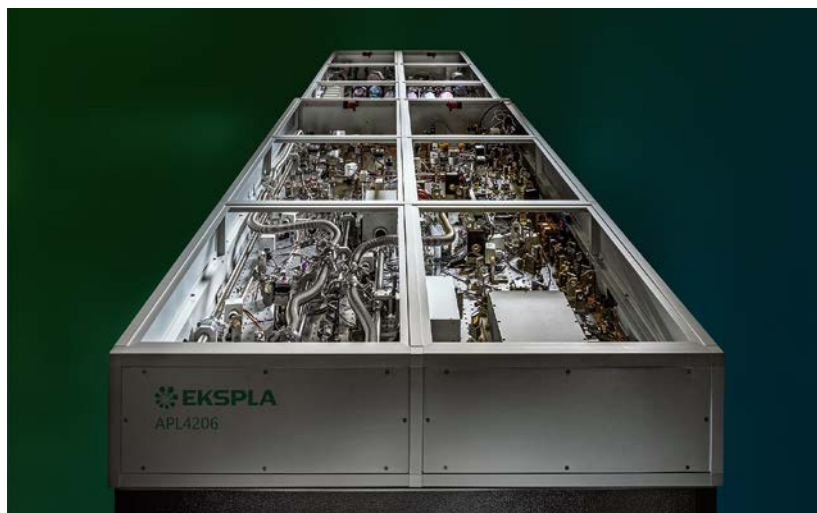


# APL4000 SERIES



APL4000 series picosecond amplifiers were designed and manufactured for multiple stage OPCPA pumping. Systems can be specially tailored for customer's needs and have up to 8 pumping channels with different wavelength, energy, pulse duration, spatial and temporal profiles, adjustable delay, image translation to customers specified location and various other features.

Short pulse duration, excellent pulse-to-pulse stability, superior beam quality makes APL4200 series diode pumped picosecond amplifiers well suited for other applications like non-linear optics.

## Regenerative amplifier / Power amplifier design

APL4000 series amplifiers consist of regenerative and power amplifiers. System could be seeded by built-in picosecond oscillator or other ultrafast laser system. Pulses from regenerative amplifier are spatially shaped and amplified in double-pass amplifiers with thermally induced birefringence compensation. Advanced optical design ensures smooth, without hot spots beam

spatial profile at the laser output. Low light depolarization level allows high efficiency generation of up to 4th harmonic with build-in harmonic generators. Repetition rate and timing of the pulses can be locked to the external RF source (with -PLL option) or other ultrafast laser system (with -FS option).

## Simple and convenient laser control

For customer convenience the amplifier can be controlled through Laser Control software via USB interface (control PC included). Alternatively, the amplifier can be controlled from personal computer with supplied software for Windows™ operating system. LabVIEW™ drivers are supplied as well.

## Build-in harmonic generators

Angle-tuned LBO and/or BBO crystals mounted in temperature stabilized heaters are used for second, third and fourth harmonic generation. Harmonic separation system is designed to ensure high spectral purity of radiation and direct it to the output ports.

## Picosecond Amplifiers for Multiple Stage OPCPA Pumping

### FEATURES

- ▶ High pulse energy up to **1 kHz** rate
- ▶ Two versions available:
  - flash lamp pumped APL4100 providing 8 channels × ≥2200 mJ
  - diode pumped APL4200 providing 8 channels × ≥130 mJ
- ▶ Each of 8 channels can be tailored according to pumping requirements
- ▶ Low maintenance costs
- ▶ PC control via USB with supplied, LabVIEW™ drivers
- ▶ Optional temperature stabilized second, third and fourth harmonic generators
- ▶ Cooled by supplied water-to-water chiller

### APPLICATIONS

- ▶ Multiple stage OPCPA pumping
- ▶ Non-linear optics
- ▶ Other spectroscopic and nonlinear optics applications

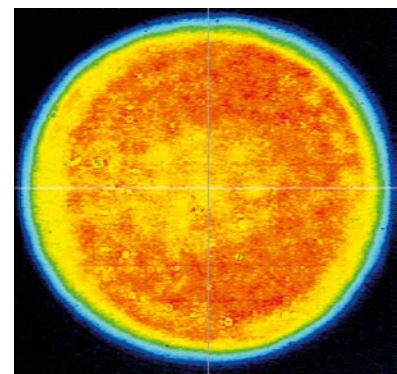
**SPECIFICATIONS <sup>1)</sup>**

Model	APL4100	APL4200
<b>MAIN SPECIFICATIONS <sup>2)</sup></b>		
Central wavelength (optional 532 nm and 355 nm outputs available)	1064 nm	
Output energy <sup>3)</sup>	up to 8 channels with 2200 mJ	up to 8 channels with 130 mJ
Pulse energy stability <sup>4)</sup>	≤ 1.5 %	≤ 1.0 %
Pulse duration (FWHM) <sup>5)</sup>	90 ± 10 ps	
Pulse repetition rate <sup>6)</sup>	10 Hz	1 kHz
Spatial mode	super-Gaussian <sup>7)</sup>	
Beam diameter <sup>8)</sup>	~ 24 mm	~ 8 mm
Beam divergence <sup>9)</sup>	≤ 0.5 mrad	≤ 0.7 mrad
Beam pointing stability <sup>10)</sup>	≤ 60 μrad	≤ 30 μrad
Deviation of spatial parameters between beams	±10 %	
Pre-pulse contrast	> 200:1	
Polarization contrast	> 100:1	
Polarization	linear	
<b>PHYSICAL CHARACTERISTICS</b>		
Laser head size (W×L×H)	1000 × 6000 × 500 mm (preliminary)	1500 × 3000 × 400 mm (preliminary)
Power supply size (W×L×H)	553 × 600 × 1231 mm – 3 units (preliminary)	553 × 600 × 1200 mm – 1 unit 553 × 600 × 500 mm – 1 unit
Maximum umbilical length	up to 10 m (must be confirmed when ordering)	
<b>OPERATING REQUIREMENTS</b>		
Warm up time	< 45 min	< 30 min
Total water consumption	< 25 l/min, 2 bar, 20 °C	< 20 l/min, 2 bar, 20 °C
Relative humidity	20–80 % (non condensing)	
Operating ambient temperature	22 ± 2 °C	
Mains voltage <sup>11)</sup>	208, 380 or 400 V AC, three phases, 50/60 Hz	
Power rating	< 12 kVA	< 22 kVA
Cleanness of the room	ISO Class 7 or 10000 as per U.S. Fed Std. 209 (5 VDI 2083, C GMP)	
Vacuum supply	better than 10 <sup>-2</sup> Torr	

- <sup>1)</sup> Due to continuous improvement, all specifications are subject to change. Parameters marked typical are illustrative; they are indications of typical performance and will vary with each unit we manufacture.
- <sup>2)</sup> All parameters measured at 1064 nm if not stated otherwise.
- <sup>3)</sup> All channels can be specially tailored for customer’s needs and have different wavelength, energy, pulse duration, spatial and temporal profiles, adjustable delay, image translation to customers specified location and various other features.
- <sup>4)</sup> RMS, measured over 30 s.
- <sup>5)</sup> Optional pulse duration available down to 20 ps. Inquire for pulse energies.
- <sup>6)</sup> Should be specified when ordering. Inquire for custom pulse repetition rates.
- <sup>7)</sup> Super-Gaussian spatial mode will be of 6–11th order in near field. Inquire for other spatial beam shapes.
- <sup>8)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> level.
- <sup>9)</sup> Full angle measured at the 1/e<sup>2</sup> level at 1064 nm.
- <sup>10)</sup> Beam pointing stability is evaluated as movement of the beam centroid in the focal plane of a focusing element.
- <sup>11)</sup> Voltage fluctuations allowed are +10% / -15% from nominal value.



**BEAM PROFILE**



*Fig 1. Typical beam profile of APL4206 series laser (measured at the relay image plane)*