



Laserline LDMblue
Blue High Power
Diode Laser

1000 W
cw power
@ 450 nm

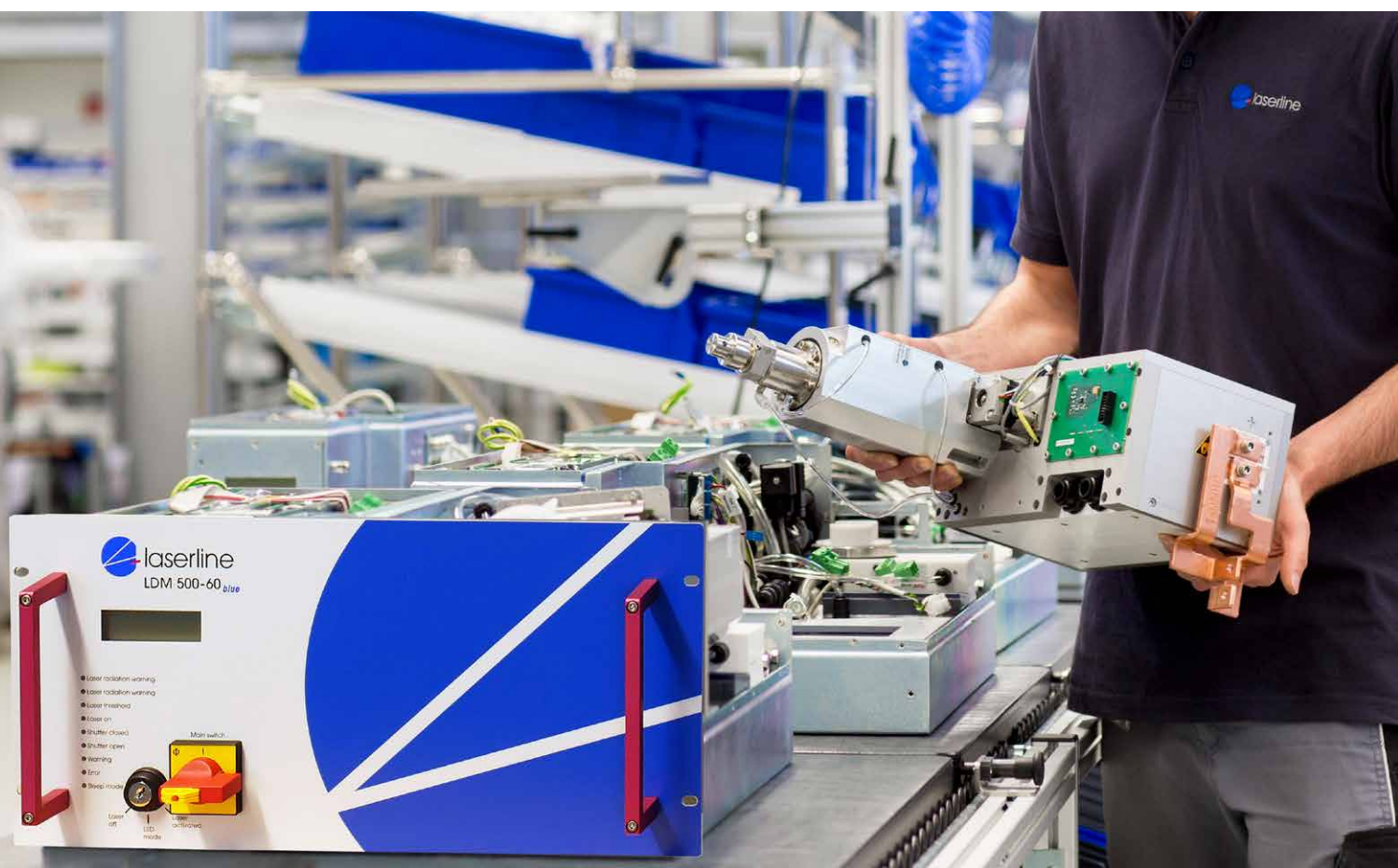
High Power CW Laser meets Blue Wavelength

Efficiency by blue laser light

LDM*blue* revolutionizes the processing of copper, gold and other highly reflective metals in multiple ways. The direct generation of 1 kW cw laser power in the 450 nm wavelength range is unique and also avoids the detour via complex and inefficient wavelength conversions. At the same time the absorption and thus process efficiency is increased by a factor of up to 20 compared to lasers in the 1 micron range. The precisely controllable energy deposition of the diode laser enables the melting of copper without evaporation, leading to a previously unattained stability of the melt pool. This opens up new application opportunities, such as heat conduction welding of thin copper foils.

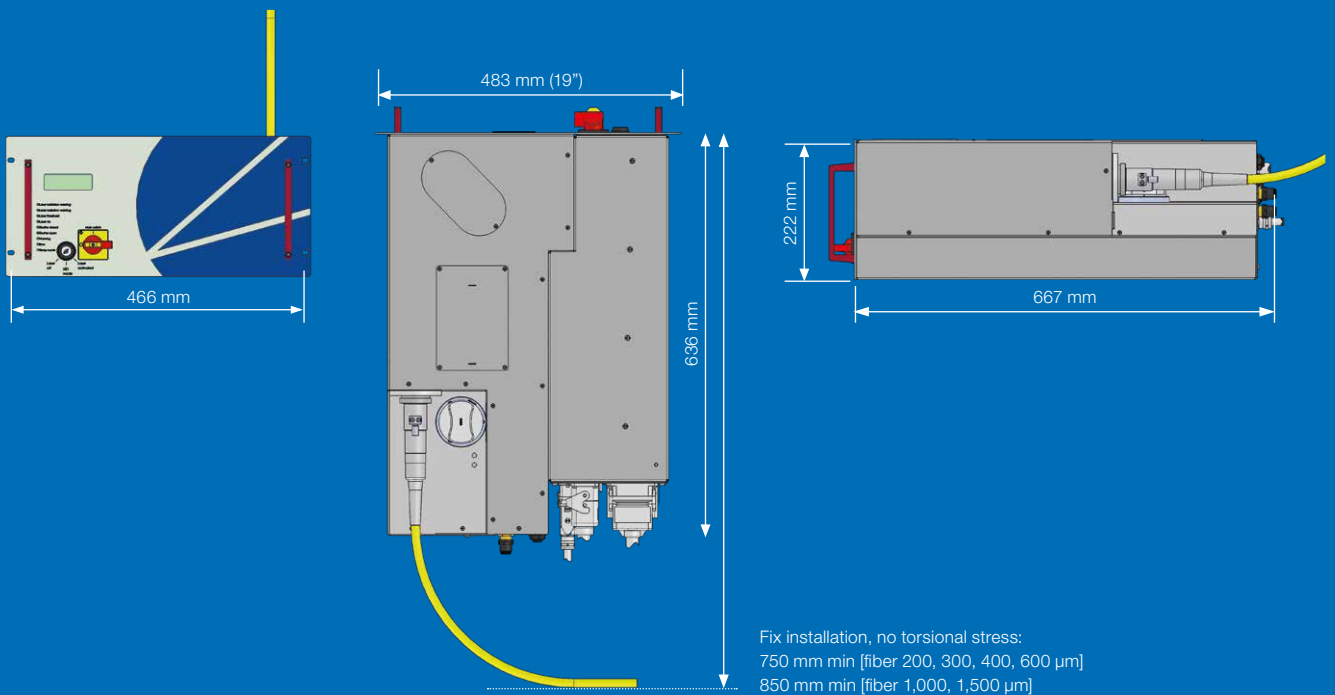
Industry proven system concept

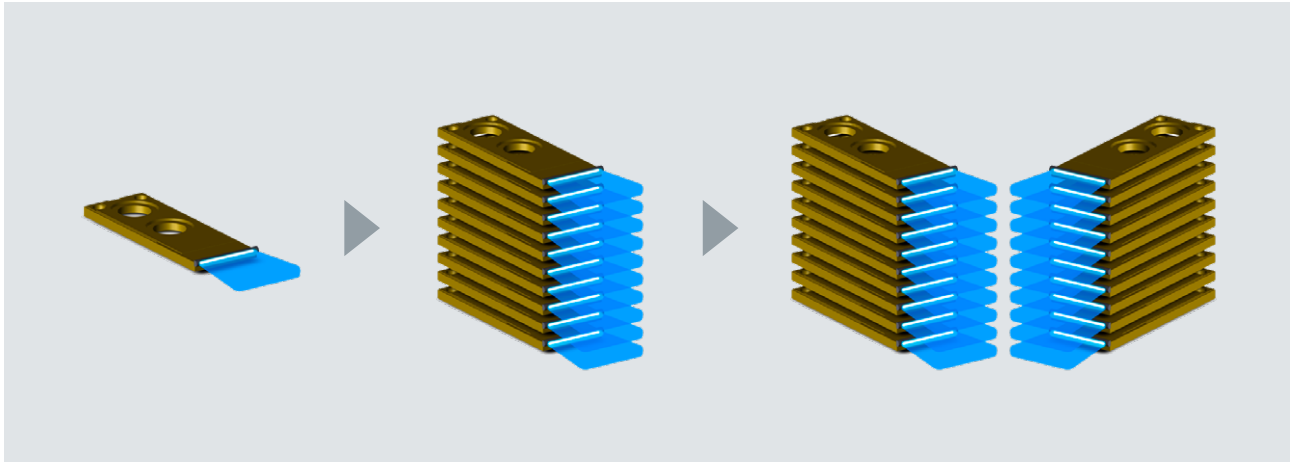
LDM*blue* is based on the 19" rack design of the LDM product family well established in industrial applications for many years. The modular system design enables maintenance and service of the lasers in the field. Pre-defined spare part modules allow central system components to be easily replaced by trained personnel. Besides the service concept, all interfaces for control and system integration remain unchanged. The control options also include the fast modulation of the diode laser output power with rise time less than 150 microseconds (10%-90%).





The new LDM*blue* shows again the proven advantages of the LDM series. With a wavelength of 450 nm and 1 kW cw power it sets new benchmarks in the industrial copper processing.



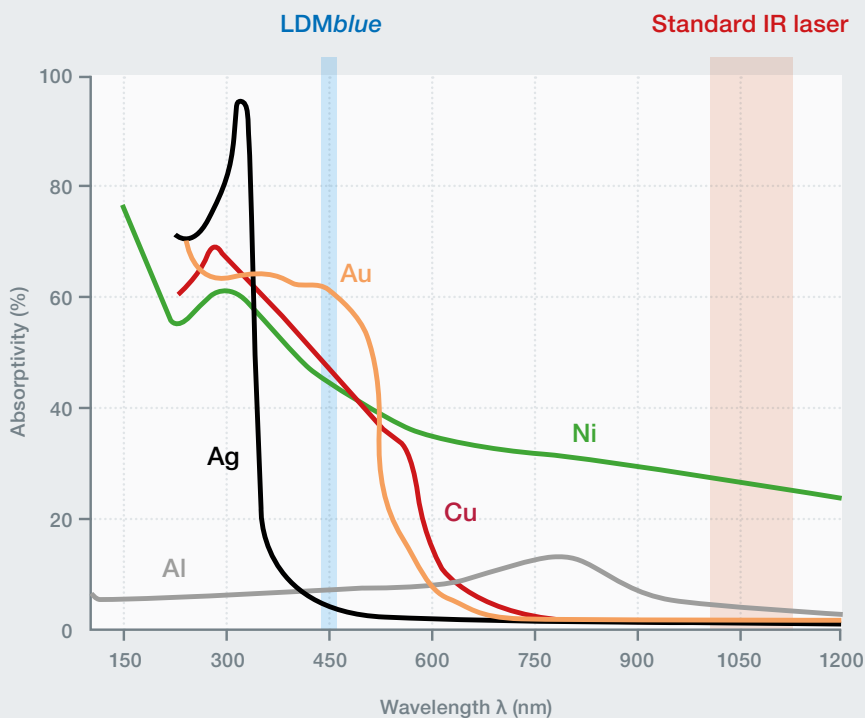


Scalable laser power

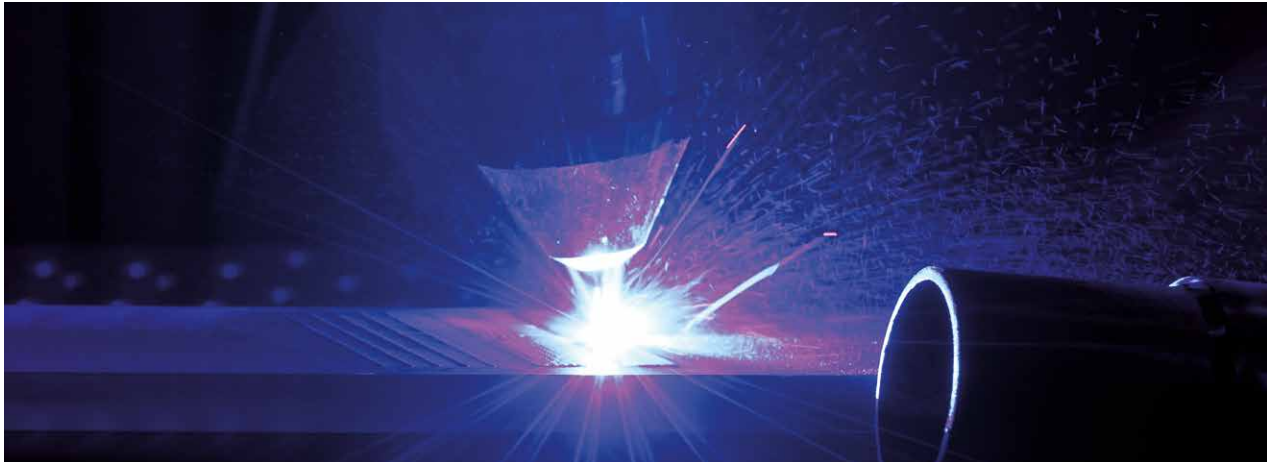
The Laserline typical modular system concept facilitates the stagewise scaling of the maximum LDMLblue laser power. At the same time the beam quality can be adapted to process requirements by means of different diode stack configurations. This unique technology provides the flexibility, modularity and scalability already known from other Laserline products.

Technical advantages at a glance

- > Up to 1000 W cw power at 450 nm
- > Fast power control and power modulation
- > Optimized absorption in highly reflective metals
- > Industry proven system architecture
- > Highly stable process with quiet melt pool characteristics
- > Welding of stacked thin foils and copper sheets
- > Welding of dissimilar metals
- > 19" rack mount for easy integration into existing systems



Processing of highly reflective material depends on the choice of the appropriate wavelength. With 450 nm wavelength, the LDMLblue provides for the first time the ideal wavelength for the processing of highly reflective metals combined with a laser power of 1000 W.



New application opportunities

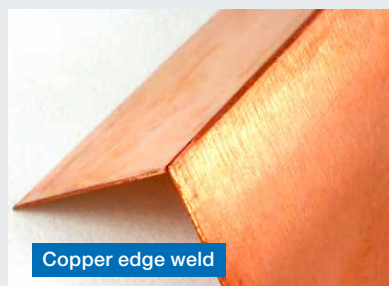
The combination of the 450 nm wavelength with 1000 Watt cw laser power opens up completely new opportunities for high-quality processing of copper and other highly reflective metals. Moreover can it be done almost independently of the surface condition e.g. oxidation in combination with the lack of spatters. This gives a new perspective for the creation of electrical interconnections which improves the welding process in electromobility applications, such as battery interconnection. Due to the world wide first system proving up to 1000 W of blue laser power, many more applications are expected in the near future e.g. copper cladding.

Welding of thin sheets

Tasks that are very challenging utilizing conventional joining techniques such as welding of thin copper foils and copper sheets with perfect cosmetic appearance are now possible. Furthermore, combinations of dissimilar metals can be realized with copper as first joining partner, for example copper to aluminium or copper to steel, which breaks the convention that copper must be the bottom joining partner. The new possible heat conduction process comes along with a high gap bridgeability, which allows the usage of novel component designs such as edge welds or butt joints, in order to increase the material efficiency.



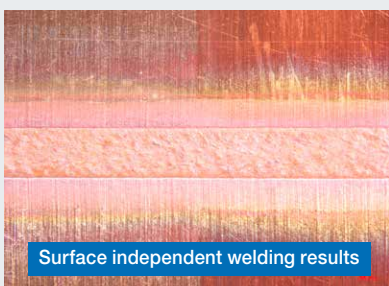
Welded copper sheet
polished, oxidized, etched



Copper edge weld



Dissimilar metals copper and steel



Surface independent welding results



Cross section of welded copper foils



Dissimilar metals nickel coated
copper and aluminum

LDMblue Series

Optical specifications

Max. output power (cw)	300 W	500 W	1,000 W
Beam quality	60 mm mrad	60 mm mrad	100 mm mrad
Optical fiber	600 µm [NA 0.2]	600 µm [NA 0.2]	1,000 µm [NA 0.2]
Min. fokus at f = 150 mm	900 µm	900 µm	1,500 µm
Fiber-coupling unit	LLK-D/Auto		
Fiber length	5 m, 10 m	5 m, 10 m	5 m
Power stability	< +/- 2% over 2 h		
Wavelength range	400 nm to 500 nm		

Mechanical specifications

VG5H	Weight: approx. 50 kg, size: 19" rack mount, 5U (220 mm), depth 636 mm
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Connection data

Voltage	400 - 480 V, 3 phases, PE, 50 or 60 Hz		
Power consumption at nom. power	3.2 kW	5.0 kW	6.9 kW
Recom. cooling requirements max.	2.9 kW	4.5 kW	5.9 kW
External inputs	Digital 24 V, analog power control 0 - 10 V, safety interlocks		

Operating conditions

Temperature	10 - 45 °C operational, 5 - 65 °C storage
Humidity	Max. 70% @ 25 °C, non condensing
Protection rating	IP54
Safety class	Laser safety class 1 according to EN 60825-1

Options

Interfaces	Profibus DP, Ethernet, RS232 (VG5H)
Optics	Dedicated Laserline optics for 450 nm applications
Others	Teleservice, pilot laser, CMOS camera, software for PC

Concerning functional safety, the laser is conform to DIN EN ISO 13849-1 and achieves the performance level d.

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