

# SL330 SERIES



SL 300 series lasers are an excellent solution for applications that require high energy picosecond pulses.

Pulse compression during backward-stimulated Brillouin scattering (SBS), used in EKSPILA SL300 series lasers, is a simple and cost-efficient way to generate picosecond pulses, with the unique capability of producing pulses with tunable duration.

An electro-optically Q-switched Single Longitudinal Mode (SLM) nanosecond generator is the heart of the system. Instead of external narrow linewidth diode lasers, the selective properties of Fabry-Perrot etalon, and a laser cavity are used to produce SLM pulses with a smooth temporal envelope. In scientific literature this method of generating SLM pulses is known as a selfseeding technique.

Pulse compression is done in a SBS-cell. Depending on the geometry of interaction, a pulse with duration in the 170–1500 ps range can be produced. Pulse duration can be tuned in discrete steps when a variable pulse duration option (-VPx) is installed.

After SBS compression, the pulse is directed to a multi-pass power amplifier system for amplification to up to 500 mJ energy. Temperature controlled harmonics generators, based on angle-tuned KD\*P and KDP crystals and harmonic separation optics, are available as standard options. Each wavelength has a separate output port.

A power supply and cooling units are placed in a standard 19" rack that requires little space under an optical table.

The very low jitter of the optical pulse relative to the Q-switch triggering pulse ensures reliable synchronization of the laser with external equipment.

For customer convenience the laser can be controlled from a user-friendly remote control pad or RS232 interface.

The remote pad allows easy control of all laser parameters and features a backlit display that is easy to read even when wearing laser safety eyewear.

Alternatively, the laser can be controlled from a personal computer with supplied software for a Windows™ operating system. LabView™ drivers are supplied as well.

## SBS Compressed Picosecond Nd:YAG Lasers

### FEATURES

- ▶ Innovative and cost-efficient design
- ▶ Up to 500 mJ per pulse at 1064 nm
- ▶ 150 ps pulse duration
- ▶ Self seeding SLM master oscillator
- ▶ More than  $10^5$ :1 pre-pulse contrast ratio
- ▶ Low jitter external triggering
- ▶ Versatile synchronization possibilities
- ▶ Variable pulse duration option
- ▶ LabVIEW™ drivers for convenient control from PC via RS232 port
- ▶ Remote control via keypad
- ▶ Compact laser head and power supply cabinet

### APPLICATIONS

- ▶ Plasma research
- ▶ Medical
- ▶ Material ablation and deposition
- ▶ Holography
- ▶ Absorption spectroscopy of laser induced plasmas
- ▶ Satellite ranging
- ▶ EUV light source development for photolithography
- ▶ OPCPA pumping

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

Model	SL330	SL332	SL333	SL334
<b>Max. pulse energy:</b>				
at 1064 nm	30 mJ	150 mJ	250 mJ	500 mJ
at 532 nm <sup>2)</sup>	12 mJ	70 mJ	120 mJ	240 mJ
at 355 nm <sup>3)</sup>	7 mJ	40 mJ	80 mJ	140 mJ
at 266 nm <sup>4)</sup>	4 mJ	25 mJ	40 mJ	80 mJ
at 213 nm <sup>5)</sup>	2 mJ	10 mJ	15 mJ	25 mJ
<b>Pulse energy stability (StdDev) <sup>6)</sup>:</b>				
at 1064 nm	6 %		4 %	
at 532 nm	8 %		7 %	
at 355 nm	10 %		9 %	
at 266 nm	13 %		12 %	
at 213 nm	15 %		15 %	
Pulse duration at 1064 nm (FWHM) <sup>7)</sup>	150±20 ps		170±20 ps	
Pulse duration stability at 1064 nm <sup>8)</sup>	10 % (StdDev)			
Repetition rate <sup>9)</sup>	10 or 50 Hz	10 Hz	5 Hz	
Linewidth	≤0.1 cm <sup>-1</sup>			
Polarization	linear, >50:1			
Optical pulse jitter <sup>10)</sup>	0.5 ns			
Beam profile <sup>11)</sup>	Hat Top, >70% fit to Gaussian			
Beam pointing stability at 1064 nm <sup>12)</sup>	50 µrad			
Beam divergence <sup>13)</sup>	<0.5 mrad			
Beam height	170±5 mm			
Pre-pulse contrast ratio	10 <sup>5</sup> : 1			
Beam diameter <sup>14)</sup>	~4 mm	~8 mm	~10 mm	~12 mm

<b>PHYSICAL CHARACTERISTICS</b>				
Laser head size (W × L × H)	255 × 790 × 240 mm		305 × 990 × 260 mm	
Electric cabinet size (W × L × H)	550 × 600 × 530 mm		550 × 600 × 850 mm	
Umbilical length	2.5 m			

<b>OPERATING REQUIREMENTS</b>				
Water consumption (max. 20 °C)	< 10 liters/min			
Room temperature	18–27 °C			
Relative humidity	10–80 % (non-condensing)			
Power requirements <sup>15)</sup>	208 or 230 V AC, single phase, 50/60 Hz		208 or 380 V AC, three phase, 50/60 Hz	
Power consumption <sup>16)</sup>	<1.5 kVA	<2.5 kVA	<3.5 kVA	<3.5 kVA

<sup>1)</sup> Due to continuous improvement, all specifications are subject to change without notice. Parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture. Unless stated otherwise, all specifications are measured at 1064 nm.

<sup>2)</sup> For -SH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.

<sup>3)</sup> For -TH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.

<sup>4)</sup> For -FH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.

<sup>5)</sup> For -FiH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.

<sup>6)</sup> Averaged from 300 pulses.

<sup>7)</sup> Variable pulse duration options are available with 170–500 ps or 500–1000 ns tuning range.

<sup>8)</sup> Measured from 300 shots using 40 Gs/s oscilloscope and photodetector with 50 ps rise time.

<sup>9)</sup> Inquire for up to 50 Hz custom pulse repetition rates.

<sup>10)</sup> In external triggering mode with two separate triggering pulses for flashlamps and Q-switch. Low jitter sync pulse is available for user equipment triggering.

<sup>11)</sup> Improved Gaussian fit profile is available on request.

<sup>12)</sup> RMS value measured from 300 shots.

<sup>13)</sup> Full angle measured at the 1/e<sup>2</sup> point at 1064 nm.

<sup>14)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> level.

<sup>15)</sup> Three phase 208 or 380 V AC mains are required for 20 or 50 Hz versions.

<sup>16)</sup> For 5 or 10 Hz pulse repetition rate.



**OPTIONS**

► **Variable pulse duration options -VPx and -VPCx**

SL series lasers offer a unique capability for tuning pulse duration. The tuning is done by changing the geometry of interaction in the SBS compressor. Two tuning ranges – 170–500 ps (option -VP1) and 500–1000 ps (option -VP2) – are available as standard options.

While the -VPx option requires manual tuning of optical layout components for pulse duration change, the -VPCx option provides motorized tuning that allows a change in pulse duration from a personal computer or laser control pad.

*Note. Certain specifications may change when the laser is configured for variable pulse duration. Contact Ekspla for detailed data sheets.*

**OUTLINE DRAWINGS**

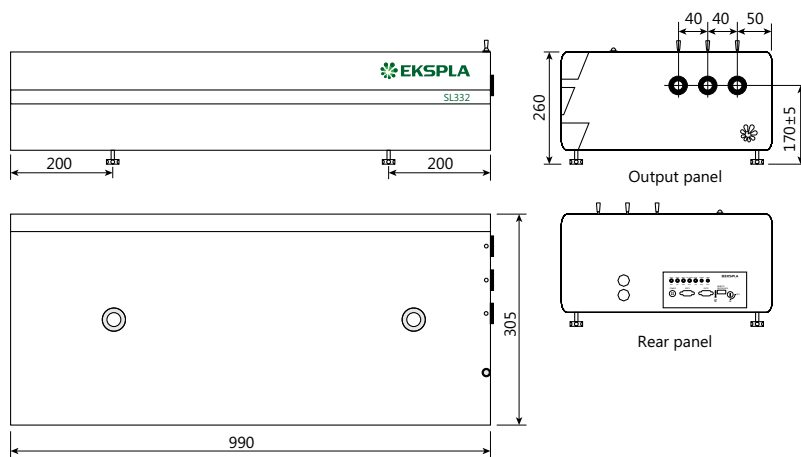


Fig 1. Dimensions of SL332, SL333 and SL334 lasers

**APPLICATIONS**

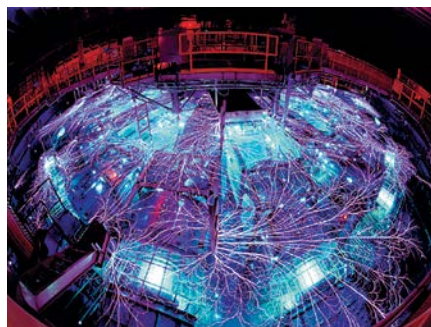


Fig 2. SL330 series laser used as a flash in high speed photography to illuminate wires as they explode  
 Courtesy of Dr. Randy Montoya, Sandia National Laboratories, USA

**ORDERING INFORMATION**

