Diamond J-3

RF Excited OEM Industrial CO₂ Laser

Coherent Diamond J-3 Series are sealed, pulsed CO_2 lasers offering average power greater than 250 Watts in a fully integrated and compact package. The unique pulsing characteristics derived from its slab discharge design enable the J-3 Series laser to reach peak powers well in excess of 750 W in contrast to CW modulated lasers. The J-3 Series lasers are available in 10.6 μ m, 10.2 μ m, and 9. 4 μ m, and can be operated with pulsed repetition rates up to 200 kHz with fast pulse rise and fall times. This combination of wavelength selection, high peak power and fast rise and fall times, together with pow er on demand and excellent beam quality makes the J-Series an ideal laser for a wide range of materials processing applications.

The J-3 Series is part of the J-Series family spanning a power range from 150 W to greater than 500 W. The J-Series family is built on a common platform with common mechanical, electrical, and optical interfaces, common software, and a common service and support strategy. All J-Series lasers offer proactive maintenance capability enabled by the integrated yet field serviceable RF power supply design and overall systems monitoring using Coherent's field proven full suite of on-board diagnostics.



FEATURES

- Wide operating power range
- High peak power >750 W
- Pulse frequency from single-shot to 200 kHz
- Fast rise-and-fall time
- Outstanding beam quality
- · Excellent power stability
- Low-cost OEM configuration
- Integrated but removable RF power supply
- Compact design
- Equipped with on-board internet-accessible diagnostics

APPLICATIONS

- Converting
- Drilling
- Cutting
- Scribing
- Engraving
- Marking



Wavelength (µm) 9.36 ±0.05 10.25 ±0.1 10.6 ±0.4 Output Power²² (W) ≥250 ≥250 ≥250 Power Range⁴ (W) 10 to 250 10 to 225 10 to 250 Typical Peak Power⁴ (W) = ₹750 10 to 225 10 to 250 Power Stability²a² (%) = ₹50 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Specifications ¹	Diamond J-3-9.4	Diamond J-3-10.2	Diamond J-3-10.6	
Power Range⁴ (W) 10 to 250 10 to 255 10 to 250 Typical Peak Power⁵ (W) ≥750 ≥750 Power Stability²e² (%) ±6 ±6 Mode Quality (M²) < 1.2	Wavelength (μm)	9.36 ±0.05	10.25 ±0.1	10.6 ±0.4	
Typical Peak Power [®] (W) ≥750 Power Stability ^{2,8} (%) ±6 Mode Quality (M²) < 1.2 Beam Waist Diameter ^{7,8} at 1/e² (mm) 7.0 ±1.0 8.5 ±1.0 8.5 ±1.0 Full-Angle Beam Divergence ⁸ (mrad) ≤2.4 ≤2.0 ≤2.0 Typical Polarization (parallel to baseplate) Linear ≥100:1 Beam Elipticity ^{7,8} ≥ 2.83, ≤1.2 Pulse Frequency (kHz) Single-shot to 200 RF Excitation Pulse Width Range (µsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time ⁸ (µs) ≤60 Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements DC Input Voltage (VDC) 48 ±1% Continous DC Input Current ⁹ (A) ≤100 Peak Current (A) ≤200 for ≤6 ms Coolant Heat Load (kW) ≤4.5 Dynamic Coolant Flow Rate (l/min.) ≥5.7 Coolant Setpoint Temperature Range 2 1 to 25 °C (89.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant Differential Pressure ¹¹ (kPa) 103 (15 psi) at 5.7 l/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5 °C to 45°C (41 to 113°F) Relative Humidity ¹² (non-condensing) (%)	Output Power ^{2,3} (W)	≥250	≥225	≥250	
Power Stability²e (%) ±6 Mode Quality (M²) <1.2	Power Range ⁴ (W)	10 to 250	10 to 225	10 to 250	
Mode Quality (M²) < 1.2 Beam Waist Diameter 78 at 1/e² (mm) 7.0 ±1.0 8.5 ±1.0 8.5 ±1.0 Full-Angle Beam Divergence8 (mrad) ≤2.4 ≤2.0 ≤2.0 Typical Polarization (parallel to baseplate) Linear ≥100:1 ≥ Beam Elipticity 78 ≥0.83, ≤1.2 ≥ Pulse Frequency (kHz) Single-shot to 200 ≥ RF Excitation Pulse Width Range (µsec) 2 to 1000	Typical Peak Power ⁵ (W)	≥750			
Beam Waist Diameter?a at 1/e² (mm) 7.0 ±1.0 8.5 ±1.0 8.5 ±1.0 Full-Angle Beam Divergence® (mrad) ≤2.4 ≤2.0 ≤2.0 Typical Polarization (parallel to baseplate) Linear ≥100:1 5.0.83, ≤1.2 Beam Elipticity?a ≥0.83, ≤1.2 5.0.83, ≤1.2 Pulse Frequency (kHz) Single-shot to 200 RF Excitation Pulse Width Range (µsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time® (µs) ≤60 Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements DC Input Voltage (VDC) 48 ± 1/6 Continous DC Input Current® (A) 5 Lough C	Power Stability ^{2,6} (%)	±6			
Full-Angle Beam Divergence® (mrad) Typical Polarization (parallel to baseplate) Beam Elipticity™ Eleam Elipticity™ Eventiation Pulse Width Range (µsec) Duty Cycle Limit (%) Fall Time® (µs) Weight Dimensions (L x W x H) Electrical Power Requirements DC Input Voltage (VDC) Continous DC Input Current® (A) Peak Current (A) Coolant Heat Load (kW) Dynamic Coolant Flow Rate (I/min.) Coolant Setpoint Temperature Range Coolant Temperature Stability (max.) Coolant Maximum Static Pressure (kPa) Entire Power Requirement (Rate (Passure MRa)) Entire Power Requirement (Passure MRa) Example Power R	Mode Quality (M ²)	<1.2			
Typical Polarization (parallel to baseplate) Beam Elipticity7s 20.83, ≤1.2 Pulse Frequency (kHz) Single-shot to 200 RF Excitation Pulse Width Range (μsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time5 (μs) Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements DC Input Voltage (VDC) 48 ± 1% Continous DC Input Current* (A) Each Coolant Heat Load (kW) Dynamic Coolant Flow Rate (I/min.) Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) Coolant Differential Pressure* (kPa) Toolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity7* (non-condensing) (%)	Beam Waist Diameter ^{7,8} at 1/e ² (mm)	7.0 ±1.0	8.5 ±1.0	8.5 ±1.0	
Beam Elipticity ^{7,8} ≥0.83, ≤1.2 Pulse Frequency (kHz) Single-shot to 200 RF Excitation Pulse Width Range (μsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time ⁶ (μs) ≤60 Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements 20 Input Voltage (VDC) Continous DC Input Current ⁹ (A) ≤100 Peak Current (A) ≤200 for ≤6 ms Coolant 44.5 Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant Differential Pressure¹¹ (kPa) 103 (15 psi) at 5.7 I/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Full-Angle Beam Divergence ⁸ (mrad)	≤2.4	≤2.0	≤2.0	
Pulse Frequency (kHz) Single-shot to 200 RF Excitation Pulse Width Range (μsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time® (μs) ≤60 Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements DC Input Voltage (VDC) 48 ± 1% Continous DC Input Current® (A) ≤100 Peak Current (A) ≤200 for ≤6 ms Coolant Heat Load (kW) Stynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant Differential Pressure¹¹ (kPa) 103 (15 psi) at 5.7 I/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Typical Polarization (parallel to baseplate)	Linear ≥100:1			
RF Excitation Pulse Width Range (μsec) 2 to 1000 Duty Cycle Limit (%) ≤60 Fall Time⁵ (μs) ≤60 Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements To Input Voltage (VDC) Continous DC Input Current⁰ (A) ≤100 Peak Current (A) ≤200 for ≤6 ms Coolant Electrical Power Requirements Coolant 500 Peak Current (A) ≤200 for ≤6 ms Coolant 500 Weight 48 ± 1% Coolant 500 Weight 48 ± 1% Coolant 500 Peak Current (A) ≤200 for ≤6 ms Coolant 500 Weight 54.5 Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant** Of (±0.18 °F) 41.0 °C (±0.18 °F) Coolant** Of (±0.18 °F) 41.0 °C (±0.18 °F) <	Beam Elipticity ^{7,8}	≥0.83, ≤1.2			
Duty Cycle Limit (%) ≤60 Fall Time ⁸ (µs) ≤60 Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements	Pulse Frequency (kHz)	Single-shot to 200			
Fall Time ⁶ (µs) ≤60 Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements Electrical Power Requirements DC Input Voltage (VDC) 48 ±1% Continous DC Input Current ⁹ (A) ≤100 Peak Current (A) ≤200 for ≤6 ms Coolant Heat Load (kW) ≤4.5 Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant Differential Pressure ¹¹ (kPa) 103 (15 psi) at 5.7 I/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity ¹² (non-condensing) (%) ≤95	RF Excitation Pulse Width Range (µsec)	2 to 1000			
Weight 45 kg (99.27 lbs.) Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements	Duty Cycle Limit (%)	≤60			
Dimensions (L x W x H) 1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.) Electrical Power Requirements 48 ±1% DC Input Voltage (VDC) 48 ±1% Continous DC Input Current9 (A) ≤100 Peak Current (A) ≤200 for ≤6 ms Coolant W Heat Load (kW) ≤4.5 Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant Ion Anti-Corrosion Treated Water Coolant Differential Pressure1 (kPa) 103 (15 psi) at 5.7 I/min. (1.5 ppm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions 5°C to 45°C (41 to 113°F) Relative Humidity12 (non-condensing) (%) ≤95	Fall Time ⁵ (μs)	≤60			
Electrical Power Requirements DC Input Voltage (VDC) Continous DC Input Current® (A) Peak Current (A) Coolant Heat Load (kW) Sequence Sequen	Weight	45 kg (99.27 lbs.)			
DC Input Voltage (VDC) Continous DC Input Current (A) Peak Current (A) Coolant Heat Load (kW) Dynamic Coolant Flow Rate (I/min.) Coolant Setpoint Temperature Range Coolant Temperature Stability (max.) Coolant Temperature Stability (max.) Coolant Differential Pressure (kPa) Environmental Conditions Ambient Temperature Set to 45°C (41 to 113°F) Relative Humidity¹2 (non-condensing) (%) Set 0000 Action Assume As ±1% Assume 1000 Assume As ±100 Assume As ±1% Assume 1000 Assume As ±100 Anti-Corrosion Treated Water Anti-Corrosion Treated Water Assume A	Dimensions (L x W x H)	1064.1 x 198.1 x 227.6 mm (41.89 x 7.8 x 8.96 in.)			
Continous DC Input Current Peak Current (A) Sequence of the	Electrical Power Requirements				
Peak Current (A) ≤200 for ≤6 ms Coolant Heat Load (kW) ≤4.5 Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant¹⁰ Anti-Corrosion Treated Water Coolant Differential Pressure¹¹ (kPa) 103 (15 psi) at 5.7 I/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	DC Input Voltage (VDC)	48 ±1%			
Coolant Heat Load (kW) ≤4.5 Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant¹⁰ Anti-Corrosion Treated Water Coolant Differential Pressure¹¹ (kPa) 103 (15 psi) at 5.7 I/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Continous DC Input Current ⁹ (A)	≤100			
Heat Load (kW) Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant Temperature Stability (max.) Anti-Corrosion Treated Water Coolant Differential Pressure¹¹ (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Peak Current (A)	≤200 for ≤6 ms			
Dynamic Coolant Flow Rate (I/min.) ≥5.7 Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) ±1.0 °C (±0.18 °F) Coolant¹⁰ Anti-Corrosion Treated Water Coolant Differential Pressure¹¹ (kPa) 103 (15 psi) at 5.7 I/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Coolant				
Coolant Setpoint Temperature Range 21 to 25 °C (69.8 to 77 °F) Coolant Temperature Stability (max.) £1.0 °C (±0.18 °F) Coolant¹¹⁰ Anti-Corrosion Treated Water Coolant Differential Pressure¹¹ (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Heat Load (kW)	≤4.5			
Coolant Temperature Stability (max.) Coolant¹¹⁰ Coolant Differential Pressure¹¹ (kPa) Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature S°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) £1.0 °C (±0.18 °F) Anti-Corrosion Treated Water 103 (15 psi) at 5.7 l/min. (1.5 gpm) 827 (120 psi) 5°C to 45°C (41 to 113°F) ≤95	Dynamic Coolant Flow Rate (I/min.)	≥5.7			
Coolant¹¹º Anti-Corrosion Treated Water Coolant Differential Pressure¹¹ (kPa) 103 (15 psi) at 5.7 l/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Coolant Setpoint Temperature Range	21 to 25 °C (69.8 to 77 °F)			
Coolant Differential Pressure¹¹ (kPa) 103 (15 psi) at 5.7 l/min. (1.5 gpm) Coolant Maximum Static Pressure (kPa) 827 (120 psi) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Coolant Temperature Stability (max.)	±1.0 °C (±0.18 °F)			
Coolant Maximum Static Pressure (kPa) Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Coolant ¹⁰	Anti-Corrosion Treated Water			
Environmental Conditions Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Coolant Differential Pressure ¹¹ (kPa)	103 (15 psi) at 5.7 l/min. (1.5 gpm)			
Ambient Temperature 5°C to 45°C (41 to 113°F) Relative Humidity¹² (non-condensing) (%) ≤95	Coolant Maximum Static Pressure (kPa)	827 (120 psi)			
Relative Humidity¹² (non-condensing) (%) ≤95	Environmental Conditions				
	Ambient Temperature		5°C to 45°C (41 to 113°F)		
Altitude ≤2000 m (6500 ft.)	Relative Humidity ¹² (non-condensing) (%)		≤95		
	Altitude		≤2000 m (6500 ft.)		

Notes:

- All specifications apply when the product is operated in accordance with the guidelines defined in the operators manual. Measured at 10 kHz PRF, max. duty cycle after a 30 second warm-up from cold start.
- 2.
- 3. Guaranteed during warranty period.
- 4. Output stability specification may not be met at lowest power or at acoustic resonances.
- 5. Measured for a 100 µs pulse width at 1 kHz repetition frequency.
- 6. 7. Measured as ±(Pmax-Pmin)/2Pmax.
- Measured at typical waist location ~1.4 m from the laser output.
- 8. Measured at 10 kHz PRF, 18% duty cycle.
- 9. At 10 kHz PRF, maximum duty cycle operation.
- 10. See manual for details.
- This differential pressure is from system input to output and do es not include the pressure drop from chiller fittings and the supply and return hose. 11.
- Do not operate at or below dew point.



Mechanical Specifications

Diamond J-3



