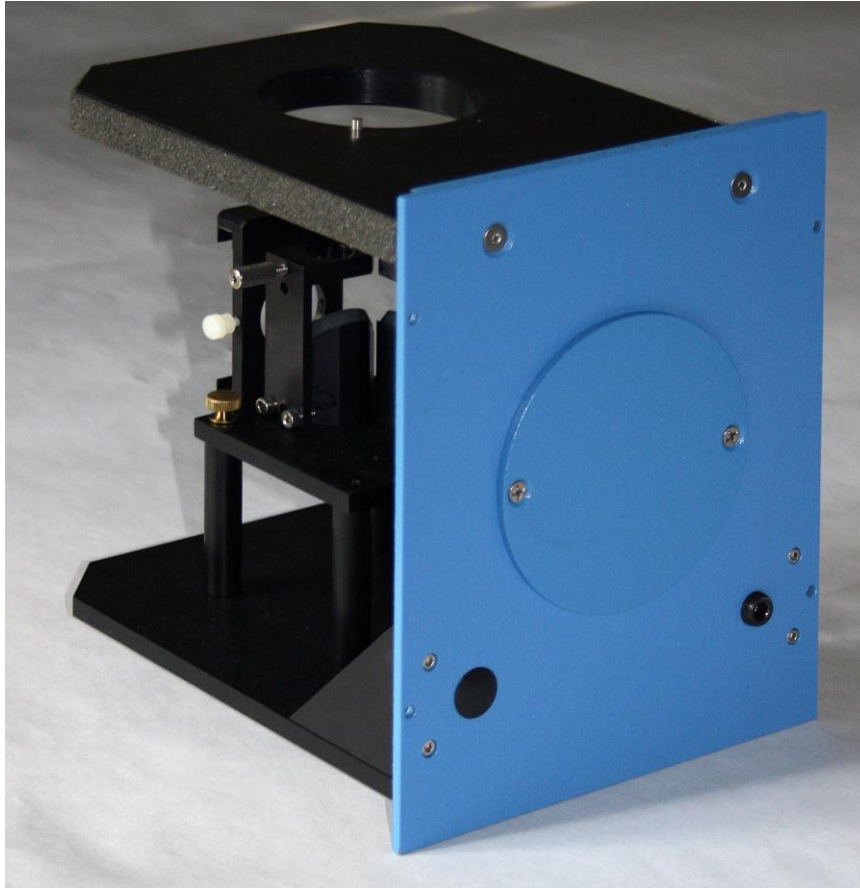


**Fiber-Optics Adaptor
FL-3000/FM4-3000**

**Operation Manual
Part number J81041 rev. D**

FL-3000/FM4-3000

Fiber-Optic Adaptor



Operation Manual

rev. D

<http://www.HORIBA.com/scientific>

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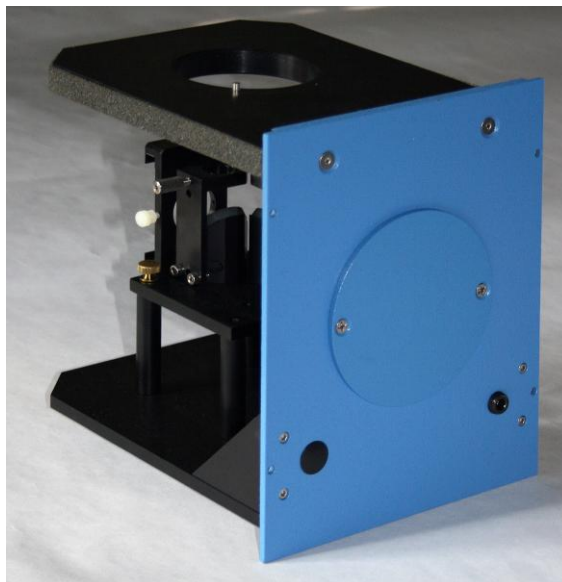
July 2010

Part Number J81041

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0 : Introduction



About the Fiber-Optic Adaptor

The FL-3000 Fiber-Optic Adaptor is used with the Fluorolog[®]-3, FluoroMax[®]-3, and Fluorolog[®]-Tau-3 spectrofluorometers to introduce a fiber-optic bundle into the sample compartment. The FM4-3000 is used with the FluoroMax[®]-4 spectrofluorometer. Fiber-optic bundles are useful for samples that are too large, too remote, or otherwise not appropriate for measurement within the sample compartment. Additionally, fiber-optic bundles provide the ability to add specialized instrumentation to your spectrofluorometer system that cannot interface directly with the sample compartment.

The fiber-optics are held in place using pinned mounts and collars that secure them in the proper alignment. The entire accessory is held in place using two thumb screws on the base of the platform. Filter-holders are included in the excitation and emission optical paths for 1" diameter round, 1" × 2" rectangular or 2" × 2" square filters. The platform uses all-reflective optics to minimize chromatic aberrations.

Fiber-optic bundles must be ordered separately for the Fiber-Optic Adaptor. See the chapter on Technical Specifications for more information on compatible fiber-optic bundles.

This manual explains how to operate and maintain the Fiber-Optic Adaptor.



Note: Keep this and the other reference manuals near the system.

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By setting up or starting to use any HORIBA Jobin Yvon product, you are accepting the following terms:

You are responsible for understanding the information contained in this document. You should not rely on this information as absolute or all-encompassing; there may be local issues (in your environment) not addressed in this document that you may need to address, and there may be issues or procedures discussed that may not apply to your situation.

If you do not follow the instructions or procedures contained in this document, you are responsible for yourself and your actions and all resulting consequences. If you rely on the information contained in this document, you are responsible for:

- Adhering to safety procedures
- Following all precautions
- Referring to additional safety documentation, such as Material Safety Data Sheets (MSDS), when advised

As a condition of purchase, you agree to use safe operating procedures in the use of all products supplied by HORIBA Jobin Yvon, including those specified in the MSDS provided with any chemicals and all warning and cautionary notices, and to use all safety devices and guards when operating equipment. You agree to indemnify and hold HORIBA Jobin Yvon harmless from any liability or obligation arising from your use or misuse of any such products, including, without limitation, to persons injured directly or indirectly in connection with your use or operation of the products. The foregoing indemnification shall in no event be deemed to have expanded HORIBA Jobin Yvon's liability for the products.

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Due to HORIBA Jobin Yvon's efforts to continuously improve our products, all specifications, dimensions, internal workings, and operating procedures are subject to change without notice. All specifications and measurements are approximate, based on a standard configuration; results may vary with the application and environment. Any software manufactured by HORIBA Jobin Yvon is also under constant development and subject to change without notice.

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Safety summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of instrument. HORIBA Jobin Yvon assumes no liability for the customer's failure to comply with these requirements. Certain symbols are used throughout the text for special conditions when operating the instruments:



A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or similar that, if incorrectly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met. HORIBA Jobin Yvon Inc. is not responsible for damage arising out of improper use of the equipment.



A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or similar that, if incorrectly performed or adhered to, could result in damage to the product. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met. HORIBA Jobin Yvon Inc. is not responsible for damage arising out of improper use of the equipment.



Intense ultraviolet, visible, or infrared light! Wear light-protective goggles, full-face shield, skin-protection clothing, and light-blocking gloves. Do not stare into light.



Ultraviolet light! Wear protective goggles, fullface shield, skin-protection clothing, and UV-blocking gloves. Do not stare into light.



Explosion hazard! Wear explosion-proof goggles, full-face shield, skin-protection clothing, and protective gloves.



This symbol cautions the user that excessive humidity, if present, can damage certain equipment.



Wear protective gloves.



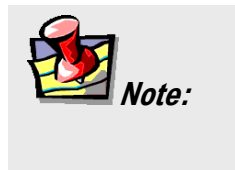
Wear appropriate safety goggles to protect the eyes.



Wear an appropriate face-shield to protect the face.



Read this manual before using or servicing the instrument.



General information is given concerning operation of the equipment.

Risks of ultraviolet exposure



Caution: This instrument is used in conjunction with ultraviolet light. Exposure to these radiations, even reflected or diffused, can result in serious, and sometimes irreversible, eye and skin injuries. Overexposure to ultraviolet rays threatens human health by causing:

- Immediate painful sunburn
- Skin cancer
- Eye damage
- Immune-system suppression
- Premature aging

Do not aim the UV light at anyone.

Do not look directly into the light.

Always wear protective goggles, full-face shield, and skin-protection clothing and gloves when using the light source.

- Light is subdivided into visible light, ranging from 400 nm (violet) to 700 nm (red); longer infrared, “above red” or $> 700\text{nm}$, also called heat; and shorter ultraviolet radiation (UVR), “below violet” or $< 400\text{nm}$. UVR is further subdivided into UV-A or near-UV (320–400 nm), also called black (invisible) light; UV-B or mid-UV (290–320 nm), which is more skin penetrating; and UV-C or far-UV ($< 290\text{ nm}$).
- Health effects of exposure to UV light are familiar to anyone who has had sunburn. However, the UV light level around some UV equipment greatly exceeds the level found in nature. Acute (short-term) effects include redness or ulceration of the skin. At high levels of exposure, these burns can be serious. For chronic exposures, there is also a cumulative risk of harm. This risk depends upon the amount of exposure during your lifetime. The long-term risks for large cumulative exposure include premature aging of the skin, wrinkles and, most seriously, skin cancer and cataract.
- Damage to vision is likely following exposure to high-intensity UV radiation. In adults, more than 99% of UV radiation is absorbed by the anterior structures of the eye. UVR can contribute to the development of age-related cataract, pterygium, photodermatitis, and cancer of the skin around the eye. It may also contribute to age-related macular degeneration. Like the skin, the covering of the eye or the cornea, is epithelial tissue. The danger to the eye is enhanced by the fact that light can enter from all angles around the eye and not only in the direction of vision. This is especially true while working in a dark environment, as the pupil is wide open. The lens can also be damaged, but because the cornea acts as a filter, the chances are reduced. This should not lessen the concern over lens damage however, because cataracts are the direct result of lens damage.

Burns to the eyes are usually more painful and serious than a burn to the skin. Make sure your eye protection is appropriate for this work. **NORMAL EYEGASSES OR CONTACTS OFFER VERY LIMITED PROTECTION!**



Warning: *UV exposures are not immediately felt. The user may not realize the hazard until it is too late and the damage is done.*

Training

For the use of UV sources, new users must be trained by another member of the laboratory who, in the opinion of the member of staff in charge of the department, is sufficiently competent to give instruction on the correct procedure. Newly trained users should be overseen for some time by a competent person.

Additional risks of xenon lamps



Among the dangers associated with xenon lamps are:

- Burns caused by contact with a hot xenon lamp.
- Fire ignited by hot xenon lamp.
- Interaction of other nearby chemicals with intense ultraviolet, visible, or infrared radiation.
- Damage caused to apparatus placed close to the xenon lamp.
- Explosion or mechanical failure of the xenon lamp.



Warning: Xenon lamps are dangerous. Please read the following precautions.

Visible radiation

Any very bright visible light source will cause a human aversion response: we either blink or turn our head away. Although we may see a retinal afterimage (which can last for several minutes), the aversion response time (about 0.25 seconds) normally protects our vision. This aversion response should be trusted and obeyed. **NEVER STARE AT ANY BRIGHT LIGHT-SOURCE FOR AN EXTENDED PERIOD.** Overriding the aversion response by forcing yourself to look at a bright light-source may result in permanent injury to the retina. This type of injury can occur during a single prolonged exposure. Excessive exposure to visible light can result in skin and eye damage.

Visible light sources that are not bright enough to cause retinal burns are not necessarily safe to view for an extended period. In fact, any sufficiently bright visible light source viewed for an extended period will eventually cause degradation of both night and color vision. Appropriate protective filters are needed for any light source that causes viewing discomfort when viewed for an extended period of time. For these reasons, prolonged viewing of bright light-sources should be limited by the use of appropriate filters.

The blue-light wavelengths (400–500 nm) present a unique hazard to the retina by causing photochemical effects similar to those found in UV-radiation exposure.

Infrared radiation

Infrared (or heat) radiation is defined as having a wavelength between 780 nm and 1 mm. Specific biological effectiveness “bands” have been defined by the CIE (Commission Internationale de l’Eclairage or International Commission on Illumination) as follows:

- IR-A (near IR) (780–1400 nm)
- IR-B (mid IR) (1400– 3000 nm)
- IR-C (far IR) (3000 nm–1 mm)

The skin and eyes absorb infrared radiation (IR) as heat. Workers normally notice excessive exposure through heat sensation and pain. Infrared radiation in the IR-A that enters the human eye will reach (and can be focused upon) the sensitive cells of the retina. For high irradiance sources in the IR-A, the retina is the part of the eye that is at risk. For sources in the IR-B and IR-C, both the skin and the cornea may be at risk from “flash burns.” In addition, the heat deposited in the cornea may be conducted to the lens of the eye. This heating of the lens is believed to be the cause of so called “glassblowers’ ” cataracts because the heat transfer may cause clouding of the lens.

- Retinal IR Hazards (780 to 1400 nm): possible retinal lesions from acute high irradiance exposures to small dimension sources.
- Lens IR Hazards (1400 to 1900 nm): possible cataract induction from chronic lower irradiance exposures.
- Corneal IR Hazards (1900 nm to 1 mm): possible flashburns from acute high irradiance exposures.

Who is likely to be injured? The user and anyone exposed to the radiation or xenon lamp shards as a result of faulty procedures. Injuries may be slight to severe.

1 : Requirements & Unpacking

Environmental requirements

- Temperature 59–86°F (15–30°C)
- Maximum temperature fluctuation $\pm 2^\circ\text{C}$
- Ambient relative humidity $< 75\%$
- Low dust levels
- No special ventilation

Unpacking

Introduction

The Fiber-Optic Adaptor is delivered in a single packing carton. All hardware is included with the delivery. Examine the shipping box carefully. Any evidence of damage should be noted on the delivery receipt and signed by representatives of the receiving and carrier companies. Once a location has been chosen, unpack and assemble the equipment as described below. To avoid excessive moving and handling, unpack the equipment as close as possible to the selected location.



Note: Many public carriers will not recognize a claim for concealed damage if it is reported later than 15 days after delivery. In case of a claim, inspection by an agent of the carrier is required. For this reason, the original packing material should be retained as evidence of alleged mishandling or abuse. While HORIBA Scientific assumes no responsibility for damage occurring during transit, the company will make every effort to aid and advise.

Standard FL-3000 Fiber-Optic Adaptor carton contents

Quantity	Item	Part number
1	Fiber-optic interface platform	
2	Fiber-holder collar for MicroMax	351446
1	Plate	351682
2	O-rings	
4	Split-halves of plugs	
1	Gasket	351683
1	Fiber-Optic Accessory Operation Manual	81041
2	Thumbscrew	50597
2	Thumbscrew	50594
1	10-mm interface	354614

Standard FM4-3000 Fiber-Optic Adaptor carton contents

Quantity	Item	Part number
1	Fiber-optic interface platform	
2	Fiber-holder collar for MicroMax	351446
1	Hole Plug	934157
2	O-rings	
4	Split-halves of plugs	
1	Gasket	351683
1	Fiber-Optic Accessory Operation Manual	81041
2	Thumbscrew	50594
1	10-mm interface	354614

Handling fiber-optic bundles



Caution: Fiber-optic bundles are delicate. Mishandling may seriously damage the optical fibers.



Caution: Avoid twisting the fiber-optic bundles too much. Breakage of the glass fibers may occur with excessive strain.



Caution: Do not remove the fibers from their collars or they will require realignment!



Caution: Never polish the exposed ends of the glass fibers in a fiber-optic bundle. This may decrease the optical throughput and damage the fibers.



Caution: Do not expose the ends of the fiber-optic bundles or the ferrules to aqueous solutions, especially acids or bases.



Caution: Do not expose the ends of the fiber-optic bundles to chemicals or oils. Such exposure may influence the spectroscopic data.



Caution: Do not bend the bundles at sharp angles, or put excessive strain on the ferrules, for these actions can damage the glass fibers and reduce their throughput!

Unpacking the Fiber-Optic Adaptor



Caution: *The Fiber-Optic Adaptor is a delicate instrument. Mishandling may seriously damage its components.*

- 1 Read this operation manual thoroughly before installing or using the Fiber-Optic Adaptor.
- 2 Carefully open the shipping carton.
- 3 Remove the foam-injected top piece and any other shipping restraints in the carton.
- 4 Carefully lift the accessory from the carton, and rest it on the laboratory bench.
- 5 Inspect for previously hidden damage.
Notify the carrier and HORIBA Scientific if any is found.
- 6 Check the packing list to verify that all components are present.



2 : Installation & Use

Introduction

Normally, light from the excitation monochromator of the spectrofluorometer is directed through the sample compartment and focused at the cuvette position.

After installing the Fiber-Optic Adaptor, the excitation light hits a turning mirror which directs the focused beam into the excitation fiber-optic bundle. The excitation light leaves the fiber-optic bundle and strikes the sample. Emission from the sample enters the fiber-optic bundle. Light returning from the emission fiber-optic bundle is directed by another turning mirror towards the right-angle (90°) emission port of the instrument, where it is focused and directed to the emission monochromator for measurement.

Be sure that you already have or have ordered a fiber-optic bundle that is compatible with the Fiber-Optic Adaptor. The setup of the Adaptor with an appropriate fiber-optic bundle is described below. The bundle may be bifurcated (one end at the sample, two ends at the excitation and emission mirrors) or single (two individual fiber-optic bundles).

Installing a new Fiber-Optic Adaptor

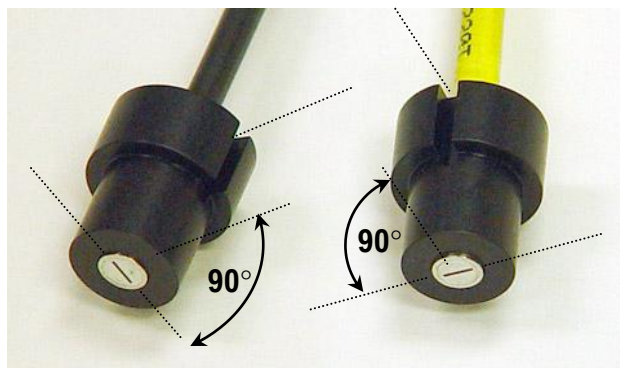
If the Adaptor arrived with a new instrument:

If your Fiber-Optic Adaptor arrived with a new spectrofluorometer system, then the accessory was already aligned and optimized. Follow this procedure in this section to install a Fiber-Optic Adaptor that is already aligned.

If the Adaptor arrived as an upgrade, or the Adaptor is not calibrated:

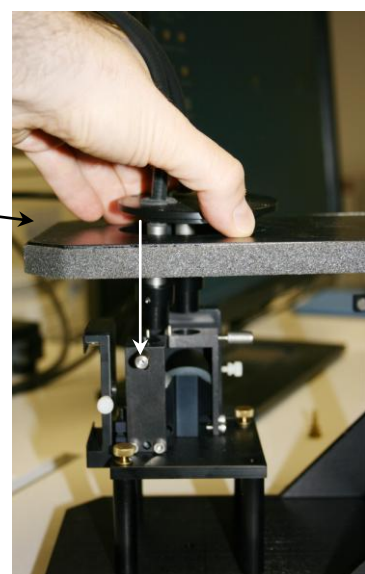
If the Fiber-Optic Adaptor was purchased as an accessory for an instrument already in your laboratory, or it is not calibrated, then follow the alignment procedure in the *next* section for the Fiber-Optic Adaptor and its fiber-optic bundles.)

- 1 Verify that the entire spectrofluorometer system is OFF.
- 2 Verify that the ends of the fiber-optic bundles are perpendicular to the slots on the ferrules.



If they are not perpendicular, use the fine-adjustment technique explained on pages 24–25 (step 6).

- 3 Remove the existing sample drawer from the sample compartment.
- 4 Lower the fiber-optic bundles through the top hole into the F-3000.

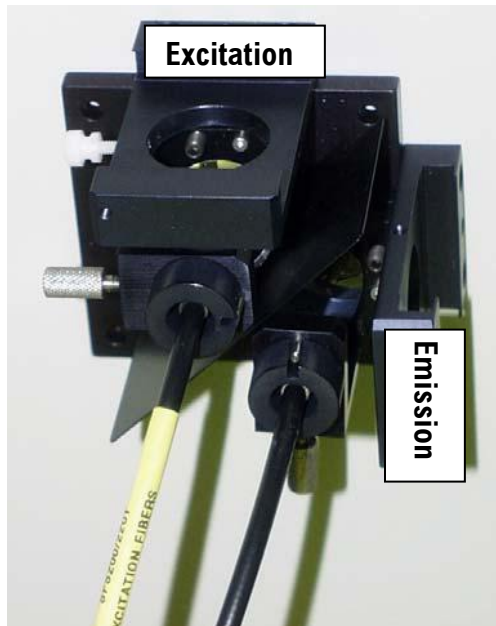


5 Insert the fiber bundle labeled “excitation fibers”



into the excitation port,
and then insert the other (unlabeled) fiber bundle into the other port, as shown below:

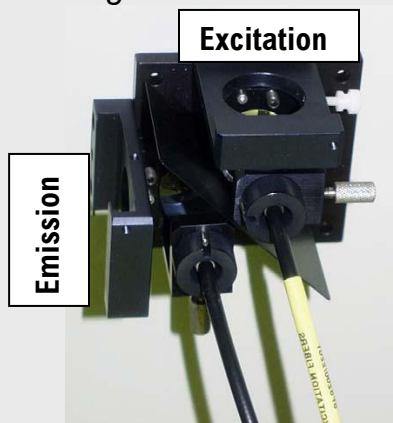
One mirror faces the excitation monochromator and the other faces the desired emission monochromator.



Caution: Avoid twisting the fiber-optic bundles too much. Breakage of the glass fibers may occur with excessive strain.



Note: If the fiber-optics will be used for a T-side detector, the excitation and emission bundles should be inserted in a mirror-image manner:

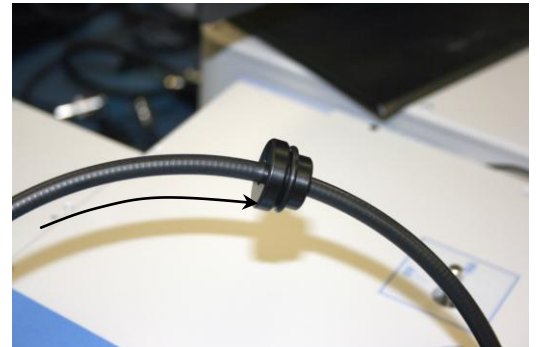


- 6 Slide an O-ring onto each fiber-optic bundle, then insert two split-halves into each O-ring.

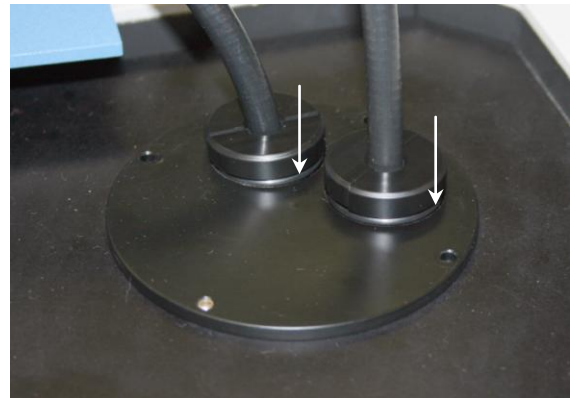


Each fiber-optic bundle requires 1 O-ring and 2 plug halves as shown.

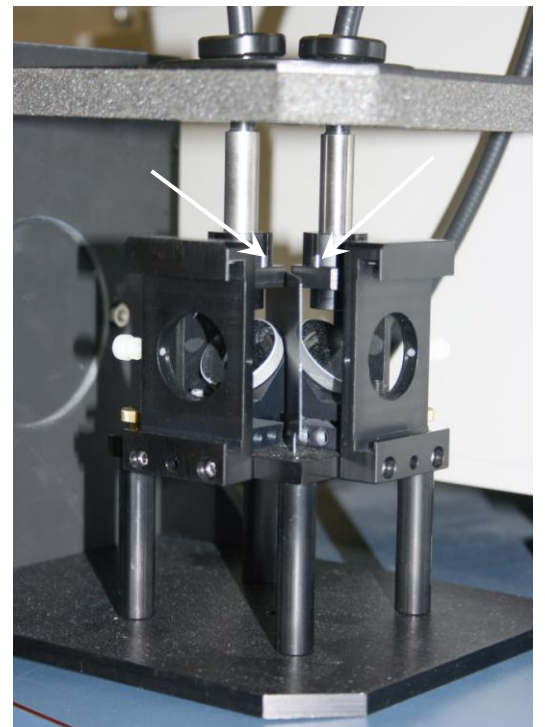
- 7 Slide an O-ring-plug assembly onto each fiber-optic bundle.



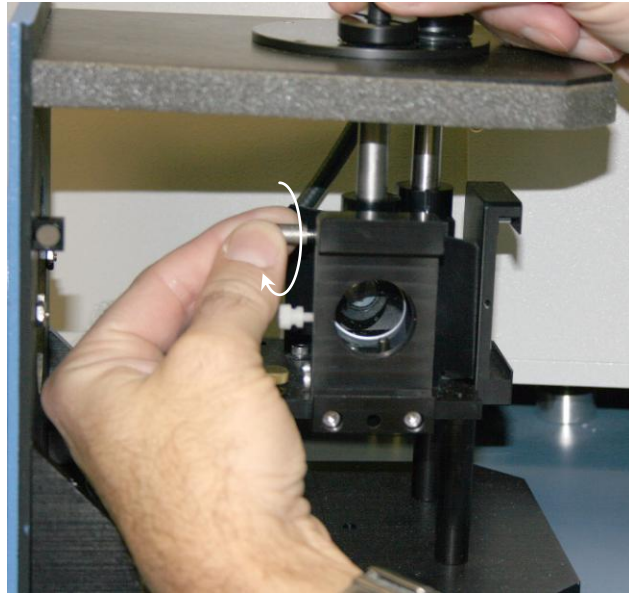
- 8 Place the O-ring-plug assembly into each hole in the top plate.



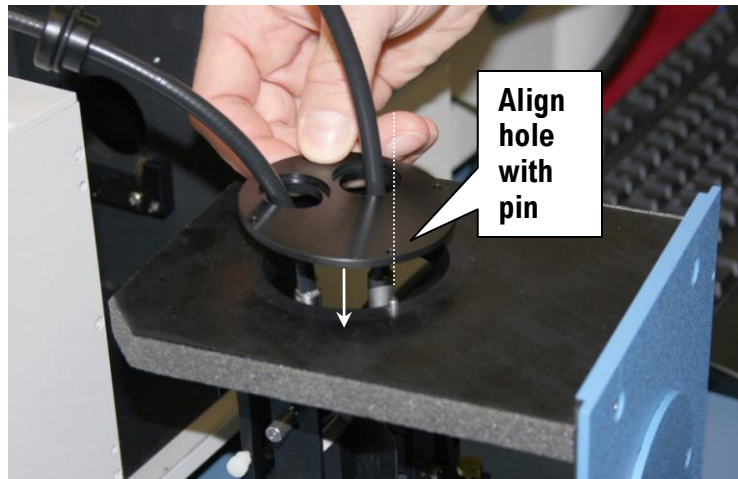
- 9 Make sure the pins on the Adaptor are inside the collars' alignment slots in their respective receptacles.



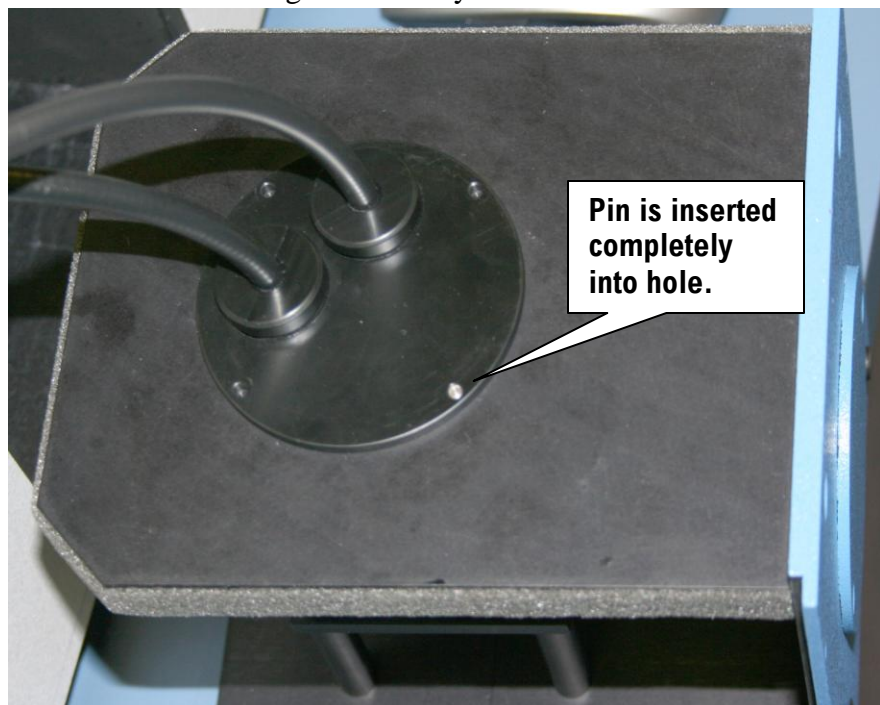
10 Secure the fiber-optic bundles with the two narrow thumbscrews on the Fiber-Optic Adaptor, in their respective mounts.



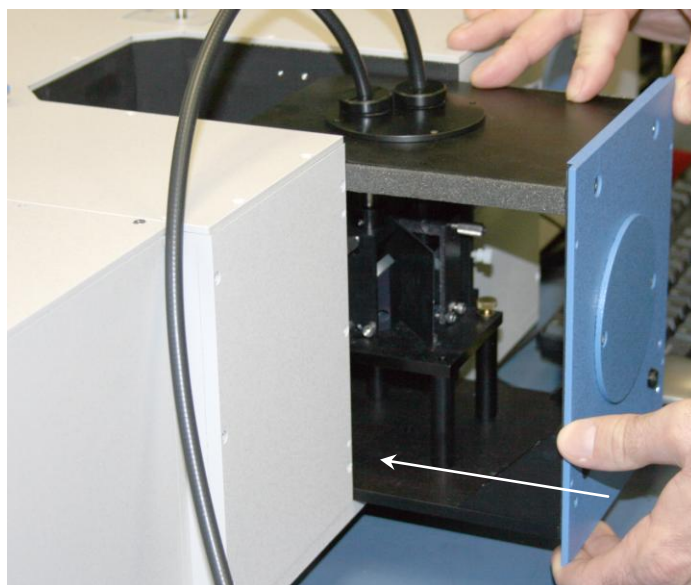
11 Lower the circular cover onto the top of the Adaptor, aligning the cover's hole with the metal pin.



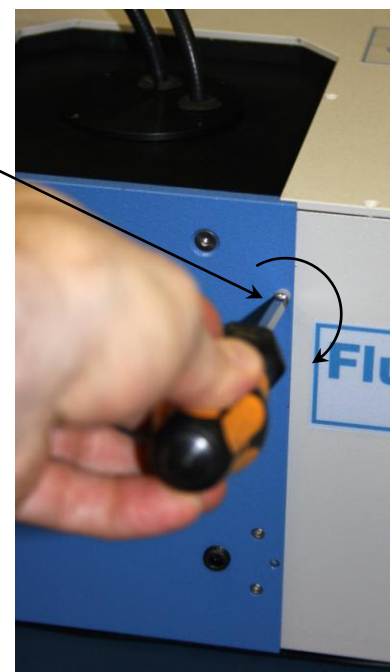
The cover looks like this when aligned correctly:



- 12 Insert Adaptor sample-drawer into your instrument's sample compartment:



- 13 Securely fasten the four screws on the front panel.
- 14 Turn on the spectrofluorometer system as described in your spectrofluorometer's Operation Manual.
- 15 Start FluorEssence™, and open the **Real Time Control**.
- 16 Move the excitation monochromator to 540 nm, open the slits to 5-nm bandpass, and open the excitation shutter.
- 17 Verify that green light is emitted from the excitation fiber.



Caution: Intense light may be present in the sample compartment, and may be emitted from the fiber-optic bundles. Wear appropriate eye-protection and never stare into the light or its reflections.

18 Run a scan of an appropriate calibration sample to verify the performance of the Fiber-Optic Adaptor.

After running the scan, if you have any concerns about the performance or alignment of the platform or fibers, proceed to the alignment section below. Examples of appropriate scans for the various fibers are included in the alignment section as well. We recommend as good laboratory practice to run a performance check for the fiber-optic platform each time the platform is installed in the spectrofluorometer. If the performance is acceptable then the Fiber-Optic Adaptor is ready for use.

Aligning the Fiber-Optic Adaptor

If the Fiber-Optic Adaptor was purchased as an accessory for an instrument already in your laboratory, or it is not calibrated, then follow this alignment procedure for the Fiber Adaptor and its fiber-optic bundles. If the Fiber-Optic Adaptor or the fiber-optic bundles used with it need alignment optimization, then follow this procedure. Users who have purchased the Fiber-Optic Adaptor as an add-on accessory for their existing systems ought to verify that the alignment of the accessory is optimized for their individual instrument.

- 1 Verify that the entire spectrofluorometer system is OFF.
- 2 Set up the fiber-optic bundles and Adaptor in the sample compartment.
- 3 Ready the spectrofluorometer.
 - a Turn on the spectrofluorometer system as described in your spectrofluorometer's Operation Manual.
 - b Start FluorEssence™, and open the **Real Time Control**.
 - c Set the excitation monochromator to 500 nm (blue-green light).
 - d Set the bandpass to 5 nm.
 - e Open the shutter.
 - f Remove the top of the spectrofluorometer's sample compartment.



Caution: Intense light may be present in the sample compartment, and may be emitted from the fiber-optic bundles. Wear appropriate eye protection and never stare into the light or its reflections.

- 4 Align the Adaptor.
 - a With a dental mirror, check to see that the bright blue-green, slit-shaped beam falls properly on the slit-shaped entrance to the excitation fibers. The beam should fall directly on the fibers:

End of fiber-optic bundle's ferrule



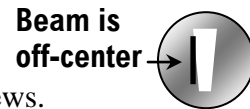
Slit-shaped bundle of fibers

Beam of light

Depending on the bundle, you will see light coming out evenly across the fiber bundle (random bundle such as 1950-1M, -2M, -5M or fibers for Microscope interfaces) or only on the outer ring (concentric ring bundle, 650025 for MicroMax).

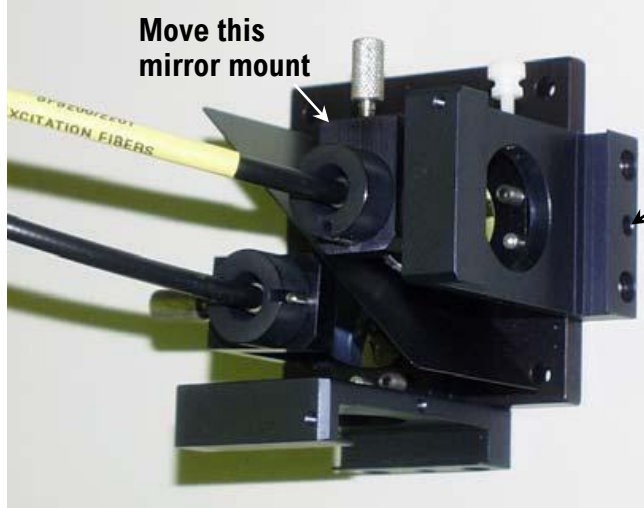
b

If the beam is not in the center, insert an Allen wrench in the central hole between the mounting screws.



c

Loosen *very slightly* the front-mirror set screw, and adjust the mirror mount to move the mirror's left-right position slightly. Then tighten the set screw.

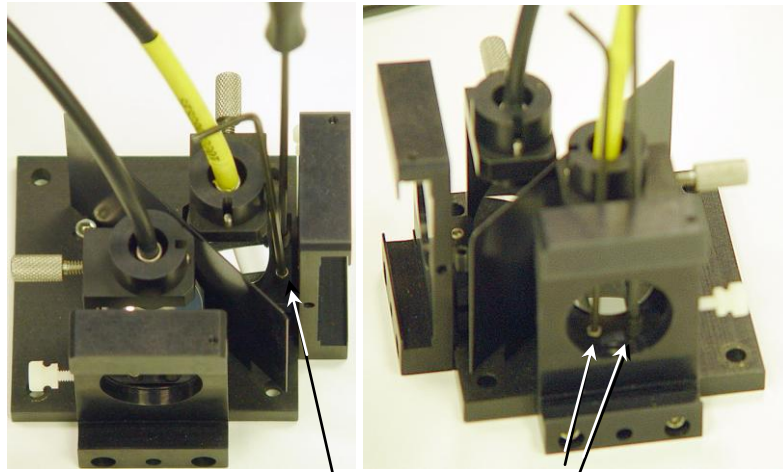


d

Loosen one of the interior-mirror set screws, and adjust the mirror's back position slightly. Then tighten the set screw. If necessary, loosen the other set screw, adjust the position of the mirror, then tighten the screw.



Caution: This procedure is delicate and not recommended for novice users. Contact Fluorescence Service to perform this alignment.



Two views of the set screws adjusted with Allen wrenches.

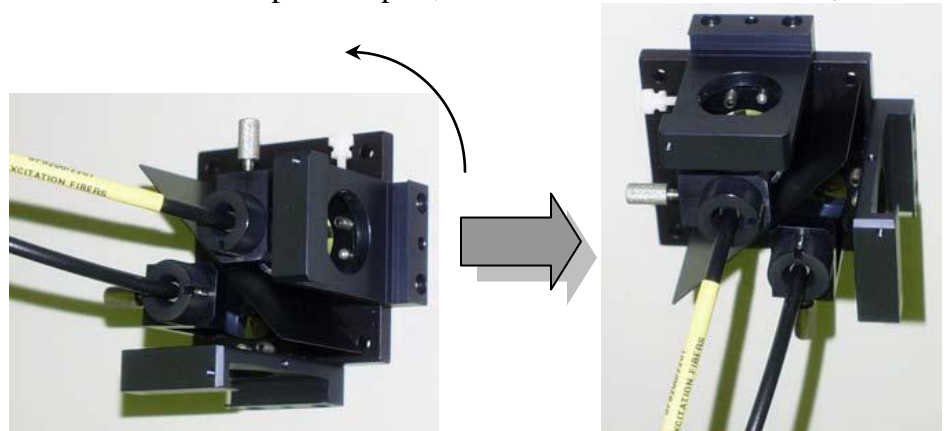
Examine the beam again.

e Repeat step **c** until the beam falls properly on the entrance of the fiber bundle.

f Reduce the band pass to 2 nm, and examine the beam again. The beam should fall directly on the fibers. If not, repeat step **c**.

g Reduce the band pass to 1 nm, and re-examine the beam. The beam should fall directly on the fibers. If not, repeat step **c**.

h Remove the Fiber-Optic Adaptor, rotate it 90° counterclockwise,



and replace it in the sample compartment so that the emission beam now is at the excitation-fiber position.

i With the dental mirror, examine the slit-shaped beam as in steps **a** through **f**.

j Verify that the light falls in the middle of the emission's ferrule end. Adjust the mirror as needed. (A later procedure will tune the emission's signal level.)

- k Remove the Fiber-Optic Adaptor, rotate it 90° clockwise back to its original position, and fasten it down with the two thumbscrews.
- 5 **Set up the fiber-optic bundle and any accessories at the sampling end of the fiber:**
- a For MicroMax: Follow the MicroMax instructions for inserting the fiber into the lens cell and optimizing the alignment for your microwell-plate.
- b For Microscope: Follow the instructions for your particular microscope interface for inserting the fiber-optic bundles into their respective interfaces and optimizing their alignment.
- c For Research Fiber-Optics: If you are directly measuring samples using the fiber-optic bundles or have a custom set-up, optimize this apparatus at this time. Use **Real Time Control** in FluorEssence™ to set the monochromator wavelengths, slits and other settings to optimize your sample alignment photometrically.
- 6 **Do a fine adjustment of the Fiber-Optic Adaptor and the ends of the fiber-optic bundles in the Adaptor.**



Note: It is important to adjust the emission fiber-optic bundle using a fluorescence standard, in order to obtain optimum results.

This involves optimizing the fiber-optic alignment on the Adaptor photometrically.

- a Choose an excitation/emission wavelength-pair for a fluorescence emission of a fluorophore standard sample.
- b Set the **Real Time Control** in FluorEssence™ to these wavelengths, open the shutter, turn on the detector high-voltages (if necessary), and set the slits for 100 000–1 000 000 counts/s in emission signal.
- c Loosen the non-marring set screw that secures the excitation fiber-optic bundle in the collar and gently adjust the bundle for the maximum signal. Only a slight amount of adjustment should be necessary.
- d When done, secure the excitation fiber-optic bundle.



Note: The fiber-optic bundles should extend ~½ mm beyond the ferrules.

e If desired, you may also perform a fine adjustment on the turning mirror for the lateral and height adjustments.

f Repeat steps c–e for the emission fiber-optic bundle.
The Fiber-Optic Adaptor and the fiber-optic bundle are now aligned and optimized.



Note: *If you have trouble adjusting the position of the light beam on the ferrules, or maximizing the signal, contact Fluorescence Service.*

3 : Maintenance

Introduction

The major maintenance steps for the Fiber-Optic Adaptor are removal and storage of the Adaptor when the Adaptor is not in use.

Removal

When removed using this procedure, the fibers may be reinserted without requiring realignment for the Fiber-Optic Adaptor or the fiber-optic bundles at the Adaptor.

- 1 Loosen the thumbscrews that hold the collars in the fiber-optic-bundle holders.



Caution: Do not remove the fibers from their collars or they will require realignment!

- 2 Remove the other end of the fiber-optic bundle from the sample area or accessory, if desired. Cover the ends of the fiber-optic bundles with their soft plastic shipping covers.
- 3 Remove the Adaptor from the sample compartment.

Care of the fiber-optic cable

To clean the ends of the bifurcated cable,

- 1 Wet a cotton swab with organic solvent (e.g., acetone).
- 2 Gently wipe the exposed face of the fibers with the solvent-saturated swab.



Warning: Refer to your Material Safety Data Sheet (MSDS) for information on the hazards of acetone or other organic solvents.



Caution: Never polish the exposed ends of the glass fibers in a fiber-optic bundle.



Caution: Do not expose the ends of the fiber-optic bundles or the ferrules to aqueous solutions, especially acids or bases.

Treat fiber-optic bundles gently. In the sample compartment, take special care to arrange the fiber-optic bundles so that they are bent in large, gentle curves entering the fiber-optic-bundle holders, and that they do not block the optical path.

Storage



Caution: Do not bend the bundles at sharp angles, or put excessive strain on the ferrules, for these actions can damage the glass fibers and reduce their throughput!

- 1 Cover the open ferrules on the ends of the fiber-optic bundles with the plastic shipping caps.
- 2 Store fiber-optic bundles and Adaptor in a dust-free drawer or cabinet.

Insertion and removal of optical filters

Filters may be installed and removed from the Fiber-Optic Adaptor easily. One-inch (2.5 cm) diameter filters are held in place using the thumbscrews located on the side of each fiber holder. 1" × 2" (2.5 cm × 5 cm) or 2" × 2" (5 cm × 5 cm) filters are held in place using a copper spring-tab on the front surface of the filter holder.

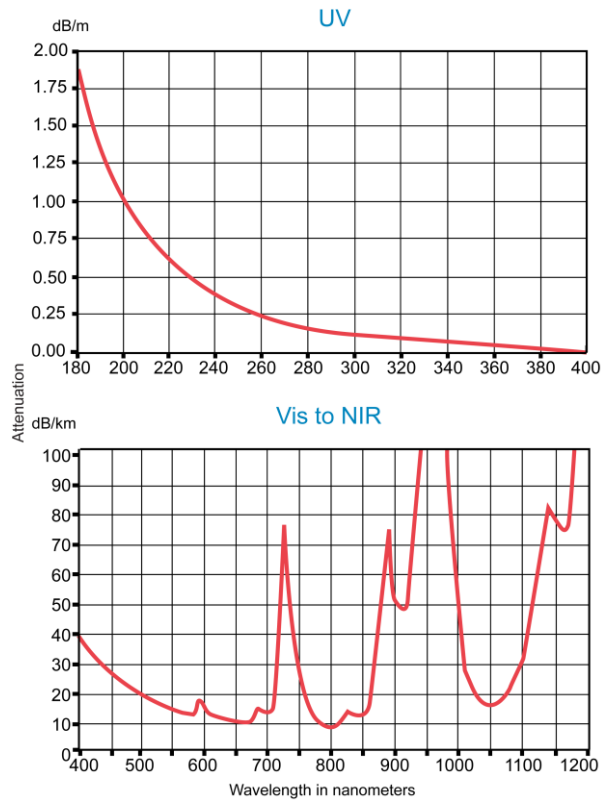
Cleaning the Fiber-Optic Adaptor

The Adaptor and the turning mirrors may be dusted gently using canned dry dusting gas. Be careful not to get Freon[®] on the optics (usually from holding the can in a downward direction).

4 : Technical Specifications

Instrument compatibility	FL-3000:	FluoroMax [®] -3 and Fluorolog [®] -3 Fluorolog [®] -Tau-3 systems in steady-state mode only
	FM4-3000:	FluoroMax [®] -4 only
Fiber-optic bundle compatibility		1950-1M, 1950-2M, 1950-5M random bifurcated fiber-optic bundles 650025 concentric ring bifurcated fiber-optic bundle (MicroMax) 650133 non-bifurcated fiber-optic bundles (for microscope interfaces)
Fiber-optic bundle		0.22 NA fiber-optic cables with 6 mm diameter ferrules

Transmission of fiber-optic bundles



Filters accepted	1" (2.5 cm) diameter round 1" × 2" (2.5 cm × 5 cm) rectangular 2" × 2" (5 cm × 5 cm) square filters
Focusing optics	Reflective optics to minimize chromatic aberrations

5 : Troubleshooting

The Fiber-Optic Adaptor has been designed to operate reliably and predictably. If there is a problem, try the steps below. Read all software and accessory manuals before contacting the Service Department. Often the manuals show the problem's cause and a method of solution. Technical support is available for both hardware and software troubleshooting. Before contacting the Service Department, however, complete the following steps.

- 1 If this is the first time the problem has occurred, try turning off the system and accessories.

After a cool-down period, turn everything back on.

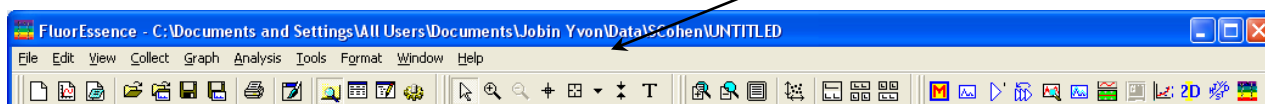
- 2 Make sure all accessories are properly configured, and turned on as needed.
- 3 Following the instructions in Chapter 3, System Operation, run a lamp scan and a water Raman scan to make sure the system is properly calibrated.

Print the spectrum for each and note the peak intensities.

- 4 If this is the first time the problem has occurred, try turning off the system and accessories.
- 5 Check this chapter to see if the problem is discussed.
- 6 Try to duplicate the problem and write down the steps required to do so.

The service engineers will try to do the same with a test system. Depending on the problem, a service visit may not be required.

- 7 If an error dialog box appears in FluorEssence™, write down the exact error displayed.
- 8 In FluorEssence™, in the FluorEssence main window's toolbar, choose Help:

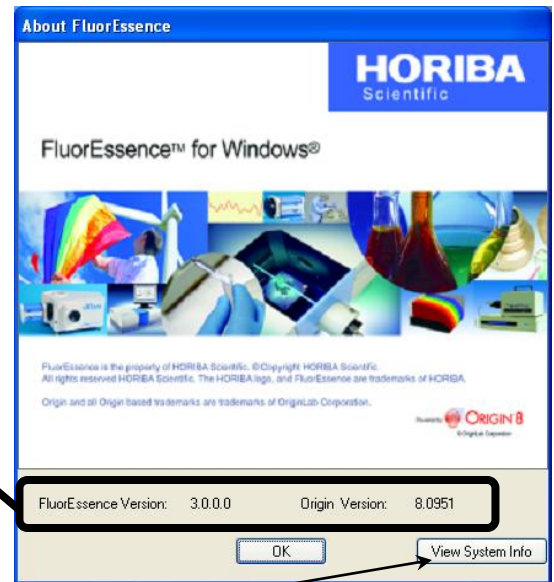


A drop-down menu appears.

9 Under Help, choose About FluorEssence....

This opens the **About FluorEssence** window:

The version of the software (both FluorEssence™ and Origin®) is listed here.

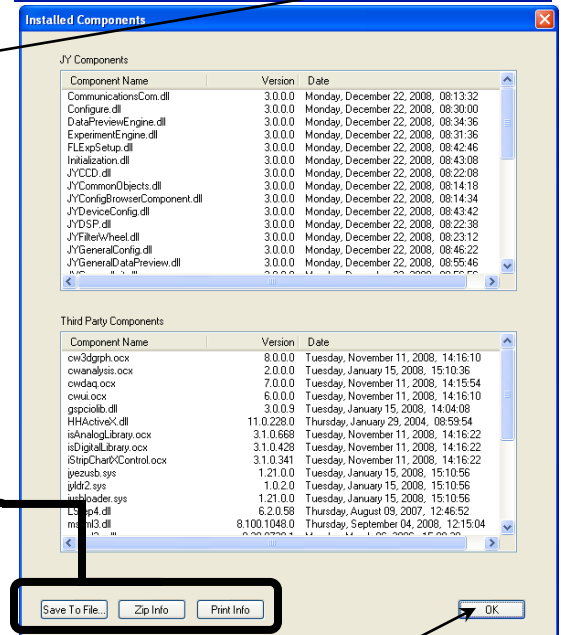


10 Click the View System Info button.

The **Installed Components** window appears, displaying all the software required for FluorEssence™.

11 Record the information by clicking the:

- Save To File... button, which saves the information to a file;
- Zip Info button, which compresses the information while saving it;
- Print Info button, which prints out the software information.



12 Click the OK button to close the **Installed Components** window.

13 Click the OK button to close the **About FluorEssence** window.

14 Write down the software's version numbers, along with the purchase dates, model numbers,

system configuration, and serial numbers of the instrument and its accessories.

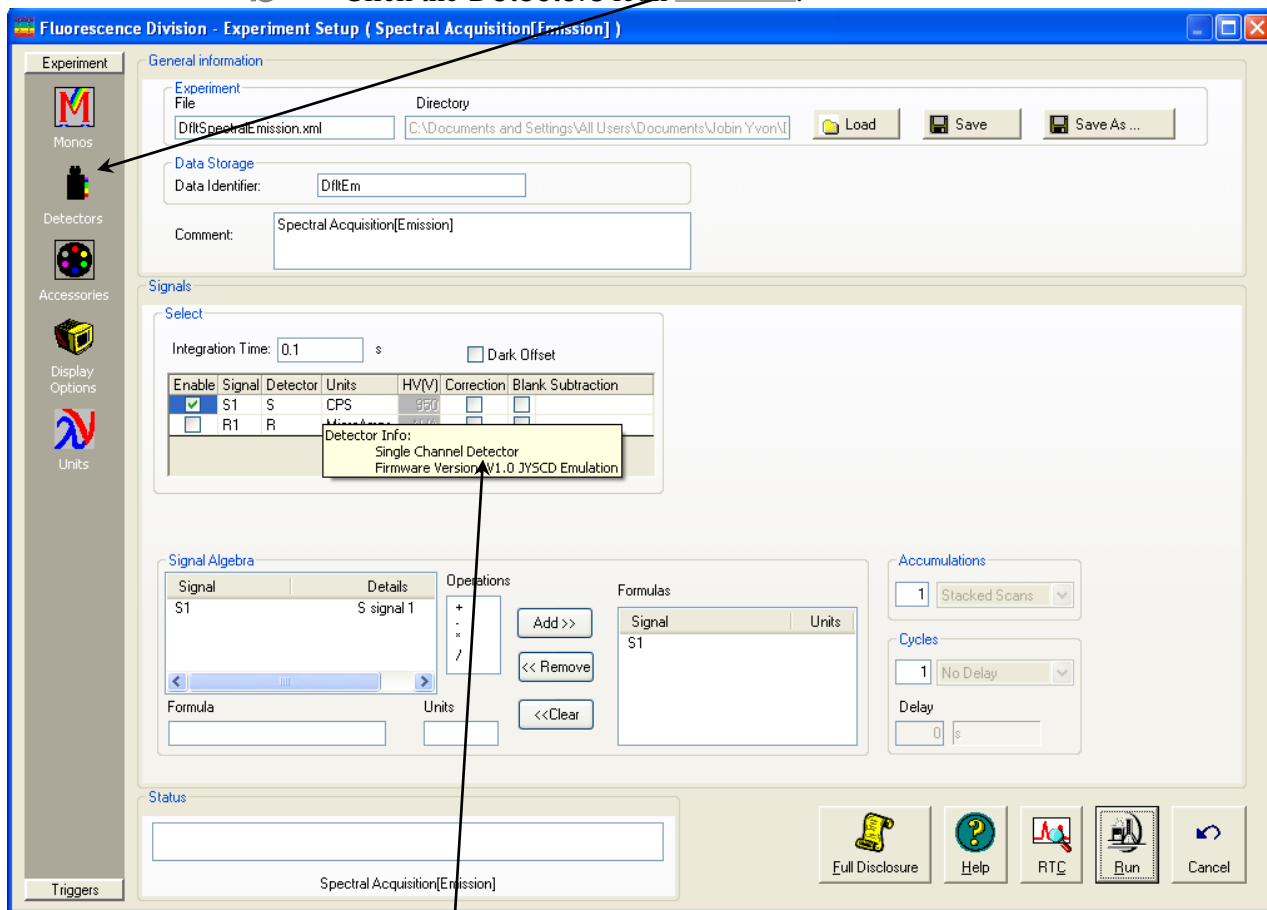
15 Determine the SpectrAcq firmware version:

a Open the **Experiment Setup** window:



b Click the Detectors icon

Detectors



c Move the mouse over the detectors' table in the **Select** area.
The SpectrAcq firmware version appears in a small pop-up window:

If the problem persists or is unlisted, call the Service Department at (732) 494-8660 × 160.

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[Design Concept]

The HORIBA Group application images are collaged in the overall design.
Beginning from a nano size element, the scale of the story develops all the way to the Earth with a gentle flow of the water.

