

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

The Wayback Machine - https://web.archive.org/web/19981206232131/http://www.eosi.com:80/lasdiod.html

EOSI

Environmental Optical Sensors, Inc.

BACK TO THE FIRST PAGE

[Welcome to EOSI][Technical Support][Tunable Laser Diode][Accessories][LabView]
[Applications][EOSI Capabilities][Specifications][Ordering]



ECU-2010-0XM Manual Tunable

Click on picture to get larger image



ECU-2010-0XA Automatic Stepper motor

driven tunable laser up to 25nm/sec

Click on picture to get larger image

Featuring:

- Linewidth less than 1Mhz
- Wide tuning range with no mode hopping
- Interchangeable modules to economically extend wavelength range (630nm - 1550nm)
- Direct wavelength readout
- Collimated and fiber coupled output.
- **New for 2010 No Alignment Modules**

Applications in:

- Atomic hyperfine studies
- Saturation and non-linear spectroscopy
- Doppler-free spectroscopy
- Frequency locked measurements
- Injection seeding.

Overview

The 2010 series of CW tunable lasers has been designed with a simple philosophy: To offer spectroscopists the ideal combination of cutting edge performance and entry level cost. This is delivered through use of a laser cavity which combines narrow line operation (100kHz) and a wide continuous tuning range. Laser diodes were chosen to provide the gain medium since these semiconductor devices offer the highest reliability, longest lifetime (up to 10 to the fifth--10 to the sixth hours), and lowest cost of any known class of laser. Cost of ownership is further minimized by the modular design of this laser; changing wavelength regime requires simple replacement of a low cost module in the laser head. The result is a laser system that is ideal for high resolution spectroscopy, from studies of atomic hyperfine structure through jet-cooled clusters.

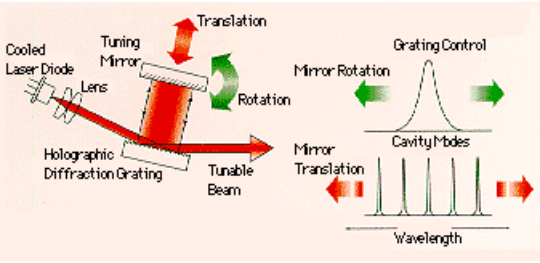
Before we designed our 2010 series lasers, we surveyed a number of laboratories involved in high resolution spectroscopy. Although most felt that existing tunable lasers could meet their performance needs, two very common complaints we heard were about the high cost and complexity of these lasers. In fact, such laser systems were often the single most expensive piece of equipment in the lab, and required a high degree of operator skill and familiarity.

The 2001 was created specifically to overcome these drawbacks. To simplify operation, its 16-bit microprocessor controls and monitors all functions, including wavelength tuning, absolute wavelength readout and direct wavelength and amplitude modulation. The microprocessor also reduces scanning, locking and calibrating a laser wavelength to simple push-button operations, and automatically controls "internal" functions, such as laser current and temperature.

Output wavelength is tuned simply by rotating the cavity end mirror. In our manual model, mirror rotation is achieved using a fine-geared knob on the side of the cavity. In our other lasers, rotation is controlled by a microprocessor driven stepper motor system, allowing automatic control of laser wavelength and scan rate. Step size ranges from 60-200 MHz.

In addition, all 2010 lasers have a piezo element (PZT) attached to the mirror. This allows fine continuous (mode hop free) scanning over a 30-100GHz range, or non-continuous scanning over a 200-600GHz range. The PZT also permits a servo of the wavelength to an optical reference. In the case of the stepper scanned models, all scanning can be programmed through an IEEE 488 interface, including the option to "stitch" together multiple successive fine scans.

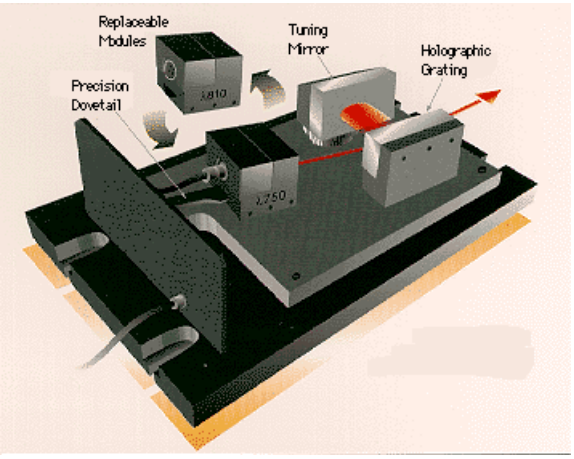
High Performance Cavity




```
The Littman/Metcalf cavity design combines narrow line performance
 with a wide tuning range.  Mode hopping is eliminated by synchronous
 rotation and translation of the tuning mirror.
```

The 2001 itself consists of a low cost, interchangeable laser diode module in a high efficiency tunable laser cavity, which supports both normal and fine tuning of a wavelength. A holographic diffraction grating is used as the wavelength tuning element. This is operated in a grazing incidence (Littman/Metcalf) configuration, which allows narrow line operation (100kHz) without the use of etalons. Consequently, the laser can be scanned over tens of nanometers with a linewidth of only 100kHz.

Low Cost Diode Modules




```
The modular design permits simple switching between wavelength regions.
```

Unlike a Ti:Sapphire or dye laser, the gain medium in one of these lasers is a low cost laser diode of the type used in compact disc players and telecommunications applications. Normally, the laser resonator consists of the small diode cavity itself, which is defined by the mirrored coatings on each end of this tiny chip.

In order to define a new, external, tunable end mirror, we first remove this dielectric coating from the front facet of the laser diode, and then apply an antireflection coating that reflects less than 10 to the -5 of incident light. This is a critical step, because failure to totally eliminate this unwanted third cavity mirror leads to unstable control over the laser's wavelength.

In our ultra-stable cavity, any given laser diode can be tuned over a range of between 15 and 90nm, depending on center wavelength. In order to minimize the cost of extending and varying the wavelength range of our lasers, we have made changing wavelength regions both simple and inexpensive.

The key to this is the modular design of our cavity. Changing wavelength merely requires interchanging modules, which consist of a laser diode and collimating lens. These low cost, pre-aligned modules can be completely exchanged in just a few minutes, including any slight optimizing of overall alignment.

Due to this modular approach, the limit on the total wavelength range of the laser is determined by the diffraction grating. Our holographic gratings not only exhibit high efficiency, but also can be used over a wide spectral range. At this time, we offer our lasers with a choice of three gratings, covering the ranges 600-946nm, 900-1400nm or 1200-1890nm. These gratings are easily interchangeable and can be ordered separately.

Mode Hopping

Mode hops - unpredictable changes in output, wavelength and power - have been a curse of narrow line CW lasers of all types, from ion lasers through dye and Ti:Sapphire.

Mode hopping occurs because the laser wavelength is actually controlled by two factors; the length of the cavity itself and whatever wavelength controlling elements (gratings, etalons, etc.) are inserted in the cavity. As the tuning element (grating) scans the output to longer wavelength, the length of the laser cavity must also be extended to maintain the same number of waves in the cavity. Otherwise, the output wavelength will suddenly shift as the number of cavity waves jumps, for example, from N to N+1: a mode hop.

Mode hopping is virtually eliminated in our Tunable Laser Diode system by a simple approach; the tuning mirror is rotated on a cam mechanism. As the mirror rotates, it also undergoes a minute amount of translation, altering the length of the cavity. The cam is precision machined so that the output wavelength and cavity length tune synchronously. With the possible exception of some of the wider tuning range modules, you will not experience a mode hop with the 2001.

Wavelength Readout



A common problem with many tunable lasers is determining the precise output wavelength. Because of this, spectroscopists often have to use an expensive external wavelength-meter.

All 2010 lasers contain an absolute 12-bit encoder attached to the grating, together with a temperature sensor in the laser cavity. By reading data from these, the microprocessor is able to compute and display the wavelength of the laser with a resolution of 0.1nm.

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP