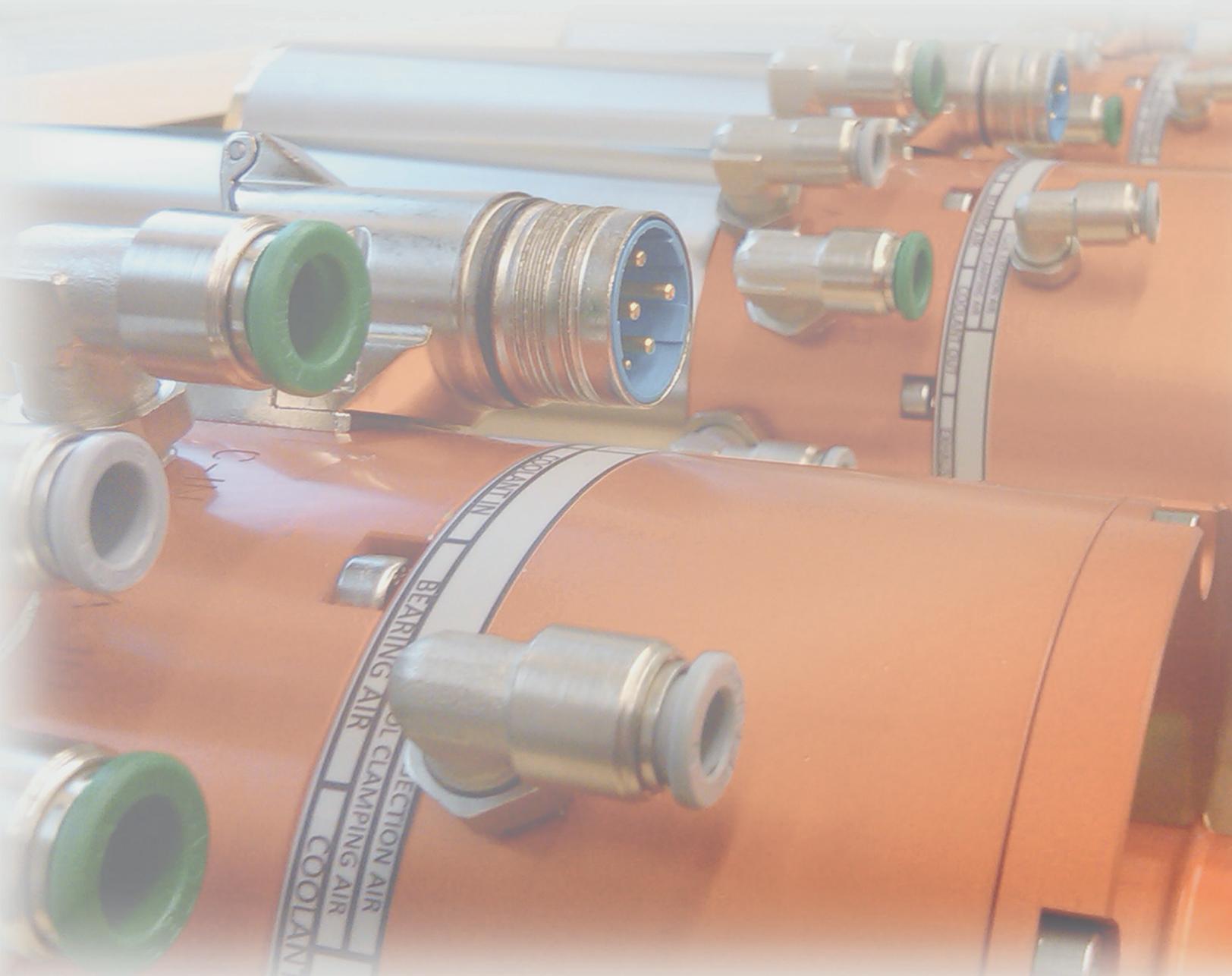




LEVIACROM
NON-CONTACT PRECISION MOTION

ASD-H25 / UASD-H25 (HSK-E25, radial spindle connectors)



Levicron

The development, manufacturing, and sales of motor spindle solutions with non-contact bearing technologies for ultra-precision and CNC machining are Levicron's core businesses.

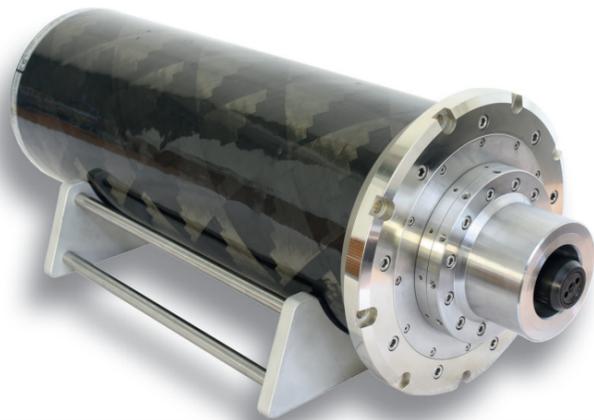
At Levicron, bespoke proven analytical methods and simulation tools for structural analysis and fluid dynamics complement sound practical experience of spindle development and production. Together with the first-ever aerostatic tool spindle comprising an industrial taper interface (HSK) and full CNC functionality, products from Levicron are now used for CNC-machine precision parts with optical surface finish all around the world.

Our requirements for our products and those of our customers prevent the use of off-the-shelf components. Therefore, not only the patented bearing technology and patent-pending spring-free HSK taper clamping systems can be found in our motor spindles, but also in-house developed motor, encoder and tool clamping solutions.

A vertical manufacturing integration of more than 90 % incorporates CNC turning, -milling, -diamond machining, -cylindrical/ bore grinding, -wire cut EDM, and bespoke machining solutions. You can find all our sophisticated production tests and dynamic balancing methods under one roof.

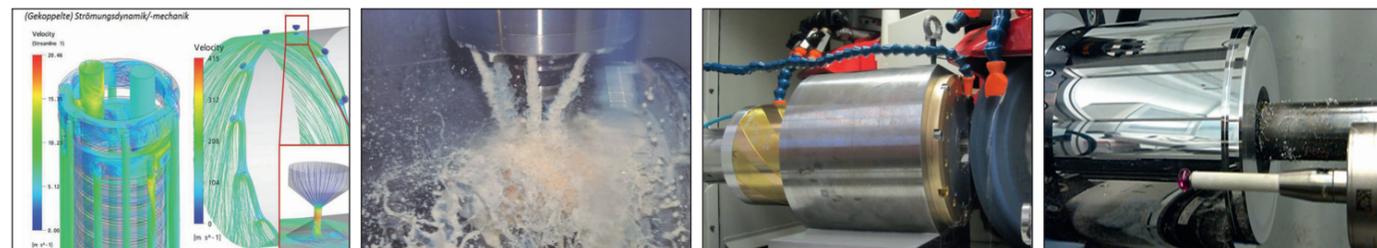
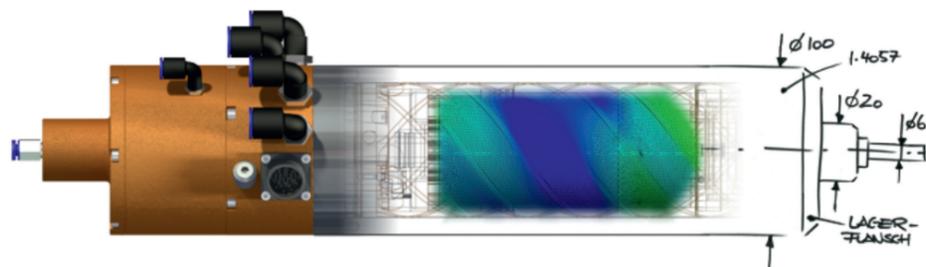
The quality, speed, and accuracy of Levicron spindles and the requirements coming from the applications are used to make it necessary to develop bespoke encoder and motor solutions as well as solutions for HSK tool clamping, HSK tool holding, and others. Because of their unique performance and functionality, some solutions have been made available for our customers as off-the-shelf items.

Although Levicron had to reinvent the wheel more than once, our customers can confirm that our wheels run smoother and faster than others. As a result, tool and work-holding spindle solutions for turning, milling, and grinding can provide the customer with unique thermal stability and robustness at shaft dynamics, errors in shaft motion, and speeds that have not been available so far.



Levicron

All in house developed and manufactured Ultra Precision Technology for CNC Machining



Why aerostatic bearing systems for tool and work-holding spindles?

Although it is difficult to believe for many engineers that the radial stiffness of our tool and work-holding spindles is comparable with the radial stiffness of actual roller-bearing spindles, the axial stiffness can even be higher. Compared to the tiny Hertzian contact in a roller bearing, ultra-thin bearing gaps combined with a large bearing surface lead to a comparable bearing stiffness. Combined with our high-pressure aerostatic bearing technology, it leads to even higher load capacities. Also, bearing gaps with only a few microns in width allow very high shear velocities and compensate for shape errors. This averaging effect of the air film between the shaft and the bearing allows a shaft rotation more controlled than the sum of all shape errors.

Technical benefits

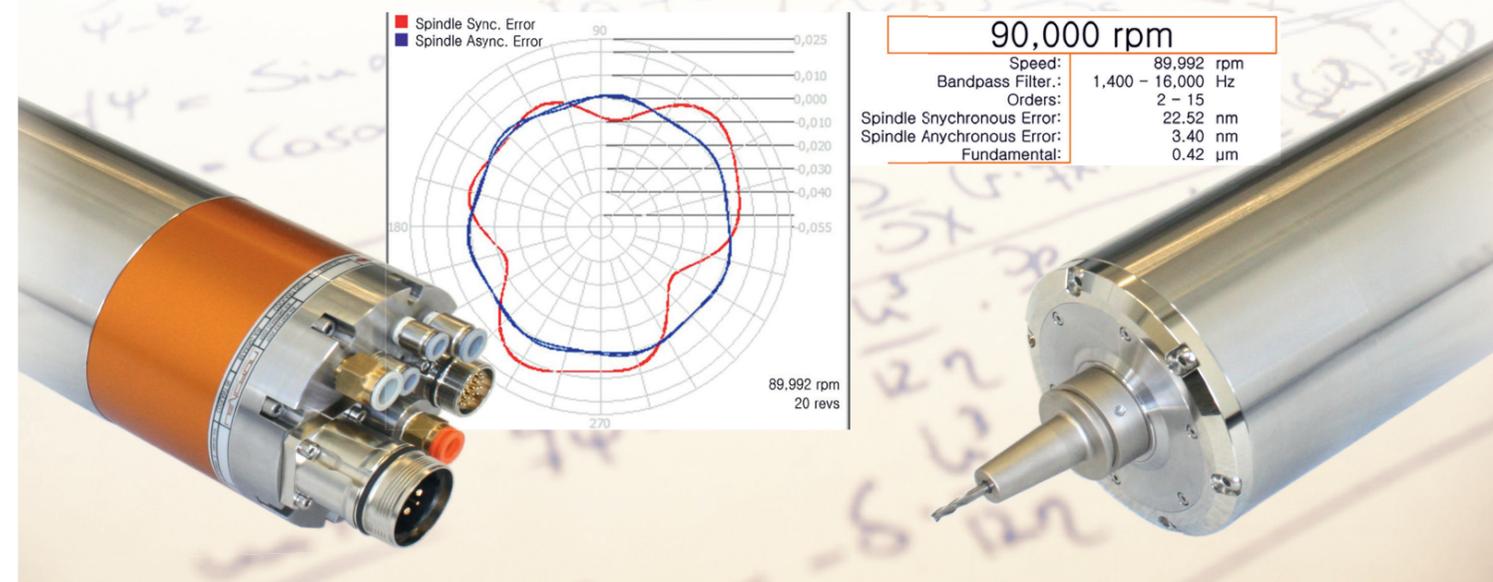
- Higher speeds: speeds of up to 100,000 rpm with HSK-E25 tool holders
- Significantly more minor synchronous and asynchronous spindle errors: dynamic run-out values < 0.5 micron and errors in shaft motion of < 30 nm at any speed
- Thermal stability: spindle soak time < 5 min., axial shaft growth < 5 micron, X/ Y stability < 0.5 micron
- Wear-free and stable operation even at top speed
- Modular and service-friendly cartridge design
- Oil and grease-free operation

Customer benefits

- Higher productivity and reduced tool wear
- Remarkably better surface finishes in any material; suitable for ultra-precision machining
- Stable operation at any speed with no time limit
- Cost-effective assembly due to a modular spindle design
- Oil- and grease-free operation suitable for medical parts and applications within the food industry

Solutions from Levicron - bespoke solutions to not compromise accuracy and performance:

- ➔ Patented bearing technology for outstanding shaft errors in motion, minimized air consumption & spindle stiffness
- ➔ Patented automatic and spring-less tool interface for DIN69893 (HSK) taper clamping to give the exceptional shaft dynamics and reliability
- ➔ Bespoke iron-less motor solutions for ultra-precision machining & high-power motor options
- ➔ In-house developed integral encoder systems with a reduced number of parts and a reduced size compared to industry-standard
- ➔ DIN69893 (HSK) tool holder series UTS-x for ultra-precision machining



ASD-H25 / UASD-H25

Ultra-precision aerostatic tool spindle with automatic spring-less HSK-E25 tool interface and radially oriented spindle connectors.

Description

Our spindle models **ASD-H25** and **UASD-H25** fulfill all your requirements for a high-quality CNC motor spindle to generate high-precision parts with an optical surface finish. They combine robustness and CNC functionality with high spindle speeds for micromachining and low errors in shaft motion to machine optical components.

Both models feature an automatic spring-less **HSK-E25** tool clamping, a high-resolution rotary encoder, a highly efficient thin-film liquid cooling, tool clamp status monitoring, and a robust steel housing with a standardized diameter.

What is the added value?

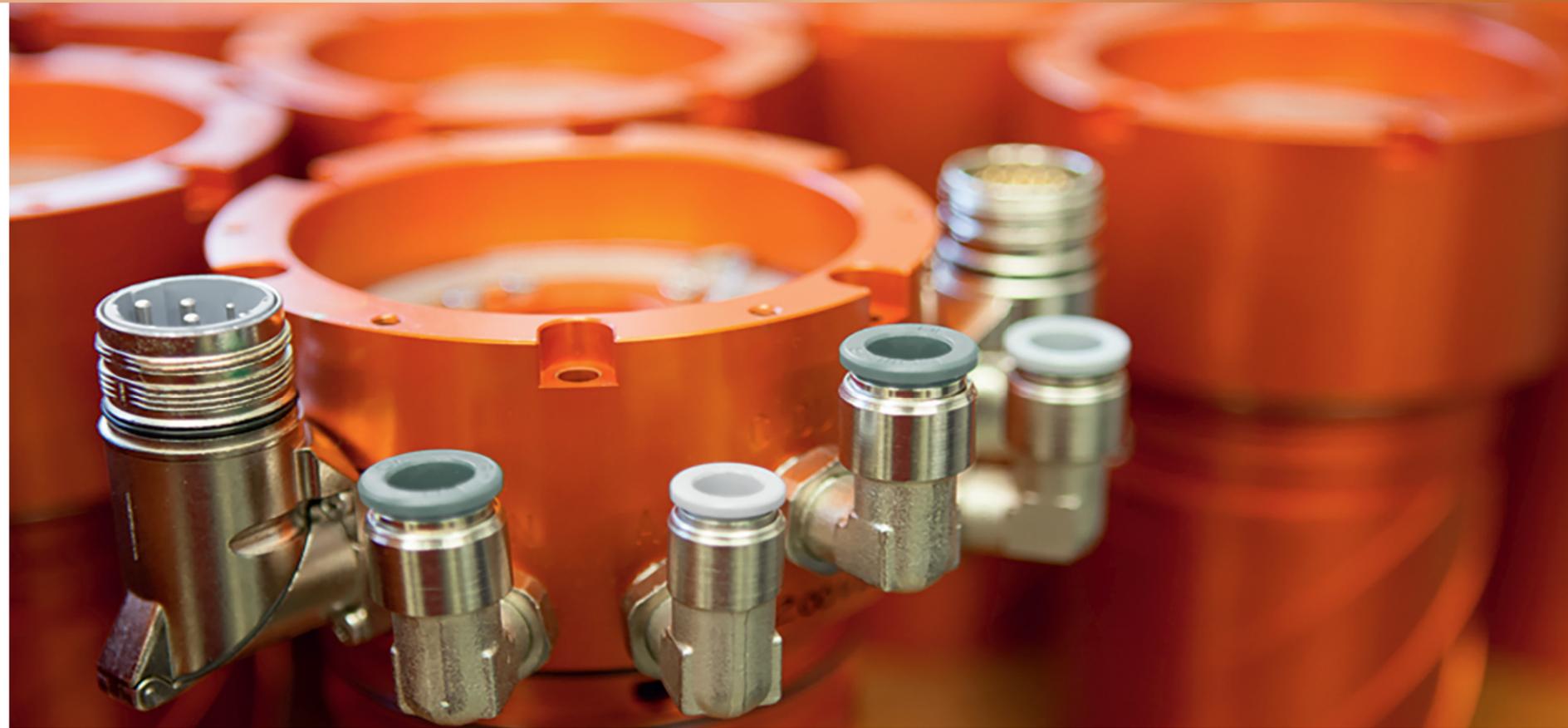
If used in CNC machine tools, the user not only gets outstanding precision, thermal stability, and speed but also, for the first time, the ability to create parts with optical surface finish. For ultra-precision machining, on the other hand, our **ASD-H25** and **UASD-H25** now enable significantly increased chip loads and automated tool change to increase productivity at an ultra-precision level.

Both models are also available with axial spindle connectors (ASD-H25A/ UASD-H25A).

At a glance, ASD-H25 / UASD-H25

Tool interface	HSK-E25, automatic, spring-less (SLH25)
Body diameter	100 mm
Motor options	400 V max., high-power, 0.7 Nm S1
	200 V max., high-power, 0.7 Nm S1
	400 V max., iron-less, 0.33 Nm S1
	200 V max., iron-less, 0.33 Nm S1
Angular position control	1 VSS SinCos, 80 lines, zero-flag
Nominal speed	60,000 rpm
	80,000 rpm
	90,000 rpm
Tool change system	pneumatic, 4bit tool clamp status monitoring, taper cleaning air
Spindle cooling	thin-film liquid cooling
Bearing system	aerostatic (ASD-H25)
	high-pressure aerostatic (UASD-H25)
Accuracy, dynamics	dynamic tool run-out < 0.5 μm *)
	Error-motion < 30 nm (ASD060H25)
Cutting fluid feedthrough	2x spray nozzle at spindle front
Spindle connectors	radially oriented

*) if used with the tool holders series UTS-25

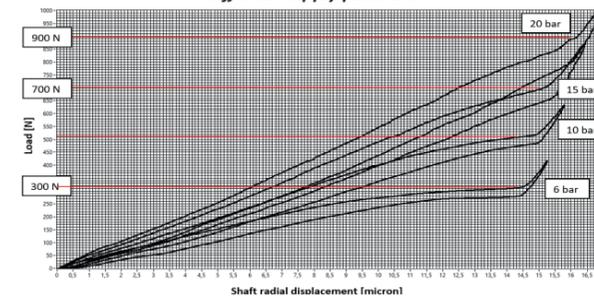


ASD-H25 and UASD-H25, a comparison

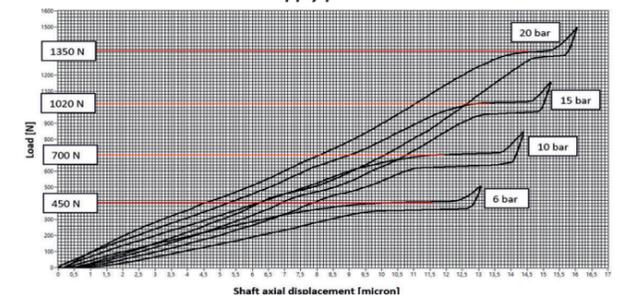
The aerostatic bearing system of the UASD-H25 type spindles has specifically been designed and manufactured for use with supply pressures of 20 - 30 bar. Compared to the standard models, the result is an increase in load capacity at the spindle nose of approximately 300 %. The new axial bearing and bearing orifice design significantly reduce air consumption to provide economical operation even at higher supply pressures.

You may need an alternative air compressor to your machine's standard to operate with the UASD-x models.

Radial static load capacity at spindle nose at different supply pressures



Axial static load capacity at different load supply pressures

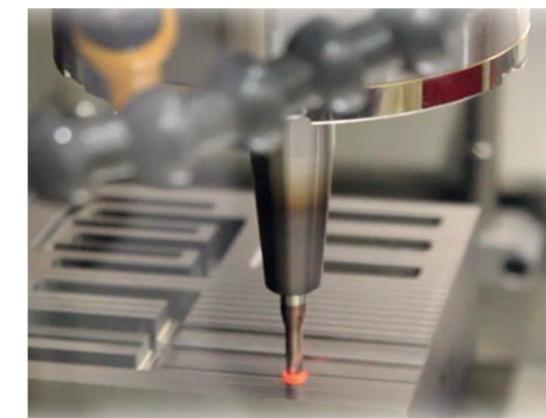
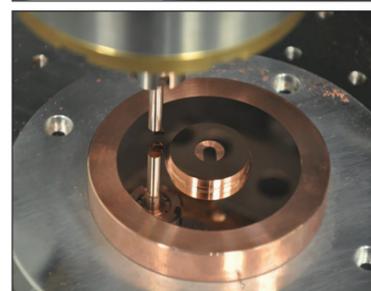
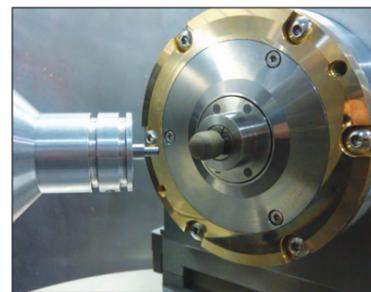


ASD-H25 and UASD-H25, test results

		ASD060H25	UASD060H25 *)
Bearing air supply pressure	[bar]	6 - 10	20 - 30
Speed	[rpm]	0 - 60,000	0 - 60,000
Static radial ult. load capacity at the spindle nose	[N]	330	900 (273 %)
Static ult. load capacity	[N]	650	1,300 (200 %)
Static radial stiffness at the spindle nose	[N/ μm]	41	83 (202 %)
Static axial stiffness	[N/ μm]	60	75 (125 %)
Static air consumption	[l/ min]	50	90 (180 %)
Dynamic tool run-out **)	[μm]	< 0.4	< 0.3
Shaft error in motion **)	[nm]	< 23	< 28

*) all values are taken at 20 bar bearing air supply pressure

**) if used with the UTS-25 tool holder series





ASD-H25/ UASD-H25
with radially oriented spindle connectors („front view“)



ASD-H25/ UASD-H25
with radially oriented spindle connectors („rear view“)

Data Sheet ASD-H25

		ASD060H25	ASD080H25	ASD090H25
General	Body diameter [mm]	100	100	100
	Total length [mm]	472	472	472
	Weight [kg]	16	16	16
	Speed [rpm]	0 - 60,000	0 - 80,000	0 - 90,000
	Automatic tool interface [-]	HSK-E25, spring-less	HSK-E25, spring-less	HSK-E25, spring-less
	Tool clamp status monitoring [-]	4bit digital	4bit digital	4bit digital
Motor option „high-power“, 400 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.7	0.7	0.7
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	270	370	410
	Rated current [A]	10	10	10
	Peak current, RMS [A]	20	20	20
Motor option „high-power“, 200 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.7	0.7	0.7
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	170	205	235
	Rated current [A]	18	18	18
	Peak current, RMS [A]	36	36	36
Motor option „iron-less“, 400 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.33	0.33	0.33
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	260	330	380
	Rated current [A]	5	5	5
	Peak current, RMS [A]	11	11	11
Motor option „iron-less“, 200 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.33	0.33	0.33
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	160	180	208
	Rated current [A]	9	9	9
	Peak current, RMS [A]	18	18	18
Rotary encoder	Type [-]	incremental	incremental	incremental
	Lines [-]	80	80	80
	Signal A/B [-]	1VSS SinCos	1VSS SinCos	1VSS SinCos
	Zero flag [-]	yes (digital/ analog)	yes (digital/ analog)	yes (digital/ analog)
Bearing system	Bearing air supply pressure [bar]	6 - 10	6 - 10	6 - 10
	Air cleanliness, ISO8573 [-]	3 or any better	3 or any better	3 or any better
	Static radial zero position stiffness at the spindle nose [N/μm]	> 40	> 25	> 20
	Static radial load capacity at the spindle nose [N]	> 330	> 300	> 280
	Static axial zero position stiffness [N/μm]	> 60	> 40	> 30
	Axial load capacity [N]	> 600	> 550	> 500
Stability and precision	Taper run-out TIR [nm]	< 100	< 100	< 100
	Shaft error in motion [nm]	< 30	< 35	< 45
	Dynamic tool run-out *) [μm]	< 0.5	< 1	< 1.2
	Spindle soak time [min]	< 3	< 3	< 3
	Axial shaft growth [μm]	< 3	< 5	< 6

all values are taken at 6 bar bearing air supply pressure
* if used with the UTS-25 tool holder series

Data Sheet UASD-H25

		UASD060H25	UASD080H25	UASD090H25
General	Body diameter [mm]	100	100	100
	Total length [mm]	472	472	472
	Weight [kg]	16	16	16
	Speed [rpm]	0 - 60,000	0 - 80,000	0 - 90,000
	Automatic tool interface [-]	HSK-E25, spring-less	HSK-E25, spring-less	HSK-E25, spring-less
	Tool clamp status monitoring [-]	4bit digital	4bit digital	4bit digital
Motor option „high-power“, 400 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.7	0.7	0.7
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	270	370	410
	Rated current [A]	10	10	10
	Peak current, RMS [A]	20	20	20
Motor option „high-power“, 200 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.7	0.7	0.7
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	170	205	235
	Rated current [A]	18	18	18
	Peak current, RMS [A]	36	36	36
Motor option „iron-less“, 400 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.33	0.33	0.33
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	260	330	380
	Rated current [A]	5	5	5
	Peak current, RMS [A]	11	11	11
Motor option „iron-less“, 200 V max.	Type [-]	3 phases, synchronous	3 phases, synchronous	3 phases, synchronous
	Constant torque [Nm]	0.33	0.33	0.33
	Poles [-]	2	2	2
	max. phase voltage, RMS [V]	160	180	208
	Rated current [A]	9	9	9
	Peak current, RMS [A]	18	18	18
Rotary encoder	Type [-]	incremental	incremental	incremental
	Lines [-]	80	80	80
	Signal A/B [-]	1VSS SinCos	1VSS SinCos	1VSS SinCos
	Zero flag [-]	yes (digital/ analog)	yes (digital/ analog)	yes (digital/ analog)
Bearing system	Bearing air supply pressure [bar]	20 - 30	20 - 30	20 - 30
	Air cleanliness, ISO8573 [-]	3 or any better	3 or any better	3 or any better
	Static radial zero position stiffness at the spindle nose [N/μm]	> 70	> 50	> 35
	Static radial load capacity at the spindle nose [N]	> 900	> 800	> 750
	Static axial zero position stiffness [N/μm]	> 70	> 60	> 50
	Axial load capacity [N]	> 1,300	> 1,200	> 1,100
Stability and precision	Taper run-out TIR [nm]	< 100	< 100	< 100
	Shaft error in motion [nm]	< 35	< 40	< 50
	Dynamic tool run-out *) [μm]	< 0.5	< 1	< 1.2
	Spindle soak time [min]	< 3	< 3	< 3
	Axial shaft growth [μm]	< 3	< 5	< 6

all values are taken at 20 bar bearing air supply pressure
* if used with the UTS-25 tool holder series



Levicron GmbH | Clara-Immerwahr-Str. 2
67661 Kaiserslautern, Germany

Phone: +49 (0) 6301 - 66 800 - 0 | <https://levicron.com> | E-Mail: info@levicron.com