

# NL200 SERIES



## Compact Q-switched DPSS Lasers

### FEATURES

- ▶ Up to **4 mJ** pulse energy at **1064 nm**
- ▶ Up to **2500 Hz** variable repetition rate
- ▶ **532 nm, 355 nm, 266 nm, 213 nm** wavelengths as standard options
- ▶ **<10 ns** pulse duration at 1064 nm
- ▶ Electro-optical Q-switching
- ▶ Turn-key operation
- ▶ Rugged sealed cavity
- ▶ Extremely compact size
- ▶ Simple and robust
- ▶ Air cooled
- ▶ External TTL triggering
- ▶ Remote control via keypad and/or PC with supplied LabVIEW™ drivers
- ▶ Remote control pad

### BENEFITS

- ▶ Continuous tuning of repetition rate while maintaining constant pulse energy, superior beam pointing and energy stability make the NL200 the first choice for micromachining, marking and thin film removal applications
- ▶ Close to Gaussian smooth beam profile with low value  $M^2 < 1.3$  and good focusability are beneficial for applications such as LCD pixel repair
- ▶ Easy to transport and saves on valuable laboratory space due to compact and light design
- ▶ Fast wavelength selection is superior for applications where alternating wavelengths are required, like material ablation and LIBS
- ▶ Air cooling, cost-effective and reliable end-pumping technology and amplifier-free DPSS design guarantee easy operation and alignment simple installation and low maintenance costs
- ▶ Variety of control interfaces: USB, RS232, LAN and WLAN ensures easy control and integration with laboratory or OEM equipment

### APPLICATIONS

- ▶ Material processing
- ▶ LCD repair
- ▶ Marking
- ▶ Micromachining
- ▶ Engraving
- ▶ Laser deposition
- ▶ Laser cleaning
- ▶ Ablation
- ▶ Spectroscopy
- ▶ OPO pumping
- ▶ Remote sensing

NL200 series DPSS Q-switched nanosecond lasers offer high pulse energy at kHz repetition rates. End-pumped design makes this laser compact and easy to integrate. Harmonic generation modules for 532 nm, 355 nm, 266 nm and 213 nm wavelengths are easily attached to the laser frame.

Featuring short pulse duration, variable repetition rate and external TTL triggering, nanosecond diode pumped NL200 series Q-switched lasers are excellent cost effective

sources for specific applications like pulsed laser deposition, ablation through mask or intravolume marking of transparent materials, when higher pulse energy is required. Excellent energy stability and a wide range of wavelength options make this laser a perfect tool for spectroscopy and remote sensing applications.

Mechanically stable and hermetically sealed design ensures reliable operation and long lifetime of laser components.

SPECIFICATIONS <sup>1)</sup>

Model	NL201 <sup>2)</sup>	NL202 <sup>3)</sup>	NL204 <sup>3)</sup>
<b>Pulse energy</b>			
at 1064 nm	0.9 mJ	2.0 mJ	4.0 mJ
at 532 nm	0.3 mJ	0.9 mJ	2.0 mJ
at 355 nm	0.2 mJ	0.6 mJ	1.3 mJ
at 266 nm	0.08 mJ	0.2 mJ	0.6 mJ
at 213 nm	0.04 mJ	0.1 mJ	0.2 mJ
<b>Pulse to pulse energy stability (StdDev) <sup>4)</sup></b>			
at 1064 nm	<0.5 %		
at 532 nm	<2.5 %		
at 355 nm	<3.5 %		
at 266 nm	<4.0 %		
at 213 nm	<5.0 %		
Typical pulse duration <sup>5)</sup>	7 – 10 ns		
Power drift <sup>6)</sup>	± 2 %		
Pulse repetition rate	10–2500 Hz	10–1000 Hz	500–1000 Hz
Beam spatial profile	Close to Gaussian in near and far fields		
Ellipticity	0.9–1.1 at 1064 nm		
M <sup>2</sup>	<1.3		
Beam divergence <sup>7)</sup>	<3 mrad		
Polarization	linear		
Typical beam diameter <sup>8)</sup>	0.7 mm		
Beam pointing stability (StDev) <sup>9)</sup>	≤10 μrad		
Optical jitter (StdDev) <sup>10)</sup>	<0.5 ns		

**PHYSICAL CHARACTERISTICS**

Laser head (W × L × H) <sup>11)</sup>	164 × 320 × 93 mm
Power supply unit (W × L × H)	365 × 415 × 290 mm
Umbilical length	3 m

**OPERATING REQUIREMENTS**

Cooling	air cooled
Ambient temperature	18–30 °C
Relative humidity	20–80 % (non-condensing)
Power requirements	100–240 V AC, single phase, 50/60 Hz
Power consumption	<600 W

<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. Unless stated otherwise all specifications are measured at 1064 nm and for basic system without options.

<sup>2)</sup> Unless stated otherwise all specifications are measured at 2500 Hz pulse repetition rate.

<sup>3)</sup> Unless stated otherwise all specifications are measured at 1000 Hz pulse repetition rate.

<sup>4)</sup> Averaged from pulses emitted during 30 sec time interval.

<sup>5)</sup> FWHM at 1064 nm.

<sup>6)</sup> Measured over 8 hour period after 20 min warm-up when ambient temperature variation is less than ±2 °C.

<sup>7)</sup> Full angle measured at the 1/e<sup>2</sup> level at 1064 nm.

<sup>8)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> level.

<sup>9)</sup> Beam pointing stability is evaluated as movement of the beam centroid in the focal plane of a focusing element.

<sup>10)</sup> With respect to QSW IN or SYNC OUT pulse.

<sup>11)</sup> Without optional harmonic module.



PERFORMANCE

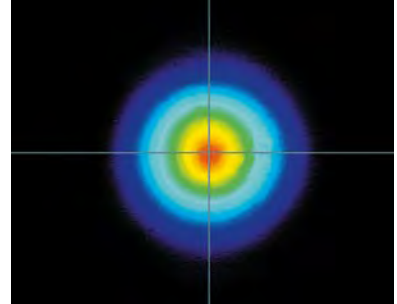
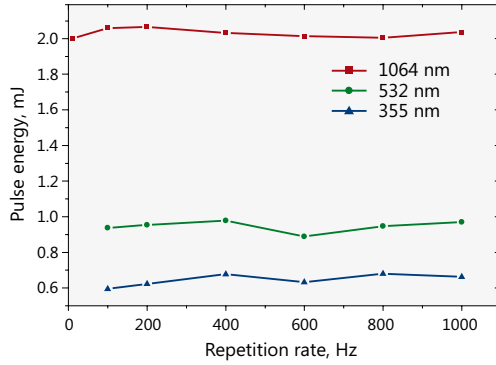


Fig 1. Typical performance data of model NL202 laser

Fig 2. Typical beam intensity profile in the far field

OUTLINE DRAWINGS

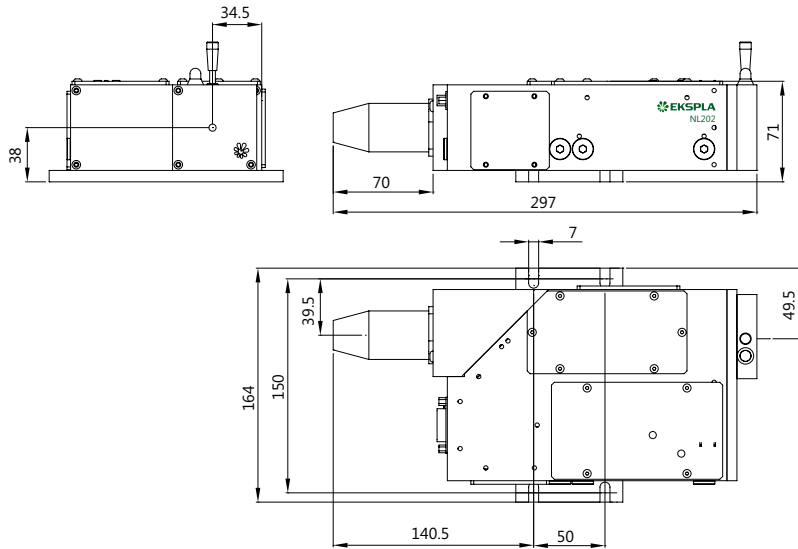


Fig 3. NL202 laser head drawing

ORDERING INFORMATION

**Note:** Laser must be connected to the mains electricity all the time. If there will be no mains electricity for longer than 1 hour then laser (system) needs warm up for a few hours before switching on.

NL201-H200SHC

Model	Harmonic generator options:
	H200SHC → second harmonic
	H200THC → third harmonic
	H200FHC → fourth harmonic
	H200FiHC → fifth harmonic

# NL210 SERIES



## High Energy kHz Pulsed Cavity Dumped DPSS Nd:YAG Lasers

### FEATURES

- ▶ **10 mJ** at 1064 nm
- ▶ **1 kHz** pulse repetition rate
- ▶ **All-solid-state** design
- ▶ Internal/external triggering
- ▶ Short warm-up time
- ▶ Air cooled
- ▶ Optional temperature stabilized second, third and fourth harmonic generators
- ▶ Remote control via keypad or PC with supplied LabVIEW™ drivers

### BENEFITS

- ▶ High 10 mJ pulse energy and nanosecond pulse-width ensures strong nonlinear response
- ▶ Smooth beam profile with optimal  $M^2$  value suitable for OPO pumping
- ▶ 1 kHz repetition rate enables fast material processing and data collection
- ▶ Air cooling, cost-effective and reliable end-pumping technology and amplifier-free DPSS design guarantee easy operation and alignment, simple installation and low maintenance costs
- ▶ Variety of control interfaces: USB, RS232, LAN and WLAN ensures easy control and integration with laboratory or OEM equipment

### APPLICATIONS

- ▶ OPO pumping
- ▶ Laser spectroscopy
- ▶ Remote sensing
- ▶ Material ablation
- ▶ Micromachining

NL210 series diode pumped Q-switched lasers produce up to 10 mJ at 1000 Hz pulse repetition rate. The laser is designed to produce high intensity, high brightness pulses and is targeted for applications like OPO pumping, nonlinear spectroscopy, material ablation, micromachining, and other tasks.

Employing electro-optical type of the cavity dumping, the master oscillator can produce pulses with a short pulse duration of 3 – 4 ns, the uniform beam profile and low divergence. The  $M^2$  factor of 3 – 4 and uniform beam profile is useful for OPO pumping.

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

For customer convenience the laser can be controlled from a remote control pad or PC. The remote pad allows easy control of all parameters and features a backlit display that is easy to read even 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.

SPECIFICATIONS <sup>1)</sup>

Model	NL210
<b>MAIN SPECIFICATIONS</b>	
Pulse energy:	
at 1064 nm	10 mJ
at 532 nm <sup>2)</sup>	5 mJ
at 355 nm <sup>3)</sup>	3 mJ
at 266 nm <sup>4)</sup>	1 mJ
Pulse to pulse energy stability <sup>5)</sup>	
at 1064 nm	< 1.0 % rms
at 532 nm <sup>2)</sup>	< 2.0 % rms
at 355 nm <sup>3)</sup>	< 2.5 % rms
at 266 nm <sup>4)</sup>	< 4.0 % rms
Pulse duration <sup>6)</sup>	3 – 4 ns
Pulse repetition rate	1000 Hz
Beam profile	multimode
Elipticity	0.9 – 1.1 at 1064 nm
M <sup>2</sup>	< 4
Beam divergence <sup>7)</sup>	< 2 mrad
Beam pointing stability, StDev	< 50 μrad
Polarization	linear, > 95 %
Typical beam diameter <sup>8)</sup>	2 mm
Pulse jitter wrt to SYNC OUT, StDev <sup>9)</sup>	< 0.5 ns
Pulse jitter wrt to ext. trigger, StDev <sup>10)</sup>	< 0.5 ns
<b>PHYSICAL CHARACTERISTICS</b>	
Laser head (W × L × H)	456 × 1031 × 260 mm
Power supply unit (W × L × H)	520 × 400 × 290 mm
Umbilical length	3 m
<b>OPERATING REQUIREMENTS</b>	
Cooling <sup>11)</sup>	Built-in chiller
Ambient temperature	18–27 °C
Relative humidity	20–80 % (non-condensing)
Power requirements	100–240 V AC, single phase, 50/60 Hz
Power consumption	< 1 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 and for basic system without options.

<sup>2)</sup> For NL210 with -SH option. Outputs are not simultaneous.

<sup>3)</sup> For NL210 with -SH/TH option. Outputs are not simultaneous.

<sup>4)</sup> For NL210 with -SH/FH option. Outputs are not simultaneous.

<sup>5)</sup> Averaged from pulses, emitted during 30 sec time interval.

<sup>6)</sup> FWHM.

<sup>7)</sup> Full angle measured at the 1/e<sup>2</sup> point at 1064 nm.

<sup>8)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> point.

<sup>9)</sup> Optical pulse jitter with respect to SYNC OUT in internal triggering mode.

<sup>10)</sup> Optical pulse jitter with respect to QSW IN in external triggering mode.

<sup>11)</sup> Air cooled



PERFORMANCE

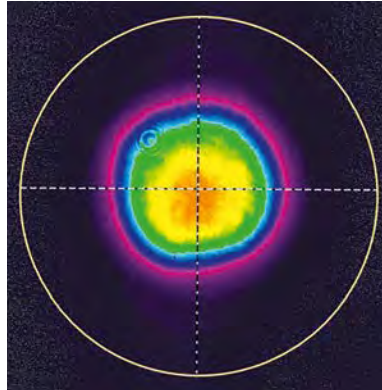


Fig 1. Typical near field beam profile of NL210 series laser

OUTLINE DRAWINGS

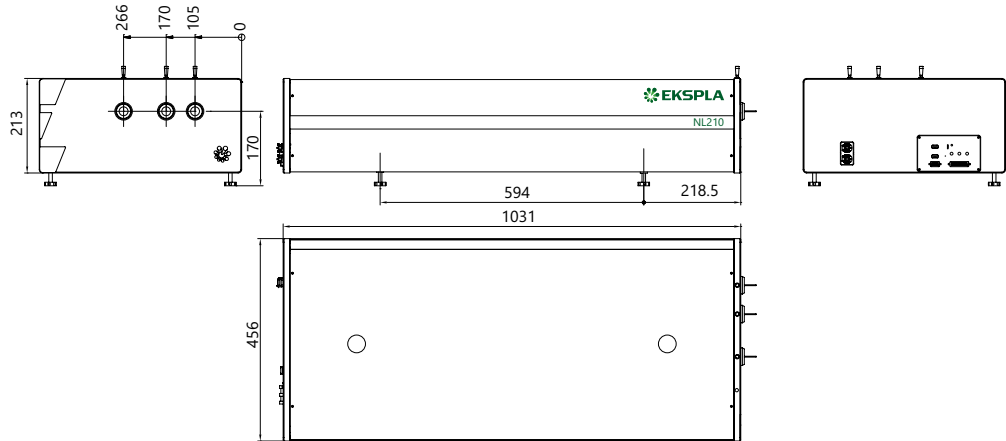


Fig 2. NL210 series laser head dimensions

ORDERING INFORMATION

**Note:** Laser must be connected to the mains electricity all the time. If there will be no mains electricity for longer than 1 hour then laser (system) needs warm up for a few hours before switching on.

NL210-SH	
Model	Harmonic generator options:
	SH → second harmonic
	SH/TH → third harmonic
	SH/FH → fourth harmonic

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