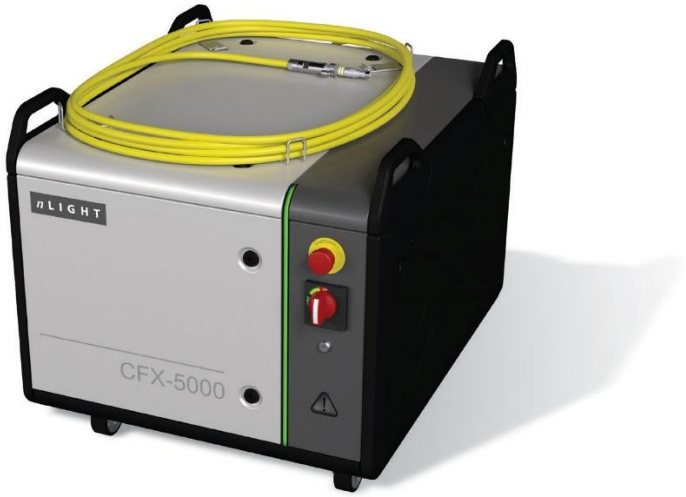
High-Power Fiber Lasers

Programmable beam quality for advanced metal processing



The nLIGHT® CFX-5000 utilizes a unique all-fiber beam tuning capability to give end users thin sheet cutting speeds characteristic of a 6kW fiber laser, along with excellent thick metal edge quality similar to a CO^2 laser, without the need to change any optics. This increase in performance allows job shops to get the productivity benefits of a 6kW with the lower costs of ownership a 5kW laser provides.

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 cutting, plus the high uptime and lower operating costs of a fiber laser solution. The CFX-5000 lowers the cost of ownership, increases productivity, and expands a job shop's capability.

Features

- **5kW with Cutting Speeds of a 6kW**
  Get all the productivity benefits of a 6kW with the lower cost of ownership of a 5kW.
- **Optimized Tuning of Beam Size and Shape**
  Maintains fiber laser performance, stability, efficiency, and reliability with spot sizes from 90um to 300um and beam shapes from top-hat to donut mode.
- **Rapid Beam Switching**
  Beam adjustments in less than 30 ms 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**
  All-fiber solution avoids free-space optics, zoom process heads, and external fiber-to-fiber couplers providing reliable maintenance-free operation.
- **Unparalleled Serviceability**
  Modular design simplifies repairs maximizing uptime.

nLIGHT

nLIGHT 5kW Industrial Fiber Laser Specifications

Models	CFX-5000
Optical Specifications	
Mode of Operation	CW/Modulated
Polarization	Random
Maximum Average Power, CW	5kW
Power Tunability	5 – 100%
Power Variation, 8-Hour	≤ 1%
Modulation Frequency	≤ 20kHz
Rise and Fall Times	≤ 10µs
Beam Quality	Programmable (see next page for details)
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 1 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.

nLIGHT Beam Characteristics

Setting	Beam	Beam Description	Beam Diameter (typical)[1]	BPP (typical)[1]	Optimized Cutting Example
0		Small flat-top	90µm	2.8mm-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 Second-Moment method

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