

# LaserMount™

# 234B

## USER'S MANUAL



HIGH POWER  
TEC TO-CAN

 arroyo instruments

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## Introduction

Thank you for choosing the **234B TEC TO-Can LaserMount** from Arroyo Instruments. The **234B LaserMount** is designed for high performance and long term use.

The **234B LaserMount** is a higher performance TO-can mount, similar to our smaller **224 LaserMount**, but offering a much higher thermal capacity (up to 10W at 25°C), lower operating temperatures, and a much higher 3A higher laser current capacity. The **234B** integrates dual Peltier coolers for precise control of the package temperature. With an operating range of -5°C to +85°C, the **234B LaserMount** covers a wide range of temperature control needs.

The **234B** has a cover plate with a small opening whose face is close to the diode as well as mounting holes for 30mm CAGE systems. For applications using 1" lens tubes, there is an optional **234-C-02** cover plate, which replaces the small opening with a larger, 1" threaded opening compatible with 1" lens tube systems.

When coupled with the **234-OFFSET-KIT**, the **234B** can be used with 2-pin 1mm offset mounted lasers from manufacturers such as the Nichia, Mitsubishi, and others.

The mount requires no wiring thanks to a simple configuration switches conveniently located on the rear of the fixture. **234B LaserMount** is also finned to provide the highest heat dissipation capability, and is designed to be posted mounted (post mount not included).

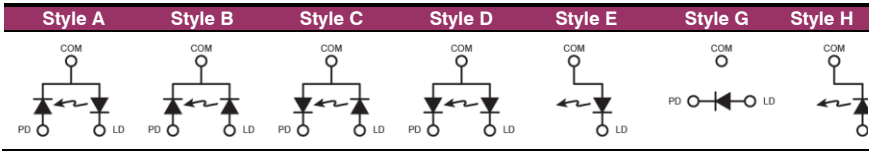
The **234B LaserMount** also offers all the features you would expect from a modern TO-Can laser diode fixture, including:

- Designed to be quickly integrated with Arroyo's **LaserSource** and **TECSource** instruments.
- Industry-standard D-sub connectors and pin-outs allow for quick integration into existing laser applications.
- Banana plug for case ground, which can be used as a wrist strap connection or to assure proper grounding to an optical table or test bench.

*Note: photos in this manual may show a CAGE system or post mount. The 234B does not come with either of these systems; they are shown for illustrative purposes only.*

# Installation and Use

**Configuring the mount:** Start by identifying the specific electrical configuration style of your device from the illustrations below. The switch settings for each style are illustrated on the following page. For two pin devices (style G), which have their pins at the 3 o'clock and 9 o'clock positions, the third switch must be placed in the N/C position.



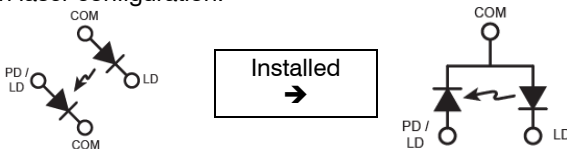
**Laser Styles**

The upper and lower holes of the laser socket, labeled the COM pins, are always tied together. The PD and LD switches on either side of socket are to set the polarity of the outside pin. For example, if your device has the laser cathode common to the photodiode anode (lower left diagram above), when you plug in your device, the left hole would have the photodiode cathode (except for style G lasers, in which case, the left hole is *laser cathode*), and the right hole would have the laser anode.

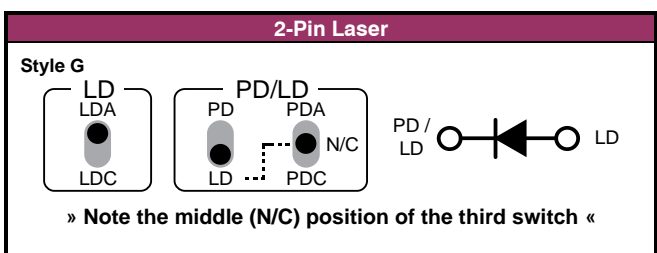
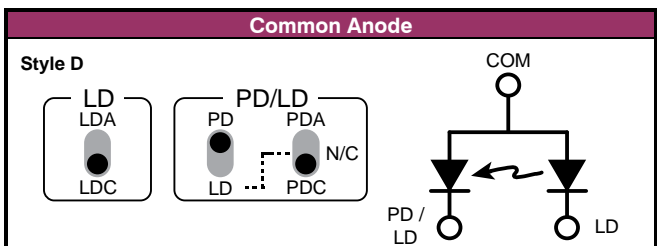
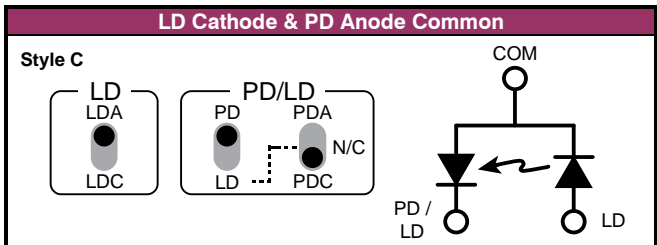
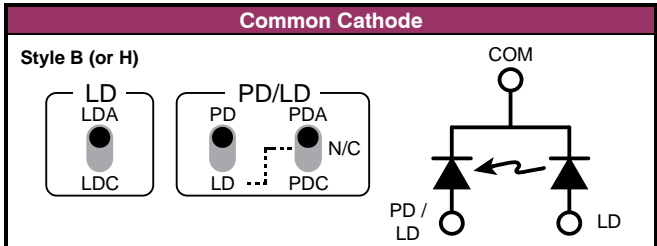
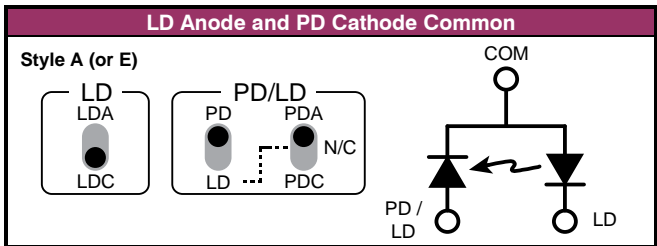
When installing your laser, the isolated (non-common) photodiode pin goes into the left (PD/LD) hole of the laser socket, and the isolated (non-common) laser pin goes into the right (LD) hole of the laser socket. The common pin can go into either the upper or lower hole.

For style G 2-pin packages, the laser anode pin should go into the right (LD) hole of the socket while the laser cathode pin goes into the left (PD/LD) hole of the socket.

If you have a 4-pin TO-can package where the laser and photodiode are completely isolated from each other, the mount will connect the two pins that are inserted into the COM positions of the socket. For example, consider the following 4-pin laser configuration:



When inserted into the fixture as shown, the laser anode and photodiode cathode pins will be connected together, making the laser equivalent to style A, and the switches should be set accordingly.





Face of 234B with cover off

**Connect to Laser Diode Driver and TEC Controller:** Next, connect the **234B** to your laser diode driver and temperature controller.

#### NOTE

Arroyo Instruments offers Laser and TEC cables designed to connect directly between our **LaserSource** and **TECSource** products. If you use your own cables, ensure the connections are properly made between the instrument and the mount, and that proper grounding techniques are used. The pin-out of the connectors can be found later in this document.

#### WARNING

Be sure you are properly ESD protected before handling your laser. For additional information, read the section titled “Laser Diode Protection” later in this manual.

**Mounting your device:** Insert the device so that the common pin is the top or bottom pin, the isolated photodiode pin is on the left, and the isolated laser pin is on the right. If using a 2-pin style G laser, the laser anode would be to the right and the laser cathode to the left. The illustrations below show the mounting of a free-space TO-can laser, but the fiber-pigtailed device would mount in a similar fashion.

Your pin length must be in the range of 5mm to 9mm; most diodes are 6.25mm. Longer pins must be trimmed or they will bend when clamping the diode.



No Laser



Laser Loose

Once the device is loaded, for free-space TO-can lasers, use the provided 5.6mm or 9mm diode clip to clamp the TO-can to the temperature-controlled gold plate. For fiber pigtailed lasers, the panel mount holes will line up with either the inside (for 5.6mm) or outside (for 9mm) holes, or the top and bottom holes when mounting vertically housed packages, such as those available from Thorlabs.

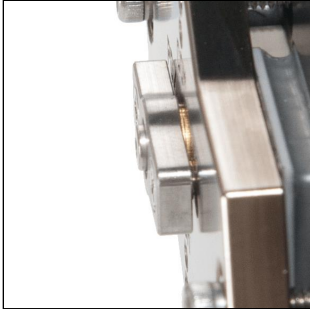


Clip, 1 Screw

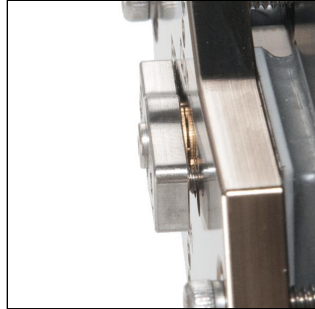


Clip, 2 Screws

When tightening the screws, do not over tighten, which may strip the threads. Do not tighten one side more than the other, as poor or uneven temperature control may result; the two pictures below show a correct and improper use of the diode clip:



**GOOD:** Diode properly clamped, clip is even with cold plate



**BAD:** Diode improperly clamped, clip is uneven with cold plate

The photos below illustrate the various covers and clips:



**Standard cover plate**



**Optional 234-C-02 cover plate**



**1mm offset cover plate**



You may choose to install the cover. The cover is not required, but will improve the temperature stability of the mount.

Depending on the type of the device, choose the appropriate clip to mount it:



**TO-5.6 and TO-9 clips**



**TO-9 1mm offset clip**



**234B with diode loaded,  
standard cover**



**234B with diode loaded,  
optional 234-C-02 cover**



**234B with CAGE system attached  
(CAGE system not included)**

## Configuring the Temperature Controller

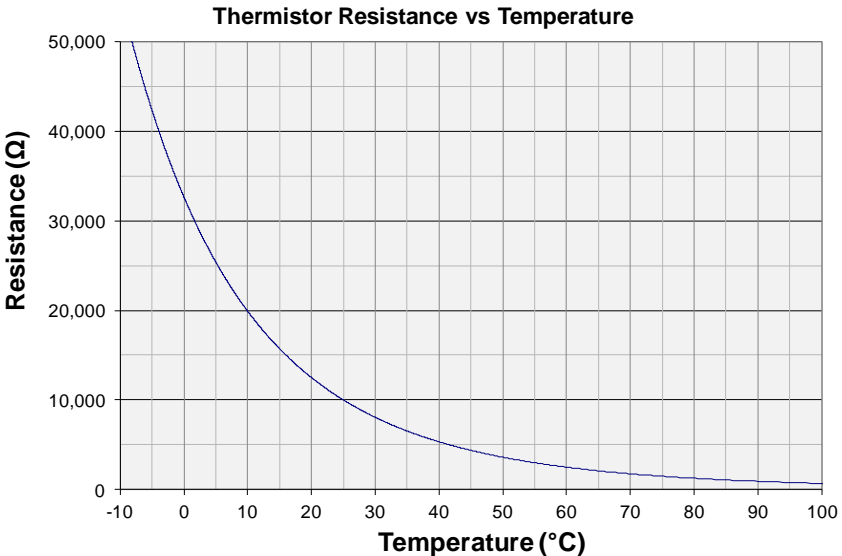
The Arroyo Instruments **5305 TECSource** or **5240 TECSource** are the recommended temperature controllers for this mount. When using an Arroyo Instruments temperature controller, the easiest method for configuring the controller to operate with the mount is to change the **Mount** setting in the menu to **234B**. This will change the sensor settings, current limit, and fan settings to be appropriate for this mount. If you have an older Arroyo Instruments temperature controller that does not have this selection, there may be an upgrade available for your instrument, check with the factory for more information, or simply adjust the current limit to no more than the maximum current of the **234B**.

If you will be using a non-Arroyo controller, make sure to adjust the limits and sensor settings appropriately to ensure proper and safe operation of the mount.

## Working with Thermistors

The **234B** is equipped with a 10k $\Omega$  negative temperature coefficient (NTC) thermistor, specifically, the BetaTHERM 10K3A1. A thermistor works by translating temperature into resistance, with resistance decreasing as temperature increases (hence the 'negative coefficient').

Below is the response curve of the thermistor:



As can be seen by the graph, the resistance of the thermistor drops very quickly. In the typical control range (0°C to 40°C), typical 10K thermistors offer good sensitivity to changes in temperature, and this is the range in which most 10K thermistors are typically used. 10K thermistors can be used at much higher temperatures, but will suffer poorer temperature stability performance because of the lower sensitivity.

All Arroyo temperature controllers support operation using a 10µA or 100µA thermistor bias, which limits the upper control range to 450kΩ or 45kΩ, respectively. To minimize noise and maximize stability, you should select highest current while still allowing you full operation across your required temperature range. The typical setting is 100µA, but your application will determine the actual needs.

### The Steinhart-Hart Equation

As can be seen from the temperature versus resistance graph above, resistance varies inversely with temperature in a non-linear fashion. This relationship can be accurately modeled by polynomial equations, and one such being the Steinhart-Hart equation:

$$\frac{1}{T} = A + B * \ln(R) + C * \ln(R)^3$$

The coefficients for the BetaTHERM 10K3A1 thermistor are:

$$A = 1.12924 \times 10^{-3}$$

$$B = 2.34108 \times 10^{-4}$$

$$C = 0.87755 \times 10^{-7}$$

These are the default coefficients for Arroyo Instruments temperature controllers, but can be changed in the **Sensor** menu, or by selecting the appropriate **234B** mount from the **Mount** menu setting.

## TEC Lifetime

While the TEC elements in the **234B** are semiconductor devices, they do wear over time. The life of a TEC module is based on several parameters, but three parameters in particular will affect the lifetime performance of the TEC:

1. The most damaging operation for a TEC is continuous thermal cycling, particularly when the high temperature is near the upper operating range of the TEC and/or where the TEC is operated near its current limits. In these applications, anticipate a much shorter lifetime for the TEC.
2. Operating the TEC for prolonged periods at or near the maximum current or temperature. While not as harsh as thermal cycling, high operating temperatures will still degrade the TEC more quickly.
3. Mechanical stresses caused by uneven surfaces, uneven compression, or sheer or uneven loads. Arroyo Instruments mounts are designed to avoid these conditions, but can still be induced by customer loads in the final application.

The first two issues can be mitigated (lessened) by operating the TEC below its current limit. While the **234B** has a maximum operating current of 5.6A, we recommend operating the mount at no more than 75% of the rated current (approximately 4.3A).

The application will dictate the thermal cycling and temperature requirements, but understand that operating under more extreme conditions simply means the TECs in the **234B** may need to be replaced more frequently.

In predicting lifetimes, under normal operating conditions (operating at 50% load or less around 25°C), which is the most common application, the TECs should last for years. Under very harsh operating conditions, TECs could wear out in as short as 4 to 6 months, possibly even less. If you have a question on how best to operate your mount under harsh conditions, contact the factory for additional support.

## Connector Pin-Outs



**234B Rear Connectors**

DB-9 Pin	Description
1 – 3	No connection
4 & 5	Laser cathode
6	Photodiode cathode
7	Photodiode anode
8 & 9	Laser anode

**Laser DB-9 Connector Pin-Out**

DB-15 Pin	Description
1 & 2	TE (+)
3 & 4	TE (-)
7	Thermistor
8	Thermistor
11	FAN (+)
12	FAN (-)
5, 6, 9-15	No connection

**TEC DB-15 Connector Pin-Out**

The nitrogen fitting is intended for use with lid-less TO-can applications, or where condensation might occur. The recommended flow rate is 2-3 CFH, or whatever is required to prevent condensation.

# Technical Specifications

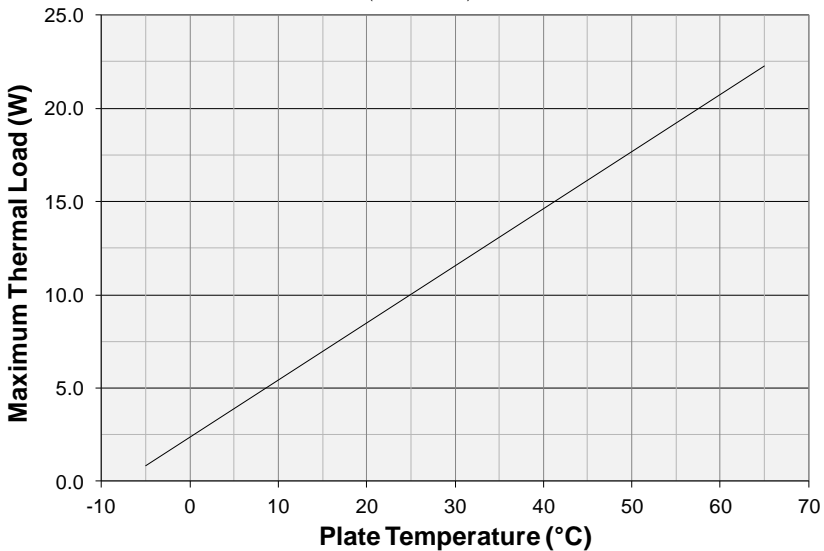
234B TEC TO-Can LaserMount	
<b>Laser</b>	
Packages Supported	5.6mm and 9mm TO-Can, 2, 3 & 4 pin. 2-pin 1mm offset packages with optional 234-OFFSET-KIT.
Fiber Pigtailed Package Support	Flange mount, 12mm or 18mm horizontal hole spacing, or 0.75" (19.1mm) vertical hole spacing.
Pin Length Range	5mm to 9mm
Maximum Laser Current	3 Amps
Temperature Control	
Standard Version	<b>234B</b>
Temperature Range	-5°C to +85°C
Sensor Type	BetaTHERM 10K3A11A
Sensitivity	10kΩ @ 25°C
TE Module (at 25°C)	I <sub>max</sub> = 5.6A V <sub>max</sub> = 7.2V
Recommended Controller	5240 TECSOURCE
High Temperature Version	<b>234B-150</b>
Temperature Range	-5°C to +150°C
Sensor Type	Platinum RTD
Sensitivity	100Ω @ 0°C, 0.00385 Ω / Ω / °C
TE Module (at 25°C)	I <sub>max</sub> = 6A V <sub>max</sub> = 8.6V
Recommended Controller	5305 TECSOURCE
Mechanical Summary	
Maximum Thread Depth	0.15" [3.8mm]
Center hole	0.27" [6.9mm], straight through
Cage mount	4-40 x 4 holes, 30mm on center
Size (H x W x D) [in(mm)]	3.0 (76.2) x 3.0 (76.2) x 2.91 (73.9)
234B with 234-C-02 Cover Plate	
Center hole	1.035"-40, threaded through
Cage mount	4-40 x 4 holes, 30mm on center
Size (H x W x D) [in(mm)]	3.0 (76.2) x 3.0 (76.2) x 3.19 (80.9)
Connectors	
Laser Diode	DB-9, male
Mount TEC	DB-15, male
Nitrogen	1/16" barb
Case Ground	4mm banana jack
General	
Fan Power	12VDC, 210mA max
Mounting holes	8-32 and M4 threaded holes

## Thermal Capacity

The maximum thermal load supported by the **234B** depends on the ambient temperature and cold plate temperature, as shown by the graph below.

The performance is based on an ambient temperature of 25°C, and actual performance will be improved or degraded if the ambient temperature is lower or higher, respectively.

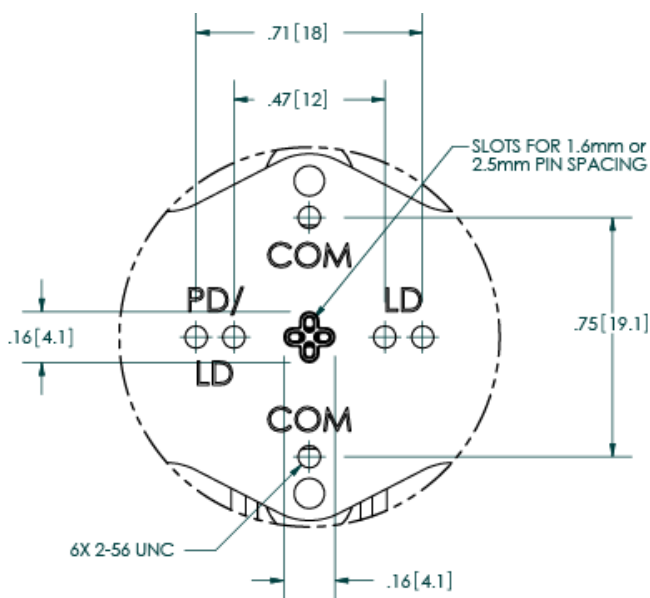
**234 Thermal Capacity**  
(25°C Ambient)



When operating at temperatures that cause condensation (below the dew point), the fixture must be purged with nitrogen to prevent the condensation of moisture for two reasons:

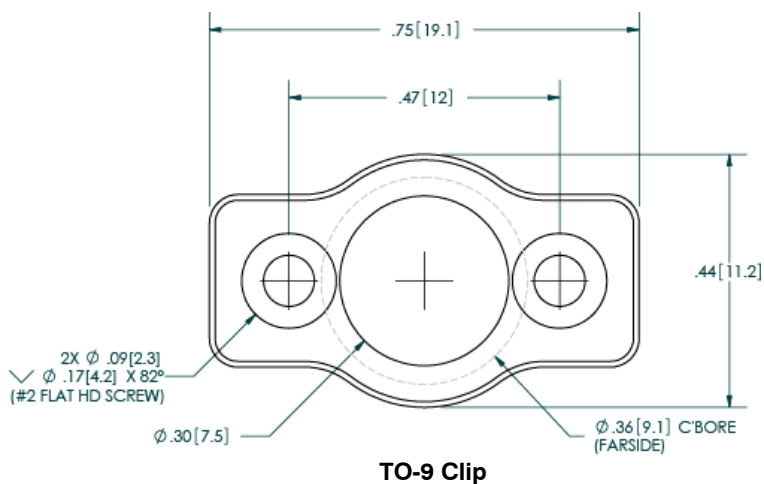
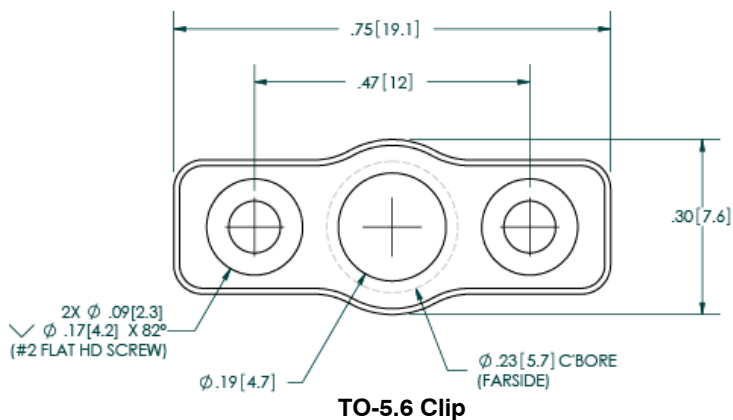
1. The energy required to condense the moisture from the air will significantly degrade the performance of the fixture; and
2. Condensation can lead to an accumulation of water inside the fixture, which, over time, can cause corrosion and interfere with the proper operation of the mount.

## Mechanical Specifications

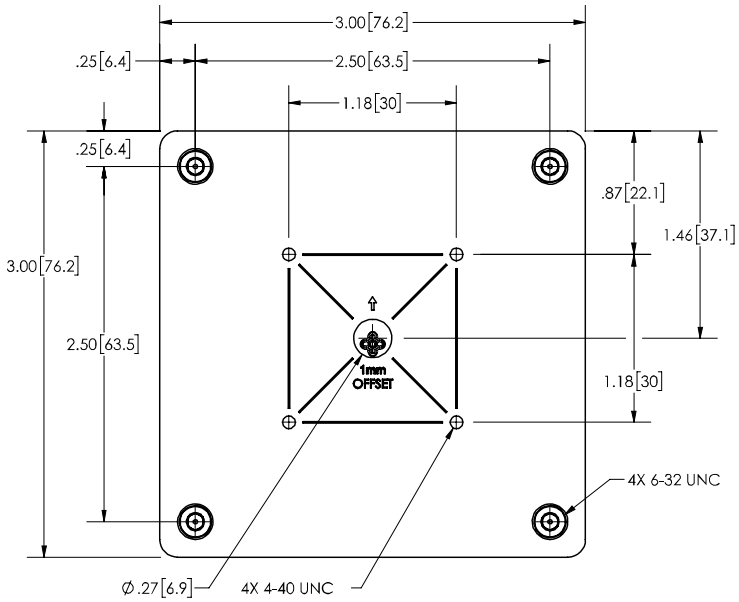


**Front Detail View**

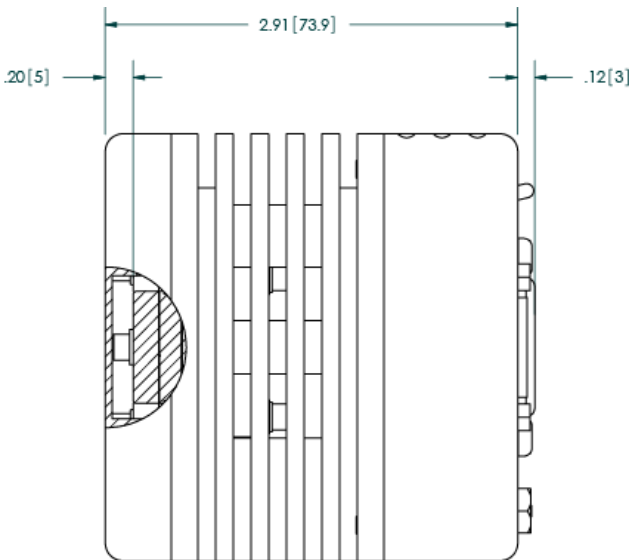




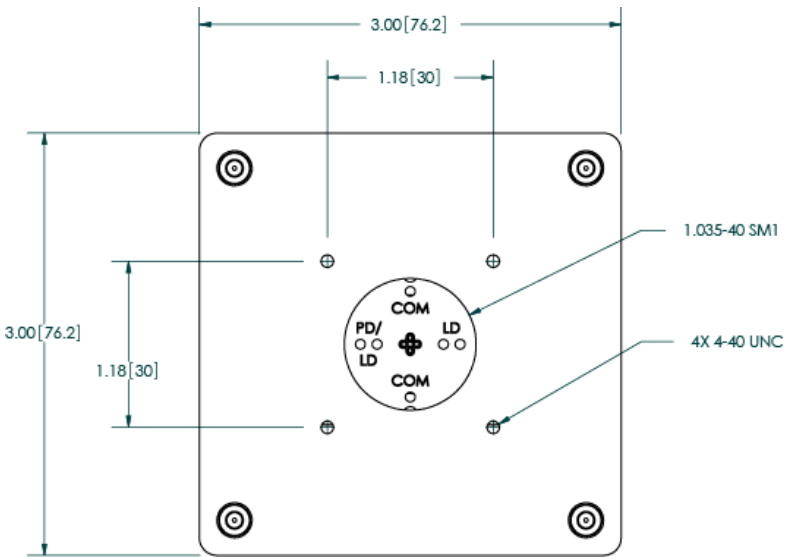




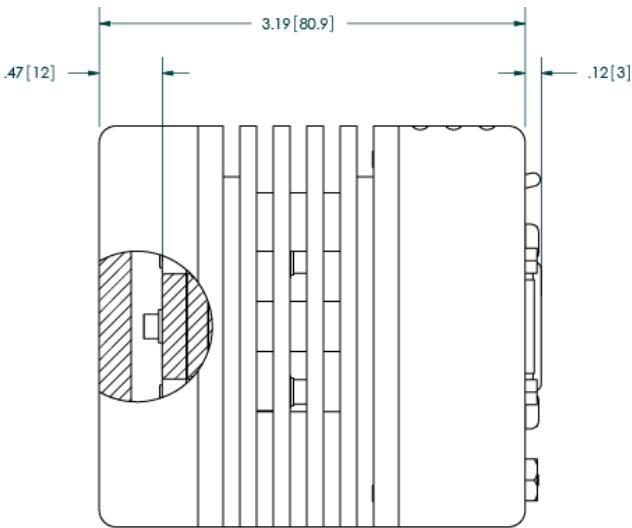
**234B with 1mm Offset Cover, Front View**



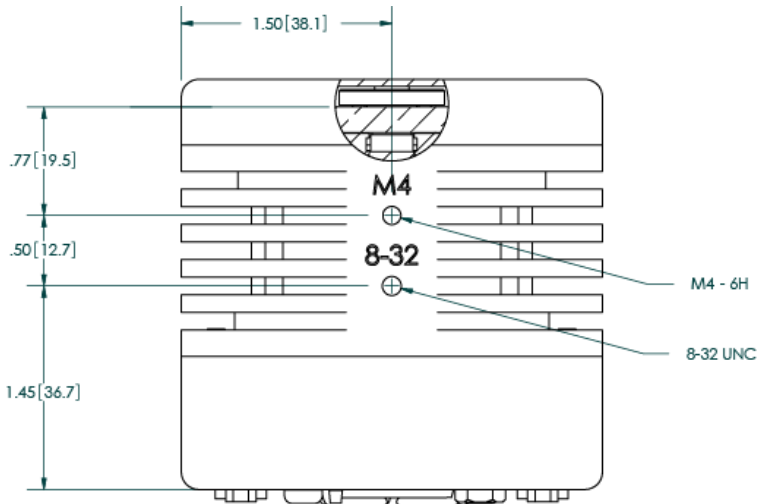
**234B with Standard or 1mm Offset Covers, Side View**



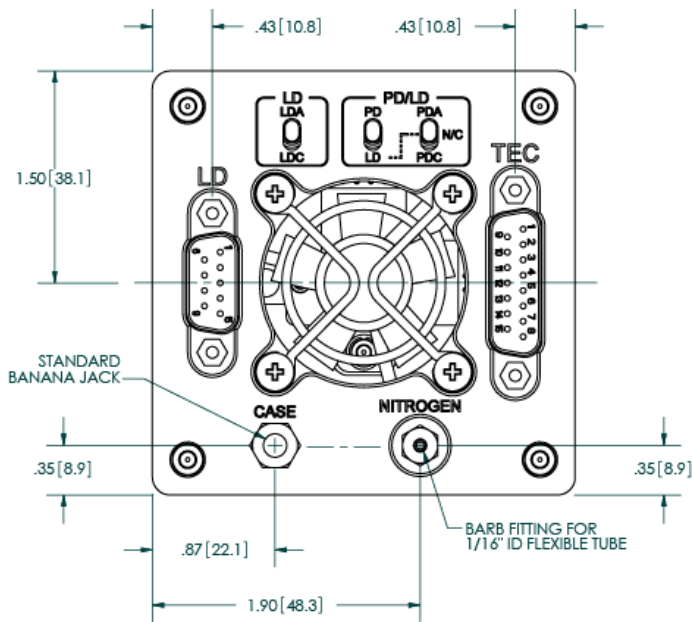
**234B with 234-C-02 Cover, Front View**



**234B with 234-C-02 Cover, Side View**



**Bottom View**



**Rear View**

## Laser Diode Protection

Electrostatic discharge and current spikes can be a significant cause of damage to laser diodes, but when proper precautions are taken, these risks can be greatly reduced or eliminated. Arroyo Instruments' controllers offer state-of-art laser diode protection, but no instrument can fully shield the laser from damage. Please take these considerations into account when operating your laser:

1. Always set the current limit at or below the maximum current your laser can handle. This prevents the device from accidentally driving the current too high, either via the set point or from the modulation port. This also provides additional current limiting protection from ESD.
2. Always work in an ESD safe operating environment, including the use of wrist straps, ESD grounded work surfaces and floors, and ESD-safe tools.
3. Where the AC power to the laser driver to temperature controller may be noisy, use isolation transformers or uninterruptible power supplies that provide isolation.
4. Make sure all cables are securely connected and fastening screws are screwed in tight.
5. Do not route power cords or other cables in parallel with the laser or temperature controller cables, as coupling may occur between the cables and inject noise into the laser diode.
6. While it is not possible to create a ground loop through the LaserSource because of it's isolation of all inputs, it is possible when using other equipment. Ensure that any other equipment is properly isolated to avoid any ground loop problems.

## Warranty

Arroyo Instruments warrants this product to be free from defects in material and workmanship under normal use and service for a period of two (2) years from date of shipment except for the TEC elements. Arroyo Instruments warrants the Peltier (TEC) element to be free from defects in material and workmanship under normal use and service for a period of one (1) year from date of shipment.

This warranty does not apply when the product has been misused, altered or damaged by accident or abnormal conditions of operation. If found to be defective during the warranty period, the product will either be repaired or replaced at Arroyo Instruments's option.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. ARROYO INSTRUMENTS SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ITS PRODUCTS.

## Service and Support

For service and support, contact your local distributor or Arroyo Instruments.

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