Single-Mode Beam Shaping Fiber Lasers

Programmable beam technology to maximize Additive Manufacturing productivity

The nLIGHT® Corona™ AFX fiber laser family provides the ability to switch between a single-mode beam for high-spatial-resolution printing and larger ring beams for greatly accelerated build rates delivering revolutionary productivity with generous process windows and improved material quality.

Features

- **Up to 1.5 kW**
  Delivers industry-leading print productivity for large layer thicknesses with improved process stability and reduced soot and spatter, leading to faster printing at lower costs.
- **Optimized Tuning of Beam Size and Shape**
  Maintains fiber laser performance, stability, efficiency, and reliability through seven beam shapes from single-mode to large donut.
- **Rapid Beam Switching**
  Beam adjustments in less than 30 ms enables real-time optimization of each process step while maintaining full-power operation.
- **Back-Reflection Protection**
  Hardware-based back-reflection protection allows processing of even the most reflective metals with no build interruptions or damage to the laser.
- **Innovative All-Fiber Beam Shaping**
  All-fiber technology does not use complex, performance-limiting hardware such as free-space optics, zoom process heads, and external fiber-to-fiber couplers.
- **Unparalleled Serviceability**
  Durable design ensures continuous operation in manufacturing environments with easy onsite serviceability to maximize uptime.

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nLIGHT AFX Corona Fiber Laser Specifications

Model	AFX-1000	AFX-1500
Optical		
Mode of Operation	CW/Modulated	
Maximum Power, SM Setting	1200 W	1200 W
Maximum Power, MM Settings	1200 W	1500 W
0.10 NA Power Enclosure	> 90%	
Power Tunability	5 to 100%	
Power Variation, 8-Hour	≤ 1%	
Modulation Frequency	≤ 100 kHz	
Rise and Fall Times	≤ 5 µs	
Beam Profile Switching Time	< 30 ms	
Beam Diameter	Programmable (see table below)	
Wavelength	1070 ± 10 nm	
Electrical		
Supply Voltage	200 to 240 VAC, single phase, 50/60 Hz	
Control Interface	External hardware control / RS-232 / Ethernet	
Mechanical		
Dimensions (W x D x H)	445 x 677 x 177 mm	
Optical Fiber [1]	5 or 10 m fiber with QBH connector	
Cooling Method	Water	
Environmental		
Operating Temperature [2]	10 to 40 °C	
Storage Temperature	-10 to 60 °C	
Relative Humidity	10 to 80%	

[1] Configuration dependent

[2] Non-condensing or with use of CDA

nLIGHT AFX Corona Example Beam Characteristics

Index Setting	0	1	2	3	4	5	6
Beam Shape (typical near-field profile)							
Power Ratio (nominal single-mode / ring)	93 / 7	75 / 25	65 / 35	50 / 50	30 / 70	20 / 80	10 / 90
Beam Diameter [3] (nominal near-field)	15 µm	25 µm	30 µm	35 µm	40 µm	43 µm	45 µm

[3] Measured using second-moment method

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