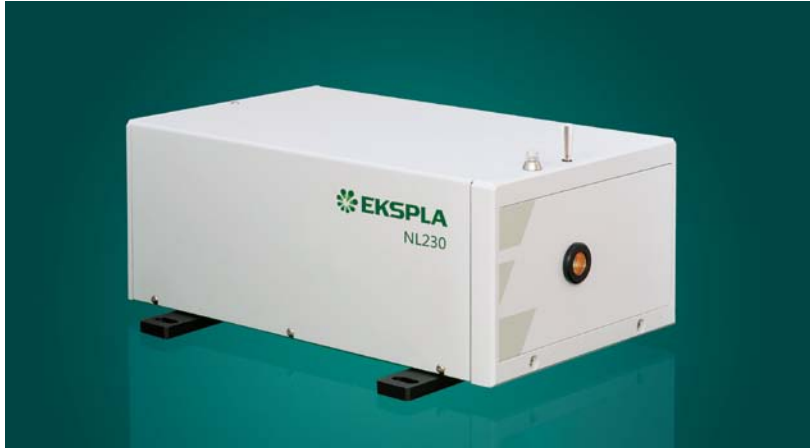


NL230 SERIES



The NL230 series diode-pumped Q-switched lasers produce up to 150 mJ at 100 Hz or up to 190 mJ at 50 Hz pulse repetition rate. Diode pumping allows maintenance-free laser operation for an extended period of time (more than 3 years for an estimated eight working hours per day). The typical pump diode lifetime is more than 1 billion shots.

Lasers are designed to produce high-intensity, high-brightness pulses and are targeted for applications such as material ablation, remote sensing, OPO, Ti:Sapphire or dye laser pumping. Due to an electro-optical Q-switch, the master oscillator generates short duration pulses in the 3–7 ns range. The oscillator cavity optical design features a variable-reflectivity output coupler, giving a low-divergence laser beam.

A closed-loop TEC based chiller is used for laser cooling, eliminating the need for external cooling water and reducing running costs.

OEM version of NL230 series laser features compact design and stable output parameters

Angle-tuned non-linear crystals mounted in temperature stabilized heaters are used for optional second, third or fourth harmonic generation. The harmonics separation system is designed to ensure radiation with a high spectral purity and to direct it to the separate output ports.

For customer convenience the laser can be controlled via a user-friendly remote control pad or a USB interface. The remote pad allows easy control of all parameters and features a backlit display that is easy to read even through laser safety eyewear. Alternatively, the laser can be controlled from a personal computer via supplied Windows™ compatible software. LabVIEW™ drivers are also included with each laser installation package.



High Energy Q-switched DPSS Nd:YAG Lasers

FEATURES

- ▶ Diode-pumped, typical diode lifetime >1 Gshot
- ▶ Rugged sealed laser cavity
- ▶ Up to **190 mJ** at **1064 nm** pulse energy
- ▶ Up to **100 Hz** pulse repetition rate
- ▶ Short pulse duration in the **3–7 ns** range
- ▶ Variable reflectivity output coupler for low-divergence beam
- ▶ Quiet operation: no more flashlamp firing sound
- ▶ Air cooled
- ▶ Remote control via keypad and/or PC via USB (RS232 optional) port with supplied LabVIEW™ drivers
- ▶ Optional temperature-stabilized second, third and fourth harmonic generators
- ▶ Optional attenuators for fundamental or/and harmonics wavelengths

APPLICATIONS

- ▶ OPO, Ti:Sapphire and dye laser pumping
- ▶ TFT-LCD Repair
- ▶ Mass Spectroscopy
- ▶ Remote Sensing
- ▶ LIDAR (Light Detection And Ranging)
- ▶ LIF (Light Induced Fluorescence)
- ▶ PIV (Particle Image Velocimetry)
- ▶ LIBS (Light Induced Breakdown Spectroscopy)
- ▶ ESPI (Electronic Speckle Pattern Interferometry)
- ▶ Medical
- ▶ Photo acoustic imaging

SPECIFICATIONS ¹⁾

Model	NL230-30	NL230-100	NL231-50	NL231-100
Pulse energy (not less than) ²⁾				
at 1064 nm	140 mJ	60 mJ	190 mJ	150 mJ
at 532 nm ³⁾	70 mJ	30 mJ	90 mJ	70 mJ
at 355 nm ⁴⁾	40 mJ	15 mJ	55 mJ	40 mJ
Pulse energy stability (StdDev) ⁵⁾				
at 1064 nm	<1 %			
at 532 nm	<2.5 %			
at 355 nm	<3.5 %			
Pulse repetition rate	30 Hz	100 Hz	50 Hz	100 Hz
Power drift ⁶⁾	< ±1 %			
Pulse duration ⁷⁾	3 – 7 ns			
Linewidth	<1 cm ⁻¹ at 1064 nm			
Beam profile ⁸⁾	"Top Hat" in near field and close to Gaussian in far field			
Beam divergence ⁹⁾	<0.8 mrad			
Beam pointing stability ¹⁰⁾	≤60 μrad rms			
Polarization	linear, >95 % at 1064 nm			
Typical beam diameter ¹¹⁾	5 mm			
Optical pulse jitter				
Internal triggering regime ¹²⁾	<0.5 ns rms			
External triggering regime ¹³⁾	<0.5 ns rms			
SYNC OUT pulse delay	-100 μs ... 100 ms			
Typical warm-up time	5 min			
PHYSICAL CHARACTERISTICS				
Laser head size (W × L × H)	190×305×165 mm ± 3 mm			
Power supply unit (W × L × H)				
Desktop case	471×391×147 mm ± 3 mm			
19" module	483×355×133 mm ± 3 mm			
External chiller (where applicable)	inquire			
Umbilical length	2.5 m			
OPERATING REQUIREMENTS				
Cooling (air cooled) ¹⁴⁾	built in chiller		external chiller	
Ambient temperature	18–27 °C			
Relative humidity (non-condensing)	20–80 %			
Power requirements	100–240 V AC, single phase, 50/60 Hz			
Power consumption	<1.0 kVA			

¹⁾ Due to continuous improvement, all specifications are subject to change without notice. The parameters marked typical may vary with each unit we manufacture. Unless stated otherwise all specifications are measured at 1064 nm.
²⁾ Outputs are not simultaneous. Inquire for fourth 266 nm and fifth 213 nm harmonic specifications.
³⁾ With H200SH and H200S or H200SHC harmonics generator module. See harmonics generator selection guide for more detailed information.
⁴⁾ With H200STH and H200ST harmonics or H200SH and H200THC generator modules. See harmonics generator selection guide for more detailed information.
⁵⁾ Averaged from pulses, emitted during 30 sec time interval.

⁶⁾ Measured over 8 hours period after 20 min warm-up when ambient temperature variation is less than ± 2 °C.
⁷⁾ FWHM.
⁸⁾ Near field (at the output aperture) TOP HAT fit is >80%.
⁹⁾ Full angle measured at the 1/e² level.
¹⁰⁾ Beam pointing stability is evaluated as movement of the beam centroid in the focal plane of a focusing element.
¹¹⁾ Beam diameter is measured at 1064 nm at the 1/e² level.
¹²⁾ With respect to SYNC OUT pulse.
¹³⁾ With respect to QSW IN pulse.
¹⁴⁾ Adequate room air conditioning should be provided.



Notes: The laser and auxiliary units must be settled in such a place void of dust and aerosols. It is advisable to operate the laser in air conditioned room, provided that the laser is placed at a distance from air conditioning outlets. The laser should be positioned on a solid worktable. Access from one side should be ensured. Intensive sources of vibration should be avoided near the laboratory (ex. railway station or similar).

CONFIGURATIONS

The following are suggested optimal configurations of H200 series modules for various output wavelengths:

1. For **2nd harmonics** output only: the H200SHC module.
2. For **2nd and 3rd harmonics**:
 - a) H200SH+H200S+H200THC – for SH and TH output.
 - b) H200STH+H200ST – a cost-effective solution not requiring the replacement of modules when changing from a 532 nm to 355 nm beam and vice versa. The 532 nm beam specification will, however, be 15% lower relative to the values specified above due to extra components in the beam path.
3. For **attenuators** for all wavelengths up to the 3th harmonic: H200A1+H200SH+H200A2+H200TH+H200A3 modules.

Modules Selection Guide

Module	Description	Output ports	Output pulse energy specifications	Dimensions W×L×H, mm	Extension possible?	Notes
H200SH	Second harmonic generator	Port 1: 1064, 532 nm	N/d	154×160×128	Yes	
H200S	532 nm beam separator	Port 1: 532 nm Port 2: residual 1064 nm	See NL230 specifications for 532 nm beam	154×160×128	No	Should be used with H200SH
H200SHC	Second harmonic generator with 532 nm beam separator	Port 1: 532 nm Port 2: residual 1064 nm	See NL230 specifications for 532 nm beam	154×210×128	No	
H200TH	Third harmonic generator	Port 1: 1064, 532 & 355 nm	N/a	154×160×128	Yes	Should be used with H200SH
H200THC	Third harmonic generator with 355 nm beam separator	Port 1: 355 nm Port 2: residual 1064 & 532 nm	See NL230 specifications for 355 nm beam	154×210×128	No	Should be used with H200SH
H200STH	Second and third harmonics generator	Port 1: 1064, 532 & 355 nm	N/a	154×210×128	Yes	
H200ST	355 nm beam separator	Port 1: 355 nm Port 2: residual 532 nm	See NL230 specifications for 355 nm beam	154×160×128	No	Recommended to use with H200STH
H200A1	Attenuator for 1064 nm beam	Port 1: 1064 nm beam	Transmission in 5–90% range at 1064 nm	154×210×128	No	
H200A2	Attenuator and beam separator for 532 nm beam	Port 1: 532 nm Port 2: residual 532 nm	Transmission in 5–90% range at 532 nm	154×210×128	No	Should be used with H200SH
H200A3	Attenuator and beam separator for 355 nm beam	Port 1: 355 nm Port 2: residual 355 nm	Transmission in 5–90% range at 355 nm	154×210×128	No	Should be used with H200TH or H200STH

PERFORMANCE

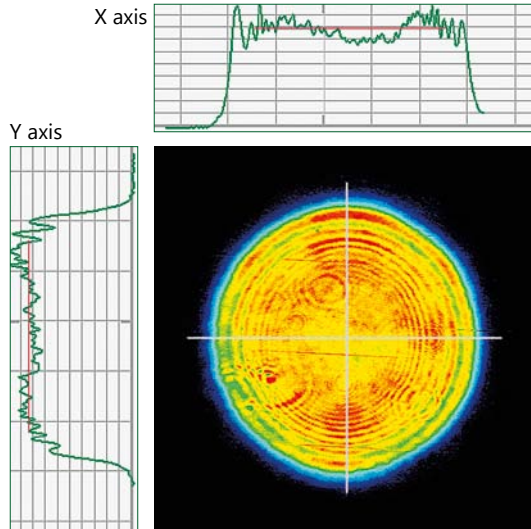


Fig 1. NL230 laser typical near field beam profile

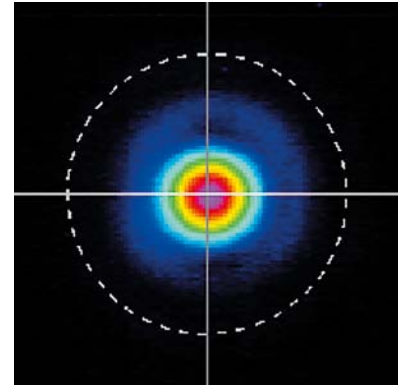


Fig 2. NL230 laser typical far field beam profile

Measure	P1.delay	P2.width	P3.area
value	72.011 ns	5.507 ns	2.358455 mVs
mean	72.044 ns	5.482 ns	2.355738 mVs
min	71.456 ns	5.167 ns	2.277066 mVs
max	72.552 ns	5.970 ns	2.409653 mVs
sdev	156.11 ps	81.27 ps	16.89196 pVs
num	4.697×10^3	4.697×10^3	4.697×10^3

NL230 laser pulse waveform

OUTLINE DRAWINGS

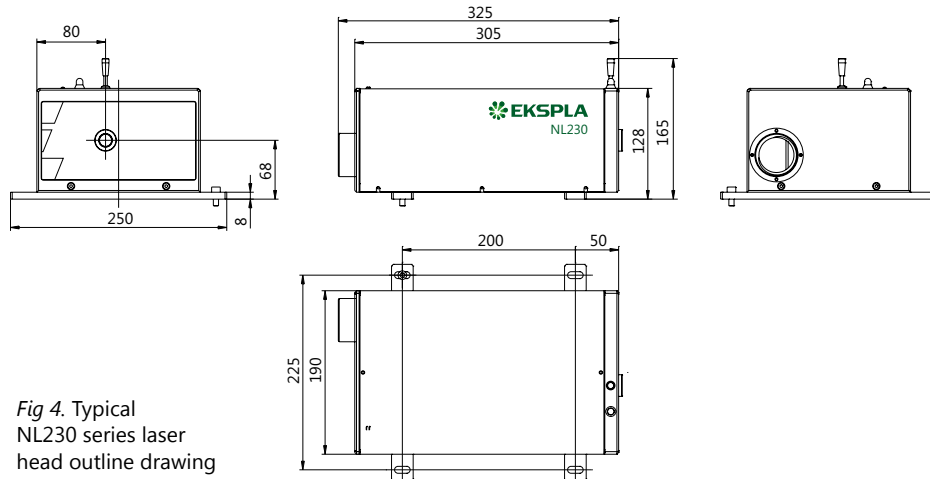


Fig 4. Typical NL230 series laser head outline drawing

ORDERING INFORMATION

NL230-H200SH-H200THC

Model Optional harmonic generator modules and other accessories