Laser Diode Current Controller

Overview

Current Controllers Our laser diode current controllers include an easy-to-use K-Cube ® current controller, benchtop controllers, and PRO8 series rack mode.

Key Takeaways

A controllable laser diode current controller provides precise, stable current to a laser diode while often integrating temperature control and protection features to ensure safe and reliable operation.

Overview

Laser diodes are highly sensitive to injected current and temperature, and their optical output is strongly dependent on these parameters. A laser diode current controller, often combined with a temperature controller, ensures that the diode receives a stable, low-noise current, preventing damage from current spikes and maintaining consistent optical output power. These controllers are essential for both laboratory testing and practical applications where precise optical performance is required.

Key Features

Constant Current Mode: Maintains a fixed current to the laser diode, ensuring stable optical output. This is critical because the diode's light output is directly proportional to the drive current. Constant Power Mode: Uses feedback from a monitor photodiode to adjust the current automatically, keeping the optical output power constant.

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Temperature Control: Integrated TEC (thermoelectric cooler) control stabilizes the diode temperature, which affects both wavelength and efficiency. Protection Mechanisms: Includes current limiting, compliance voltage monitoring, and soft-start features to prevent catastrophic optical damage from overcurrent or voltage spikes. Remote Control and Automation: Many modern controllers, such as the Thorlabs LDC4000 Series, support SCPI-compatible USB interfaces for remote operation, high-resolution current setting, and integration with software like LabVIEW or Python.

Commercial Examples

Thorlabs LDC4000 Series: Supports injection currents up to 20 A, constant current and power modes, quasi-continuous wave operation, internal modulation, and optical power limiting. It is suitable for high-power laser diodes and can be recalibrated every 24 months.

Agiltron LDC

D Series: Compact modules providing low-noise laser driving current up to 1 A and TEC cooling current up to 2 A, designed for easy integration into laser systems. General Controllers: Many brands offer integrated current and temperature controllers with low-noise DC current sources, bipolar TEC drivers, and compliance voltage monitoring to ensure safe operation.

Practical Considerations

When selecting a laser diode current controller, consider: Required drive current and compliance voltage for your diode. Temperature control capability if wavelength stability is critical. Form factor and integration options for your system.

Software and remote control features for automated testing or modulation. Protection features to prevent damage during startup or transient events. Using a high-quality controller ensures stable optical output, protects the laser diode, and allows precise characterization or operation in research and industrial applications.

Article Content

Current Controllers

Our laser diode current controllers include an easy-to-use K-Cube ® current controller, benchtop controllers, and PRO8 series rack models. Combined

High-Power Laser Diode Controllers

This series supports all laser diode and monitor diode pin configurations and features a constant current or constant power mode. The series is designed for

Laser Diode Control Fundamentals

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These values are usually listed in a laser diode''s specification sheet so that a user can determine important operational parameters such as the current at which

Power efficient laser diode driver circuit and method

The laser diode drivers of FIGS. 10 and 11 both control laser diode power by adjusting a current source Ictl. In FIG. 10, a single-ended voltage modulation signal Vmod modulates the laser diode LD by

Arroyo Instruments

Arroyo Instruments is a laser diode driver and temperature controller manufacturer offering incredibly precise instruments for use in a variety of applications.

Stanford LDC500 Laser Diode Controller — Coherent Scientific

The LDC500 series are the ideal instruments for controlling the current and temperature of your laser diodes. They have the performance and features you expect from instruments costing twice as much.

Evolase PLD-NS-GSS-Tr Nanosecond Pulsed Laser Diode Driver

What laser diode packages does the PLD-NS-GSS-Tr support? It supports both standard 10-pin and 14-pin butterfly packages with defined pin assignments for TEC, thermistor, monitor photodiode, and

ETSC LCM-6000 Benchtop Semiconductor Laser Diode Controller

The ETSC LCM-6000 is a precision benchtop semiconductor laser diode controller engineered for demanding applications requiring simultaneous high-stability current drive and bidirectional

Laser Diode Driver

CW laser diode drivers are used to precisely control a laser diode''s optical output while protecting the laser diode from over current conditions. Multiple levels of laser diode protection are included in the

Semiconductor Laser Module and Method for Controlling the Same

U.S. Patent Application US20070242712A1 for the present invention is to provide a laser module that includes a semiconductor laser diode that is raised in a temperature without degrading the heat

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Melles Griot 06DLD103 Diode Laser Driver Controller Instrument

Model: 06DLD103. Diode Drive Current: Up to 200 mA. Io (Laser Drive Current): Initialized & set to 10 mA. Connectivity/Ports: RS-232 Serial Interface (Rear Panel) & Laser/TEC Drive Port.

Laser Driver | Current Controllers for Laser Diode Drivers

Current controllers can operate laser diodes with different operating currents and compliance voltages (voltage required to operate the laser diode at a given or specified current). The current and voltage

An Analog Current Controller Design for Laser Diodes

All the laser diodes have temperature controllers (WTC3243 from Wavelength Electronics) driving TECs to stabilize the temperature. In addition to the current controller, the laser diode has the protection

Koheron CTL200-1-B-100 Digital Butterfly Laser Diode Controller Board

Overview The Koheron CTL200-1-B-100 is a precision digital laser diode controller engineered for demanding optical laboratory and industrial integration applications. As the digital evolution of the

Laser Diode Controllers (ALL LEADING BRANDS)

A laser diode controller consists of a constant current source combined with a TEC temperature controller. Their function is to provide constant, stable current to a

LASER DIODE DRIVER BASICS – Wavelength

In the most ideal form, it is a constant current source, linear, noiseless, and accurate, that delivers exactly the current to the laser diode that it needs to

Laser Diode Controllers

The LDC500 series are the ideal instruments for controlling the current and temperature of your laser diodes. They have the performance and features you

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