KOMtronic U-axis system

Efficient actuating tool systems for turning contours with a stationary workpiece for machining centres and special-purpose machines

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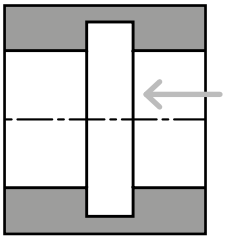
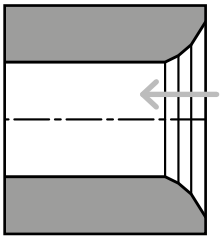
KOMtronic

Efficient U-Axis System for Machining Centres

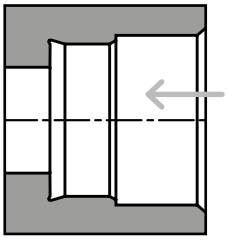
Machining examples



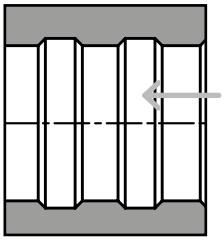
Grooving



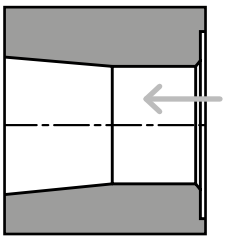
Turning valve seats



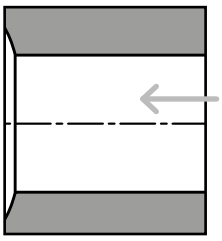
Bearing seat



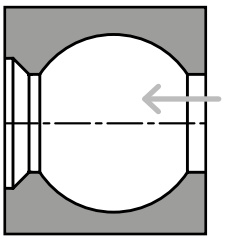
Bore with coolant passages



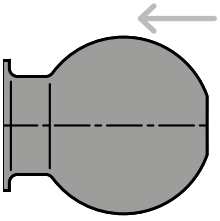
Tie rod



Undercutting differential housing



Internal contour turning



External contour turning

It makes turning contours possible when working with a stationary workpiece

The freely programmable KOMtronic U-axis system make any contour and turning operations possible on non-rotationally symmetrical parts.

Combined with custom-made front tools and the optimum selection of inserts, contours in bores and external machining operations can be successfully carried out. This allows a considerable reduction in production times – with better surface quality and greater accuracy of form.

Higher economy

- Use of standard instead of special machines
- Reduction in number of tools
- No need for clamping devices for finish machining on turning machines

Reduced unit costs

- Reduction in machining and throughput times
- Savings on tool changes
- Replacement of time consuming circular machining operations
- Reduced holding times
- High cutting capacity

Lower operating costs

- Complete machining on one machine without the workpiece being rotated
- Minimum power consumption because of U-axis systems

Your Technical Sales Engineer will be happy to answer any further questions or please contact directly

Offer.Actuatingtools@ceratizit.com

KOMtronic U-Axis system with linear encoder

Advantages Benefits

- **Direct path measurement system on the slide**
  Position detection as close to the tool as possible.
- **Maximum positioning accuracy**
  For precise machining.
- **Direct coupling of the slide movement**
  Mechanical influences such as wear are eliminated.
- **Consideration of the disturbance variables of mechanical components such as backlash, wear, etc.**
  Process-secure machining reduces disturbing influences.
- **Improvement of the repeatability**
  Consistent quality.
- **Wear monitoring of the mechanical components**
  Through double position detection within the U-axis.

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CERATIZIT has successfully led and completed the BaZMod research project with partners from industry and research. The BaZMod research project has resulted in the standardisation proposal of the HSK-i .

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Tool combinations

The functionality of the tool combinations depends on the L/D ratio, weight and cutting parameter.
The maximum permissible spindle speed of the U-axis must be observed.

Key

- ABS connection
- Cylindrical connection
- Toothing
- UltraMini / EcoCut connection

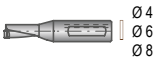
Excerpt „Catalogue – Cutting Tools“ (exemplary)

→ Chapter 12

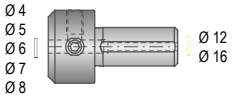
UltraMini Ø 0,5 – 7 mm

→ Chapter 10

EcoCut – Mini Ø 2 – 8 mm



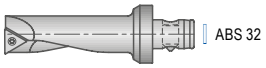
→ Chapter 5



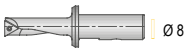
→ Chapter 5

MicroKom – Boring bar

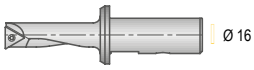
Ø 8 – 24 mm

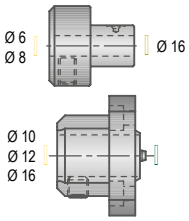


Ø 5,6 – 8 mm



Ø 8 – 24 mm





Ø 13 – 17 mm

Ø 17 – 26 mm

MicroKom – Boring bar, vibration-optimised

Ø 5,6 mm / Ø 6,9 mm

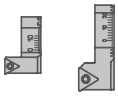
Ø 9 mm / Ø 11 mm

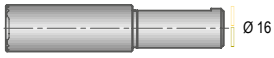
MicroKom – Boring bar

Ø 6 – 22 mm

MicroKom – Serrated body + Insert holder

Ø 25 – 44 mm

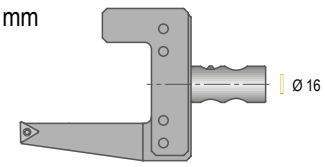




Ø 44 – 63 mm

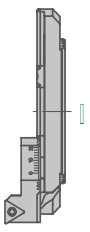
MicroKom – Mounting bridge for external machining

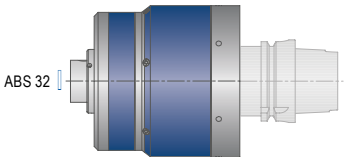
Ø 5 – 70 mm



MicroKom – Insert holder
Ø 63 – 93 mm

MicroKom – Bridge + Insert holder
Ø 90 – 365 mm

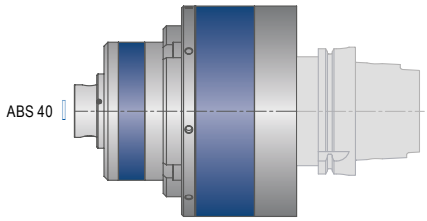




HPS 115

- ▲ **stroke: 2 (±1) mm**
- ▲ **max. feed: 80 mm/min**
- ▲ **max. spindle speed: 6000 rpm**

HPS-115-EM-ABS32 → 8

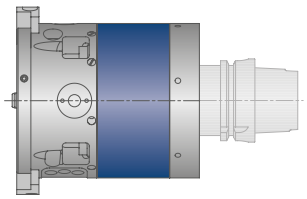


HPS 160

- ▲ **stroke: 2 (±1) mm**
- ▲ **max. feed: 100 mm/min**
- ▲ **max. spindle speed: 6000 rpm**

HPS-160-EM-ABS40 → 9

UAS 115

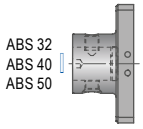


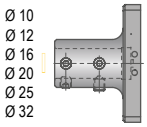
- ▲ **stroke: 22 (±11) mm**
- ▲ **max. feed: 300 mm/min**
- ▲ **max. spindle speed: 4000 rpm**

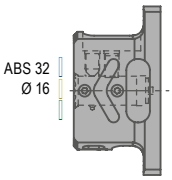
UAS-115-E-G-22-2 / UAS-115-EM-G-22-2 → 10

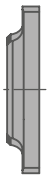
UAS-115-E90-G-22-2 / UAS-115-EM90-G-22-2 → 11

Front tools
→ 18

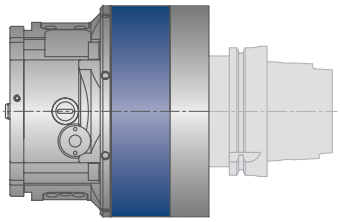






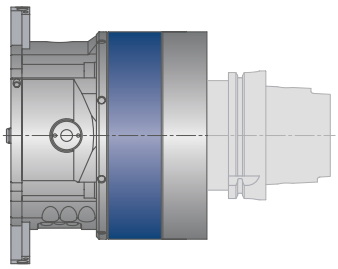


UAS 160



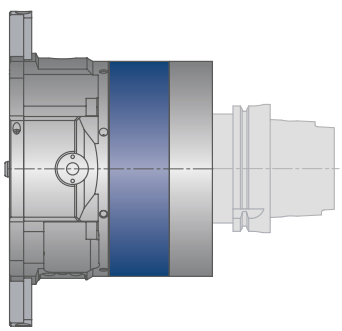
- ▲ **stroke: 32 (±16) mm**
- ▲ **max. feed: 350 mm/min**
- ▲ **max. spindle speed: 4000 rpm**

UAS-160-EM-G-32-3 → 12



- ▲ **stroke: 50 (±25) mm**
- ▲ **max. feed: 350 mm/min**
- ▲ **max. spindle speed: 4000 rpm**

UAS-160-EM-G-50-3 → 13

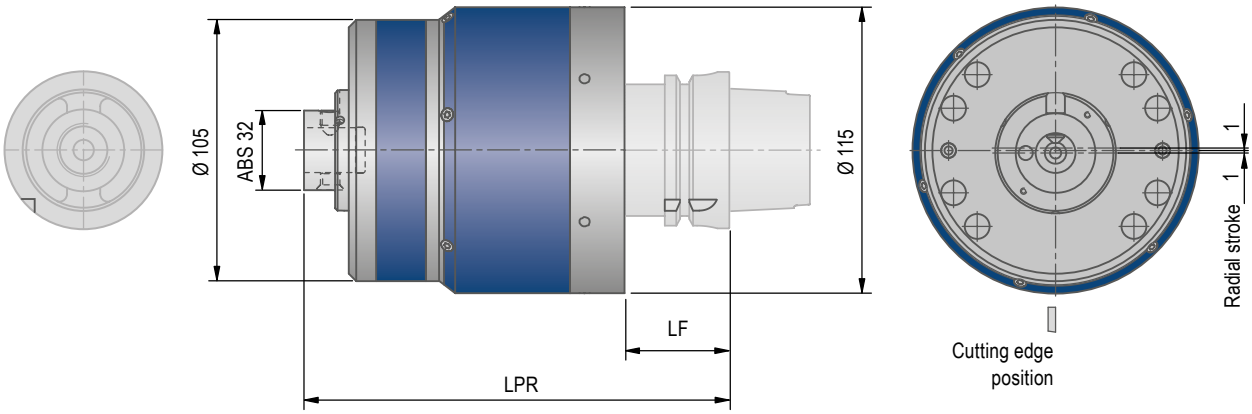


- ▲ **stroke: 70 (±35) mm**
- ▲ **max. feed: 350 mm/min**
- ▲ **max. spindle speed: 4000 rpm**

UAS-160-EM-G-70-3 → 14

KOMtronic High-Performance-System HPS-115-2

HPS-115-EM-ABS32



Standard interface HSK, other interfaces (page 19) on request.

HPS-115-EM-ABS32 Position sensor direct on slide

Description	KOMET No. Article No.	Interface	LPR mm	LF mm	WT kg
HPS-115-HSK63-EM-ABS32-2-2	**E32 20012** 60 005 10257	HSK 63	171	42	6,5
HPS-115-SK40-EM-ABS32-2-2	**E32 22012**	SK 40	164	35	6,6

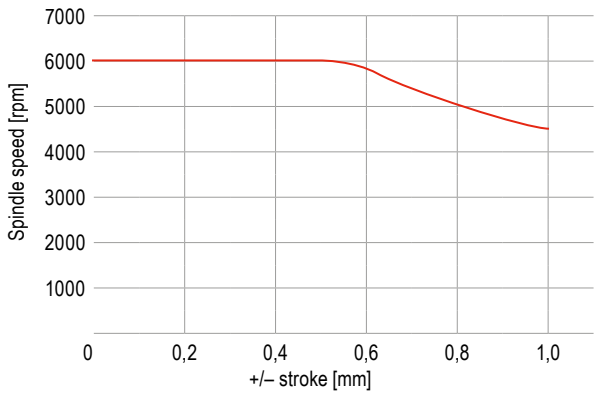
Technical data

- ▲ stroke: 2 (±1) mm without imbalance correction
- ▲ max. feed: within ± 0,5 mm stroke 80 mm/min above decreasing
- ▲ max. spindle speed: 6000 rpm
- ▲ with internal coolant: 40 bar – MQL possible
- ▲ compact design
- ▲ increased accuracy by position sensor direct at the slide

Protection class: IP67
Operating modes: full NC axis for interpolation

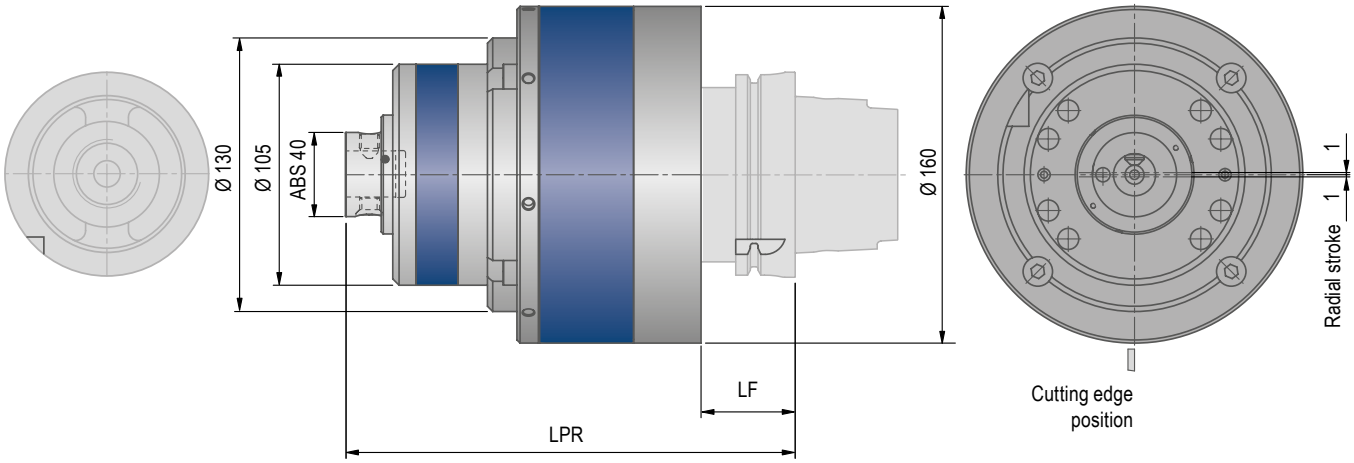
Adaption into machine tool control and spindle see page 16.

Max. stroke/spindle speed diagram
up to 0.6 kg front tool



KOMtronic High-Performance-System HPS-160-3

HPS-160-EM-ABS40



Standard interface HSK, other interfaces (page 19) on request.

HPS-160-EM-ABS40 Position sensor direct on slide

Description	KOMET No.	Interface	LPR mm	LF mm	WT kg
HPS-160-HSK100-EM-ABS40-2-3	**1E32000100008X**	HSK 100	214	45	13,6
HPS-160-SK50-EM-ABS40-2-3	**1E32000100010X**	SK 50	204	35	14,0
HPS-160-CAT50-EM-ABS40-2-3	**1E32000100012X**	CAT 50	204	35	14,0
HPS-160-BT50-EM-ABS40-2-3	**1E32000100011X**	BT 50	222	53	15,1

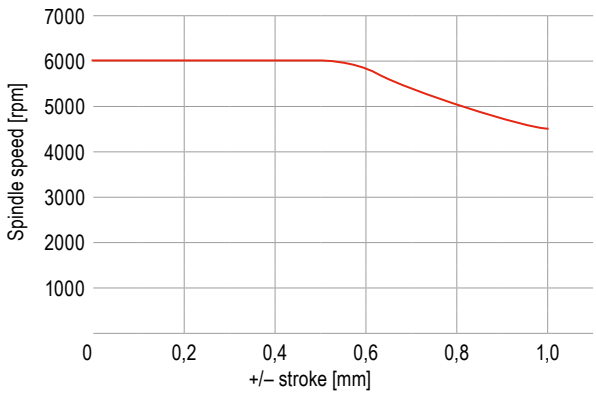
Technical data

- ▲ stroke: 2 (±1) mm without imbalance correction
- ▲ max. feed: within ± 0,5 mm stroke 100 mm/min above decreasing
- ▲ max. spindle speed: 6000 rpm
- ▲ with internal coolant: 40 bar – MQL possible
- ▲ compact design
- ▲ increased accuracy by position sensor direct at the slide

Protection class: IP67
Operating modes: full NC axis for interpolation

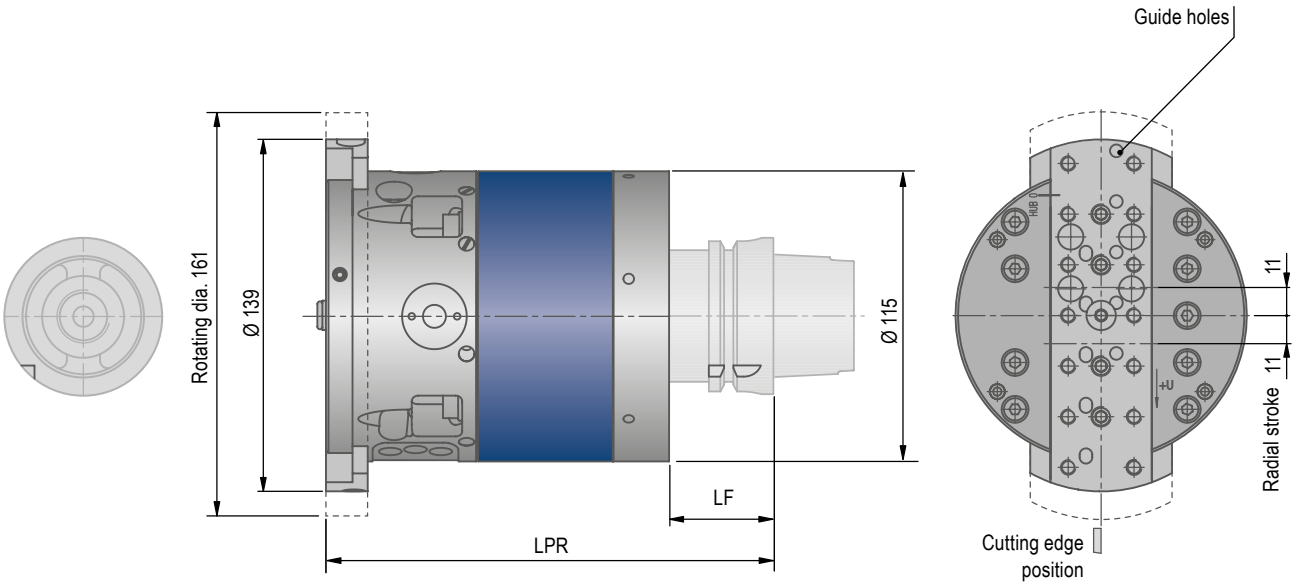
Adaption into machine tool control and spindle see page 17.

Max. stroke/spindle speed diagram
up to 0.8 kg front tool



KOMtronic U-axis UAS-115-2

UAS-115-E-G-22-2 / UAS-115-EM-G-22-2



Dimensioning of drill pattern on page 15.

Standard interface HSK, other interfaces (page 19) on request.

UAS-115-E-G-22-2		UAS-115-EM-G-22-2 Position sensor direct on slide					
Description	**KOMET No.** Article No.	**Description**	**KOMET No.** Article No.	**Interface**	**LPR** mm	**LF** mm	**WT** kg
UAS-115-HSK63-E-G-22-2	**E21 20110** 60 005 02257	UAS-115-HSK63-EM-G-22-2	**E31 20110** 60 005 12257	HSK 63	178	42	6,4
UAS-115-SK40-E-G-22-2	**E21 22110**	UAS-115-SK40-EM-G-22-2	**E31 22110**	SK 40	171	35	6,5
UAS-115-CAT40-E-G-22-2	**E21 24110**	UAS-115-CAT40-EM-G-22-2	**E31 24110**	CAT 40	171	35	6,8
UAS-115-BT40-E-G-22-2	**E21 26110**	UAS-115-BT40-EM-G-22-2	**E31 26110**	BT 40	178	42	6,7

Technical data

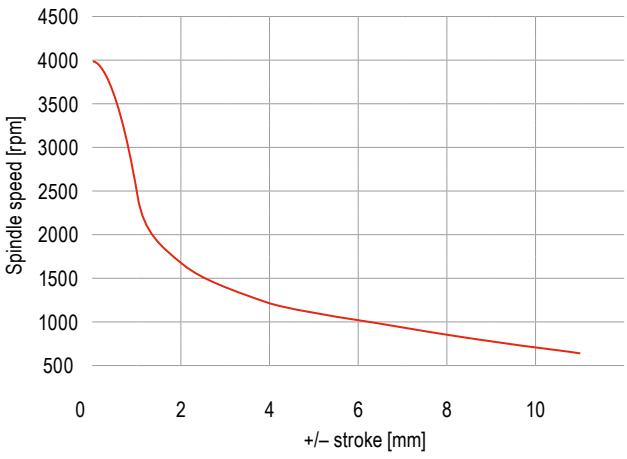
- ▲ Stroke: 22 (±11) mm
- ▲ Max. feed: 300 mm/min
- ▲ Max. spindle speed: 4000 rpm, depending on slide position (see stroke/spindle speed diagram)
- ▲ With internal coolant: 40 bar
- ▲ Versions with other strokes on request

Protection class: IP67
Operating modes: full NC axis for interpolation

Adaption into machine tool control and spindle: page 16.

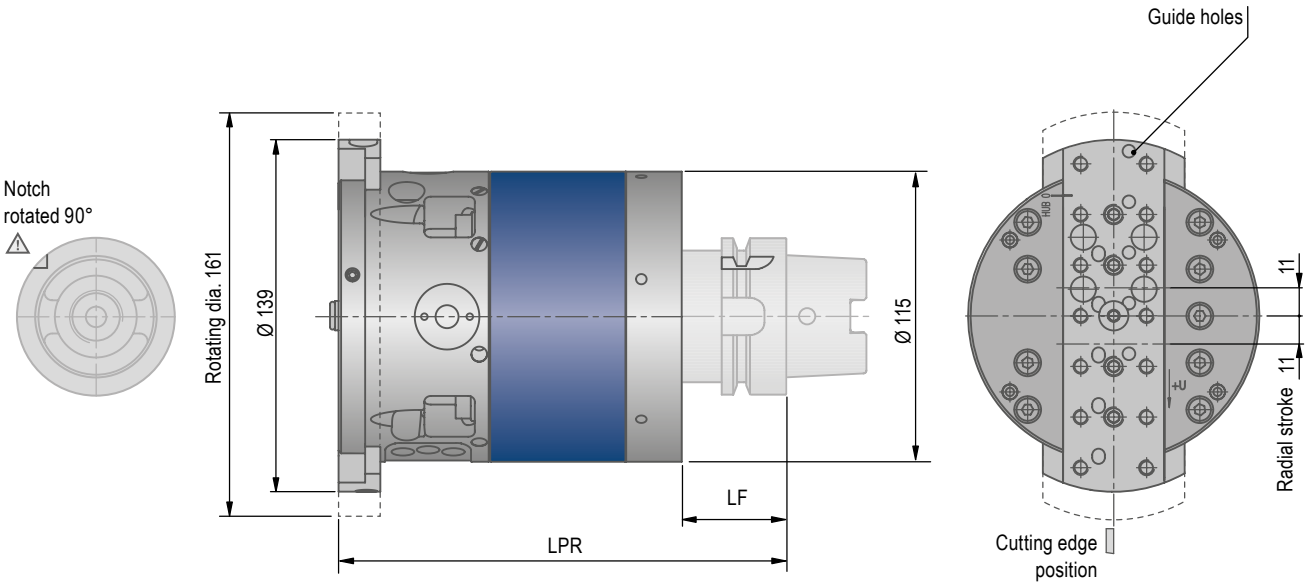
Front tools: page 18.

Max. stroke/spindle speed diagram
up to 1 kg front tool incl. adaptor



KOMtronic U-axis UAS-115-2

UAS-115-E90-G-22-2 / UAS-115-EM90-G-22-2



Dimensioning of drill pattern on page 15.

Standard interface HSK, other interfaces (page 19) on request.

UAS-115-E90-G-22-2		UAS-115-EM90-G-22-2 Position sensor direct on slide					
Description	**KOMET No.**	**Description**	**KOMET No.**	**Interface**	**LPR** mm	**LF** mm	**WT** kg
UAS-115-HSK63-E90-G-22-2	**E21 20120**	UAS-115-HSK63-EM90-G-22-2	**E31 20120**	HSK 63	178	42	6,4
UAS-115-SK40-E90-G-22-2	**E21 22120**	UAS-115-SK40-EM90-G-22-2	**E31 22120**	SK 40	171	35	6,5
UAS-115-CAT40-E90-G-22-2	**E21 24120**	UAS-115-CAT40-EM90-G-22-2	**E31 24120**	CAT 40	171	35	6,8
UAS-115-BT40-E90-G-22-2	**E21 26120**	UAS-115-BT40-EM90-G-22-2	**E31 26120**	BT 40	178	42	6,7

Technical data

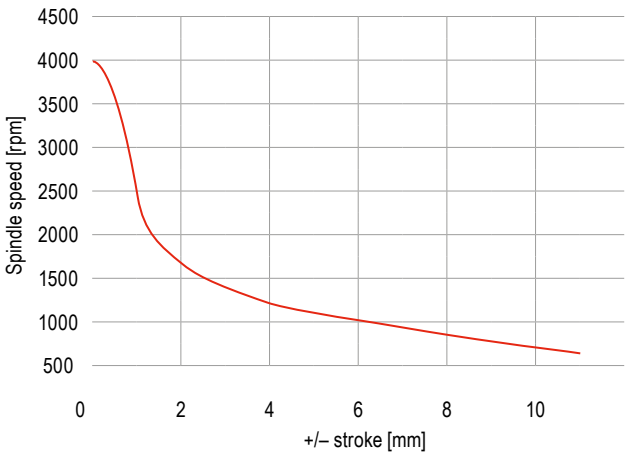
- ▲ Stroke: 22 (±11) mm
- ▲ Max. feed: 300 mm/min
- ▲ Max. spindle speed: 4000 rpm, depending on slide position (see stroke/spindle speed diagram)
- ▲ With internal coolant: 40 bar
- ▲ Versions with other strokes on request

Protection class: IP67
Operating modes: full NC axis for interpolation

Adaption into machine tool control and spindle: page 16.

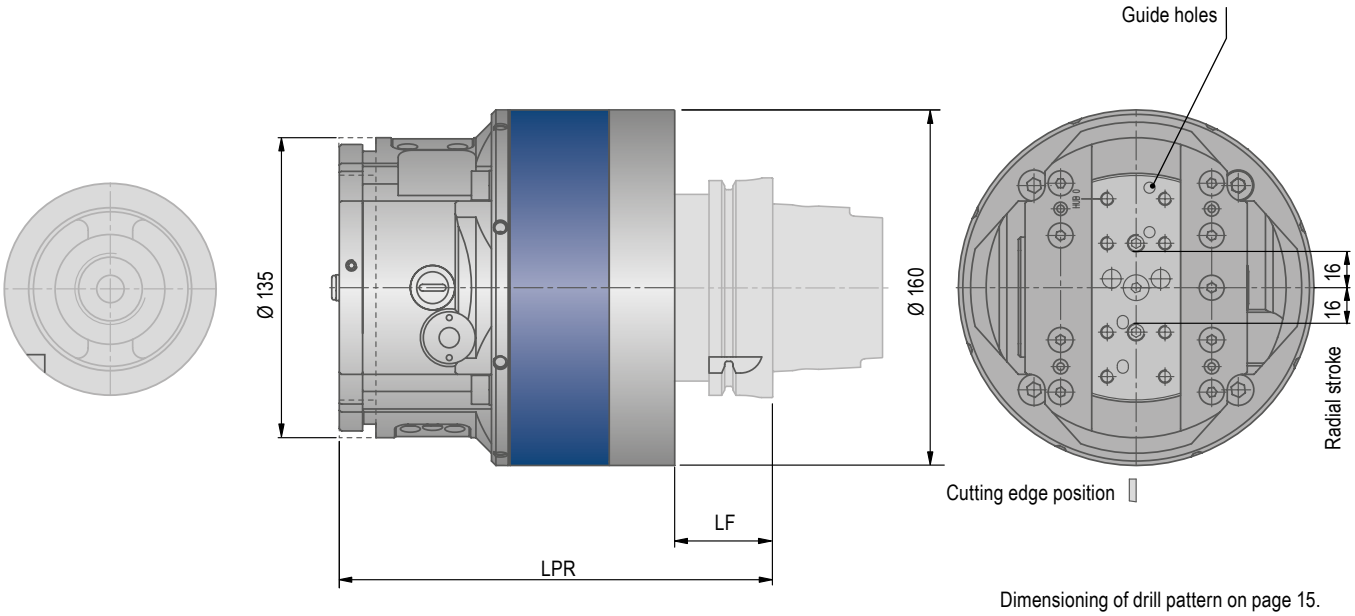
Front tools: page 18.

Max. stroke/spindle speed diagram
up to 1 kg front tool incl. adaptor



KOMtronic U-axis UAS-160-3

UAS-160-EM-G-32-3



Dimensioning of drill pattern on page 15.

Standard interface HSK, other interfaces (page 19) on request. Interface rotated by 90° on request.

UAS-160-EM-G-32-3 Position sensor direct on slide

Description	KOMET No. Article No.	Interface	LPR mm	LF mm	WT kg
UAS-160-HSK100-EM-G-32-3	**1E313310032010** 60 005 13255	HSK 100	198,5	45	12,1
UAS-160-SK50-EM-G-32-3	**1E313330032010**	SK 50	188,5	35	12,5
UAS-160-CAT50-EM-G-32-3	**1E313350032010**	CAT 50	188,5	35	12,5
UAS-160-BT50-EM-G-32-3	**1E313370032010**	BT 50	206,5	53	13,6

Technical data

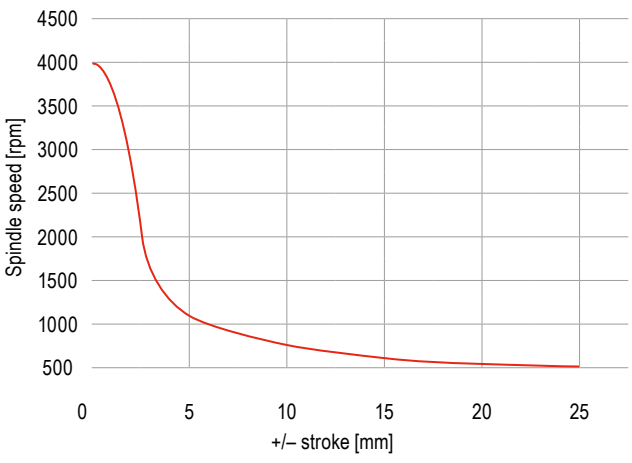
- ▲ Stroke: 32 (±16) mm
- ▲ Max. feed: 350 mm/min
- ▲ Max. spindle speed: 4000 rpm, depending on slide position (see stroke/spindle speed diagram)
- ▲ With internal coolant: 40 bar
- ▲ Versions with other strokes on request

Protection class: IP67
Operating modes: full NC axis for interpolation

Adaption into machine tool control and spindle: page 17.

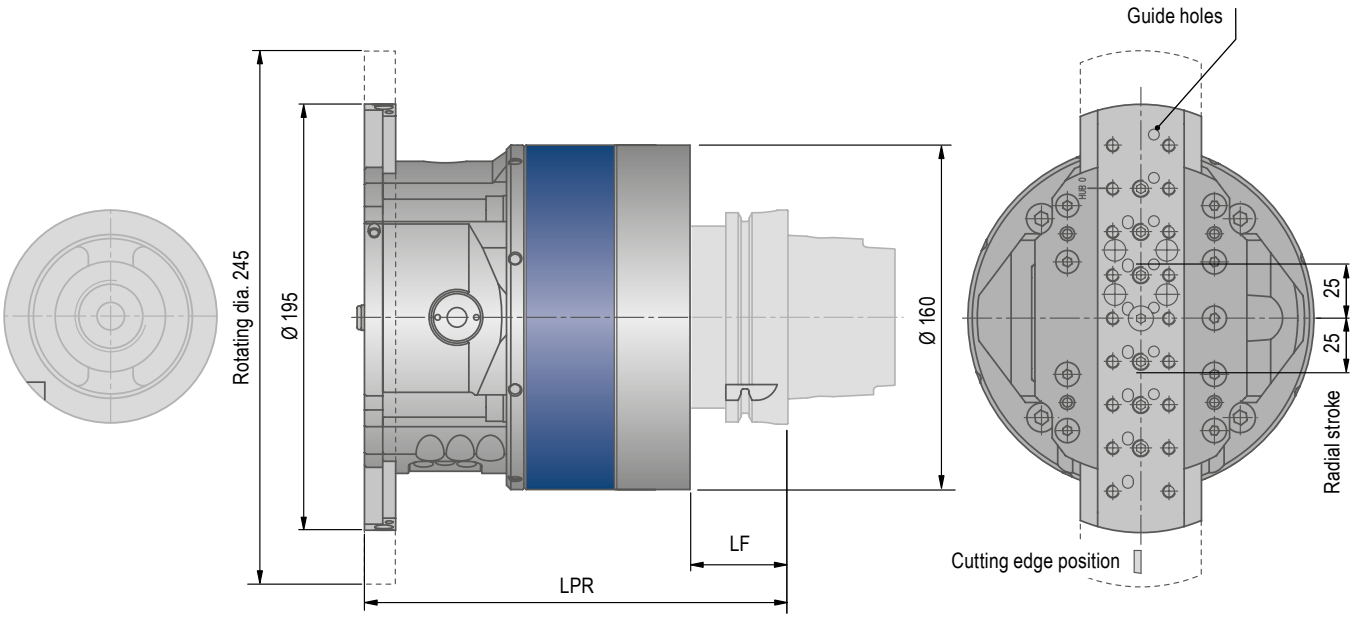
Front tools: page 18.

Max. stroke/spindle speed diagram
up to 1,8 kg front tool incl. adaptor



KOMtronic U-axis UAS-160-3

UAS-160-EM-G-50-3



Dimensioning of drill pattern on page 15.

Standard interface HSK, other interfaces (page 19) on request. Interface rotated by 90° on request.

UAS-160-EM-G-50-3 Position sensor direct on slide

Description	KOMET No. Article No.	Interface	LPR mm	LF mm	WT kg
UAS-160-HSK100-EM-G-50-3	**1E313310050010** 60 005 15055	HSK 100	196	45	12,4
UAS-160-SK50-EM-G-50-3	**1E313330050010**	SK 50	186	35	12,8
UAS-160-CAT50-EM-G-50-3	**1E313350050010**	CAT 50	186	35	12,8
UAS-160-BT50-EM-G-50-3	**1E313370050010**	BT 50	204	53	13,9

Technical data

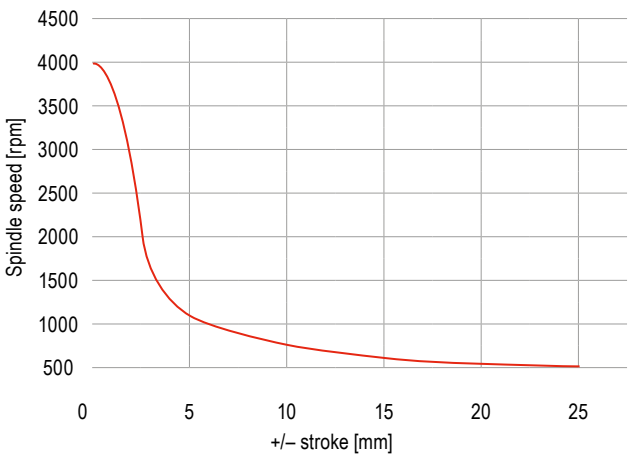
- ▲ Stroke: 50 (±25) mm
- ▲ Max. feed: 350 mm/min
- ▲ Max. spindle speed: 4000 rpm, depending on slide position (see stroke/spindle speed diagram)
- ▲ With internal coolant: 40 bar
- ▲ Versions with other strokes on request

Protection class: IP67
Operating modes: full NC axis for interpolation

Adaption into machine tool control and spindle: page 17.

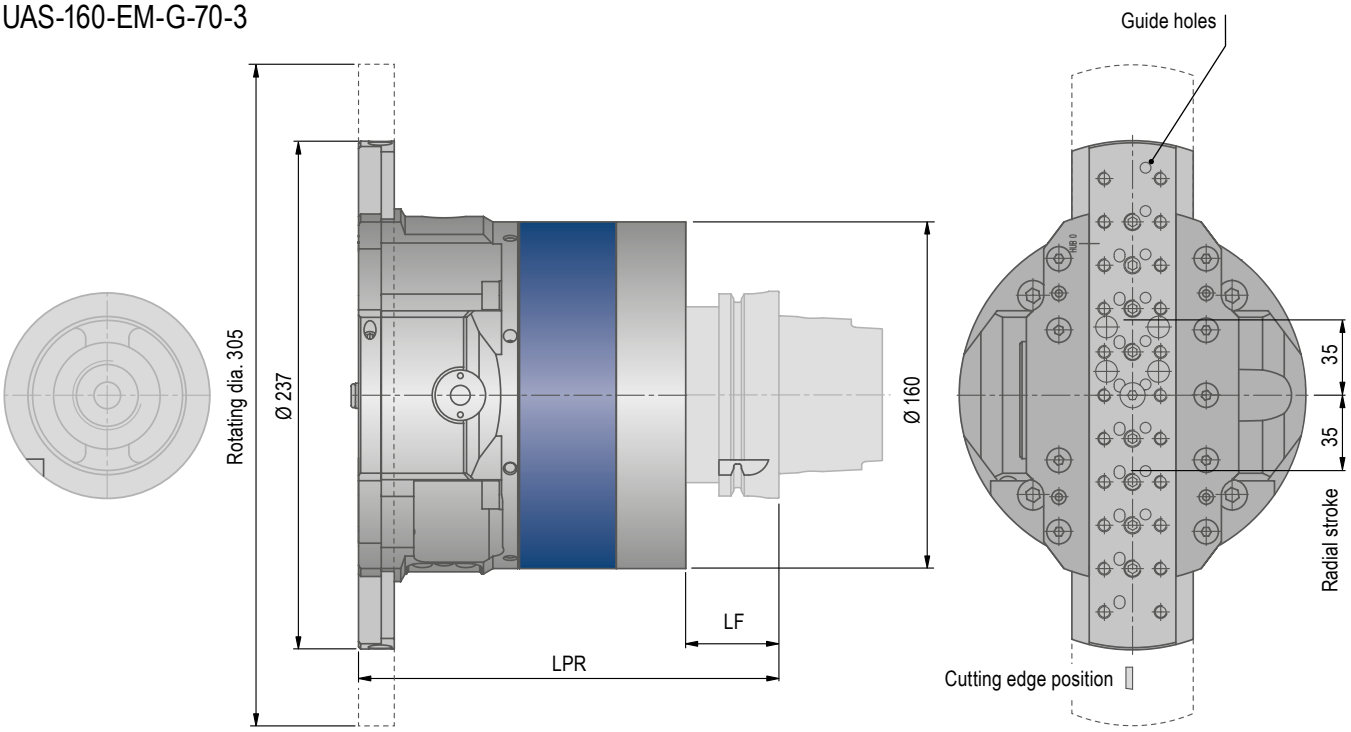
Front tools: page 18.

Max. stroke/spindle speed diagram
up to 1,8 kg front tool incl. adaptor



KOMtronic U-axis UAS-160-3

UAS-160-EM-G-70-3



Dimensioning of drill pattern on page 15.

Standard interface HSK, other interfaces (page 19) on request. Interface rotated by 90° on request.

UAS-160-EM-G-70-3 Position sensor direct on slide

Description	KOMET No. Article No.	Interface	LPR mm	LF mm	WT kg
UAS-160-HSK100-EM-G-70-3	**1E313310070010** 60 005 17055	HSK 100	196	45	12,6
UAS-160-SK50-EM-G-70-3	**1E313330070010**	SK 50	186	35	13,0
UAS-160-CAT50-EM-G-70-3	**1E313350070010**	CAT 50	186	35	13,0
UAS-160-BT50-EM-G-70-3	**1E313370070010**	BT 50	204	53	14,1

Technical data

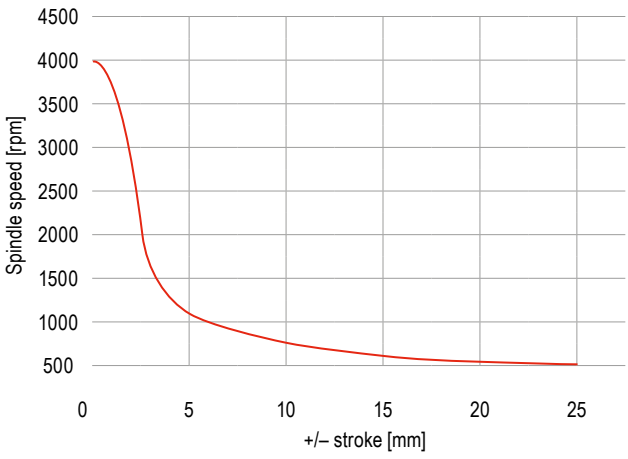
- ▲ Stroke: 70 (±35) mm
- ▲ Max. feed: 350 mm/min
- ▲ Max. spindle speed: 4000 rpm, depending on slide position (see stroke/spindle speed diagram)
- ▲ With internal coolant: 40 bar
- ▲ Versions with other strokes on request

Protection class: IP67
Operating modes: full NC axis for interpolation

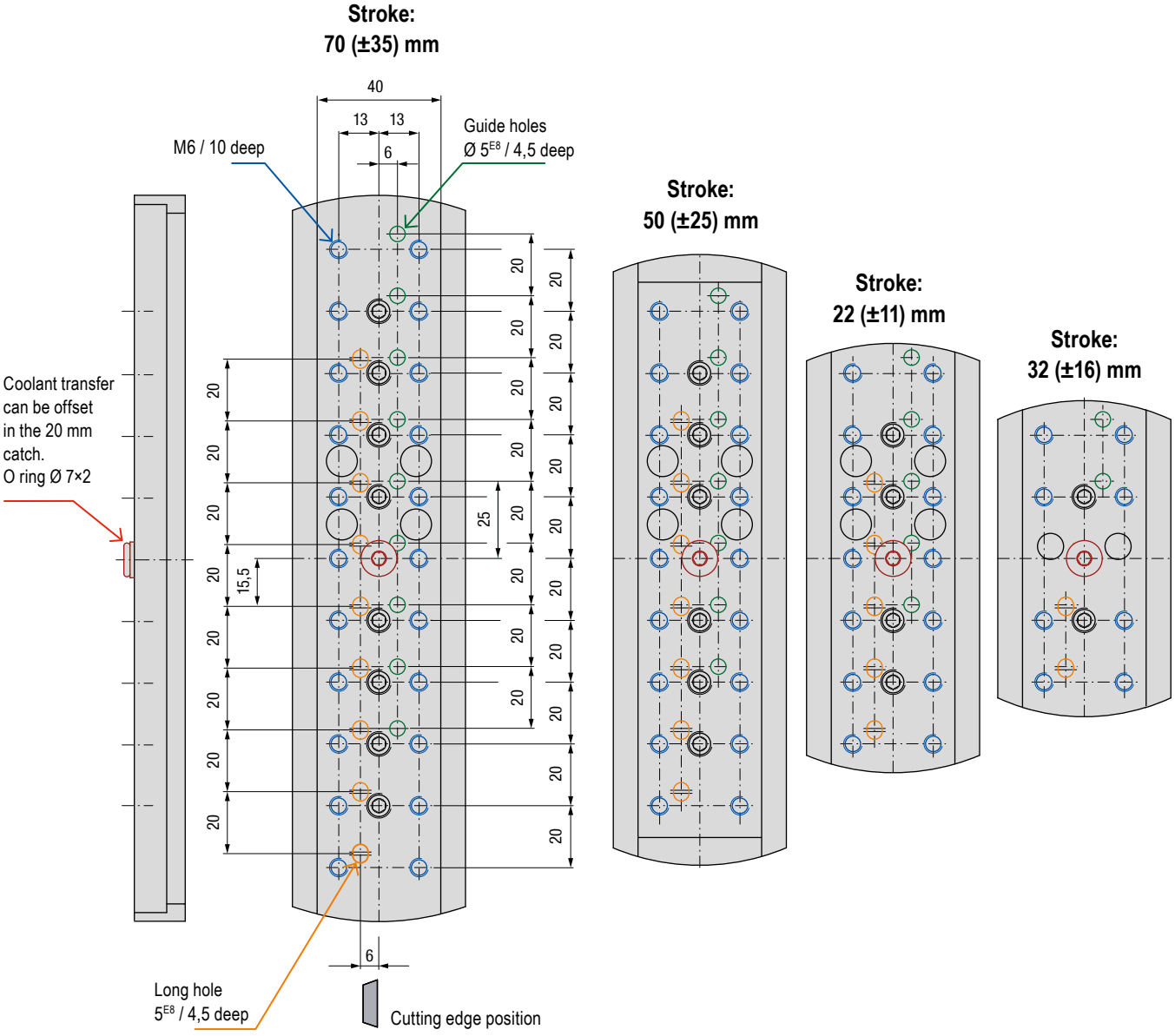
Adaption into machine tool control and spindle: page 17.

Front tools: page 18.

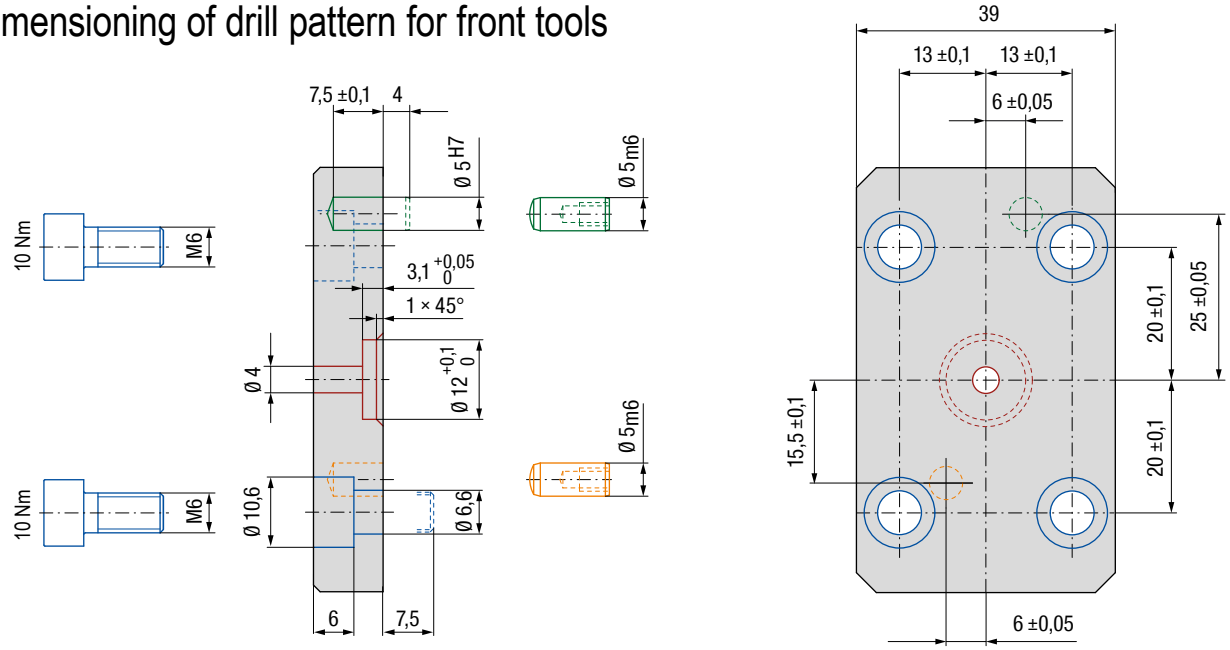
Max. stroke/spindle speed diagram
up to 1,8 kg front tool incl. adaptor



Dimensioning of drill pattern for series 2 and 3

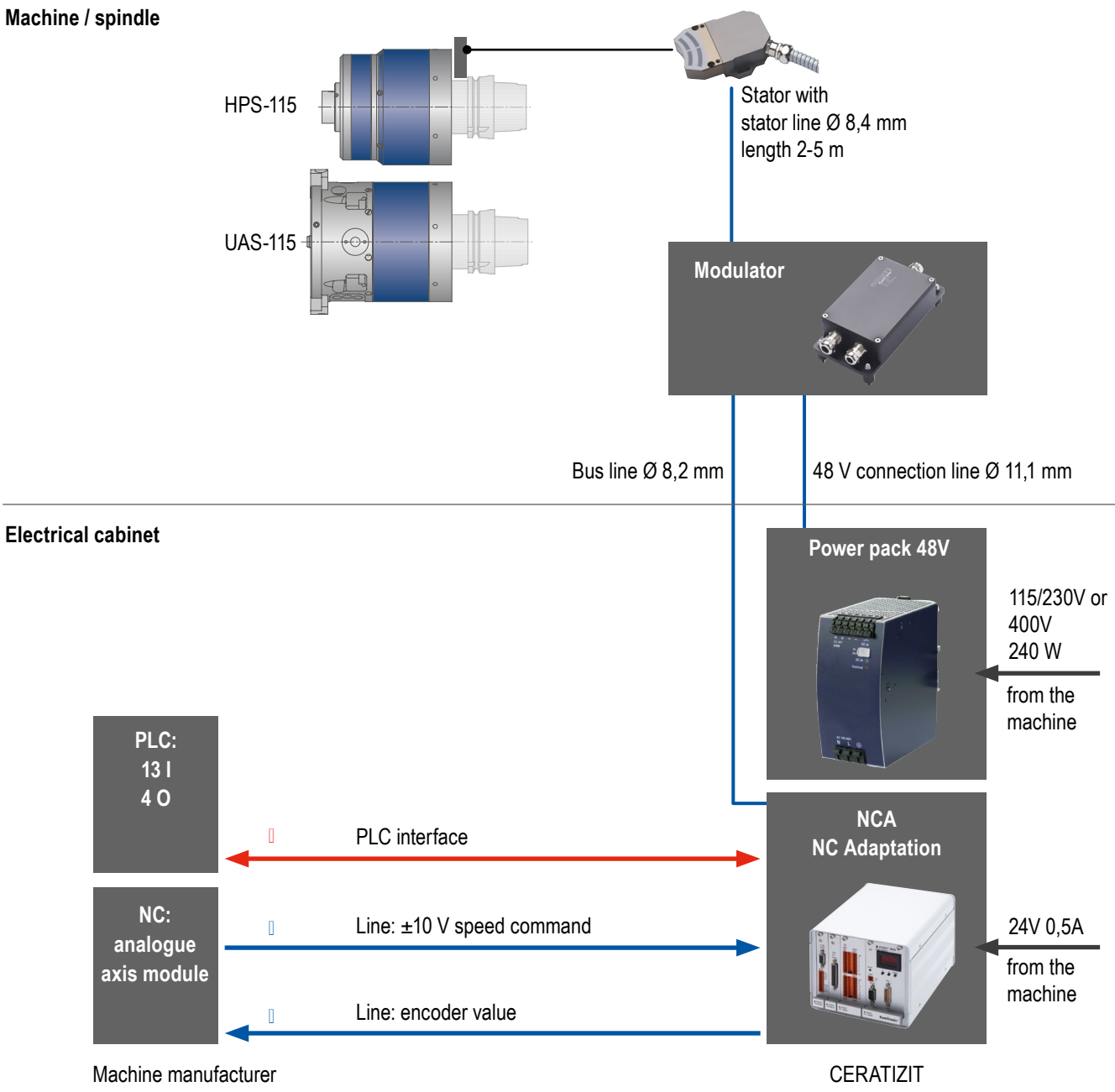


Dimensioning of drill pattern for front tools



Adaptation into machine tool control and spindle (schematic overview)

Detailed schematic overview will be created based on the specific project.



PLC connection

13 inputs and 4 outputs are required on the PLC. 3 M-commands are required for selecting u-axis functions.

Nominal value requirement

±10 V nominal speed value from analogue axis module of NC control to the NCA.

Incremental actual position value

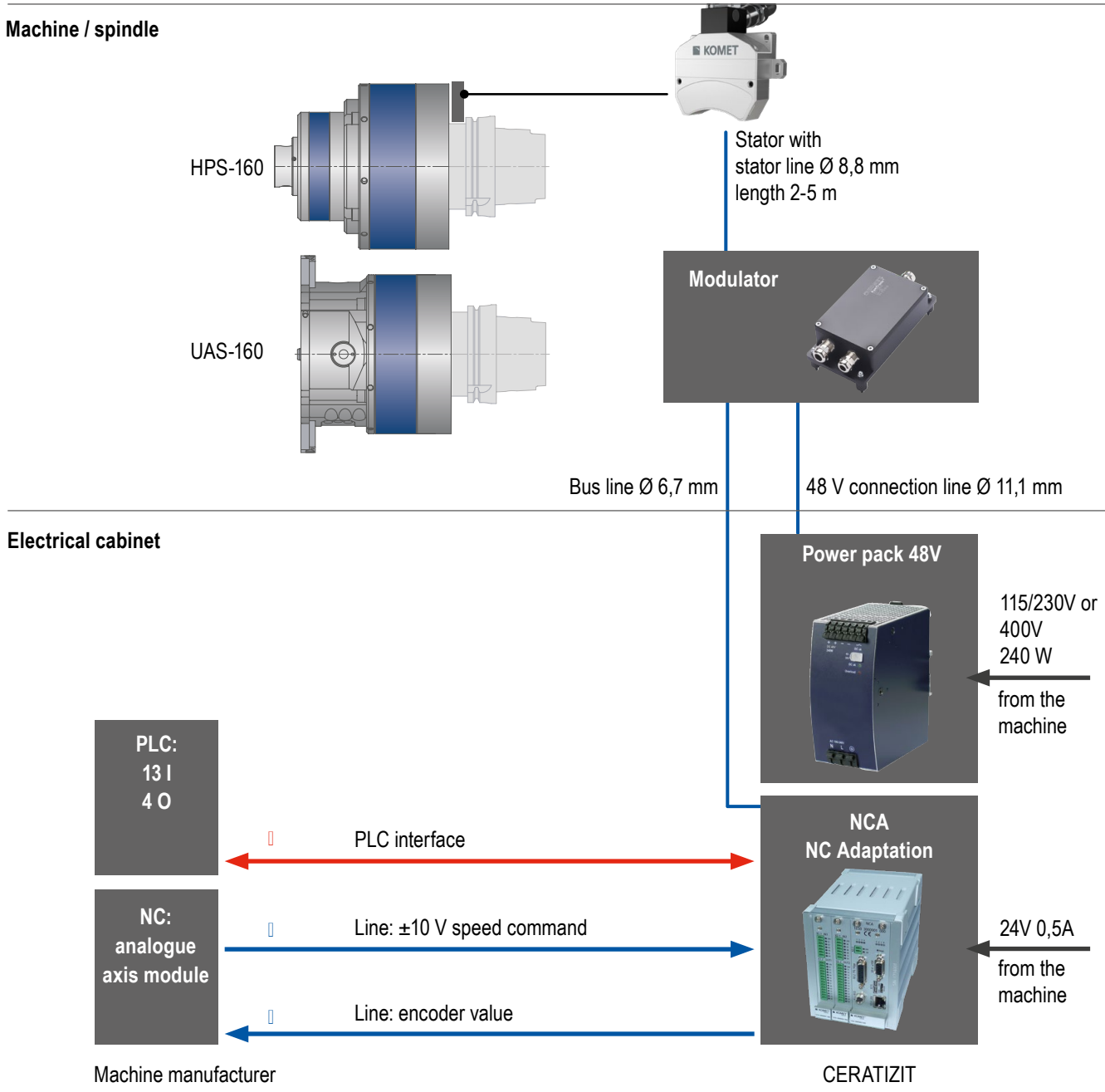
The current position is transmitted from the NCA to the analogue axis module for the NC control.
The following signal forms are available:

- ▲ TTL level (5 V) in acc. with RS 422, interpolated, square signal form
- ▲ 1 Vpp (1 V peak to peak), sine signal form

The KOMtronic u-axis system does not need a power unit on the NC control.

Adaptation into machine tool control and spindle (schematic overview)

Detailed schematic overview will be created based on the specific project.



PLC connection

13 inputs and 4 outputs are required on the PLC. 3 M-commands are required for selecting u-axis functions.

Nominal value requirement

±10 V nominal speed value from analogue axis module of NC control to the NCA.

Incremental actual position value

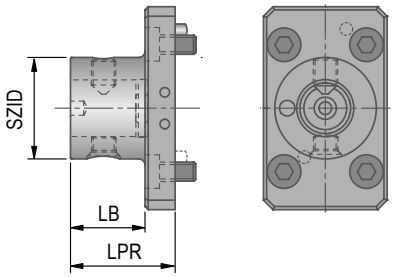
The current position is transmitted from the NCA to the analogue axis module for the NC control.
The following signal forms are available:

- ▲ TTL level (5 V) in acc. with RS 422, interpolated, square signal form
- ▲ 1 Vpp (1 V peak to peak), sine signal form

The KOMtronic u-axis system does not need a power unit on the NC control.

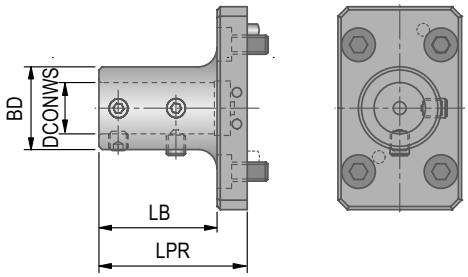
Front tools

The front tool can be mounted directly onto the slide.
The following adaptors are available when using standard tools (others available on request).



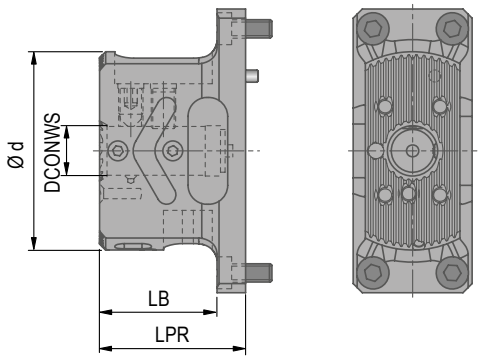
ABS adaptor

SZID	LPR mm	LB mm	WT kg	KOMET No. Article No.
ABS 32	33	22,5	0,28	**P80 23060** 60 006 13200
ABS 40	37	26,5	0,37	**P80 24060** 60 006 14000
ABS 50	42	28	0,64	**P80 25060**



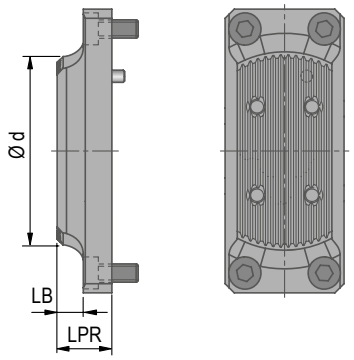
Cylindrical adaptor

DCONWS mm	BD mm	LPR mm	LB mm	WT kg	KOMET No. Article No.
10	17,8	36	26,5	0,22	**P81 21070**
12	21,8	36	26,5	0,23	**P81 21080** 60 006 01200
16	25,8	46,5	36	0,27	**P81 21090** 60 006 01600
20	33,8	46,5	36	0,38	**P81 21100** 60 006 02000
25	38,8	56	46,5	0,53	**P81 21110**
32	47,8	58,5	49	0,67	**P81 21120**



Universal adaptor

DCONWS mm	d mm	LPR mm	LB mm	WT kg	KOMET No.
16 ABS 32	65	48	38	0,56	**P81 29060**



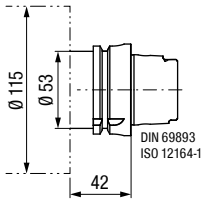
Bridge adaptor

d mm	LPR mm	LB mm	WT kg	KOMET No.
65	18	8,49	0,36	**P81 29070**

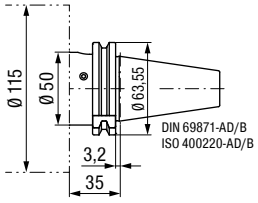
Article no. 60.... available from stock

Overview tool interfaces

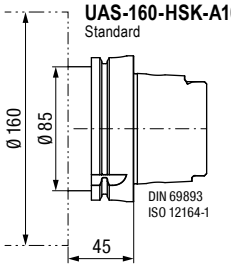
UAS-115-HSK-A63-...-L42
Standard



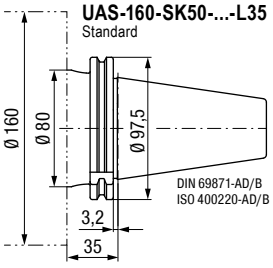
UAS-115-SK40-...-L35
Standard



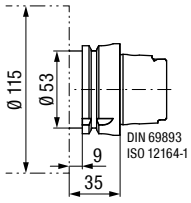
UAS-160-HSK-A100-...-L45
Standard



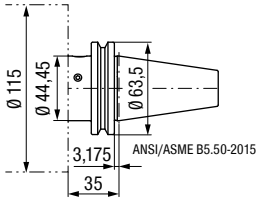
UAS-160-SK50-...-L35
Standard



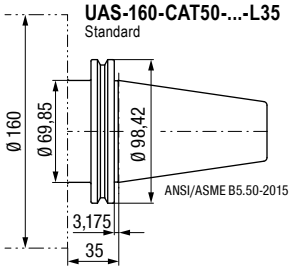
UAS-115-HSK-A63-...-L35
Variant



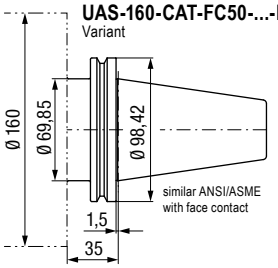
UAS-115-CAT40-...-L35
Standard



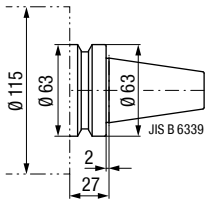
UAS-160-CAT50-...-L35
Standard



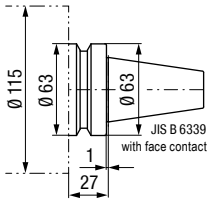
UAS-160-CAT-FC50-...-L35
Variant



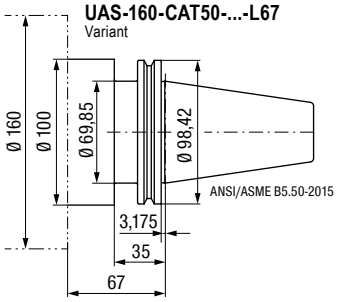
UAS-115-BT40-...-L27
Variant



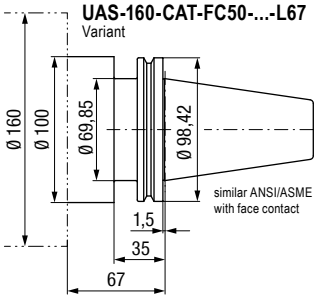
UAS-115-BT-FC40-...-L27
Variant



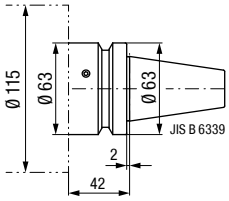
UAS-160-CAT50-...-L67
Variant



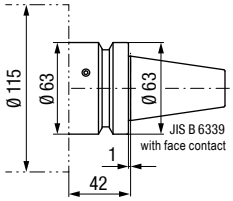
UAS-160-CAT-FC50-...-L67
Variant



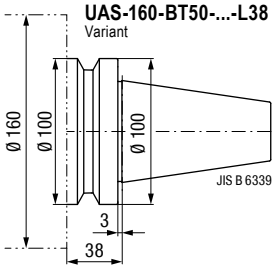
UAS-115-BT40-...-L42
Standard



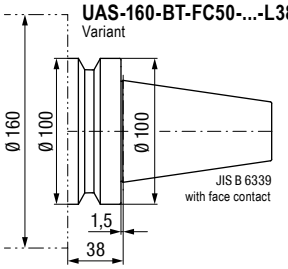
UAS-115-BT-FC40-...-L42
Variant



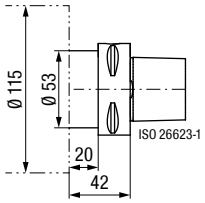
UAS-160-BT50-...-L38
Variant



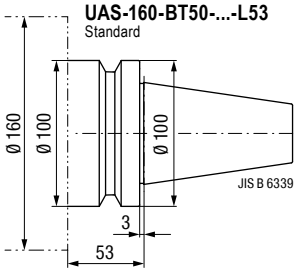
UAS-160-BT-FC50-...-L38
Variant



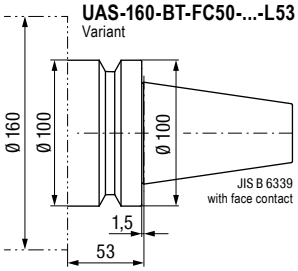
UAS-115-PSC63-...-L42
Variant



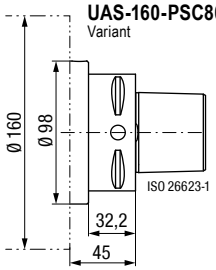
UAS-160-BT50-...-L53
Standard



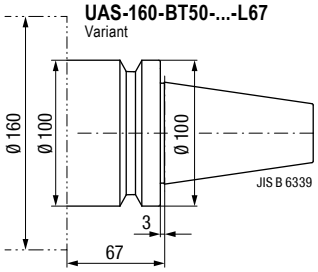
UAS-160-BT-FC50-...-L53
Variant



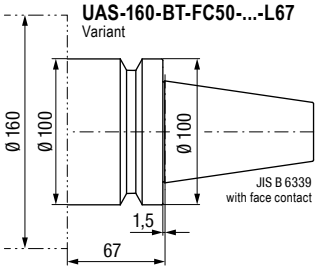
UAS-160-PSC80-...-L45
Variant



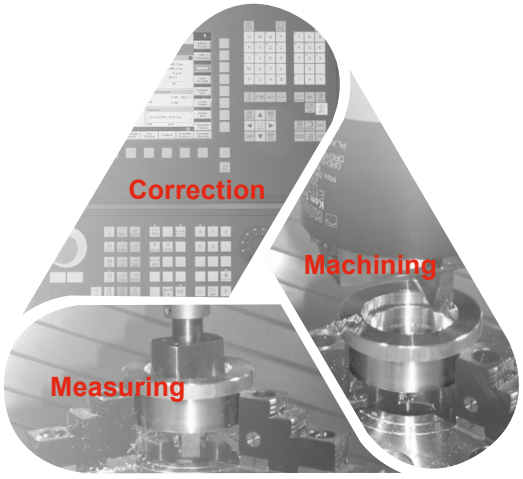
UAS-160-BT50-...-L67
Variant



UAS-160-BT-FC50-...-L67
Variant



Complete machining in a closed process chain



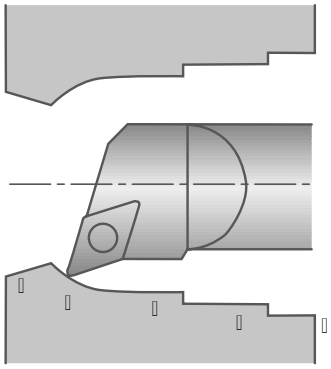
Turning and measuring on the machining centre

Complete machining:
- No switching to a turning machine
- Saving on tools, no special tools required
- Higher quality

Measuring of fits:
- Precision measurement with a barrel gauge or calliper
- Automatic test cut possible

▲ **Saving time**
▲ **Saving on tools**
▲ **Increase in quality**
▲ **Automatic wear compensation**

Programming as usual ...



G0 U15		
G1 Z0		
G1 U14.5 Z-0.5	▯	Chamfer
G1 Z-6		
G1 U14	▯	Level
G1 U13.75 Z-6.25	▯	Chamfer
G1 Z-17		
G1 U13.5	▯	Level
G1 Z-25		
G3 Z-34.18 U9.9 E13.5	▯	Radius
G1 Z-42 U12	▯	Incline
G0 U9.75		
G0 Z10		

Integration of the KOMtronic U-Axis system into different machine control systems

Control system | Manufacturer	
Sinumerik 840 D powerline	SIEMENS
Sinumerik 840 D(i) solution line	
Sinumerik ONE	
Fanuc 15i | 16i | 18i | 21i	FANUC
Fanuc 30i | 31i | 32i | 0i from version D	
Heidenhain iTNC 530 | iTNC 530 HSCI	HEIDENHAIN
Heidenhain TNC 640, TNC 7	
Mazatrol Matrix | SmoothX	MAZAK
Bosch Rexroth MTC-200 V18	BOSCH REXROTH
Bosch Rexroth MTX	
Meldas	MITSUBISHI

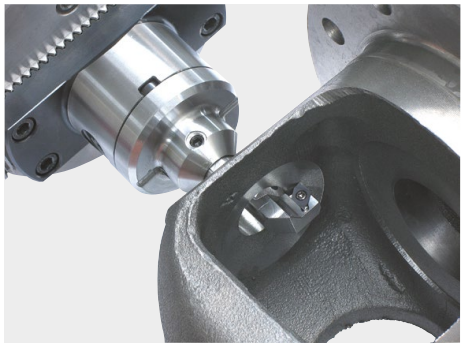
Workpiece: differential housing

- **Flexibility**
- **Saves on expensive blanking**
- **Replaces separate machining on a lathe and thus eliminates the need for a clamping device**
- **Increase in quality**

Machining: turning an inside radius

Cutting speed		v_c = 80 m/min
Feed		f = 0,1 mm/rev.
Cutting width	1st cut	a_p = 1,5 mm
	2nd cut	a_p = 0,2 mm

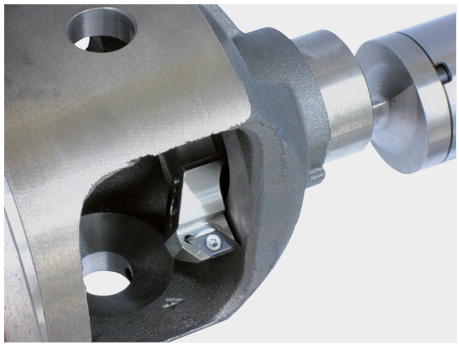
Radial stroke 10 mm

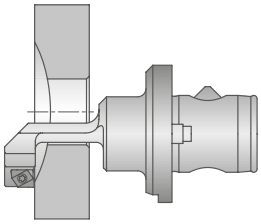


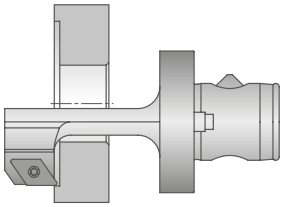
Machining: rear planing

Cutting speed		v_c = 80 m/min
Feed		f = 0,12 mm/rev.
Cutting width		a_p = 0,3 mm

Radial stroke 14,5 mm







Workpiece: medical hinged plate

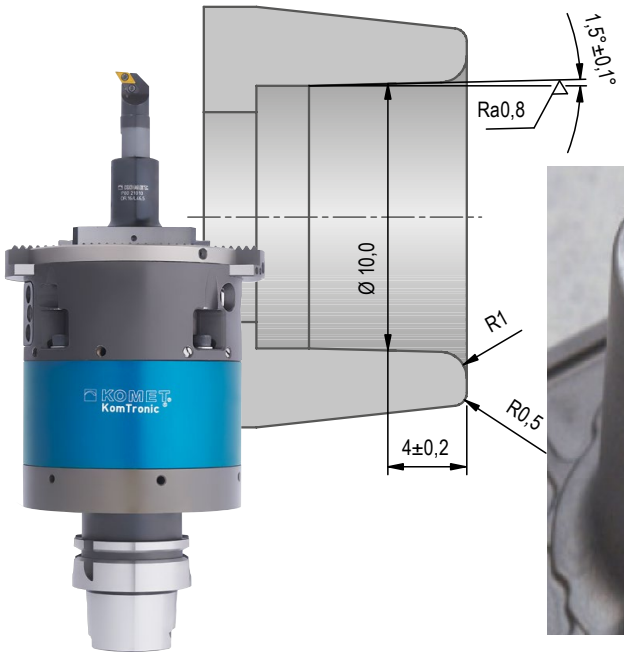
Machining: taper machining with radius contour

- **Reduced processing time**
- **Reduced tool costs**
- **Reduced production time**
- **Higher quality and process reliability**

Material: Titan

Cutting speed
v_c = 50 m/min

Feed
f = 0,05 mm/rev.



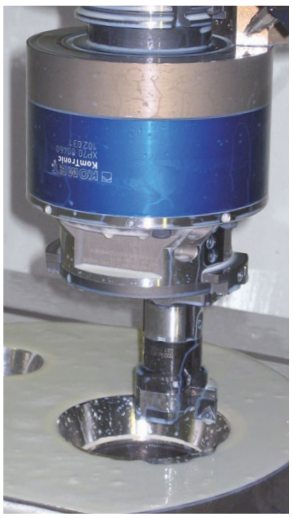
Workpieces can be completely machined with high precision and cycle time savings utilising these options for turning, undercutting, chamfering and generation of NC controlled contours.

Workpiece: control block

Machining: turning an inside taper

- ▲ **Replaces separate machining on a lathe and thus eliminates the need for a clamping device**
- ▲ **Reduced production times**
- ▲ **Increase in quality**

The material Inconel 625 was applied to a tapered hole and machined in 2 cuts.

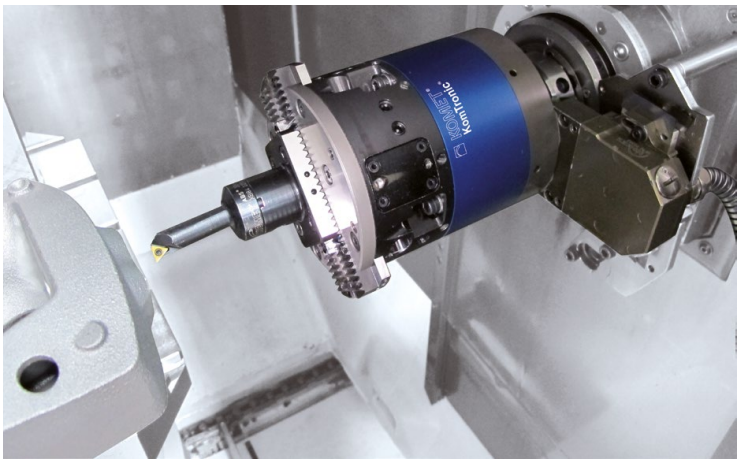


Cutting speed		v_c = 30 m/min
Feed		f = 0,08 mm/rev.
Cutting width	1st cut	a_p = 2,5 mm
	2nd cut	a_p = 0,5 mm

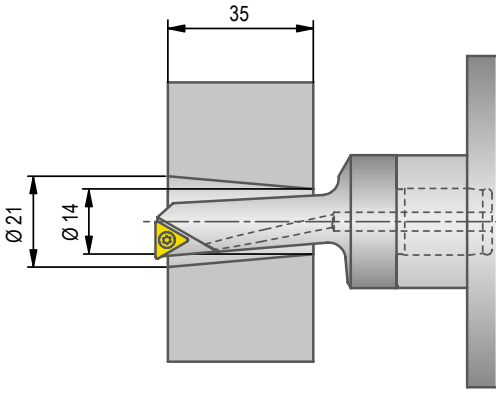
Workpiece: wheelmount

Machining: reverse taper machining

- ▲ **Complete machining on one machine**
- ▲ **Replaces separate machining on a lathe and thus eliminates the need for a clamping device**
- ▲ **Reduced processing times**
- ▲ **Increase in quality**



Cutting speed	v_c	= 150 m/min
Feed	f	= 0,08 mm/rev.
Taper angle	α	= 9,5° $_{-0,05°}$
Material:		Cast aluminum



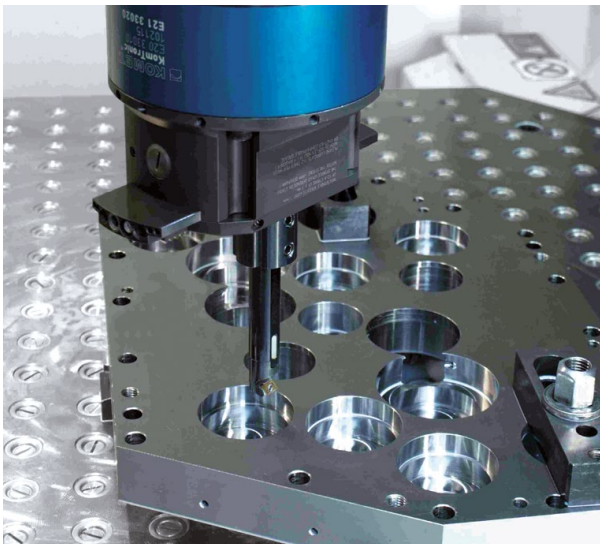
Workpieces can be completely machined with high precision and cycle time savings utilising these options for turning, undercutting, chamfering and generation of NC controlled contours.

Workpiece: bearing plate

Machining: turning a bearing plate

- ▲ **Reduced processing time**
- ▲ **Reduced tool change time**
- ▲ **Reduced tool costs**
- ▲ **Complete machining**
- ▲ **Flexibility**
- ▲ **Higher precision and process reliability**

Material 42CrMo4
Variable diameter

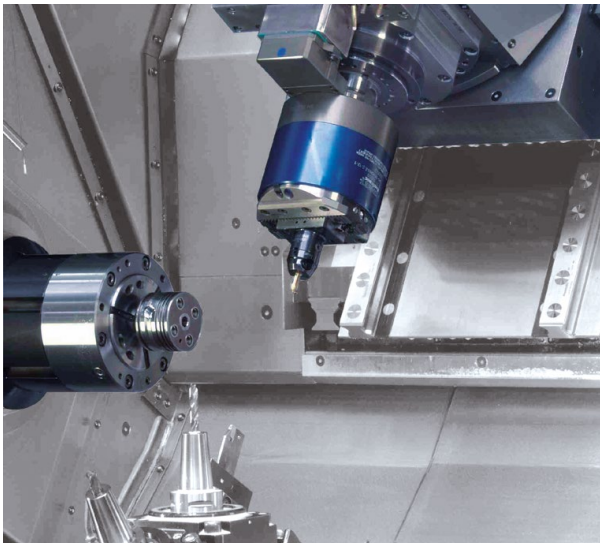


Workpiece: control block

Machining: complete machining on one turning/milling centre

- ▲ **Reduced production time**
- ▲ **Reduced tool costs**
- ▲ **Flexibility**
- ▲ **Increase in quality**

Material 42CrMo4

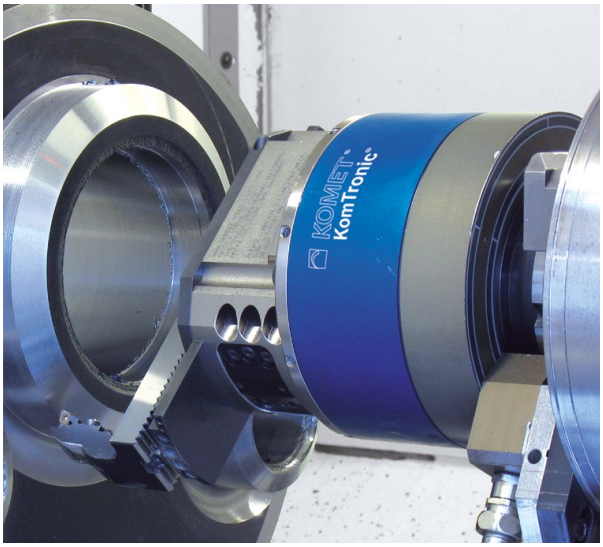


Workpiece: control block

Machining: turning an outer contour

- ▲ **Complete machining on one machining centre**
- ▲ **Replaces separate machining on a lathe and thus eliminates the need for a clamping device**
- ▲ **Reduced production times**
- ▲ **Increase in quality**

Material: Inconel

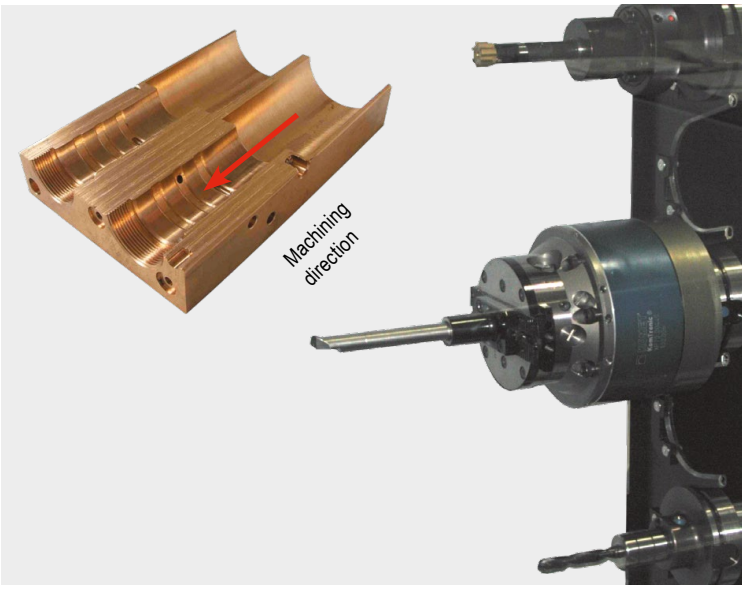


Workpiece: hydraulic cylinder

Machining: springing valves
Boring inner contours and recesses with
2 U-axis systems

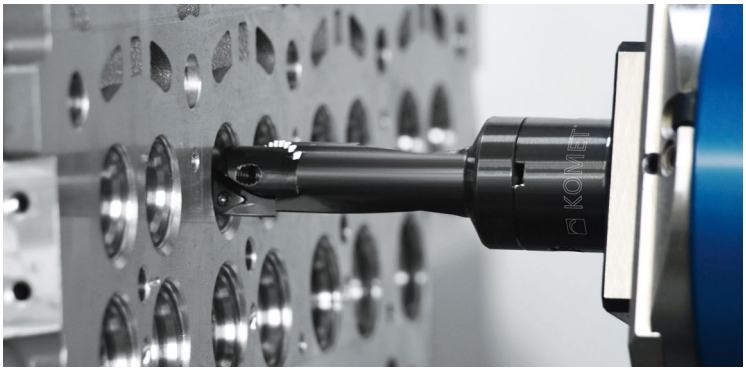
- ▲ **Reduced processing times**
- ▲ **Reduced tool change times**
- ▲ **Reduced tool costs**
- ▲ **Reduced additional costs**
- ▲ **Flexibility**

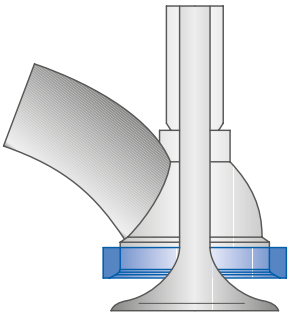
Feed f = 0,1–0,15 mm/rev.
Spindle speed n = 2000 min^{-1}

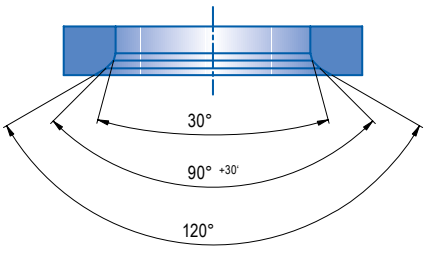


Valve seat machining

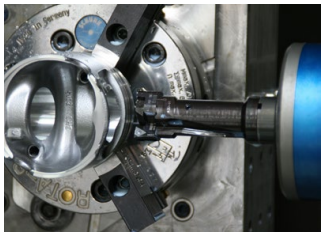
- ▲ **Machining on standard machines instead of special purpose machinery**
- ▲ **Prototype production, engine reconditioning**
- ▲ **Turning contours in a large range, in one large operation**
- ▲ **Increase in quality**
- ▲ **Increase in productivity**

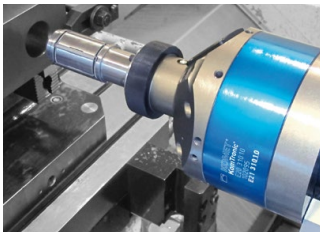


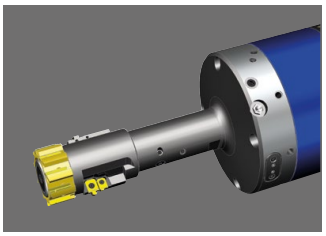


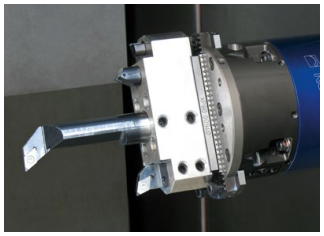


YOUR job – OUR solution

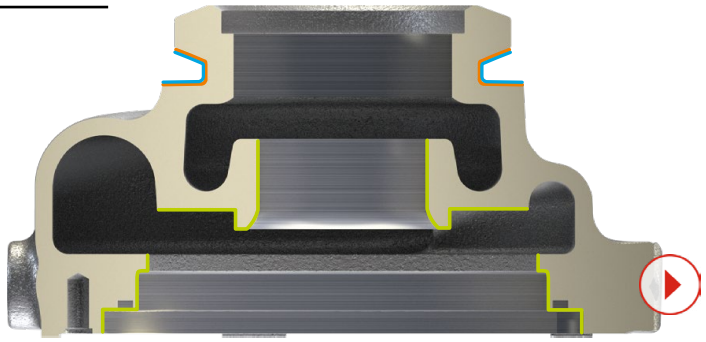

Fine boring


Honing


Reaming and grooving


Flexible, modular tool design

Complete machining of turbochargers



MaxiMill 275 arbor face-milling cutter for machining of turbo chargers Ø 50 – 125 mm
With double-sided octagonal indexable inserts with 16 usable cutting edges.

- ▲ **Robust design, stable and secure position in the basic body**
- ▲ **Special cutting material suitable for the toughest thermomechanical requirements**
- ▲ **Defined, stable cutting edge guidance**
- ▲ **Maximum productivity, process reliability and cost-efficiency guaranteed**

Pre-machining of V-belt outer diameter – interpolation grooving and turning tool

- ▲ **Extremely stable tool design**
- ▲ **Special adaptation of the cutting edge geometry to the machining process with regard to machining time and stability**
- ▲ **Internal coolant supply directly to the tool's cutting edge**

Finish machining of V-belt outer diameter – KOMtronic U-axis systems
With 3D-printed snap-on tool and indexable inserts in special designs, with three cutting edges with ground recess geometry and flute.

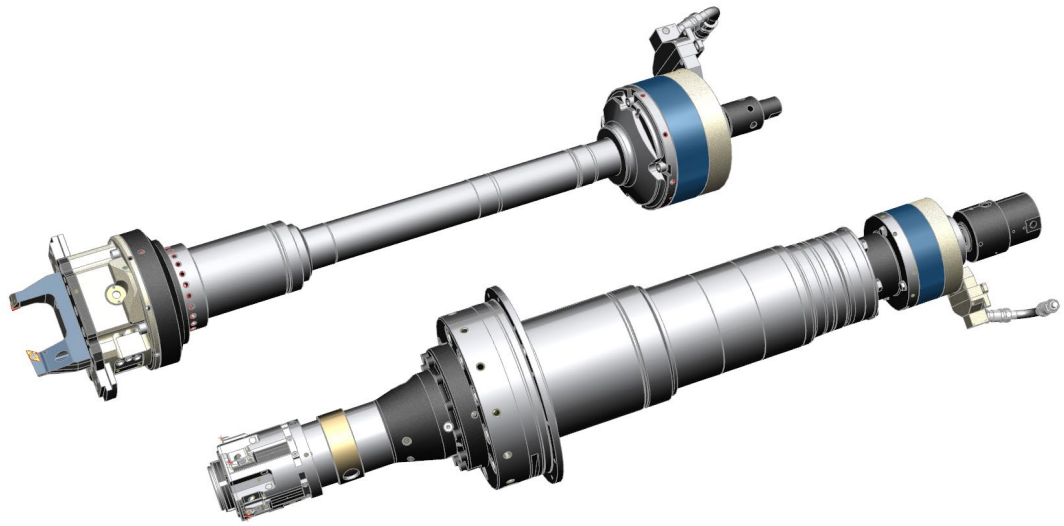
- ▲ **Considerably higher cutting values than with conventional machining**
- ▲ **Integrated position measuring system**
- ▲ **Short, stable tool design thanks to optimal compact connection**

Finish machining of counter bearing conical hole – KOMtronic U-axis systems
With stepped snap-on tool with four indexable inserts.

- ▲ **Complete finish machining with a single tool**
- ▲ **Enables maximum precision to be achieved**
- ▲ **99% use of standard indexable inserts**
- ▲ **Direct coolant supply to the individual cutting edges**
- ▲ **Integrated position measuring system**
- ▲ **Short, stable tool design thanks to optimal compact connection**

KOMtronic SMS / UAC / UAD

Facing heads with integrated measuring system and KOMtronic U-axis systems for spindle integration



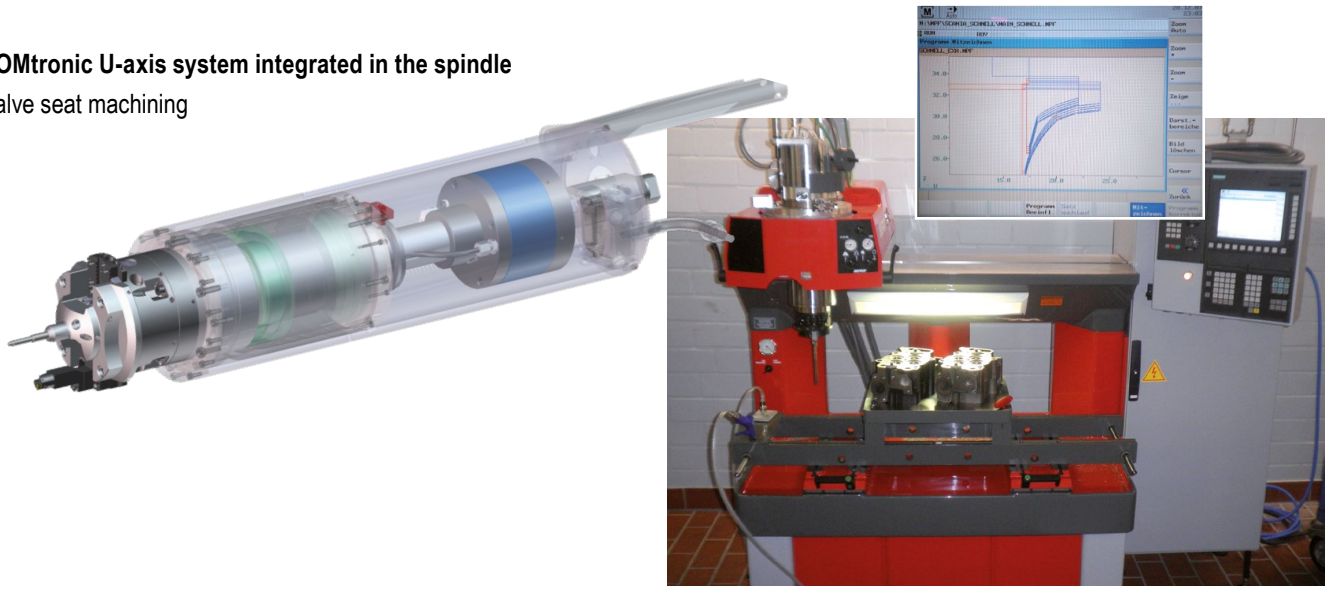
Produce turning contours economically when working with a stationary workpiece

Based on decades of experience producing facing heads for special purpose machines, CERATIZIT is expanding its product range to include KOMtronic systems for spindle integration for different installation and usage requirements for facing heads.

- ▲ **Facing heads with direct encoder on the slide**
- ▲ **KOMtronic systems for spindle integration with own drive**

KOMtronic U-axis system integrated in the spindle

Valve seat machining

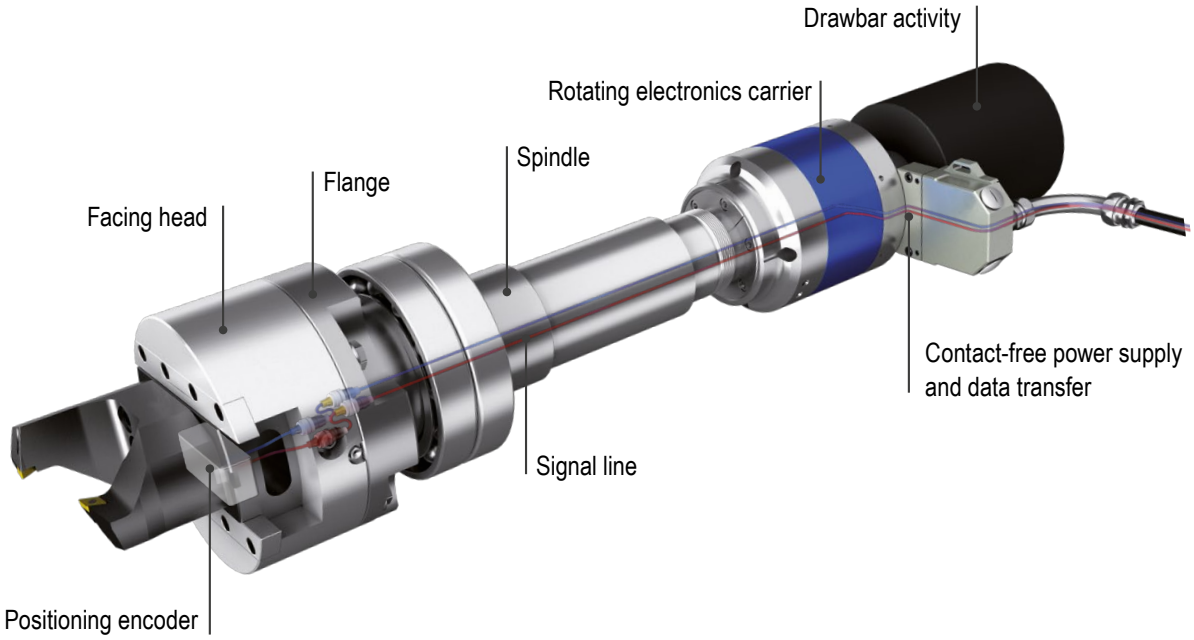


KOMtronic SMS

Slide Measurement System

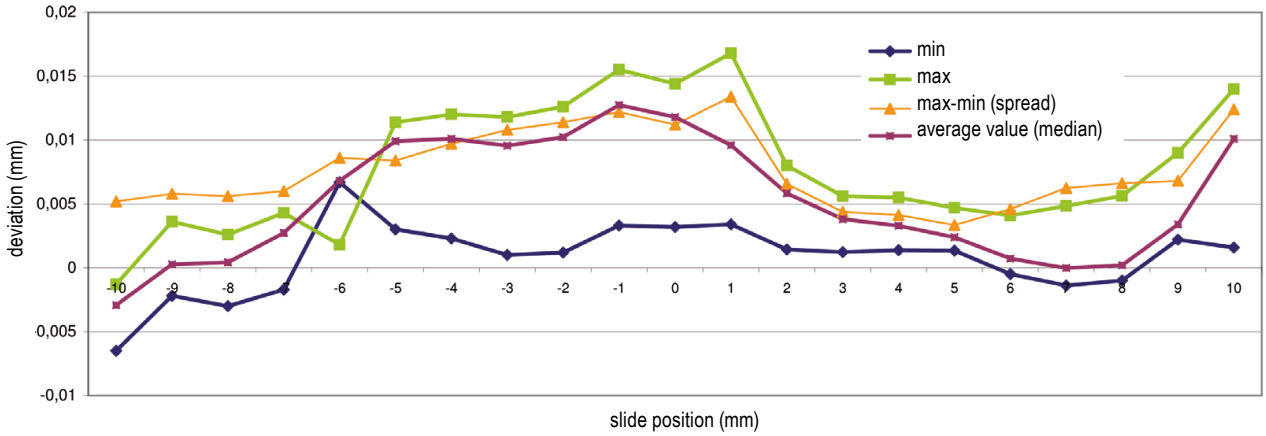
Conventional facing heads with direct encoder (SMS)

- ▲ **Direct measuring system on slide increases positioning accuracy and thus machining quality**
- ▲ **Suppression of backlash, even in the case of wear-related change**
- ▲ **Reduced influence of wear on machining quality**
- ▲ **Possible to compensate for heat cycle of draw bar drive**
- ▲ **Process capability is improved**

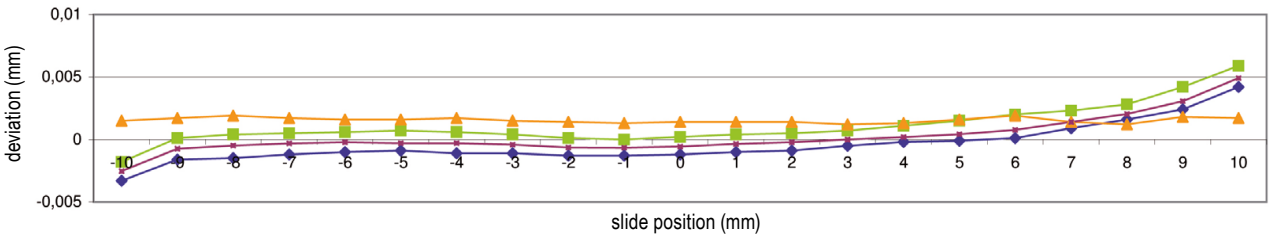


Example:

PKE 160-25-101-SMS / Motor-encoder positioning / 100 repetitions per mm / Measuring range ± 10 mm



PKE 160-25-101-SMS / Direct linear scale positioning / 100 repetitions per mm / Measuring range ± 10 mm



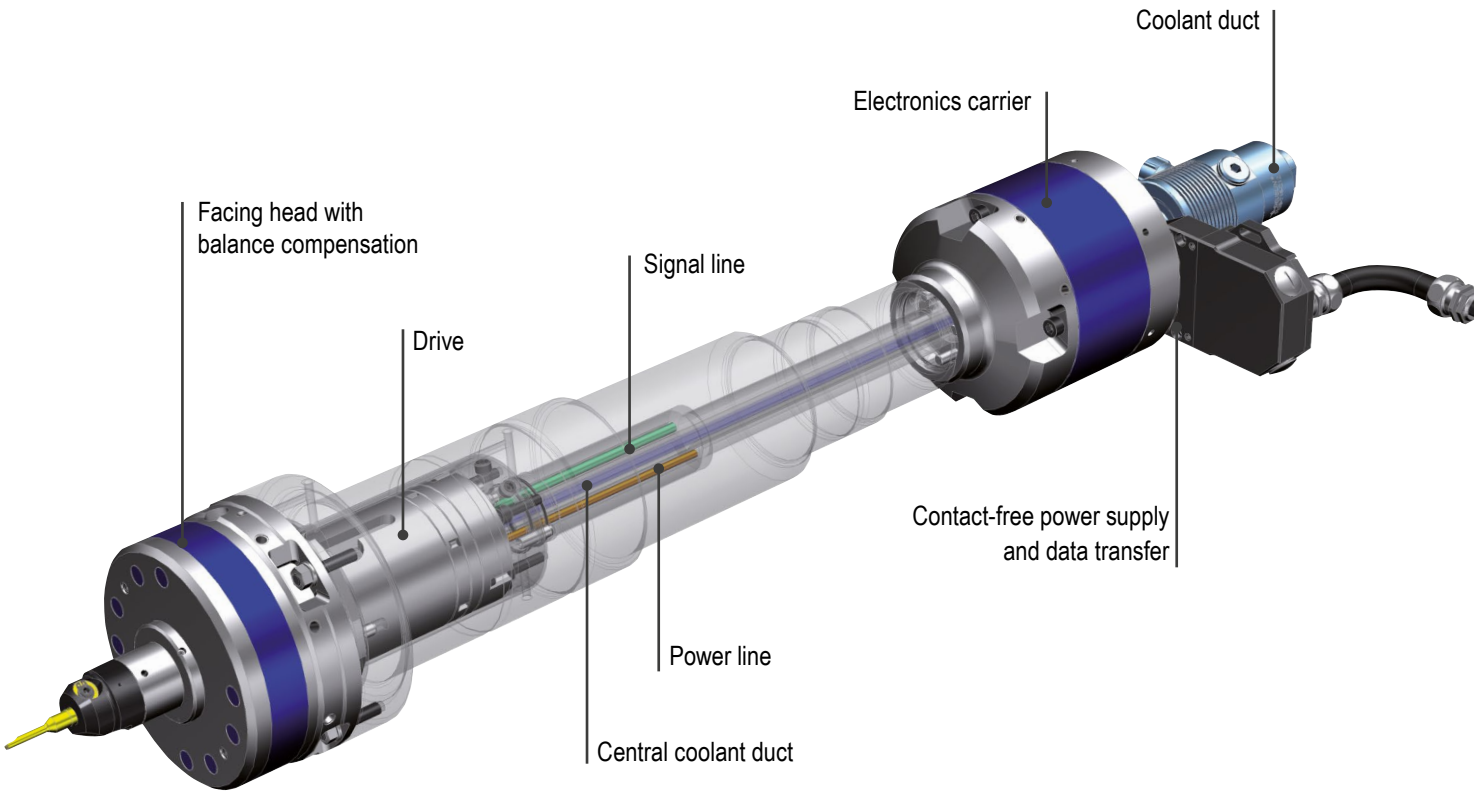
KOMtronic UAC

U-Axis Cartridge

KOMtronic UAC system for spindle integration

- ▲ **KOMtronic drive on the facing head integrated in the front side of the spindle**
- ▲ **No drive elements through the spindle (hollow centre, makes it easier for the media, e.g. MQL, to flow through), as a result bearing points are also not required.**
- ▲ **Short projection, maximum rigidity, special spindle design (bearings), compact construction**
- ▲ **Optionally available with direct encoder on the slide for increased accuracy requirements**
- ▲ **Simple installation of the actuating tool with drive unit, connection of the modules via plugs**
- ▲ **Suitable for higher speeds (for facing heads with balancing compensation)**
- ▲ **No positioning movement is introduced into the rotating spindle from outside, therefore there is no additional stress on spindle connection design**

Adaption into machine tool control and spindle see page 30.



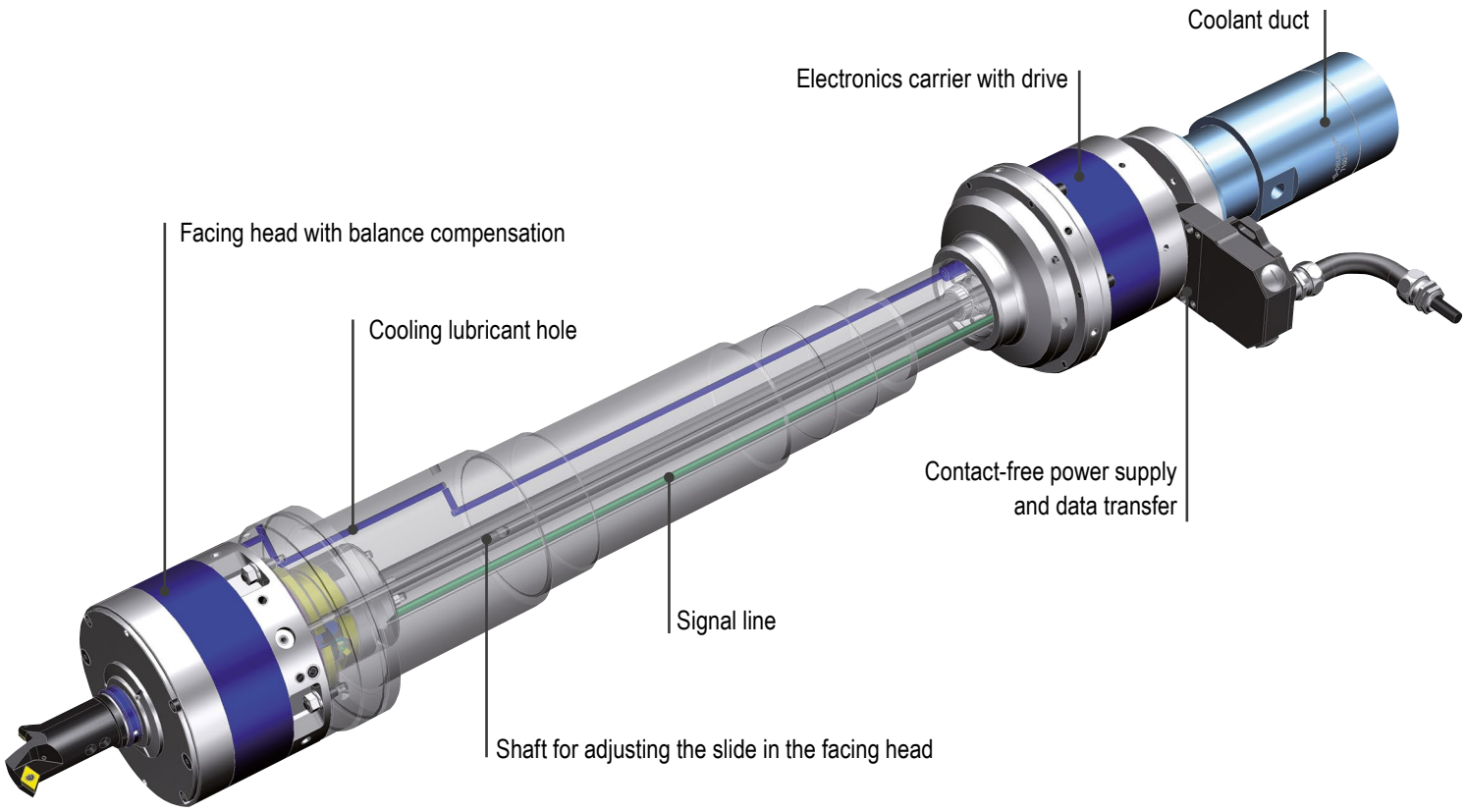
KOMtronic UAD

U-Axis Drive

KOMtronic UAD system for spindle integration

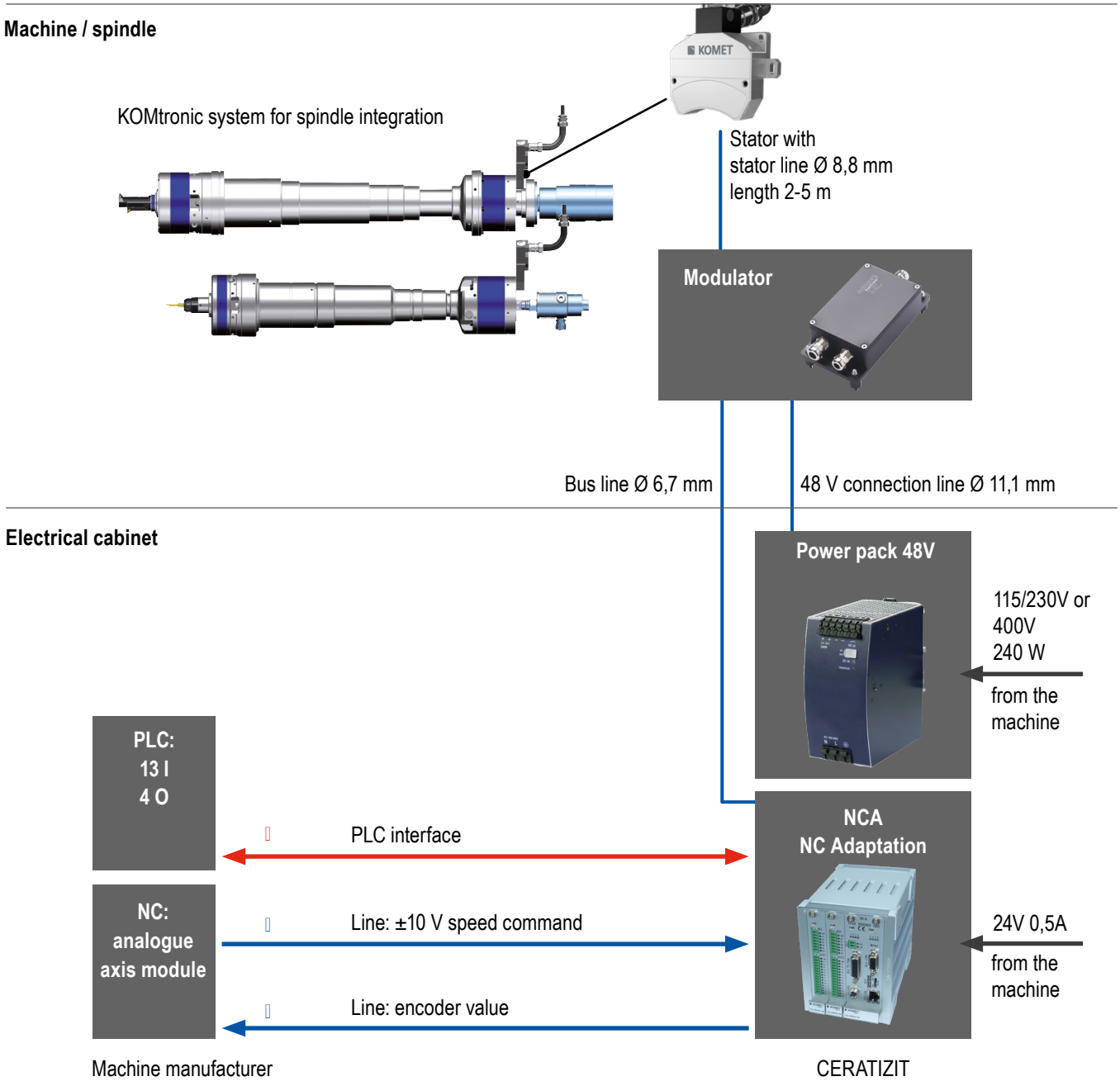
- **Electronics carrier with integrated servo motor (also rotating on the spindle end)**
- **No adjustment movements introduced into the spindle from outside. As a result, loads on the spindle system are reduced. The integrated electric servo drive on the spindle end also rotates and is supplied with electrical energy via a transformer that is also rotating. The data is also exchanged contact-free via the transformer that is also rotating.**
- **Well suited for "slide boring bars". The rotation of the shaft is converted in the slide boring bar into a translational movement.**
- **Optionally available with direct encoder on the slide for increased accuracy requirements**
- **Only a signal line through the machine spindle is required**
- **Small spindle bearing diameter possible**

Adaption into machine tool control and spindle see page 30.



Adaptation into machine tool control and spindle (schematic overview)

Detailed schematic overview will be created based on the specific project.



PLC connection

13 inputs and 4 outputs are required on the PLC. 3 M-commands are required for selecting u-axis functions.

Nominal value requirement

±10 V nominal speed value from analogue axis module of NC control to the NCA.

Incremental actual position value

The current position is transmitted from the NCA to the analogue axis module for the NC control.
The following signal forms are available:

- ▲ TTL level (5 V) in acc. with RS 422, interpolated, square signal form
- ▲ 1 Vpp (1 V peak to peak), sine signal form

The KOMtronic u-axis system does not need a power unit on the NC control.

Questions and answers regarding U-axis tools

1. What level of accuracy can be achieved with the KOMtronic U-axis?

Without a measuring system on the slide ± 0.01 mm for the diameter, with a measuring system ± 0.005 mm for the diameter. The measuring system has a resolution of < 1 µm (the level of accuracy that can be achieved depends on other machining influences, such as tool change errors, cutting edge wear, etc.).

2. How can the cutting insert position be corrected?

Each cutting edge can be corrected via the tool management area of the NC control system. Settings can also be made in this way for tools with short clamping holders.

3. Does the U-axis always need to be re-measured each time the inserts are changed?

No, the U-axis or slide is always in the same position. The insert position can be corrected directly in the machine via an in-process measurement.

4. Does the KOMtronic U-axis have to be removed from the machine to measure the tool?

No, it can easily be released using an interface connection (optional).

5. What is the RPM limit?

When the snap-on tool is mounted centrally on the slide so that the weight distribution is completely balanced the speed is max. 4000 rpm, stroke-dependent actuation.

6. Can the KOMtronic U-axis also be used for roughing?

A variety of machining processes can be used (finishing and roughing). The slide has a maximum power of 4000 N and a permissible torque of 200 Nm. However, the possible usage data depends on the overall length of the tool and the U-axis.

7. How is the U-axis driven?

The U-axis is driven by a servo motor. Slides in the UAS115/160 series are driven by a low-backlash roller screw drive.

8. What workpiece diameters can be machined?

The range of application is 0.5 – 500 mm, taking into consideration the relevant projection length and attachment point.

9. How many different diameters and cutting edges are possible?

There are several possible cutting edges depending on the NC control system and tool design.

10. How is the tool system set?

The U-axis is always changed in the central position. This enables the snap-on tool to be measured on a dummy in the presetting device. In addition, post-process measurement with automated cutting edge correction is possible via the tool management.

11. What about maintenance intervals and servicing?

Recommended 1x year or every 2 years at the latest.

12. How long is the expected service life?

With regular maintenance and care and the replacement of wear parts, a service life of >6500 operating hours is realistic, corresponding to approximately 10 years.

13. Can KOMtronic U-axes be used on multi-spindle machines?

Yes, taking into account the usual specifications for tools in multi-spindle machines.

14. What is the maximum size that can be machined with HSK63 or HSK100?

KOMtronic UAS-115: Up to dia. approx. 250 mm
KOMtronic UAS-160: Up to dia. approx. 500 mm
taking into consideration the relevant projection length and attachment point.

15. Are U-axes better suited to vertical machining rather than horizontal machining?

U-axes are used vertically and horizontally. Compare with the advantages and disadvantages of a conventional tool (centrifugal forces).

Installation support

In order to ensure that the KOMtronic U-Axis system is correctly incorporated into the machine and is able to carry out the required functions, the customer must provide clarification and comply with the necessary requirements:

1. Fitting the stator for non-contact power and data transmission to the KOMtronic U-Axis system. Care should be taken to ensure that no conflict occurs with other parts of the machine, the tool changer or similar units. CERATIZIT obligations do not include provision of the adaptor element for the stator unit.

2. The customer will supply the inputs and outputs required for the KOMtronic U-Axis system on the machine side. The analogue axis unit required for operation with the U-Axis must be provided and configured for the machine control system by the customer.

3. The customer must carry out the necessary software adjustments for the machine sequence control before the installation.

4. Function clarification: Process requirements must be met with reference to machine and processing concept. For example cycle times and machining data must be clarified. The tool changer must be designed for the tool weight and the tool must fit into the tool magazine.

CERATIZIT will provide the necessary assistance for clarification of the tasks as stated.

KOMtronic HSK-i

Research project BaZMod

Component-compliant machine configuration in manufacturing using cyber-physical additional modules.

CERATIZIT has successfully led and completed the BaZMod research project with partners from industry and research.

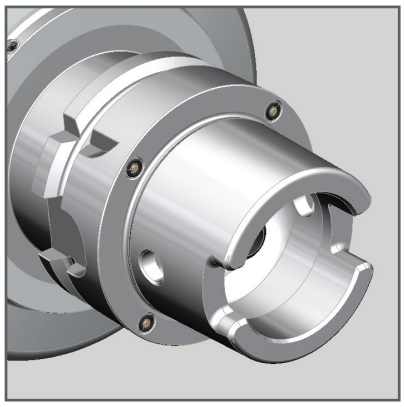
What is the significance of BaZMod?

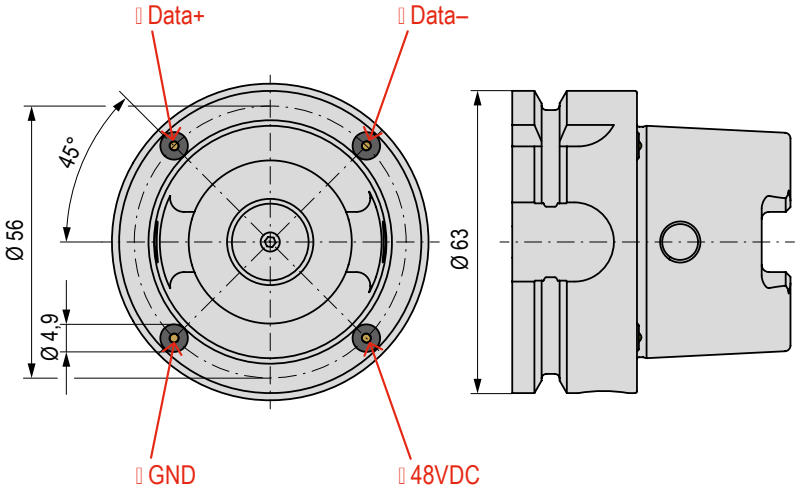
To expand the machining spectrum in modern machining centres, an increased number of intelligent tools (cyber-physical modules – CPM) are being utilised that need to be supplied with additional data, energy or media.

Integrating transmission components into the tool spindle and the hollow shaft cone tool holder (HSK-A) is intended to enable the transfer of these parameters via the machine/tool interface. Consequently, a standard is to be created for the future that will allow for manufacturer-independent, standardised connection of intelligent tools and/or CPMs.
As part of the BaZMod project (www.bazmod.de), the existing HSK interface has been expanded to include contacts on the end face for transferring data and energy.

HSK-i

tool/machine interface





Contact allocation

There are provisions for 4 contacts with the following signal assignment:

1	Data+	
2	Data–	
3	+48 V	High power supply
4	GND (48 V)	High power supply ground, not galvanically isolated

Data transfer

similar to RS485, 22.85714 MHz, 8N1
(1 start bit, 8 data bits, 1 valid bit, 8 data bits, 1 valid bit, then direction reversal, 1 start bit, 8 data bits, 1 valid bit, 8 data bits and 1 valid bit...), half duplex

Data transfer protocol

similar to Profidrive protocol telegram type 3, additional proprietary data transfer possible

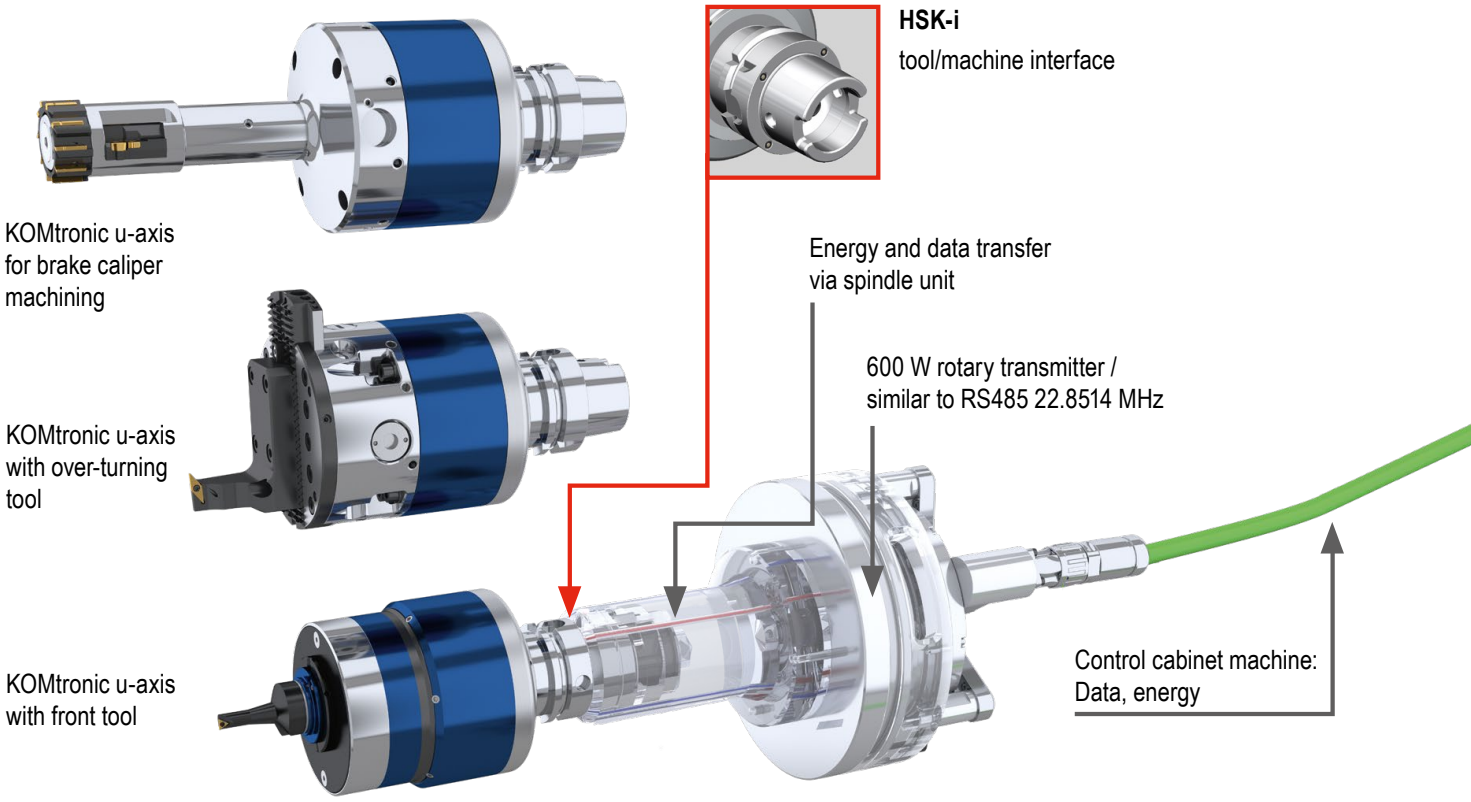
Energy transfer

+48 V with max. 12.5 A; (max. 600 W)
(±10% with ≤5% peak-to-peak ripple for outputs in the range between 50 W–400 W as well as ±20% with ≤5% peak-to-peak ripple for outputs in the ranges 0 W–50 W and 400 W–600 W)

KOMtronic HSK-i

Standardisation of the communications peripherals with the machine control system and the CPS (cyber-physical system)

- ▲ **Standardised HSK-i 63 or HSK-i 100 interface**
- ▲ **CPS with actuators and sensors for active machining operation**
- ▲ **CPS with sensors for machining monitoring or regulating**
- ▲ **Contact-free data and energy transfer at the spindle end**
- ▲ **Up to 600 W power transferable**
- ▲ **+48V switchable**
- ▲ **10 Mbit/s full duplex (on the Profidrive adapter) or 22 Mbit/s half duplex (on the CPS)**
- ▲ **Transfer similar to RS485 transfer**



Interested?
All the BaZMod technology from the machine equipment to the tool can be obtained from CERATIZIT Besigheim.
Contact: Offer.Actuatingtools@ceratizit.com

KOMlife

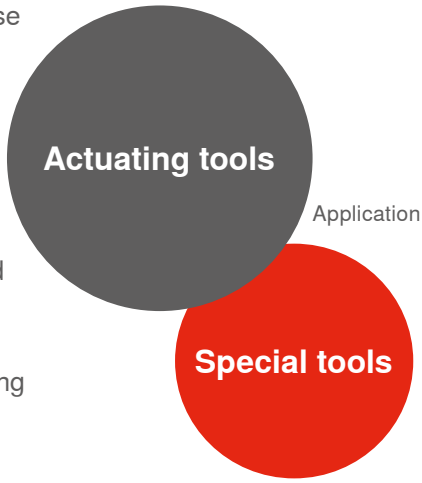
Autonomous acquisition of production data accurate to the second

KOMET

Autonomous acquisition and processing of production data directly on the respective tool

Advantages Benefits

- **Planned, preventative maintenance**
  Regular, advance maintenance planning can increase tool service life and ensure workpiece quality at all times.
- **Digital production data acquisition**
  Through a patented, dynamic QR code and the KOMlife app.
- **Assessment of tool use**
  Conclusions can be drawn about the status and load of the cutting edge by gathering data on tool use.
- **Not dependent on tool manufacturer**
  KOMlife can be easily integrated into new and existing linear and rotating systems, irrespective of the tool manufacturer.

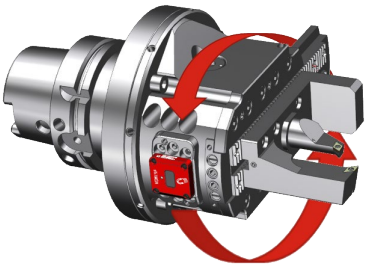


Technical data

Lithium battery	CR2032
Battery life	Approx. 2 years
Min. acceleration	1,5 g
Min. tool diameter	50 mm

cutting.tools/int/en/komlife

KOMlife deactivated

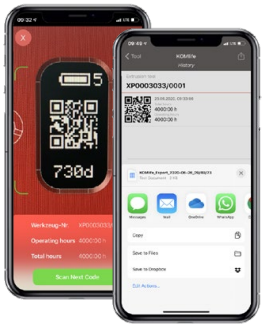


Tool rotates

KOMlife activated

Maintenance interval reached

QR code screen



Digital display of production data

Try me out with the KOMlife app!

Ergonomic display unit

- Number of operating hours
- Current status of the maintenance interval
- Dimensions: 30 x 30 x 11 mm

Can be used with various tool systems

- With linear or rotary acceleration greater than 1.5 g
- Required installation space: 30.1 x 30.1 x 10 mm

Customer-specific adaptation

- Adjustable maintenance interval depending on the application
- Visualisation of the necessary tool maintenance with a red, flashing LED

Patented, dynamic QR code

- Digital acquisition and export of production data via smartphone and KOMlife app
- Display of serial number and production data

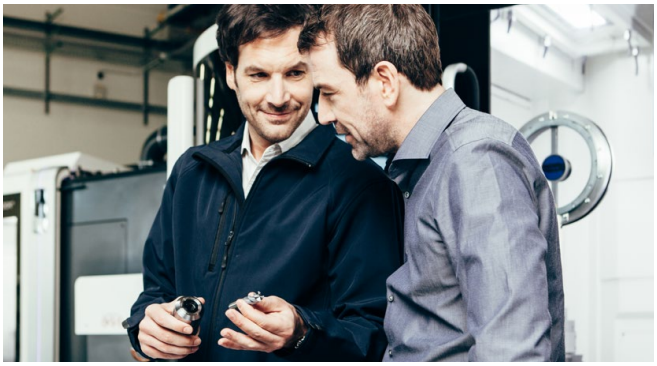
Free KOMlife app in the App Store for iOS devices

Service & Maintenance

for actuating tools KOMdrive / KOMtronic

Our SERVICE

- ▲ Visual inspection
- ▲ Disassembly and cleaning
- ▲ Analysis of the current state
- ▲ Replacement of all sealing elements
- ▲ Assembly, functional testing and creation of a test log
- ▲ In the event that repairs are necessary, we will create a fair offer with a binding delivery date

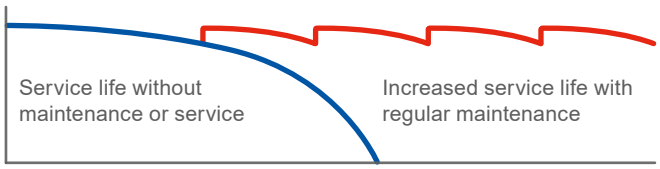


Maintenance recommendations

Precision tools are often subject to difficult operating conditions in the machining process, where swarf, dirt, cooling lubricants and mechanical stresses lead to high levels of wear, compromising the quality of the finished end product and often causing reduced process capacity.

Regular maintenance prevents expensive repairs. Planning maintenance at an early stage significantly reduces the risk of machine downtimes.

Conclusion: Regular maintenance increases the service life of actuating tools and the cost-effectiveness of the system as a whole.



An initial assessment is carried out at a set time. An individual maintenance plan will be developed on the basis of the operating conditions.

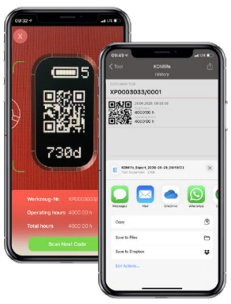
Maintenance intervals

These guideline values may vary depending on the specific application.

Tool	Lubrication	Maintenance intervals
KOMtronic U-axis systems	Permanent	2000 – 3000 operating hours at least every 1 – 2 years
Facing heads with draw bars	Central, automatic lubrication cycle	8000 – 10000 operating hours 7 million strokes
Contact actuation tools	Manual	3000 – 4000 operating hours
Slide boring bars	Manual	3000 – 4000 operating hours

And if repairs do become necessary: No problem.

Repair or maintenance work on head and base elements should only be repaired or serviced at the CERATIZIT location in Besigheim, Germany. All actuating tools are in a mechanically perfect condition when they leave our assembly department. In order to prevent production downtimes, we recommend procurement of a replacement tool.



KOMET KOMlife maintenance system – Autonomous acquisition of production data accurate to the second

The operating data will be provided via dynamic QR Code. It can be used on various systems.

We reserve the right to make technical changes and product improvements.

CERATIZIT GROUP

07/2023 – 94 221 00756