

- **ASD-Cx / ASD-H25 – Industrial Air Bearing Motor Spindles**

- Features & properties
- Technical advantages & customer benefits
- Applications
- Dynamic run-out & vibrations
- Data sheets

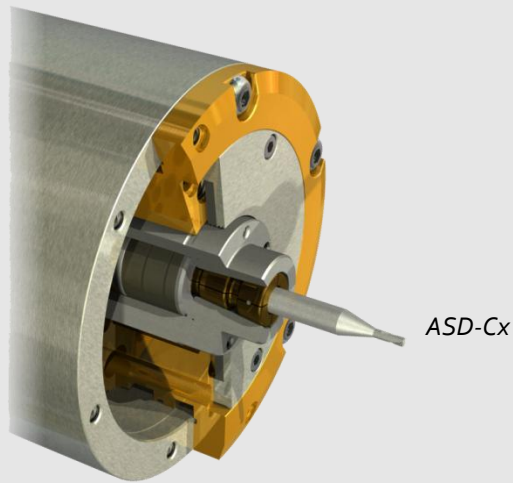
NEW

- **ASD-H25 with axial connectors (ASD-H25A)**



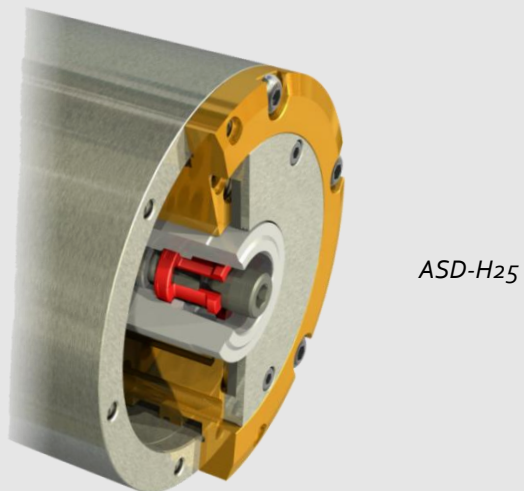
ASD-H25 / ASD-Cx – Industrial air bearing motor spindles

Along with the formation of Levicron our motor spindles **ASD-Cx** and **ASD-H25** were developed to unite unique characteristics of air bearings with properties of state of the art milling spindles or wheel heads without compromising the functionality for the customer like an automated taper clamping system or clamping status monitoring, e.g. This enables CNC machine tool manufacturer to take advantage of higher speeds, better surface finishes and practically unlimited machining time at high speed, but also means a step change for ultra-precision machine tool manufacturer towards a more industrial spindle usage without compromising accuracy and surface finish.



Our **ASD-Cx** with its bespoke pneumatically actuated and very compact **direct tool shank** clamping system aims on high speeds and best rotor dynamics. With only one tool interface and minimized number of parts rotating it is capable of operating to speeds of up to **100.000 rpm**. When it leaves our premises we guarantee a static run-out at tool of **< 0.5 μm**, vibrations at front/rear of **< 0.5 mm/s** and error motions (asynchronous errors) of **< 30 nm** at any speed.

Our **ASD-H25** works with a pneumatically actuated and **spring-less HSK-E25** taper clamping system and is capable of operating to speeds of up to **90.000 rpm**. Together with its non-rotating pull-/pushrod this guarantees exceptional rotor dynamics due to the fact that no springs are required and thus hundreds of additional parts don't rotate with the shaft. Due to this broken disc springs is not of an issue anymore. Even the force needed to eject the tool is reduced by more than 50% as this force doesn't have to overcome the preload of the disc springs as well as no retention system which normally is required to prevent the bearings to take damage from loads during tool ejection. When one of our **ASD-H25** leaves our premises we guarantee a static taper run-of **< 75 nm**, a repeatable tool clamping of **< 100 nm** and vibrations at spindle front/rear of **< 0.7 mm/s** over the whole speed range.



Both spindle types are equipped with a **permanent magnet synchronous motor** which we offer in two variations, a performance optimized one with **0.6 Nm** (S1, 100%) and a dynamics optimized one with air gap windings to reduce vibrations coming from the motor to a minimum.

Brush- and frameless permanentmagnet DC-Motor

Option 1: High-Performance Motor with 0.6 Nm S₁, 1 Nm peak

Option 2: Ultra low vibration Motor with Air Gap Windings and 0.35 Nm S₁, 0.6 Nm peak

Bürstenloser Permanentmagnet-Synchronmotor

Option 1: Hochleistungsmotor mit 0.6 Nm S₁, 1 Nm Spitze

Option 2: dynamikoptimierter Motor mit Luftspaltwicklung und 0.35 Nm S₁, 0.6 Nm Spitze

Easy Maintenance Bearing System

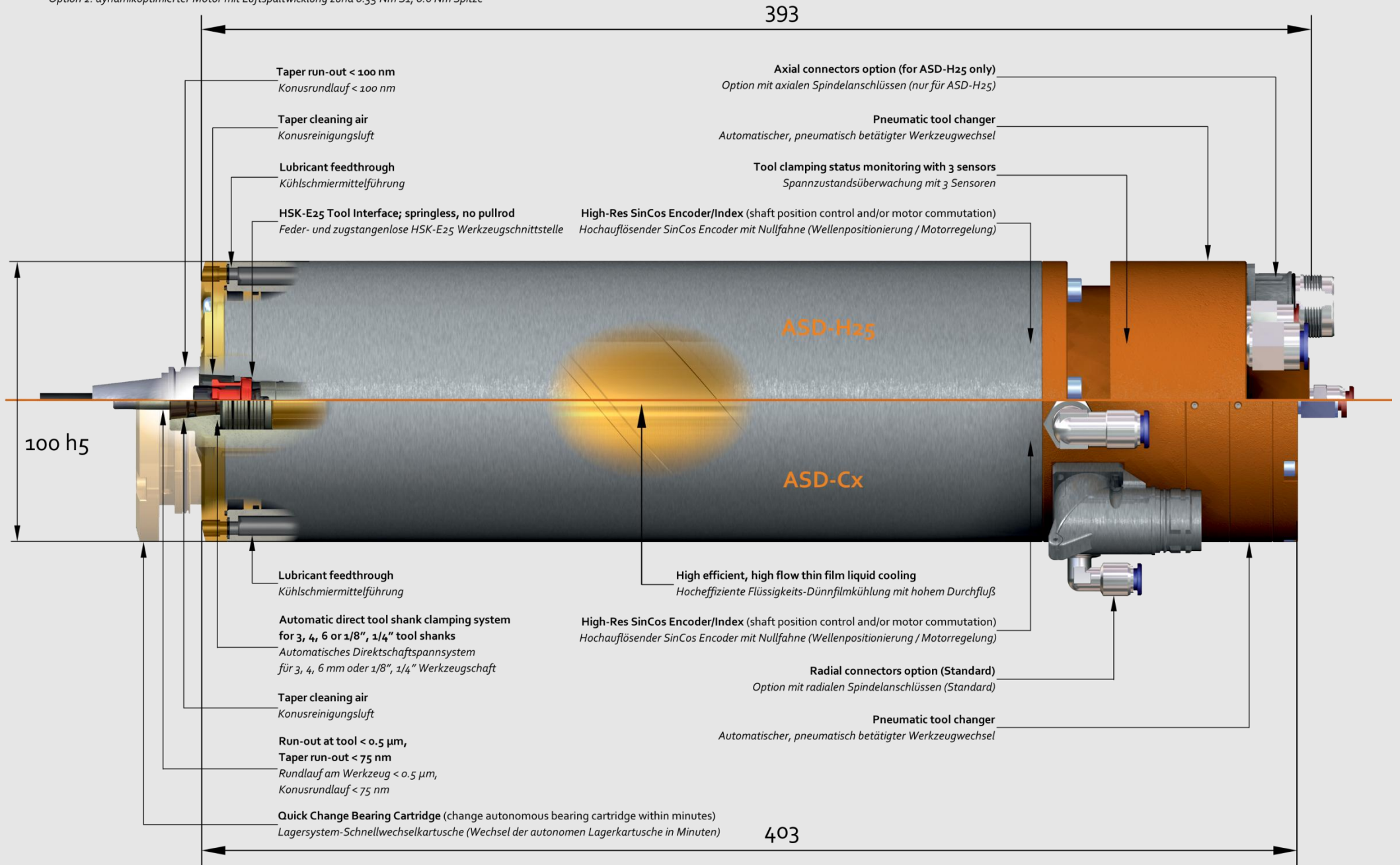
*Axiales Wellenwachstum < 5 µm (ASDo80),
statisch nach 3 Min.*

**Axial shaft growth < 5 µm (ASDo80),
stable after 3 min.**

*Axiales Wellenwachstum < 5 µm (ASDo80),
statisch nach 3 Min.*

Thermal XY stability < 1 µm (ASDo60)

Thermische XY Stabilität < 1 µm (ASDo60)

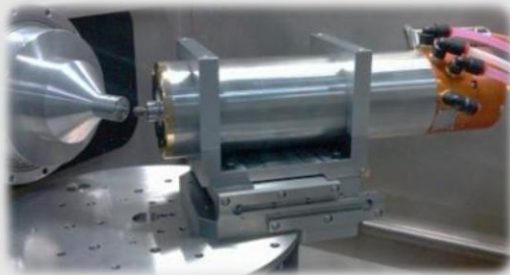


Benefits using air bearing systems in comparison to solutions with roller bearings like...

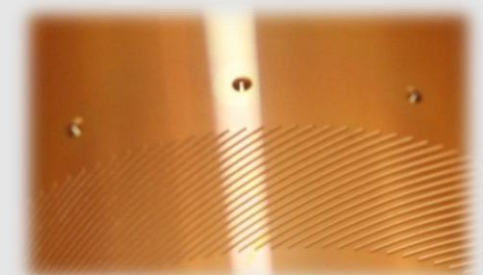
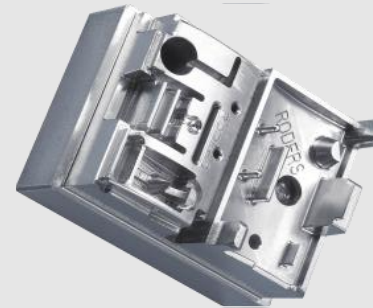
- *Higher speeds* ⇒ increased productivity and reduced tool wear for small tools,
- *Exceptionally smaller synchronous-/asynchronous errors* ⇒ clearly better surface finishes in all materials; suitable for ultra-precision machining,
- *Thermal stability* ⇒ warm through time < 5 min., axial shaft (Z) growth < 5 µm, thermal X/Y-stability < 1 µm,
- *wear-free operation at any speed* ⇒ safe stationary continuous operation even at high-speed,
- *oil- and grease-free operation* ⇒ no grease relubrication or oil-mist lubrication required; suitable for medical technology and food industry

...lead to typical applications like...

- *Mold and die with hardened steel and tungsten carbide for optical components and parts with fine patterns and engravings*



- *Milling/engraving of fine patterns and microstructures*

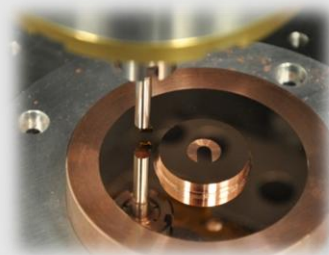


- *Diamond machining of metal optics with surface finishes of Ra < 5 nm,*



Rz (nm)	Rt (nm)	Ra (nm)	Rq (nm)
23,09 ± 4,45	29,89 ± 6,66	3,87 ± 0,68	4,90 ± 0,91

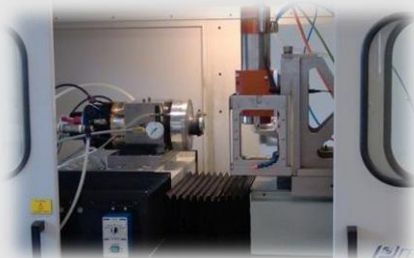
Fraunhofer
IPT



- *Milling/tapping of lenses and parts for watches and jewellery*



- *Grinding of lenses made from brittle materials (glass, crystal)*

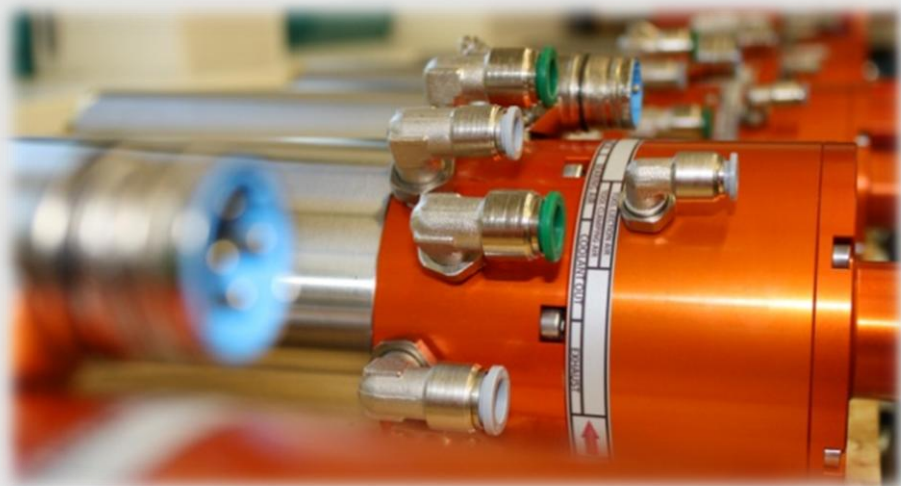


- *Turning of intralocular and contact lenses*

NEW

ASD-H25 with axial connectors option (ASD-H25A)

The radial connectors option is standard for both our ASD-Cx and ASD-H25 and offers our customers the most flexible solution with respect to combinations of spindle modules and serviceability. However for machines with **limited headstock space** our **ASD-H25A** with axial connectors option is available from January 2013. Unfortunately this option is not available for our ASD-Cx spindle type.



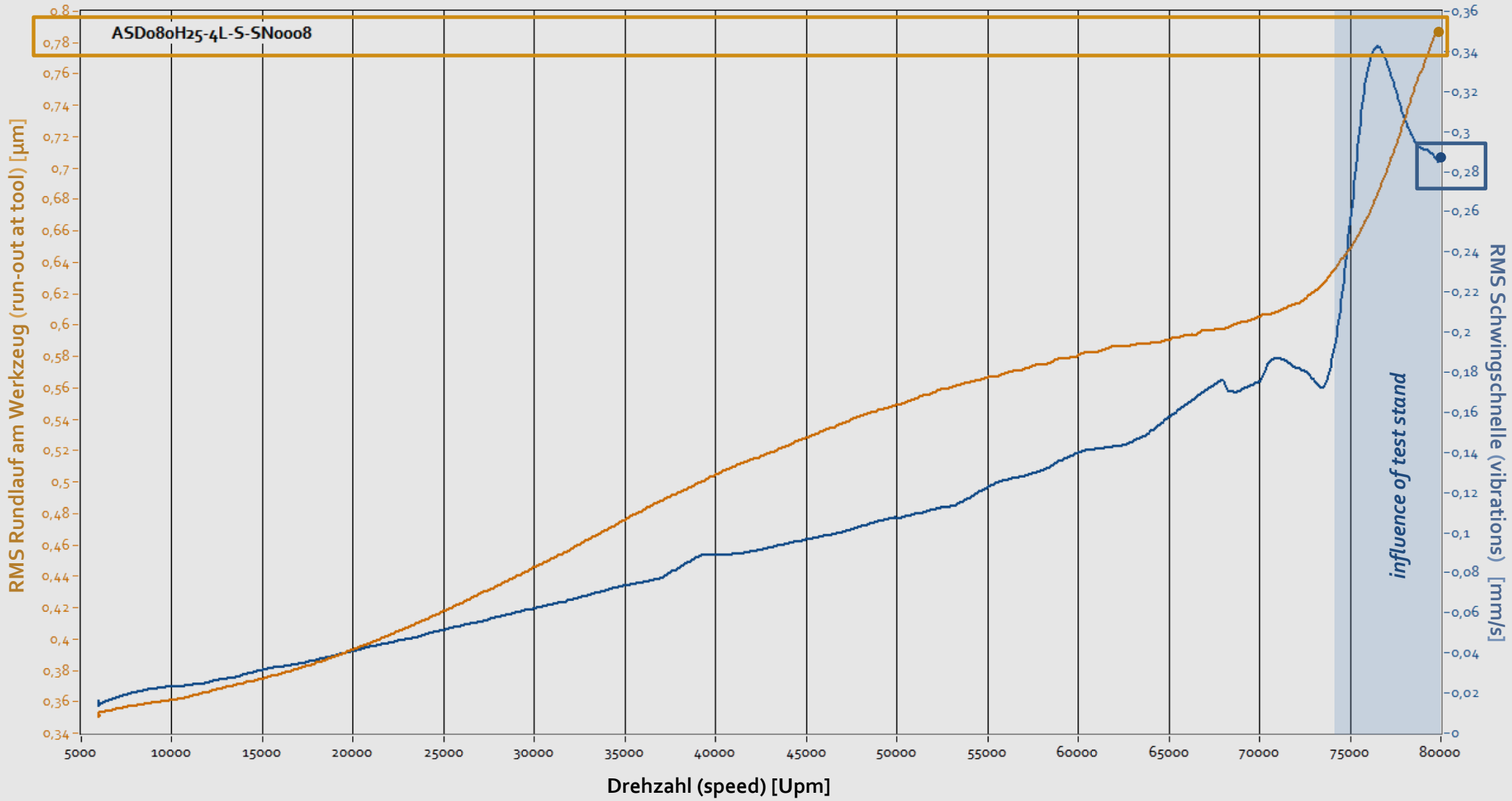
ASD-H25
(with radial connectors option)



ASD-H25A
(with axial connectors option)

This also reduces the interference contour of our ASD-H25 to a small cylinder with 100 mm in diameter and 393 mm in length (without mating connectors).

ASD-H25 – Dynamic run-out and vibrations with spindle speed



Spindle Options

				ASD080/100-C	ASD060/080/090-H25
Permanent magnet synchronous motor	Motor, permanentmagnet-synchron	200V max., air gap windings, 0.35 Nm S1 100%	200V max., Luftspaltwicklung, 0.35 Nm S1 100%	●	● *)
		400V max., air gap windings, 0.35 Nm S1 100%	400V max., Luftspaltwicklung, 0.35 Nm S1 100%	●	●
		400V max., frame less,0.55 Nm S1 100%	400V max., genutet, 0.55 Nm S1 100%	●	●
Commutation and positioning	Kommutierung und Positionierung	fully encoder controlled, resolution 0.002° (12 bit interp.)	voll gebergeregelt, Positionierung 0.002° (12 bit interpo.)	●	●
		sensorless controlled, no positioning, encoder monitoring	sensorlos geregelt, keine Positionierung, Geberausw.	●	●
		fully sensorless controlled, no positioning	voll sensorlos geregelt, keine Positionierung	●	●
Nom. speed	Nenndrehzahl	60.000 rpm / Upm		● *)	●
		80.000 rpm / Upm		●	●
		90.000 rpm / Upm		●	●
		100.000 rpm / Upm		●	in Entwicklung / in development
Tool Clamping Interface	Werkzeugspannsystem	spring-less HSK-E25, no rotating draw bar	HSK-E25, feder- und zugstangenlos		●
		bespoke collet system for 1/4" tool shank	Präzisionsspannzange für Werkzeugschaft 1/4"	● *)	
		bespoke collet system for 6 mm tool shank	Präzisionsspannzange für Werkzeugschaft 6 mm	●	
		bespoke collet system for 4 mm tool shank	Präzisionsspannzange für Werkzeugschaft 4 mm	● *)	
		bespoke collet system for 1/8" tool shank	Präzisionsspannzange für Werkzeugschaft 1/8"	● *)	
		bespoke collet system for 3 mm tool shank	Präzisionsspannzange für Werkzeugschaft 3mm	●	
Tool changing system	Werkzeugwechsel-system	pneumatic actuated	pneumatischer Wechselmechanismus	●	●
		tool clamping status monitoring	Spannzustandsüberwachung		●
		taper cleaning air	Kegelreinigungsluft	●	●
Bearing system	Lagersystem	quick change bearing cartridge	Schnellwechselkartusche	●	
		Dünnfilm-Flüssigkeitskühlung	thim film liquid cooling	●	●
lubricant feed-through	Spindelinterne Kühlschmier-mittelleitung	lubricant nozzles at front face	Kühlschmiermitteldüsen an Spindelfront	2 x	2 x
Connectors and fittings	Anschlüsse	radially oriented	radial abgehend	●	●
		axially oriented (for limited mounting space)	axial abgehend **) (für schmale Spindeldurchlässe)		●

*) no standard, on request / kein Standard, auf Anfrage

Data Sheets

			ASD080Cx	ASD100Cx	ASD060H25	ASD080H25			
Operating Parameters Betriebsparameter	Speed Range		Drehzahlbereich	U/min	0 (with encoder) - 80.000	0 (with encoder) - 100.000	0 (w. enco.) - 60.000	0 (w. enco.) - 80.000	
	permanent Motor Torque, S1 100%		Permanetdrehmoment, S1 100%	N · m	0,35 ^{1,2)} / 0,55 ³⁾	0,29 ²⁾	0,35 ^{1,2)} / 0,55 ³⁾	0,35 ^{1,2)} / 0,55 ³⁾	
	max. Shaft Power, S1 100%		max. Wellenleistung, S1 100%	kW	2,7 ^{1,2)} / 4,2 ³⁾	3 ²⁾	2,1 ^{1,2)} / 3,2 ³⁾	2,7 ^{1,2)} / 4,2 ³⁾	
	Bearing Supply Gauge Pressure		Manometerdruck Lagerversorgung	bar	6 - 10	6 - 10	6 - 10	6 - 10	
	Air Consumption		Luftverbrauch	NL/min	65	70	55	65	
	Bearing Air Cleanliness Class		Luftreinheitsklasse für Lagerung	-/-	3	3	3	3	
	Coolant type		Kühlmittel	-/-	water / oil	water	water / oil	water / oil	
	Coolant Supply Gauge Pressure		Manometerdruck Kühlung	bar	3 - 5	4 - 5	3 - 5	3 - 5	
	Coolant Inlet Temperature		Kühlmittelvorlauftemperatur	°C	20 +/- 1	20 +/- 1	23 +/- 1	23 +/- 1	
	nom. Coolant Flow, 3 / 5 bar		Nomineller Kühlmitteldurchfluß 3/ 5 bar	l/min	4 / 10	4 / 10	4 / 10	4 / 10	
Tool Clamping Werkzeugspannung	Tool Interface		Werkzeugschnittstelle	-/-	bespoke collet system	bespoke collet system	HSK-E25	HSK-E25	
	Tool Shank Diameter (x)		Werkzeugschaftdurchmesser	mm	3 mm, 6 mm, 1/8" or 1/4"	3 mm, 6 mm, 1/8" or 1/4"	-/-	-/-	
	Tool Change Operation		Werkzeugwechselmechanismus	-/-	pneumatic	pneumatic	pneumatic	pneumatic	
	Tool Clamping Status Monitoring		Spannzustandsüberwachung		n.a.	n.a.	yes	yes	
Motor	Motor Type		Motor	-/-	DC 2-poles, 3 phases	DC 2-poles, 3 phases	DC 2-poles, 3 phases	DC 2-poles, 3 phases	
	Motor Commutation		Antriebskommutierung	-/-	rot.encoder or sensorless	rot.encoder or sensorless	rot. enc. or sensorless	rot. enc. or sensorless	
	Motor Protection		Motorschutz	-/-	2 x KTY 84-130, PTC 130	2 x KTY 84-130, PTC 130	2 x KTY 84-130, PTC 130	2 x KTY 84-130, PTC 130	
Vector Position Control (optional sensor-less drive operation) Lagerregelung (optional sensorless)	Shaft Positioning Measurement Method		Lagerregelungsart	-/-	GMR	GMR	GMR	GMR	
	Shaft Positioning Angular Accuracy (12 bit)		Lagerregelungsaufösung (12 bit)	-/-	+/- 0.002°	+/- 0.002°	+/- 0.002°	+/- 0.002°	
	Index		Nullfahne	-/-	yes	yes	yes	yes	
	Encoder	Encoder Output Signal		Encodersignalart	-/-	SinCos, 1 VSS	SinCos, 1 VSS	SinCos, 1 VSS	SinCos, 1 VSS
		Encoder Supply Voltage		Encoderversorgungsspannung	V	5	5	5	5
Encoder Current Draw		Encoder	mA	30	30	30	30		
Bearing System Lagersystem	axial	Zero Point Stiffness		Nullpunktssteifigkeit	N/µm	> 50	> 40	> 75	> 50
		Load Capacity		Tragfähigkeit	N	> 550	> 450	> 550	> 500
	radial	static radial Zero Point Stiffness at Spindle Nose, warm		Nullpunktssteifigkeit an Spindelnose, warm	N/µm	> 30	> 25	> 35	> 30
		static radial Load Capacity at Spindle Nose, warm		Tragfähigkeit an Spindelnose, warm	N	> 290	> 280	> 330	> 290
Measures and Weights Maße und Gewichte	Body (clamping) Diameter		Gehäuseklemmdurchmesser	mm	100 h5	100 h5	100 h5	100 h5	
	Spindle Total Length		Spindellänge, über Alles	mm	400	400	454 / 393 ⁴⁾	454 / 393 ⁴⁾	
	Spindle Weight		Spindelgewicht	kg	16	16	16	16	

1) Motor: DC permanentmagnet synchronous motor with air gap windings, phase voltage 200V max.

2) Motor: DC permanentmagnet synchronous motor with air gap windings, phase voltage 400V max.

3) Motor: DC permanentmagnet synchronous motor, phase voltage 200V max.

4) with axial connector option / mit axialer Anschlußoption