Model LDKIT Series

Laser Diode Control Kit

User's Manual

Newport®
Experience | Solutions

Model LDKIT Series
Laser Diode Control Kit

Dear Customer,

This User Manual contains essential information, including safety precautions and start up procedures, needed to get your new instrument up and running. Please review it prior to unpacking and powering up the instrument.

In an effort to keep the Newport instruments optimized for your applications, Newport will on occasion update existing and add new features and documents. You can find the latest User Manual, application software, Start-up Guide, or firmware at the product page on the Newport website (www.newport.com). Call your local Newport application specialist if you need support with locating or downloading these files.

Enjoy your new product!

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 one year 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 the remainder of the original warranty period or 90 days, whichever first occurs.

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.

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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
Part No. 90026746, Rev. A

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Service Information

This section contains information regarding factory service for the source. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.

Technical Support Contacts

North America & Asia
Newport Corporation Service Dept.
1791 Deere Ave. Irvine, CA 92606
Telephone: (949) 253-1694
Telephone: (800) 222-6440

Europe
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Zone Industrielle
45340 Beaune la Rolande, FRANCE
Telephone: (33) 02 38 40 51 56

Asia

253 Aidu Road, Bld #3, Flr 3, Sec C
Shanghai 200131, China
Telephone: +86-21-5046 2300
Fax: +86-21-5046 2323

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?

Table of Contents

Maintenance and Service

List of Figures

List of Tables

1 Safety Precautions

1.1 Definitions and Symbols

The following terms and symbols are used in this documentation where safety-related issues occur.

Figure 1 – General Warning or Caution Symbol

The Exclamation Symbol in the figure above appears on the product and in Warning and Caution tables throughout this document. This symbol designates that documentation needs to be consulted to determine the nature of a potential hazard, and any actions that have to be taken.

1.1.2 Waste Electrical and Electronic Equipment (WEEE)

Figure 2 – WEEE Directive Symbol

This symbol on the product or on its packaging indicates that this product must not be disposed of with regular waste. Instead, it is the user responsibility to dispose of waste equipment according to the local laws. The separate collection and recycling of the waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For information about where the user can drop off the waste equipment for recycling, please contact your local Newport Corporation representative. See Section 5 for instructions on how to disassemble the equipment for recycling purposes.

1.2 Warnings and Cautions

The following are definitions of the Warnings, Cautions and Notes that are used throughout this manual to call your attention to important information regarding your safety, the safety and preservation of your equipment or an important tip.

WARNING
Situation has the potential to cause bodily harm or death.

CAUTION
Situation has the potential to cause damage to property or equipment.

NOTE
Additional information the user or operator should consider.

1.2.1 General Warnings

Observe these general warnings when operating or servicing this equipment:

- Heed all warnings on the unit and in the operating instructions.
- Do not use this equipment in or near water.
- This equipment is grounded through the connections to the laser diode driver and TE controller.
- Route connecting cables so that they are not likely to be damaged.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp lint-free cloth.

1.2.2 General Cautions

Observe these cautions when operating this equipment:

- If this equipment is used in a manner not specified in this manual, the protection provided by this equipment may be impaired.
- Follow precautions for static sensitive devices when handling this equipment.
- This product should only be powered as described in the manual.
- There are no user-serviceable parts inside the Model 764H series products.
- Adhere to good laser safety practices when using this equipment.

1.2.3 Summary of Warnings and Cautions

The following general warning and cautions are applicable to this instrument:

WARNING
Before operating the Laser Diode Control Kit, please read and understand all of Section 1.

WARNING
Do not attempt to operate this equipment if there is evidence of shipping damage or you suspect the unit is damaged. Damaged equipment may present additional hazards to you. Contact Newport technical support for advice before attempting to plug in and operate damaged equipment.

CAUTION
There are no user serviceable parts inside the products. Work performed by persons not authorized by Newport Corporation will void the warranty. For instructions on obtaining warranty repair or service, please refer to Section 5.

2 General Information

2.1 Introduction

Newport has been an industry leader in providing high performance laser diode drivers and temperature controllers for various types of laser diodes.

The Model LDKIT series Laser Diode Control Kits offer numerous benefits to customers:

- Maximum user flexibility with minimum complexity
- Simpler product selection and ordering process
- One source solution from a single vendor guaranteeing product performance, and compatibility
- Making initial setup installation easy
- Making repeat order or setup simple

Each kit consists of a laser diode driver, temperature controller, a laser mount, cables, a user manual, and additional accessories. The model number scheme follows the following easy-to-follow logic:

LDKIT-(max current)-(max heat capacity)

For example, LDKIT-80A-110W can drive up 80 A current with the model 5700-80-7 and 110W heat capacity capable using the mount model 764H-110. The model number scheme is easy to recognize and intuitive, as the max input current and heat capacity are the two most important specifications in building a laser diode control system.

Product Model	Description
LDKIT-80A-110W	Laser Diode Control Kit, 80 A, 110 W
LDKIT-30A-61W	Laser Diode Control Kit, 30 A, 61 W
LDKIT-6A-55W	Laser Diode Control Kit, 6 A, 55 W
LDKIT-1.5A-TO	Laser Diode Control Kit, 1.5 A, TO-can type
LDKIT-1.5A-BUT	Laser Diode Control Kit, 1.5 A, Butterfly type

Table 1 – Laser Diode Control Kit Offering

2.2 Parts List

The following instruments are used for each kit.

Kit Model	LD Driver	Temp Cont	Mount	Cable LD-MT	Cable TEC-MT
LDKIT-80A-110W	5700-80-7 	3700 	764H-110 	5700-06 	--
LDKIT-30A-61W	5700-30-5 	3700 	764H-061 	5700-06 	--
LDKIT-6A-55W	560B 	350B 	764H-061 	500-02 	300-02 
LDKIT-1.5A-TO	6100 		710 	500-04 	300-04 
LDKIT-1.5A-BUT	6100 		744 	500-04 	300-04 

Table 2 – Instruments Included in Each Laser Diode Control Kit

In addition, some laser diode kits include accessories such as heat shrink tubing, ring lugs, a simple terminal block that help the customer make a quick connection between the laser diode and the laser diode driver. The customer must consult his or her site safety or regulation officer to come up with the proper electrical connections.

If parts are missing or there are questions regarding any of the items shipped to you, please contact Newport Corporation technical support at 800-222-6440. Some of useful spare and accessory parts include:

Part #	Description	Catagory
05173-01	Thermal paste, silicone	Accessory/Spare
FK-STRAP	Grounding wrist strap	Accessory/Spare
90032542	Top plate for 764H-110, copper	Spare, only with 764H-110
30032541	Top plate for 764H-061, copper	Spare, only with 764H-061

Table 3 – Accessory and spare parts list

Customer supplied Equipment:

- *Laser diode*
- *Special cabling if necessary*

WARNING

Make sure of obtaining and understanding specifications of the laser diode you are going to use on this mount, because there are a multitude of commercially available high power laser diode packages with various package styles and electrical requirements. Request datasheets from laser manufacturers.

2.3 Specifications and Choosing the Right Kit

The Laser Diode Control Kits do not have system level specifications. As opposed to a turn-key system, the kits are specifically offered to increase the flexibility of the user experience by conveniently having all piece parts available in a single order. Refer to the user manual of individual components for their specifications. The following table, constructed from specifications from individual components, may provide rough ideas about the capabilities of the kits.

	LDKIT-80A-110W	LDKIT-30A-61W	LDKIT-6A-55W	LDKIT-1.5A-TO	LDKIT-1.5A-BUT
Laser Diode Driver					
Max Output Current	80 A	30 A	6 A	1.5 A	1.5 A
Compliance Voltage	7.5 V	5.0 V	7.0 V	10 V	10 V
Total Electrical Output	600 W	150 W	42 W	15 W	15 W
Temperature Controller					
TE Current/ Voltage	±14 A/24 V	±14 A/24 V	±5 A/11 V	±4 A/8 V	±4 A/8 V
TE Output Power	336 W	336 W	55 W	32 W	32 W
Laser Diode Mount					
Heat Capacity	110 W	61 W	55 W	2.0 W	2.0 W

Table 4 – Accessory and spare parts list

2.3.1 Laser Diodes and Drivers

There are a huge variety of laser diodes and package styles available in the market currently. It is expected that the user already has selected the laser diode that meets the requirements. Refer to the datasheet of the laser diode and determine what the operating current and the forward voltage are. Choose a driver model whose current and voltage limits are at least 10 – 20 % more.

2.3.2 Heat Load Calculations

A simple way to approximately calculate your heat load is to use the following rule of thumb. The heat load generated is the difference between the total electrical power going into the laser diode (Current times Voltage) and the optical output power of the laser diode. The current and voltage are input from the laser diode driver.

An example would be using a BW series Oclaro laser diode, at 40 Amps and 2.3 Volts resulting in a total of 92 Watts electrical power input to the device. If the optical output measured is 40 Watts, means 52 Watts of thermal heat is generated.

This calculation is only an approximation since there are additional heat loads on the mount from the ambient temperatures and other possible inefficiencies within the mount depending on the TEC drive current and voltage (the relationships are not simple calculations). It is best to operate the system at less than 90 % of the maximum rated heat load for the specific laser diode mount to avoid thermal runaway conditions. For multiple laser diodes attached to the LD mount, similar calculations should be made.

2.3.3 Laser Diode Mounts and Temperature Controllers

Based on the results of the heat load calculations, select the most appropriate laser diode mount and the temperature controller. Choose a mount that can handle at least 10 – 20 % more than the calculated heat load.

3 Getting Started

3.1 Unpacking and Handling

The Laser Diode Control Kits are designed for easy setup and use. You will receive several boxes from Newport. To unpack, remove the each item from its packaging. The user manuals of each individual component have specific unpacking and handling information.

3.2 Inspection for Damage

The Laser Diode Control Kit is carefully packaged at the factory to minimize the possibility of damage during shipping. Inspect the boxes for external signs of damage or mishandling. Inspect the contents of the box for damage. If there is visible damage upon receipt, inform the shipping company and Newport Corporation immediately. You may consider saving the boxes in case of shipping needs in the future.

WARNING

Do not attempt to operate this equipment if there is evidence of shipping damage or you suspect the unit is damaged. Damaged equipment may present additional hazards to you. Contact Newport technical support for advice before attempting to plug in and operate damaged equipment.

CAUTION

The user is advised to save the packaging material in case the unit has to be shipped to a different location. The packaging material is specially designed to protect the unit during shipping.

3.3 Choosing and Preparing a Suitable Work Surface

Work on a surface where proper electrostatic discharge protection is provided, as it is extremely easy to damage a laser diode otherwise. Make sure that there is enough space for the operator to comfortably set up the instruments and the mounts.

4 Operation

WARNING
Before starting to operate a laser diode, please read all the component manuals provided with the kit.

4.1 Connecting Cables

Please note that the cables connecting between a laser diode mount and a laser diode driver and a temperature controller are unique to each product or kit. It is important to make the instrument connection before mounting the laser diode, because the instruments provide necessary protection for the diode to ESD.

4.1.1 LDKIT-1.5A-TO and LDKIT-1.5A-BUT

Connecting the cables are straightforward for these kits. The 300-04, DB15 temperature controller cable, and the 500-04, DB9 laser diode driver cable, are industry standard cables, and they are directly hooked up between the Model 6100 Combo Laser Diode and Temperature Controller and the laser diode mounts.

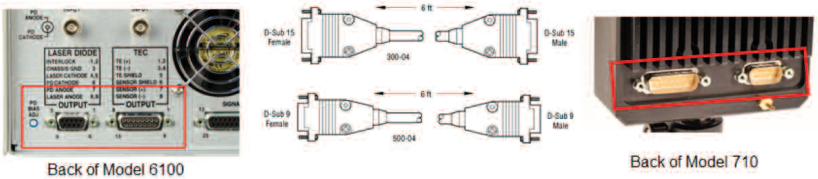

Figure 3 – Connecting Model 6100 and 710 Laser Diode Mount

4.1.2 LDKIT-6A-55W

This kit is for medium power level laser diodes in packages other than the TO and the Butterfly packages. It utilizes Model 560B Laser Diode Driver, 350B Temperature Controller, and 764H-061 High Power Laser Diode Mount. Note that the mount comes with a cable that is directly compatible with Model 3700 High Power Temperature Controller.

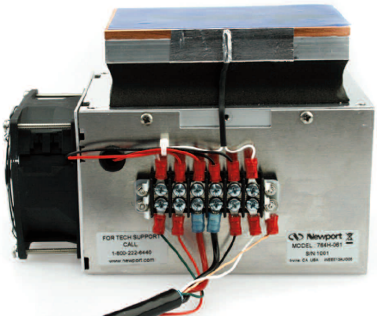

Figure 4 – Model 764H-061 High Power Laser Diode Mount

The terminal block pin connections are as shown in Figure 5. The left of the figure shows internal connections for the mount. The right side of the figure is the connections to the TE Controller. By using a screw driver, carefully remove the cable and connect the open ended side of Model 300-02 cable.

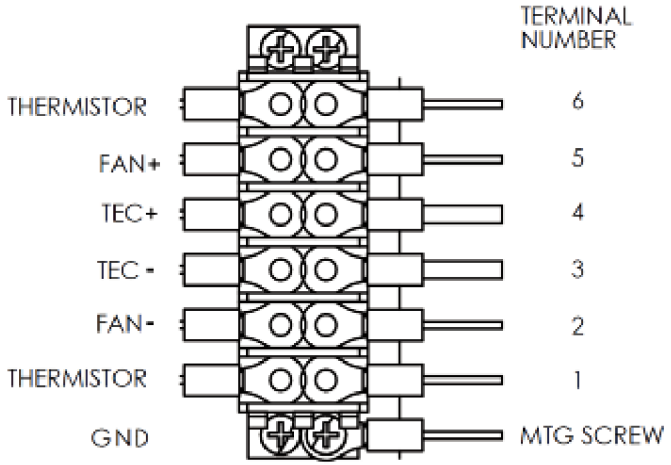

Figure 5 – Terminal block connections

The connector pin connection of 300-02 is shown below (Table 5).

Pin #	Connection	Wire Color (300-02 cable)
1 & 2	TE +	RED
3 & 4	TE –	BLACK
5	TE SHIELD	
6	SENSOR SHIELD	
7	SENSOR +	GREEN
8	SENSOR –	WHITE

Table 5 – Model 300-02 pin configuration

Also supplied in the kit is Model 500-02 cable that allows the user to connect the laser diode to Model 560B, 6 Amp Laser Diode Driver. It has a DB9 connector on one end, and bare wire on the other end. It is impossible to provide connectors for all commercially available laser diode types. We recommend that the user contact the laser diode manufacturer for inquiring correct types of cables and connectors.

WARNING

Contact the laser manufacturer or provider and inquire information about how to properly connect the laser diode to a laser diode driver.

4.1.3 LDKIT-80A-110W and LDKIT-30A-61W

These kits include our newest 5700 series High Power Laser Diode Drivers and a Model 3700 High Power Temperature Controller.

Kit Model	LD Driver	Temp Cont	Mount	Cable LD-MT	Cable TEC-MT
LDKIT-80A-110W	5700-80-7	3700	764H-110	5700-06	--
LDKIT-30A-61W	5700-30-5	3700	764H-061	5700-06	--

As mentioned earlier, the 764 series Laser Diode Mounts come with a cable that is directly compatible with the Model 3700 or the obsolete Model 3150. We also provide a Model 5700-06 cable to allow the user to connect the laser diode to the Laser Diode Driver. We recommend that the user contact the laser diode manufacturer for inquiring correct types of cables and connectors.

WARNING

Contact the laser manufacturer or provider and inquire information about how to properly connect the laser diode to a laser diode driver.

4.2 Laser Diode Mounting

Be extremely careful in mounting the laser diode to the supplied laser diode mount. The TO and Butterfly mounts are industry standard. The 764H series High Power Laser Diode Mounts have hole patterns compatible with Oclaro's select laser diode families and other popular diode package types. For custom laser diode hole patterns, the customer can carefully remove the top plate and drill desired hole patterns. Spare copper top plates are available for purchase. For details about how to install laser diodes into each mount, refer to the product User Manual.

4.3 General Operating Procedures

1. Securely mount the laser diode mount.
2. After securing the mount, connect the cables of the temperature controller and the laser diode driver to the mount.
3. Set the maximum TE module current on the temperature controller.
4. Set the current limit level on the laser diode driver and the desired drive current. Turn the output of the laser diode driver on.
5. Allow the mount to stabilize its temperature which may take up to half an hour.

WARNING

Never look directly into the output aperture of laser diode at any time. Laser Diodes emit invisible radiation that can cause damage to the eyes. Also, take precautions to prevent specular reflections from the laser diode's output beam. Avoid exposure at all times to laser emissions or collateral radiation in excess of the applicable emission limits given in "Performance Standards for Laser Products" United States Code of Federal Regulation, 21 CFR 1040.10(D)

5 Maintenance and Service

WARNING
There are no user serviceable parts inside the Model 764H Temperature Controlled Laser Diode Mount. Work performed by persons not authorized by Newport Corporation will void the warranty.

5.1 Obtaining Service

Any of the components included in the Laser Diode Control Kits contain no user serviceable parts. To obtain information regarding factory service, contact Newport Corporation or your Newport representative. Please have the following information available:

- Instrument model number (on the side of the unit)
- Instrument serial number (on the side of the unit)
- Description of the problem.

If the mount is to be returned to Newport Corporation, you will be given a Return Number, which you should reference in your shipping documents. Please fill out a copy of the service form, located on the following page, and have the information ready when contacting Newport Corporation. Return the completed service form with the instrument.

3 Service Form

Newport Corporation
USA 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):

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Newport Corporation, Irvine, California, has been certified compliant with ISO 9001 by the British Standards Institution.