The LDC-3700C Series Laser Diode Controllers

Laser Diode Controllers

The LDC-3700C Series Laser Diode Controllers are an industry-leading family of high performance, microprocessor-based instruments that offer a high stability, low noise current source with an integrated 32W temperature controller specifically designed for controlling the current and temperature of laser diodes. These controllers are known throughout the industry for their reliability, precision, and ease-of-use.

Two models cover a wide range of low to medium power laser diode testing and control applications. The LDC-3724C is targeted specifically for precision control of laser diodes. The LDC-3744C provides a dual range current source of 2/4A. Both models come with an integrated 32W temperature controller.

ORDERING INFORMATION

LDC-3724C-120V Laser Diode Controller, 120V (200/500mA Current Source, 32W TEC)
LDC-3724C-220V Laser Diode Controller, 220V (2000/4000mA Current Source, 32W TEC)
LDC-3744C-220V Laser Diode Controller, 220V (2000/4000mA Current Source, 32W TEC)

Specifications

GENERAL
Chassis Ground: 4mm Banana jack
GPIB Connector: IEEE-488
USB Connector: Type B
Power Requirements (50-60Hz):
100-240VAC (±10%)
220-240VAC (±10%)
Size (WxHxD):
127mm x 329mm x 345mm
5in x 13.3in x 13.6in
Weight:
LDC-3724C: 10.2kg (22.5lbs)
LDC-3744C: 11.3kg (25lbs)

Laser Diode Controllers

An unbeatable combination for controlling low to medium power laser diodes.

For information call 1-800-459-9459

Product Features

Laser diode current source with integrated 32W temperature controller
Two models available with up to 4A laser drive current
USB remote interface
GPIB/IEEE-488 remote interface

High stability, low noise laser current source operating in constant power or constant current modes.
Analog modulation capability to 1MHz
4-wire laser forward voltage measurement and adjustable voltage limit
Temperature controller compatible with thermistor, IC, and RTD temperature sensors
Temperature stability of ±0.004°C
TE voltage measurement

Notes

All controllers include ILX model TS-510 calibrated 10kΩ thermistors. Laser diode mounts and other accessories are also available. Contact an ILX Lightwave sales engineer for more information.

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In keeping with our commitment to continuing improvement, ILX Lightwave reserves the right to change specifications without notice and without liability for such changes.
Remote instrument operation in an R&D or production environment is available through a USB or GPIB/IEEE-488 interface. A trigger output is provided for integration into an automated measurement system where the TTL level output indicates a current step change for initiation of a measurement. For virtual instrument programming, LabView® instrument drivers can be downloaded from the ILX website.

High Stability, Low Noise Laser Control

Laser diodes act as a gain medium. Small drive current fluctuations due to noise and drift are amplified optically. Because of this, a controller with a low noise and stable output is required to ensure stable optical output. The LDC-3700C Series of controllers makes this possible.

Each LDC-3700C Controller offers a precision 16-bit current source with 0.05% accuracy. Careful attention to design delivers as low as 20ppm stability and 2µA of noise so component measurements can be made with confidence.

- fast output shut-off - provides an additional level of protection from intermittent contacts between the laser diode and the current source. These protection features all work in conjunction with all instrument modes of operation, providing worry-free, fail safe control of your laser diode.

A Choice of Laser Current Control Modes

With the LDC-3700C Series Controllers, you can easily control the current to your laser diode in one of three operating modes:

- Constant current, low bandwidth
- Constant current, high bandwidth
- Constant optical power

The constant current, low bandwidth mode offers improved laser protection and noise performance and is optimized for DC operation. This mode supports external modulation up to 15kHz.

In constant current high bandwidth mode, the output stage supports higher modulation frequencies up to 1MHz for dithering the laser current for power and wavelength tuning. For laser protection, the modulation input is implemented as a differential input, allowing the modulation control voltage and laser outputs to use different grounds.

The constant power mode provides constant optical power operation of your laser diode by using the photocurrent from its rear facet photodiode or from an external photodiode measuring front facet light in a feedback control loop to the current source.

Precision Temperature Control

The LDC-3700C Series Controllers include an integrated precision 32W temperature controller for quick temperature response of the laser diode’s chip temperature. For precise wavelength control during component testing, the LDC-3700C Series’ control algorithm maintains temperature with a stability of 0.004°C.

Sixteen-bit control and measurement allows you to set temperature with 0.01°C resolution with a measurement accuracy of 0.05°C (with a calibrated sensor). In addition, the LDC-3700C series supports TEC forward voltage measurement for monitoring the total power consumption of your laser diode module.

Wide Temperature Control Range

These controllers offer extended temperature control from -100°C to 199.9°C with a choice of thermometer, IC, or RTD temperature sensors. Temperature can be controlled in one of three modes: constant temperature, constant sensor, or constant TE current.

As an added precaution, if the temperature sensor or TE module circuit should open during operation, the laser diode current source output will be shut off and the appropriate fault indicator LED will illuminate.

In addition to the normal control modes, the TEC output of the LDC-3700C Controllers is bounded by a fully independent hardware current limit to protect the laser diode’s internal TE module. These limits cannot be exceeded in any mode of operation. The controller can also be bounded by a high temperature limit setting.

Ease of Operation

Divided into two sections, TEC and LASER, the front panel offers quick, easy operation and information display without confusing multi-layer menus. Each bright, 5-digit, green LED display is easy to read from a distance, even with laser safety goggles. Each channel is directly addressable from the front panel “adjust” section with LASER and TEC parameters and modes easily selected or adjusted through discrete pushbuttons and a rotary digital encoder.

Save and Recall Instrument Settings

For multiple instrument test configurations, the LDC-3700C Controllers offer a SAVE and RECALL feature. The SAVE function allows you to store all the front panel settings for any given instrument condition. The RECALL function allows you to retrieve any of the saved conditions at any time. This saves time in instrument re-configuration for different production runs or R&D experiments.

Simplify Routine Maintenance

The LDC-3700C architecture simplifies routine maintenance; calibration of the laser current source and TE controller can be performed via the front panel or through USB or GPIB. 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 LDC-3700C Series Controllers and our complete family of Laser Diode Instrumentation and Test Systems, call us today or visit us at www.newport.com/ilxlightwave.
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Put Our Expertise to Work

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ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDC-3724C-120V</td>
<td>Laser Diode Controller, 120V (200/500mA Current Source, 32W TEC)</td>
</tr>
<tr>
<td>LDC-3724C-220V</td>
<td>Laser Diode Controller, 120V (200/500mA Current Source, 32W TEC)</td>
</tr>
<tr>
<td>LDC-3744C-120V</td>
<td>Laser Diode Controller, 120V (2000/4000mA Current Source, 32W TEC)</td>
</tr>
<tr>
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<td>Laser Diode Controller, 120V (2000/4000mA Current Source, 32W TEC)</td>
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The Standard for High Performance Laser Diode Control
### LASER CURRENT SOURCE

#### MODEL NUMBER

<table>
<thead>
<tr>
<th>LDC-3724C</th>
<th>LDC-3744C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Current Range:</strong></td>
<td>0–200mA</td>
</tr>
<tr>
<td><strong>Setpoint Resolution:</strong></td>
<td>4µA</td>
</tr>
<tr>
<td><strong>Accuracy:</strong></td>
<td>±0.05% of FS</td>
</tr>
<tr>
<td><strong>Compliance Voltage Range:</strong></td>
<td>0–10V adjustable</td>
</tr>
<tr>
<td><strong>Temperature Coefficient:</strong></td>
<td>&lt;50ppm/°C</td>
</tr>
<tr>
<td><strong>Short-Term Stability (one-hour):</strong></td>
<td>&lt;20ppm</td>
</tr>
<tr>
<td><strong>Long-Term Stability (24-hour):</strong></td>
<td>&lt;40ppm</td>
</tr>
</tbody>
</table>

### COMPLIANCE VOLTAGE ADJUST

<table>
<thead>
<tr>
<th>Range</th>
<th>LDC-3724C</th>
<th>LDC-3744C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolution:</strong></td>
<td>50mV</td>
<td>50mV</td>
</tr>
<tr>
<td><strong>Accuracy:</strong></td>
<td>±2.5%</td>
<td>±2.5%</td>
</tr>
</tbody>
</table>

### DRIVE CURRENT LIMIT SETTINGS

<table>
<thead>
<tr>
<th>Range</th>
<th>LDC-3724C</th>
<th>LDC-3744C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolution:</strong></td>
<td>1–202mA</td>
<td>1–505mA</td>
</tr>
<tr>
<td><strong>Accuracy:</strong></td>
<td>±2mA</td>
<td>±5mA</td>
</tr>
</tbody>
</table>

### PHOTODIODE FEEDBACK

<table>
<thead>
<tr>
<th>Type</th>
<th>LDC-3724C</th>
<th>LDC-3744C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Photodiode Reverse Bias:</strong></td>
<td>Differential</td>
<td>Differential</td>
</tr>
<tr>
<td><strong>Output Current Range:</strong></td>
<td>5–5000µA</td>
<td>5–10,000µA</td>
</tr>
<tr>
<td><strong>Setpoint Accuracy:</strong></td>
<td>±0.05% of FS</td>
<td>±0.05% of FS</td>
</tr>
</tbody>
</table>

### EXTERNAL ANALOG MODULATION

<table>
<thead>
<tr>
<th>Bandwidth (3dB)</th>
<th>High Bandwidth</th>
<th>Low Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input:</strong></td>
<td>DC to 1MHz</td>
<td>DC to 15kHz</td>
</tr>
<tr>
<td><strong>Transfer Function:</strong></td>
<td>20mV/V</td>
<td>20mV/V</td>
</tr>
<tr>
<td><strong>Output Current:</strong></td>
<td>DC to 1MHz</td>
<td>DC to 10kHz</td>
</tr>
<tr>
<td><strong>Output Power:</strong></td>
<td>DC to 250kHz</td>
<td>DC to 250kHz</td>
</tr>
<tr>
<td><strong>Input:</strong></td>
<td>DC to 15kHz</td>
<td>DC to 10kHz</td>
</tr>
</tbody>
</table>

### TRIGGER OUTPUT

<table>
<thead>
<tr>
<th>Type</th>
<th>LDC-3724C</th>
<th>LDC-3744C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pulse Width:</strong></td>
<td>TTL</td>
<td>TTL</td>
</tr>
<tr>
<td><strong>Delay:</strong></td>
<td>13µs</td>
<td>13µs</td>
</tr>
</tbody>
</table>

### MEASUREMENT (DISPLAY)

<table>
<thead>
<tr>
<th>Type</th>
<th>LDC-3724C</th>
<th>LDC-3744C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Current Resolution:</strong></td>
<td>0.01mA</td>
<td>0.01mA</td>
</tr>
<tr>
<td><strong>Accuracy:</strong></td>
<td>±0.05% of FS</td>
<td>±0.05% of FS</td>
</tr>
<tr>
<td><strong>Photodiode Current Resolution:</strong></td>
<td>1µA</td>
<td>1µA</td>
</tr>
<tr>
<td><strong>Accuracy:</strong></td>
<td>±2µA</td>
<td>±3µA</td>
</tr>
</tbody>
</table>

### CURRENT SOURCE NOTES

1. All values after a one-hour warm-up period at room temperature, 25°C.
2. Over any one-hour period, half-scale output.
3. Over any 24-hour period, half-scale output.
4. Measured optically, evaluating noise intensity of a laser diode into a photodetector with 150kHz bandwidth.
5. Maximum output current transient resulting from normal operational situations (e.g., power on-off, current on-off), as well as accidental situations (e.g., power line plug removal).
8. 50% modulation at mid-scale output. Higher bandwidth is possible with smaller modulation signal.
9. Responsivity value is user-defined and is used to calculate the optical power.
10. Four-wire voltage measurement. Voltage measurement accuracy while driving calibration load. Accuracy is dependent upon load used and length of cable.
**Specifications**

### TEMPERATURE CONTROL

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>ALL MODELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Control Range:</td>
<td>–100°C to 199°C</td>
</tr>
<tr>
<td>Thermostat Setpoint:</td>
<td>–100°C to 199°C</td>
</tr>
<tr>
<td>Resolution and Accuracy</td>
<td>Resolution = 0.1°C, Accuracy = ±0.2°C</td>
</tr>
<tr>
<td>AD590 &amp; LM335 Setpoint</td>
<td>0.1°C ±0.1°C</td>
</tr>
</tbody>
</table>

| Short-Term Stability (one-hour): | ±0.004°C or better |
| Long-Term Stability (24-hours): | ±0.01°C |

**TEC OUTPUT**

- Output Type: Bipolar, constant current source
- Compliance Voltage: >8V DC
- Maximum Output Current: 4.0A
- Maximum Output Power: 32W
- Current Noise and Ripple: <1mA rms
- Current Limit Range: 0–4A
- Setpoint Accuracy: ±50mA
- Control Algorithm: Smart Integrator, Hybrid PI

**TEMPERATURE SENSOR**

- Types: Thermistor, IC Temperature Sensor, RTD Sensor
- Thermistor Sensing Current: 10/100µA
- Sensor Bias: AD590=8V, LM335=1mA, RTD=0.8mA

**TEMPERATURE CONTROL NOTES**

1. All values relate to a one-hour warm-up period.
2. Software limits of range. Actual range possible depends on the physical load, thermostat type, and TEC module used.
3. Accuracy figures are quoted for a typical 10kΩ thermistor and 100µA current setting. Accuracy figures are relative to the calibration standard. Both resolution and accuracy are dependent upon the user-defined configuration of the instrument.
4. Accuracy depends upon the sensor model selected, the calibration standard, and the user-defined configuration of the instrument.
5. Over any one-hour period, half-scale output, controlling an LDM-4412 mount at 25°C, with 10kΩ thermistor, on 100µA setting.
6. Over any 24-hour period, half-scale output, controlling an LDM-4412 mount at 25°C, with 10kΩ thermistor, on 100µA setting.
7. Into a 1Ω load.

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8. Measured at 1A over bandwidth of 10Hz to 10MHz
10. Nominal temperature coefficients, I and V, apply over the rated temperature sensor range.
11. Software limits of display range.
12. Using a 100kΩ thermistor controlling an LDM-4412 mount over –30°C to 25°C.
13. Using a 10kΩ thermistor, controlling an LDM-4412 mount over 0°C to 90°C.
14. Voltage measurement is available only through USB or the GPIB interface.
15. Voltage measurement accuracy while driving calibration load. Accuracy is dependent upon load use.