Femtosecond Lasers

NL210 SERIES



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 the beam is typically between 3 - 4.

Laser cooling uses a closed loop chiller, thus eliminating the need for external cooling water, and reducing running costs. 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 USB interface. 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.

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
- Built-in water-to-air chiller (external water service is not required)
- Optional temperature stabilized second, third and fourth harmonic generators
- PC control via USB (RS232 is optional) with supplied LabVIEW™ drivers
- ► Remote control via keypad

APPLICATIONS

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



NL210 SERIES

SPECIFICATIONS 1)

NANOSECOND LASERS

Pulse energy: at 1064 nm at 532 nm ²⁰ at 355 nm ³⁰ at 355 nm ³⁰ at 266 nm ⁴⁰ 1 mJ Pulse to pulse energy stability ⁵⁰ at 1064 nm 4 1.0 % rms at 532 nm ²⁰ at 1064 nm 4 1.0 % rms at 532 nm ²⁰ at 2.0 % rms at 355 nm ³⁰ 4 2.0 % rms at 355 nm ³⁰ 4 2.5 % rms at 266 nm ⁴⁰ 4 4.0 % rms Pulse duration ⁶⁰ 3 - 4 ns Pulse repetition rate Beam profile Elipticity 10.9 - 1.1 at 1064 nm M ² 4 4 Beam divergence ⁷⁰ 8 Beam pointing stability, StDev Polarization Ream pointing stability, StDev 8 50 µrad Polarization Pulse jitter wrt to SYNC OUT, StDev ²⁰ Pulse jitter wrt to ext. trigger, StDev ¹⁶⁰ Pulse jitter wrt to ext. trigger, StDev ¹⁶⁰ Power supply unit (W × L × H) 10 456 × 1031 × 260 mm Power supply unit (W × L × H) 10 520 × 400 × 290 mm Dimbilical length 3 m OPERATING REQUIREMENTS Relative humidity Power requirements 10 - 240 V AC, single phase, 50/60 Hz	Model	NL210
at 1064 nm 10 mJ at 532 nm 3 5 mJ at 355 nm 3 3 mJ at 266 nm 4 1 mJ Pulse to pulse energy stability 9 at 1064 nm < 1.0 % rms at 1064 nm < 1.0 % rms at 532 nm 3 < 2.0 % rms at 532 nm 3 < 2.0 % rms at 532 nm 3 < 2.0 % rms at 355 nm 3 < 2.5 % rms at 266 nm 4 < 4.0 % rms Pulse duration 9 3 - 4 ns Pulse repetition rate Pulse repetition rate Beam profile Beam profile Beam profile Beam profile Beam divergence 7 < 4 Beam divergence 7 < 2 mrad Beam pointing stability, StDev Pollarization Beam diameter 8 2 mm Pulse jitter wrt to SYNC OUT, StDev 9 Pulse jitter wrt to ext. trigger, StDev 30 < 0.5 ns PHYSICAL CHARACTERISTICS Laser head (W × L × H)	MAIN SPECIFICATIONS	
at 532 nm 3	Pulse energy:	
at 355 nm 3	at 1064 nm	10 mJ
at 266 nm ⁴⁰ Pulse to pulse energy stability ³⁰ at 1064 nm	at 532 nm ²⁾	5 mJ
Pulse to pulse energy stability ⁹ at 1064 nm	at 355 nm ³⁾	3 mJ
at 1064 nm	at 266 nm ⁴⁾	1 mJ
at 532 nm 2)	Pulse to pulse energy stability 5)	
at 355 nm 30	at 1064 nm	< 1.0 % rms
at 266 nm 49	at 532 nm ²⁾	< 2.0 % rms
Pulse duration 6 3 – 4 ns Pulse repetition rate 1000 Hz Beam profile multimode Elipticity 0.9 – 1.1 at 1064 nm M² < 4 Beam divergence 7) < 2 mrad Beam pointing stability, StDev < 50 µrad Polarization linear, > 95 % Typical beam diameter 6) 2 mm Pulse jitter wrt to SYNC OUT, StDev 9) < 0.5 ns Pulse jitter wrt to ext. trigger, StDev 100 Power supply unit (W × L × H) 456 × 1031 × 260 mm Power supply unit (W × L × H) 520 × 400 × 290 mm Umbilical length 3 m OPERATING REQUIREMENTS Cooling 10 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	at 355 nm ³⁾	< 2.5 % rms
Pulse repetition rate Beam profile Beam divergence 70 Colorization Beam pointing stability, StDev Polarization Beam diameter 80 Typical beam diameter 80 Pulse jitter wrt to SYNC OUT, StDev 90 Pulse jitter wrt to stringer, StDev 100 Power supply unit (W × L × H) Colorization Coloring 100 Built-in chiller Ambient temperature Relative humidity Power requirements 100 – 240 V AC, single phase, 50/60 Hz	at 266 nm ⁴⁾	< 4.0 % rms
Beam profile multimode Elipticity 0.9 – 1.1 at 1064 nm M² < 4 Beam divergence ¹¹ < 2 mrad Beam pointing stability, StDev < 50 µrad Polarization linear, > 95 % Typical beam diameter ®¹ 2 mm Pulse jitter wrt to SYNC OUT, StDev ®¹ < 0.5 ns Pulse jitter wrt to ext. trigger, StDev ¹¹0 < 0.5 ns PHYSICAL CHARACTERISTICS Laser head (W × L × H) 456 × 1031 × 260 mm Power supply unit (W × L × H) 520 × 400 × 290 mm Umbilical length 3 m OPERATING REQUIREMENTS Cooling ¹¹¹ 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	Pulse duration 6)	3 – 4 ns
Elipticity 0.9 – 1.1 at 1064 nm M²	Pulse repetition rate	1000 Hz
M ² < 4 Beam divergence ⁷⁾ < 2 mrad Beam pointing stability, StDev < 50 µrad Beam pointing stability, StDev 1 linear, > 95 % Typical beam diameter ⁸⁾ 2 mm Pulse jitter wrt to SYNC OUT, StDev ⁹⁾ < 0.5 ns Pulse jitter wrt to ext. trigger, StDev ¹⁰⁾ < 0.5 ns PHYSICAL CHARACTERISTICS Laser head (W × L × H)	Beam profile	multimode
Ream divergence 7) Ream pointing stability, StDev Polarization Ilinear, > 95 % Typical beam diameter 8) Pulse jitter wrt to SYNC OUT, StDev 9) Pulse jitter wrt to ext. trigger, StDev 10) PHYSICAL CHARACTERISTICS Laser head (W × L × H) Power supply unit (W × L × H) Umbilical length OPERATING REQUIREMENTS Cooling 110 Ambient temperature Relative humidity Power requirements	Elipticity	0.9 – 1.1 at 1064 nm
Ream pointing stability, StDev < 50 µrad Polarization Typical beam diameter ® Pulse jitter wrt to SYNC OUT, StDev ® Pulse jitter wrt to ext. trigger, StDev ® Pulse jitter wrt to ext. trigger, StDev ® PHYSICAL CHARACTERISTICS Laser head (W × L × H) Power supply unit (W × L × H) Umbilical length 3 m POPERATING REQUIREMENTS Cooling ® Ambient temperature Relative humidity Power requirements < 50 µrad linear, > 95 % 2 mm 4.56 × 10.5 ns 4.56 × 10.31 × 260 mm 520 × 400 × 290 mm 3 m 520 × 400 × 290 mm 3 m 520 × 400 × 290 mm 4.56 × 10.31 × 260 mm 520 × 400 × 290 mm 520 × 400 × 200 mm 520 × 400 × 200 mm 520 × 400 × 200 mm 520 ×	M ²	< 4
Polarization linear, > 95 % Typical beam diameter 8) 2 mm Pulse jitter wrt to SYNC OUT, StDev 9) < 0.5 ns Pulse jitter wrt to ext. trigger, StDev 10) < 0.5 ns PHYSICAL CHARACTERISTICS Laser head (W × L × H) 456 × 1031 × 260 mm Power supply unit (W × L × H) 520 × 400 × 290 mm Umbilical length 3 m OPERATING REQUIREMENTS Cooling 10) 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	Beam divergence 7)	< 2 mrad
Typical beam diameter ® 2 mm Pulse jitter wrt to SYNC OUT, StDev ® < 0.5 ns Pulse jitter wrt to ext. trigger, StDev ® < 0.5 ns PHYSICAL CHARACTERISTICS Laser head (W × L × H) 456 × 1031 × 260 mm Power supply unit (W × L × H) 520 × 400 × 290 mm Umbilical length 3 m OPERATING REQUIREMENTS Cooling ® 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	Beam pointing stability, StDev	< 50 μrad
Pulse jitter wrt to SYNC OUT, StDev 9) Pulse jitter wrt to ext. trigger, StDev 10) PHYSICAL CHARACTERISTICS Laser head (W × L × H) Power supply unit (W × L × H) Umbilical length OPERATING REQUIREMENTS Cooling 10) Ambient temperature Relative humidity Power requirements SYNC OUT, StDev 90 < 0.5 ns < 0.5 ns < 4.05 ns < 0.5 ns Abserved Abserved Story Sto	Polarization	linear, > 95 %
Pulse jitter wrt to ext. trigger, StDev ¹⁰⁾ PHYSICAL CHARACTERISTICS Laser head (W × L × H) Power supply unit (W × L × H) Umbilical length 3 m OPERATING REQUIREMENTS Cooling ¹⁰⁾ Ambient temperature Relative humidity Power requirements	Typical beam diameter 8)	2 mm
PHYSICAL CHARACTERISTICS Laser head (W × L × H) 456 × 1031 × 260 mm Power supply unit (W × L × H) 520 × 400 × 290 mm Umbilical length 3 m OPERATING REQUIREMENTS Cooling 10 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	Pulse jitter wrt to SYNC OUT, StDev 9)	< 0.5 ns
Laser head (W × L × H) $456 \times 1031 \times 260 \text{ mm}$ Power supply unit (W × L × H) $520 \times 400 \times 290 \text{ mm}$ Umbilical length 3 m OPERATING REQUIREMENTS Cooling 10 Built-in chiller Ambient temperature $18-27 \text{ °C}$ Relative humidity $20-80 \text{ % (non-condensing)}$ Power requirements $100-240 \text{ V AC, single phase, } 50/60 \text{ Hz}$	Pulse jitter wrt to ext. trigger, StDev 10)	< 0.5 ns
Power supply unit (W × L × H) Umbilical length 3 m OPERATING REQUIREMENTS Cooling 11) Ambient temperature Relative humidity Power requirements 520 × 400 × 290 mm 3 m Built-in chiller 18–27 °C 20–80 % (non-condensing) Power requirements 100–240 V AC, single phase, 50/60 Hz	PHYSICAL CHARACTERISTICS	
Umbilical length 3 m OPERATING REQUIREMENTS Cooling 11) 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	Laser head (W × L × H)	456 × 1031 × 260 mm
OPERATING REQUIREMENTS Cooling ¹¹⁾ Ambient temperature Relative humidity Power requirements Built-in chiller 18–27 °C 20–80 % (non-condensing) 100–240 V AC, single phase, 50/60 Hz	Power supply unit (W × L × H)	520 × 400 × 290 mm
Cooling ¹¹⁾ Ambient temperature Relative humidity Power requirements Built-in chiller 18–27 °C 20–80 % (non-condensing) 100–240 V AC, single phase, 50/60 Hz	Umbilical length	3 m
Ambient temperature 18–27 °C Relative humidity 20–80 % (non-condensing) Power requirements 100–240 V AC, single phase, 50/60 Hz	OPERATING REQUIREMENTS	
Relative humidity 20–80 % (non-condensing) Power requirements 100–240 V AC, single phase, 50/60 Hz	Cooling 11)	Built-in chiller
Power requirements 100–240 V AC, single phase, 50/60 Hz	Ambient temperature	18–27 °C
	Relative humidity	20-80 % (non-condensing)
Power consumption < 1 kVA	Power requirements	100-240 V AC, single phase, 50/60 Hz
	Power consumption	< 1 kVA

- 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.
- For NL210-SH option. Outputs are not simultaneous. The laser performance is specified for SH wavelength; specifications for other wavelengths may differ from that indicated above.
- For NL210-SH/TH option. Outputs are not simultaneous. The laser performance is specified for TH wavelength; specifications for other wavelengths may differ from that indicated above.
- 4) For NL210-SH/FH option. Outputs are not simultaneous. The laser performance is specified for FH wavelength; specifications for other wavelengths may differ from that indicated above.
- ⁵⁾ Averaged from pulses, emitted during 30 sec time interval.
- 6) FWHM.
- Full angle measured at the 1/e² point at 1064 nm.
- Beam diameter is measured at 1064 nm at the 1/e² point.
- ⁹⁾ Optical pulse jitter with respect to SYNC OUT in internal triggering mode.
- Optical pulse jitter with respect to QSW IN in external triggering mode.
- 11) Air cooled



NL210 SERIES

PERFORMANCE

NANOSECOND LASERS

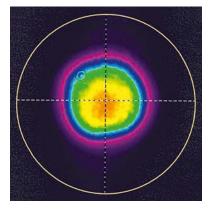


Fig 1. Typical near field beam profile of NL210 series laser

OUTLINE DRAWINGS

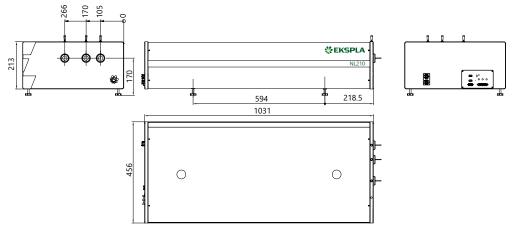


Fig 2. NL210 series laser head dimensions

ORDERING INFORMATION

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

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

