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Operating Instructions
for
NFC-446-040
Raman Notch Filter

Ver 2.0

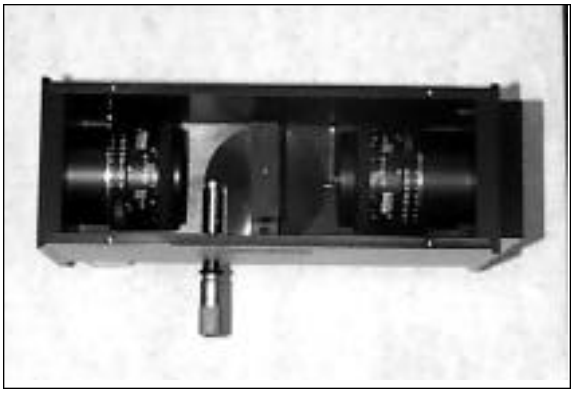
Supplemental Instructions
Acton Research Corporation
Model NFC-446-040
Raman Notch Filter Assembly

Description:

The ARC Model NFC-446-040 is a filter chamber designed to permit use of Raman notch filters with ARC monochromators and spectrographs. It is designed primarily to collect the output of fiber optics, however it may be used with other sources of Raman scatter (eg: focused sample image or direct collection of scatter from a sample positioned close to the NFC-446-040).

NFC-446-040 Raman Notch Filter Assembly

The standard NFC-446-040 includes a lens chamber with sample holder designed to accept 1.5 inch diameter filters. Other sample holders are available on a custom order basis. Filters can be rotated up to 10° by an external micrometer in order to tilt-tune the rejection band of the filter.

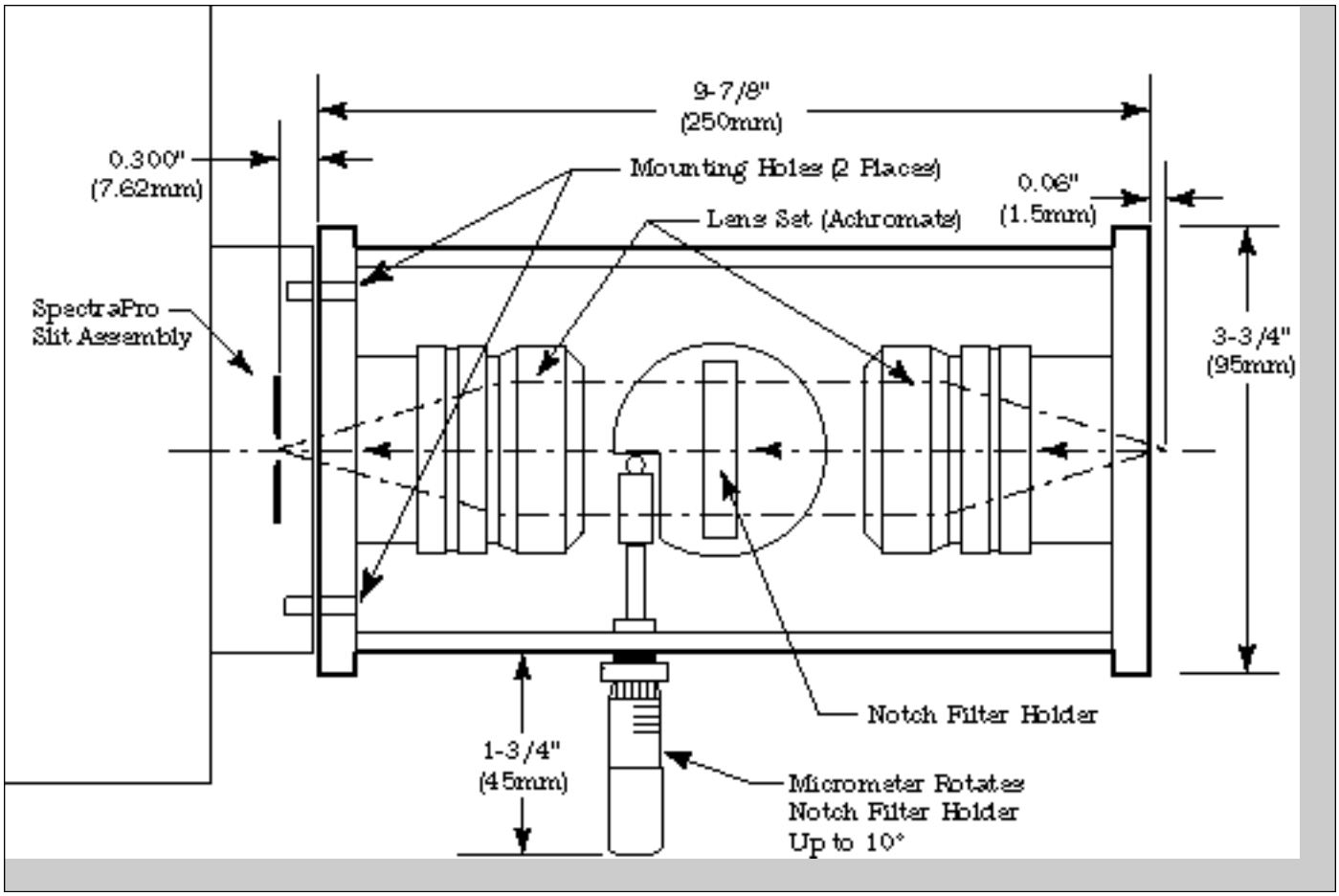


Inside view of the NFC-446-040 showing the sample holder and micrometer positioned between the collimating and focusing lenses.

Principle of Operation: The NFC-446-040 is designed to provide a collimated beam for operation with notch (or cut-off) filters. The first lens collects and collimates the beam through the notch filter. The second lens collects the collimated beam and focuses it to the entrance slit of the monochromator or spectrograph. The light is then dispersed to a detection system.

Notch filters are designed to significantly reduce (or block) the amount of laser light reaching the monochromator or spectrograph, while transmitting the desired Raman scatter. This permits efficient detection of the Raman scatter by the system without requiring a double or triple monochromator. The integrated tilt adjustment capabilities of the NFC-446-040 enable fine tuning of the notch filters to achive the best combination of laser light blocking and Raman scatter transmission.

Figure 1: NFC-446-040 Layout (Top View)



Mounting the NFC-446-040 to SpectraPro Monochromators or Spectrographs:

Use the illustration above for reference when mounting the NFC-446-040 to ARC monochromators or spectrographs.

1. **Unpack the NFC-446-040 Raman Notch Filter Chamber.**
2. **Remove the cover of the NFC-446-040.**
3. **Set the components on a stable, flat working surface. Position the NFC-446-040 against the ENTRANCE SLIT of the SpectraPro monochromator or spectrograph as shown in the illustration above. Align the mounting holes of the NFC-446-040 with the tapped holes in the SpectraPro slit assembly.**
4. **Insert the two (2) 8-32 screws provided through the mounting holes and into the tapped holes of the slit assembly. Tighten to secure the NFC-446-040 to the entrance slit.**
5. **The NFC-446-040 includes a support post to help stablize the system. This post should rest flat on the working surface, and should not exert stress on the system.**
6. **The NFC-446-040 is now mounted to the SpectraPro monochromator or spectrograph.**

Mounting a Filter Inside the NFC-446-040:

The standard filter holder inside the NFC-446-040 accepts 1.5" (38.1mm) diameter filters. Use the following procedure to mount filters:

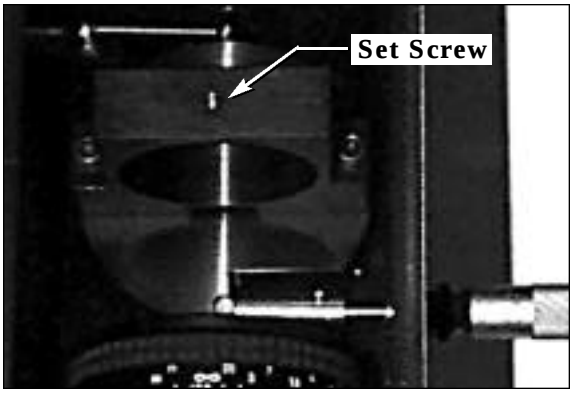
1. **If not already completed, mount the NFC-446-040 to the monochromator or spectrograph.**

2. **Remove the NFC-446-040 access cover.**

3. **Locate the filter holder between the lenses.**

4. **Slide the notch filter into the holder and secure it in position with the set-screw (located on top of the holder).**

5. **Replace the access cover.**



Close up view of the sample holder inside the NFC-446-040.

Optimizing the NFC-446-040 for Best Performance:

<u>Lens Aperture Ratio</u>:

Under normal operating conditions with ARC monochromators and spectrographs, use the following lens aperture settings inside the NFC-446-040:

SpectraPro-150, SpectraPro-275, or SpectraPro-300i: Set both lenses to an aperture of 4 or smaller.

SpectraPro-500 or SpectraPro-500i: Set both lenses to an aperture of 6.5 or smaller.

SpectraPro-750: Set both lenses to an aperture of 9.7 or smaller.

Note: When using fiber optic input, especially when the fiber size or configuration of fibers is tall (eg: a column of fibers), we recommend setting the aperture of the lens closest to the fiber at 1.8. This will permit efficient collection of the fiber output and will reduce possible vignetting of the light.

Note: It is possible to adjust the lens apertures of the NFC-446-040 to optimize system performance. Reducing the aperture of the lenses, for example, will improve the overall image quality of the system.

<u>Lens Focus:</u>

The NFC-446-040 is optimized for best performance when the light source image is in sharp focus on the SpectraPro entrance slit, and **both lenses are set to the same focus position. This can be accomplished using the following procedure:**

1. **Assure that the NFC-446-040 is correctly mounted to the monochromator or spectrograph**

2. **Mount the detection system to the monochromator or spectrograph. Assure that the detection system is operating.**

3. **Use a light source with line spectrum output, such as a mercury pen-ray lamp.**

4. **Set the monochromator or spectrograph to a central wavelength of 435.8nm if using a mercury source, or the corresponding wavelength to match your light source output if it is not mercury. If no line source is available, use a white light source and set the monochromator or spectrograph to a central wavelength of 0.0nm.**

5. **Operate the system and continuosly monitor for intensity. Slowly adjust the lenses until highest intensity is achieved, and both lenses are set to the same focus position.**

6. **When operating the NFC-446-040 with multiple light source inputs (a multi-leg fiber optic bundle, for example), an imaging spectrograph, and a CCD detection system, we recommend operating the detection system in an imaging mode and adjusting the lenses until best image quality is achieved.**