**Specifications**

**CONTROL SYSTEM**
- **Temperature Control Range**: -100 °C to +200 °C
  - Thermistor: Steinhart-Hart, 3 constants
  - IC Sensors: Slope, Offset
  - RTD: R

**Temperature Setpoint and Measurement**
- **Precision / Accuracy**:
  - 25 °C: ±0.01 °C / ±0.01 °C
  - 75 °C: ±0.02 °C / ±0.04 °C
- **Temperature Stability**:
  - 1 hour: ±0.001 °C (LDT-5910C)
  - 24 hours: ±0.002 °C
  - 24 hours: ±0.003 °C (LDT-5940C)

**SENSOR**
- **Thermistor (5910C)**: NTC (2-wire)
- **Thermistor (5940C)**: NTC (2 or 4-wire)
- **IC-V Semiconductors**: LM-335
- **IC-I Semiconductors**: AD-590
- **RTD (5910C)**: Platinum 100 kΩ/1000 Ω (2-wire)
- **RTD (5940C)**: Platinum 100 kΩ/1000 Ω (2 or 4-wire)

**Thermistor Sensor Resistance**
- 10 µA Bias Setting: 0 to 450 kΩ
  - Resolution: 0.01 kΩ
  - Accuracy: ±180 Ω
- 100 µA Bias Setting: 0 to 45 kΩ
  - Resolution: 0.001 kΩ
  - Accuracy: ±18 Ω

**Linearized Thermistor Resistance**
- 10 µA Bias Setting: 0 to 15 kΩ
  - Resolution: 0.001 kΩ
  - Accuracy: ±18 Ω
- 100 µA Bias Setting: 0 to 1.5 kΩ
  - Resolution: 0.001 kΩ
  - Accuracy: ±18 Ω

**IC-V Sensor Voltage**
- Nominal Bias: 1 mA
- Range: 0 to 8 V
- Power Supply: 0.0001 V
- Accuracy: ±22 mV

**IC-I Sensor Current**
- Nominal Bias: 5 to 15 V
- Range: 0 to 600 µA
- Resolution: 0.001 µA
- Accuracy: ±18 µA

**RTD Sensor Resistance**
- 1 mA Bias Setting: 0 to 1500 Ω
  - Resolution: 0.01 Ω
  - Accuracy: ±8 Ω
- 2.5 mA Bias Setting: 0 to 200 Ω
  - Resolution: 0.001 Ω
  - Accuracy: ±5.1 Ω

**User Sensor Calibration**
- **Thermistor**: Steinhart-Hart, 3 constants
- **IC Sensors**: Slope, Offset
- **RTD**: R

**AUXILIARY I/O**
- **Analog Control Input**
  - Input Voltage Range: -5 V to +5 V
  - Input Resistance: >100 kΩ
- **Gain**: 2
- **Bandwidth**: 5 Hz
- **External Fan Control Output**
  - Output Voltage Range: 0 to +12 V
  - Maximum Current: 500 mA

**NOTES**
- 1. All values are specified for an ambient temperature of 23 ± 5 °C after a 1 hour warm-up unless otherwise specified.
- 2. Software limits of range. Actual range depends on the physical load, sensor type, and TEC module used.
- 3. 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.
- 4. Temperature stability measurements made in a stable ambient environment +0.2°C over 24 hours.
- 5. Thermistor sensor resistance measured at both 100 µA and 10 mA. Resolution will be reduced when displayed on the lower display. In remote operation, 6 significant digits of resolution are reported.
- 6. Maximum resolution available when operating in the control mode (using the 7-segment display). Output voltage range is ±10 V and ±100 V for the -100V version.
- 8. Output Voltage Range on -100V version is 0 to +9.5V; all values are typical voltage.

**Product Features**
- 32W and 60W thermoelectric temperature control
- Precision set point resolution of ±0.01°C with long-term temperature stability of ±0.003°C
- Pseudo 4-wire sensor and TEC measurement (LDT-5940C only)

**ORDERING INFORMATION**
- **LDT-5910C Series**
  - 32W Thermoelectric Temperature Controller, 12V
  - 60W Thermoelectric Temperature Controller, 220V
- **LDT-5910C-10V**
  - 32W Thermoelectric Temperature Controller, 10 V
  - 60W Thermoelectric Temperature Controller, 220V
- **LDT-5910C-220V**
  - 32W Thermoelectric Temperature Controller, 12V
  - 60W Thermoelectric Temperature Controller, 220V

**LDT-5910C Cables**
- **CC-501S**
  - TE Controller / Unterminated Interconnect Cable
- **CC-505S**
  - TE Controller / Laser Diode Mount Interconnect Cable (9-pin, D-sub)
- **CC-594H**
  - TE Controller / Unterminated Interconnect Cable
- **CC-594S**
  - TE Controller / Laser Diode Mount Interconnect Cable
- **CC-596**
  - 10A TE Controller / Laser diode Mount Interconnect Cable

**LDT-5940C Cables**
- **CC-596H**
  - TE Controller / Unterminated Interconnect Cable
- **CC-696S**
  - TE Controller / Laser Diode Mount Interconnect Cable

**Controller**
- **TS-521**
  - Uncalibrated Thermistor
- **TS-523**
  - Uncalibrated Thermistor
- **TS-525**
  - Uncalibrated Thermistor
- **TS-530**
  - Uncalibrated AD590
- **TS-540**
  - Uncalibrated LM335

**LDT-5910C**
- For easy integration into automated test applications, the LDT-5910C and LDT-5940C come standard with GPIB and USB remote interfaces. A robust and easy to modify LabVIEW driver is available to download from the Newport website.
HIGH PERFORMANCE TEMPERATURE CONTROL

The LDT-5910C and LDT-5940C easily control the temperature of your laser diode in one of three modes: (1) Constant Temperature, (2) Constant Sensor or (3) Constant Current. Temperature stability of \(<0.003^\circ\text{C}\) ensures device performance and highly reliable test measurements. With \(<0.003^\circ\text{C}\) stability, the controllers are ideal for R&D applications, eliminating mode hopping and significantly reducing noise due to temperature fluctuations.

FULLY PROGRAMMABLE PID CONTROL

The LDT-5910C and LDT-5940C feature 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 controllers accommodate 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 10k\(\Omega\) 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 10k\(\Omega\) 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 10k\(\Omega\) 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 controllers on-site via the USB 2.0 interface. For detailed instructions, on upgrading the firmware, contact ILX Lightwave.

SAFEGUARDING YOUR DEVICES

The LDT-5910C and LDT-5940C provide 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 controllers are 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.

COMPREHENSIVE REMOTE INTERFACE

Remote instrument operation is available on the LDT-5910C and LDT-5940C 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 controllers 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 and LDT-5940C Thermoelectric Temperature Controllers deliver 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

| Type          | TEC OUTPUT Type (5910C): Bidirectional, linear (5940C): Bidirectional, switch mode Isolation: Floating with respect to earth ground Current Setpoint Range: -4.00 A to +4.00 A (5910C) -5.00 A to +5.00 A (5940C) Current Setpoint Resolution: \(0.01 \text{ A}\) Current Setpoint Accuracy: \(\pm 0.05 \text{ A}\) Current Limit Range: -4.05 A to +4.05 A (5910C) -5.05 A to +5.05 A (5940C) Current Limit Resolution: \(0.01 \text{ A}\) Current Limit Accuracy: \(\pm 0.05 \text{ A}\) Voltage Measurement Range: -8.00 V to +8.00 V (5910C) -12.00 V to +12.00 V (5940C) Voltage Measurement Resolution: \(0.01 \text{ V}\) Voltage Measurement Accuracy: \(\pm 0.01 \text{ V}\) Compliance Voltage: +8 V (5910C); +12V (5940C) Maximum Output Power: 32 W (5910C); 60 W (5940C) Current Noise and Ripple: \(<1 \text{ mA rms (5910C)}; <2 \text{ mA rms (5940C)} \) |}

GENERAL

Connectors TEC I/O: Female 15-Pin D-sub (5910C) Female 25-Pin D-sub (5940C) GPIB: IEEE-488.1 USB: 2.0 Analog Input: BNC Power Requirements LDT-5910C and 5940C: 110 - 120 VAC, 50/60 Hz, 1 A LDT-5910C and 5940C: 220- 240 VAC, 50/60 Hz, 0.5 A LDT-5910C and 5940C: 100 - 110 VAC, 50/60 Hz, 1 A Size (HxWxD): 102 mm x 216 mm x 356 mm (4.0 x 8.5 x 14.0") Weight (LDT5910C): 4.9 kg (10.8 lbs.) Weight (LDT5940C): 3.8 kg (8.3 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
HIGH PERFORMANCE TEMPERATURE CONTROL
The LDT-5910C and LDT-5940C easily control the temperature of your laser diode in one of three modes: (1) Constant Temperature, (2) Constant Sensor or (3) Constant Current. Temperature stability of <0.003°C ensures device performance and highly reliable test measurements. With <0.003°C stability, the controllers are ideal for R&D applications, eliminating mode hopping and significantly reducing noise due to temperature fluctuations.

FULLY PROGRAMMABLE PID CONTROL
The LDT-5910C and LDT-5940C feature 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 thermistor temperature sensor compatibility, the controllers accommodate RTD, current and voltage IC sensors. The type of temperature sensor is changed or the sensor calibration constants are automatically set in the instrument.

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 load 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.

Now to ILX Lightwave is the ability to upgrade the firmware of the controllers on-site via the USB 2.0 interface. For detailed instructions, on upgrading the firmware, contact ILX Lightwave.

SAFEGUARDING YOUR DEVICES
The LDT-5910C and LDT-5940C provide 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 controllers are 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.

COMPREHENSIVE REMOTE INTERFACE
Remote instrument operation is available on the LDT-5910C and LDT-5940C 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 controllers 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 and LDT-5940C Thermoelectric Temperature Controllers deliver 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 (5910C): Bidirectional, linear (5940C): Bidirectional, switch mode Isolation: Floating with respect to earth ground
Current Setpoint Range: -4.00 A to +4.00 A (5910C) -6.00 A to +5.00 A (5940C)
Current Setpoint Resolution: 0.01 A
Current Setpoint Accuracy: ±0.05 A
Current Limit Range: -4.05 A to +4.05 A (5910C) -5.05 A to +5.05 A (5940C)
Current Limit Accuracy: ±0.05 A
Voltage Measurement Range: -8.00 V to +8.00 V (5910C) -12.00 V to +12.00 V (5940C)
Resolution: 0.01 V
Accuracy: ±0.01 V
Compliance Voltage: 25 V (5910C); 50V (5940C)
Maximum Output Power: 32 W (5910C); 60 W (5940C)
Current Noise and Ripple: <1 mA rms (5910C); <2 mA rms (5940C)

**GENERAL**
Connectors TEC I/O: Female 15-Pin D-sub (5910C) Female 25-Pin D-sub (5940C)
USB: 2.0
GPIB: IEEE-488.1
Analog Input: BNC
Power Requirements LDT-5910C and 5940C: 110 - 130 VAC, 50/60 Hz, 1 A LDT-5910C and 5940C: 220 - 240 VAC, 50/60 Hz, 0.5 A LDT-5910C: 100 - 110 VAC, 50/60 Hz, 1 A Size (H x W x D): 102 mm x 216 mm x 356 mm Weight: 4.9 kg (10.8 lbs.) LDT-5910C: 3.8 kg (8.3 lbs.) LDT-5940C: 6.0 kg (13.2 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
**Product Features**

32W and 60W thermoelectric temperature control

- Precision set point resolution of ±0.01°C with long term temperature stability of ±0.003°C
- Pseudo 4-wire sensor and TEC measurement (LDT-5940C only)

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

**Specifications**

**CONTROL SYSTEM**

- **Temperature Control Range:** -200 °C to +590 °C
- **Thermistor Sensor:** -100 °C to +200 °C
- **IC Sensor:** -100 °C to +25 °C
- **RTD Sensor:** -100 °C to +25 °C

**Temperature Setpoint and Measurement**

- **Precision / Accuracy:**
  - -200 °C: ±0.001 °C / ±0.01 °C
  - -100 °C: ±0.002 °C / ±0.04 °C
  - 0 °C: ±0.002 °C / ±0.04 °C
  - 25 °C: ±0.002 °C / ±0.04 °C
  - +50 °C: ±0.003 °C / ±0.05 °C
  - +100 °C: ±0.005 °C / ±0.08 °C
  - +200 °C: ±0.01 °C / ±0.15 °C

**Temperature Stability**

- 1 hour: ±0.001 °C (LDT-5910C)
- 24 hours: ±0.002 °C (LDT-5910C)
- 1 hour: ±0.002 °C (LDT-5940C)
- 24 hours: ±0.003 °C (LDT-5940C)

**AUXILIARY I/O**

- **Analog Control Input**
  - Input Voltage Range: -5 V to +5 V
  - Input Resistance: >100 kΩ

- **Temperature Setpoint and Measurement**
  - 0 °C: ±0.001 °C / ±0.01 °C
  - 50 °C: ±0.007 °C / ±0.15 °C
  - 75 °C: ±0.005 °C / ±0.08 °C

**Thermistor Sensor:** -100 °C to +200 °C

**Bandwidth:** 5 Hz

**Input Voltage Range:** 0 to +12 V

**Maximum Current:** 500 mA

**Sensor Types**

- Thermistor (9910C): NTC (2-wire)
- Thermistor (9940C): NTC (2-4 wire)
- IC-V Semiconductor IC: LM335
- IC-I Semiconductor IC: AD590
- RTD Sensor (9910C): Platinum 100 kΩ/1000 °C (2-wire)
- RTD Sensor (9940C): Platinum 100 kΩ/1000 °C (2 or 4-wire)

**Thermistor Data**

- **Nominal Bias:**
  - 50 µA Bias Setting:
    - Range: 0 to 450 kΩ
    - Resolution (Display): 0.001 kΩ
    - Accuracy: ±1800 %
  - 100 µA Bias Setting:
    - Range: 0 to 45 kΩ
    - Resolution (Display): 0.001 kΩ
    - Accuracy: ±18 %

- **Linearized Thermistor Resistance**
  - Range: 0 to 15 kΩ
  - Resolution (Display): 0.001 kΩ
  - Accuracy: ±18 %

- **IC-V Sensor Voltage**
  - Range: 0 to 8 V
  - Resolution (Display): ±0.0001 V
  - Accuracy: ±22 mV

- **IC-I Sensor Current**
  - Range: 5 to 15 V
  - Resolution (Display): ±0.0001 A
  - Accuracy: ±25 µA

- **RTD Sensor Resistance**
  - Range: 0 to 1500 Ω
  - Resolution (Display): ±0.01 Ω
  - Accuracy: ±0.18 %

- **2.5 mA Bias Setting**
  - Range: 0 to 200 Ω
  - Resolution (Display): ±0.001 Ω
  - Accuracy: ±0.1 %

**User Sensor Calibration**

- **Thermistor:** Steinhart-Hart, 3 constants
- **IC Sensors:** Slope, Offset, RTD
- **RTD:** R, A, B, C

**ORDERING INFORMATION**

- LDT-5910C-120V 32W Thermoelectric Temperature Controller, 120V
- LDT-5910C-220V 32W Thermoelectric Temperature Controller, 220V
- LDT-5910C-120V 60W Thermoelectric Temperature Controller, 120V
- LDT-5910C-220V 60W Thermoelectric Temperature Controller, 220V

**Thermoelectric Temperature Controller**

- Designed for unmatched performance and incredible value, the LDT-5910C and LDT-5940C Thermoelectric Temperature Controllers offer <±0.003°C long term temperature stability and intuitive front panel operation.
- The controllers can operate in constant temperature, sensor, and TE current while measuring TE current, sensor resistance, and TE voltage. The controllers are compatible with thermistor, IC sensors, and RTD sensors providing maximum flexibility in your application.

The LDT-5910C and LDT-5940C include 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 1 mA of rms noise.

For easy integration into automated test applications, the LDT-5910C and LDT-5940C come standard with GPIB and USB remote interfaces. A robust and easy to modify LabVIEW® driver is available for download from the Newport website.