



MIRA OPO

Synchronously-Pumped Optical Parametric Oscillator

The Mira® OPO is a synchronously-pumped optical parametric oscillator that extends the wavelength tuning range of the Mira mode-locked Ti:Sapphire oscillator. Offering the ultimate in flexibility, the Mira OPO platform provides simple access to widely tunable, near-transform-limited femtosecond or picosecond pulses, either in the visible or infrared (IR). In addition to a choice of pulse widths and tuning ranges, two types of rapid wavelength tuning are available – either electronic tuning with periodically-poled (PP) OPO crystals, or pump-wavelength tuning with bulk crystals. Adding different pulse width¹, wavelength or crystal options to any base system, or switching between them, is simple and straight-forward.

Comprehensive Wavelength Coverage

If tuning in the IR is needed, two types of Mira OPO are available, the PP-crystal OPO (electronically tuned) or a bulk crystal OPO (higher output power, pump wavelength tuned). In addition, idler wavelengths are accessible up to 3 μm with optional optics sets. The Mira OPO visible system uses intracavity frequency doubling to ensure the highest possible conversion efficiency to visible wavelengths. And if needed, a change of just two optics (supplied) converts the visible OPO to infrared (IR) operation.

Compatibility with Many Pump Sources

With a threshold of only 500 mW, the Mira OPO is fully compatible with all Mira 900 series ultrafast oscillators, whether the Mira is pumped by a Verdi™ 5W, 6W, 8W or 10W diode-pumped solid-state laser, or an Innova 310 or Sabre® argon-ion laser. The highest OPO output powers and tuning ranges are obtained when pumping with a Verdi 10W or Innova-Sabre, but identical OPO pulse widths, amplitude stability, and beam quality are obtained with all Coherent pump sources.

Maximum Stability and Control

The cavity length of the Mira OPO is actively stabilized and precisely matched to the Mira oscillator cavity. System diagnostics monitor OPO performance, transmitting signals to the electronic controller, which in turn, provides feedback to a piezoelectric transducer (PZT) mounted on the OPO cavity's end mirror. This feature guarantees long-term, stable operation. The basic control scheme (supplied as standard) ensures that the OPO cavity length is always optimized for maximum OPO output power. The optional advanced control scheme includes an autocorrelator, spectrometer and more sophisticated electronics, which allow the user to stabilize the OPO with respect to pulse width, bandwidth or power.

¹ Assumes appropriate femtosecond or picosecond pump source.

² Included with optional advanced stabilization package.

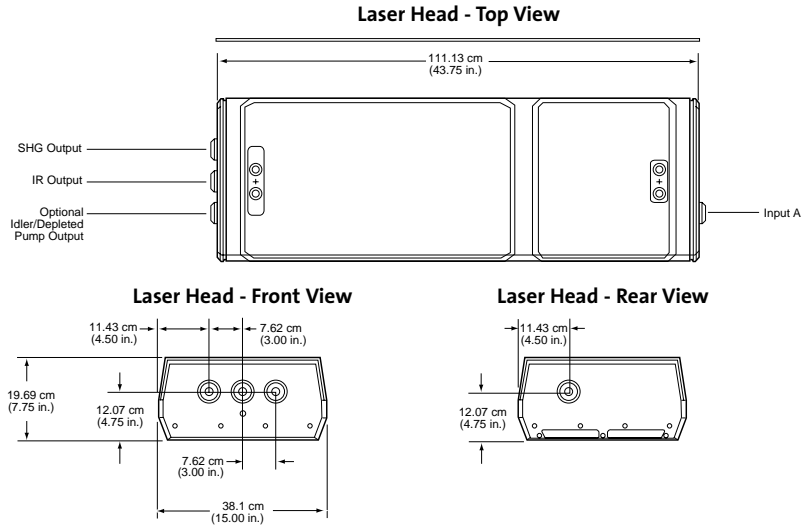
FEATURES

- **Ultimate flexibility – tunable IR, visible and visible/IR versions**
- **Femtosecond, picosecond and visible operation using a common platform¹**
- **Low pump threshold (only 0.5W)**
- **Simple, fast wavelength tuning**
- **Access to idler wavelengths to ~3 μm with optional optics sets**
- **High power visible output using highly efficient intracavity doubling**
- **Active cavity length stabilization (all models)**
- **Active pulse width or bandwidth stabilization²**
- **Singly resonant design for optimum power stability**
- **Sealed enclosure for purged pump operation above 920 nm**
- **Simple control interface**
- **Analog voltage input for remote tuning (PP version)**
- **Unique alignment tools simplify setup**



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OPO Crystal

		KTP	KTP	CTA/PP ¹	
Specifications	Configuration	VIS ^{2,3}	IR	IR	
	Average Power	high-power version ⁷ low-power version ⁸	>200 mW ⁴ >60 mW ⁴	>240 mW ⁵ >80 mW ⁵	>150 mW ⁶ >40 mW ⁶
	Tuning Range	high-power version ⁷ low-power version ⁸	525 to 665 nm 545 to 625 nm	1050 to 1320 nm ⁹ 1065 to 1265 nm ¹¹	1350 to 1600 nm ¹⁰ 1425 to 1600 nm ¹⁰
	Pulse Width ¹²	fs version ps version	<200 fs <1.6 ps	<250 fs <1.6 ps	<200 fs <1.6 ps
	Time-bandwidth Product	fs version ps version	<0.6 ¹⁵ <0.5 ¹⁵		
	Repetition Rate		76 MHz ^{13,15} (nominal)		
	Pump Threshold		500 mW ¹⁵		
	Noise ¹⁴		<2% ¹⁵		
	Spatial Mode		TEM ₀₀ ¹⁵		
	Beam Diameter (1/e ²)		<1.25 mm ¹⁵		
	Beam Divergence (full angle)		<1.30 mrad ¹⁵		
	Polarization		Horizontal (>100:1) ¹⁵		

¹ PP-OPO offers electronic tuning. Remote tuning of PP-OPO over typically >40 nm is possible via $\pm 5V$ analog voltage input on rear of control box.

² Using intracavity second harmonic generation (SHG) with single output.

³ IR output also available for VIS version with simple modification.

⁴ Operation at 580 nm.

⁵ Operation at 1160 nm.

⁶ Operation at 1550 nm.

⁷ Mira OPO pumped by Mira 900 pumped by Verdi 8W, 10W DPSS laser or Sabre 15W argon-ion laser.

⁸ Mira OPO pumped by Mira 900 pumped by Verdi 5W, 6W DPSS laser or Innova[®] 310 argon-ion laser.

⁹ Signal range. Idler accessible from 2200 to 3000 nm.

¹⁰ CTA: Additional optics set available that covers 1600 to 1900 nm.

PP: Idler accessible from 1700 to 2100 nm.

¹¹ Signal range. Idler accessible from 2300 to 2850 nm.

¹² Assumes sech² pulse shape (deconvolution factor 0.65).

¹³ Mira OPO can be supplied for operation at other repetition rates.

¹⁴ RMS noise measured in 10 Hz to 1 MHz bandwidth.

¹⁵ All versions.



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Coherent follows a policy of continuous product improvement. Specifications are subject to change without notice.

Coherent's scientific and industrial lasers are certified to comply with the Federal Regulations (21 CFR Subchapter J) as administered by the Center for Devices and Radiological Health on all systems ordered for shipment after August 2, 1976.

Coherent offers a limited warranty for all Mira OPO systems. For full details of this warranty coverage, please refer to the Service and Support section at www.Coherent.com or contact your local Sales and Service Representative.

The Mira OPO is manufactured jointly by Coherent, Inc and APE GmbH.