

Innovative manufacturer of ultra-precise tool and workpiece motor spindles for milling, grinding, drilling and turning applications.



LEVICRON

NON-CONTACT PRECISION MOTION

(High-pressure) aerostatic tool motor spindle with HSK-E 20: U/ASD-H20A



Levicron GmbH



Company profile

Levicron GmbH is a leading developer, manufacturer, and distributor of non-contact, ultra-precision air-bearing motor spindles for micro, precision, and ultra-precision machining applications. Dr. Ralf Dupont founded Levicron in 2010 in Kaiserslautern, and ever since it has been established as a world-leading industrial company in ultra-precise motor spindle solutions. Our expertise is not only based on decades of practical experience in spindle design but also on using innovative calculation models, simulations, and test methods in structural analysis and fluid dynamics.

As a pioneer in CNC machining spindles with aerostatic bearings, industrial tool interfaces (HSK), and full CNC functionality, Levicron has globally set standards. Our products not only meet the highest demands of our customers in CNC and Ultra-precision machining, we are also committed to exceeding them. We use patented bearing technologies, springless HSK clamping systems and in-house developed motor and encoder systems to make sure our spindles always represent the cutting edge of spindle technology. With a vertical manufacturing integration of more than 90%, including CNC turning, milling, external cylindrical grinding, internal grinding, diamond machining, and wire EDM, we have gained exceptional control of any aspect of the manufacturing process. In addition to our spindle products, we bespoke machining solutions, test benches, test methods, and balancing techniques in-house.

Our customers' demands on speed, accuracy, and quality require tailor-made partial solutions that other manufacturers can only offer to a certain extent. Besides our spindle solutions, we also provide components such as bearing systems, rotary encoders, electric motors, and HSK tool holders with unique properties. This approach makes sure our customers receive superior spindle solutions for turning, milling, or grinding applications. With superior spindle dynamics, lowest spindle errors, exceptionally high stiffness values and a broad speed range, we don't just set standards - we define them.



Our Solutions

- ➔ Patented bearing technology for exceptionally **low spindle errors**, **minimized air consumption**, and **high stiffness values**
- ➔ **Improved robustness and precision** thanks to **higher rigidity and load capacity** than conventional air-bearing spindle solutions
- ➔ **Optimized motor solutions & reduced power losses** for dynamically thermal-enhanced operations over the entire speed range
- ➔ Customized and in-house developed **rotary encoder systems** for sublime position control, signal adjustment, and reliability
- ➔ **Ultra-precision HSK tool holders according to DIN-69893** for automatic tool changes with under 200 nm repeatability and, for example, a balanced quality of **G 0.3 mm/s at 60,000 rpm** (HSK-E 25)
- ➔ **Spring-less patented HSK clamping units** to improve spring-based systems regarding repeatability, stability, size, and reliability
- ➔ **Innovative calculation, simulation, optimization, and manufacturing technologies**, as well as decades of experience with non-contact bearing systems

Your Advantages

- ✓ **Higher speed possible** (with U/ASD-H20A (HSK-E 20) up to 150,000 rpm)
- ✓ **Lowest synchronous and asynchronous errors** according to DIN ISO 230-07
- ✓ **Wear-free and stable continuous operation at maximum speed**
- ✓ **Short ramp times and no warm-up or re-lubrication cycle** for an immediate machine operation up to 75,000 rpm/s
- ✓ **A minimum optimized axial shaft growth & soak time across the entire speed range** (< 0.8 µm with ASD-Px in less than 10 min)
- ✓ **Oil, grease, and contactless operation**, as well as **short repair times** through the use of complexity-reduced methods already in the modular design of the spindle
- ✓ **No axial retention system is required when changing ejecting tools** to protect the bearings from being damaged by the eject load, and there is **no need for ESD protection measures**



ASD-H20A/ UASD-H20A

(High-pressure) aerostatically tool motor spindle with HSK-E 20 interface (SLH-20)



General information at a glance

Tool interface	Automatic spring-less HSK-E 20 tool interface (SLH-20)
Housing diameter	Ø 80 mm
Available speeds	0 - 120,000 rpm; 0 - 150,000 rpm
Motor options	max. 400V - High performance, 0.22 Nm S1 (option)
	max. 200V - High performance, 0.22 Nm S1
	max. 200V - Iron-less, 0.13 Nm S1
Angular Position control	1 VSS SinCos, 60 lines, with reference
Tool change system	Pneumatic, 3 bit tool clamp status monitoring; cone cleaning air
Spindle cooling	Thin-film liquid cooling
Bearing system	Aerostatic (ASD-H20A), 6-10 bar
	High-pressure aerostatic (UASD-H20A), 20-30 bar
Accuracy, dynamics	Dynamic tool run-out < 1 µm *)
	Shaft Error in motion < 40/ 45 nm
Axial shaft growth	< 1 µm; < 3 minutes **)
Spindle connections	Axially outgoing (Dmax 80 mm)

*) when using the UTS-20 tool holder series
**) from cold/standstill to 120,000 rpm warmed through

Values of: May 2024

About

Our **U/ASD-H20A** tool spindle combines the highest speeds, precision, stability, and automation. It was specifically developed to meet the long-awaited requirements for producing integral semiconductor and optoelectronic components, significantly boosting performance and efficiency. Like the larger „UASD-H25A“ model, this new spindle model is also available with our high-pressure aerostatic technology (**UASD-H20A**), which increases triples the load capacity and robustness, especially at low speeds and with larger tools.

By using our spring-less, patented HSK clamping system SLH-x in size **HSK-E 20**, consistent optimization of the shaft dynamics, and highly efficient and symmetrical thin-film liquid cooling, our **U/ASD-H20A** offers exceptional dynamic and thermal stability compared to other solutions. In addition, it enables highly dynamic machining of micro and integral electronic components (electronic packaging).



High speeds of up to 150,000 rpm for fully automated machining

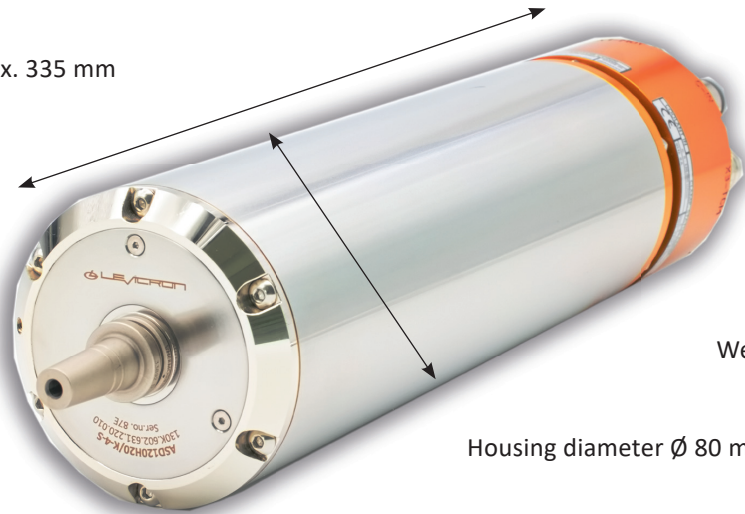


Particularly suitable for the production of integral semiconductor components



With an automatic and spring-less **HSK-E 20 tool interface (SLH-20)**

Lenght: approx. 335 mm



Weight: approx. 8 kg

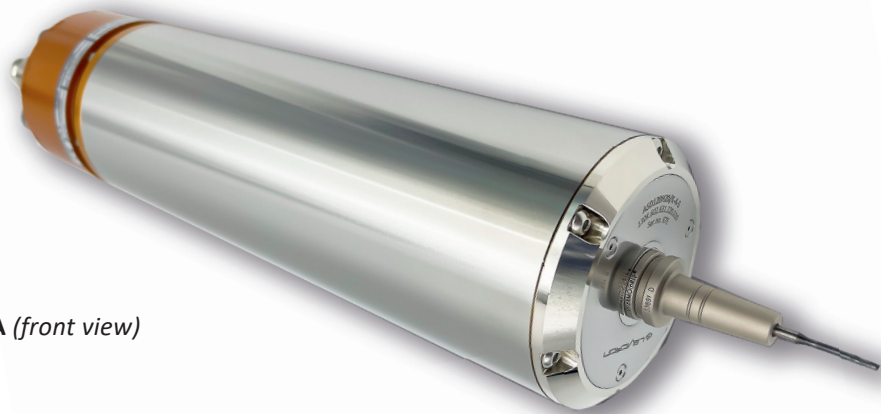
Housing diameter Ø 80 mm

High-Pressure Aerostatic Bearing System (**UASD-H20A**)

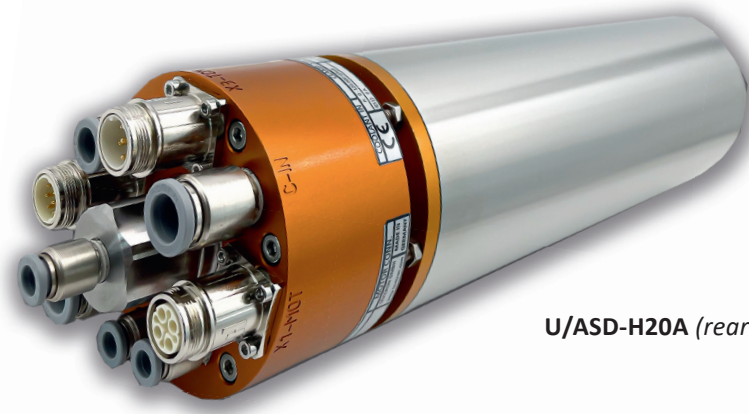
ASD-H20A & UASD-H20A in comparison *)		ASD120H20A	UASD120H20A **)
Bearing air supply pressure	[bar]	6-10	20-30
Available speed	[rpm]	0 - 120,000	0 - 120,000
Radial load capacity at the spindle nose	[N]	190	580
Axial load capacity at the spindle nose	[N]	240	650
Static radial zero point stiffness at the spindle nose	[N/ µm]	20	38
Static axial zero point stiffness at the spindle nose	[N/ µm]	25	45
Static air consumption	[l/ min]	40	73
Dynamic tool run-out ***)	[µm]	< 1	< 1
Shaft Error in motion ***)	[nm]	< 40	< 45

*) ASD-H20A= aerostatic; UASD-H20A= high-pressure aerostatic
**) all values at 20 bar bearing feed pressure (gauge pressure)
***) when using the UTS-20 tool holder series

Values of: May 2024



U/ASD-H20A (front view)



U/ASD-H20A (rear view)

Data Sheet ASD-H20A (Aerostatic)

		ASD120H20A	ASD150H20A
General	Housing diameter [mm]	80	80
	Length over all [mm]	335	335
	Weight [kg]	8.1	8.1
	Available Speeds [rpm]	0 - 120,000	0 - 150,000
	Tool interface [-]	HSK-E 20 (SLH-20)	HSK-E 20 (SLH-20)
	Tool clamp status monitoring [-]	3 bit digital	3 bit digital
Motor option „High performance“, max. 400V (option)	Motor type [-]	3 phases, synchronous	3 phases, synchronous
	Constant torque, S1 [Nm]	0.22	0.22
	Number of poles [-]	2	2
	max. Phase voltage [V]	300	380
	Rated current [A]	5	5
	Peak current [A]	10	10
Motor option “High performance”, max. 200V	Shaft power [kVA]	2.5	2.8
	Motor type [-]	3 phases, synchronous *)	3 phases, synchronous
	Constant torque, S1 [Nm]	0.22	0.22
	Number of poles [-]	2	2
	max. Phase voltage [V]	165	190
	Rated current [A]	9.5	9.5
Motor option “Iron-less”, max. 200V	Peak current [A]	19	19
	Shaft power [kVA]	2.5	2.8
	Motor type [-]	3 phases, synchronous	3 phases, synchronous
	Constant torque, S1 [Nm]	0.13	0.13
	Number of poles [-]	2	2
	max. Phase voltage [V]	170	195
Rotary encoder	Rated current [A]	5	5
	Peak current [A]	10	10
	Shaft power [kVA]	1.6	1.9
	Encoder type [-]	incremental	incremental
Bearing system	Periods [-]	60	60
	Signal A/B [-]	SinCos, 1 VSS	SinCos, 1 VSS
	Zero flag [-]	yes (digital/ analog)	yes (digital/ analog)
	Bearing supply pressure [bar]	6-10	6-10
Stability and precision	Air cleanliness, ISO 8573 [-]	3 or better	3 or better
	Radial zero point stiffness at the spindle nose, static [N/μm]	> 20	> 16
	Radial load capacity at the spindle nose, static [N]	> 190	160 - 200
	Axial zero point stiffness at the spindle nose, static [N/μm]	> 25	> 21
	Axial load capacity at the spindle nose, static [N]	> 240	> 230
	Taper run-out TIR [nm]	< 100	< 100
	Shaft Error in motion [nm]	< 40	< 50
	Dynamic tool run-out **) [μm]	< 1	< 1.3
	Spindle soak time [min]	< 3	< 4
	Axial shaft growth [μm]	< 3	< 4

all values at 6 bar bearing feed pressure (gauge pressure)
*) only with field-weakened converter operation
**) when using the UTS-20 tool holder series

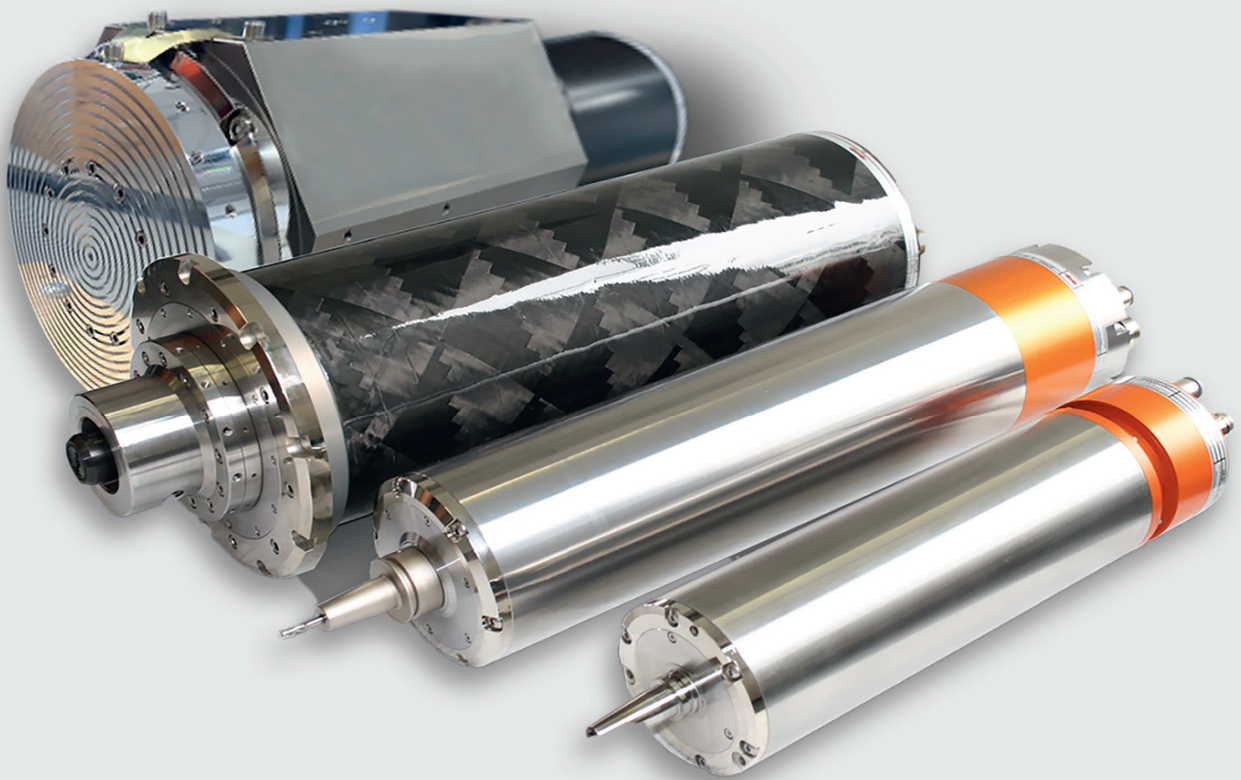
Values of: May 2024

Data sheet UASD-H20A (High-Pressure Aerostatic)

		UASD120H20A	UASD150H20A
General	Housing diameter [mm]	80	80
	Length over all [mm]	335	335
	Weight [kg]	8.1	8.1
	Available Speeds [rpm]	0 - 120,000	0 - 150,000
	Tool interface [-]	HSK-E 20 (SLH-20)	HSK-E 20 (SLH-20)
	Tool clamp status monitoring [-]	3 bit digital	3 bit digital
Motor option „High performance“, max. 400V (option)	Motor type [-]	3 phases, synchronous	3 phases, synchronous
	Constant torque, S1 [Nm]	0.22	0.22
	Number of poles [-]	2	2
	max. Phase voltage [V]	300	380
	Rated current [A]	5	5
	Peak current [A]	10	10
Motor option “High performance”, max. 200V	Shaft power [kVA]	2.5	2.8
	Motor type [-]	3 phases, synchronous *)	3 phases, synchronous
	Constant torque, S1 [Nm]	0.22	0.22
	Number of poles [-]	2	2
	max. Phase voltage [V]	165	190
	Rated current [A]	9.5	9.5
Motor option “Iron-less”, max. 200V	Peak current [A]	19	19
	Shaft power [kVA]	2.5	2.8
	Motor type [-]	3 phases, synchronous	3 phases, synchronous
	Constant torque, S1 [Nm]	0.13	0.13
	Number of poles [-]	2	2
	max. Phase voltage [V]	170	195
Rotary encoder	Rated current [A]	5	5
	Peak current [A]	10	10
	Shaft power [kVA]	1.6	1.9
	Encoder type [-]	incremental	incremental
Bearing system	Periods [-]	60	60
	Signal A/B [-]	SinCos, 1 VSS	SinCos, 1 VSS
	Zero flag [-]	yes (digital/ analog)	yes (digital/ analog)
	Bearing supply pressure [bar]	20-30	20-30
Stability and precision	Air cleanliness, ISO 8573 [-]	3 or better	3 or better
	Radial zero point stiffness at the spindle nose, static [N/μm]	> 38	> 24
	Radial load capacity at the spindle nose, static [N]	> 580	280-310
	Axial zero point stiffness at the spindle nose, static [N/μm]	> 45	> 30
	Axial load capacity at the spindle nose, static [N]	> 650	> 630
	Taper run-out TIR [nm]	< 100	< 100
	Shaft Error in motion [nm]	< 45	< 55
	Dynamic tool run-out **) [μm]	< 1	< 1.3
	Spindle soak time [min]	< 3	< 4
	Axial shaft growth [μm]	< 3	< 4

all values at 6 bar bearing feed pressure (gauge pressure)
*) only with field-weakened converter operation
**) when using the UTS-20 tool holder series

Values of: May 2024



Levicron GmbH | Clara-Immerwahr-Str. 2
67661 Kaiserslautern, Germany
Phone: +49 (0) 6301 - 66 800 - 0 | <https://levicron.com> | E-Mail: info@levicron.com