

# NL310 SERIES



High pulse energy NL310 series lasers are targeted for applications like OPO or Ti: Sapphire pumping, material processing and plasma diagnostics. These lasers can produce pulse energies up to 10 J in fundamental wavelength at 10 Hz pulse repetition rate.

For the convenience of customers the NL310 series nanosecond Q-switched laser can be controlled either through a remote keypad or USB-CAN port. The remote keypad allows easy control of all parameters and features a backlit display that is easy to read even wearing laser safety eyewear.

Software for Windows™ operating system is provided to control the laser from PC. LabView™ drivers are supplied as well, allowing laser control integration into existing Labview™ programs.

The optional second (SH, 532 nm), third (TH, 355 nm), fourth (FH, 266 nm) and fifth (FiH, 213 nm) harmonic generators can be integrated into laser head or placed outside laser head into auxiliary harmonic generator module. Output wavelength switching is done manually. Motorized wavelength switching is available by request.

Triggering of the laser is possible from built-in internal or external pulse generator. Pulses with TTL levels are required for external triggering. Laser pulses have less than 0.5 ns rms jitter with respect to Q-switch triggering pulse in both cases.

The simple and field proven design ensures easy maintenance and reliable long-term operation of the NL310 series laser.

Optional Relay Imaging for smooth beam profile is available.

## High Energy Q-switched Nd:YAG Lasers

### FEATURES

- ▶ Up to **10 J** output energy
- ▶ Better than **0.5% rms pulse energy stability**
- ▶ **4–6 ns** pulse duration
- ▶ **10 or 20 Hz** repetition rate
- ▶ Temperature stabilized second, third, fourth and fifth harmonic generators
- ▶ Remote control via keypad or USB-CAN port
- ▶ Low jitter internal/external synchronization
- ▶ Robust and stable laser head

### APPLICATIONS

- ▶ OPO, Ti: Sapphire, dye laser pumping
- ▶ Material processing
- ▶ Plasma generation and diagnostics
- ▶ Nonlinear spectroscopy
- ▶ Remote sensing

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

Model	NL311	NL313	NL314	NL315	NL317	NL319
Pulse energy:						
at 1064 nm	1300 mJ	1600 mJ	2000 / 1800 mJ	3500 mJ	5000 mJ	10000 mJ
at 532 nm <sup>2) 6)</sup>	600 mJ	800 mJ	1000 / 900 mJ	1700 mJ	2500 mJ	5000 mJ
at 355 nm <sup>3) 6)</sup>	390 mJ	490 mJ	610 / 600 mJ	1000 mJ	1300 mJ	2000 mJ
at 266 nm <sup>4) 6)</sup>	130 mJ	180 / 150 mJ	190 / 160 mJ	270 mJ	400 mJ	700 mJ
at 213 nm <sup>5) 6)</sup>	25 / 20 mJ	30 / 25 mJ	40 / 30 mJ	inquire		
Pulse energy stability (StdDev): <sup>7)</sup>						
at 1064 nm				0.5 %		
at 532 nm				1.5 %		
at 355 nm				2.5 %		
at 266 nm				4.0 %		
at 213 nm				6.0 %		
Power drift <sup>8)</sup>				± 2 %		
Pulse duration <sup>9)</sup>	4–6 ns			4–7 ns		
Repetition rate	10 / 20 Hz			10 Hz		
Polarization	vertical, > 90 %					
Optical pulse jitter <sup>10)</sup>	< 0.5 ns					
Linewidth	< 1 cm <sup>-1</sup>					
Beam profile <sup>11)</sup>	"Hat-Top" (near field), near Gaussian (far field)					
Typical beam diameter <sup>12)</sup>	~ 10 mm	~ 12 mm		~ 18 mm	~ 21 mm	~ 27 mm
Beam divergence <sup>13)</sup>	< 0.5 mrad					
Beam pointing stability <sup>14)</sup>	± 50 µrad					

**PHYSICAL CHARACTERISTICS**

Laser head (W × L × H)	460 × 1250 × 260 mm	310 × 800 × 230 mm / 460 × 1250 × 260 mm	460 × 1250 × 260 mm		600 × 1800 × 300 mm
Power supply unit (W × L × H)	553 × 600 × 653 mm / 553 × 600 × 832 mm		553 × 600 × 832 mm / 553 × 600 × 1020 mm	550 × 600 × 1250 mm	550 × 600 × 1640 mm
Umbilical length	2.5 m				

**OPERATING REQUIREMENTS**

Water consumption (max 20 °C) <sup>15)</sup>	< 8 / < 12 l/min		< 12 / < 16 l/min	< 12 l/min		
Ambient temperature	22 ± 2 °C					
Relative humidity	20 – 80 % (non-condensing)					
Power requirements <sup>16)</sup>	208–240 V AC, single phase 50/60 Hz / 220, 380 or 400 V AC, three phases, 50/60 Hz			220, 380 or 400 V AC, three phases, 50/60 Hz		
Power consumption	<2 / <3.5 kVA	<2.5 / <4 kVA	<4 / <5 kVA	<5 kVA	<6 kVA	<8 kVA

<sup>1)</sup> Due to continuous improvement, all specifications 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 -SH harmonic generator option.  
<sup>3)</sup> For -SH/TH harmonic generator option.  
<sup>4)</sup> For -SH/FH, -SH/TH/FH or -SH/FH/FiH harmonic generator option.  
<sup>5)</sup> For -SH/FH/FiH harmonic generator option.

<sup>6)</sup> Harmonic outputs are not simultaneous; only single wavelength beam is present at the output at once. Manual reconfiguration is required to switch wavelength.

<sup>7)</sup> Averaged from pulses, emitted during 30 sec time interval after 5–15 minutes of warm-up.

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

<sup>9)</sup> FWHM.

<sup>10)</sup> Standard deviation value, measured with respect to Q-switch triggering pulse.

<sup>11)</sup> Near field (at the output aperture) TOP HAT fit is >70%.

<sup>12)</sup> Beam diameter is measured at 1064 nm at the 1/e<sup>2</sup> level.

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

<sup>14)</sup> Beam pointing stability is evaluated as movement of the beam centroid in the focal plane of a focusing element.

<sup>15)</sup> Water air cooling chiller is possible. Inquire for details.

<sup>16)</sup> Mains voltage should be specified when ordering.



OPTIONS

- ▶ **-G option.** For models NL311, NL313. Provides beam profile optimized for applications requiring smooth, without hot spots beam profile in the near and medium field. Pulse energies typically are lower by 30% in comparison to standard lasers without -G option.
- ▶ Multimode spatial beam profile for smooth envelope.  $M^2 > 20$ .
- ▶ **-RLI.** Optional Relay Imaging for smooth beam profile.

BEAM PROFILE

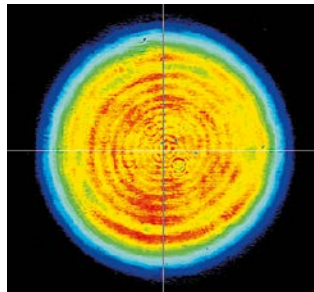


Fig 1. Typical beam profile of NL313 laser output

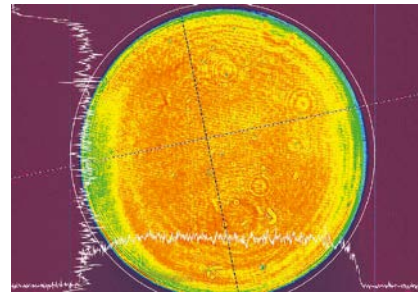


Fig 2. Typical NL319 beam profile after image relay system at 10 J at 1064 nm (with -RLI option)

OUTLINE DRAWINGS

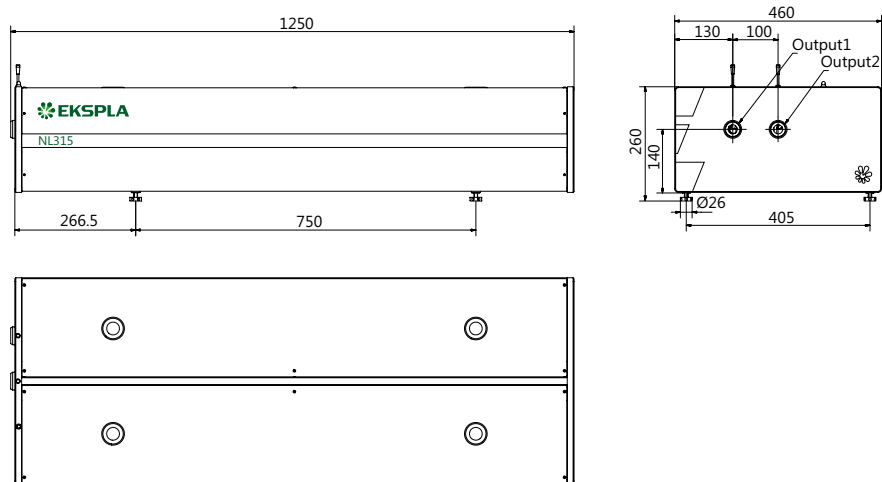


Fig 3. NL315 and NL317 lasers head outline drawing

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.

