

# EX10

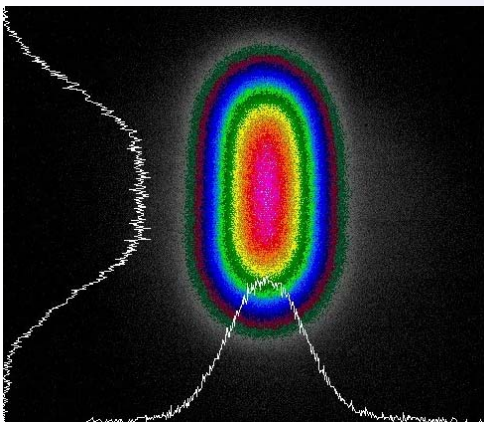
## An exceptional Excimer Laser

*Long gas lifetime*

*Corona PreIonization*

*On-Board Vacuum Pump*

*Long life optics*



The EX10 laser is an all metal/ceramic device and uses the most advanced design of any commercial excimer laser.



## *Performance benefits*

For applications requiring high repetition rate and moderate average power, when you need a compact air cooled laser, the EX10 is the choice. The EX10 excimer laser offers state of the art performance in a compact package and provides a highly reliable, powerful source of ultraviolet radiation. Repetition rates of 300Hz and 600Hz in air cooled units, an average power of 12W with KrF at 248nm and 7W with ArF at 193nm give the EX10 the highest outputs of any mini excimer. The EX10 also gives very long gas lifetimes with up to 2 years of operation between refills using XeCl. Ideal for applications in micromachining, tunable laser pumping, marking and mass spectrometry. A 1000Hz version is also available.

The EX10 laser is total metal/ceramic device and uses an advanced linear design to produce high energy output in a compact package. The carefully chosen materials for laser construction give the EX10 static and dynamic gas lifetimes unmatched by any other excimer laser. The gas lifetime advantage is particularly noticeable with F2 at 157nm in the VUV where static gas lifetime is over 15 days compared to 1day for most excimer lasers.

The EX10 is designed for medical, scientific and industrial applications where long term service free operation is required. Software automatically maintains constant, highly stable (<2% standard deviation), energy output using the standard internal energy monitor. The software also warns the user if maintenance is required. The laser can operate directly from a PC for remote programming and software upgrading. The EX10 of course includes standard features such as active thermal stabilization, constant power and energy control, external triggered operation, sync out, automatic refill and automatic gas control. The laser can be completely controlled from a Windows 9x /2000/XP software package.



## *High efficiency*

High efficiency is the key to outstanding laser performance. The EX10 operates with up to 3 times the efficiency of similar mini excimer lasers. This means that only 1/3 of the energy input is required to achieve the same optical output. The optimized soft corona preionization state creates a uniform high efficiency discharge at repetition rates up to 600Hz with a switching jitter of less than 2nS. Additionally the increased efficiency greatly decreases the wasted energy deposited to the discharge and results in reduced EMI and much reduced electrode and component wear. This also increases total system lifetime and allows air cooled operation at the highest repetition rates.

The laser features active thermal stabilization. This allows long term operation of the laser with excellent pointing stability, better than 20 microradians/C.

## *Economical Operation*

The EX10 uses one small cylinder of gas for up to 2 years of operation. No heated solid state Fluorine generators, no high temperatures, no water chiller, the EX10 operates for  $10^9$  pulses as supplied with one small tank of premix gas. When a gas refill is required the AutoFill software replaces the gas fill in under 1 minute using the internal vacuum pump and Halogen filter unit. Modular electronics allows for rapid serviceability in OEM units.

## *High Reliability*

The EX10 offers unmatched reliability. The laser electronics are input and output noise protected and shielded inside an EMI tight compartment. The corona preionized discharge region is inherently low noise and has been tested for more than 2 Billion pulses. The gas lifetime is unmatched by any competitive excimer laser. The relatively long pulse output (15ns) and the use of only the highest quality ultraviolet optical material gives the maximum optics lifetime. The optics service interval for KrF, 248nm, is greater than 1 Billion pulses. The EX10 provides a perfect combination of power, repetition rate with exceptional gas and system lifetime, all in an air cooled compact table top package. The EX10 also produces 2mJ with F2 at 157nm, a special VUV optimized version of the EX10 gives 3mJ at 157nm.

### Specifications

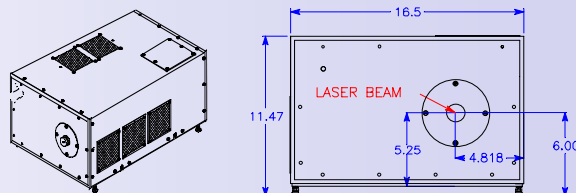
PARAMETER	F2	ArF	KrF	XeCl	XeF
Wavelength nm	157	193	248	308	351
Energy Max. mJ	2	20	35	15	15
Energy Control Range mJ	0-2	5-20	10-35	7-15	7-15
Average Power 300 / 600 W	0.5/ 1	4/ 7	6/ 12	3/ 6	3/ 6
Dynamic gas lifetime Pulses to 50% energy	1E7	20E6	35E6	50E6	30E6
Static Gas life to 50% energy	10 days	60 days	90 days	>1 year	90 Days
Repetition Rate	300/ 600/ 1000 <sup>a</sup> Hz				
Pulse Length	15 nS <sup>b</sup>				
Beam Size	8 X 3 mm				
Stability	< 1% Standard Deviation <sup>c</sup>				
Divergence	1 X 2mRad <sup>d</sup>				
Cooling	Air				
Tube Service	2 Billion Pulses				

a 1000Hz specifications given in next page  
c typical

b At Max. Voltage  
d Full width half Max.

### Dimensions and electrical service

The EX10 gives high performance in a compact package. The laser is only 61cm long. The entire laser including the vacuum pump is packaged in one table top unit.



#### Dimensions:

61 X 40 X 27cm (L X W X H)

#### Power Requirements:

95-135 and 185-240 VAC, 8A/15A, 47/63Hz. Weight 40Kg

#### Options

- ◆ SEALED OFF XECL OPERATION
- ◆ 10 and 40 pm LINE NARROWING
- ◆ LONG PULSE XECL OUTPUT
- ◆ UNSTABLE RESONATOR OPTICS
- ◆ CLEAN ROOM PACKAGE

### Key Benefits

- ◆ Easy to use all in one compact package
- ◆ High stability Corona PreIonization
- ◆ Ultra long gas lifetime
- ◆ 1 Billion Pulse Optic service

# EX10/1000Hz Type II Specifications

## Specifications

PARAMETER	ArF	KrF	XeCl
Wavelength nm	193	248	308
Energy Max. mJ	12	20	8
Repetition Rate Max Hz	1000		
Max. Average Power, W	8	18	7
Static Gas lifetime	60 days	90 days	6 months
Dynamic gas lifetime Pulses to 50% energy	25E6	50E6	30E6
Optics service	500 Mil- lion	1Bil- lion	150 Million
Pulse to Pulse stability	+ / - < 2%		
Pointing Stability	< 4 microradians		
Pulse Length	14 nS <sup>a</sup>		
Beam Size	8 X 3 mm		
Divergence	1 X 2 mRad <sup>b</sup>		
Jitter	2nS		
Cooling	Forced Air		

The Type II EX10/1000 is a new version of the EX10 Laser. The laser is designed to produce high pulse to pulse stability, high pointing stability and improved gas and optics lifetime.

a At Max. Voltage      b Full Width Half Max

The new chamber features include:

- Improved chamber construction materials for longer gas lifetime and reduced optics contamination
- Narrower discharge gap for improved high repetition rate performance
- Improved corona preionization
- Improved electrode design
- Direct drive coupled, high speed laser blower
- Increased window replacement interval to > 500 million
- Reduced component count in gas handling system
- Pulse stretching in development

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