

# SL230 SERIES



SL 200 series lasers are excellent solution for applications, where high energy picosecond pulses are needed. Not like conventional mode-locked lasers that typically uses saturable nonlinear absorption or Kerr lensing to produce ultrafast pulses, the SL200 series lasers employ backward-stimulated Brillouin scattering (SBS) in liquid for the same purpose.

### Innovative design

Diode pumped electro-optically Q-switched single longitudinal mode (SLM) nanosecond generator is the heart of the system. It provides nanosecond optical pulse that is later compressed during SBS in a special cell.

Q-switched master oscillator allows precise external triggering with jitter of less than 0.2 ns rms while mode-locked lasers typically have jitters of at least of tens of nanoseconds or even worse. Precise sync pulses from internal delay generator are also available with less than 200 ps rms jitter in respect to optical pulse.

Pulse compression is done in SBS-cell. The geometry of interaction is designed to produce shortest and most stable pulses with 100 ps duration.

After SBS compression, pulse is directed to multi-pass flashlamp pumped power amplifier for amplification to up to 250 mJ pulse energy.

Some versions, like SL230 and SL231 are available with diode pumped power amplifier.

Thermocontrolled 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.

Build in energy monitors continuously monitors output pulse energy. Data from the energy monitor can be seen on the remote keypad or on PC screen.

Power supply and cooling units are mounted into standard 19" rack.

### Simple and convenient laser control

Laser is controlled by PC via USB port with application for Windows™ operating system.

In addition, major settings of laser can be controlled through user-friendly remote control pad. The remote pad features a backlit display that is easy to read even while wearing laser safety eyewear.

## SBS Compressed Nd:YAG Lasers

### FEATURES

- ▶ Diode pumped Q-switched SLM master oscillator
- ▶ Flashlamp pumped power amplifier for up to **250 mJ** pulse energy at 1064 nm
- ▶ Advanced SBS compression produces pulses down to **100 ps** duration
- ▶ Up to **50 Hz** pulse repetition rate
- ▶ Excellent pre-pulse contrast ratio
- ▶ Thermo stabilized second, third or fourth harmonic generator options
- ▶ Low jitter external triggering
- ▶ Pre-trigger option produces sync pulses with <200 ps rms jitter
- ▶ Laser control from PC via USB port
- ▶ Simple and reliable design
- ▶ Low maintenance costs

### APPLICATIONS

- ▶ Plasma research
- ▶ Medical
- ▶ Material ablation and deposition
- ▶ Holography
- ▶ Remote laser sensing
- ▶ Satellite ranging
- ▶ OPCPA pumping

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

Model	SL230 <sup>2)</sup>	SL231 <sup>2)</sup>	SL232	SL233	SL234
<b>Max. pulse energy:</b>					
at 1064 nm	5 mJ	20 mJ	90 mJ	150 mJ	250 mJ
at 532 nm <sup>3)</sup>	2 mJ	8 mJ	40 mJ	70 mJ	125 mJ
at 355 nm <sup>4)</sup>	1.5 mJ	5 mJ	25 mJ	40 mJ	80 mJ
at 266 nm <sup>5)</sup>	0.5 mJ	2 mJ	10 mJ	15 mJ	25 mJ
at 213 nm <sup>6)</sup>	–	1 mJ	4 mJ	10 mJ	15 mJ
<b>Pulse energy stability (StdDev): <sup>7)</sup></b>					
at 1064 nm	3 %	2 %		1.5 %	
at 532 nm	5 %	3.5 %		3 %	
at 355 nm	8 %	5 %		4 %	
at 266 nm	10 %	8 %		7 %	
at 213 nm	–	10 %		10 %	
Pulse duration at 1064 nm (FWHM) <sup>8)</sup>	100±15 ps				
Pulse duration stability at 1064 nm (StdDev) <sup>7)</sup>	5 %				
Repetition rate	50 Hz		10 Hz <sup>9)</sup>		10 Hz <sup>10)</sup>
Linewidth	≤0.1 cm <sup>-1</sup>				
Polarization ratio at 1064 nm	>1:100				
Optical pulse jitter <sup>11)</sup>	0.2 ns rms				
Beam profile	Hat Top <sup>12)</sup>				
Beam pointing stability at 1064 nm <sup>13)</sup>	<50 μrad				
Beam divergence <sup>14)</sup>	<0.5 mrad				
Beam height	180±5 mm				
Contrast ratio at 1064 nm	≥10 <sup>5</sup> : 1				
Beam diameter <sup>15)</sup>	~4 mm	~5 mm	~8 mm	~10 mm	~12 mm

**PHYSICAL CHARACTERISTICS**

Laser head size (W × L × H) <sup>16)</sup>	452 × 810 × 260 mm	452 × 1010 × 260 mm
Electric cabinet size (W × L × H)	553 × 600 × 665 mm	
Umbilical length	2.5 m	

**OPERATING REQUIREMENTS**

Water consumption (max. 20 °C)	< 10 liters/min				
Room temperature	18–24 °C				
Relative humidity	10–80 % (non-condensing)				
Power requirements <sup>17)</sup>	208 or 230 V AC, single phase, 50/60 Hz		208 or 380 V AC, three phase, 50/60 Hz		
Power consumption	<2 kVA	<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> Only diode pumped versions available.
- <sup>3)</sup> For -SH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.
- <sup>4)</sup> For -TH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.
- <sup>5)</sup> For -FH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.
- <sup>6)</sup> For -FiH option. Outputs are not simultaneous. Please inquire for pulse energies at other wavelengths.
- <sup>7)</sup> Averaged from 300 pulses.

- <sup>8)</sup> Variable pulse duration options are available with 120–500 ps or 500–1000 ps tuning range.
- <sup>9)</sup> Models with pulse repetition rates up to 50 Hz are available.
- <sup>10)</sup> Models with pulse repetition rates up to 20 Hz are available.
- <sup>11)</sup> In external triggering mode with two separate triggering pulses for flashlamps and Q-switch. Low jitter sync pulse available for user equipment triggering.
- <sup>12)</sup> Improved Gaussian fit profile is available by request.
- <sup>13)</sup> RMS value measured from 300 shots.
- <sup>14)</sup> Full angle measured at the 1/e<sup>2</sup> point at 1064 nm.
- <sup>15)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> level.
- <sup>16)</sup> Models with 213 nm output, feature length equal to 1024 mm.
- <sup>17)</sup> Three phase 208 or 380 VAC mains are required for 20 or 50 Hz versions.



**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 – 120–500 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**

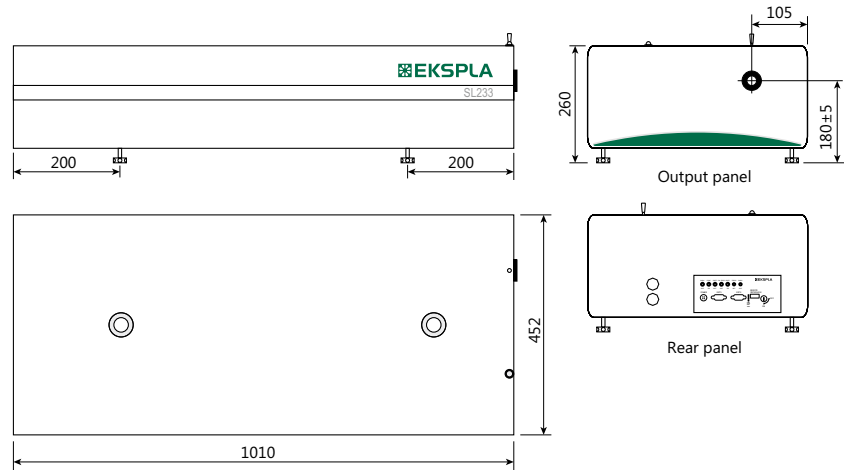


Fig 1. SL230 laser head outline drawing