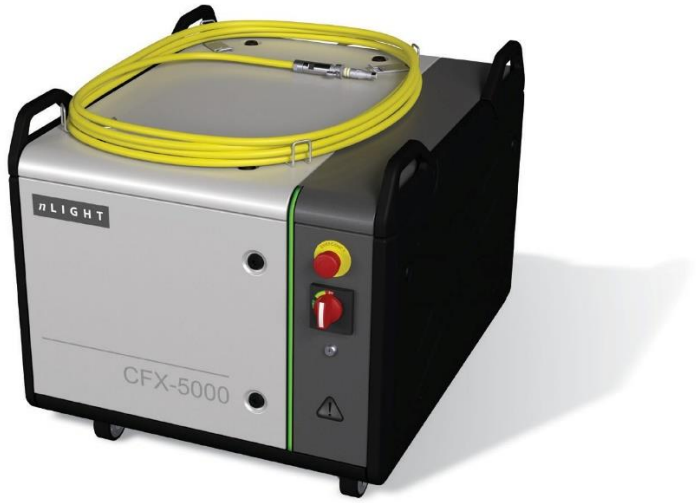
High-Power Fiber Lasers

Programmable beam quality for advanced metal processing



All-new nLIGHT® CFX-3000, CFX-4000, and CFX-5000 high-power fiber lasers give users the ability to tune the beam settings based on their application. With a single fiber laser, users can rapidly select from high-intensity, small-spot-size beams to large, donut-shaped beams, and everything in between. This dramatic advance allows optimal thick and thin metal cutting, higher cutting speed, superior quality, and improved piercing and small-feature processing with a single tool. End users get the best of all worlds—the speed of high-power fiber lasers for thin metal processing, the quality of CO^2 lasers for thick metal processing, and the high uptime and lower operating costs of a fiber laser solution.

Features

- **3, 4, and 5kW**
  Delivers excellent productivity for advanced cutting and welding applications.
- **Optimized Tuning of Beam Size and Shape**
  Maintains fiber laser performance, stability, efficiency, and reliability with spot sizes from 100µm to 300µm and beam shapes from top-hat to donut mode.
- **Rapid Beam Switching**
  Beam adjustments in less than 30ms allows for real-time optimization of each process step while maintaining full power operation to maximize productivity.
- **Back-Reflection Protection**
  Hardware-based back-reflection protection allows processing of even the most reflective metals with no interruptions or damage to the laser.
- **Breakthrough Integrated Beam Shaping**
  Removal of free-space optics, zoom process heads, and external fiber-to-fiber couplers avoids complex performance-limiting hardware.
- **Unparalleled Serviceability**
  Modular design simplifies repairs and maximizes uptime.

nLIGHT

nLIGHT 3, 4 and 5kW Industrial Fiber Laser Specifications

Models	CFX-3000	CFX-4000	CFX-5000
Optical Specifications			
Mode of Operation	CW/Modulated		
Polarization	Random		
Maximum Average Power, CW	3kW	4kW	5kW
Power Tunability	5 – 100%		
Power Variation, 8-Hour	≤ 1%		
Modulation Frequency	≤ 100kHz		
Rise and Fall Times	≤ 10µs		
Beam Quality	Programmable		
Wavelength	1070 ± 10nm		
Electrical Specifications			
Supply Voltage	380 – 480VAC 3P+PE, 50/60Hz		
Control Interface, Standard	External hardware control, analog power control, analog monitors, Ethernet control, GUI, and API		
Control Interface, Optional	EtherCAT, EtherNet/IP, DeviceNet, Profinet, Profibus		
Mechanical Specifications			
Dimensions (W x D x H)	685 × 800 × 560mm		
Optical Fiber	20m, QBH connector standard		
Cooling Method	Water		
Environmental Specifications			
Operating Temperature[1]	+10 to +40°C		
Storage Temperature	-10 to +60°C		
Relative Humidity	10 to 80%		

[1] Non-condensing or with use of CDA.

nLIGHT Beam Control Example

As an example, table below shows the typical beam output. Note that beams with similar diameters or BPP values can have significantly different shapes or power distributions. A wide range of beam characteristics provides the versatility necessary to optimize each application or process step.

Setting	Beam	Beam Description	Beam Diameter (typical)[1]	BPP (typical)[1]	Optimized Cutting Example
0		Small flat-top	100µm	3.1mm-mrad	Any Metal Piercing, Thin Metal
1		Large flat-top	245µm	13mm-mrad	Piercing Optimization
2		Small Donut	260µm	13mm-mrad	Kerf Optimization
3		Thick Donut	325µm	18mm-mrad	Oxygen Medium Mild Steel
4		Thin Donut	350µm	18mm-mrad	Oxygen Thick Mild Steel

[1] Measurement is using 86% method

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