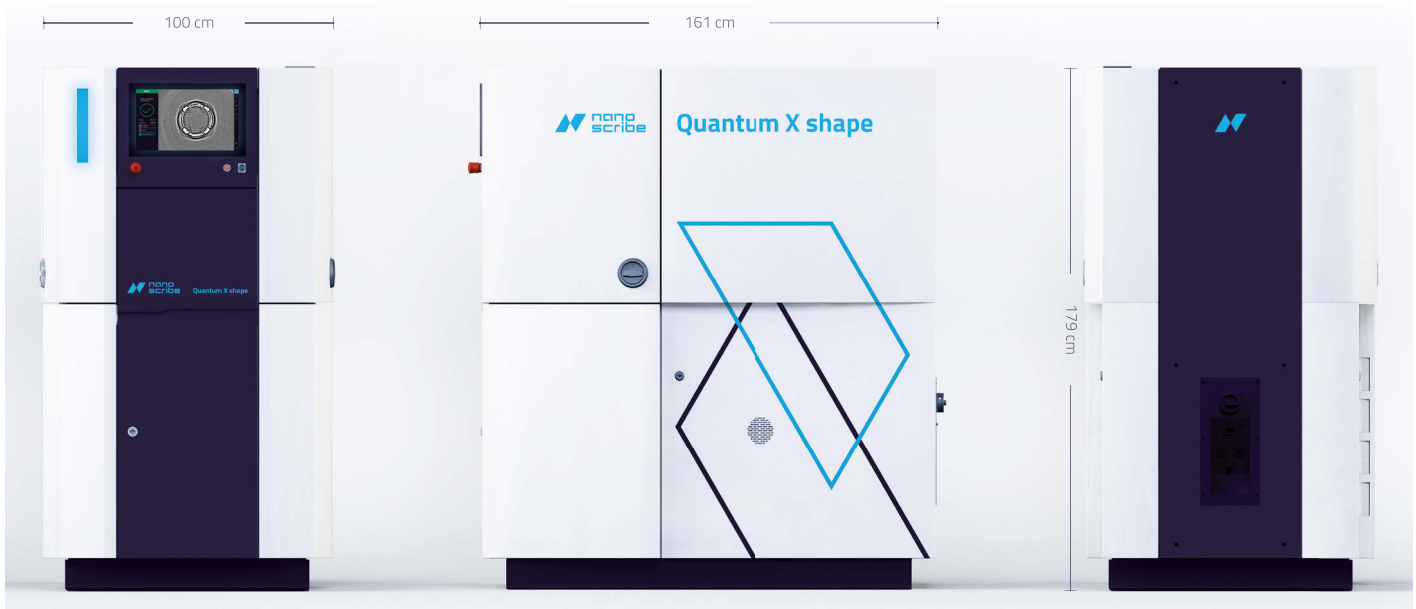


High-resolution 3D printer

Most versatile, powerful system for advanced research

The highly configurable 3D printer, which is based on Two-Photon Polymerization (2PP), is designed for science, R&D, and shared facilities. The Quantum X shape covers multiple orders of magnitude, ranging from the nano to the centimeter scale. It supports a broad range of

materials and substrates. With its flexible configuration options for 2.5D grayscale lithography, aligned 3D printing, and 3D biofabrication, Quantum X shape is the most versatile system for advanced research across various disciplines and applications.



FEATURES

included

- ▶ High-resolution 3D printing based on 2PP
- ▶ Flexibility with a wide range of printing materials and substrates

optional

- ▶ Ultra-fast 2.5D printing enabled by Two-Photon Grayscale Lithography 2GL®
- ▶ Ultra-fast 3D printing by 2GL®
- ▶ Aligned 3D printing on various substrates enabled by Aligned 2-Photon Lithography A2PL®
- ▶ Automatic printing aligned to fiber cores enabled by the Fiber Printing Set
- ▶ Automatic printing aligned to fiducials and chip edges enabled by the Chip Printing Set
- ▶ CO₂, temperature, and humidity control, heatable cell culture dishes enabled by the Bioprinting Set
- ▶ Automatic photoresin dispensing of Nanoscribe resins

FOCUS APPLICATIONS



High-res 3D printing



High-res 3D biofabrication



Optics manufacturing



2.5D surface patterning

SOFTWARE

included

- ▶ DeScribeX for 3D printing by 2PP
- ▶ nanoConnectX for remote control of the printer

optional

- ▶ nanoPrintX for aligned 3D printing and 3D printing by 2GL®
- ▶ GrayScribeX for 2.5D printing with 2GL®

Benchmark scores *

Surface roughness R_a	down to ≤ 5 nm
Feature size control ¹	down to 100 nm
Shape accuracy S_a	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 setup	Upright system enabling high-resolution 3D printing with flexible DiLL and non-DiLL setups to suit various material and application requirements.
Laser source	Femtosecond laser (780 nm), avg. power 250 mW
Laser safety	Class 1 (IEC 60825-1)
Voxel modulation rate	1,000 kHz
Positioning volume	150 x 150 x 20 mm ³ , stage repeatability ≤ 150 nm
Substrates	Microscope slides (3" x 1" / 76 mm x 26 mm) Wafers (from 1" to 8" / 25.4 mm to 200 mm) Flat substrates (up to 100 x 100 mm ²) Dishes (35 / 50 mm) Glass, silicon, other transparent and opaque materials
Photoresins	Nanoscribe photoresins (polymer printing) Nanoscribe GP-Silica (glass printing) 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	Up to 1,350 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 ²	Dip-in ²	Dip-in ²	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

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

Software

included / optional

nanoPrintX basic version	Process parameter presets for 2PP-based 3D printing included Compatible with alignment routines Input format: STL, OBJ, lens formula
nanoPrintX 3D printing by 2GL version	<i>Additional features compared to the nanoPrintX basic version:</i> Process parameter presets for 3D printing by 2GL [®] included Throughput increase of up to 60x times at high quality Quality increase at same throughput
GrayScribeX	Software for 2.5D structures with 2GL [®] 2GL stitching for seamless prints Input format: STL, grayscale images
DeScribeX	3D printing preparation software for classic 2PP Process parameter presets for 2PP-based 3D printing included Parameter sweeps, STL scaling, print preview and simulation Input format: STL, plain text coordinates
Printer touchscreen	User interface with print job management, live-view camera and two navigation cameras, and a 3D model view “Tap to align” function for printing aligned to any position on a substrate
nanoConnectX	Remote control of the printer with complete replication of the touchscreen functionality

Application Sets

included / optional

Chip Printing Set

Key process	Automated printing aligned to fiducials and chip edges
Alignment system	Confocal detection of fiducials and 3D topographies
Detection accuracy in x/y direction ³	≤ 100 nm
Compatible form factors	Unmounted with flat bottom, TO cans, others on request
Compatible substrate materials	Silicon, SiP, Sol, SiN, InP Polymers Glass Others on request
Fiducial detection	Via pattern matching (e.g. crosshairs, double squares, circles); index contrast fiducial/surrounding material > 0.02
Printing to chip edges	Automatic chip edge detection and laser power compensation

Fiber Printing Set

Key process	Automated printing aligned to fiber cores
Alignment system	Fiber core illumination (requires FC connector, others on request)
Detection accuracy in x/y direction ³	≤ 500 nm
Compatible fiber array types	V-groove fiber arrays with 2.5 – 8.5 x 2.0 x 10.0 mm ³ block size, 127 – 250 µm or custom pitch 4 x 8 fibers Others on request
Compatible single fiber types	Single cleaved fibers (SM/MM/PM), fibers in FC or SMA connectors
Lensed fiber mode field diameter (typical)	3 - 30 µm
Height of optical elements (typical)	≤ 250 µm

Bioprinting Set

Temperature control range	Up to 50 °C, stability ± 0.5 °C
Humidity control range	55 – 90% RH at 37 °C, stability ± 1 % RH
Gas flow	HEPA-filtered air (exchangeable filters), connection for external supply of premixed CO ₂
Compatible substrates	Cell culture imaging dishes (glass bottom, 35 mm or 50 mm)
Reliable results	Sterilizable parts Sterile consumables and biomaterials Sensor and video data collection
Bioprinting Model Library	Access to a collection of verified, ready-to-use designs for common structures and applications

Technology Features included / optional

Automatic dispenser	Fully automatic application of Nanoscribe photoresins
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Alignment processes included / optional

Alignment to	Fiber cores Fiducials (e.g. markers, waveguides) Chip edges
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Site requirements

Conditions	21 °C (± 1 °C); 35-65 % relative humidity
Environment	Yellow light (> 520 nm) recommended, low dust, low vibration
Power supply	100 - 240 V, 50/60 Hz, standard electrical connection
Power consumption	400 W (typical)
Compressed air supply ⁴	6 - 8 bar

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

¹ in x/y direction

² It is possible to avoid contact with the photoresin

³ Depends on Print Set

⁴ Compressor available on request

Datasheet valid from January 2026

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