LQx / RLx Series

LQx and RLx Series User's Manual

Newport®

Experience | Solutions

Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of 90 days from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for an additional 90 days.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages resulting from the purchase or use of its products.

First printing 2004

This manual has been provided for information only and product specifications are subject to change without notice. Any change will be reflected in future printings.

Newport Corporation
1791 Deere Avenue
Irvine, CA, 92606 USA

P/N 41317-01 Rev. E

EU Declaration of Conformity

We declare that the accompanying product, identified with the CE mark, complies with requirements of the Electromagnetic Compatibility Directive, 89/336/EEC and the Low Voltage Directive 73/23/EEC.

Model Number: LQA, LQC, LQD, RLA, RLC, and RLD Series Laser Source Modules

Year CE mark affixed: 2004

Type of Equipment:

Electrical equipment for measurement, control and laboratory use

Standards Applied:

Compliance was demonstrated to the following standards to the extent applicable:

BS EN61326-1:1997+A1+A2 “Electrical equipment for measurement, control and laboratory use – EMC requirements”

This equipment meets the Class A radiated and conducted emission limits.

BS EN 61000-3-2:2001, Harmonic current emissions, Class A

BS EN 61000-3-3:2002, Voltage fluctuations and flicker

BS EN 61010-1:2001, A1+A2 “Safety requirements for electrical equipment for measurement, control and laboratory use”

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Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling

1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

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1 General Information

1.1 Introduction

Newport's **LQx Series Laser Diode Light Source Modules** can be used in analytical, industrial and biomedical applications, such as spectroscopy, interferometry, machine vision, marking, flow cytometry and tissue fluorescence. The **RLx Series** can be used for Raman spectroscopy, holography, and interferometry. Modules are available at various wavelengths and output power levels, with the choice of either elliptical or circular output beam shape for the LQx series. Both the LQx and RLx Series include self-contained laser diode modules with superior optical quality and ultra-stable temperature, wavelength and output power control. The LQx and RLx Series modules feature a precision current source and a PID temperature controller. Three types of LQx and RLx Series are featured:

LQC/RLC Series - CW operation

LQA/RLA Series - Analog modulation of up to 20 MHz

LQD/RLD Series - Digital modulation (via TTL) of up to 100 MHz

For the LQx Series, both elliptical (E versions) and circular beam output options are available. Circular beams are generated using either a microlens (C versions) or an anamorphic prism pair (P versions) resulting in a higher beam quality. The LQx Series can be ordered with a fiber pigtail. When the fiber pigtail option is applied to the LQx series, the part number becomes LDM-OPT-aa-bb, where aa denotes the laser module model and bb denotes the multi-mode fiber core diameter and connector type. See the Appendix for further information on the LQx series diode and fiber type used The RLx Series comes standard with an SMA fiber pigtail.

The center wavelength indicated by the LQx model number is typical. Center wavelength accuracy for LQx Series is as follows:

Wavelengths less than 700 nm, accuracy +/- 10 nm

Wavelengths 700-1300 nm, accuracy +/- 15 nm

Wavelength 1300-1600 nm, accuracy +/- 20 nm

Wavelength greater than 1600 nm, accuracy +/- 10 nm

All RLx Series modules center wavelengths are accurate to +/- 0.5 nm

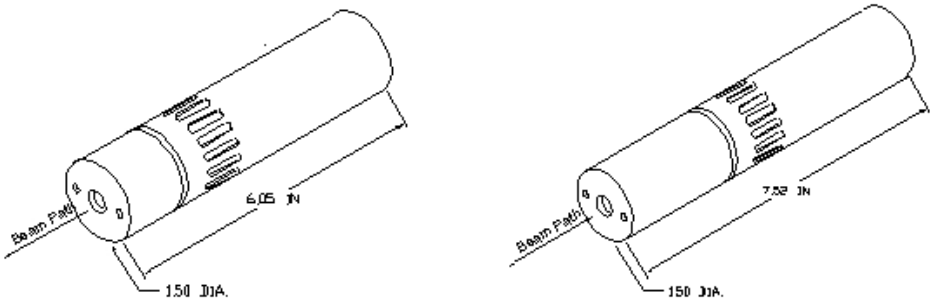
All LQx and RLx modules with wavelengths in the range 635nm -2330nm require an external 4.8 (~5) VDC power source. Modules with wavelengths below 500 nm require an 8 to 12 VDC power source. Newport offers a 5, 8 and 12 VDC supply for use with the LQx and RLx series. The operating voltage for the LQx and RLx series is dependent on the wavelength specifications of the laser diode module, as shown in the following table:

		Power Supply	
Diode Module λ	**Operating Voltage**	**110 VAC**	**220 VAC**
635-2330nm	5V	LPMS-5-110	LPMS-5-220
375-473nm	8V	LPMS-8-110	LPMS-8-220
375-473nm	12V	LIQS-12-110	LIQS-12-220

Table 1 Diode and Power Supply Table

The LPMS-5-110, LPMS-8-110 and LIQS-12-110 Power Supplies meet CDRH requirements by providing an interlock input, key enable switch, delayed start-up, and laser active indicator. These units are purchased separately and are not included with the Laser Diode Light Sources Modules. 220 VAC input versions are also available.

The LQx and RLx series can be configured with a variety of laser diodes at various output powers and operating wavelengths. Products with output powers above 5mW or with IR output are not intended for surveying, leveling, and alignment applications. Visible units less than 5mW are CDRH certified as laser systems.



xxE -xxC

Figure 1 Dimensions of LQx and RLx series

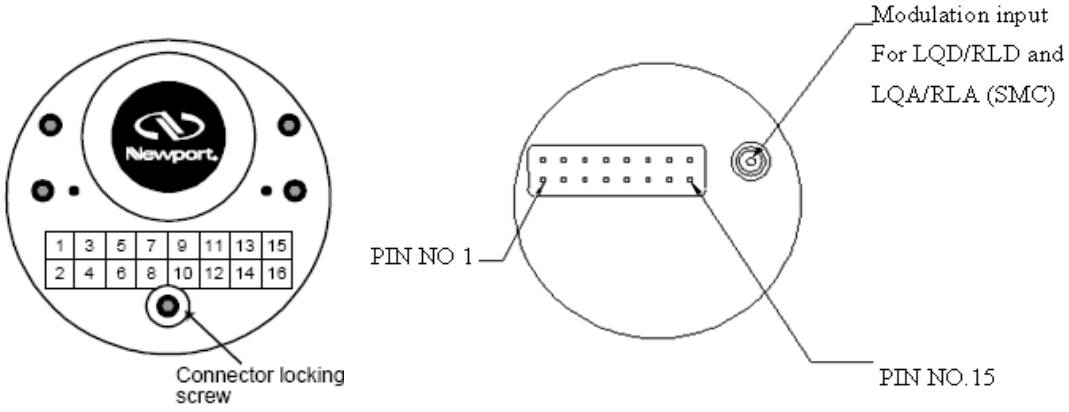
1.2 Installation

Do not mount the laser in a thermal insulating material, such as foam plastic. Heat can have adverse effects on laser diodes. Such effects include decreased output power and large shifts in wavelengths. Lasers below 5mW may not need a heat sink. For best heat dissipation use a metal mounting fixture like Newport's ULM Series mounting brackets. A heat sink is always recommended for operating temperatures above 25°C.

The operating voltage for the LQx and RLx Series laser modules in the wavelength range of 635nm-2330nm is 5 VDC. Modules less than 500nm require 8 – 12 VDC.

If the label attached to the laser module reads, "This product complies with 21CFR 1040.10 and 1040.11," a permanently installed switch at the power source will be required to retain the modules certification as a laser system. This certification is void if the unit is enclosed or otherwise inaccessible, if the labels are modified or removed, or if the system is permanently connected (i.e. soldered, etc.) directly to the power source without the required switch. Modifying the laser will void the CDRH certification. If the distance between the laser head and the power source switch exceeds two meters, an emissions indicator must be mounted near the switch.

This laser module is connectorized for easy integration into your application. The 16-pin header connector is present on all units and accommodates the DC supply voltage and monitoring connections. Pin 1 is marked on the back of the unit with a red dot. On LQA/LQD and RLA/RLD series modules the modulation connection is incorporated into pins 13 and 14. (Previous LQA/LQD and RLA/RLD modules had two connectors on the rear panel. An SMC connector was provided for analog and TTL modulation input.) Connections are listed below:



Current LQX-models **Previous LQX-models**

Figure 2 LQX Connections

A power only cable is provided with the LQx/RLx series. Newport supplies two accessory cables for easy access to the monitoring connections. The part number for the cables for the CW lasers is LQC-CAB and the cable part number for the analog and digital lasers is LQA-CAB. The LQA-CAB also incorporates a BNC input connector for analog or TTL modulation input. If you prefer to manufacture your own cable harness, we recommend using Molex part number 22-55-2161 and crimp terminal 16-02-0103 or equivalents. Newports's standard cable includes only the 5, 8 or 12 VDC and ground leads. A green bare wire adapter is included (see picture below) with the PPMS and LIQS series power supplies. It is for use with those laser diode modules that do not have a DB-9 connector installed. In this case, attach the module's black wire to the properly marked location (ground) on the bare wire adapter. Then attach the red wire to the proper location (5, 8 or 12V according to your laser's power requirement) on the bare wire adapter. Then, with the power supply turned off, attach the adapter to the DB-9 connector on the power supply.

Pin	Wire Color	Description
1	Red	5 VDC, 8VDC or 12VDC
2	Red	5 VDC, 8VDC or 12VDC
3		For future use
4	Gray	PDMON, Photodiode monitor (+)
5		For future use
6		For future use
7	Blue	LDIMON, Laser Diode Current Monitor (+)
8		For future use
9	White	TMPMON, Laser Diode Temperature Monitor (+)
10		For future use
11	Yellow	Error signal/Inhibit
12	Green	GRD, Monitoring ground
13	Green	Modulation Signal (+)
14	Green	GRD, Monitoring ground, Modulation Signal (-)
15	Black	Ground
16	Black	Ground

Table 2 Pin/Wire Table

To monitor laser diode current, read the voltage between the blue wire and green wire. This reading will be in mV with 1mV=1mA.

To monitor laser diode temperature, read the voltage between the white wire and green wire. This reading will be in V. Use the chart below to calculate laser diode temperature. Please note that the temperature control pot is used

to set the desired temperature. There will be a short delay between adjusting the pot and monitoring a change in the laser diode temperature.

ANALOG MODULATION USERS: Analog modulation requires an input voltage on the BNC Connector of the LQA-CAB cable. A control voltage of 1 VDC will yield a 100% power output. A control voltage of 0 VDC will yield a threshold power output. The relationship between voltage and output power is not linear.

TTL MODULATION USERS: TTL modulation requires an input voltage on the BNC Connector of the LQA-CAB. A control voltage of 5 VDC will yield a threshold power output. A control voltage of 0 VDC will yield a 100% output. The laser is either ON or OFF depending on the control voltage. The LQD-xxE and LQD-xxP are easily connected to either a function or pulse generator.

TEMPERATURE MONITOR: The temperature of the laser diode can be monitored by measuring the voltage between Temperature Monitor Pin 9 (white) and Pin 14 (green).. This reading can be compared with the chart below to determine the diode's temperature.

Voltage	Temp		Voltage	Temp
0.950996483	-0.003050765		1.983406439	23.99951443
0.988555222	0.997046962		2.028	24.99963102
1.026862732	1.997145503		2.072331362	25.99974836
1.065891044	2.997244855		2.116360728	26.99986646
1.10560988	3.997345018		2.160049906	27.9999853
1.145986745	4.997445987		2.203362406	29.00010489
1.18698702	5.99754776		2.246263529	30.00022523
1.228574089	6.997650336		2.288720439	31.00034631
1.27070946	7.997753711		2.330702222	32.00046813
1.313352918	8.997857883		2.372179931	33.00059068
1.356462679	9.99796285		2.41312662	34.00071398
1.39999556	10.99806861		2.45351736	35.000838
1.44390716	11.99817516		2.493329247	36.00096275
1.488152041	12.99828249		2.532541399	37.00108824
1.532683927	13.99839061		2.571134938	38.00121444

1.5774559	14.99849952		2.609092965	39.00134137
1.622420602	15.9986092		2.646400526	40.001469
1.667530436	16.99871966		2.683044569	41.00159739
1.71273777	17.99883089		2.71901389	42.00172648
1.757995134	18.9989429		2.754299082	43.00185628
1.803255416	19.99905568		2.788892466	44.00198678
1.848472054	20.99916922		2.822788029	45.002118
1.893599212	21.99928353		2.855981348	46.00224992
1.938591962	22.9993986		2.888469518	47.00238255

Table 3 Temperature Monitor Look Up Chart

ERROR/DISABLE: Pin 11 (yellow) has two functions. (1) It can be monitored for an error signal. If the voltage is low (~0VDC) then laser diode has been shutdown due to temperature conditions or insufficient voltage is being supplied for operation of the laser. If the monitored voltage is high (~5VDC), then the laser module is operating properly. (2) As a secondary function, the user can disable the laser output by grounding this pin.

1.3 Operation

1.3.1 Operation and Control Procedure

The LQx and RLx Series does not have any user adjustable controls. The user may adjust the focus or collimation of the output beam on E models by using the supplied spanner wrench to increase or decrease the distance between the diode and the optic. The P (prism) series does not have adjustable optics.

1.3.2 Preventative Maintenance

This laser module contains no user serviceable parts. Occasionally the optics may need cleaning depending on environmental conditions. When cleaning is required, the use of clean, compressed air is recommended to blow the optics clean. If compressed air fails, clean lens carefully with alcohol and a lint free rag or Q-tip.

1.3.3 Laser Safety

Class 3b and 4 lasers are not intended for use in surveying, leveling, alignment, or medical applications.

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CAUTION

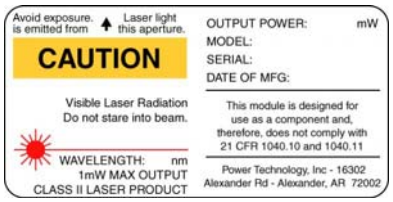
The use of optical instruments with this product will increase eye hazard. Do not shine laser in the direction of other people or at reflective surfaces that might cause exposure to the human eye. Do not mount the laser at eye level.

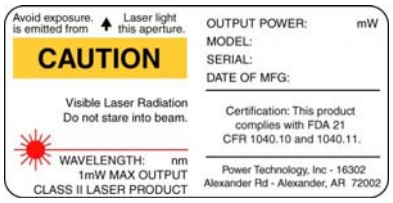
Modifications, that affect any aspect of the product's performance or intended functions will require re-certification and re-identification of the product in accordance with the provisions of 21CFR 1040.10 and 1040.11.

The product labels shown below can typically be found near the output optics.

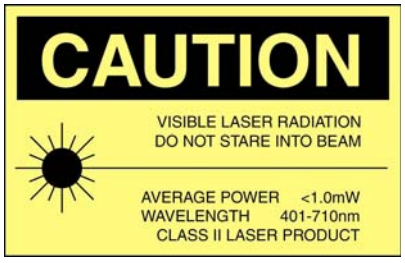
Class II Laser:
Visible Laser Radiation
Do Not Stare Into Beam

☐ Component ☐ System



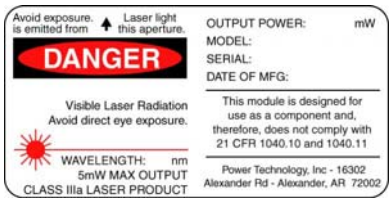


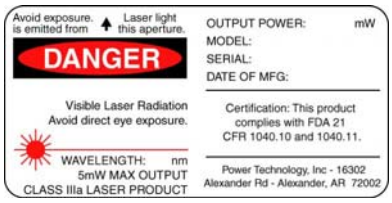
One of the above labels is attached to the laser head.



Class IIIa Laser:
Visible Laser Radiation,
Avoid Direct Eye Exposure

☐ Component ☐ System

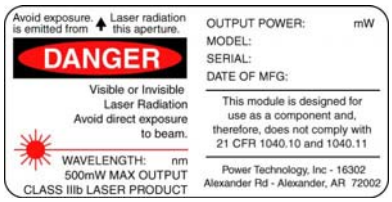


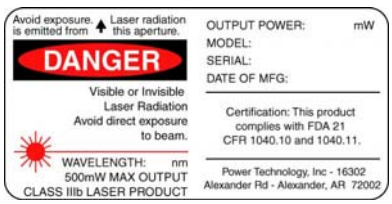


One of the above labels is attached to the laser head.

Class IIIb Laser:
Visible Or Invisible Laser Radiation
Avoid Direct Exposure To Beam

☐ Component ☐ System





One of the above labels is attached to the laser head.

Figure 3 Product Caution/Danger Labels

2 Appendix

2.1 LDM-OPT Modules

LQx series laser diode light source modules have the option of an MM (multi-mode) fiber pigtail with either an SMA 905 or an FC/PC connector. Available fiber core diameters are 50um, 62.5um, 100um and 200um. The choice to pigtail the laser module must be made at the time of purchase. When this option is chosen, the part number of the module changes to the LDM-OPT-aa-bb format, where aa represents the LQx module choice and bb represents the fiber and connector choice. Refer to www.newport.com for the latest list of laser diode module products and the appropriate option code.

The following table indicates the fiber and the connector type available for fiber-pigtailing.

Core Diameter	bb	Connector Type	Fiber Type
50	10	SMA905	Multi Mode
62.5	11	SMA905	Multi Mode
100	12	SMA905	Multi Mode
200	13	SMA905	Multi Mode
50	20	FC/PC	Multi Mode
62.5	21	FC/PC	Multi Mode
100	22	FC/PC	Multi Mode
200	23	FC/PC	Multi Mode

Table 4 Fiber and Connector Types Available for Pigtail

3 Factory Service Information

3.1 Service Form

Newport Corporation
U.S.A. Office: 800-222-6440
FAX: 949/253-1479

Name_____ Return Authorization # _____
(Please obtain RA# prior to return of item)

Company _____

Address _____ Date _____

Country _____ Phone Number _____

P.O. Number _____ FAX Number_____

Item(s) Being Returned:

Model # _____ Serial # _____

Description _____
_____
_____
_____
_____
_____

Reason for return of goods (please list any specific problems):

_____
_____
_____
_____
_____
_____
_____
_____
_____

Notes: _____

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