



MODULAR CLAMPING TECHNOLOGY

OTT
Spanntechnik

JAKOB

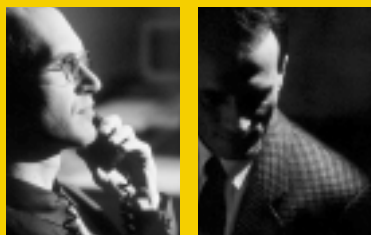
LET OUR EXPERIENCE WORK FOR YOU

You can rely on us.

We offer you the service that you can expect from the leader in technology. Selling good products is not enough. We also provide our customers with fast and efficient support so they are able to run their production without delays.

Our technical support team is always there for you and will answer your most difficult and complex questions. You find local hotline support in our sales offices all around the world and our main office in Lengenwang is also prepared to help you:

Call: OTT-JAKOB/Lengenwang:
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SEIT 1873 HISTORY

SINCE 1873

We combine traditional values like striving for perfection and precision with our commitment to innovation. New inventions and patents in all areas are the results.

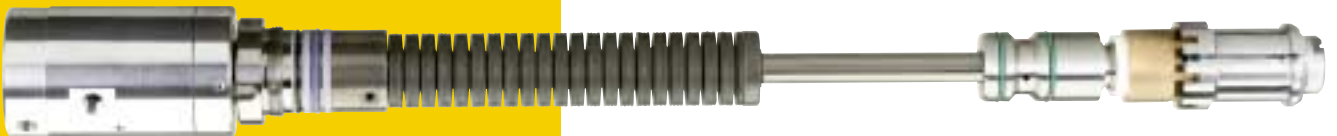


Innovative competence is an OTT-JAKOB tradition.

Our company goes back to 1873 when Albert Ott founded the Mathematical-Mechanical Institute in Kempten

1880 - World exhibition in Melbourne

1897 - Exhibition in Chicago



In 1974 we developed the power drawbar, which has been continuously improved to meet new application requirements. Today, 250,000 machines worldwide are operating with the Ott power drawbar.

On March 1, 1993 the company Ott-Spanntechnik merged with the Jakob Group. OTT-JAKOB Spanntechnik was born.

1998 - We are celebrating 125 years of world-renowned capability in precision mechanics and tool clamping technology.

A small company made its way to become the leading manufacturer of automatic tool clamping systems.



UNSER DENKEN PHILOSOPHY

OUR THINKING

In the past years OTT-JAKOB could further develop its leading position in tool clamping technology.

Out of this position we entered the following commitments:

1. Our highly motivated and trained employees produce customer oriented high-tech products in best quality. Know-how, team spirit and innovative power are the most important components for developing high-end clamping technology products for mechanical engineering



2. All OTT-JAKOB product lines guarantee the optimum in system safety on the highest level of technological development.

PHILOSOPHY

TRENDS ERKENNEN

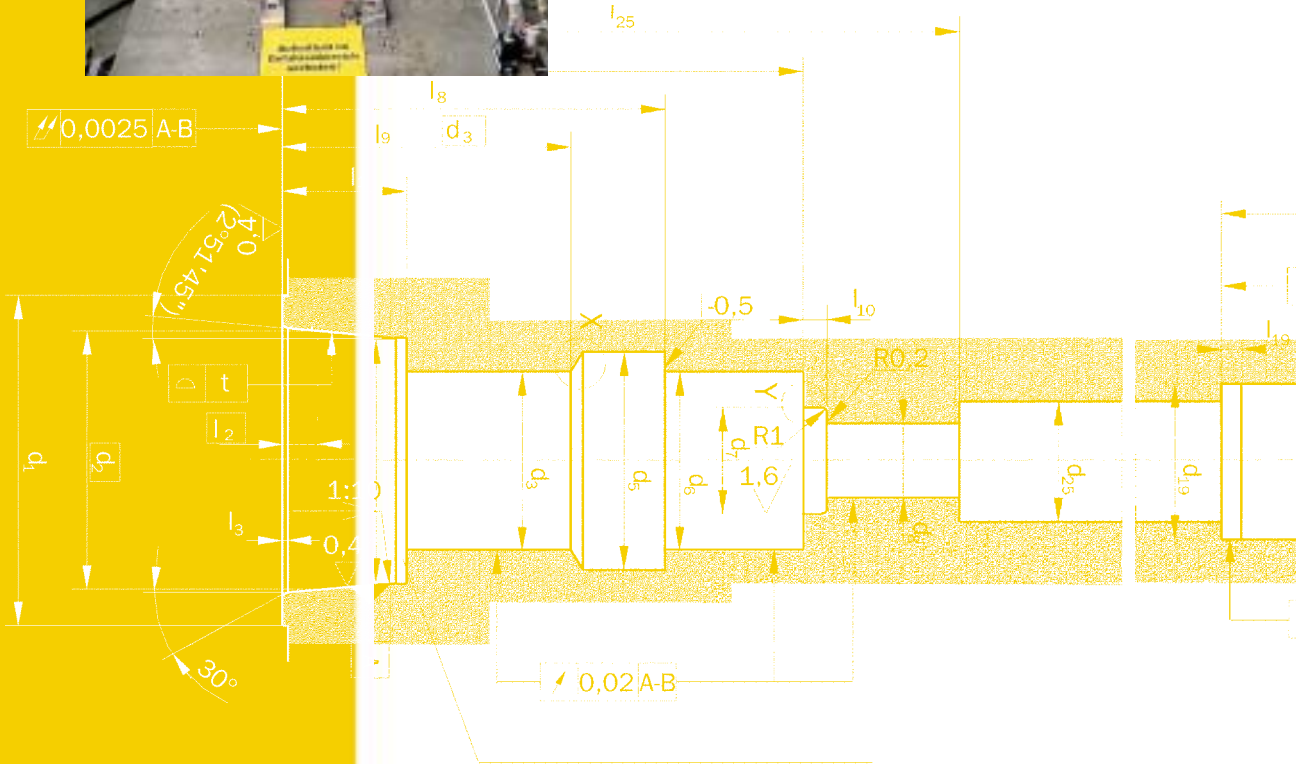
RECOGNIZING

TRENDS

A shorter Time-to-Market ratio secures your investments. But first one has to recognize the trends. Our Research & Development department cooperates with universities and research teams to develop customer oriented system solutions, which build trends for the future.



Sensational test results: Our plant in Lengenwang tested several clamping units. The units were successfully clamped and released up to 9 million times with a speed of 0.13 seconds.



PERFEKTION FERTIGEN

FINISHING



The employee and his knowledge are the center of attention

Ott employees have years of experience and are innovative. They are familiar with complex speed calculations and limitations thereof for machine tool applications, necessary unclamp forces and other parameters.

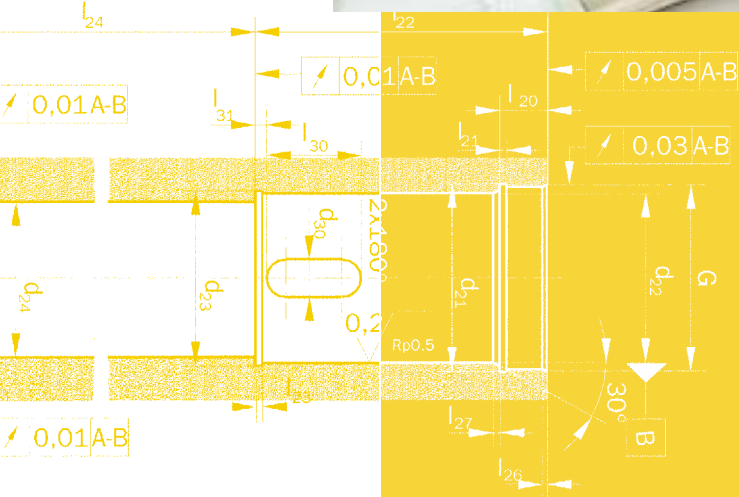
High-tech manufacturing machines and latest CAD software are employed with perfection.



Years of experience,

cooperation with leading machine and spindle manufacturers, internationally recognized competence and cooperation with universities in the development of standards maximise our performance. OTT-JAKOB maintains a close contact with engineers in research and development. This guarantees user-specific products, which work efficiently in practical applications.

OTT-JAKOB –
Success through perfection.



COMPLETE SYSTEMS

Standardization requires meeting the needs of the user. The Ott universal inside spindle contour is an important step towards modular tooling. It offers the manufacturer of machines and/or spindle units the ability to clamp different steep taper tools (taper/retention knob standard) simply by exchanging the gripper unit.

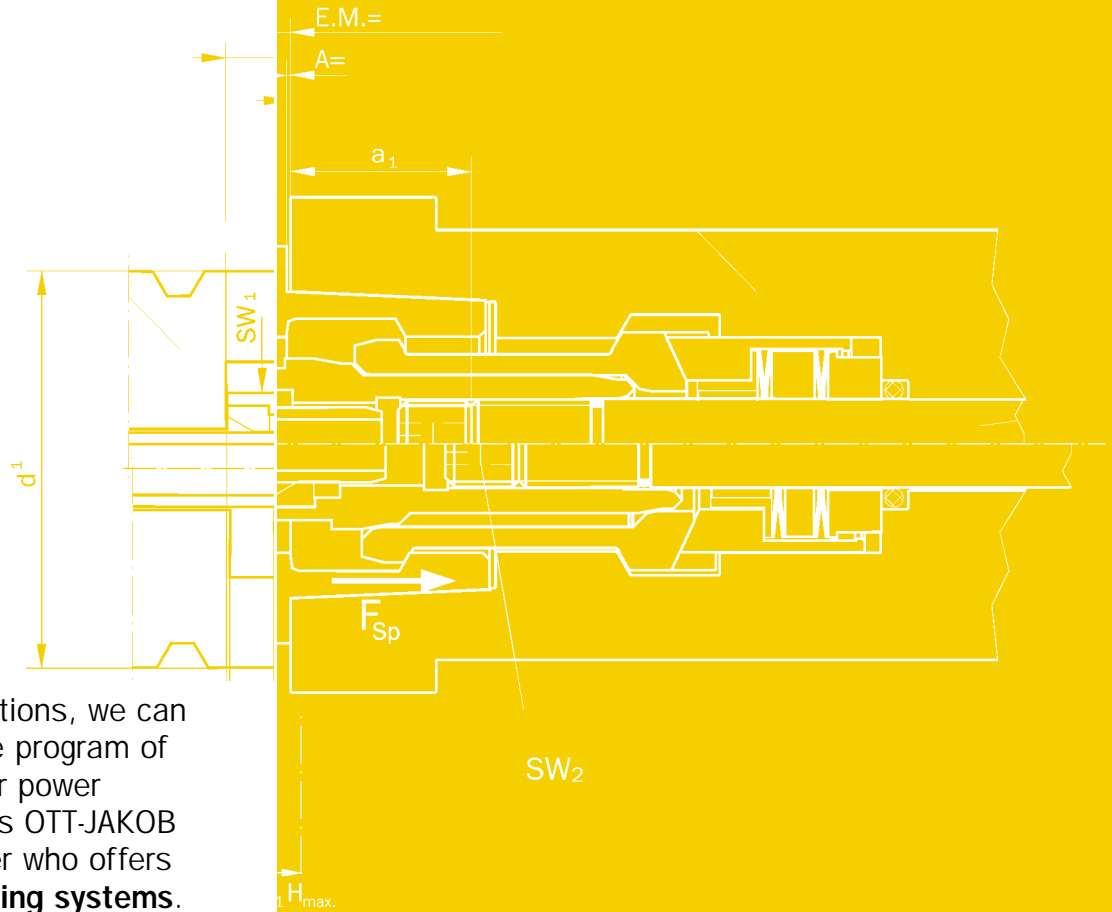
We would like you to benefit from this advantage.



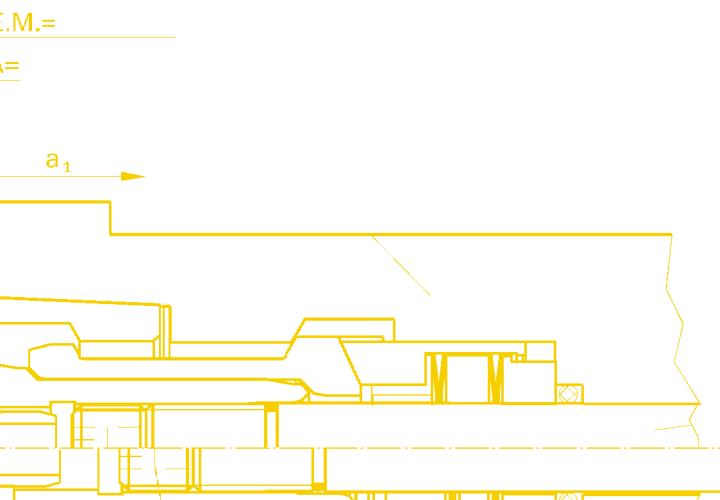
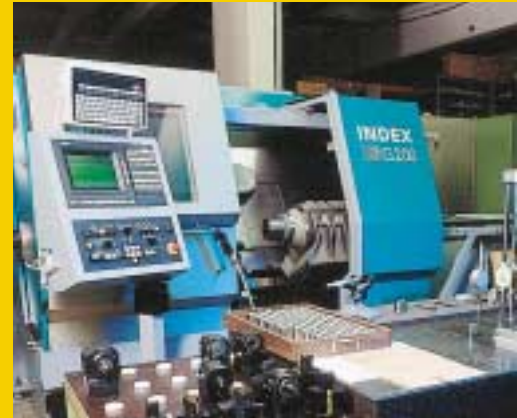
Several variations of power drawbars with or without coolant, with hydraulic or pneumatic unclamp units can be built into the same spindles. Rotary unions and unclamp units are compatible and exchangeable.

We offer high performance at a fair price.





Due to recent innovations, we can now offer a complete program of HSK- and steep taper power drawbars. This makes OTT-JAKOB the only manufacturer who offers **complete tool clamping systems**.



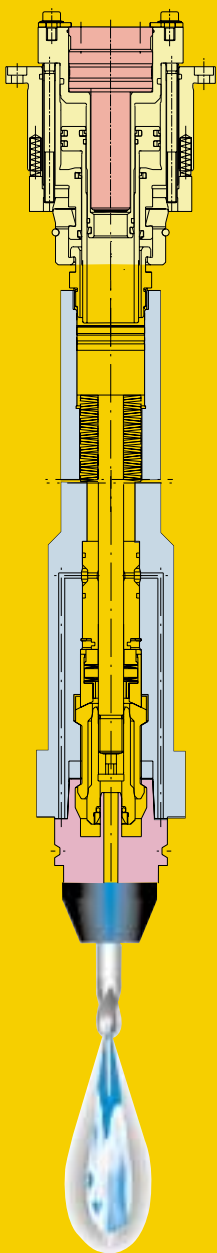
The impressive number of different modules with all necessary adaptations to customers and standards show the advantages of customer and user oriented product development. Take advantage of our professional design and engineering department to optimize your products and minimize your cost.

Minimalmengenschmierung:

MINIMUM VOLUME LUBRICATION

The latest technique of using minimum volumes of coolant for dry operations has become a focal point in the manufacturing industry. Ott-Jakob offers two variations for all HSK-clamping units:

Internal

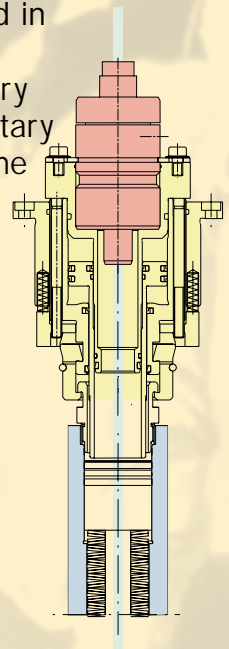


External minimum volume lubrication

Using external MMKS, the aerosol is produced in a special mixing device outside the spindle. Like coolant, the mixture is fed through a rotary union. OTT-JAKOB offers three variations of rotary unions to be used for external minimum volume lubrication for OTT-JAKOB HSK-clamping units:

- Dual-passage rotary union (max. 10.000 RPM – mixed externally $p_{\max} = 5$ bar)
- Single-passage rotary union GDR for OTT-JAKOB unclamp units (max. 16.000 RPM – mixed externally $p_{\max} = 5$ bar)
- Single-passage rotary union GD for OTT-JAKOB unclamp units (max. 36.000 RPM – mixed externally $p_{\max} = 5$ bar)

External



Internal minimum volume lubrication

Using internal MMKS, the air-lubrication mixture is produced inside the spindle. Air and minimum amounts of lubrication are fed separately into the spindle through the OTT-JAKOB HSK-clamping unit.

They are mixed directly in front of the tool interface. Changing the mixture ratio allows for a quick adjustment of the aerosol doses.

You can rely on us - in every situation!

Both systems can be integrated as modules into existing as well as new HSK-clamping units.

HSC - High Speed Cutting:

Accelerated machining in the machine tool and mold making industry and in the cutting industry through High-Speed-Cutting (HSC) requires solutions for faster tool change.

OTT-JAKOB's new clamping units, rotary unions and unclamp units meet these requirements.



A shorter tool changing time represents a constant challenge, which even increased with HSC-manufacturing. Fast working automatic clamping systems are necessary which have to be more accurate, rigid and universal than conventional systems. OTT-JAKOB met these requirements by developing a complete new HSC-clamping unit.

OTT-JAKOB has the necessary know-how

The table below shows the maximum RPM and the minimum length for HSK power drawbars:

HSK Power Drawbar (Revision 01/01)		
Size	Length from	RPM up to
HSK E 25	211 mm	80.000 min-1
HSK A/E 32 B 40	208 mm	60.000 min-1
HSK A/E 40 B/F 50	252 mm	50.000 min-1
HSK A/E 50 B/F 63	222 mm	45.000 min-1
HSK A/E 63 B/F 80	232 mm	40.000 min-1
HSK A 80 / B 100	229 mm	24.000 min-1
HSK A 100 / B 125	320 mm	18.000 min-1
HSK A 125 / B 160	575 mm	6.000 min-1
HSK E 160	451 mm	200 min-1

We are happy to answer your questions regarding HSC.

POWERCHECK



All SK work holders from SK30 to SK60 (DIN/ISO/ANSI) and all HSK work holders according to DIN 69893 (HSK-A 32/B 40 to HSK-A 125/B 160) can be used.

Conventional gages measure in accordance to the nominal component dimension. The manufacturing related tolerance range of the components could cause a false measuring result. The power check offers the possibility to take these tolerances into consideration during the measuring process!

The LCD-display shows the actual clamping force.

Display of the measuring results in Newton and Kilopound.

The critical guard

The pull force gage "Power Check" minimizes the down times for your machines. It is a compact unit with power supply and adjustable tolerance range, which should not be missing in any production facility. The Power Check measures the pull force of your machines fast and reliable and prevents tool breaking and down times.

Rely on OTT-JAKOB for the safety of your production!

KÜRZESTER SK-50 SPANNER

SHORTEST SK-50 GRIPPER

Highest Precision in smallest Space

OTT-JAKOB has been designing and manufacturing Power Drawbars for the machine tool industry for over 25 years.

In the area of Steep Tapers, the traditional manufacturer from Bavaria has just developed a SK-50 Power Drawbar with a sensational short spindle of 298 mm length.

Because of these new dimensions, new manufacturing methods became feasible of which machine tool designers in the past could only dream. This short spindle length of 298 mm allows for optimum flexibility and space saving.

5-axis heads, as well as nutating heads, can now be built more compact.

As spindle speed of 6,000 RPM and a pull force of 15,000 N (3,370 lbs)

are features which can be advantageously utilized for extreme applications. Secure tool retention at extreme cutting conditions at any angle position can be realized.

The coolant/air supply is possible through single or double passage rotary unions.

The assembly of the OTT-JAKOB Power Drawbars can be done easily and quickly by average personnel.



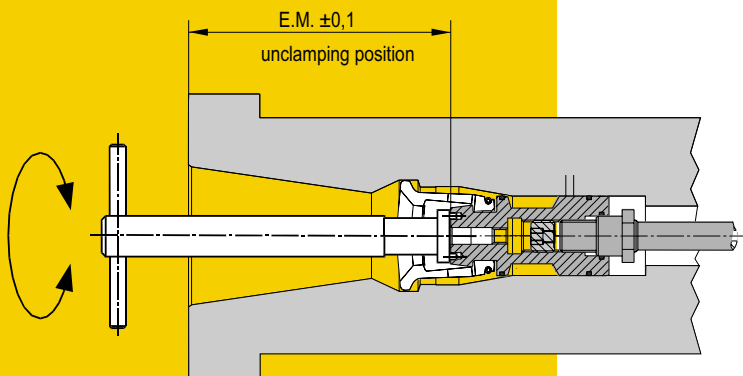
Thanks to the OTT-JAKOB universal contour....

.... the use of the most known standard tooling ist guaranteed:

- DIN 61871 / 69872
- ANSI B5.50
- ISO 7388/1/2 Typ A
- ISO 7388/1/2 Typ B
- MAS 403-1982 BT/PT 2 (30°)
- MAS 403-1982 BT/PT 1 (45°)

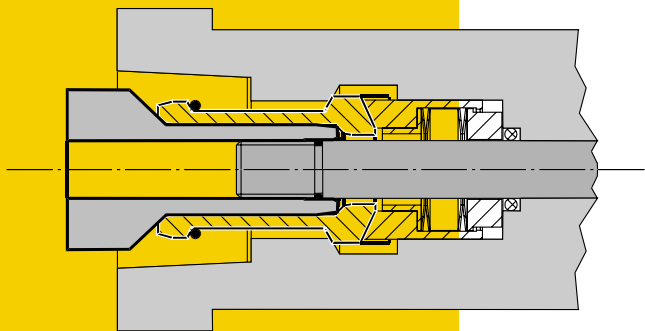
OTT-JAKOB HILFSGERÄTE

ACCESSORIES



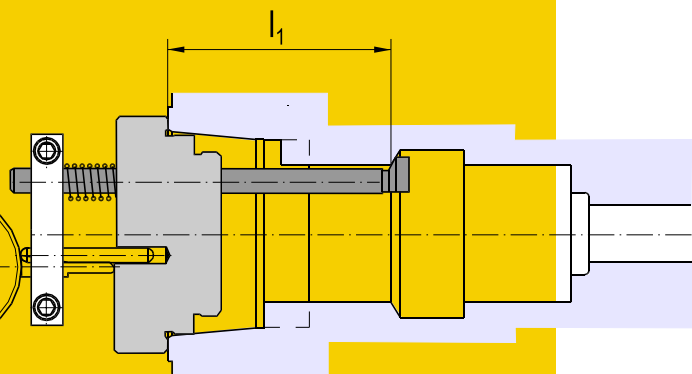
Steep taper assembly tool for gripper units

The OTT-JAKOB steep taper assembly tool allows for an easy gripper change or adjustment to the setting dimension. This tool is available in all steep taper sizes from SK30 to SK60.



HSK assembly tool for clamping units

The assembly tool facilitates the mounting of the clamping unit. It is available in all HSK sizes from HSK E 25 to HSK A 160.

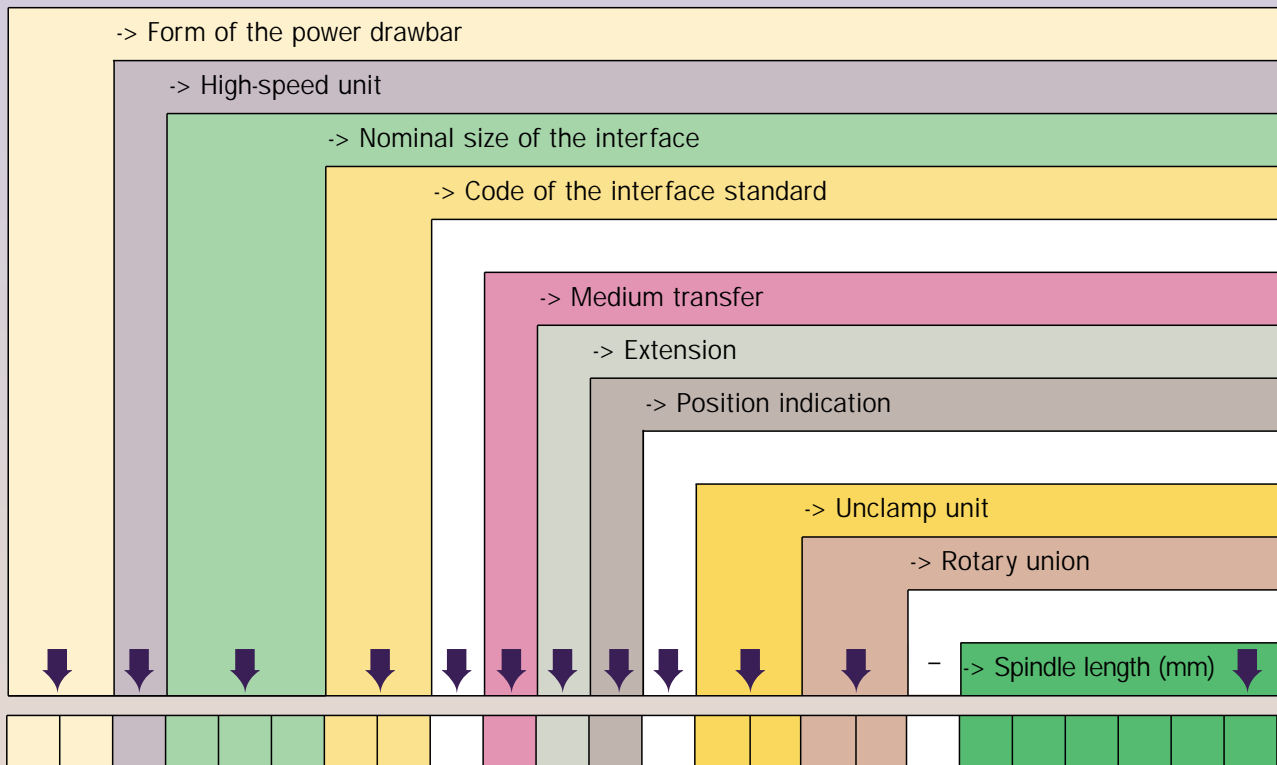


Gage for HSK spindle edge

The OTT-JAKOB gage for HSK spindle edge enables an easy determination of the dimension l_1 . The gage is available in all HSK sizes from HSK E 25 to HSK A 160.

Nomenclature - Information

We developed a new nomenclature system to be able to define complete tool clamping systems before the actual design process. This system characterizes the single modules and assembly units:



The following pages describe the different variations. All other forms are special designs and not part of this standard catalog:

Example: Nomenclature for steep taper power drawbars

- Spindle integrated steep taper power drawbar for steep taper tooling size ISO-40 (DIN 69871/2) SK 7 - 11
- Central coolant supply
- Position indication with signal ring at the diameter of the spindle shaft
- Without unclamp unit
- Dual-passage rotary union for hydraulic unclamping of power drawbars and central coolant supply or cleaning of the tool interface with air during tool change DDF 20
- Spindle length: 550.0 mm

I S - 4 0 - A 1 - 2 - G - 0 0 2 5 - 0 5 5 0 , 0

Example: Nomenclature for HSK-clamping units

- HSK-high speed units for tooling size HSK-A100 (DIN 69893) HSK 2 - 5
- Central coolant supply / radial air blast for cleaning the interface HSK 24
- One-piece drawbar shaft extension
- LE 95 with longer grippers - hydraulic unclamp unit with connection for single-passage rotary union position indication LE 6
- Single-passage high speed rotary union GD with closed seal unit to be used in OTT-JAKOB unclamp units (max. 36,000 RPM - 80 bar KSM-pressure) DDF 22
- Spindle length: 1.082,5 mm

I F H 1 0 0 A K - 4 V K - 0 5 2 1 - 1 0 8 2 , 5

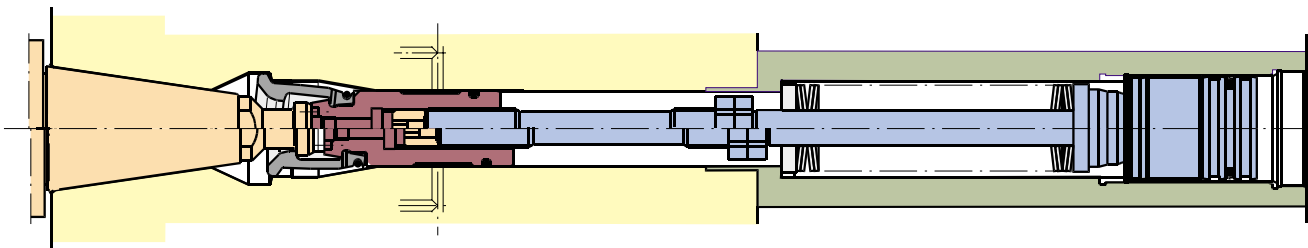
Form of the power drawbar

1	2	Nomenclature position
		Power drawbar for steep taper tools
A	S	Power drawbar
E	S	Inside spindle drawbar
I	S	Spindle integrated power drawbar
		HSK-clamping units
I	F	Spindle integrated spring loaded power drawbar

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

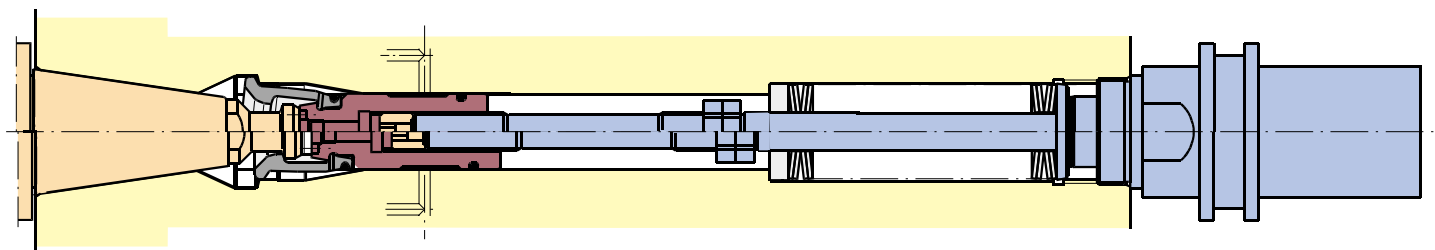
A	S	Power Drawbar
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The complete power drawbar (spring stack, patented intensifying mechanism, piston, etc) is built into an added-on cylinder outside the spindle shaft to accommodate a short and narrow spindle:



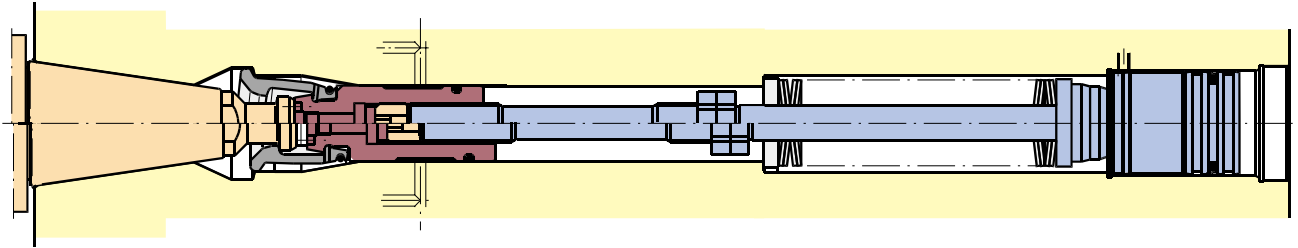
E	S	Inside spindle drawbar
---	---	------------------------

Intensifying mechanism and piston are built into an added-on cylinder outside the spindle shaft. The spring stack is built inside the spindle shaft. A signal ring enables position indication at the end of the spindle:



I	S	Spindle integrated power drawbar
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The complete power drawbar is built into the spindle shaft. This form is used mainly for higher RPM:

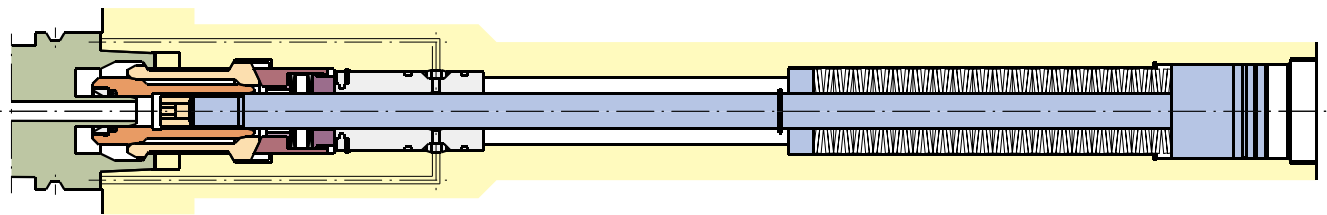


Function:

Grippers with preloaded spring stacks or special springs and standard retention knobs pull the cutting tools into the spindle. A special intensifying mechanism amplifies the spring force of OTT-JAKOB steep taper power drawbars. The clamping system is locked at the same time. The pull force is a measure for the transmittable horsepower or torque of the motor. The compact design of the Ott-Jakob power drawbars offers high pull forces and system safety in the smallest installation spaces.

I	F	Spindle integrated spring loaded power drawbar
---	---	--

HSK-clamping units use only one form, similar to the IS-form for steep taper power drawbars:



Function:

During clamping of the hollow shaft taper (HSK), the clamping cone of the clamping unit presses the gripper segments radially to the outside. The spindle and the tool support the gripper segments. They pull the oversize hollow shaft taper into the spindle and clamp it against the axial face of the spindle. The patented design of the OTT-JAKOB HSK-clamping units amplifies the spring force of the intensifier. The friction between the taper and the face contact as well as the keyways transmit the torque. Spring stack or special springs generate the pull force.

High-speed unit

	3	Nomenclature position		
	H	High-speed unit		

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

Attention:

Please note that high-speed units can only be designed after technical consultation and discussion of the intended application. Complex calculations are necessary to determine the RPM limit of the power drawbar. We will also give you all necessary parameters like unclamp pressure, clamping force, etc. with the drawing. Contact us!

Nominal size of the interface

		4	5	6	Nomenclature position		
					Power drawbar for steep taper tooling		
S	K	2	0				
S	K	2	5				
S	K	3	0		DIN	ANSI	MAS
S	K	4	0		DIN	ANSI	MAS
S	K	4	5		DIN	ANSI	
S	K	5	0		DIN	ANSI	MAS
S	K	6	0		DIN	ANSI	

			4	5	6	Nomenclature position						
						HSK-clamping units						
						Form of the hollow shaft taper						
						A	B	E	F	AB		
H	S	K	2	5				X				
H	S	K	3	2		X		X			X	
H	S	K	4	0		X	X	X			X	
H	S	K	5	0		X	X	X	X		X	
H	S	K	6	3		X	X	X	X		X	
H	S	K	8	0		X	X		X		X	
H	S	K	1	0	0	X	X				X	
H	S	K	1	2	5	X	X					
H	S	K	1	6	0	X	X					

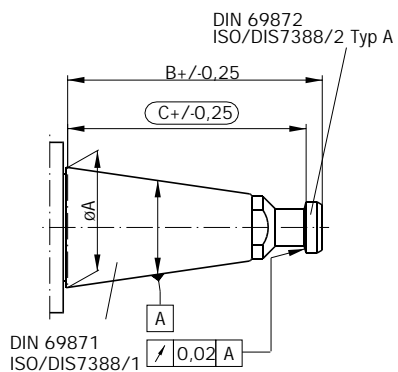
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

Code for steep taper tool standards

7	8	Nomenclature position
		Power drawbar for steep taper tooling
A	1	DIN 69871/2 ISO 7388 / 1 / 2 Typ A
C	1	ANSI B.5.50 - 78 ISO 7388 / 1 / 2 Typ B
E	1	MAS 403-1982 BT/PT 30-degree
F	1	MAS 403-1982 BT/PT 45-degree

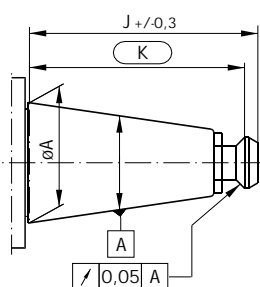
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

SK-standards



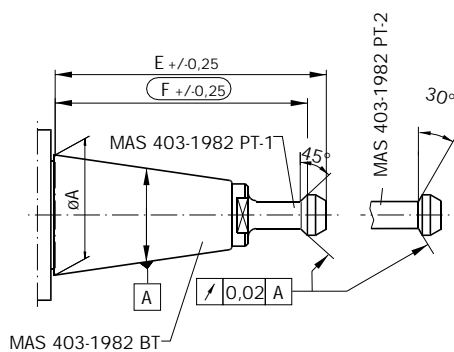
tool standard	code
DIN 69871/69872	A1
ISO 7388/1/2 Typ A	

	A	B $\pm 0,25$	C $\pm 0,25$
SK 30	31,75	71,65	66,65
SK 40	44,45	94,25	88,25
SK 50	69,85	135,60	126,60
SK 60	107,95	201,65	191,65



tool standard	code
ANSI B5.50-78	C1
ISO7388/1/2 Typ B	

	A	J $\pm 0,3$	K $\pm 0,3$
SK 30	31,75	59,30	55,65
SK 40	44,45	84,50	79,25
SK 50	69,85	127,00	119,40
SK 60	107,95	199,95	189,45



tool standard	code
MAS 403-1982 BT/PT30°	E1
MAS 403-1982 BT/PT45°	F1

	A	E $\pm 0,25$	F $\pm 0,25$
SK 30	31,75	71,35	66,35
SK 40	44,45	100,35	93,35
SK 50	69,85	146,75	136,75
SK 60	-	-	-

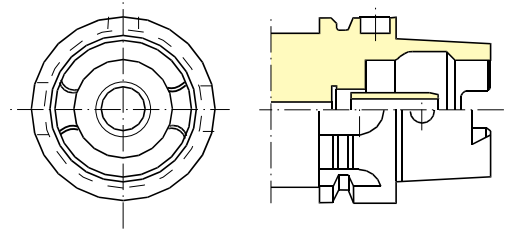
Code for HSK-standards

7	8	Nomenclature position
		HSK-clamping units
A	K	DIN 69893 - part 1 - form A with gripper groove
A	B	DIN 69893 - part 1 - form A with gripper groove - black
B	K	DIN 69893 - part 2 - form B with gripper groove
E	K	DIN 69893 - part 5 - form E with gripper groove
F	K	DIN 69893 - part 6 - form F with gripper groove

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

HSK-standards

hollow shaft tapers DIN 69893; Form A



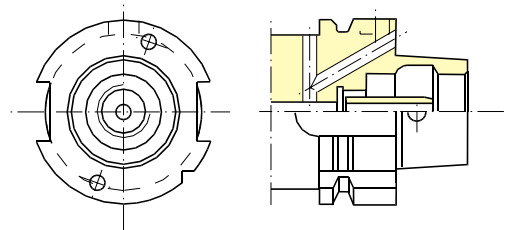
features

- central, axial coolant supply with KSM-tube
- keyways at the taper end

application

- machining centers, milling machines

hollow shaft tapers DIN 69893; Form B



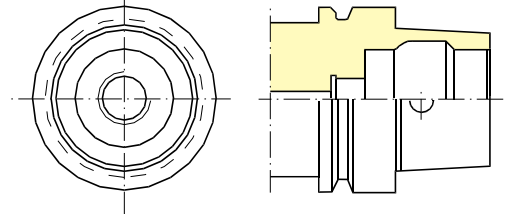
features

- decentralized coolant supply over the flange or central coolant supply through coolant tube
- enlarged flange
- keyways at the flange

application

- machining centers, heavy milling machines

hollow shaft tapers DIN 69893; Form E



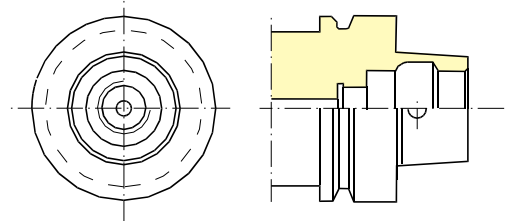
features

- rotational symmetry without keyways

application

- HSC-spindles

hollow shaft tapers DIN 69893; Form F



features

- enlarged flange

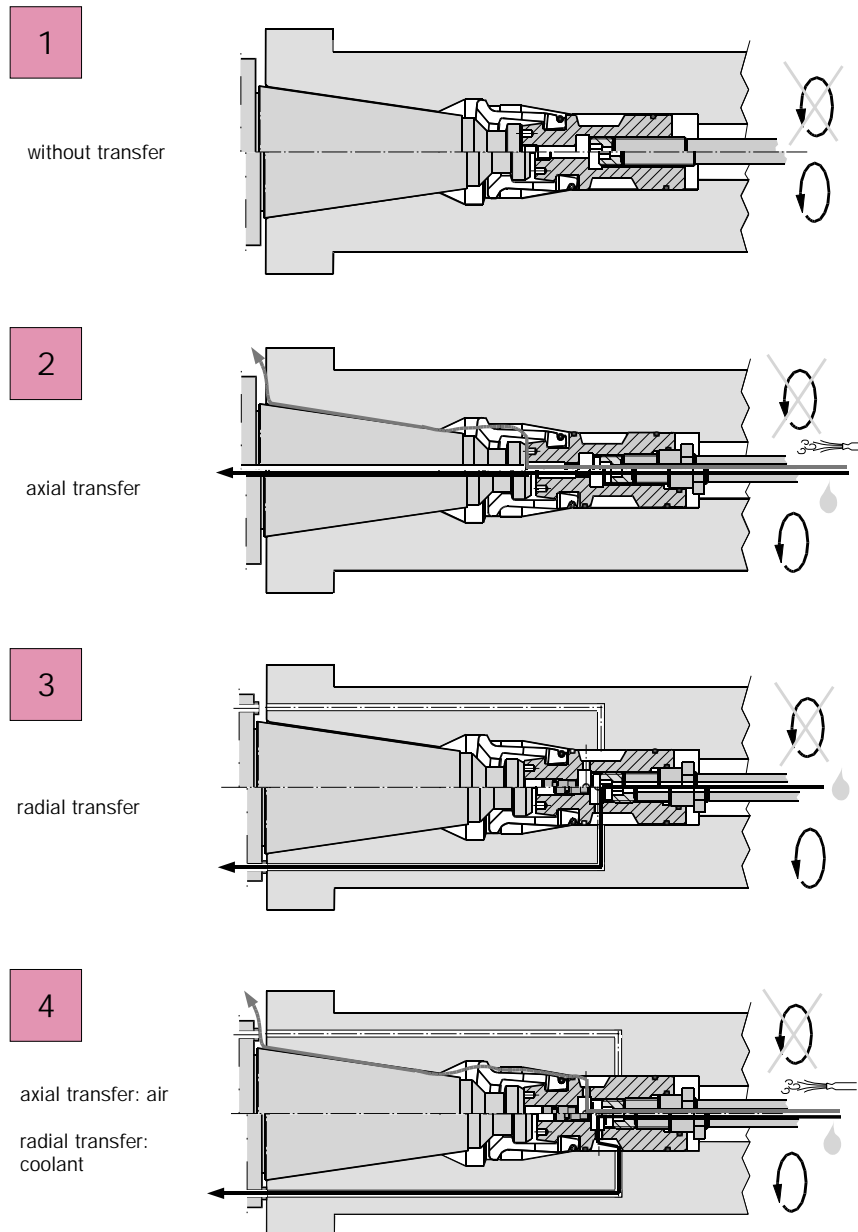
application

- HSC-spindles e. g. machining of wood and plastic

Medium transfer for steep taper power drawbars

Nomenclature position	10	
Power drawbar for steep taper tooling		
Without medium transfer	1	
With central medium transfer	2	
With radial medium transfer	3	
With radial medium transfer and central air blast transfer	4	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	



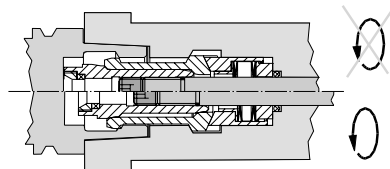
Medium transfer for HSK-clamping units

Nomenclature position	10	
HSK-clamping units		
Without medium transfer	1	
With central medium transfer	2	
With radial medium transfer	3	
With central medium transfer and radial air blast transfer	4	
With central medium transfer and radial air blast transfer (special passage)	5	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

1

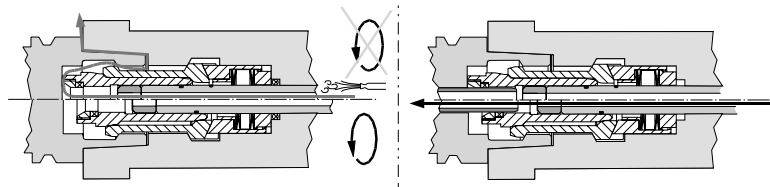
without transfer



2

axial transfer for closed HSK-tool

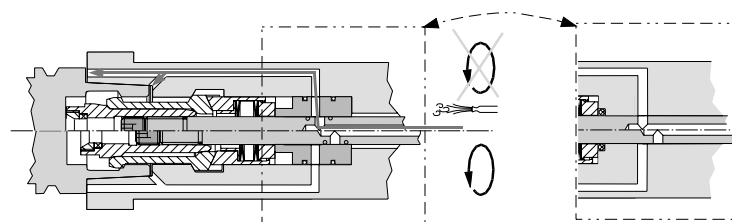
axial transfer for open HSK-tool



3

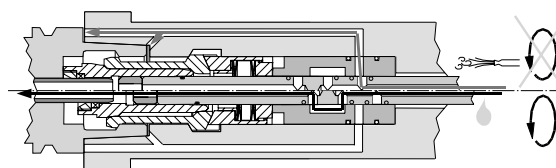
radial transfer (with bushing)

radial transfer (without bushing)



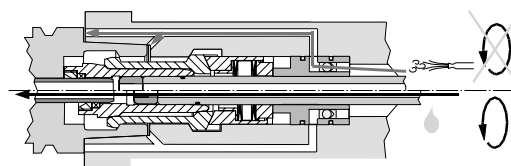
4

radial/axial transfer



5

axial transfer:
air transfer through spring location

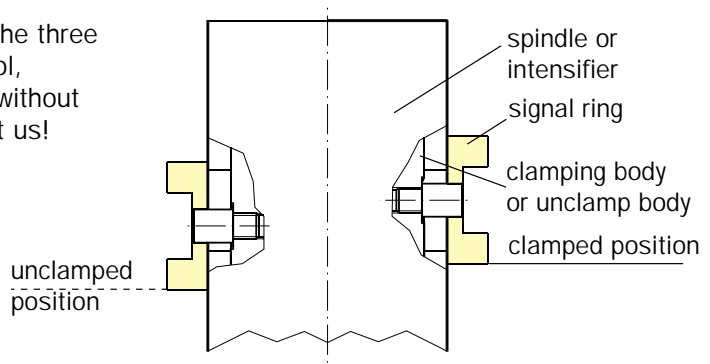


Position indication

Nomenclature position	12
Thread in clamping body	G
Signal ring	H
Indication through piston position	K
Without thread / without elongated hole	O

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

Please note that the position indication of the three possible settings, clamped position with tool, unclamped position, and clamped position without tool, can be done in different ways. Contact us!



Example rotary union 2KA-SR



Example LE95 - with longer grippers



Example LE102 – with analog sensor for integrated clamping stroke monitoring

Rotary union

Nomenclature position	16	17
without rotary union	0	0
Rotary union for hydraulic unclamping of power drawbars	1	1
Dual-passage rotary union for hydraulic unclamping of power drawbars and cleaning of the tool interface with air during tool change	1	4
Dual-passage rotary union for hydraulic unclamping of power drawbars and central coolant supply or cleaning of the tool interface with air during tool change	2	5
Dual-passage rotary union for hydraulic unclamping of power drawbars and central coolant supply or cleaning of the tool interface with air during tool change; including position indication with signal ring and proximity switch	2	6
Dual-passage rotary union for hydraulic unclamping of power drawbars and cleaning of the tool interface with air during operation and tool change	2	8
Single-passage high speed rotary union GD - radial connection with closed seal unit to be used in OTT-JAKOB unclamp units (max. 36.000 RPM - 80 bar KSM-pressure)	2	1
Single-passage high speed rotary union GD - axial connection with closed seal unit to be used in OTT-JAKOB unclamp units (max. 36.000 RPM - 80 bar KSM-pressure)	2	2
Single-passage high speed rotary union GDR - radial connection with closed seal unit to be used in OTT-JAKOB unclamp units (max. 16.000 RPM - 50 bar KSM-pressure)	2	3
Single-passage high speed rotary union GDR - axial connection with closed seal unit to be used in OTT-JAKOB unclamp units (max. 16.000 RPM - 50 bar KSM-pressure)	2	4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

Spindle length

Nomenclature position	19	20	21	22	23	24
Spindle length	0	0	0	0	,	0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

Fax-Cover

Sender



**Ott-Jakob GmbH & Co
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Tel.: +49 83 64 / 98 21-0
Fax: +49 83 64 / 98 21-10
www.Ott-Jakob.de
info@Ott-Jakob.de

Quote: Order: Request for tech.
information:

Nomenclature:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

Technical data:

Tool interface: Steep taper tooling HSK-tooling

Size of the interface: _____

Tool standard: _____

Form of the power drawbar: AS ES IS IF

RPM range: from _____ RPM to _____ RPM

Pull force: _____ N

Spindle length: _____ mm

Spindle diameter at the front bearing: _____ mm Spindle diameter at the rear bearing: _____ mm

Desired medium supply yes no

Coolant: _____ bar medium transfer

Cleaning air: _____ bar 1 2 3 4 5

Compressed air during rotation: _____ bar

Spindle orientation: horizontal vertical tilting spindle overhead spindle

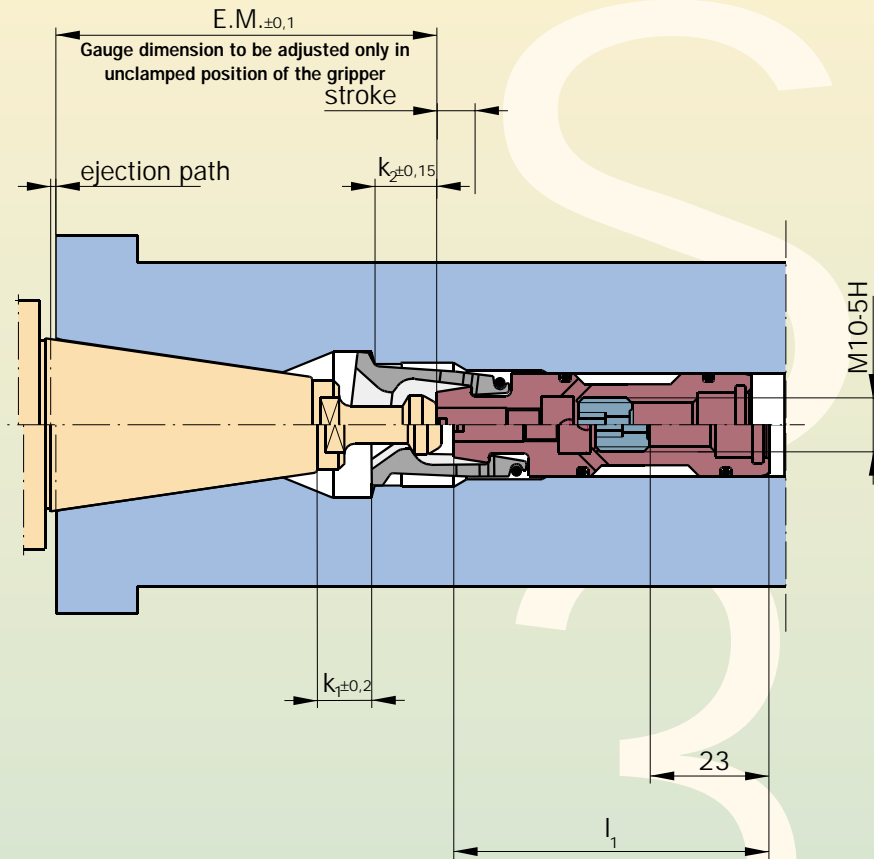
Available release pressure: _____ bar Mechanical release force _____ kN

Available pneumatic release pressure: _____ bar

Position indication: with signal ring indication with piston indication

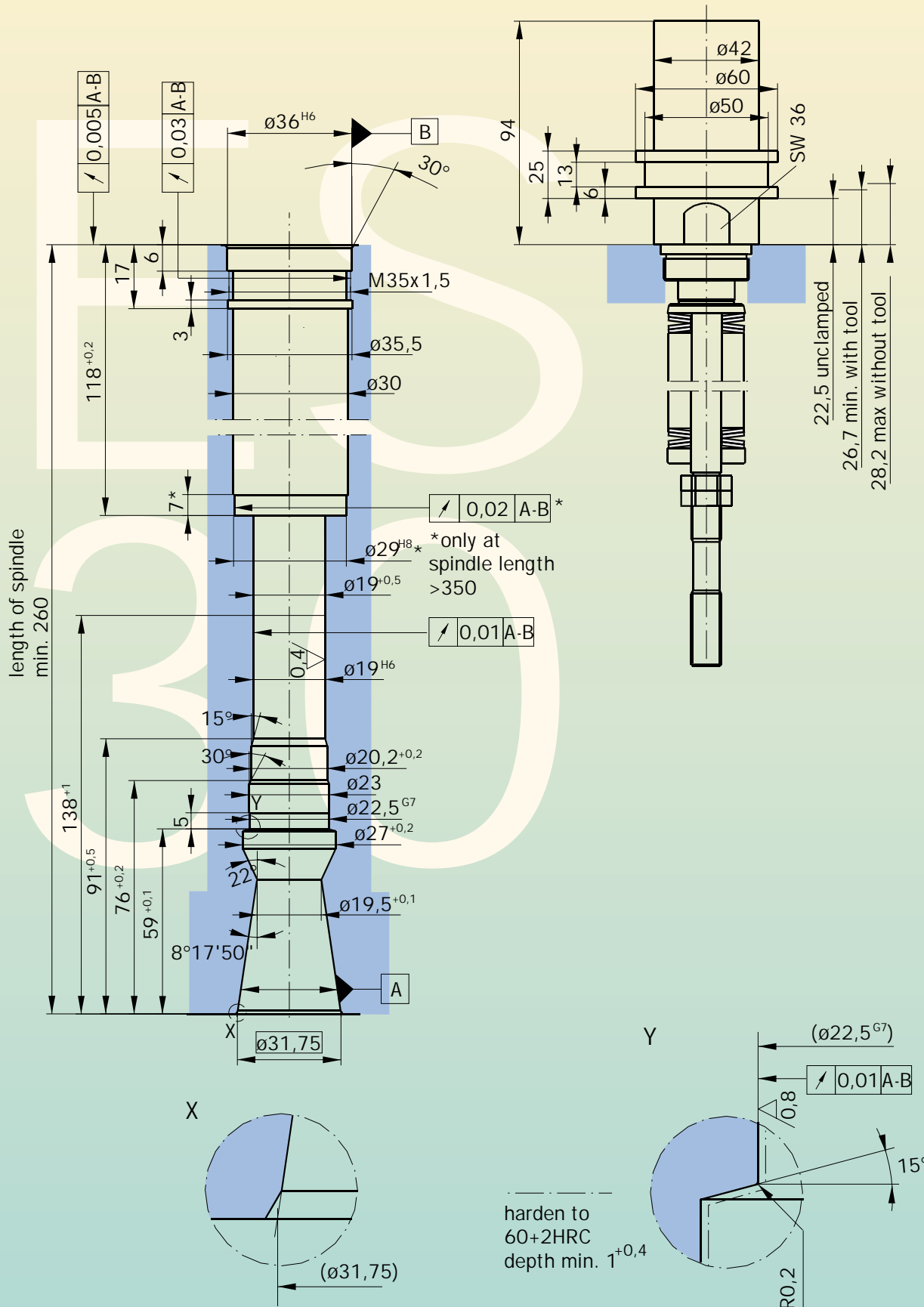
SK-Grippers
SK-Inside spindle intensifier





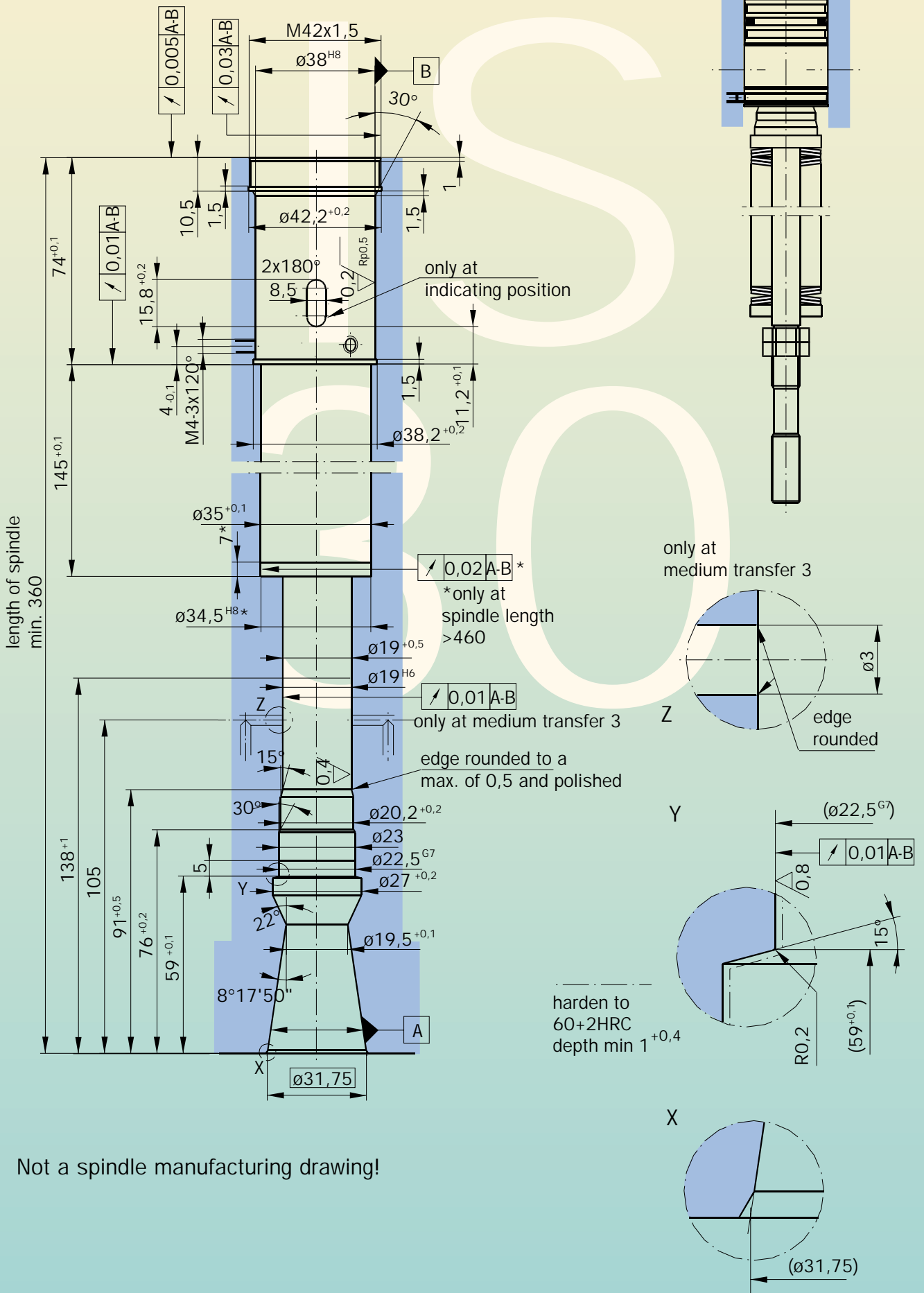
tool standard	code
DIN 69871/69872 ISO 7388/1/2 Typ A	A1
ANSI B 5.50 - 78 ISO 7388/1/2 Typ B	C1
MAS 403-1982 BT/PT 2 (30°)	E1
MAS 403-1982 BT/PT 1 (45°)	F1
medium transfer	
without transfer	1
axial transfer	2
radial transfer	3

rated quantity		SK 30			
code		A1	C1	E1	F1
medium transfer		1 / 2 / 3			
[N]	pull in force	6000	5500		
[mm]	stroke	5,5	5,5	5,5	5,5
	ejection path	0,95	1,6	0,95	0,95
	reference gauge	70,7	57,7	70,4	70,4
	k ₁	11,2	11,2	10,6	10,6
	k ₂	11,7	-1,3	11,4	11,4
	l ₁	57,5	72	57,5	57,5
order no.	mounting tool	95.101.280.9.2	95.101.280.9.2	95.101.280.9.2	95.101.280.9.2



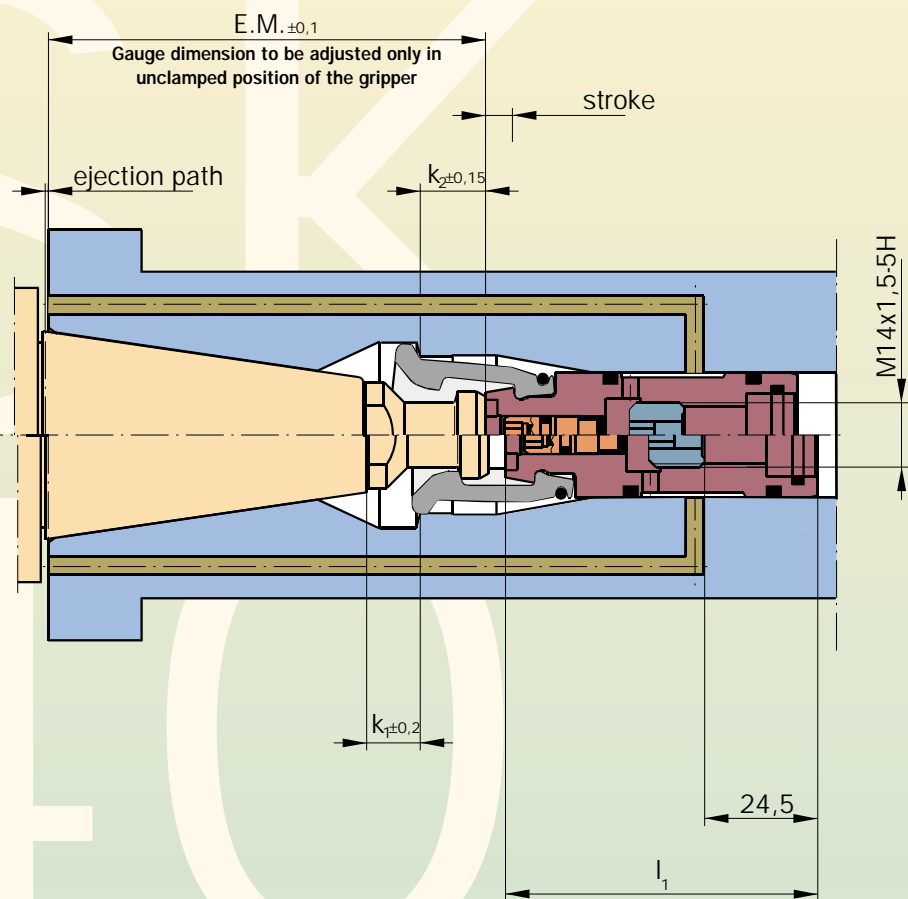
Not a spindle manufacturing drawing!

Subject to modification due to technical advance!



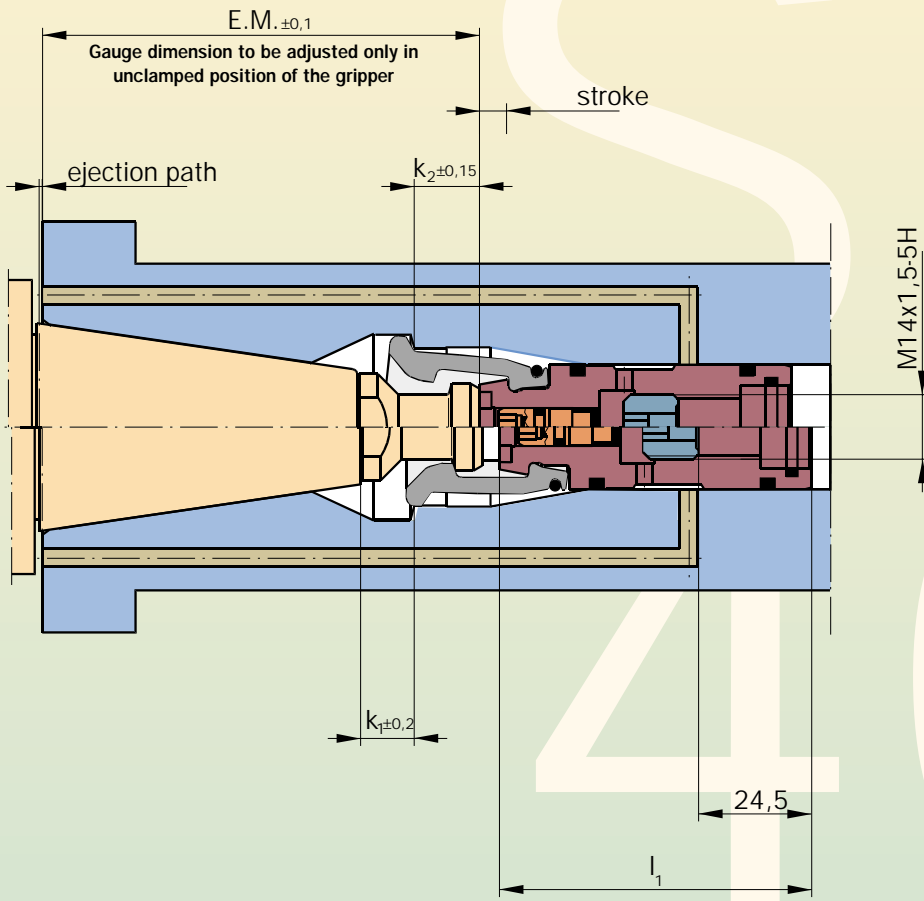
Not a spindle manufacturing drawing!





tool standard		code
DIN 69871/69872	ISO 7388/1/2 Typ A	A1
ANSI B 5.50 - 78	ISO 7388/1/2 Typ B	C1
MAS 403 - 1982 BT/PT 2 (30°)		E1
MAS 403 - 1982 BT/PT 1 (45°)		F1
medium transfer		
radial transfer		3

rated quantity		SK 40			
code		A1	C1	E1	F1
medium transfer		3			
[N]	pull in force	12000	10500		
[mm]	stroke	5,5	5,5	5,5	5,5
	ejection path	0,65	1,6	0,65	0,65
	reference gauge	93,6	82,9	93,6	93,6
	k_1	11,1	11,1	11,1	11,1
	k_2	14,1	3,4	14,1	14,1
	l_1	67,4	78,3	67,4	67,4
order no.	mounting tool	95.101.281.9.2	95.101.281.9.2	95.101.281.9.2	95.101.281.9.2



tool standard		code
DIN 69871/69872	ISO 7388/1/2 Typ A	A1
ANSI B 5.50 - 78	ISO 7388/1/2 Typ B	C1
MAS 403 - 1982 BT/PT 2 (30°)		E1
MAS 403 - 1982 BT/PT 1 (45°)		F1
medium transfer		
radial / axial transfer		4

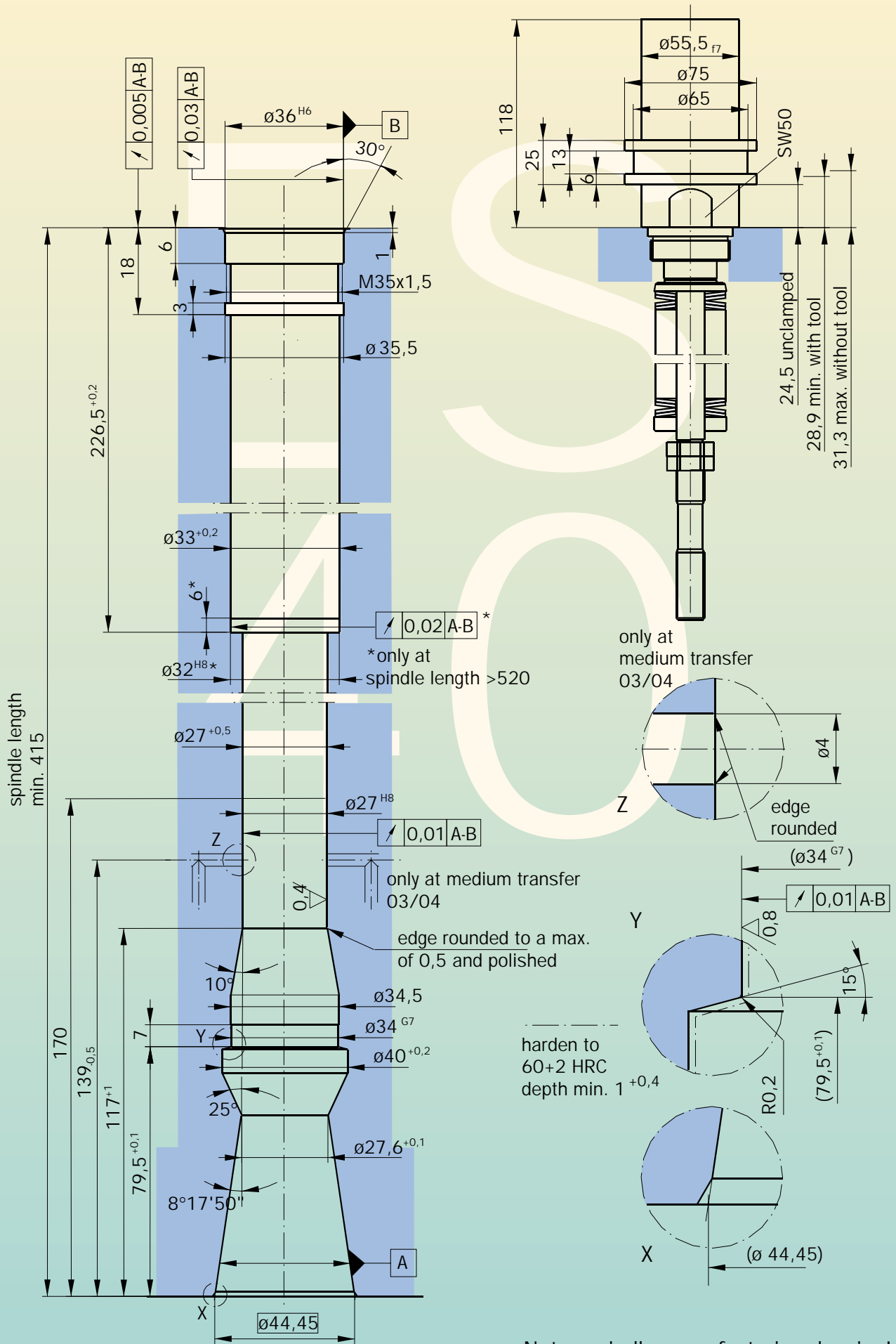
Technical data for the combination
inside spindle intensifier - rotary
union/unclamp unit in ES/IS-power
drawbar
page 22/23

Subject to modification due to technical advance!

rated quantity		SK 40			
code		A1	C1	E1	F1
medium transfer		4			
[N]	pull in force	12000	10500	10500	10500
[mm]	stroke	5,5	5,5	5,5	5,5
	ejection path	0,65	1,6	0,65	0,65
	reference gauge	93,6	82,9	93,6	93,6
	k ₁	11,1	11,1	11,1	11,1
	k ₂	14,1	3,4	14,1	14,1
	l ₁	67,4	78,3	67,4	67,4
order no.	mounting tool	95.101.281.9.2	95.101.281.9.2	95.101.281.9.2	95.101.281.9.2

Inside spindle drawbar ES 40

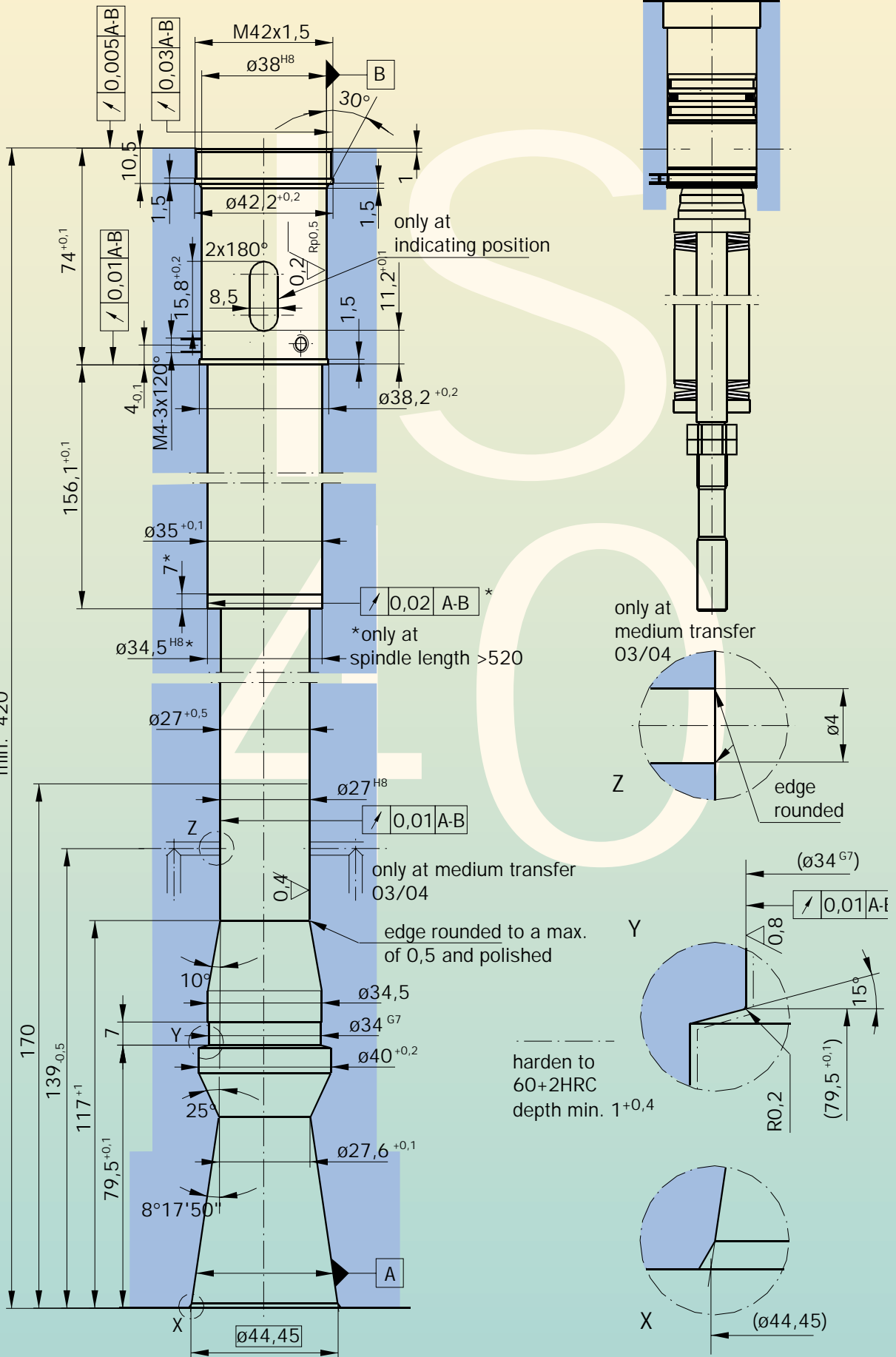
10



Not a spindle manufacturing drawing!

Subject to modification due to technical advance!

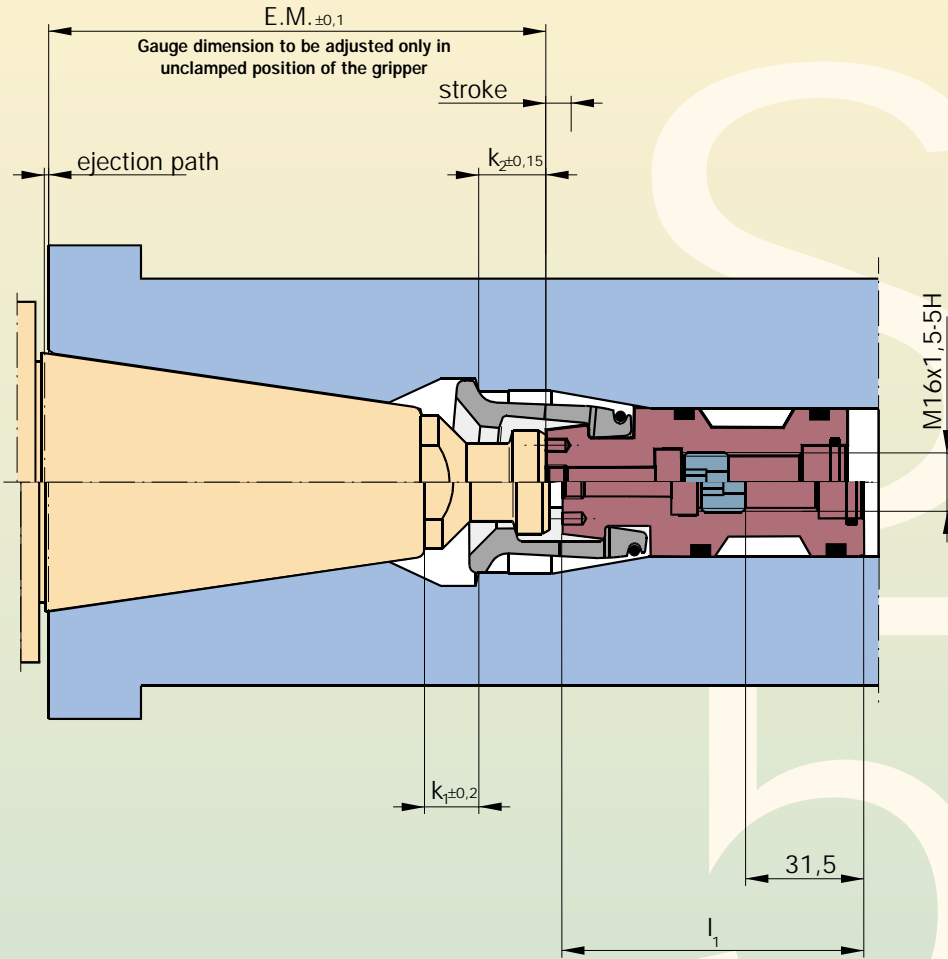
spindle length
min. 420



Not a spindle manufacturing drawing!

Technical data for the combination inside spindle intensifier-
rotary union/unclamp unit in ES/IS-power drawbar



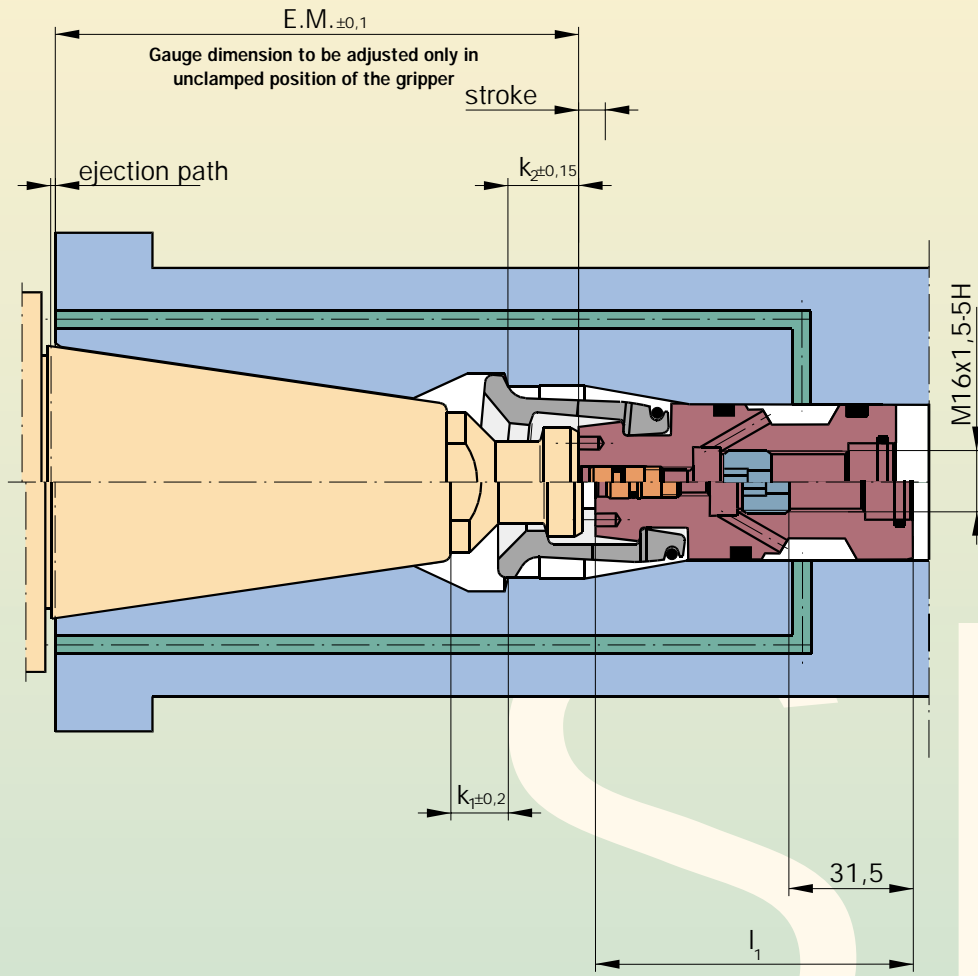


tool standard		code
DIN 69871/69872	ISO 7388/1/2 Typ A	A1
ANSI B 5.50 - 78	ISO 7388/1/2 Typ B	C1
MAS 403 - 1982 BT/PT 2 (30°)		E1
MAS 403 - 1982 BT/PT 1 (45°)		F1
medium transfer		
without transfer		1
axial transfer		2

Technical data for the combination
insider spindle intensifier - rotary
union/unclamp unit in ES/IS-power
drawbar
page 22/23

Subject to modification due to technical advance!

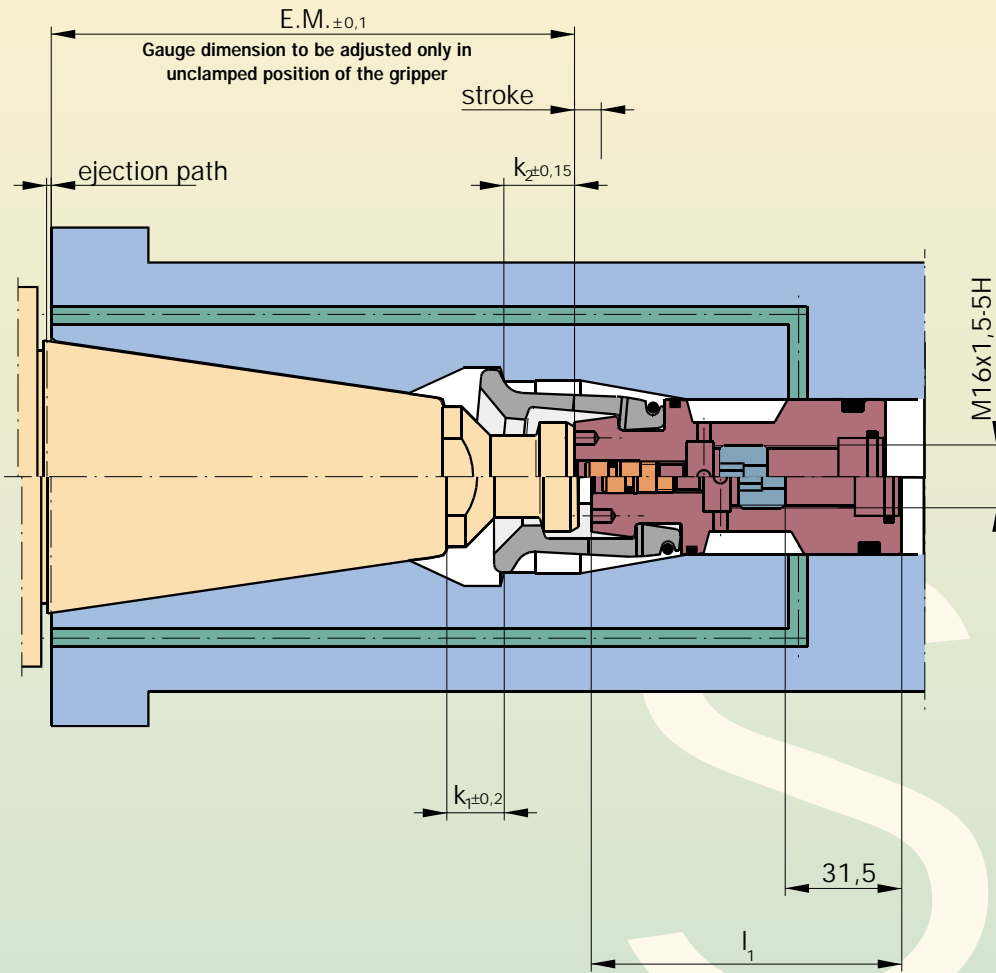
rated quantity		SK 50			
code		A1	C1	E1	F1
medium transfer		1 / 2			
[N]	pull in force	25000	23000		
[mm]	stroke	6	6	6	6
	ejection path	1	1	1	1
	reference gauge	134,6	126	145,75	145,75
	k_1	14,75	14,75	14,7	14,7
	k_2	18,1	9,5	29,25	29,25
	l_1	79,7	87,9	68,8	68,8
order no.	mounting tool	95.101.337.9.2	95.101.337.9.2	95.101.337.9.2	95.101.337.9.2



tool standard		code
DIN 69871/69872	ISO 7388/1/2 Typ A	A1
medium transfer		
radial transfer		3

	rated quantity	SK 50
	code	A1
	medium transfer	3
[N]	pull in force	25000
	stroke	6
	ejection path	1
	reference gauge	134,6
	k ₁	14,75
	k ₂	18,1
[mm]	l ₁	79,7
	order no.	95.101.337.9.2

Technical data for the combination
inside spindle intensifier - rotary
union/unclamp unit in ES/IS-power
drawbar
page 22/23

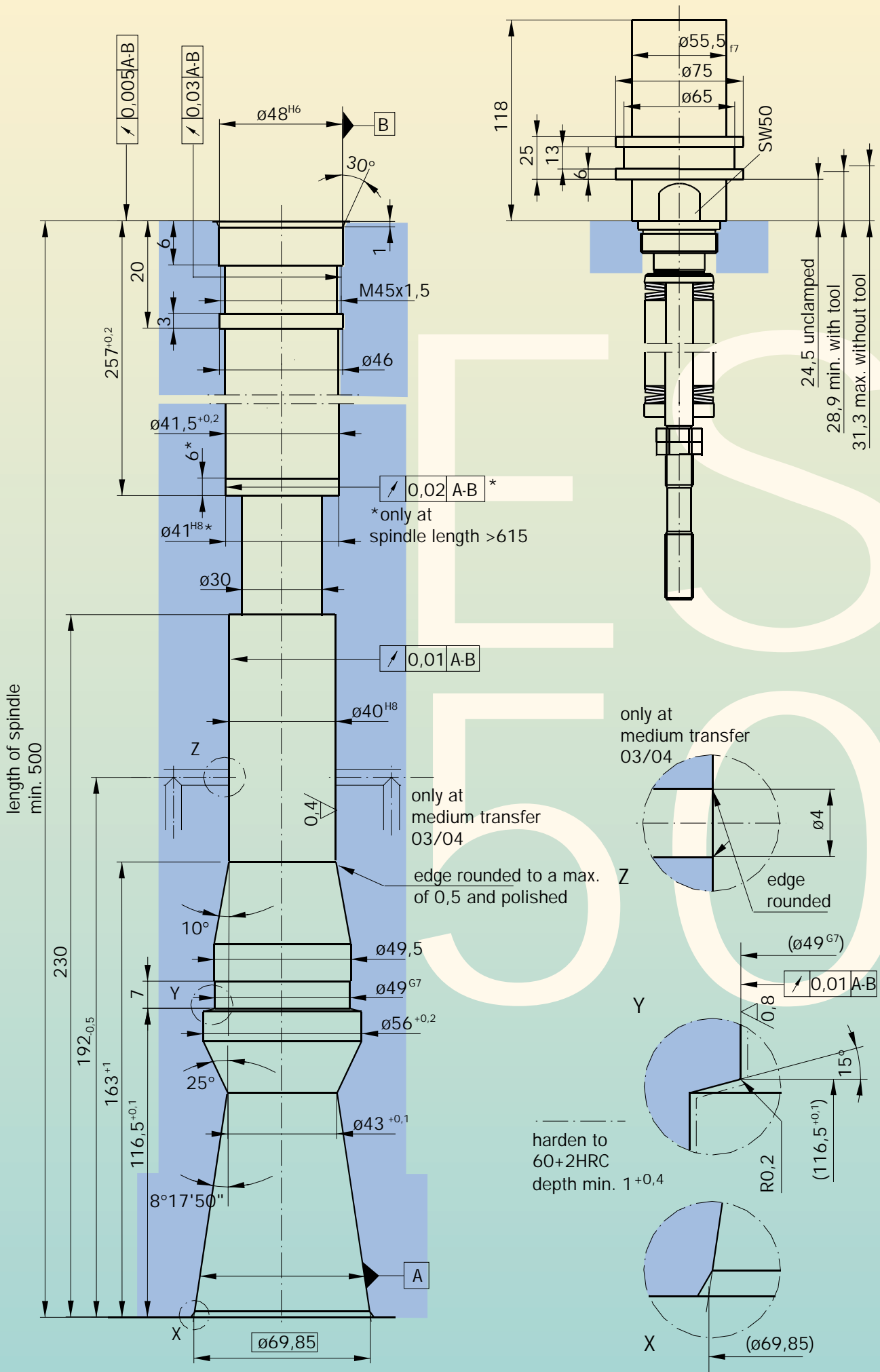


tool standard		code
DIN 69871/69872	ISO 7388/1/2 Typ A	A1
ANSI B 5.50 - 78	ISO 7388/1/2 Typ B	C1
medium transfer		
radial / axial transfer		4

Technical data for the combination
inside spindle intensifier - rotary
union/unclamp unit in ES/IS-power
drawbar
page 22/23

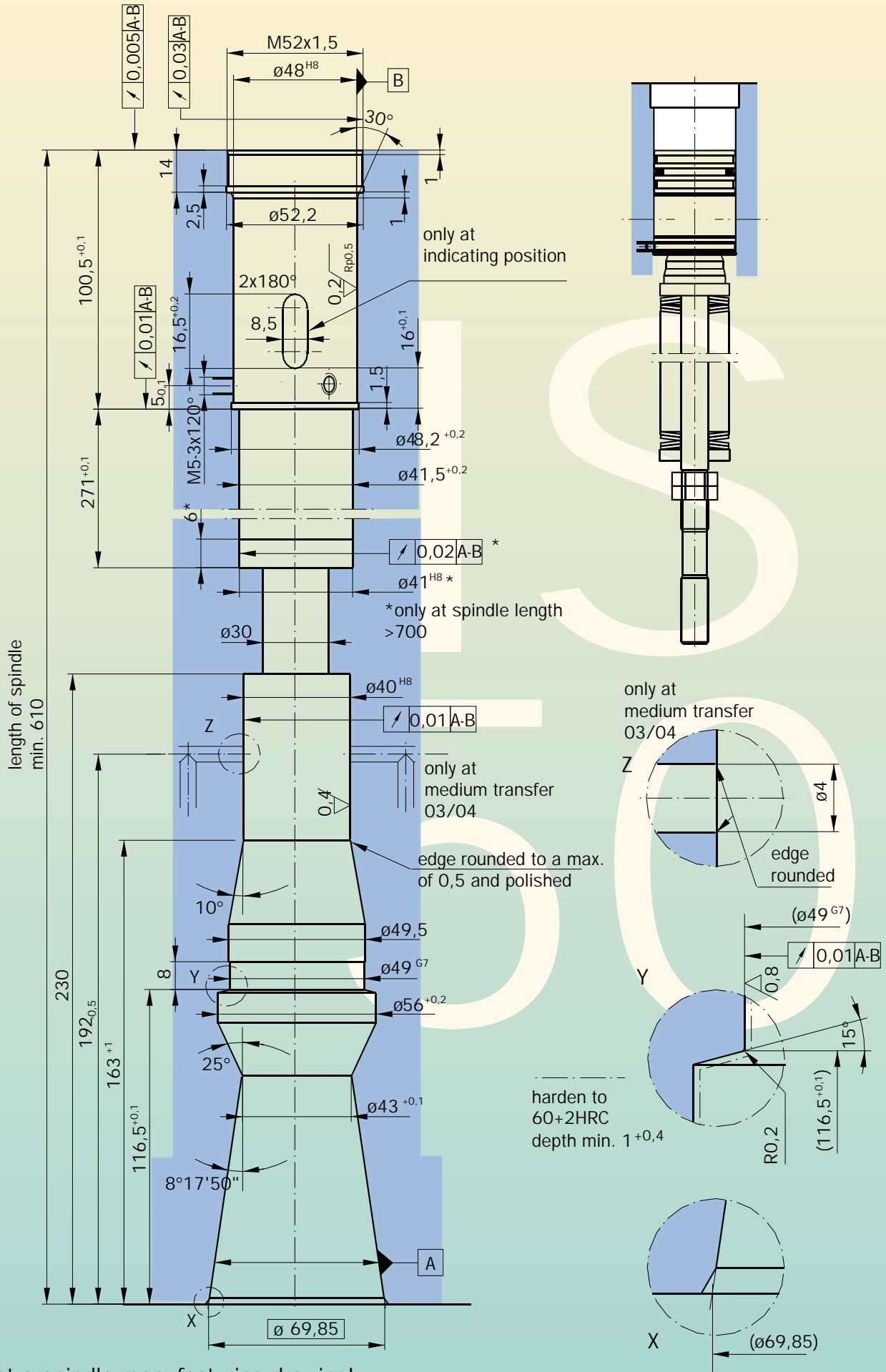
Subject to modification due to technical advance!

rated quantity		SK 50	
code		A1	C1
medium transfer		4	
[N]	pull in force	25000	23000
[mm]	stroke	6	6
	ejection path	1	1
	reference gauge	134,6	126
	k ₁	14,75	14,75
	k ₂	18,1	9,5
	l ₁	79,7	87,9
order no.	mounting tool	95.101.337.9.2	95.101.337.9.2



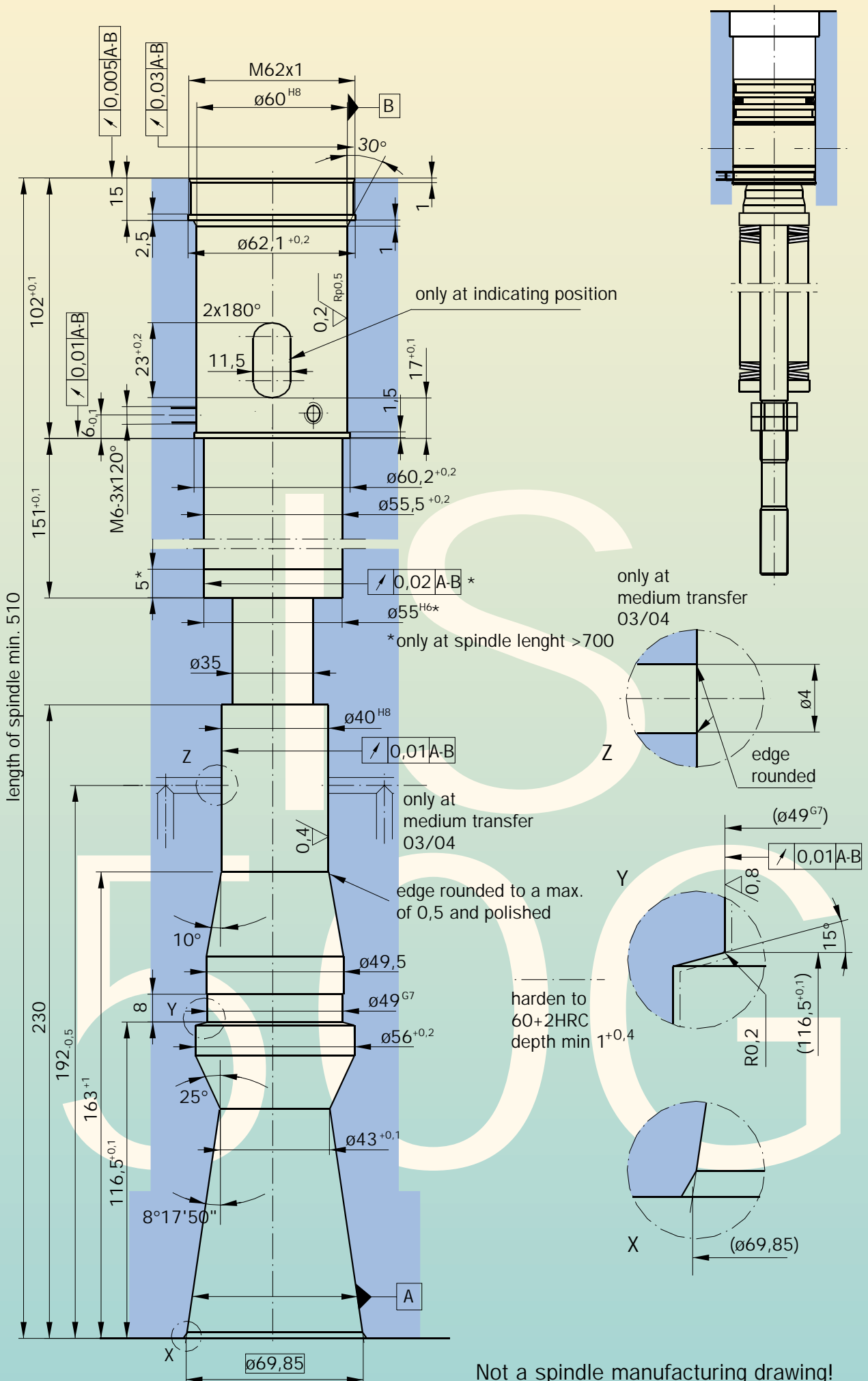
Not a spindle manufacturing drawing!

Subject to modification due to technical advance!



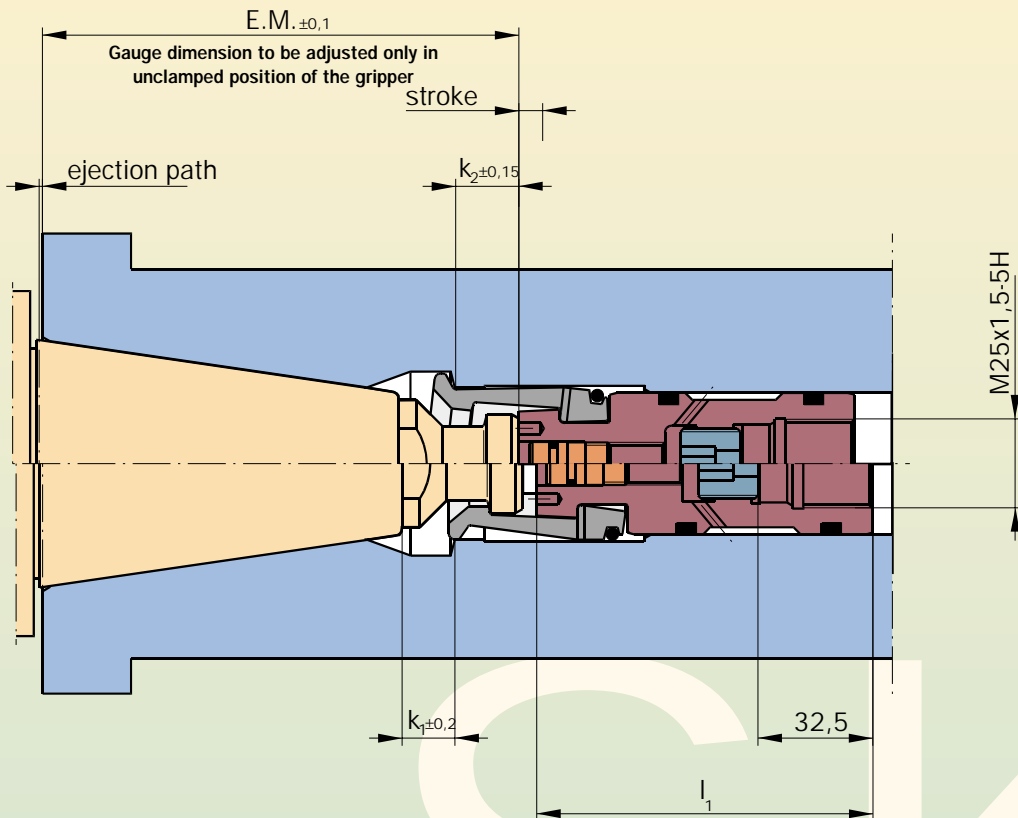
Not a spindle manufacturing drawing!

Technical data for the combination inside spindle intensifier - rotary union/unclamp unit in ES/IS-power drawbarpage



Not a spindle manufacturing drawing!

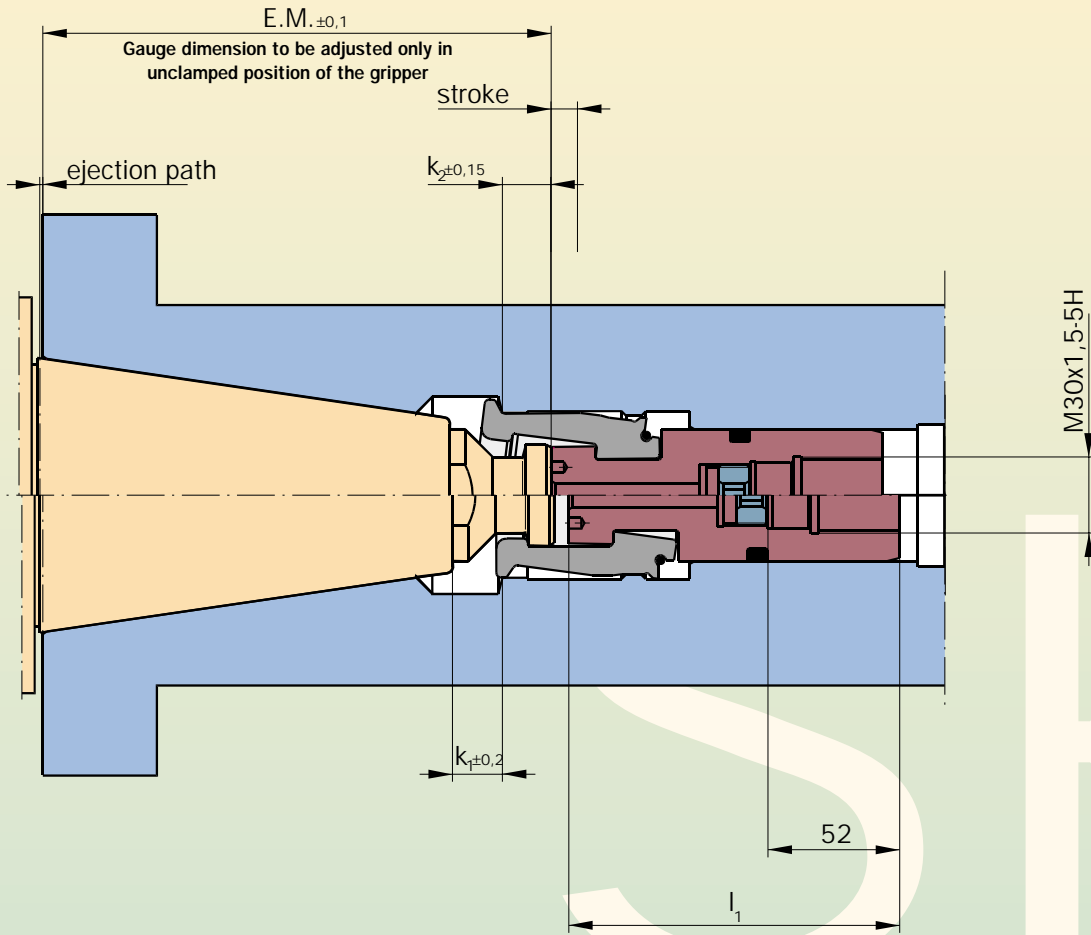
Subject to modification due to technical advance!



tool standard		code
DIN 69871/69872	ISO 7388/1/2 Typ A	A1
ANSI B 5.50 - 78	ISO 7388/1/2 Typ B	C1
medium transfer		
without transfer		1
axial transfer		2
radial transfer		3

Power drawbar and spindle contour for reinforced design upon request

rated quantity		SK 50 increased	
code		A1	C1
medium transfer		1 / 2 / 3	
[N]	pull in force	35000	
[mm]	stroke	9	9
	ejection path	1	1
	reference gauge	134,6	134,6
	k_1	14,75	14,75
	k_2	18,1	9,5
	l_1	94,6	103,2
order no.	mounting tool	95.101.336.9.2	95.101.336.9.2

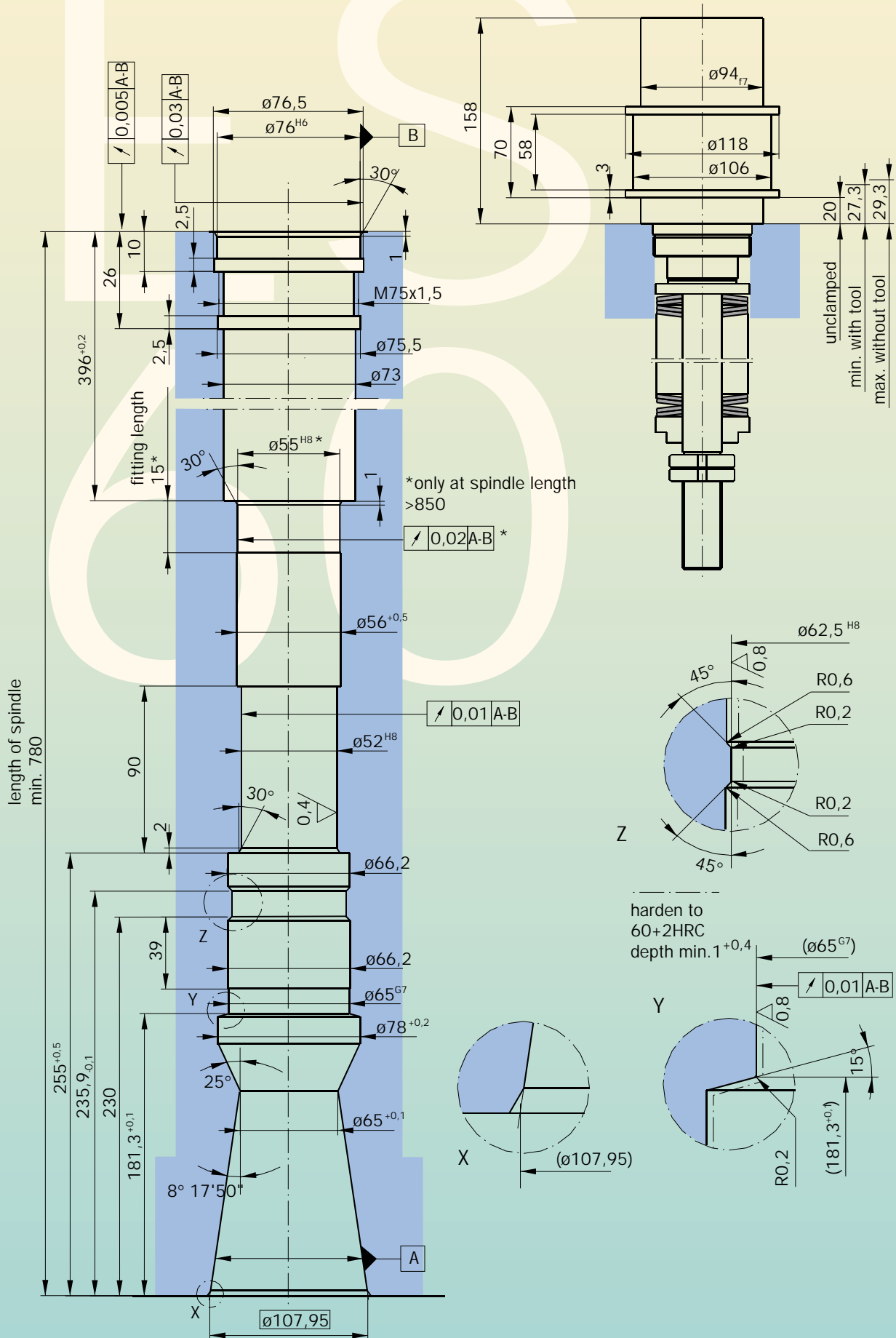


tool standard		code
DIN 69871/69872	ISO 7388/1/2 Typ A	A1
ANSI B 5.50 - 78	ISO 7388/1/2 Typ B	C1
medium transfer		
without transfer		1
axial transfer		2

tool standard		SK 60	
code		A1	C1
medium transfer		1 / 2	
[N]	pull in force	65000	60000
[mm]	stroke	8,5	8,5
	ejection path	1,15	0,95
	reference gauge	200,5	199
	k ₁	19,5	19,2
	k ₂	19,2	17,7
	l ₁	130,5	132,2
order no.	mounting tool	95.101.284.9.2	95.101.284.9.2

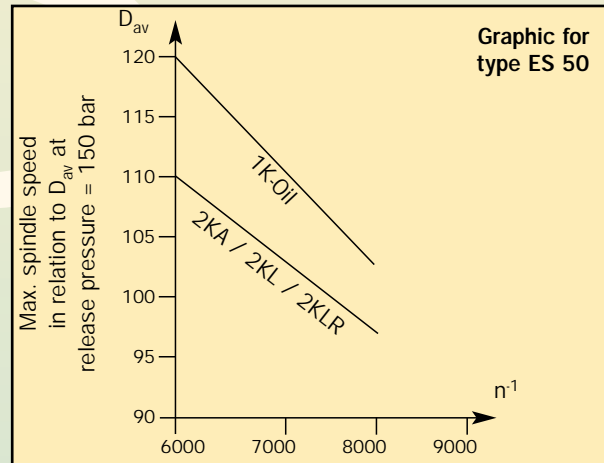
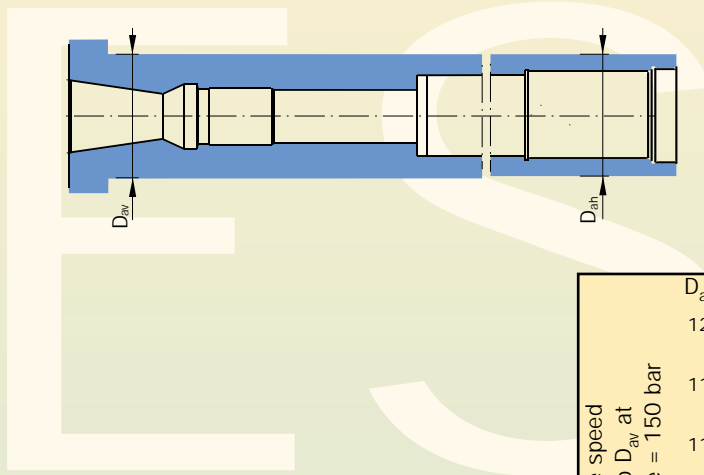
Technical data for the combination
inside spindle intensifier - rotary
union/unclamp unit in ES/IS-power
drawbar
page 22/23

Subject to modification due to technical advance!



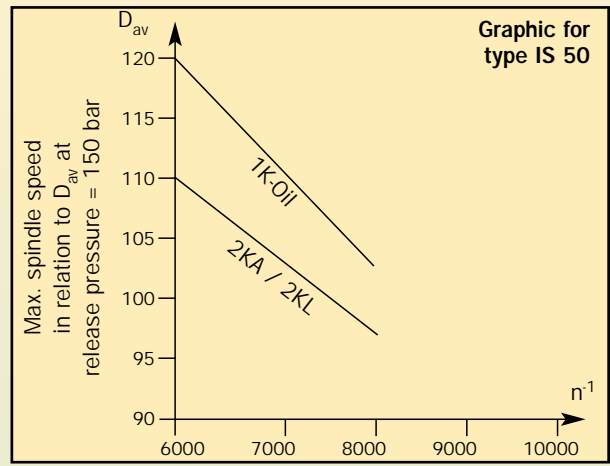
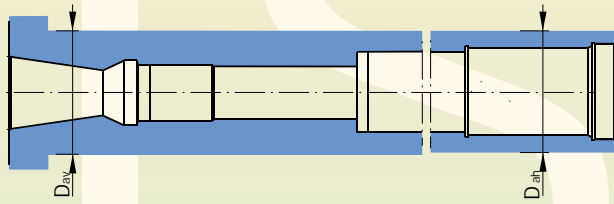
Not a spindle manufacturing drawing!

For the combination inside spindle intensifier-
rotary union / unclamp unit in **ES-power drawbar**



ES 30		1K-Oil			
spindle speed max.	[min ⁻¹]	10000			
piston area	[cm ²]	10,78			
oil volume	[cm ³]	17,0			
release pressure max.	[bar]	120			
ES 40		1K-Oil	2KA	2KL	2KLR
spindle speed max.	[min ⁻¹]	10000	8000	8000	8000
piston area	[cm ²]	18,1	17,15	17,3	17,3
oil volume	[cm ³]	31,7	55	55	55
release pressure max.	[bar]	160	160	160	160
cleaning air; n=0; max.	[bar]	-	-	10	10
air pressure max.	[bar]	-	-	-	10
coolant pressure max.	[bar]	-	80	-	-
ES 50		1K-Oil	2KA	2KL	2KLR
spindle speed max.	[min ⁻¹]	siehe Diagramm			
piston area	[cm ²]	18,1	17,15	17,3	17,3
oil volume	[cm ³]	31,7	55	55	55
release pressure max.	[bar]	160	160	160	160
cleaning air; n=0; max	[bar]	-	10	10	10
air pressure max.	[bar]	-	-	-	10
coolant pressure max.	[bar]	-	80	-	-
ES 60		1K-Oil	2KA	2KL	
spindle speed max.	[min ⁻¹]	8000	8000	8000	
piston area	[cm ²]	50,26	43,3	43,5	
oil volume	[cm ³]	106	104	104	
release pressure max.	[bar]	160	160	160	
cleaning air; n=0; max	[bar]	-	10	10	
coolant pressure max.	[bar]	-	80	-	

For the combination inside spindle intensifier-rotary union/unclamp unit in **IS-power drawbar**

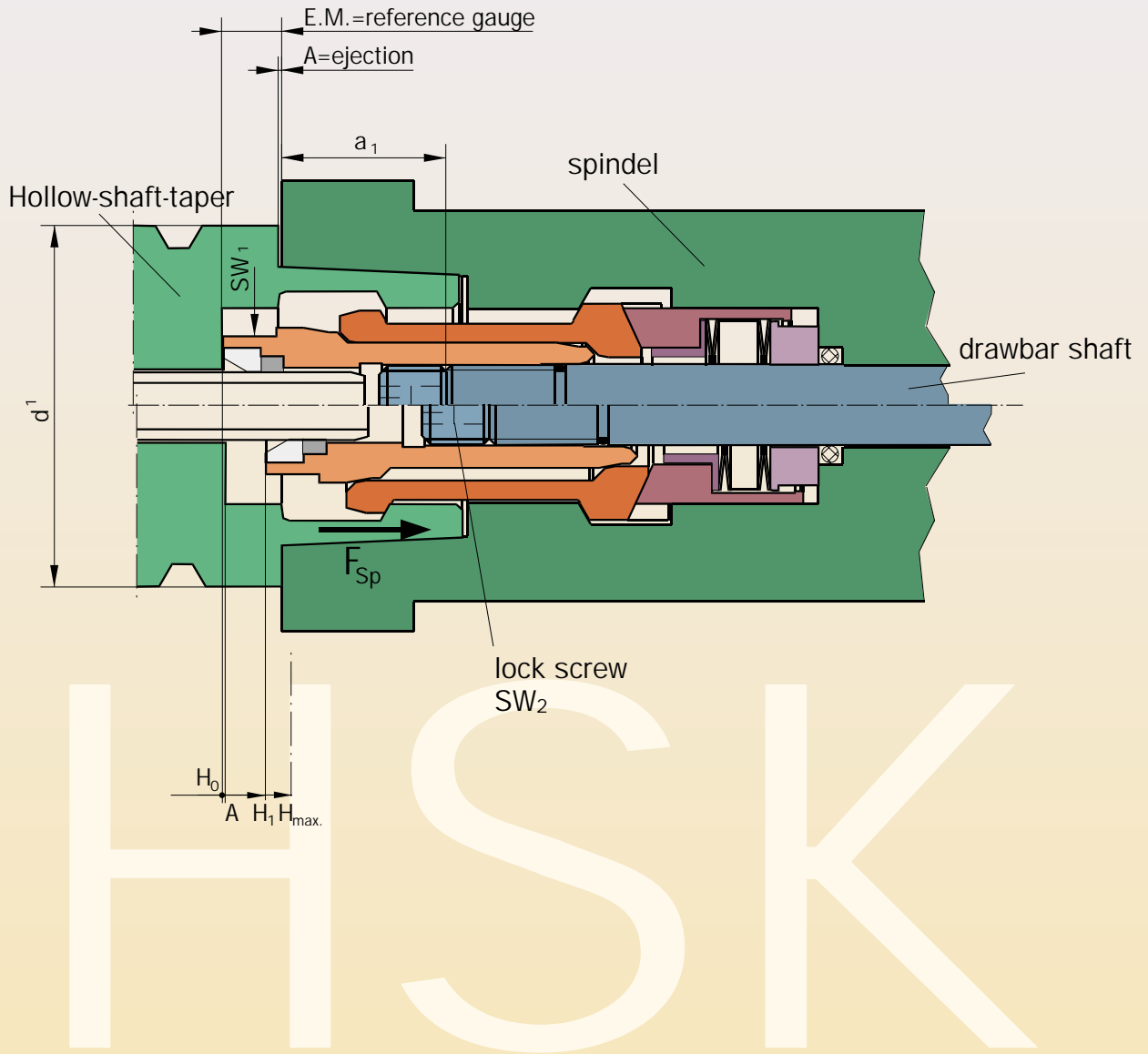


Subject to modification due to technical advance!

					HSC-module				
		1K-Oil	2KA	2KL	2KLR	LE 95+GD	LE 95+GDR	LE 92	LE 150P
IS 30					on request				
spindle speed max.	[min ⁻¹]	10000	10000	10000	on request				
piston area	[cm ²]	11,34	10,39	10,56	10,56	19,36	19,36	16,5	→ data sheet
oil volume	[cm ³]	20,4	23,5	20,4	20,4	45	45	38	-
release pressure max.	[bar]	120	120	120	120	100	100	100	-
cleaning air; n=0; max.	[bar]	-	10	10	10	10	10	10	10
air pressure max.	[bar]	-	-	-	10	5	5	-	-
coolant pressure max.	[bar]	-	80	-	-	80	50	-	-
IS 40		1K-Oil	2KA	2KL	2KLR	LE + GD	LE + GDR	LE 92	LE 150P
spindle speed max.		10000	10000	10000	on request				
piston area	[cm ²]	11,34	10,39	10,56	10,56	19,36	19,36	16,5	→ data sheet
oil volume	[cm ³]	20,4	23,5	23,9	23,9	45	45	38	-
release pressure max.	[bar]	160	160	160	160	160	160	160	-
cleaning air; n=0; max	[bar]	-	10	10	10	10	10	10	10
air pressure max.	[bar]	-	-	-	10	5	5	-	-
coolant pressure max.	[bar]	-	80	-	-	80	50	-	-
IS 50		1K-Oil	2KA	2KL	2KLR	LE + GD	LE + GDR		LE 150P
spindle speed max.		see diagram			on request				
piston area	[cm ²]	18,1	17,15	17,3	17,3	19,36	19,36		→ data sheet
oil volume	[cm ³]	31,7	54,5	55	55	45	45		-
release pressure max.	[bar]	160	160	160	160	160	160		-
cleaning air; n=0; max	[bar]	-	10	10	10	10	10		10
air pressure max.	[bar]	-	-	-	10	5	5		-
coolant pressure max.	[bar]	-	80	-	-	80	50		-
IS 50 G		1K-Oil	2KA	2KL	2KLR				LE 150P
spindle speed max.		10000	10000	10000	on request				
piston area	[cm ²]	28,3	27,4	27,5	17,3				→ data sheet
oil volume	[cm ³]	55	53	54	55				-
release pressure max.	[bar]	160	160	160	160				-
cleaning air; n=0; max.	[bar]	-	10	10	10				10
air pressure max.	[bar]	-	-	-	10				-
coolant pressure max.	[bar]	-	80	-	-				-

HSK-Grippers
HSK-Inside spindle intensifier

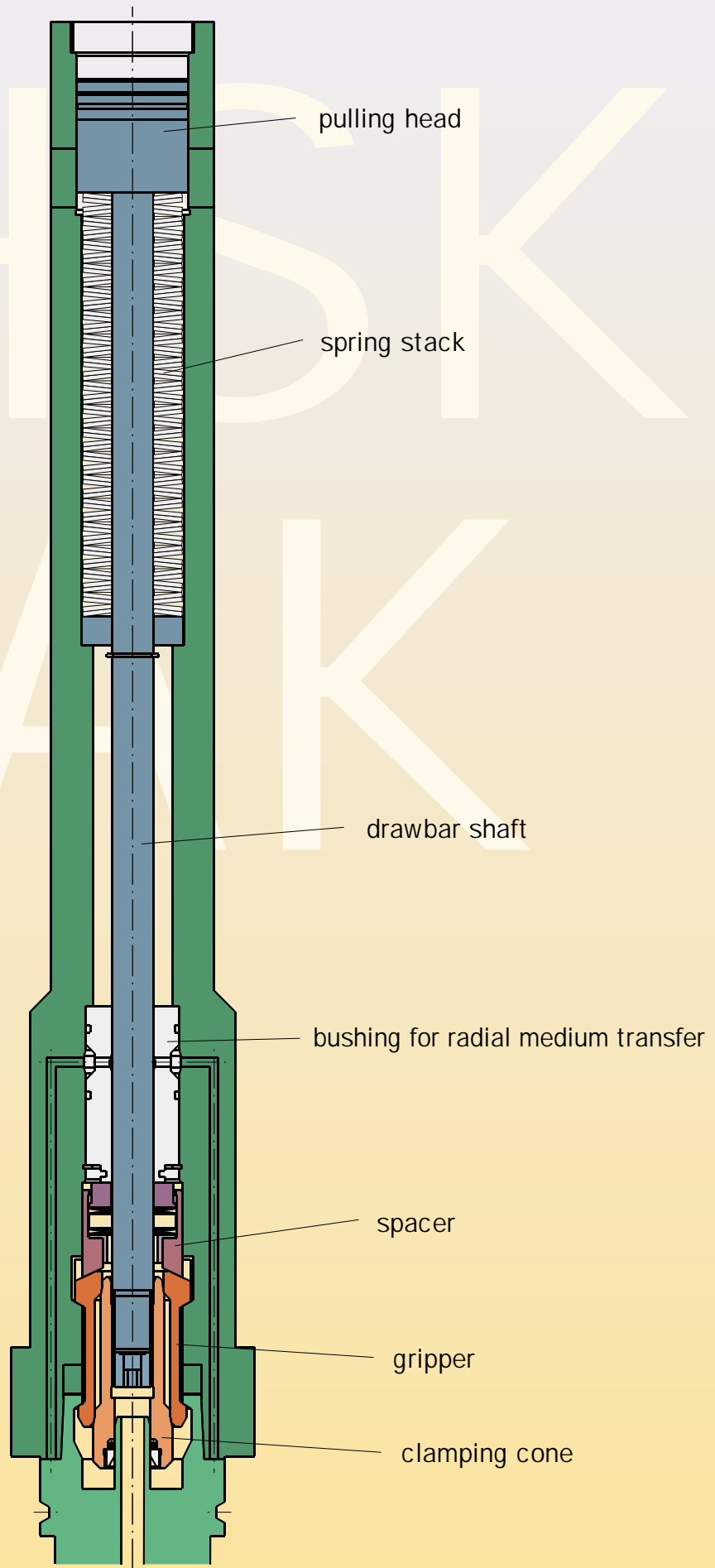




Hollow-shaft-tapers Form A		code
DIN 69893 - 1	ISO 12164-1	AK

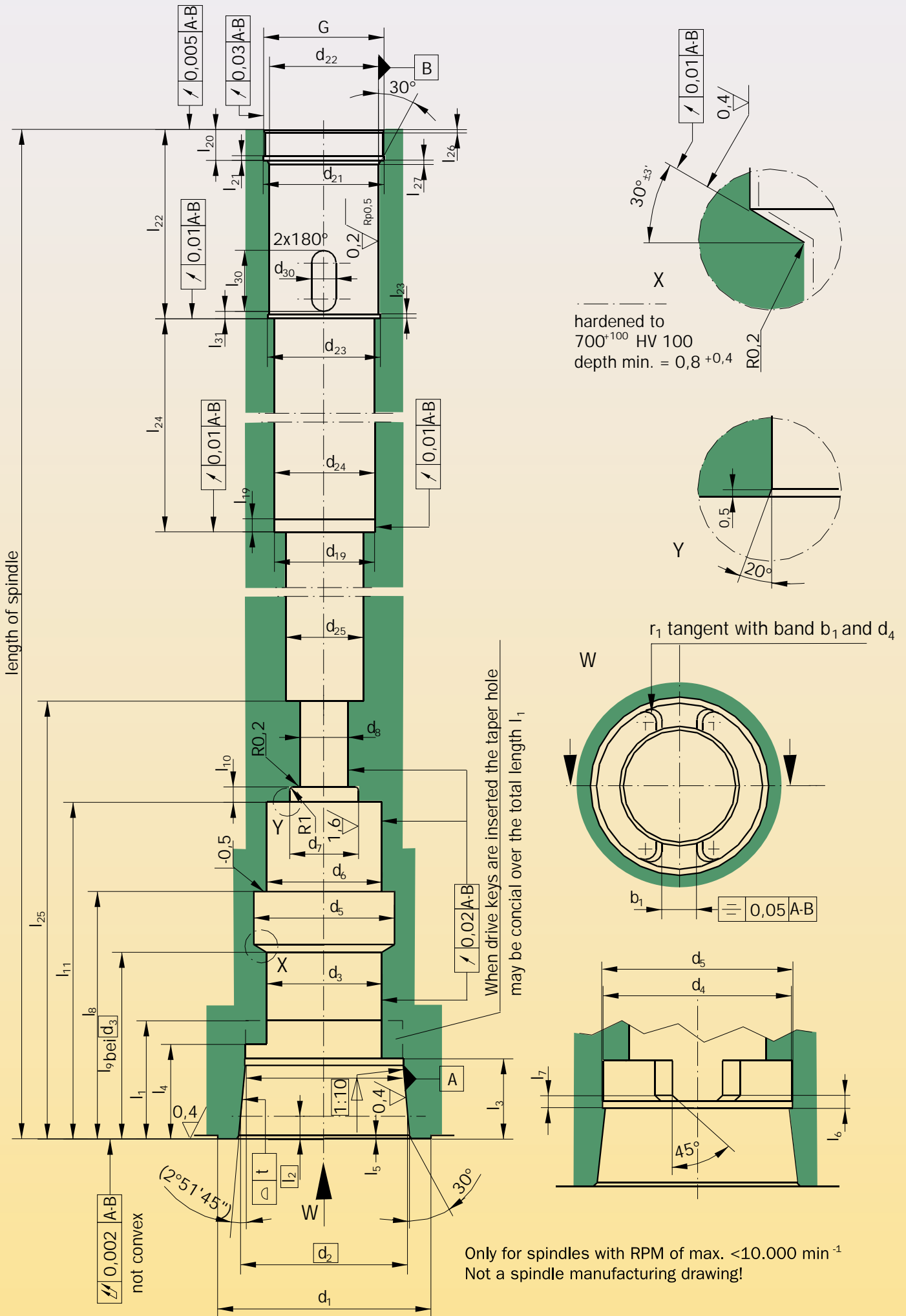
		d1	32	40	50	63	80	100	125	160	
[mm]	[kN]	F_{Sp}	5	6,8	11	18	28	45	70	115	
		A	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1	
		E.M.	$\pm 0,1$	8,5	8,5	10,5	10,5	13	13	16,5	17
		$H_{max.}$		7,5	8	9	10	11	12,5	15,8	24,5
		H_1		5,1	5,6	6,4	7,4	8,3	9,15	10,8	17,5
		SW_1		12	15	18	22	27	36	46	55
		SW_2		3	4	4	5	6	6	14	16
	a_1		19,5	27	26,5	31,5	29	34,5	40,5	56	
mounting tool			95.601.111.3.1	95.601.112.3.1	95.601.113.3.1	95.601.114.3.1	95.601.115.2.1	95.601.116.2.1	95.601.117.2.1	95.601.118.2.1	

Subject to modification due to technical advance!



spindle inside contour AK

4

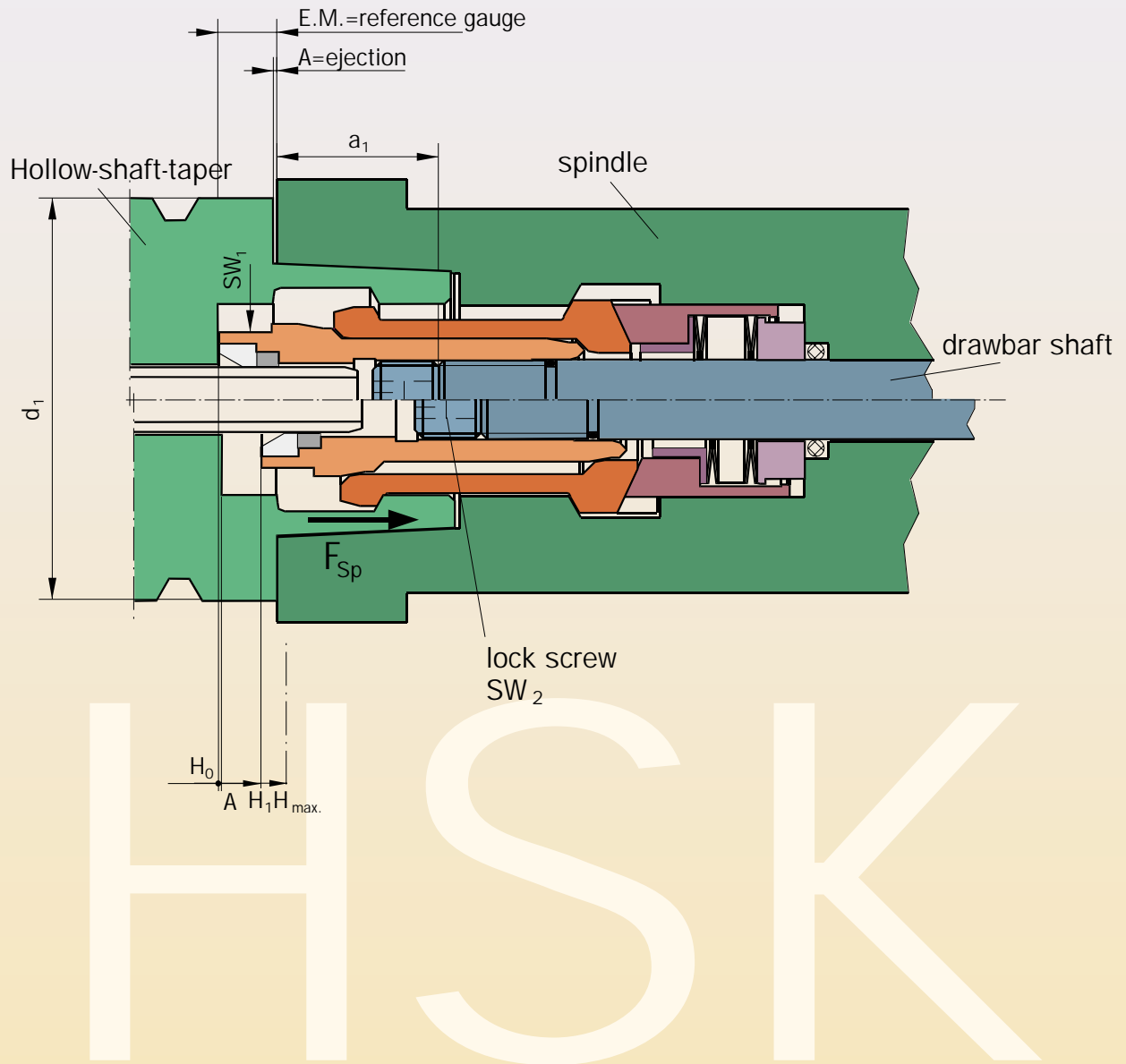


Dimensions not approved for spindle manufacturing! Subject to modification due to technical advance!

DIN 69063-1 1996-01 bzw. ISO / WD 12164-2 *													
clamping unit	[mm]	d1		32	40	50	63	80	100	125	160		
		b ₁	^{+0,05} _{-0,05}	6,8	7,8	10,3	12,3	15,8	19,78	24,78	29,78		
		d ₂		23,998	29,998	37,998	47,998	59,997	74,997	94,996	119,996		
		d ₃	H10	17	21	26	34	42	53	67	85		
		d ₄	+0,1	23,28	29,06	36,85	46,53	58,1	72,6	92,05	116,1		
		e ₁		8,91	11,08	14	18,11	22,07	27,56	35,58	44,54		
		e ₂		4,9	5,9	7,65	9,15	11,9	14,89	18,39	22,89		
		l ₁	+0,2	16,5	20,5	25,5	33	41	51	64	81		
		l ₂		3,2	4	5	6,3	8	10	12,5	16		
		l ₃	+0,2	11,4	14,4	17,9	22,4	28,4	35,4	44,4	57,4		
		l ₄	+0,2	13,4	16,9	20,9	26,4	32,4	40,4	51,4	64,4		
		l ₅		0,8	0,8	1	1	1,5	1,5	2	2		
		l ₆	+0,1	1	1	1,5	1,5	2	2	2,5	2,5		
		l ₇	±0,1	2,0	2,0	2,0	2,5	3,0	3,0	4,0	4,0		
r ₁	^{+0,025} _{-0,025}	1,5	2	2,5	3	4	5	6	8				
t ^{**}		0,0015	0,0015	0,0020	0,0020	0,0025	0,0030	0,0035	0,0035				
inside spindle intensifier	[mm]	d ₅	+0,2	22,5	26,5	33	41,6	50	63	79	104		
		d ₆	H6	17	21	26	34	42	53	67	85		
		d ₇	+0,1	10,3	13,2	15,2	20,4	22,4	24,2	32	37,2		
		d ₈	+0,1	6,6	8,6	10,6	14,6	16,6	18,4	25,4	32,4		
		l ₈	±0,1	43	58	61	69	72	93	112,5	148		
		l ₉	js8 at d ₃	30	44	45	52	56	70	86	113		
		l ₁₀	+0,2	3	3,6	3,6	4,2	4,2	4,2	4,7	4		
l ₁₁	-0,2	62,5	78	84	94	98	124	149	188				
inside spindle intensifier	[mm]	G		on request		M42x1,5	M42x1,5	M42x1,5	M52x1,5	M52x1,5	M85x1,5	on request	
		d ₂₁	+0,2	on request		42,2	42,2	42,2	52,2	52,2	85,5	on request	
		d ₂₂	H8	on request		38	38	38	48	48	80	on request	
		d ₂₃	+0,2	on request		38,2	38,2	38,2	48,2	48,2	80,2	on request	
		d ₂₄	+0,2	on request		32	32	35	41,5	44	72	on request	
		d ₂₅	+0,2	on request		20	20	27	27	36	57	on request	
		l ₂₀	+0,2	on request		10,5	10,5	10,5	14	14	17	on request	
		l ₂₁		on request		1,5	1,5	1,5	1,5	1,5	2,5	on request	
		l ₂₂	+0,1	on request		65,5	65,5	65,5	86,5	86,5	118	on request	
		l ₂₃		on request		1,5	1,5	1,5	1,5	1,5	2	on request	
		l ₂₄	-0,2	on request		100	100	158	167	298	405,5	on request	
		l ₂₅	-0,5	on request		85	95	105	110	135	160	on request	
		l ₂₆		on request		1	1	1	1	1	2	on request	
		l ₂₇		on request		1,5	1,5	1,5	2,5	2,5	1,5	on request	
		at a spindle length of more than:				350			450				
		d ₁₉	H8	on request		31,5	31,5	34,5	41	43,5	71,5	on request	
		l ₁₉		on request		6			7				
				at position indication C:									
d ₃₀		on request		8,5	8,5	8,5	8,5	8,5	13	on request			
l ₃₀	+0,2	on request		19	20	20	21	22,5	32	on request			
l ₃₁	+0,1	on request		2,5	2,5	2,5	2	2	7	on request			

* see updated standard!!

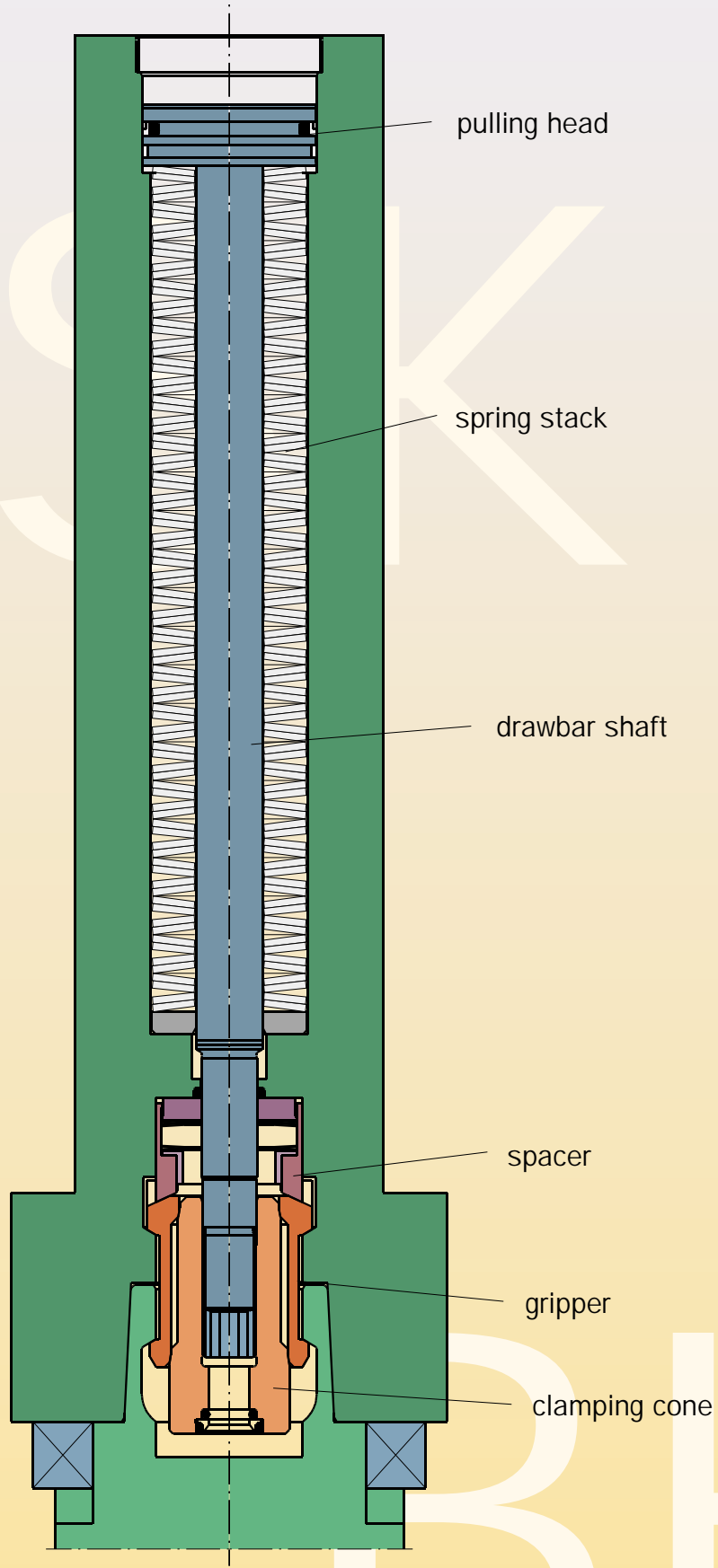
** see ISO 1101 and ISO 3040



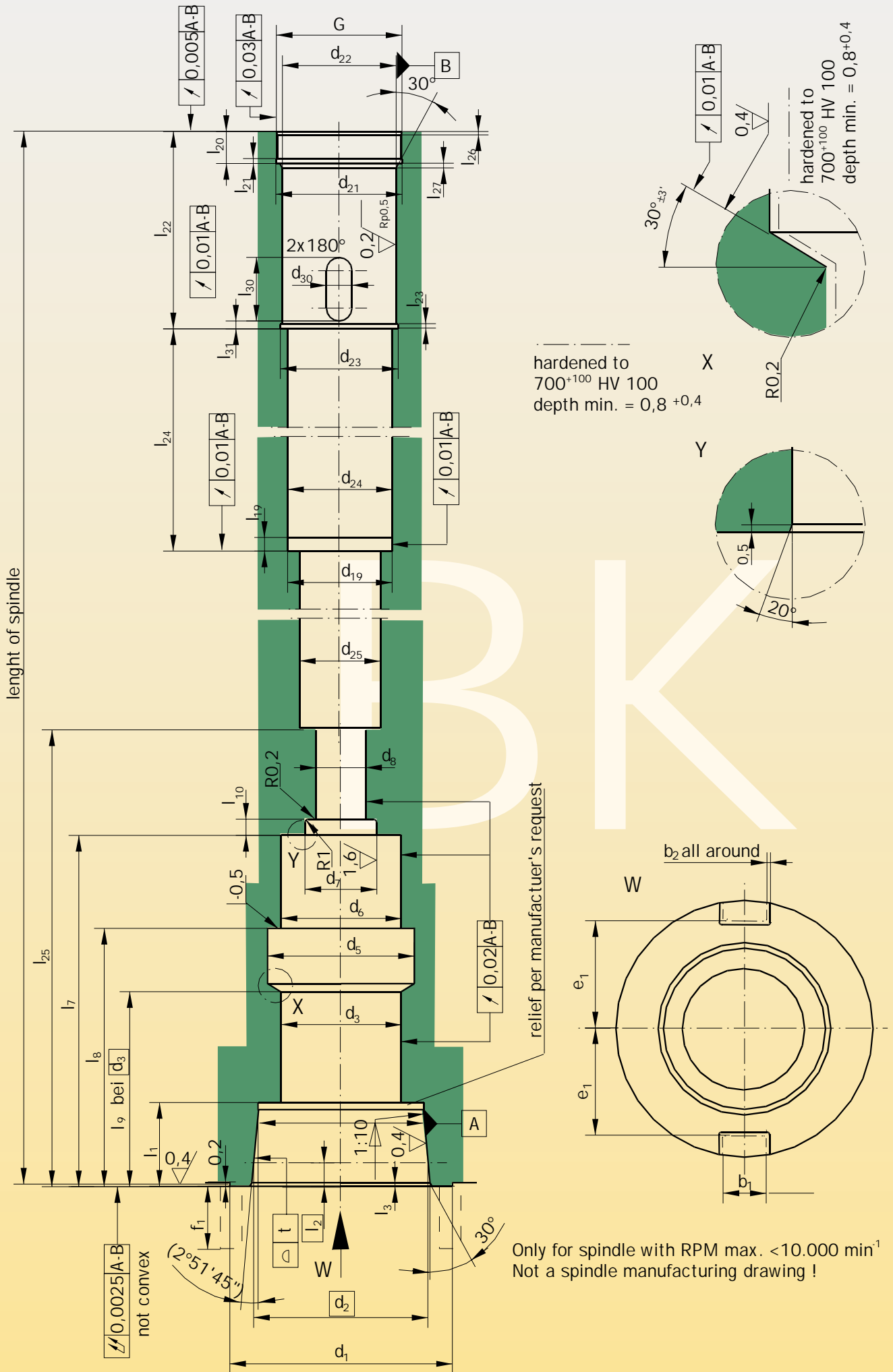
Hollow-shaft-tapers Form B	code
DIN 69893 - 2	BK

		d1	40	50	63	80	100	125	160	
[mm]	[kN]	F_{Sp}	5	6,8	11	18	28	45	70	
		A	0,5	0,5	0,5	0,5	0,5	0,5	0,5	
		E.M.	$\pm 0,1$	8,5	8,5	10,5	10,5	13	13	16,5
		$H_{max.}$		7,5	8	9	10	11	12,5	15,8
		H_1		5,1	5,6	6,4	7,4	8,3	9,15	10,8
		SW_1		12	15	18	22	27	36	46
		SW_2		3	4	4	5	6	6	14
		a_1		19,5	27	26,5	31,5	29	34,5	40,5
mounting tool			95.601.111.3.1	95.601.112.3.1	95.601.113.3.1	95.601.114.3.1	95.601.115.2.1	95.601.116.2.1	95.601.117.2.1	

Subject to modification due to technical advance!



spindle inside contour BK



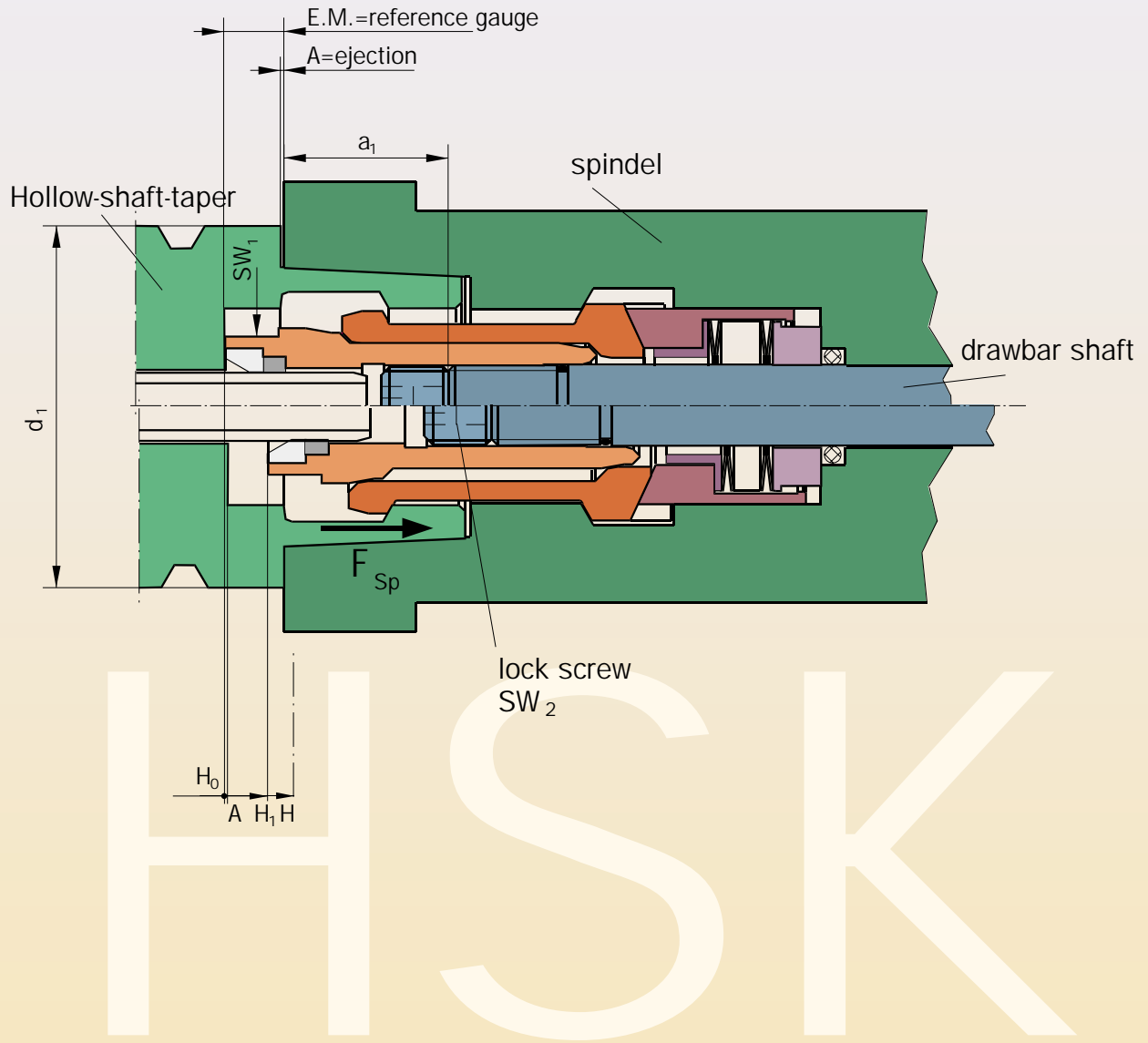
Only for spindle with RPM max. 10.000 min^{-1}
Not a spindle manufacturing drawing !

Dimensions not approved for spindle manufacturing! Subject to modification due to technical advance!

		DIN 69063-2 1996-01 *								
		d1	40	50	63	80	100	125	160	
DIN 69063-2 1996-01 *	[mm]	b ₁	+0,05 -0,05	9,9	11,9	15,9	17,9	19,9	24,9	31,9
		b ₂		1	1	1	1	2	2	2
		d ₂		23,998	29,998	37,998	47,998	59,997	74,997	94,996
		d ₃	H10	17	21	26	34	42	53	67
		e ₁	+0,2	16,2	20,2	25,2	31,7	40,2	50,2	62,7
		f ₁	max.	19,5	25,5	25,5	25,5	28,5	28,5	30,5
		l ₁	+0,2	16,5	20,5	25,5	33	41	51	64
		l ₂		3,2	4	5	6,3	8	10	12,5
		l ₃		0,8	0,8	1	1	1,5	1,5	2
		t ^{**}		0,0015	0,0015	0,0020	0,0020	0,0025	0,0030	0,0035
		d ₅	+0,2	22,5	26,5	33	41,6	50	63	79
		d ₆	H6	17	21	26	34	42	53	67
		d ₇	-0,1	10,3	13,2	15,2	20,4	22,4	24,2	32
		d ₈	+0,1	6,6	8,6	10,6	14,6	16,6	18,4	25,4
clamping unit	[mm]	l ₇	-0,2	62,5	78	84	94	98	124	149
		l ₈	±0,1	43	58	61	69	72	93	112,5
		l ₉	js8 at d3	30	44	45	52	56	70	86
		l ₁₀	+0,2	3	3,6	3,6	4,2	4,2	4,2	4,7
		G		on request	M42x1,5	M42x1,5	M42x1,5	M52x1,5	M52x1,5	M85x1,5-5H
		d ₂₁	+0,2		42,2	42,2	42,2	52,2	52,2	85,5
		d ₂₂	H8		38	38	38	48	48	80
d ₂₃	+0,2	38,2	38,2		38,2	48,2	48,2	80,2		
inside spindle intensifier	[mm]	d ₂₄	+0,2	32	32	35	41,5	44	72	
		d ₂₅	+0,2	20	20	27	27	36	57	
		l ₂₀	+0,2	10,5	10,5	10,5	14	14	17	
		l ₂₁		1,5	1,5	1,5	1,5	1,5	2,5	
		l ₂₂	+0,1	65,5	65,5	65,5	86,5	86,5	118	
		l ₂₃		1,5	1,5	1,5	1,5	1,5	2	
		l ₂₄	-0,2	100	100	158	167	298	405,5	
		l ₂₅	-0,5	85	95	105	110	135	160	
		l ₂₆		1	1	1	1	1	2	
		l ₂₇		1,5	1,5	1,5	2,5	2,5	1,5	
		at a spindle length of more than:			350		450			
		d ₁₉		on request	31,5	31,5	34,5	41	43,5	71,5
		l ₁₉			6		7			
					at position indication G:					
d ₃₀		8,5	8,5		8,5	8,5	8,5	13		
l ₃₀	+0,2	19	20	20	21	22,5	32			
l ₃₁	+0,1	2,5	2,5	2,5	2	2	7			

* see updated standard!

** see ISO 1101 and ISO 3040

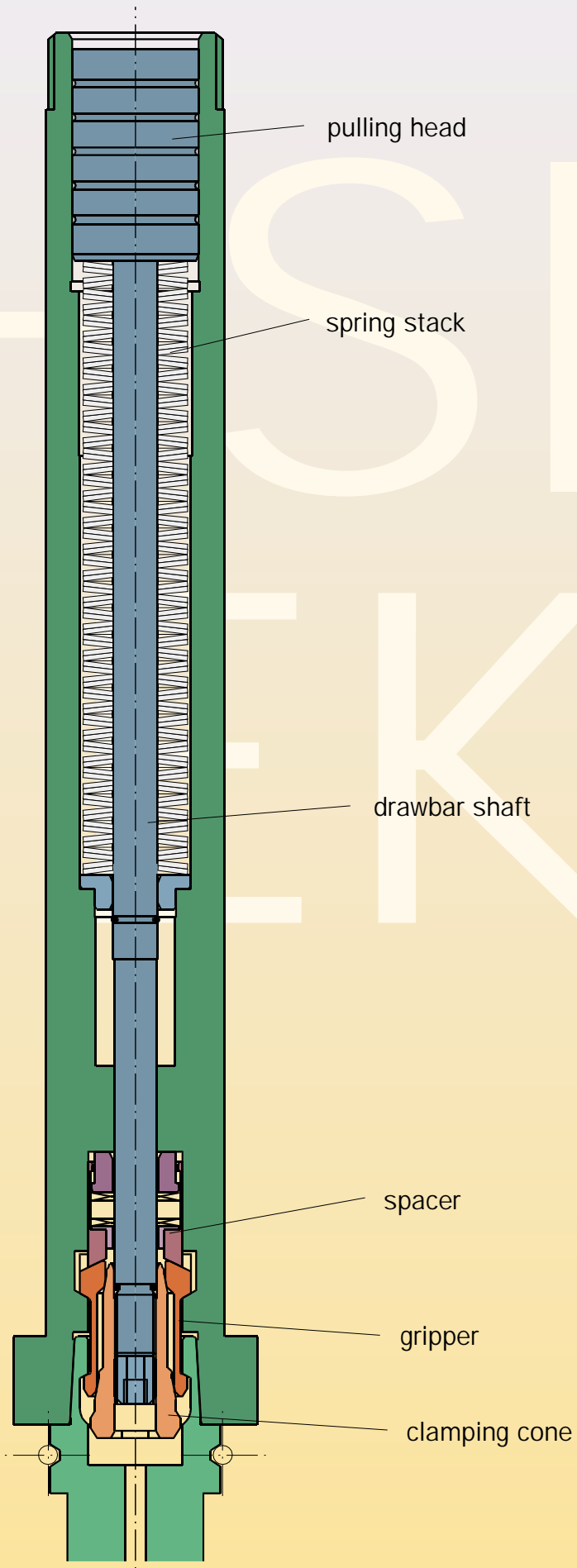


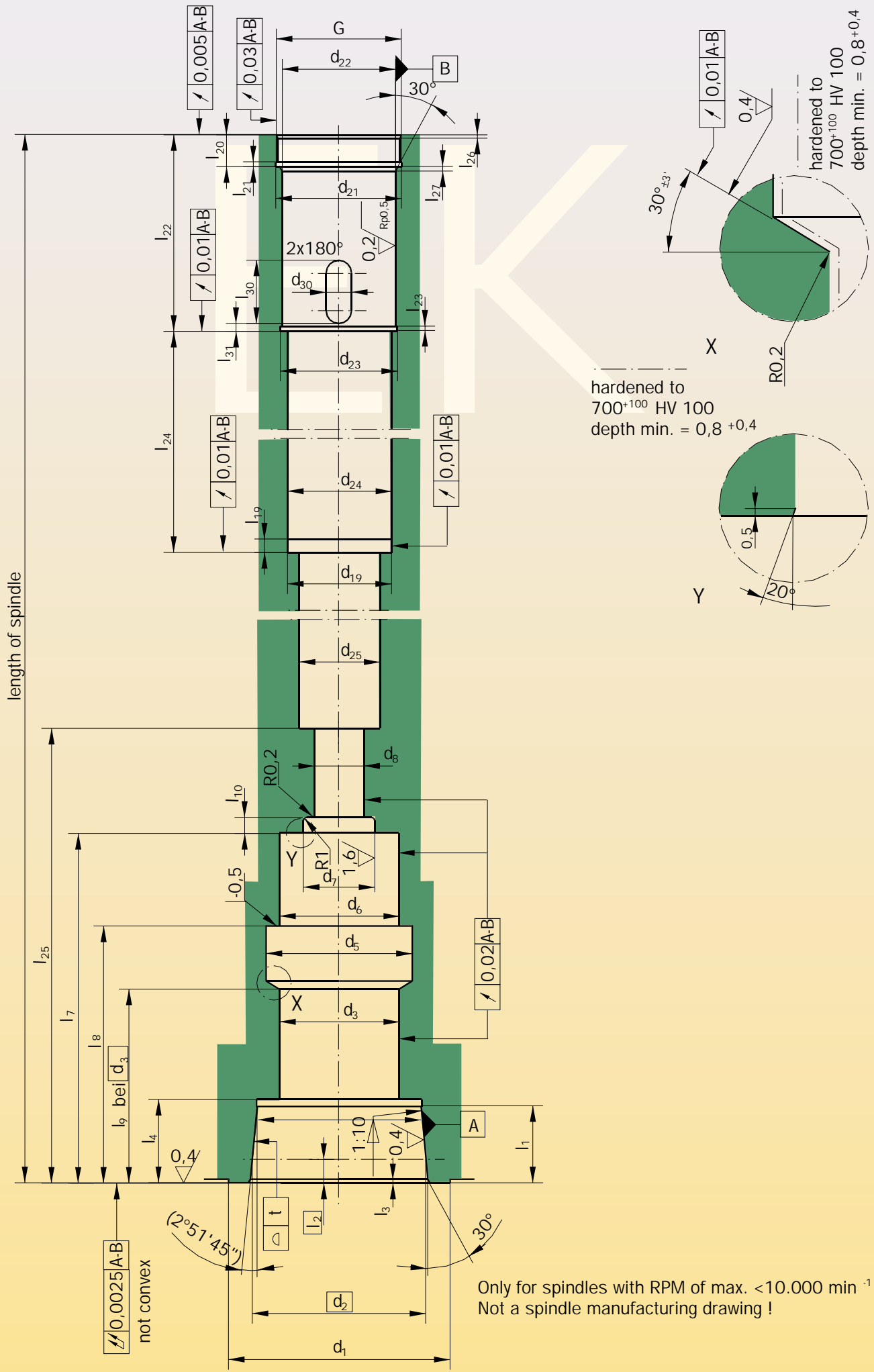
HSK

Hollow-shaft-tapers Form E	code
DIN V 69893 - 5	EK

		d1	25	32	40	50	63	
[mm]	[kN]	F_{Sp}	2,8	5	6,8	11	18	
		A	0,5	0,5	0,5	0,5	0,5	
		E.M.	$\pm 0,1$	6,5	8,5	8,5	10,5	10,5
		$H_{max.}$	7	7,5	8	9	10	
		H_1	4,6	5,1	5,6	6,4	7,4	
		SW_1	10	12	15	18	22	
		SW_2	3	3	4	4	5	
		a_1	5,5	19,5	27	26,5	31,5	
mounting tool			95.601.110.3.1	95.601.111.3.1	95.601.112.3.1	95.601.113.3.1	95.601.114.3.1	

Subject to modification due to technical advance!





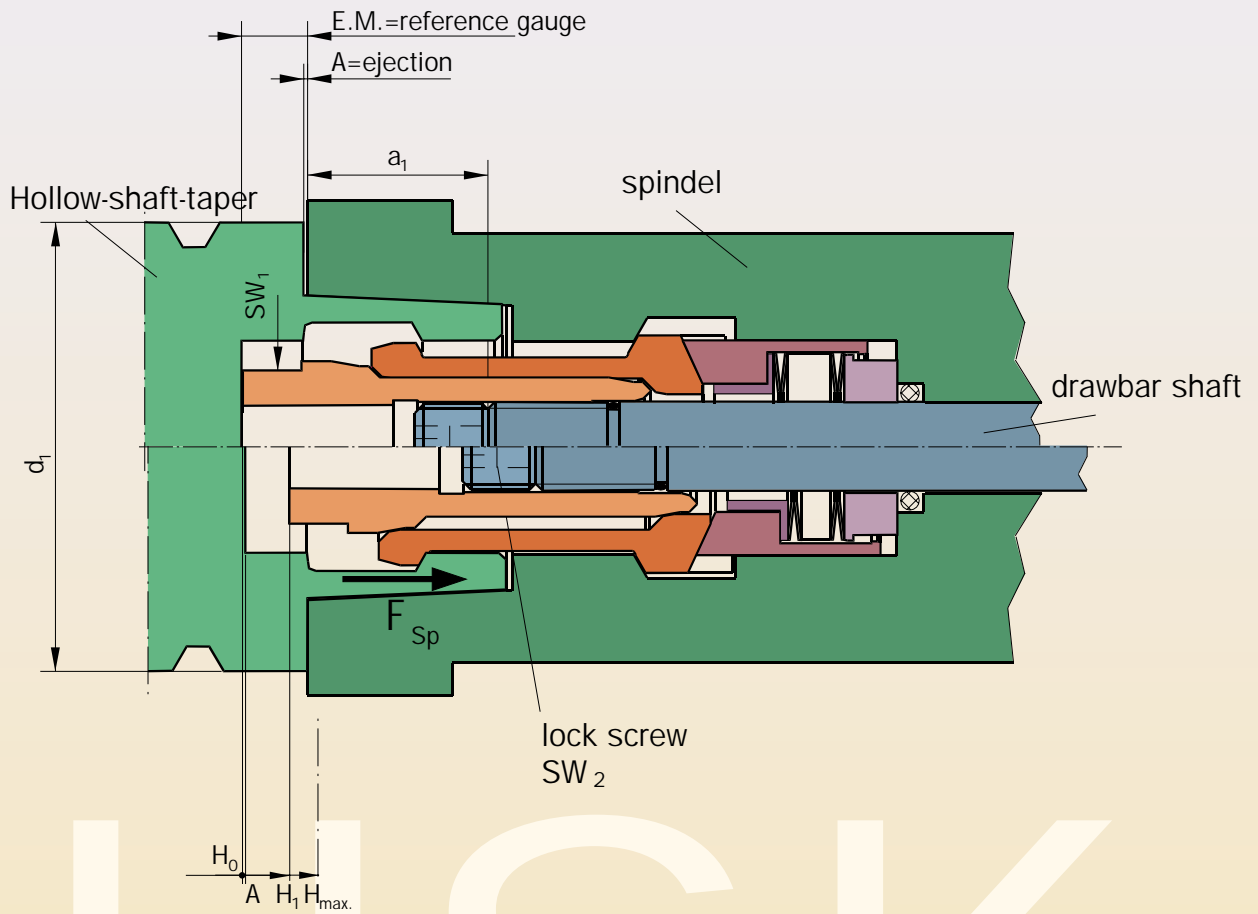
Only for spindles with RPM of max. $< 10.000 \text{ min}^{-1}$
Not a spindle manufacturing drawing !

Dimensions not approved for spindle manufacturing! Subject to modification due to technical advance!

DIN V 69063-5 1996-01*								
[mm]	d1		25	32	40	50	63	
	d2		18,998	23,998	29,998	37,998	47,998	
	l1		13	16	20	25	32	
	l2		2,5	3,2	4	5	6,3	
	l3		0,5	0,8	0,85	1	1	
	l4		13,5	16,5	20,5	25,5	33	
	t**		0,001	0,0015	0,0015	0,0020	0,0020	
clamping unit [mm]	d3	H10	14	17	21	26	34	
	d5	+0,2	18	22,5	26,5	33	41,6	
	d6	H6	14	17	21	26	34	
	d7	+0,1		10,3	13,2	15,2	20,4	
	d8	+0,1	6,6	6,6	8,6	10,6	14,6	
	l7	-0,2	40	62,5	78	84	94	
	l8	±0,1	25,5	43	58	61	69	
	l9	js8 at d3	18,5	30	44	45	52	
	l10	+0,2		3	3,6	3,6	4,2	
inside spindle intensifier [mm]	G		on request		M42x1,5	M42x1,5	M42x1,5	
	d21	+0,2			42,2	42,2	42,2	
	d22	H8			38	38	38	
	d23	+0,2			38,2	38,2	38,2	
	d24	+0,2			32	32	35	
	d25	+0,2			20	20	27	
	l20	+0,2			10,5	10,5	10,5	
	l21				1,5	1,5	1,5	
	l22	+0,1			65,5	65,5	65,5	
	l23				1,5	1,5	1,5	
	l24	-0,2			100	100	158	
	l25	-0,5			85	95	105	
	l26				1	1	1	
	l27				1,5	1,5	1,5	
	at a spindle length of more than:				350		450	
	d19	H8				31,5	31,5	34,5
	l19					6		7
	at position indication G:							
	d30					8,5	8,5	8,5
l30	+0,2			19	20	20		
l31	+0,1			2,5	2,5	2,5		

* see updated standard!

** see ISO 1101 and ISO 3040

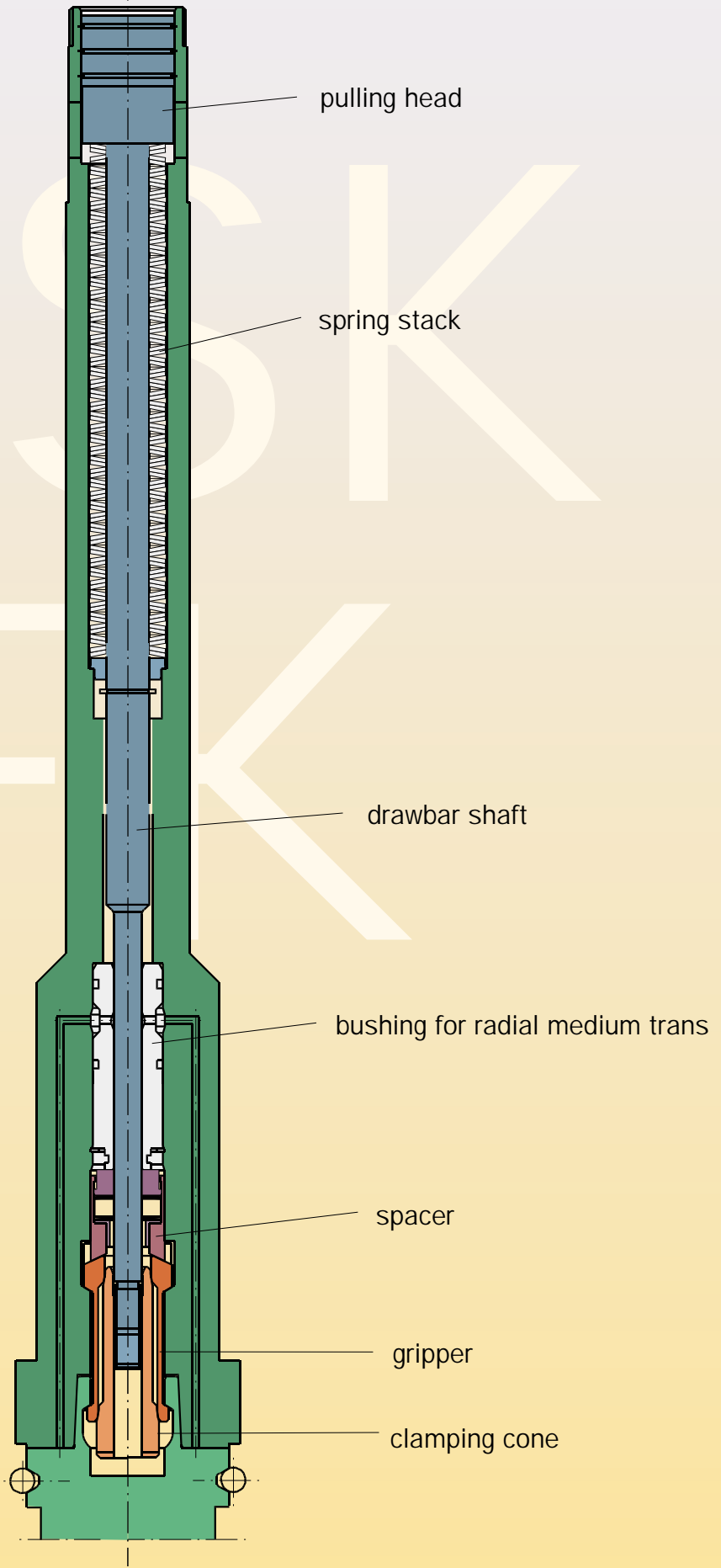


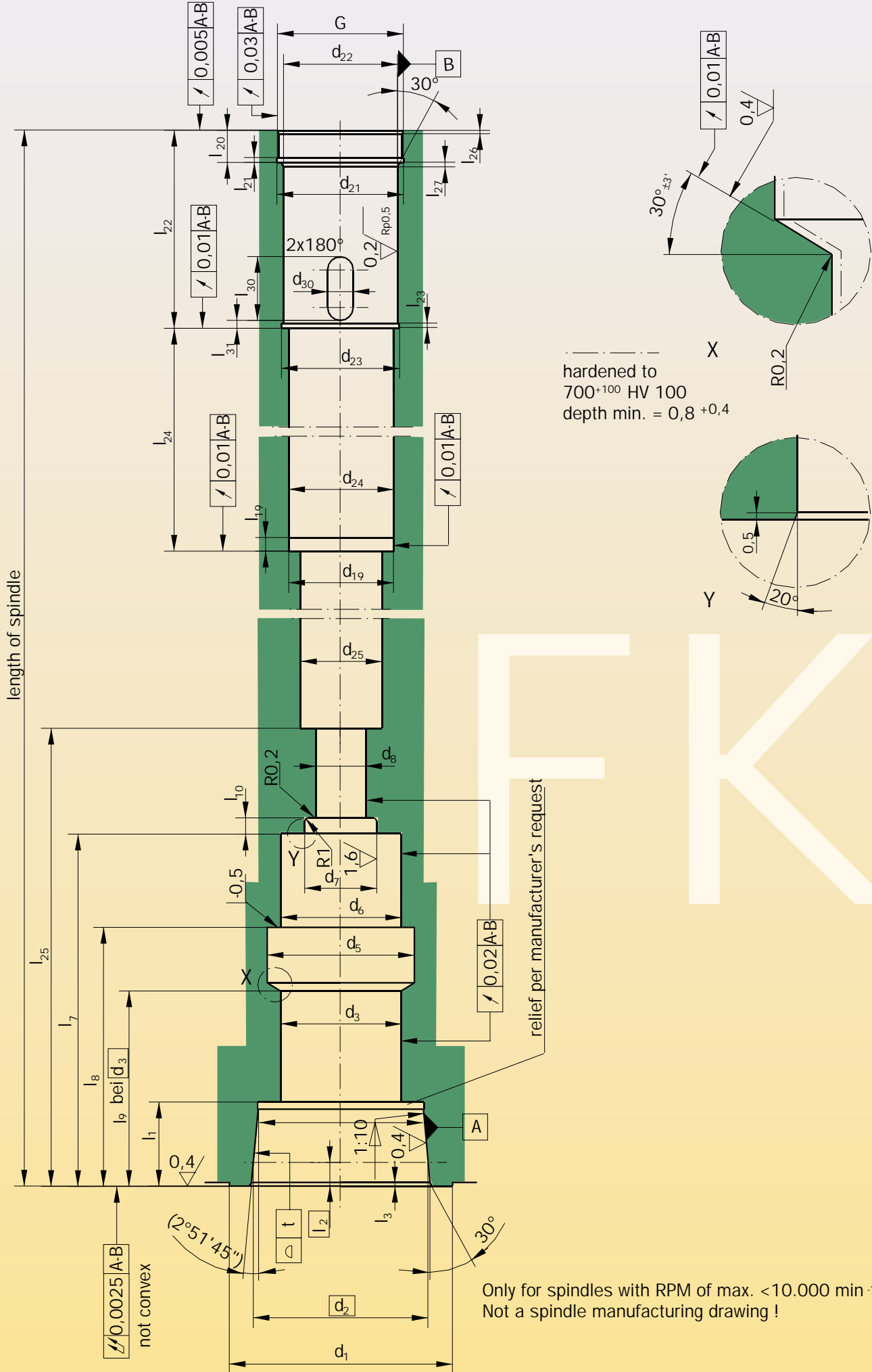
HSK

Hollow-shaft-tapers Form F	code
DIN V 69893 - 6	FK

		d1	50	63	80	
[mm]	[kN]	F_{Sp}	6,8	11	18	
		A	0,5	0,5	0,5	
		E.M.	$\pm 0,1$	8,5	10,5	10,5
		$H_{max.}$	8	9	10	
		H_1	5,6	6,4	7,4	
		SW_1	15	18	22	
		SW_2	4	4	5	
		a_1	27	26,5	31,5	
mounting tool			95.601.112.3.1	95.601.113.3.1	95.601.114.3.1	

Subject to modification due to technical advance!





Dimensions not approved for spindle manufacturing! Subject to modification due to technical advance!

DIN V 69063-6 1996-01*	[mm]	d1	50	63	80		
		d ₂		29,998	37,998	47,998	
d ₃	H10	21	26	34			
l ₁	+0,2	20,5	25,5	33			
l ₂		4	5	6,3			
l ₃	+0,2	0,8	1	1			
t**		0,0015	0,0020	0,0020			
clamping unit	[mm]	d ₅	+0,2	26,5	33	41,6	
		d ₆	H6	21	26	34	
		d ₇	+0,1	13,2	15,2	20,4	
		d ₈	+0,1	8,6	10,6	14,6	
		l ₇	-0,2	78	84	94	
		l ₈	±0,1	58	61	69	
		l ₉	js8 at d3	44	45	52	
		l ₁₀	+0,2	3,6	3,6	4,2	
inside spindle intensifier	[mm]	G		M42x1,5	M42x1,5	M42x1,5	
		d ₂₁	+0,2	42,2	42,2	42,2	
		d ₂₂	H8	38	38	38	
		d ₂₃	+0,2	38,2	38,2	38,2	
		d ₂₄	+0,2	32	32	35	
		d ₂₅	+0,2	20	20	27	
		l ₂₀	+0,2	10,5	10,5	10,5	
		l ₂₁		1,5	1,5	1,5	
		l ₂₂	+0,1	65,5	65,5	65,5	
		l ₂₃		1,5	1,5	65,5	
		l ₂₄	-0,2	100	100	158	
		l ₂₅	-0,5	85	95	105	
		l ₂₆		1	1	1	
		l ₂₇		1,5	1,5	15	
		at a spindle length of more than:		350		450	
		d ₁₉		31,5	31,5	34,5	
		l ₁₉		6		7	
		at position indication G:					
		d ₃₀		8,5	8,5	8,5	
		l ₃₀	+0,2	19	20	20	
l ₃₁	+0,1	2,5	2,5	2,5			

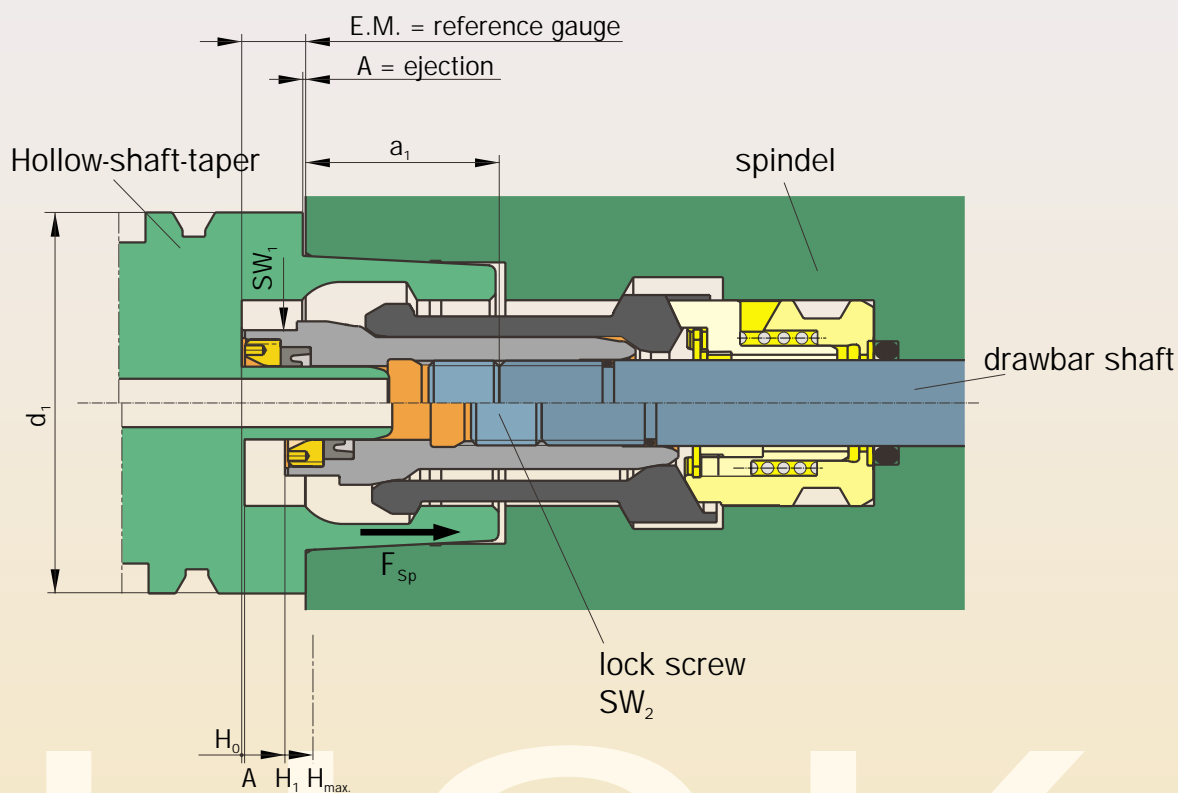
* see updated standard!

** see ISO 1101 and ISO 3040

FK

HSK-Grippers
HSK-Inside spindle intensifier



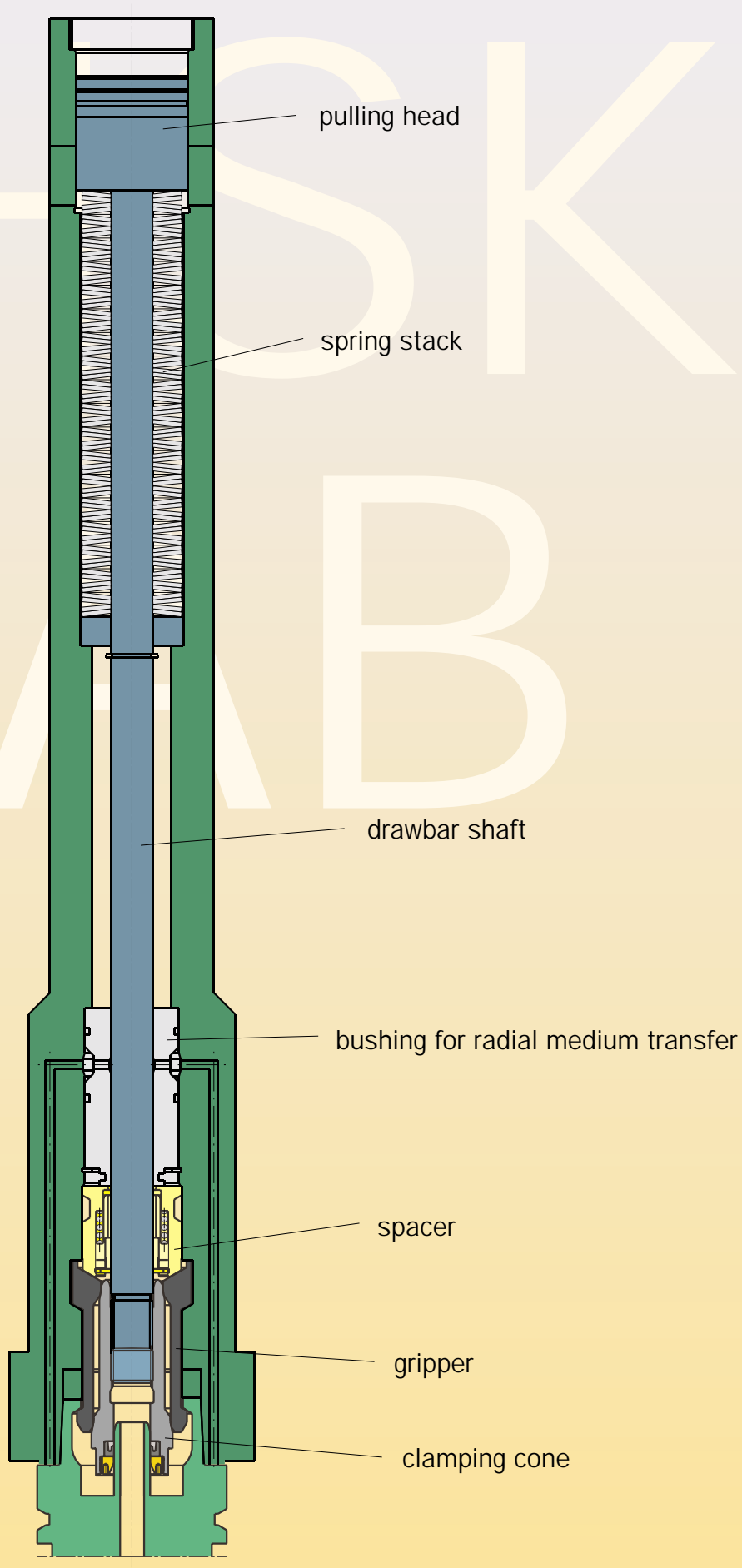


HSK

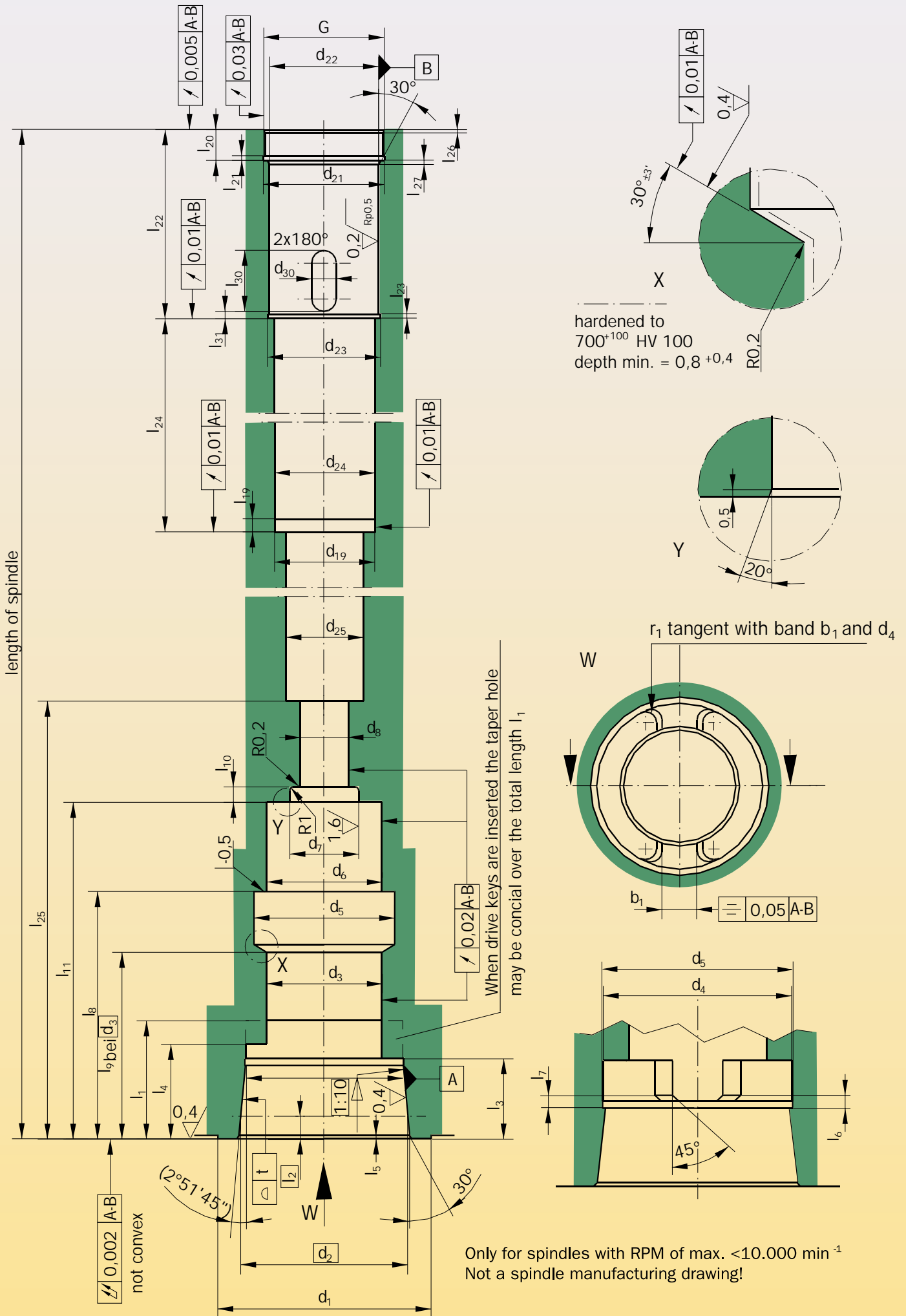
Hollow-shaft-tapers Form A / Series B		code
DIN 69893 - 1	ISO 12164-1	AB

		d1	32	40	50	63	80	100	
[mm]	[kN]	F_{Sp}	5	6,8	11	18	28	45	
		A	0,5	0,5	0,5	0,5	0,5	0,5	
		E.M.	$\pm 0,1$	8,5	8,5	10,5	10,5	13	13
		$H_{max.}$		7,5	8	9	10	11	12,5
		H_1		5,1	5,6	6,4	7,4	8,3	9,15
		SW_1		12	15	18	22	27	36
		SW_2		3	4	4	5	6	6
		a_1		19,5	27	26,5	31,5	29	34,5

Subject to modification due to technical advance!



Inside spindle Intensifier
with Clamping Unit HSK-AB



Dimensions not approved for spindle manufacturing! Subject to modification due to technical advance!

DIN 69063-1 1996-01 bzw. ISO / WD 12164-2 *	[mm]	d1		32	40	50	63	80	100			
		b ₁	^{+0,05} _{-0,05}	6,8	7,8	10,3	12,3	15,8	19,78			
		d ₂		23,998	29,998	37,998	47,998	59,997	74,997			
		d ₃	H10	17	21	26	34	42	53			
		d ₄	+0,1	23,28	29,06	36,85	46,53	58,1	72,6			
		e ₁		8,91	11,08	14	18,11	22,07	27,56			
		e ₂		4,9	5,9	7,65	9,15	11,9	14,89			
		l ₁	+0,2	16,5	20,5	25,5	33	41	51			
		l ₂		3,2	4	5	6,3	8	10			
		l ₃	+0,2	11,4	14,4	17,9	22,4	28,4	35,4			
		l ₄	+0,2	13,4	16,9	20,9	26,4	32,4	40,4			
		l ₅		0,8	0,8	1	1	1,5	1,5			
		l ₆	+0,1	1	1	1,5	1,5	2	2			
		l ₇	±0,1	2,0	2,0	2,0	2,5	3,0	3,0			
		r ₁	^{+0,025} _{-0,025}	1,5	2	2,5	3	4	5			
t**		0,0015	0,0015	0,0020	0,0020	0,0025	0,0030					
clamping unit	[mm]	d ₅	+0,2	22,5	26,5	33	41,6	50	63			
		d ₆	H6	17	21	26	34	42	53			
		d ₇	+0,1	10,3	13,2	15,2	20,4	22,4	24,2			
		d ₈	+0,1	6,6	8,6	10,6	14,6	16,6	18,4			
		l ₈	±0,1	43	58	61	69	72	93			
		l ₉	js8 at d3	30	44	45	52	56	70			
		l ₁₀	+0,2	3	3,6	3,6	4,2	4,2	4,2			
l ₁₁	-0,2	62,5	78	84	94	98	124					
inside spindle intensifier	[mm]	G		on request	M42x1,5	M42x1,5	M42x1,5	M52x1,5	M52x1,5			
		d ₂₁	+0,2		42,2	42,2	42,2	52,2	52,2			
		d ₂₂	H8		38	38	38	48	48			
		d ₂₃	+0,2		38,2	38,2	38,2	48,2	48,2			
		d ₂₄	+0,2		32	32	35	41,5	44			
		d ₂₅	+0,2		20	20	27	27	36			
		l ₂₀	+0,2		10,5	10,5	10,5	14	14			
		l ₂₁			1,5	1,5	1,5	1,5	1,5			
		l ₂₂	+0,1		65,5	65,5	65,5	86,5	86,5			
		l ₂₃			1,5	1,5	1,5	1,5	1,5			
		l ₂₄	-0,2		100	100	158	167	298			
		l ₂₅	-0,5		85	95	105	110	135			
		l ₂₆			1	1	1	1	1			
		l ₂₇			1,5	1,5	1,5	2,5	2,5			
		at a spindle length of more than:					350		450			
		d ₁₉	H8			31,5	31,5	34,5	41	43,5		
		l ₁₉				6		7				
					at position indication G:							
d ₃₀			8,5	8,5	8,5	8,5	8,5					
l ₃₀	+0,2		19	20	20	21	22,5					
l ₃₁	+0,1		2,5	2,5	2,5	2	2					

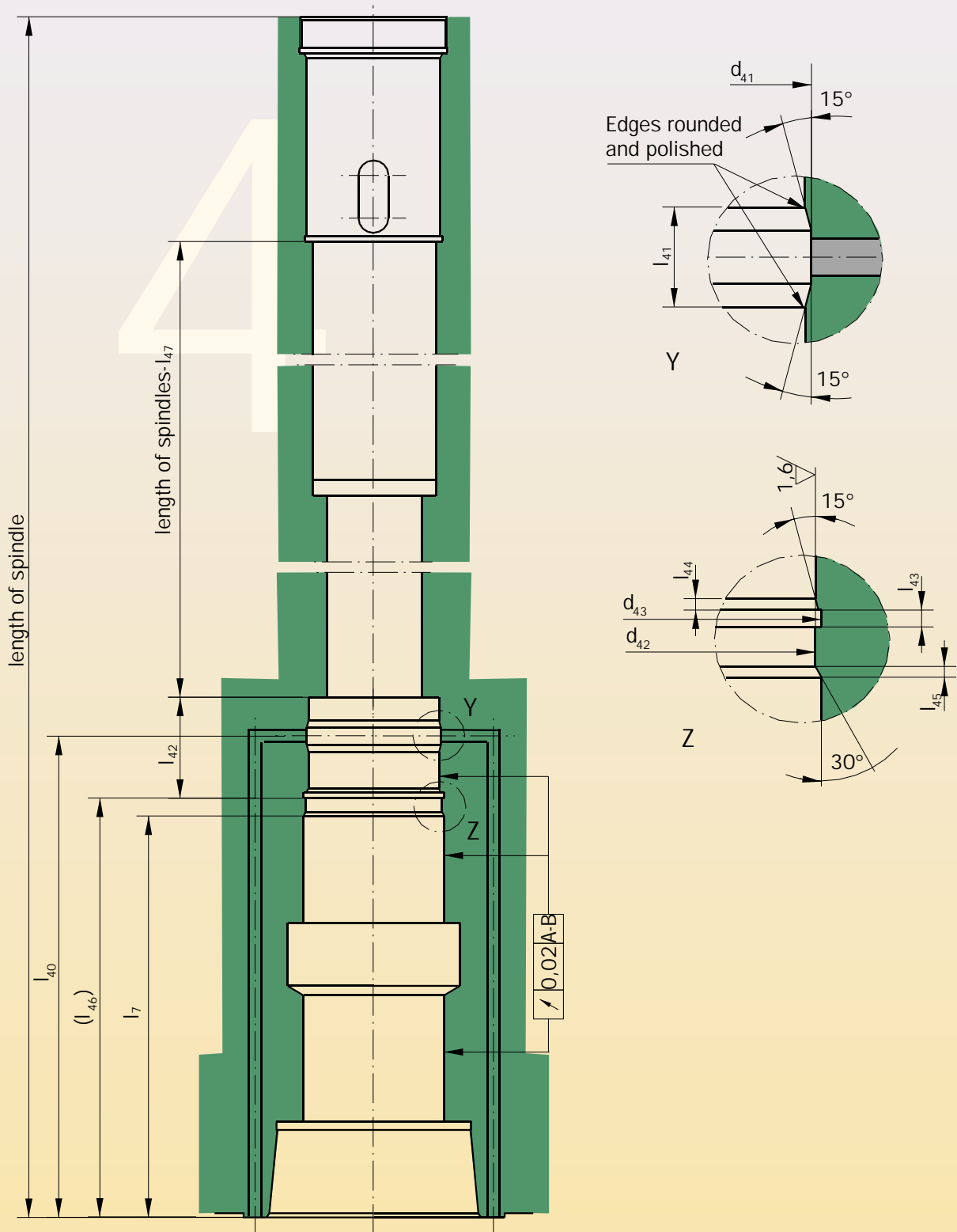


Technical data for the combination HSK-rotary union/ unclamp unit in IF-tool clamping units

		HSC-Module															
E 25						LE 60				LE 150 P							
pull force	[N]					2.800				2.800							
spindle speed max.	[min ⁻¹]	on request															
piston area	[cm ²]					5,8				→ data sheet							
oil volume	[cm ³]					12											
release pressure max.	[bar]					100				8							
cleaning air; n=0; max.	[bar]					10				10							
air pressure max.	[bar]					-				→ data sheet							
coolant pressure max.	[bar]					-		-									
A 32 / B 40 / E 32						LE95+GD		LE95+GDR		LE 60 LE 92 LE 150 P							
pull force	[N]					5.000											
spindle speed max.	[min ⁻¹]	on request															
piston area	[cm ²]					19,36		19,36		5,8 16,5 → data sheet							
oil volume	[cm ³]					45		45		12 38							
release pressure max.	[bar]					100		100		160 100 8							
cleaning air; n=0; max.	[bar]					10		10		10 10 10							
air pressure max.	[bar]					5		5		- → data sheet							
coolant pressure max.	[bar]					80		50		- -							
A 40 / B 50 / E 40 / F 50		1K-ÖI		2KA		2KL		2 KLR		LE95+GD LE95+GDR LE 92 LE 150 P							
pull force	[N]	6.800		6.800		6.800				6.800							
spindle speed max.	[min ⁻¹]	10.000		10.000		10.000		on request									
piston area	[cm ²]	11,34		10,39		10,56		10,56		19,36		19,36		16,5 → data sheet			
oil volume	[cm ³]	9		8,2		8,3		8,3		45		45		38			
release pressure max.	[bar]	100		100		100		100		100		100		100 8			
cleaning air; n=0; max.	[bar]	-		10		10		10		10		10		10 10			
air pressure max.	[bar]	-		-		-		10		5		5		- → data sheet			
coolant pressure max.	[bar]	-		80		-		-		80		50		- -			
A 50 / B 63 / E 50 / F 63		1K-ÖI		2KA		2KL		2 KLR		LE95+GD LE95+GDR LE 92 LE 150 P							
pull force	[N]	11.000		11.000		11.000		11.000		11.000							
spindle speed max.	[min ⁻¹]	10.000		10.000		10.000		on request									
piston area	[cm ²]	11,34		10,39		10,56		10,56		19,36		19,36		16,5 → data sheet			
oil volume	[cm ³]	10,2		9,4		9,5		9,5		45		45		38			
release pressure max.	[bar]	160		160		160		160		160		160		160 8			
cleaning air; n=0; max.	[bar]	-		10		10		10		10		10		10 10			
air pressure max.	[bar]	-		-		-		10		5		5		- → data sheet			
coolant pressure max.	[bar]	-		80		-		-		80		50		- -			

Subject to modification due to technical advance!

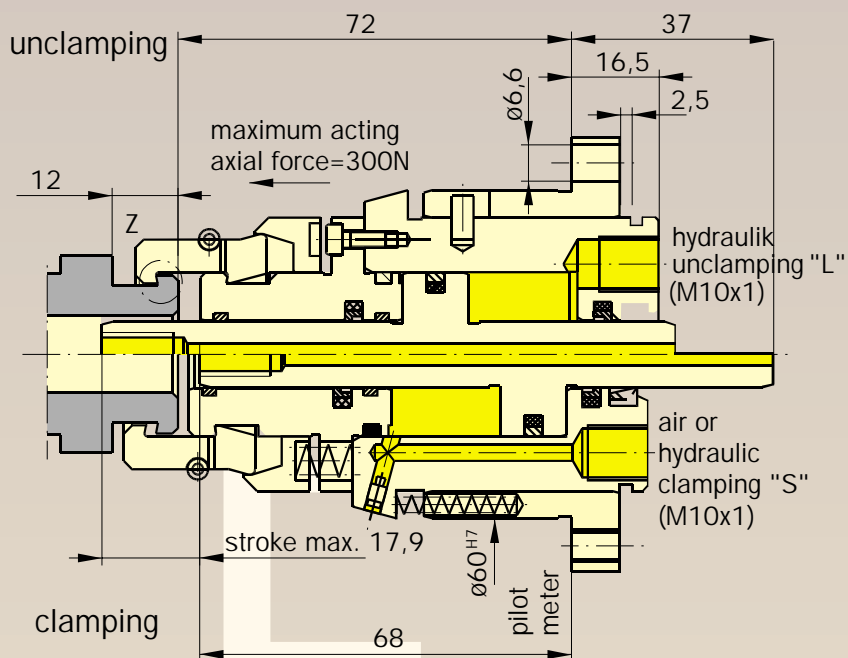
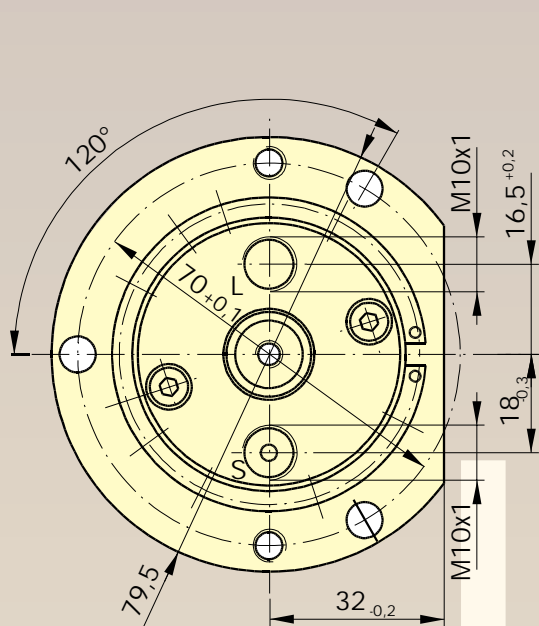
		HSC-Module								
A 63 / B 80 / E 63 / F 80		1 K-ÖI	2 KA	2 KL	2 KLR	LE95+GD	LE95+GDR		LE 92	LE 150 P
pull force	[N]	18.000			18.000				18.000	
spindle speed max.	[min ⁻¹]	10.000	10.000	10.000	on request					
piston area	[cm ²]	11,34	10,39	10,56	10,56	19,36	19,36		16,5	→ data sheet
oil volume	[cm ³]	11,4	10,4	10,6	10,6	45	45		38	
release pressure max.	[bar]	160	160	160	160	160	160		160	8
cleaning air; n=0; max.	[bar]	-	10	10	10	10	10		10	10
air pressure max.	[bar]	-	-	-	10	5	5		-	→ data sheet
coolant pressure max.	[bar]	-	80	-	-	80	50		-	
A 80 / B 100		1 K-ÖI	2 KA	2 KL	1 KLR	LE95+GD	LE95+GDR		LE 92	LE 150 P
pull force	[N]	28.000			28.000				28.000	
spindle speed max.	[min ⁻¹]	10.000	10.000	10.000	on request					
piston area	[cm ²]	18,1	17,15	17,3	17,3	19,36	19,36		16,5	→ data sheet
oil volume	[cm ³]	20	18,9	19	19	45	45		38	
release pressure max.	[bar]	160	160	160	160	160	160		160	8
cleaning air; n=0; max.	[bar]	-	10	10	10	10	10		10	10
air pressure max.	[bar]	-	-	-	10	5	5		-	→ data sheet
coolant pressure max.	[bar]	-	80	-	-	80	50		-	
A 100 / B 125		1K-ÖI	2KA	2KL	2 KLR	LE95+GD	LE95+GDR			
pull force	[N]	45.000			45.000					
spindle speed max.	[min ⁻¹]	10.000	10.000	10.000	on request					
piston area	[cm ²]	18,1	17,15	17,3	17,3	19,36	19,36			
oil volume	[cm ³]	22,6	21,4	21,6	21,6	45	45			
release pressure max.	[bar]	160	160	160	160	160	160			
cleaning air; n=0; max.	[bar]	-	10	10	10	10	10			
air pressure max.	[bar]	-	-	-	10	5	5			
coolant pressure max.	[bar]	-	80	-	-	80	50			
A 125 / B 160		1 K-ÖI	2 KA	2 KL	2 KLR					
pull force	[N]	70.000								
spindle speed max.	[min ⁻¹]	9.500	9.500	9.500	9.500					
piston area	[cm ²]	50,2	49,25	49,4	49,4					
oil volume	[cm ³]	79,3	77,8	78	78					
release pressure max.	[bar]	160	160	160	160					
cleaning air; n=0; max.	[bar]	-	10	10	10					
air pressure max.	[bar]	-	-	-	10					
coolant pressure max.	[bar]	-	80	-	-					



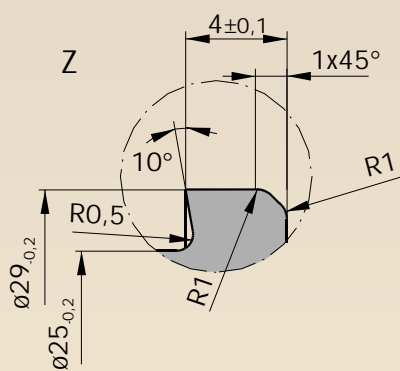
	l_{40}	l_{41}	l_{42}	l_{43}	l_{44}	l_{45}	l_{46}	l_{47}	d_{40}	d_{41}	d_{42}	d_{43}
A32/B40/E32	on request											
A40/B50/E40/F50	120±0,2	7	53,1 ^{+0,1}	1,1 ^{H13}	1	1,5	82,9	201,5	2	21 ^{+0,2}	20 ^{H8}	21 ^{+0,15}
A50/B63/E50/F63	125±0,2	8	55,3 ^{+0,1}	1,3 ^{H13}	1	1	88,7	209,5	3	25 ^{+0,2}	24 ^{H8}	25,7 ^{H12}
A63/B80/E63/F80	135±0,2	8	55,3 ^{+0,1}	1,3 ^{H13}	1	1	98,7	219,5	3	33 ^{+0,2}	32 ^{H8}	33,7 ^{H12}
A80/B100	142±0,2	9	58,3 ^{+0,1}	1,3 ^{H13}	1	2	102,7	247,5	3	33 ^{+0,2}	32 ^{H6}	33,7 ^{H12}
A100/B125	178±0,2	9	66,8 ^{+0,1}	1,85 ^{H13}	1	1	134,2	287,5	4	47 ^{+0,2}	46 ^{H6}	49,5 ^{H12}
A125/B160	on request											
A160	on request											

Unclamp Units
Rotary Unions





gripper contour



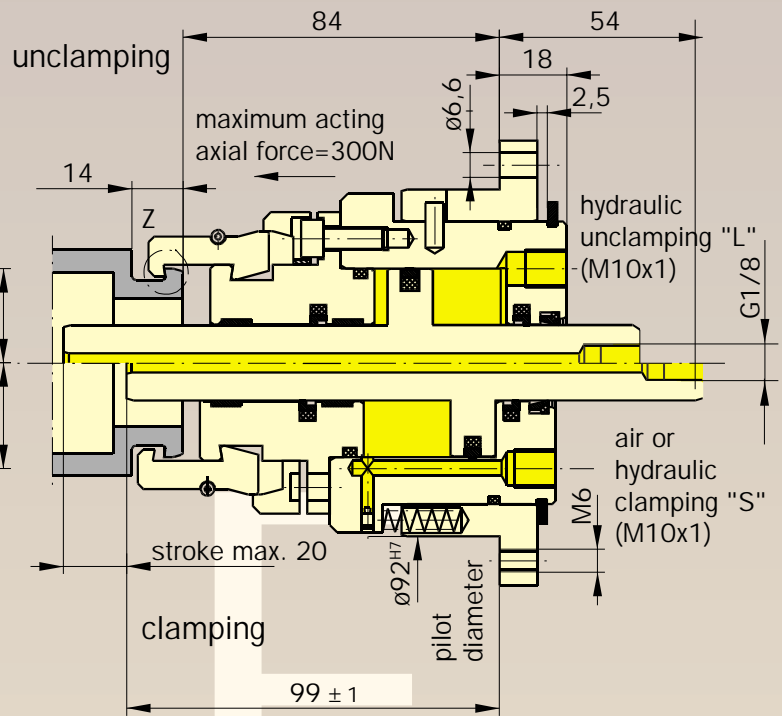
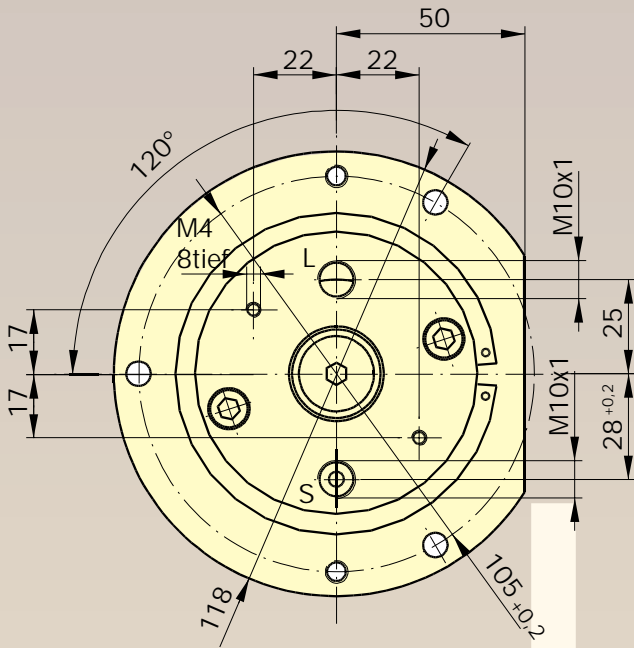
60

code	
0	2

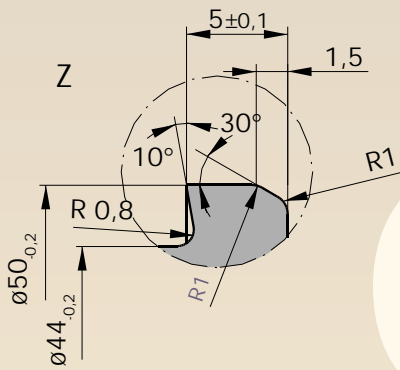
technical data	
piston area "L" [cm ²]	5,8
piston area "S" [cm ²]	5,8
hydraulic pressure "L" max. [bar]	160
air or hydraulic pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • passage for air cleaning in unclamped position • low bearing load • easy to assemble • RPM independant 	

Subject to modification due to technical advance!



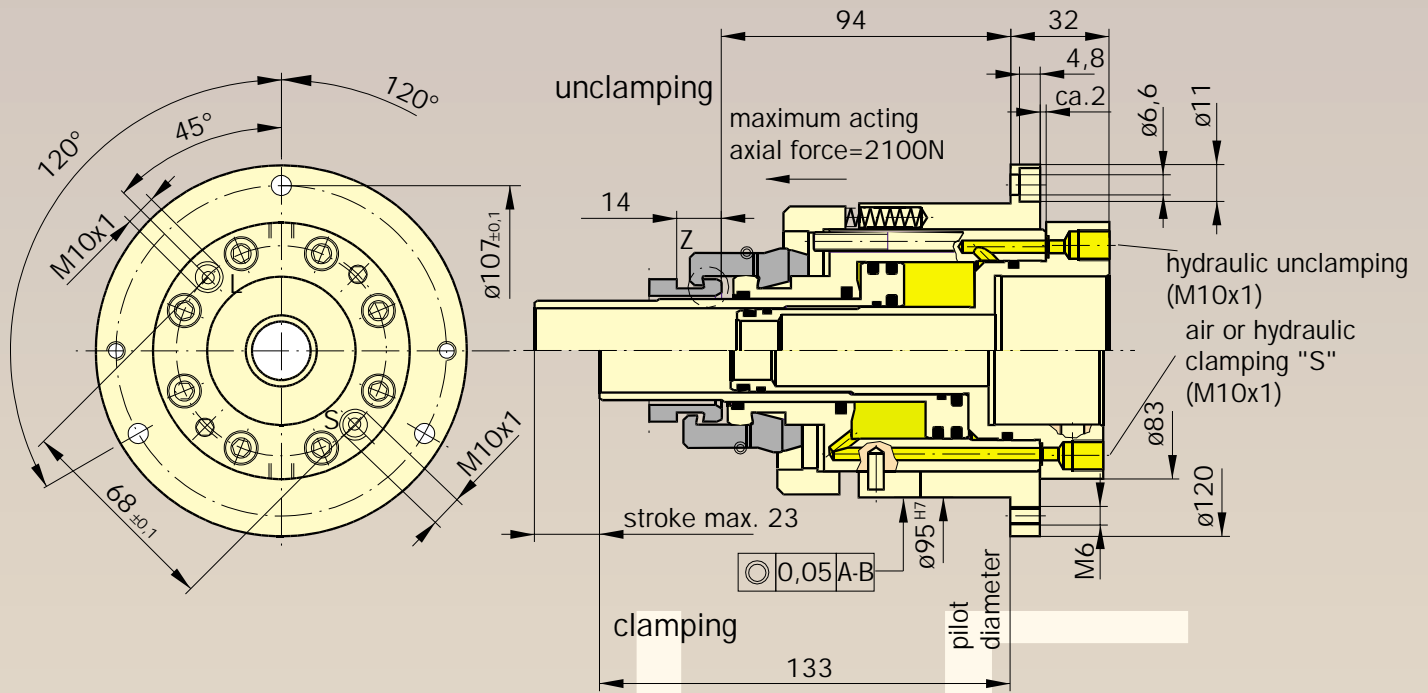
gripper contour



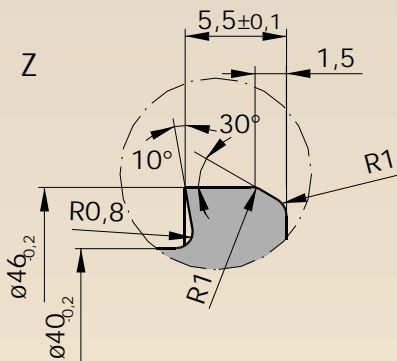
code	
0	1

technical data	
piston area "L" [cm ²]	16,5
piston area "S" [cm ²]	16,5
hydraulic pressure "L" max. [bar]	160
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • passage for air cleaning in unclamped position • low bearing load • easy to assemble • RPM independant 	



gripper contour

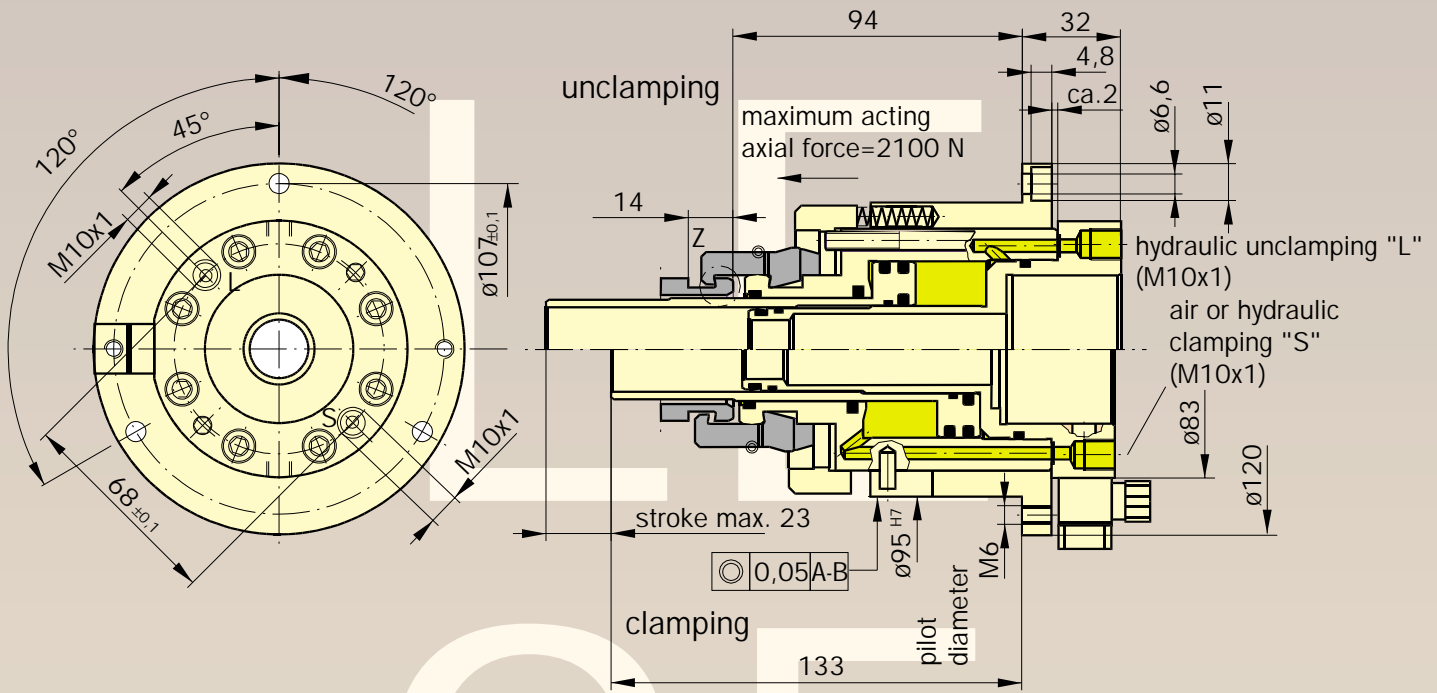


code	
3	6

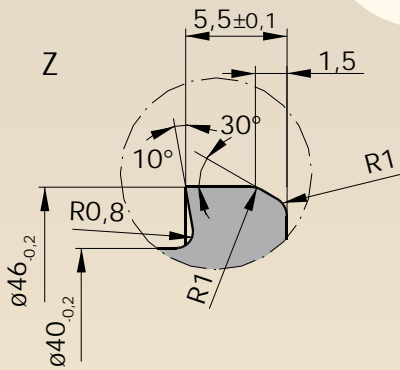
technical data	
piston area "L" [cm ²]	19,36
piston area "S" [cm ²]	17
hydraulic pressure "L" max. [bar]	160
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • low bearing load • easy to assemble • RPM independant • suitable for holding 1K-rotary unions 	

Subject to modification due to technical advance!



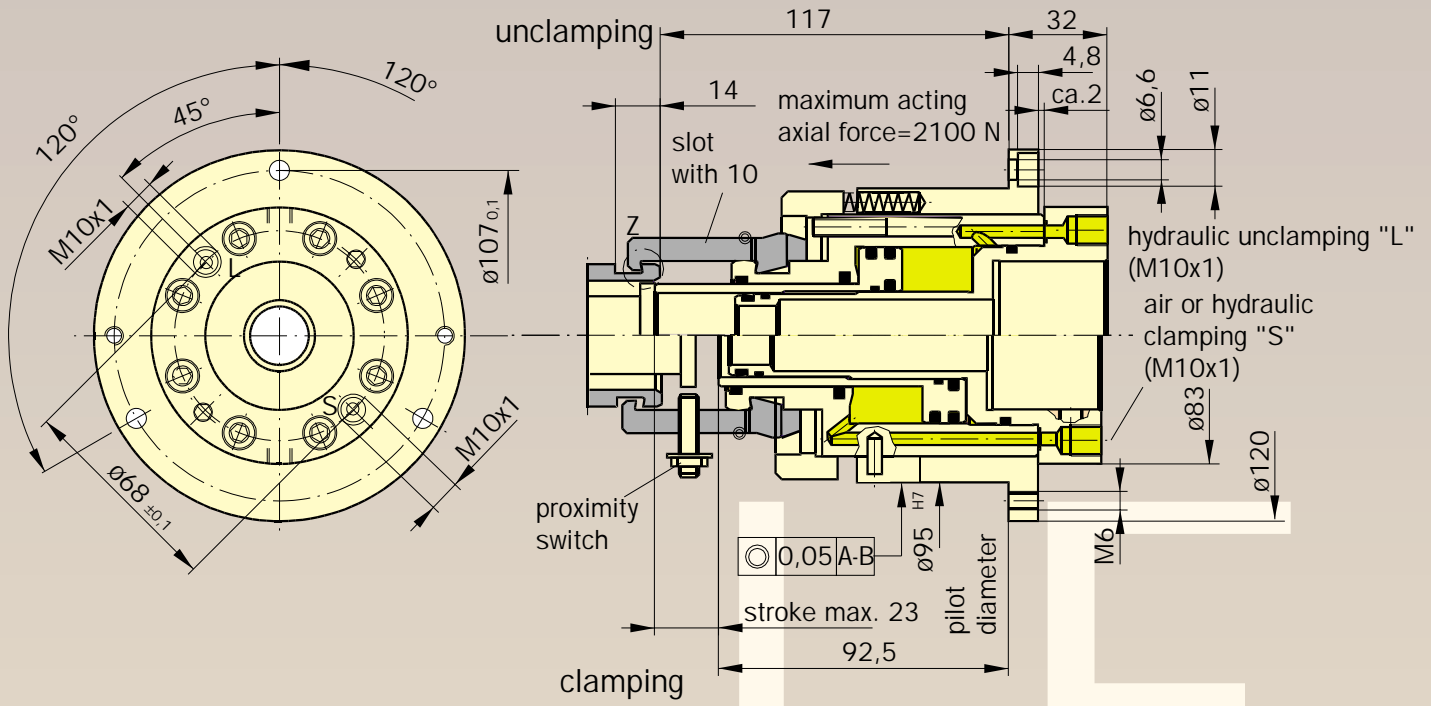
gripper contour



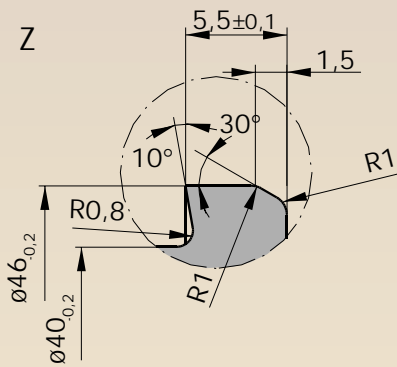
code	
5	8

technical data	
piston area "L" [cm ²]	19,36
piston area "S" [cm ²]	17
hydraulic pressure "L" max. [bar]	160
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • purge passage • low bearing load • easy to assemble • RPM independant • suitable for holding 1K-rotary unions 	



gripper contour

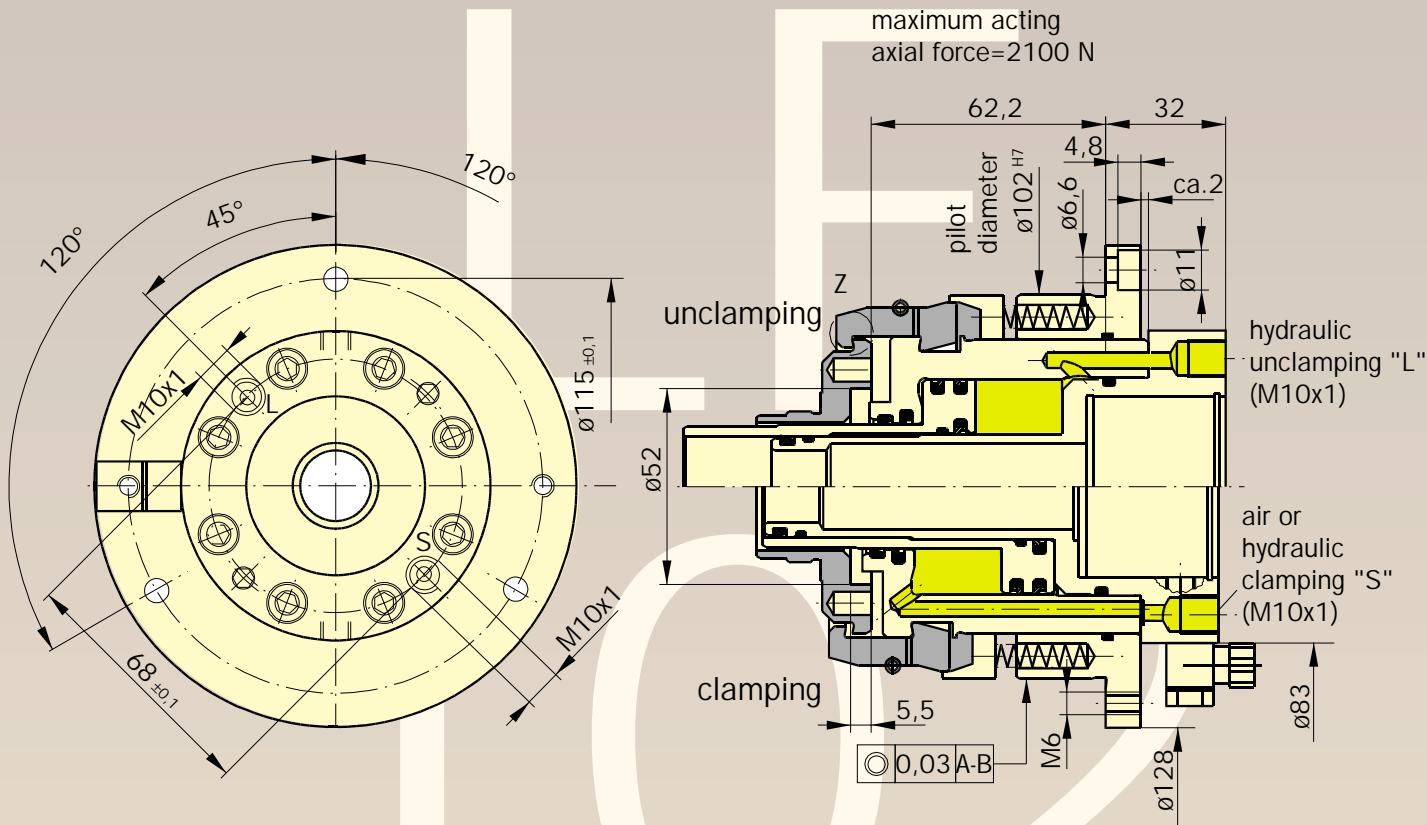


code	
0	5

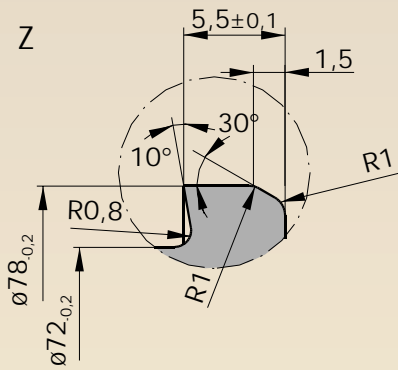
technical data	
piston area "L" [cm ²]	19,36
piston area "S" [cm ²]	17
hydraulic pressure "L" max. [bar]	160
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • suitable for indicating position at spindle end • low bearing load • easy to assemble • RPM independant • suitable for holding 1K-rotary unions 	

Subject to modification due to technical advance!



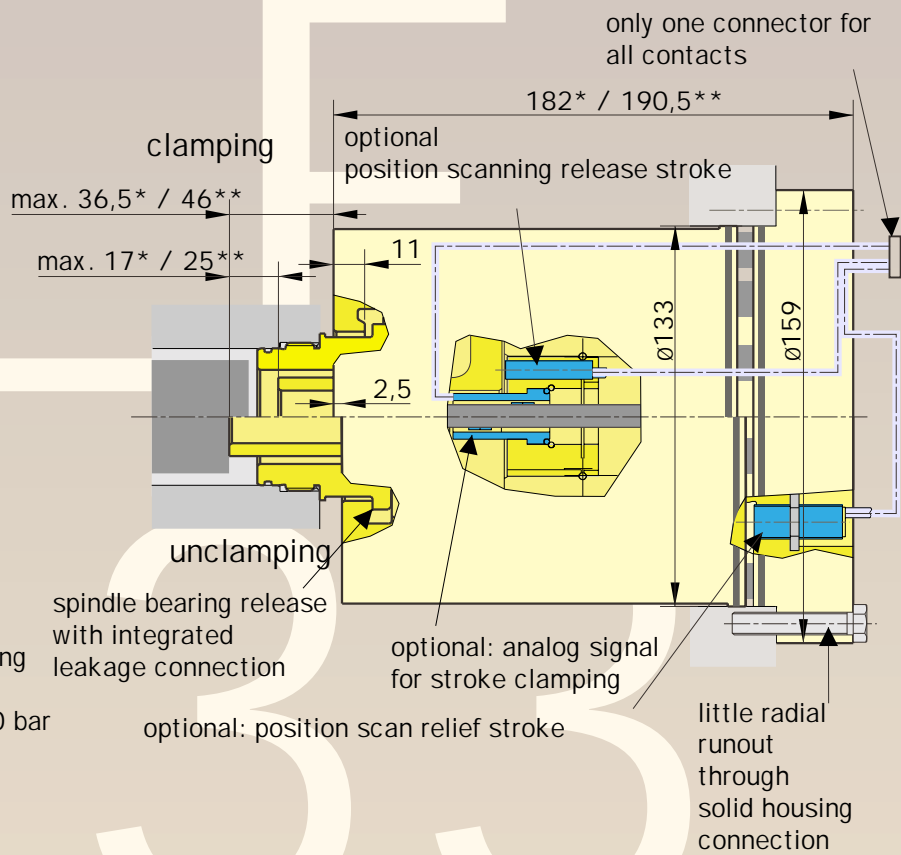
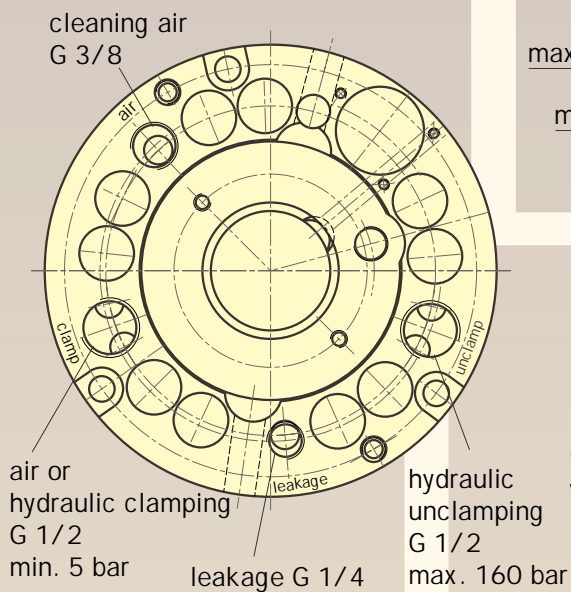
gripper contour



code	
0	3

technical data	
piston area "L" [cm ²]	19,36
piston area "S" [cm ²]	17
hydraulic pressure "L" max. [bar]	160
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • purge passage • low bearing load • easy to assemble • RPM independant • suitable for holding 1K-rotary unions • optional with analog clamping stroke scan 	

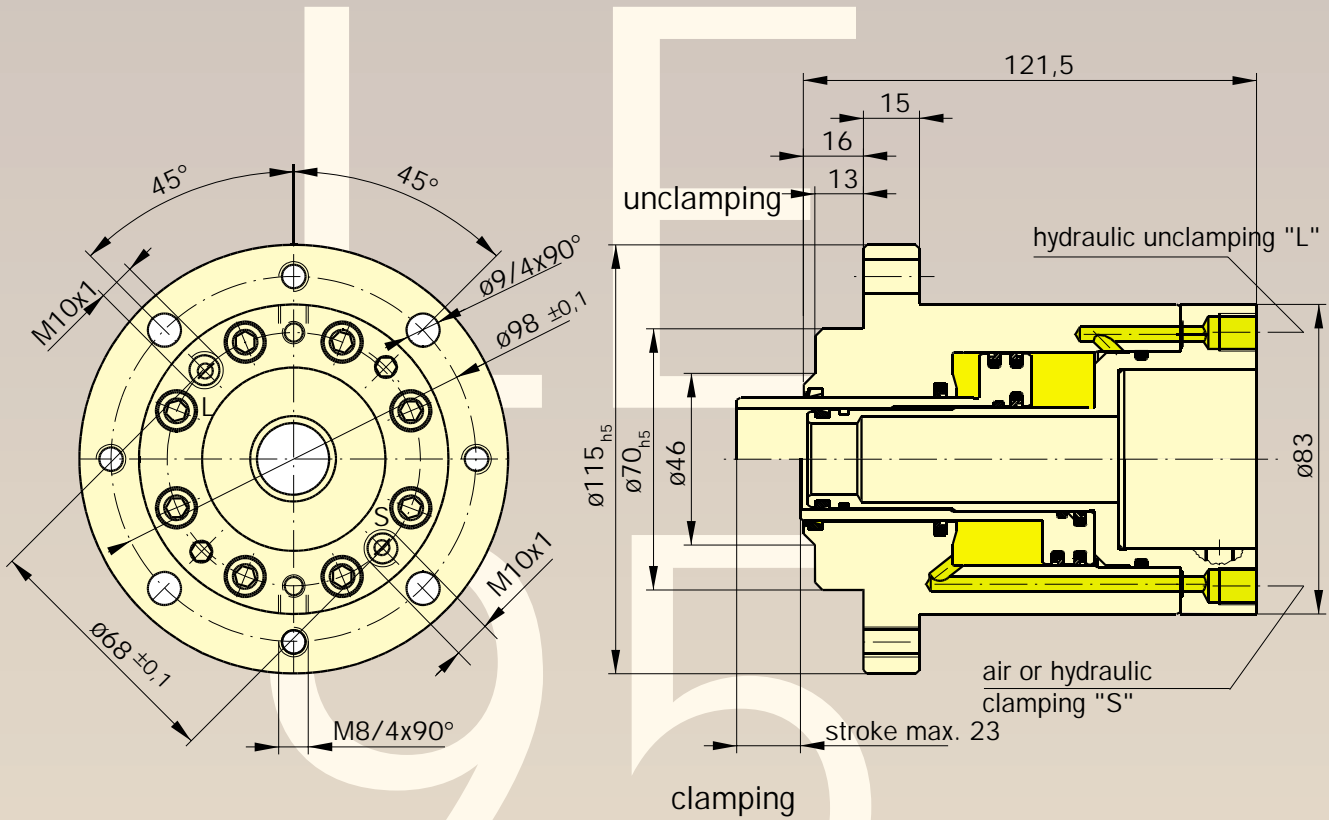


	code	
*	1	2
**	1	3

technical data	
release pressure at 160 bar [kN]	80
piston area "unclamping" [cm ²]	50,27
piston area "clamping" [cm ²]	40,06
hydraulic pressure "unclamping" max. [bar]	160
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • purge passage • spindle bearing release • easy to assemble • RPM independant • leakage connection • suitable for holding 1K-rotary unions • no moving or extended parts • optional position scan for release stroke and relief stroke and analog signal for clamping stroke 	

Subject to modification due to technical advance!

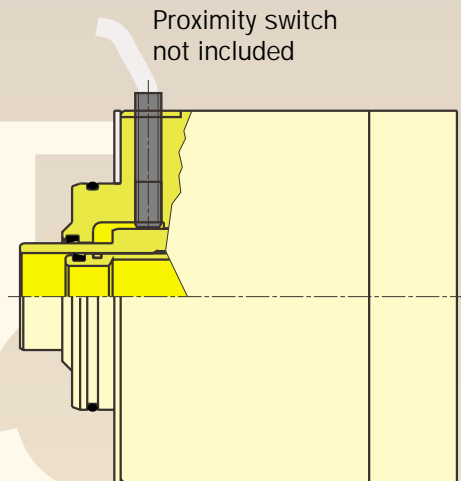
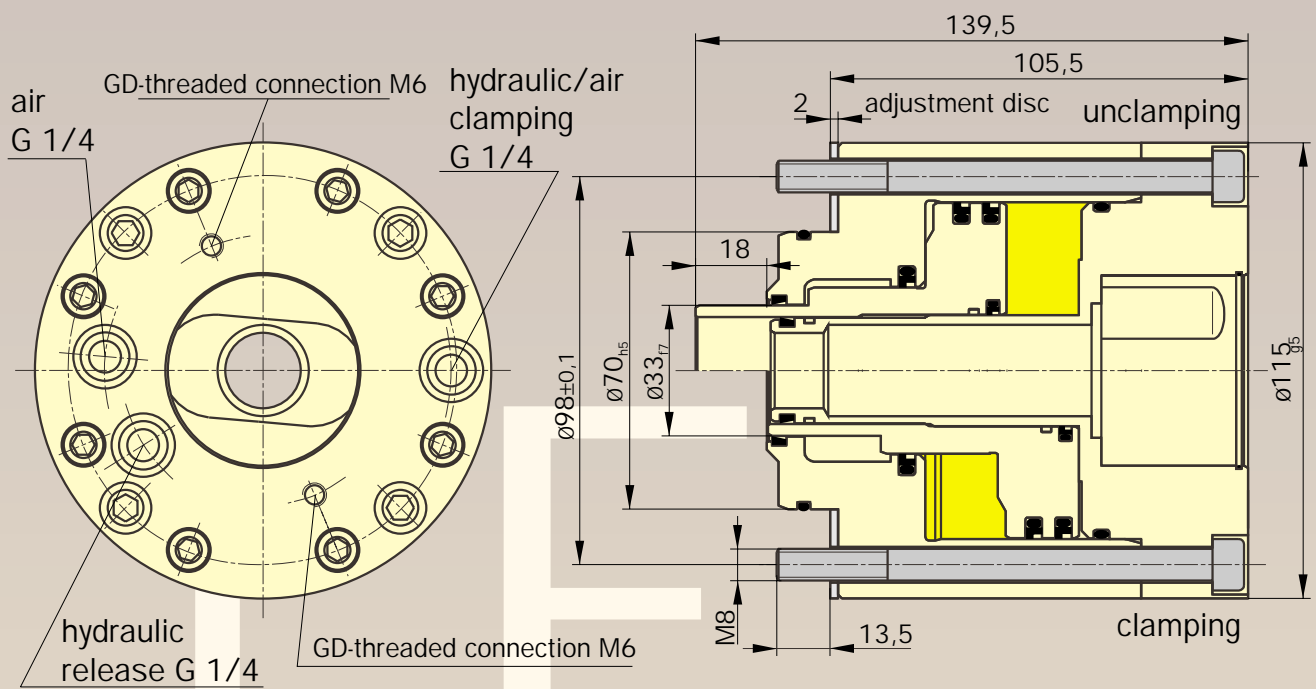


F

code	
0	4

technical data	
piston area "L" [cm ²]	19,36
piston area "S" [cm ²]	17
hydraulic pressure "L" max. [bar]	160
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • easy to assemble • suitable for holding 1K-rotary unions • RPM independant 	

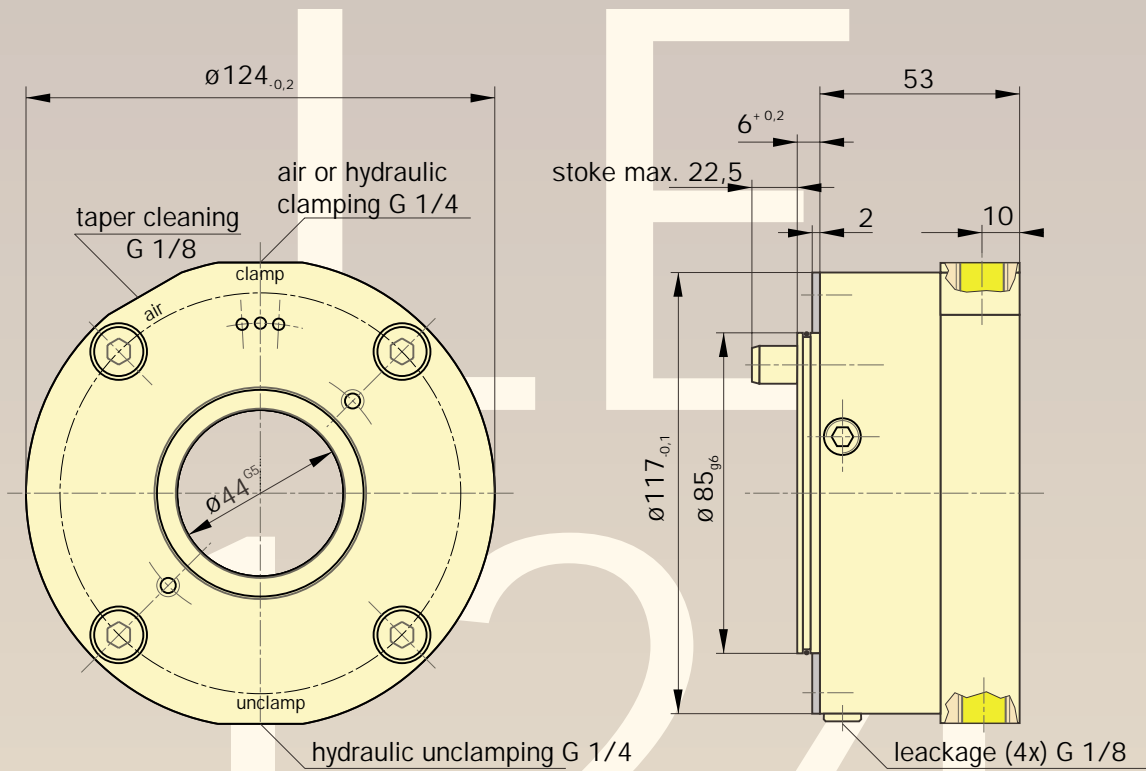


code	
1	0

technical data	
piston area "L" [cm ²]	50,6
piston area "S" [cm ²]	42,9
hydraulic pressure "L" max. [bar]	120
air or hydr. pressure "S" min. [bar]	5

features	
<ul style="list-style-type: none"> • easy to assemble • suitable for holding 1K-rotary unions • RPM independant 	

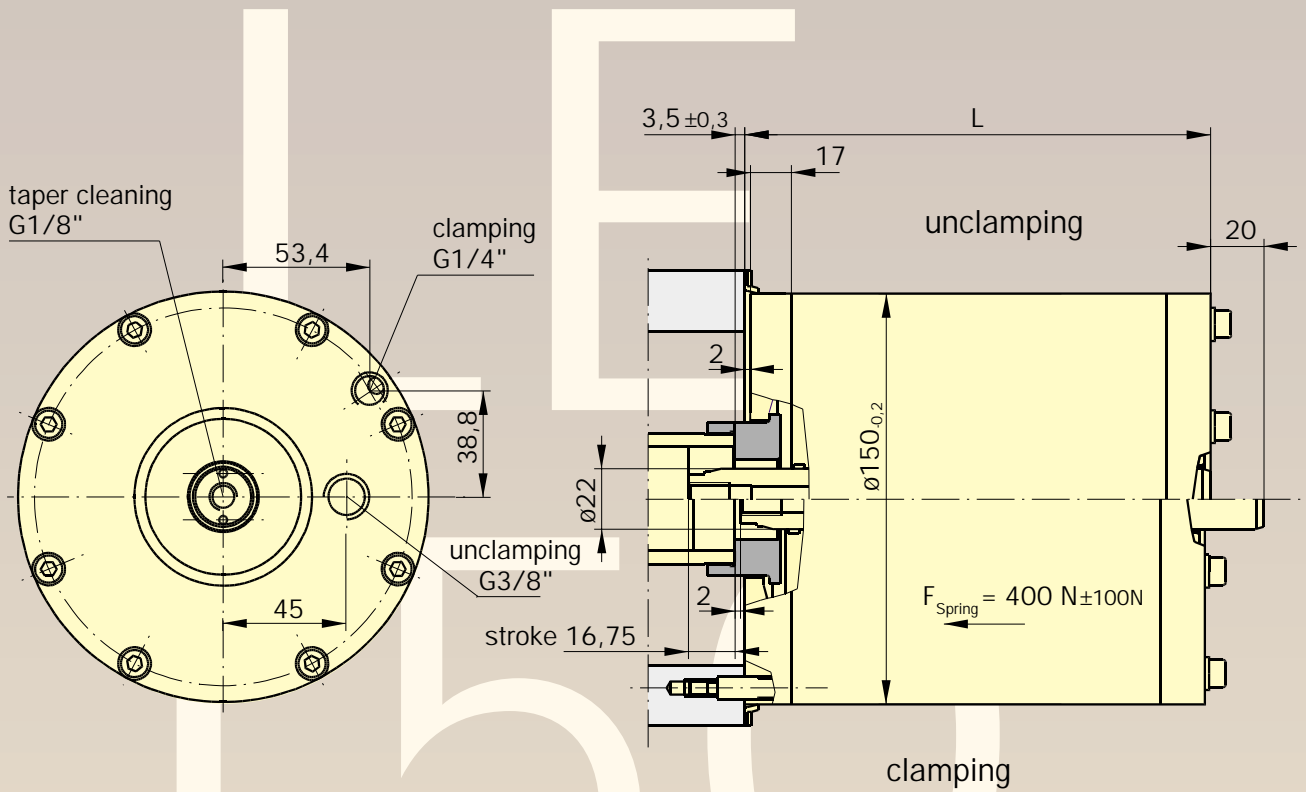
Subject to modification due to technical advance!



code	
1	1

technical data	
release pressure at 120 bar [kN]	38,5
piston area "unclamping" [cm ²]	32,11
piston area "clamping" [cm ²]	19,55
hydraulic pressure "unclamping" max. [bar]	120
air or hydr. pressure "S" min. [bar]	5

features
<ul style="list-style-type: none"> • short design • easy to assemble • RPM independant • leakage connection • purge passage • suitable for holding 1K-rotary unions



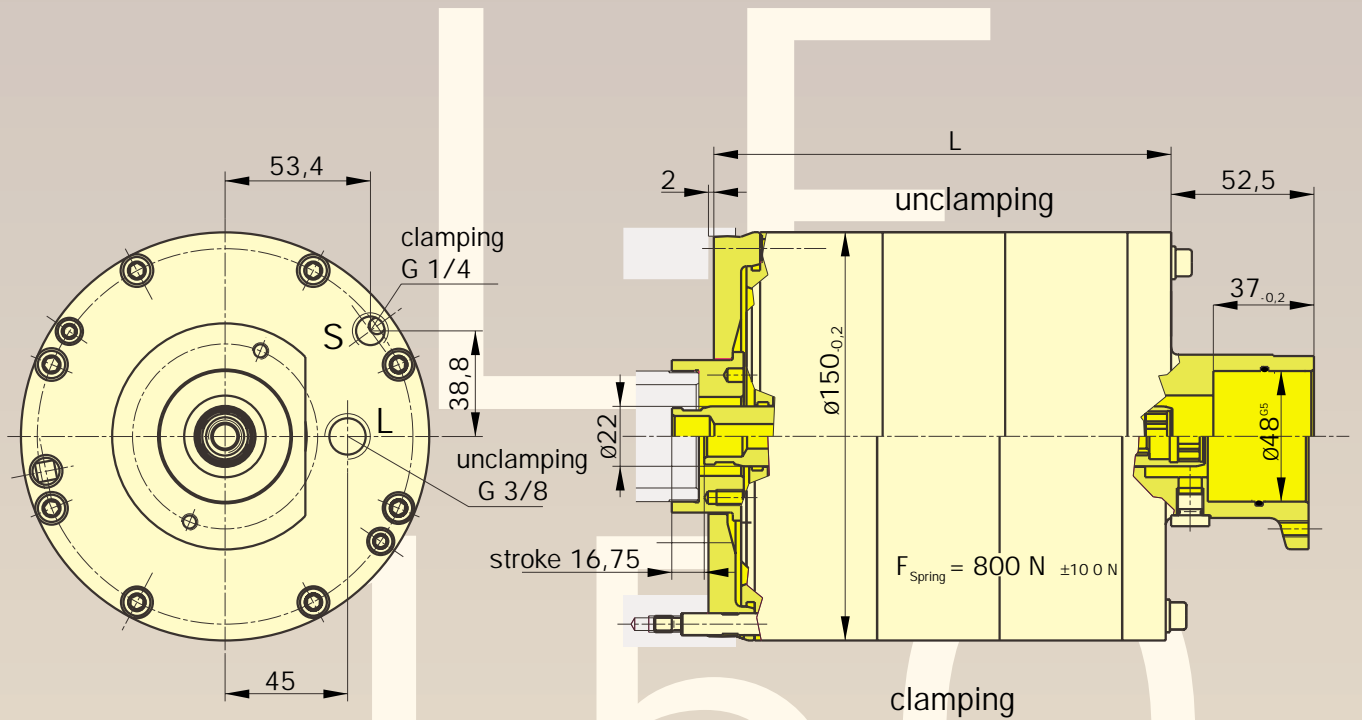
code					
3	1	3	2	3	3

technical data	LE 150 - P1	LE 150 - P2	LE 150 - P3
"L" [mm]	80	125	170
piston area [cm ²]	119	238	357
max. piston stroke [mm]	21	21	21
max. stroke volume [cm ³]	250	500	750
unclamp force at p _e = 5 bar [kN]	5,5	10,9	16,4
unclamping: max. allowable pressure [bar]	8	8	8
clamping: max. allowable pressure [bar] (hold pressure while spindle is rotating!)	1 - 8	1 - 8	1 - 8

features

- low bearing load
- enclosed housing
- modular
- RPM independant

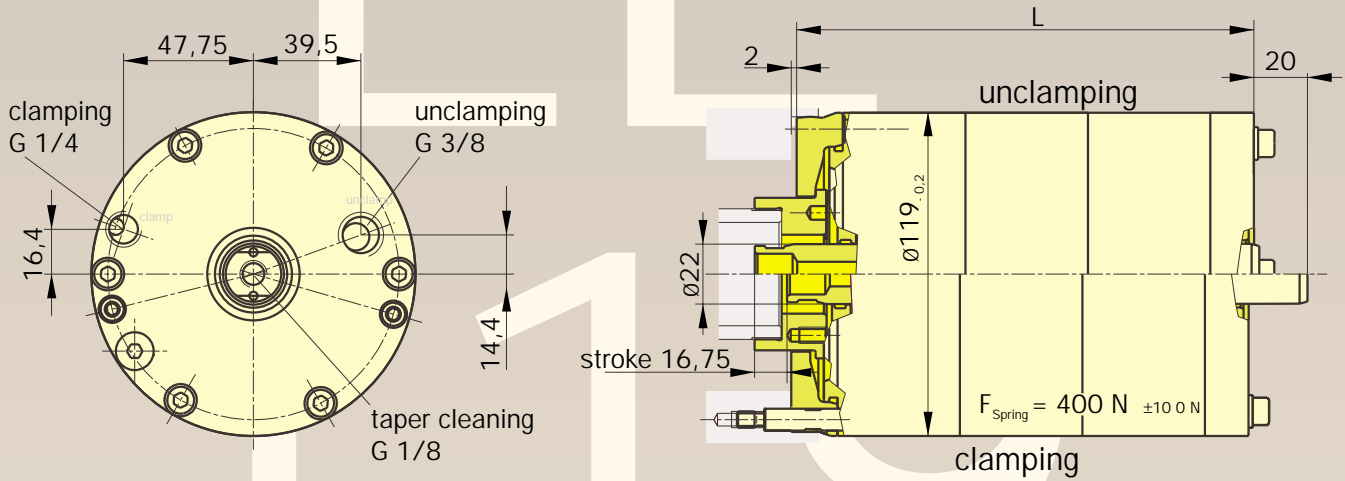
Subject to modification due to technical advance!



code					
4	1	4	2	4	3

technical data	LE 150 - P1A	LE 150 - P2A	LE 150 - P3A
"L" [mm]	80	125	170
piston area [cm ²]	119	238	357
max. piston stroke [mm]	21	21	21
max. stroke volume [cm ³]	250	500	750
unclamp force at p _e = 5 bar [kN]	5,5	10,9	16,4
unclamping: max. allowable pressure [bar]	8	8	8
clamping: max. allowable pressure [bar] (obligatory while spindle is rotating!)	1 - 8	1 - 8	1 - 8

features
<ul style="list-style-type: none"> • low bearing load • enclosed housing • modular • RPM independant • suitable for holding 1K-rotary unions

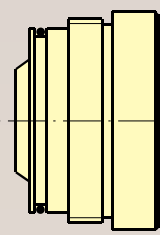


code					
2	1	2	2	2	3

technical data	LE 150 - P1A	LE 150 - P2A	LE 150 - P3A
"L" [mm]	80	125	170
piston area [cm ²]	119	238	357
max. piston stroke [mm]	21	21	21
max. stroke volume [cm ³]	250	500	750
unclamp force at $p_e = 5$ bar [kN]	5,5	10,9	16,4
unclamping: max. allowable pressure [bar] (dry or oil lubricated air)	8	8	8
clamping: max. allowable pressure [bar] (dry or oil lubricated air) obligatory while spindle is rotating!	1 - 8	1 - 8	1 - 8

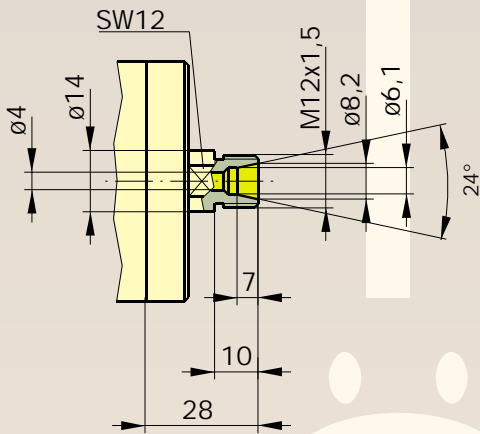
features
<ul style="list-style-type: none"> • low bearing load • enclosed housing • modular • RPM independant • optional suitable for holding 1K-rotary unions

Subject to modification due to technical advance!



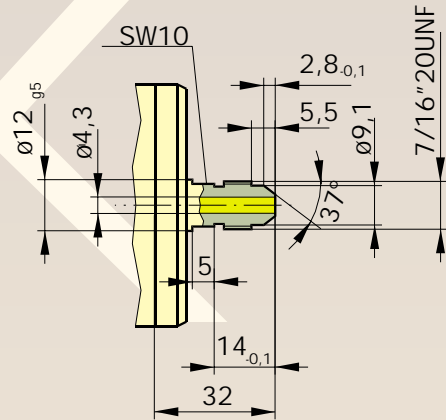
hydraulic

only at standstill - no pressure while spindle is rotating



connection M12x1,5

code	
1	1

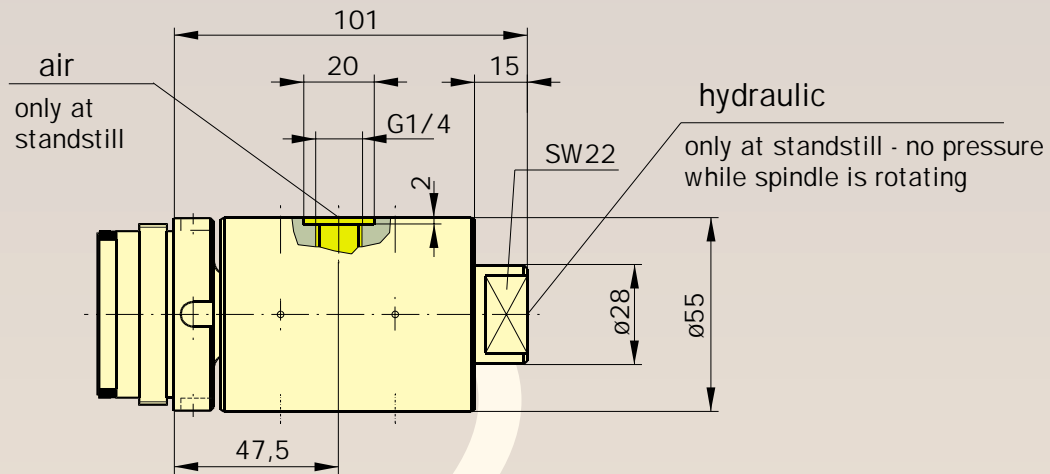


connection 7/16"

code	
1	2

technical data	
spindle speed max. (min ⁻¹)	10.000
hydr. pressure max.; n=0 min ⁻¹ [bar]	160

features	
<ul style="list-style-type: none"> rotary union for hydraulic unclamping of power drawbar 	

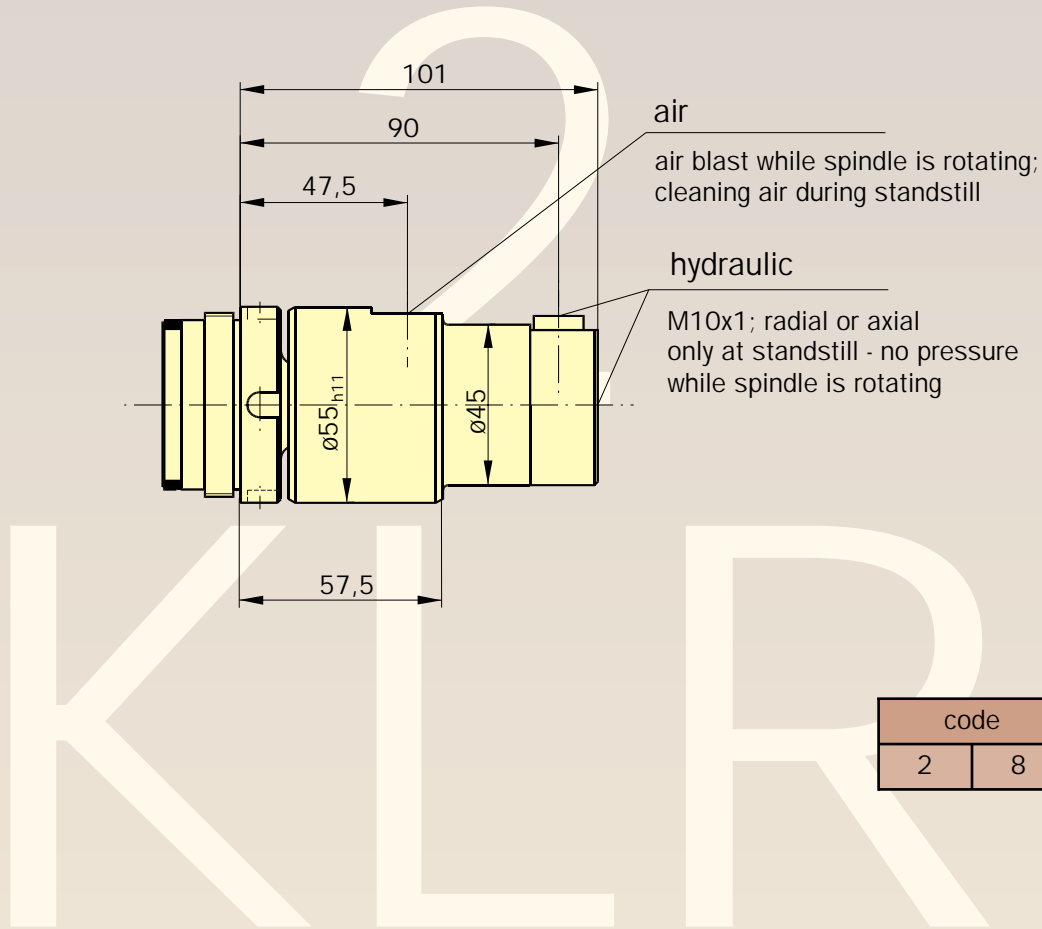


code	
1	4

2KL

technical data	
spindle speed max. (min^{-1})	10.000
hydr. pressure max.; $n=0 \text{ min}^{-1}$ [bar]	160
air pressure max.; $n=0 \text{ min}^{-1}$ [bar]	10

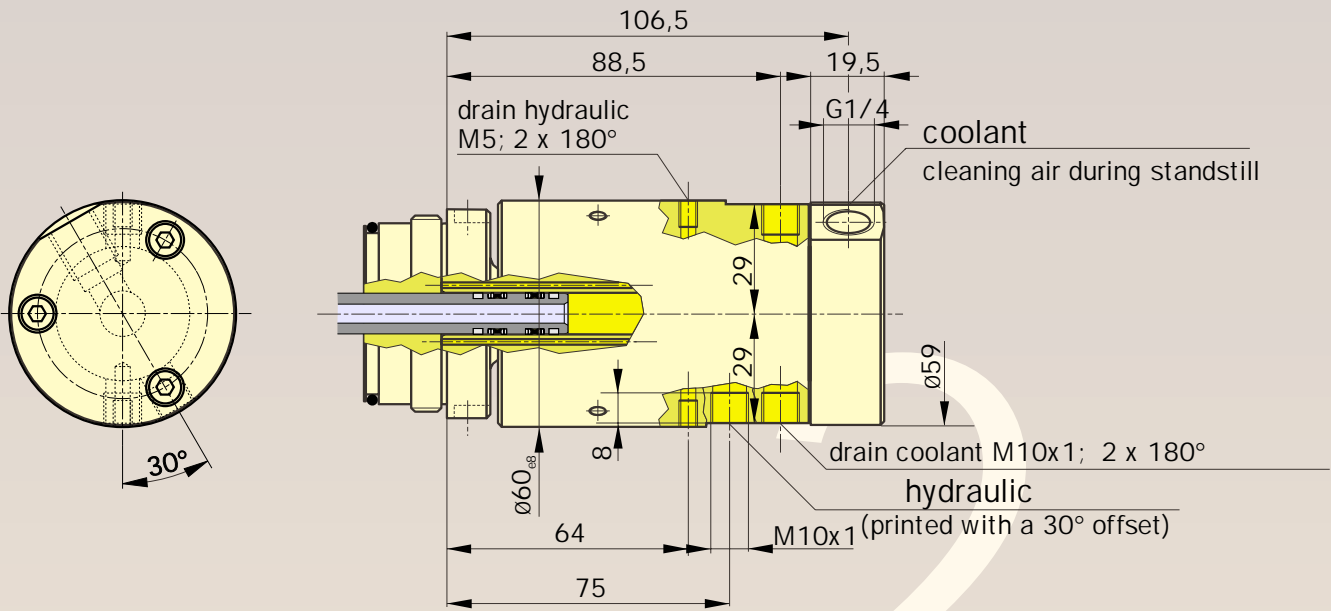
features	
<ul style="list-style-type: none"> • cleaning air during tool changing • hydraulic unclamping of power drawbars 	



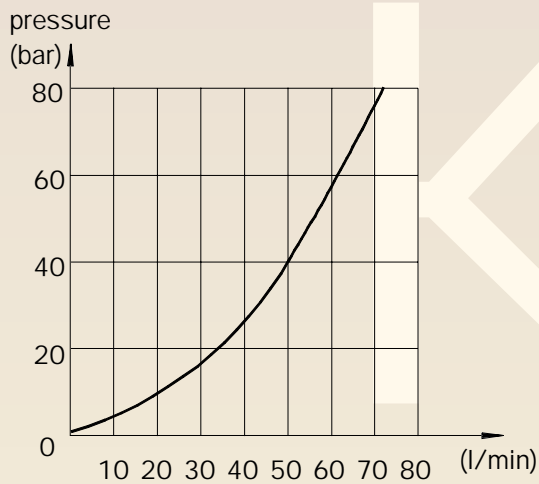
code	
2	8

technical data	
spindle speed max. (min^{-1})	20.000
hydr. pressure max.; $n=0 \text{ min}^{-1}$ [bar]	160
air pressure max. [bar]	10

features	
<ul style="list-style-type: none"> • due to aluminium housing, hybrid bearing and air blast during rotation especially suitable for HSC-operations on wood, plastic, light alloy and other dry operations • hydraulic unclamping of HSC-power drawbars 	



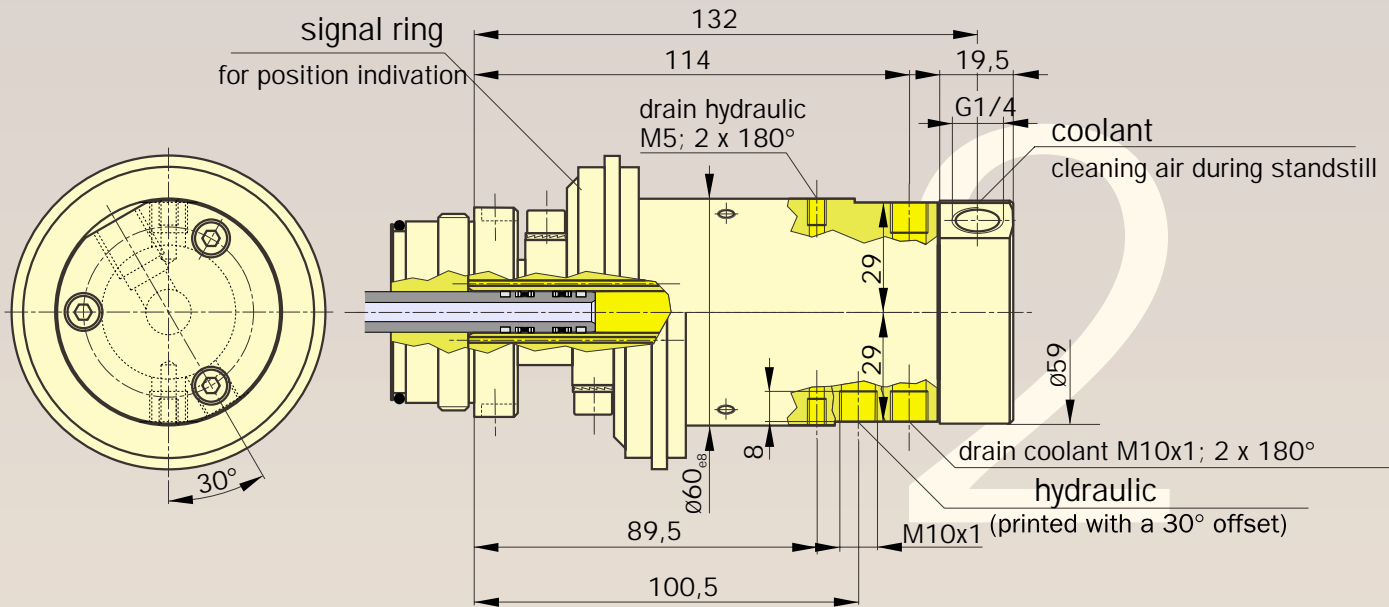
flow volume
at orifice $\varnothing 5$



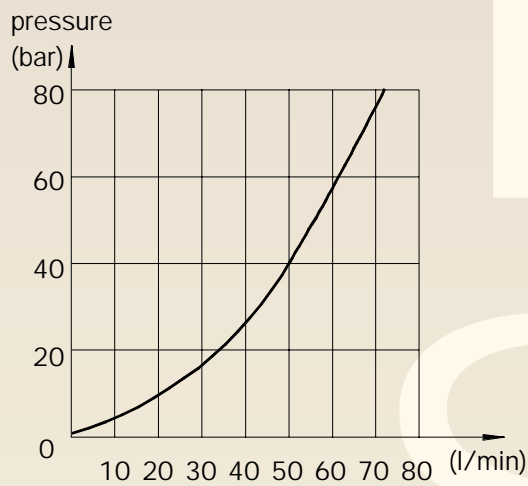
code	
2	5

technical data	
spindle speed max. (min. ⁻¹)	10.000
coolant pressure max. [bar]	80
hydr. pressure max.; n=0 min. ⁻¹ [bar]	160
air pressure max.; n=0 min. ⁻¹ [bar]	10
required media purity according to ISO 4406 filter grade [μm]	-/16/13 <50

features	
<ul style="list-style-type: none"> • suitable for dry operation • hydraulic unclamping of power drawbars • central coolant supply • cleaning air during tool changing 	



flow volume
at orifice $\varnothing 5$

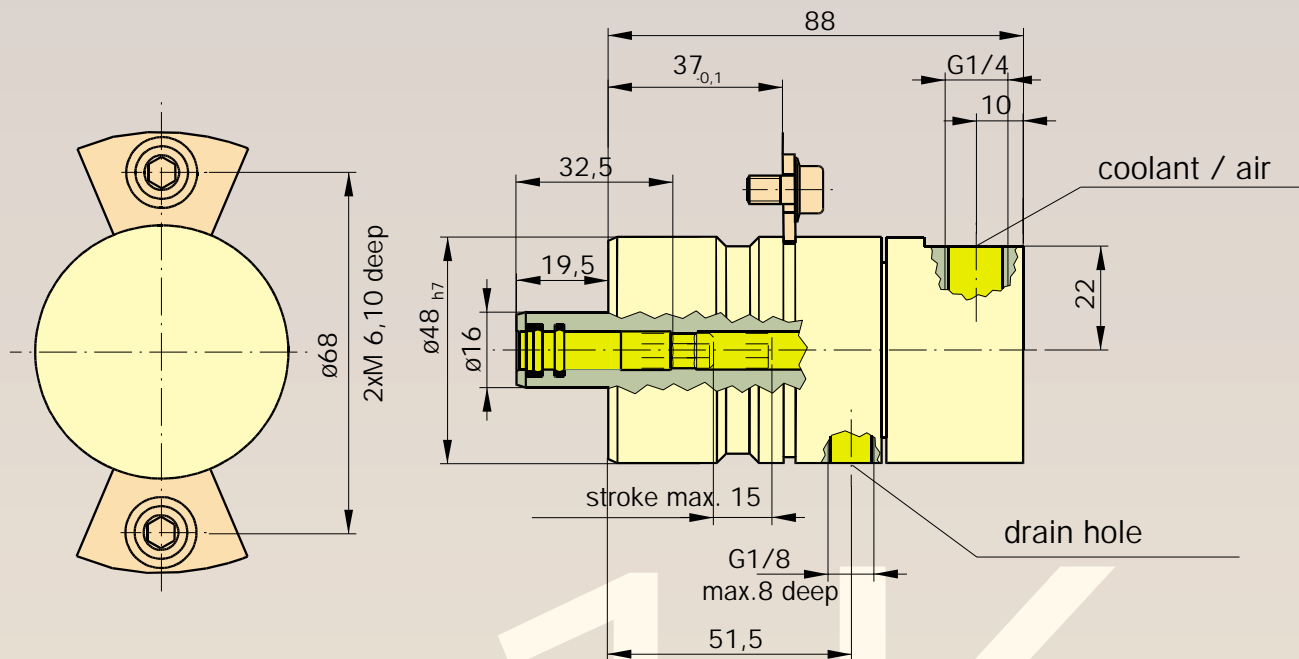


code	
2	6

technical data	
spindle speed max. (min ⁻¹)	8.000
coolant pressure max. [bar]	80
hydr. pressure max.; n=0 min. ⁻¹ [bar]	160
air pressure max.; n=0 min. ⁻¹ [bar]	10
required media purity according to 4406 filter grade [μm]	-/16/13 <50
stroke of signal ring max. [mm]	12,5

features	
<ul style="list-style-type: none"> • suitable for dry operation • hydraulic unclamping of power drawbars • central coolant supply • cleaning air during tool changing • signal ring for position indication 	

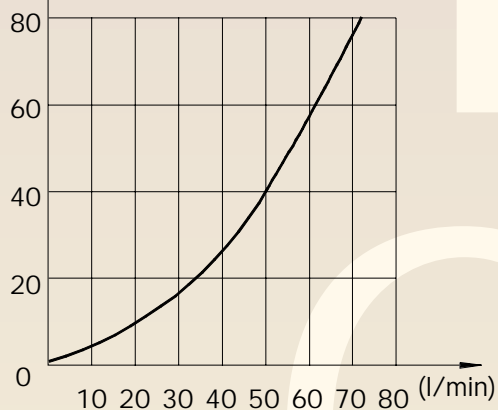
Subject to modification due to technical advance!



flow volume
at orifice $\varnothing 5$

pressure

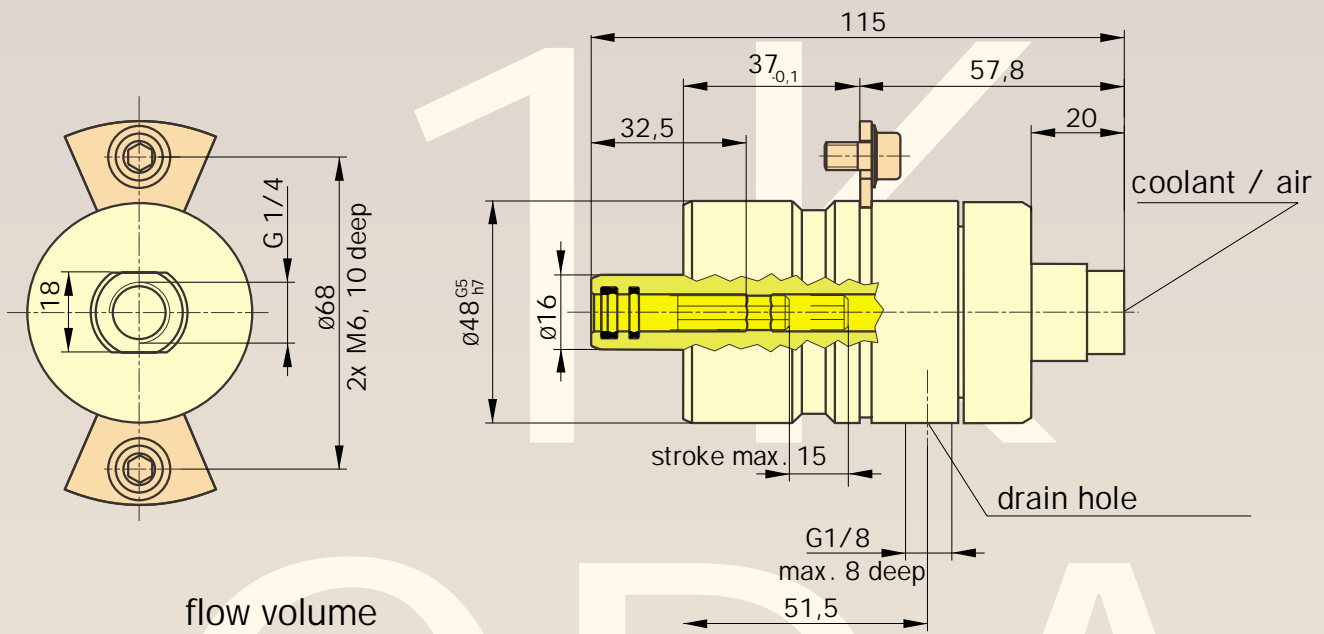
(bar) ↑



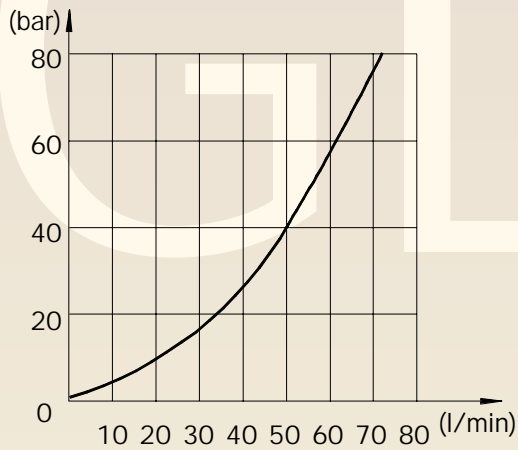
code	
2	1

technical data	
spindle speed max. (min^{-1})	36.000
coolant pressure max. [bar]	80
cleaning air max.; $n=0 \text{ min}^{-1}$ [bar]	10
pressure air max.; $n < 10000 \text{ min}^{-1}$ [bar]	5
required media purity according to ISO 4406 filter grade [μm]	-/16/13 <50

features	
<ul style="list-style-type: none"> • hybrid bearing • closed sealing surface • balanced design • coolant • minimum volume lubrication (mixed externally) $p_{\text{max}} = 5 \text{ bar}$ • dry operation 	



flow volume
at orifice $\varnothing 5$
pressure

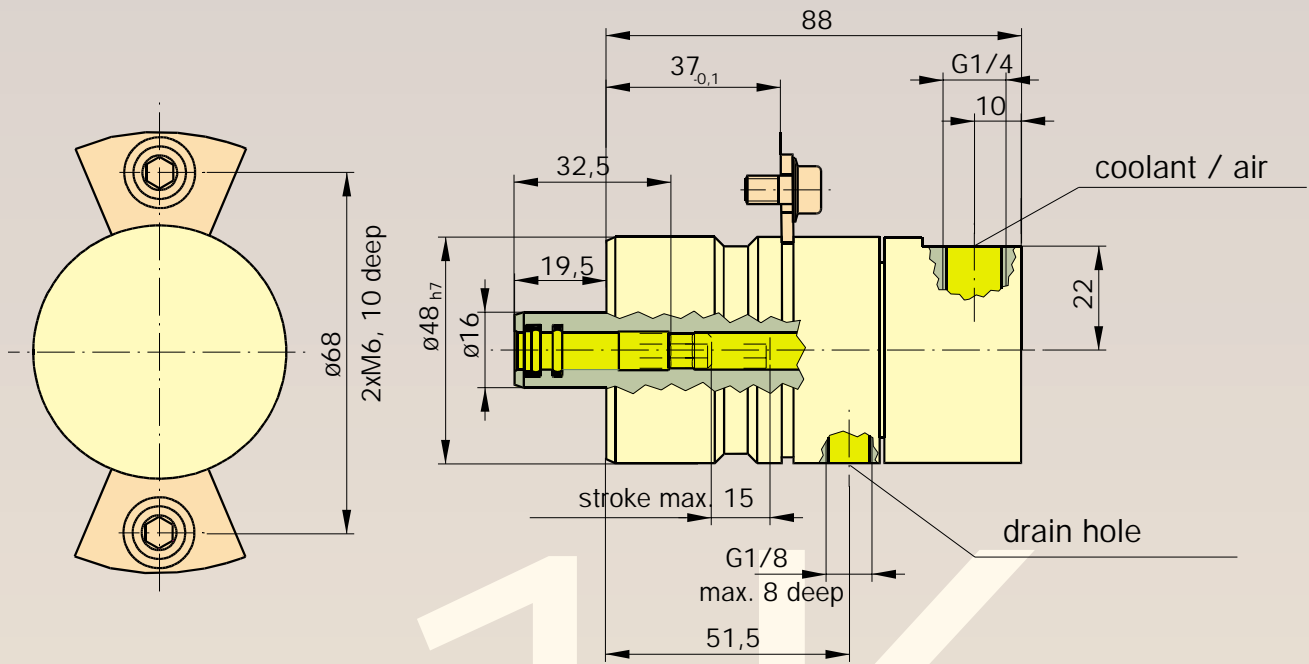


code	
2	2

technical data	
spindle speed max. (min^{-1})	36.000
coolant pressure max. [bar]	80
cleaning air max.; $n=0 \text{ min}^{-1}$ [bar]	10
pressure air max.; $n < 10000 \text{ min}^{-1}$ [bar]	5
required media purity according to ISO 4406 filter grade [μm]	-/16/13 <50

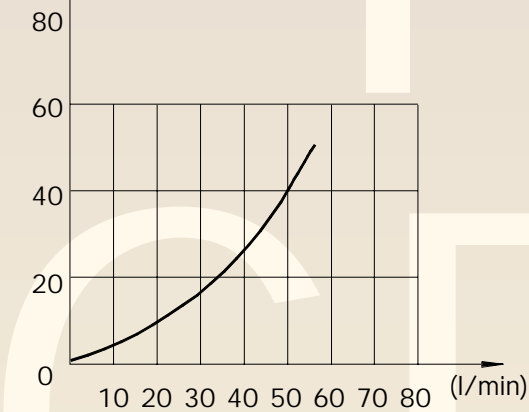
features	
<ul style="list-style-type: none"> • hybrid bearing • closed sealing surface • balanced design • coolant • minimum volume lubrication (mixed externally) $p_{\text{max}} = 5 \text{ bar}$ • dry operation 	

Subject to modification due to technical advance!



flow volume
at orifice $\varnothing 5$

pressure
(bar)

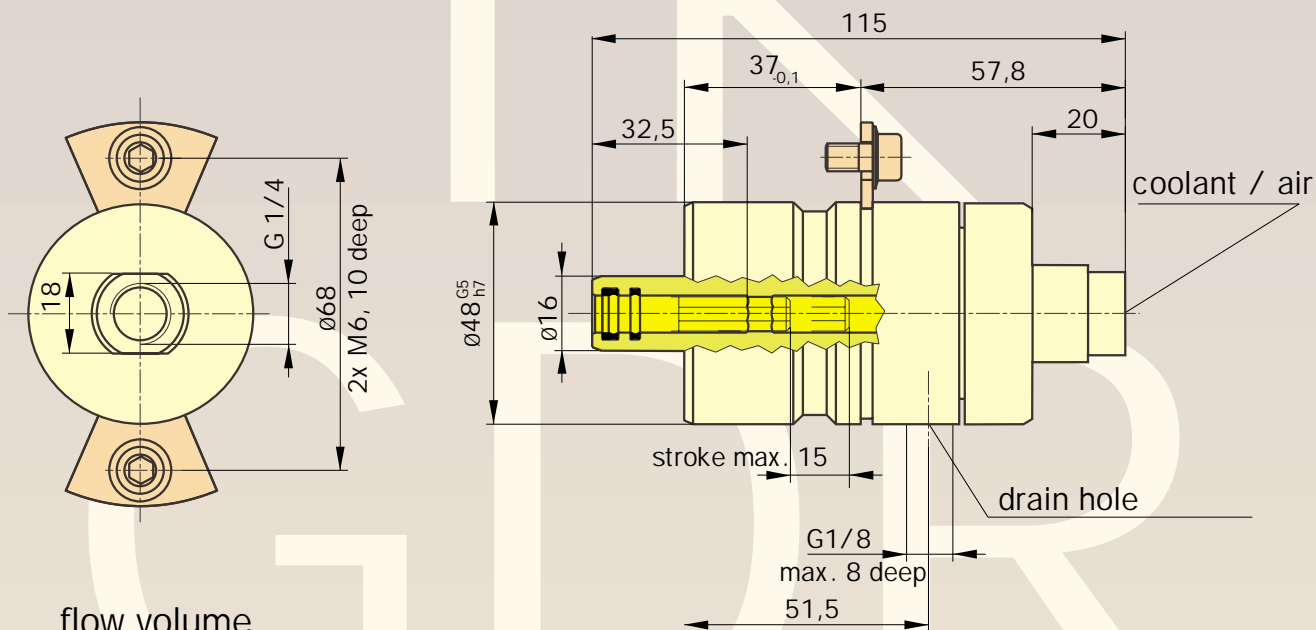


code	
2	3

technical data	
spindle speed max. (min^{-1})	16.000
coolant pressure max. [bar]	50
cleaning air max.; $n=0 \text{ min}^{-1}$ [bar]	10
pressure air max.; $n < 10000 \text{ min}^{-1}$ [bar]	5
required media purity according to ISO 4406 filter grade $[\mu\text{m}]$	-/16/13 <50

features	
<ul style="list-style-type: none"> • closed sealing surface • coolant • minimum volume lubrication (mixed externally) $p_{\text{max}} = 5 \text{ bar}$ • dry operation 	

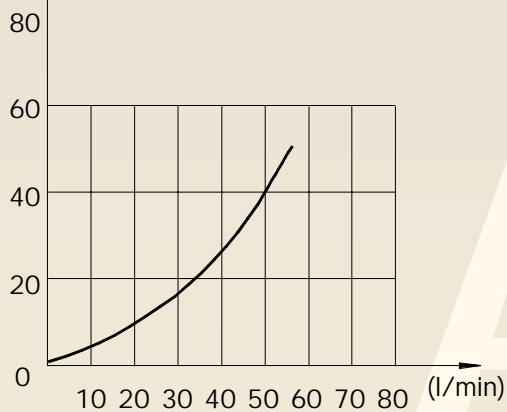
Subject to modification due to technical advance!



flow volume
at orifice $\varnothing 5$

pressure

(bar)



code	
2	4

technical data	
spindle speed max. (min^{-1})	16.000
coolant pressure max. [bar]	50
cleaning air max.; $n=0 \text{ min}^{-1}$ [bar]	10
pressure air max.; $n < 10000 \text{ min}^{-1}$ [bar]	5
required media purity according to ISO 4406 filter grade [μm]	-/16/13 <50

features	
<ul style="list-style-type: none"> • closed sealing surface • coolant • minimum volume lubrication (mixed externally) $p_{\text{max}} = 5 \text{ bar}$ • dry operation 	



WORLDWIDE

WORLDWIDE

Our international market share has increased considerably during the past several years. Companies in over 30 countries rely on OTT-JAKOB power drawbars. Please call us, if you need details about service availability or distributors in your area; or visit our web site:
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Lengenwang



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Ott-Jakob sales territories



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- USA
- Argentina
- Brazil
- Spain
- England
- France
- Italy
- Sweden
- Turkey
- Israel
- Czech Republic / Slovakia
- India
- Taiwan
- Korea
- Japan
- Australia

The world we are working in
Lengenwang, the site of
our plant, is situated in the
middle of the beautiful
Allgäu, where in the spring
time the dandelions shine
on the deep green



meadows and the eyes
are following the outlines
of the Alps on the horizon.
The landscape forms the
people living there and it
is also reflected in our
company.
The yellow of the dandelion
meadows symbolizes
human warmth and sunny
friendliness in today's
high-tech world.

OTT 
Spanntechnik

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