



## TEMPERATURE CONTROL OUTPUT

Temperature Control Range: <sup>1</sup>	-99°C to 199.9
Temperature Setpoint Resolution:	0.1°C
Temperature Setpoint Accuracy: <sup>2</sup>	±0.2°C
Thermistor:	±0.2°C
AD590:	±0.2°C
LM335:	±0.2°C
Short-Term Stability (1 hr): <sup>3</sup>	±0.006°C
Long-Term Stability (24 hr): <sup>3</sup>	±0.01°C

## TEC OUTPUT

Type:	Bipolar current
Control Algorithm	Smart Integral
Compliance Voltage:	>6 V DC
Maximum Output Current:	4.0 A
Maximum Output Power:	24W <sup>4</sup>
Current Noise and Ripple: <sup>5</sup>	<1 mA rms

## CURRENT LIMIT

Current Limit Range:	0 - 4.04 A
Current Limit Set Accuracy:	± 50 mA

## TEMPERATURE SENSOR

Types	
Thermistor:	2-wire NTC
IC Sensor:	AD590/LM335
RTD Sensor: <sup>7</sup>	2-wire RTD, 10
Thermistor Sensing Current:	10 /100 µA
IC Sensor Bias:	AD590 = 8V LM335 = 0.6 V
Usable Thermistor Range:	250-450,000 Ω
User Calibration	
Thermistor:	Steinhart-Hart
IC Sensor:	Two point
Analog Output: <sup>8</sup>	0-5V
Transfer Function:	
Thermistor:	10 kΩ/V
LM335:	1 V/V
AD590:	100 µA/V

## Product Features

24W and 50W models

Low noise, bi-polar output

Typical drift less than  $\pm 0.004^{\circ}\text{C}$

Wide temperature control range  
 $-99^{\circ}\text{C}$  to  $+199^{\circ}\text{C}$

Operational with thermistors and  
IC temperature sensors

Smart integrator control loop with  
fast response and temperature  
settling

USB 2.0 serial interface

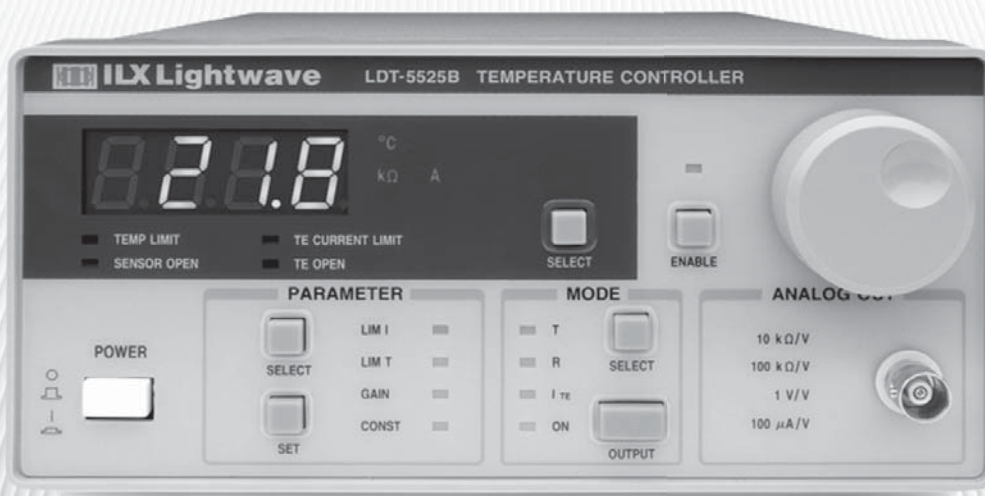
The LDT-5500B Series Temperature Controllers are optimized for precision temperature control of laser diodes and other optoelectronic components. Two models combine up to 24W and 50W of thermoelectric control power with a hybrid smart-integrator feedback loop for precise temperature control. The LDT-5500B Series accept thermistor, IC, and RTD temperature sensors providing convenience and flexibility over a broad range of temperature control applications.

These instruments utilize a hybrid smart integrator algorithm to ensure fast settling times and maintain high temperature stability, typically within  $\pm 0.004^{\circ}\text{C}$ . A simple, intuitive front panel interface makes these instruments easy to use and with ILX interconnect cables and the industry's widest selection of laser diode mounts, you can set up and be controlling the temperature of your laser diode in minutes.

The USB interface and control software allows for fast, repeatable instrument control in R&D and manufacturing testing and other automated control applications.

# LDT 5500B Series

## Thermoelectric Temperature Controller



## Exceptional Value for Temperature Controlling Laser Diodes

 **Newport® Products**

# LDT 5500B Series

## Thermoelectric Temperature Controller

The LDT-5500B Series are precision, microprocessor based thermoelectric (TE) temperature controllers that deliver a low noise, bipolar constant current output of up to 5 Amps and 50W of heating or cooling power. These instruments close a precision temperature control loop through a variety of temperature sensors and display temperature from -99°C to 199°C or sensor resistance.

The temperature controller topology, paired with a hybrid smart-integrator control loop result in fast settling times with a temperature stability of 0.004°C which is ideal for laser diode or optoelectronic component testing requiring stable wavelength and optical power.

### PRECISION TEMPERATURE CONTROL

The LDT-5500B's operate in constant temperature, constant resistance (sensor), or constant current mode. Attention to detail in the design of the low noise current source, feedback loop, and sensor measurement circuits ensure accurate, low noise temperature control that won't drift over time in any of the instrument operating modes.

In constant temperature mode, the instrument will control to a setpoint temperature between -99°C and 199°C depending on the thermoelectric module performance characteristics, heat load, and temperature sensor connected to the instrument. Because these instruments are micro-processor controlled, the temperature can be displayed in °C accurately with the appropriate sensor constants entered through the front panel or USB interface.

Even with two-terminal thermistors and their non-linear relationship between temperature and resistance and IC temperature sensors where a highly linear relationship exists between temperature and voltage or current, by using the appropriate equation for the selected temperature sensor and the pertinent calibration constants, residual errors of less than 0.01°C can be realized over wide temperature ranges.

The LDT-5500B's low noise bipolar current source reduces the noise coupled to your laser diode for precise control and measurements in your application.

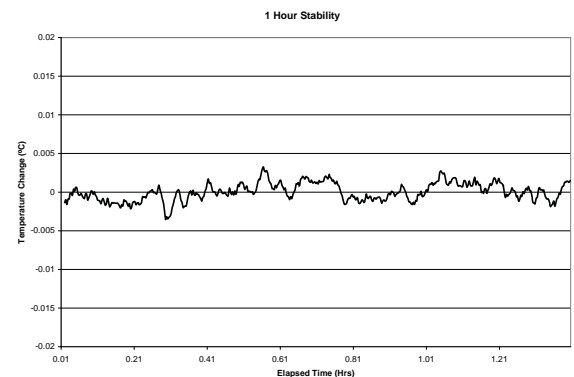
### WIDE TEMPERATURE CONTROL RANGE

The LDT-5500B's offer user-selectable thermistor source currents of 10  $\mu$ A and 100  $\mu$ A allowing the

instruments to measure resistance from 250 $\Omega$  to 450k $\Omega$  providing control over a wide range of temperatures and applications. For a typical 10 k $\Omega$  thermistor, this corresponds to a temperature control range from -25°C to 60°C. Other temperature control ranges are possible by choosing different resistance value thermistors.

For more information, refer to ILX Application Note "Selecting Thermistors for Temperature Control".

In addition to compatibility with a wide range of thermistors, the LDT-5500B also accepts IC temperature sensors and with the TSC-599 sensor converter, platinum RTD sensors. Depending on the temperature sensor selected, the LDT-5500B measures the thermistor resistance, the AD590 current or the LM335 voltage, calculates the temperature for display and controls precisely to a temperature set point.



*The LDT-5500B demonstrates temperature stability better than  $\pm 0.004$ °C over one hour.*

### SIMPLE, EASY TO OPERATE INSTRUMENT

Configuration of the LDT-5500B for your application is made even easier through a new front panel interface. Display modes are selectable for temperature, resistance, and current readout, easily visible with the bright green LED 4-digit display. SELECT and SET controls along with the rotary control knob allows you to quickly set temperature setpoints along with sensor calibration constants, output current limits, temperature limits, and the control loop gain. With ILX interconnect cabling and a wide variety of laser diode mounts, you can set up and control temperature within minutes.

# LDT 5500B Series

Thermoelectric  
Temperature  
Controller



## SAFEGUARDING YOUR DEVICES

In addition to normal instrument control and operating modes, the current output of the LDT-5500B's are bound by fully independent programmable current limits. The temperature control loop can also be bound by programmable temperature limits. Adjustment of either of the limit settings is easy and precise even with the instrument controlling temperature. Furthermore, if a temperature sensor or the TE module should open, the 5500B automatically shuts the control output off and lights up a front panel LED indicating the cause of the fault.

## AUTOMATE INSTRUMENT OPERATION

Remote instrument operation is available on all LDT-5500B Temperature Controllers through a USB 2.0 serial computer interface. All instrument controls and functions are accessible through the interface for easy remote programming and control in automated test and control systems where repeatable and accurate test sequencing, measurements, and data handling are required. Installation software available with each instrument in a very easy to read and change format facilitates instrument set up and control. Through this software, instrument controls are organized similar to the front panel for easy, intuitive remote control and monitoring.

## SIMPLIFY ROUTINE MAINTENANCE

The LDT-5500B architecture simplifies routine maintenance; calibration of the TEC current and sensor measurement can be performed via the front panel or through USB interface, without opening the instrument up or manual adjustments. A calibration mode is entered through unique push button combinations or remote commands, and all calibration data is easily entered via the front panel or USB interface. Calibration data is automatically stored in on-board non-volatile memory.

## PUT OUR EXPERTISE TO WORK

ILX Lightwave is a recognized world leader in Laser Diode Instrumentation and Test Systems. Our products are not only renowned for their reliability, quality, and value, they're backed by industry-leading after sales support. For more information about the LDT-5500B Series Temperature Controllers, and our complete family of Laser Diode Instrumentation and Test Systems, call us today or visit our website at [www.newport.com/ilxlightwave](http://www.newport.com/ilxlightwave).

# LDT 5500B Series

## Thermoelectric Temperature Controller

### Specifications

#### TEMPERATURE CONTROL OUTPUT

Temperature Control Range:<sup>1</sup>  
Temperature Setpoint Resolution:  
Temperature Setpoint Accuracy:<sup>2</sup>  
Thermistor:  
AD590:  
LM335:  
Short-Term Stability (1 hr):<sup>3</sup>  
Long-Term Stability (24 hr):<sup>3</sup>

#### LDT-5525B

-99°C to 199.9°C  
0.1°C  
±0.2°C  
±0.2°C  
±0.2°C  
±0.2°C  
±0.006°C  
±0.01°C

#### LDT-5545B

-99°C to 199.9°C  
0.1°C  
±0.2°C  
±0.2°C  
±0.2°C  
±0.2°C  
±0.006°C  
±0.01°C

#### TEC OUTPUT

Type:  
Control Algorithm  
Compliance Voltage:  
Maximum Output Current:  
Maximum Output Power:  
Current Noise and Ripple:<sup>6</sup>

Bipolar current source  
Smart Integrator, Hybrid PI  
>6 V DC (@ 4A)  
4.0 A  
24W<sup>4</sup>  
<1 mA rms

Bipolar current source  
Smart Integrator, Hybrid PI  
>10 V DC (@ 5A)  
5.0 A  
50W<sup>5</sup>  
<1 mA rms

#### CURRENT LIMIT

Current Limit Range:  
Current Limit Set Accuracy:

0 - 4.04 A  
± 5.0 mA

0 - 5.05 A  
± 5.0 mA

#### TEMPERATURE SENSOR

##### Types

Thermistor:  
IC Sensor:  
RTD Sensor:<sup>7</sup>  
Thermistor Sensing Current:  
IC Sensor Bias:

2-wire NTC  
AD590/LM335  
2-wire RTD, 100Ω, 500Ω, 1kΩ  
10 / 100 μA  
AD590 = 8V  
LM335 = 0.6 mA

2-wire NTC  
AD590/LM335  
2-wire RTD, 100Ω, 500Ω, 1kΩ  
10 / 100 μA  
AD590 = 8V  
LM335 = 0.6 mA

Usable Thermistor Range:  
User Calibration  
Thermistor:  
IC Sensor:

250-450,000 Ω, typical  
Steinhart-Hart, 3 constants  
Two point

250-450,000 Ω, typical  
Steinhart-Hart, 3 constants  
Two point

Analog Output:<sup>8</sup>  
Transfer Function:  
Thermistor:  
LM335:  
AD590:

0-5V  
10 kΩ/V  
1 V/V  
100 μA/V

0-5V  
10 kΩ/V  
1 V/V  
100 μA/V

#### TEC MEASUREMENT (DISPLAY)

Display Type:  
Temperature Range:  
Temperature Resolution

4 digit green LED  
-99.9°C to 199.9°C

4 digit green LED  
-99.9°C to 199.9°C

Thermistor:  
AD590:  
LM335:

0.1°C  
0.1°C  
0.1°C  
±0.5°C

0.1°C  
0.1°C  
0.1°C  
±0.5°C

##### Accuracy:<sup>2</sup>

Thermistor Resistance Range  
10 μA:  
100 μA:

2.5 - 450 kΩ  
0.25 - 45.0 kΩ

2.5 - 450 kΩ  
0.25 - 45.0 kΩ

Thermistor Resistance Resolution

10 μA:  
100 μA:

0.1 kΩ  
0.01 kΩ

0.1 kΩ  
0.01 kΩ

Thermistor Resistance Accuracy:

TE Current Range:  
TE Current Resolution:  
TE Current Accuracy:

±0.05% of FS  
-4.00 to 4.00 A  
0.01 A  
±0.03 A

±0.05% of FS  
-5.00 to 5.00 A  
0.01 A  
±0.03 A

#### OUTPUT CONNECTOR

TEC I/O:  
Analog Output:  
Communication:

15 pin, D-sub  
BNC  
USB

#### GENERAL

Power, VAC (50-60 Hz)  
Current Draw (5525B):  
(5545B):

100 ± 10%; 120 ± 10%; 230 ± 10%  
100-120VAC: 0.86A; 230VAC: 0.42A  
100-120VAC: 1.16A; 230VAC: 0.55A

Size:

88mm x 185mm x 304mm  
3.5" x 7.3" x 12"

Weight:

3.6 kg (8 lbs.)

Operating Temperature:

0°C to 40°C

Storage Temperature:

-40°C to 70°C

Humidity:

<80% relative, non-condensing

#### NOTES

- Actual temperature control range depends primarily on the thermal load, sensor and TE module used.
- Accuracy figures are quoted for a typical 10 kΩ thermistor and 100 μA current setting. Accuracy figures are relative to the calibration standard. Both resolution and accuracy are dependent upon the user-defined configuration of the instrument.
- Stability is a strong function of the thermal environment of the temperature sensor and the TE module. Ambient air currents in particular can cause fluctuations of 0.1°C in an exposed mounting configuration.
- Output power rated into a 1.5Ω load.
- Output power rated into a 2.0Ω load.
- Measured with the instrument in ITE mode at half scale output over a bandwidth of 10 Hz to 10 MHz.
- With use of optional TSC-599 Temperature Sensor Converter.
- 0 to 5V representing measured temperature.

#### ORDERING INFORMATION

LDT-5525B-120V	24W Thermoelectric Temperature Controller, 120V
LDT-5525B-220V	24W Thermoelectric Temperature Controller, 220V
LDT-5545B-120V	50W Thermoelectric Temperature Controller, 120V
LDT-5545B-220V	50W Thermoelectric Temperature Controller, 220V
CC-501S	TE Controller / Underterminated Interconnect Cable
CC-505S	TE Controller / Laser Diode Mount Interconnect Cable
CC-501HT	TE Interconnect Cable, 15 pin to 7W2
TS-510	10 kΩ Calibrated Thermistor
TS-520	10 kΩ Uncalibrated Thermistor
RM-134	Single Instrument Rack Mount Kit
RM-135	Dual Instrument Rack Mount Kit
TSC-599	RTD Temperature Sensor Converter

In keeping with our commitment to continuing improvement, ILX Lightwave reserves the right to change specifications without notice or liability for such changes.