

# The ULTRA Series



## Advanced Laser Material Processing Solutions

The ULTRA product line offers tailored solutions for laser material processing for the widest possible range of materials. The ULTRA series is designed and ideally suited for precision material processing in manufacturing, research and development, academic research, and prototyping environments. With its unique modular architecture, the ULTRA series, provides customizable solutions that can be easily reconfigured. A wide array of options is available for enhancing performance, capability and safety to complete the perfect solution to meet present and future business needs.

### ULTRA SERIES FEATURES:

- High performance servo-driven beam delivery system with dual loop encoding
- Precision focusing with autofocus touch probe
- Selectable laser power density
- Computer controlled gas assist with material collision detection
- Optics protection
- Camera registration
- 21 in (533 mm) touch screen control panel
- Automation interface
- All-in-one multi-function material support table
- ULTRA Laser System Manager
- Support for Class 4 conversion



ULTRA 9MW



ULTRA 9MWH

# Platform Features

## ULTRA 9MW:

- MultiWave processing with support for one interchangeable CO<sub>2</sub> or fiber laser source
- Manually adjustable three position Z-axis for materials with a thickness up to 2 in (51 mm)

## ULTRA 9MWH:

- MultiWave Hybrid™ processing with support for two interchangeable CO<sub>2</sub> laser sources and a fiber laser
- Motorized long travel Z-axis for materials with a thickness up to 12 in (305 mm)
- Support for SuperSpeed™ (optional)

## Options:

- 1X/13X Selectable Laser Power Density Optical Assembly
- Porous Carbon Tiles and Perforated Aluminum Tiles for Vacuum Table Configuration
- Elevating Aluminum Pins for Pin Table Configuration
- Vacuum Table Pump
- Lateral Gas Assist
- Fire Suppression
- Class 4 Conversion Module
- Traveling Exhaust
- UAC 4000 Air Cleaner
- SuperSpeed™ (available for ULTRA 9MWH only)
- Rotary Fixture (available for ULTRA 9MWH only)



21" (533 mm) touch screen control panel



UAC 4000 Air Cleaner

# Specifications

	ULTRA 9MW	ULTRA 9MWH
Materials Library	www.ulsinc.com/material/materials-library	
Processing Area	36 x 24 in (914 x 610 mm)	
Max Material Thickness	2 in (51 mm)	12 in (305 mm)
Carriage Travel	1.0 in (25.4 mm)	
Autofocus Range	1 in (25 mm)	12 in (305 mm)
Autofocus Accuracy	+/- .001 (25 µm)	
Beam Positioning Acceleration	> 5G	
Max Beam Positioning Speed	> 150 in/sec (3810 mm/sec)	
Path Planning	Real Time Path Planning Optimization	
Minimum Addressable Beam Positioning	.00008 in (2 µm)	
Beam Delivery System Accuracy	.001 in (25 µm) <sup>2,3</sup>	
Selectable Power Density Coefficients for CO <sub>2</sub> laser	3X/5X (Standard), 1X/13X (Optional) <sup>4</sup>	
Fiber Power Density Coefficient	52X <sup>4</sup>	
Number of Lasers Supported	1	3
Available Wavelengths	1.06, 9.3 and 10.6 µm	1.06, 9.3 and 10.6 µm
Max Laser Power	75 Watts CO <sub>2</sub> (9.3 or 10.6 µm) 50 Watts Fiber (1.06 µm)	150 Watts CO <sub>2</sub> (9.3 or 10.6 µm) 50 Watts Fiber (1.06 µm)
Laser Power Control	Encoder Based Programmable	
System Cooling	Air Cooled	
External Connectivity	Ethernet or WIFI Windows™/ macOS™/ Linux™/ Android™/ iOS™ (browser based)	
Controls	21 in (533 mm) Touchscreen Interface	
Software Interface	File Formats: PDF, DXF, G-code, Intelligent Materials Database, Design File Management, Design File Estimator, Design File Relocation and Duplication, Process Control Programming	
Overall Dimensions	Width: 65 in (1651 mm) ( <i>control panel folded</i> ) Width: 83.5 in (2121 mm) ( <i>control panel extended</i> ) Depth: 45 in (1143 mm), Height: 53 in (1346 mm)	
Weight	450 lbs (204 Kg) <sup>5</sup>	550 lbs (250 Kg) <sup>5</sup>
Power Requirements	110V/10A or 220-240V/5A	220-240V/16A
Exhaust Requirements	UAC 4000 Air Cleaner or External Exhaust Blower capable of 700 CFM @ 6 in Static Pressure (1190 m <sup>3</sup> /hr at 1.5 kPa)	
Safety	Class 1 for Material Processing Lasers (1.06, 9.3, 10.6 µm) Contains Class 2 Alignment Laser (670 nm) Convertible to Class 4 Operation with Patented Optional Class 4 Conversion Module ( <i>patent no. 7,723,638</i> )	

(1) Universal Laser Systems reserves the right to change these specifications at any time without notification (2) Accuracy is measured per foot under controlled conditions. Accuracy is affected by temperature.

(3) Accuracy of material processing results are affected by ambient temperature, material temperature, processing area temperature, humidity, laser processing settings, and material characteristics.

(4) Normalized power density (Watts/cm<sup>2</sup>) = Power Density Coefficient x 103 x Average Laser Power (Watts) where average laser power is power of lasers used to process materials and normalized power density is power of laser used to process materials divided by the area of the focal spot measured at 1/e<sup>2</sup>. (5) Weight approximate and will vary with laser selection

# Feature Descriptions

**Rapid Laser Reconfiguration** – This ULS innovation allows laser sources to be quickly interchanged in the laser system without tools or need for realignment. This feature allows users to easily switch between sources of different wavelengths and peak power levels to optimize laser power delivery for different materials and applications which increases the flexibility and functionality of the laser system by increasing the number of materials that can be laser processed.

**MultiWave Processing** – In the ULTRA 9MW, the beam delivery system uses sophisticated MultiWave optics to enable laser processing using any of three wavelengths (10.6, 9.3 or 1.06  $\mu\text{m}$ ) by rapidly reconfiguring the laser sources.

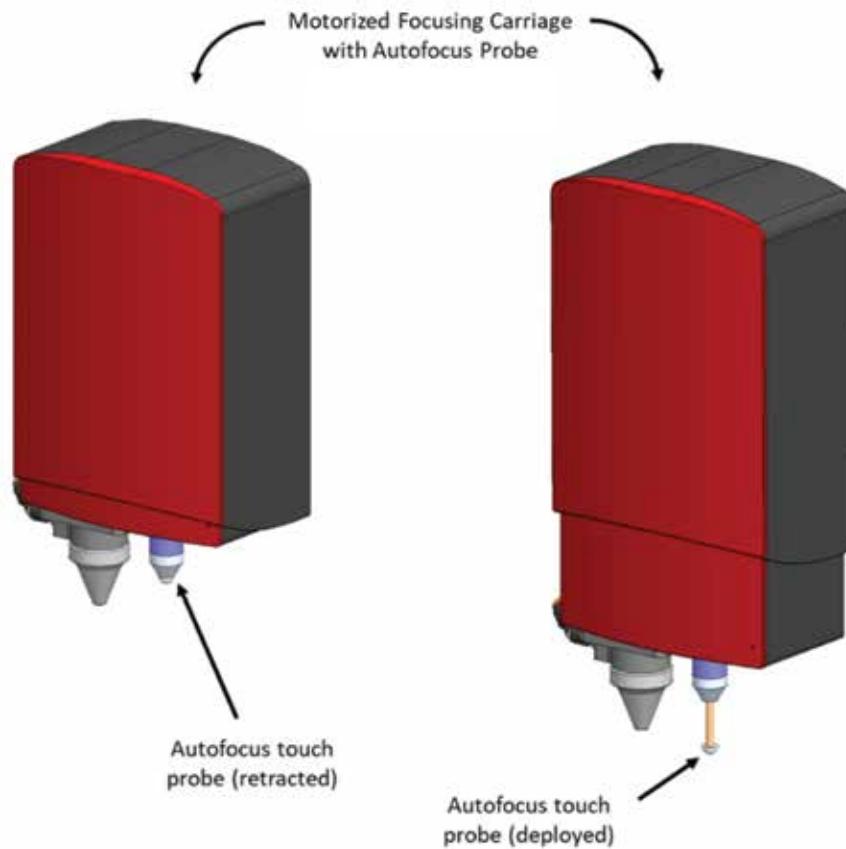
**MultiWave Hybrid™ Processing** – In the ULTRA 9MWH, three lasers can be used simultaneously for MultiWave Hybrid processing. The same unique optical assembly that provides selectable laser power density separates the CO<sub>2</sub> (9.3 and 10.6  $\mu\text{m}$ ) from the fiber laser beam and conditions the CO<sub>2</sub> beam in order to shift the CO<sub>2</sub> focal plane after the final focus lens. This allows the CO<sub>2</sub> focal plane to be coplanar with the fiber laser focal plane (1.06  $\mu\text{m}$ ). This offers the ability to process materials using any of three available wavelengths (1.06, 9.3 and 10.6  $\mu\text{m}$ ) without having to refocus when switching between wavelengths.

Additionally, this feature allows users to process materials with a hybrid laser beam made of a combination of any of the three wavelengths, power levels and duty cycles. Hybrid laser material processing opens the possibility to process challenging materials by taking advantage of the differing energy absorption at different wavelengths.

**High Performance Beam Delivery System** – Servo-based beam delivery system with dual loop encoder feedback and linear encoders on all axes. This enables precise, repeatable beam positioning allowing laser processing of a wide variety of materials and to address tight tolerance requirements. High precision beam positioning and excellent repeatability make these platforms ideal for high accuracy laser processing for manufacturing and research and development.

**Precision Focusing with Autofocus Touch Probe** – A lightweight autofocus touch probe integrated into the motorized assembly deploys and retracts to automatically detect the top surface of any material including transparent materials and foams. This feature improves usability and workflow by:

- Eliminating the inaccurate, error prone and sometimes forgotten process of finding focus with a manual tool by instructing the system to automatically perform the focus operation each time laser processing commences.
- Automatically focusing before laser processing begins to ensure that the laser system is always focused on materials, avoiding the potential for damage to the material or for fire caused by out of focus laser energy.
- Improving accuracy beyond non-contact ultrasonic and photo sensor methods by achieving surface detection and repeatability of +/- .001" (25  $\mu\text{m}$ ), including foams and transparent materials.



**Selectable Laser Power Density for CO<sub>2</sub> Lasers** – A unique optical assembly in the carriage provides a fixed 2” working distance from the bottom of the carriage while allowing the user to select power density from 3X/5X (Standard) to 1X/13X (Optional) with a Gaussian beam profile. This allows users to easily select the laser power density and focal depth best suited to their application without having to replace final focus lenses and readjust focus or replace the gas assist fitting with longer or shorter ones. Users will benefit from the increased flexibility to optimize laser processing results for a wider range of materials and ease of use through reduced setup time.

**Computer Controlled Coaxial Gas Assist with Material Collision Detection** – Gas assist can be programmed to switch between compressed air and other non-flammable support gases such as nitrogen. Users can program use of gas type and flow level on a process by process basis within a design file.

Material collision detection is built into the coaxial gas fitting on the carriage with provisions for the fitting to breakaway in case of lateral collision and auto-sense vertical collision. Safety is improved because collisions are detected and processing is stopped. This feature reduces the likelihood of damage to the material being processed and to the laser system due to collisions between material, fixturing and the carriage.

Gas assist improves results for a variety of laser processing applications by directing byproducts (smoke and fumes) of laser processing away from the material, cooling materials, and changing the gas components ratio at the point of laser energy interaction with the material to increase or reduce oxidation reactions during laser processing.

**Optics Protection** – Optics protection is provided for all optical elements in the material processing area. This feature reduces the need for maintenance and increases equipment reliability (requires compressed air).

**Camera Registration** – A high resolution camera integrated in the beam delivery carriage enables calibration of the laser system across the processing field and camera registration of materials. Calibration improves accuracy of the laser system. Camera registration allows design files to be automatically translated, scaled and skewed to align properly with preexisting features on the surface of the materials. Camera registration marks and other features of the material surface can be used.

**21” Touch Screen Control Panel** – The user interface is a 21” touchscreen control panel allowing for standalone operation without the need for a tethered PC. The user interface allows adjustment of all laser processing settings in order to optimize processing results.

Additionally, the control panel has the following features to reduce setup time and improve usability of the laser system:

- Progressive Joystick for accurate positioning of X, Y and Z axes. The progressive control built into the joystick allows users to make rapid movements when needed and fine movements for precision positioning.
- Coordinate readout showing positions of beam delivery system and material support surface
- Processing start and pause buttons
- Rapid design file relocation function allows repositioning of design files anywhere in the material processing field.
- Design file selection which allows users to select the design file to process from the storage buffer.

**Automation Interface** – Programmable inputs and outputs allow the laser system to control external devices and allows external devices to initiate functions of the laser system. This feature helps to support the widest range of use scenarios.

**ULTRA Laser System Manager** – The integrated, cross-platform control and user interface software supports Windows™/macOS™/Linux™/Android™/iOS™ operating systems (browser based). It provides access to a suite of tools that allows users to quickly and confidently create and manage design files and program laser material processing settings:

- Design file storage and management.
- Importing of design files from common formats such as DXF and PDF formats.
- Modification of design files including, relocation and duplication functions.
- Intelligent materials database which calculates optimal processing settings for widest selection of compatible materials, taking into account laser power and wavelength currently installed in the system.
- Vector sorting and kerf compensation for cutting applications.
- Calibration, setup and diagnostics functions.

**Support for Fire Detection and Suppression** – This feature protects laser systems from damage during laser processing by detecting an over-temperature event in the laser material processing area, halting laser processing and triggering an audible alarm. Additionally, this feature supports the optional fire suppression module which, if attached, can deploy fire suppressant on the material being laser processed.

**Multi-function Material Support Table** – A built in multi-function table supports materials and provides exhaust for evacuating laser processing byproducts from underneath materials during laser processing with various options for eliminating back reflections. The multi-function table reduces setup time and improves laser processing results with features such as:

- Support for an optional masking material dispenser to mask the material support surface to maximize vacuum hold down force.
- Porous carbon tiles and perforated aluminum tiles (12 x 12 in, 305 x 305 mm) are available to create vacuum table surfaces for thin flexible materials. Porous carbon tiles can also reduce back reflections.
- Aluminum pins are available to elevate rigid materials above the material support surface table to reduce back reflections.
- A convenient clean out tray is integrated into the base of the material support table for cleaning debris from laser processing.

**Reconfigurable Exhaust** – This feature allows the user to balance exhaust flow between the upper surface and lower surface of the material being laser processed to optimize capture of exhaust byproduct to improve laser processing results.

## Options

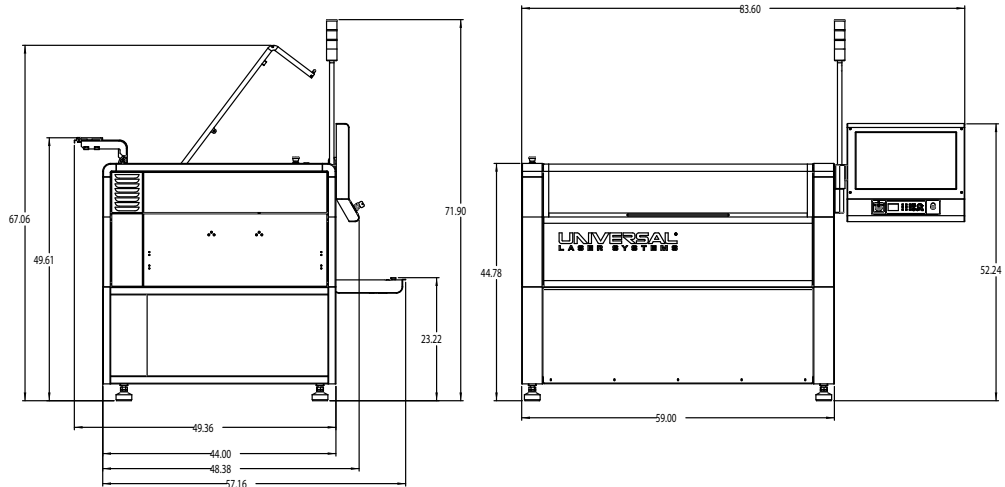
- **1X/13X Selectable Laser Power Density Optical Assembly** - A unique optical assembly in the carriage provides a fixed 2” working distance from the bottom of the carriage while allowing the user to select power density.
- **Elevating Pins for Pin Table Configuration** - Aluminum pins to elevate rigid materials above the material support surface table to reduce back reflections.
- **Tiles for Vacuum Table Configuration (compressed carbon or perforated aluminum)** - Porous carbon tiles and perforated aluminum tiles (12 x 12 in, 305 x 305 mm) to create vacuum table surfaces for thin flexible materials. Porous carbon tiles can also reduce back reflections.
- **Vacuum Table Pump** – Dedicated pump for true vacuum hold down of materials on multi-function table.

- **Lateral Gas Assist** - The Lateral Gas Assist attachment is an adjustable attachment that can direct air along the material's surface at a variety of incident angles.
- **Fire Suppression** – This module provides pressurized fire suppressant that can be automatically deployed on the material being laser processed in the event that high temperatures are detected in the processing area. A backup tank is present to provide continuous protection if the primary tank is deployed and has to be replaced.
- **Class 4 Conversion Module** – This option allows users to remove the side panels of the laser system and bypass the interlocks to operate the system in an open class 4 configuration. In a Class 4 configuration, the user can process oversized materials or integrate custom material handling hardware with the laser system. This module provides all of the safety features required of a class 4 laser system including key switch, mechanical shutter and emission indicator. The module can be easily removed to return the laser system to class 1 operation.
- **Traveling Exhaust** – This is an exhaust manifold that mounts to the arm of the beam delivery system to more effectively capture byproducts of laser material processing before they can deposit on the surface of the material being processed. This option reduces maintenance requirements and improves reliability of laser systems for applications involving removal of large amounts of material or when operating the laser system with side panels removed in optional Class 4 mode.
- **UAC Air Cleaner** – This optional air cleaner can be connected to a laser system to exhaust byproducts of laser material processing (particulate and fumes) from the processing area. The air cleaner removes particulate and fumes from the exhaust air using a four stage filtration process including a patented dual carbon filter. The UAC air cleaner controls exhaust flow and communicates state of the filter media to the user.
- **SuperSpeed™** –This option allows increased raster processing throughput by separating the beams from two CO<sub>2</sub> lasers and producing two raster lines with each pass of the beam delivery system. SuperSpeed enables higher raster throughput without the wear caused by increased beam delivery travel. It also produces better laser processing results because lower processing speeds increase laser power density on material surfaces. SuperSpeed requires two CO<sub>2</sub> lasers of same peak power and wavelength. SuperSpeed is not compatible with the ULTRA 9MW platform.
- **Rotary Fixture** – This optional fixture supports and rotates cylindrical material or parts under the beam delivery system allowing these types of materials or parts to be laser processed. This fixture can also be tilted to support tapered material.

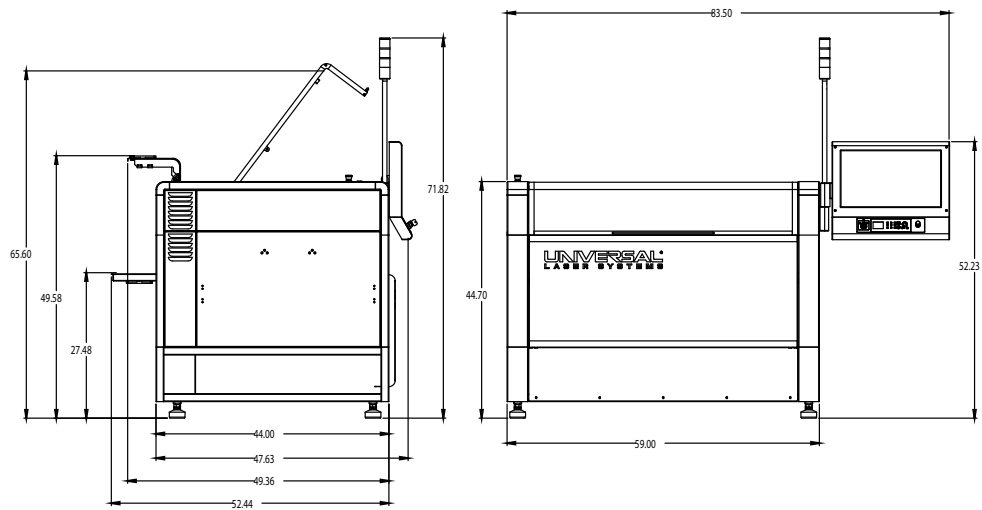


# Mechanical Specifications

## ULTRA 9MW



## ULTRA 9MWH



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