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VITAL

先导激光设备手册

Vital Laser Equipment Manual

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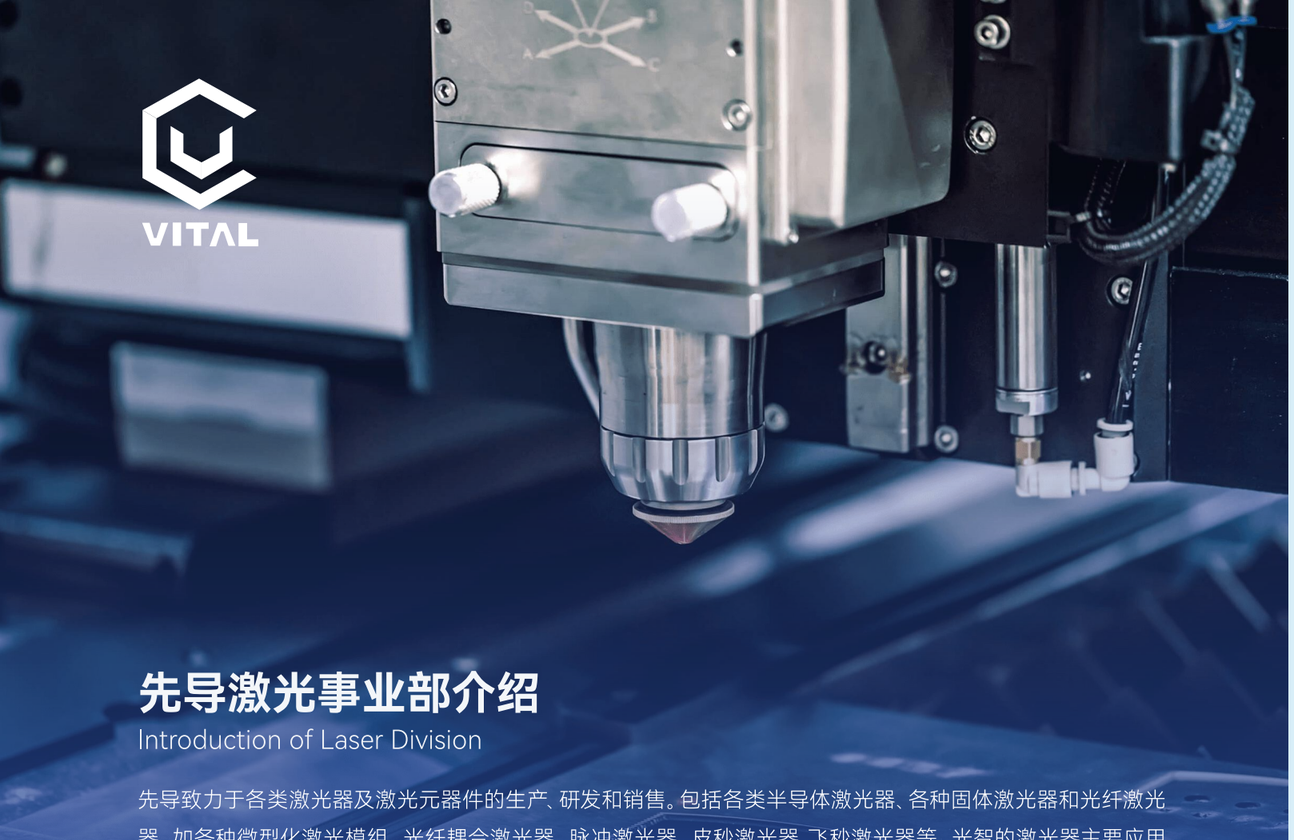


先导激光事业部介绍
Introduction of Laser Division

先导致力于各类激光器及激光元器件的生产、研发和销售。包括各类半导体激光器、各种固体激光器和光纤激光器，如各种微型化激光模组、光纤耦合激光器、脉冲激光器、皮秒激光器、飞秒激光器等。光智的激光器主要应用于工业激光精细加工、激光雷达、各类检测仪器、生物医疗检测仪器、机器视觉、科研激光、量子光通信等，可为各类客户提供大批量标准化产品以及各类定制化产品和全方位整体化技术解决方案。先导激光全方位具备了从激光元器件到各类型激光器及激光设备、各类非标激光精密加工设备的自主研发、制造和生产能力。

VLS is committed to the production including all kinds of laser components, laser and laser equipment. It covers fourcategories that contain semiconductor laser, solid-state laser, fiberlaser and gas laser. it is involved in various laser modules, fiber coupled lasers, pulse lasers, picosecond lasers, femtosecond lasers, RF CO2 lasers and so cn. The products of VOT are mainly used in industrial laser fine processing LiDAR, all kinds of testing instruments, biome-dical testing instruments, machine vision scientific research, quantum optical communication etc. The products of VOT can provide various customers with large quantities of standardized products and various customized products and all-round integrated technical solutions.

核心产品与技术
Core Products And Technologies

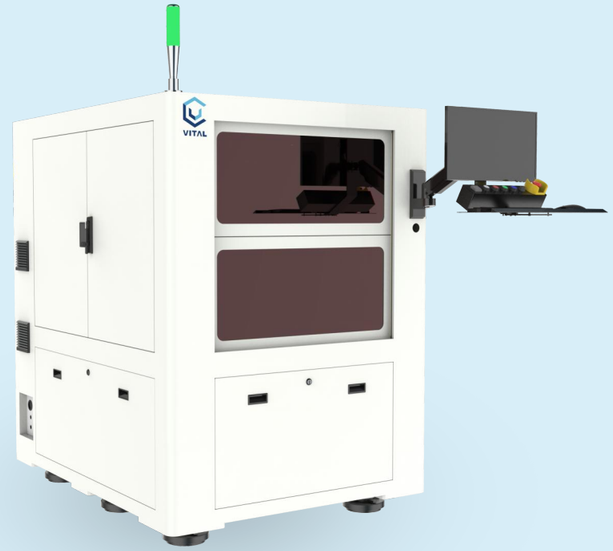
先导已经掌握了精密激光切割机技术，此设备具备高精度扫描振镜、三轴运动平台及视觉定位系统，可实现大范围材料的精密加工，包括精细打孔、精细切割、微细加工等。

VLS has mastered the technology of precision laser cutting machinethis equipment withhigh-precision scanning galvanometer three-axis movenent platform and visual positio-ning systemcan achieve a wide range of materials precision machiningincluding finedrilling, fine cutting, micro-machining.

陶瓷激光钻孔设备
Ceramic Laser Drilling Equipment

陶瓷激光钻孔设备利用高能量密度的激光束照射陶瓷表面，使局部材料瞬间熔化或汽化，从而形成孔洞。由于激光属于非接触式加工，特别适合硬脆材料如氧化铝陶瓷、氮化铝陶瓷等，能够在极短时间内完成大批量微孔的精准加工。

Ceramic laser drilling equipment utilizes high-energy-density laser beams to irradiate the ceramic surface, causing local materials to melt or vaporize instantaneously, thereby forming holes. As laser processing is non-contact, it is particularly suitable for hard and brittle materials such as alumina ceramics and aluminum nitride ceramics, enabling precise processing of a large number of micro-holes in a very short period of time.



产品参数
Product parameters

项目 Parameter	规格 Value
激光源Laser	355nm 20W
XYZ轴行程 X/Y/Z axis travel	580x650x90mm
XY轴最大运行速度 X/Y max. operating speed	800mm/s
Z轴最大运行速度 Z max. operating speed	25mm/s
XY轴定位精度 X、Y positioning accuracy	±3μm
XY轴重复定位精度 X、Y repeated accuracy	±2μm
Z轴重复定位精度 Z repeated accuracy	±2μm
CCD定位精度 CCD positioning accuracy	≤10μm
系统加工精度 Machining accuracy	20μm
振镜扫描范围 Scan range	46 x 46 mm
切割最小线宽 Min. cutting line width	< 10μm
电源及功率 Power supply/Dissipation	AC380V 12KW

钙钛矿四合一划线设备
Perovskite 4-in-1 Scribing Equipment

本设备是用高能量的激光在玻璃表面进行划线的激光加工装置，根据不同的激光器配置，可进行不同的工艺作业。

设备各部件高效集成，集成激光器、光路、振镜系统、聚焦系统、三轴运动平台、影像系统等，可实现高精度、高速划线、蚀刻工艺。

This equipment is a laser processing device that uses high-energy laser to scribe on glass surfaces. Different processes can be performed according to different laser configurations.

The components of the equipment are highly integrated, including laser, optical path, galvanometer system, focusing system, three-axis motion platform, vision system, etc., enabling high-precision and high-speed scribing and etching processes.

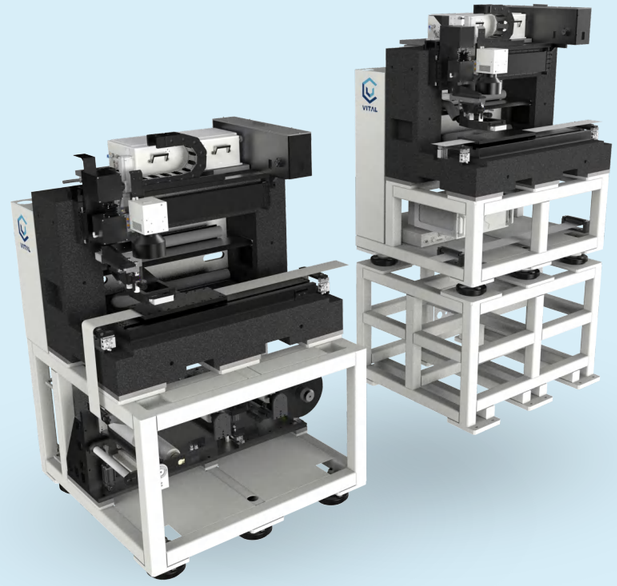
产品参数
Product parameters

项目 Parameter	规格 Value
激光波长Wavelength	1064nm/532nm
激光功率Power	300W/5W
X/Y/Z轴行程 X/Y/Z axis travel	1300/1000/100mm
X轴速度 X operating speed	> 1000mm/s
Y轴速度 Y operating speed	> 500mm/s
X/Y轴定位精度 X、Y positioning accuracy	±5μm
加工尺寸 Machining Size	1200*600*3.2mm向下兼容Backward compatible
电力需求 Power Supply	380V，50Hz，40A
设备尺寸 size	L2100 x W2300 x H1930mm
整机重量 Weight	2500kg

薄膜激光划线设备
Thin-film laser scribing equipment

薄膜激光划线设备是钙钛矿太阳能电池生产中的关键工艺装备，主要用于在薄膜电池内部创建电气隔离与互连的精密线槽，从而实现电池子单元的串联。其核心功能在于高精度、低损伤地去除特定膜层。

Thin-film laser scribing equipment is a crucial process in the production of perovskite solar cells. It is primarily utilized to create precise wire grooves for electrical isolation and interconnection within thin-film batteries, thereby facilitating the series connection of battery sub-units. Its core functionality lies in the high-precision and low-damage removal of specific film layers.



产品参数
Product parameters

项目 Parameter	规格 Value
激光波长 Wavelength	355/532nm
XYZ轴行程 X/Y/Z axis travel	550x800x50mm
XY轴最大运行速度 X/Y max. operating speed	1000mm/s
Z轴最大运行速度 Z max. operating speed	25mm/s
XY轴定位精度 X、Y positioning accuracy	±4μm
XY轴重复定位精度 X、Y repeated accuracy	±2μm
Z轴重复定位精度 Z repeated accuracy	±5μm
CCD定位精度 CCD positioning accuracy	≤10μm
系统加工精度 Machining accuracy	20μm
振镜扫描范围 Scan range	100x100mm
电源及功率 Power supply/Dissipation	AC380V 12KW

精密激光切割设备
Precision Laser Cutting Equipment

精密激光切割设备是现代制造业中实现高精度、高效率金属加工的核心装备，广泛应用于机械制造、汽车零部件、航空航天、电子精密件等领域。这类设备利用高功率密度激光束熔化或汽化材料，结合数控系统实现自动化切割，具有切缝窄、热变形小、切割速度快、精度高等显著优势。

Precision laser cutting equipment is a core tool in modern manufacturing for achieving high-accuracy and high-efficiency metal processing, widely used in machinery manufacturing, automotive components, aerospace, and precision electronic parts. These devices utilize high-power-density laser beams to melt or vaporize materials, combined with CNC systems to enable automated cutting, offering significant advantages such as narrow kerf width, minimal thermal deformation, fast cutting speed, and high precision.

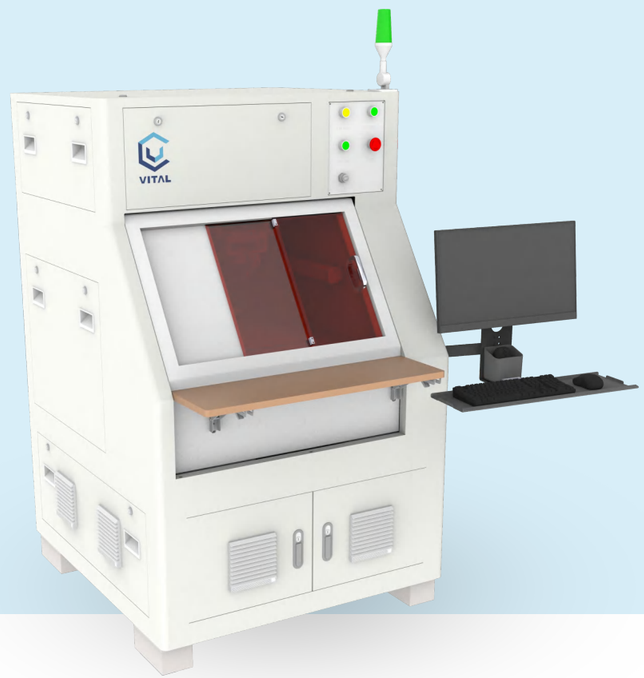
产品参数
Product parameters

项目 Parameter	规格 Value
激光波长 Wavelength	355nm
激光功率 Power	25W
频率范围	40-200khz
控制方式 Control Mode	振镜控制 Galvanometer control
切割方式 Cutting Mode	Z轴动态调焦自动补偿 Z-axis dynamic focus automatic compensation
XYZ轴行程 XYZAxis Travel	450/450/100mm
定位精度 Positioning Accuracy	土0.003mm
工装温湿度 Temperature & Humidity	15℃~35℃ 、10%~80% (non-condensing)
电力需求Power Supply	AC380V 63A ²
总功率Power Dissipation	12KVA
设备尺寸外形 Size	1630/1600/2300mm
设备总重量 Weight	2900Kg

金刚石切割设备
Diamond Cutting Equipment

金刚石切割系统是针对硬脆与复合材料加工开发出的工业化解决方案，适合于CVD和HPHT以及复合材料的切割加工。其自主研发的激光器与软件系统稳定可靠。具有加工速度快,设备体积小,模块化设计，可拓展性强;以及操作系统简单易懂,使用便捷,并可为用户提供专业的定制化服务。

Diamond cutting system is an industrial solution developed for hardand brittle and composite material processing, suitable for CVD andHPHT and composite material cutting. Its self-developed laser andsoftware systems are stable and reliable. With fast processingspeed, small equipment size, modular design, strong scalability; Andthe operating system is simple to understand, convenient to use,and can provide users with professional customized services.

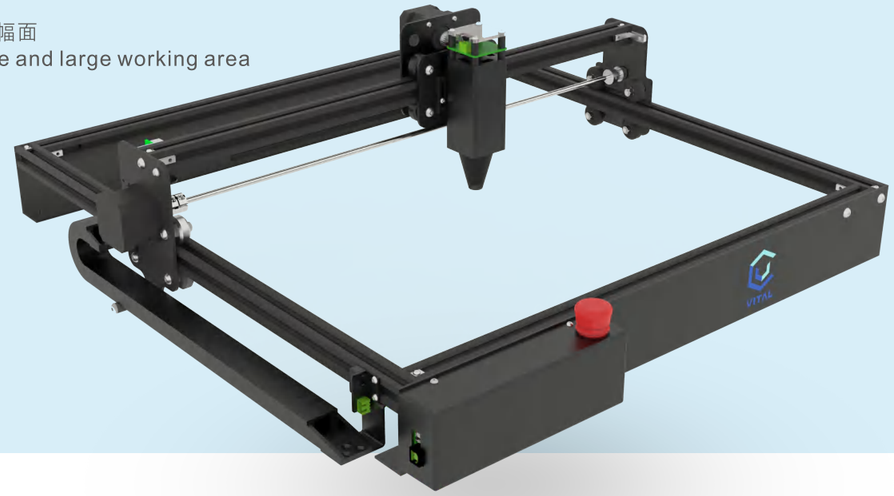


产品参数
Product parameters

项目 Parameter	规格 Value
激光波长 Wavelength	532nm
激光功率 Power	20W
光束质量 M2	M2<1.3
聚焦方式 Focus Mode	单点聚焦镜 Single point focusing lens
控制方式 Control Mode	PC软件 PC software
切割方式 Cutting Mode	Z轴动态调焦自动补偿Z-axis dynamic focus automatic compensation
XYZ轴行程 XYZAxis Travel	100/200/100mm
定位精度 Positioning Accuracy	土0.003mm
切割缝宽 Cutting Seam Width	0.1-0.12mm
工装温湿度 Temperature & Humidity	15℃~35℃ 、10%~80% (non-condensing)
电力需求 Power Supply	AC220V/50Hz
总功率 Power Dissipation	< 1500W
设备尺寸外形 Size	1040/970/1570mm
设备总重量 Weight	< 1000Kg

框架式激光雕刻机
Frame Type Laser Engraving Machine

应用场景
Application
雕刻、切割
Engraving and cutting
主要特性
Feature
结构紧凑、大工作幅面
Compact structure and large working area



产品参数
Product parameters

项目 Parameter	规格 Value
整机外形尺寸 Size	610×636×194mm
加工区域 Working Area	425×440mm
激光器功率 Laser Power	5/10W
激光波长 Wavelength	455nm
木板最大切割厚度 Maximum Cutting Thickness of Plywood	3/8mm
对焦方式 Focus Mode	手动对焦Manual focus
支持软件、格式 Supported Software and Formats	Software: LaserGRBL、LightBurn Formats: NC/BMP/JPG/PNG/DXF/GIF等格式etc.
安全防护 Safety Protection	护目镜Goggles
雕刻材料 Carving Material	纸、木片、塑胶、布料、皮革、陶瓷、不锈钢、涂层金属、 等大部分非透明材料 Paper, plywood, plastic, cloth, leather, ceramics, stainless steel, Coating metal, most of the non-transparent materials

桌面式激光雕刻机
Desktop Laser Engraving Machine

应用场景
Application
雕刻、切割
Engraving and cutting
主要特性
Feature
高安全性、高可靠性
High security and reliability

产品参数
Product parameters

项目 Parameter	规格 Value
整机外形尺寸 Size	755×618×249mm
加工区域 Working Area	420×315mm
激光器功率 Laser Power	10W
激光波长 Wavelength	455nm
木板最大切割厚度 Maximum Cutting Thickness of Plywood	8mm
对焦方式 Focus Mode	手动对焦Manual focus
支持软件、格式 Supported Software and Formats	Software: LaserGRBL、LightBurn Formats: NC/BMP/JPG/PNG/DXF/GIF等格式 etc.
安全防护 Safety Protection	激光防护板
雕刻材料 Carving Material	纸、木片、塑胶、布料、皮革、陶瓷、不锈钢、涂层金属、 等大部分非透明材料 Paper, plywood, plastic, cloth, leather, ceramics, stainless steel, Coating metal, most of the non-transparent materials

全封闭式激光打标机
Fully Enclosed Laser Marking Machine

适用于铁、铜、铝、金、银等各类金属材质，及PC、ABS、PVC、PC+ABS等部分非金属材质。广泛应用于3C、汽车零配件、电子元器件、集成电路(IC)、电工电器、精密器械、五金制品、建材、眼镜钟表、首饰饰品、工艺礼品等行业。

Suitable for iron, copper, aluminum, gold, silver and other metalmaterials, and PC, ABS, PVC, PC+ABS and other non-metallic materi-als. Widely used in 3C, automotive parts, electronic components,integrated circuits (IC), electrical appliances, precision instruments,hardware products, building materials, glasses, watches, jewelry, craftgifts and other industries.

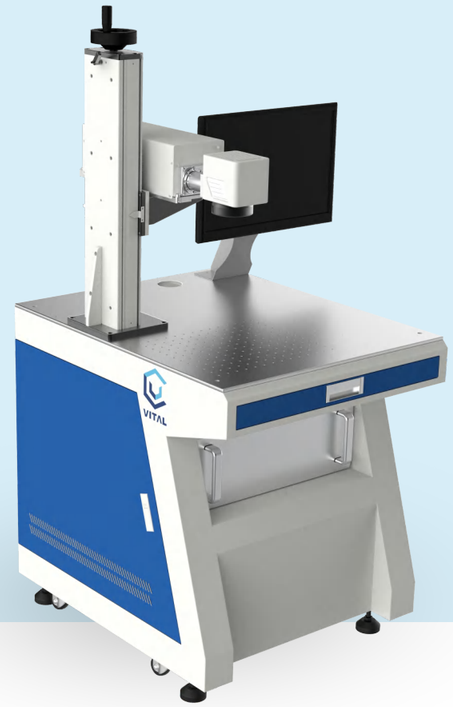
产品参数
Product parameters

项目 Parameter	规格 Value
激光波长 Wavelength	可选Choosability（355nm、1064nm）
激光功率 Power	可选Choosability（3/5/15w、20/30/50/100w）
扫描速度 Scan speed	≤7000mm/s
标刻范围 Marking range	50x50mm-175x175mm(可选Choosability)
冷却方式 Cooling mode	风冷/水冷（根据激光激光器类型） Air cooling / Water cooling (depending on the laser type)
系统供电 Power supply	AC220V/50Hz
整机重量 Weight	≈200kg

半封闭式激光打标机
Semi-enclosed Laser Marking Machine

可选355nm/1064nm波长激光器，适用包括塑料(ABS、PC、PVC、HIPS等)、皮革、金属、玻璃、液晶屏、薄片陶瓷、单晶硅片、IC晶粒、蓝宝石等材料的精密标记，应用主要分布在3C、汽车、电气仪表、白色家电、集成电路、医疗器械、五金工具、食品、药品等标记，金属或非金属镀层去除，各类材料的划线，盲槽处理，新兴超薄金属箔片微孔制作等。

355nm/1064nm laser can mark many materials, such as plastic (ABS, PC, PVC, HIPS,etc.), leather, metal, glass, LCD screen, thin ceramic, monocrystal silicon, ICgrains, sapphire. Applications are mainly distributed in 3C, automobiles,electrical instruments, white goods, integrated circuits, medical devices,hardware tools, food, drugs and other marking, metal or non-metal coatingremoval, all kinds of materials marking, blind slot treatment, emergingultra-thin metal foil microhole production.



产品参数
Product parameters

项目 Parameter	规格 Value
激光波长Wavelength	可选Choosability（355nm、1064nm）
激光功率Power	可选Choosability（3/5/15w、20/30/50/100w）
扫描速度Scan speed	≤7000mm/s
标刻范围Marking range	50x50mm-175x175mm(可选Choosability)
冷却方式Cooling mode	风冷/水冷（根据激光激光器类型） Air cooling / Water cooling (depending on the laser type)
系统供电Power supply	AC220V/50Hz
整机重量Weight	≈150kg

半封闭式激光焊接机
Semi-Enclosed Laser Welding Machine

光纤激光焊接机是一种利用高能量密度光纤激光束作为热源，对工件进行局部熔化并形成牢固焊缝的先进焊接设备，广泛应用于汽车、电子、新能源、医疗、航空航天等高精度制造领域，适用于不锈钢、碳钢、铜、铝等多种金属的焊接。

Fiber laser welding machine is an advanced welding equipment that utilizes a high-energy-density fiber laser beam as a heat source to locally melt workpieces and form strong welded joints. It is widely applied in high-precision manufacturing fields such as automotive, electronics, new energy, medical, and aerospace industries, and is suitable for welding various metals including stainless steel, carbon steel, copper, aluminum, and others.

产品参数
Product parameters

项目 Parameter	规格 Value
激光波长 Wavelength	1080nm±5nm
激光功率 Power	2000W
工作模式 Operating Mode	连续/脉冲Continuous Wave (CW) / Pulsed
脉冲频率 Pulsing Rate	0-1000Hz
脉宽 Pulse Width	0.5-50ms
焊接速度 Welding Speed	300mm/s
焊接范围 Welding Range	X、Y、Z、R-360，R轴数量可选，行程可以定制 Number of R-axes is optional/configurable, Travel can be customized
输出功率不稳定度 Power Stability	±1.5%
冷却方式 Cooling Mode	水冷 Water Cooling

全封闭式激光焊接机
Fully Enclosed Laser Welding Machine

光纤激光焊接机是一种利用高能量密度光纤激光束作为热源，对工件进行局部熔化并形成牢固焊缝的先进焊接设备，广泛应用于汽车、电子、新能源、医疗、航空航天等高精度制造领域，适用于不锈钢、碳钢、铜、铝等多种金属的焊接。

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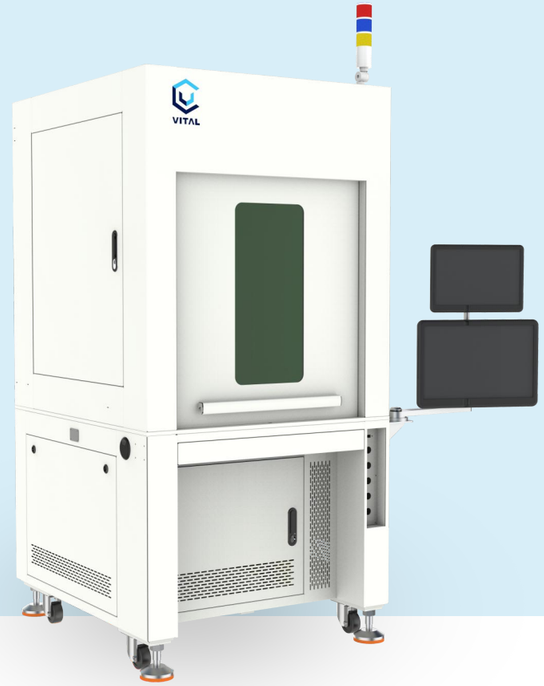

产品参数
Product parameters

项目 Parameter	规格 Value
激光波长 Wavelength	1080nm±5nm
激光功率 Power	2000W
工作模式 Operating Mode	连续/脉冲Continuous Wave (CW) / Pulsed
脉冲频率 Pulsing Rate	0-1000Hz
脉宽 Pulse Width	0.5-50ms
焊接速度 Welding Speed	300mm/s
焊接范围 Welding Range	X、Y、Z、R-360，R轴数量可选，行程可以定制 Number of R-axes is optional/configurable, Travel can be customized
输出功率不稳定度 Power Stability	±1.5%
冷却方式 Cooling Mode	水冷 Water Cooling

真空焊接设备
Vacuum Welding Equipment

真空激光焊接设备是一种在真空环境下利用高能量密度激光束进行金属连接的先进制造装备，广泛应用于航空航天、精密医疗器件、微波器件、新能源等对焊接质量要求极高的领域。该技术通过消除空气干扰，显著提升焊缝的致密性与力学性能，是当前高端制造中实现“无缺陷焊接”的核心技术之一。

Vacuum Laser Welding Equipment is an advanced manufacturing device that utilizes high-energy-density laser beams to join metals in a vacuum environment. It is widely used in fields with extremely high requirements for welding quality, such as aerospace, precision medical devices, microwave components, and new energy. By eliminating air interference, this technology significantly enhances the density and mechanical properties of welds, making it a core technology for achieving "defect-free welding" in high-end manufacturing.

产品参数
Product parameters

项目 Parameter	规格 Value
主机尺寸/Host system dimensions	1200/1000/2300mm
水机尺寸/Cooling system Sise	750/560/1020mm
整机耗电功率/Machine power consumption	15KVA
电力需求Power Supply	AC380V 63A
瞄准定位/Aiming and positioning	CCD和红光 CCD and red light
激光类型/Laser material	Nd:YAG
激光功率 Power	1500W
激光波长 Wavelength	1064nm
焊接最小熔池/Weld minimum weld Pool	0.2mm
焊接深度/Welding depth	2.5mm
脉冲宽度/Pulse width	0.1ms-20ms
脉冲频率/Pulse frequency	1-100HZ
控制方式 Control Mode	DSP or PLC
定位精度 Positioning Accuracy	0.2mm
重复定位精度 RepeatingPositioning Accuracy	±0.2mm
工装温湿度 Temperature & Humidity	15°C~35°C 、10%~80% (non-condensing)

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