EKSPLA

Industrial Lasers

Award winning tools for micromachining applications

INNOVATORS AWARDS 2022 LaserFocusWorld GOLD HONOREE

2023

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 515 nm	350 fs – 1 ps	> 27 W (typical 30 W)	4 MHz	90 µJ	4
FemtoLux 3	1030 nm 515 nm	300 fs – 5 ps	3 W	10 MHz	3 µJ	12
Picosecond						
Atlantic	1064 nm 532 nm 355 nm	10 ± 3 ps	80 W	1 MHz	200 µJ	18
Nanosecond						
NL200	1064 nm 532 nm 355 nm 266 nm 213 nm	< 10 ns	4 W	2.5 kHz	4.0 mJ	26
NL230	1064 nm 532 nm 355 nm	2 – 4 ns	15 W	100 Hz	190 mJ	30

[1] At fundamental wavelength.

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

Learn more about EKSPLA

Latest information about Industrial Lasers
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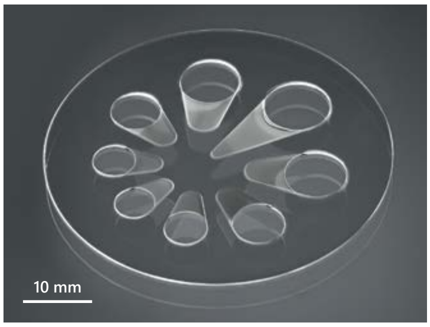
Material processing examples
Made with **FemtoLux 30** laser

Transparent materials

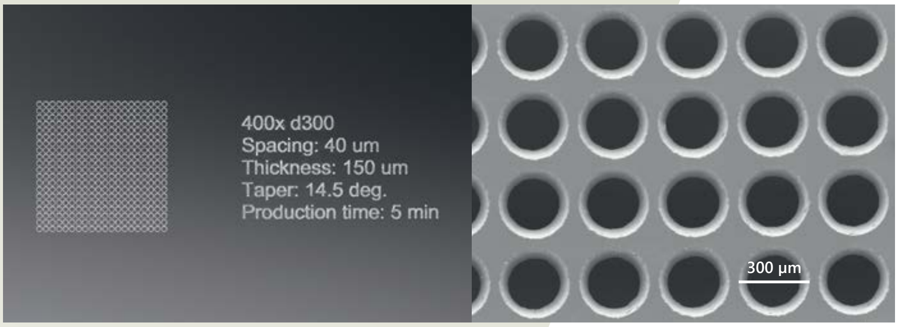
Transparent materials, such as glass/sapphire are fascinating materials with remarkable properties that have made it a favorite among researchers and engineers for decades. Its robustness, chemical resistance, transparency, and affordability have made it an ideal candidate for a multitude of applications, ranging from microfluidic devices and optical components to electronic devices.

The femtosecond laser micromachining technique has brought transparent materials processing to the next level. Complex structures can now be precisely fabricated by selectively removing material through drilling, cutting, and milling.

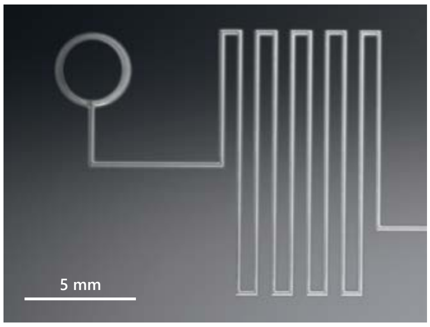
Fused-silica milling. Courtesy of FTMC.



Sapphire milling. Courtesy of FTMC.



Borosilicate drilling. Courtesy of FTMC.



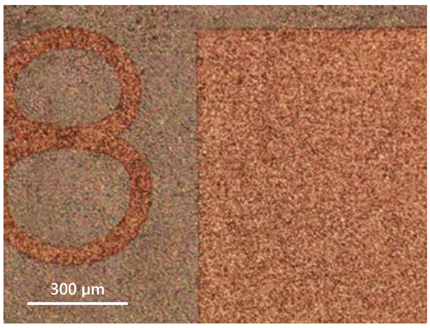
Soda-lime milling. Courtesy of FTMC.

Polymers

Polymers are revolutionizing various industries with their exceptional properties, including flexibility, durability, and ease of processing. These versatile materials find application in a wide range of fields, from aerospace and biomedicine to electronics.

Polymer processing with femtosecond lasers has opened up new avenues for precision fabrication of complex structures by selectively removing polymer with high precision and minimal thermal effects.

Femtosecond laser processing can also be used for photo-polymerization, a process where monomers or prepolymers are selectively polymerized to create complex 3D structures with sub-micron resolution, high accuracy, and repeatability.



Insulation layer removal from PCB.
Courtesy of FTMC.

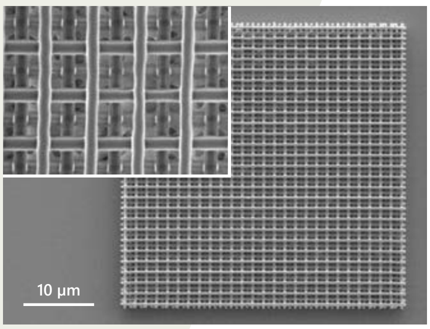


Photo-polymerization. Courtesy of WOP.

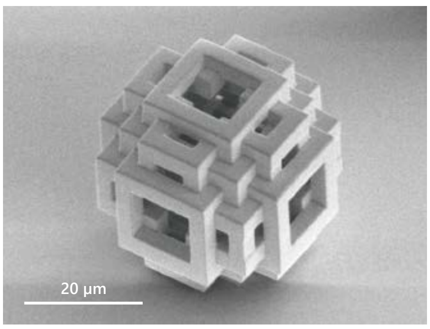
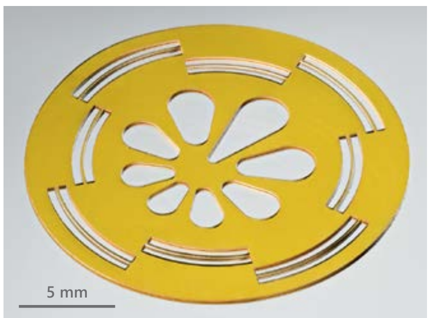


Photo-polymerization. Courtesy of WOP.



Polymide cutting. Courtesy of FTMC.

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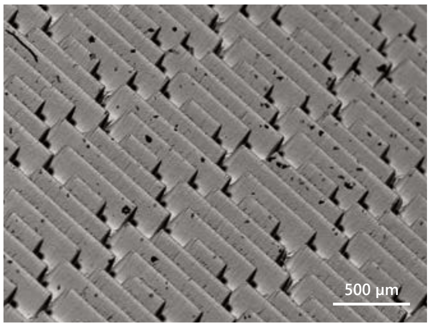
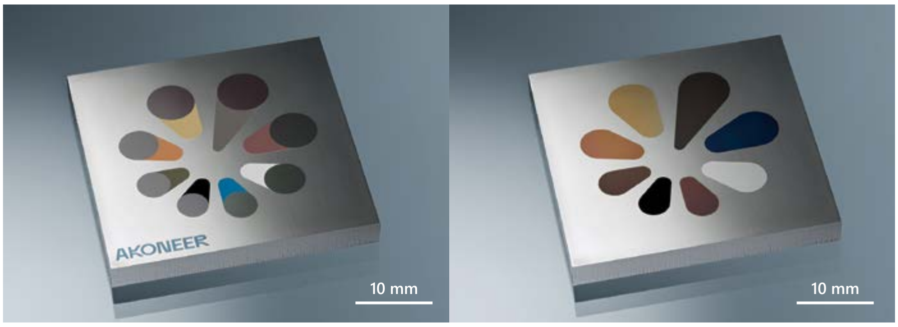
Metals

Metals, particularly stainless steel, has become an integral part of modern engineering and manufacturing thanks to its mechanical, chemical, and aesthetic properties. Its versatility has led to its use in diverse fields such as aerospace, automotive, architecture, and medical equipment.

Femtosecond laser technology has revolutionized metal micromachining, offering an exciting array of possibilities for creating visually stunning and intricately precise structures with minimal heat affected zones. Femtosecond lasers enable the production of complex shapes and features, while also providing the capability to perform black/white marking and coloring without the need for chemical additives.

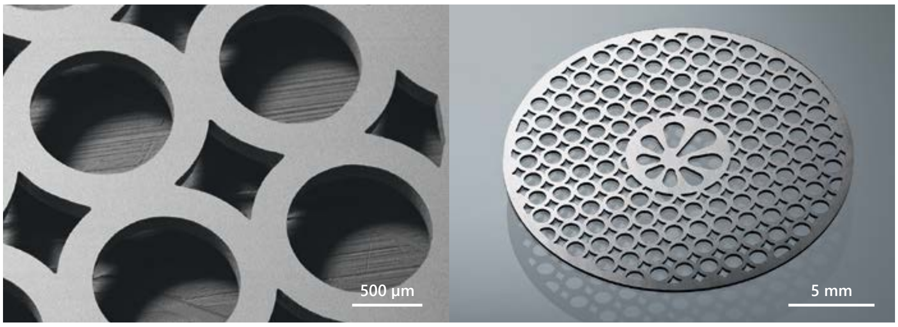


“Shark skin” surface structuring. Courtesy of FTMC.

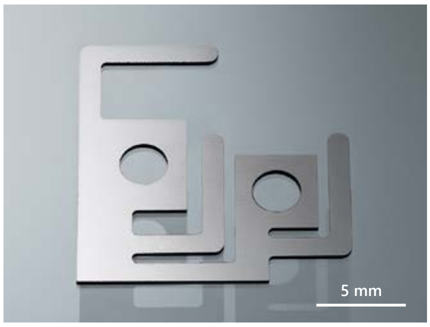


Stainless steel coloring with GHz burst feature. Courtesy of Akoneer.

Highly-resistant black marking. Courtesy of FTMC.

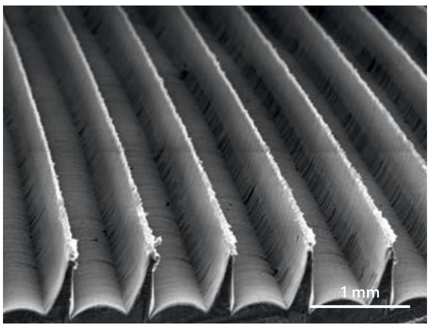


Stainless steel cutting. Courtesy of FTMC.

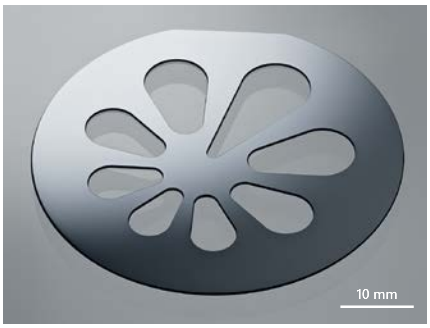


Stainless steel cutting. Courtesy of FTMC.

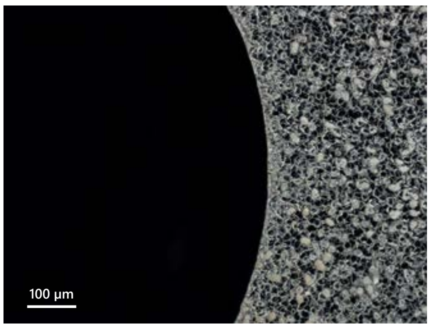
Other materials



Teflon (PTFE) milling. Courtesy of FTMC.



Crystalline silicon cutting. Courtesy of FTMC.



Crystalline silicon cutting. Courtesy of FTMC.

fs Industrial Femtosecond Lasers

FemtoLux 30

Reliability Redefined

A reliable & versatile tool for micromachining

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

Zero maintenance

2 years of total warranty

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30 W Femtosecond Industrial Laser

FemtoLux 30

Designed from the get-go for maximum reliability, seamless integration and non-stop 24/7/365 zero maintenance operation with innovative ”dry” cooling.

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.

Seamless User Experience

Easy integration – remote control using REST API via RS232 and LAN.

Reduced integration time – demo electronics is available for laser control programming in advance.

Easy and quick installation – no water, fully disconnectable laser head. Can be installed by the end-user.

Easy troubleshooting – integrated detectors and constant system status logging.

No periodic maintenance required.

Features

Typical max output power **30 W at 1030 nm, 11 W at 515 nm**

> 90 μJ at 1030 nm, > 50 μJ at 515 nm

MHz, GHz burst modes

> 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

At 1030 nm	At 515 nm	Single shot (AOM)
30 W	11 W	up to 4 MHz
>90 μJ	>50 μJ	350 fs – 1 ps

Learn more about FemtoLux 30 **www.ekspla.com**

"Dry" Cooling

Direct Refrigerant 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.

See **FemtoLux 30** introduction video showing "dry cooling" advantages

Benefits

Military-grade reliability

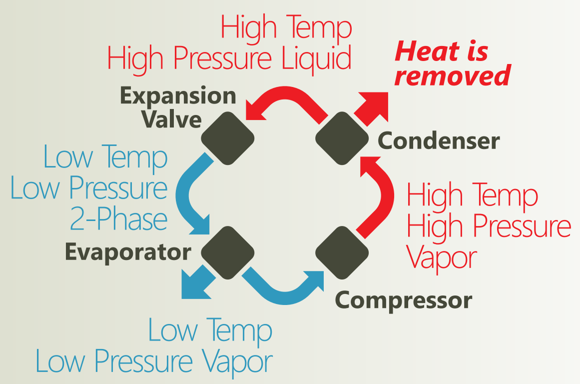
Permanently hermetically sealed system **>90,000 hour MTBF**

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 & 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.

Detachable cooling plate

Integrated cooling equipment with the laser power supply

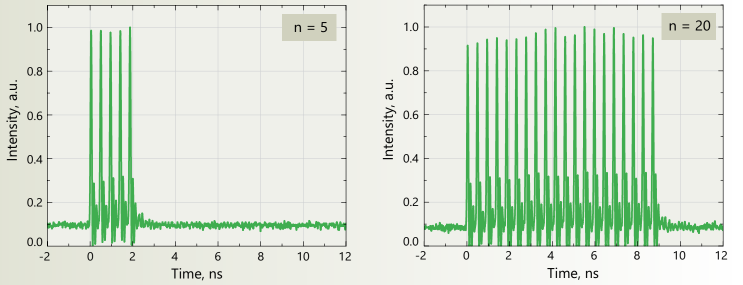
Simple and reliable cooling plate attachment

GHz Burst Option

Patent-Pending Method for Ultra-High Rate Bursts

Short GHz burst

Fig 12. Measured 2.2 GHz intra-burst PRR burst of pulses containing a different number of pulses of equal amplitudes at 31.5 W average output power



Long GHz burst

Fig 13. Measured 2.2 GHz pre-shaped bursts of 1000 pulses at 233 kHz burst repetition rate for the desired rectangular-like burst shape

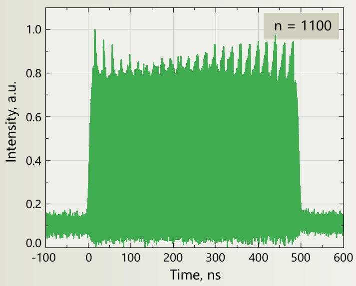
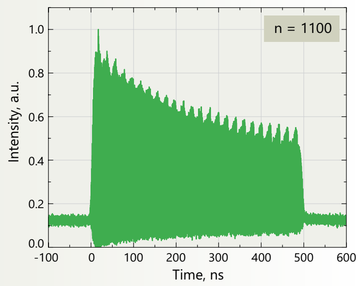


Fig 14. Measured 2.2 GHz non-pre-shaped bursts of 1100 pulses at 233 kHz burst repetition rate



A new versatile patent-pending method to form ultra-high repetition rate bursts of ultrashort laser pulses.

The developed method is based on the use of an all-in-fiber active fiber loop (AFL). A detailed description of the invention can be found on:

[1] Andrejus Michailovas, and Tadas Bartulevičius. 2021 Int. patent application published under the Patent Cooperation Treaty (PCT) WO2021059003A1.

[2] Tadas Bartulevičius, Mykolas Lipnickas, Virginija Petrauskienė, Karolis Madeikis, and Andrejus Michailovas, (2022), "30 W-average-power femtosecond NIR laser operating in a flexible GHz-burst-regime," Opt. Express 30, 36849-36862.

Specifications

Parameter	Value	
Burst repetition rate	200 – 650 kHz	
Intra-burst pulse repetition rate [1]	2 GHz	
GHz burst mode	**short**	**long**
Number of pulses [2]	2 – 22	44 – 1100
Shape	square, rising, falling	falling, pre-shaped [3]

[1] Custom intra-pulse PRR is available upon a request.
[2] Depends on the intra-pulse PRR.
[3] For more information, please inquire sales@ekspla.com.

Benefits

The Femtolux 30 laser can operate in the **single-pulse** mode, **MHz burst** mode and **GHz burst** mode.

The burst formation technique based on the use of the AFL is a very versatile method as it allows to overcome many limitations encountered by other fiber- and/or solid-state-based techniques.

The benefits of this technology:

Any desired intra-burst PRR can be achieved independently from the initial PRR of the master oscillator

Identical pulse separation inside the GHz bursts is maintained

Short- and long-burst formation modes can be provided.

/ A short burst is up to about 10 ns burst width (from 2 to tens of pulses in the GHz burst).

/ A long burst is from ~20 ns up to a few hundred ns in burst width (from tens to thousands of pulses in the GHz burst)

An adjustable amplitude envelope of the GHz bursts is provided

No pre/post pulses in GHz burst. Pure GHz bursts

Ultrashort pulse duration is maintained inside the bursts

See video showing principle of **AFL technology**

Specifications [1]

Model		FemtoLux 30
Main specifications		
Central wavelength	fundamental	1030 nm
	with second harmonic option	515 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
Average output power	at 1030 nm	> 27 W (typical 30 W)
	at 515 nm	> 11 W [3]
Pulse energy	at 1030 nm	> 90 µJ
	at 515 nm	> 50 µJ [3]
Total energy in MHz/GHz burst mode		> 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
Beam diameter ($1/e^2$) at 20 cm distance from laser aperture at 1030 nm		2.5 ± 0.4 mm
Triggering mode		internal / external
Pulse output control		frequency divider, pulse picker, burst mode, packet triggering, power attenuation
Control interfaces		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) At 200 kHz.

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.

DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT

Performance

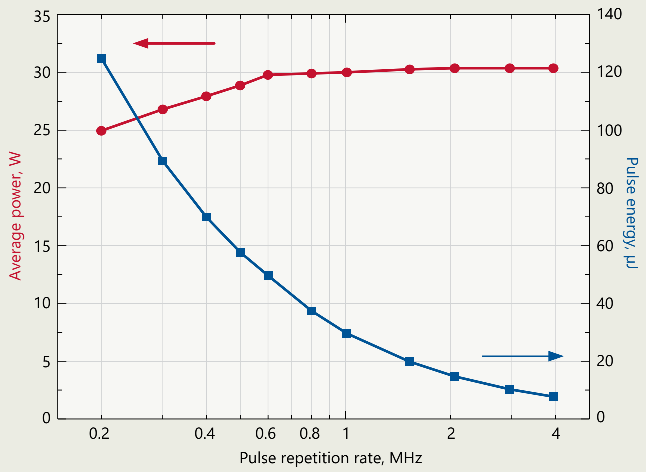


Fig 1. Typical dependence of output power and pulse energy of FemtoLux 30 laser at 1030 nm on pulse repetition rate

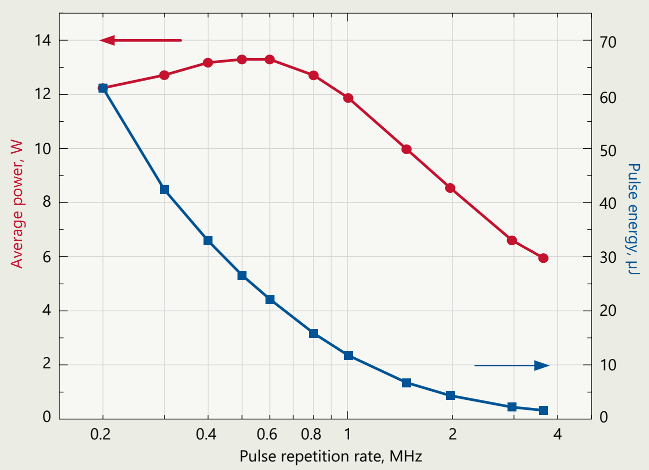


Fig 2. Typical dependence of output power and pulse energy of FemtoLux 30 laser at 515 nm on pulse repetition rate

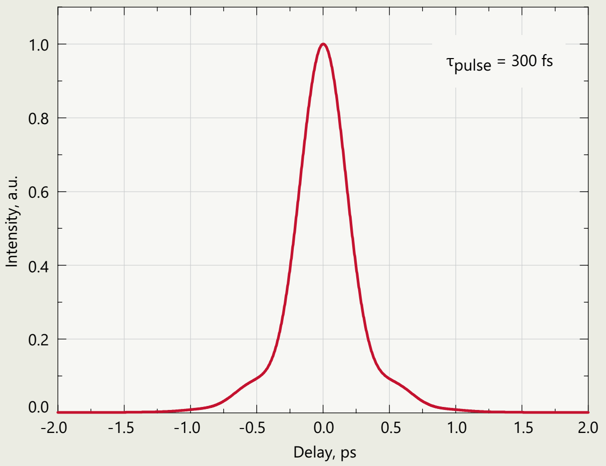


Fig 3. Typical FemtoLux 30 laser (at 1030 nm) output pulse autocorrelation function

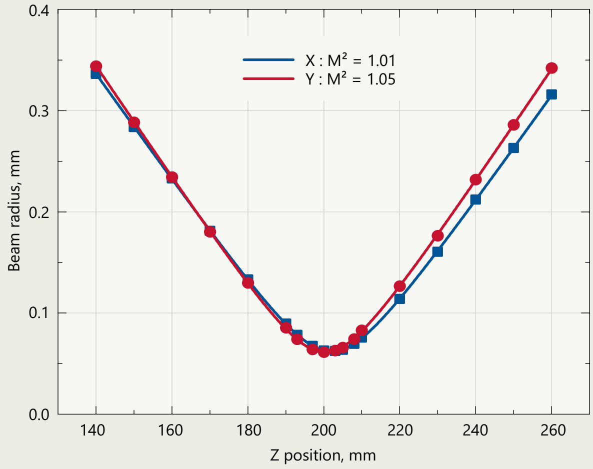


Fig 4. Typical M^2 measurement of FemtoLux 30 laser at 1030 nm

FemtoLux 30 with second harmonic option and power supply

Stability

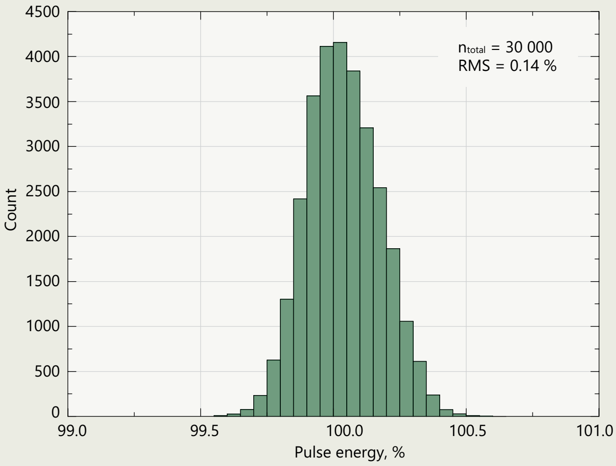


Fig 5. Typical pulse-to-pulse energy stability of FemtoLux 30 laser at 200 kHz over 30 000 pulses. RMS was calculated by using a set of mean values of 10 consecutive laser shots

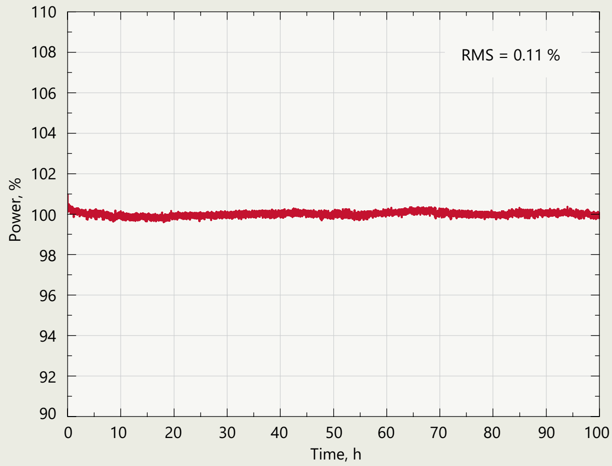


Fig 6. Typical long term average power stability of FemtoLux 30 laser at 1030 nm under constant environmental conditions

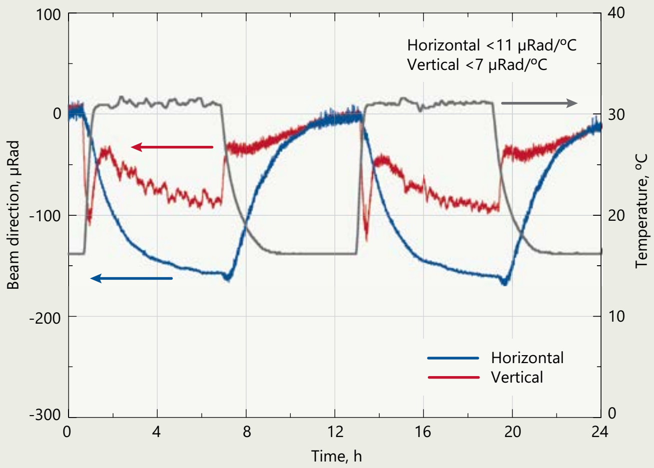


Fig 7. Typical beam direction stability of FemtoLux 30 under harsh environmental conditions

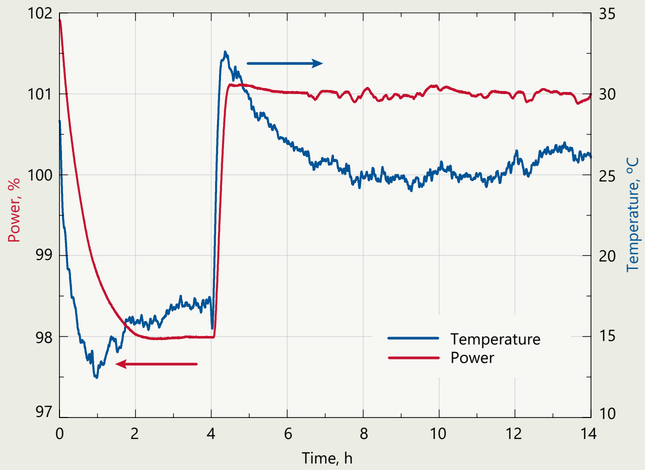


Fig 8. Average output power dependance of FemtoLux 30 laser on ambient temperature at 1030 nm

Drawings

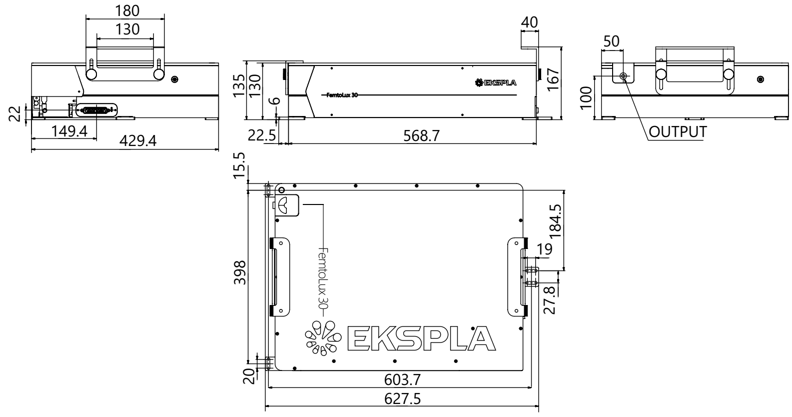


Fig 9. FemtoLux 30 laser head outline drawing

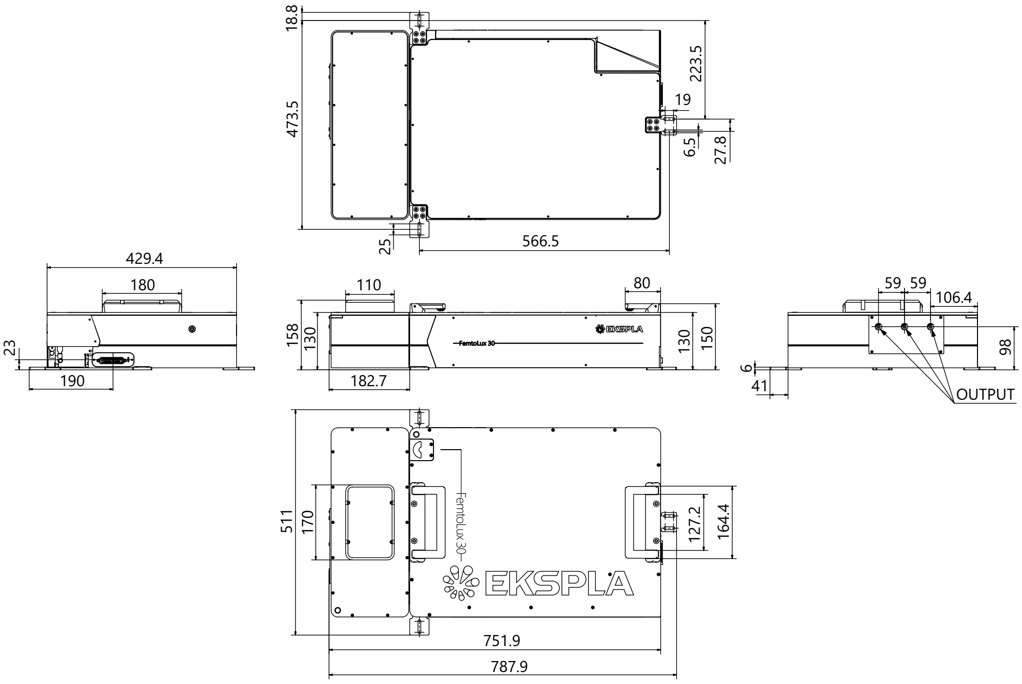


Fig 10. FemtoLux 30 with second harmonic option. Laser head outline drawing

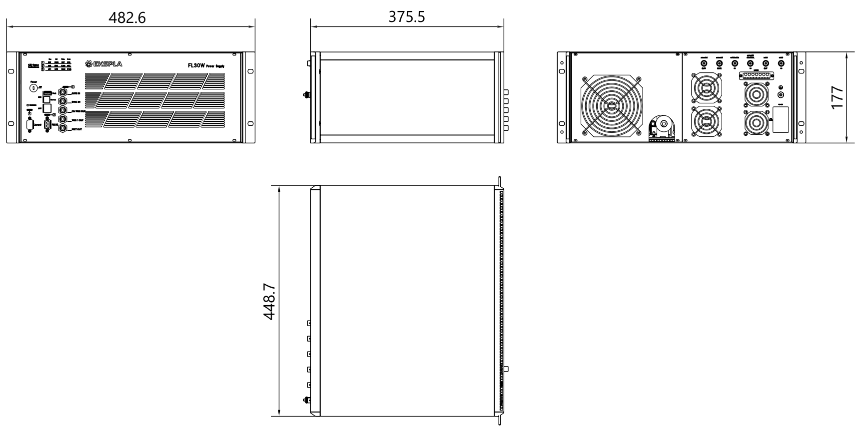


Fig 11. Power supply outline drawing

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FemtoLux 3

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

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Microjoule Class Femtosecond Industrial Lasers

FemtoLux 3

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 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.

FemtoLux 3 laser with second harmonic option

Features

Output power
3 W at 1030 nm,
1.2 W at 515 nm

Up to **3 µJ/pulse** and **10 µJ/burst** (at 1030 nm)

Up to **1.2 µJ/pulse** and **5 µJ/burst** (at 515 nm)

< 300 fs ... 5 ps tunable pulse duration

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

	Output power	Pulse energy	Burst mode
At 1030 nm	3 W	3 µJ	10 µJ
At 515 nm	1.2 W	1.2 µJ	5 µJ

Learn more about FemtoLux 3
www.ekspla.com

Specifications [1]

Model		FemtoLux 3
Main specifications		
Central wavelength	fundamental	1030 nm
	with second harmonic option	515 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	> 1.2 W
Power long term stability (Std. dev.) [3]		≤ 0.5 %
Maximal pulse energy [2]	at 1030 nm	> 3 μJ
	at 515 nm	> 1.2 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
Burst shape 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	1.0 ± 0.2 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 nm	464 × 363 × 129 mm
	at 515 nm	620 × 363 × 129 mm
Power supply unit size (L×W×H)	stand-alone	449 × 436 × 140 mm
	19" rack mountable	483 × 436 × 140 mm
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.

DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT

Performance

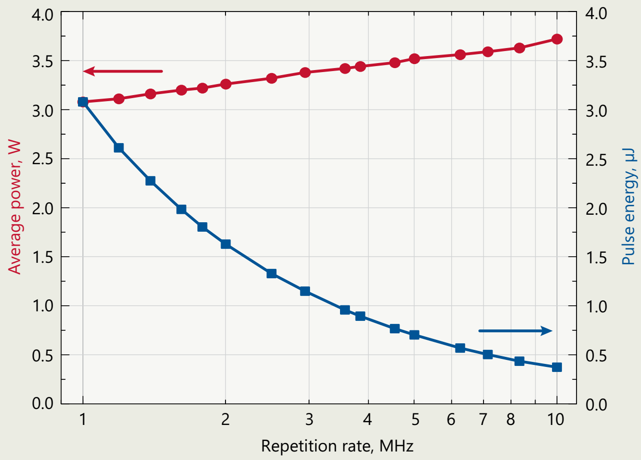

Fig 1. Typical dependence of output power and pulse energy of FemtoLux 3 laser at 1030 nm when changing internal repetition rate of the laser

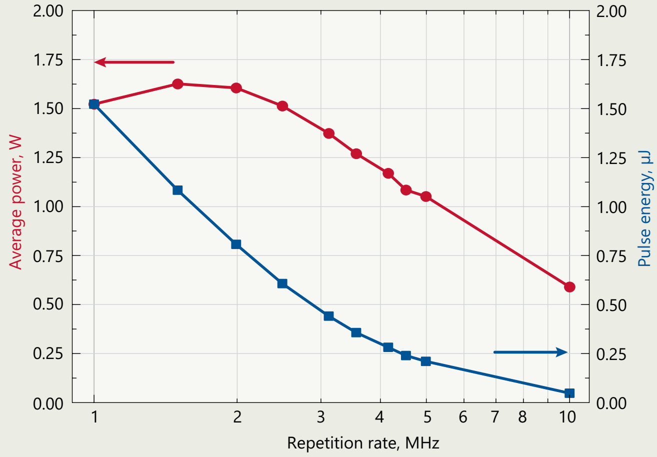

Fig 2. Typical dependence of output power and pulse energy of FemtoLux 3 laser at 515 nm on pulse repetition rate

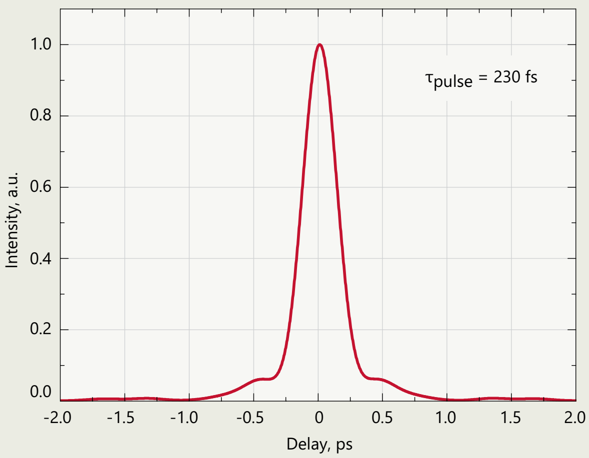

Fig 3. Typical FemtoLux 3 laser (at 1030 nm) output pulse autocorrelation function at 3 μJ pulse energy. Calculated pulse duration is 230 fs

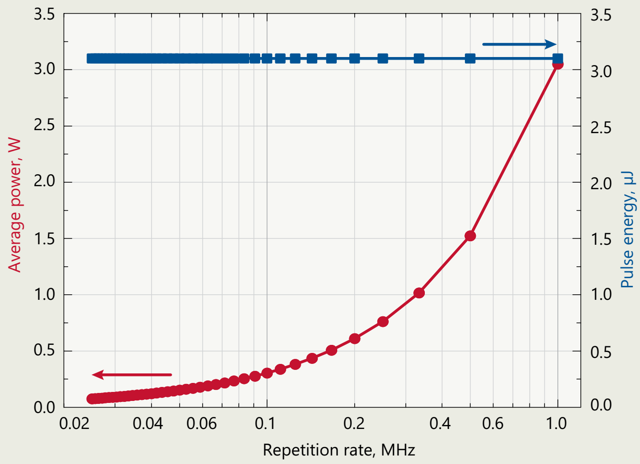

Fig 4. Typical dependence of output power and pulse energy of FemtoLux 3 laser at 1030 nm when repetition rate is reduced by pulse picker. Internal repetition rate of the laser in this case is 1 MHz

Stability

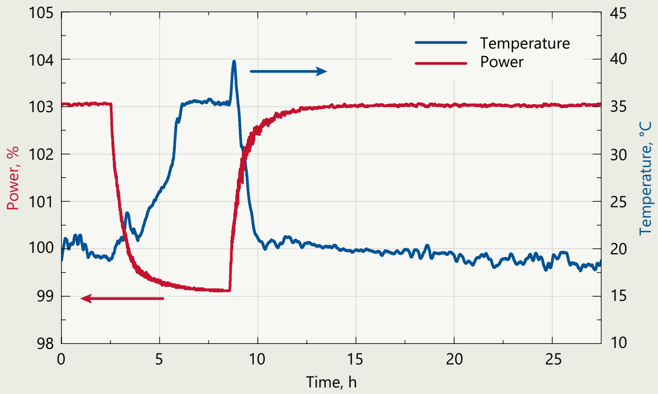

Fig 5. Average output power dependance on ambient temperature at 1030 nm

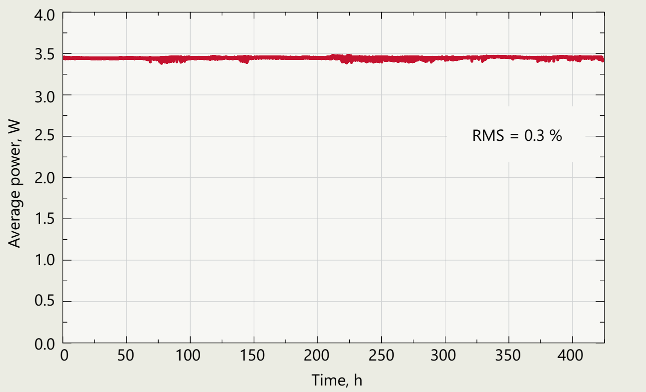

Fig 6. Typical long term average output power stability of FemtoLux 3 laser at 1030 nm under constant environmental conditions

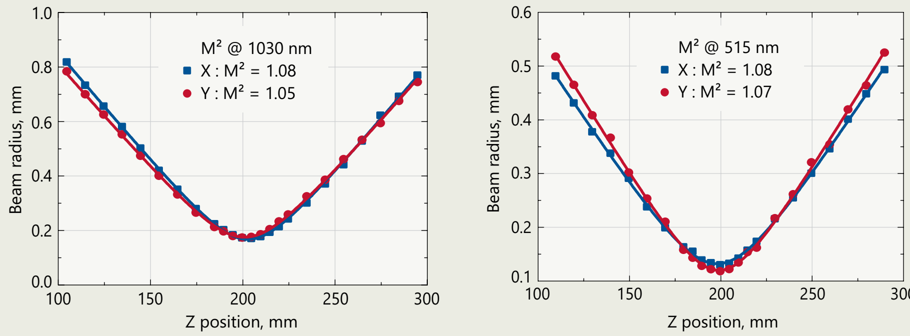

Fig 7. Typical M² measurement of FemtoLux 3 at 1030 nm (left) and 515 nm (right)

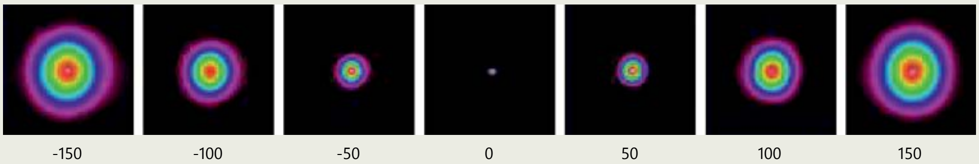

Fig 8. Typical beam profiles along propagation axis of FemtoLux 3 series laser

Remote control application

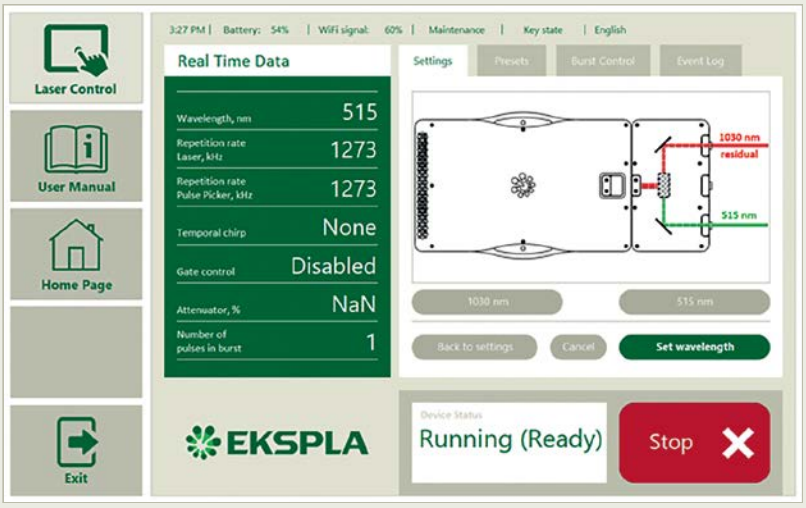

Fig 9. Example of FemtoLux 3 remote control application

Drawings

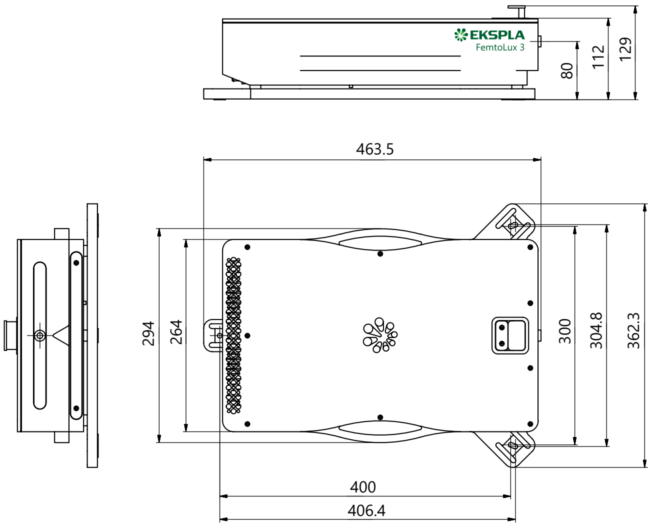

Fig 11. Outline drawings of FemtoLux 3 laser head

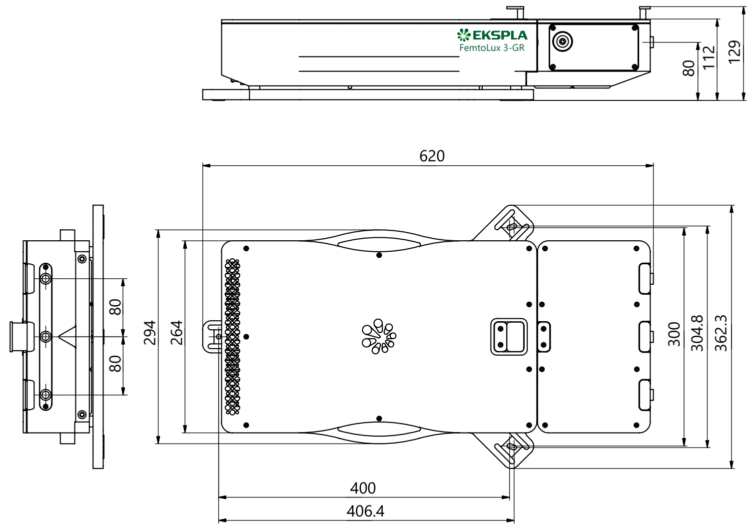

Fig 12. Outline drawings of FemtoLux 3 laser head with second harmonic option

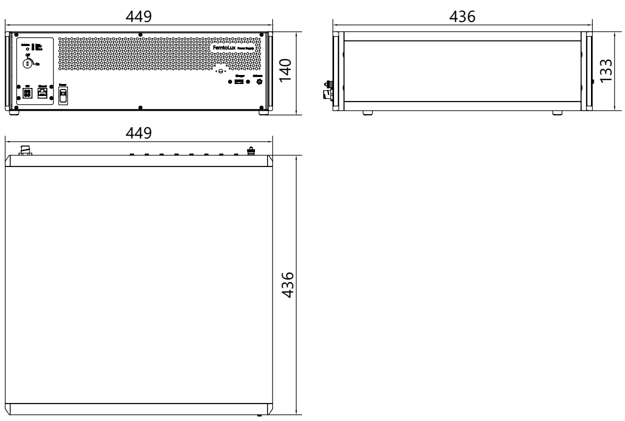

Fig 13. Outline drawings of FemtoLux 3 stand-alone control unit

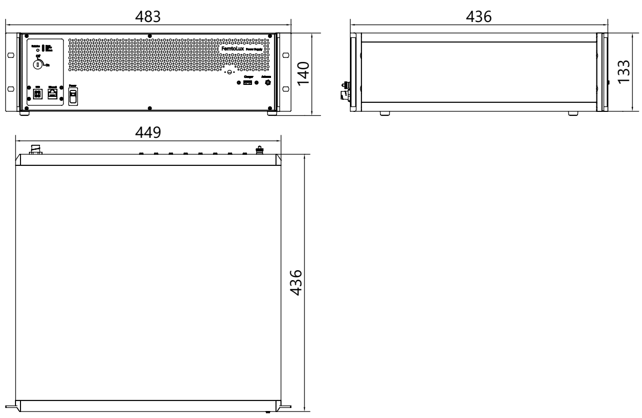

Fig 14. Outline drawings of FemtoLux 3 19" rack mountable control unit

Atlantic

Materials

/ Various metals

/ Brittle materials including glass, ceramics, sapphire and PCD

/ Silicon, Silicone

/ PET, PP, PI, PTFE, PCB

/ LCD, LED, OLED, microLED display panels

/ Solar cells

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

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

EKSPLA Savanoriu Av. 237, LT-02300 Vilnius, Lithuania | ph. +370 5 2649629 | e-mail: sales@ekspla.com | **www.ekspla.com**

Rev. 20230321

Industrial High Power Picosecond Lasers

Atlantic

High-energy and high-power water-cooled Atlantic series picosecond lasers are designed for a variety of industrial applications.

Suitable for 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.

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.

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**
- **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)

At 1030 nm	At 515 nm	At 355 nm
80 W	40 W	30 W
200 μJ	100 μJ	75 μJ

Learn more about Atlantic
www.ekspla.com

Specifications 1)

Model		Atlantic 25	Atlantic 50	Atlantic 80
General specifications				
Central wavelength	fundamental	1064 nm		
	with 2H option	532 nm (optional 1064 nm output) 2)		
	with 3H option	355 nm (optional 1064 nm and/or 532 nm outputs) 2)		
Laser pulse repetition rate (PRR_L) range 3)		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	25 W	50 W	80 W
	at 532 nm	12 W	25 W	40 W
	at 355 nm	8 W	18 W	30 W
Pulse energy at lowest PRR_L 4)	at 1064 nm	125 µJ	165 µJ	200 µJ
	at 532 nm	60 µJ	85 µJ	100 µJ
	at 355 nm	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 (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/e²) 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	< 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		
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.

DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT

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Rev. 20230321

Performance

1064 nm

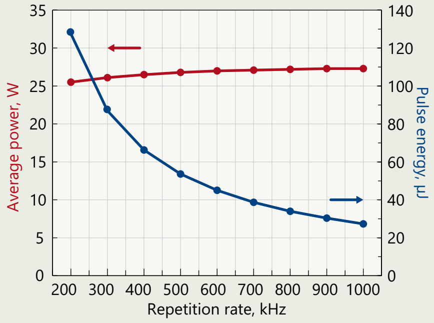


Fig 1. Typical output power and energy curves of Atlantic 25

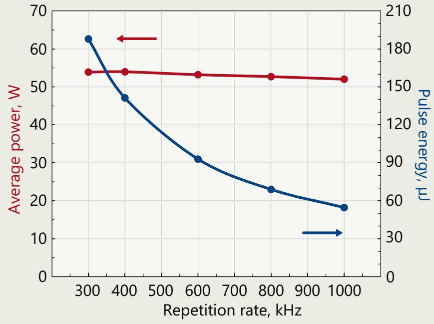


Fig 2. Typical output power and energy curves of Atlantic 50

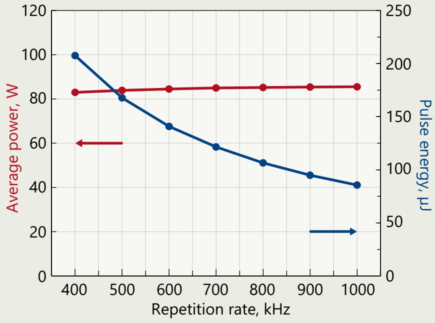


Fig 3. Typical output power and energy curves of Atlantic 80

532 nm

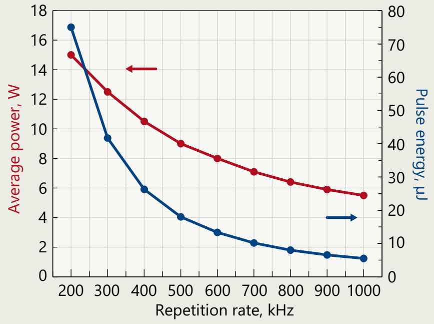


Fig 4. Typical output power and energy curves of Atlantic 25-GR12

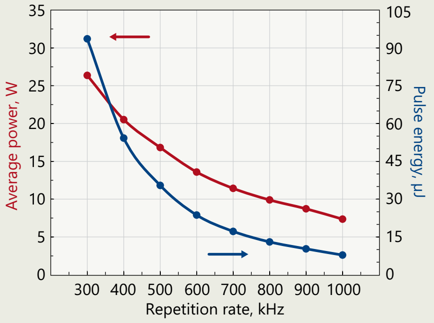


Fig 5. Typical output power and energy curves of Atlantic 50-GR25

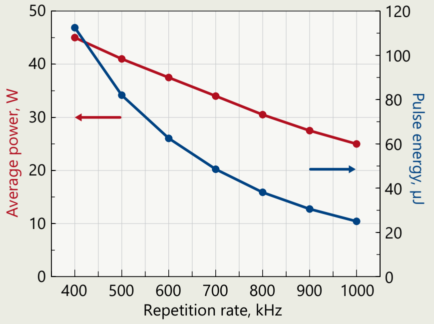


Fig 6. Typical output power and energy curves of Atlantic 80-GR40

355 nm

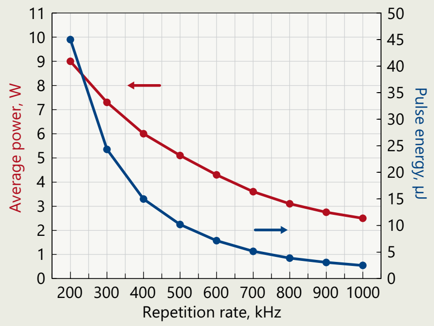


Fig 7. Typical output power and energy curves of Atlantic 25-UV8

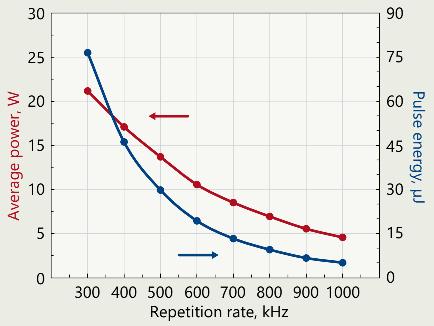


Fig 8. Typical output power and energy curves of Atlantic 50-UV18

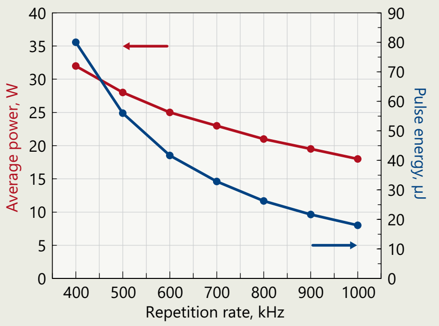


Fig 9. Typical output power and energy curves of Atlantic 80-UV30

Stability

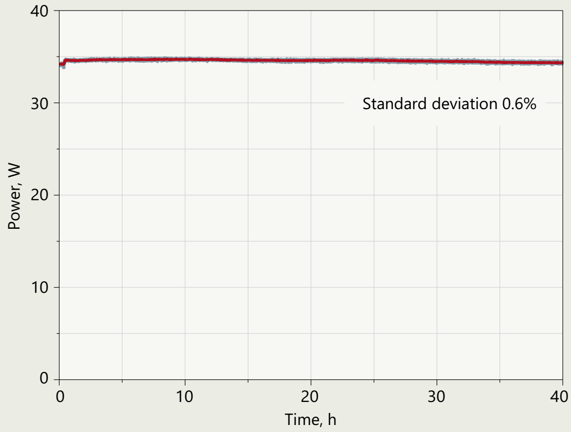


Fig 10. Typical long term 355 nm output average power stability of Atlantic 80-UV30 under constant environmental conditions

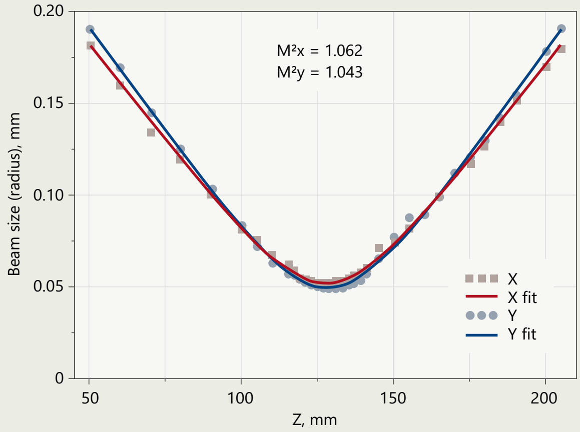
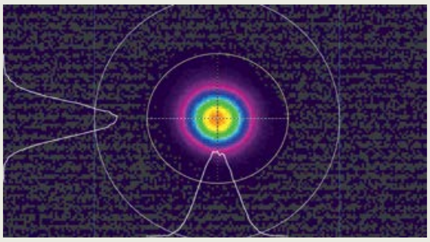
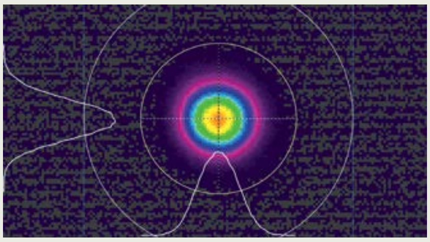


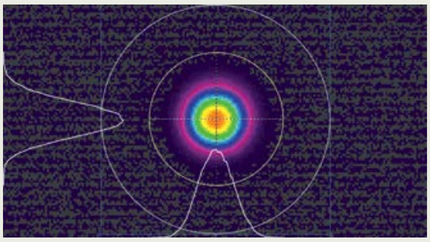
Fig 11. Typical M^2 measurement of 355 nm wavelength at 34 W average power, 400 kHz repetition rate (Atlantic 80-UV30)



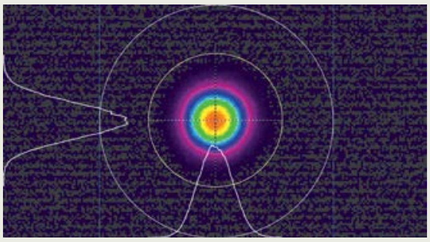
100% power level



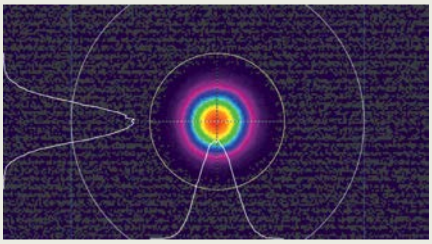
75% power level



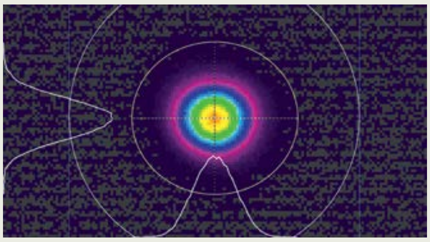
50% power level



25% power level



10% power level



100% power level with pulse divider 10

Fig 12. Typical beam profile of 355 nm in far field at 34 W max average power with different attenuation conditions

Images

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

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

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

Drawings

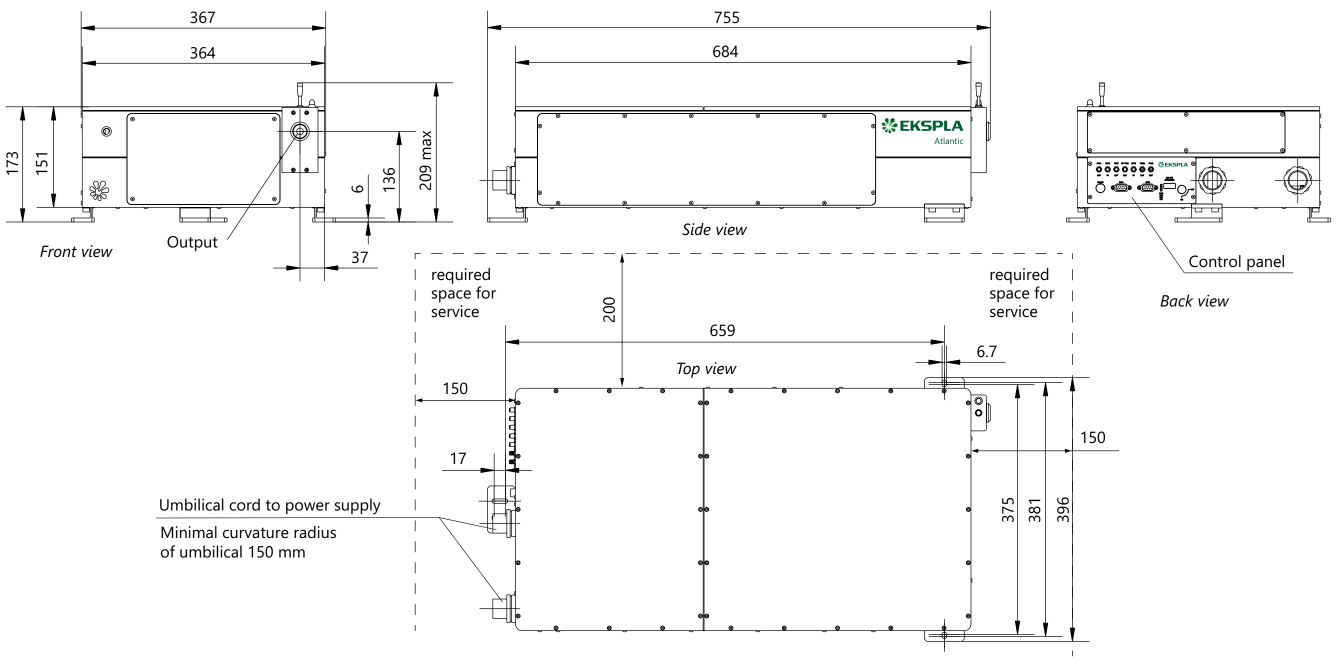


Fig 13. Outline drawings of Atlantic 25, 50, 80 laser head with a single 1064 nm output (dimensions in mm)

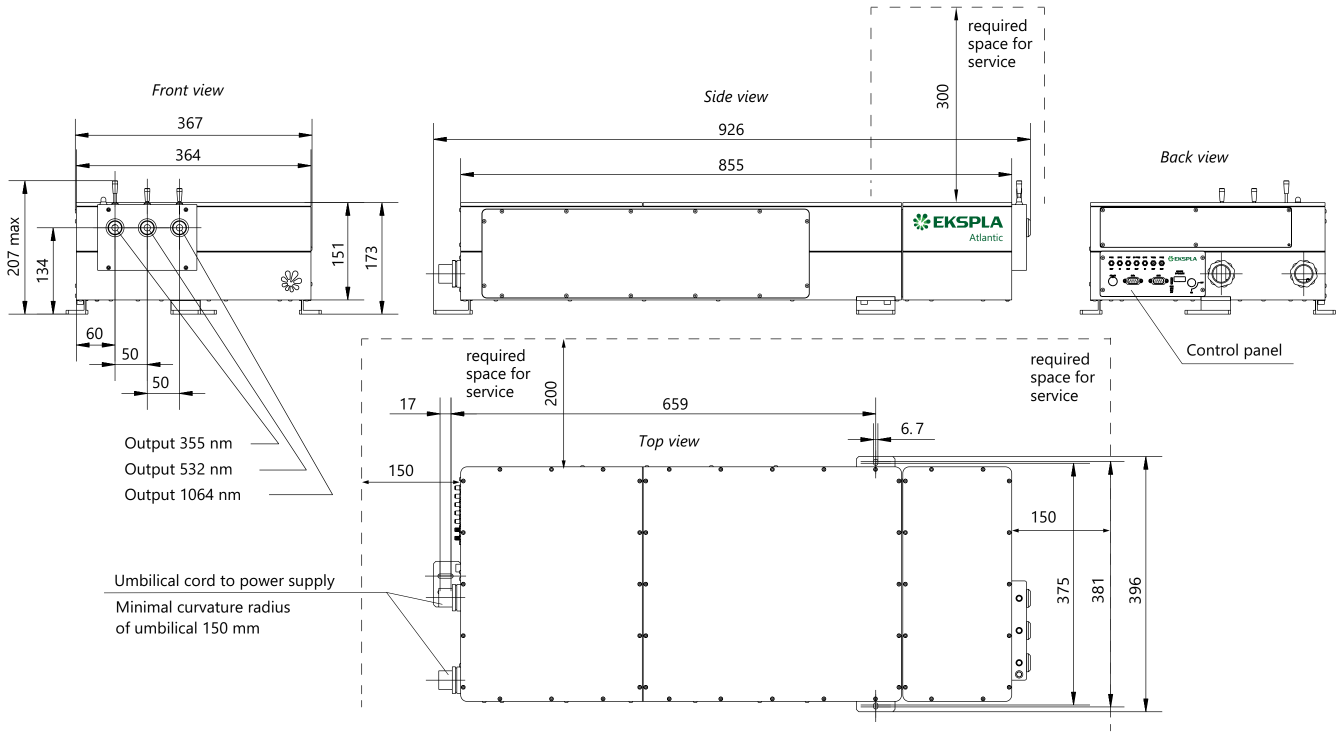


Fig 14. Outline drawings of Atlantic 25, 50, 80 laser head with two and three outputs (dimensions in mm)

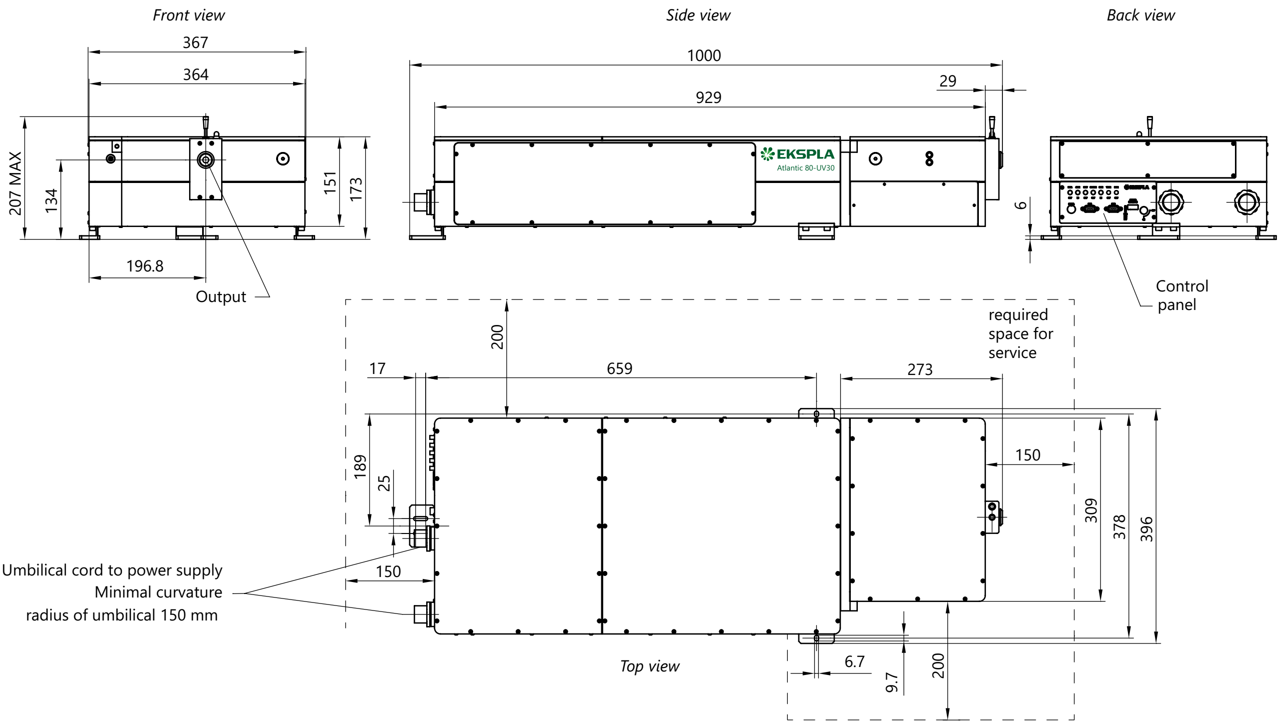


Fig 15. Outline drawings of Atlantic 25-UV8, 50-UV18, 80-UV30 laser head with a single 355 nm output (dimensions in mm)

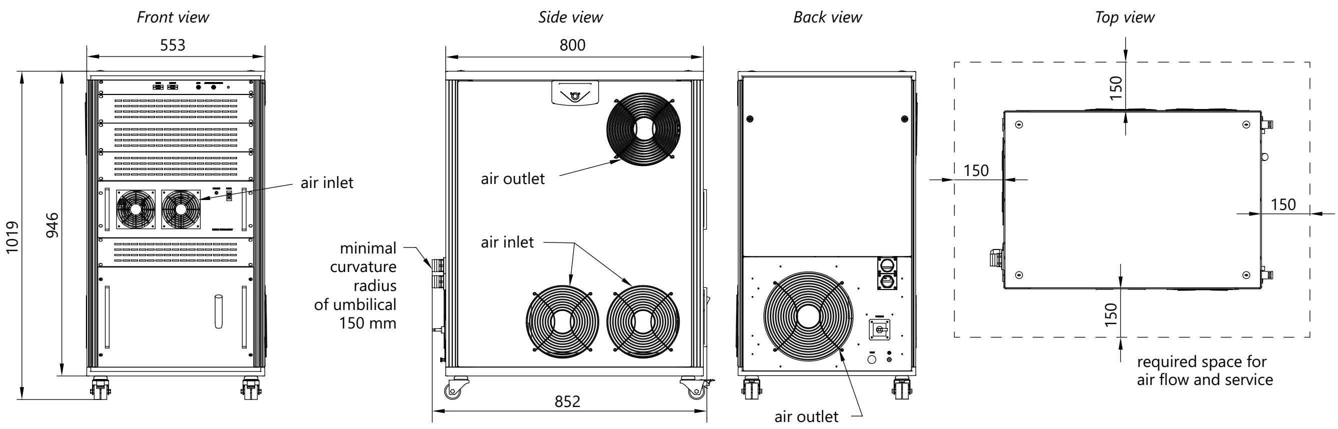


Fig 16. Outline drawings of Atlantic 25, 50, 80 power supply unit (dimensions in mm)

Ordering information

Atlantic 25-IR-GR12-UV8

Model

Fundamental wavelength max power:

25 → 25 W
50 → 50 W
80 → 80 W

1064 nm output (only for models with multiple outputs)

532 nm output max power:

GR12 → 12 W
GR25 → 25 W
GR40 → 40 W

355 nm output max power:

UV8 → 8 W
UV18 → 18 W
UV30 → 30 W

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NL200 series

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 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, 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

Compact
Q-switched DPSS Lasers
NL200 series

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.

Applications

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

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

At 1064 nm

4 mJ / 2 500 Hz / <10 ns

Learn more about NL200
www.ekspla.com

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 (StdDev) [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.

DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION
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Performance

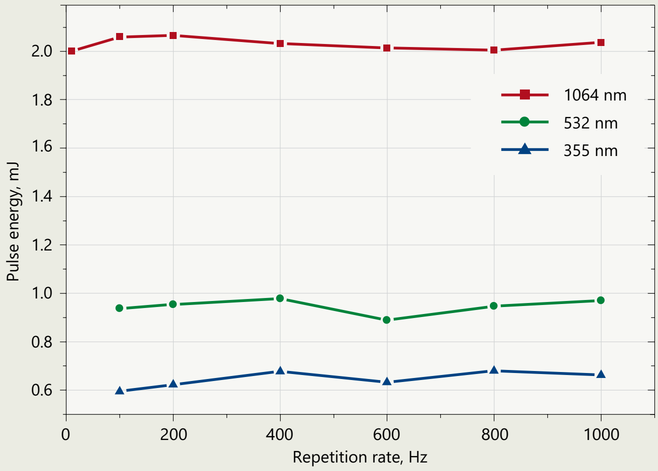

Fig 1. Typical performance data of model NL202 laser

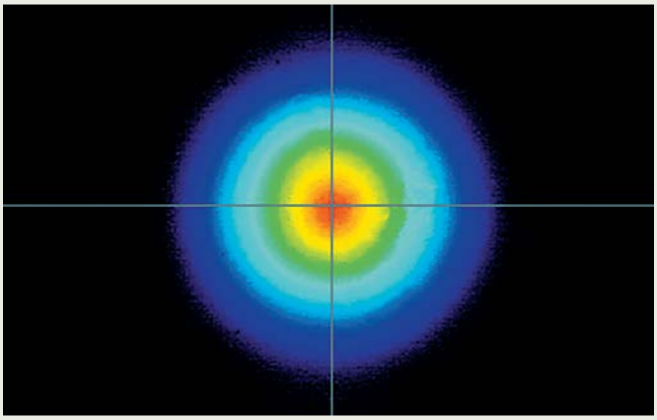

Fig 2. Typical beam intensity profile in the far field

Drawings

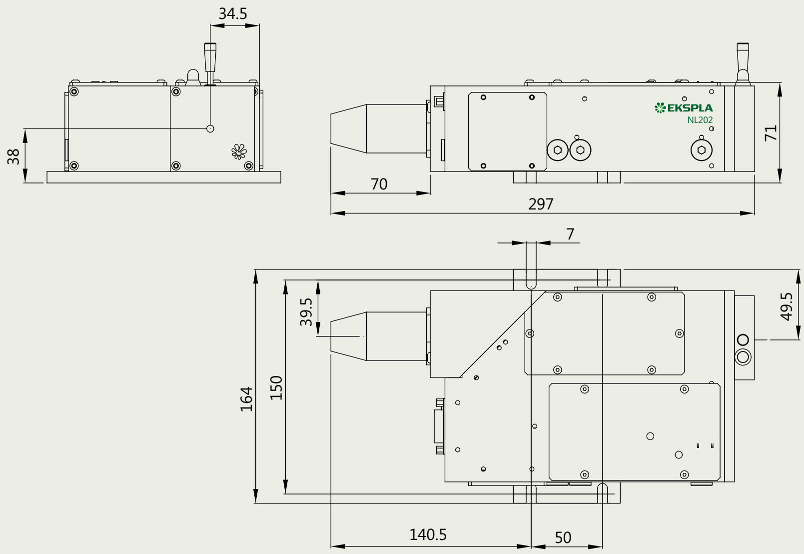

Fig 3. NL202 laser head drawing

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

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

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High Energy Q-switched DPSS Nd:YAG Lasers

NL230 series

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

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.

Applications

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

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

At 1064 nm

190 mJ / 100 Hz / 3 – 6 ns

Learn more about NL230
www.ekspla.com

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 mode	< 0.5 ns	
	External triggering mode	< 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/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 $1/e^2$ level.
12) Adequate room air conditioning should be provided.

DANGER: VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT, REFLECTED OR SCATTERED RADIATION
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Performance

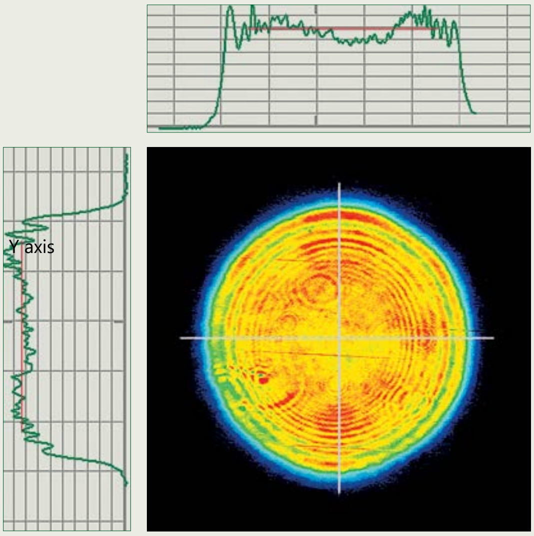

Fig 1. NL230 laser typical near field beam profile

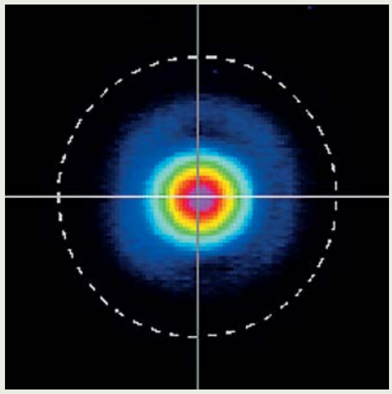

Fig 2. NL230 laser typical far field beam profile

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

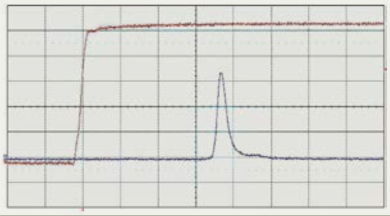

Fig 3. NL230 laser pulse waveform

Drawings

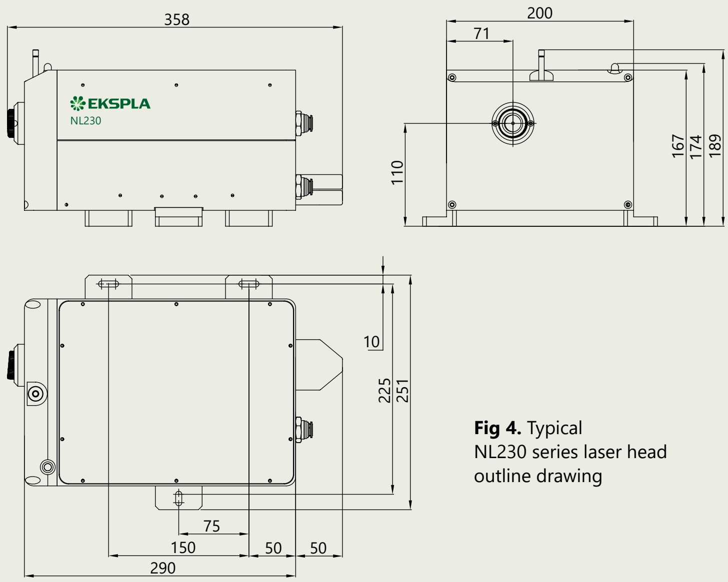

Fig 4. Typical NL230 series laser head outline drawing

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.

NL231-H230THC	
Model	Optional harmonic generator modules

Ordering Information

Delivery	Products are made and dispatched within agreed term. Shipping charges are object of agreement between EKSPLA and customer.
Ordering	Orders may be placed by mail, fax or e-mail. All orders are object of General Sales Conditions, which can be found on **www.ekspla.com**. Mail orders should be sent to: EKSPLA, UAB Savanoriu Av. 237 LT-02300 Vilnius Lithuania Phone: +370 5 264 96 29 Fax: +370 5 264 18 09 E-mail: sales@ekspla.com **Ask for quotation online at www.ekspla.com.**
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Warranty	All products are guaranteed to be free from defects in material and workmanship. The warranty period depends on the product and is object of agreement between EKSPLA and customer. Warranty period can be extended by separate agreement. EKSPLA does not assume liability for unproper installation, labour or consequential damages.
Specifications	Due to the constant product improvements, EKSPLA reserves its right to change specifications without advance notice.

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