
Laser Diode Controllers

Committed to Excellence

Model LDC-3700B Series Laser Diode Controllers conveniently offer both laser diode current and temperature control in the same instrument. Each unit is a dual-range current source offering 16W TEC and either 50/100 mA, 200/500 mA, or 2/4 A output current. Each controller offers a low noise, highly stable current source operating in one of three modes: constant current, high bandwidth or constant optical power. Mode 1 is optimized for DC operation, supports external modulation and offers improved laser protection and noise performance. In Mode 2, the output stage supports higher frequency, external modulation with control circuitry optimized for high bandwidth operation of up to 1 MHz. Mode 3 supports constant optical power operation, using photodiode input current as the control setpoint.

Features

- 0–50/0–100 mA with 16W TEC (LDC-3714B)
- 0–200/0–500 mA with 16W TEC (LDC-3724B)
- 0–2/0–4 A with 16W TEC (LDC-3744B)
- Fast GPIB/IEEE-488.2 Interface
- 4-wire voltage sense and adjustable voltage limit
- Resistive heater adapters available for TEC modules



LDC-3700B
Series Laser Diode Controllers

Advanced Laser Protection

Protection features like clamping current limits and braid-shielded cables suppress radiated noise and transients. Turn-on sequencing and output shorting circuits protect the laser from current transients. When output is turned on, the slow-start circuit allows current to be diverted to the laser slowly. The output shorting switch provides safe switching of output off/on during operation. In addition, the outputs are bound by fully independent hardware current limits, which cannot be exceeded, even under externally modulated conditions. In optical power mode, the output current also can be bound by a software optical power limit. In addition to these proven protection features, the LDC-3700B Series now offers adjustable compliance voltage and faster shut-off circuitry. This new level of protection reduces potentially dangerous reconnect current transients in the event of intermittent connections between the controller and the laser diode.

Precision Temperature Control

LDC-3700B Series controllers offer extended temperature control, from -99°C to 199°C , with a choice of temperature sensors. Temperature control is available in one of three modes: constant temperature, constant sensor value, and constant TE module current. Mode 1 permits TE module operation anywhere over the temperature range, depending on parameter selection. Mode 2 supplies the flexibility to drive to a prescribed thermistor resistance value, or IC temperature sensor current or voltage. Mode 3 permits output to be driven to a predetermined TE-module current setting. As an added precaution, if the temperature sensor or TE module should open during operation, the laser diode output will shut down and the appropriate fault indicator lamp will flash. In addition, the LDC-3700B family now supports the measurement of TEC voltage via simple GPIB commands.

Ease of Operation

The standard GPIB/IEEE-488.2 interface allows remote programming and readout from most computers. All instrument functions accessible from the front panel are also accessible through the interface bus, and all commands are based on a set of easy-to-use mnemonics. LabVIEW® instrument drivers are also available. Routine maintenance is simplified since calibration can be performed via the front panel or the GPIB interface. The operating parameters, logically grouped together into TEC and LASER sections, offer a simultaneous dual display for laser current and temperature parameters. The units also offer bright green, five-digit LEDs, digital adjust knobs, informative error indicators and SAVE and RECALL features.

Key Benefits
Fast GPIB/IEEE-488.2 Interface
TEC Output
External Analog Modulation

SPECIFICATIONS

Current Source	LDC-3714B		LDC-3724B		LDC-3744B	
Drive Current Output						
Output Current Range	0–50 mA	0–100 mA	0–200 mA	0–500 mA	0–2000 mA	0–4000 mA
Set-Point Resolution	1 μ A	2 μ A	4 μ A	10 μ A	40 μ A	80 μ A
Set-Point Accuracy(% of FS)	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%
Compliance Voltage (adj.)	0–10 V	0–10 V	0–10 V	0–10 V	0–10 V	0–10 V
Temperature Coefficient	<50 ppm/°C	<50 ppm/°C	<50 ppm/°C	<50 ppm/°C	<100 ppm/°C	<100 ppm/°C
Short-Term Stability (1 hr)	<20 ppm	<20 ppm	<20 ppm	<20 ppm	<20 ppm	<20 ppm
Long-Term Stability (24 hr)	<40 ppm	<40 ppm	<40 ppm	<40 ppm	<40 ppm	<40 ppm
Noise and Ripple (A rms)						
High Bandwidth Mode	<1.5 μ A	<1.5 μ A	<4 μ A	<4 μ A	<15 μ A	<20 μ A
Low Bandwidth Mode	<1.5 μ A	<1.5 μ A	<2 μ A	<2 μ A	<10 μ A	<10 μ A
Transients						
Operational	<2 mA	<2 mA	<3 mA	<3 mA	<4 mA	<4 mA
1 kV EFT	<5 mA	<5 mA	<8 mA	<8 mA	<8 mA	<8 mA
Surge	<8 mA	<8 mA	<12 mA	<12 mA	<10 mA	<10 mA
Compliance Voltage Adjust						
Range	0–10 V	0–10 V	0–10 V	0–10 V	0–10 V	0–10 V
Resolution	50 mV	50 mV	50 mV	50 mV	50 mV	50 mV
Accuracy	\pm 2.5%	\pm 2.5%	\pm 2.5%	\pm 2.5%	\pm 2.5%	\pm 2.5%
Drive Current Limit Settings						
Range	1–50.5 mA	1–101 mA	1–202 mA	1–505 mA	1–2020 mA	1–4040 mA
Current	0.25 mA	0.5 mA	1 mA	2.5 mA	10 mA	20 mA
Accuracy	\pm 0.5 mA	\pm 1.0 mA	\pm 2.0 mA	\pm 5.0 mA	\pm 20 mA	\pm 40 mA
Photodiode Feedback						
Type	Differential	Differential	Differential	Differential	Differential	Differential
Photodiode Reverse Bias	0–5 V adjustable	0–5 V adjustable	0–5 V adjustable	0–5 V adjustable	0–5 V adjustable	0–5 V adjustable
Photodiode Current Range	5–5000 μ A	5– 5000 μ A	5–5000 μ A	5–5000 μ A	5–10000 μ A	5–10000 μ A
Output Stability	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Accuracy, setpoint(% of FS)	\pm 0.05%	\pm 0.05%	\pm 0.05%	\pm 0.05%	\pm 0.05%	\pm 0.05%
External Analog Modulation						
Input	0–10V, 10 kW	0–10V, 10 kW	0–10V, 10 kW	0–10V, 10 kW	0–10V, 10 kW	0–10V, 10 kW
Transfer Function	5 mA/V	10 mA/V	20 mA/V	50 mA/V	200 mA/V	400 mA/V

Bandwidth(3dB)

High Bandwidth	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 250 KHz	DC to 250 KHz
Low Bandwidth	DC to 15 kHz	DC to 15 kHz	DC to 15 kHz	DC to 15 kHz	DC to 10 kHz	DC to 10 kHz

Output Connectors

Current Source Output	9-pin D-sub	9-pin D-sub	9-pin D-sub	9-pin D-sub	9-pin D-sub	9-pin D-sub
Analog Modulation Output	Coax BNC inst. amp. input	Coax BNC inst. amp. input	Coax BNC inst. amp. input	Coax BNC inst. amp. input	Coax BNC inst. amp. input	Coax BNC inst. amp. input

Measurement (Display)

Output Current Range	0–50.00 mA	0–100.00 mA	0–200.00 mA	0–500.00 mA	0–2000.0 mA	0–4000.0 mA
Output Current Resolution	0.001 mA	0.002 mA	0.01 mA	0.01 mA	0.1 mA	0.1 mA
Output Current Accuracy	±0.05% of FS	±0.05% of FS	±0.05% of FS	±0.05% of FS	±0.1% of FS	±0.1% of FS
Photodiode Current Range	0–5,000 µA	0–5,000 µA	0–5,000 µA	0–5,000 µA	0–10,000 µA	0–10,000 µA
Photodiode Current Resolution	1 µA	1 µA	1 µA	1 µA	1 µA	1 µA
Photodiode Current Accuracy	±2 µA	±2 µA	±2 µA	±2 µA	±2 µA	±2 µA
Photodiode Responsivity Range(µA/mW)	0.00–1000.00	0.00–1000.00	0.00–1000.00	0.00–1000.00	0.00–1000.00	0.00–1000.00
Photodiode Responsivity Resolution	0.01 µA/mW	0.01 µA/mW	0.01 µA/mW	0.01 µA/mW	0.01 µA/mW	0.01 µA/mW
Optical Power Range(mW)	0.00–101.00	0.00–101.00	0.00–101.00	0.00–101.00	0.00–101.00	0.00–101.00
Optical Power Resolution(mW)	0.01	0.01	0.01	0.01	0.01	0.01
Forward Voltage Range (V)	0.000–10.000	0.000–10.000	0.000–10.000	0.000–10.000	0.000–10.000	0.000–10.000
Forward Voltage Resolution	1 mV	1 mV	1 mV	1 mV	1 mV	1 mV
Forward Voltage Accuracy	±2 mV	±2 mV	±2 mV	±2 mV	±2 mV	±2 mV

Temperature Control

Temperature Control Range:	All Models -99.9°C to +199.9°C	
Thermistor Setpoint		
Resolution and Accuracy	Resolution	Accuracy
-20°C to 20°C	0.1°C	±0.2°C
+20°C to 50°C	0.2°C	±0.2°C
AD590 & LM335 Setpoint		
-20°C to +50°C	0.01°C	±0.1°C
Short Term Stability (1 hr)	±.004 °C or better	
Long Term Stability (24 hrs)	±0.01°C	

TEC Output

Output Type	Bipolar, constant current source
Compliance Voltage	>4 V DC
Short Circuit Output Current	4.0 A
Maximum Output Power	16 W
Current Noise and Ripple	<1 mA rms
Current Limit Range	0–4 A
Current Limit Setpoint Accuracy	±50 mA
Control Algorithm	Smart Integrator, Hybrid PI
Connector	15-pin D-sub

Temperature Sensor

Types

Thermistor	Thermistor (2-wire NTC)
IC Temperature Sensor	AD590/LM335
RTD Sensor	P _t 100/Other 100 Ω RTD
Thermistor Sensing Current	10 μA/100 μA
Sensor Bias	AD590 = 8V, LM335 = 1mA
Useable Thermistor Range	25–450,000 Ω
Typical Sensor Output	
AD590 Current Output	I(25°C) = 298.2 μA, I _t = 1 μA/K
LM335 Voltage Output	V(25°C) = 2.73 V, V _t = 10mV/K
RTD (P _t 100) Resistance	R(25°C)=109.73 W
User Calibration	Thermistor = Steinhart-Hart IC Sensors, RTD = Two-point

TEC Measurement (Display)

	Range	Resolution	Accuracy
Temperature			
10 μA Setting	-99.9°C to +199.9°C	0.01°C	±0.1°C
100 μA Setting	-99.9°C to +199.9°C	0.01°C	±0.05°C
Thermistor Resistance			
10 μA Setting	0.00–450.00 kΩ	0.01 kΩ	±0.05%
100 μA Setting	0.000–45.000 kΩ	0.001 kΩ	±0.05%
TE Current	-4.000–4.000 A	0.001 A	±0.04 A
TEC Voltage Measurement			
Voltage Range/Resolution	-10.0–10.0 V / 1mV		
Voltage Accuracy	±30 mV		

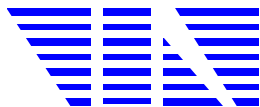
All controllers include ILX model 510 calibrated 10kΩ thermistor.

Laser diode collimating lenses, and other accessories are also available.

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GENERAL SPECIFICATIONS

Chassis Ground	4 mm Banana jack
GPIB Connector	24-pin IEEE-488.1
Power Requirements (50-60 Hz)	110–115 VAC, 220–240 VAC, (+6% / -10%)
Operating Temperature	0°C–50°C
Laser Safety Features	All instruments utilize a Keyswitch, Interlock, and Output delay (Meets CDRH US21 CFR 1040.10)
LASER and TEC Display Type	5-Digit, Green LED



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