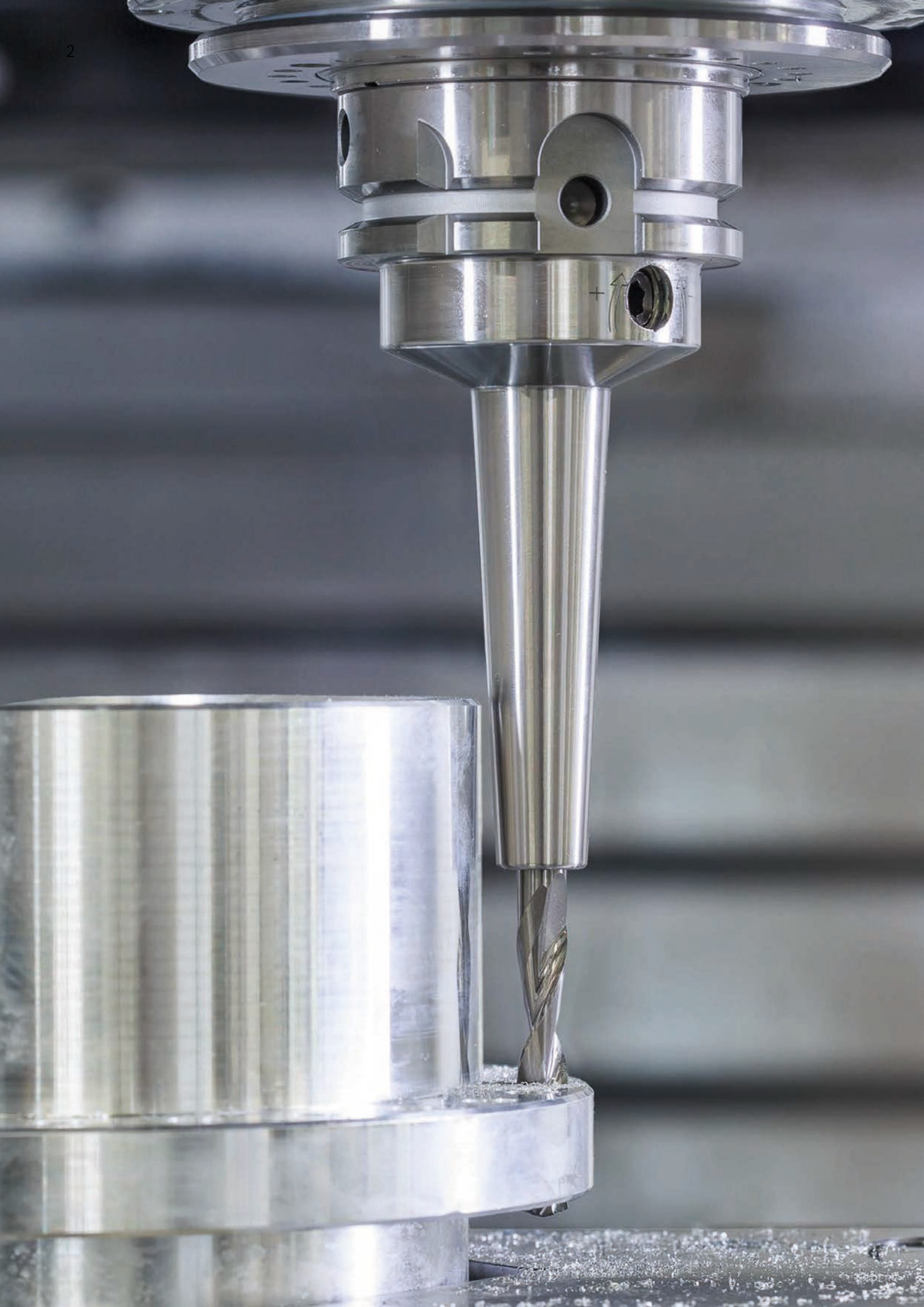




Optimally matched to the machining process

APPLICATION OPTIMISED HYDRAULIC CLAMPING CHUCKS





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EXTENSIVE APPLICATION OPTIMISED CLAMPING CHUCK PROGRAMME



1 Direct clamping
with narrow contour from \varnothing 3mm

2 Extra short design
with BT or BT with face surface

3 With optimised interference contour
for the highest rigidity in mould and die construction
with 226 mm length

4 HSK-E
with adjusted interference contour in short design

5 Minimal interference contour
for special contour critical machining processes in
long design

6 Thermal shrinking chuck
with optimal contour and adjusted length for mould
and die construction

7 Slim thermal shrinking chuck
with narrow contour

8 Miniature hydraulic clamping chuck
with HSK-25

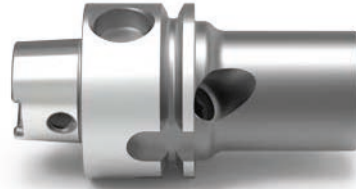
9 Hydraulic clamping chuck
with additional decentralised coolant outlets



APPLICATION ORIENTATED FORMAT

HSK-25

Hydraulic clamping chuck with miniature connection to reduce non-productive time



HSK-32

Customer specific MQL solutions for small connections



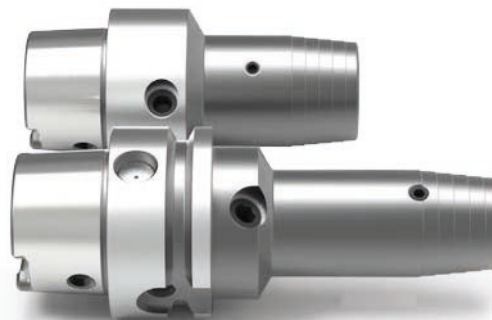
HSK-40

HSK-E for high rotational speed machining



HSK-50

Clamping activation through the HSK flange



HSK-63

Long, cylindrical construction for machining processes in limited spaces



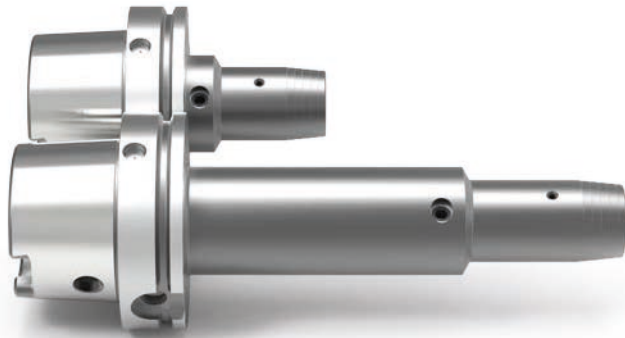
HSK-80

With enlarged face surface for higher bending resistance



HSK-100

Short and heavy to long and slim designs possible



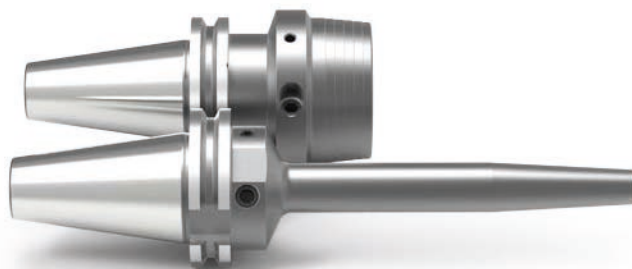
BT-30

Connections for every spindle type



SK-40

Greatest geometric design freedom through additive manufacturing



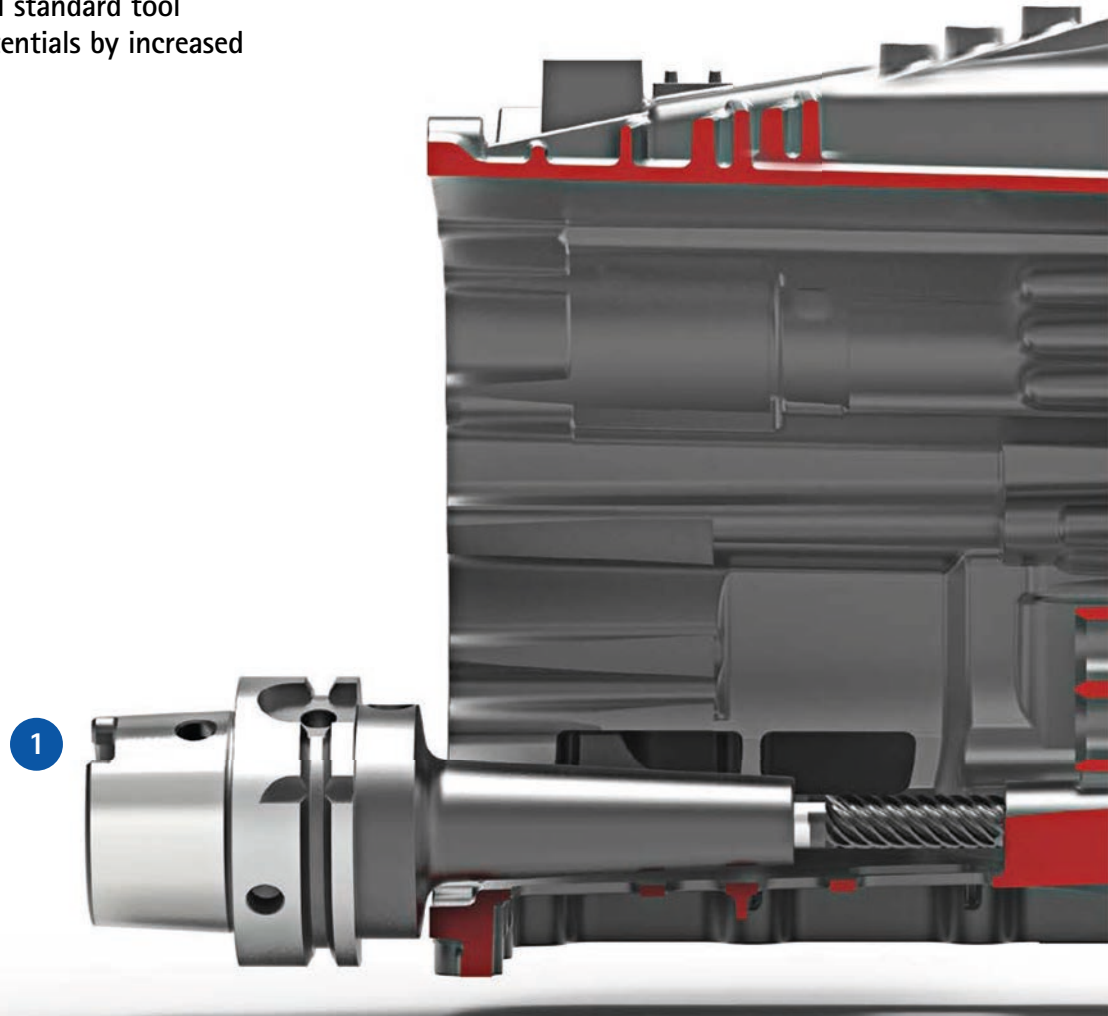
SK-50

Hydraulic clamping chuck with $A \geq 400$ possible



HIGH COST SAVING POTENTIAL

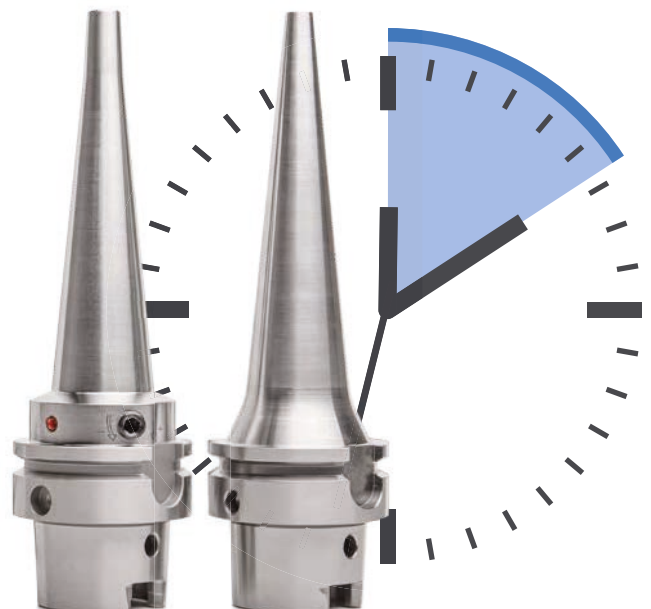
The ideal combination of application optimised hydraulic clamping chuck and standard tool achieves high cost saving potentials by increased performance and tool life.

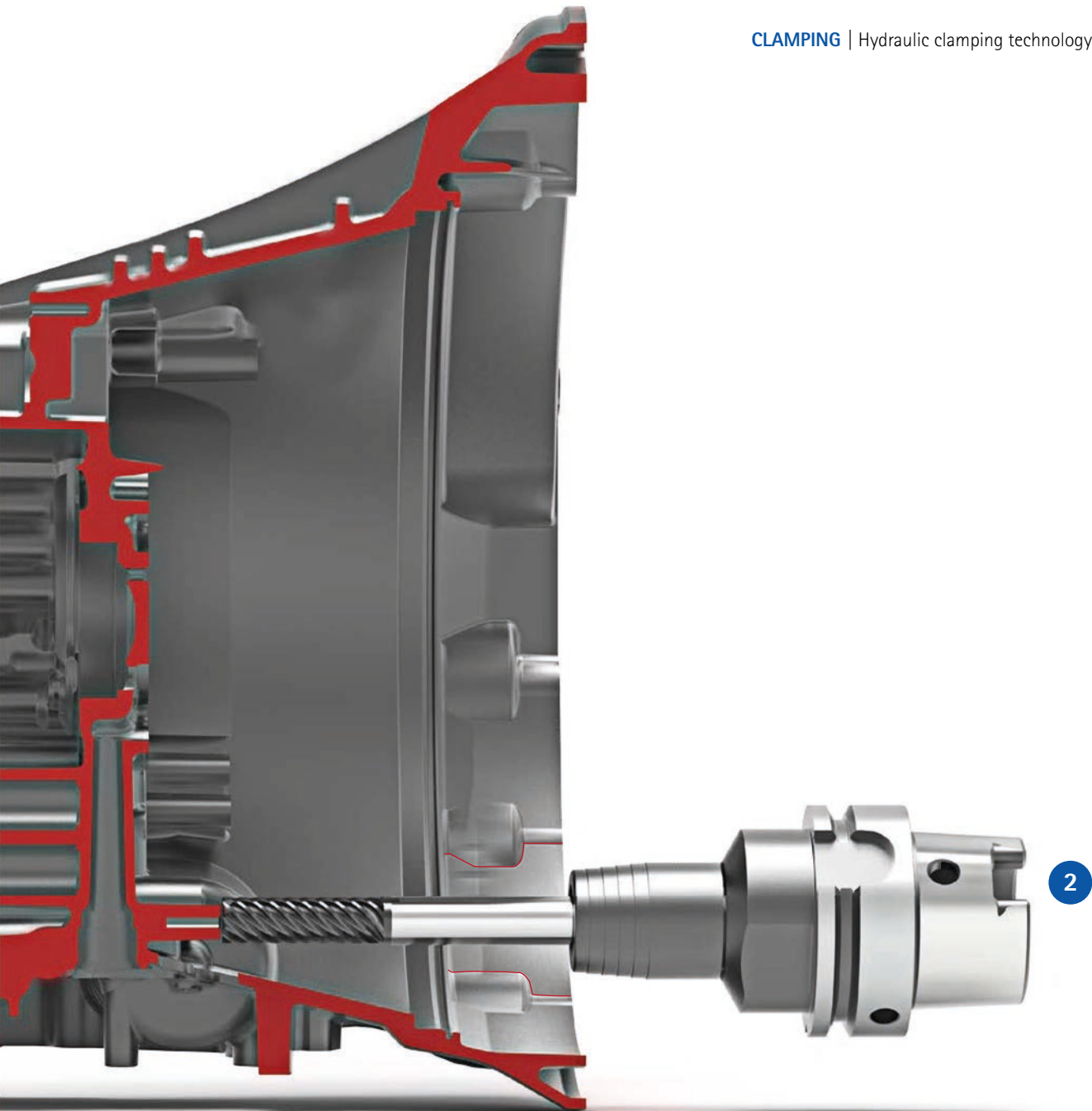


Reducing non-productive times through changing to hydraulic clamping technology

Not only the achievable improvement in surface finish, but also the significantly simplified handling speaks for the change from thermal shrinking chucks to a HighTorque Chuck HTC with narrow contour. Here only a simple Allen key and the predefined number of rotations are required to clamp and release the tool, resulting in significantly quicker and simpler tool changes.

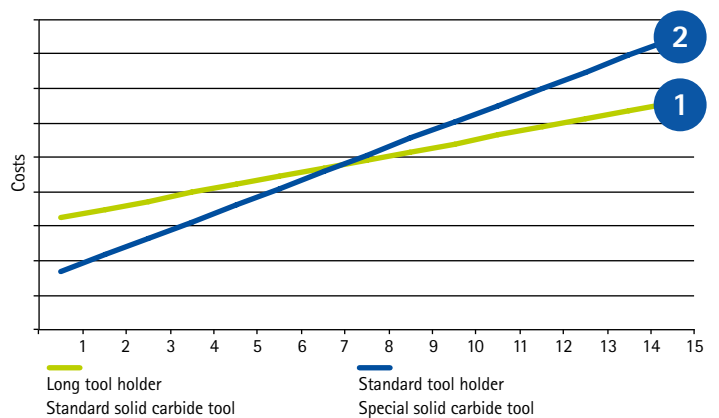
Number of tools in use	Tool changes per day	Time saved in minutes
10	3	120
20	3	240
50	3	600
10	5	200
20	5	400
50	5	1,000
100	5	2,000





Amortisation calculation: Long hydraulic chuck and standard solid carbide tool

An example calculation shows that the higher acquisition costs of an application optimised chuck in combination with a standard tool opposed to the use of a standard chuck using a special solid carbide tool is redeemed after just eight tool changes.



ADDITIVE MANUFACTURING PUSHES THE BOUNDARIES OF HYDRAULIC CLAMPING TECHNOLOGY

Accuracy, process reliability, flexibility and simple handling are the key requirements on a clamping chuck. From the systems available the hydraulic clamping chucks contribute the most when it comes to accuracy. However, the brazed connection of hydraulic chucks previously caused limitations in the area of temperature resistance and torque transfer. Additive manufacturing pushes the boundaries, in that, the chucks are produced in "one piece", allowing the hydraulic clamping technology to be used in a much broader range of applications.



THE ADVANTAGES OF ADDITIVELY MANUFACTURED HYDRAULIC CLAMPING TECHNOLOGY IN DETAIL

Optimal run-out, as the clamping area is positioned in the area of the chuck tip

High torque transfer and temperature resistance

Back taper of 3° on the outer contour allows machining to be carried out in contour critical areas

All from one mould – no brazed connection between bush and body

High bending resistance, despite the slim design

Simple and quick clamping thanks to the hexagonal screw



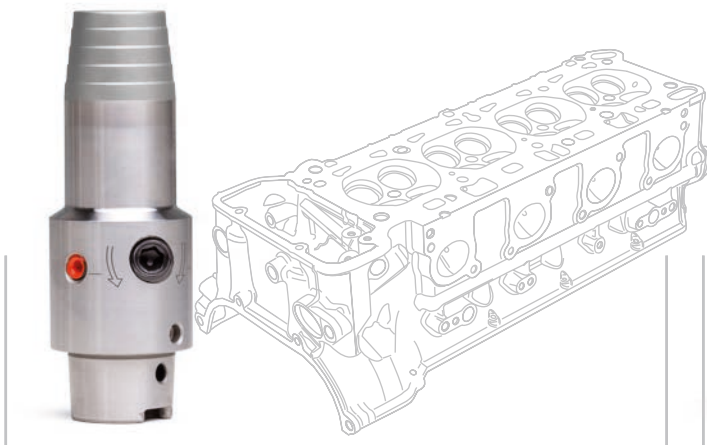
Additively manufactured hydraulic clamping technology with the least interference contour for a wide range of applications

ADVANTAGES

- Wide spectrum of applications, amongst others, in mould and die construction, automobile and aerospace industries
- Machining in contour critical areas
- Process reliable clamping even with temperatures of up to 170 °C thanks to the elimination of the brazed connection between the bush and the body
- Optimal run-out accuracy of 3 µm by a projection length of 2.5 x D
- Improved surface finish values with longer tool life
- Shorter set-up times and lower tool costs
- No peripheral devices required

PERFORMANCE CHARACTERISTICS

- Narrow contour with a back taper of 3°
- High torque transfer and bending resistance
- Simple and quick clamping directly in the machine
- Balancing value $G=2.5$ at $25,000 \text{ min}^{-1}$
- ϕ -range 3–32 mm
- Available with HSK and SK connections
- RFID option possible



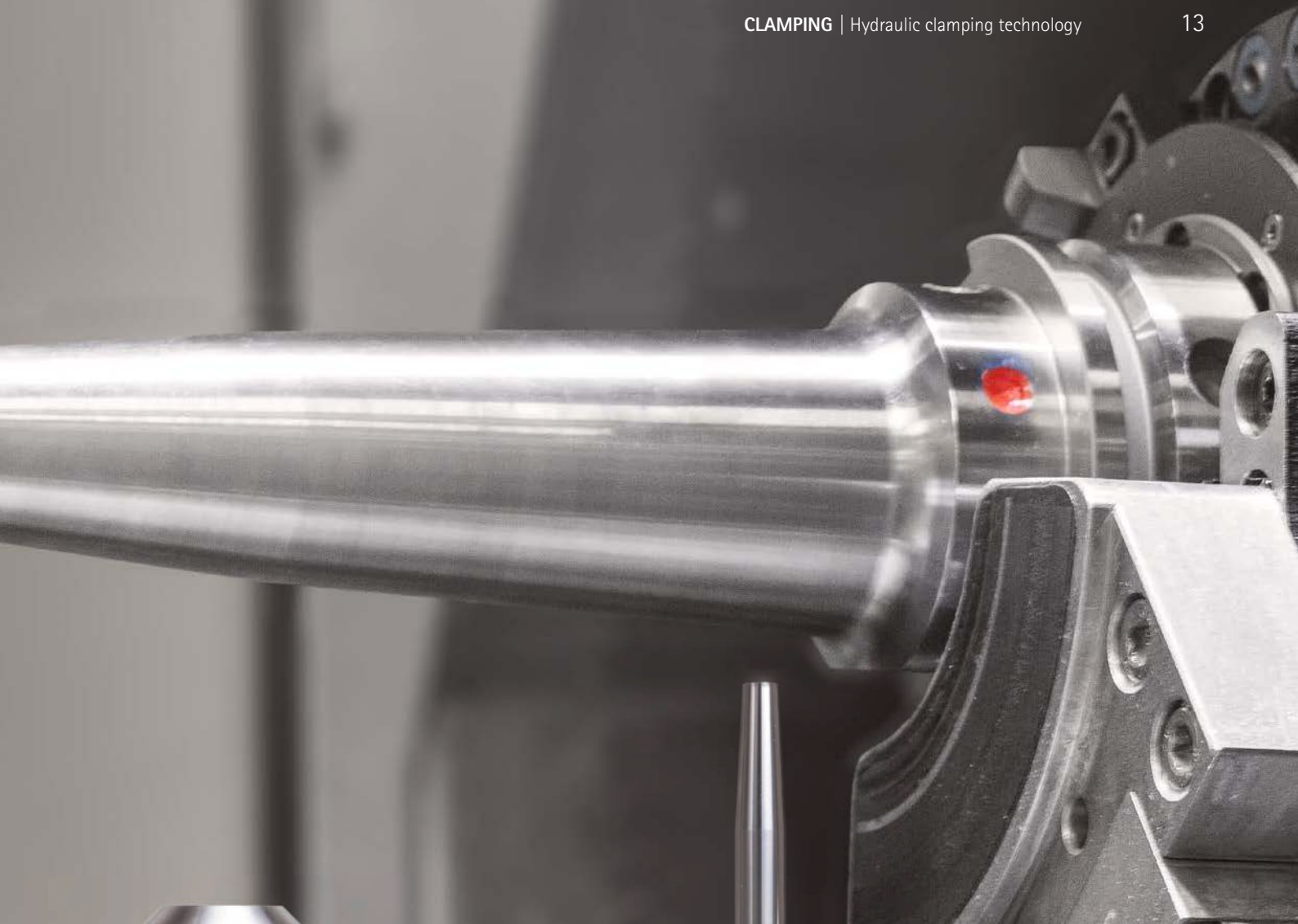
1 Machining of an injector bore

Due to the conversion from collet chucks to hydraulic clamping chucks with decentral coolant supply, the surface finish quality is improved and the non-productive time reduced. The improved coolant supply and better radial run-out of the hydraulic chuck result in an improvement of the bore quality with increased process reliability and tool life.



2 Machining of a valve body

The conversion to a compact hydraulic clamping chuck with integrated radial length adjustment in the flange allows the exact length adjustment and the compensation of length changes caused by the reconditioning of PCD tools, to be carried out on the high-productivity machine.



3 Heavy duty machining – milling process of wheel suspension

Conversion to additively manufactured hydraulic clamping chucks allows the highest load capacity through the elimination of the weak point on the brazed connection of the hydraulic bush. The highest operating temperature by maximum bending resistance and torque transfer assure the highest process reliability.



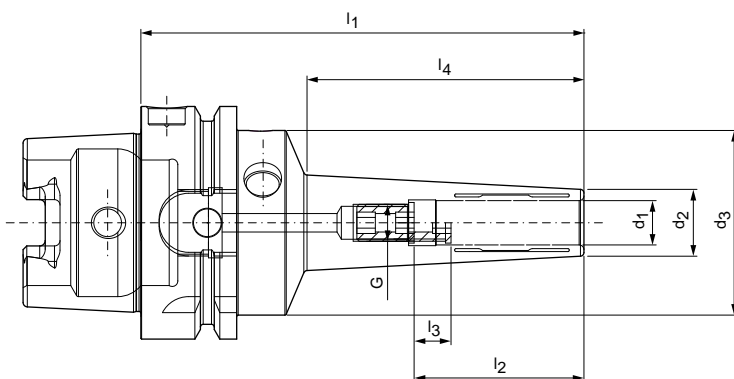
4 Drilling of stack materials with minimal interference contour

The conversion from standard shrinking chuck with extra-long special drill to long, additively manufactured hydraulic clamping chucks with standard length drill improves the bore quality with simpler handling and a considerable extension of the chuck life.

HighTorque Chuck HTC

with axial tool length adjustment

Shank HSK-A as per DIN 69893-1



Narrow design

HSK-A	Dimensions							G	sw	Specification	Order No.
	d_1	d_2	d_3	l_1	l_2	l_3	l_4				
40	3	9	34	85	28	16	45	M2.5	1,3	HTC-HSK-A040-03-85-1-0-A	30817979
40	4	10	34	85	28	12	45	M2.5	1,3	HTC-HSK-A040-04-85-1-0-A	30817980
40	5	11	34	85	28	8	45	M2.5	1,3	HTC-HSK-A040-05-85-1-0-A	30817981
40	6	12	34	85	37	10	46	M5	2,5	HTC-HSK-A040-06-85-1-0-A	30817982
40	8	14	34	85	37	10	46	M6	3	HTC-HSK-A040-08-85-1-0-A	30817983
40	10	16	34	85	41	10	47	M8x1	3	HTC-HSK-A040-10-85-1-0-A	30817984
40	12	18	34	85	46	10	47	M8x1	3	HTC-HSK-A040-12-85-1-0-A	30817985
63	3	9	50	120	28	16	73	M3	1,5	HTC-HSK-A063-03-120-1-0-A	30639848
63	3	9	52	126	28	16	80	M3	1,5	HTC-HSK-A063-03-126-1-0-A	30832804
63	4	10	50	120	28	12	73	M3	1,5	HTC-HSK-A063-04-120-1-0-A	30702807
63	4	10	52	126	28	12	80	M3	1,5	HTC-HSK-A063-04-126-1-0-A	30832805
63	5	11	50	120	28	8	73	M3	1,5	HTC-HSK-A063-05-120-1-0-A	30702808
63	5	11	52	126	28	8	80	M3	1,5	HTC-HSK-A063-05-126-1-0-A	30832806
63	6	12	50	120	37	10	74	M5	2,5	HTC-HSK-A063-06-120-1-0-A	30639849
63	6	12	52	126	37	10	80	M5	2,5	HTC-HSK-A063-06-126-1-0-A	30832807
63	6	16	50	160	37	10	111	M5	2,5	HTC-HSK-A063-06-160-1-0-A	30727647
63	6	12	52	176	37	10	132	M5	2,5	HTC-HSK-A063-06-176-1-0-A	30832808
63	6	16	50	200	37	10	152	M5	2,5	HTC-HSK-A063-06-200-1-0-A	30720812
63	6	12	52	226	37	10	184	M5	2,5	HTC-HSK-A063-06-226-1-0-A	30832809
63	7	13	50	120	37	10	74	M5	2,5	HTC-HSK-A063-07-120-1-0-A	30856736
63	8	14	50	120	37	10	74	M6	3	HTC-HSK-A063-08-120-1-0-A	30639851
63	8	15	52	126	37	10	80	M6	3	HTC-HSK-A063-08-126-1-0-A	30832810
63	8	18	50	160	37	10	111	M6	3	HTC-HSK-A063-08-160-1-0-A	30727648
63	8	14	52	176	37	10	133	M6	3	HTC-HSK-A063-08-176-1-0-A	30832811
63	8	18	50	200	37	10	152	M6	3	HTC-HSK-A063-08-200-1-0-A	30720815
63	8	14	52	226	37	10	185	M6	3	HTC-HSK-A063-08-226-1-0-A	30832812
63	9	15	50	120	37	10	74	M6	3	HTC-HSK-A063-09-120-1-0-A	30856737
63	10	16	50	120	41	10	74	M8x1	3	HTC-HSK-A063-10-120-1-0-A	30639852
63	10	18	52	126	41	10	80	M8x1	3	HTC-HSK-A063-10-126-1-0-A	30832813
63	10	20	50	160	41	10	113	M8x1	3	HTC-HSK-A063-10-160-1-0-A	30727650
63	10	19	52	176	41	10	134	M8x1	3	HTC-HSK-A063-10-176-1-0-A	30832814
63	10	20	50	200	41	10	154	M8x1	3	HTC-HSK-A063-10-200-1-0-A	30720816
63	10	19	52	226	41	10	185	M8x1	3	HTC-HSK-A063-10-226-1-0-A	30832815
63	11	17	50	120	41	10	74	M8x1	3	HTC-HSK-A063-11-120-1-0-A	30856738

HighTorque Chuck HTC | with axial tool length adjustment | Shank HSK-A as per DIN 69893-1 | Narrow design

HSK-A	Dimensions							G	sw	Specification	Specification
	d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	l ₄				
63	12	18	50	120	46	10	75	M10x1	5	HTC-HSK-A063-12-120-1-0-A	30639853
63	12	24	52	126	46	10	83	M10x1	5	HTC-HSK-A063-12-126-1-0-A	30832816
63	12	22	50	160	46	10	113	M10x1	5	HTC-HSK-A063-12-160-1-0-A	30727651
63	12	24	52	176	46	10	135	M10x1	5	HTC-HSK-A063-12-176-1-0-A	30832817
63	12	22	50	200	46	10	154	M10x1	5	HTC-HSK-A063-12-200-1-0-A	30720817
63	12	24	52	226	46	10	185	M10x1	5	HTC-HSK-A063-12-226-1-0-A	30832818
63	13	20	50	120	46	10	75	M10x1	5	HTC-HSK-A063-13-120-1-0-A	30856739
63	14	22	50	120	46	10	71	M10x1	5	HTC-HSK-A063-14-120-1-0-A	30782686
63	16	24	50	120	49	10	72	M12x1	5	HTC-HSK-A063-16-120-1-0-A	30699883
63	16	26	52	126	49	10	84	M12x1	5	HTC-HSK-A063-16-126-1-0-A	30832819
63	16	28	52	176	49	10	135	M12x1	5	HTC-HSK-A063-16-176-1-0-A	30832820
63	16	28	52	226	49	10	185	M12x1	5	HTC-HSK-A063-16-226-1-0-A	30832821
63	18	26	50	120	49	10	72	M12x1	5	HTC-HSK-A063-18-120-1-0-A	30699886
63	20	28	50	120	51	10	72	M16x1	5	HTC-HSK-A063-20-120-1-0-A	30699888
100	3	9	50	120	28	16	70	M3	1,5	HTC-HSK-A100-03-120-1-0-A	30856740
100	4	10	50	120	28	12	70	M3	1,5	HTC-HSK-A100-04-120-1-0-A	30856741
100	5	11	50	120	28	8	70	M3	1,5	HTC-HSK-A100-05-120-1-0-A	30856742
100	6	12	50	120	37	10	70	M5	2,5	HTC-HSK-A100-06-120-1-0-A	30856743
100	7	13	50	120	37	10	70	M5	2,5	HTC-HSK-A100-07-120-1-0-A	30856744
100	8	14	50	120	37	10	71	M6	3	HTC-HSK-A100-08-120-1-0-A	30856745
100	9	15	50	120	37	10	71	M6	3	HTC-HSK-A100-09-120-1-0-A	30856746
100	10	16	50	120	41	10	71	M8x1	3	HTC-HSK-A100-10-120-1-0-A	30856747
100	11	17	50	120	41	10	71	M8x1	3	HTC-HSK-A100-11-120-1-0-A	30856748
100	12	18	50	120	46	10	72	M10x1	5	HTC-HSK-A100-12-120-1-0-A	30856749
100	13	19	50	120	46	10	72	M10x1	5	HTC-HSK-A100-13-120-1-0-A	30856750
100	14	22	50	120	46	10	68	M10x1	5	HTC-HSK-A100-14-120-1-0-A	30856751
100	16	24	50	120	49	10	68	M12x1	5	HTC-HSK-A100-16-120-1-0-A	30856752
100	18	26	50	120	49	10	69	M12x1	5	HTC-HSK-A100-18-120-1-0-A	30856753
100	20	28	50	120	51	10	69	M16x1	5	HTC-HSK-A100-20-120-1-0-A	30856754

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter $d_1 = 20$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.

Items included: With length adjustment screw, without coolant tube.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA.

With a projection length of $2.5 \times D$ (max. 50 mm) radial run-out accuracy 3 μm .

On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore.

Chip version: RFID code carrier on request.

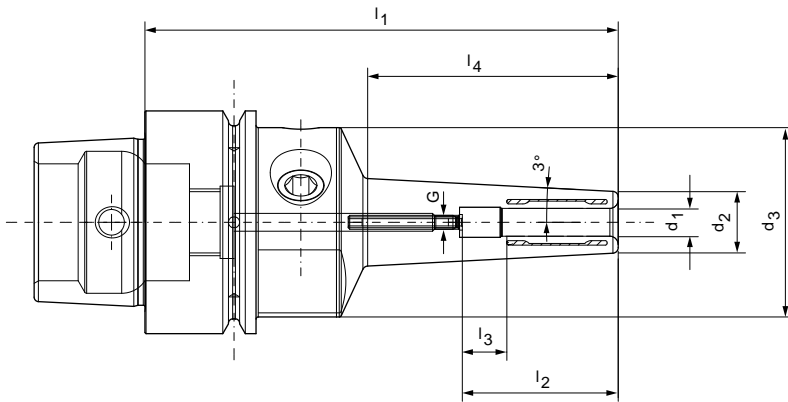
Further code carriers on request.

Balancing value: G 2.5 at 25,000 min^{-1} as delivered.

HighTorque Chuck HTC

with axial tool length adjustment

Shank HSK-E as per DIN 69893-5



Narrow design

HSK-E	Dimensions							G	sw	Specification	Order No.
	d_1	d_2	d_3	l_1	l_2	l_3	l_4				
40	3	9	34	85	28	16	45	M2.5	1,3	HTC-HSK-E040-03-85-1-0-A	30817965
40	4	10	34	85	28	12	45	M2.5	1,3	HTC-HSK-E040-04-85-1-0-A	30817966
40	5	11	34	85	28	8	45	M2.5	1,3	HTC-HSK-E040-05-85-1-0-A	30817967
40	6	12	34	85	37	10	46	M5	2,5	HTC-HSK-E040-06-85-1-0-A	30817968
40	8	14	34	85	37	10	46	M6	3	HTC-HSK-E040-08-85-1-0-A	30817969
40	10	16	34	85	41	10	47	M8x1	3	HTC-HSK-E040-10-85-1-0-A	30817970
40	12	18	34	85	46	10	47	M8x1	3	HTC-HSK-E040-12-85-1-0-A	30817971
50	3	9	42	85	28	16	37	M2.5	1,3	HTC-HSK-E050-03-85-1-0-A	30817972
50	4	10	42	85	28	12	37	M2.5	1,3	HTC-HSK-E050-04-85-1-0-A	30817973
50	5	11	42	85	28	8	37	M2.5	1,3	HTC-HSK-E050-05-85-1-0-A	30817974
50	6	12	42	85	37	10	38	M5	2,5	HTC-HSK-E050-06-85-1-0-A	30817975
50	8	14	42	85	37	10	38	M6	3	HTC-HSK-E050-08-85-1-0-A	30817976
50	10	16	42	85	41	10	39	M8x1	3	HTC-HSK-E050-10-85-1-0-A	30817977
50	12	18	42	85	46	10	39	M8x1	3	HTC-HSK-E050-12-85-1-0-A	30817978

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter $d_1 = 20$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.

Items included: With length adjustment screw, without coolant tube.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA.

With a projection length of $2.5 \times D$ (max. 50 mm) radial run-out accuracy 3 μm .

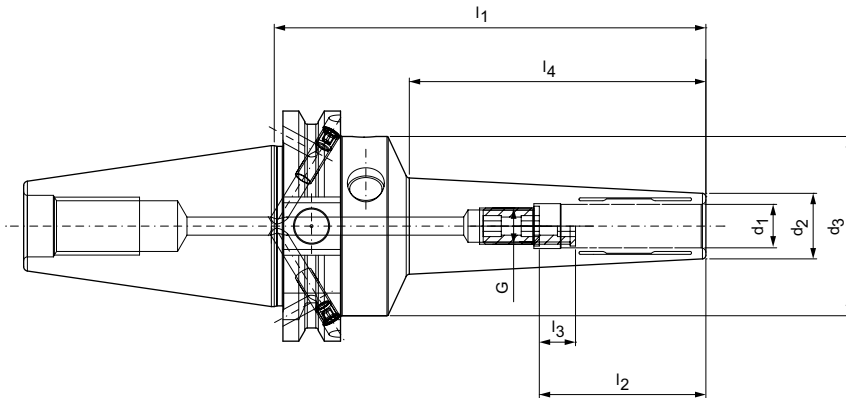
On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Balancing value: G 2.5 at $25,000 \text{ min}^{-1}$ as delivered.

HighTorque Chuck HTC

with axial tool length adjustment

Shank SK as per ISO 7388-1 Form AD/AF



Narrow design

SK	Dimensions							G	sw	Specification	Order No.
	d_1	d_2	d_3	l_1	l_2	l_3	l_4				
30*	3	9	40	80	28	16	40	M2.5	1,3	HTC-SK030-03-80-1-0-A	30817986
30*	4	10	40	80	28	12	40	M2.5	1,3	HTC-SK030-04-80-1-0-A	30817987
30*	5	11	40	80	28	8	40	M2.5	1,3	HTC-SK030-05-80-1-0-A	30817988
30*	6	12	40	80	37	10	41	M5	2,5	HTC-SK030-06-80-1-0-A	30817989
30*	8	14	40	80	37	10	41	M6	3,0	HTC-SK030-08-80-1-0-A	30817990
30*	10	16	40	80	41	10	42	M8x1	3,0	HTC-SK030-10-80-1-0-A	30817991
30*	12	18	40	80	46	10	42	M8x1	3,0	HTC-SK030-12-80-1-0-A	30817992
40	3	9	50	120	28	16	80	M3	1,5	HTC-SK040-03-120-3-0-A	30781267
40	4	10	50	120	28	12	80	M3	1,5	HTC-SK040-04-120-3-0-A	30781270
40	5	11	50	120	28	8	80	M3	1,5	HTC-SK040-05-120-3-0-A	30781273
40	6	12	50	120	37	10	80	M5	2,5	HTC-SK040-06-120-3-0-A	30655457
40	6	16	50	160	37	10	119	M5	2,5	HTC-SK040-06-160-3-0-A	30817993
40	6	16	50	200	37	10	161	M5	2,5	HTC-SK040-06-200-3-0-A	30817997
40	8	14	50	120	37	10	80	M6	3,0	HTC-SK040-08-120-3-0-A	30655458
40	8	18	50	160	37	10	119	M6	3,0	HTC-SK040-08-160-3-0-A	30817994
40	8	18	50	200	37	10	161	M6	3,0	HTC-SK040-08-200-3-0-A	30817998
40	10	16	50	120	41	10	81	M8x1	3,0	HTC-SK040-10-120-3-0-A	30655459
40	10	20	50	160	41	10	121	M8x1	3,0	HTC-SK040-10-160-3-0-A	30817995
40	10	20	50	200	41	10	162	M8x1	3,0	HTC-SK040-10-200-3-0-A	30817999
40	12	18	50	120	46	10	82	M10x1	5,0	HTC-SK040-12-120-3-0-A	30655460
40	12	22	50	160	46	10	122	M10x1	5,0	HTC-SK040-12-160-3-0-A	30817996
40	12	22	50	200	46	10	163	M10x1	5,0	HTC-SK040-12-200-3-0-A	30818000
40	14	22	50	120	46	10	79	M10x1	5,0	HTC-SK040-14-120-3-0-A	30782699
40	16	24	50	120	49	10	79	M12x1	5,0	HTC-SK040-16-120-3-0-A	30782702
40	18	26	50	120	49	10	80	M12x1	5,0	HTC-SK040-18-120-3-0-A	30782708
40	20	28	50	120	51	10	80	M16x1	5,0	HTC-SK040-20-120-3-0-A	30782712

* Design: Steep taper sizes are not available in combination AD/AF

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter $d_1 = 32$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.

Items included: With length adjustment screws. Without pull stud.

Design: Normal setting Form AD, if Form AF is required, please state with the order.

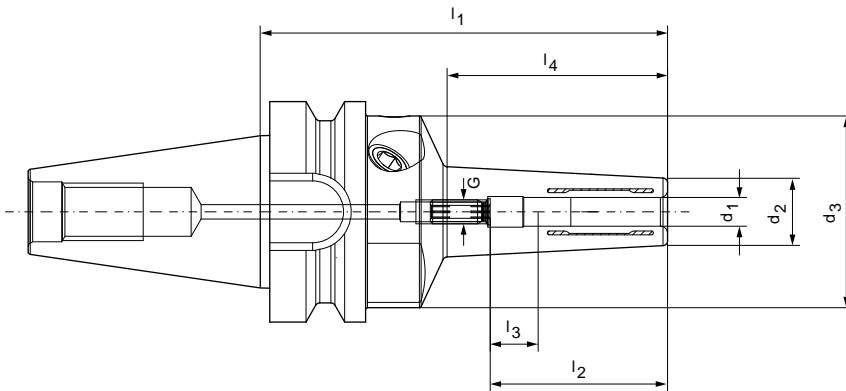
Note: Chuck with axial tool length adjustment.

Balancing value: G 2.5 at 25,000 min⁻¹ as delivered.

HighTorque Chuck HTC

with axial tool length adjustment

Shank BT as per ISO 7388-2 Form JD/JS (JIS B 6339)



Narrow design

BT	Dimensions							G	sw	Specification	Order No.
	d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	l ₄				
30	3	10	40	85	28	16	45	M3	1,5	HTC-BT030-03-85-1-0-A	30819403
30	4	12	40	85	28	12	45	M3	1,5	HTC-BT030-04-85-1-0-A	30819404
30	5	13	40	85	28	8	45	M3	1,5	HTC-BT030-05-85-1-0-A	30819405
30	6	14	40	85	37	10	46	M5	2,5	HTC-BT030-06-85-1-0-A	30819406
30	8	16	40	85	37	10	46	M6	3	HTC-BT030-08-85-1-0-A	30819407
30	10	18	40	85	41	10	47	M8x1	3	HTC-BT030-10-85-1-0-A	30819408
30	12	20	40	85	46	10	47	M8x1	3	HTC-BT030-12-85-1-0-A	30819409
30	14	24	40	85	46	10	47	M8x1	3	HTC-BT030-14-85-1-0-A	30819410
30	16	26	40	85	49	10	48	M8x1	3	HTC-BT030-16-85-1-0-A	30819411
30	18	28	40	85	49	10	48	M8x1	3	HTC-BT030-18-85-1-0-A	30819412
30	20	30	40	85	51	10	49	M8x1	3	HTC-BT030-20-85-1-0-A	30819413
40	3	9	50	120	28	16	70,5	M3	1,5	HTC-BT040-03-120-3-0-A	30781286
40	4	10	50	120	28	12	70,5	M3	1,5	HTC-BT040-04-120-3-0-A	30781287
40	5	11	50	120	28	8	71	M3	1,5	HTC-BT040-05-120-3-0-A	30781290
40	6	12	50	120	37	10	72	M5	2,5	HTC-BT040-06-120-3-0-A	30757078
40	8	14	50	120	37	10	72,5	M6	3	HTC-BT040-08-120-3-0-A	30757080
40	10	16	50	120	41	10	73	M8x1	3	HTC-BT040-10-120-3-0-A	30757081
40	12	18	50	120	46	10	73,5	M10x1	5	HTC-BT040-12-120-3-0-A	30757082
40	14	22	50	120	46	10	71	M10x1	5	HTC-BT040-14-120-3-0-A	30858267
40	16	24	50	120	49	10	71	M12x1	5	HTC-BT040-16-120-3-0-A	30858268
40	18	26	50	120	49	10	72	M12x1	5	HTC-BT040-18-120-3-0-A	30858269
40	20	28	50	120	51	10	72	M16x1	5	HTC-BT040-20-120-3-0-A	30858270
40	6	16	50	160	37	10	111	M5	2,5	HTC-BT040-06-160-3-0-A	30858274
40	8	18	50	160	37	10	111,5	M6	3	HTC-BT040-08-160-3-0-A	30858275
40	10	20	50	160	41	10	113	M8x1	3	HTC-BT040-10-160-3-0-A	30858277
40	12	22	50	160	46	10	114	M10x1	5	HTC-BT040-12-160-3-0-A	30858278
40	6	16	50	200	37	10	152,5	M5	2,5	HTC-BT040-06-200-3-0-A	30858286
40	8	18	50	200	37	10	152,5	M6	3	HTC-BT040-08-200-3-0-A	30858287
40	10	20	50	200	41	10	154	M8x1	3	HTC-BT040-10-200-3-0-A	30858288
40	12	22	50	200	46	10	155	M10x1	5	HTC-BT040-12-200-3-0-A	30858289

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter $d_1 = 12$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.

Items included: With length adjustment screw. Without pull stud.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. With a projection length of $2.5 \times D$ (max. 50 mm) radial run-out accuracy 3 μm .

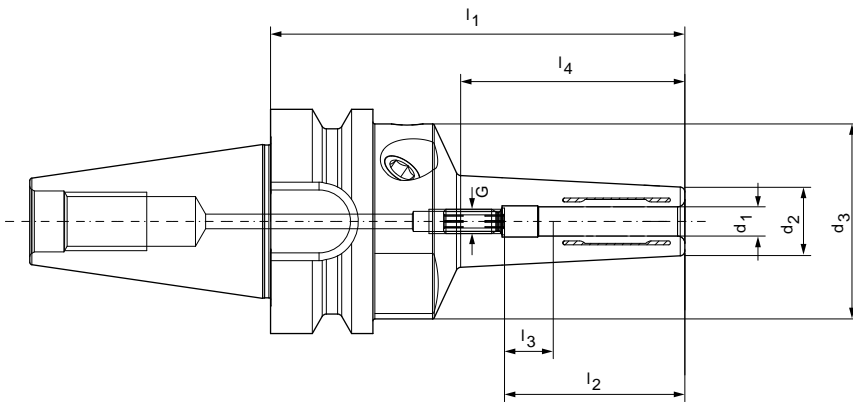
On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected. Normal setting Form JD, if Form JF is required, please state with the order.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Balancing value: G 2.5 at 25,000 min^{-1} as delivered.

HighTorque Chuck HTC

with axial tool length adjustment

Shank similar to ISO 7388-2 Form JD (with contact face)



Narrow design

BT	Dimensions							G	sw	Specification	Order No.
	d_1	d_2	d_3	l_1	l_2	l_3	l_4				
30	3	10	40	85	28	16	45	M3	1,5	HTC-JD-FC030-03-85-1-0-A	30819441
30	4	12	40	85	28	12	45	M3	1,5	HTC-JD-FC030-04-85-1-0-A	30819442
30	5	13	40	85	28	8	45	M3	1,5	HTC-JD-FC030-05-85-1-0-A	30819443
30	6	14	40	85	37	10	46	M5	2,5	HTC-JD-FC030-06-85-1-0-A	30819444
30	8	16	40	85	37	10	46	M6	3	HTC-JD-FC030-08-85-1-0-A	30819445
30	10	18	40	85	41	10	46	M8x1	3	HTC-JD-FC030-10-85-1-0-A	30819446
30	12	20	40	85	46	10	47	M8x1	3	HTC-JD-FC030-12-85-1-0-A	30819448
30	14	24	40	85	46	10	47	M8x1	3	HTC-JD-FC030-14-85-1-0-A	30819449
30	16	26	40	85	49	10	48	M8x1	3	HTC-JD-FC030-16-85-1-0-A	30819450
30	18	28	40	85	49	10	48	M8x1	3	HTC-JD-FC030-18-85-1-0-A	30819451
30	20	30	40	85	51	10	49	M8x1	3	HTC-JD-FC030-20-85-1-0-A	30819452

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A, DIN 6535 Form HA up to clamping diameter $d_1 = 12$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.

Items included: With length adjustment screw. Without pull stud.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. With a projection length of $2.5 \times D$ (max. 50 mm) radial run-out accuracy $3 \mu\text{m}$.

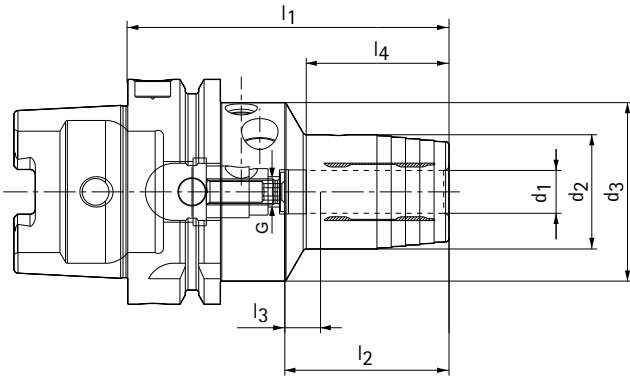
On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected. Normal setting Form JD, if Form JF is required, please state with the order.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Balancing value: $G 2.5$ at $25,000 \text{ min}^{-1}$ as delivered.

Hydraulic chuck HydroChuck

as per DIN 69882-7 with axial tool length adjustment

Shank HSK-A as per DIN 69893-1



HSK-A	Dimensions							G	sw	Specification	Order No.
	d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	l ₄				
63	6	26	50	90	37	10	44	M5	2,5	MHC-HSK-A063-06-090-1-0-A	30882153
63	6	26	50	170	37	10	123	M5	2,5	MHC-HSK-A063-06-170-1-0-A	30882154
63	6	26	50	210	37	10	153	M5	2,5	MHC-HSK-A063-06-210-1-0-A	30882226
63	6	26	50	230	37	10	153	M5	2,5	MHC-HSK-A063-06-230-1-0-A	30882227
63	7	27	50	70	37	10	23	M5	2,5	MHC-HSK-A063-07-070-1-0-A	30882155
63	8	28	50	90	37	10	45	M6	3	MHC-HSK-A063-08-090-1-0-A	30882156
63	8	28	50	170	37	10	124	M6	3	MHC-HSK-A063-08-170-1-0-A	30882157
63	8	28	50	210	37	10	154	M6	3	MHC-HSK-A063-08-210-1-0-A	30882228
63	8	28	50	230	37	10	154	M6	3	MHC-HSK-A063-08-230-1-0-A	30882229
63	9	29	50	70	37	10	24	M6	3	MHC-HSK-A063-09-070-1-0-A	30882158
63	10	30	50	170	41	10	124	M8x1	3	MHC-HSK-A063-10-170-1-0-A	30882159
63	10	30	50	210	41	10	154	M8x1	3	MHC-HSK-A063-10-210-1-0-A	30882230
63	10	30	50	230	41	10	154	M8x1	3	MHC-HSK-A063-10-230-1-0-A	30882231
63	11	31	50	80	41	10	34	M8x1	3	MHC-HSK-A063-11-080-1-0-A	30882160
63	12	32	50	170	46	10	125	M10x1	5	MHC-HSK-A063-12-170-1-0-A	30882161
63	12	32	50	210	46	10	155	M10x1	5	MHC-HSK-A063-12-210-1-0-A	30882232
63	12	32	50	230	46	10	155	M10x1	5	MHC-HSK-A063-12-230-1-0-A	30882233
63	13	33	50	85	46	10	39	M10x1	5	MHC-HSK-A063-13-085-1-0-A	30882162
63	14	34	50	170	46	10	125	M10x1	5	MHC-HSK-A063-14-170-1-0-A	30882163
63	14	34	50	210	46	10	155	M10x1	5	MHC-HSK-A063-14-210-1-0-A	30882234
63	14	34	50	230	46	10	155	M10x1	5	MHC-HSK-A063-14-230-1-0-A	30882235
63	16	38	50	170	49	10	126	M12x1	5	MHC-HSK-A063-16-170-1-0-A	30882164
63	16	38	50	210	49	10	156	M12x1	5	MHC-HSK-A063-16-210-1-0-A	30882236
63	16	38	50	230	49	10	156	M12x1	5	MHC-HSK-A063-16-230-1-0-A	30882237
63	18	40	50	170	49	10	127	M12x1	5	MHC-HSK-A063-18-170-1-0-A	30882165
63	18	40	50	210	49	10	157	M12x1	5	MHC-HSK-A063-18-210-1-0-A	30882238
63	18	40	50	230	49	10	157	M12x1	5	MHC-HSK-A063-18-230-1-0-A	30882239
63	20	42	50	170	51	10	128	M16x1	5	MHC-HSK-A063-20-170-1-0-A	30882166
63	20	42	50	210	51	10	158	M16x1	5	MHC-HSK-A063-20-210-1-0-A	30882240
63	20	42	50	230	51	10	158	M16x1	5	MHC-HSK-A063-20-230-1-0-A	30882241
63	25	57	52,5	150	57	10	93	M16x1	5	MHC-HSK-A063-25-150-1-0-A	30785029
63	25	57	52,5	170	57	10	113	M16x1	5	MHC-HSK-A063-25-170-1-0-A	30882167
63	25	57	52,5	200	57	10	143	M16x1	5	MHC-HSK-A063-25-200-1-0-A	30882168
63	25	57	52,5	210	57	10	143	M16x1	5	MHC-HSK-A063-25-210-1-0-A	30882242
63	25	57	52,5	230	57	10	143	M16x1	5	MHC-HSK-A063-25-230-1-0-A	30882243
63	32	63	59	150	61	10	116	M16x1	5	MHC-HSK-A063-32-150-1-0-A	30882169
63	32	63	59	170	61	10	136	M16x1	5	MHC-HSK-A063-32-170-1-0-A	30882170

Hydraulic chuck HydroChuck | as per DIN 69882-7 with axial tool length adjustment | Shank HSK-A as per DIN 69893-1

HSK-A	Dimensions							G	sw	Specification	Order No.
	d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	l ₄				
63	32	63	59	200	61	10	166	M16x1	5	MHC-HSK-A063-32-200-1-0-A	30882171
63	32	63	59	210	61	10	166	M16x1	5	MHC-HSK-A063-32-210-1-0-A	30882244
63	32	63	59	230	61	10	166	M16x1	5	MHC-HSK-A063-32-230-1-0-A	30882245
100	6	26	50	90	37	10	41	M5	2,5	MHC-HSK-A100-06-090-1-0-A	30882172
100	6	26	50	170	37	10	131	M5	2,5	MHC-HSK-A100-06-170-1-0-A	30882173
100	6	26	50	210	37	10	131	M5	2,5	MHC-HSK-A100-06-210-1-0-A	30882246
100	6	26	50	230	37	10	131	M5	2,5	MHC-HSK-A100-06-230-1-0-A	30882247
100	7	27	50	90	37	10	41	M5	2,5	MHC-HSK-A100-07-090-1-0-A	30882174
100	8	28	50	90	37	10	41	M6	3	MHC-HSK-A100-08-090-1-0-A	30882175
100	8	28	50	170	37	10	131	M6	3	MHC-HSK-A100-08-170-1-0-A	30882176
100	8	28	50	210	37	10	161	M6	3	MHC-HSK-A100-08-210-1-0-A	30882248
100	8	28	50	230	37	10	161	M6	3	MHC-HSK-A100-08-230-1-0-A	30882249
100	9	30	50	90	37	10	41	M6	3	MHC-HSK-A100-09-090-1-0-A	30882177
100	10	30	50	170	41	10	122	M8x1	3	MHC-HSK-A100-10-170-1-0-A	30884632
100	10	30	50	210	41	10	152	M8x1	3	MHC-HSK-A100-10-210-1-0-A	30882250
100	10	30	50	230	41	10	152	M8x1	3	MHC-HSK-A100-10-230-1-0-A	30882251
100	11	32	50	90	41	10	42	M8x1	3	MHC-HSK-A100-11-090-1-0-A	30882178
100	12	32	50	170	46	10	122	M10x1	5	MHC-HSK-A100-12-170-1-0-A	30882179
100	12	32	50	210	46	10	152	M10x1	5	MHC-HSK-A100-12-210-1-0-A	30882252
100	12	32	50	230	46	10	152	M10x1	5	MHC-HSK-A100-12-230-1-0-A	30882253
100	13	34	50	95	46	10	47	M10x1	5	MHC-HSK-A100-13-095-1-0-A	30882181
100	16	38	50	170	49	10	123	M12x1	5	MHC-HSK-A100-16-170-1-0-A	30882182
100	16	38	50	210	49	10	153	M12x1	5	MHC-HSK-A100-16-210-1-0-A	30882254
100	16	38	50	230	49	10	153	M12x1	5	MHC-HSK-A100-16-230-1-0-A	30882255
100	20	42	50	170	51	10	124	M16x1	5	MHC-HSK-A100-20-170-1-0-A	30882183
100	20	42	50	210	51	10	154	M16x1	5	MHC-HSK-A100-20-210-1-0-A	30882256
100	20	42	50	230	51	10	154	M16x1	5	MHC-HSK-A100-20-230-1-0-A	30882257
100	25	57	63	165	57	10	117	M16x1	5	MHC-HSK-A100-25-165-1-0-A	30882185
100	25	57	63	170	57	10	122	M16x1	5	MHC-HSK-A100-25-170-1-0-A	30882186
100	25	57	63	210	57	10	152	M16x1	5	MHC-HSK-A100-25-210-1-0-A	30882258
100	25	57	63	230	57	10	152	M16x1	5	MHC-HSK-A100-25-230-1-0-A	30882259
100	32	63	67	165	61	10	117	M16x1	5	MHC-HSK-A100-32-165-1-0-A	30882187
100	32	63	67	170	61	10	122	M16x1	5	MHC-HSK-A100-32-170-1-0-A	30882188
100	32	63	67	210	61	10	152	M16x1	5	MHC-HSK-A100-32-210-1-0-A	30882260
100	32	63	67	230	61	10	152	M16x1	5	MHC-HSK-A100-32-230-1-0-A	30882261

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 6535 Form HA up to clamping diameter $d_1 = 32$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a tool tolerance of h6. Items included: With length adjustment screw, without coolant tube.

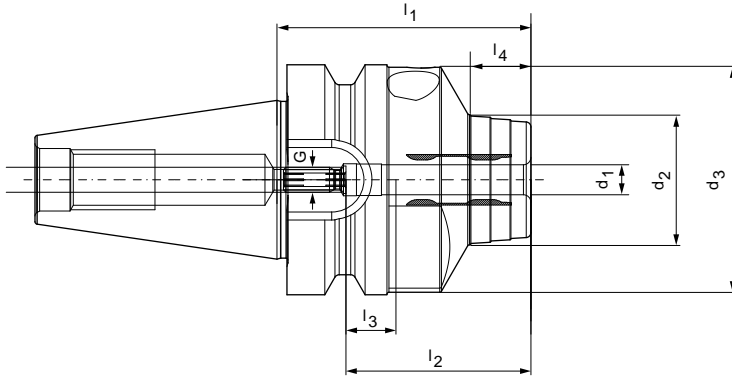
Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA. With a projection length of $2.5 \times D$ (max. 50 mm) radial run-out accuracy $3 \mu\text{m}$. On usage of cylindrical shanks with angled clamping surface (Form E and Form HE) the accuracy may be affected.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Balancing value: G 2.5 at $25,000 \text{ min}^{-1}$ as delivered.

Hydraulic chuck HydroChuck

with axial tool length adjustment

Shank BT as per ISO 7388-2 Form JD (JIS B 6339)



BT	Dimensions							G	sw	Specification	Order No.
	d_1	d_2	d_3	l_1	l_2	l_3	l_4				
30	3	20	40	51	28	16	12	M3	1,5	MHC-BT030-03-051-1-0-A	30817010
30	4	20	40	51	28	12	12	M3	1,5	MHC-BT030-04-051-1-0-A	30817011
30	5	20	40	51	28	8	12	M3	1,5	MHC-BT030-05-051-1-0-A	30817013
30	6	26	45	51	37	10	12	M5	2,5	MHC-BT030-06-051-1-0-A	30270438
30	8	28	45	51	37	10	13	M6	3	MHC-BT030-08-051-1-0-A	30270439
30	10	30	45	51	41	10	13	M8x1	3	MHC-BT030-10-051-1-0-A	30270440
30	12	32	45	51	46	10	14	M8x1	3	MHC-BT030-12-051-1-0-A	30270441
30	14	34	45	90	46	10	45	M8x1	3	MHC-BT030-14-090-1-0-A	30270442
30	16	38	45	90	49	10	50	M8x1	3	MHC-BT030-16-090-1-0-A	30270443
30	18	40	45	90	49	10	50	M8x1	3	MHC-BT030-18-090-1-0-A	30270444
30	20	42	45	90	51	10	50	M8x1	3	MHC-BT030-20-090-1-0-A	30270445
40	6	26	50	60	37	10	12	M5	2,5	MHC-BT040-06-60-1-0-A	30273841
40	8	28	50	60	37	10	12	M6	3	MHC-BT040-08-60-1-0-A	30273844
40	10	30	50	60	41	10	12	M8x1	3	MHC-BT040-10-60-1-0-A	30273847
40	12	32	50	60	46	10	12	M10x1	5	MHC-BT040-12-60-1-0-A	30273850
40	6	26	50	90	37	10	29	M5	1,5	MHC-BT040-06-090-3-0-A	30251037
40	8	28	50	90	37	10	30	M6	1,6	MHC-BT040-08-090-3-0-A	30251038
40	10	30	50	90	41	10	35	M8x1	1,6	MHC-BT040-10-090-3-0-A	30251039
40	12	32	50	90	46	10	40	M10x1	1,6	MHC-BT040-12-090-3-0-A	30251040

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1855 Form A, DIN 6535 Form HA up to clamping diameter $d_1 = 32$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.

Items included: With length adjustment screw. Without pull stud.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA.

With a projection length of $2.5 \times D$ (max. 50 mm) radial run-out accuracy $3 \mu\text{m}$.

On usage of cylindrical shanks with angled clamping surface (Form E and Form HE)

the accuracy may be affected. Normal setting Form JD, if Form JF is required,

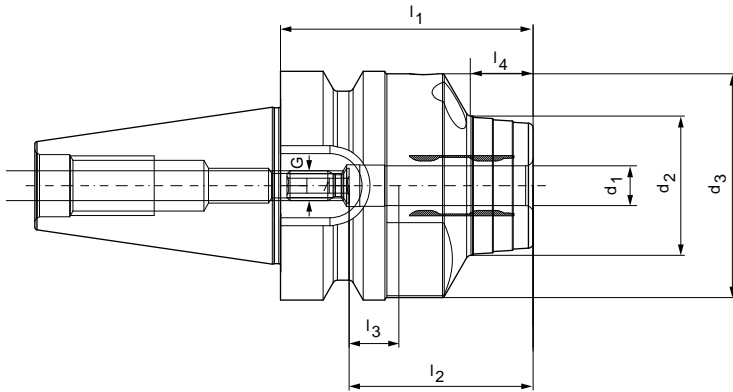
please state with the order.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Balancing value: G 2.5 at $25,000 \text{ min}^{-1}$ as delivered.

Hydraulic chuck HydroChuck

with axial tool length adjustment

Shank similar to ISO 7388-2 Form JD (with contact face)



BT	Dimensions							G	sw	Specification	Order No.
	d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	l ₄				
30	3	20	40	51	28	16	12	M3	1,5	MHC-JD-FC030-03-051-1-0-A	30817014
30	4	20	40	51	28	12	12	M3	1,5	MHC-JD-FC030-04-051-1-0-A	30817015
30	5	20	40	51	28	8	12	M3	1,5	MHC-JD-FC030-05-051-1-0-A	30817016
30	6	26	45	51	37	10	12	M5	2,5	MHC-JD-FC030-06-051-1-0-A	30817017
30	8	28	45	51	37	10	13	M6	3	MHC-JD-FC030-08-051-1-0-A	30817018
30	10	30	45	51	41	10	13	M8x1	3	MHC-JD-FC030-10-051-1-0-A	30817020
30	12	32	45	51	46	10	14	M8x1	3	MHC-JD-FC030-12-051-1-0-A	30817021
30	14	34	45	90	46	10	45	M8x1	3	MHC-JD-FC030-14-051-1-0-A	30817023
30	16	38	45	90	49	10	50	M8x1	3	MHC-JD-FC030-16-051-1-0-A	30817024
30	18	40	45	90	49	10	50	M8x1	3	MHC-JD-FC030-18-051-1-0-A	30817025
30	20	42	45	90	51	10	50	M8x1	3	MHC-JD-FC030-20-051-1-0-A	30728347
40	6	26	50	90	37	10	29	M5	2,5	MHC-JD-FC040-06-090-1-0-A	30868799
40	8	28	50	90	37	10	30	M6	3	MHC-JD-FC040-08-090-1-0-A	30868800
40	10	30	50	90	41	10	35	M8x1	3	MHC-JD-FC040-10-090-1-0-A	30868801
40	12	32	50	90	46	10	40	M10x1	5	MHC-JD-FC040-12-090-1-0-A	30868802

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1855 Form A, DIN 6535 Form HA up to clamping diameter $d_1 = 32$ mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6.

Items included: With length adjustment screw. Without pull stud.

Design: Longest tool lives and highest manufacturing quality on usage of smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA.

With a projection length of $2.5 \times D$ (max. 50 mm) radial run-out accuracy $3 \mu\text{m}$.

On usage of cylindrical shanks with angled clamping surface (Form E and Form HE)

the accuracy may be affected. Normal setting Form JD, if Form JF is required,

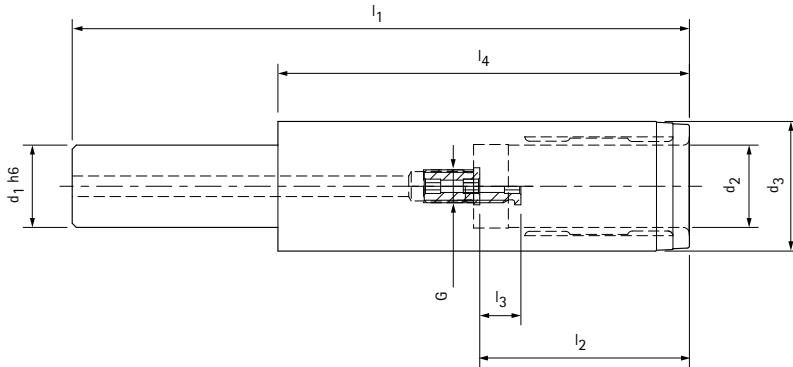
please state with the order.

Note: Chuck with axial tool length adjustment. Coolant supply via central through bore. Balancing value: G 2.5 at $25,000 \text{ min}^{-1}$ as delivered.

Hydraulic extensions

with axial tool length adjustment

Cylindrical shank as per DIN 1835-A



d ₁ h6	Dimensions							G	sw	Specification	Order No.
	d ₁	d ₂	d ₃	l ₁	l ₂	l ₃	l ₄				
20	20	12	25	150	46	10	100	M10x1	5	MHC-ZYL020-12-150-1-0-A	30479014
20	20	20	32	150	51	10	100	M16x1	5	MHC-ZYL020-20-150-1-0-A	30479015
25	25	12	25	150	46	10	-	M6	3	MHC-ZYL025-12-150-1-0-A	30801069
32	32	20	32	150	51	10	90	M16x1	5	MHC-ZYL032-20-150-1-0-A	30479016
32	32	20	32	200	51	10	90	M16x1	5	MHC-ZYL032-20-200-1-0-A	30479018

Dimensions in mm.

Use: For clamping tools with smooth cylindrical shanks in accordance with DIN 1835 Form A and DIN 6535 Form HA up to diameter 20 mm as well as with recesses in accordance with DIN 1835 Form B, E and DIN 6535 Form HB, HE directly and without reducing sleeve in the clamping diameter. The clamping diameter is designed for a shank tolerance of h6. To increase the torque transmission, suitable for all MAPAL hydraulic chucks HydroChuck and HTC.

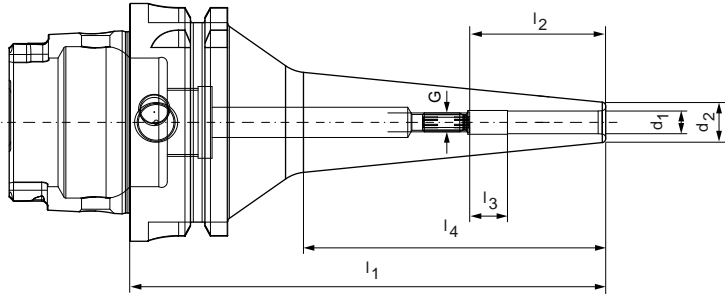
Items included: With length adjustment screw.

Balancing value: G 2.5 at 25,000 min⁻¹ as delivered.

Thermal shrinking chuck ThermoChuck

with axial tool length adjustment

Shank HSK-A as per DIN 69893-1



Narrow design

HSK-A	Dimensions						G	sw	Specification	Order No.
	d ₁	d ₂	l ₁	l ₂	l ₃	l ₄				
63	3	8	126	28	16	80	M6	2	MTC-HSK-A063-03-126-1-0-A	30813694
63	4	8	126	28	12	80	M6	2	MTC-HSK-A063-04-126-1-0-A	30813695
63	5	9	126	30	10	80	M6	2	MTC-HSK-A063-05-126-1-0-A	30813696
63	6	11	126	36	10	80	M5	2,5	MTC-HSK-A063-06-126-1-0-A	30813697
63	6	10	176	36	10	130	M5	2,5	MTC-HSK-A063-06-176-1-0-A	30813698
63	6	10	226	36	10	200	M5	2,5	MTC-HSK-A063-06-226-1-0-A	30813699
63	8	15	126	36	10	80	M6	3	MTC-HSK-A063-08-126-1-0-A	30813700
63	8	14	176	36	10	130	M6	3	MTC-HSK-A063-08-176-1-0-A	30813701
63	8	14	226	36	10	200	M6	3	MTC-HSK-A063-08-226-1-0-A	30813702
63	10	18	126	41	10	80	M8x1	3	MTC-HSK-A063-10-126-1-0-A	30813703
63	10	19	176	41	10	130	M8x1	3	MTC-HSK-A063-10-176-1-0-A	30813707
63	10	19	226	41	10	200	M8x1	3	MTC-HSK-A063-10-226-1-0-A	30813705
63	12	24	126	47	10	80	M10x1	5	MTC-HSK-A063-12-126-1-0-A	30813706
63	12	24	176	47	10	150	M10x1	5	MTC-HSK-A063-12-176-1-0-A	30813704
63	12	24	226	47	10	200	M10x1	5	MTC-HSK-A063-12-226-1-0-A	30813708
63	16	26	126	50	10	80	M12x1	5	MTC-HSK-A063-16-126-1-0-A	30813709
63	16	28	176	50	10	150	M12x1	5	MTC-HSK-A063-16-176-1-0-A	30813710
63	16	28	226	50	10	200	M12x1	5	MTC-HSK-A063-16-226-1-0-A	30813711
63	20	33	126	52	10	100	M16x1	5	MTC-HSK-A063-20-126-1-0-A	30885652
63	20	33	176	52	10	150	M16x1	5	MTC-HSK-A063-20-176-1-0-A	30885653
63	20	33	226	52	10	200	M16x1	5	MTC-HSK-A063-20-226-1-0-A	30885654

Dimensions in mm.

Items included: Built-in length adjustment screw with through hole.

Without fine balancing screws and coolant tube.

Design: Permissible run-out deviation on the hollow taper shank in relation to the clamping diameter $d_1 = 3 \mu\text{m}$. The clamping diameter is designed for a shank tolerance of h6.

Chip version: RFID code carrier on request.

Balancing value: G 2.5 at $25,000 \text{ min}^{-1}$ as delivered.

ENTIRE PROGRAMME CLAMPING CHUCKS



1 Hydraulic extensions

2 Precision drill chuck
Micro design

3 ThermoChuck
Slim design 3°

4 Whistle Notch chuck

5 Precision drill chuck

6 Collet chuck

7 HydroChuck Compensation

8 HighTorque Chuck
Available in long and short heavy duty designs

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