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

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

Rev. 240117

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 100 µJ operating with single pulses and can reach more than 450 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,
6 W at 343 nm

Typical max output energies
> 100 µJ at 1030 nm,
> 55 µJ at 515 nm,
> 30 µJ at 343 nm

High energy version available (**1 mJ** at 10 kHz)

MHz, GHz, MHz+GHz burst modes

> 450 µJ in a burst mode

< 350 fs – 1 ps

Single shot to 4 MHz (AOM controlled)

Pulse-on-demand (PoD), with jitter as low as 20 ns (peak-to-peak)

<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)

2 years of total warranty

At 1030 nm	At 515 nm	At 343 nm
30 W	11 W	6 W
>100 µJ	>55 µJ	>30 µJ

Learn more about FemtoLux 30
www.ekspla.com

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"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

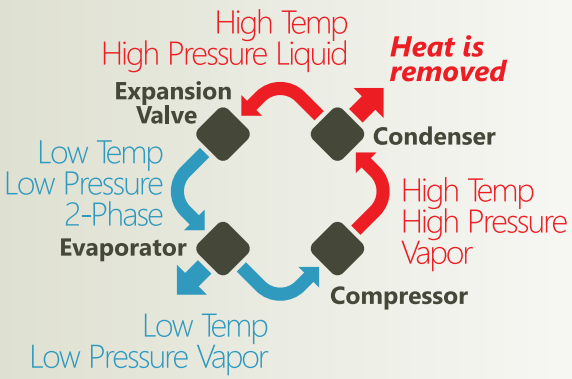
Permanently hermetically sealed system **>90,000 hour MTBF**

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

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Specifications [1)]

Model		FemtoLux 30
Main specifications		
Central wavelength	fundamental	1030 nm
	with second harmonic option	515 nm
	with third harmonic option	343 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)]
	at 343 nm	> 6 W [3)]
Pulse energy	at 1030 nm	> 100 µJ or 1 mJ [4)]
	at 515 nm	> 55 µJ [3)]
	at 343 nm	> 30 µJ [3)]
Number of pulses in MHz burst [5)]		2 – 10
Total energy in burst mode		> 450 µJ [6)]
Power long term stability (Std. dev.) [7)]		< 0.5 %
Pulse energy stability (Std. dev.) [8)]		< 1 %
Pulse duration (FWHM)		tunable, < 350 fs [9)] – 1 ps [10)]
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, pulse-on-demand [11)]
Control interfaces		RS232 / LAN
Length of the umbilical cord		3 m, detachable. Custom length option available
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
Maximal power rating		800 W
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. Unless stated otherwise, all specifications are measured at 1030 nm and for basic system without options.

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

3) At 200 kHz.

4) Other combinations of energy and repetition rate available.

5) Oscillator frequency ~50 MHz, ~20 ns separation between pulses.

6) > 450 µJ in MHz burst mode or MHz+GHz burst mode at 100 kHz PRR. > 90 µJ energy in GHz burst mode.

7) Over 100 h after warm-up under constant environmental conditions.

8) Under constant environmental conditions.

9) At PRR > 500 kHz. At PRR < 500 kHz shortest pulse duration is < 400 fs.

10) Custom pulse duration by request. For example – fixed 50 fs available.

11) Jitter < 20 ns. Trigger-to-pulse delay < 1 µs.

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