Nitrogen and Dye Lasers

General

The Nitrogen Laser delivers a crisp pulse at 337 nanometers with a hefty 1.45 megawatts of peak power. With a pulse width of 1 nanosecond, that results in a pulse energy of 1.45 millijoules. As an excitation source or a pump for a dye laser, the Nitrogen Laser has no peer. And you don't have to be a "laser jock" to use the Nitrogen Laser—you'll get the specified power with the specified pulse characteristics the first time and every time. No tweaking is needed to coax the expected performance from the Nitrogen Laser.

Operation is simple and convenient. Turn on the power, purge with nitrogen for 5 seconds, and the Nitrogen Laser will activate. An inexpensive cylinder of nitrogen is connected to the rear panel. Everything needed to control the nitrogen flow and pressure is built into the Nitrogen Laser. Since the nitrogen pressure is low, there is no need for any special safety precautions.
Because higher repetition rates require higher nitrogen flow, gas usage is dependent on the rep rate. With a rate of 10 Hz and a use time of 4 hours per day, a typical tank of nitrogen will last about five days. There is even a built-in gas-flow interlock that automatically shuts the laser down if the gas supply is interrupted.

The repetition rate may be varied from 1 to 20 Hz; the Nitrogen Laser may also be fired manually for a single laser pulse. The Nitrogen Laser can be synchronized to external instruments in a variety of ways. A sync pulse is available 1 microsecond before the laser fires. The Nitrogen Laser can also be triggered by an external signal. For precise event triggering, OBB Corp provides an optional Optical Trigger which consists of a beam splitter and fast-rise-time photodiode.

The nitrogen laser can be used as a pumping laser for dye lasers. In this case, the dye lasers are tunable over a wide spectral range from 360 to 1000 nanometers by means of using various dyes.

One can add a frequency doubler to the dye laser, which will generate tunable radiation in the deep UV region from 235 to 345 nm. Nitrogen lasers are excellent sources for general spectroscopy, laser-induced fluorescence and photochemistry, as well as in teaching laboratories. For experiments in the life science laboratory, nitrogen and dye lasers can easily be fiber-optically coupled to most microscopes

Dye Lasers

You have a choice of two different dye lasers—the 1012 high resolution dye laser and the 1011 dye laser. Both lasers work with the same dyes.

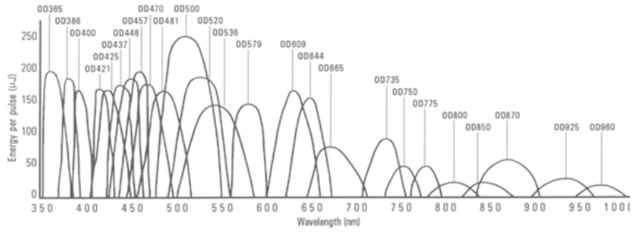
The 1012 high-resolution dye laser allows you 0.04 nm resolution, has a little more power and is the dye laser of choice if you need to use a frequency doubler.

The 1011 dye laser has 1–3 nm resolution (dye dependent), has a little less power but this dye laser does not work with frequency doubler.

Both dye lasers and the frequency doubler are amazingly simple to align and operate. All have the same physical profile—simply place the cabinets together and the beams are aligned. After placing the dye cell in the cuvette holder, set the desired wavelength on the digital readout. The dye is contained in a standard 1 cm cuvette, and there is no need for stirring. For computer control of the output wavelength, a motorizing option can be purchased.

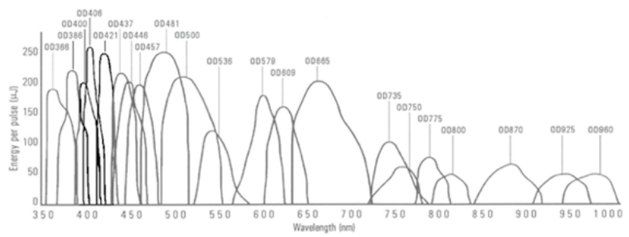
High Resolution Dye Laser

High Efficiency Dye Laser



1011 Tuning Curves

The dyes come in 50 ml ready to use solutions. A 1 cm quartz dye cell is available. The 1012 high-resolution dye laser requires two dye cells.

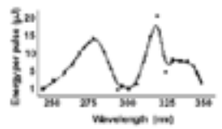


1012 Tuning Curves

Frequency Doubler

The frequency doubler is used with the 1012 dye laser to derive wavelengths from 235 to 345 nm. The Beta Barium Borate crystal allows continuous tuning in this wavelength range without the inconvenience of changing crystals.

The 1013 makes wavelengths in the UV possible by doubling the frequency of the input, thereby halving the wavelength. Adjusting the crystal incidence angle controls the output. For computer control of the output, a motorizing option can be



1013 Output

Frequency Doubler

Accessories

Optical Trigger

If you need to synchronize the laser with other equipment very accurately, less than a nanosecond—input or output—then you require an optical trigger.

Optical Trigger Specifications	
Rise Time	Less than 1 ns (typically 650–800 ps)
PIN Photodiode Spectral Rrange	280 to 1100 nm
Beam Splitter	Quartz with ¾ inch throughput aperture
Maximum Output Amplitude	4 Volts
Output Impedance	50 ohms
Battery	Internal 9 V battery

Fiber Optic Output Cartridge

You have an option of having a 40 meter 1 mm diameter quartz fiber output cartridge which you can attach to: nitrogen laser, dye lasers, or frequency doubler. Ideal for delivering the light to where you need it—like a microscope for example. The extra length fiber allows for reasonable delay so that you can trigger it with electronic equipment—recommend optical trigger.

Detector

To measure the output of your laser from 290–900 nm—flat response over the entire wavelength range, you should have our detector. The output is via an analog channel.

Dye Cell

A 1 cm quartz dye cell is available for use with dyes. It is recommended that if you use more than one dye, you should use separate dye cells for different dyes. The 1012 high-resolution dye laser requires two dye cells.

Computer Wavelength Control for the Dye Lasers and Frequency Doubler

The dye lasers have a certain wavelength tuning range determined by each dye. For example PL 665 has over 65 nm range over which it is tunable. You can tune the wavelength manually by means of a dial located on each dye laser, or you can elect to have the dye laser wavelength control motorized and under computer control, similarly for the frequency doubler which is tunable from 235 to 345 nm. Here are some images of the laser Wavelength Control Software included with this option.

Specifcations

	1010 Nitrogen Laser	1011 Dye Laser pumped by 1010	1012 Dye Laser pumped by 1010	1013 Frequency Doubler pumped by 1010/1012
Peak power at 5 Hz	1.45 MW	250 kW	275 kW	25 kW
Energy per pulse at 5 Hz	1.45 mJ	200 µJ @ 500 nm	220 µJ @ 500 nm	20 µJ
Pulse width	1 ns		800 ps	
Spectral output	337.1 nm	360–990 nm	360–990 nm	235–345 nm
Spectral bandwidth	0.1 nm	1–3 nm	0.04 nm	
Repetition rate	Single shot to 20 Hz			
Energy stability, peak-to-peak	+/- 2.5%			
Beam dimensions at exit	3 x 6 mm	1 mm		1.5 mm
Beam divergence (1/2 angle)	3 x 7 mrad	2 mrad		
Lasant	N_2 gas	fluorescent dye		N/A
Dimensions (in)	30 x 20.2 x 9.2	10 x 20.2 x 9.2	21 x 20.2 x 9.2	10 x 20.2 x 9.2
Dimensions (cm)	76.2 x 51.3 x 23.4	25.4 x 51.3 x 23.4	53.3 x 51.3 x 23.4	25.4 x 51.3 x 23.4
Weight (lbs)	85 lbs	25 lbs	40 lbs	25 lbs
Weight (kg)	38.5 kg	11.3 kg	18.1 kg	11.3 kg