

# Nitrogen Laser

NL337 — 337 nm nitrogen laser



## •NL337 Nitrogen Laser

- **337 nm wavelength**
- **170  $\mu$ J pulse energy**
- **Internal or external triggering to 20 Hz**
- **Replaceable laser cartridge**
- **No mirror alignment necessary**
- **TTL level sync output pulse (opt.)**
- **Fully compatible with VSL-337i OEM**

The NL337 Nitrogen Laser is ideal for fluorescence measurements, MALDI-TOF mass spectrometers, and other pulsed UV radiation experiments. It provides 3.5 ns pulses at 337 nm (UV), with repetition rates up to 20 Hz. The pulse energy is 170  $\mu$ J, which results in a peak power of 45 kW and an average power of 3 mW.

The NL337 can be triggered internally or externally at rates up to 20 Hz. It can also provide a sync output pulse (optional) derived from the laser pulse for experiments or systems where sub-nanosecond accuracy is critical. The user also has the option of running the laser system in command charge mode.

The NL337 uses a replaceable, sealed laser cartridge which includes the high voltage storage capacitors, switching element, and laser tube. The cartridge is warranted to maintain at least 70% of its energy for twenty million pulses or one year, whichever occurs first.

No mirror alignment is ever necessary in the NL337, as the laser optics are mounted on the plasma tube and aligned at the factory. The NL337 also includes all safety features necessary to comply with the U.S. laser safety standards contained in 21 CFR 1040.10.

The NL337 is fully compatible with the Spectra-Physics model VSL-337i OEM Nitrogen Laser (part #337999-04). The mechanical design of the NL337 includes all of the mounting and alignment features of the VSL-337i, making the NL337 a straightforward retrofit in many pre-existing systems.

**NL337 Specifications**

**Beam Characteristics**

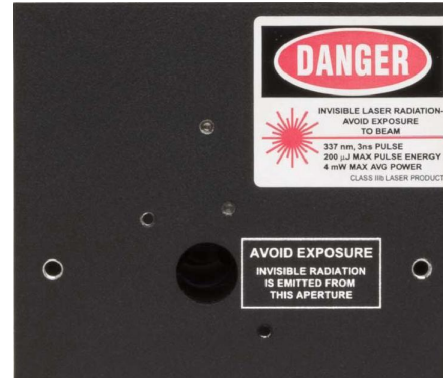
Wavelength	337.1 nm
Spectral bandwidth	0.1 nm
Pulse width (FWHM)	<3.5ns
Pulse energy	170 µJ
Energy stability (pulse to pulse)	3 % std. dev. (at 10 Hz)
Peak power	45 kW
Average power	3 mW (at 20 Hz)
Beam size	3 x7mm
Beam divergence (full angle)	5x8 mrad

**Triggering**

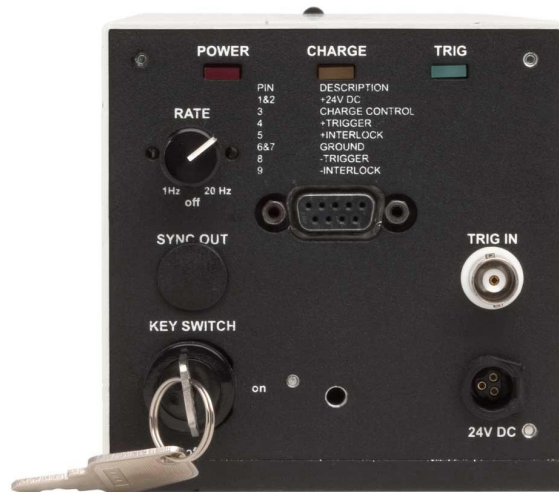
Repetition rate	0 to 20 Hz (external trigger) 1 to 20 Hz (internal trigger)
External trigger input	TTL (opto-isolated)
Internal trigger generator	1 to 20 Hz (adjustable)
Sync output pulse	TTL level (opt.)

**General**

Power requirements	+24VDC, 1.5 A (average) at 20 Hz., 3 A (peak)
Power consumption	36 W (20 Hz operation)
Key switch	On/off
Interlock switch	Built-in
Dimensions	3.75" x 3.75" x 11" (WHD) (9.5cmx9.5cmx27.9cm)
Weight	7.5 lbs., 3.4kg
Warranty	Cartridge is warranted to maintain at least 70 % of its energy for twenty million pulses or one year, whichever occurs first.



NL337 front panel and rear panel



**Ordering Information**

NL 337	Nitrogen laser
O100SP	Optional sync-out pulse

## Power Input

The NL337 requires 24V DC, 3A peak, 1.5 A average input power. Power may be applied through a Hypertronics #D01PB 306 MST plug connected to the Hypertronics receptacle located on the bottom right of the back panel. A Hypertronics connector is supplied with your laser. Alternatively, power can be supplied through the DB-9 connector (see DB-9 CONNECTOR below).



Figure 10. Hypertronics power receptacle, as viewed from the back panel of the NL337. Supply +24V DC on Pin 1. Pin 2 is the supply return and pin 3 is the case ground.

## Sync Out (Optional)

This BNC connector outputs a +5V pulse into 50 Ohms synchronously with the laser emission from the front aperture. Figure 11 shows a single shot from the sync out BNC captured with an oscilloscope.

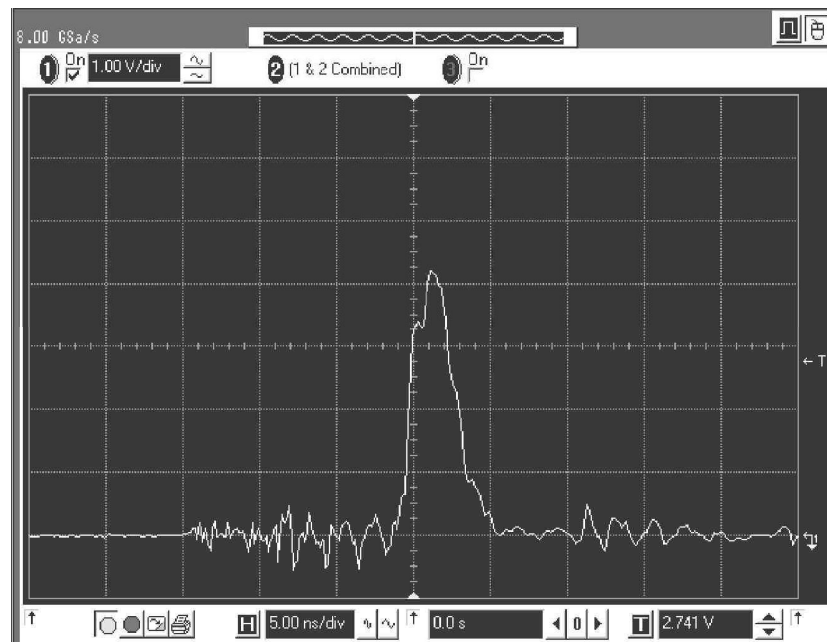


Figure 11. Single shot oscilloscope trace of the sync out of the NL337.

## Trigger In

When the RATE switch is in the OFF position (see RATE below), the NL337 is triggered by a TTL pulse at this BNC connector. The laser will fire the laser on the rising edge of the TTL pulse. The width required of the TTL pulse depends on whether the laser is being operated in COMMAND CHARGE or AUTO CHARGE mode. (See DB-9 CONNECTOR below for information on how to configure the laser in either COMMAND CHARGE or AUTO CHARGE modes).

In AUTO CHARGE mode, the falling edge of the trigger pulse has no effect on the operation of the NL337 laser system, as shown in Figure 12. The trigger pulse width should be  $> 1 \mu\text{s}$ . The high voltage charging circuitry becomes active immediately after the laser has fired.

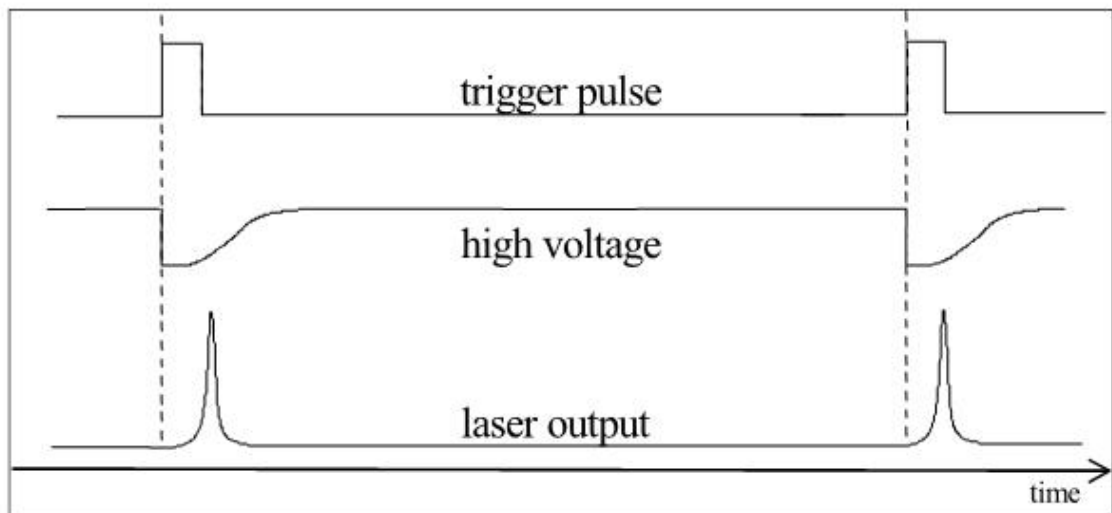


Figure 12. Timing diagram of AUTO CHARGE mode. Note that time is not shown to scale and the diagram does not reflect triggering delays, etc.

In COMMAND CHARGE mode, high voltage charging circuitry becomes active only when a TTL low appears on the trigger input, as depicted in Figure 13. To allow for complete high voltage charging in this case, the dwell time of the trigger pulse must be  $>30 \text{ ms}$ . In other words, the trigger must be TTL low for  $>30 \text{ ms}$  in COMMAND CHARGE mode.

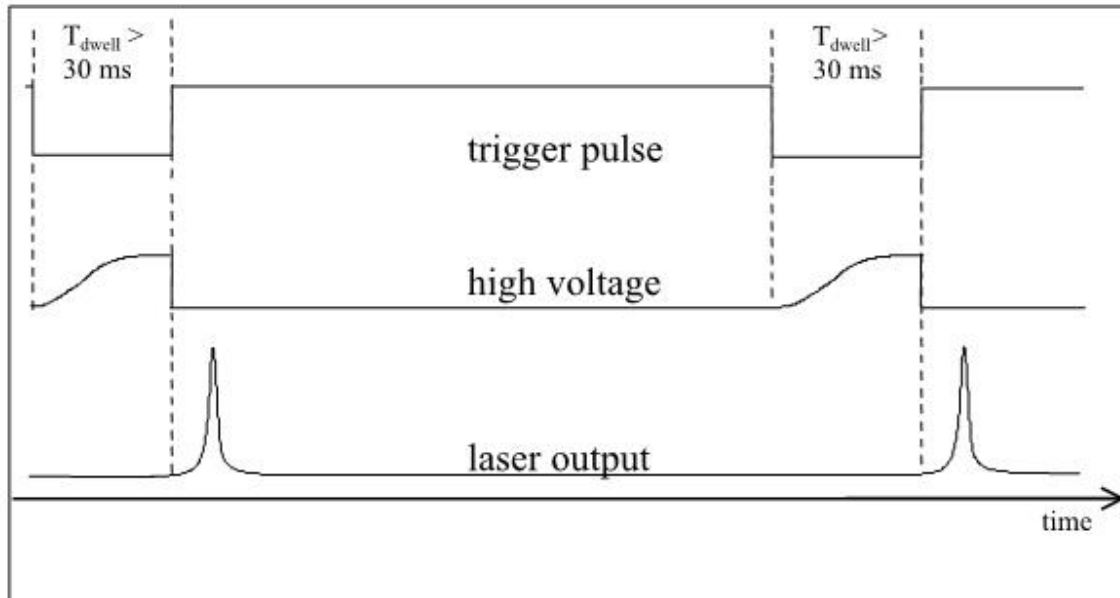


Figure 13. Timing diagram of COMMAND CHARGE mode. Note that time is not shown to scale and the diagram does not reflect triggering delays, etc.

Where possible, we recommend using the NL337 in the COMMAND CHARGE mode. This mode limits the amount of time high voltage resides on the laser components and therefore improves laser performance and lifetime.

As shown in Figure 14, the trigger pulse is optoisolated from the rest of the laser electronics. This allows triggering of the laser without permitting electrical noise from the laser discharge from impacting the user's electronics.

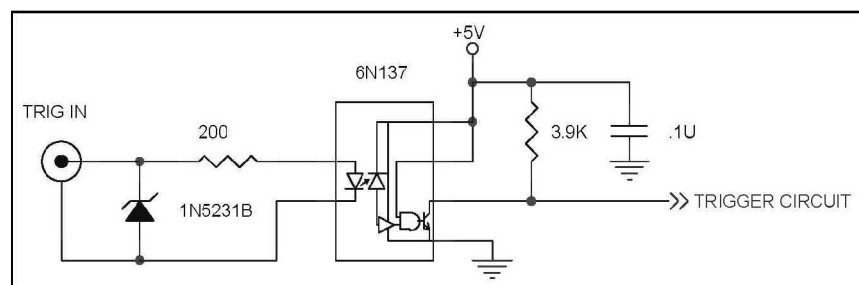


Figure 14. Schematic diagram of optoisolated trigger input.

## Rate

When the RATE knob is in the EXT TRIG position (indicator pointing down), the laser system is in EXTERNAL TRIGGER mode, and will fire only when an appropriate pulse is applied either to the TRIG IN BNC or through the DB-9 connector.

When the RATE knob indicator is between 1 and 20, the laser system is in INTERNAL RATE mode and will generate laser pulses between 1-20 Hz, depending on the positioning of the RATE knob indicator

## High Voltage Adjust

The energy output of the NL337 laser system is roughly proportional to the high voltage charge. The high voltage can be changed by adjusting the ten-turn potentiometer that can be accessed through the hole labeled HV ADJUST located in the left side of the protective housing. The high voltage of each unit is set during testing such that the unit meets specifications. As the pulse energy drops as the laser tube ages through use, increasing the high voltage will help offset the drop in pulse energy.

We do not recommend running the NL337 laser system with the high voltage adjusted to the maximum for long periods because this will shorten the life of laser cartridge. If your application does not require full pulse energy of the NL337, reducing the high voltage may significantly increase cartridge life.



*Figure 17. Changing the high voltage adjustment potentiometer.*