

Model 710
TO-CAN Laser Diode Mount
User's Manual

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.

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Newport Corporation
1791 Deere Avenue
Irvine, CA, 92606
USA

Part No. 90029196 rev D

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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 x31694

Europe

Newport/MICRO-CONTROLE S.A.

Zone Industrielle

45340 Beaune la Rolande, FRANCE

Telephone: (33) 02 38 40 51 56

Asia

Newport Opto-Electronics Technologies

中国 上海市 爱都路 253号 第3号楼 3层
C部位, 邮编 200131

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?

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1 Safety Precautions

1.1 Definitions and Symbols

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

1.1.1 General Warning or Caution



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 710 Laser Diode Mount.
- 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 Models 710 Laser Diode Mount, 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 Models 710 Temperature Controlled Laser Diode Mount. 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 6.

2 General Information

2.1 Introduction

The Model 710 Temperature Controlled Mount is a research quality unit that provides precise temperature control of laser diodes. The mount includes thermoelectric coolers and an efficient thermal design for optimum cooling or heating. A dry nitrogen purge nipple allows the laser diode to be surrounded in a nitrogen environment preventing condensation at below ambient temperatures. Connectors on the back side of the Model 710 mount provide a convenient manner to connect a Model 300B Series Temperature Controller and a Model 500B Series Laser Diode Driver.

The Model 710 Temperature Controlled Mount has been designed to operate laser diodes in TO-56 and TO-9 packaging, up to 2 Watts of power. Two 12.5 watt thermo-electric coolers actively cool and heat the laser diode. These coolers are series connected and handle a maximum of 6.0 Amps at 7.5 volts when operated at 25°C ambient temperature.

2.2 Specifications

| | Model 710 |
|----------------------------|--|
| Types of Packages accepted | TO-56 , TO-9, and pigtailed diodes |
| LD Current Input Range | 0 to 3 Amps |
| Optical Beam Height | 2.00 +- 0.02" (from bottom of unit without support) |
| TE Modules | Two 12.5 Watt, 20mm by 20mm series connected, 7.5V at 6 Amp max at 25 Deg ambient temp |
| Connectors | 15-pin male D-sub, laser temperature control 9-pin male D-sub, laser diode current control, isolated chassis mount BNC and solder post |
| Other | Dry nitrogen purge nipple |
| Temperature Range | -10°C to +80°C |
| Sensor Type | 10 kΩ thermistor and AD592CN (user selectable) |
| | |

Table 1 General Specifications

Environmental Specifications

| | |
|-----------------------------|--|
| Size (H x W x D) [in. (mm)] | 4.0 (101.6) x 4.0 (101.6) x 1.95 (49.53) without collimation 4.0 (101.6) x 4.0 (101.6) x 2.9 (7) with LP-05A-XYZ lens mount |
| Weight [lb (kg)] | 1 (0.45) |
| Operating Temperature | 0°C to 30°C (<90% humidity non-condensing) |
| Storage Temperature | -30°C to + 60°C (<90% humidity non-condensing) |
| Relative Humidity, Storage | <90% humidity non-condensing |
| Use Location | Indoor use only |
| | |

Table 2 Environmental Specifications

3 Getting Started

3.1 Unpacking and Handling

The Temperature Controlled Laser Diode Mount is designed for easy setup and use. To unpack, remove the Mount from its packaging. A post holder system (not included) will be needed with this unit. The mount accommodates 8-32 and M-4 threads (e.g. PS-2 post and PS-F clamping fork).

3.2 Inspection for Damage

The LD Mount is carefully packaged at the factory to minimize the possibility of damage during shipping. Inspect the box 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 box 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 Parts List

The following is a list of parts included in Model 710:

User manual hardcopy part number 90029196

LD Mount

If parts are missing or there are questions regarding any of the above items, please contact Newport Corporation technical support at 800-222-6440.

Customer supplied Equipment:

1. Adequate work surface (recommend Newport type breadboard or optical table)
2. Post and post holder with 8-32 or M4 thread
3. DB-9 and DB-15 cables for LD control and Temperature Controller (500-04 and 300-04 respectively)
4. LD Driver and Temp Controller (Newport models 500B and 300B series products recommended)
5. Anti-Static mat
6. Anti-static grounding wrist strap
7. Laser diode
8. Laser protective eyewear

3.4 Choosing and Preparing a Suitable Work Surface

The most important consideration while installing the laser diode into the mount is protection against static discharge. Make sure you have the proper static protection equipment including the following items:

1. Wrist strap and proper grounding connection
2. Static protective mat
3. Connect the LD mount to LD driver and Temp controller. Make sure the units are grounded to the same ground as the static wrist strap before installing the laser diode.
4. Contact Newport Technical support if you have further questions.

4 System Operation



WARNING

Before operating the Models 710 Temperature Controlled Laser Diode Mount, please read and understand all of Section 1.

4.1 Temperature Controlled Laser Diode Mount Anatomy

The Laser diode mount has the following components:

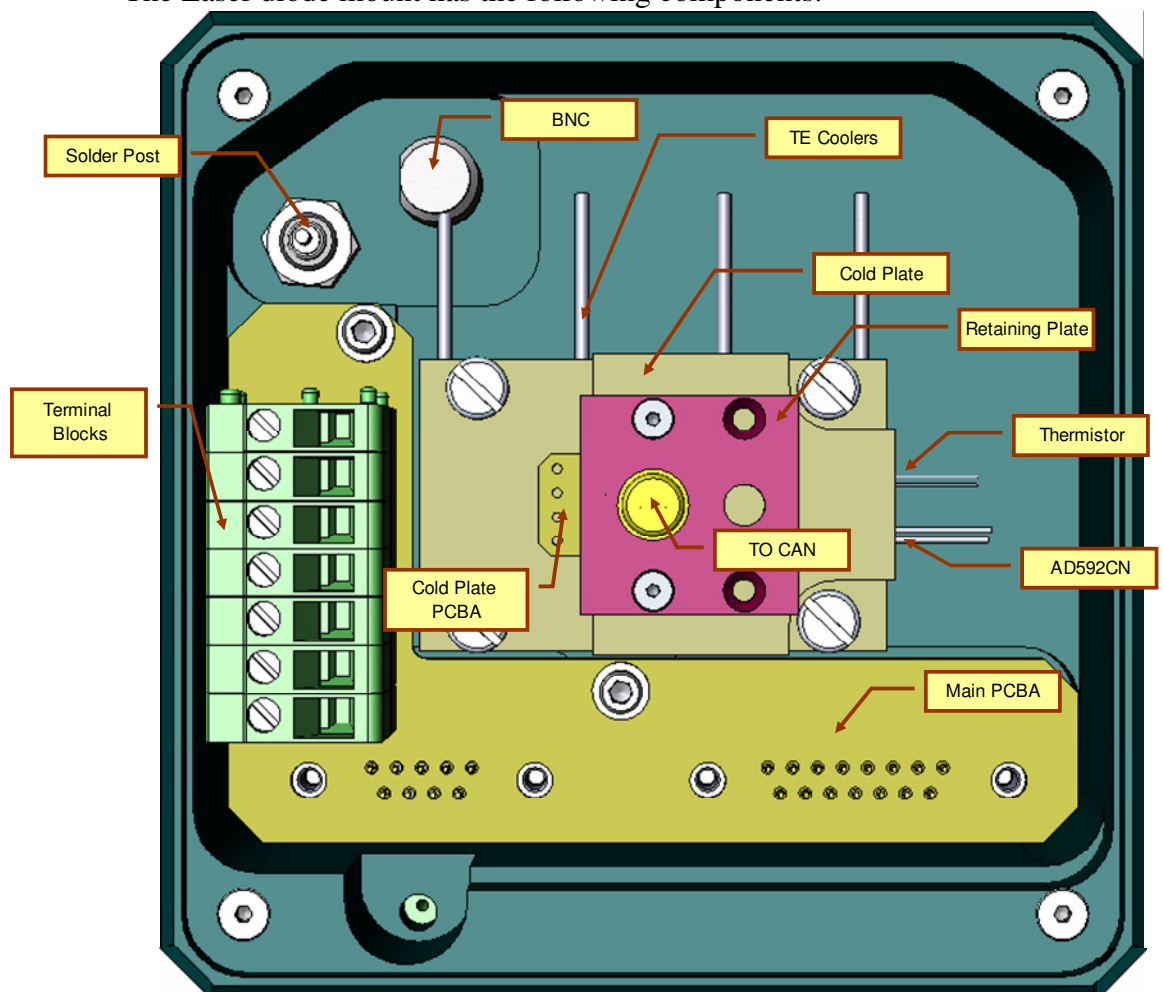


Figure 3 Model 710 internal view

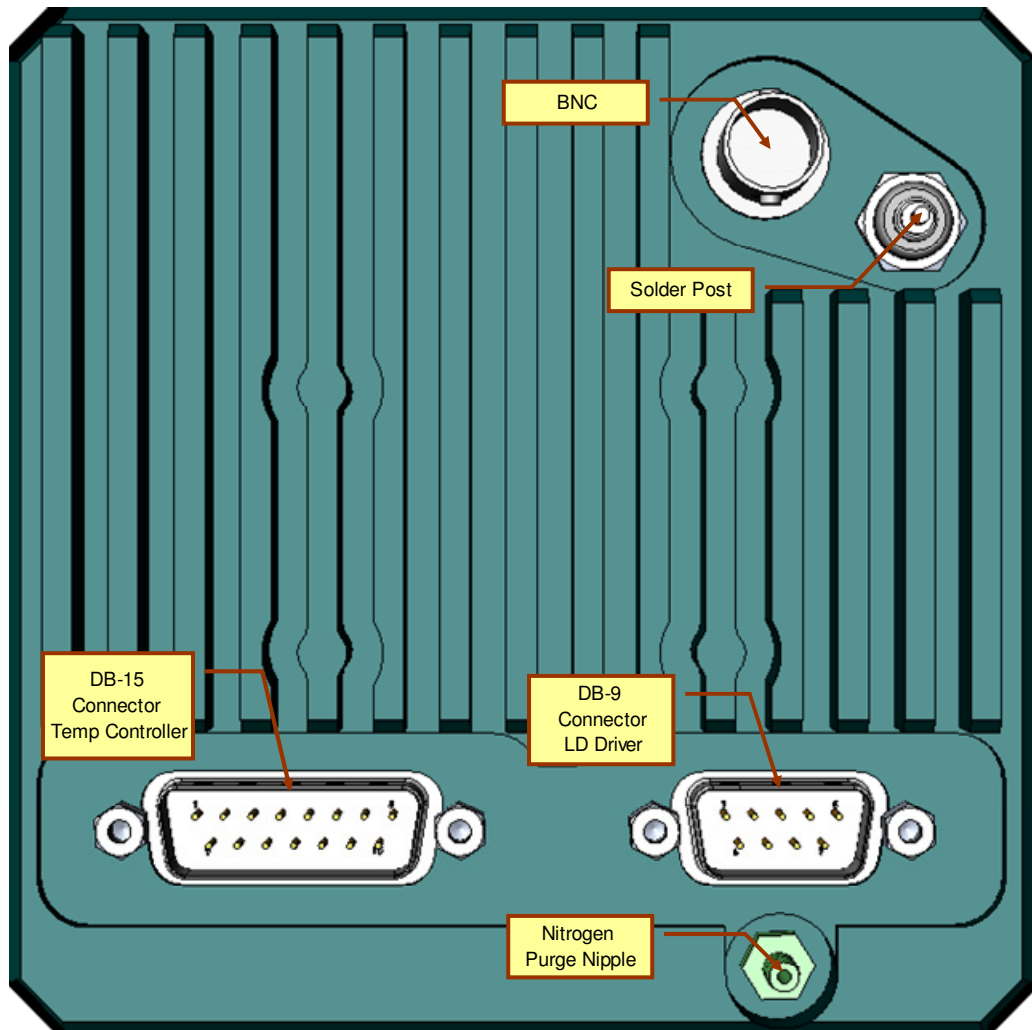


Figure 4 Model 710 rear view

4.2 Laser Diode Handling Precautions



CAUTION

Laser diodes are extremely sensitive to static discharge. The manufacturer's guidelines should be followed at all times when handling laser diodes.

For a safe installation of the laser diode into the mount, please observe the following:

- a. All operators must be properly grounded before handling any laser diode.
- b. All related test and assembly equipment must be properly grounded.

Laser Diodes can only withstand a maximum reverse voltage of 2 to 3 volts across their leads and no more than their maximum rated current in the forward direction. Always follow the manufacturer's instructions for removing and handling laser diodes.

It is recommended that the connection to the laser diode remain floating relative to Chassis Ground (earth ground). This prevents AC transients or other voltage potentials due to multiple earth ground loops from damaging the laser diode. Extreme care must be taken to ensure that all devices including the Model 500B Series and any devices connected to the laser diode, such as an external modulations source, are all grounded to the same earth ground point. It is strongly recommended that this common earth ground be the chassis ground (pin 3) on the sub-D 9-Pin connector. If you have any questions on earth grounding a laser diode contact a Newport Applications Engineer.

4.3 Laser Diode Mounting

The laser diode is mounted to the cold plate built into the Model 710 Temperature Controlled Mount. A combination 9mm/5.6mm retaining plate holds the laser diode in place with two screws and accommodates both TO-56 and TO-9 packages. The threaded holes in the cold plate used for the retaining plate can also accommodate mounting the pigtailed laser diodes supplied by Newport.

A 4 pin socket on a small PC board (Cold Plate PCBA) is provided in the cold plate and each connection in the socket has a wire pigtail that will connect to the terminal block. The wire connections can be changed to accommodate various pin configurations. Also the polarization plane of the diode may be changed by rotating the laser diode in 90 Degree increments in the socket; the wiring connections will have to be changed accordingly.

Use the following steps to install and turn on a laser diode:

1. Determine desired orientation of the diode
2. Determine pin configuration of the diode
3. Connect the wires to the terminal block according the pin configuration
4. Connect LD Mount to LD driver
5. Install Laser diode
6. Power up

4.3.1 Laser Diode Orientation

First step to mounting the laser diode is to determine the desired orientation of beam output of the diode (e.g. polarization direction).

The emitting area of most laser diodes is rectangular in shape resulting in the elliptical beam shape output. The polarization is generally aligned with the shorter dimension of the rectangle (which is also the semi major axis of the elliptical beam emitting from the diode).

The documentation provided with the laser diodes should describe or indicate the orientation with respect to the markings on the TO-CAN.

4.3.2 Wiring Diagram

Once the orientation of the TO-CAN is determined, the wiring can be completed as follows:

1. Determine the pinout (see figure 5 for examples) from the spec sheet of the laser diode
2. From the cold plate socket connections (see figure 6) the corresponding wires can be connected to the proper terminal block.
3. For cases where there are common pins (3 pin LD configurations) between photo diodes and laser diodes internal to the device, the wiring can be made just as simply. See next section.

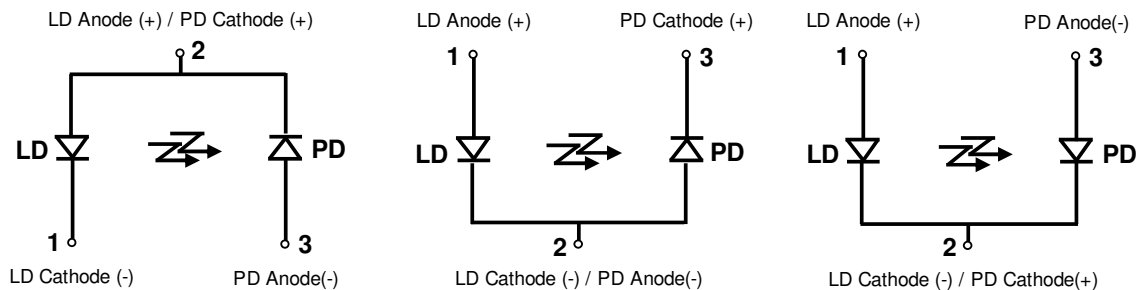


Figure 5 Three popular laser diode configurations

4. Make sure the wire connections are completed before inserting the laser diode.

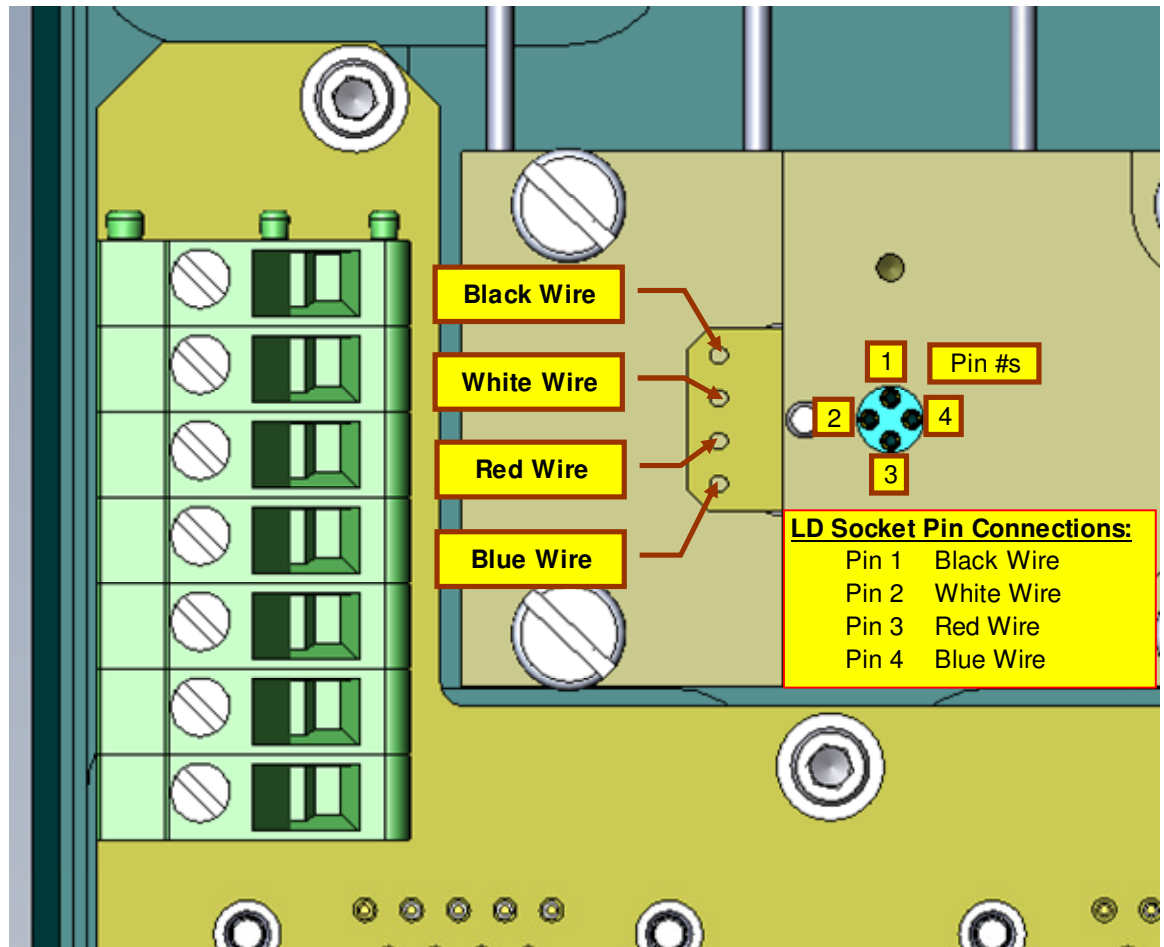


Figure 6 Cold plate socket connections

4.3.3 Terminal Block Connections

The terminal blocks are used for quick and secure connection of the wires without having to perform any soldering operations. Each terminal block has a label indicating its electrical connection. You can also refer to Figures 6 and 7, and table 3 for the description of the terminal block connections.

| Terminal Block # | Connection | Notes: |
|------------------|------------|---|
| 1 | Auxiliary | Used with BIAS-T application |
| 2 | LD Cathode | Connected to pins 4 & 5 of DB-9 Connector |
| 3 | LD Anode | Connected to pins 8 & 9 of DB-9 Connector |
| 4 | PD Anode | Connected to pins 7 of DB-9 Connector |
| 5 | PD Cathode | Connected to pin 6 of DB-9 Connector |
| 6 | Sensor (+) | Connected to pin 7 of DB-15 Connector |
| 7 | Sensor (-) | Connected to pin 8 of DB-15 Connector |

Table 3 Terminal Block Connections

1. To insert wires into the terminal blocks, first unscrew the flat head screws in the specific terminal block for connection, then insert wire and tighten the screw.
2. Gently pull on the wire to insure it actually locked in place. If the wire comes out, undo the screw again, re-insert wire to the bottom of the terminal block and tighten the screw again.
3. Recheck the wire to make sure it is secured.
4. For pin connections requiring interconnects (e.g. LD Anode to PD Cathode), use the two extra wires provided in the terminal blocks to connect across the terminals. You might have to put two wires into each related terminal blocks.
5. Make sure the DB-9 and DB-15 cables are already connected to LD mount and the laser diode driver and TE cooler, and that they are plugged in and grounded properly.
6. Remove retaining plate if not already. Insert the laser diode into the socket and secure into place using the retaining plate. Do not over tighten screws; the TO-CAN may be damaged from excessive force.

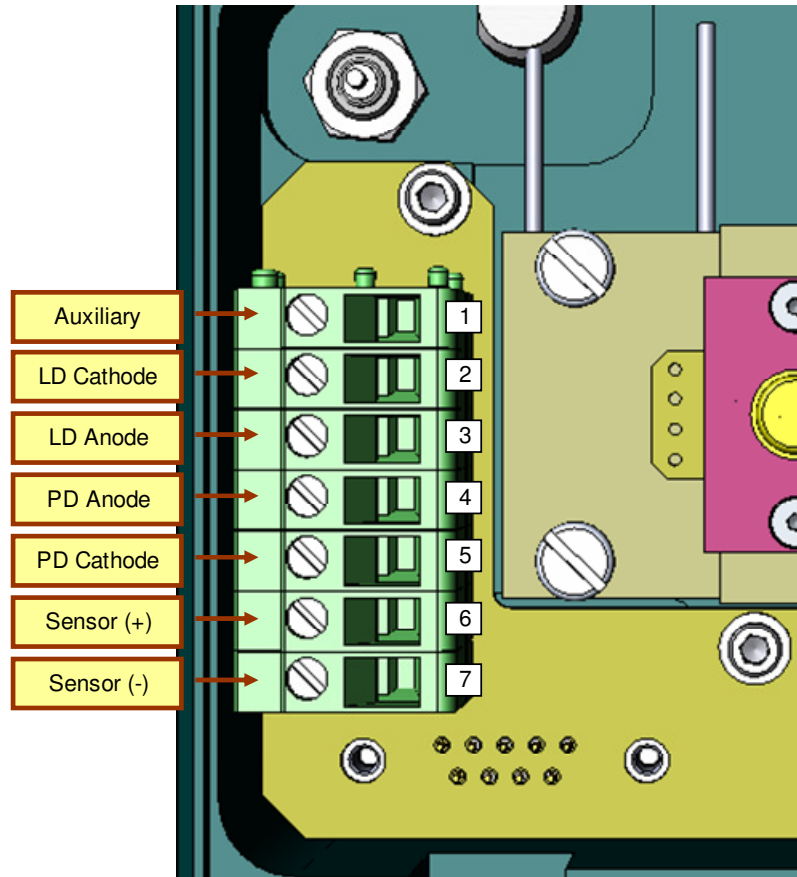


Figure 7 Terminal block connections

7. Connect one of the sensors to terminal blocks 6 and 7. The thermistor is most commonly used for room temperature or greater temperature value applications.
8. The Thermistor does not have electrical polarization, so either wire can be connected to the Sensor (+) or Sensor (-).
9. The AD592CN sensor needs to be connected with proper polarization. Connect blue wire to Sensor (-) and the Red wire to Sensor (+) terminal blocks.

4.3.4 Example

This is an example to help understand the wiring connections:

1. LD configuration in figure 3, laser diode on the left is used for the example.
2. Use pins 1, 2, and 3 on the socket in the mount (see figure 6).
3. Pin 1 of the TO-CAN is the LD Cathode, will connect to pin 1 of the socket.
4. Black wire from the #1 socket will connect to terminal block 2 (labeled LD Cathode)
5. Pin 2 of the TO-CAN is the LD Anode and PD Cathode.
6. Pin 2 also happens to match the pin number in the socket leading to the white wire.
7. Connect white wire to terminal block 3 (LD Anode) and put a jumper wire also from terminal block 3 to terminal block 5 (PD Cathode).
8. Pin #3 of the TO-CAN is the PD Anode and will align to socket #3 of the mount (Red wire connection)
9. Connect the red wire from the socket to terminal block #5 (PD Anode).
10. Connect one of the sensors (Thermistor) to Terminal Bocks 6 and 7.
11. Secure all wires by tightening the flat head screws on the terminal blocks. Gently pull on each connected wire in the terminal block to ensure they are secured.
12. With all other external cables already connected and the instruments grounded, insert laser diode into socket and secure with retaining plate.
13. Ready to turn on the laser diode.
14. If a Temperature Controller is connected, the displayed measured temperature with the device off, and the TEC not active should be room temperature.
15. Set temperature of the controller to a desired value (per manufacturer's spec sheet), and turn on.
16. Set drive current of the laser diode according to the manufacturer specifications and turn on laser diode.

4.4 Collimation Lens (Optional)

The Model 710 Temperature Controlled Mount is designed to accept the Newport LP-05A-XYZ lens mount. The combination of this Newport standard opto-mechanical lens mount with the Model 710 provides a versatile assembly for collimating the output of a laser diode with either standard ½” lenses, GRIN lenses, or Molded Glass Aspheric lenses (using an adapter).

The range of adjustment is 3.2 mm in the X and Y directions with a 100 pitch screws and 6.4mm along the focal axis with an 80 thread screw. All screws use non-outgassing grease for smooth and accurate adjustments.

The lens adapters (for GRIN and Aspheric lenses) can be easily removed permitting different sets of optics to be inserted.

Check the webpage on the model 710 for the latest range of accessories and collimating optics.

4.5 Thermoelectric (TE) Modules

The Model 700 Series Temperature Controlled Mount uses two 12.5 Watt thermoelectric modules for active heating and cooling. A series connection is used to maximize their efficiency when used with a Model 300B Series Temperature Controller insuring that the current flow to the TE modules does not exceed their maximum current rating. In series, these TE modules can handle a maximum of 6.0 Amps and will drop a maximum of 7.5 volts. Care must be taken not to exceed the TE modules' maximum temperature rating of +80 degrees C. If your application requires operating at a higher temperature, contact Newport Corporation.

Even though the TE modules can dissipate up to 25 watts, at high heat levels, convection cooling may not be sufficient to stabilize the heat dissipation, limiting the mount's ability to maintain the laser at the target set temperatures below ambient. Fan cooling increases the mount's dissipation efficiency and will allow operation at the desired temperatures, preventing thermal saturation or runaway conditions. Consult Newport if you have requirements to lower the temperature of a laser diode below 10 degrees C.

4.6 Electrical Connections Overview

Electrical Connections to the laser diode and temperature sensors are facilitated from the inside of the mount requiring removal of the front cover. The TE coolers are hard wired to the terminal blocks via the PCBA. External connections to a Temperature Controller are made via a DB-15 and to a Laser Diode Driver via a DB-9 connector respectively. A BNC connector and Solder

Post are supplied on the mount to input modulation signals via a Bias Tee module (not supplied) that will reside outside of the laser diode mount.

4.6.1 Temperature Controller Connection

A DB-15 connector has been provided to connect the TE modules and thermistor to a temperature controller. A Model 300B Series Temperature Controller can be connected directly to the DB-15 connector using Newport's cable part number 300-04. Looking from the outside of the mount, pin numbers can be seen on the connector's insulation printed around the pins.

Pin Connection

- 1 & 2 TE (+) (Pre connected to TE cooler from factory)
- 3 & 4 TE (-) (Pre connected to TE cooler from factory)
- 7 Sensor (+)
- 8 Sensor (-)

Pins 1 & 2 and 3 & 4 are pre connected together from the factory inside the main housing on the PCBA so that currents up to 6 Amps can be supplied to the TE coolers. The user does not need to change any setting or wiring on these connection.

The Model 710 Series Temperature Controlled LD Mount comes with a precision 10 kOhm thermistor and an AD592 sensor. The mount is supplied with the sensors unconnected. The sensor pins on the DB-15 connector are permanently attached to the terminal blocks via the PCBA. The user can select the sensor type to be connected via the terminal blocks. When connecting the AD592 sensor, assure that the polarization is correct (RED lead is S+ and BLUE lead is S-).

4.6.2 Laser Diode Driver Connection

A DB-9 male connector has been provided pre-connected to the PCBA from the factory. The key connections are routed to the terminal blocks on the PCBA for user adjustability.

A Model 500B Series Laser Diode Driver can be connected directly to the mount using Newport's cable part number 500-04. Looking from the outside of the mount, the pin numbers can be seen on the connector's insulation printed around the pins.

Pin Connection:

- 3 Chassis Ground
- 4,5 Laser Cathode
- 6 Photodiode Cathode
- 7 Photodiode Anode
- 8,9 Laser Anode

The chassis ground connection (earth ground) can be used if there is a danger of electrostatic discharge (ESD) to the laser. This connection provides a path to earth ground for energy arising from ESD at the laser diode case. The ground connection must be made at the laser diode and only one ground path must be made. The mount and any equipment connected to the mount must have only one ground path and that must be through the chassis ground pin (pin 3) on the laser diode connector. If possible, the laser diode should be left floating (with no connection to earth ground) to improve transient protection and to prevent ground loop potentials created from improper earth grounding, which could damage the laser diode.

4.7 Modulation Input Connection

On the back of the mount a BNC Connector and a Soldering Post are provided which can be used in conjunction with a BIAS-T to input a modulation signal. The Bias-T will have to be external to the mount and additional internal wiring will be necessary for properly operating the instrument.

4.8 Purge Nipple

To prevent condensation from occurring on the laser diode when operating below ambient temperatures, a dry nitrogen purge nipple is supplied with the mount. The purge nipple is located on the lower back side of the mount. Flexible tubing, with an inside diameter of one sixteenth (1/16") inch, is used to connect the mount to a dry nitrogen source. When the collimating lens housing is not used the flow of nitrogen must be great enough to fill the front portion of the mount and flow out of the front cover around the laser diode package.

4.9 General Operating Procedures

1. Securely mount the Model 710 Temperature Controlled Mount on an optical table by using a post and post holder system not supplied with the 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 one half of an hour.



WARNING

Never look directly into the output aperture of the mount 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 Disassembly Instructions

NOTE

These disassembly instructions are intended only for recycling at the end of the product lifetime. For troubleshooting or servicing, users should contact the local Newport Corporation representative. There are no user serviceable parts inside the equipment. Attempting to self-service the unit will void the warranty.

Disassembly instructions

Figure 8 shows an exploded view of the Model 710 LD Mount.

For recycling purposes, only, the disassembly steps are as follows:

1. Make sure all cabling is disconnected from unit.
2. Remove Cover.
3. Remove D-Sub Screw-locks
4. Remove Main PCB Assembly.
5. Remove Cold Plate Assembly.
6. Remove LD Connector PCB Assembly.
7. Remove TEC Assembly

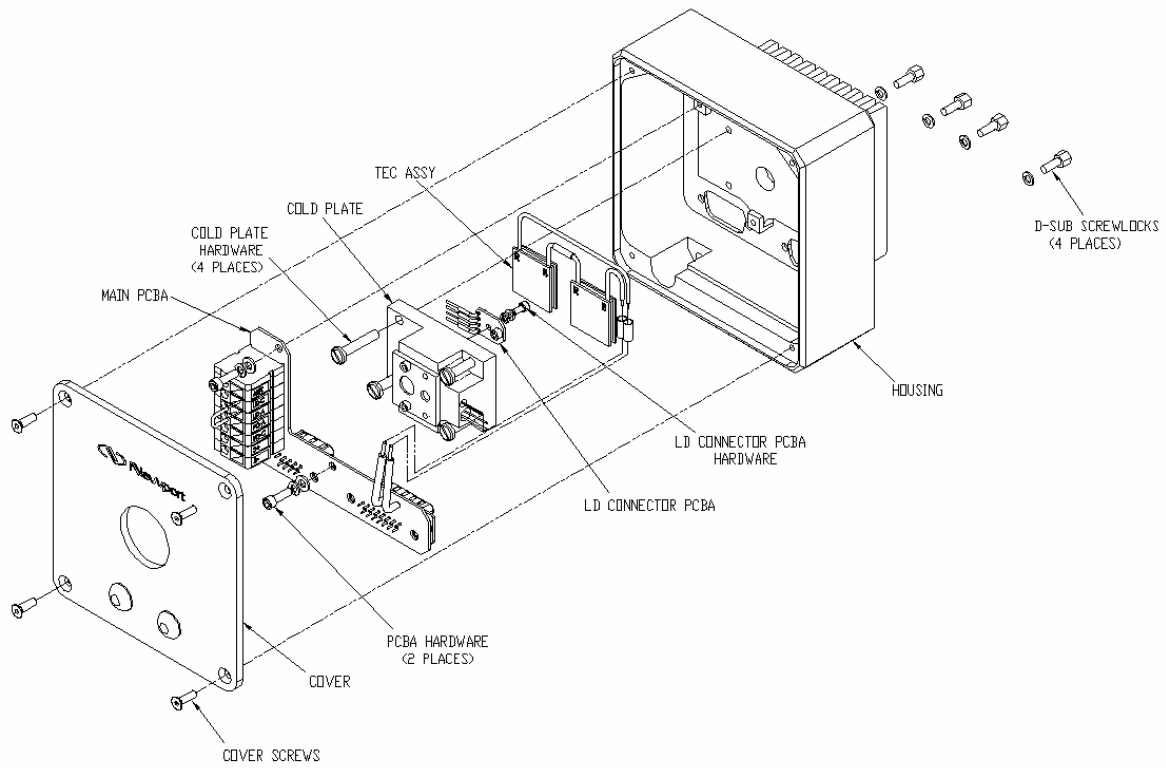



Figure 8 Disassembly Diagram

6 Maintenance and Service

| | |
|---|---|
|  | <p style="text-align: center;">WARNING</p> <p>There are no user serviceable parts inside the Model 710 Temperature Controlled Laser Diode Mount. Work performed by persons not authorized by Newport Corporation will void the warranty.</p> |
|---|---|

6.1 Obtaining Service

The Model 710 Temperature Controlled Laser Diode Mount contains no user serviceable parts. To obtain information regarding factory service, contact Newport Corporation or your Newport representative. Please have the following information available:

1. Instrument model number (on the side of the unit)
2. Instrument serial number (on the side of the unit)
3. 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.

6.2 Service Form



Newport®
Experience | Solutions

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

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):
