LDC 3916

16-Channel Laser Diode Controller

Product Features

- 16 independent, isolated channels for laser and TEC control
- Wide variety of laser controller modules (current and temperature) with up to 3A available per channel
- Dual channel laser current or temperature control modules for control of up to 32 laser diodes with one mainframe
- Laser current sources feature low noise and high stability and operate in constant current or constant power operating modes with direct modulation up to 1MHz
- Temperature controllers operate in constant temperature or constant resistance mode with expanded gain setting from 1 to 127
- GPIB / IEEE488 or RS-232 remote control interface

The LDC-3916 Laser Diode Controller offers 16 channels of laser diode current source and temperature control in a space-saving, rack-mountable instrument for simultaneous control of both current and temperature of up to 16 laser diodes in one mainframe. ILX Lightwave developed the LDC-3916 for multiple pump control in optical amplifier testing. The high stability, low noise, current, and temperature controllers also make the 3916 suitable for low-channel count burn-in systems.

A wide variety of laser control modules are available, including laser controller modules, dual channel laser current source, and dual channel temperature control modules. Controller modules source up to 1.5A of laser current with an integrated 9W temperature controller. Dual laser current source modules, with two isolated outputs, source up to 1A per channel, while dual temperature control modules provide two independent 9W outputs for control of up to 32 laser diodes per mainframe.

Remote operation for independent control of all 16 channels is provided through the IEEE488 GPIB port or RS-232 serial interface.

16 Channels of Laser Diode Control

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FRONT PANEL INTERFACE PROVIDES SIMPLE OPERATION

The bright vacuum fluorescent display is readable from almost any angle. Status screens show four channels at once and scroll both directions to view any channel easily. Monitoring operations, changing setpoints, and switching any output on or off can be done from the status menu. Plus, you can define any two parameters to be displayed on the status screen for each channel.

For initial or detailed setup, simple and intuitive menus supported by screen-specific soft keys quickly configure and operate each channel. Menu depths have been limited to keep the front panel operation concise, while more sophisticated operations are reserved for the GPIB interface. An "All Channel" menu facilitates initial setup, and ten storage bins allow you to save and recall all instrument settings. Setpoints and other values can be entered through a numeric keypad, up/down arrow keys, or the rotary adjustment knob.

POWERFUL GPIB INTERFACE

A powerful master processor platform drives the LDC-3916 controller, communicating with all sixteen microprocessor-controlled modules. When coupled with the HS488TNT chipset GPIB technology from National Instruments®, the LDC-3916 provides all of the necessary processing capabilities for automated production testing. With microprocessors on each module, the mainframe master manages 16 independent control channels quickly and reliably. Free LabVIEW® instrument drivers are available upon request or online at www.newport.com/ilxlightwave.

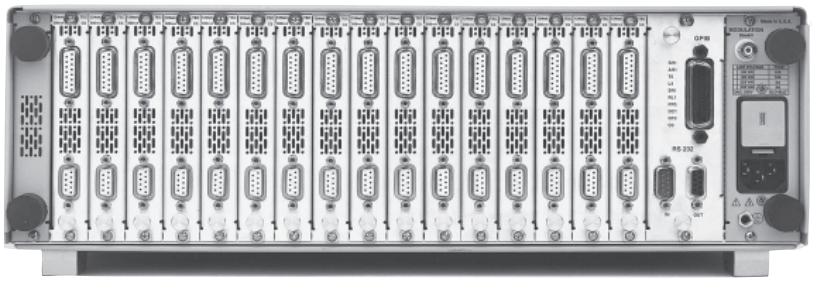
SUPPORT FUTURE SYSTEM EXPANSION

Designed to provide the most efficient and safest control available for multiple laser diodes, each module's control functions are managed locally and communicated to the master processor. On-board intelligence simplifies future addition of modules since all operational and calibration data is stored in the module. Simply plug in the new module and power up the system. The mainframe never needs to leave the rack.

STATE-OF-THE-ART LASER DIODE CURRENT SOURCE

The LDC-3916 current source topology uses an innovative, proprietary control loop and incorporates the latest techniques for signal filtering and circuit board shielding. Adjustable voltage limit and faster shutoff help prevent dangerous reconnect transients that can occur from intermittent connections between controller and laser diode. Investment in this instrument provides assurance for safe, worry-free testing and control of a variety of laser diodes.

Operational modes including constant current in low or high bandwidth or constant optical power are selectable from the front panel or via the remote interface. Measurement of the laser diode forward voltage is provided with 4-wire accuracy for protection environments where longer cable runs are common. A single, rear panel modulation port provides direct modulation of each channel's laser current and supports external modulation bandwidths of up to 1MHz (lower current modules). Individual channel modulation ports are available on request.



The back panel of the LDC-3916 instrument, with 16-channel full capacity module loading. Offering secure and flexible module population, customized to fit your testing needs. Standard 1 MHz modulation port and GPIB / RS232 remote terminals expand upon its application and control.

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With the optional rack mount kits, the LDC-3916 can be expanded on standard 19" cabinet racks to fi t any scaling production requirements. The full system offers intuitive front panel control and remote operation via our complimentary LabVIEW® instrument drivers.

HIGH STABILITY TEC CONTROL

Achieve up to +0.007°C temperature stability with the low noise temperature controller modules. The temperature control circuits optimize temperature settling times with a smart integrator control loop with expanded gain setting ranges. All TEC control modules for the LDC-3916 include voltage measurement capabilities and internal thermistor current selection via front panel or remotely for control over a wide temperature range.

FLEXIBLE CONTROL OVER A WIDE RANGE OF APPLICATIONS

By combining true modularity and high channel density, the LDC-3916 easily adapts to a wide variety of applications. This system can be used for controlling multiple pump lasers in amplifier test or low channel count burn-in applications.

PROTECT YOUR INVESTMENT WITH THE LEADERS IN LASER DIODE PROTECTION

The LDC-3916 provides all of ILX Lightwave's proven laser protection features like independent current limits, slow start turn-on circuits, and isolated power supplies.

The adjustable laser voltage limit brings even greater levels of protection. If a temperature limit is reached, the TEC temperature control modules can be programmed to turn off any or all lasers in a mainframe.

Designed for production testing, the LDC-3916 will satisfy higher power multiple laser diode operation with reliabie and secure control.

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-3916 16-Channel Laser Diode Controller, call us today or visit us online at www.newport.com/ilxlightwave.

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Specifications

GENERAL	3916
Chassis Ground:	4 mm Banana jack
GPIB Connector:	24-pin IEEE-488
RS-232 Connector:	9-pin D-sub
Power Requirements:[1]	Selectable voltage 110 - 130 VAC; 60 Hz / 210 - 240 VAC; 50 - 60 Hz
Size (HxWxD):	133 mm x 482 mm x 653 mm 5.25" x 18.98" x 25.7"
Weight (typical)	
Mainframe only:	34.4 kg; 76 lbs.
With 16 modules:	41 kg; 91 lbs.
Operating Temperature:	0°C to 40°C
Storage Temperature:	-40°C to +70°C
Humidity:[2]	20-85%, non-condensing
Laser Safety Features:	Keyswitch, Interlock, Output Delay Meets 21CFR1040.10)
Display:	Vacuum fluorescent, 64 x 128 pixels 83 mm x 41 mm

MAINFRAME NOTES

1. All channels driving 6A.
2. Based on the vacuum fluorescent display specification.

ORDERING INFORMATION

LDC-3916	16-Channel Laser Diode Controller Mainframe
LDC-3916372	500mA/9W Controller Module
LDC-3916374	1A/9W Controller Module
LDC-3916376	1.5A/9W Controller Module
LDC-3916332	500mA/500mA Dual Current Source Module
LDC-3916334	1A/1A Dual Current Source Module
LDC-3916338	3A Current Source Module
LDC-3916550	9W/9W Dual Temperature (TEC) Controller Module
LDC-3915558	3A (24W) Temperature (TEC) Controller Module
RM-137	Rack Mount Kit, 20.5" hole spacing
RM-138	Rack Mount Kit, 25" hole spacing
CC-305S	Current Source/Laser Diode Mount Interconnect Cable
CC-306S	Current Source/Unterminated Interconnect Cable
CC-316M	Laser Current Cables (Bundle of 8)
CC-501S	TE Controller/Laser Diode Mount Interconnect Cable
CC-505S	TE Controller/Laser Diode Mount Interconnect Cable
CC-516M	TE Controller Cables (Bundle of 8)
LNF-320	Low Noise Filter
UCA-350	Unipolar Heater Control Adapter

LabVIEW® Instrument Driver; LabVIEW® is a registered trademark of National Instruments.

This product has passed all CE requirements and bears the CE mark.

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

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31950 Frontage Road, Bozeman, MT 59715 • FAX: 406-586-9405

www.newport.com/ilxlightwave

For information call

1-800-459-9459

International Inquiries: 406-556-2481

email: sales@ilxlightwave.com

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Specifications[1]

CURRENT SOURCE MODULES

	3916332* DUAL 500mA	3916334* DUAL 1A	3916338 SINGLE 3A
LASER CURRENT OUTPUT			
Output Current Range:	0-500 mA	0-1000mA	0-3000mA
Setpoint Resolution:	10µA	20µA	80µA
Setpoint Accuracy:	±0.1% of FS	±0.1% of FS	±0.1% of FS[14]
Compliance Voltage:	6V (adjustable voltage limit)	6V (adjustable voltage limit)	4.5V (adjustable voltage limit)
Temperature Coefficient:	≤50ppm/°C	≤50ppm/°C	≤100ppm/°C
Short Term Stability (1 hr.):[2]	≤20ppm	≤20ppm	≤50ppm/°C
Long Term Stability (24 hrs.):[3]	≤50ppm	≤50ppm	≤75ppm/°C
Noise and Ripple[4]			
High Bandwidth:	<10µA rms	<12µA rms	<36µA rms
Low Bandwidth:	<5µA rms	<8µA rms	<24µA rms
Transients			
Operational:[5]	<3mA	<3mA	<5mA
1kV EFT:[6]	<4mA	<5mA	<10mA
Surge:	<8mA	<10mA	<8mA
LASER DRIVE LIMIT SETTINGS			
Current Limit Range:	0-500 mA	0-1000 mA	0-3000mA
Current Limit Resolution:	0.2mA	0.4mA	1.025mA
Current Limit Accuracy:	±0.7mA	±1.4mA	±9mA
Voltage Limit Range:	0-7.5V	0-7.5V	0-7.5V
Voltage Limit Resolution:	0.1V	0.1V	0.2V
Voltage Limit Accuracy:	±200mV	±200mV	±200mV
PHOTODIODE FEEDBACK			
Type:	Differential 10Ω input, Selectable Zero Bias, or 5V Reverse Bias		
Photodiode Current Range:	0-5000µA	0-5000µA	0-5000µA
Output Stability:[7]	0.01%	0.01%	±0.01%
Setpoint Accuracy:	±0.1% of FS	±0.1% of FS	±0.1% of FS
EXTERNAL ANALOG MODULATION			
Input:[8]	0-10V, 50Ω	0-10V, 50Ω	0-8.0V, 50Ω
Transfer Function:	50mA/V	100mA/V	375mA/V ±10%
High Bandwidth Mode			
Small Signal Bandwidth:[9]	DC to 1.2MHz	DC to 1.0MHz	DC to 0.6MHz
Large Signal Bandwidth:[10]	DC to 1.0MHz	DC to 1.0MHz	DC to 0.6MHz
Low Bandwidth Mode:	DC to 30kHz	DC to 30kHz	DC to 30kHz
LASER CURRENT MEASUREMENT (DISPLAY)			
Output Current Range:	0-500.0mA	0-1000.0mA	0-3000.0mA
Output Resolution:	0.01mA	0.01mA	0.01mA
Output Current Accuracy:	±0.05% of FS (@ 25°C)	±0.05% of FS (@ 25°C)	±0.07% of FS (@ 25°C)
Photodiode Current			
Range:	0-5000µA	0-5000µA	0-5000µA
Resolution:	0.1µA	0.1µA	0.1µA
Accuracy:	±2µA (@ 25°C)	±2µA (@ 25°C)	±2µA (@ 25°C)
Photodiode Responsivity			
Range:[11]	0.00-1000.00µA/mW	0.00-1000.00µA/mW	0.00-1000.00µA/mW
Resolution:	0.01µA/mW	0.01µA/mW	0.01µA/mW
Optical Power Range:	0.0-5000.00mW	0.0-5000.00mW	0.0-5000.00mW
Optical Power Resolution:	100µW	100µW	100µW
Forward Voltage Range:	0.00-7.5V	0.0-7.5V	0.0-7.5V
Forward Voltage Resolution:[12]	10mV	10mV	10mV
Forward Voltage Accuracy:[13]	±7mW	±7mW	±7mW

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Specifications[1]

LASER DIODE CONTROLLER MODULE

	3916372 500mA/9W	3916374 1A/9W	3916376 1.5A/9W
LASER CURRENT OUTPUT			
Output Current Range:	0-500 mA	0-1000 mA	0-1500 mA
Setpoint Resolution:	10µA	20µA	40µA
Setpoint Accuracy:	±0.1% of FS	±0.1% of FS	±0.1% of FS
Compliance Voltage:	6V (adjustable voltage limit)	6V (adjustable voltage limit)	4.75V (adjustable voltage limit)
Temperature Coefficient:	≤50ppm/°C	≤50ppm/°C	≤50ppm/°C
Short Term Stability (1 hr.):[2]	≤20ppm	≤20ppm	≤20ppm
Long Term Stability (24 hrs.):[3]	≤50ppm	≤50ppm	≤50ppm
Noise and Ripple[4]			
High Bandwidth:	<10µA rms	<10µA rms	<12µA rms
Low Bandwidth:	<5µA rms	<5µA rms	<8µA rms
Transients			
Operational:[5]	<3 mA	<3 mA	<3 mA
1kV EFT:[6]	<4 mA	<5 mA	<5 mA
Surge:	<8 mA	<10 mA	<10 mA
LASER DRIVE LIMIT SETTINGS			
Current Limit Range:	0-500 mA	0-1000 mA	0 to 1500 mA
Current Limit Resolution:	0.2 mA	0.4 mA	0.6 mA
Current Limit Accuracy:	±0.7 mA	±1.4 mA	±4.5 mA
Voltage Limit Range:	0-7.5V	0-7.5V	0-7.5V
Voltage Limit Resolution:	0.1V	0.1V	0.1V
Voltage Limit Accuracy:	±0.2V	±0.2V	±0.2V
PHOTODIODE FEEDBACK			
Type:	Differential 10Ω input, Selectable Zero Bias, or 5V Reverse Bias	Differential 10Ω input, Selectable Zero Bias, or 5V Reverse Bias	Differential 10Ω input, Selectable Zero Bias, or 5V Reverse Bias
Photodiode Current Range:	0-5000µA	0-5000µA	0-5000µA
Output Stability:[7]	0.01%	0.01%	0.01%
Setpoint Accuracy:	±0.1% of FS	±0.1% of FS	±0.1% of FS
EXTERNAL ANALOG MODULATION			
Input:[8]	0-10V, 50Ω	0-10V, 50Ω	0-7.5V, 50Ω
Transfer Function:	50 mA/V	100 mA/V	200 mA/V
High Bandwidth Mode			
Small Signal Bandwidth:[9]	DC to 1.2MHz	DC to 1.0MHz	DC to 0.9MHz
Large Signal Bandwidth:[10]	DC to 1.0MHz	DC to 1.0MHz	DC to 0.9MHz
Low Bandwidth Mode:	DC to 30kHz	DC to 30kHz	DC to 30kHz
LASER CURRENT MEASUREMENT (DISPLAY)			
Output Current Range:	0-500.0 mA	0-1000.0 mA	0-1500.0 mA
Output Resolution:	0.01 mA	0.01 mA	0.01 mA
Output Current Accuracy:	±0.05% of FS (@ 25°C)	±0.05% of FS (@ 25°C)	±0.07% of FS (@ 25°C)
Photodiode Current			
Range:	0-5000µA	0-5000µA	0-5000µA
Resolution:	0.1µA	0.1µA	0.1µA
Accuracy:	±2µA (@ 25°C)	±2µA (@ 25°C)	±2µA (@ 25°C)
Photodiode Responsivity			
Range:[11]	0.00-1000.00µA/mW	0.00-1000.00µA/mW	0.00-1000.00µA/mW
Resolution:	0.01µA/mW	0.01µA/mW	0.01µA/mW
Optical Power Range:	0.0-5000.00mW	0.0-5000.00mW	0.0-5000.00mW
Optical Power Resolution:	100µW	100µW	100µW
Forward Voltage Range:	0.00-7.5V	0.00-7.5V	0.00-7.5V
Forward Voltage Resolution:[12]	10mV (1mV through GPIB)	10mV (1mV through GPIB)	10mV (1mV through GPIB)
Forward Voltage Accuracy:[13]	±7mV (±2mV through GPIB)	±7mV (±2mV through GPIB)	±7mV (±2mV through GPIB)

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	3916372 500mA/9W 3916374 1A/9W 3916376 1.5A/9W
TEMPERATURE CONTROL OUTPUT	
Temperature Control Range:[2]	-99°C to 150°C
Temperature Setpoint	
Resolution (-20°C to 20°C):	0.1°C
Accuracy (-20°C to 20°C):[3]	±0.2°C
Resolution (20°C to 50°C):	0.2°C
Accuracy (20°C to 50°C): [3]	±0.2°C
Short Term Stability (1 hr.):[4]	<±0.007°C
Long Term Stability (24 hrs.):[5]	±0.01°C
Output Type:	Bipolar current source
Compliance Voltage:	>7V DC
Maximum Output Current:	1.5A
Maximum Output Power:	9W
Current Noise and Ripple:[6]	<1mA rms
Current Limit Range:	0-1.5A
Current Limit Accuracy:	±0.05A
Control Algorithm:	Smart Integrator, Hybrid PI, Gain adjustable from 1-127
TEMPERATURE SENSOR	
Types:	Thermistor (2-wire NTC)
Thermistor Sensing Current:[7]	10/100µA
Usable Thermistor Range:	25-450,000Ω, typical
User Calibration:	Steinhart-Hart, 3 constants
TEC MEASUREMENT (DISPLAY)	
Temperature Range:[8]	-99.9°C to 199.9°C
Temperature Accuracy:[3]	±0.5°C
Thermistor Resistance	
Range (10µA setting):	0.01-450.00kΩ
Accuracy (10µA setting):[9]	±0.05kΩ
Range (100µA setting):	0.001-45.000kΩ
Accuracy (100µA setting):[10]	±0.005kΩ
TEC Current Range:	-1.50 to 1.50A
TEC Current Accuracy:	±0.04A
TEC Current Resolution:	±0.01A
Voltage Range:	-9.999 to 9.999V
Voltage Resolution:[11]	100mV (1mV in GPIB)
Voltage Accuracy:[12]	±70mW (±20mV in GPIB)

	3916550 DUAL 9W	3916558 SINGLE 24W (3A)
TEMPERATURE CONTROL MODULES		
TEMPERATURE CONTROL OUTPUT		
Temperature Control Range:[2]	-99.9°C to 150°C	-99.9°C to 150°C
Temperature Setpoint		
Resolution (-20°C to 20°C):	0.1°C	0.1°C
Accuracy (-20°C to 20°C):[3]	±0.2°C	±0.2°C
Resolution (20°C to 50°C):	0.2°C	0.2°C
Accuracy (0°C to 50°C):[3]	±0.2°C	±0.2°C
Short-Term Stability (1 hr.):[4]	<±0.007°C	<±0.007°C
Long-Term Stability (24 hrs.):[5]	<±0.01°C	<±0.01°C
Output Type:	Bipolar current source	Bipolar current source
Compliance Voltage:	>6V DC	>8V DC
Maximum Output Current:	1.5A	3A
Maximum Output Power:	9W	24W
Current Noise and Ripple:[6]	<1mA rms	<2mA rms
Current Limit Range:	0.1-1.6A	0.1-3.10A
Current Limit Set Accuracy:	±0.05A	±0.05A
Control Algorithm:	Smart integrator, Hybrid PI, Gain adjustable from 1-127	

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Specifications[1]

TEMPERATURE CONTROL MODULES (CONTINUED)

	3916550 DUAL 9W	3916558 SINGLE 24W (3A)
TEMPERATURE SENSOR		
Types:	Thermisor (2-wire NTC)	Thermistor (2-wire NTC)
Thermistor Sensing Current:[7]	10μA/100μA	10μA/100μA
Usable Thermistor Range:	25-450,000Ω, typical	25-450,000Ω, typical
User Calibration:	Steinhart-Hart, 3 constants	Steinhart-Hart, 3 constants
TEC MEASUREMENT (DISPLAY)		
Temperature Range:[8]	-99.9°C to 199.9°C	-99.9°C to 199.9°C
Temperature Accuracy:[3]	±0.5°C	±0.5°C
Thermistor Resistance		
Range (10μA setting):	0.01-450.00kΩ	0.01-450.00kΩ
Accuracy (10μA setting):[9]	±0.05kΩ	±0.05kΩ
Range (100μA setting):	0.001-45.000kΩ	0.001-45.000kΩ
Accuracy (100μA setting):[10]	±0.005kΩ	±0.005kΩ
TEC Current Range:	-1.50 to 1.50A	-3.00 to 3.00A
TEC Current Accuracy:	±0.04A	±0.04A
Voltage Range:	-9.999 to 9.999V	-10.75 to 10.75V
Voltage Resolution:[11]	100mV (1mV in GPIB)	100mV (1mV in GPIB)
Voltage Accuracy:[12]	±70mV (±20mV in GPIB)	±70mV (±20mV in GPIB)

CURRENT SOURCE NOTES

* Two isolated laser sources in each module

1. All values after a one-hour warm-up period.
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 1480nm laser diode into a photodetector with 160kHz 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).
6. Maximum output current transient resulting from a 1000V power line transient spike. Tested to ILX Lightwave Technical Standard #LDC-00196. Request ILX Application Note #3 "Protecting Your Laser Diode".
7. Maximum monitor photodiode current drift over any 30-minute period. Assumes zero drift in responsivity of photodiode.
8. Modulation input is 50Ω terminated inside the mainframe.
9. 250mA setpoint, 50mA modulation current, 1Ω load.
10. 50% modulation at mid-scale output, 1Ω load, high bandwidth mode.
11. Responsivity value is user-defined and is used to calculate the optical power.
12. 1mV through GPIB.
13. Four-wire voltage measurement while driving calibration load. Specifications are valid for values above 10mV. Accuracy is ±2mV through GPIB.
14. Accuracy is 0.15% above 2.5A after a one-hour warm-up period.

TEMPERATURE CONTROL NOTES

1. All values after a one-hour warm-up period.
2. Software limits of range. Actual range possible depends on the physical load, thermistor type, and TEC module.
3. Accuracy figures are quoted for a typical 10kΩ thermistor and 100μA current setting for -5°C to 50°C and typical 10kΩ thermistor and 10μA current setting for -20°C to -5°C. Accuracy figures are relative to the calibration standard. Both resolution and accuracy are dependent upon the user-defined configuration of the instrument.
4. Over any one-hour period, half-scale output, controlling an LDM-4412 mount at 25°C with 10kΩ thermistor on a 100μA setting.
5. Over any 24-hour period, half-scale output, controlling an LDM-4412 mount at 25°C with 10kΩ thermistor on a 100μA setting.
6. Measured at 1A output over a bandwidth of 10Hz to 10MHz. 3916558 module noise measured at 2A output over a bandwidth of DC to 25MHz.
7. Thermistor current range software selectable by front panel or GPIB.
8. Software limits of display range.
9. Using a 10kΩ thermistor, controlling an LDM-4412 mount over -30°C to 65°C (~200-2kΩ) or a 100kΩ thermistor controlling an LDM-4412 mount over 10°C - 85°C (~200-10kΩ).
10. Using a 10kΩ thermistor, controlling an LDM-4412 mount over -5°C to 90°C (45-1kΩ).
11. 1mV through GPIB.
12. Voltage measurement accuracy while driving calibration load. Accuracy is dependent upon load used. Accuracy of ±20mW through GPIB.

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31950 Frontage Road, Bozeman, MT 59715 • FAX: 406-586-9405

www.newport.com/ilxlightwave

For information call

1-800-459-9459

International Inquiries: 406-556-2481

email: sales@ilxlightwave.com

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