



compact design. modular usage. straightforward integration.

The fiberSYS is a 3D scan system for lasers in the 1kW power range. It is based on a low-drift xy scan module and a fast and precise z-axis. The fiberSYS offers a compact sealed housing with a direct fiber connection. This speeds up and facilitates the installation in laser processing machines.

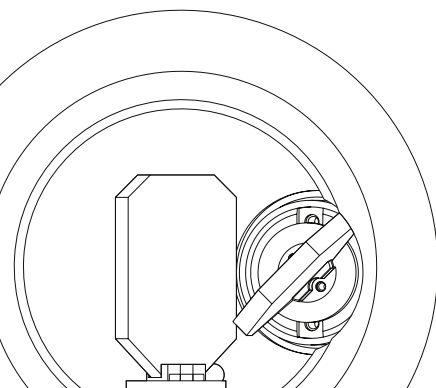
For multi-head systems, the narrow footprint of the fiberSYS allows for maximum overlap of the image fields, which benefits the user through increased productivity of the laser machine.

Key features:

- Modular, compact 3D scan system with integrated z-axis
- Maximum image field overlap in multi-head systems
- Low-drift galvanometer scanner thanks to digital encoders
- Optimized for 1 kW single-mode laser
- Interface for process monitoring

Typical applications:

- Additive manufacturing
- Laser welding
- 3D applications

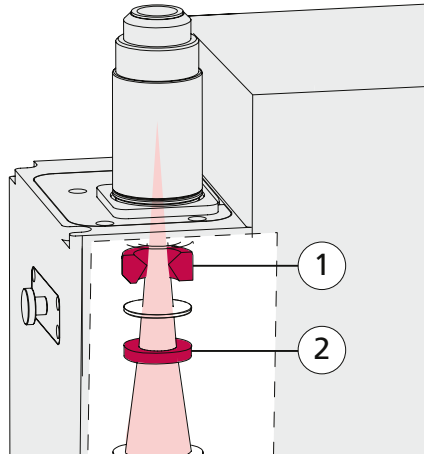


Optimum integratability

The fiberSYS was designed to simplify integration for machine manufacturers. This is achieved by the following features:

- Fully integrated beam guidance from the fiber adapter, including z-axis
- Efficient water cooling for galvanometer scanners, electronics and beam entrance aperture
- Flexible installation options: top, bottom, front face
- Sealed optics path in a dust- and splash-proof housing (IP 64 rating)
- Torsion-resistant main body ensures a high positional stability of the sub-modules relative to one another
- Compact optical design
- Replaceable protective window on the beam entrance side prevents contamination when changing the fiber

- Possibility to adapt for a range of lasers by replacing the aperture (1) and diverging lens (2). Thereby, the external dimensions and interfaces remain identical.



Status and process monitoring

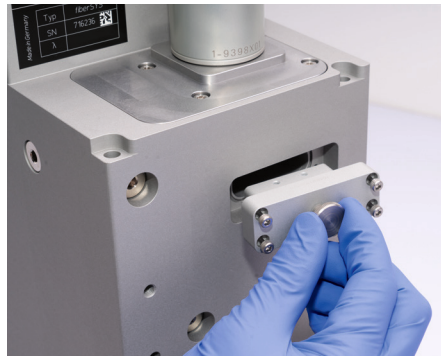
- Optomechanical interface for coaxial process monitoring
- High transmission over a wide range of wavelengths
- Can be individually adapted to sensor concept
- Record all key status variables in real time (*iDRIVE* technology)
- Scan mirror monitoring via contactless temperature sensors

Optional additions:

- Open Interface Extension (OIE): Synchronization of sensor and position data for spatially resolved measurements
- Beam splitter cube for simultaneous connection of different sensors, e.g. pyrometer, camera and/or OCT sensor



Direct fiber connection

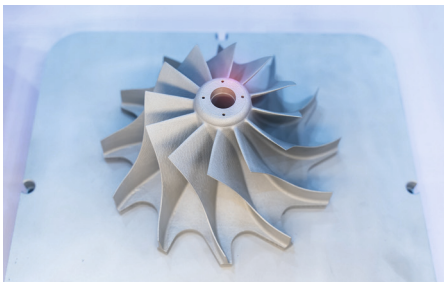


Replaceable protective window

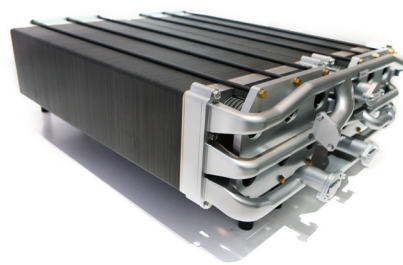


Process monitoring port with beam splitter cube

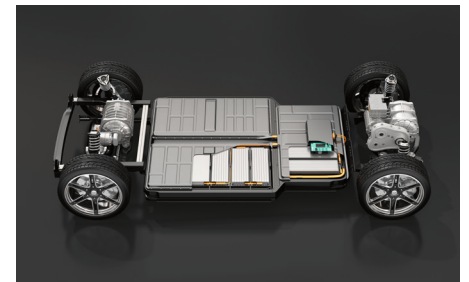
Applications



Additive manufacturing (PBF-LB/M)

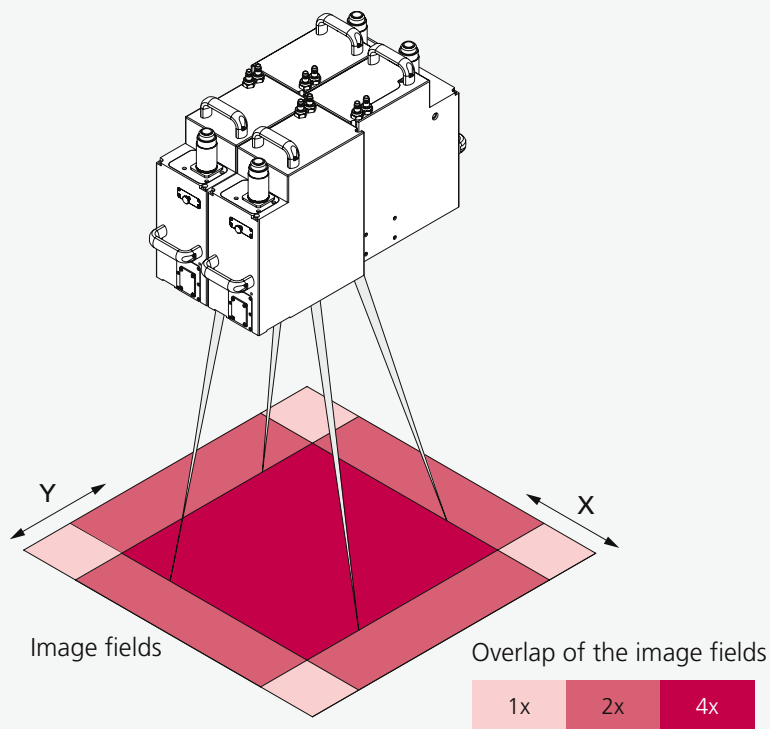


Welding bipolar plates for fuel cells



Electromobility

Expansion to a multi-head system: High productivity thanks to maximum image field overlap



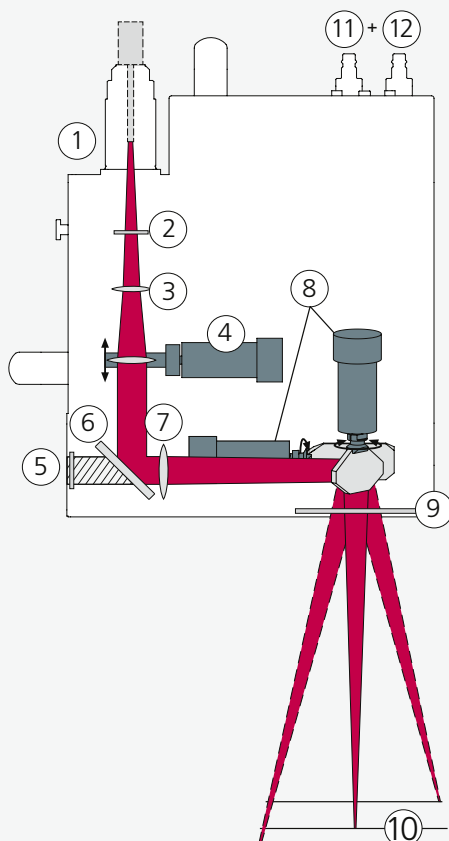
Advantages

- Galvo-based z-axis allows for a slim design, which means 3D scan systems can be arranged in rows (in the x direction) close to one another
- Denser packing than standard systems (in the y direction) thanks to optimized arrangement of the galvanometers in the xy sub-module
- CalibrationLibrary software package (optional) provides support during scan field calibration

Benefits for the user

- Shorter process times due to simultaneous processing of a component using multiple lasers
- Improved productivity thanks to parallel processes in a given process chamber
- Optimized duty cycle of the laser and 3D scan system due to flexible use of the available lasers throughout the entire construction area

Operating principle

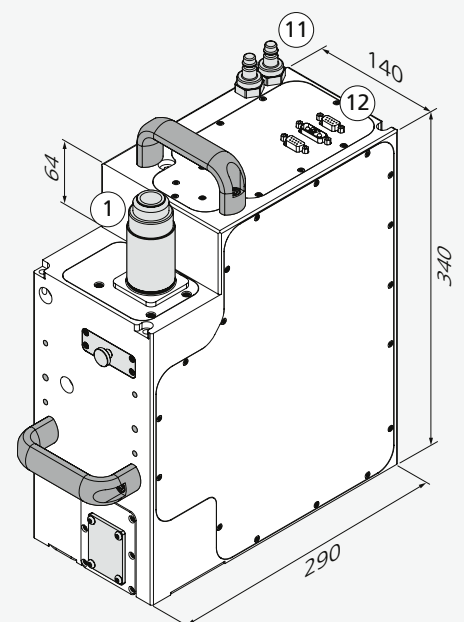


Legend

- 1 Fiber adapter
- 2 Replaceable protective window
- 3 Diverging lens
- 4 Galvanometer scanner collimation optics and z-axis
- 5 Connection for process monitoring with protective window
- 6 Tilted mirror
- 7 Pre-focus optics
- 8 Galvanometer scanner with digital encoders
- 9 Protective window
- 10 Focal plane
- 11 Cooling water connections
- 12 Electrical connections

Dimensions

(in mm)



fiberSYS – Preliminary specifications

(all angle specifications optical)

Typical optical configurations ⁽¹⁾

Image field size [mm ²]	450 x 450	550 x 550	650 x 650
100% overlap per image field [mm²] 2x2 scanner	308 x 323	408 x 423	508 x 523
Free working distance from lower edge of scan system [mm]	495	615	730
Rayleigh length [mm]	1.8	2.6	3.5
Average focus diameter in the image field [μm] ⁽²⁾	55	65	75
Defocus diameter [μm]	approx. 200 – 250	approx. 200 – 250	approx. 200 – 250

General specifications

Aperture	30 mm
Wavelength	1060 – 1085 nm
Max. laser power	1 kW
Wavelength range for process monitoring ⁽³⁾	800 – 870 nm and 1450 – 2000 nm
Supply voltage (Requirements)	48 V DC max. 6 A
Dimensions LxWxH in mm ⁽⁴⁾	290x140x340
Interface	SL2-100
Water cooling	3 l/min Δp < 4,5 bar
IP code	IP 64
Weight	approx. 20 kg

Precision & stability

Repeatability (RMS)	<0.4 μrad
Position resolution	20 Bit
Nonlinearity	<0,5 mrad/44°
Dither	<1.6 μrad
Temperature drift	
Offset	< 25 μrad/K
Gain	< 8 ppm/K
Long-term drift	
8-hr drift (after 30 min)	
Offset	< 30 μrad
Gain	< 30 ppm
24-hr drift (after 3 hrs)	
Offset	< 30 μrad
Gain	< 30 ppm

Collimation

	Config. 1	Config. 2
Limiting NA (full angle)	160 mrad	224 mrad
Colimation focal length	180 mm	135 mm
Typ. beam divergence (full angle, 1/e²)	100 mrad	140 mrad
Fiber diameter	14 μm	10 μm

The laser in use determines the appropriate configuration. Further configurations on request.

Dynamics

Process speed ⁽⁵⁾	5 m/s
Step response ⁽⁶⁾	
1% full scale	1 ms
10% full scale	3.3 ms
Tracking error	<0.4 ms
XY sub-module (standard tuning)	
Tracking error	<0.84 ms
Z-axis	

⁽¹⁾ Other configurations on request

⁽²⁾ At z=0, M²=1.05, typ. beam divergence

⁽³⁾ Other wavelengths on request

⁽⁴⁾ Dimensions without fiber adapter, handles and plug connections

⁽⁵⁾ For an image field of 550 mm²

⁽⁶⁾ Adjusted to 1/1000 full scale

Options

Expansions for process monitoring

- Synchronization of sensor data with RTC data possible using Open Interface Extension (OIE)
- Additional monitoring port via beam splitter cube

Tilted mirror (variants)

- HR mirror for the laser
- Dichroitic beam splitter for process monitoring

Fiber adapters

- QBH/HLC-8
- QD/LLK-D

More information about the fiberSYS in video form:

