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FiberAll www.FIBERALL.co.kr 광통신 전문 쇼핑몰! 파이버올!
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Sampling Accessories

Choosing Your Accessory by Measurement Type

We proudly offer a full range of Sampling Accessories that help you obtain accurate, reliable measurements in virtually any environment.

Absorbance and Transmission

1-cm Cuvette Holder
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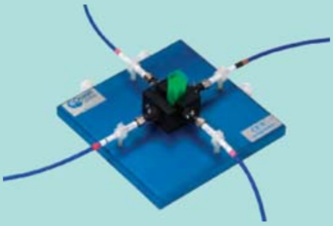
10-cm Cuvette Holder
See Page 110

Longpass Flow Cells
See Page 116

Cuvettes
See Page 113

Fluorescence


4-way Cuvette Holder
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Linear Variable Filters
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Reflectance

Diffuse Reflectance Standards
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Sampling Accessories

Collimating Lenses

74-Series Lens Fixtures

Our 74-Series Collimating Lens Fixtures are the common fiber optic-coupled lens fixtures used throughout our extensive line of sampling accessories. They feature an inner barrel threaded for SMA 905 Connectors.

74-UV Collimating Lens

(200-2000 nm) The 74-UV has an f/2 fused silica lens for 200-2000 nm. When focused for collimation, beam divergence is 2° or less, depending on fiber diameter. The 74-UV can be adjusted for UV-VIS or VIS-NIR setups.

74-90-UV Collimating Lens

(200-2000 nm) The 74-90-UV features a mirror located under its cap that reflects light from the collimating lens to 90°. The mirror is coated with a UV-enhanced aluminum substrate that is >80% reflective from 200-2000 nm.

74-VIS Collimating Lens

(350-2000 nm) The 74-VIS has a BK7 lens suitable for the VIS-NIR. These single-lens systems have the disadvantage of chromatic aberration, due to dispersion or variation in refractive index with wavelength.

74-ACR Collimating Lens

(350-2000 nm) The 74-ACR has two optical elements cemented together to form an achromatic doublet, optimized to correct for spherical and chromatic aberrations.

74-DA Collimating Lens

(200-2000 nm) The 74-DA Direct-attach Collimating Lens screws on to a spectrometer's SMA 905 Connector for increased light throughput. The lens collects collimated light in a straight path of open air and focuses it onto a spectrometer's slit.

COL-UV-30 Collimating Lens

(200-2000 nm) This 74-series Collimating Lens is our largest-diameter lens – 30 mm – and couples to SMA 905 connectors for simple use.

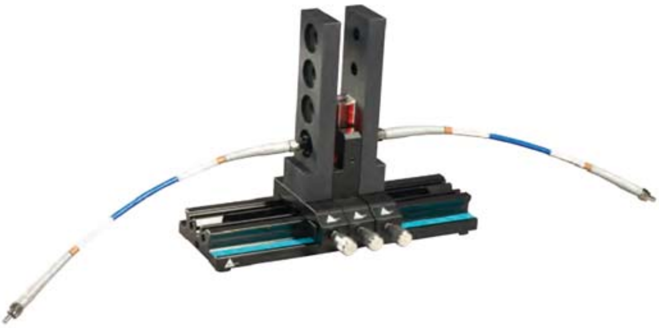
84-Series Lens Fixtures

(200-2000 nm) The 84-Series Collimating Lens is designed for coupling larger free-space beams to optical fibers. The fiber is coupled to the assembly with an inner 17.85 mm threaded barrel. The barrel positions the fiber ~100 mm from the lens surface and is turned to achieve a fine focus.

Item	Diameter	Focal Length	Material	Range	Operating Temp	Connector
74-UV	5 mm	10 mm	f/2 fused silica Dynasil	200-2000 nm	150 °C	SMA 905, 6.35-mm ferrule, 3/8-24 external thread
74-90-UV	5 mm	10 mm	f/2 fused silica Dynasil	200-2000 nm	120 °C	SMA 905, 6.35-mm ferrule, 3/8-24 external thread
74-VIS	5 mm	10 mm	f/2 BK7 glass	350-2000 nm	150 °C	SMA 905, 6.35-mm ferrule, 3/8-24 external thread
74-ACR	5 mm	10 mm	f/2 BaF10 and FD10 fused silica	350-2000 nm	150 °C	SMA 905, 6.35-mm ferrule, 3/8-24 external thread
74-DA	5 mm	10 mm	f/2 fused silica Dynasil	200-2000 nm	150 °C	SMA 905, 1/4-36 internal thread, 3/8-24 external thread
COL-UV-30	30 mm	30 mm	f/2 fused silica Suprasil	200-2000 nm	200 °C	SMA 905, 6.35-mm ferrule, 1/4-36 external thread
84-UV-25	25.4 mm	100 mm	f/2 fused silica Dynasil	200-2000 nm	70 °C	SMA 905, 6.35-mm ferrule, 1/4-36 external thread

ACH-CUV-VAR
Adjustable Collimating Lens and Cuvette Holder

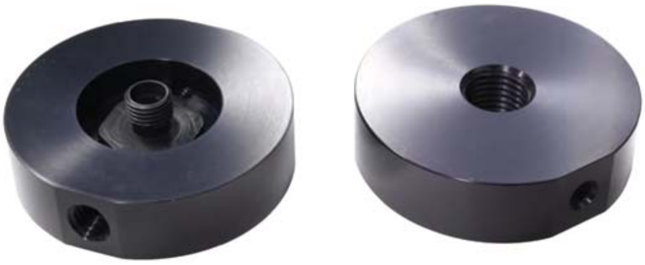
The ACH-CUV-VAR Adjustable Collimating Lens and Cuvette Holder is two products in one: a fixture for positioning collimating lenses at various heights or for holding extra-large or especially thick samples, and a holder for accepting cuvettes for transmission measurements.



As a lens holder, the ACH-CUV-VAR has an anodized aluminum base and adjustable mount bars with 3/8-24 threaded holes for collimating lenses (two 74-UV Collimating Lenses are included). The bars can be adjusted to accept samples up to ~150 mm thick and the base is marked in 1-mm intervals as a pathlength guide. The ACH-CUV-VAR has a cuvette holder component that fits securely between the two mount bars and can accept cuvettes up to ~150-mm wide.

OPM-SMA
Optical Post Mount

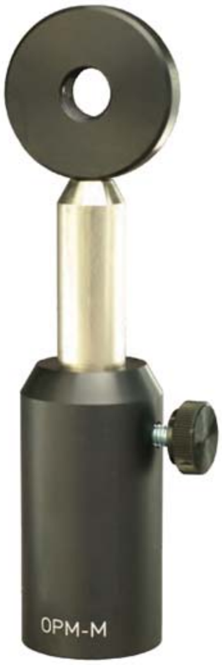
The OPM-SMA is a fixture for mounting 74-Series Collimating Lenses and SMA 905-terminated optical fibers. The OPM-SMA consists of a 1.5-inch OD disk with 3/8-24 threads for use with lenses and an adapter for use with SMA 905-terminated optical fibers. A special adapter that holds an SMA 905-terminated optical fiber flush against one surface of the OPM-SMA is included. The OPM-SMA also includes 8-32 (Imperial) and M6 (metric) threads for attachment to an optical post.



OPM-M
Optical Post Mount Assemblies

We offer four stainless steel optical posts (in 25.4-mm, 50.8-mm, 76.2-mm and 101.6-mm heights) to attach to the OPM-SMA. These posts have a 12.7 mm OD and screw into optical breadboards via a 1/4"-20 (M6) tapped hole in the bottom of each post. The posts also have a removable 8-32 (M4) threaded stud.

Item Codes: OPM-1, OPM-2, OPM-3, OPM-4



Specification	OPM-SMA	OPM-M
Dimensions (in mm):	38.1 OD x 10.2 width	30 mm OD x 6.5 width
Weight:	130 g (including post)	220 g (including post)
Collimating lens included:	No	No
Threads:	3/8-24 (lens holder) 8-32 (bore for mounting)	3/8-24 (lens holder) M4 (bore for mounting)
Material:	Black anodized Al (mount) and stainless steel (post)	Black anodized Al (mount) and stainless steel (post)

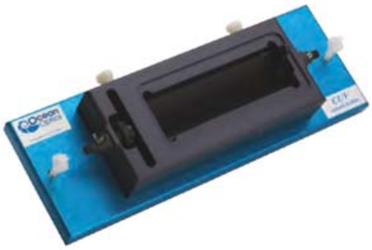
Sampling Accessories

Cuvette Holders

CUV-UV
Holder for 1-cm Cuvettes

The CUV-UV Cuvette Holder for 1-cm pathlength cuvettes couples via SMA 905-terminated optical fibers to Ocean Optics high-sensitivity miniature fiber optic spectrometers and light sources to create small-footprint spectrophotometric systems for absolute absorbance measurements of aqueous solutions. This compact cuvette holder is optimized for UV-VIS-NIR.
(~200-2000 nm) applications.

CUV-UV-10
Holder for 10-cm Cuvettes



The CUV-UV-10 Cuvette Holder for 10-cm pathlength cuvettes couples via SMA 905-terminated optical fibers to Ocean Optics high-sensitivity miniature fiber optic spectrometers and light sources to create small-footprint spectrophotometric systems for absorbance/transmission measurements of aqueous solutions and gases. This compact cuvette holder is optimized for UV-VIS-NIR.
(~200-2000 nm) applications.

CUV-ALL
4-way Holder for 1-cm Cuvettes

The CUV-ALL-UV 4-way Cuvette Holder for 1-cm pathlength cuvettes is equipped with fiber optic couplings at each of four quartz f/2 collimating lenses, which couple to optical fibers to either read or illuminate the sample. When used with Ocean Optics modular spectrometers and light sources, CUV-ALL-UV Cuvette Holders can measure absorbance, fluorescence, scattering or any combination of these optical phenomena.

CUV-FL-DA
Direct-attach Cuvette Holder

The CUV-FL-DA Cuvette Holder attaches directly to Ocean Optics light sources and couples via SMA 905-terminated optical fibers to our spectrometers, creating an incredibly small-footprint spectrophotometric system for fluorescence and relative absorbance experiments. The CUV-FL-DA, optimized for UV-VIS-NIR (200-2000 nm) applications, holds 1-cm square cuvettes.

74-MSP
Mirror Screw Plugs

Designed for use with our fluorescence cuvette holders, our Mirror Screw Plugs are inserted into a collimating lens port on the cuvette holder to redirect energy back to the sample or back into a collimating lens. This increases signal collection for fluorescence measurements.

Specifications	CUV-UV	CUV-UV-10	CUV-ALL-UV	CUV-FL-DA
Dimensions:	58 mm x 140 mm x 38 mm	97 mm x 147 mm x 40 mm	147 mm x 147 mm x 40 mm	57 mm x 61 mm x 29 mm
Weight:	230 g	1.4 kg	540 g	80 g
Pathlength:	1 cm	10 cm	1 cm	1 cm
Z dimension:	15 mm	15 mm	15 mm	15 mm
Filter slot:	Up to 6 mm, screw clamp	Up to 6 mm, wheel clamp	Up to 6 mm, screw clamp	Up to 6 mm, screw clamp
Water input fittings:	3.175 mm (1/8") NPT	3.175 mm (1/8") NPT	3.175 mm (1/8") NPT	NA
Collimating lens:	2 each 74-UV	2 each 74-UV	4 each 74-UV	2 each 74-UV
Fiber termination:	SMA 905	SMA 905	SMA 905	SMA 905

Sampling Accessories
Temperature-Regulated Cuvette Holders

CUV-QPOD-2e
Temperature-Controlled Cuvette Holder

The qpod™ is a temperature-regulated sample compartment for fiber optic spectroscopy that controls the temperature of standard 1-cm square cuvettes to +/-0.05 °C. The unit includes a Peltier controller, magnetic stirrer and fused silica focusing lenses, and has SMA 905 connectors for easy coupling to Ocean Optics spectrometers and accessories. The qpod is built for cuvettes with a Z-dimension of 8.5 mm.

When combined with Ocean Optics spectrometers and accessories, the qpod is especially useful for absorbance and fluorescence measurements that require stringent control of the sample's temperature. Each unit is calibrated against a NIST-traceable thermometer; performance data is provided.

Here are some typical applications:

- DNA melting and annealing
- Protein thermodynamics
- Fluorophore characterization
- Enzyme kinetics
- On-line thermocycling of biological particles

Features

- Rapid and precise temperature control over a wide range of temperatures from -30 °C to +105 °C +/- 0.05 °C (controllable to even lower temperatures under special conditions)
- Calibrated against a NIST-traceable thermometer with performance data provided
- Designed for standard 1 x 1 cm square cuvettes or standard microcuvettes
- All optical components have focusing and position adjustments to maximize light throughput
- Light-tight cover with access cap providing a means of holding a thermistor probe in the cuvette

QNW
qpod 2e
POWER
STATUS

The qpod was conceived by our channel partner Quantum Northwest as an improvement on its CUV-TLC-Series Temperature-regulated Cuvette Holders.

Available Items

Item	Description
CUV-QPOD-ABSKIT	Temperature Controlled Sample Compartment - Absorbance
CUV-QPOD-2E-ABSKIT	Temperature Controlled Sample Compartment -- Absorbance; USB/Bluetooth interface
CUV-QPOD-FLKIT	Temperature Controlled Sample Compartment - Fluorescence
CUV-QPOD-2E-FLKIT	Temperature Controlled Sample Compartment -- Fluorescence; USB/Bluetooth interface
CUV-QPOD-MPKIT	Temperature Controlled Compartment - Absorbance and Fluorescence
CUV-QPOD-2E-MPKIT	Temperature Controlled Sample Compartment -- Absorbance and Fluorescence; USB/Bluetooth interface
CUV-QPOD	Temperature Controlled Sample Compartment - No Optics
CUV-QPOD-CL-UV	Collimating Lens for qpod Absorbance
CUV-QPOD-IL-UV	Imaging Lens for qpod Fluorescence
CUV-QPOD-MP	Mirror Plug for qpod Sample Compartment
CUV-QPOD-POL	Polarizer for qpod Sample Compartment
CUV-QPOD-FH	Holder for 12.5 mm Diameter Optical Filter for qpod
CUV-QPOD-SER	Serial Interface for qpod External Computer Control
CUV-QPOD-16.10-Q	Micro-volume (10 ul) transmission cuvette
CUV-QPOD-16.100F-Q	Micro-volume (100 ul) fluorescence cuvette
CUV-QPOD-16.10F-Q	Micro-volume (10 ul) fluorescence cuvette
CUV-QPOD-Q-02SH	Oxygen holder for the qpod sample compartment
CUV-QPOD-THERM	Thermistor for the qpod sample compartment

Technical Tip

Proper use of cuvettes can help avoid measurement errors. For example, cuvettes always should be used in the same orientation. Most cuvettes have index marks as a guide. Also, it's important not to touch the optical surfaces of the cuvette. Oils from your skin, particles from wiping tissues and other contaminants can affect the readings.

For open-top square cuvettes, perhaps the most effective approach is to use a slender transfer or Pasteur pipette to add and remove fluids. The tiny tip allows for suction of fluid from the corners, minimizing the carry-over volume. The typical procedure is to rinse the cuvette with the next sample to be analyzed at least three times. If the residual fluid is less than 10% of the wash fluid (it's more likely to be 1% or less), the carry-over is reduced to 1/1000. It is important that the pipettes also be washed with the sample and not be allowed to touch or scratch the inside optical surfaces.

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Sampling Accessories

Integrated Sampling Systems

These Integrated Sampling Systems are direct-attach cuvette holder and light source combinations created specifically for our USB2000+ and USB4000 Spectrometers (page 14). Both systems receive power and control signals though a connector on the spectrometer.

USB-ISS-UV-VIS
Integrated Sampling System

The USB-ISS-UV-VIS Integrated Sampling System is a direct-attach sample holder and deuterium tungsten halogen light source (200-1100 nm) combination for 1-cm square cuvettes. The USB-ISS-UV-VIS allows you to adjust the intensity of the bulb via software. The sampling system has an electronic shutter for taking dark measurements and comes with a 5-volt power supply.

Ocean Optics
USB-ISS-UV-VIS
www.oceanoptics.com | +1 727-733-2447

USB-ISS-VIS
Integrated Sampling System

The USB-ISS-VIS Integrated Sampling System has a violet LED-boosted tungsten source (390-900 nm) and a sample holder that bolts to the front of a USB4000 or USB2000+ Spectrometer. The spectrometer provides the power and control signals for the light sources. The USB-ISS-VIS holds 1-cm cuvettes.

Ocean Optics
ISS-UV-VIS

ISS-UV-VIS
Integrated Sampling System

The ISS-UV-VIS Integrated Sampling System is a combination RF deuterium source with a tungsten bulb in a housing connected to a holder for 1-cm cuvettes. This sampling system couples to an Ocean Optics spectrometer with optical fiber to create a small-footprint system for relative absorbance. This sampling system is best used with Ocean Optics' 300 µm solarization-resistant optical fiber.

Ocean Optics

ISS-2
Integrated Sampling System

The ISS-2 Integrated Sampling System is a fully integrated 1-cm cuvette holder and tungsten halogen light source for relative absorbance measurements. It couples to Ocean Optics spectrometers with optical fiber to create a small-footprint system for VIS-NIR (~360-1100 nm) applications.

Specifications	USB-ISS-UV-VIS	USB-ISS-VIS	ISS-UV-VIS	ISS-2
Dimensions (mm):	198 x 105.1 x 40.6	40.7 x 88.8 x 34.1	198 x 104.9 x 40.9	155 x 50 x 53.3
Weight:	200 g	130 g	400 g	240 g
Power consumption:	1.8 A @ 5 VDC	160 mA @ 5 VDC	420 mA @ 12 VDC	600 mA @ 12 VDC
Wavelength range (source):	~200-1100 nm (Typical)	390-900 nm (Typical)	~200-1100 nm (Typical)	~360-1100 nm (Typical)
Pathlength:	1 cm	1 cm	1 cm	1 cm
Cuvette shape:	Square	Square	Square	Square
Light source:	Deuterium tungsten	Tungsten and violet LED	Deuterium tungsten	Tungsten
Bulb life (hours):	800 (deut.); 2,000 (tung.)	2000 (tungsten); 45,000 (LED)	800 (deut.); 2,000 (tung.)	900
Time to stabilized output:	~30 minutes	~5 minutes	~30 minutes	~30 minutes
Filter slot:	None	None	None	6.35 mm
Recommended optical fibers:	None	None	QP400-025-SR	QP400-2-UV-VIS
Spectrometers:	USB2000+ and USB4000	USB2000+ and USB4000	All	All
"Z" dimension:	15 mm	15 mm	15 mm	15 mm

Sampling Accessories

Plastic and Quartz Cuvettes and More

Disposable Cuvettes

Our CVD-Series Disposable Cuvettes are a low-cost, zero-maintenance alternative to quartz cuvettes. They feature a 1-cm pathlength, 220-900 nm or 350-900 nm wavelength range coverage and a variety of fill volumes.

Quick tip: You can use a single cuvette for your measurements, but take care to rinse the cuvette thoroughly with the next sample being analyzed in order to eliminate cross-over contamination. Oils from your skin, particles from wiping tissues and other contaminants also can affect the readings. In addition, proper positioning of cuvettes is important. The cuvettes are marked with an arrow indicating the transmission path; the user consistently must position the cuvette with the arrow facing the light source.

CVD-VIS1M

CVD-UV1U

CVD-UV1S

Item Code	Range	Material	Volume	Window (in mm)	Clear Sides*	Cover Needed	Quantity
CVD-UV1S	220-900 nm	Plastic	1.5 - 3.0 mL	4.5 x 23	4	Square	100 Pack
CVD-UV1S-SAM	220-900 nm	Plastic	1.5 - 3.0 mL	4.5 x 23	4	Square	8 Pack
CVD-UV1U	220-900 nm	Plastic	70 µL - 1.8 mL	2 x 3.5	2	Round	100 Pack
CVD-UV1U-SAM	220-900 nm	Plastic	70 µL - 1.8 mL	2 x 3.5	2	Round	8 Pack
CVD-VIS1S	350-900 nm	Polystyrene	1.5 - 3.0 mL	5 x 23	4	Square	100 Pack
CVD-VIS1M	350-900 nm	Polystyrene	2.5 – 4.0 mL	10 x 35	2	Square	100 Pack

*Cuvettes with 4 clear sides are suitable for fluorescence measurements.

Quartz Cuvette Cells

We offer several popular high-purity quartz cuvettes including macro, semi-micro, flow and cylindrical cells. These Quartz Cuvette Cells are suitable for use from 200-2700 nm.

Item	Description	Windows	Path	Lid	Exterior (mm)	Volume
CV-Q-10	Standard	2 clear	10 mm	Teflon cover	12.5 x 12.5 x 45	3.5 mL
CVFL-Q-10	Fluorescence	4 clear	10 mm	Teflon stopper	12.5 x 12.5 x 45	3.5 mL
CVS-Q-10	Self-masking	2 clear	10 mm	Teflon stopper	12.5 x 12.5 x 48	1.4 mL
CVF-Q-10	Flow cell	2 clear	10 mm	M6 screws	12.5 x 12.5 x 35	0.42 mL
CV-Q-100	Cylindrical	2 clear	100 mm	Teflon stopper	22 OD x 102.5	28.2 mL

SpecVette Cuvettes

SpecVette™ Cuvettes are UV-transparent, short pathlength, disposable cuvettes especially designed for use with the HR4000 and HR2000+ High-resolution Spectrometers. Economical and disposable, SpecVettes eliminate cross-contamination and reduce analyte consumption. SpecVettes are sold in packs of 25, with or without the universal adapter. Sample packs are also available. SpecVettes are a product of ALine, Inc.

CSV-6-SP	CSV-250-25	CSV-250-25-A	CSV-500-25	CSV-500-25-A	CSV-1000-25	CSV-1000-25-A
6-piece sample pack with adapter, 2 each: 250 µm pathlength, 500 µm pathlength and 1000 µm pathlength	25-pack, 250 µm pathlength	25-pack with adapter, 250 µm pathlength	25-pack, 500 µm pathlength	25-pack with adapter, 500 µm pathlength	25-pack, 1000 µm pathlength	25-pack with adapter, 1000 µm pathlength

Sampling Accessories

Flow Cells for Flow Injection Analysis

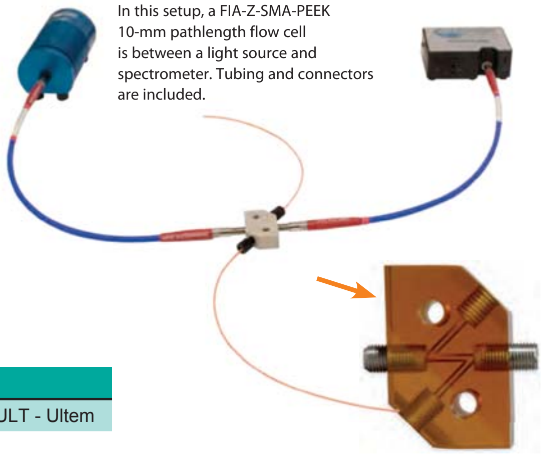
We offer a variety of optical flow cells with a Z configuration. For measuring the optical absorbance of fluids, couple Z cells directly to our spectrometers to monitor chemical or biological processes and immunoassays.

In our FIA-Z-SMA Flow Cells, standard optical fibers (available separately) connect to the SMA 905 fittings to transmit and receive light through the central axis of the Z. The FIA-Z-SMA cells use silica windows as wetting surfaces at each fiber optic junction and are available in PEEK polymer, Plexiglas, Stainless Steel, Teflon and Ultem.

The FIA-Z-CELL Flow Cells are different from the FIA-Z-SMAs; instead of windows they use optical fibers in 1.58-mm ferrules, a design that allows you to slide the ferrules in and out of the cell to adjust the optical pathlength from 0-10 mm.

Item Code: FIA-Z-CELL-####

Specifications	
Cell materials:	PEEK, Plexiglas, Teflon, Stainless Steel, Ultem
Inner diameter:	1.5 mm
Window material:	UV-grade fused silica
Window thickness:	1 mm
Wavelength range:	200-2000 nm
FIA connectors:	1/4-28 fittings (included)
Fiber connectors:	SMA 905 for FIA-Z-SMA cells; 1.58 mm stainless steel ferrules for FIA-Z-CELL cells


In this setup, a FIA-Z-SMA-PEEK 10-mm pathlength flow cell is between a light source and spectrometer. Tubing and connectors are included.

Available Items

Note: Item Code Extensions indicate:				
PEEK – PEEK	PLEX – Plexiglas	SS – Stainless Steel	TEF – Teflon	ULT - Ultem

10 mm Pathlength	20 mm Pathlength	50 mm Pathlength	100 mm Pathlength
FIA-Z-SMA-###	FIA-Z-SMA-20-###	FIA-Z-SMA-50-###	FIA-Z-SMA-100-###

Our standard fibers are designed for the FIA-Z-SMA cells.

The FIA-P400-SR and FIA-P200-SR fiber assemblies have ferrules for use with the FIA-Z-CELL cells.

This FIA-Z-SMA-100-ULT is a 100 mm pathlength cell made out of Ultem.

Fibers for Use with FIA Cells

A FIA-Z-SMA requires two 200 µm or 400 µm diameter fiber assemblies. Your application may require optical fibers that are optimized for a specific wavelength range. The FIA-Z-CELL requires two fiber assemblies with ferrule terminations.

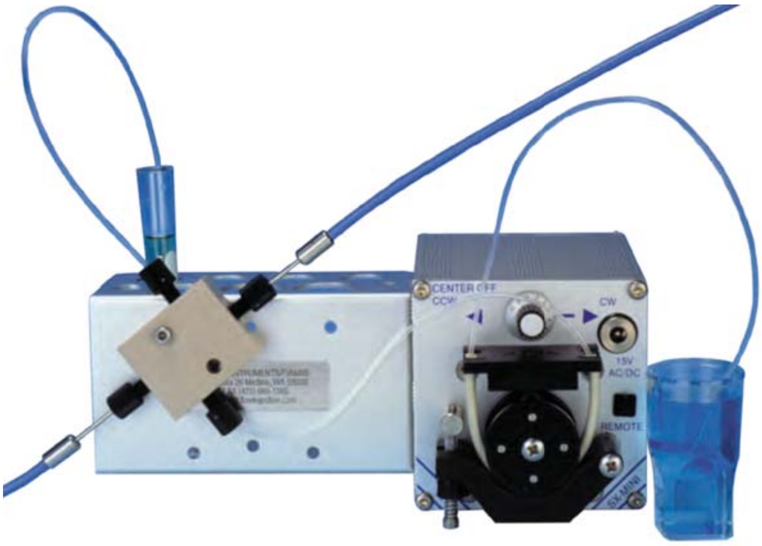
Item	Description	Use With
P400-2-UV-VIS	400 µm fiber assembly with SMA 905 connectors	FIA-Z-SMA
P200-2-UV-VIS	200 µm fiber assembly with SMA 905 connectors	FIA-Z-SMA
FIA-P400-SR	400 µm fiber assembly with ferrule terminations	FIA-Z-CELL
FIA-P200-SR	200 µm fiber assembly with ferrule terminations	FIA-Z-CELL

Sampling Accessories

Fluid Analysis Systems

Our FIA-1000-Z Flow Cell Kit is a convenient, low-cost fluid handling system that couples to Ocean Optics high-sensitivity miniature spectrometers and light sources for fast, quantitative analysis of solutions.

The FIA-1000-Z system consists of a two-channel peristaltic pump, a 1-cm pathlength fiber optic flow cell, a fittings kit and Windows-based operating software. A pair of optical fibers or special bifurcated assembly (priced separately) completes the package.



High-throughput Z-cell Option

The FIA-Z-SMA-PEEK-LENSED is a 10 mm Z-type flow cell that includes two collimating lenses and special SMA 905 adapters that increase the UV-VIS throughput of the flow cell by up to 10x compared with the standard Z-cell.

The high-throughput cell can be used as part of any system that has an Ocean Optics spectrometer configured for optical absorbance measurements, but is especially attractive as part of a multichannel Jaz system configured for chromatographic applications.

The FIA-Z-SMA-PEEK-LENSED cell has good resistance to a wide range of organic and inorganic materials. Its lens material is UV-grade fused silica with response from 200-900 nm. By adding accessories such as the FIA-PUMP-C and a pair of QP450-1-XSR 450 µm extreme solarization resistant optical fibers, you can create a system comparable to the FIA-1000-Z Flow Cell Kit.

Specifications

Criteria	
Spectral range:	260-2000 nm
Cell materials:	PEEK, Plexiglas, Teflon, Stainless Steel or Ultem
Inner diameter:	1.5 mm
Window material:	UV-grade fused silica
Pathlength:	10 mm
Fiber connectors:	SMA 905
Tubing:	1/16" Teflon, ~3 m
Tubing connectors:	1/4-28
Pump dimensions:	105 mm x 105 mm x 185 mm
Pump weight:	2100 g
Flow rate:	0.5-2.0 mL/minute/channel (depending on RPM and tubing diameter)
Pressure rating:	25 psi

Available Items

Item	Description
FIA-1000-Z	Z-SMA flow cell with peristaltic pump. Includes operating software with code for computer control of pump. User specifies cell material: Teflon, Plexiglas, Stainless Steel, PEEK polymer or Ultem.
FIA-ZSMA	Replacement Z-SMA flow cell for FIA-1000-Z. User specifies cell material: Teflon, Plexiglas, Stainless Steel, PEEK polymer or Ultem.
FIA-ZSMA-100	Z flow cell w/SMA 905, 100 mm pathlength
FIA-ZSMA-50	Z flow cell w/SMA 905, 50 mm pathlength
FIA-ZSMA-20	Z flow cell w/SMA 905, 20 mm pathlength
FIA-ZSMA-ML	Z flow cell with SMA 905 connector, microliter volume. User specifies cell material: Teflon, Plexiglas, Stainless Steel, PEEK polymer or Ultem.
FIA-ZSMA-ML-100	Z flow cell w/SMA 905, microliter volume 100 mm path
FIA-ZSMA-ML-50	Z flow cell w/SMA 905, microliter volume 50 mm path
FIA-ZSMA-ML-20	Z flow cell w/SMA 905, microliter volume 20 mm path
FIA-Z-CELL	Adjustable replacement cell for use with FIA-1000-Z. Connects to fiber optics w/ferrule termination. Standard cell materials are Plexiglas, Stainless Steel, Teflon, Ultem or PEEK.
FIA-P200-SR	Custom 200 µm ferrule-termination fiber optic for use with FIA-Z-CELL; requires 2 fibers.
FIA-P400-SR	Custom 400 µm ferrule-termination fiber optic for use with FIA-Z-CELL; requires 2 fibers.
FIA-PUMP-C	Replacement peristaltic pump (computer-controlled) for FIA-1000 flow cells

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Sampling Accessories

Fluid Analysis

SpectroPipetter Microcell

The PIP-10-2 SpectroPipetter Microcell is a combination micropipetter and 10-mm pathlength microcell for low-volume sampling. The SpectroPipetter conveniently couples to Ocean Optics high-sensitivity fiber optic spectrometers and compact light sources for rapid measurement of microliter-level solutions. It requires only 2 µL of sample for a spectral measurement and is especially handy for applications such as protein analysis, DNA experimentation and forensic toxicology.

Specifications

Sample cell pathlength:	10 mm
Sample cell volume:	2.0 µL
Wavelength range:	UV-VIS through Shortwave NIR (~240-1100 nm)

PIP-10-2	PIP-UCK	PIP-UCK-CS
Micropipetter and 1-cm pathlength microcell sampling device	Micropipetter cleaning kit	Cleaning solution

Longpass Flow Cells

LPC Longpass Flow Cells couple to Ocean Optics spectrometers and light sources for simple, efficient measurement of low-volume or low-concentration aqueous samples. These liquid waveguide capillary cells are available in pathlengths ranging from 50-500 cm, with internal sampling volumes ranging from 125 µL for a 50 cm pathlength cell to 1,250 µL for a 500 cm pathlength cell. Cells are responsive from ~230-800 nm, with higher starting wavelengths for the longer pathlength versions.

The LPC Flow Cells were developed by our partner World Precision Instruments as fiber-coupled alternatives to standard cuvettes. Units can be directly connected to a pump or fluid injection analysis system or filled with a syringe. The LPCs are ideal for various kinds of flow analysis and water monitoring.

Also available are very low-volume LPC flow cells ideal for micro-volume solution measurements such as DNA and RNA quantification, protein determination and nutrient analysis. These cells are available in 10 mm, 50 mm and 100 mm pathlengths, with sample volumes of 2.4 µL, 12 µL and 24 µL, respectively.

LPC Specifications	LPC-050CM	LPC-100CM	LPC-250CM	LPC-500CM
Optical pathlength:	50 cm	100 cm	250 cm	500 cm
Internal volume:	125 µL	250 µL	625 µL	1250 µL
Fiber connection (SMA 905):	500 µm	500 µm	500 µm	500 µm
Noise [mAU]:	<0.1	<0.2	<0.5	<1.0
Maximum pressure:	100 PSI	100 PSI	100 PSI	100 PSI
Wetted material:	PEEK, Fused Silica, PTFE			
Liquid input standard:	10-32 Coned Port Fitting			

Micro Cell Specifications	LPC-10MM	LPC-50MM	LPC-100MM
Optical pathlength:	10 mm	50 mm	100 mm
Internal volume:	2.4 µL	12 µL	24 µL
Wavelength range (most efficient):	~230-800 nm	~230-800 nm	~230-800 nm
Fiber connection (SMA 905):	500 µm	500 µm	500 µm
Maximum pressure:	1000 PSI	1000 PSI	1000 PSI
Refractive index @ 280 nm:	<7 mAU	<15 mAU	Not reported
Wetted material:	PEEK, Fused Silica, PTFE		

Longpass Flow Cell Options

Item Code	Description
LPC-050CM	Liquid Waveguide Capillary Cell, 50 cm pathlength
LPC-100CM	Liquid Waveguide Capillary Cell, 100 cm pathlength
LPC-250CM	Liquid Waveguide Capillary Cell, 250 cm pathlength
LPC-500CM	Liquid Waveguide Capillary Cell, 500 cm pathlength
LPC-10MM	Liquid Waveguide Capillary Cell, 10 mm pathlength
LPC-50MM	Liquid Waveguide Capillary Cell, 50 mm pathlength
LPC-100MM	Liquid Waveguide Capillary Cell, 100 mm pathlength

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Sampling Accessories

Fluid Analysis

CFV-Series FluoroVettes

Our FluoroVettes are ultra low-volume, disposable cells for nano-molar range fluorescence detection. These UV-transparent cuvettes require only 50 µl of fluid and slide neatly into a 1-cm cuvette adapter for use in setups with a spectrometer and cuvette holder.

The design of our FluoroVettes makes them quite suitable for a variety of applications including real-time monitoring of chemical or biological agents for competitive displacement assays, high-sensitivity quantification of double-stranded DNA and ELISA assay development.

Here are some other possible applications:

- Assay development with quantum dots
- Protein conformation analysis
- Cell marker identification
- Enzyme inhibitors using FRET assays

Specifications

Volume	
Dead volume:	2 µL
Dead volume (tubing interface):	Depends on length of tubing at inlet side of FluoroVette; typical ID is 0.030”, OD is 0.063” (1/16”); length of tubing is 1.5” on each side
Contained volume:	50 µL (+/- 1 µL)
Dimensions	
Height x width:	50 mm x 9 mm
Thickness:	1 mm
Materials	
Zeonor Film:	50 mm (0.002”) (UV-transparent to 220 nm)
Black Delrin:	0.75 mm (0.030”)
Bonding:	Medical-grade acrylic solvent for bonding Delrin to Zeonor
Compatibility:	Ethanol (up to 99.5%), Isopropyl alcohol (up to 91% water), aqueous buffers with or without detergents
Incompatibility:	Acetone or aliphatic solvents such as hexane
Connectors	
For CFV-PIP-SP:	Acrylic
For CFV-PUMP-SP:	Polysulfone
For tube connection:	Translucent FEP for tubing; glue is a solvent-less UV-curing medical-grade adhesive

Available Items

Item Code	Description
CFV-PIP-SP	10 pack Pipettor UV-transparent FluoroVettes with adapter
CFV-PUMP-SP	5 pack Pump UV-transparent FluoroVettes with adapter
CFV-PIP	10 pack Pipettor UV-transparent FluoroVettes
CFV-PUMP	5 pack Pump UV-transparent FluoroVettes
CFV-ADP-2	Universal adapter for 1 cm x 1 cm fluorescence sample holder with 2-way 90 degree viewing
CFV-ADP-4	Universal adapter for 1 cm x 1 cm sample holder with 4-way viewing
CSV-6-SP	Sample pack of 6 SpecVettes - 2 x 1 mm, 2 x 0.5 mm, and 2 x 0.25 mm + Adapter

Note: There are two types of FluoroVettes. The CFV-PIP-SP has an inlet port for loading the sample into the FluoroVette with a standard 20-200 µL pipetter and ordinary tips, making it a snap to fill and perform measurements. The CFV-PUMP-SP has tubing barbs at the inlet and outlet ports so the FluoroVette can be used in continuous or flow injected measurements using a syringe or peristaltic pump.

Sampling Accessories

Cosine Correctors

CC-Series Cosine Correctors

Our Cosine Correctors couple to optical fibers and spectrometers for relative and absolute spectral intensity measurements, emission applications and evaluation of light sources.

When the CC-3 and CC-3-UV-S are screwed onto the end of an optical fiber, the cosine corrector and optical fiber become an irradiance probe. The probe couples to one of our spectrometers to measure the intensity of light normal to the probe surface. The CC-3-DA screws directly onto the SMA 905 Connector of our spectrometers, creating a complete spectroradiometric system and eliminating the need for an optical fiber.

Please note that the native response of Spectralon covers a wider range than what we report here. Our specifications reflect its use with our spectrometers as a light collector.

Available Items	CC-3	CC-3-UV-S	CC-3-UV-T	CC-3-DA
Diffusing material:	Opaline glass	Spectralon	PTFE	Spectralon
Typical range:	350-1000 nm	200-1700 nm	200-1100 nm	200-1100 nm
Dimensions:	6.35 mm OD	6.35 mm OD	6.35 mm OD	12.7 mm OD
Field of View:	180°	180°	180°	180°

Power Supply and Controller for LEDs

The LED-PS Power Supply works with our spectrometers and the FOIS-1 Fiber Optic Integrating Sphere for spectroradiometric and color measurements of LEDs. The LED-PS unit has easy-to-reach electrical connectors for mounting LEDs that are 9.52-mm diameter or smaller with 2.77-mm lead spacing.

The LED-PS Power Supply provides three useful functions. The LED-PS holds the LED in place, powers the LED, and displays the LED's drive current. The drive current is adjustable, with a digital display to indicate the current level. Use the adjustable drive current feature to increase or decrease an LED's current up to 50 mA. With the LED-PS-NIST, the current meter is calibrated against a NIST-traceable standard.

Ocean Optics
LED-PS-NIST
LED133

Specifications	
Dimensions:	56.8 mm x 56.8 mm x 56 mm
Weight:	170 g
Power consumption:	Up to 100 mA @ 12 VDC; depends on setting
LED drive current:	12-50 mA with 0.1 mA resolution
Drive current accuracy:	± 1.0%
LED mount:	2.77 mm lead spacing, PTFE base

Available Items

Item	Description
LED-PS	Power Supply and Controller for LEDs
LED-PS-NIST	NIST-traceable Power Supply and Controller for LEDs
LED-PS-RECAL	Recalibration services for your LED-PS-NIST
FOIS-1	Fiber Optic Integrating Sphere

Sampling Accessories

Integrating Spheres

ISP-I Integrating Spheres

Our ISP-I Integrating Spheres are convenient sampling optics that couple to our spectrometers and optical fibers to measure spectral output of LEDs, lasers and other light sources from 200-2500 nm.

Each fiber optic integrating sphere consists of a proprietary PTFE-based, sintered diffusing material in diameters of 30, 50 or 80 mm. This provides a Lambertian surface with >98% reflectivity in the visible range for irradiance measurements. Sample port sizes of 6 mm for the 30 mm sphere and 8 mm for the 50 mm and 80 mm spheres are available.

ISP-50-8-R-GT
Ocean Optics

Available Items

Item Code	Description	Sample Port
ISP-30-6-I	Integrating sphere, 59 mm diameter, 58 mm high	6 mm
ISP-50-8-I	Integrating sphere, 80 mm diameter, 78 mm high	8 mm
ISP-80-8-I	Integrating sphere, 107 mm diameter, 117 mm high	8 mm
ISP-LED-ADP	Holds in place 3, 5 or 8 mm LED for reproducibility; for use with ISP-50-8-1	N/A
ISP-50-I-USB	ISP-50-8-I with connector for directly attaching to a spectrometer	8 mm
ISP-80-I-USB	ISP-80-8-I with connector for directly attaching to a spectrometer	8 mm
ISP-PORT-1	Custom sample port machining of 8, 10, or 12 mm diameter	8, 10 or 12 mm
ISP-PORT-2	Custom sample port machining of 14,16 or 20 mm diameter	14, 16 or 20 mm

Specifications	
Dimensions:	ISP-30-6-I: 59 mm diameter, 58 mm height ISP-50-8-I: 80 mm diameter, 78 mm height ISP-80-8-I: 107 mm diameter, 117 mm height
Weight:	330 g (ISP-30); 730 g (ISP-50); 1,650 g (ISP-80)
Spectral range:	200-2500 nm
Sphere diameter:	30 mm, 50 mm or 80 mm
Sample port diameter:	6 mm (ISP-30); 8 mm (ISP-50 and ISP-80)
Sphere coating:	Proprietary PTFE-based diffusing material
Reflectivity:	>98% (400-1500 nm); >95% (250-2500 nm)
LED adapter:	For 3-mm, 5-mm or 8-mm LEDs

FOIS-1 Fiber Optic Integrating Sphere

The FOIS-1 is a compact sampling optic that collects light from emission sources such as LEDs and lasers and can be used to measure light fields with a 360° field of view.

The compact FOIS-1 measures just 56.8 mm x 62.4 mm x 38.1 mm and weighs only 240 g -- yet it is durable enough for use for many types of applications. The interior of the FOIS-1 is made from Spectralon, a white diffusing material that provides a highly Lambertian reflecting surface.

The FOIS-1 is easy to operate. Simply connect an optical fiber (the read fiber) from the FOIS-1's SMA 905-terminated output port to the SMA termination of the spectrometer. The emission source is then inserted into the 0.375" input port of the FOIS-1. Or the setup can be configured so that the light energy from the emission source can enter the input port.

Specifications	
Effective spectral range:	250-2500 nm
Dimensions:	56.8 mm x 62.4 mm x 38.1 mm
Weight:	240 g
Sample port aperture:	9.5 mm
Sphere coating:	Spectralon
Top cap mounts:	(2) 8-32 threaded holes (hardware not included) (1) 1/4"-20 threaded hole in center (screw/adapter included)
Side mounts:	SMA 905 connector for coupling optical fiber to the spectrometer 8-32 threaded hole for post mounts
Connector:	SMA 905

Ocean Optics
FOIS-1

Sampling Accessories

Spheres for Reflectance

ISP-REF Integrating Sphere for Reflectance

The ISP-REF Integrating Sphere is designed for applications requiring even surface illumination for reflectance measurements -- such as in determining the color of flat surfaces.

The ISP-REF is 1.5" in diameter and features a transfer optic assembly for restricting the fiber viewing angle, a 0.4" aperture sample port and a built-in tungsten-halogen light source with 12 VDC adapter. The sphere is coated with Spectralon®, a white diffusing material that provides a highly Lambertian reflecting surface. A simple switch allows users to manipulate the sampling optic for the inclusion (I) or exclusion (E) of specular reflectance.

The ISP-REF Integrating Sphere is small and compact -- measuring just 54 mm x 57 mm x 83 mm (LWH) and weighing 865 g – yet, it is durable enough for use outside the laboratory.

Item Codes: ISP-REF Illuminated Integrating Sphere, ISP-REF-B Replacement Bulb for ISP-REF

Specifications	
Spectral range (of illumination source):	360-1000 nm
Dimensions:	54 mm x 57 mm x 83 mm (LWH)
Sphere diameter:	38.1 mm
Weight:	865 g
Sample port aperture:	10.32 mm
Sphere coating:	Spectralon (doped with Barium Sulfate)
Reflectivity:	>98% (400-1500 nm) >95% (250-2000 nm)
Reflectance measurements:	Specular included or excluded
Bulb life:	900 hours
Bulb color temperature:	3100 K
Connector:	SMA 905

Ocean Optics
Integrating Sphere 30 mm
ISP-30-6-R
Ser. No.047820006

ISP-R Integrating Spheres for Reflectance

The ISP-R Integrating Spheres are distinguished by their compact size and sturdy design. All ISP-R spheres have two SMA 905 ports. The excitation input is angled at 8° and collimates the fiber input before introduction into the sphere. The output port is angled at 90° (to connect to a spectrometer). A gloss-trap version comes with two cylindrical inserts coated with either a black absorbing material (for excluding the specular component of the reflection) or with the same material as the sphere (to include the specular component). This insert fits into a hole angled at 8° at the top of the sphere.

Specifications	ISP-REF	ISP-30-6-R	ISP-50-8-R	ISP-80-8-R	ISP-50-8-R-GT
Dimensions:	54 mm x 57 mm x 83 mm	59 mm dia., 58 mm high	80 mm dia., 78 mm high	107 mm dia., 117 mm high	80 mm dia., 78 mm high
Weight:	864.7 g	330 g	730 g	1,650 g	743.3 g
Power consumption:	600 mA @ 12 VDC (lamp)	None	None	None	None
Spectral range:	360-2000 nm	200-2500 nm	200-2500 nm	200-2500 nm	200-2500 nm
Sphere diameter:	38.1 mm	30 mm	50 mm	80 mm	50 mm
Sample port diameter:	10.32 mm	6 mm	8 mm	8 mm	8 mm
Sphere coating:	Spectralon	PTFE material	PTFE material	PTFE material	PTFE material
Reflectance:	Diffuse or specular and diffuse	Specular and diffuse	Specular and diffuse	Specular and diffuse	Diffuse or specular and diffuse
Reflectivity:	>98% (400-1500 nm) >95% (250-2000 nm)	>98% (400-1500 nm) >95% (250-2000 nm)	>98% (400-1500 nm) >95% (250-2000 nm)	>98% (400-1500 nm) >95% (250-2000 nm)	>98% (400-1500 nm) >95% (250-2000 nm)
Bulb:	900-hour bulb; 3100 K color temp.	None	None	None	None

Sampling Accessories

Spheres for Reflectance

Reflectance/Transmittance Spheres

The RT and RTC Spheres from Labsphere are basic measurement tools that can be used to measure the reflectance or transmittance of light through a wide variety of sample media. These spheres feature 25.4 mm diameter ports to accommodate sample and reference beams as well as port plugs required for a 9° single beam geometry.

RTC Spheres add further versatility with a center-mounted sample holder so users are able to measure reflectance and transmittance versus incident angle of radiation. Five ports accommodate a sample and reference beam with a center mount stage located at the top of the sphere, and a 12.7 mm detector port located at the bottom of the sphere assembly.

Item Codes: LAB-RT-060SF, Reflectance/Transmittance Integrating Sphere; 6"; includes 0° sample holder and accessories
LAB-RTC-060SF, Reflectance/Transmittance Integrating Sphere; 6"; includes 0° and 8° sample holders, center mount and accessories

Specifications	RT-060-SF	RTC-060-SF
Sphere diameter:	152. 4 mm (6")	152. 4 mm (6")
Sphere coating:	Spectraflect®	Spectraflect®
Optimum spectral range:	250-2500 nm	250-2500 nm
Detector port diameter:	12.7 mm (0.5")	12.7 mm (0.5")
Sample and reference ports:	5	5
Sample and reference ports (diameters):	25.4 mm (1") for all	25.4 mm (1") for three and 31.75 mm (1.25") for two
Center-mount sample holder:	NA	Jaw and clip styles
Sphere mount:	1/4-20 boss mounting post and base assembly	Adjustable H-frame assembly

CAN WE HELP YOU FIND SOMETHING?

Since 1989, Ocean Optics has been helping people all over the world find answers. Our range of optical sensing instruments and systems have been used in medical discovery, science, education and even in space. With the creation of the world's first miniature spectrometer and over 150,000 spectrometers specified and delivered – in every imaginable industry – Ocean Optics is the innovator of discovery. Let us show you how to find your answer.

SPECTROMETERS | SAMPLING ACCESSORIES | WORLD CLASS SERVICE

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Sampling Accessories

Light Modification

MonoScan2000

The MonoScan2000 is a computer-controlled scanning monochromator with a 300-700 nm wavelength range. The rapid system scans one nanometer in 15-20 milliseconds and covers its entire range within three seconds. The MonoScan2000 is compatible with all Ocean Optics spectrometers, light sources, accessories and optical fibers.

Ocean Optics
SCANNING MONOCHROMATOR
MonoScan 2000

A light source directs light via optical fiber to a sample, interacts with the sample and sends light to the MonoScan2000. The monochromator captures the incoming light and transmits it via fiber to a single-element detector (such as a photodiode) one wavelength at a time. The MonoScan2000 allows a high optical throughput and provides an intense spectral signal. The MonoScan2000 has the ability to scan through a wavelength range you select via software. Because the MonoScan2000 has no slit, the diameter size of the optical fiber determines the optical resolution of the system. When using 200 µm fibers, for example, optical resolution is <3 nm (FWHM).

Item Code: MONOSCAN2000

Specifications	
Dimensions:	112 mm x 132 mm x 145 mm
Weight:	1.1 kg
Wavelength range:	300-700 nm
Optical resolution:	Depends on the diameter of the optical fiber; ~4 nm (FWHM) using a 400 µm diameter optical fiber
Holographic grating:	1250 lines/mm, blazed at 350 nm
Accuracy:	<0.5 nm
Repeatability:	0.2 nm
Transition speed:	A scan from 300 nm to 700 nm takes ~3 seconds A one nanometer step takes ~15-20 milliseconds
Dispersion:	~10 nm per mm
Optical throughput:	>50% with a 1000 µm fiber at 350 nm >30% with a 1000 µm fiber at 500 nm
Grating scan angle:	14.8° (300-700 nm)
Computer interface:	USB and RS-232
Power requirement:	12 VDC max. 1.2A (WT-12V-E)
Gearbox ratio:	1:261

Hydra Fiber-Coupled Light Mixer

Hydra from Ocean Optics is a fiber-coupled light mixer that features nine SMA 905 connectors. Each connector can be used as input for light or an output.

Ocean Optics

Light coming into the Hydra's SMA connectors are mixed homogeneously inside the Hydra's chamber. The intensities of the outgoing light are at the same level with a matching of better than 1%.

The physical properties of the Hydra are based on Spectralon® diffuse reflectance material and offer high reflection efficiency (better than 90%) over a wavelength range from 200-2500 nm.

The Hydra is a compact 60 mm x 45 mm. The unit's integrating sphere is 20 mm in diameter. Use Hydra to harness up to eight light sources and accurately mix light intensities to fit your application's requirements.

Item Code: HYDRA

Specifications	
Dimensions:	60 mm ht x 45 mm diameter
Integrating sphere:	20 mm diameter
Integrating sphere coating:	Spectralon
Integrating sphere reflectivity:	>90% from 200-2500 nm
Connectors:	(9) SMA 905

Sampling Accessories

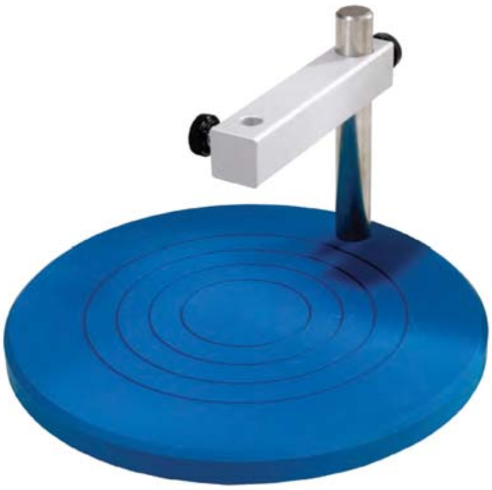
Reflection and Transmission Stages

Reflectance Stage

Our Single-Point Reflection stage is a probe holder that is perfect for reflection measurements of optical layers and other substrates (up to 150 mm in diameter). The probe holder accommodates fiber optic probes up to 6.35 mm in diameter and slides up and down a stainless steel post for adjustment to heights as great as ~63.5 mm.

The Stage has an anodized base plate, scored in concentric circles of varying diameters, that act as a guide when positioning round samples.

Item Code: STAGE



Reflection-Transmission Stage

The Stage-RTL-T is a unique and versatile sampling system for performing transmission and reflection measurements in numerous configurations. When combined with Ocean Optics spectrometers and light sources, the Stage-RTL-T is ideal for applications ranging from materials analysis of coatings, plastics, glass and semiconductor wafers to characterization of biological samples such as plants, animal tissue and fruit.

The Stage-RTL-T includes a variable rail to which various additional sampling fixtures can be attached. In addition to the rail, the Stage-RTL-T comes with a sample plate, adapter, a pair of 74-UV collimating lenses and a light trap.

Here are some of the ways you can utilize the Stage-RTL-T:

- Attach any Ocean Optics reflection probe with ¼" (6.35 mm) OD and position the rail to measure an extensive range of sample shapes and sizes.
- With the generic adapter, position the collimating lenses to measure transmission at a perpendicular angle or reflection at a 45-degree angle. The adapter also will accommodate Ocean Optics reflection probes with ¼" (6.35 mm) OD.
- Add an optional ISP-RTL-ADP adapter to accommodate our 30 mm and 50 mm ISP-series integrating spheres. This allows the user to take diffuse reflection and transmission measurements.

The optical components in the Stage-RTL-T are responsive from 200-2500 nm, making them feasible for the full range of Ocean Optics UV, Visible and NIR spectrometers and light sources. The system's anodized aluminum plates and rails and its stainless steel posts and post holders are sturdy and dependable.

Item Code: STAGE-RTL-T

DH-2000-
Ocean Optics

Specifications	STAGE	STAGE-RTL-T
Dimensions:	152.4 mm diameter (base) 101.6 mm diameter (sample area)	206.3 mm diameter (base) 152.4 mm diameter (sample area)
Weight:	620 g	4.5 kg
Height:	Adjustable 63.5 mm	Adjustable to 400 mm
Materials:	Anodized aluminum plate, stainless steel post and post holder	Anodized aluminum

Sampling Accessories

Specular Reflectance Standards

We offer three Specular Reflectance Standards for use in measuring the reflectance of surfaces with high or low specular reflectivity. Each consists of a 31.7-mm outer diameter optical reflectance material in a protective aluminum receptacle with screw-on top. The superior coatings on the substrates are environmentally stable and can withstand high temperature and mechanical stresses.

STAN-SSH

The STAN-SSH High-reflectivity Specular Reflectance Standard is a mirrored, fused-silica standard that can be used as a reference when measuring surfaces with high specular reflectance values such as optical substrates, optical coatings, machined metals and semiconductor materials. The STAN-SSH provides high reflectance across the range from 800-2500 nm.

Ocean Optics

STAN-SSH-NIST

The NIST-traceable STAN-SSH-NIST is calibrated to a NIST master (NIST part number NIST38060S, s/n 99G16) and is spectrally flat to <5% from 250-2500 nm. With the shipment of the NIST-traceable version, the customer will receive a certificate of calibration, a data sheet with the reflectance values as a function of wavelength and a diskette that contains calibration data that can be transferred to Ocean Optics SpectraSuite Operating Software.

Ocean Optics

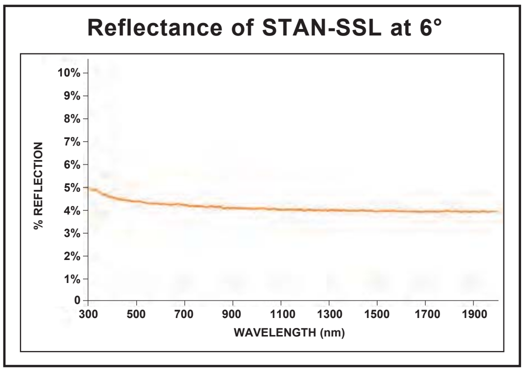
STAN-SSL

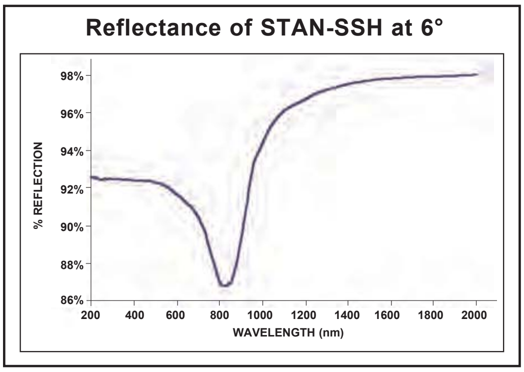
The STAN-SSL Low-reflectivity Specular Reflectance Standard is a black glass standard that can be used as a reference when measuring surfaces with low specular reflectance values such as thin film coatings, anti-reflective coatings, blocking filters and substrates. The coated surface of the STAN-SSL provides ~4.0% reflectance across the 200-2500 nm wavelength range.

STAN-HOLDER

This convenient accessory option keeps your standard securely in place during measurements and helps preserve its coating.

Specifications	STAN-SSH	STAN-SSH-NIST	STAN-SSL
Substrate dimensions:	31.75 mm outer diameter x 6.35 mm height	31.75 mm outer diameter x 6.35 mm height	31.75 mm outer diameter x 6.35 mm height
Housing dimensions:	38 mm outer diameter x 19 mm height	38 mm outer diameter x 19 mm height	38 mm outer diameter x 19 mm height
Weight:	40 g	40 g	40 g
Reflectance material:	Front-surface protected aluminum mirror on fused silica substrate	Front-surface protected aluminum mirror on fused silica substrate	Schott ND9 glass
Reflectivity:	~87-93% (200-1000 nm) ~93-98% (1000-2050 nm)	~87-93% (200-1000 nm) ~93-98% (1000-2050 nm)	~5% (200-950 nm) ~4% (950-2500 nm)





Sampling Accessories

Diffuse Reflectance Standards

Ocean Optics
CERTIFIED REFLECTANCE STANDARD
labsphere

WS-1 Diffuse Reflectance Standard

The WS-1 Diffuse Reflectance Standard is made of PTFE, a diffuse white plastic that provides a Lambertian reference surface for reflectance experiments. The WS-1 comes in an anodized aluminum housing, and is hydrophobic, chemically inert and very stable, even in deep-ultraviolet applications. It is >98% reflective from 250-1500 nm and >95% reflective from 250-2200 nm.

Item Code: WS-1

WS-1-SL White Reflectance Standard with Spectralon

The WS-1-SL is a diffuse reflectance standard from Labsphere and is made from their patented diffuse reflectance material, Spectralon. Spectralon is hydrophobic and is thermally stable to 350 °C. The durable material provides highly accurate, reproducible data.

Item Code: WS-1-SL

Specifications	WS-1	WS-1-SL
Dimensions:	38 mm diameter housing	32 mm OD, 10 mm thick tile
Weight:	30 g	30 g
Spectral range:	250-2000 nm	250-2500 nm
Housing:	Aluminum	Delrin holder, protective cover
Reflectivity:	>98% (250-1500 nm) >95% (250-2200 nm)	99% (400-1500 nm) >96% (250-2000 nm)

Sampling Accessories

Spectralon Standards from Labsphere

Spectralon® material is distinguished by its high diffuse reflectance values (>99% over a range from 400-1500 nm and >95% from 250-2500 nm) and is available in components such as reflectance, color and fluorescence standards.

Diffuse reflectance standards are highly Lambertian, with reflectance values ranging from 2%-99%. Color standards come in various color sets and are an excellent choice for developing consistent reproduction in manufacturing applications. Fluorescence standards use various combinations of Spectralon and inorganic fluors and are photochemically stable compared with their organic counterparts.

Available Reflectance and Color Standards	
LAB-RSS-040-010	Diffuse reflectance standard set, 1", 2%, 50%, 75%, 99% reflectance values
LAB-RSS-08-020	Diffuse reflectance standard set, 2", 2%, 5%, 10%, 20%, 40%, 60%, 80%, 99% reflectance values
LAB-SRS-02-010	Diffuse reflectance standard, 1", 2% reflectance value
LAB-SRS-10-010	Diffuse reflectance standard, 1", 10% reflectance value
LAB-SRS-20-010	Diffuse reflectance standard, 1", 20% reflectance value
LAB-SRT-50-020	Diffuse reflectance target, UV-NIR, 2", 50% reflectance value, single centerpoint calibration
LAB-SRT-99-020	Diffuse reflectance target, UV-NIR, 2", 99% reflectance value, single centerpoint calibration
LAB-SRT-MS-050	Diffuse reflectance target, multi-step, 250-2500 nm, 5" x 5", 12%, 25%, 50%, 99% reflectance values, single centerpoint calibration
LAB-CSS-04-010	Diffuse color standards set, 1”, Red-Green-Blue-Yellow
LAB-CSS-04A-010	Diffuse color standards set, 1”, Orange-Purple-Violet-Cyan
LAB-CSS-12-010	Diffuse color standards set, 1”, RGBY and OPVC, 2%, 20%, 50%, 99% reflectance values

Available Fluorescence Standards	
LAB-USFS-500-010	Fluorescence standards set, includes five fluors, uncalibrated
LAB-USFS-200-010	Fluorescence standards, 1", Blue/White Fluor #200, uncalibrated
LAB-USFS-205-010	Fluorescence standards, 1", Blue Fluor #205, uncalibrated
LAB-USFS-210-010	Fluorescence standards, 1", Green Fluor #210, uncalibrated
LAB-USFS-336-020	Fluorescence standards, 1", Orange Fluor #336, uncalibrated
LAB-USFS-461-010	Fluorescence standards, 1", Blue/White Fluor #461, uncalibrated

Sampling Accessories

Filter Holders

FHS-UV In-Line Filter Holder

The FHS-UV In-Line Filter Holder is a low-cost spectrophotometric accessory for fast, convenient absorbance/transmission measurements of optical and other filters.

The FHS-UV In-Line Filter Holder features a pair of 74-UV 5-mm diameter f/2 collimating lenses that maximize light throughput, as well as a manual light-block wheel for dark readings. The Filter Holder acts as a simple yet effective device for measuring filters. It also provides a convenient place to accommodate filters for optical setups.

FHSA-Series Filter and Cuvette Holders

With our FHSA Filter and Cuvette Holders, you can configure the holders to sample either cuvettes or filters. Use FHSAs to measure transmission of a 1-cm square cuvette or filter up to 7 mm thick. Plus, FHSAs interface to your PC, allowing you to control many of their functions via the included software.

With the FHSA-TTL, you have manual control of attenuation (adjustable 0-100%) and manual or software control of a shutter.

FHSA-TTL
OPEN FILTER TTL
Ocean Optics

Specifications	FHSA-TTL	FHS-UV
Dimensions:	150 mm x 50 mm 50 mm	50.6 mm x 140 mm x 43.1 mm
Weight:	490 g	240 g
Power consumption:	100 mA @ 12 VDC	None
Maximum filter size:	7 mm thick	25 mm diameter round; up to 6 mm thick
Wavelength range:	200-2000 nm	200-2000 nm
Cuvette dimensions:	10 mm x 10 mm	NA
Shutter frequency:	5 Hz/60 dB maximum	NA
Shutter response time:	7 µsec	NA

INLINE-FH Filter Holder for Optical Fibers

Our INLINE-FH is an in-line filter holder that accommodates filters up to 8 mm in diameter and 3 mm in thickness. This filter holder includes two collimating lenses and connects to two fibers for in-line filtering. Filter options are similar to the 25.4 mm square filters listed on page 128. Please consult an Applications Scientist for assistance.

The FH-SMA allows you to mount filters or diffusers at the end of the SMA 905-terminated optical fibers. The FH-SMA accepts 8 mm diameter filters in thicknesses of 1-7 mm.

Ocean Optics
FH-SMA

Specifications	FH-SMA	INLINE-FH
Dimensions:	16 mm diameter	15 mm diameter
Weight:	10 g	20 g
Filter size:	8 mm diameter, 1-7 mm thick	8 mm diameter, 3 mm thick
Material:	Anodized aluminum	Stainless steel (collimating lenses have anodized housings)

Sampling Accessories

Linear Variable Filters

We've combined our patented high-pass and low-pass technology to create an exceptional Linear Variable Filter line that features an adjustable center wavelength and bandpass. Each filter delivers an outstanding transmission band (~90%) and blocking band (99.8%).

Our LVF Filters have interference coatings applied to 57 mm x 10 mm quartz substrates and are particularly useful for spectrally shaping the excitation energy from broadband sources used for fluorescence.

Slide Carriers

These off-the-shelf filters are epoxied into slide carriers that allow you to move the transmission or blocking band throughout each filter's wavelength range.

Single High-pass and Single Low-pass Filter

The LVF-H High-pass Filter is a single filter that blocks light at 98.8% until a transition wavelength that varies along its length. At that point, the LVF-H passes light better than 90%. The LVF-L Low-pass Filter is a single filter that passes light at 88% until a transition wavelength that varies along its length.

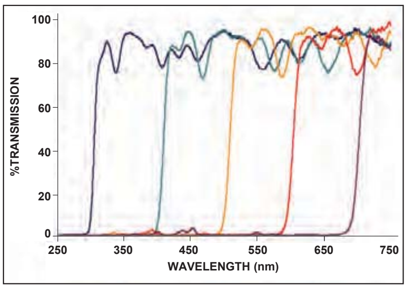
Double High-pass and Double Low-pass Filters

The benefit of having double filters versus a single filter is that the optical density of the blocking band increases to 99.96%. However, the transmission band is reduced to 80%.

High-pass and Low-pass Variable Bandpass Filters

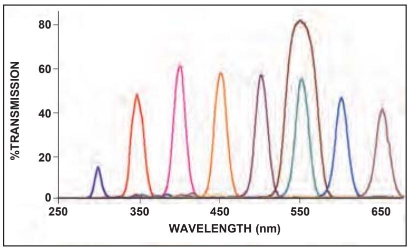
By fastening together a high-pass filter and a low-pass filter, we created a variable bandpass notch filter that allows you to adjust the center wavelength and the bandwidth. We preset the transmission bandwidth at ~25 nm FWHM, but adjusting four screws allows you to slide the filters against one another to create a wider or narrower transmission bandwidth.

LVF-H High-pass Filter



The transition wavelength from blocking to transmission band varies according to the filter's position in front of the collimating lens.

LVF-HL Variable Bandwidth Filter



These spectra were taken with an LVF-HL to show how a transmission bandwidth can be set throughout the filter's range (300-750 nm).

Item	Description
LVF-H	A single high-pass filter for 300-750 nm
LVF-L	A single low-pass filter for 300-750 nm
LVF-HH	Two LVF-H high-pass filters epoxied together for 300-750 nm
LVF-LL	Two LVF-L low-pass filters epoxied together for 300-750 nm
LVF-HL	An LVF-H high-pass filter and LVF-L low-pass filter fastened together to create an adjustable bandpass linear variable filter
LVF-UV-H	A single high-pass filter for 230-500 nm
LVF-UV-L	A single low-pass filter for 230-500 nm
LVF-UV-HH	Two LVF-UV-H high-pass filters epoxied together for 230-500 nm
LVF-UV-LL	Two LVF-UV-L low-pass filters epoxied together for 230-500 nm
LVF-UV-HL	An LVF-UV-H high-pass filter and LVF-UV-L low-pass filter fastened together to create an adjustable bandpass linear variable filter
LVF-CUV-ADP	Adapter for use with cuvette holders, to clamp filter slides into place
CVD-DIFFUSE	Teflon diffuser for cuvette holder-LVF setups, to redirect excitation energy to spectrometer
FHS-LVF	In-line system with two collimating lenses that accommodates slide carriers for straight-through (absorbance/transmission) measurements
LVF-KIT	Consists of the LVF-HL, LVF-CUV-ADP, FHS-LVF, and CVD-Diffuse
LVF-UV-KIT	Consists of the LVF-UV-HL, LVF-CUV-ADP, FHS-LVF and CVD-Diffuse

Sampling Accessories
Accessories for Linear Variable Filters

FHS-LVF

The FHS-LVF is an in-line filter holder that is used in absorbance and transmission applications. This in-line LVF holder features two collimating lenses with SMA 905 connectors. Its slot accommodates the LVF slide carrier. Screws hold the FHS-LVF in place. For absorbance/transmission measurements only.

Item Code: FHS-LVF

LVF-CUV-ADP

The LVF-CUV-ADP is an adapter piece that fits onto our 1-cm cuvette holders and holds the LVF slide carrier. The cuvette adapter slides over the top of the cuvette holder and includes screws to clamp the LVF's slide carrier into place. The LVF-CUV-ADP comes with a cover to block out ambient light and can accommodate both single-filter and double-filter slide carriers

Item Code: LVF-CUV-ADP

CVD-DIFFUSE

The CVD-DIFFUSE is a 1-cm cuvette-shaped piece of Teflon with a 45° surface at the measurement height. Use it in a fluorescence cuvette holder-with-filters configuration to redirect the excitation energy into the spectrometer. This facilitates setting the filter position or selecting the wavelength passed by the filter.

Item Code: CVD-DIFFUSE

Packages

Select one of the following packages for a convenient, all-in-one filter solution.

Item Code: LVF-KIT includes: LVF-HL, LVF-CUV-ADP, FHS-LVF, CVD-DIFFUSE

Item Code: LVF-UV-KIT includes: LVF-UV-HL, LVF-CUV-ADP, FHS-LVF, CVD-DIFFUSE

Sampling Accessories
Absorbing Glass Filters

High-Pass Filters

We offer our OF2 filters for installing into the optical path of your spectrometer setup. These high-pass filters are transmissive approximately 50% of the normal cutoff wavelength, >99% at wavelengths 50 nm higher than the cutoff and less than 0.1% at 50 nm lower than the cutoff. High-pass filters are used to block second orders, test for stray light and block excitation energy in fluorescence or Raman experiments.

Available Items		
OF2-WG305	pass >305 nm	square 25.4 x 25.4 x 3 mm
OF2-GG375	pass >375 nm	square 25.4 x 25.4 x 3 mm
OF2-GG395	pass >395 nm	square 25.4 x 25.4 x 3 mm
OF2-GG475	pass >475 nm	square 50.8 x 50.8 x 3 mm or square 25.4 x 25.4 x 3 mm
OF2-OG515	pass >515 nm	square 25.4 x 25.4 x 3 mm
OF2-OG550	pass >550 nm	square 25.4 x 25.4 x 3 mm

Balancing Filters

Our Balancing Filters absorb energy in some regions while transmitting in others. The BG34 filter, for example, reduces the intensity of light at 600 nm from a tungsten halogen bulb while transmitting all of the light at the blue and red regions, where detector sensitivity is lower.

Available Items		
OF2-FG3	enhance blue and red	square 25.4 x 25.4 x 3 mm
OF2-BG34R	enhance blue and red	round 12.7 mm OD

Bandpass Filters

These filters transmit a particular wavelength range while rejecting energies higher and lower than the selected range.

Available Items		
OF2-KG3	>325 nm and <700 nm	square 25.4 x 25.4 x 3 mm
OF2-U360	>340 nm and <380 nm	square 25.4 x 25.4 x 3 mm
OF2-RG780	>780 nm and 50% transmission <2.7 µm	square 25.4 x 25.4 x 3 mm

Note: Some of 25.4 mm square filters may be available in dimensions suitable for use with the INLINE-FH filter holder (page 126). Consult an Applications Scientist for details.

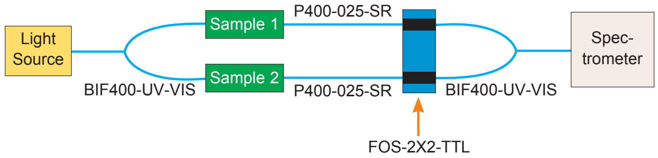
Sampling Accessories

Routing Control and More

Fiber Optic Dual Switch with TTL Line

The FOS-2X2-TTL Fiber Optic Dual Switch was designed to provide you with flexibility in routing, splitting and controlling light. The FOS has two light channels. You can opt to have one light channel open at a time or have both closed. The FOS is useful for monitoring the drift of the light source or for measuring two samples with one spectrometer channel and one light source. The diagram below is an example of how the FOS can be utilized. In this setup, the FOS eliminates the need for a second spectrometer channel.

Item Code: FOS-2X2-TTL



In this setup, light enters a Bifurcated Optical Fiber Assembly and then splits into two arms, one for each sample. Light interacts with each sample and travels through another fiber assembly, each into its own port in the FOS. Another Bifurcated Assembly collects the light from the FOS and sends it to the spectrometer. Here you would switch the shutter on the FOS from one light channel to another in order to get clean data from each sample. Without the FOS, you would need another spectrometer channel to monitor the two samples.

Electronic TTL Shutter

In spectrometer setups, the INLINE-TTL TTL-driven shutter allows you to block the light path without disturbing the experiment -- for example, by turning the light source on and off. The laser-cut shutter is installed between two collimating lenses, which attach to two optical fibers. The INLINE-TTL is driven by a small board with a TTL input. Included is a cable for interfacing to a spectrometer.

Item Code: INLINE-TTL-S

Specifications	
Dimensions:	140 mm x 50 mm x 50 mm
Weight:	~600 g
Shutter-Input:	TTL maximum 5 Hz
Power requirements:	12 VDC (power supply included)
Power consumption:	100 mA maximum
Maximum frequency:	5 Hz

Field of View Control

The Gershun Tube Kit (GER-KIT) controls the field of view of our SMA 905-terminated optical fiber. It also directly attaches to a spectrometer with an SMA 905 Connector. User-interchangeable apertures provide many different fields of view from 1° to 28°. When the GER-KIT is used with our optical fiber, the field of view cannot exceed the optical fiber's 25° field of view if you are measuring radiance.

Item Code: GER-KIT

Specifications	
Material:	Black anodized aluminum
Interior:	Bead-blasted surface to reduce off-axis reflections
Connection:	Directly attaches to one of our spectrometers or couples to an SMA 905-terminated optical fiber with included adapter barrel
Apertures:	1°, 3°, 8°, 10° and 14° apertures included, providing 1°, 2°, 3°, 6°, 8°, 10°, 14°, 16°, 20° and 28° fields of view

Sampling Accessories

Filtering Light

MPM-2000 Optical Multiplexer

Our MPM-2000 Fiber Optic Multiplexers take light to your spectrometer or from a light source (connected to one of the input ports) and distribute it to either 8 or 16 outputs. The light is distributed through the output ports in sequential order with switching times between channels of less than 150 milliseconds. These precision instruments are ideal for process environments where multiple locations need to be measured with a single spectrometer channel or light source.

High-Precision

All versions of our MPM-2000 include a DC motor that provides excellent speed control without sacrificing power. An included encoder converts movement into a digital pulsed output. Each channel in the MPM-2000 has a collimating lens that connects to an internal optical fiber system. Plus, the MPM-2000 provides accurate measurements with superior repeatability of 99%.

Software Controlled

Our MPM-2000 Multiplexers interface easily with your PC via an RS-232 port and come with software and drivers for complete PC control. The MPM-2000's software allows you full control of the switching order, switching delay time and system calibration.

Specifications	
Dimensions (600 µm version):	400 mm x 170 mm x 130 mm
Dimensions (400 µm version):	200 mm x 170 mm x 130 mm
Wavelength range:	250-800 nm – UV-VIS 350-2000 nm – VIS-NIR
Optical throughput:	>60% when using standard 400 µm fibers @ 650 nm
Motor:	Direct-current
Repeatability:	>99%
Switching time:	150 ms between adjacent positions
Interface:	RS-232 (optional USB)
Power requirement:	24 VDC, 1.2 A (includes WT-24V-E power supply)
Connectors:	SMA 905

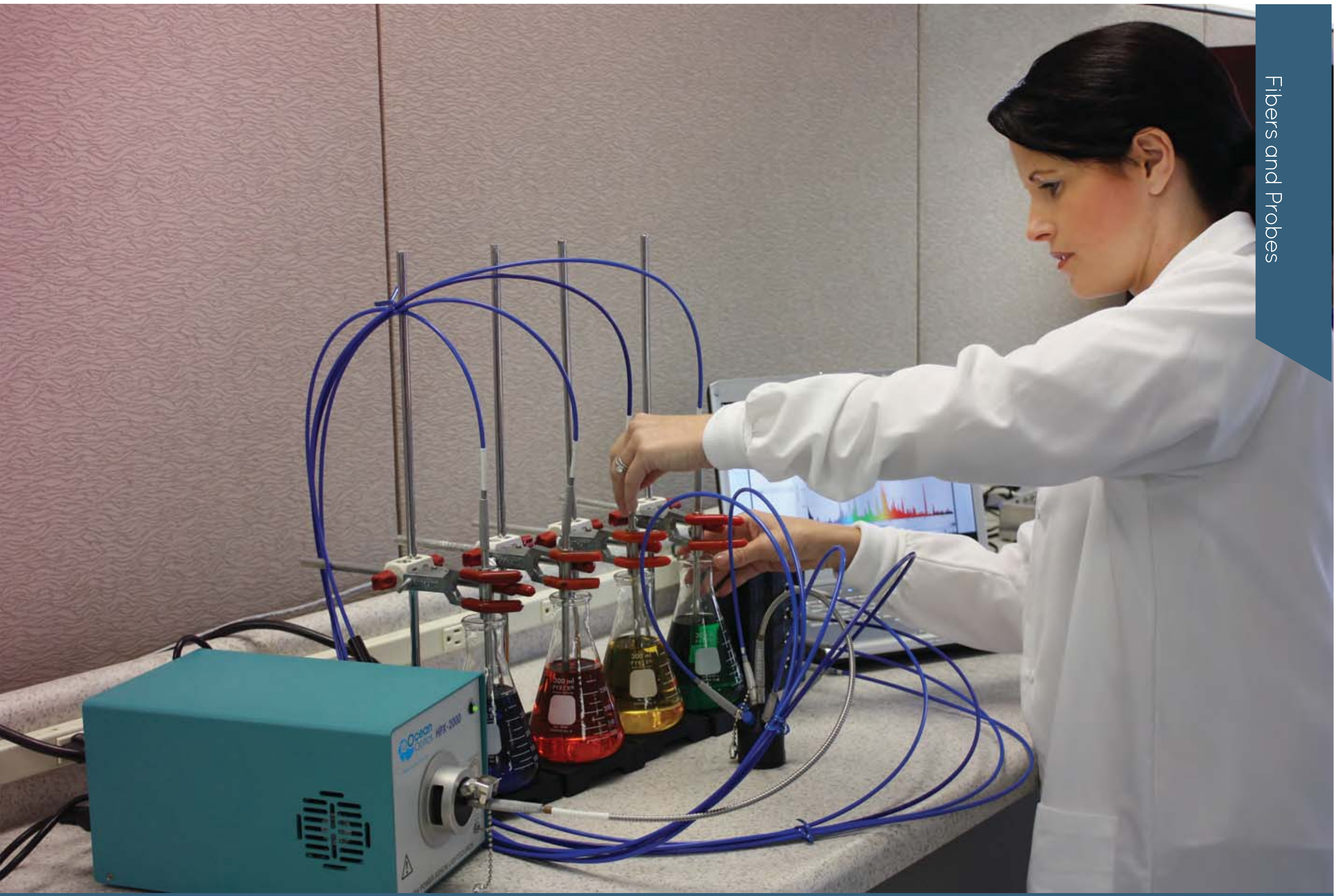
Available Items	
MPM-2000-UV-VIS400-1X16	1x input 16x output channels, RS-232 controlled, 24VDC. 400 µm fiber
MPM-2000-UV-VIS400-2X8	2x input 8x output channels, RS-232 controlled, 24VDC. 400 µm fiber
MPM-2000-VIS400-1X16	1x input 16x output channels, RS-232 controlled, 24VDC. 400 µm fiber
MPM-2000-VIS400-2X8	2x input 8x output channels, RS-232 controlled, 24VDC. 400 µm fiber
MPM-2000-VIS600-1X16	1x input 16x output channels, RS-232 controlled, 24VDC. 600 µm fiber
MPM-2000-VIS600-2X8	2x input 8x output channels, RS-232 controlled, 24VDC. 600 µm fiber
MPM-2000-UV-VIS600-1X16	1x input 16x output channels, RS-232 controlled, 24VDC. 600 µm fiber
MPM-200-UV-VIS600-2x8	2x input 8x output channels, RS-232 controlled, 24VDC. 600 µm fiber

Fiber Optic Variable Attenuator

Our FVA-UV Fiber Optic Variable Attenuator is an opto-mechanical device that helps you control the amount of light transmitted between two fibers. Fibers screw into either side of the FVA-UV via SMA 905 connectors with collimating lenses that project light across a metal disk in which a slit has been cut. The width of the slit varies as a function of manually adjusted radial position. Rotating the disc varies the attenuation from 0-100% uniformly across a 200-2000 nm wavelength range.

Item Code: FVA-UV Fiber Optic Variable Attenuator, FVA-ADP Adapter for FVA-UV

Specifications	
Dimensions:	38.1 mm x 59.4 mm x 40 mm
Weight:	90 g
Assembly ports:	3/8-24 threads for collimating lenses
Wheel lock:	6-32 nylon thumbscrew
ADP adapter:	Directly attaches to a light source with a collimating lens
Connector:	SMA 905



Fibers and Probes

Ocean Optics provides the most flexible line of optical fibers available. We craft our standard and custom fiber assemblies to provide you years of reliable, accurate results. You can depend on Ocean Optics for everything from one-off patch cords and custom assemblies to OEM builds for virtually any application you can imagine.

Our fiber accessories, fixtures and fiber assembly kits allow you to easily connect or manipulate fibers and integrate them into the most challenging application setups.

Tip

To get the most from your Ocean Optics optical fiber, it's important to use special care in handling. Never bend or wind fibers tightly and always store in a cool, dry place.