Model 764H Series

High Power Laser Diode Mounts

User's Manual

ILX Lightwave®

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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 web site (www.Newport.com). Call your local Newport application specialist if you need support with locating or downloading these files.

Enjoy your new product!

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First printing 2009

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Newport Corporation
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USA

Part No. 90032670 rev C

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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

To obtain further information regarding sales, technical support or factory service, United States and Canadian customers should contact Newport Instruments directly.

Newport Instruments

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Sales and Technical Assistance: salesirv@mksinst.com

Customers outside of the United States must contact their regional representative for all sales, technical support and service inquiries. A list of worldwide representatives can be found on Newport's website: https://www.newport.com/contact/contactslocations

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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)

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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.

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 Laser Diode Mounts.
- 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 764H 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 764H 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 764H series High Power Laser Diode Mounts are industrial grade Cold Plates adapted for research applications. These mounts are optimized with Newport's temperature controllers, specifically with Model 3700 temperature controller to provide most rapid settling time, and maintaining the needed temperature regulation. The hardware included supports most Oclaro (formerly Spectra-Physics) laser diode family. Custom or other laser diode hole patterns can be created by the user relatively easily. The copper alloy top plate is available for purchase as a spare part. Note that significant amount of variations exist in laser diode package designs among manufacturers. Therefore, before mounting any laser diode on the 764H mount, contact the manufacturers and confirm all the dimensions of the physical device.

2.2 Specifications

	Model 764H-061	**Model 764H-110**
Types of Oclaro laser diodes compatible	• SF Series (qty 1) • BW/CW series (qty 1) • Orion series (qty 1)	• Orion series (qty 3) • BW/CW series (qty 2) • Prosario (qty 1) • Courvus (qty 1)
Max Heat Load Capacity @ 25°C Ambient (2)	61 W	110 W
TE Power Rating	24VDC @ 6.0 Amps	24VDC @ 11 Amps
Platform Height +/- Vertical Adjustment	5.55"	7.77" +1.5" / - 0" (197.3 + 38.1 / -0 mm)
Main Connectors	Pigtailed Cable, D-Sub 7W2 Male	Pigtailed Cable, D-Sub 7W2 Male
Other Connections	Power Supply	Power Supply
Temperature Range (3)	-10°C to +80°C	-10°C to +80°C
Sensor Type	10 kΩ thermistor	10 kΩ thermistor
(1) Performance based on unrestricted air flow to heat sink and fan. In no case should the ambient, cold plate, or heat sink temperature be allowed to exceed 70°C. (2) Controller dependent		

Table 1 General Specifications

Environmental Specifications

	764H-061	764H-110
Size (H x W x D) [in. (mm)]	5.55” x 4.72” x 7.87” (141 x 120 x 200)	7.77” x 5.75” x 8.70” (197.3 x 143 x 221)
Weight [lb (kg)]	8 Lbs (3.7 Kg)	11 Lbs (5 Kg)
Operating Temperature (1)	-10 °C to 50 °C Ambient (<90% humidity non-condensing)	
Storage Temperature	-30°C to + 70°C (<90% humidity non-condensing)	
Relative Humidity, Storage	<90% humidity non-condensing	
Use Location	Indoor use only	
(1) Performance based on unrestricted air flow to heat sink and fan. In no case should the ambient, cold plate, or heat sink temperature be allowed to exceed 70°C.		

Table 2 Environmental Specifications

3 Getting Started

3.1 Unpacking and Handling

The High Power Laser Diode Mount is designed for easy setup and use. To unpack, remove the Mount from its packaging.

- Remove the zip ties from the cable and uncoil cable before connecting to the Temperature Controller. The connecting cable is pre-attached to the mount from the factory and is configured to work with the models 3150 (obsolete) and 3700 high power temperature controllers.
- Mounting accessories included in the box will make mounting of the product simple. 764H-110 comes with VPHV-2 post holders and clamps to hold the posts (posts already attached to the LD mount) to the optical table surface. 764H-061 comes with a mounting kit for user convenience.
- Remove the blue plastic cover from the copper plate before mounting the laser diode.

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.

4 Parts List

The following table contains the list of standard parts included in the 764H mounts. Note that 764H-061 mount comes with additional washers and screws for assembly:

Part #	Description	764H-061	764H-110
VPHV-2-F	ValuMax Post Holder & Clamping Fork Bundle	--	Qty 4
B-05A	Stainless Steel Slotted Base	Qty 4	--
1918-PS	Power Supply for the fan	Qty 1	Qty 1
1918-PSC	Power supply cable	Qty 1	Qty 1

Table 3 List of parts included in 764H 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. Spare and accessory parts include:

Part #	Description	Category
FK-STRAP	Grounding wrist strap	Accessory
90032542	Top plate for 764-110, copper	Spare
90032541	Top plate for 764H-061, copper	Spare

Table 4 Accessory and spare parts list

Customer supplied Equipment:

- Laser diode
- Special cabling if necessary
- Thermal paste or SIL pad

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.

4.1 Choosing and Preparing a Suitable Work Surface

The 764H series mounts are recommended to be secured on an optical table. The setup can be mounted to both metric or standard threaded tables with a 1" (25mm) hole pattern. Model 764H-110 comes with mounting posts, post holders, and tightening forks. When mounting a Model 764H-061 on an optical table, we recommend attaching Newport's B-05A bases at the four bottom threaded holes using M5 screws. Make sure you don't tighten the base to the mount too tightly so that the base slot can be aligned to a mounting hole on the optical table.

An area of approximately 8"x 8" (200 x 200mm) is needed for installation. The perimeter of the unit cannot be blocked or enclosed for proper air flow for cooling the heat sink fins. A minimum of 50 mm clearance height is necessary under the mount for proper operation of the fan when mounting the Model 764H-110.

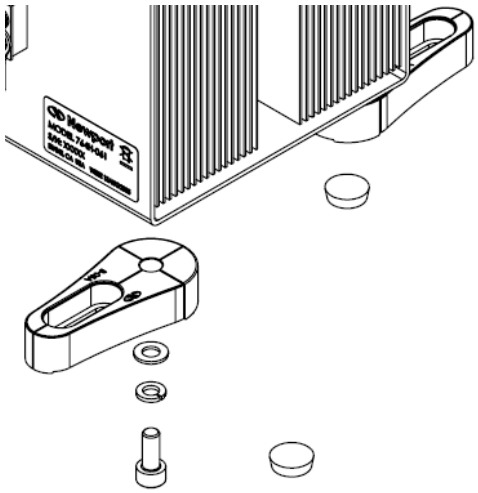


Figure 3 Model 764H-061 base mounting options. One can use either mount a B-05A slotted base for mounting on an optical table, or simply put a sticky rubber foot at each corner.

5 System Operation

	**WARNING** **Before operating the Models 764H series High Power Laser Diode Mounts, please read and understand all of Section 1.**

5.1 Heat Load Calculation

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.

Please refer to figure 3 for a typical heat load performance graph of the Model 764H-110 mount.

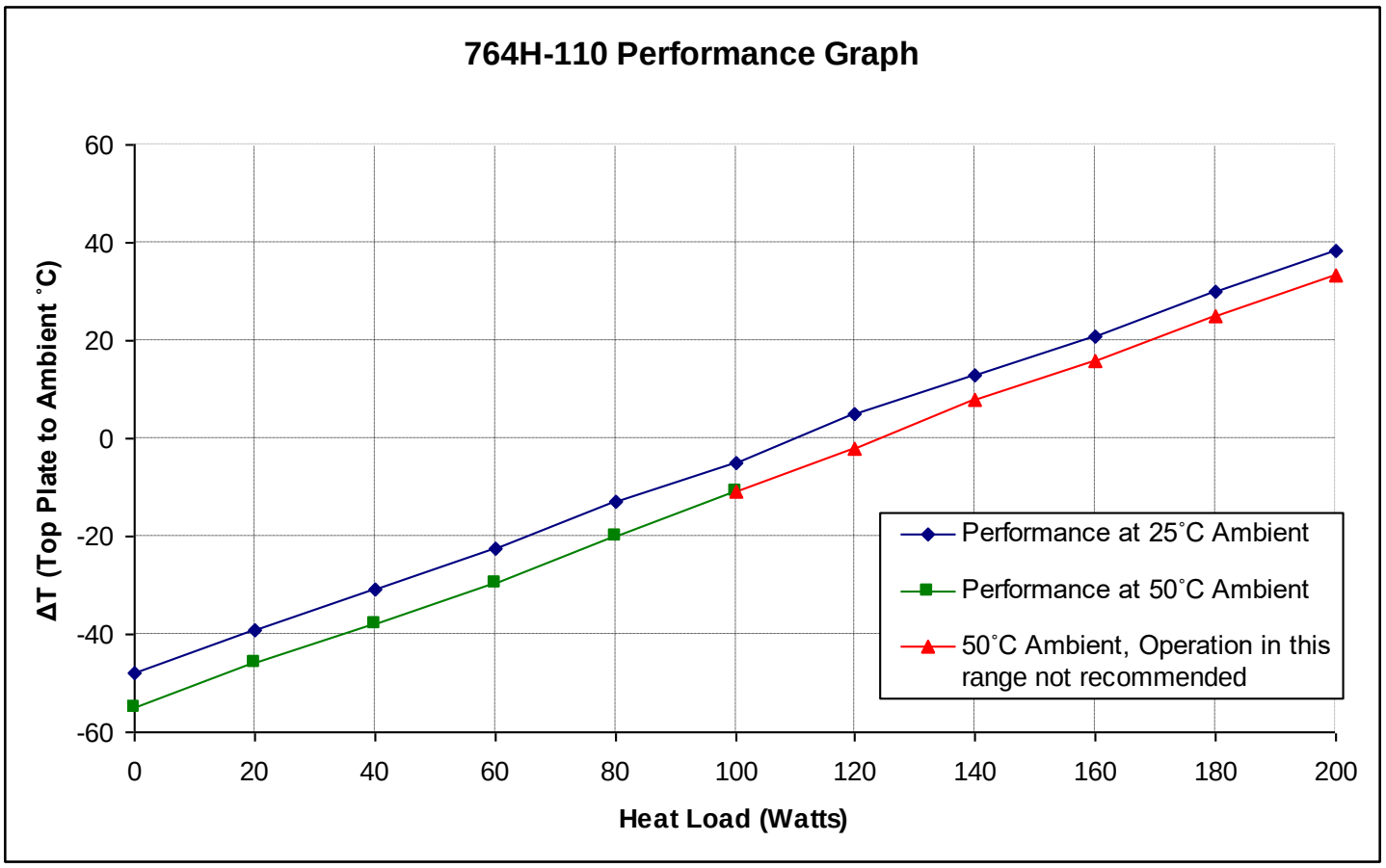


Figure 4 Model 764H-110 heat removal performance chart

⚠	**CAUTION** **Exceeding the maximum thermal load of the laser diode mount will result in thermal run-away conditions and will cause severe and permanent loss or degradation of the output power of the laser diode.**

5.2 High Power Laser Diode Mount Anatomy

The Laser diode mount has the following components:

- Main Heat transfer unit
- Copper Cold plate
- Support system
- Electrical connections

5.2.1 Main Heat Transfer Unit

The Cold Plate/Heat Sink assembly is an industrial grade thermoelectric cooling system. The heat load is transferred from the cold pate to the heatsink area by means of multiple TE coolers.

5.2.2 Copper Cold Plate

The laser diode (heat load) is mounted to the copper cold plate via the hole pattern on the 5 mm thick copper top plate. The depth of the hole where the thermocouples are epoxied is 30 mm from the surface.

5.2.3 Support System

The unit is attached to the work surface via four mounting post/post holder system.

5.2.4 Electrical Connections

The TE cooler electrical connection is provided via a 7W2 connector cable attached to the mount.

Electrical connections for the laser diode are made via other cables suitable for the specific laser diode to the selected laser diode driver. Please contact Newport Corporation for assistance for selecting proper cabling.

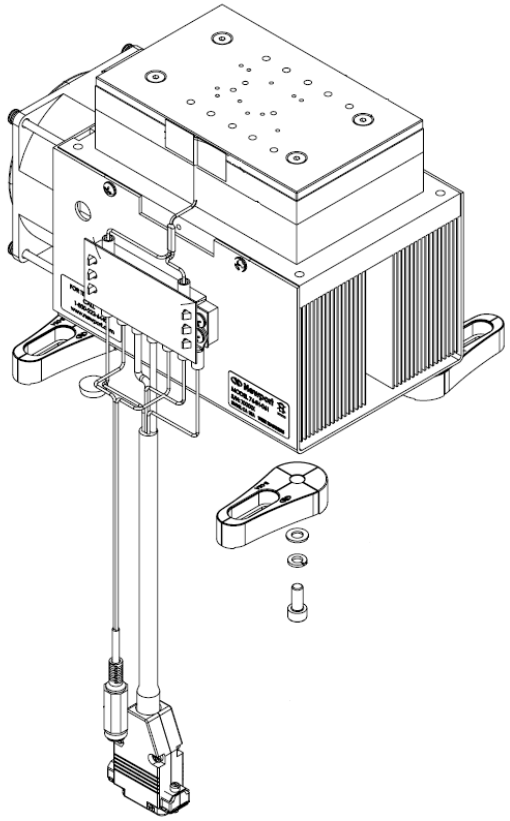


Figure 5 Model 764H-061 mounting hardware and electrical connections

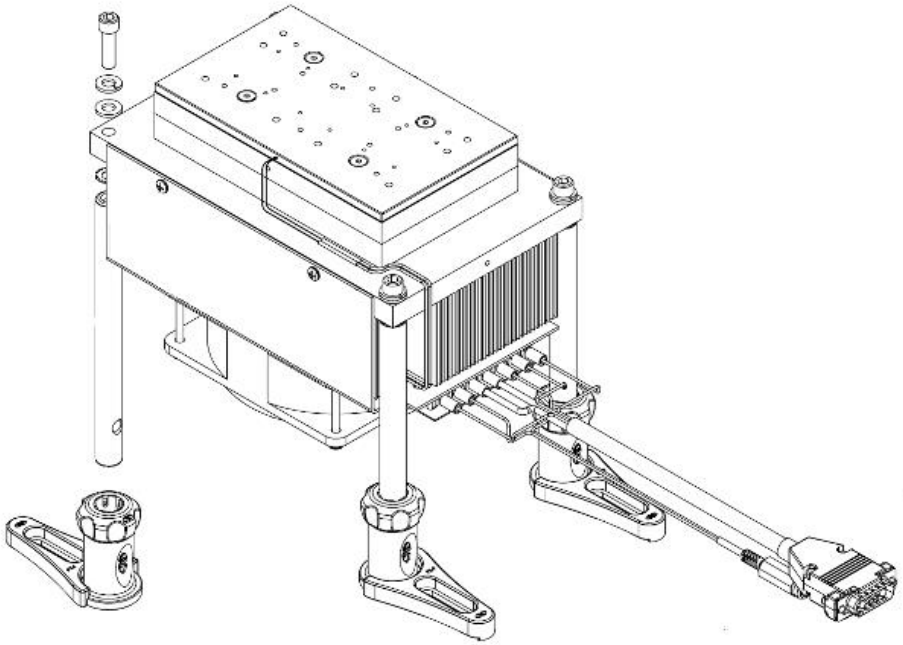


Figure 6 Model 764H-110 mounting hardware and electrical connections

5.3 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.

Most 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 arising from multiple earth ground loops front, damaging the laser diode. Extreme care must be taken to ensure that all devices including the laser diode driver, and any devices connected to the laser diode, temperature controller, are all grounded to the same earth ground point.

If you have any questions on earth grounding a laser diode contact a Newport Applications Engineer.

5.4 Laser Diode Mounting

5.4.1 Mounting the Laser Diodes and Wire Connection

The laser diode mount is provided with hole patterns from Oclaro's select laser diode families. For other laser diode hole patterns, the customer can order a spare top plate and drill desired hole patterns.

Figure 7 Model 764H-110 mount (photo with special hole pattern on top plate)

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

1. Carefully remove laser diode from packaging. Make certain you are properly grounded and have proper anti-static work surface and environment at all times.

2. Use a SIL pad (if provided with a laser diode package) between the bottom surface of the laser diode and the cold plate (mounting plate with the hole-pattern). If SIL pads are not available, you may use thermal paste (AKA thermal grease). Apply the thermal paste uniformly on the bottom surface of the laser diode module. Make sure there are no air bubbles or areas without paste between the bottom surface of diode and the cold plate of the LD mount. To clean excess thermal grease from around the laser diode, industrial grade acetone and q-tips or Kim-wipes can be used.

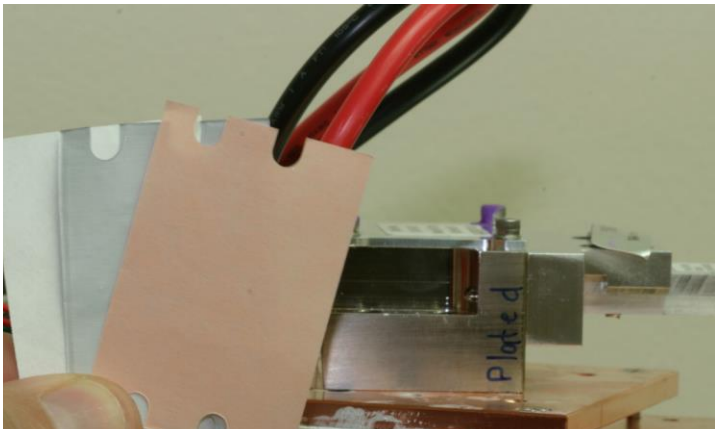


Figure 8 SIL Pads for thermal coupling with cold plate

(Photo: the useful part of the SIL pad is in the metallic sheet between the white and pink papers. Colors may vary.)

3. There are a few hole-patterns available on the LD mounting plates (cold plates). Depending on which cold plate you have on your mount, various laser diodes can be accommodated. Please refer to the appendix if you do not know which hole pattern to use for your specific laser diode. If custom hole patterns are desired, one can carefully remove the top plate and drill the desired holes. It is strongly recommended that the user purchase an extra top plate (P/N 90032542 for 764H-110 and 90032541 for 764H-061) from Newport. Thermal compound paste, required to enhance the thermal flow between the top plates, can be purchased at a local hardware store.

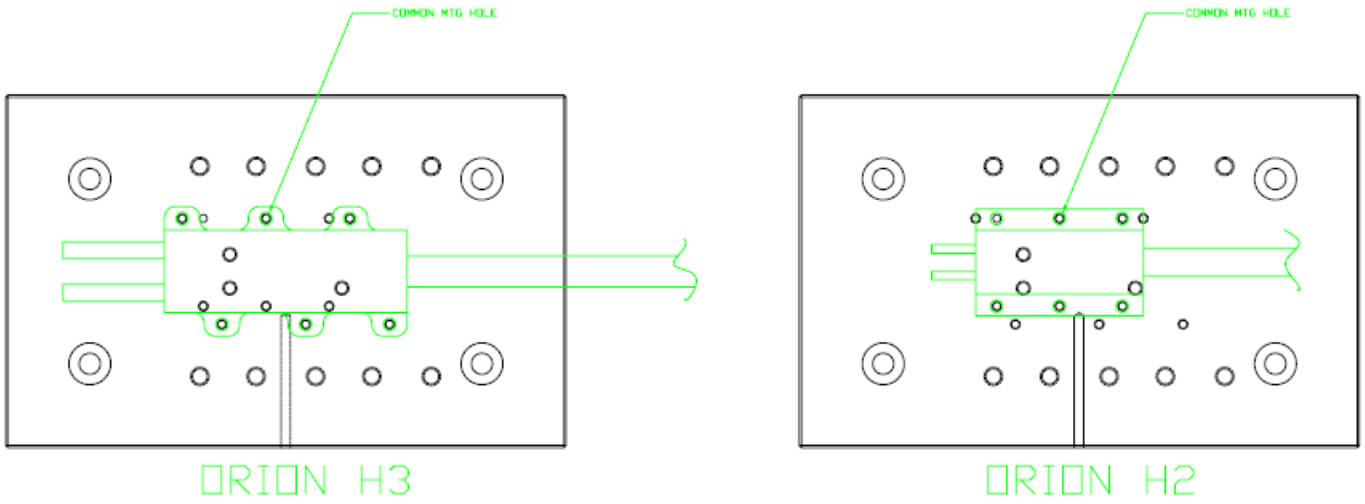


Figure 9 Hole patterns on 764H-061 top plate for Oclaro's Orion H2 and H3 package styles

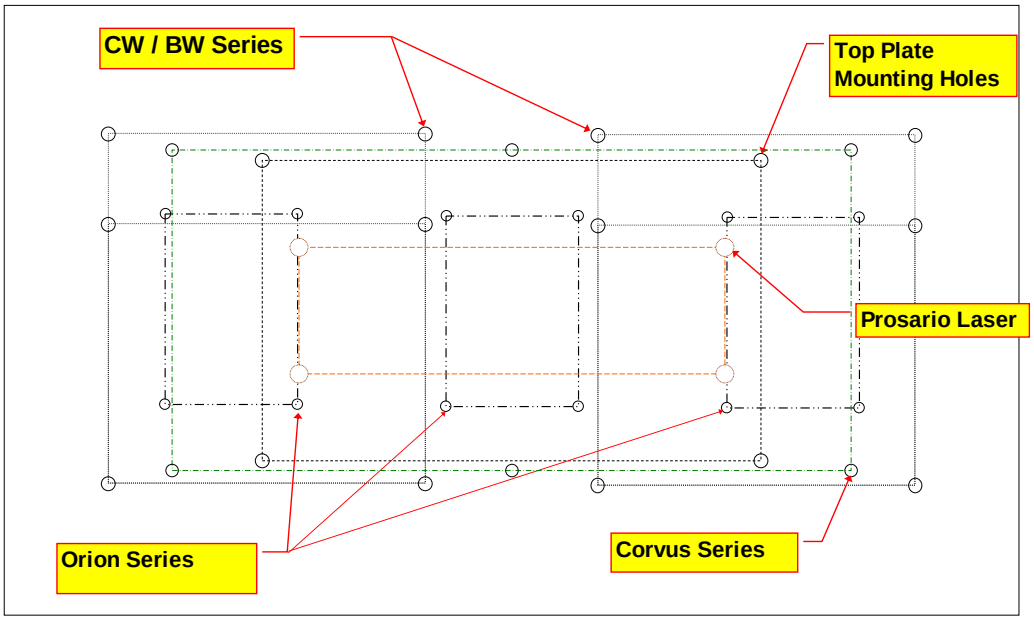


Figure 10 Hole patterns on 764H-110 top plate

4. Place the laser diode module onto the heat sink and gently tighten the screws onto the mounting holes. Be careful not to damage the top-plate by applying too much force while tightening the screws, if the screw bottoms out before the screw head reached the body of the laser, do not tighten further and check screw length with the laser manufacturers. Verify that the screws are of appropriate length.

⚠	**CAUTION** **Critical screw length - Improper mounting screw length can damage the cold plate. If damage occurs, the mount will not regulate temperature. Make sure the screws are not too long for the laser diode/copper plate combination**

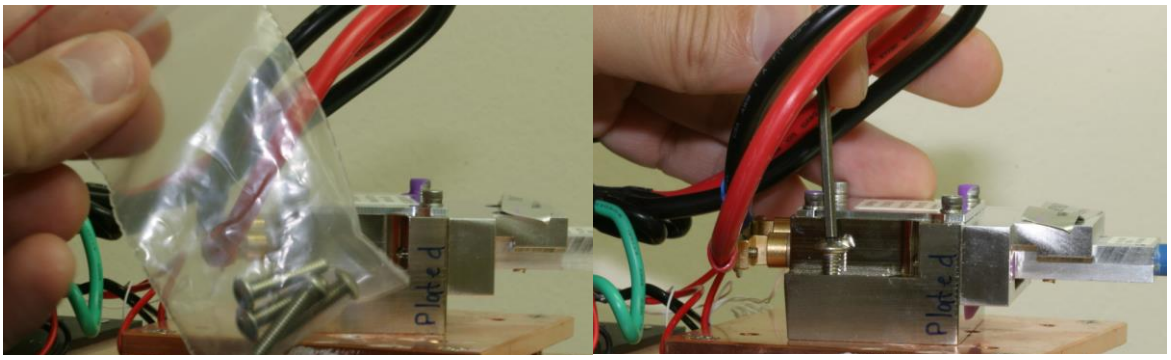


Figure 11 Mounting screws for BWA series LD

5. Remove the shorting strip from the two electrodes on the back of diode module. Other laser diodes may have alternate methods of shorting the terminals. (Photos for reference only).

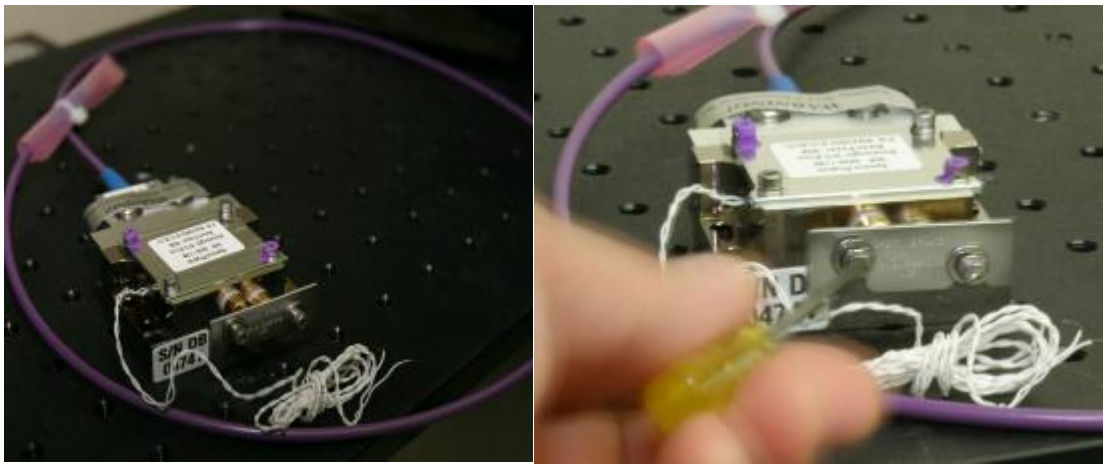


Figure 12 BWA laser diode shown as an example

6. Connect the laser diode electrical cable (not supplied with mount) to the electrodes. Figure 9 shows example cable with the red wire connected to (+) and black wire connected to (-). The specific cable used to connect the laser diode may vary depend on the laser diode and LD driver used. Please see Newport's website for available cable options. Contact the laser diode manufacturers for recommended cable specifications. We recommend Newport's 5700 Series High Power Laser Diode Drivers to supply input current to the laser diode.

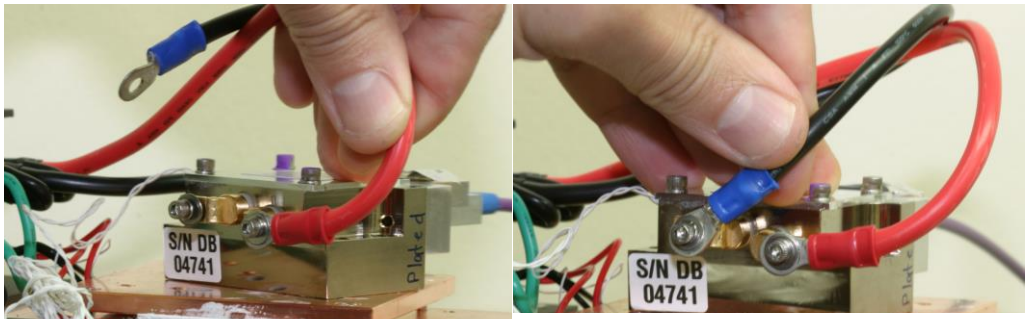


Figure 13 LD wire connections

7. Make sure to connect the 24VDC adaptor to turn on the fan before supplying any current to the diode module and TE Cooler on the mount.

5.4.2 Terminal Block Connections

The Terminal block connections are shown in figure 10. The left of the figure shows internal connections for the mount. The right side of the figure is the connections to the TE Controller.

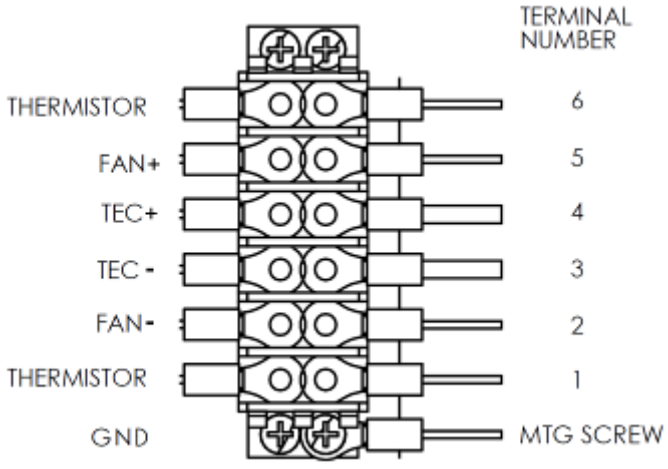


Figure 14 Terminal block connections

5.4.3 Temperature Controller Connection

The cable provided with the models 764H-061 and 764H-110 are designed to interface with Newport models 3150 (obsolete) and 3700. The 764H-061 can also be used with 300B series temperature controllers as well by using cable Model 300-02 and connecting the bare cable ends to the mount. Make sure all the connections are securely tightened.

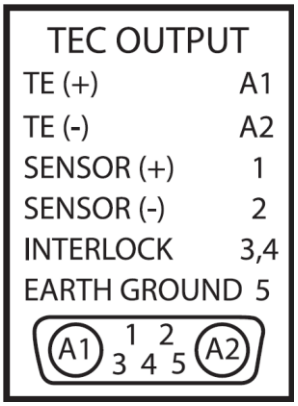


Figure 15 Pinout of cable for models 3150 and 3700

5.4.4 Laser Diode Driver Connection

High Power Laser diodes typically have two main connections for current, and some may have a thermistor (or other sensor) connection. Therefore, most cable connection to the laser diode consists of large diameter wires (rated for 40-80 Amps of current) with ring lugs for connecting to the laser diode terminals (see previous section on mounting laser diode). Newport offers various cables for connecting the laser diodes to the drivers. Contact Newport Corporation or check on the website for the cable accessories available with each type of laser diode driver.

5.5 General Operating Procedures

1. Securely mount the Model 764H 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 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)

6 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.

6.1 Obtaining Service

The Model 764H series Temperature Controlled Laser Diode Mounts contains 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.

6.2 Service Form

Newport Corporation
U.S.A. Office: 800-222-6440
FAX: 949-253-1680

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:

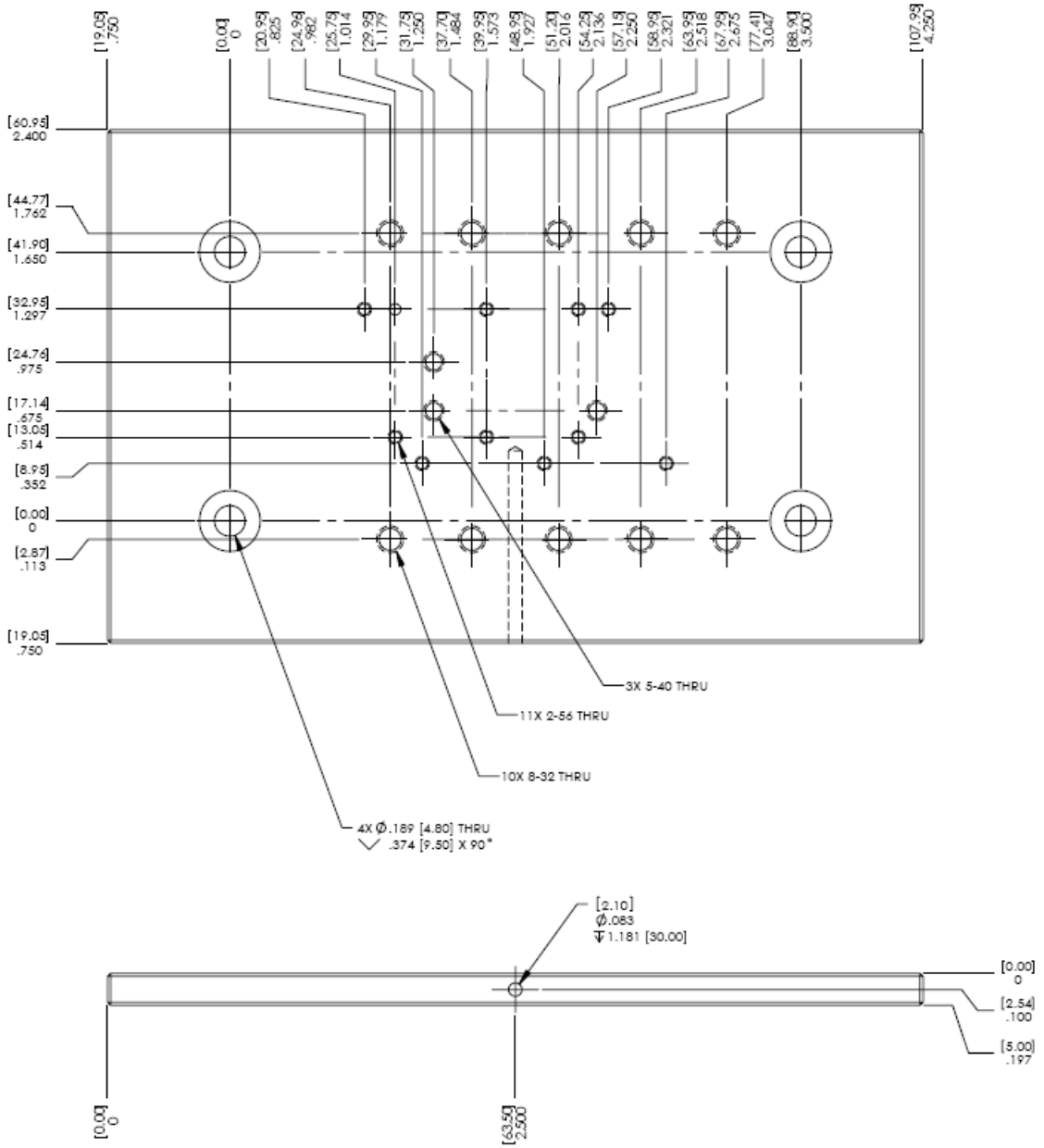
Model # _____ Serial # _____

Description _____

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

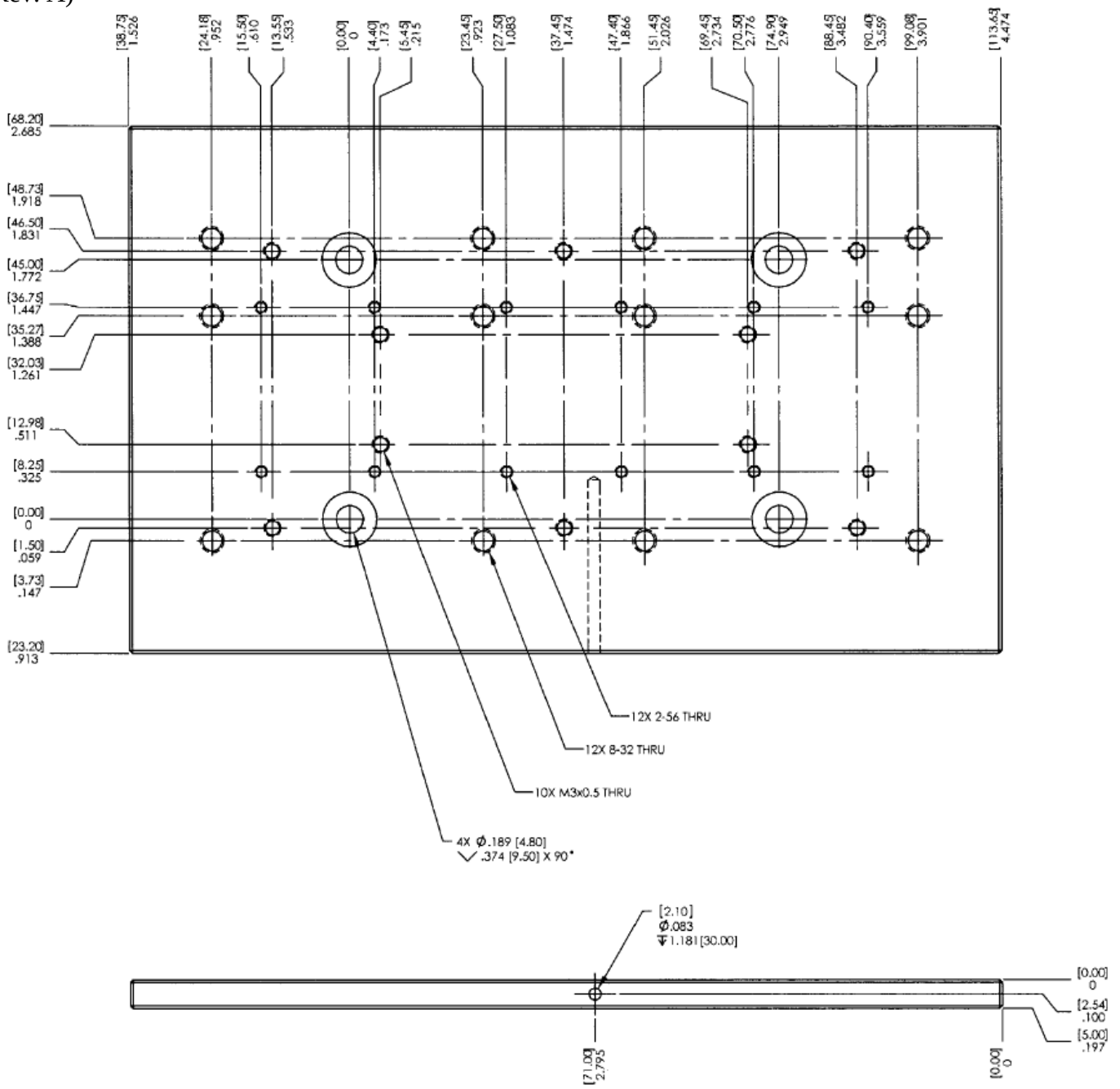
7 Appendix

7.1 764H-061 Top Plate Dimensions

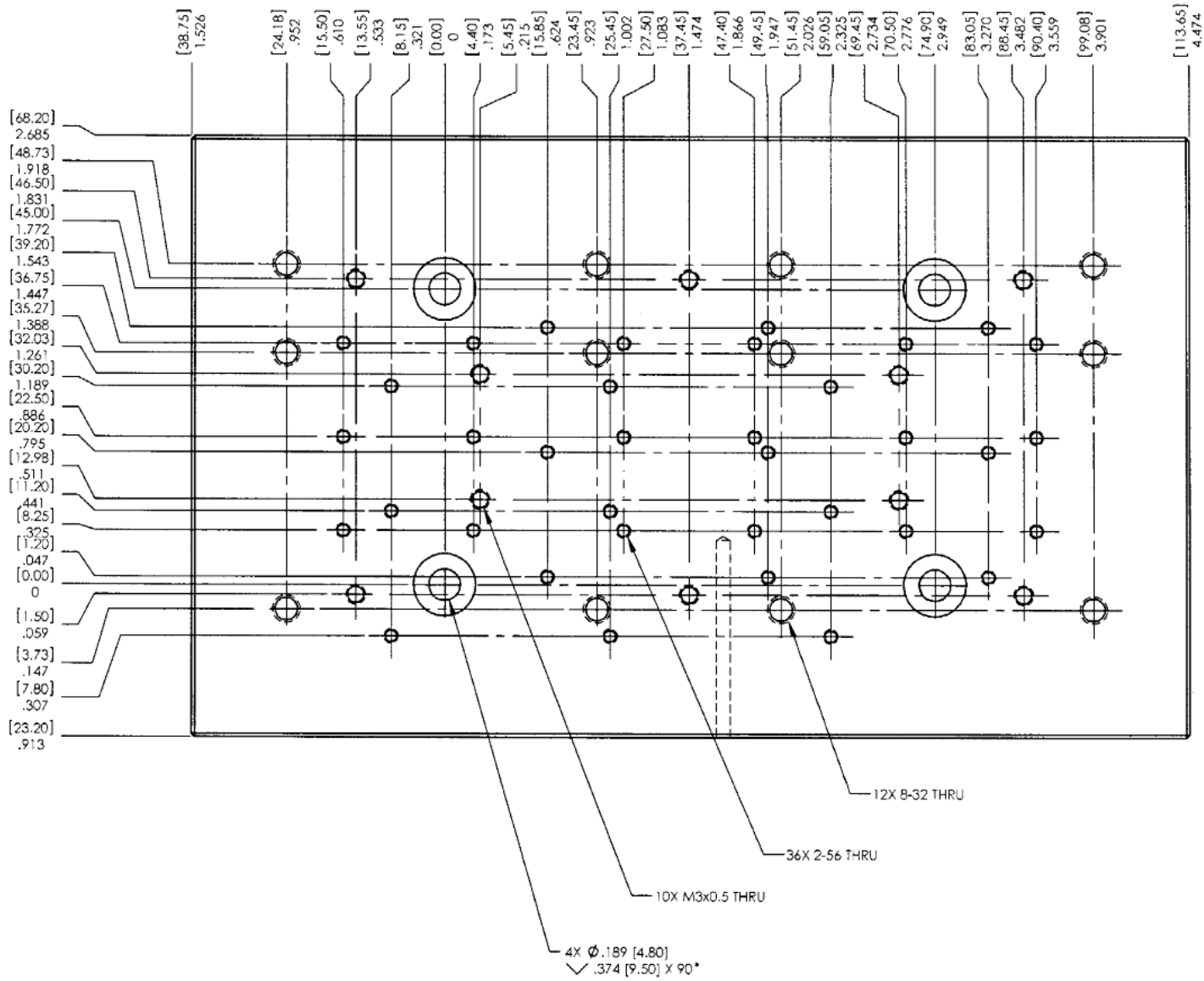


7.2 764H-110 Top Plate Dimensions

(Rev. A)



(Rev. B)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12X 8-32 THRU
36X 2-56 THRU
10X M3x0.5 THRU
4X Ø.189 [4.80]
.374 [9.50] X 90°