

## 1030 nm, High Pulse Energy, Femtosecond Fiber Laser



### Applications

- Medical therapeutic surgery
- Nanoscience
- Materials precision machining
- Biomedical instrumentation
- Terahertz radiation
- Nonlinear optical studies
- Tissue cutting

### Features

- Up to 30  $\mu\text{J}$  pulse energy
- 1030 nm wavelength
- Tunable pulse width (0.4-30 ps)
- User selectable pulse energy levels
- Pulse amplitude modulation (0-5VDC input) available
- Variable repetition rates down to single pulse
- Data log to record performance over life of laser
- Maintenance free
- Fiber-based architecture
- Single mode output,  $M^2 < 1.2$
- Linearly polarized output
- Second harmonic (515 nm) and third harmonic (343 nm) output available
- Optional pulse compression to  $< 100$  fs

The fiber laser based chirped pulse amplification system (FLCPA) starts with a passively mode-locked seed fiber laser. The short pulse is time stretched by frequency (chirped) for lower intensity amplification through a high power fiber amplifier stage. Up to 30  $\mu\text{J}$  of short pulse energy is delivered into free space, with a typical minimum pulse width of 370 fs.

The pulse repetition rate and pulse energy are user selectable. The pulse width is tunable up to 30 ps. Minimum pulse width and its pulse shape can both be optimized for any given pulse repetition rate. Our Arbitrary Pulse Picker feature allows you to easily select individual pulses to be emitted from the laser. An RF output signal is provided to allow easy synchronization to the laser. Our unique data log is a powerful tool both for system diagnostics and quality assurance, measuring and recording all relevant laser performance data over the life of the laser. Optional pulse compression can generate  $< 100$  fs at a specific energy level.

The Cazadero Scientific fiber based femtosecond laser is lightweight, compact, and flexible, offering a reliable, cost-effective alternative to solid state laser amplifiers for biomedical, scientific, industrial, and research applications.

## Technical Specifications

Model Number	FLCPA-05U-20		
Output Wavelength	Primary	SHG (optional)	THG (optional)
<b>OPTICAL</b>			
Central Wavelength (nm)	1030	515	343
Minimum Pulse Width <sup>1</sup> (ps)	< 0.4 (0.37 typical)	< 0.4	< 1
Average Power <sup>2</sup> (W)	> 2.4	> 1	0.6
Tunable Pulse Width (ps)	Up to 30	NA	NA
Primary Repetition Rate and Pulse Energy	There are 16 switchable repetition rates (< 27 MHz) can be chosen. The highest pulse energy of 20 $\mu$ J is at 120 kHz	8.4 $\mu$ J of pulse energy at 120 kHz	5 $\mu$ J pulse energy at 120 kHz
Arbitrary Repetition Rate <sup>3</sup> (optional)	From single shot up to primary repetition rates. Required an external gating signal generator		
Polarization Extinction Ratio	100:1		
Beam Quality, M <sup>2</sup>	1.2 (typ. 1.1)	< 1.2	< 1.2
Beam Diameter at Exit, $\omega_0$ (mm)	$2\omega_0 \sim 3.0 \pm 10\%$	$2\omega_0 \sim 1.1 \pm 10\%$	$2\omega_0 \sim 0.8 \pm 10\%$
Beam Divergence (mrad, full angle)	< 0.55	$\sim 0.55$	$\sim 0.55$
Pulse Energy Stability (%rms, 100 hours)	< 1		
Termination / Output	Free space collimated beams, 3 wavelength can be collinear from one output port or separated output ports		
Cold Start Time (min.)	< 10		
Warm Start Time (min.)	< 2		
<b>ELECTRICAL</b>			
Supply Voltage (VAC)	85 - 264 auto-ranging		
Supply Frequency (Hz)	47 - 63 auto-ranging		
Power Consumption (VA)	< 200 (150 typical)		
Synchronization Output	LVCMOS laser clock signal		
<b>MECHANICAL</b>			
Dimensions (cm): Laser Head	48 (W) x 76 (D) x 14 (H)		
Dimensions (cm): Laser Controller	48 (W) x 50 (D) x 18 (H)		
Weight (kg): Laser Head	27.3 (typical)		
Weight (kg): Laser Controller	13.6 (typical)		



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Model Number	FLCPA-05U-20		
Output Wavelength	Primary	SHG (optional)	THG (optional)
<b>ENVIRONMENTAL</b>			
Cooling	Air-low noise fan		
Operating Temperature (°C)	17 - 32		
Storage Temperature (°C)	0 - 50		
<b>I/O CONTROL</b>			
Communication Interface Type	RS232, Gate in and Sync (optional)		
Front Panel Indicators and Controls	Pulse width dispersion knob, Repetition rate switch, Electrical power on/off, Laser on/good indicators, Emergency Stop, Interlock		
<b>OPTIONS</b>			
Remote Pulse Amplitude Adjustment	Pulse amplitude control via 0 - 5 V analog input		
Programmable Burst Mode	Programmable pulse pattern actuated by a single trigger		

<sup>1</sup> A sech<sup>2</sup> pulse shape (convolution factor of 0.65) is used to determine the pulse width for the second harmonic autocorrelation trace.

<sup>2</sup> Unless otherwise stated, all specified values are measured after the pulse picker, at the output of the laser.

<sup>3</sup> LVCMOS digital input

Due to our continuous improvement program, specifications are subject to change without notice

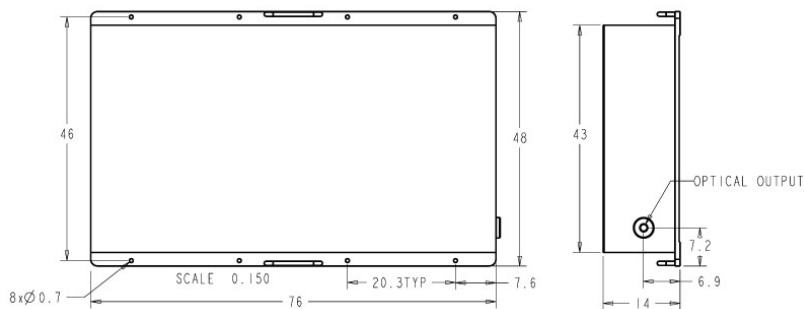


Figure 1 – Dimensions of Cazadero FLCPA-05U head

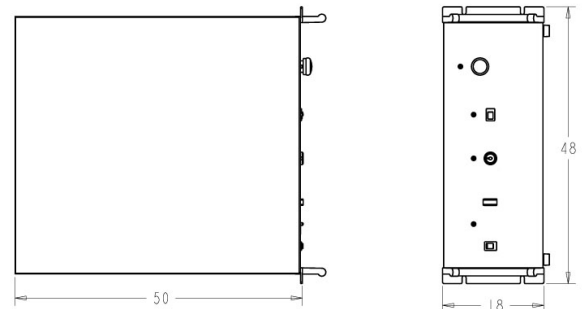


Figure 2 – Dimensions of Cazadero FLCPA-05U controller

