

p SERIES PULSED CO₂ LASER DATA SHEET

INDUSTRIAL PULSED LASERS FOR PRECISION MARKING, DRILLING AND CUTTING

High performance pulsed CO₂ laser engineered for optimal power stability, excellent beam quality, and fastest pulse rise time delivers exceptional quality on the most challenging materials

CUT AND DRILL FASTER WITH CLEAN, CRISP RESULTS EVEN ON SENSITIVE MATERIALS

The p Series pulsed CO₂ lasers cut faster, drill flawlessly and micro-process with precision. Harnessing pulse technology to deliver peak pulse power levels many times greater than standard continuous-wave laser power levels, the p Series expands cutting, drilling and perforating applications to a wider range of materials, including films, high performance textiles, certain metals, and high-tech composites. Internal beam conditioning before the aperture, focuses the beam down to a narrow spot for increased laser processing detail with near-perfect beam quality. Built for industrial environments, all models feature built-in gas purge ports for convenient in-field servicing and protective optical windows.



DESIGNED FOR OEMs AND SYSTEM ARCHITECTS

Faster throughput and better results

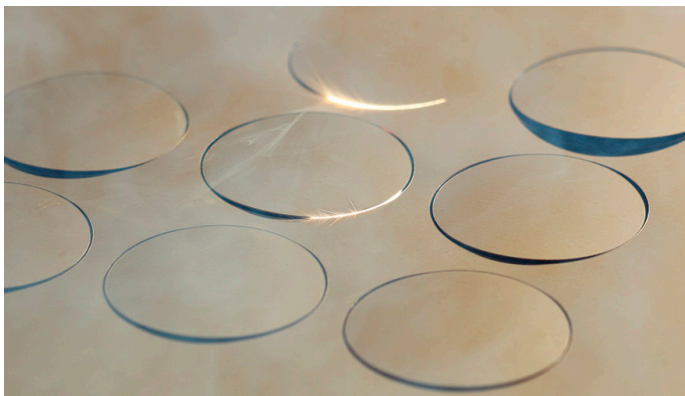
- 100 - 400 Watts of average power for fast processing speeds
- Fast rise pulse time and excellent power and divergence stability delivers clean, crisp cuts and perforations
- Integrated beam conditioning guarantees a high quality, circular output beam for precise cutting, drilling and intricate feature details

Adds flexibility to OEM machine design

- Unmatched application flexibility with user controlled pulse/continuous wave operation modes
- Real-time performance monitoring (p250 & p400) reduces unplanned downtime with onboard advanced diagnostics that are Industry 4.0 ready

Pulse Model For Heat-Sensitive Materials

- 400 Watts – 1kW of peak power delivers energy more efficiently, minimizing heat affected zone (HAZ) to better process sensitive materials such as thin films, glass, and ceramics



CLEAN CUTS, FASTER THROUGHPUT

- Excellent stability and high peak power limit the heat affected zone (HAZ), delivering cuts and perforations with minimal discoloration and melt
- Excellent solution for high-speed cutting, drilling and perforating applications on heat sensitive materials
- Zero contact to the target material eliminates surface deformation commonly associated with mechanical cutting systems

p SERIES PULSED CO₂ LASER RECOMMENDED APPLICATIONS

CUTTING TEXTILES



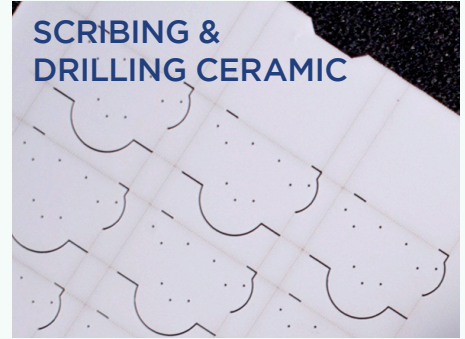
When cutting many natural and synthetic textiles cut edge charring or melting is caused by excessive heat build-up in the material. High peak power and fast pulse rise time eliminates this issue, expanding the range of materials for laser processing.

PACKAGING MATERIAL PROCESSING



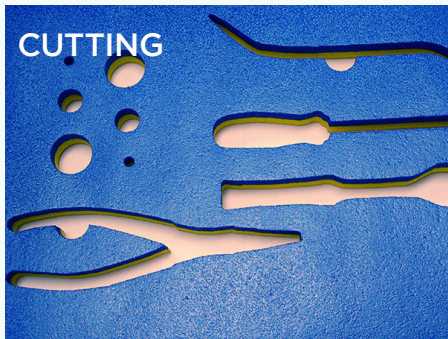
High-speed non-contact drilling and perforating of packaging films and pouches; perfect for easy-open or breathe ability of perishables.

SCRIBING & DRILLING CERAMIC



The high peak power is essential to minimizing heat build-up and avoid cracking when processing brittle materials such as alumina, ceramic and quartz glass. Excellent beam quality allows for very small features and clean symmetric holes.

CUTTING



Continuous output power drives faster throughput for higher production yields. Excellent rise/fall time and divergence stability minimizes HAZ for clean cuts.

PERFORATING



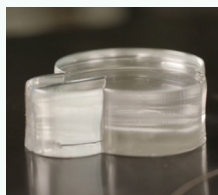
Peak power delivers efficient energy, increasing perforating or drilling speeds and reducing HAZ; a solid solution for laser finishing processes on automated packaging lines.

THIN FILM PROCESSING



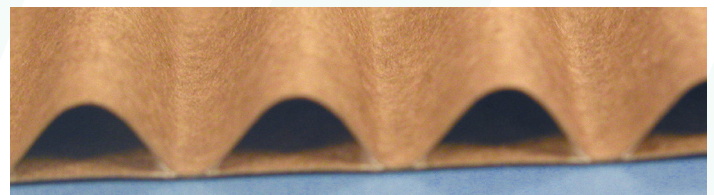
High peak and average power deliver the perfect laser for high quality, precision drilling and cutting applications on a wide variety of thin, sensitive materials.

p SERIES PERFORMANCE ADVANTAGES



Superior Edge Cut Quality on a Wide Variety of Materials

Higher average power and peak pulse power delivers high cut quality with faster processing speeds. The unique user switchable pulse/continuous wave modes makes the p Series the most versatile laser source available. Easier field serviceability with a modular electronics package make the p400 and p250 the first choice for high speed industrial processing systems.



Clean Cuts, Faster Throughput

Excellent stability and high peak power limits the heat affected zone (HAZ), delivering cuts and perforations with minimal discoloration and melt. With zero contact to the target material, the p Series is an excellent CO₂ laser source for sensitive high-speed cutting applications. Zero contact with the target material eliminates surface deformation commonly associated with mechanical cutting systems.

p SERIES PULSED CO₂ LASER SPECIFICATIONS

Output Specifications	p100	p150	p250	p400
Wavelength	10.2 μm, 10.6 μm	9.3 μm, 10.2 μm, 10.6 μm	10.2 μm, 10.6 μm	10.6 μm
Average Output Power ¹	> 90 W @ 10.2 μm > 100 W @ 10.6 μm	> 150 W	> 250 W	> 400 W
Peak Pulse Power ²	375 W @ 10.2 μm 400 W @ 10.6 μm	600 W @ 9.3 & 10.6 μm 550 W @ 10.2 μm	750 W @ 10.2 μm 800 W @ 10.6 μm	1 kW
Peak Pulse Energy ³	180 mJ @ 10.2 μm 190 mJ @ 10.6 μm	355 mJ	600 mJ	1.0 J
Power Stability (cold start) ⁴	± 7%	± 5% @ 9.3 μm ± 6% @ 10.2 μm and 10.6 μm	± 5%	± 7%
Power Stability (typical, after 3 min.)	± 5%	± 3%	± 3%	± 5%
Beam Quality (M ²)	< 1.2			
Beam Diameter ⁵	7.5 mm ± 1.1 mm @ 10.2 μm 8.0 mm ± 1.0 mm @ 10.6 μm	8.5 mm ± 1.1 mm	8.0 mm ± 1.0 mm @ 10.2 μm 9.0 mm ± 1.0 mm @ 10.6 μm	1 - 6.5 mm ± 1.0 mm 2 - 9.0 mm ± 1.0 mm
Divergence (full angle)	1.8 mrad ± 0.4 mrad @ 10.2 μm 2.0 mrad ± 0.4 mrad @ 10.6 μm	1.9 mrad ± 0.4 mrad		1 - 2.5 mrad ± 0.6 mrad 2 - 1.8 mrad ± 0.4 mrad
Ellipticity	< 1.2			
Polarization	Linear (Vertical)		Linear (Horizontal)	Linear (45°)
Rise/Fall Time ⁶	< 40 μs / < 80 μs@10.2 μm < 40 μs / < 100 μs@10.6 μm	< 50 μs / < 100 μs	< 60 μs / < 110 μs	< 50 μs / < 100 μs
Operating Frequency	0 - 100 kHz	0 - 130 kHz	0 - 100 kHz	
Duty Cycle Range	≤ 37.5%		≤ 45%	≤ 50%
Maximum Pulse Length	100 μs	600 μs	1.0 μs	
Power Supply				
DC Voltage Input	48 VDC			
Maximum Current	40 A	65 A	90 A	175 A
Pulsed Current	75 A for < 100 μs	100 A for < 100 μs	250 A for < 1 μs	300 A for < 1 μs
Cooling				
Maximum Heat Load	2000 W	3500 W	4.3 kW	8.5 kW
Coolant Temperature	18 - 22° C (water)			
Minimum Flow Rate	1.5 GPM, < 60 PSI	2.0 GPM, < 60 PSI	3.0 GPM, < 60 PSI	4.0 GPM, < 60 PSI
Environmental				
Operating Ambient Temperatures	15 - 40° C			
Maximum Humidity	95%, non-condensing			
Physical				
OEM Air Cooled Dimensions (LxWxH) mm (inches)	590 x 132 x 155 (23.2 x 5.2 x 6.1)	798 x 132 x 155 (31.4 x 5.2 x 6.1)	12527 x 315 x 198 (49.3 x 12.4 x 7.8)	1262 x 208 x 300 (49.7 x 8.2 x 11.8)
Weight kg (lbs.)	13.6 kg (30.0 lbs.)	18.1 kg (40.0 lbs.)	48.5 kg (107 lbs.)	59 kg (130 lbs.)

1 - Power level guaranteed for 2 years from date of shipment, regardless of operation hours, within recommended coolant flow rate and temperature range.

2 - Measured at 1 kHz, 10% duty cycle

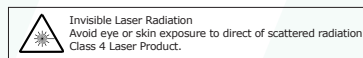
3 - Measured from average power at 100 Hz, 10% duty cycle.

4 - Measured as $\pm(P_{\text{max}} - P_{\text{min}}) / (P_{\text{max}} + P_{\text{min}})$ from cold start at 5 kHz, 50% duty cycle.

5 - Measured 1/e² diameter at laser output

6 - Measured at 1 kHz, 10% duty cycle.

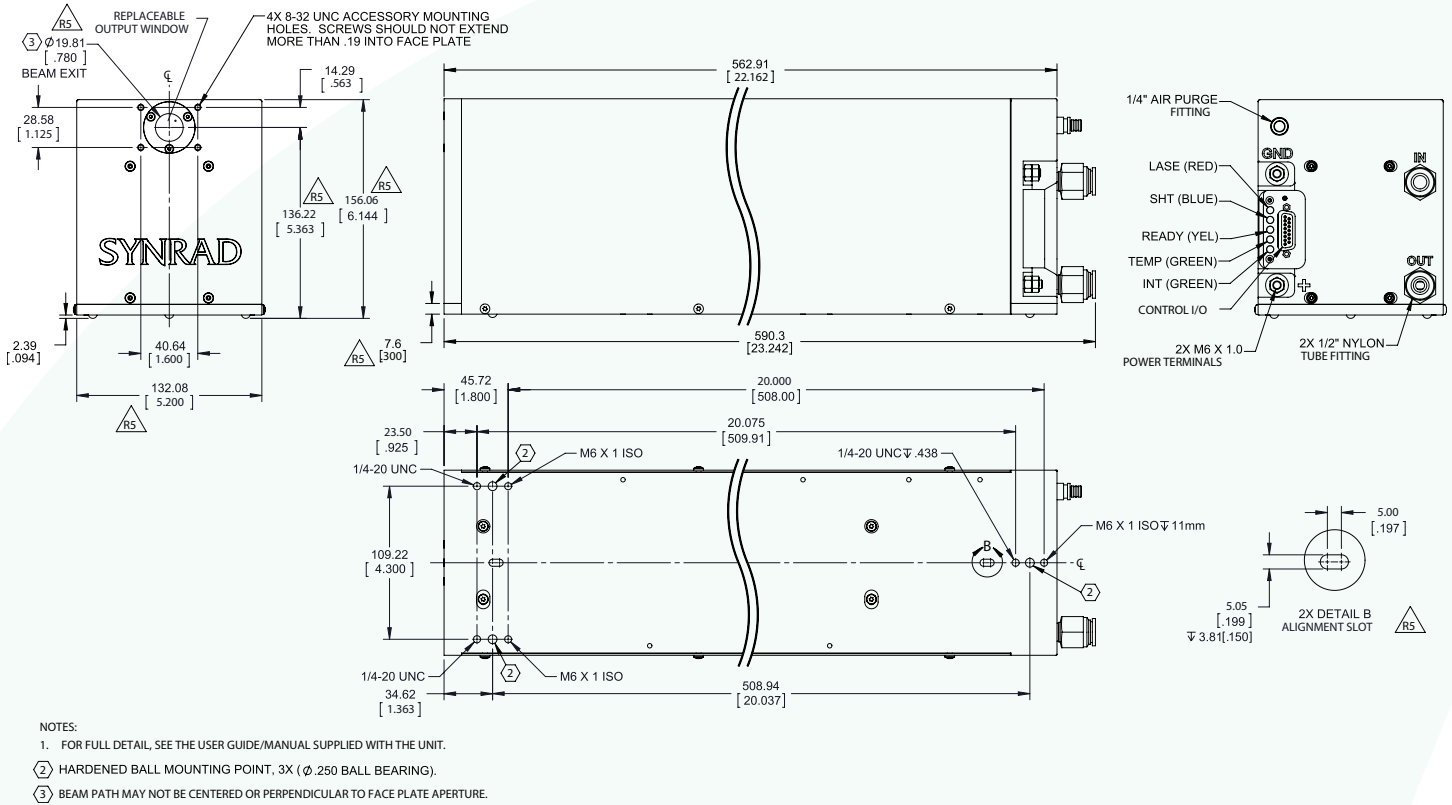
Specifications are subject to change without notice



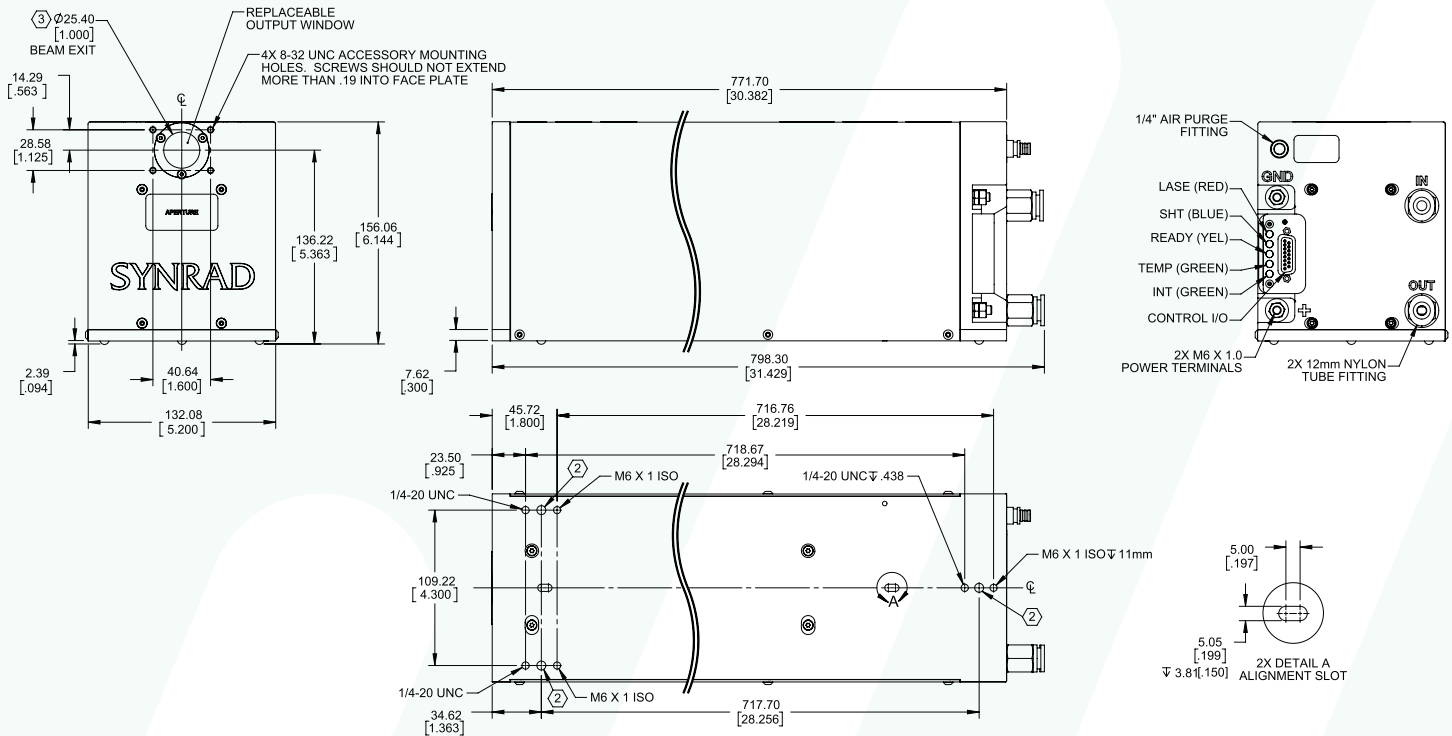
p SERIES TECHNICAL ILLUSTRATIONS

Dimensions are in mm (inches)

SYNRAD p100 - 100 W



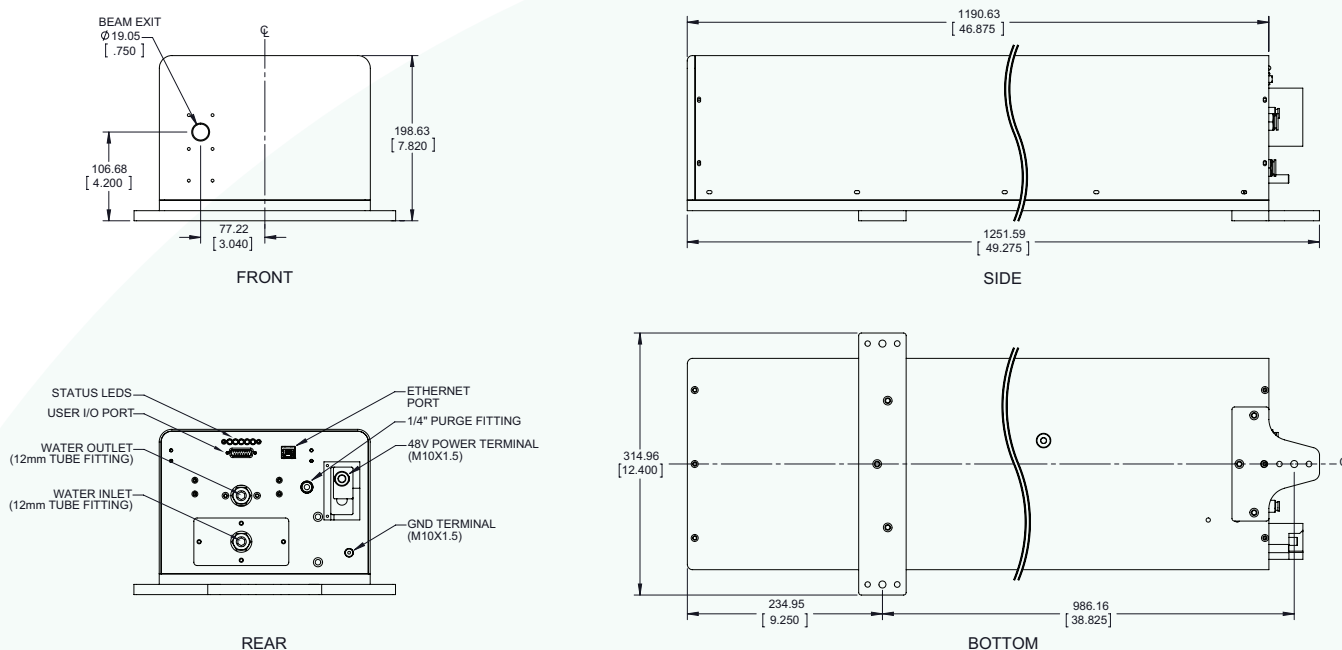
SYNRAD p150 - 150 W



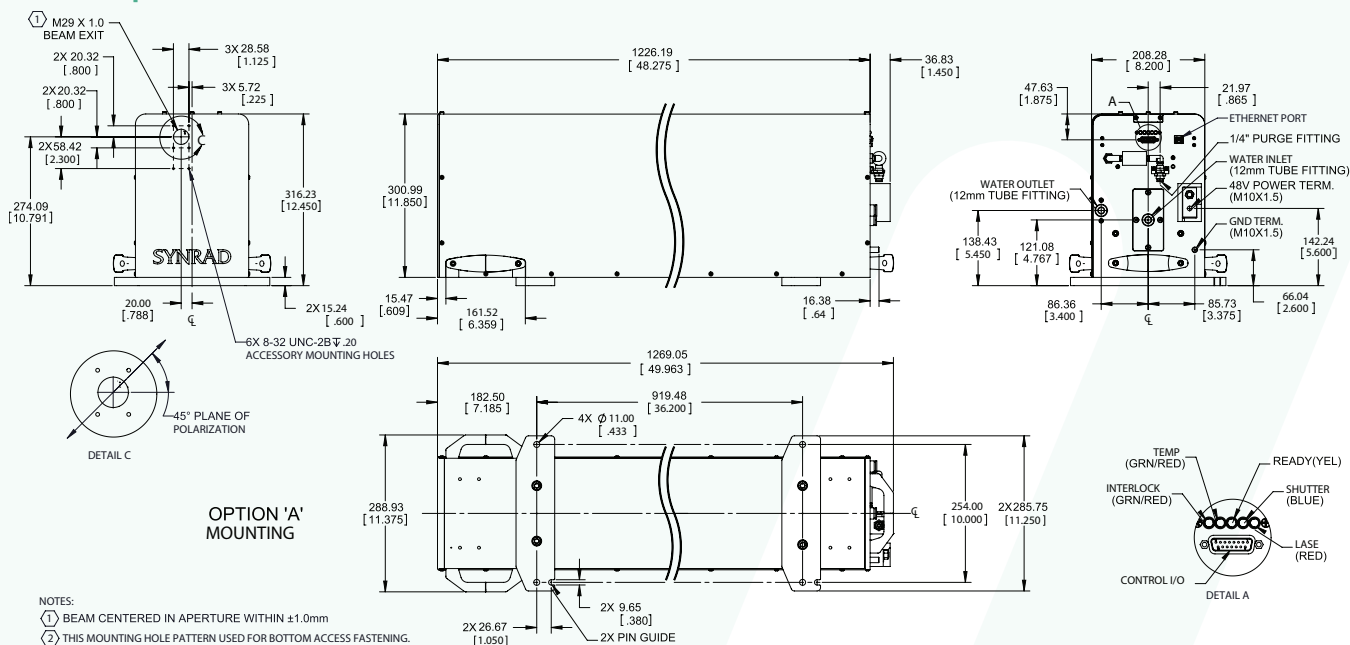
p SERIES TECHNICAL ILLUSTRATIONS

Dimensions are in mm (inches)

SYNRAD p250 - 250 W



SYNRAD p400 - 400 W



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