Nanosecond Lasers

Short pulse duration, wide range of customization options and high stability are distinctive features of EKSPLA nanosecond lasers. Employing latest achievements in laser technologies, team of dedicated engineers designed wide range of products tailored for specific applications: from compact, simple and robust DPSS NL200 series lasers for OEM manufacturers to high energy customized flash-lamp or diode pumped multijoule systems for research laboratories.

The laser can be controlled from remote control pad with backlit display that is easy to read even while wearing laser safety glasses. Alternatively, the laser can be operated also from personal computer using supplied LabVIEW™ drivers.

Second (532 nm), third (355 nm), fourth (266 nm) and fifth (213 nm) (where available) harmonic options combined with various accessories and customization possibilities make these lasers well suited for many OEM and laboratory applications like OPO, OPCPA, Ti:Sapphire and dye laser pumping, spectroscopy, remote sensing, plasma research ...

SHORT SELECTION GUIDE

For Your convenience, table contains all available options and highest parameter values. Not all output specifications are available at the same time simultaneously. Please refer to the catalog page for exact specifications and available options.

Model	Max. pulse energy at fundamental wavelength	Repetition rate, up to	Pumping	Pulse duration	Special feature	Page
NL200	4 mJ at 1064 nm	10 – 2500 Hz	Diode pumped solid state	8–10 ns	Compact and robust	28
NL230	190 mJ at 1064 nm	100 Hz	Diode pumped solid state	3–6 ns	Diode pumped only	31
NL300	1100 mJ at 1064 nm	20 Hz	Flash-lamp pumped	3–6 ns	Versatile, compact nanosecond laser	34

World leading reliability

NL200 SERIES

Compact Q-switched DPSS Lasers



BENEFITS

- *Continuous tuning of repetition rate while maintaining constant pulse energy, superior beam pointing and energy stability make the laser the first choice for micromachining, marking, thin film removing applications*
- *Close to Gaussian smooth beam profile with low value M^2 < 1.3 and good focusability is beneficial for such applications, as LCD and OLED display repair*
- *Compactness and lightness make a laser easy transportable, saves on valuable laboratory space*
- *Fast wavelength selection is superior for applications where alternating wavelengths are required, like material ablation, LIBS*
- *Air cooling, cheap and reliable end-pumping technology, amplifiers free DPSS design guarantee easy operation and alignment of laser, simple installation and low life-time ownership cost*
- *Variety of control interfaces USB, RS232, LAN, WLAN ensure easy control and integration of laser with laboratory or OEM equipment*

FEATURES

- *Customers recognized reliability*
- *Two years warranty*
- *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*
- *Compact size*
- *Simple and robust*
- *Air cooled*
- *External TTL triggering*
- *Remote control via keypad and/or any controller running on any OS using REST API commands*

APPLICATIONS

- *Material processing*
- *LCD and OLED display panel repair*
- *Marking*
- *Micromachining*
- *Engraving*
- *Laser deposition*
- *Laser cleaning*
- *Ablation*
- *Spectroscopy*
- *OPO pumping*
- *Remote sensing*

NL200 series DPSS air-cooled nanosecond lasers offer high pulse energy at kHz repetition rates. End-pumped design makes this laser compact and easy to integrate into various laser equipment both industrial and R&D. Featuring short nanosecond pulse duration, variable repetition rate and external TTL triggering, nanosecond diode pumped NL200 series Q-switched lasers are excellent and cost-effective sources for specific applications, when higher pulse energy is required, like material processing, LCD and OLED display panel repair, ablation, marking, engraving, laser cleaning, laser deposition and many more.

This laser can be equipped with harmonic generation modules for 532 nm, 355 nm, 266 nm and 213 nm wavelengths. Excellent energy stability and a wide range of wavelength options make this laser a perfect tool for spectroscopy, photoacoustic imaging and remote sensing applications. The mechanically stable and hermetically sealed design ensures reliable operation and long lifetime of the laser components.

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SPECIFICATIONS [1]

Model [2]	NL201 [3]	NL202 [4]	NL204 [4]
Pulse energy			
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
Pulse to pulse energy stability (StdDev) [5]			
at 1064 nm	<0.5 %		
at 532 nm	<2.5 %		
at 355 nm	<3.5 %		
at 266 nm	<4 %		
at 213 nm	<5 %		
Typical pulse duration [6]	< 8 ns	< 10 ns	< 8 ns
Power drift [7]	± 2 %		
Pulse repetition rate	0–2500 Hz	0–1000 Hz	
Beam spatial profile	close to Gaussian in near and far fields		
Roundness	0.9–1.1 at 1064 nm		
M^2	<1.3		
Beam divergence [8]	<3 mrad		
Polarization	linear		
Typical beam diameter [9]	0.7 mm		
Beam pointing stability (RMS) [10]	≤10 µrad		
Optical jitter (StdDev) [11]	<0.5 ns		

PHYSICAL CHARACTERISTICS	
Laser head (W × L × H) [12]	164 × 320 × 93 mm
Power supply unit (W × L × H)	470 × 390 × 140 mm
Umbilical length	3 m

OPERATING REQUIREMENTS	
Cooling	air cooled
Ambient temperature	18–30 °C
Realtive humidity	20–80 % (non-condensing)
Power requirements	100–240 V AC, single phase, 50/60 Hz
Power consumption	<600 W
Cleanliness of the room	not worse than ISO Class 9

1) 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 maximal pulse repetition rate and for basic system without options.

2) Please indicate clearly if 1064 nm output is required in case harmonics options are ordered (except H200STHC module). In such a case, the energy of 1064 nm is optimized for harmonics generation and may differ from specified in the table.

3) Unless stated otherwise all specifications are measured at 2500 Hz pulse repetition rate.

4) Unless stated otherwise all specifications are measured at 1000 Hz pulse repetition rate.

5) Averaged from pulses emitted during 30 sec time interval.

6) FWHM at 1064 nm.

7) Measured over 8 hours period after 20 min warm-up when ambient temperature variation is less than ± 2 °C and humidity <± 5%.

8) Full angle measured at the $1/e^2$ level at 1064 nm.

9) Beam diameter is measured at 1064 nm at the $1/e^2$ level.

10) Beam pointing stability is evaluated as movement of the beam centroid in the focal plane of a focusing element.

11) With respect to QSW IN or SYNC OUT pulse.

12) Without optional harmonic module.



PERFORMANCE

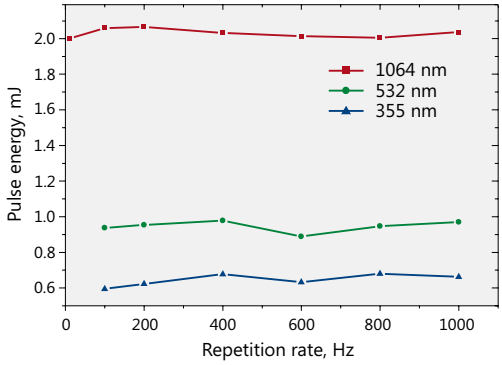


Fig 1. Typical performance data of model NL202 laser

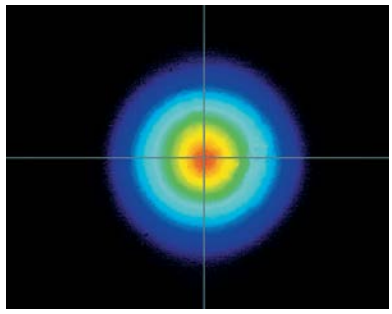


Fig 2. Typical beam intensity profile in the far field

OUTLINE DRAWINGS

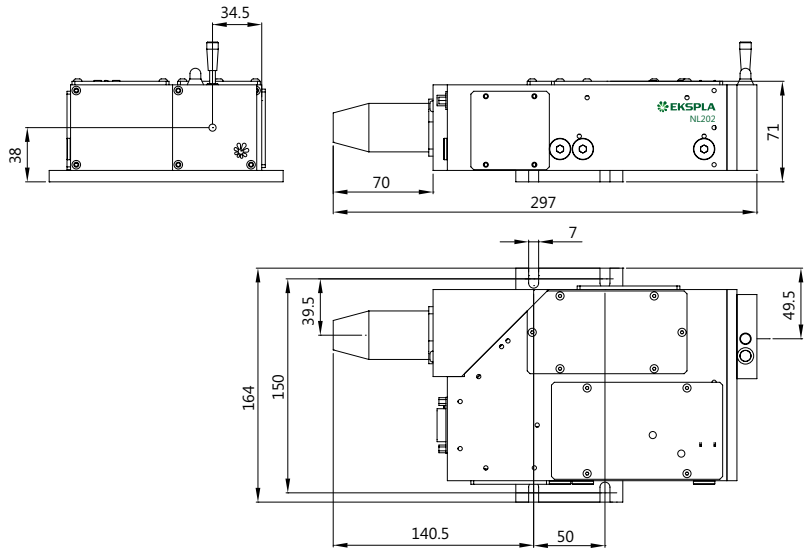


Fig 3. NL202 laser head drawing

ORDERING INFORMATION

Note: Laser must be connected to the mains electricity all the time. If there will be no mains electricity for longer that 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

NL230 SERIES

High Energy Q-switched DPSS Nd:YAG Lasers



BENEFITS

- *Short duration 3 – 6 ns pulses ensures strong interaction with material, are highly suitable for LIBS*
- *User selectable wavelength single axis output is superior for experiments, where alternating wavelengths are required, like material ablation, LIBS*
- *Rugged, monolithic design enables laser usage in hash environment*
- *Diode pumped design provides quiet operation, eliminates the irritation of flash light*
- *Variety of interfaces USB, RS232, LAN, WLAN ensures easy control and integration with other equipment*

FEATURES

- *Customers recognized reliability*
- *Two years warranty*
- *Diode-pumped*
- *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 **3–6 ns** range*
- *Variable reflectivity output coupler for low-divergence beam*
- *Quiet operation: no more flashlamp firing sound*
- *Remote control via keypad and/or any controller running on any OS using REST API commands*
- *Optional temperature-stabilized second and third harmonic generators*
- *Electromechanical shutter (optional)*
- *Easy replaceable output window*

The NL230 series diode-pumped short nanosecond lasers are designed to produce high-intensity, high-brightness pulses and are targeted for applications such as material ablation, Light Detection And Ranging (LIDAR), remote sensing, mass spectroscopy, OPO, Ti:Sapphire or dye laser pumping and many more. 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.

Because laser head components are placed in a robust, sealed and precisely machined monolithic aluminium block, this laser can reliably work in a harsh industrial environment with applications such as laser-induced breakdown spectroscopy (LIBS).

Second and third harmonic options allows for an expanded range of applications, where high pulse energy and high pulse to pulse stability are required.

For easy and seamless control and integration with other industrial equipment, the NL230 series laser is equipped with USB/RS232 interfaces and can be externally triggered with a jitter as low as < 0.5 ns StDev.

NL230 series lasers are designed to work reliably 24/7 in an industrial environment.

APPLICATIONS

- *LIBS (Light Induced Breakdown Spectroscopy)*
- *Material ablation*
- *OPO pumping*
- *Remote Sensing*
- *LIDAR (Light Detection And Ranging)*
- *Mass Spectroscopy*
- *LIF (Light Induced Fluorescence)*

SPECIFICATIONS [1]

Model	NL231-50	NL231-100
Pulse energy (not less than) [2]		
at 1064 nm	190 mJ	150 mJ
at 532 nm	110 mJ	90 mJ
at 355 nm	55 mJ	40 mJ
at 266 nm	3 mJ	1.2 mJ
Pulse energy stability (StdDev) [3]		
at 1064 nm	< 1 %	
at 532 nm	< 2.5 %	
at 355 nm	< 3.5 %	
at 266 nm	< 5 %	
Pulse repetition rate	50 Hz	100 Hz
Power drift [4]	< ±3 %	
Pulse duration [5]	3 – 6 ns	
Linewidth	< 1 cm^{-1} at 1064 nm	
Beam profile [6]	"Top Hat" in near field and close to Gaussian in far field	
Beam divergence [7]	< 0.8 mrad	
Beam pointing stability (RMS) [8]	≤ 60 µrad	
Polarization	linear, > 90 % at 1064 nm	
Typical beam diameter [9]	5 mm	
Optical pulse jitter (StDev)		
Internal triggering regime	< 0.5 ns	
External triggering regime	< 0.5 ns	
Typical warm-up time	10 min	
PHYSICAL CHARACTERISTICS		
Laser head size (W × L × H)	251 × 290 × 167 ± 3 mm	
Power supply unit (W × L × H)		
Desktop case	449 × 390 × 140 ± 3 mm	
19" module	483 × 390 × 140 ± 3 mm	
External chiller	inquire	
Umbilical length	3 m	
OPERATING REQUIREMENTS		
Cooling (air cooled) [10]	external chiller	
Ambient temperature	18 – 30 °C	
Relative humidity (non-condensing)	20 – 80 %	
Power requirements	100 – 240 V AC, single phase, 50/60 Hz	
Power consumption	< 1.0 kW	
Cleanliness of the room	not worse than ISO Class 9	

1) Due to continuous improvement, all specifications are subject to change. The parameters marked typical may vary with each unit we manufacture. Unless stated otherwise all specifications are measured at 1064 nm and for basic system without options.

2) Outputs are not simultaneous. Inquire for higher energy (up to 350 mJ at 50 Hz, 250 mJ at 100 Hz) custom models.

3) Averaged from pulses, emitted during 30 sec time interval.

4) Measured over 8 hours period after 20 min warm-up when ambient temperature variation is less than ± 2 °C and humidity < ± 5%.

5) FWHM.

6) Near field (at the output aperture) TOP HAT fit is >80%.

7) Full angle measured at the $1/e^2$ level.

8) Beam pointing stability is evaluated as movement of the beam centroid in the focal plane of a focusing element.

9) Beam diameter is measured at 1064 nm at the $1/e^2$ level.

10) Adequate room air conditioning should be provided.



PERFORMANCE

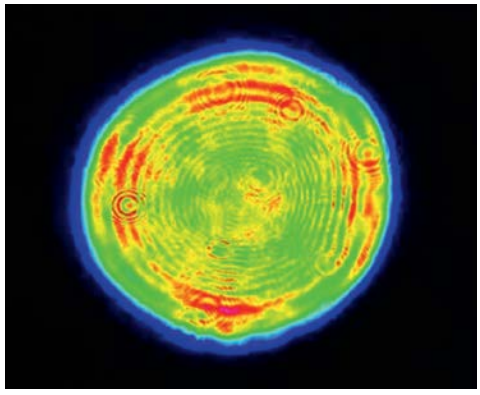


Fig 1. NL230 series laser typical near field beam profile

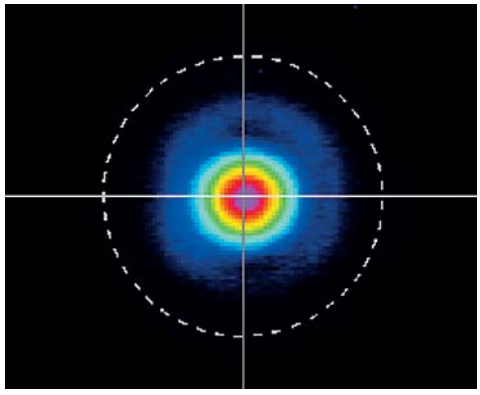


Fig 2. NL230 series laser typical far field beam profile

Measure	P1.ddelay	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

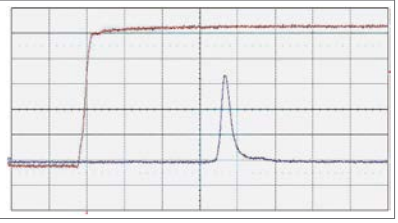


Fig 3. NL230 laser pulse waveform

OUTLINE DRAWINGS

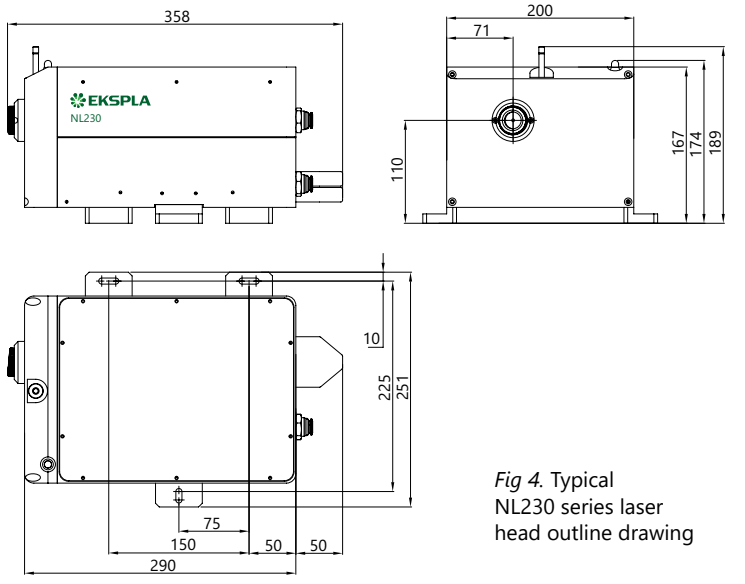


Fig 4. Typical NL230 series laser head outline drawing

ORDERING INFORMATION

NL231-H230THC

Model

Optional harmonic generator modules

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.

NL300 SERIES

Compact Flash-Lamp Pumped Q-switched Nd:YAG Lasers



BENEFITS

- *High pulse energy (up to 1100 mJ at 1064 nm, 700 mJ at 532 nm and 450 mJ at 355 nm) and short pulse duration about 4 ns ensure strong interaction with material which is excellent for LIBS and material ablation applications*
- *Small size saves valuable space in the laboratory room*
- *Fast flashlamp replacement without realignment of laser cavity ensures easy maintenance*
- *Cost-effective, single-cavity design with no amplifiers for easy alignment, high reliability and low maintenance costs*
- *Air cooling enables simple installation, easy operation and low maintenance costs*
- *Variety of interfaces: USB, RS232, optional LAN and WLAN ensures easy integration with other equipment*

FEATURES

- *Customers recognized reliability*
- *Two years warranty*
- *Rugged sealed laser cavity*
- *Up to **1100 mJ** pulse energy*
- *Better than 1 % StDev pulse energy stability*
- ***5–20 Hz** pulse repetition rate*
- ***3–6 ns** pulse duration*
- *Thermo stabilized second, third, fourth and fifth harmonic generator modules*
- *Optional attenuators for fundamental and/or harmonic wavelengths*
- *Water-to-water or water-to-air cooling options*
- *Replacement of flashlamps without misalignment of laser cavity*
- *Remote control via keypad and/or RS232/USB port*

APPLICATIONS

- *Material ablation*
- *LIBS (Light Induced Breakdown Spectroscopy)*
- *OPO pumping*
- *Remote Sensing*
- *LIDAR (Light Detection And Ranging)*
- *Mass Spectroscopy*
- *LIF (Light Induced Fluorescence)*

NL300 series electro-optically Q-switched nanosecond Nd:YAG lasers produce high energy pulses with 3–6 ns duration. Pulse repetition rate can be selected in range of 5–20 Hz. NL30×HT models are designed for maximum energy extraction from the active element. Up to 1100 mJ pulse energy can be produced at a 5 Hz pulse repetition rate.

A wide range of harmonic generator modules for generation up to a 5th harmonic is available. Harmonic generators can be combined with attenuators that allow smooth output energy adjustment without changing other laser parameters, i.e. pulse duration, pulse-to-pulse stability, divergence or beam profile. For a more detailed description of harmonic and attenuator modules please check our harmonic generators selection guide on the page 36.

The extremely compact laser head is approximately 480 mm long and can be fitted into tight spaces. The laser power supply has a 330 × 490 mm footprint. Easy access to the water tank from the back side of the power supply facilitates laser maintenance. Replacement of flashlamp does not require removal of pump chamber from the laser cavity and does not lead to possible misalignment.

The powering unit can be configured with water-to-water or water-to-air heat exchangers. The latter option allows for laser operation without the use of tap water for cooling.

For customer convenience the laser can be controlled via PS with LabView™ drivers (included) or a remote control pad. Both options allow easy control of laser settings.

SPECIFICATIONS [1]

Model	NL303HT		NL305HT	
Pulse repetition rate	10 Hz	20 Hz	10 Hz	5 Hz
Pulse energy:				
at 1064 nm	800 mJ	800 mJ	1000 mJ	1100 mJ
at 532 nm [2]	400 mJ	400 mJ	650 mJ	700 mJ
at 355 nm [3]	250 mJ	250 mJ	400 mJ	450 mJ
at 266 nm [4]	80 mJ	60 mJ	100 mJ	120 mJ
at 213 nm [5]	13 mJ	10 mJ	20 mJ	25 mJ
Pulse energy stability (StdDev) [6]				
at 1064 nm	1 %			
at 532 nm	1.5 %			
at 355 nm	3 %			
at 266 nm	3.5 %			
at 213 nm	6 %			
Power drift [7]	±2 %			
Pulse duration [8]	3–6 ns			
Polarization	vertical, >90 %			
Optical pulse jitter [9]	< 0.5 ns StDev			
Linewidth	< 1 cm^{-1}			
Beam profile [10]	Hat-Top in near and near Gaussian in far fields			
Typical beam diameter [11]	~8 mm		~10 mm	
Beam divergence [12]	< 0.6 mrad			
Beam pointing stability [13]	50 µrad RMS			
Beam height	68 mm			
PHYSICAL CHARACTERISTICS				
Laser head size (W × L × H) [14]	154 × 475 × 128 mm			
Power supply unit (W × L × H)	330 × 490 × 585 mm			
Umbilical length	2.5 m			
OPERATING REQUIREMENTS				
Water consumption (max 20 °C) [15]	< 8 l/min	< 12 l/min	< 10 l/min	< 6 l/min
Ambient temperature	15–30 °C			
Relative humidity	20–80 % (non-condensing)			
Power requirements [16] [17]	208–240 V AC, single phase 50/60 Hz			
Power consumption [18]	< 1.5 kVA	< 2.5 kVA	< 2.5 kVA	< 1.5 kVA
Cleanliness of the room	not worse than ISO Class 9			

1) Due to continuous improvement, all specifications are subject to change without notice. The 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.

2) With H300SH, H300S or H300SHC harmonic generator modules. See harmonic generator selection guide on the page 36 for more detailed information.

3) With H300THC harmonic generator modules. See harmonic generator selection guide on the page 36 for more detailed information.

4) With H300SH and H400FHC harmonic generator modules. See harmonic generator selection guide on the page 36 for more detailed information.

5) With H300FiHC harmonic generator module. See harmonic generator selection guide on the page 36 for more detailed information.

6) Averaged from pulses, emitted during 30 sec time interval.

7) Measured over 8 hours period after 20 min warm-up when ambient temperature variation is less than ± 2 °C and humidity <± 5%.

8) FWHM.

9) With respect to SYNC OUT pulse.

10) Near field (at the output aperture) TOP HAT fit is >70%.

11) Beam diameter is measured at 1064 nm at the $1/e^2$ level.

12) Full angle measured at the $1/e^2$ level.

13) Beam pointing stability is evaluated as movement of the beam centroid in the focal plane of a focusing element.

14) See harmonic generator selection guide on the page 36 for harmonic generators units sizes.

15) For water cooled version. Air cooled version does not require tap water for cooling.

16) Power requirements should be specified when ordering.



17) 110 V AC powering is available, please inquiry for details.

18) Required current rating can be calculated by dividing power value by mains voltage value.

OPTIONS

- **Option -AW** – air-cooled power supply option. An adequate air conditioner should be installed in order to keep room temperature stable.
- **Harmonic generator options** – an extensive selection of harmonic generators up to 5th harmonic.
- **Attenuator options** allow a smooth change of laser pulse energy, while other laser pulse parameters, such as pulse duration, jitter, pulse-to-pulse stability, beam divergence and profile remain the same.

OPTIONAL HARMONIC GENERATOR AND ATTENUATOR MODULES

Module	Description	Output ports	Output pulse energy specifications	Dimensions W×L×H, mm	Extension possible?	Notes
H300A	Attenuator for 1064 nm beam	Port 1: 1064 nm beam	Transmission in 5–90% range at 1064 nm		No	Integrated into a laser head
H300SH	Second harmonic generator	Port 1: 1064, 532 nm	n/d	154×160×128	Yes	
H300S	532 nm beam separator	Port 1: 532 nm Port 2: residual 1064 nm	See NL300 specifications for 532 nm beam	154×160×128	No	Should be used with H300SH
H300SHC	Second harmonic generator with 532 nm beam separator	Port 1: 532 nm Port 2: residual 1064 nm	See NL300 specifications for 532 nm beam	154×210×128	No	
H300SHA	Second harmonic generator, beam separator and attenuator for 532 nm beam	Port 1: 532 nm Port 2: residual 532 nm	Transmission in 5–90% range at 532 nm	154×260×128	No	
H300THC	Third harmonic generator with 355 nm beam separator	Port 1: 355 nm Port 2: residual 1064 & 532 nm	See NL300 specifications for 355 nm beam	154×210×128	No	Should be used with H300SH
H300THA	Third harmonic generator, beam separator and attenuator for 355 nm beam	Port 1: 355 nm Port 2: residual 355 nm	Transmission in 5–90% range at 355 nm	154×260×128	No	Should be used with H300SH
H300FHC	Fourth harmonic generator with 266 nm beam separator	Port 1: 266 nm Port 2: residual 532 nm	See NL300 specifications for 266 nm beam	154×260×128	No	Should be used with H300SH
H300FHA	Fourth harmonic generator, beam separator and attenuator for 266 nm beam	Port 1: 266 nm Port 2: residual 266 nm	Transmission in 5–75% range at 266 nm	154×430×128	No	Should be used with H300SH
H300FiHC	Fifth harmonics generator with 213 nm beam separator	Port 1: 213 nm Port 2: residual 1064, 532 & 266 nm	See NL300 specifications for 213 nm beam	154×350×128	No	

OUTLINE DRAWINGS

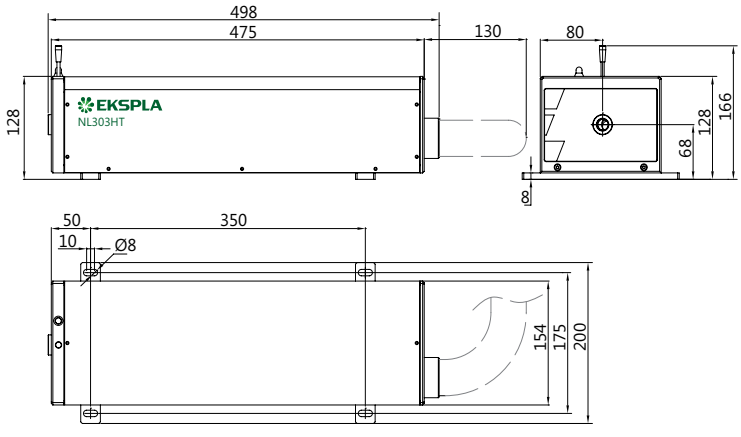


Fig 1. Typical NL300 series laser head outline drawing

ORDERING INFORMATION

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

NL303HT-10-AW-H300SH-H300THC

- Model
- Pulse repetition rate in Hz
- Options: AW → water-air heat exchanger
- Optional harmonic generator modules and other accessories

HARMONIC GENERATORS & ATTENUATORS

For NL300 Series Lasers

Nanosecond Q-switched lasers enable simple and cost effective laser wavelength conversion to shorter wavelengths through harmonic generation. EKSPLA offers a broad selection of wavelength conversion accessories for NL300 series lasers. The purpose of this guide is to help configure available harmonic generator and attenuator modules for NL300 series lasers for optimal performance.

The harmonic module uses a modular design that allows reconfiguration of laser output for the appropriate experiment wavelength. A typical module houses a non-linear crystal together with a set of dichroic mirrors for separating the harmonic beam from the fundamental wavelength. Nonlinear crystals used for the purpose of wavelength conversion are kept at an elevated temperature in a thermo-stabilized oven.

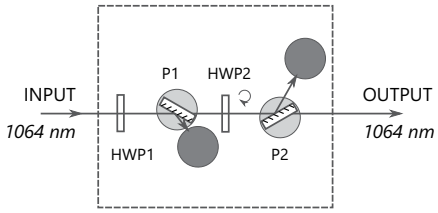
Two or more modules can be joined together for higher harmonic generation: attaching one extra module to a second harmonic generator allows for the generation of 3rd or 4th harmonic wavelengths. It should be noted that only modules with a single output port can be joined together: it is possible to attach a H300S module to a H300SH unit for 532 nm beam separation, or a H300FHC module for 4th harmonic generation (see detailed description below). Modules with two output ports (e.g., H300SHC) cannot be attached to extra units.

FEATURES

- *Compact harmonic modules*
- *Thermo stabilized crystals for long lifetime*
- *Dichroic mirrors*
- *AR coatings on crystals*
- *Phase matching by mechanical adjustment*
- *High conversion efficiency*
- *Wide selection of different configurations*
- *Smooth adjustment of output pulse energy with attenuator*

H300A attenuator

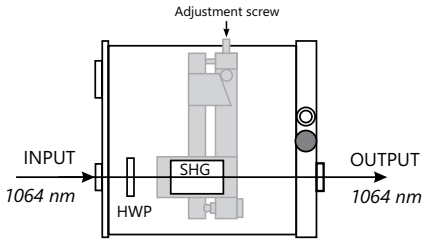
The H300A1 module is integrated into the laser head and designed to attenuate a **1064 nm**. Beam (the length of the laser head extends to 619 mm). Optical layout includes half-wave plates HWP1, HWP2 and polarizers P1, P2. Rotation of the HWP2 half-wave plate changes the polarization of the laser beam and its transmission factor via the P2 polarizer.



H300A

H300SH harmonic generators

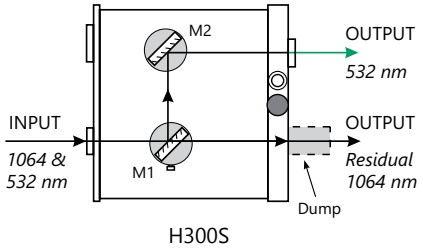
H300SH module contains a SH crystal with a half-wave plate for input polarization adjustment. The output of the H300SH module has both **532 nm** and **1064 nm** wavelengths.



H300SH

H300S harmonic separator

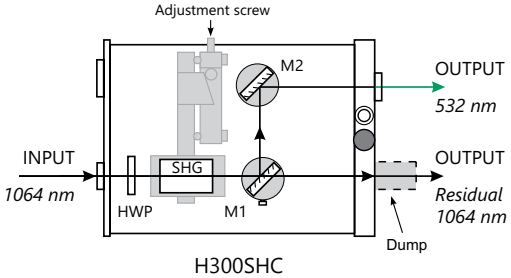
The H300S module has two output ports for the separation of **1064 nm** and **532 nm** wavelengths.



H300S

H300SHC harmonic generator

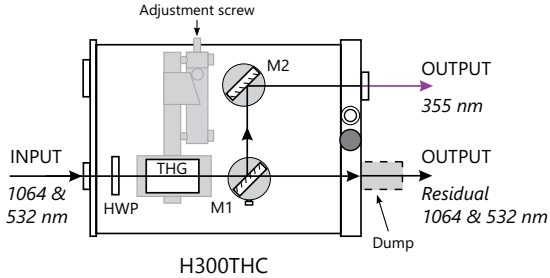
The most cost-effective solution for customers who need a **532 nm** wavelength only, the H300 SHC module combines a SHG crystal and beam separators and has two output ports for **532 nm** and **1064 nm** beams.



H300SHC

H300THC harmonic generator

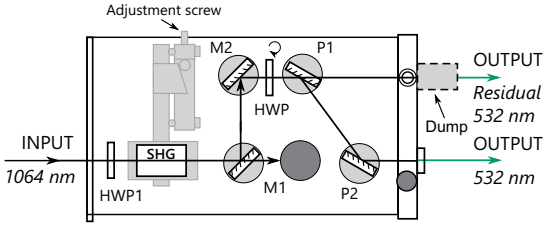
The H300THC module is a third harmonic generator and beam separator with two output ports for a 355 nm beam, and for a residual **532 nm + 1064 nm** beam. This module should be used with the H300SH module.



H300THC

H300SHA harmonic generator & attenuator

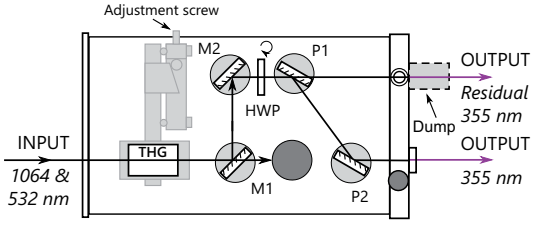
The cost-effective solution for customers who need an attenuated **532 nm** wavelength, the H300SHA module combines a SHG generator with attenuator.



H300SHA

H300THA harmonic generator & attenuator

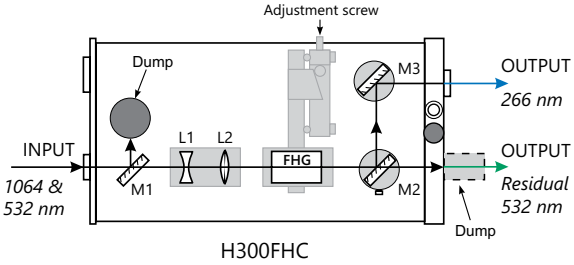
The cost-effective solution for customers who need an attenuated **355 nm** wavelength, the H300THA module combines a THG generator with attenuator.



H300THA

H300FHC harmonic generator

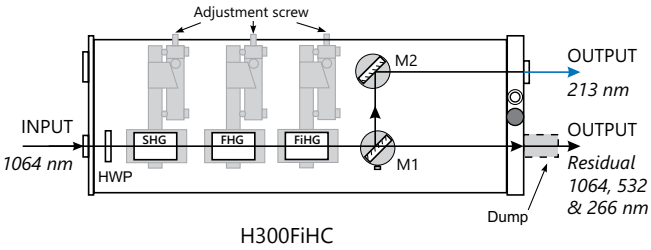
The H300FHC module is a fourth harmonic generator and beam separator for a 266 nm wavelength, with two output ports for a **266 nm** beam, and for a residual **532 nm** beam. This module should be used with the H300SH module.



H300FHC

H300FiHC harmonic generator

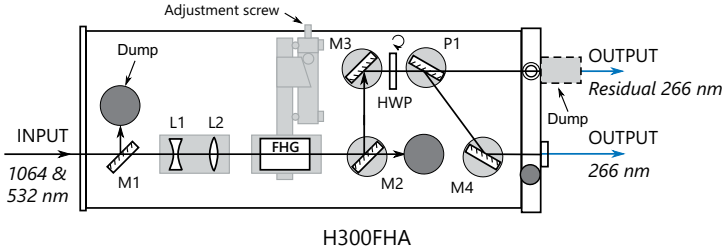
The H300FiHC module is designed to produce a 5th harmonic output. As it requires only a 1064 nm input, the unit contains SH, FH and FiH crystals together with a beam separator for a **213 nm** beam.



H300FiHC

H300FHA harmonic generator & attenuator

The cost-effective solution for customers who need an attenuated **266 nm** wavelength, the H300FHA module combines a FHG generator with attenuator.



H300FHA

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