut. Push collet in the direction of the arrow until it clicks in place. Screw nut with collet onto toolholder. We recommend to tighten the nut with a torque wrench.



Disassembling instructions:

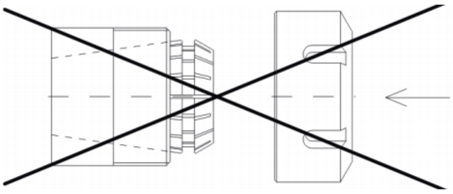
After the nut is unscrewed from the toolholder, press on the face of the collet while simultaneously pushing sideways on the back of the collet until it disengages from the clamping nut.

Improper assembly can permanently destroy the concentricity of the collet and may result in a damaged clamping nut.



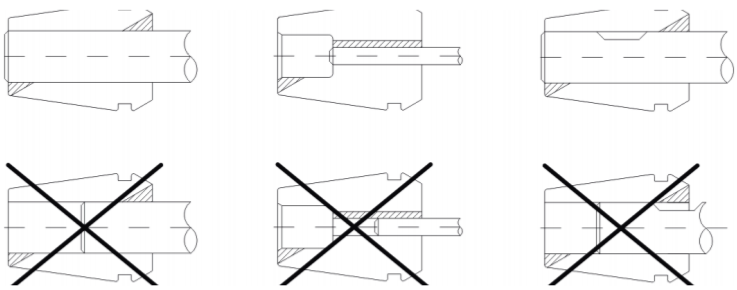
Note:

Only mount nuts with correctly inserted collets! Never place the collet into the holder without first assembling it into the nut.



Never clamp oversize tool shanks!
e.g. never use a Ø 12–11 mm collet to clamp a Ø 12.2 mm shank. Rather use the next bigger collet (here Ø 13–12 mm collet).

Insert tool the full length of the collet for best results if possible. However, never insert tool less than 2/3 of the collet bore length. Improper tool insertion can permanently deform the collet and will result in poor runout.



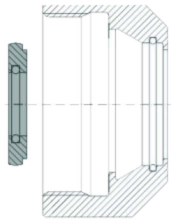
Maximum torque

ER 16	M22 × 1,5	50 Nm
ER 20	M25 × 1,5	75 Nm
ER 25	M32 × 1,5	85 Nm
ER 32	M40 × 1,5	105 Nm
ER 40	M50 × 1,5	150 Nm
ER 11 Mini	M13 × 0,75	18 Nm
ER 16 Mini	M19 × 1	28 Nm

Please observe the maximum torque indicated in the chart!

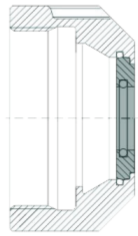
Assembly

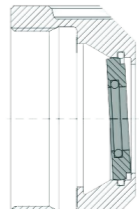
Insert the small diameter of the disc into the centre of the coolant nut and apply even pressure until the disc is properly seated into the nut. The disc must be flush with the outside of the nut.



Removal

To remove the disc, simply press on the outside of the disc evenly, until it snaps out.





The process of tapping is a complex balance of rotational and axial movements of the tool. It is sometimes necessary to restrict the axial movements of the tool.

If the axial movement is not accurately controlled, the leading or trailing flanks of the tap may be forced to progressively "shave" one flank of the component thread, thus producing a thin and oversize thread in the component.

Tension – forward float capability allows the tap to progress into the component without interference from the axial feed of the machine spindle.

Compression – backward float capability, acts as a cushion and allows the tap to commence cutting at its owns axial feed independent of the machine spindle.

Compression/Tension – float is designed to negate any external forces during the machining operation.

Radial float – allows for slight misalignment of the machine spindle axis and hole axis prior to tapping. This is not recommended manufacturing practice and should be avoided.

For a correct use of the tapping chuck, please check, during the first thread, not to exceed the max. asial stroke of the compensation values. This ist to avoid damaging the thread or the tapping chuck.

Code	Tap capacity	Adapters	Length adjustment in mm on Compression	Extension
xxx.16.12	M 3– M14	16.11.xx / 16.01.xx	7	7
xxx.16.20	M 5 – M22	16.12.xx / 16.02.xx	12	12
xxx.16.36	M14 – M36	16.14.xx / 16.03.xx	17.5	17.5

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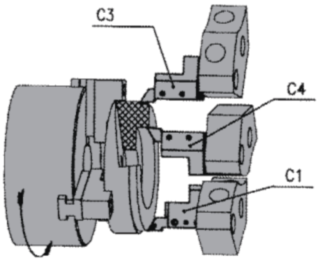
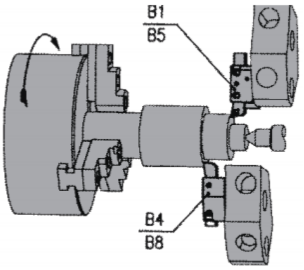
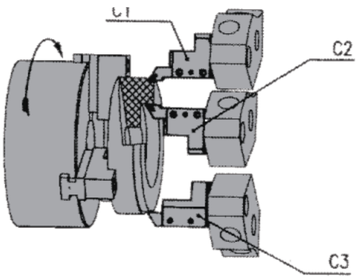
Shaft diameter Ø × □	DIN 352	DIN 5157	DIN 371	DIN 374	DIN 376
Ø 2.5 × 2.1 □	M1		M1	M3	M3.5
Ø 2.5 × 2.1 □	M1.1		M1.1	M3.5	
Ø 2.5 × 2.1 □	M1.2		M1.2		
Ø 2.5 × 2.1 □	M1.4		M1.4		
Ø 2.5 × 2.1 □	M1.6		M1.6		
Ø 2.5 × 2.1 □	M1.8		M1.8		
Ø 2.8 × 2.1 □	M2		M2	M4	M4
Ø 2.8 × 2.1 □	M2.2		M2.2		
Ø 2.8 × 2.1 □	M2.5		M2.5		
Ø 3.5 × 2.7 □	M3		M3	M5	M5
Ø 4 × 3 □	M3.5		M3.5		
Ø 4.5 × 3.4 □	M4		M4	M6	M6
Ø 6 × 4.9 □	M5		M5		
Ø 6 × 4.9 □	M6		M6		
Ø 6 × 4.9 □	M8			M8	M8
Ø 7 × 5.5 □	M10	G 1/8"		M10	M10
Ø 8 × 6.2 □			M8		
Ø 9 × 7 □	M12			M12	M12
Ø 10 × 8 □			M10		
Ø 11 × 9 □	M14	G 1/4"		M14	M14
Ø 12 × 9 □	M16	G 3/8"		M16	M16
Ø 14 × 11 □	M18			M18	M18
Ø 16 × 12 □	M20	G 1/2"		M20	M20
Ø 18 × 14.5 □	M22	G 5/8"		M22	M22
Ø 18 × 14.5 □	M24			M24	M24
Ø 20 × 16 □	M27	G 3/4"		M27	M27
Ø 22 × 18 □	M30	G 7/8"		M30	M30
Ø 25 × 20 □	M33	G 1		M33	M33
Ø 28 × 22 □	M36	G 1 1/8"		M36	M36
Ø 32 × 34 □	M39	G 1 1/4"		M39	M39
Ø 32 × 24 □	M42			M42	M42
Ø 36 × 29 □	M45	G 1 3/8"		M45	M45
Ø 36 × 29 □	M48	G 1 1/2"		M48	M48
Ø 36 × 29 □		G 1 3/4"			
Ø 36 × 29 □		G 2"			



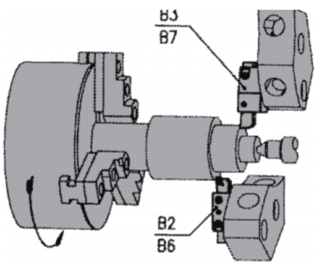
Application of radial tool holders with counter clockwise spindle rotation



Application of radial tool holders with clockwise spindle rotation



Application of axial tool holders with counter clockwise spindle rotation



Application of axial tool holders with clockwise spindle rotation

The high precision collet chuck (KPS) is the alternative to hydraulic expansion chucks and shrink chucks.

High flexibility due to interchangeable collets (precision collets System KPS available from Ø 0.5 up to 16 mm).

High clamping forces and concentricity lead to top surfaces and longer tool life.

Plain clamping nut without grooves for high speed machining.

Slim version.

Tool shanks:

Cylindrical DIN 1835-1 form A/DIN 6535 form HA, tolerance h_8.

Dedicated clamping size on the nominal diameter. Collets available in steps of 0.5 mm.

Run-out:

Maximum runout when measured at a gauge projection of 4×d in relation to the external taper is 5 µm.

Balancing:

Fine balancing is standard (G 2.5 30,000 min^{-1}).

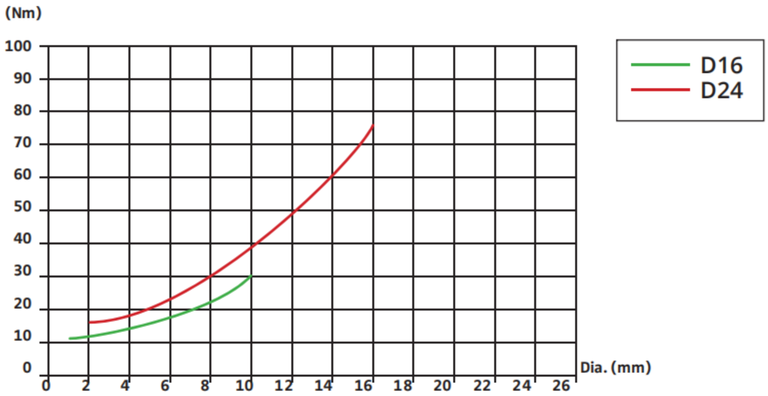
Note:

KPS-system chucks are delivered as standard without stop end screws. The use of stop end screws is not recommended at high spindle speeds, e.g. over 10,000 rpm.

Collet chuck size	Capacity d mm	D	L_1	M	S	Max. tightening torque	D type clamping system max. Rpm*
D16	1 – 10	27	19	M20 × 1	24	40 Nm	60,000
D24	2 – 16	36	22	M28 × 1	32	70 Nm	40,000

* The maximum rpm for holders equipped with this clamping system is often restricted by the holder's back-end taper type and size.

Transmittable static torque to the tool shank (Nm)



Assembly advice for KPS-system collets with a collet extractor

1. Remove the nut from the chuck.
2. Insert and squeeze the collet into the collet extractor.*
3. Insert the unit collet + ring into the nut until stop end.
4. Push the back end of the collet to remove the unit collet + nut from the ring.
5. Mount the nut together with the collet on the collet chuck.

Dismantling

To dismantle, push unit collet + nut into the collet extractor in order to squeeze the collet. Remove the nut.

Finally, push the back end of the collet to remove it from the collet extractor.

The collet must always be inserted into the nut, and the nut screwed onto the chuck before introducing the tool into the collet.

Never lock the nut without a tool shank located in the full length of the collet.

KPS-Collet

KPS-Collet extractor

KPS-Collet nut

KPS-Wrench

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The high-performance milling chucks are suitable for almost all applications.

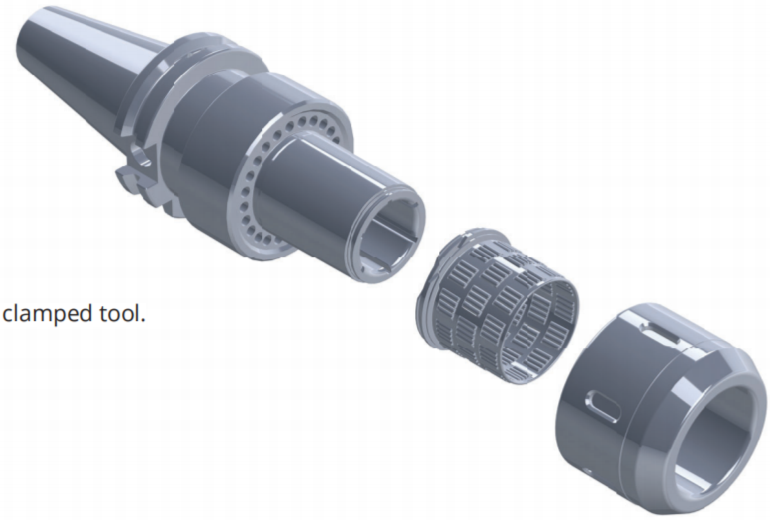
Especially in heavy roughing we guarantee unsurpassed high clamping forces and high process reliability.

HKS power chucks lead through the rigidity of the chuck, its concentricity and clamping even at 3 mm from nose lining to excellent surface finish and high tool life.

All HKS chucks grant a maximum deviation of concentricity of 3 µm at 3 x D.

Application:

- heavy roughing
- finish milling
- hard milling
- drilling, reaming
- thread milling



Concentricity:

Max. deviation of concentricity 3 µm at 3 x D of the clamped tool.

Balancing:

standard fine-balanced (G 6,3 15.000 min^{-1}).

Clamping shank:

All available tool shanks with or without Weldon shank can be clamped directly or with an adapter sleeve.

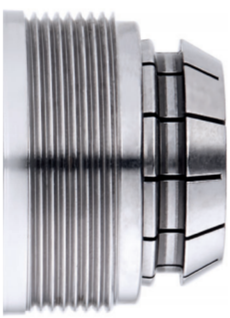
Size	20mm	25mm	32mm
Clamping torque	50-70 Nm	80-100 Nm	80-100 Nm
Clamping force	780 Nm	2000 Nm	2000 Nm

Release the Beast
KEMMLER®
Präzisionswerkzeuge

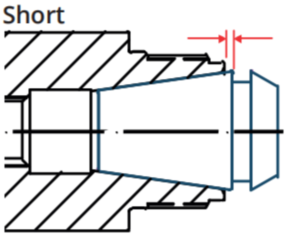
Enforced body:
Ensures ultimate stability and better axial and radial rigidity

Plain clamping nut without grooves for high speed machining

Precision ER



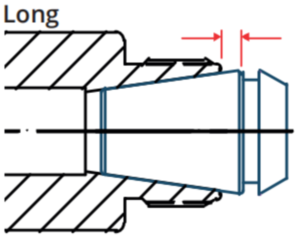
Short



KEMMLER Precision collet chuck:
The deeper seat of the collet in the chuck leads to more precise concentricity and a clear plus in radial stability.
Extreme holding forces (increases the holding force by at least 60 % compared to standard ER collet chucks).

Standard ER

Long



KEMMLER OEM

Laser engraving of toolholders

Laser engraving of toolholders

With our newly acquired laser engravers we can offer you individual and cost-effective engraving of tools.
The permanent engraving can include your company's name, logo or any other special description.
Also the labels on the packaging can be designed according to your specifications.

Tightening torque of clamping tools

Here you will find an overview of tightening torque / tightening torque of clamping tools.
The tightening torque is the force with which the screw connection is tightened during assembly using a tool. This torque is transferred to the bolt or the corresponding nut using an adjustable torque spanner suitable for this purpose. Refer to the tightening torque table / torque table below for the corresponding values for the various bolt sizes and clamping nuts.

The tightening torque is measured in Newton metres (Nm). 1 Nm corresponds to pulling a lever 1 metre long with a force of 1 Newton = 100 grams.

TIP: A torque spanner should be used to tighten a screw connection to the correct torque. You can also find torque spanners and torque spanner inserts for tightening bolts and clamping nuts in our product range.

Pull studs / Tightening bolt

Recommended tightening torque for mounting the pull studs / tightening bolts:

Tightening bolt (thread)	TQX (torque)
SK / BT / ISO 30 (M12)	20 Nm
SK / BT / ISO 40 (M16)	50 Nm
SK / BT / ISO 50 (M24)	100 Nm

Higher tightening torques can lead to deformation of the steep taper.

Torque for clamping Weldon milling cutters in DIN 6359 milling cutter holders

Hole	Clamping screw	TQX (torque)
Ø 6 mm	M 6 | SW 3	10 Nm
Ø 8 mm	M 8 | SW 4	10 Nm
Ø 10 mm	M 10 | SW 5	16 Nm
Ø 12 mm	M 12 | SW 6	28 Nm
Ø 14 mm	M 12 | SW 6	28 Nm
Ø 16 mm	M 14 | SW 6	42 Nm
Ø 18 mm	M 14 | SW 6	42 Nm
Ø 20 mm	M 16 | SW 8	50 Nm
Ø 25 mm	M 18 × 2 | SW 10	60 Nm
Ø 32 mm	M 20 × 2 | SW 10	72 Nm
Ø 40 mm	M 20 × 2 | SW 10	72 Nm
Ø 50 mm	M 24 × 2 | SW 12	90 Nm
Ø 63 mm	M 24 × 2 | SW 12	90 Nm

Collet chuck system KPS

Typ	THSZMS (thread)	TQX (torque)
KPS 10	M21,5 × 1,0	40 Nm
KPS 16	M32,0 × 1,5	70 Nm

ER collet chuck
Chucks for collets ISO 15488 (DIN 6499) ER system

Typ	THSZMS (thread)	TQX (torque)
ER 16	M22 × 1,5	50 Nm
ER 20	M25 × 1,5	75 Nm
ER 25	M32 × 1,5	85 Nm
ER 32	M40 × 1,5	105 Nm
ER 40	M50 × 1,5	150 Nm

Collet chuck ER type „Mini“

Typ	THSZMS (thread)	TQX (torque)
ER 11 Min	M13 × 0,75	18 Nm
ER 16 Mini	M19 × 1	28 Nm

Clamping nuts ISO 15488 (DIN 6499) system ER, hexagon nut

Typ	THSZMS (thread)	DRVS	TQX (torque)
4008E | ER 11	M14 × 0,75	17	30 Nm
426E | ER 16	M22 × 1,5	25	40 Nm
428E | ER 20	M25 × 1,5	30	60 Nm
430E | ER 25	M32 × 1,5	38	60 Nm

Precision collet chuck ER for collets ISO 15488 (DIN 6499) System ER

Artikelnum-mer	Abmessung | Typ	THSZMS (thread)	TQX (torque)
110.P2.20	470 E | ER 32	M40 × 1,5	170 Nm

Collet chuck for collets DIN 6388 (ISO 10897)
System OZ („Ortlieb collet chuck“)

Typ	THSZMS (thread)	TQX (torque)
415E | OZ 16	M33 × 1,5	85 Nm
462E | OZ 25	M48 × 2	140 Nm
467E | OZ 32	M60 × 2,5	170 Nm

ER-Collets

Typ	THSZMS (thread)	Clamping diameter	TQX (torque)
4004E | ER 8	M10 × 0,75	1,0 - 2,5	5 Nm
4004E | ER 8	M10 × 0,75	3,0 - 5,0	8 Nm
4008E | ER 11	M13 × 0,75	1,0 - 2,5	13 Nm
4008E | ER 11	M13 × 0,75	3,0 - 7,0	25 Nm
426E | ER 16	M22 × 1,5	1,0 - 4,5	30 Nm
426E | ER 16	M22 × 1,5	5,0 - 10,0	50 Nm
428E | ER 20	M25 × 1,5	1,0 - 5,5	45 Nm
428E | ER 20	M25 × 1,5	6,0 - 13,0	75 Nm
430E | ER 25	M32 × 1,5	1,0 - 6,5	55 Nm
430E | ER 25	M32 × 1,5	7,0 - 16,0	85 Nm
470E | ER 32	M40 × 1,5	2,0 - 6,5	70 Nm
470E | ER 32	M40 × 1,5	7,0 - 20,0	105 Nm
472E | ER 40	M50 × 1,5	3,0 - 7,5	100 Nm
472E | ER 40	M50 × 1,5	8,0 - 26,0	150 Nm

Cutter tightening screws for cutter arbors
Combination arbors and cross groove arbors - DIN 6367

Article number	Dimension / Type	THOD (thread)	TQX (torque)
102.10.16	16	M8	35
102.10.22	22	M10	75
102.10.27	27	M12	130
102.10.32	32	M16	320
102.10.40	40	M20	620
102.10.50	50	M24	1000
102.10.60	60	M30	2000

Socket head cap screws for push-on mandrels DIN 912
Hexagon socket head cap screw

Article number	Dimension / Type	THOD (thread)	TQX (torque)
102.10.161	16	M8	35 Nm
102.10.221	22	M10	70 Nm
102.10.271	27	M12	120 Nm
102.10.321	32	M16	300 Nm
102.10.401	40	M20	500 Nm

Cheese head screw for driver blocks for milling arbour holders DIN 2079

Article number	Dimension / Type	THOD (thread)	TQX (torque)
101.11.16	16	M3	4,4 Nm
101.11.22	22	M4	4,4 Nm
101.11.27	27	M4	4,4 Nm
101.11.32	32	M5	8,7 Nm
101.11.40	40	M5	36 Nm
101.11.60	60	M12	120 Nm

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CNC drill chuck

Size	0,5 - 8 mm	1 - 13 mm	2,5 - 16 mm
Tightening torque	10 Nm	15 Nm	15 Nm
Holding torque	30 Nm	40 Nm	40 Nm

Milling chucks

Size	20mm	25mm	32mm
Tightening torque	50-70 Nm	70-90 Nm	80-100 Nm
Clamping force	780 Nm	1150 Nm	2000 Nm

Cooling lubricant pipe with threaded bushing for hollow taper shafts to ISO 22402-1 (formerly DIN 69895)

Size / Typ	TQX (torque)
HSK 32	7 Nm
HSK 40	11 Nm
HSK 50	15 Nm
HSK 63	20 Nm
HSK 80	25 Nm
HSK 100	30 Nm

Fluid transfer units for hollow shank tapers to ISO 26623 to ISO 22402-2

Size / Typ	TQX (torque)
PSK 32	10 Nm
PSK 40	10 Nm
PSK 50	10 Nm
PSK 63	20 Nm
PSK 80	20 Nm
PSK 100	30 Nm

Milling cutter holders for screw-in milling cutters

THOD (thread)	TQX (torque)
M6	10 Nm
M8	25 Nm
M10	40 Nm
M12	50 Nm
M16	60 Nm

Hydraulic expansion chuck

Clamping Ø	Tightening torque	Minimum Clamping depth	Permissible transmissible torque with shaft minimum dimension h6	Tolerance of the shank tools	Max. Speed [min-1]	
[mm]	[Nm]	[mm]	[Nm]		LPR = 125	LPR > 125
6	10	27	12	h6	40.000	20.000
8	10	27	30	h6	40.000	20.000
10	10	31	40	h6	40.000	20.000
12	10	36	70	h6	40.000	20.000
14	10	36	100	h6	40.000	20.000
16	10	39	135	h6	40.000	20.000
18	10	39	180	h6	40.000	20.000
20	10	41	220	h6	40.000	20.000
25	10	47	500	h6	20.000	10.000
32	10	51	700	h6	20.000	10.000

Example: **40 3 . 02 . 20 . 1**

- 40 → Cone
- 3 → Design
- 02 → Type
- 20 → Diameter
- 1 → Length

Cone

SK 30 = 30
SK 40 = 40
SK 50 = 50

VDI .
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VDI 30 = 30
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HSK .
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A63 = A63
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Design

1 = DIN 2080

2 = DIN 69871 A – AD
3 = DIN 69871 AD/B

5 = JIS B 6339 A – AD
6 = JIS B 6339 AD/B

9 = VDI

Type

01 = OZ-system
02 = ER-system
03 = KPS-system
04 = Weldon
05 = Whistle Notch
06 = Milling arbors for screw in cutters
07 = Adaptor sleeves DIN 6383
08 = Adaptor sleeves DIN 6364
09 = Adaptor sleeves for SK
10 = Combi shell mill holders
11 = Shell mill holders
14 = Drill chuck adaptors DIN 238
15 = CNC-drill chucks
16 = Quick change tapping chucks
17 = Boring bar blanks
18 = Test arbors
20 = Pull studs
61 = OZ without drive slots
62 = ER without drive slots
64 = Milling chuck
70 = Shrink fit chucks
H = Hydraulic chucks

Diameter

Length

Tool parameters according to ISO 13399

This catalogue was created in accordance with ISO 13399 „Tool data representation and exchange" in order to enable easy handling of tool and product data.

Here you will find a list of the ISO attributes and feature names used in our catalogue.
A complete listing of tool parameters according to ISO/TS 13399 can be found on our website.

ISO attribute	Feature Description
ISO 13399	English
ADJRGA	Adjustment range, axial
BD	Body diameter
BHTA	Body half taper angle
BTED	Body taper end diameter
CND	Coolant entry diameter
CNT	Coolant entry thread size
CRKS	Pull stud thread size
CTWS	Connection text workpiece side
CXD	Coolant exit diameter
CXT	Coolant exit thread size
DCF	Functional diameter
DCONMS	Mounting Ø, machine side
DCONWS	Clamping Ø, nominal, workpc. side
DF	Flange diameter
DLN	Diameter lock nut
DMIN	Minimum bore diameter
DRVS	Drive size
FLGT	Flange thickness
HF	Functional height
HLN	Lock nut height
HTB	Body height
LB	Body length
LBD	Length body diameter
LCOL	Collet length
LCOMP	Length compensation compression
LDRED	Reduced body diameter length
LF	Functional length
LFSF	Distance to face
LH	Head length
LPR	Protruding length
LS	Shank length
LSC	Clamping length machine side
LSCN	Clamping length minimum machine side
LSCX	Clamping length maximum machine side
OAH	Overall height
OAL	Overall length
OAW	Overall width
PHD	Premachined hole diameter
RADH	Radial body height
RADW	Radial body width
RADWOF	Radial offset width
SZID	nominal size
TD	Thread diameter
TDCON	Tolerance class connection diameter
THID	Thread designation inside
THL	Thread cutting part length
THOD	Thread designation outside
THSZMS	Connection thread nominal size
THSZWS	Connection thread nominal size workpiece side
TP	Thread pitch
TQX	Torque maximum
WF	Functional width