

# Laser Diode Controller

LDC501 — Laser diode controller with integrated temperature controller



## LDC501 Laser Diode Controller

### Laser Diode Controller

- 500 mA low-noise current source
- Low drift (<10 ppm/°C)
- 1.1 MHz modulation
- CC & CP mode dynamic switching
- GPIB, RS-232 and Ethernet

### TEC Controller

- 36 W output power
- High stability 0.0005 °C/°C
- Thermistor, RTD and IC sensors
- Auto-tuning of loop parameters
- CC & CP mode dynamic switching

• LDC501 ... \$2495 (U.S. list)

Introducing the LDC501 Laser Diode Controller: a highly stable, low-noise current source, with an integrated temperature controller — all at a very affordable price.

The LDC501 is the ideal instrument for controlling the current and temperature of your laser diodes. It has the performance and features you expect from instruments costing twice as much.

With a low-noise current source that delivers up to 500 mA, a 36 W high-precision temperature controller, and standard computer interfaces including Ethernet, the LDC501 is the right choice for your laser diode testing and control applications.

### Easy-To-Use Interface

The LDC501 has an intuitive user interface, and many first time users will be able to operate the instrument without having to crack open the manual (although we do recommend reading the manual). Unlike competitive models, the LDC501 has a dedicated front-panel display for parameter entry. You don't have to sacrifice monitoring temperature or current to simply change an instrument setting — you have a separate two-line, blue alpha-numeric display for that. In addition, bright 5-digit green LED displays constantly monitor current and temperature, and are large enough to easily read from anywhere in the lab.



## Laser Diode Current Source

### Current Source

Range	0 to 500 mA
Setpoint resolution	10 $\mu$ A
Accuracy	$\pm$ 0.01 % of full scale
Output impedance	>1 M $\Omega$ (DC)
Stability	
Thermal	<10 ppm/ $^{\circ}$ C
Short-term (1 hr.)	<5 ppm full scale
Long-term (24 hr.)	<20 ppm full scale
Noise	<3.5 nA/ $\sqrt$ Hz
	<3 $\mu$ A rms (10 Hz to 100 kHz)
Compliance voltage	
Range	0 to 10 V, programmable
Resolution	10 mA
Accuracy	$\pm$ 0.5 %
Current Limit	
Range	0 to 501 mA
Resolution	1 mA
Accuracy	$\pm$ 2 mA

### Analog Modulation

Input range	0 to 10 V
Input impedance	4 k $\Omega$
Gain	
CC mode	50 mA/V (LD current)
CP mode	500 $\mu$ A/V (PD current)
Bandwidth (3 dB)	
CC mode	DC to 1.1 MHz (high)
	DC to 10 kHz (low)
CP mode	DC to 10 kHz (high)
	DC to 90 Hz (low)

### Monitor Photodiode

Bias voltage	0 to 5 V, programmable
PD current range	3 to 5000 $\mu$ A
Setpoint resolution	1 $\mu$ A (CP mode)
Setpoint accuracy	$\pm$ 2 $\mu$ A
Drift	$\pm$ 0.03 % (CP mode)

### Measurement & Display

Output current	
Range	0 to 501 mA
Resolution	0.01 mA
Accuracy	$\pm$ 0.03 % FS
Photodiode current	
Range	0 to 5010 $\mu$ A
Resolution	0.1 $\mu$ A
Laser diode forward voltage	
Range	0 to 12 V
Resolution	1 mV
Accuracy	$\pm$ 2 mV (4 wire)

## Temperature Controller

### Temperature Control

Control range	
Firmware limits	-150 $^{\circ}$ C to +250 $^{\circ}$ C
Setpoint resolution	0.001 $^{\circ}$ C
Setpoint accuracy	0.01 $^{\circ}$ C, sensor dependent
Stability (using a 10 k NTD thermistor), typ.	
Thermal	0.0005 $^{\circ}$ C/ $^{\circ}$ C (vs. ambient)
Short-term (1 hr.)	$\pm$ 0.001 $^{\circ}$ C
Long-term (24 hr.)	$\pm$ 0.004 $^{\circ}$ C
Control algorithm	PID, with autotuning & antiwindup

### TEC Output

Source type	Linear, bipolar current source
Current range	-4.5 A to +4.5 A
Setpoint resolution	1 mA
Setpoint accuracy	$\pm$ 10 mA
Max. power	36 W
Compliance voltage	>8 VDC
Current noise	<1 mA rms @ 4 A output
Current limits	
Range	-4.5 A to +4.5 A, low & high
Accuracy	$\pm$ 5 mA

### Temperature Sensors

Thermistors	10 to 500 k $\Omega$ (sensor bias at 10 $\mu$ A, 100 $\mu$ A, 1000 $\mu$ A)
RTD	Pt-100, Pt-1000 (1 mA sensor bias)
IC voltage sensors	LM335 and equivalent
IC current sensors	AD590, TMP17, and equivalent

### Measurement & Display

Temperature	
Range	-150 $^{\circ}$ C to +250 $^{\circ}$ C
Resolution	0.001 $^{\circ}$ C
Thermistor	
Range	0 to 500 k $\Omega$
Resolution	0.01 %
Accuracy	0.03 %
TEC current	
Range	-4.5 A to +4.5 A
Resolution	1 mA
Accuracy	$\pm$ 10 mA
TEC voltage	
Range	-9 V to +9 V
Resolution	1 mV
Accuracy	$\pm$ 10 mV (4 wire)

### General

Instrument connectors	DB9-F (laser diode), DB15-F (TEC) BNC (modulate, trigger output)
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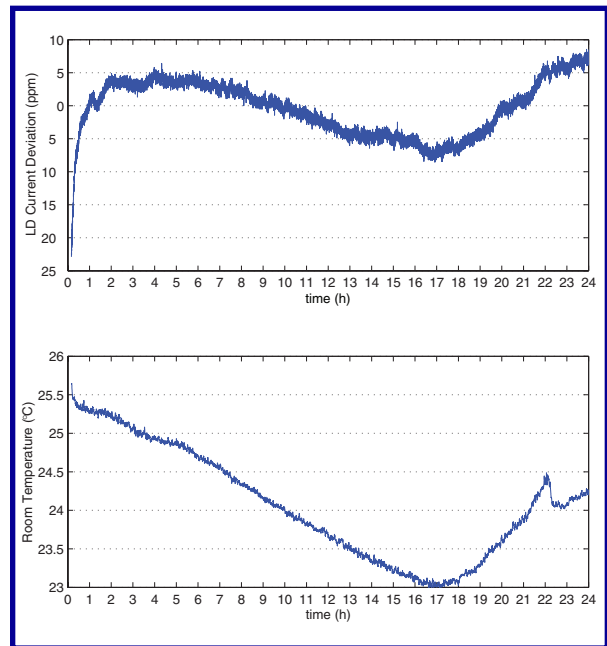
Remote interfaces	GPIB (IEEE488.2), RS-232, Ethernet
Power	100 to 120 VAC, 220 to 240 VAC, 50Hz/60Hz, 100W
Dimensions	7"×5"×15" (WHL)
Weight	15 lbs.
Warranty	One years parts and labor on defects in material and workmanship

## About Thermal Stability

Temperature fluctuations in a typical laboratory environment can often exceed several degrees Celsius over the course of a day. Small temperature changes can mean significant current changes in your laser diode if your controller is not up to the task.

The LDC501 has a temperature coefficient of 10 ppm/°C, which is a factor of five better than competing models, making it the ideal controller for precision laser diode experiments.

The graphs below demonstrate the temperature performance of the LDC501. Over a 24 hour period, the ambient temperature change in the laboratory exceeds two degrees Celsius. Note that the output current deviation of the LDC after warm-up is stable to better than  $\pm 10$  ppm.



### Ordering Information

LDC501 Laser Diode Controller

\$2495