

## Product Features

32W thermoelectric temperature control

Precision set point resolution of  $\pm 0.01^{\circ}\text{C}$  with long term temperature stability of  $\pm 0.002^{\circ}\text{C}$

Fully programmable PID control loop with auto-tune and preset PID values

Independent heating and cooling current limits

GPIB 488.1 and USB 2.0 computer interfaces with LabVIEW® instrument driver

Remote commands compatible with LDT-5910B

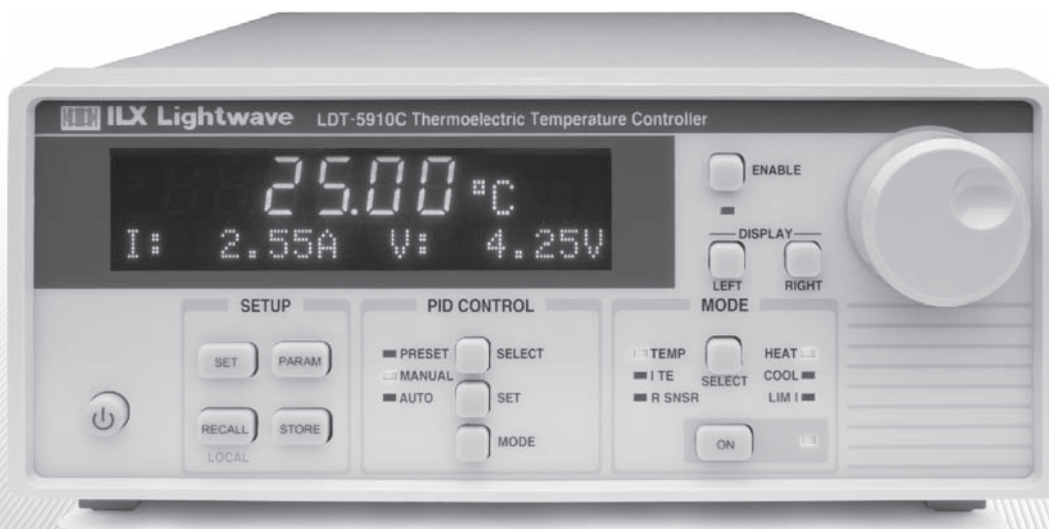
Designed for unmatched performance and incredible value, the LDT-5910C Thermoelectric Temperature Controller offers  $\pm 0.002^{\circ}\text{C}$  long term temperature stability and intuitive front panel operation. The LDT-5910C can operate in constant temperature, sensor, and TE current while measuring TE current, sensor resistance, and TE voltage. The LDT-5910C is compatible with thermistor, IC sensors, and RTD sensors providing maximum flexibility in your application.

The LDT-5910C includes a fully programmable PID control loop with twelve preset PID values and an auto-tuning feature to calculate the optimal PID values. For demanding applications such as wavelength stability, the LDT-5910C provides a low noise, linear bi-polar current source output with less than 1mA of rms noise.

For easy integration into automated test applications, the LDT-5910C comes standard with GPIB and USB remote interfaces. A robust and easy to modify LabVIEW® driver is available to download from the ILX Lightwave website.

# LDT 5910C

Thermoelectric  
Temperature  
Controller



Temperature Control with Unmatched  
Performance and Intuitive Operation

 **ILX Lightwave**  
Photonic Test and Measurement

# LDT 5910C

## Thermoelectric Temperature Controller

### HIGH PERFORMANCE TEMPERATURE CONTROL

The LDT-5910C easily controls the temperature of your laser diode in one of three modes: (1) Constant Temperature, (2) Constant Sensor or (3) Constant Current. Temperature stability of  $\pm 0.002^{\circ}\text{C}$  ensures device performance and highly reliable test measurements. With  $\pm 0.002^{\circ}\text{C}$  stability, the LDT-5910C is ideal for R&D applications, eliminating mode hopping and significantly reducing noise due to temperature fluctuations.

### FULLY PROGRAMMABLE PID CONTROL

The LDT-5910C features a fully programmable PID loop with manually adjustable PID constants, twelve preset PID values, and an auto-tuning mode. The different PID modes allow for fast and easy instrument configuration or precise PID adjustment.

The first six presets feature the original gain values of the LDT-5910B and the second six presets offer optimal performance for the compatible ILX Lightwave mounts. In addition to selecting the optimum PID value for ILX Lightwave mounts, when a preset is chosen, the correct TE current limit and sensor of the mount is automatically set in the instrument.

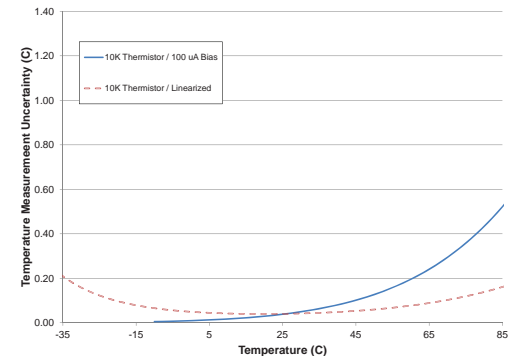
The two auto-tune functions provide the ideal auto-tuning algorithm in varying applications and automatically determine the optimal PID control constants for your particular thermal load.

### TEMPERATURE SENSOR COMPATIBILITY

In addition to thermistor temperature sensor compatibility, the LDT-5910C accommodates RTD, current and voltage IC sensors. The type of temperature sensor is selected through the front panel or by remote command. An auto-sensing thermistor current mode selects thermistor current based on measured resistance. By using the appropriate calibration constants,  $0.2^{\circ}\text{C}$  absolute accuracy can be achieved.

A unique linearized thermistor mode allows a standard  $10\text{k}\Omega$  thermistor to be used over the range from  $-30^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  in the  $100\ \mu\text{A}$  setting.

In the graph below, the solid line demonstrates the measurement uncertainty of a  $10\text{k}\Omega$  thermistor at the  $100\ \mu\text{A}$  setting. The dashed line represents the uncertainty of the resistance measurement over the temperature range of  $-30^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  for the linearized  $10\text{k}\Omega$  thermistor mode.



### EASE OF OPERATION

The front panel features a large 7-segment LED display with integrated dot matrix display. The 7-segment display enables easy viewing of temperature, sensor resistance, or TE current across the lab depending on the control mode. The dot matrix display can display TE current, TE voltage, sensor resistance or temperature, as well as the control set point and errors. The front panel buttons are grouped by function for easy setup. With ILX interconnect cabling and a wide variety of laser diode mounts, you can set up and control temperature within minutes.

New to ILX Lightwave is the ability to upgrade the firmware of the LDT-5910C on-site via the USB 2.0 interface. For detailed instructions, on upgrading the firmware, visit [www.ilxlightwave.com](http://www.ilxlightwave.com).

### SAFEGUARDING YOUR DEVICES

The LDT-5910C provides peace of mind with normally open and normally closed interlocks that open or close when the output is disabled. The interlocks are designed to connect to your current source and will disable the output of the current source if the LDT-5910C is disabled. The current, temperature, and temperature sensor control loops are bound by programmable limits. The current limit includes independent heating and cooling current limits that provide not only device protection, but a heat only mode. Adjustment of the limit settings is easy and precise, even with the instrument's output enabled.

# LDT 5910C

## Thermoelectric Temperature Controller

### COMPREHENSIVE REMOTE INTERFACE

Remote instrument operation is available on the LDT-5910C through an IEEE 488.1 GPIB interface or USB 2.0 interface. All instrument controls and functions are accessible through the interfaces for easy remote programming and control in automated test systems where repeatable and accurate test sequencing, measurements, and data handling are required. The LDT-5910C can replace the LDT-5910B in automated setups by providing compatible remote commands.

### SIMPLIFY ROUTINE MAINTENANCE

The architecture of the LDT-5910C simplifies routine maintenance; calibration of the TEC current, TE voltage measurement and sensor measurement can be performed via the front panel or through remote interface, without opening the instrument or making manual adjustments.

### PUT OUR EXPERTISE TO WORK

In keeping with ILX Lightwave tradition, the LDT-5910C Thermoelectric Temperature Controller delivers exceptional performance, backed by ILX Lightwave's unmatched service and applications support. ILX is a recognized world leader in laser diode instrumentation and test systems. Our products are renowned for their reliability, quality, value, and strong after-sales support.

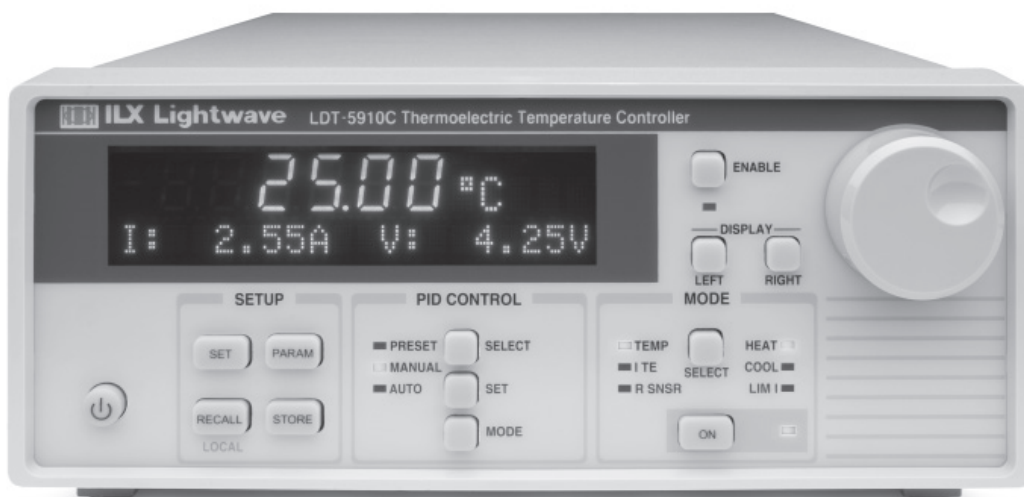
### Specifications

#### TEC OUTPUT

Type :	Bidirectional, linear
Isolation:	Floating with respect to earth ground
Current Setpoint Range:	-4.00 A to +4.00 A
Current Setpoint Resolution: <sup>6</sup>	0.01 A
Current Setpoint Accuracy:	±0.05 A
Current Limit Range:	-4.05 A to +4.05 A
Current Limit Accuracy:	±0.05 A
Voltage Measurement <sup>7</sup>	
Range:	-8.00 V to +8.00 V
Resolution: <sup>6</sup>	0.01 V
Accuracy:	±0.01 V
Compliance Voltage:	±8 V
Maximum Output Power:	32 W
Current Noise and Ripple: <sup>5</sup>	<1 mA rms

#### GENERAL

Connectors	
TEC I/O:	Female 15-Pin D-sub
GPIB:	IEEE-488.1
USB:	2.0
Analog Input:	BNC
Power Requirements	
LDT-5910C:	110 - 130 VAC, 50/60 Hz, 1 A
LDT-5910C:	220 - 240 VAC, 50/60 Hz, 0.5 A
LDT-5910CJ:	100 - 110 VAC, 50/60 Hz, 1 A
Size (HxWxD):	86 mm x 86 mm x 100 mm (3.4" x 3.4" x 3.9")
Weight:	4.9 kg. (10.8 lbs.)
Operating Temperature:	10 °C to 40 °C
Storage Temperature:	-40 °C to 70 °C
Humidity:	<85%, relative, non-condensing
Warm Up:	1 hour
Compliance:	CE



# LDT 5910C

## Thermoelectric Temperature Controller

### Specifications

#### CONTROL SYSTEM

##### Temperature Control Range <sup>2</sup>

Thermistor Sensor:	-100 °C to +200 °C
IC Sensor:	-100 °C to +150 °C
RTD Sensor:	-100 °C to +200 °C

##### Temperature Setpoint and Measurement

##### Precision / Accuracy <sup>3</sup>

0 °C:	±0.001 °C / ±0.01 °C
25 °C:	±0.002 °C / ±0.04 °C
50 °C:	±0.007 °C / ±0.15 °C
75 °C:	±0.05 °C / ±0.9 °C

##### Temperature Stability <sup>4</sup>

1 hour:	±0.001 °C
24 hours:	±0.002 °C

#### SENSOR

##### Types

Thermistor:	NTC (2-wire)
IC-V Semiconductor IC:	LM-335
	Voltage output, 5 to 14 mV/K
IC-I Semiconductor IC:	AD-590
	Current output, 1 μA/K
RTD Sensor:	Platinum 100 Ω/1000 Ω (2-wire)

##### Thermistor Sensor Resistance

100 μA Bias Setting	
Range:	0 to 450 kΩ
Resolution (Display): <sup>6</sup>	0.01 kΩ
Accuracy:	±180 Ω

100 μA Bias Setting	
Range:	0 to 45 kΩ
Resolution (Display): <sup>6</sup>	0.001 kΩ
Accuracy:	±18 Ω

##### Linearized Thermistor Resistance

Range:	0 to 15 kΩ
Resolution (Display): <sup>6</sup>	0.001 kΩ
Accuracy:	±10 Ω

##### IC-V Sensor Voltage

Nominal Bias:	1 mA
Range:	0 to 6 V
Resolution (Display): <sup>6</sup>	0.0001 V
Accuracy:	±2 mV

##### IC-I Sensor Current

Nominal Bias:	5 to 15 V
Range:	0 to 600 μA
Resolution (Display): <sup>6</sup>	0.001 μA
Accuracy:	±0.18 μA

##### RTD Sensor Resistance

1 mA Bias Setting	
Range:	0 to 1500 Ω
Resolution (Display): <sup>6</sup>	0.01 Ω
Accuracy:	±0.8 Ω

2.5 mA Bias Setting	
Range:	0 to 200 Ω
Resolution (Display): <sup>6</sup>	0.001 Ω
Accuracy:	±0.1 Ω

##### User Sensor Calibration

Thermistor:	Steinhart-Hart, 3 constants
IC Sensors:	Slope, Offset
RTD:	R <sub>0</sub> , A, B, C

#### AUXILIARY I/O

##### Analog Control Input

Input Voltage Range:	-5 V to +5 V
Input Resistance:	>100 kΩ
Gain:	2 °C/V
Bandwidth	5 Hz
Interlock:	n/o and n/c relay contacts

##### External Fan Control Output

Output Voltage Range:	0 to +12 V
Maximum Current:	500 mA

#### ORDERING INFORMATION

LDT-5910C	Thermoelectric Temperature Controller
LDT-5910CJ	Thermoelectric Temperature Controller, 100 V
CC-505S	TE Controller / Laser Diode Mount Interconnect Cable
CC-501S	TE Controller / Unterminated Interconnect Cable
RM-144	Single Rack Mount Kit
RM-145	Dual Rack Mount Kit
TS-510	10 kΩ Calibrated Thermistor
TS-520	10 kΩ Uncalibrated Thermistor
TS-521	5 kΩ Uncalibrated Thermistor
TS-523	20 kΩ Uncalibrated Thermistor
TS-525	100 kΩ Uncalibrated Thermistor
TS-530	Uncalibrated AD590
TS-540	Uncalibrated LM335

#### NOTES

- All values are specified for an ambient temperature of 23 ± 5 °C after a 1 hour warm up unless otherwise specified.
- Software limits of range. Actual range depends on the physical load, sensor type, and TEC module used.
- Accuracy figures represent the uncertainty that the 5910C/40C adds to the measurement. This figure does not include the sensor calibration uncertainties. Thermistor accuracy figures are quoted for a typical 10k thermistor and 100 μA current setting for -5 °C to 50 °C.
- Temperature stability measurements made in a stable ambient environment ±5 °C with a 10 kΩ thermistor on the 100 μA setting after a 2 hour warm up period. Stability is defined as ±(T<sub>max</sub>-T<sub>min</sub>)/2 over the measurement period.
- Measured over the full DC current range into a 1 Ω load.
- Maximum resolution available when operating in the control mode (using the 7-segment display) resolution will be reduced when displayed on the lower display. In remote operation, 6 significant digits of resolution are reported.
- Measured at the output connector. Users may enter in cable resistance to provide an accurate voltage measurement at the load.

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

 **ILX Lightwave**  
Photonic Test and Measurement

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