THORLABS

KT311(/M)
Spatial Filter System

User Guide

Table of Contents

Chapter 1 Warning Symbol Definitions

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Description
	Direct Current
	Alternating Current
	Both Direct and Alternating Current
	Earth Ground Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	On (Supply)
	Off (Supply)
	In Position of a Bi-Stable Push Control
	Out Position of a Bi-Stable Push Control
	Caution: Risk of Electric Shock
	Caution: Hot Surface
	Caution: Risk of Danger
	Warning: Laser Radiation
	Caution: Spinning Blades May Cause Harm

Chapter 2 Safety

WARNING

Never look directly into a laser. It is recommended that the laser power be limited to a few milliwatts during the alignment process.

Chapter 3 Operation Instructions

To best use these instructions, please refer to Figure 1 and the mechanical drawings in Chapter 4 for the arrangement of various components. The KT311(/M) comes fully assembled except for the optics and pinhole. Alignment mirrors maybe purchased separately (see Section 3.7). Alignment of the spatial filter involves: stripping down the KT311(/M), coarse alignment of the beam to the table, placement of the KT311(/M) in the beam, fine alignment of the optical path, installation of the focusing lens, and installation and adjustment of the collimating lens.

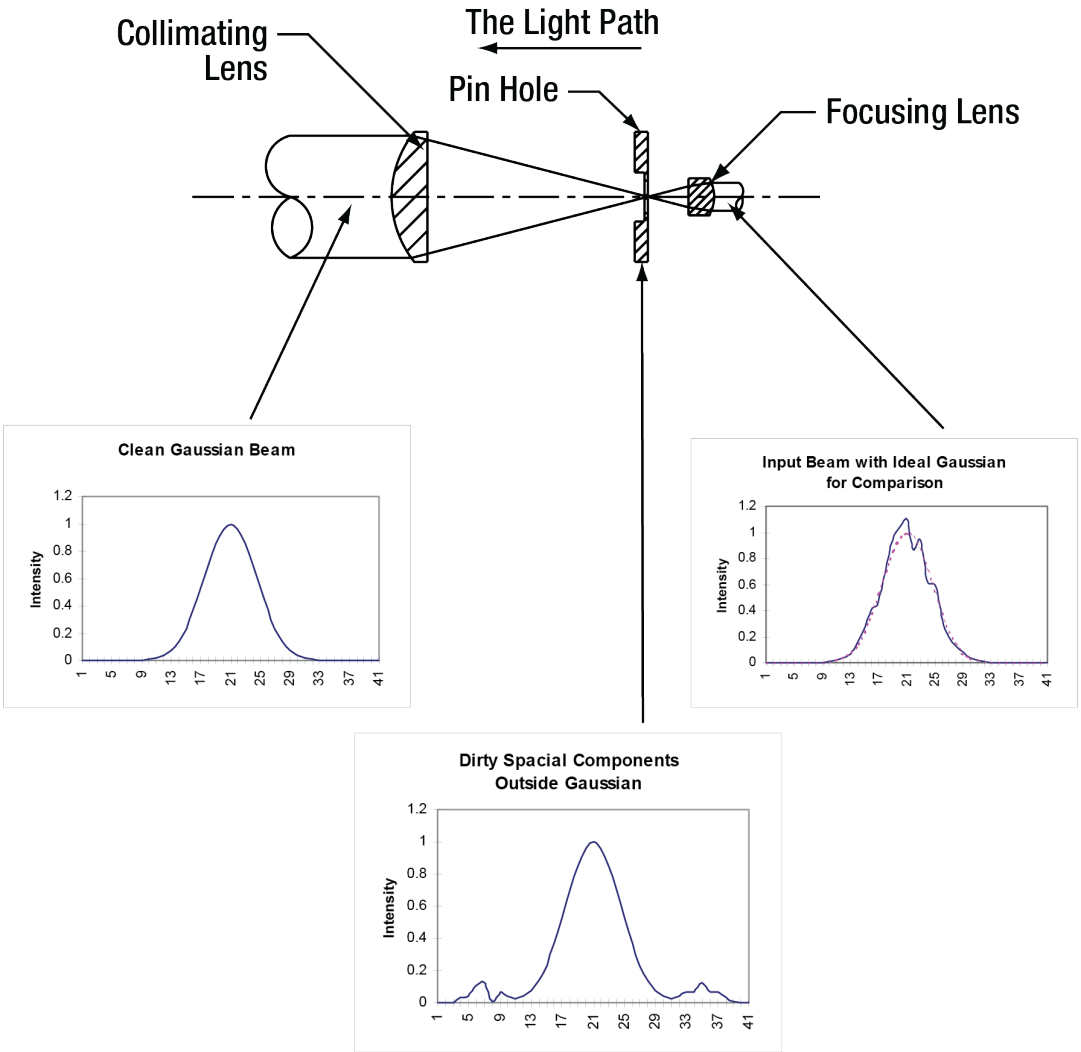


Figure 1 Noise is removed from a Gaussian beam as it travels through a focusing lens, pinhole, and collimating lens.

3.1. Partial Disassembly of the KT311(/M)

In this section, the KT311(/M) will be partially disassembled to allow the laser beam to pass through the spatial filter. This will provide an easy means for ensuring that the system's optical axis is aligned with that of your laser beam.

1. A stripped down version of the KT311(/M) needs to be created. This is accomplished by removing the slip plate positioner, Z translator, and extension rods. Place these components aside. The stripped down KT311(/M) appears in Figure 2.
2. The threaded bore of the XY translator on the KT311(/M) needs to be roughly centered. The KT311(/M) is now ready and should be placed aside until Section 3.3.

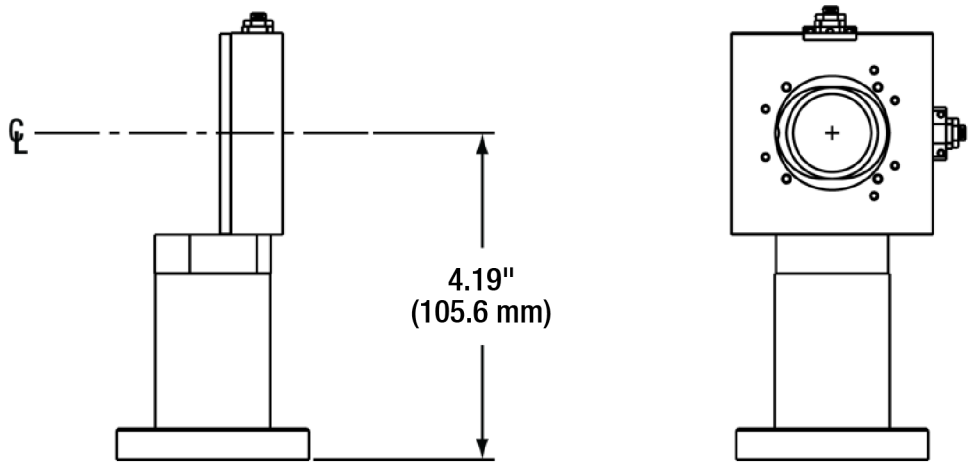


Figure 2 The KT311(/M) has been stripped down by removing the components listed in Step 1. Imperial units are representative of the KT311 and metric units are representative of the KT311/M

3.2. Coarse Alignment of the Beam Path

In this section, the path of the laser beam will be set. While a recommended beam steering layout is shown in Section 3.7, this is only one of many configurations that will work. Most importantly, the beam should be parallel to and 4.19" (105.6 mm for the KT311/M) above the optical bench with at least one mirror with two angular adjustments close to the input of the KT311(/M).

1. With an optical layout similar to that of Section 3.7, ensure that the beam hits Mirror “A” at a height between 4.0" to 4.4". Using a card marked at a height of 4.19" (105.6 mm), ensure that the beam hits Mirror “B” at that height.

2. Move the marked card downstream from Mirror B about 18" (460 mm) (the further the better). Use Mirror “B” to adjust the height of the laser beam so that it is 4.19" (105.6 mm) above the optical bench. At this point it is assumed that the laser beam is pointed in a direction that will allow the KT311(/M) to be inserted close (within a few inches) to the mirror mount.

3.3. Placement of the KT311(/M) in the Optical Path

In this section, the stripped down KT311(/M) will be aligned with the laser beam and clamped into place on the optical bench. By using the alignment tools on the input and output ends, sufficient initial alignment will be achieved.

1. Replace the extension rods onto the XY translator and hang an alignment tool from the top extension rods on both the input and output sides.

2. Place the KT311(/M) in the beam path, and adjust so that the beam is well centered horizontally through each alignment tool.

3. Use Mirror B to adjust the vertical height of the laser to ensure that the beam is well centered vertically through both alignment tools. See Section 3.7 for mirror alignment instructions.

4. Once the stripped down KT311(/M) is in alignment, three table clamps should be used to secure the KT311(/M) in position. Thorlabs' CL series table clamps are recommended. Check the alignment of the beam through the system to ensure movement of the KT311(/M) did not occur during clamping

5. Repeat this procedure as needed.

3.4. Fine Alignment of the Optical Path

This section details the installation and centering of the pinhole. A small card will be used to catch the Airy image produced by the laser passing through the pinhole.

1. Remove the alignment tools from the KT311(/M).

2. Insert the pinhole into the center of the XY translator (See Figure 3). Remove one or more of the extension rods for easier access to the XY translator. The pinhole should be placed near the input side of the XY translator where it will not interfere with future XY-translation.

3. Replace all extension rods on cage assembly.

4. Place a business card or similar target a few centimeters away from the pinhole at the output end of the KT311(/M).

5. Move the X and Y adjusters of the XY translator to center the beam on the pin hole. When the beam is roughly centered on the pinhole an Airy pattern should appear on the card.

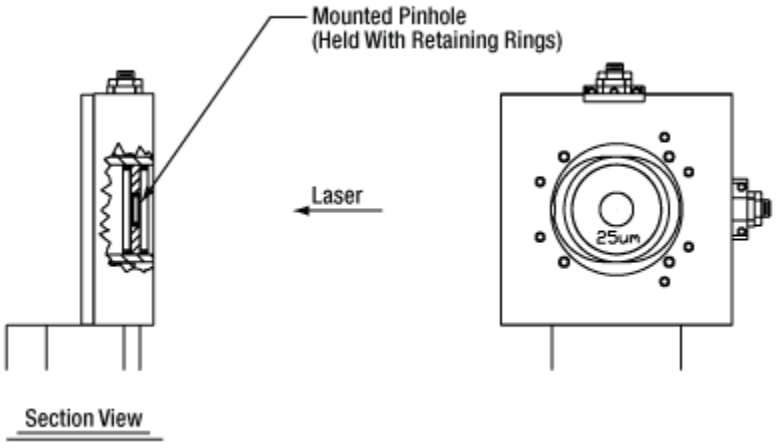


Figure 3 A pinhole should be placed into the XY translator, as mentioned in Step 2.

3.5. Installation of the Focusing Lens

This section outlines the installation of the focusing lens and its alignment. The focusing lens is adjusted to bring the focused beam through the center of the pinhole. This focused beam is projected onto a card to allow for more accurate centering.

1. Place the focusing lens in the microscope extension tube. The curved side of the lens should be facing the incoming collimated laser beam. Mount the Z translator with this lens assembly in it onto the cage assembly.

2. With the Z translator on the cage but not locked down, visually adjust the location of the lens to focus the light on the pinhole. Obtain a large spot diameter on the pinhole. This will ensure that some of the laser

light will pass through the pinhole. The light passing through the pinhole will create a spot. This spot should be used as a guide to peak the laser with the XY translator.

3. Slide the Z translator until the beam is focused through the pinhole. Slowly lock each screw on the Z translator and peak the XY translator to maintain throughput. If movement does occur during lockdown, repeat Step 2.

4. Adjust each of the X, Y and Y translators to get the brightest spot. Adjustment should be continued until the fringes of the Airy disk are eliminated and a clear Gaussian spot appears on the card.

3.6. Installation and Adjustment of the Collimating Optic

In this step, the collimating optic will be installed (on the output side), and the now filtered beam will be centered and collimated.

1. Before installing the collimating optic, place a target at a distance as far from the pinhole as possible, while still being able to clearly locate the center of the spot on the target. Mark the center of the spot on the target. Make sure that the target is fixed in position, for it will be used for final alignment of the collimated beam.

2. Slip the cage plate with the 1" collimating lens onto the output side of the filter system, and slide it back and forth to attain rough collimation.

3. With the locking screws of the slip plate loosened, slide the slip plates side to side to center the roughly collimated beam on the mark on the target card.

4. Make final adjustments to the location of the collimating lens to achieve good collimation. This can be checked by moving another card along the beam path and examining the size of the spot. If the spot stays a uniform size then collimation has been achieved.

3.7. Appendix: Alignment of the Laser Beam

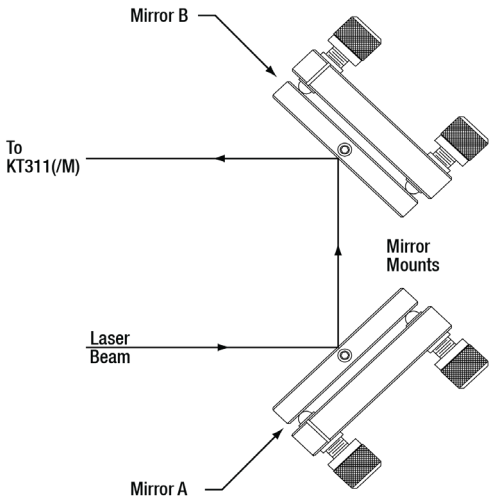


Figure 4 The laser beam can be aligned using two mirrors.

This Appendix details the method for adjusting the alignment of the laser beam. The two mirrors, Mirror “A” and Mirror “B”, (see Figure 4) will be used to adjust the approach of the beam. The procedure given below is detailed carefully, for those who might lack experience in dual mirror adjustment.

Use the alignment tools to locate the centers of the locations specified below.

1. Use Mirror “B” to carefully center the beam on the input of the KT311(/M) in both the horizontal and vertical planes. Note the position of the beam at the output. Is it high or low? Or is it to the right or left?

2. While looking at the spot at the input use Mirror “A” to move the beam a small amount in the same direction as the error that is seen at the output. In other words if the laser beam is low at the output then use mirror A to drive the beam low at the input.

3. Using Mirror “B”, adjust the beam so it is once again centered at the input.

4. Looking at the output you will note that the beam has moved in the direction opposite of the original misalignment. The amount that the laser beam is corrected in each step of this process is a matter of “feel” which can be learned quickly.

5. Continue this procedure until the beam is well aligned at both the input and output of the KT311(/M).

Chapter 4 Mechanical Drawings

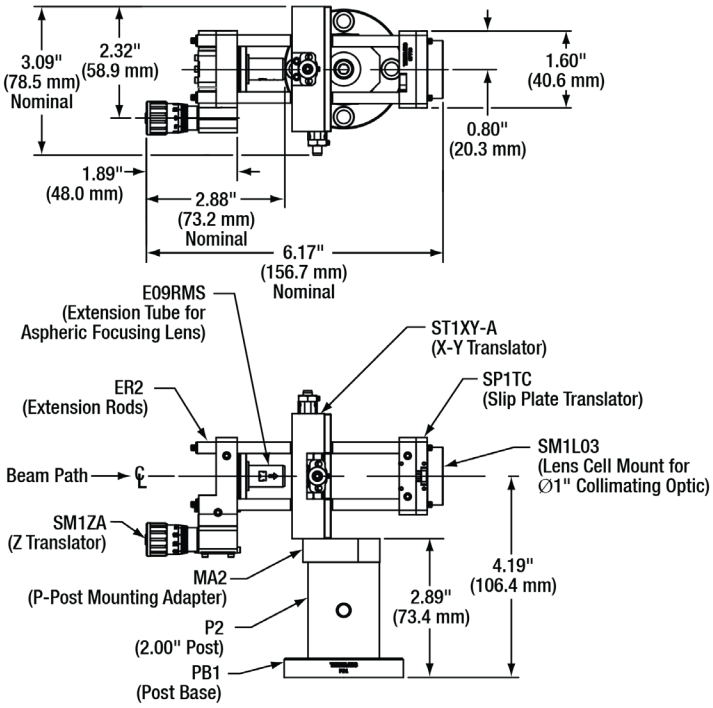


Figure 5 KT311 Mechanical Drawing

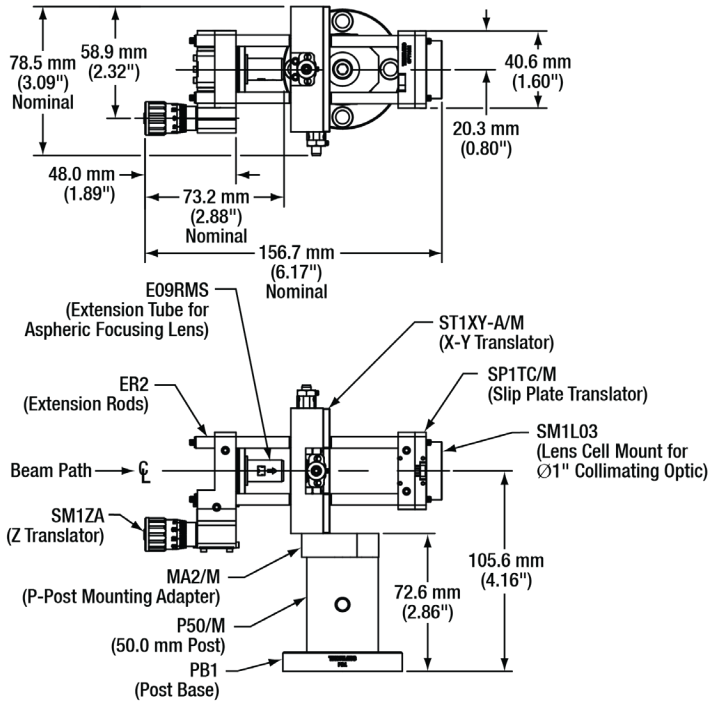
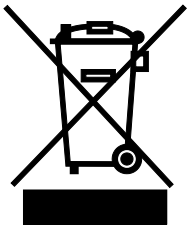


Figure 6 KT311/M Mechanical Drawing

Chapter 5 Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

- This offer is valid for Thorlabs electrical and electronic equipment:
- Sold after August 13, 2005
- Marked correspondingly with the crossed out “wheelie bin” logo (see right)
- Sold to a company or institute within the EC
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and not contaminated



Wheelie Bin Logo

As the WEEE directive applies to self-contained operational electrical and electronic products, this end of life take back service does not refer to other Thorlabs products, such as:

- Pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- Components
- Mechanics and optics
- Left over parts of units disassembled by the user (PCB’s, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

Waste Treatment is Your Own Responsibility

If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

Ecological Background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of life products will thereby avoid negative impacts on the environment.

Chapter 6 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at **www.thorlabs.com/contact** for our most up-to-date contact information.

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