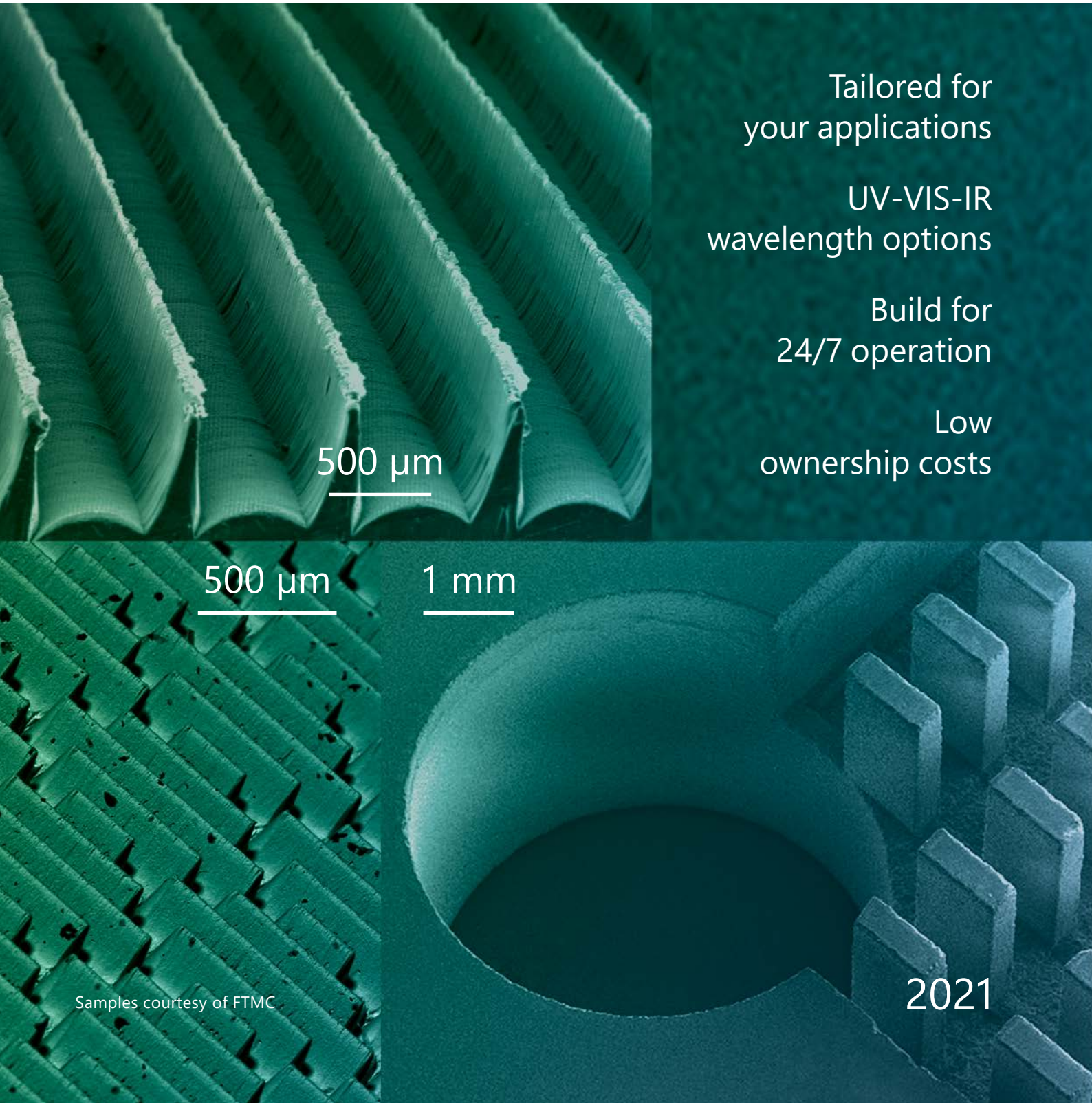
EKSPLA

Industrial Lasers

femtosecond / picosecond / nanosecond



Industrial Lasers

femtosecond / picosecond / nanosecond

SPECIFICATIONS AT A GLANCE

Not all output specifications may be available simultaneously.
Please refer to the catalog page for exact specifications and available options.

Model	Available output wavelengths	Pulse duration [1]	Max output power [1]	Max repetition rate	Max pulse energy [1]	Page
FEMTOSECOND						
FemtoLux 30	1030 nm	350 fs – 1 ps	> 27 W (typical 30 W)	200 kHz – 4 MHz	90 µJ	3
FemtoLux 3	1030 ± 2 nm 515 ± 1 nm	300 fs – 5 ps tunable	3 W	10 MHz	3 µJ	6
PICOSECOND						
Atlantic 5	1064 nm 532 nm 355 nm	10 ± 3 ps	5 W	1 MHz	30 µJ	11
Atlantic	1064 nm 532 nm 355 nm	10 ± 3 ps	80 W	1 MHz	200 µJ	17
NANOSECOND						
NL200	1064 nm 532 nm 355 nm 266 nm 213 nm	< 10 ns	4 W	2.5 kHz	4.0 mJ	25
NL230	1064 nm 532 nm 355 nm	2 – 4 ns	15 W	100 Hz	190 mJ	28

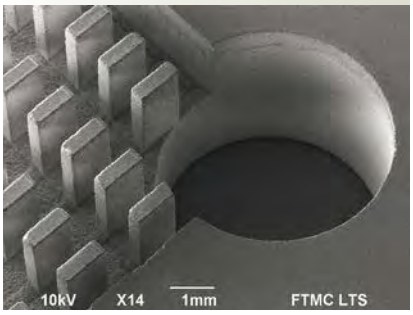
[1] At fundamental wavelength.

Due to the constant product improvements, EKSPLA reserves its right to change specifications without advance notice.

For latest information visit www.ekspla.com.

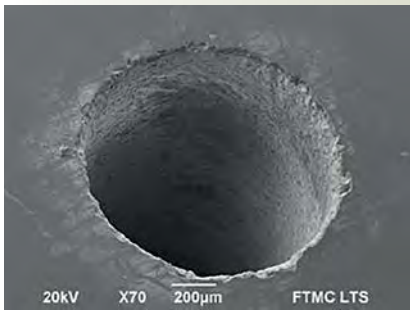
Material processing samples

GLASS MILLING



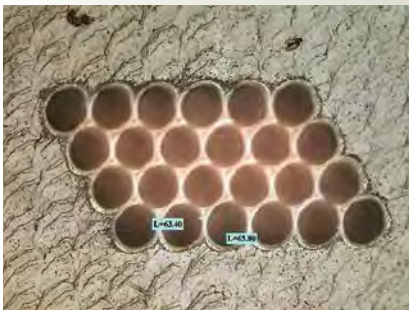
Surface chipping <100 µm, sidewall roughness <2 µm. Courtesy of FTMC.

GLASS DRILLING



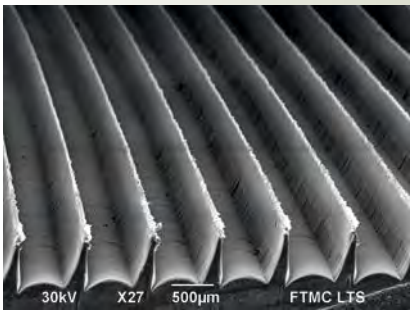
Surface chipping <100 µm, sidewall roughness <2 µm. Courtesy of FTMC.

POLYAMIDE DRILLING



Drilling of 65 µm holes in 0.8 mm PI

TEFLON ABLATION



Teflon (PTFE) ablation. Courtesy of FTMC.

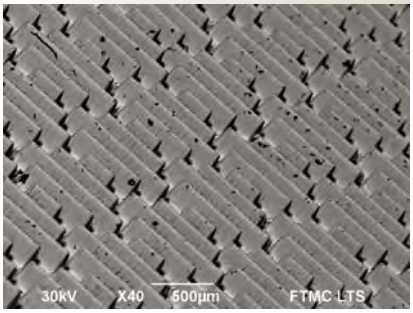
NICKEL ABLATION

Ablation of 50 µm nickel layer from a ceramic substrate.

COPPER ABLATION

Copper removal from PCB with down to <20 µm resolution.

SURFACE STRUCTURING

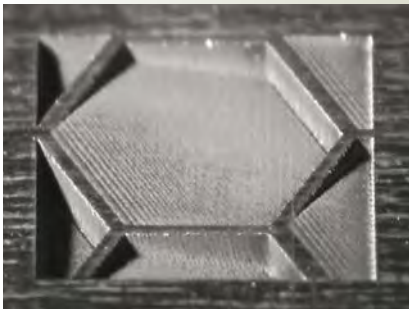


"Shark skin" surface structuring. Courtesy of FTMC.

STAINLESS STEEL MARKING

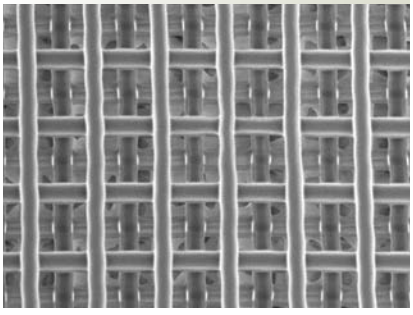
Highly resistant stainless steel black marking

COPPER ABLATION



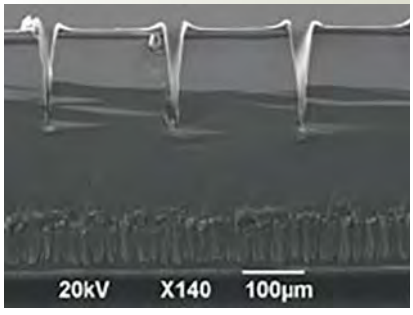
Surface roughness of 0.2 µm. Courtesy of Leibnitz IOM.

PHOTOPOLYMERIZATION



Courtesy of Workshop of Photonics.

SILICON SCRIBING



Courtesy of FTMC.

COPPER DEEP 3D ENGRAVING

Courtesy of FTMC.

FemtoLux 30

Femtosecond Industrial Lasers

FEATURES

- ***30 W*** *typical max output power*
- ***> 90 µJ*** *max pulse energy*
- ***> 250 µJ*** *in a burst mode*
- ***< 350 fs – 1 ps***
- ***Single shot to 4 MHz*** *(AOM controlled)*
- *<0.5% RMS power long term stability over 100 hours*
- *M^2 < 1.2*
- *Beam circularity > 0.85*
- *Zero maintenance*
- *Dry cooling (no water used)*
- *PSU and cooling unit integrated into single 4U rack housing*
- *Easy and quick installation*
- *Compatible with galvo and Polygon scanners as well as PSO controllers*
- *2 years of total warranty*

APPLICATIONS

- *LCD, LED, OLED drilling, cutting and repair*
- *Microelectronics manufacturing*
- *Glass, sapphire and ceramics micro processing*
- *Glass intra volume structuring*
- *Micro processing of different polymers and metals*

INNOVATIVE "DRY" COOLING SYSTEM

The FemtoLux 30 laser employs an innovative cooling system and sets new reliability standards among industrial femtosecond lasers. No additional bulky and heavy water chiller is needed.

The chiller requires periodic maintenance – cooling system draining and rinsing and water and particle filter replacement. Moreover, water leakage can cause damage to the laser head and other equipment. Instead of using water for transferring heat from a laser head, the FemtoLux 30 laser uses an innovative Direct Refrigerant Cooling method.

The refrigerant agent circulates from a PSU-integrated compressor and condenser, to a cooling plate via armored flexible lines.

The entire cooling circuit is permanently hermetically sealed and requires no maintenance.

SIMPLE & RELIABLE COOLING PLATE ATTACHMENT

The cooling plate is detachable from the laser head for more convenient laser installation.

The laser cooling equipment is integrated with the laser power supply unit into a single 4U rack-mounted housing with a total weight of 15 kg.

PERFECT AND VERSATILE TOOL FOR MICROMACHINING

The FemtoLux 30 femtosecond laser has a tunable pulse duration from <350 fs to 1 ps and can operate in a broad AOM controlled range of pulse repetition rates from a single shot to 4 MHz.

The maximum pulse energy is more than 90 µJ operating with single pulses and can reach 250 µJ in burst mode, ensuring higher ablation rates and processing throughput for different materials.

The FemtoLux 30 beam parameters will meet the requirements of the most demanding materials and micro-machining applications.

Innovative laser control electronics ensure simple control of the FemtoLux 30 laser by external controllers that could run on different platforms, be it Windows, Linux or others using REST API commands.

This makes easy integration and reduces the time and human resources required to integrate this laser into any laser micromachining equipment.

SPECIFICATIONS [1]

Model	FemtoLux 30
MAIN SPECIFICATIONS	
Wavelength	1030 nm
Pulse Repetition Rate (PRR) [2]	200 kHz – 4 MHz
Pulse repetition frequency (PRF) after frequency divider	PRF = PRR / N, N=1, 2, 3, … , 65000; single shot
Maximal average output power	> 27 W (typical 30 W)
Maximal pulse energy	> 90 µJ
Maximal total energy in a burst mode [3]	> 250 µJ
Power long term stability (Std. dev.) [4]	< 0.5 %
Pulse energy stability (Std. dev.) [5]	< 1 %
Pulse duration (FWHM)	Tunable, < 350 fs [6] – 1 ps
Beam quality	M^2 < 1.2 (typical < 1.1)
Beam circularity, far field	> 0.85
Beam divergence (full angle)	< 1 mrad
Beam pointing thermal stability	< 20 µrad/°C
Triggering mode	internal / external
Pulse output control	frequency divider, pulse picker, burst mode, packet triggering, power attenuation
Control interfaces	USB / RS232 / LAN
Length of the umbilical cord	3 m, detachable
Laser head cooling type	dry (direct refrigerant cooling through detachable cooling plate)
PHYSICAL CHARACTERISTICS	
Laser head (W × L × H)	429 × 569 × 130 mm
Power supply unit (W × L × H)	449 × 376 × 177 mm
OPERATING REQUIREMENTS	
Mains requirements	100 – 240 V AC, single phase, 50/60 Hz
Operating ambient temperature	18 – 27 °C
Relative humidity	10–80 % (non-condensing)
Air contamination level	ISO 9 (room air) or better

[1] 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. All parameters are specified for a shortest pulse duration.

[2] When frequency divider is set to transmit every pulse. Fully controllable by integrated AOM.

[3] When number of pulses within a burst is set to 10 and PRR is set to a minimum value. Separation between pulses within a burst - ~20 ns.

[4] Over 100 h after warm-up under constant environmental conditions.

[5] Under constant environmental conditions.

[6] At PRR > 500 kHz. At PRR < 500 kHz shortest pulse duration is < 400 fs.

PERFORMANCE

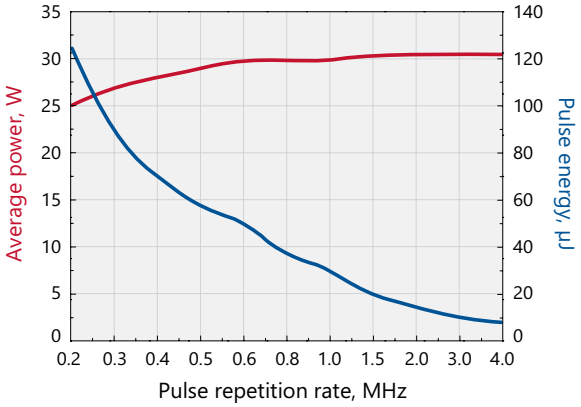


Fig 1. Typical dependence of output power and pulse energy of FemtoLux 30 laser on pulse repetition rate

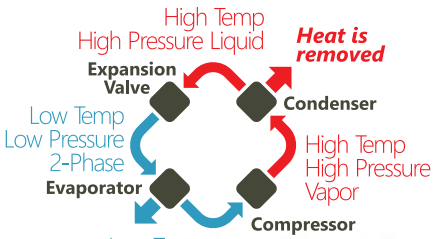
SEAMLESS USER EXPERIENCE

- *Easy integration.*
  Remote control using REST API commands via USB, RS232 and LAN
- *Reduced integration time.*
  Demo electronics is available for laser control programming in advance
- *Easy and quick installation.*
  No water, fully disconnected laser head. Can be installed by the end-user.
- *Easy troubleshooting.*
  Integrated detectors and constant system status logging.
- *No periodic maintenance required*

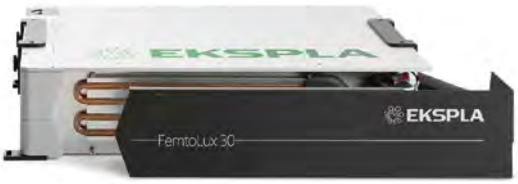
DIRECT REFRIGERANT COOLING SYSTEM

FEATURES

- *Military-grade reliability*
- *Permanently hermetically sealed system >90,000 hour MTBF*
- *No maintenance*
- *High cooling efficiency*
- *>45% lower power consumption compared to water cooling equipment*
- *Compact and light*



Compressor picture courtesy of Aspen Systems Inc.



Simple and reliable cooling plate attachment

DRAWINGS

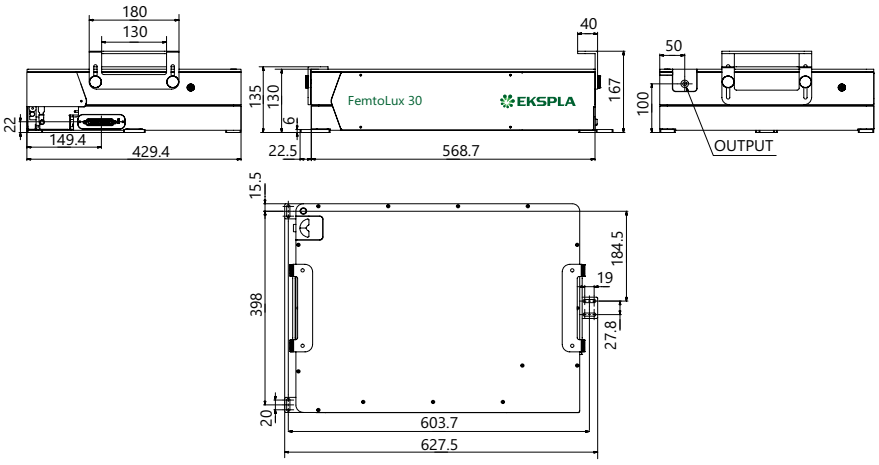


Fig 2. FemtoLux 30 laser head outline drawing

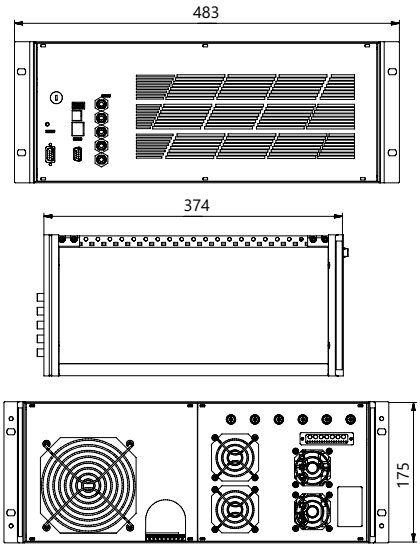


Fig 3. Power supply outline drawing

FemtoLux 3

Microjoule Class Femtosecond Industrial Lasers

FemtoLux 3 is a modern femtosecond fiber laser aimed for both R&D use and industrial integration. Tunable pulse duration in a range of 300 fs – 5 ps, adjustable pulse repetition rate up to 10 MHz and adjustable pulse energy up to 3 µJ allows optimization of laser parameters for the desired application. These include marking and volume structuring of transparent materials, photopolymerization, biological imaging, nonlinear microscopy and many others. To expand the scope of applications even further this laser can be equipped with a second harmonics module.

With burst mode enabled, FemtoLux 3 can generate bursts of pulses with energy above 10 µJ with instant burst shape control which can significantly improve the efficiency of some processes.

Having a rigid, compact, passive air-cooled laser head and the possibility to control the laser from a wireless tablet, FemtoLux 3 can be integrated with different equipment, be it laser equipment for material micro-processing, microscopy or any other research equipment.

FEATURES

- ***300 fs ... 5 ps** tunable pulse duration*
- *Output power **3 W at 1030 nm** or **1.5 W at 515 nm***
- *Up to **3 µJ/pulse** and **10 µJ/burst** (at 1030 nm)*
- *Up to **1.5 µJ/pulse** and **5 µJ/burst** (at 515 nm)*
- *Excellent beam quality **M^2 < 1.2***
- *Versatile laser control and syncronisation capabilities*
- *Up to **10 MHz** pulse repetition rate*
- *Smart triggering for synchronous operation with polygon scanner and PSO*
- *Instant amplitude control*
- *Passive air cooling of the laser head*
- *24/7 operation*

APPLICATIONS

- *Inner volume marking of transparent materials*
- *Marking and structuring*
- *Micromachining of brittle materials*
- *Photopolymerization*
- *Ophthalmologic surgery*
- *Biological Imaging*
- *Pumping of femtosecond OPO/OPA*
- *Microscopy*

SPECIFICATIONS [1]

Model	FemtoLux 3
MAIN SPECIFICATIONS	
Central wavelength	
Fundamental	1030 ± 2 nm
With second harmonic option	515 ± 1 nm
Minimal pulse duration (FWHM) at 1030 nm	< 300 fs (typical ~230 fs)
Pulse duration tuning range	300 fs – 5 ps
Maximal average output power [2]	
at 1030 nm	> 3 W
at 515 nm	> 1.5 W
Power long term stability (Std. dev.) [3]	≤ 0.5 %
Maximal pulse energy [2]	
at 1030 nm	> 3 µJ
at 515 nm	> 1.5 µJ
Pulse energy stability (Std. dev.) [4]	< 2 %
Laser pulse repetition rate (PRR_L) range [5]	1 – 10 MHz
Pulse repetition rate after pulse picker	PRR = PRR_L / N, N=1, 2, 3, ... , min 10 kHz
External pulse gating	via TTL input
Burst mode [6]	1 – 10 pulses
Max burst energy	
at 1030 nm	> 10 µJ
at 515 nm	> 5 µJ
Instant amplitude control	via analog input
Power attenuation	0 – 100 % from remote control application or via analog input
Polarization orientation	linear, vertical
Polarization extinction ratio	>1000:1
M^2	< 1.2
Beam divergence (full angle)	<1.0 mrad
Beam circularity (far field)	> 0.85
Beam pointing stability (pk-to-pk) [7]	< 30 µrad
Beam diameter ($1/e^2$) at 20 cm distance from laser aperture	
at 1030 nm	2.0 ± 0.3 mm
at 515 nm	1.5 ± 0.3 mm
OPERATING REQUIREMENTS	
Mains requirements	100–240 V AC, single phase 47–63 Hz
Maximal power consumption	< 500 W
Operating ambient temperature	15 – 30 °C
Relative humidity	10 – 80 % (non-condensing)
Air contamination level	ISO 9 (room air) or better
PHYSICAL CHARACTERISTICS	
Cooling of the laser head	air, passive
Laser head size (L×W×H)	
at 1030 ± 2 nm	464 × 363 × 129 mm
at 515 ± 1 nm	620 × 363 × 129 mm
Power supply unit size (L×W×H)	449 × 436 × 140 mm (stand-alone) or 483 × 436 × 140 mm (19" rack mountable)
Umbilical length	5 m
CLASSIFICATION	
Classification according EN60825-1	CLASS 4 laser product

[1] 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.

[2] See typical power and energy curves for other pulse repetition rates at Fig 1., Fig 2. and Fig 4.

[3] At 1 MHz PRR_L during 24 h of operation after warm-up under constant environmental conditions.

[4] At 1 MHz PRR_L under constant environmental conditions.

[5] When pulse picker is set to transmit every pulse.

[6] Pulse separation inside the burst is about 20 ns.

[7] Beam pointing stability is evaluated as a movement of the beam centroid in the focal plane of a focusing element.

PERFORMANCE

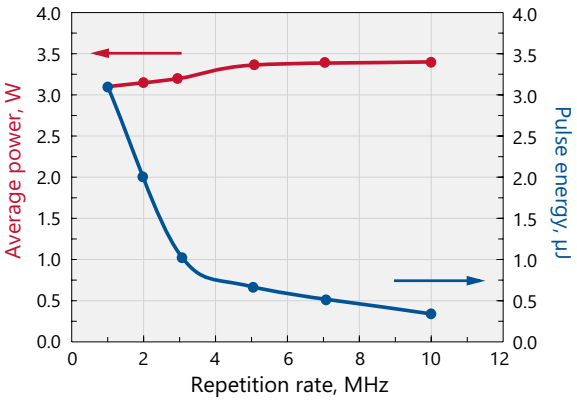


Fig 1. Typical dependence of output power and pulse energy of FemtoLux 3 laser **at 1030 nm** when changing internal repetition rate of the laser

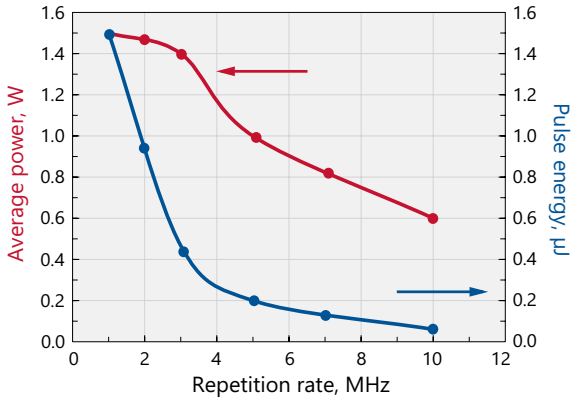


Fig 2. Typical dependence of output power and pulse energy of FemtoLux 3-GR laser **at 515 nm** on pulse repetition rate

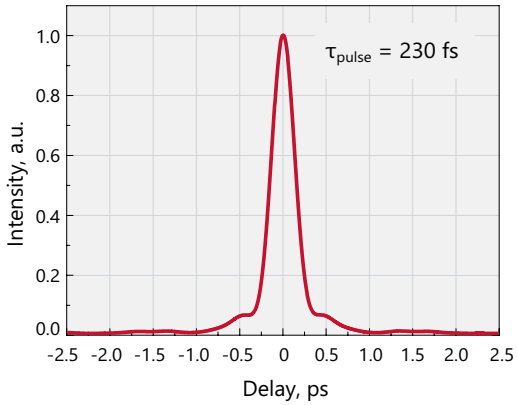


Fig 3. Typical FemtoLux 3 laser (**at 1030 nm**) output pulse autocorrelation function at 3 µJ pulse energy. Calculated pulse duration is 230 fs

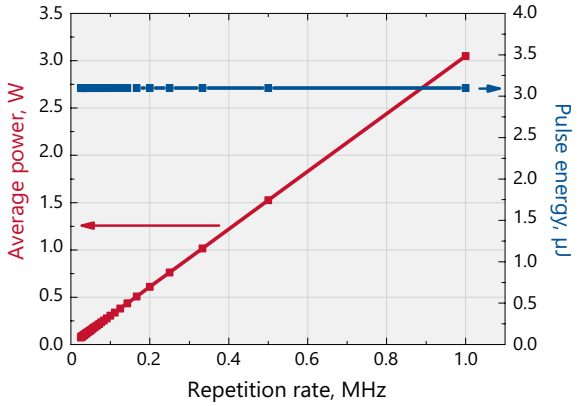


Fig 4. Typical dependence of output power and pulse energy of FemtoLux 3 laser **at 1030 nm** when repetition rate is reduced by pulse picker. Internal repetition rate of the laser in this case is 1 MHz

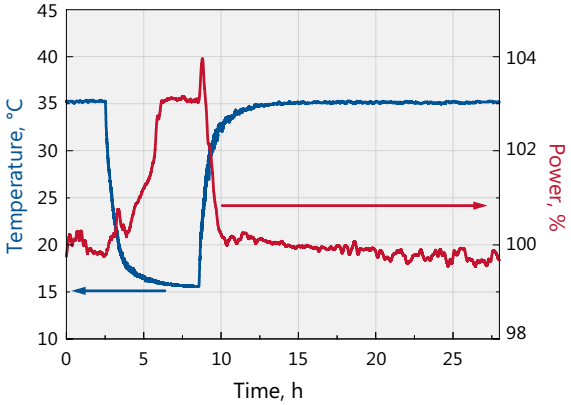


Fig 5. Average output power dependance on ambient temperature **at 1030 nm**

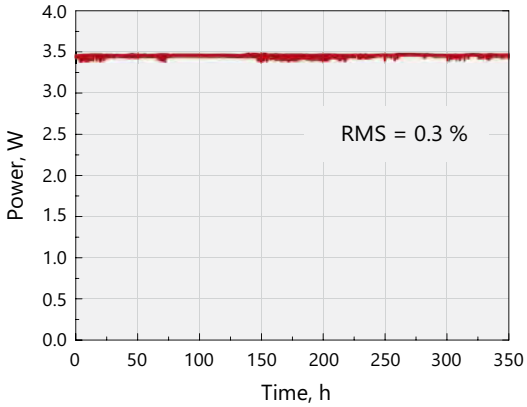


Fig 6. Typical long term average output power stability of FemtoLux 3 laser **at 1030 nm** under constant environmental conditions

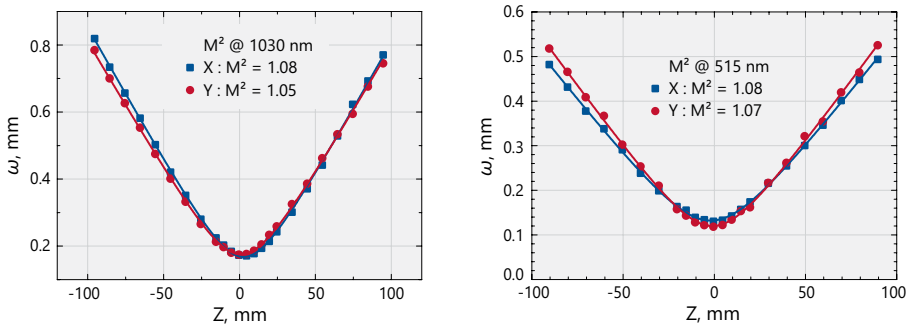


Fig 7. Typical M^2 measurement of FemtoLux 3 laser

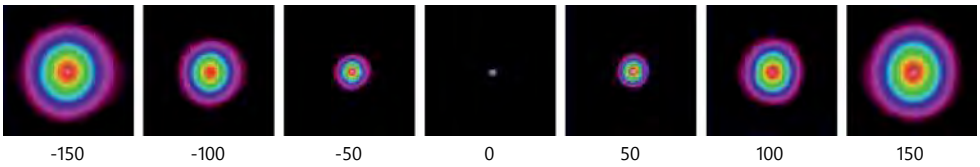


Fig 8. Typical beam profiles along propagation axis of FemtoLux 3 series laser

REMOTE CONTROL APPLICATION

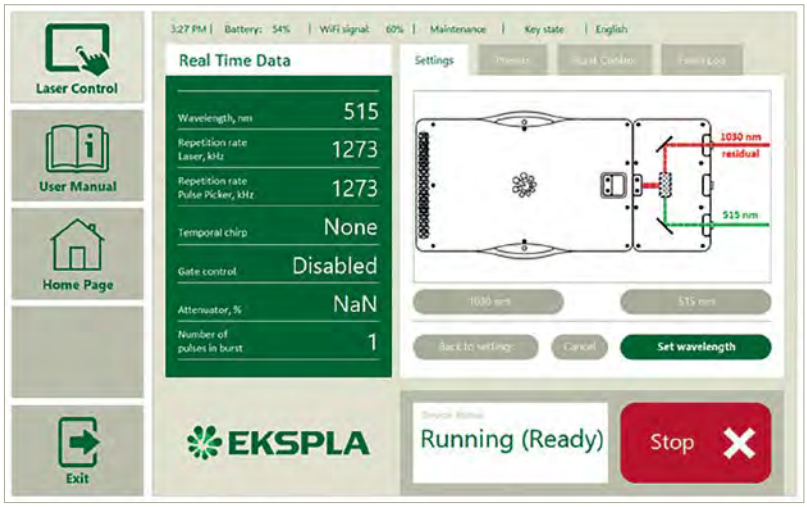


Fig 9. Example of FemtoLux 3 remote control application

DRAWINGS

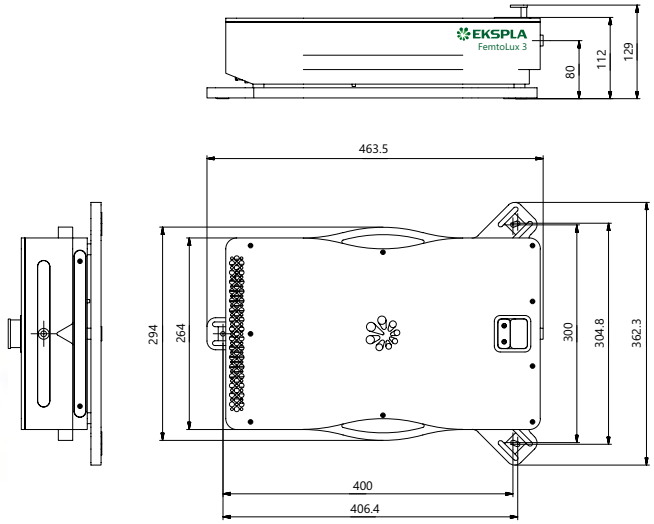


Fig 11. Outline drawings of FemtoLux 3 laser head

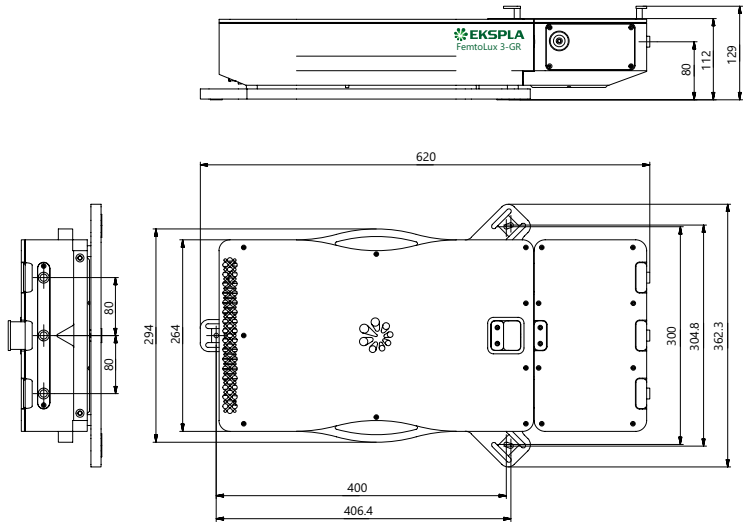


Fig 12. Outline drawings of FemtoLux 3-GR laser head with second harmonic option

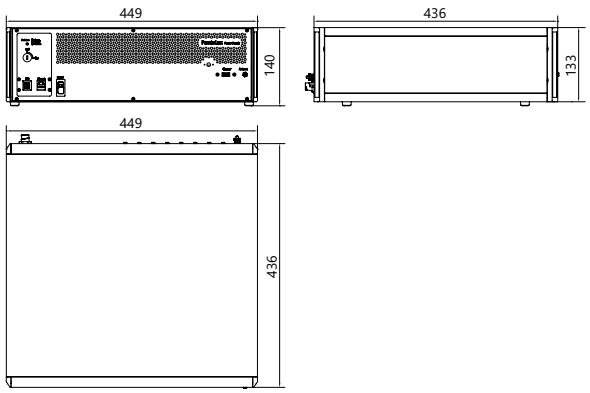


Fig 13. Outline drawings of FemtoLux 3 stand-alone control unit

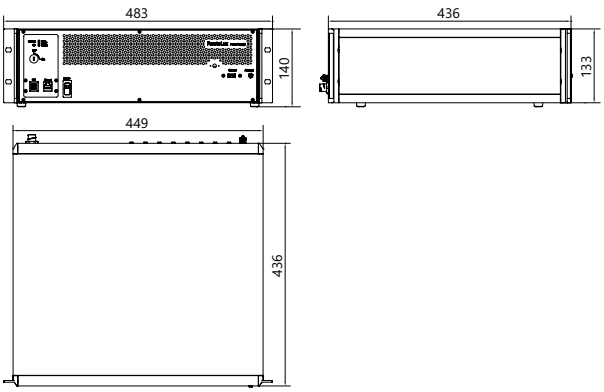


Fig 14. Outline drawings of FemtoLux 3 19" rack mountable control unit

Atlantic 5

Industrial Compact Air Cooled Picosecond Laser

MATERIALS

- *Various metals*
- *Brittle materials, including glass, ceramics, sapphire and PCD*
- *Silicon*
- *PET, PP, PI*
- *Silicone*
- *PCB*
- *Solar cells*

Atlantic 5 series air-cooled lasers are among the most compact picosecond industrial lasers. This series was designed as a versatile tool for a variety of industrial applications.

Having the capability to electronically switch IR, VIS and UV outputs as well as featuring 10 ps pulse duration, Atlantic 5 series lasers offer minimized thermal damage to different materials. This is beneficial for a variety of applications such as black marking, patterning, micromachining, PCB drilling and tracing, solar cell CIGS scribing and many others.

Atlantic 5 series lasers have a versatile synchronisation capability with external equipment, including PSO (position synchronized output) which makes integration with any laser beam control equipment seamless and easy.

Superior beam quality allows easy focusing of the laser beam into the smallest spot size at various working distances and enables processing of practically any material.

Atlantic 5 series lasers can also work in bursts, with 25 ns interval between pulses, within a burst. This is very beneficial for applications such as increasing material removal rate in laser ablation.

FEATURES

- *Up to **5 W** at **1064 nm***
- *Optional **532 nm** and **355 nm** wavelengths (could be all 3 electronically switchable wavelengths)*
- *Up to **1 MHz** repetition rate*
- *Up to **30 µJ** pulse energy*
- *Short pulse duration **10 ps***
- *Excellent beam quality **M^2<1.3***
- *Air cooled*
- *Burst mode*
- *Versatile laser control and synchronisation capabilities*
- *Smart triggering for synchronous operation with polygon scanner and PSO*
- *Compact, sealed and rugged design*
- *Low cost of ownership*

APPLICATIONS

- *Black marking, diffraction grating marking*
- *Patterning*
- *Micromachining*
- *Solar cells CIGS scribing*
- *PCB drilling and tracing*
- *Drilling*
- *Cutting*
- *Structuring*
- *Ablation*
- *Dicing*

To increase reliability and assure long-term stable operation in industrial environments, the optical components are installed in a sealed, robust, precisely machined monolithic and compact aluminium block. Designed for robust, low maintenance operation, Atlantic 5 series lasers offer maximum reliability due to an optimized and compact layout, PC controlled operation, a built-in self-diagnostic system and advanced status reporting.

The Atlantic 5 series lasers do not require installation to be performed by a qualified laser engineer and are designed to be a low lifetime ownership cost solution.

TYPICAL VIEW OF ATLANTIC 5 SERIES LASER HEADS

Typical view of Atlantic 5 laser head with a single 1064 nm output

Typical view of Atlantic 5 laser head with two and three outputs

SPECIFICATIONS [1]

Model	Atlantic 5
GENERAL SPECIFICATIONS	
Central wavelength	
Fundamental	1064 nm
With second harmonics option	532 nm (optional 1064 nm output)
With third harmonics option	355 nm (optional 1064 nm and/or 532 nm outputs)
Laser pulse repetition rate (PRR_L) range [2]	100 – 1000 kHz
Pulse repetition rate after frequency divider	$PRR = PRR_L / N$, N=1, 2, 3, ... , 1025
Maximal average output power [3]	
at 1064 nm	5 W
at 532 nm	2 W
at 355 nm	1 W
Pulse energy at lowest PRR_L [3]	
at 1064 nm	30 µJ
at 532 nm	20 µJ
at 355 nm	10 µJ
Pulse contrast	
at 1064 nm	> 150 : 1
at 532 nm	> 500 : 1
at 355 nm	> 1000 : 1
Power long term stability over 8 h after warm-up (Std. dev.) [4]	< 1.0 %
Pulse energy stability (Std. dev.) [5]	
at 1064 nm	< 0.8 %
at 532 nm	< 1.5 %
at 355 nm	< 1.5 %
Pulse duration (FWHM) at 1064 nm	10 ± 3 ps
Polarization	linear, vertical 100 : 1
M^2	< 1.3
Beam circularity, far field	> 0.85
Beam divergence, full angle	
at 1064 nm	< 2.0 mRad
at 532 nm	< 1.5 mRad
at 355 nm	< 1.5 mRad
Beam pointing stability (pk-to-pk) [6]	< 50 µRad
Beam diameter ($1/e^2$) at 50 cm distance from laser aperture	
at 1064 nm	1.4 ± 0.2 mm
at 532 nm	1.2 ± 0.2 mm
at 355 nm	1.1 ± 0.2 mm
Triggering mode	internal / external
Pulse output control	frequency divider, pulse picker, instant amplitude control, burst mode, power attenuation
Control interfaces	keypad / USB / RS232 / LAN
OPERATING REQUIREMENTS	
Mains requirements	100–240 V AC, single phase 47–63 Hz
Maximal power consumption	< 0.5 kW
Operating ambient temperature	18–27 °C
Relative humidity	10–80 % (non-condensing)
Air contamination level	ISO 9 (room air) or better

Model	Atlantic 5
PHYSICAL CHARACTERISTICS	
Cooling	air
Laser head size (W × H × L)	
at 1064 nm	372 × 158 × 423 mm
at 532 nm	372 × 158 × 590 mm
at 355 nm	
Power supply unit size (W × H × L)	471 × 153 × 511 mm
Umbilical length	3 m
CLASSIFICATION	
Classification according EN60825-1	CLASS 4 laser product

[1] 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.

[2] When frequency divider is set to transmit every pulse.

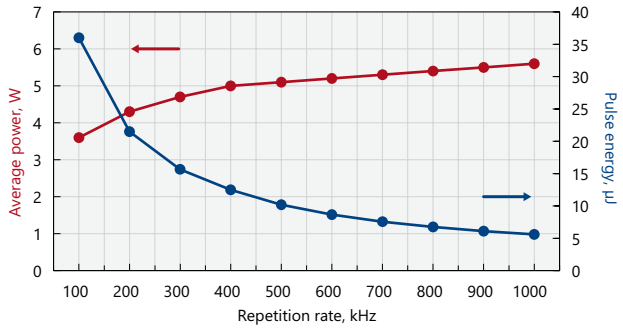
[3] See typical power and energy curves for other pulse repetition rates.

[4] At the lowest PRR_L after warm-up under constant environmental conditions.

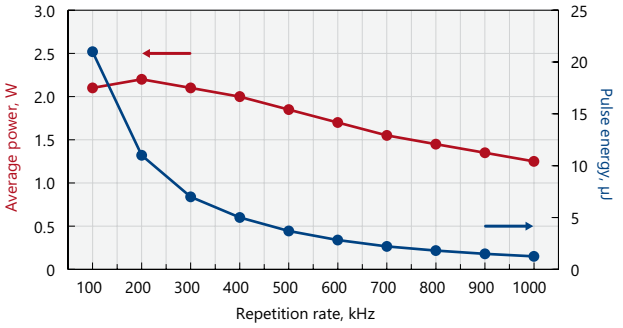
[5] At the lowest PRR_L under constant environmental conditions.

[6] Beam pointing stability is evaluated as a movement of the beam centroid in the focal plane of a focusing element.

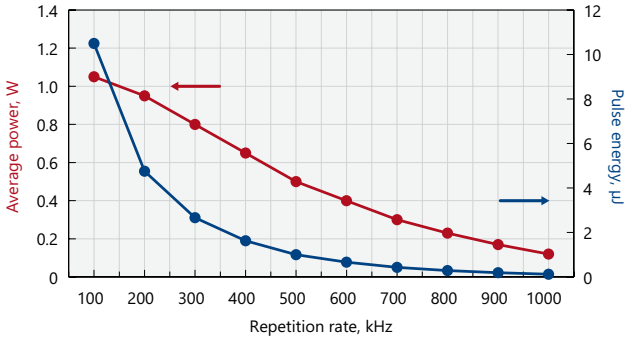
PERFORMANCE



Typical output power and energy curves of Atlantic 5

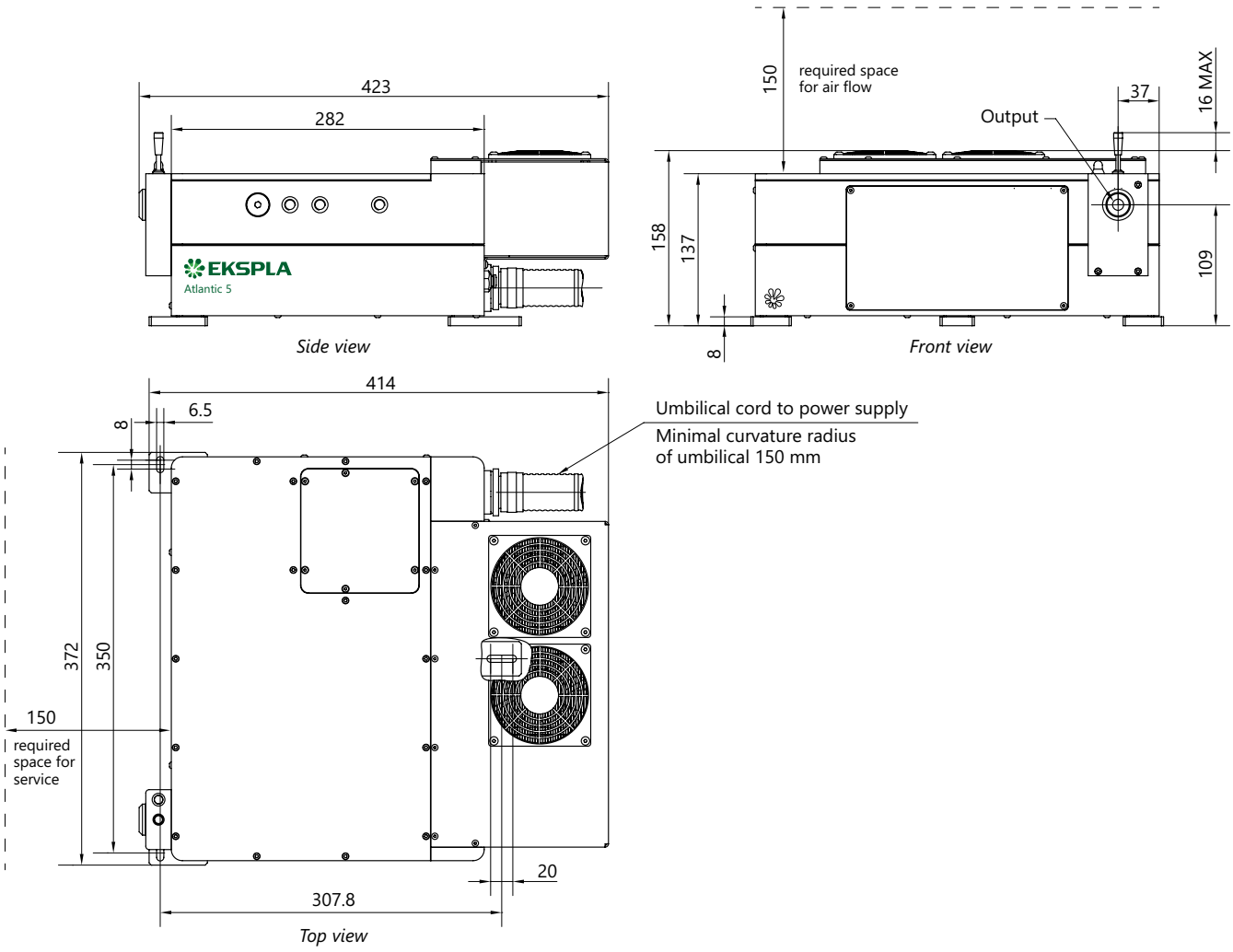


Typical output power and energy curves of Atlantic 5-GR2

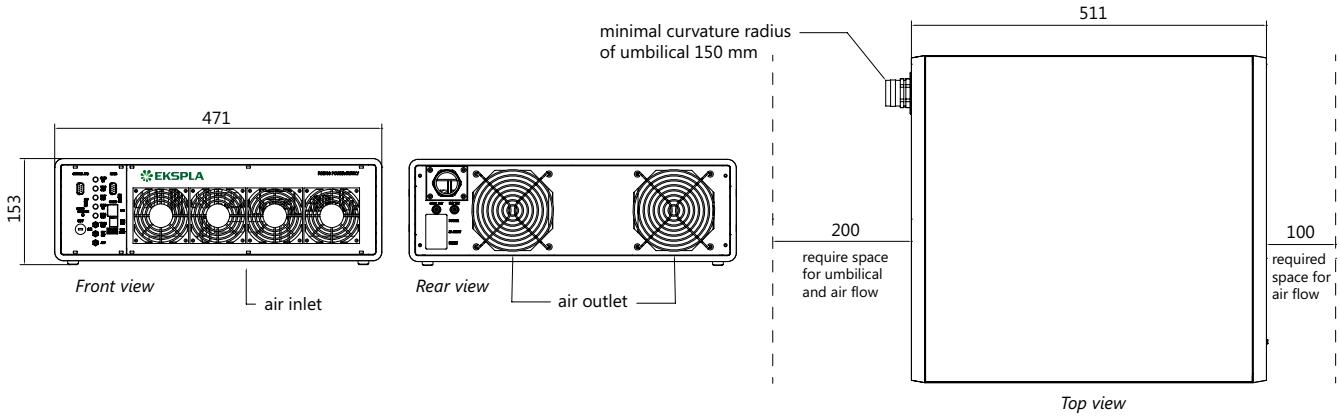


Typical output power and energy curves of Atlantic 5-UV1

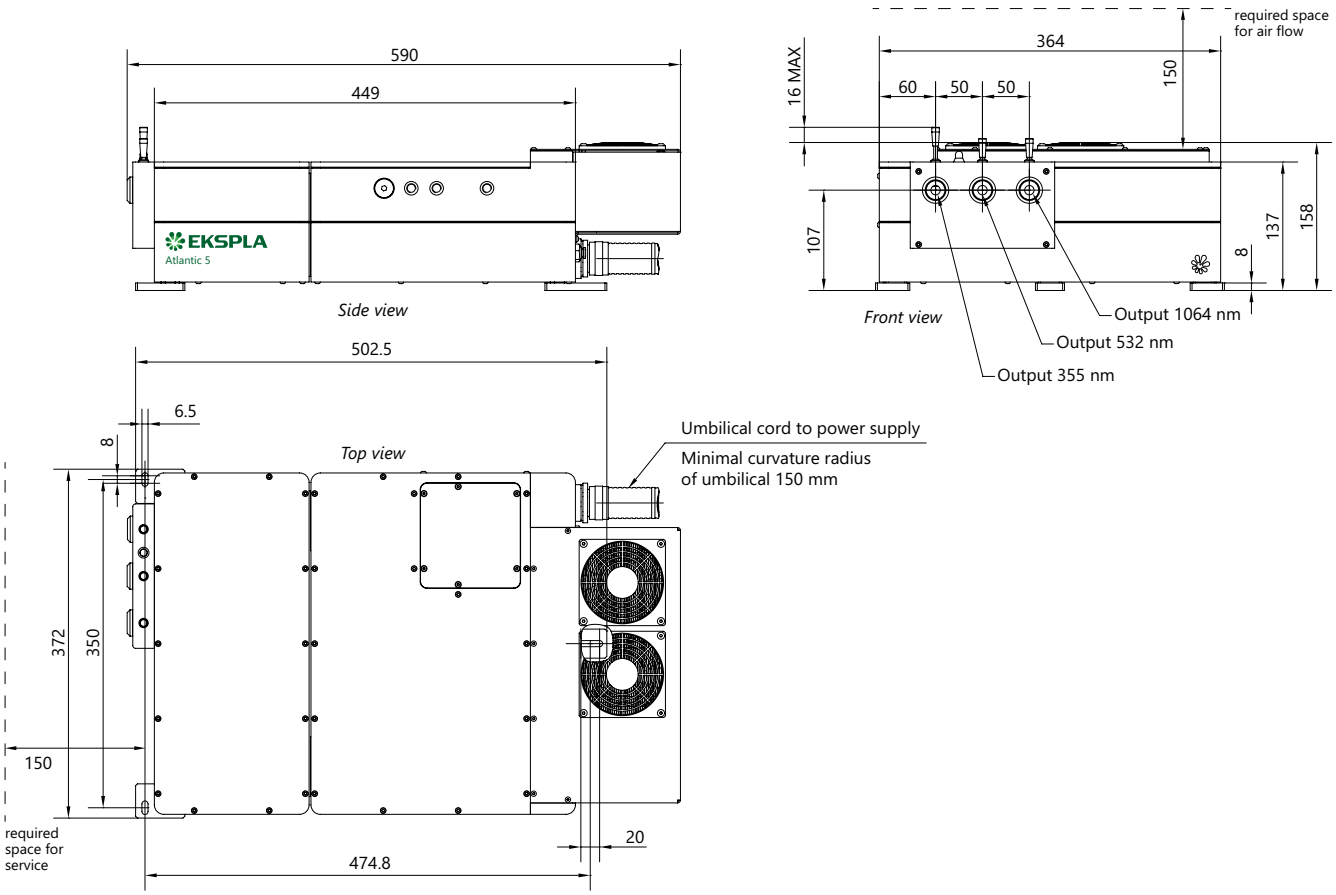
OUTLINE DRAWINGS



Outline drawings of Atlantic 5 laser head with a single 1064 nm output (dimensions in mm)



Outline drawings of Atlantic 5 power supply unit (dimensions in mm)



Outline drawings of Atlantic 5 laser head with two and three outputs (dimensions in mm)

ORDERING INFORMATION

Atlantic 5-IR-GR2-UV1

- Model
- 1064 nm output (only for models with multiple outputs)
- 532 nm output
- 355 nm output

Atlantic

Industrial High Power Picosecond Lasers

MATERIALS

- *Various metals*
- *Brittle materials including glass, ceramics, sapphire and PCD*
- *Silicon*
- *PET, PP, PI, PTFE*
- *Silicone*
- *PCB*
- *LCD, LED, OLED, microLED display panels*
- *Solar cells*

FEATURES

- *Up to **80 W** at **1064 nm***
- *Optional **532 nm** and **355 nm** wavelengths (could be all 3 electronically switchable wavelengths)*
- *Up to **1 MHz** repetition rate*
- *Up to **200 µJ** pulse energy*
- *Short pulse duration **10 ps***
- *Excellent beam quality **M^2<1.3***
- *Versatile laser control and syncronisation capabilities*
- *Smart triggering for synchronous operation with polygon scanner and PSO*
- *Monolythic, sealed and rugged design*
- *Low ownership cost*
- *Nanosecond pulse duration mode (optional)*

High-energy and high-power water-cooled Atlantic series picosecond lasers are designed for a variety of industrial applications such as LCD or OLED display cutting and drilling, laser induced forward transfer (LIFT), glass and sapphire processing, micromachining of ultra-hard materials, ablation of metals, cutting and drilling of polymers, silicon scribing, solar cell scribing and many more. Superior beam quality parameters, maximum available average power (80W@IR / 40W@VIS / 30W@UV), maximum available pulse energy (200µJ@IR / 100µJ@VIS / 75µJ@UV) and maximum pulse repetition rate (up to 1MHz) are beneficial where high processing quality and high throughput are required.

To tailor laser performance for specific industrial applications, advanced electronics enable external gating (including PSO), synchronization and precise laser triggering as well as instant signal amplitude control.

To maintain reliability and assure long-term stable operation in an industrial environment, optical components are installed in a sealed, robust, precisely machined monolithic aluminum block. Designed for robust, low maintenance operation, Atlantic series lasers offer maximum reliability due to an optimized layout, PC controlled operation, a built-in self-diagnostic system and advanced status reporting.

APPLICATIONS

- *Drilling*
- *Cutting*
- *Patterning*
- *Structuring*
- *Ablation*
- *Dicing*
- *Micromachining*
- *LCD, OLED cutting*
- *Laser induced forward transfer*
- *Sapphire structuring and dicing*
- *Ceramics micromachining*
- *PCD drilling and tracing*
- *Silicon scribing*
- *PET, PP, PTFE, Silicone cutting and drilling*

For industrial high-power UV laser applications, high reliability and low ownership cost of UV components is crucial. To meet these requirements, the optical layouts of Atlantic UV models are optimized for longevity and stable operation in the UV range, resulting in a UV optics lifetime of 8,000 hours.

A unique optional feature of Atlantic high-power lasers is that they can work in both picosecond and nanosecond modes. This 2-in-1 laser solution is beneficial for some materials processing (such as glass or ceramics), where both very high accuracy, low processed surface roughness and high throughput are required at low cost.

TYPICAL VIEW OF ATLANTIC SERIES LASER HEADS

Typical view of Atlantic 6HE, 25, 50, 80 laser head with a single 1064 nm output

Typical view of Atlantic 6HE, 25, 50, 80 laser head with two and three outputs

Typical view of Atlantic 6HE-UV2HE, 25-UV8, 50-UV18, 80-UV30 laser head with a single 355 nm output

SPECIFICATIONS [1]

Model	Atlantic 6HE	Atlantic 25	Atlantic 50	Atlantic 80
GENERAL SPECIFICATIONS				
Central wavelength				
Fundamental	1064 nm			
With second harmonics option	532 nm (optional 1064 nm output) [2]			
With third harmonics option	355 nm (optional 1064 nm and/or 532 nm outputs) [2]			
Laser pulse repetition rate (PRR_L) range [3]	30 kHz	200 – 1000 kHz	300 – 1000 kHz	400 – 1000 kHz
Pulse repetition rate after frequency divider	PRR = PRR_L / N, N=1, 2, 3, ... , 1025			
Maximal average output power [4]				
at 1064 nm	6 W	25 W	50 W	80 W
at 532 nm	3 W	12 W	25 W	40 W
at 355 nm	2 W	8 W	18 W	30 W
Pulse energy at lowest PRR_L [4]				
at 1064 nm	200 µJ	125 µJ	165 µJ	200 µJ
at 532 nm	100 µJ	60 µJ	85 µJ	100 µJ
at 355 nm	75 µJ	40 µJ	60 µJ	75 µJ
Pulse contrast				
at 1064 nm	> 300 : 1			
at 532 nm	> 500 : 1			
at 355 nm	> 1000 : 1			
Power long term stability over 8 h after warm-up (Std. dev.) [5]	< 1.0 %			
Pulse energy stability (Std. dev.) [6]				
at 1064 nm	< 1.0 %			
at 532 nm	< 2.0 %			
at 355 nm	< 2.5 %			
Pulse duration (FWHM) at 1064 nm	10 ± 3 ps			
Polarization	linear, vertical 100 : 1			
M^2	< 1.3			
Beam circularity, far field	> 0.85			
Beam divergence, full angle	< 1.5 mRad			
Beam pointing stability (pk-to-pk) [7]	< 50 µRad			
Beam diameter ($1/e^2$) at 50 cm distance from laser aperture				
at 1064 nm	1.8 ± 0.3 mm			
at 532 nm	2.2 ± 0.3 mm		1.8 ± 0.3 mm	2.2 ± 0.3 mm
at 355 nm	2.0 ± 0.3 mm		1.8 ± 0.3 mm	2.0 ± 0.3 mm
Triggering mode	internal / external			
Pulse output control	frequency divider, pulse picker, instant amplitude control, power attenuation			
Control interfaces	keypad / USB / RS232 / LAN			
OPERATING REQUIREMENTS				
Mains requirements	100–240 V AC, single phase 47–63 Hz			
Maximal power consumption	< 2.8 kW	< 2.8 kW	< 3.1 kW	< 3.5 kW
Operating ambient temperature	18–27 °C			
Relative humidity	10–80 % (non-condensing)			
Air contamination level	ISO 9 (room air) or better			

Model	Atlantic 6HE	Atlantic 25	Atlantic 50	Atlantic 80
PHYSICAL CHARACTERISTICS				
Cooling	water			
Laser head size (W × H × L)				
single output 1064 nm	396 × 173 × 755 mm			
single output 355 nm	396 × 173 × 1000 mm			
3 outputs 1064 / 532 / 355 nm	396 × 173 × 926 mm			
Power supply unit size (W × H × L)	553 × 1019 × 852 mm			
Umbilical length	4 m			
CLASSIFICATION				
Classification according EN60825-1	CLASS 4 laser product			

1) 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.

2) Can be ordered either in a single output or in 2 or 3 separate harmonics outputs versions.

3) When frequency divider is set to transmit every pulse.

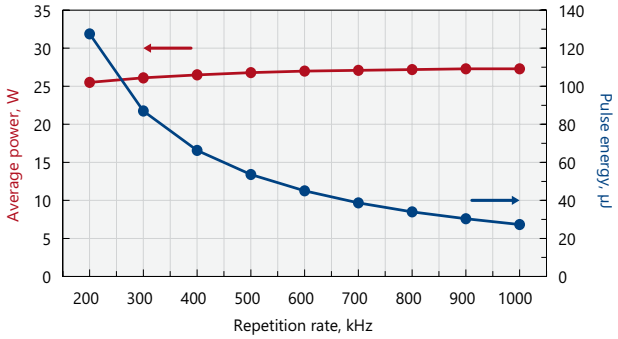
4) See typical power and energy curves for other pulse repetition rates.

5) At the lowest PRR_L after warm-up under constant environmental conditions.

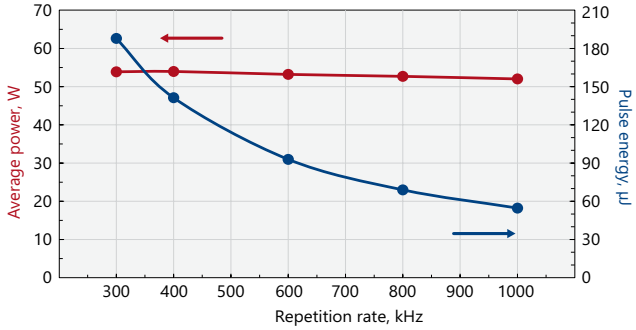
6) At the lowest PRR_L under constant environmental conditions.

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

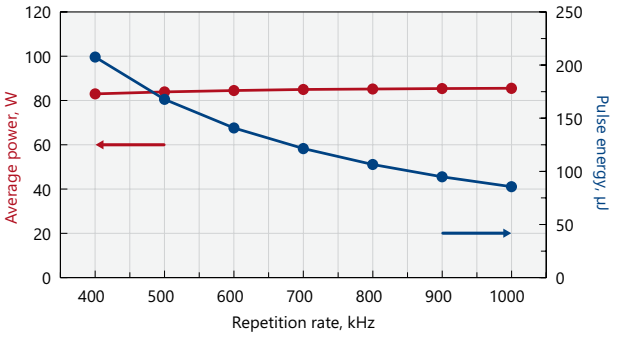
PERFORMANCE



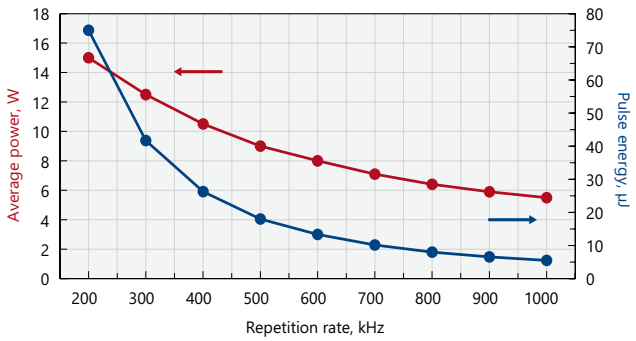
Typical output power and energy curves of Atlantic 25



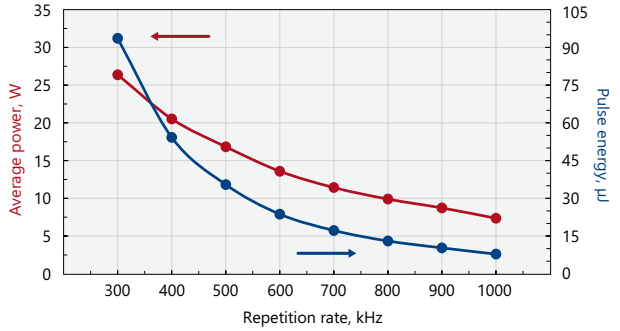
Typical output power and energy curves of Atlantic 50



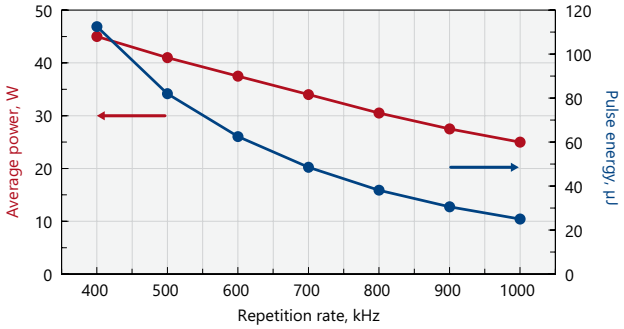
Typical output power and energy curves of Atlantic 80



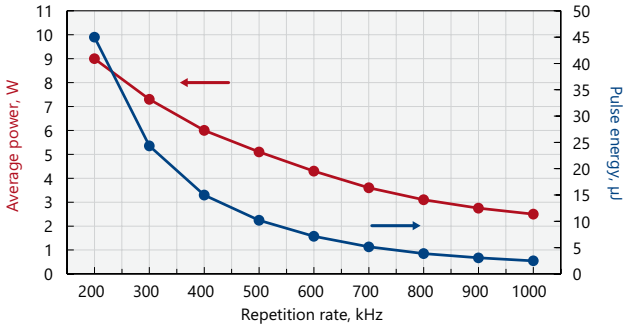
Typical output power and energy curves of Atlantic 25-GR12



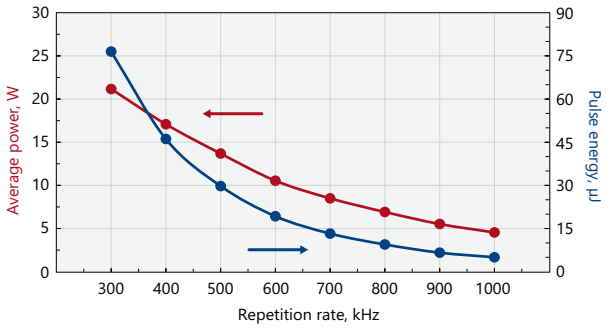
Typical output power and energy curves of Atlantic 50-GR25



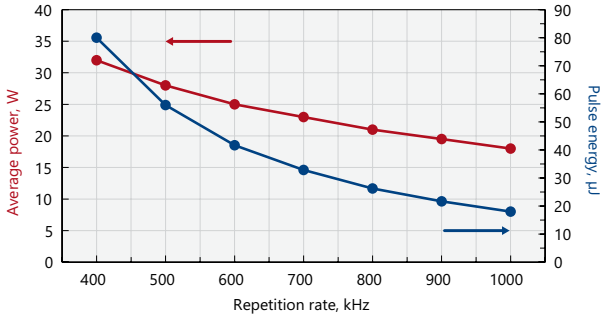
Typical output power and energy curves of Atlantic 80-GR40



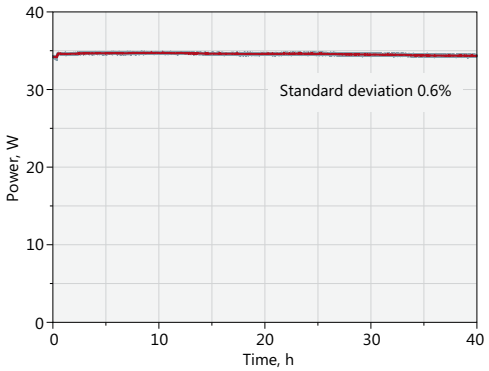
Typical output power and energy curves of Atlantic 25-UV8



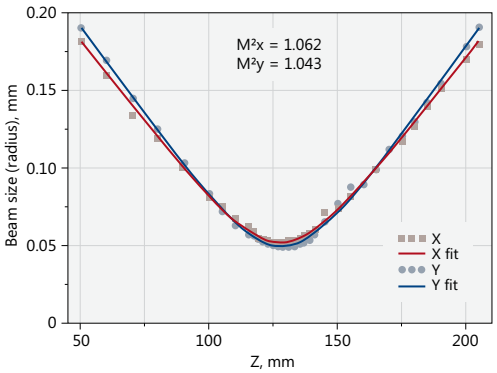
Typical output power and energy curves of Atlantic 50-UV18



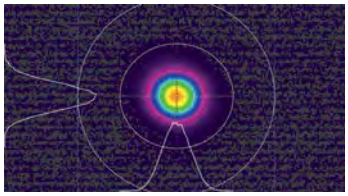
Typical output power and energy curves of Atlantic 80-UV30



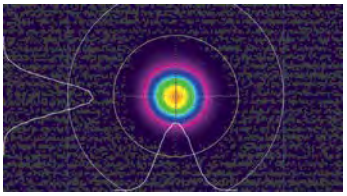
Typical long term 355 nm output average power stability of Atlantic 80-UV30 under constant environmental conditions



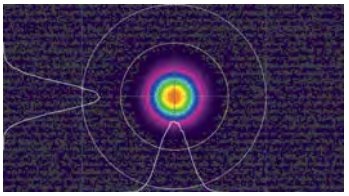
Typical M^2 measurement of 355 nm wavelength at 34 W average power, 400 kHz repetition rate (Atlantic 80-UV30)



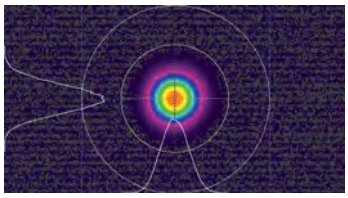
100% power level



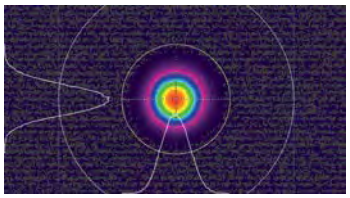
75% power level



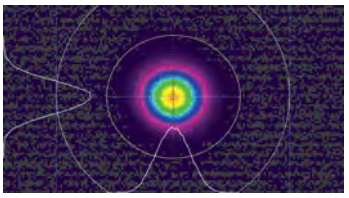
50% power level



25% power level



10% power level



100% power level with pulse divider 10

Typical beam profile of 355 nm in far field at 34 W max average power with different attenuation conditions

ORDERING INFORMATION

Atlantic 25-IR-GR12-UV8

Model

Fundamental wavelength max power:

6HE → 6 W
25 → 25 W
50 → 50 W
80 → 80 W

1064 nm output (only for models with multiple outputs)

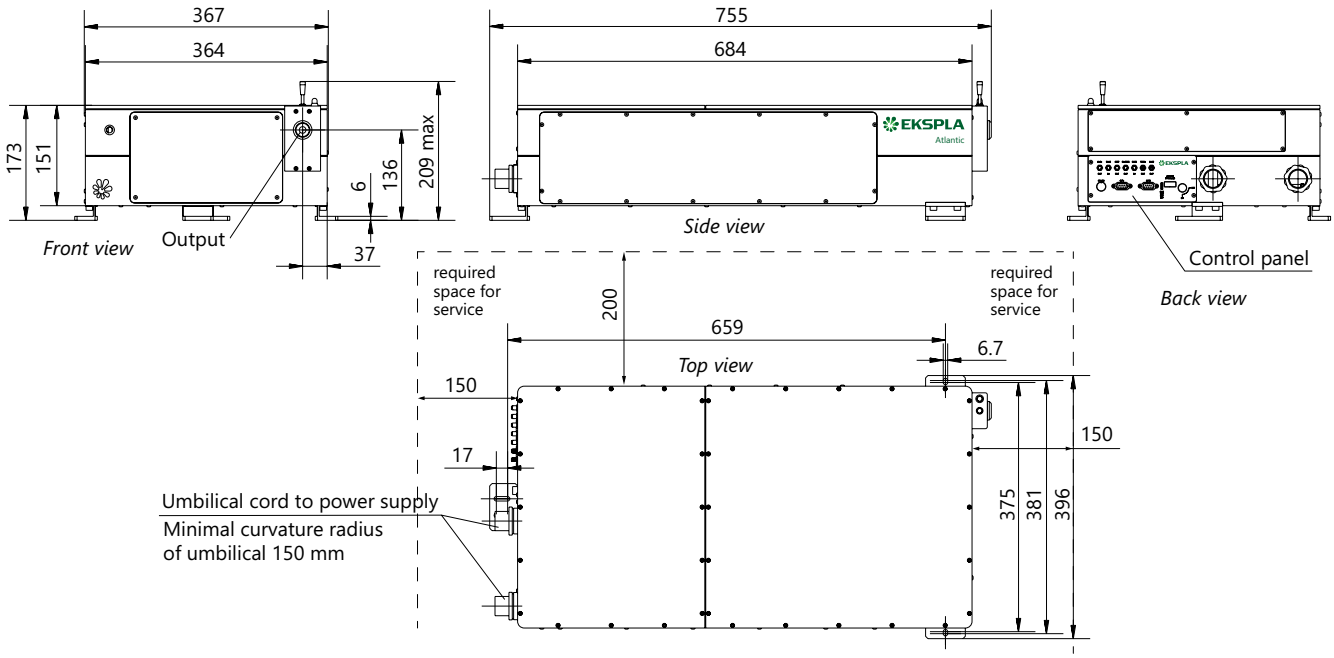
355 nm output max power:

UV2HE → 3 W
UV8 → 8 W
UV18 → 18 W
UV30 → 30 W

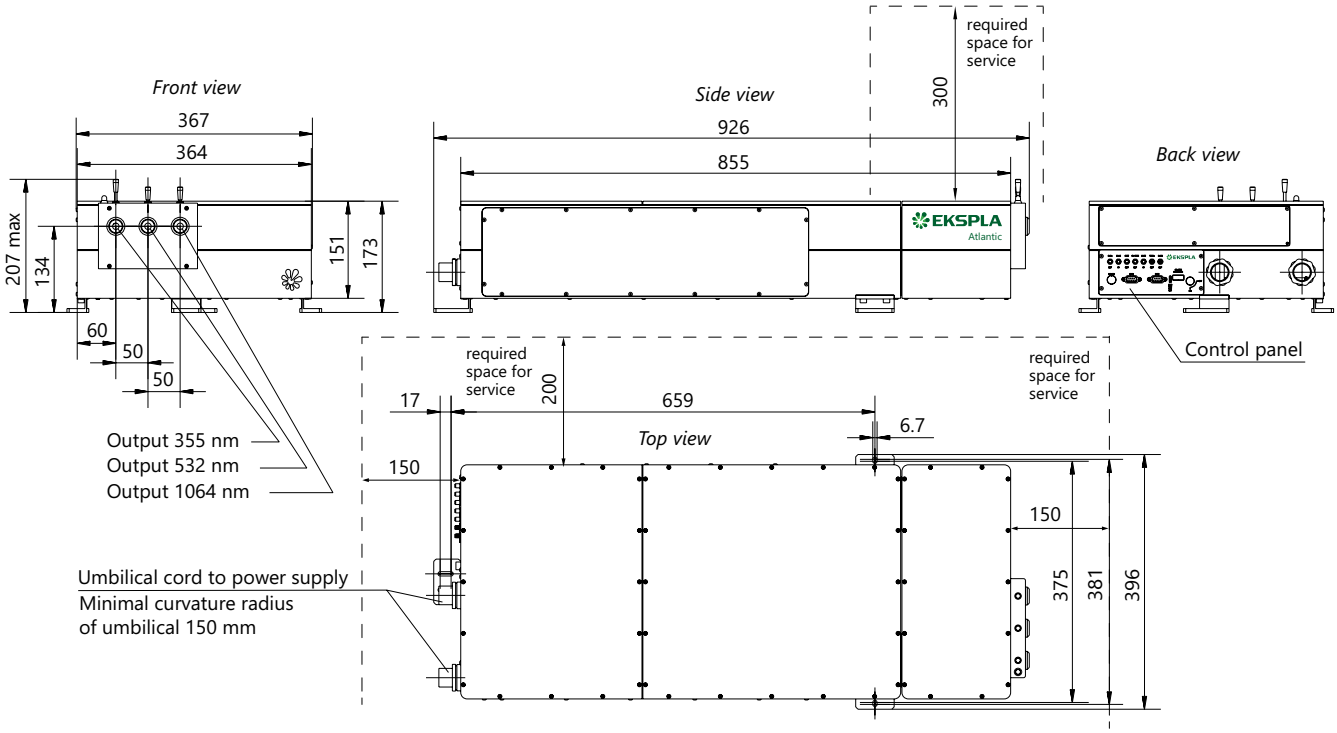
532 nm output max power:

GR3HE → 3 W
GR12 → 12 W
GR25 → 25 W
GR40 → 40 W

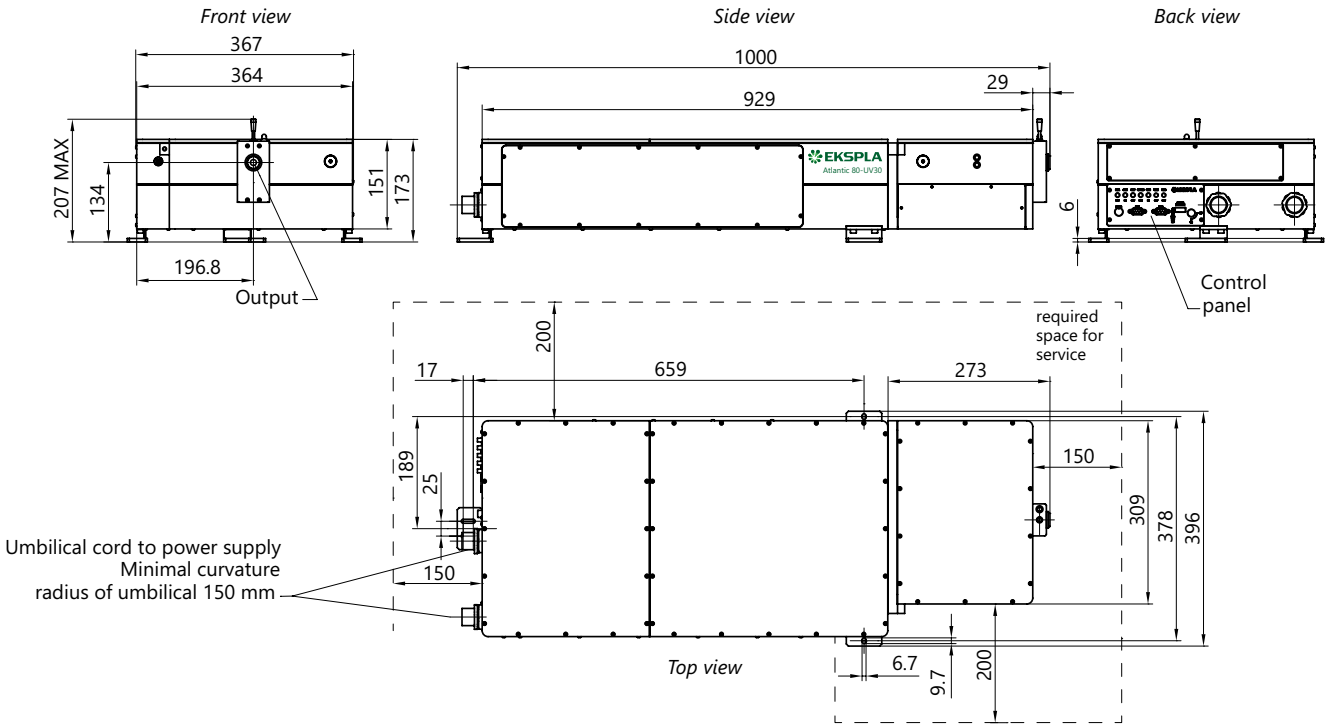
LASER HEAD & POWER SUPPLY OUTLINE DRAWINGS



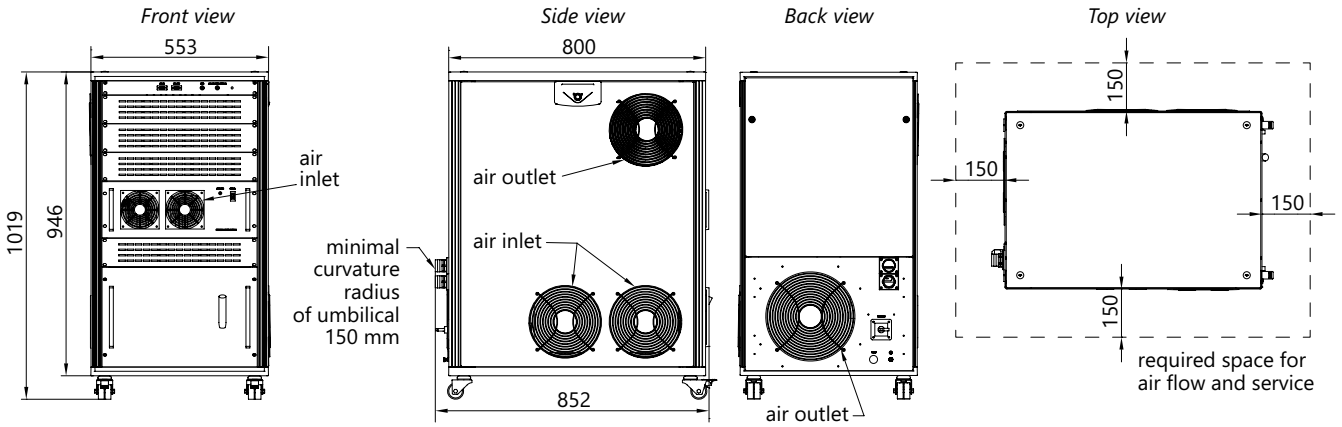
Outline drawings of Atlantic 6HE, 25, 50, 80 laser head with a single 1064 nm output (dimensions in mm)



Outline drawings of Atlantic 6HE, 25, 50, 80 laser head with two and three outputs (dimensions in mm)



Outline drawings of Atlantic 6HE-UV2HE, 25-UV8, 50-UV18, 80-UV30 laser head with a single 355 nm output (dimensions in mm)



Outline drawings of Atlantic 6HE, 25, 50, 80 power supply unit (dimensions in mm)

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

- *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.

Because of its robust design and diode-pumped technology this laser can work 24/7 with minimal down time and low ownership cost.

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	<4.0 %		
at 213 nm	<5.0 %		
Typical pulse duration [6]	7 – 10 ns		
Power drift [7]	± 2 %		
Pulse repetition rate	1–2500 Hz	1–1000 Hz	
Beam spatial profile	Close to Gaussian in near and far fields		
Ellipticity	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 (StDev) [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 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

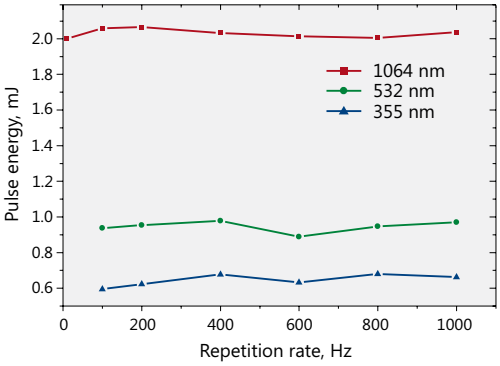


Fig 1. Typical performance data of model NL202 laser

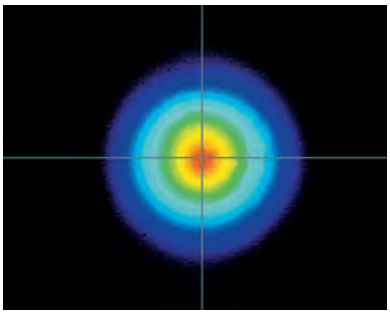


Fig 2. Typical beam intensity profile in the far field

OUTLINE DRAWINGS

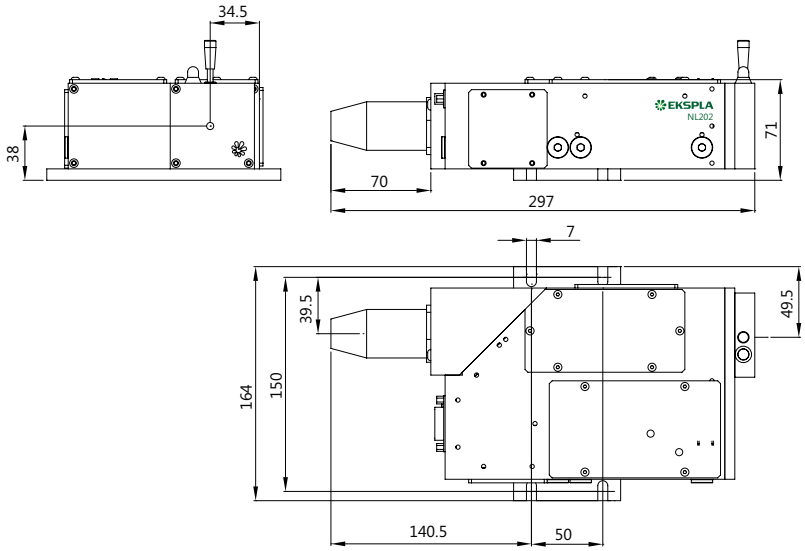


Fig 3. NL202 laser head drawing

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
H200FiHC → fifth 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

- *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 rms.

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 [3]	110 mJ	90 mJ
at 355 nm [4]	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	50 Hz	100 Hz
Power drift [6]	< ±1 %	
Pulse duration [7]	3 – 6 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 (StDev) [10]	≤ 60 µrad	
Polarization	linear, > 95 % at 1064 nm	
Typical beam diameter [11]	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 × 291 × 167 ± 3 mm	
Power supply unit (W × L × H)		
Desktop case	470 × 390 × 140 ± 3 mm	
19" module	483 × 390 × 140 ± 3 mm	
External chiller	inquire	
Umbilical length	3 m	
OPERATING REQUIREMENTS		
Cooling (air cooled) [12]	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) With H230SHC or H230STHC harmonic generator module.

4) With H230THC or H230STHC generator modules.

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 and humidity < ± 5%.

7) FWHM.

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

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

12) Adequate room air conditioning should be provided.

PERFORMANCE

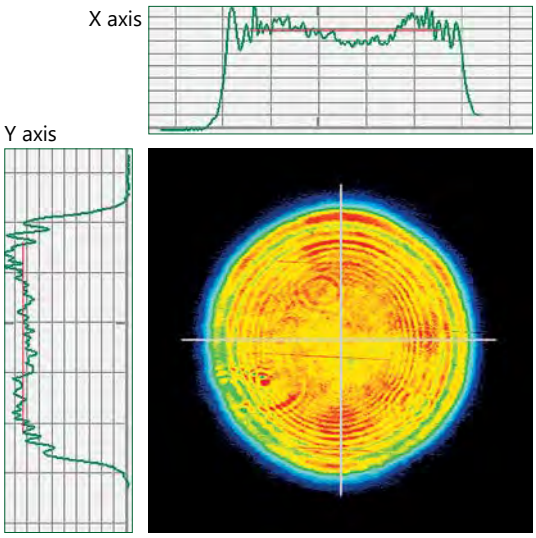


Fig 1. NL230 laser typical near field beam profile

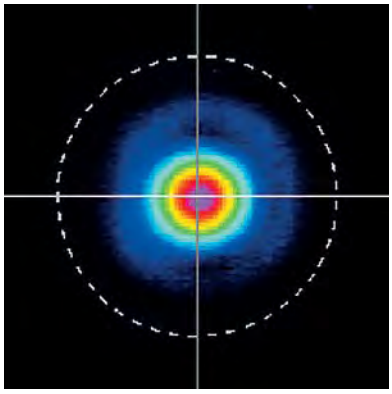


Fig 2. NL230 laser typical far field beam profile

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

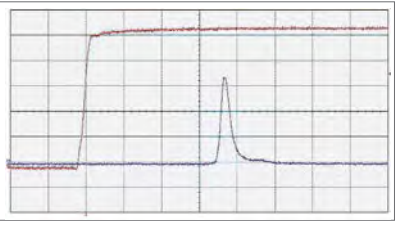


Fig 3. NL230 laser pulse waveform

OUTLINE DRAWINGS

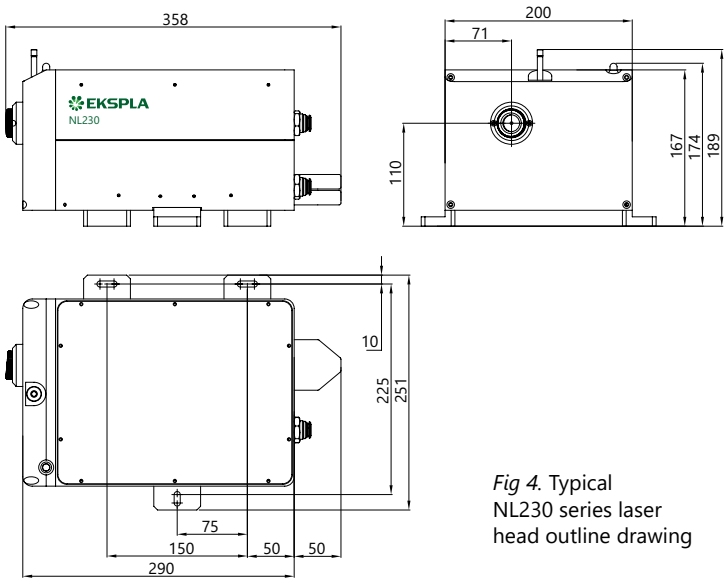


Fig 4. Typical NL230 series laser head outline drawing

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.

Notes

EKSPLA
Tailored for consistency

ISO9001 Certified

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