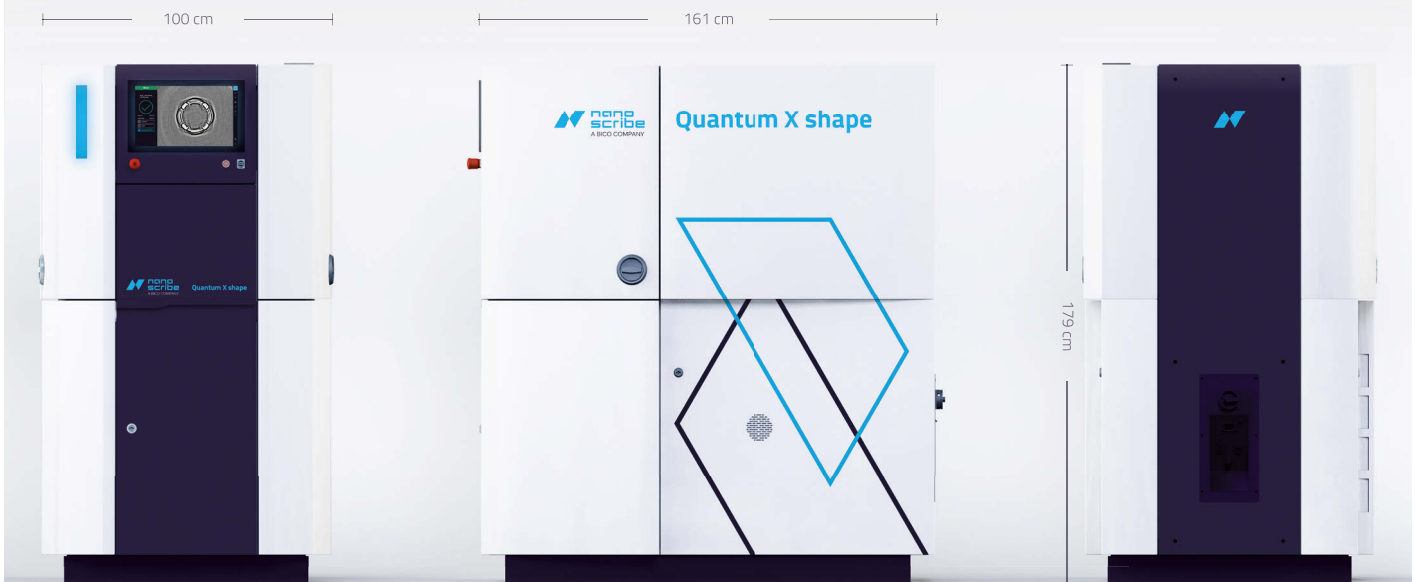


Fastest and most accurate 3D printer in class

Quantum X shape is a truly capable multi-talent. Based on Two-Photon Polymerization, the laser lithography system combines proprietary printing technologies to make it the optimal tool for rapid prototyping and wafer-scale batch production of virtually any 2.5D and 3D shapes with sub-micron precision and accuracy.

Its superior precision relies on the highest voxel modulation rate in class, and an extremely fine address grid, allowing for subvoxel power control. In addition, you benefit from Two-Photon Grayscale Lithography (2GL®) with voxel tuning capability for manufacturing 2.5D structures with stunningly smooth or micropatterned surfaces.



KEY FEATURES

- ▶ High-speed 3D Microfabrication with 100 nm feature size control
- ▶ Automatic interface finder for transparent, opaque and reflective surfaces with nanometer precision
- ▶ Automated self-calibration routines for accurate laser power control and positioning
- ▶ Broad range of substrates and wafers up to 8"
- ▶ Industrial batch processing: 200 typical mesoscale structures printable overnight
- ▶ High mechanical and thermal stability through granite base and vibration damping
- ▶ Modular system for a wide range of applications is ideal for multiuser facilities

DESIGNED FOR BEST-IN-CLASS INNOVATORS ENABLING

- ▶ Rapid prototyping
- ▶ Batch processing and small series production
- ▶ Wafer-scale fabrication

APPLICATIONS IN THE FIELDS OF

- ▶ Life sciences
- ▶ Microoptics
- ▶ Materials engineering
- ▶ Microfluidics
- ▶ Micromechanics / MEMS

Quantum X shape

Benchmark scores

Surface roughness R_a	down to ≤ 5 nm
Feature size control ¹	down to 100 nm
Shape accuracy	down to ≤ 200 nm
Batch processing	up to 200 typical mesoscale structures over night
Stitching-free part diameter	up to 4,000 μm
Maximum scan speed	6.25 m/s divided by lens magnification

Peak values, only achieved under specific conditions such as printing parameters, print heads, photoresins, and designs.

General system properties

Printing technologies	Layer-by-layer 3D printing based on Two-Photon Polymerization (2PP) Upright platform with Dip-in Laser Lithography (DiLL)
Laser source	NIR femtosecond laser (780 nm), avg. power 250 mW
Laser safety	Class 1 (IEC 60825-1)
Voxel modulation rate	1,000 kHz
Positioning volume	50 x 50 x 20 mm ³
Substrates	Microscope slides (3" x 1" / 76 mm x 26 mm) Wafers (from 1" to 8" / 25.4 mm to 200 mm) Glass, silicon, other transparent and opaque materials
Photoresins	Nanoscribe IP/IPX photoresins (polymers) Nanoscribe GP resins (glass) Open to 3rd-party or custom materials
Noise emission	36 dB LpA
System dimensions (L x W x H)	161 x 100 x 179 cm ³
Weight	1,300 kg

Print head specific properties

	SF	MF	LF	XLF
Magnification / NA	63x / 1.4	25x / 0.8	10x / 0.3	5x / 0.16
Print mode	Dip-in	Dip-in	Dip-in	Air
Working distance	360 μm	380 μm	2,600 μm	18,500 μm
Field of view diameter (max.)	400 μm	800 μm	2,300 μm	5,000 μm
Calibrated print field diameter	270 μm	700 μm	1,750 μm	3,500 μm
Scan speed (max.)	100 mm/s	250 mm/s	625 mm/s	1,250 mm/s
Field-to-field beam positioning accuracy ²	≤ 500 nm	≤ 750 nm	$\leq 2,000$ nm	

Process specific properties: 3D printing (2PP)

	SF	MF	LF	XLF
Voxel size (xy / z) (typical)	0.2 μm / 0.5 μm	0.6 μm / 3.6 μm	1.2 μm / 12 μm	2 μm / 40 μm
Slicing distance (typical range)	0.1 – 0.8 μm	0.5 – 3 μm	2 – 10 μm	5 – 100 μm

Process specific properties: 2.5D surface patterning (2GL)

	SF	MF	LF
Print height (typical)	1 – 10 μm	10 – 150 μm	50 – 700 μm
Shape accuracy (P – V) (typical)	1 % relative deviation		
Height tolerance	1 %; min. ± 400 nm		

SF: Small Features, MF: Medium Features, LF: Large Features, XLF: Extra Large Features

Quantum X shape

Software

System operation	Automatic calibration of laser power and positioning system, print job execution and status monitoring, nanoConnectX for remote control of the printer
User interface	Touch screen with shared print-job queue for multiple users, live-view process camera and two navigation cameras, 3D model view
Print preparation software	DeScribeX for 3D printing (2PP)
Design input formats	STL, plain text coordinates
Features	Parameter sweeps, Angled Stitching, STL scaling, print preview and simulation
Easy to use	“Tap to align” function for printing onto patterned surfaces or specific positions on a substrate, safe operation by automatic collision prevention Ready to go: optimized process parameter presets included

Options

2.5D surface patterning	GrayScribeX software for Two-Photon Grayscale Lithography (2GL®) with voxel tuning capability
Photoresin dispenser	Automatic dispensing of Nanoscribe photoresins for wafer-scale production
Options for other application fields	Bioprinting Set, Fiber / Chip Printing Set

Site requirements

Ambient air	21 °C (± 1 °C); ≤ 65 % RH; dust-free
Room lighting	Yellow light (> 520 nm) recommended
Power supply	100 - 240 VAC, single phase, 50/60 Hz, max 16 A
Power consumption (typical)	400 W
Compressed air supply ³	6 - 8 bar
Vibration level	VC-C in accordance with VDI 2038-2

Specifications are subject to change without notice and may vary depending on the photoresin, print head and structure geometry.

¹ 100 nm feature size control in x/y direction

² Combined accuracies of beam and substrate positioning system, guaranteed by system calibration

³ Compressor available on request

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If you have any further questions, please contact our sales team at sales@nanoscribe.com.





Why Nanoscribe

Join the Nanoscribe community! As the pioneer and market leader in high-precision additive manufacturing, we are your reliable partner for microfabrication systems, software, and solutions. Founded in 2007 as a spin-off of the Karlsruhe Institute of Technology (KIT), we are a vibrant, award-winning company and part of the BICO Group since June 2021. With our field-proven systems, straightforward 3D printing workflows and all-in-one solutions, our more than 4,000 system users are driving future-shaping applications.

In our Nanoscribe community there are innovators and thought leaders across a broad spectrum of scientific research and industries including life sciences, microoptics, photonics, materials engineering, microfluidics, micromechanics and MEMS. Their fascinating innovations have now been published in over 1,400 contributions to a wide range of peer-reviewed journals.

CUSTOMER SUPPORT AND SERVICES

With more than 15 years of experience in microfabrication technologies, our customer support team strives to provide the best support in the shortest time possible. Sales and support are provided worldwide from locations in Germany, China and the USA, as well as by a worldwide network of certified distributors. Our interdisciplinary and multilingual service team attends to your requests with comprehensive customer support:

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- ▶ On-site and online training sessions
- ▶ 24/7 assistance through NanoGuide, a comprehensive self-service platform
- ▶ Phone, e-mail and remote support
- ▶ Technical and application support beyond primary use cases
- ▶ Extended maintenance and guarantee contracts, upgrade and relocation services



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