OceanOptics

Catalog of Products

We Measure What Matters

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VOL. 0125

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Spectrometers

Ocean Optics pioneered the concept of modular, miniature spectroscopy to offer more flexibility in your optical sensing applications. Our line of spectrometer models ranges from the world's most popular general purpose miniature spectrometers to compact, scientific-grade units that perform as well as most high-priced laboratory-grade systems. Our spectrometers meet the needs of users across a wide range of industries, including scientific discovery, OEM development, healthcare, industrial process control, manufacturing, and food and beverage. Our expertise comes from assisting you in designing the optimum spectroscopy system for your needs, a service we've provided for more than 150,000 applications.

NIR Spectrometers

High-sensitivity Near Infrared Analysis

NR spectrometers have an enhanced optical bench design for high-sensitivity performance and are available in three convenient configurations – NR-512-1.7 (900-1700 nm), NR-512-2.2 (900-2200 nm) and NR-512-2.5 (900-2500 nm). The NR Series is our flagship NIR spectrometer. NR Spectrometers have Standard Gain and High Gain modes (NR 1.7 and NR 2.2)

Identify Narrow Peaks

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
NR-512-1.7-XX	900 – 1700 nm	1.82– 11.06 nm	150	1100
NR-512-2.2-XX	900 – 2200 nm	3.12– 18.96 nm	100	1500
NR-512-2.5-XX	900 – 2500 nm	4.21– 25.59 nm	75	1700

Integration time	1 ms – 120 s (NR1.7) / 1 ms – 1 s (NR2.2) / 1 – 200 ms (NR2.5)
SNR (single scan @ 10 ms)	13000:1 (NR1.7 SG) 2800:1 (NR1.7 HG) / 10000:1 (NR2.2 SG) 2800:1 (NR2.2 HG) / 7200:1 (NR2.5 SG)
Dynamic Range (Single Scan)	21000:1 (NR1.7 SG) 12000:1 (NR1.7 HG) / 17000:1 (NR2.2 SG) 10300:1 NR2.2 HG)/ 14500:1 (NR2.5 SG)
Dark noise (@ minimum integration time)	2.5 Counts
Corrected Linearity (10-90%)	0.999
Connectors	SMA 905 (input fiber)
Physical dimensions	182 x 110 x 47 mm
Weight	1.15 kg (spectrometer); 450 g (power supply)
Temperature (operation)	10 °C – 35 °C
Slit Options	10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size
Temperature (Storage)	-30 °C – 70 °C[1]
***Resolution Slit Size Dependent**	

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

QE Spectrometers

High Sensitivity and Great Flexibility

QE is a versatile, high sensitivity, high dynamic range spectrometer ideal for general-purpose and low light level applications such as fluorescence and Raman analysis. The spectrometer has a back-thinned CCD detector with high quantum efficiency and onboard spectral buffering to ensure data integrity at high collection rates.

Robust Optical Design

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
QEPRO-UV250-XX	200 – 790 nm	1.2 – 5.34 nm	400	250
QEPRO-UVV300-XX	220 – 650 nm	0.8 – 3.56 nm	600	300
QEPRO-N750-XX	640 – 810 nm	0.4 – 1.78 nm	1200	750
QEPRO-N500-XX	790 - 1000 nm	0.8 -3.56 nm	900	500
QEPRO-N1000-XX	780 – 1100 nm	0.8 – 3.56 nm	600	1000
QEPRO-XR200-XX	190 – 980 nm	1.62 – 7.21 nm	300	200
QEPRO-XR500-XX	200 - 990 nm	1.62 – 7.21 nm	300	300
QEPRO-XR300-XX	300 - 1100 nm	1.62 – 7.21 nm	300	500
QEPRO-RAMAN-785-XX	785 - 1027 nm	0.52 - 2.31 nm	830	800
QEPRO-RAMAN-638PLUS-XX	638 - 780 nm	0.3 -1.33 nm	1350	675
QEPRO-RAMAN-532-PLUS-XX	532 - 700 nm	0.4 - 1.78 nm	1200	540
QEPRO-UV-VIS-10	200 - 775 nm	1.2 nm	400	250
QEPRO-VIS-NIR-10	350 - 925 nm	1.2 nm	400	400
Integration time	8 ms – 60 min			
SNR (single scan @ 10 ms)	1,000:1			
Dynamic Range (Single Scan)	85,000:1			
Dark noise (@ minimum integration time)	2.5 Counts			
Corrected Linearity (10-90%)	99.90%			
Connectors	SMA 905 (input fiber)			
Physical dimensions	182 x 110 x 47 mm			
Weight	1.15 kg (spectrometer); 450 g (power supply)			
Temperature (operation)	0 °C – 55 °C			
Temperature (Storage)	-30 °C – 70 °C			
Communication	USB, RS-232			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

HR6 Spectrometers

High Sensitivity and Excellent Resolution

HR6 spectrometers offer high sensitivity, high resolution, and excellent SNR performance for applications including absorbance of proteins and emission of broadband sources. HR6 is a great choice for measurements requiring sub-nanometer optical resolution.

High Sensitivity

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
HR-6UV220-XX	180– 400 nm	0.12 – 1.23 nm	1800	Holographic
HR-6UV240-XX	185 – 280 nm	0.08 – 0.8 nm	2400	Holographic
HR-6UV250-XX	180 – 400 nm	0.17 – 1.69 nm	1200	Holographic
HR-6UVV250-XX	180 – 870 nm	0.53 – 5.39 nm	400	250 nm
HR-6UVV300-XX	200 – 650 nm	0.35 – 3.54 nm	600	300 nm
HR-6UVV330-XX	250 – 790 nm	0.44 – 4.47 nm	500	330 nm
HR-6VIS400-XX	350 – 800 nm	0.345 – 3.54 nm	600	400 nm
HR-6VIS450-XX	450 – 500 nm	0.08 – 0.8 nm	2400	Holographic
HR-6VIS500-XX	400 – 840 nm	0.35 – 3.54 nm	600	500 nm
HR-6VIS550-XX	450 – 650 nm	0.17 – 1.69 nm	1200	Holographic
HR-6VIS600-XX	530 – 630 nm	0.12 – 1.23 nm	1800	Holographic
HR-6VN400-XX	340 – 1025 nm	0.52 – 5.39 nm	400	400 nm
HR-6VN750-XX	520 – 950 nm	0.35 – 3.54 nm	600	750 nm
HR-6N500-XX	750 – 1000 nm	0.27 – 2.77 nm	900	500 nm
HR-6N750-XX	750 – 900 nm	0.17 – 1.69 nm	1200	750 nm
HR-6N1000-XX	750 – 1100 nm	0.35 – 3.54 nm	600	1000 nm
HR-6XR200-XX	200 – 1000 nm	0.71 – 7.24 nm	300	200 nm
HR-6XR300-XX	200 – 1100 nm	0.71 – 7.24 nm	300	Composite
HR-6XR500-XX	190 – 1100 nm	0.71 – 7.24 nm	300	500 nm
Integration time	7.2 ms – 5 s			
SNR (single scan @ 10 ms)	400:1			
SNR (max. per second w/High Speed Averaging Mode)	3,500:1			
Connectors	SMA, TFM-108-02-L-DH Samtec, USB Type-C			
Physical dimensions	148.8 x 106.4 x 48.2 mm			
Ethernet dimensions	148.8 X 106.4 X 65.3 mm (Optional)			
Weight	0.9306 kg			
Temperature (operation)	0 °C – 55 °C			
Temperature (storage)	-30 °C – 70 °C			
Communication	USB, RS-232, Ethernet (Optional)			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

HR4 Spectrometers

High Resolution and Low Stray Light

HR4 is a high resolution spectrometer with rapid acquisition speed and great thermal stability for applications from plasma monitoring to DNA/RNA analysis. HR4 is compact and robust, with enhanced electronics to ensure reliable performance.

High Resolution

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
HR-4UV220-XX	250 – 400 nm	0.08 - 1.07 nm	1800	Holographic
HR-4UV250-XX	190 - 413 nm	0.12 - 1.60 nm	1200	Holographic
HR4UVV250-XX	190 – 880 nm	0.4 - 5.36 nm	400	250 nm
HR4UVV300-XX	200 - 660 nm	0.26 - 3.48 nm	600	300 nm
HR4UVV330-XX	250 – 700 nm	0.36 - 4.82 nm	500	330 nm
HR4VIS400-XX	350 – 800 nm	0.26 - 3.48 nm	600	400 nm
HR4VIS450-XX	450 – 500 nm	0.06 - 0.80 nm	2400	Holographic
HR4VIS500-XX	400 – 850 nm	0.26 - 3.48 nm	600	500 nm
HR4VIS550-XX	450 – 650 nm	0.12 - 1.60 nm	1200	Holographic
HR4VIS600-XX	530 – 645 nm	0.08 - 1.07 nm	1800	Holographic
HR4VN400-XX	340 – 1025 nm	0.40 - 5.36 nm	400	400 nm
HR4VN750-XX	520 - 955 nm	0.26 - 3.84 nm	600	750 nm
HR4N500-XX	735 – 1000 nm	0.17 - 2.27 nm	900	500 nm
HR4N750-XX	750 – 900 nm	0.12 -1.60 nm	1200	750 nm
HR4N1000-XX	750 – 1100 nm	0.26 - 3.48 nm	600	1000 nm
HR4XR200-XX	200 – 1100 nm	0.54 -7.23 nm	300	200 nm
HR4XR300-XX	200 – 1100 nm	1.04 - 5.06 nm	300	Composite
HR4XR500-XX	190 – 1100 nm	0.54 - 7.23 nm	300	500 nm
Integration time	3.8ms-10s			
SNR (single scan @ 10 ms)	250:1			
SNR (max. per second w/High Speed Averaging Mode)	3000:1			
Connectors	SMA, TFM-108-02-L-DH Samtec, USB Type-C			
Physical dimensions	148.8 x 106.4 x 48.2 mm			
Ethernet dimensions	148.8 X 106.4 X 65.3 mm (Optional)			
Weight	0.9306 kg			
Temperature (operation)	0 °C – 55 °C			
Temperature (storage)	-30 °C – 70 °C			
Communication	USB, RS-232, Ethernet (Optional)			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

HR2 Spectrometers
High Speed

HR2 spectrometers provide reliable performance for applications with higher light levels and rapid acquisition speeds such as plasma monitoring and pharmaceuticals absorbance analysis. Its design makes HR2 ideal for integrating into OEM's and process applications.

Fast Acquistion Speeds

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
HR-2UV220-XX	250 – 400 nm	0.12 – 1.22 nm	1800	Holographic
HR-2UV250-XX	190 - 413 nm	0.17 – 1.68 nm	1200	Holographic
HR-2UVV250-XX	190 – 880 nm	0.52 – 5.36 nm	400	250 nm
HR-2UVV300-XX	200 – 650 nm	0.35 – 3.52 nm	600	300 nm
HR-2UVV330-XX	250 – 700 nm	0.44 – 4.44 nm	500	330 nm
HR-2VIS400-XX	350 – 800 nm	0.35 – 3.52 nm	600	400 nm
HR-2VIS450-XX	450 – 500 nm	0.08 – 0.77 nm	2400	Holographic
HR-2VIS500-XX	400 – 850 nm	0.35 – 3.52 nm	600	500 nm
HR-2VIS550-XX	450 – 650 nm	0.17 – 1.68 nm	1200	Holographic
HR-2VIS600-XX	530 – 645 nm	0.12 – 1.22 nm	1800	Holographic
HR-2VN400-XX	340 – 1025 nm	0.53 – 5.36 nm	400	400 nm
HR-2VN750-XX	530 - 967 nm	0.35 – 3.52 nm	600	750 nm
HR-2N500-XX	735 – 1000 nm	0.27 – 2.75 nm	900	500 nm
HR-2N750-XX	750 – 900 nm	0.16 – 1.68 nm	1200	750 nm
HR-2N1000-XX	750 – 1100 nm	0.35 – 3.52 nm	600	1000 nm
HR-2XR200-XX	200 – 1000 nm	0.71 – 7.19 nm	300	200 nm
HR-2XR300-XX	200 – 1100 nm	0.71 – 7.19 nm	300	Composite
HR-2XR500-XX	190 – 1100 nm	0.71 – 7.19 nm	300	500 nm
Integration time	1 µs – 2 s			
SNR (single scan @ 10 ms)	380:1			
SNR (max. per second w/High Speed Averaging Mode)	25,800:1			
Connectors	SMA, TFM-108-02-L-DH Samtec, USB Type-C			
Physical dimensions	148.8 x 106.4 x 48.2 mm			
Ethernet dimensions	148.8 X 106.4 X 65.3 mm (Optional)			
Weight	0.9306 kg			
Temperature (operation)	0 °C – 55 °C			
Temperature (storage)	-30 °C – 70 °C			
Temperature (storage)	-30 °C – 70 °C			
Communication	USB, RS-232, Ethernet (Optional)			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

SR6 Spectrometers

High Sensitivity in compact form

SR6 spectrometers offer excellent SNR and UV response for applications including UV absorbance, fluorescence and plasma monitoring. SR6 is a valued as a one-off setup for the lab or a customized system for high-volume industrial and OEM applications.

Compact Design and High Sensitivity

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
SR-6UV220-XX	180-400 nm	0.36 nm – 2.88 nm	1800	Holographic
SR-6UV240-XX	180-510 nm	0.54 nm – 4.32 nm	1200	Holographic
SR-6UVV240-XX	180-850 nm	1.17 nm – 9.36 nm	600	240 nm
SR-6UVV300-XX	180-900 nm	1.17 nm – 9.36 nm	600	300 nm
SR-6UVV400-XX	180-900 nm	1.17 nm – 9.36 nm	600	400 nm
SR-6VIS400-XX	350-1000 nm	1.17 nm – 9.36 nm	600	400 nm
SR-6VN500-XX	350-1040 nm	1.17 nm – 9.36 nm	600	500 nm
SR-6N750-XX	570-860 nm	0.54 nm – 4.32 nm	1200	750 nm
SR-6N1000-XX	600-1100 nm	1.17 nm – 9.36 nm	600	1000 nm
SR-6XR250-XX	190-1050 nm	1.44 nm – 11.52 nm	500	250 nm
Integration time	7.2ms-5s			
SNR (single scan @ 10 ms)	400:1			
SNR (max. per second w/High Speed Averaging Mode):	3500:1			
Connectors	USB Type-C, SMA, 16 pin Samtec TFM, RS-232			
Physical Dimensions	88.1 x 63.5 x 31.45 mm			
Ethernet Dimensions	88.1 X 63.5 X 50.1 mm (Optional)			
Weight	275 g			
Temperature (operation)	0 °C – 55 °C			
Temperature (storage)	-30 °C to 70 °C			
Commuincation	USB, RS-232, Ethernet (Optional)			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

SR4 Spectrometers

High Resolution in compact form

SR4 spectrometers offer high SNR and thermal wavelength stability for applications including plasma monitoring and reflection measurements. The spectrometer is anchored by a CCD-array detector and low-noise electronics for accurate, reliable results.

Compact Design and Powerful Performance

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
SR-4UV220-XX	190-410 nm	0.42 nm – 3.36 nm	1800	Holographic
SR-4UV240-XX	190-535 nm	0.58 nm – 4.62 nm	1200	Holographic
SR-4UVV240-XX	190-850 nm	1.17 nm – 9.24 nm	600	240 nm
SR-4UVV300-XX	190-910 nm	1.17 nm – 9.24 nm	600	300 nm
SR-4UVV400-XX	190-910 nm	1.17 nm – 9.24 nm	600	400 nm
SR-4VIS400-XX	350-1040 nm	1.17 nm – 9.24 nm	600	400 nm
SR-4VN500-XX	350-1040 nm	1.17 nm – 9.24 nm	600	500 nm
SR-4N750-XX	570-860 nm	0.58 nm – 4.62 nm	1200	750 nm
SR-4N1000-XX	600-1050 nm	1.17 nm – 9.24 nm	600	1000 nm
SR-4XR250-XX	190-1050 nm	1.43 nm – 11.34 nm	500	250 nm
Integration time	3.8ms-10s			
SNR (single scan @ 10 ms)	250:1			
SNR (max. per second w/High Speed Averaging Mode):	3000:1			
Connectors	USB Type-C, SMA, 16 pin Samtec TFM, RS-232			
Physical Dimensions	88.1 x 63.5 x 31.45 mm			
Ethernet Dimensions	88.1 X 63.6 X 50.1 mm (Optional)			
Weight	275 g			
Temperature (operation)	0 °C – 55 °C			
Temperature (storage)	-30 °C to 70 °C			
Communication	USB, RS-232, Ethernet (Optional)			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
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SR2 Spectrometers

High Speed in compact form

SR2 spectrometers provide a potent combination of spectral acquisition speed and high SNR for versatility without the trade-offs of comparable spectrometers. SR2 is ideal for applications including laser characterization, plasma monitoring, and absorbance concentration.

Compact Design and High Speed Detection

Item	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
SR-2UV220-XX	185-410 nm	0.28 nm – 2.96 nm	1800	Holographic
SR-2UV240-XX	200-530 nm	0.42 nm – 3.78 nm	1200	Holographic
SR-2UVV240-XX	185-850 nm	0.86 nm – 7.61 nm	600	240 nm
SR-2UVV300-XX	195-850 nm	0.86 nm – 7.61 nm	600	300 nm
SR-2UVV400-XX	185-850 nm	0.86 nm – 7.61 nm	600	400 nm
SR-2VIS400-XX	380-1050 nm	1.38 nm – 6.99 nm	600	400 nm
SR-2VN500-XX	350-1040 nm	0.86 nm – 7.66 nm	600	500 nm
SR-2N750-XX	570-860 nm	0.58nm - 4.34 nm	1200	750 nm
SR-2N1000-XX	600-1100 nm	0.84 nm – 7.44 nm	600	1000 nm
SR-2XR250-XX	185-1050 nm	1.44 nm – 11.52 nm	500	250 nm
Integration Time	1 µs – 2 s			
SNR (single scan @ 10 ms)	380:1			
SNR (max. per second w/High Speed Averaging Mode):	25800:1			
Connectors	USB Type-C, SMA, 16 pin Samtec TFM, RS-232			
Physical Dimensions	88.1 x 63.5 x 31.45 mm			
Ethernet Dimensions	88.1 X 63.5 X 50.1 mm (Optional)			
Weight	275 g			
Temperature (operation)	0 °C – 55 °C			
Temperature (storage)	-30 °C to 70 °C			
Communication	USB, RS-232, Ethernet (Optional)			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

ST Spectrometers
Smallest form factor

ST is a powerful microspectrometer that provides excellent UV response in an ultracompact footprint. Despite its small size and lightweight, Ocean ST delivers full spectral analysis at a performance level comparable to larger and more expensive spectrometers.

Compact Design

Specifications	Wavelength Range	Optical resolution (FWHM)*	Grating Groove Density (lines/mm)	Grating Blaze Wavelength
ST-UV-XX	180 – 650 nm	2.2 - 13nm	600	300
ST-VIS-XX	350 – 810 nm	2.2 - 13nm	600	500
ST-NIR-XX	646 – 1085 nm	2.2 - 13nm	600	1000
Integration time	3.8 ms – 6 s			
SNR (single scan @ 10 ms)	190:1			
SNR (max. per second w/High Speed Averaging Mode)	2,250:1			
Connectors	SMA 905 (input fiber)			
Physical dimensions	42.1 x 40.3 x 26.6 mm			
Weight	70 g			
Temperature (operation)	0 °C – 55 °C			
Temperature (storage)	-30 °C – 70 °C			
Communication	USB, RS-232			
Slit Options	5, 10, 25, 50, 100, 200 µm Note: Item - XX = Slit Size			
***Resolution Slit Size Dependent**				

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Spectroscopy Kits
Solids

ESSENTIAL

Essential Sample I SL-KIT-ST-SAM **645-1085 nm**

ST-NIR-10

ISP-REFL

QP600-025-VIS-NIR

WS-1

ENHANCED

Enhanced Sample I LQ-KIT-SR-SAM **220-800 nm**
(220-1050 nm potential)

SR-6XR250-10

ISP-REFL

QP600-025-VIS-NIR

WS-1

SUPERIOR

Superior Sample I SL-KIT-HR-SAM **400-1100 nm**
(190-1100 nm potential)

HR-2XR500-10

ISP-REFL

QP600-025-VIS-NIR

WS-1

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Spectroscopy Kits

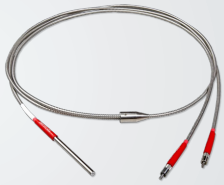
Solids

ESSENTIAL

Essential Bulk I SL-KIT-ST-BLK **645-1085 nm**

ST-NIR-10

ECOVIS



QR400-7-VIS-NIR

WS-1

ENHANCED

Enhanced Bulk I SL-KIT-SR-BLK **400-1050** nm(190-1050 nm potential)

SR-6XR250-10

HL-2000

QR400-7-UV-VIS

WS-1

SUPERIOR

Superior Bulk I SL-KIT-HR-BLK **190-1100 nm**

HR-6XR500-200

DH-2000-S-DUV-TTL

QR400-7-UV-VIS

WS-1-SL

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Spectroscopy Kits
Liquids

ESSENTIAL

Essential Sample I LQ-KIT-ST-SAM **350-810 nm**

ST-VIS-10

ECOVIS

QP230-025-XSR

CVD-UV1S

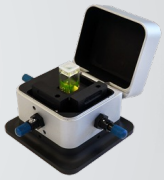
ENHANCED

Enhanced Sample I LQ-KIT-SR-SAM **220-800 nm**
(220-1050 nm potential)

SR-2XR250-10

PX-2

QP600-025-XSR



SQ1-ALL

CVD-UV1S

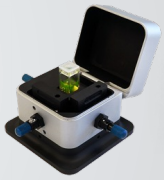
SUPERIOR

Superior Sample I LQ-KIT-HR-SAM **190-1100 nm**

HR-2XR500-10

DH-2000-S-DUV-TTL

QP600-025-XSR



SQ1-ALL

CVD-UV1S

Hint: Add a fiber and cuvettes to the Essential Bulk Kit to provide the Essential Sample Kit approach as well

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Spectroscopy Kits

Liquids

ESSENTIAL

Essential Bulk I LQ-KIT-ST-BLK **350-810 nm**

ST-VIS-10

ECOVIS

T300-RT-UV-VIS

RT-10MM

ENHANCED

Enhanced Bulk I LQ-KIT-SR-BLK **220-800 nm**
(220-1050 nm potential)

SR-2XR250-10

PX-2

T300-RT-UV-VIS

RT-10MM

SUPERIOR

Superior Bulk I LQ-KIT-HR-BLK **190-1100 nm**

HR-2XR500-10

DH-2000-S-DUV-TTL

T300-RT-UV-VIS

RT-10MM

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Spectroscopy Kits
Plasma/Emission

ESSENTIAL

Essential | PL-KIT-ST | 185-650 nm

ST-UV-25

QP600-1-XSR

CC-3-UV-S

ENHANCED

Enhanced SR2 | PL-KIT-SR2 | 220-1050 nm

SR-2XR250-25

QP600-1-XSR

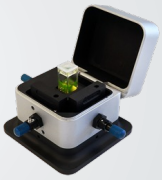
CC-3-UV-S

FLUORESCENCE

Fluorescence Sample Option | FL-KIT-SAM

LED-GP-KIT
Includes 280nm, 365nm, 470nm,
3689K LED's Controller+Case

QP600-025-XSR



SQ1-ALL

CVFL-Q-10

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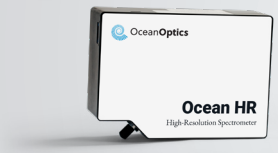
Spectroscopy Kits

Plasma/Emission

SUPERIOR

Superior Sample I PL-KIT-HR **220-1100 nm**



HR-4XR500-25

QP600-1-XSR

CC-3-UV-S

ENHANCED

Enhanced SR4 I PL-KIT-SR **220-1050 nm**

SR-4XR250-25

QP600-1-XSR

CC-3-UV-S

FLUORESCENCE

Fluorescence Bulk Option | FL-KIT-BLK

LED-GP-KIT

QR400-7-UV-VIS

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Spectroscopy Kits
Color

ESSENTIAL

Color Essential | CLR-KIT-ST 350-810 nm

ST-VIS-10

ISP-REFL

QP600-025-UV

WS-1

ENHANCED

Color Enhanced-SR2 | CLR-KIT-SR2 350-910 nm
(220-910 nm potential)

SR-2UVV400-10

ISP-REFL

QP600-025-UV

WS-1

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
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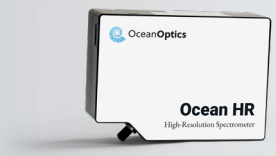
Spectroscopy Kits
Color

SUPERIOR

Color Superior I CLR-KIT-HR 350-1025 nm



HR-6VN400-10

ISP-REFL

QP600-025-VIS-NIR

WS-1

ENHANCED

Color Enhanced- SR6 I CLR-KIT-SR 350-910 nm
(200-910 nm potential)

SR-6UVV400-10

ISP-REFL

QP600-025-UV

WS-1

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

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Spectroscopy Kits
Biofluid

ESSENTIAL

Biofluid Sample I BIO-KIT-ST 185-650 nm

ST-UV-10

DH-2000-S-DUV-TTL

T300-RT-UV-VIS

RT-10MM

ENHANCED

Biofluid Enhanced I BIO-KIT-SR 220-910 nm

SR-2UVV300-10

DH-2000-S-DUV-TTL

T300-RT-UV-VIS

RT-10MM

SUPERIOR

Biofluid Superior I BIO-KIT-HR 220-880 nm

HR-2UVV250-10

DH-2000-S-DUV-TTL

T300-RT-UV-VIS

RT-10MM

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Light Sources

Our line of cleverly designed light sources covers the entire UV-NIR wavelength range and combines innovation with reliability to give you serious performance and precision. These low-cost, modular light sources feature SMA 905 connectors for quick and easy connection. From design features like built-in filter slots to optional accessories such as direct-attach cuvette holders, nothing is more convenient and simple to use than Ocean Optics light sources.

TIP
For long bulb life and accurate results, always allow your Ocean Optics light source to warm up for the recommended amount of time prior to use. See manuals for details.

Light Sources

Sources for Illumination, Excitation and Calibration

The development of Ocean Optics miniature spectrometers created the need for comparably sized and priced accessories, including light sources. Since no such sources existed, we developed our own compact, modular sources for illumination, excitation and calibration.

Our light sources for illumination cover various wavelength ranges to enable absorbance, transmission and reflectance measurements from the deep UV to the mid-IR. Light-emitting diodes produce output for fluorescence measurements. For fast, reliable spectrometer wavelength calibrations, we offer a range of options. Design features such as built-in filter slots, combined with optional accessories such as direct-attach cuvette holders, make sampling simple.

Modular Light Source Options

UV Light Sources
We offer deuterium sources for UV absorbance and reflectance measurements. Our pulsed xenon lamps (PX-2, HPX-2000) are long-life sources for absorbance, reflectance and fluorescence measurements, and for measuring optically or thermally labile samples.

UV-VIS-NIR
Combination Deuterium and Tungsten Light Sources used as single illumination sources for UV-NIR measurements (DH-2000 series).

VIS-Mid-IR Light Sources
Tungsten halogen sources (HL-2000 series) are standard VIS-NIR light sources for absorbance, reflectance of solid objects, and color measurement.

High-Powered LEDs

The LSM LEDs are controlled by the LDC-1 single channel driver and controller. This controller is required for LED operation.

LSM series LED light sources are ideal for fluorescence excitation and other measurements requiring narrowband illumination. The innovative optical design of the LSM LED family provides highly efficient coupling into an optical fiber, ensuring high power for fluorescence excitation where every photon counts.

Radiometrically Calibrated Light Sources

Radiometric calibrated sources (DH-3P-CAL, HL-3P-CAL) are used to calibrate the absolute spectral intensity of a system in irradiance/radiance applications.

Wavelength Calibration Sources
Wavelength calibration sources (HG-2, NE-2, AR-2, KR-2, XE-2) are used to calibrate the wavelength axis of the spectrometer.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Deuterium-Tungsten Halogen

UV-Vis-NIR Light Source

Product Details

Whether you are studying a sample that has multiple features in different areas or you analyze a variety of different samples in your lab, the use of a light source that covers a wide spectral range is useful.

Combination deuterium and tungsten halogen light sources fit the bill. From measuring organics and small molecules to the near-IR absorption of plastics and polymers, a combination light source allows you to extend the capabilities of your measurement. Using a combination of two lamps or a single lamp that has a wide spectral output, the entire UV-Visible-NIR range can be explored.

Product Overview

Deuterium and tungsten halogen - two powerful light sources combined in a single optical path from ~200-2500 nm

Integrated filter holder holds optical filters to condition the light prior to coupling into the fiber optic cable.

TTL control (model-dependent) allows the deuterium and halogen bulbs to be turned on/off individually and remotely

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Deuterium-Tungsten Halogen UV-VIS-NIR Light Source Table

Item	DH-2000-BAL Light Source	DH-2000-FHS-DUV-TTL Light Source	DH-2000-S-DUV-TTL UV-Vis-NIR Light Sources
Wavelength Range	210nm - 2.5µm	190nm - 2.5µm	190nm - 2.5µm
Source	Deuterium & Tungsten Halogen	Deep-UV Deuterium & Tungsten Halogen	Deep-UV Deuterium & Tungsten Halogen
Shutter	Yes	Yes	Yes
Fiber Connector	SMA 905	SMA 905	SMA 905
Nominal Bulb Power	25 W (deuterium), 20 W (tungsten halogen)	20 W (tungsten halogen), 26 W (deuterium)	20 W (tungsten halogen), 26 W (deuterium)
Typical Output Power	194 µW (deuterium), 615 µW (tungsten halogen)	217 µW (deuterium), 295 µW (tungsten halogen)	585 µW (deuterium), 990 µW (tungsten halogen)
Integrated Cuvette Holder	No		
Power Requirements	85-264 V 50/60 Hz	85-264 V, 50/60 Hz	85-264 V, 50/60 Hz
Description	DH-2000-BAL balanced deuterium halogen source	DH-2000 deuterium and halogen source	DH-2000 deuterium and halogen source
Dimensions	150 mm x 135 mm x 319 mm	151 mm x 135 mm x 319 mm	152 mm x 135 mm x 319 mm
Weight	3.5 kg	3.5 kg	3.5 kg
Power consumption	25 W (deuterium); 20 W (tungsten halogen)	26 W (deuterium); 20 W (tungsten halogen)	27 W (deuterium); 20 W (tungsten halogen)
Wavelength range	190-400 nm (deep-UV deuterium bulb); 215-2500 nm (standard deuterium and tungsten halogen bulbs)	190-400 nm (deep-UV deuterium bulb); 215-2500 nm (standard deuterium and tungsten halogen bulbs)	190-400 nm (deep-UV deuterium bulb); 215-2500 nm (standard deuterium and tungsten halogen bulbs)
Humidity	5-95% without condensation at 40 °C	5-95% without condensation at 40 °C	5-95% without condensation at 40 °C
Lamp current	Operating 85 V/0.3A	Operating 85 V/0.3A	Operating 85 V/0.3A
Lamp lifetime	1,000 hours	1,000 hours	1,000 hours
Lamp voltage	Ignition 580 V at 20 °C	Ignition 580 V at 20 °C	Ignition 580 V at 20 °C
Current voltage drift	<0.01% per hour	<0.01% per hour	<0.01% per hour
Current voltage stability	<5 x 10^6 peak-to-peak (0.1-10.0 Hz)	<5 x 10^6 peak-to-peak (0.1-10.0 Hz)	<5 x 10^6 peak-to-peak (0.1-10.0 Hz)
Operating temperature	5 °C - 35 °C	6 °C - 35 °C	7 °C - 35 °C
Power requirements	85-264 V 50/60 Hz	85-264 V 50/60 Hz	85-264 V 50/60 Hz
Radiation characteristic	Aperture 0.5 mm, numerical aperture 26° (13°); focused	Aperture 0.5 mm, numerical aperture 26° (13°); focused	Aperture 0.5 mm, numerical aperture 26° (13°); focused
Total power	100 W	101 W	102 W
Power consumption	Approximately 78VA	Approximately 78VA	Approximately 78VA
Warm-up time	40 minutes (deuterium); 20 minutes (tungsten halogen)	41 minutes (deuterium); 20 minutes (tungsten halogen)	42 minutes (deuterium); 20 minutes (tungsten halogen)
Markings	CE; VDI/VDE 0160; EN 61010	CE; VDI/VDE 0160; EN 61011	CE; VDI/VDE 0160; EN 61012

DH-2000

Balanced Deuterium Tungsten Halogen Light Source

Our DH-2000 Deuterium Tungsten Halogen Light Source combines the continuous spectrum of deuterium and tungsten halogen light sources into a single optical path for powerful output from 215-2500 nm. In addition, Deep-UV versions of our DH-2000 are available with a 190-2000 nm range.

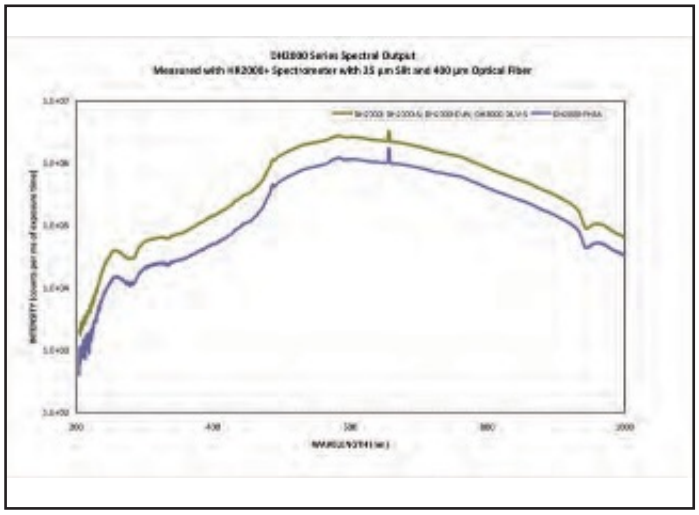
Options and Accessories: Shutter and Filter Holder

Integrated shutters are available for your DH-2000 and can be driven by either a switch or a TTL signal.

You can also include a filter holder with the source that accepts filters up to 4 mm in thickness and as large as 25 mm square or 25 mm round. The DH-2000 has an SMA 905 connector for easy coupling to our spectrometers and accessories via an optical fiber.

Adjustable Power

The DH-2000 has a potentiometer (located on the back) that adjusts the intensity of the tungsten halogen output. This allows you to adjust the optical power of the light source from 10-100%.



FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

DH-2000-BAL

Balanced Deuterium Tungsten Halogen Light Source

We've applied our expertise in patterned dichroic filters to create the only combined-spectrum illumination source available that eliminates saturation and signal-to-noise issues associated with the D-alpha line in deuterium sources. Our DH-2000-BAL Deuterium Tungsten Halogen Light Source combines deuterium and tungsten halogen light sources into a single optical path that produces a powerful, stable output from 215-2500 nm.

About the D-alpha Line

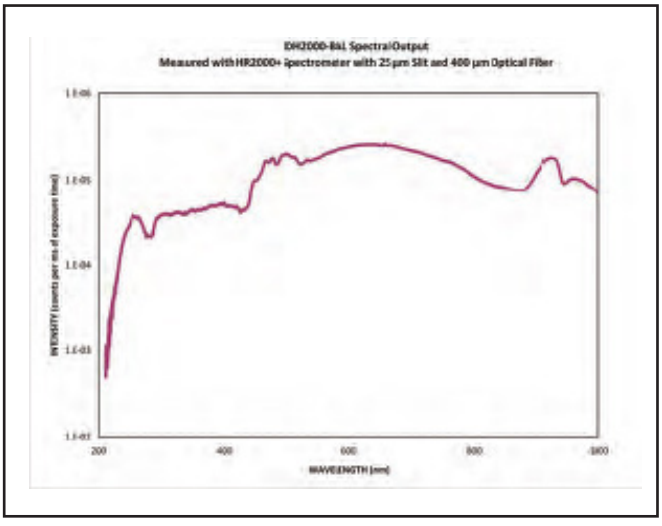
All deuterium-tungsten halogen sources have a D-alpha line, revealed as a jagged peak in the visible portion of the spectrum, that produces"unbalanced" output in the deuterium and tungsten halogen sources. Correcting for this deuterium line – a sharp spectral feature near 655 nm – is difficult.

For example, if you adjust the spectrometer integration time to reduce the intensity of this saturated spectral line, the efficiency of the system at UV wavelengths drops significantly, compromising signal-to-noise performance. Also, spectrometer efficiency

is greatest at about the same spectral range as the 655 nm line, exaggerating its effects.

Proprietary Filtering Technology

Using the same high-precision patterned dichroic filter technology that distinguishes our Linear Variable Filters, the DH-2000-BAL balances the intensity of the deuterium and tungsten halogen sources, producing a "smoother" spectrum across the entire wavelength range and eliminating problems associated with saturation. By comparison, most combination UV-NIR sources can be adjusted for relative intensity only.



Xenon Light Sources

Rapid Acquisition Speed and High Thermal Stability

Product Details:

Xenon light sources offer very high intensity in the UV and are useful for absorbance, fluorescence or reflectance measurements. Pulsed xenon sources are high intensity with a lower duty cycle, making them ideal for measurements where high intensity UV light can damage the sample.

Standard and high power output options are available.

Ocean Optics xenon sources have an SMA 905 output connector and seamlessly integrate with our fiber optic spectrometers and accessories, including optical fibers, cuvette holders, probes and other sampling optics.

Product Overview:

Wavelength coverage - sources provide broadband output from UV through NIR.

High power option - has a nominal bulb of 75 W.

Pulse-to-pulse stability - excellent performance for long-duration experiments.

Adjustable flash rate - helps to optimize measurements of light sensitive samples.

Simple experiment setup - control of flash rate and synchronization via software.

Product: PX-2 Pulsed Xenon Lamp

Wavelength Range	Source	Shutter	Fiber Connector	Average Output Power	Description
220nm - 750nm	Pulsed Xenon	Yes	SMA 905	9.9 W	PX-2 Pulsed Xenon Lamp

Product: HPX-2000 Xenon Light Source

Wavelength Range	Source	Nominal Bulb Power	Typical Output Power	Shutter	Fiber Connector	Power Requirements	Description
185nm - 2µm	HPX-2000 Xenon Light Source	35 W	1.52 mW	Yes	SMA 905	85-264 V, 50/60 Hz	HPX-2000 Xenon Light Source

PX-2

Pulsed Xenon Light Source

Versatile UV Source

The PX-2 Pulsed Xenon Lamp is a high flash rate, short-arc xenon lamp for the UV (220-750 nm). It's great for applications requiring absorbance, reflection, fluorescence and phosphorescence measurements, and is especially suited for measuring optically or thermally labile samples. The PX-2 operates at speeds up to 220 Hz, offers excellent pulse-to-pulse stability and has two trigger modes for software control of the flash rate.

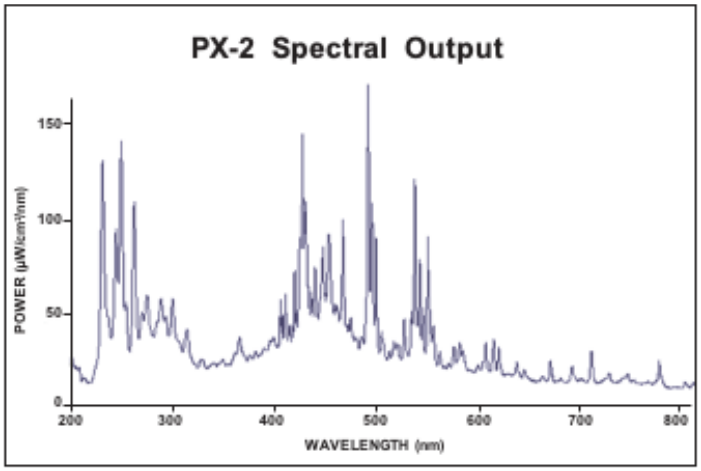
About the PX-2

Any external TTL positive pulse can be used to trigger the PX-2. With the PX-2 coupled to a USB Series spectrometer, you can easily synchronize the operation of both the light and the detector. The spectrometer sampling can be altered so that a variable number of flashes are observed during each integration period.

The Multiple mode of light source operation is useful for absorbance and reflection applications because it ensures steady, consistent light exposure for each integration period.

In the Single mode of PX-2 operation, a single flash occurs during each integration period. The flash rate is modified by changing the integration period. Because it produces a pulsed signal, the PX-2 is less likely to contribute to solarization in optical fiber assemblies, which can occur when fibers are illuminated with a signal <300 nm.

Specifications	
Spectral range:	220-750 nm
Approximate dimensions:	140 mm x 105 mm x 40 mm (LWH)
Power input:	1.3 A @ 11V @ 220 Hz
	100 mA @ 12V @ 10Hz
Trigger input:	External TTL positive pulse via 15-pin connector
Trigger output:	45 microjoules per pulse maximum 9.9 watts average power from bulb (not the same as power coming out of fiber; see graph at right) 220 Hz pulse rate maximum
Pulse duration	5 microseconds (at 1/3 height of pulse)
Lifetime:	109 pulses (estimated 230 days continuous operation at 50 Hz pulse rate)
Aperture:	3 mm
Connector:	SMA 905
Timing signals available:	Multiple mode: up to 220 Hz (varies with A/D sampling frequency); Single mode: varies with scan rate



HPX-2000

High-Powered Continuous Wave Xenon Light Source

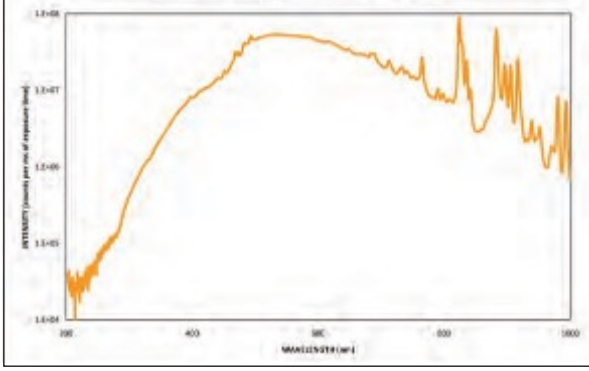
High Power Output

The HPX-2000 Xenon Light Source is a high-power source that is a brilliant companion for fluorescence applications and other applications where a high-intensity lamp is necessary. The 35-watt, short-arc lamp supplies a continuous spectrum from the UV through the NIR (185-2000 nm).

Integrated Shutter

The HPX-2000 features an integrated shutter that can be triggered by either a switch or by a TTL signal. The HPX-2000 also comes equipped with a slot for filters up to 25 mm in diameter or 25 mm square and up to 14 mm thick.

HPX-2000 (35W) Series Spectral Output



Measured with an HR Spectrometer with 25 µm Slit and 400 µm Optical Fiber

Ordering Information	
Item	Description
HPX-2000	35-watt, continuous-wave xenon light source (185-2000 nm

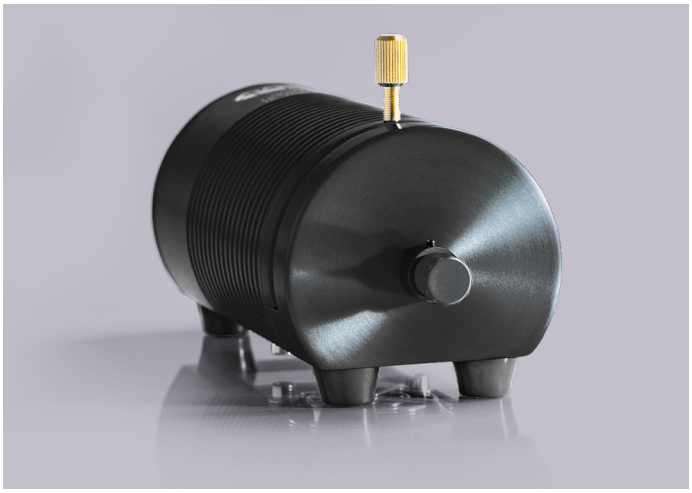
Specifications	
Dimensions:	145 mm x 165 mm x 260 mm
Weight:	5 kg
Power consumption:	60 W AC
Wavelength range:	185-2000 nm
Power output:	35 watts
Trigger input:	External TTL positive pulse via 15-pin connector (shutter)
Bulb lifetime:	1,000 hours minimum; 2,000 hours typical
Connector:	SMA 905

Replacing the Bulb

The HPX-2000 bulb may require replacement with prolonged use or breakage. In such cases, customers have two options:

- Remove the bulb module and send it to Ocean Optics for bulb replacement (REPAIR-HPX-1). You'll pay modest fees for the bulb and labor. Typical turnaround is several weeks.
- Order a new bulb module (HPX-2000-BM) and replace the entire bulb assembly in the field. Although this option is slightly more expensive, it's more convenient and can be accomplished relatively quickly.

Tungsten Halogen Light Sources



Product Details:

Ocean Optics offers sturdy, reliable tungsten halogen light sources to meet your application requirements. From high-power to long-lifetime models, our HL-2000 product family provides flexibility for your lab for measurements from 360-2400 nm.

All HL-2000 models have an integrated fan to keep the source cool and stable, and a built-in holder that accommodates filters for conditioning the light. Some models include an integrated shutter and long-lifetime bulb. A universal power supply makes setup quick and easy.

Product Overview:

Visible-NIR wavelengths - sources provide output from 360-2400 nm

Fiber optic - maximize light throughput with adjustable focus and alignment of the SMA 905 connector

Standard and enhanced models, optional configurations offer high power or long lamp lifetime.

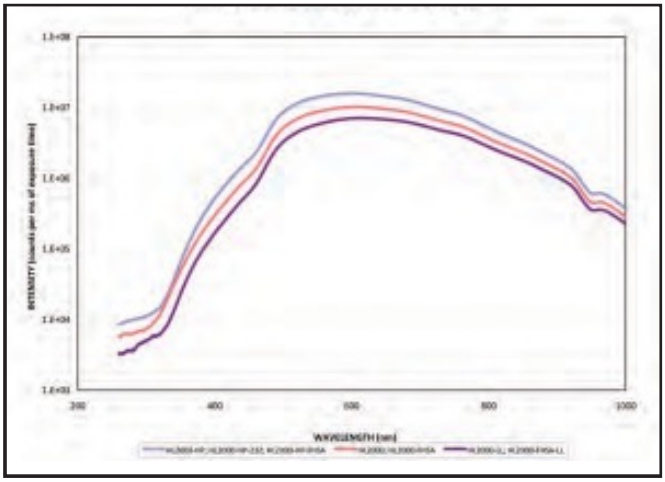
Item	HL-2000-LL-FHSA Light Source	HL-2000-LL Light Source	HL-2000-HP Light Source	HL-2000-HP-FHSA Light Source
Wavelength Range	360nm - 2400nm	360nm - 2400nm	360nm - 2400nm	360nm - 2400nm
Source	Long Lifetime Tungsten Halogen	Long Lifetime Tungsten Halogen	High-powered Tungsten Halogen	High-powered Tungsten Halogen
Typical Output Power	4.5 mW	4.7 mW	8.8 mW	8.4 mW
Shutter	Yes	No	No	Yes
Fiber Connector	SMA 905	SMA 905	SMA 905	SMA 905
Integrated Cuvette Holder	No	No	No	No
Power Requirements	12 VDC	12 VDC	24 VDC	24 VDC
Description	Tungsten Halogen Long Lifetime Light Source	Tungsten Halogen Long Lifetime Light Source	Tungsten Halogen High Power Light Source	Tungsten Halogen High Power Light Source

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

HL-2000

Tungsten Halogen Light Source



Item	Description
HL-2000	Tungsten halogen light source, 1,500-hour bulb
HL-2000-LL	Long-life version (10,000-hour)
HL-2000-LL-LVF	Long-life version with slot for linear-variable filters
HL-2000-FHSA	Includes filter holder, attenuator and shutter
HL-2000-FHSA-LL	Long-life version (10,000-hour); includes filter holder, at- tenuator and shutter
HL-2000-HP	High-powered, 20 W version
HL-2000-HP-FHSA	High-powered, 20 W version with filter holder, attenuator and shutter
HL-2000-HP-LVF	High-powered, 20 W version with slot for linear-variable filters
HL-2000-HP-232R	High-powered, 20 W version, rack-mounted, with RS-232 control
HL-2000-B	Spare 1,500-hour bulb
HL-2000-B-LL	Long-life 10,000-hour spare bulb
HL-2000-HP-B	High-power spare bulb

The HL-2000 Tungsten Halogen Light Sources are versatile lamps that are optimized for the VIS-NIR (360-2500 nm) range. The HL-2000 is available in several versions, including a model (HL-2000-FHSA) that has a shutter for dark measurements, a slot that accepts filters up to 25.4 mm round or 50.8 mm square and an attenuator to control the intensity of the light source from 0-100%.

Smart Features

- Available with 10,000-hour, long-life bulb
- High-power version available that doubles your output power
- Fan cooled with shutter, TTL and manual attenuator functions
- RS-232 interface option to access shutter and attenuator

High-power Version

For applications requiring strong VIS-NIR output and using large-diameter optical fibers or fiber and probe bundles, a special high-power version of the HL-2000 is available. The bulb used in the HL-2000-HP is a 20-watt bulb. In addition, you can opt to control the intensity of the HL-2000-HP via an RS-232 module.

Replacement Bulbs Product Details:

Replacement bulbs and accessories are available for Ocean Optics light sources. Here's what we offer for tungsten halogen light sources:

HL-2000-B-LL -- for use with long-life HL-2000-LL series sources; 10,000-hr. lifetime, 2800 K

HL-2000-HP-B -- for use with high-power HL-2000 series sources; 1,000-hr. lifetime, 3000 K

Product Overview:

Bulb options - replacement bulbs for tungsten halogen sources

Easy replacement - replace bulbs in minutes

HL-2000, HL-2000-LL Standard Sources	
Dimensions:	62 mm x 60 mm x 150 mm
Weight:	500 g
Bulb power consumption:	7 watts
Output to bulb:	1.4 A @ 5 VDC
Wavelength range:	360-2500 nm
Stability:	0.5%
Drift:	<0.3% per hour
Time to stabilize:	~5 minutes 1,500 hours
Bulb lifetime	1500 hours
Bulb color temperature:	2,960 K
Temperature:	5 °C - 35 °C
Humidity:	5-95% at 40 °C

HL-2000-HP High-Power Sources	
Dimensions:	62 mm x 60 mm x 150 mm
Weight:	500 g
Bulb power consumption:	20 watts
Output to bulb:	1.66 A @ 12 VDC
Wavelength range:	360-2000 nm
Stability:	0.5%
Drift:	<0.3% per hour
Time to stabilize:	~5 minutes
Bulb lifetime	2,000 hours
Bulb color temperature:	3,000 K
Temperature:	5 °C - 35 °C
Humidity:	5-95% at 40 °C

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

LED Light Sources

Product Details:

The LSM LEDs are controlled by the LDC-1 single channel driver and controller. This controller is required for LED operation.

LSM series LED light sources are ideal for fluorescence excitation and other measurements requiring narrowband illumination. The innovative optical design of the LSM LED family provides highly efficient coupling into an optical fiber, ensuring high power for fluorescence excitation where every photon counts.

LSM LEDs are available in discrete wavelengths ranging from 310-880 nm and in a warm white option with color temperature of 3000K. LSM LEDs accommodate multiple mounting options (DIN rail, optical bench, rack) and are supplied with a rugged plastic case for carrying multiple LEDs and accessories.

Product Overview:

The LSM LEDs are controlled by the LDC-1 single channel driver and controller. This controller is required for LED operation.

LSM LED options - UV, Visible, NIR and broadband wavelengths

LED control module - compact single channel driver and smart controller (LDC-1)

Visible kit versions - includes the controller plus 405 nm, 470 nm, 533 nm and 635 nm wavelengths

Additional wavelength options - select from UV (310 and 365 nm) wavelengths, or purchase with a mix of wavelength models (310, 365, 470 nm and 3000K warm white)

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

LED Kits

VIS LED Kit: 405, 470, 533, 635 nm + Controller and Case

Item	LDC-1 Single Channel LED Controller
Fiber Connector	SMA 905
Power Requirements	15 VDC power supply, 30W MAX
Description	LED Controller & Accessories
Dimensions	90.8mm L X 142.6mm W x 87.5mm H
Weight	0.82 kg
Power requirements	15 VDC wall transformer (included)
Power consumption	2A (maximum) at 15 VDC
BNC Source Current when Output	150mA maximum @ 3.3
Humidity	<95% Relative humidity, non-condensing
Altitude	0 m to 3050 m (0 ft. to 10,006 ft.)
Temperature	0°C to 35°C (+32°F to +95°F)

Product Overview:

LSM LED options -- UV, Visible, NIR and broadband wavelengths

LED control module -- compact single channel driver and smart controller

Kit versions -- include the controller plus UV, Visible, a mix of wavelengths, or all wavelengths

Product Details:

LSM LEDs are available in discrete wavelengths ranging from 310-880 nm and in a warm white option with color temperature of 3000K. LSM LEDs accommodate multiple mounting options and are supplied with a rugged plastic case.

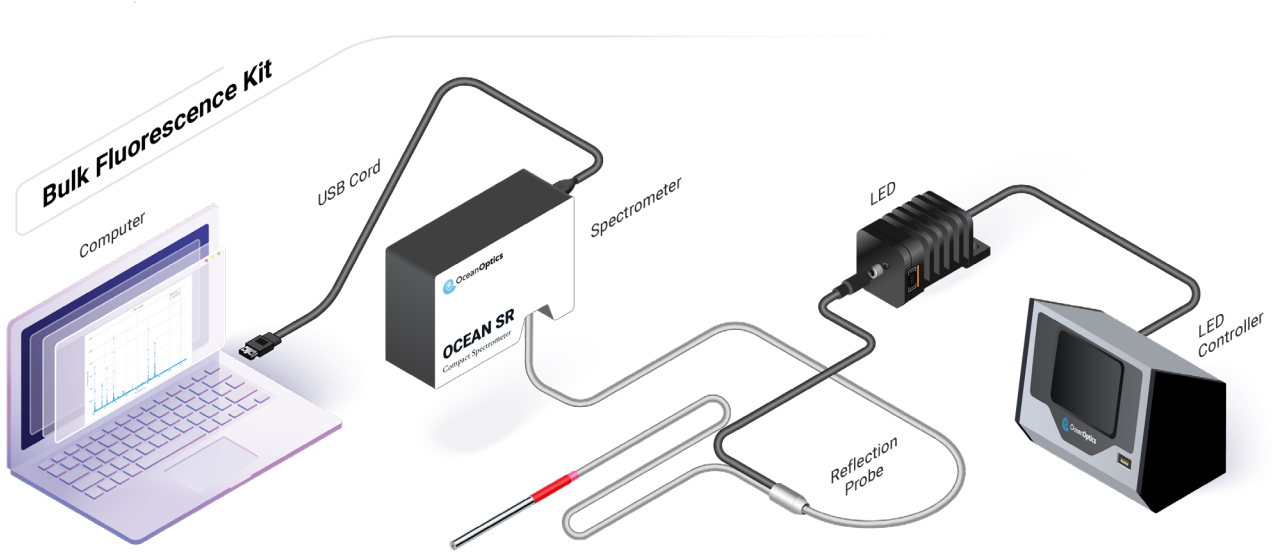
Kit versions (the controller plus selected wavelength units) cover Visible (405, 470, 533, 635 nm) wavelengths, or can be purchased with a mix of wavelength models (365, 470 nm and 3000K warm white). A kit with all wavelengths is also available.

Product	LDC-CABLE	LDC-1 LED Controller Case Accessory	LDC-1 LED Controller Power Supply Kit	LDC-1 LED Controller Rack Mount Kit
Power Requirements			Power Supply Replacement for the LDC Controller	
Description	LSM Control Cable REPLACEMENT control cable for connecting a LSM to an LDC	LED Kit Case Hard plastic case for storing the LDC, power supply, up to eleven individual LEDs	Power Supply Replacement for the LDC Controller	Rack Mount Kit Allows for mounting a LDC and LSM into a 19 Rack

LED Light Source

Product Data Table

Item	Source	Typical Output Power	Fiber Connector	Description
LSM-310A LED Light Source	LED	0.21 mW	SMA 905	310 nm UV LEDs
LSM-365A LED Light Source	LED	10.08 mW	SMA 905	365 nm UV LEDs
LSM-385A LED Light Source	LED	15.95 mW	SMA 905	385 nm UV LEDs
LSM-405A LED Light Source	LED	10.26 mW	SMA 905	Visible 405 nm LED
LSM-470A LED Light Source	LED	3.15 mW	SMA 905	470 nm Visible LEDs
LSM-533A LED Light Source	LED	1.96 mW	SMA 905	533 nm Visible LED
LSM-635A LED Light Source	LED	2.68 mW	SMA 905	635 nm Visible LED
LSM-880A LED	LED	0.84mW	SMA 905	880 nm NIR LED
LSM-WARM-WHITE	LED	6.41 mW	SMA 905	LSM-WARM WHITE Broadband LED



FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Spectrometer Wavelength Calibration Sources

Product Details:

Spectrometer wavelength calibration sources are available for convenient, reliable spectrometer calibration across UV-NIR wavelengths.

Options include mercury-argon (253-923 nm), krypton (427-893 nm), neon (540-754 nm), argon (696-1704 nm) and xenon (916-1984 nm) gas-discharge emission sources. With multiple wavelength options and emission lines to utilize, users can more readily choose a source, or combination of sources, to match analytical wavelengths of interest within the measurement range.

Quick tip: For a modest investment, adding an Ocean Optics wavelength calibration source is the perfect complement for your spectrometer setup. What's more, they're conveniently available for purchase online.

Product Overview:

Gas-discharge sources - produce atomic emission lines for performing reliable spectrometer wavelength calibration

UV-NIR coverage - choose from multiple sources across a broad range of wavelengths

Item	HG-2	AR-2	KR-2	NE-2	XE-2
Wavelength Range	253nm - 1.7µm	696nm - 1.704µm	427nm - 893nm	540nm - 754nm	916nm - 1.984µm
Source	Mercury Argon	Argon	Krypton		Xenon
Fiber Connector	SMA 905	SMA 905	SMA 905	SMA 905	SMA 905
Power Requirements	5 VDC power supply; rechargeable.	5 VDC power supply; rechargeable.	5 VDC power supply; rechargeable.	5 VDC power supply; rechargeable.	5 VDC power supply; rechargeable.

Spectrometer Wavelength Calibration Sources

Full Range of Emission Sources for Hundreds of Applications

We offer gas-discharge emission sources for spectrometer wavelength calibration that cover wavelengths ranging from ~250-2000 nm. With five different options – Mercury-Argon (HG-2), Krypton (KR-2), Neon (NE-2), Argon (AR-2) and Xenon (XE-2) – you can select a source with an optimum number of emission lines in your spectral region of interest. With more emission lines, correcting for baseline drift and related phenomena inherent to all spectrometers is more easily and reliably achieved. Also, many of the most intense emission lines are conveniently printed on each calibration source label.

Table of Emission Lines for Spectrometer Wavelength Calibration Sources

Peak	Lamp	Peak	Lamp	Peak	Lamp	Peak	Lamp	Peak	Lamp
253.652	HG	480.702	XE	692.947	NE	892.869	KR	1362.266	AR
296.728	HG	482.971	XE	703.241	NE	904.545	XE	1363.422	KR
302.150	HG	484.329	XE	717.394	NE	912.297	AR	1365.706	XE
313.155	HG	491.651	XE	724.512	NE	916.265	XE	1367.855	AR
334.148	HG	492.315	XE	733.930	XE	922.450	AR	1371.858	AR
341.790	NE	503.135	NE	738.600	XE	935.422	AR	1382.572	AR
342.391	NE	503.775	NE	739.379	XE	965.779	AR	1390.748	AR
344.770	NE	508.038	NE	740.040	XE	978.450	AR	1409.364	AR
345.076	NE	511.367	NE	743.890	NE	979.970	XE	1414.244	XE
345.419	NE	511.650	NE	747.244	NE	992.319	XE	1442.679	KR
346.052	NE	540.056	NE	748.887	NE	1047.005	AR	1473.281	XE
346.658	NE	546.074	HG	753.577	NE	1067.357	AR	1473.444	KR
347.257	NE	556.222	KR	754.404	NE	1083.837	XE	1504.65	AR
349.806	NE	557.029	KR	755.979	XE	1107.887	AR	1517.269	AR
350.121	NE	576.441	NE	758.468	XE	1117.752	NE	1520.310	KR
351.519	NE	576.960	HG	758.741	KR	1144.183	AR	1532.934	AR
352.047	NE	579.066	HG	760.155	KR	1148.811	AR	1537.204	KR
359.353	NE	582.015	NE	764.391	XE	1152.275	NE	1541.839	XE
360.017	NE	585.249	NE	768.525	KR	1166.871	AR	1598.949	AR
363.366	NE	587.096	KR	769.454	KR	1171.949	AR	1605.328	XE
365.015	HG	588.189	NE	780.265	XE	1181.938	KR	1620.872	KR
368.573	NE	594.483	NE	785.482	KR	1211.233	AR	1647.29	XE
370.122	NE	597.553	NE	788.132	XE	1213.974	AR	1656.023	XE
404.656	HG	602.000	NE	791.343	KR	1220.353	KR	1672.815	XE
407.783	HG	607.433	NE	796.734	XE	1234.339	AR	1689.676	KR
431.958	KR	609.616	NE	805.726	XE	1243.932	AR	1694.058	AR
435.833	HG	612.884	NE	805.950	KR	1248.766	AR	1704.288	AR
436.264	KR	614.306	NE	806.134	XE	1262.339	XE	1755.350	KR
437.612	KR	616.359	NE	810.436	KR	1270.228	AR	1763.882	XE
439.997	KR	621.728	NE	819.006	KR	1273.342	AR	1785.738	KR
445.392	KR	626.649	NE	823.163	XE	1280.274	AR	1790.45	XE
446.369	KR	630.479	NE	826.324	KR	1295.666	AR	1800.223	KR
450.235	KR	633.442	NE	826.652	XE	1300.826	AR	1809.09	XE
452.186	XE	638.299	NE	829.811	KR	1317.741	KR	1816.733	KR
462.420	XE	640.225	NE	837.761	NE	1322.811	AR	1832.53	XE
466.849	XE	650.653	NE	849.536	NE	1322.811	AR	1959.94	XE
469.097	XE	653.288	NE	866.794	AR	1327.264	AR	1984.638	XE
469.804	XE	659.895	NE	877.675	KR	1331.321	AR	2190.851	KR
473.415	XE	667.828	NE	878.375	NE	1336.711	AR		
479.262	XE	671.704	NE	881.941	XE	1350.419	KR		

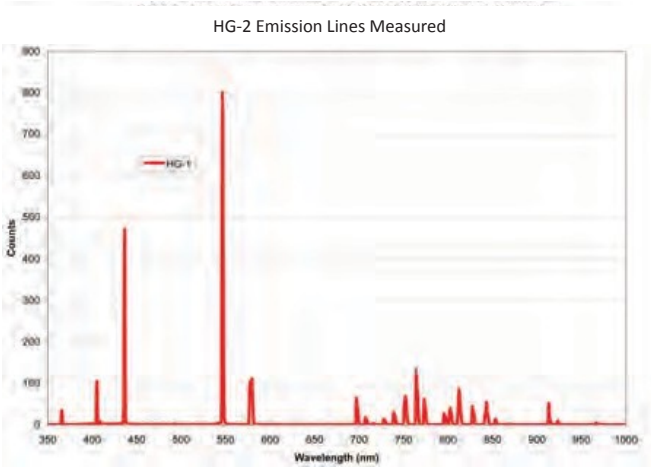
Spectrometer Wavelength Calibration Sources

Compact Sources and Adapters

HG-2 Mercury Calibration Source

Our compact, low-cost HG-2 Mercury Argon Calibration Source is a spectral wavelength calibration source for UV-VIS-Shortwave NIR spectrophotometric systems. The HG-2 produces first order mercury and argon spectral lines from 253-922 nm and second order argon lines to 1700 nm for use in performing fast, reliable spectrometer wavelength calibrations. Easily identifiable mercury and argon spectral emission lines are printed on the HG-2 housing.

HG-2 Emission Lines Measured



Cuvette Wavelength Calibration Adapter

The PS-HG1-ADP Wavelength Calibration Adapter is a 1-cm square fixture that fits into a 1-cm pathlength sample chamber and connects to the AR-1 via optical fiber. (Wavelength calibration standard and fiber are sold separately).

The adapter is designed for performing a wavelength calibration for any spectrometer and 1-cm cuvette holder system, whether it's designed by Ocean Optics or another manufacturer.

Item Code: PS-HG1-ADP

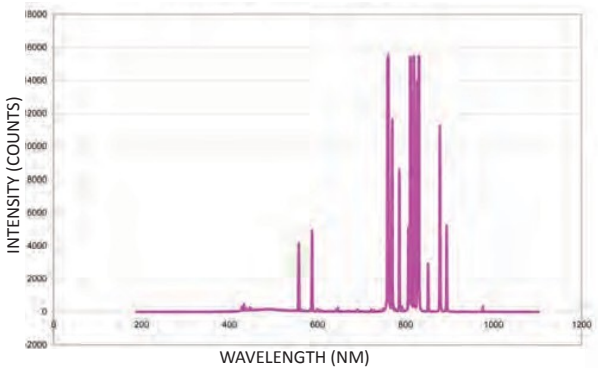
Output:	Low-pressure gas discharge lines of mercury
Spectral range:	253-1700 nm (253-922 nm first order emission lines)
Dimensions (in mm):	125.7 x 70 x 25.8
Power consumption:	250 mA at 12 VDC
Power requirements:	12 VDC wall transformer (included) or 9 VDC battery (additional)
Internal voltage:	600 volts at 30 kHz
Bulb life:	~ 3,500 hours (at 20 mA)
Amplitude stabilization:	~1 minute
Aperture:	3 mm
Connector:	SMA 905

Spectrometer Wavelength Calibration Sources

Compact Sources with Wel-Defined Emission Lines

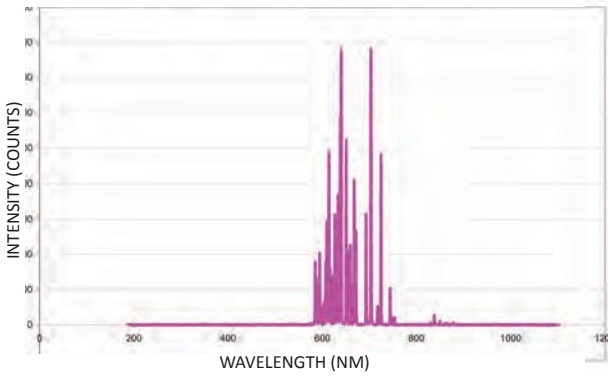
Our spectrometer wavelength calibration sources are available in more models covering more wavelengths than ever before. Those extra emission lines let you calibrate your spectrometer wavelength with greater precision and reliability. And, unlike radiometric sources that require NIST certification, these sources have atomic emission lines that are determined by quantum mechanics. Additionally, there are more emission lines for each source that may be printed on the product label.

KR-2 Emission Lines



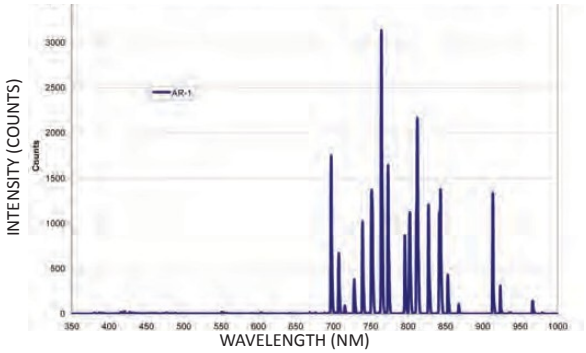
Output	Low-pressure gas discharge lines of Krypton
Spectral range:	427-893 nm
Dimensions (in mm):	125.7 x 70 x 25.8
Power consumption:	250 mA at 12 VDC
Power requirements:	12 VDC wall transformer (included) or 9 VDC battery (optional)
Bulb life:	Approx. 3500 hours (at 20 mA)
Internal voltage:	600 volts at 30 kHz
Aperture:	3 mm
Amplitude stabilization:	~ 1 minute
Connector:	SMA 905

NE-2 Emission Lines



Output	Low-pressure gas discharge lines of Neon
Spectral range:	540-754 nm
Dimensions (in mm):	125.7 x 70 x 25.8
Power consumption:	250 mA at 12 VDC
Power requirements:	12 VDC wall transformer (included) or 9 VDC battery (optional)
Bulb life:	3500 hours (at 20 mA)
Internal voltage:	600 volts at 30 kHz
Aperture:	3 mm
Amplitude stabilization:	~ 1 minute
Connector:	SMA 905

AR-2 Emission Lines Measured



Output	Low-pressure gas discharge lines of Argon
Spectral range:	-1704 nm
Dimensions (in mm):	125.7 x 70 x 25.8
Weight:	40 g
Power consumption:	250 mA at 12 VDC
Power requirements:	12 VDC wall transformer (included) or 9VDC battery (optional)
Bulb life:	~ 3,500 hours (at 20 mA)
Internal voltage:	600 volts at 30 kHz
Aperture:	3 mm
Amplitude stabilization:	~1 minute SMA 905
Connector:	SMA 905

Radiometrically Calibrated Light Sources

Radiometrically calibrated light sources from Ocean Optics are used to calibrate the absolute spectral response of a spectrometer system. Using these light sources and our software, you can determine absolute intensity values across UV, Visible and NIR wavelengths.

An extended-range (to 2400 nm) calibration option is also available, for an additional fee. Contact us for details.

Radiometrically calibrated light sources are carefully characterized to deliver a known quantity of light with very low uncertainty. Each source is measured to NIST-traceable standards, creating an unbroken chain of traceability and providing you with the highest quality and most reliable data.

Quick Tip: Ocean Optics offers radiometric calibration services performed at our ISO 17025-certified lab.

Product Overview:

Stable sources - provide consistent output for the most reliable data

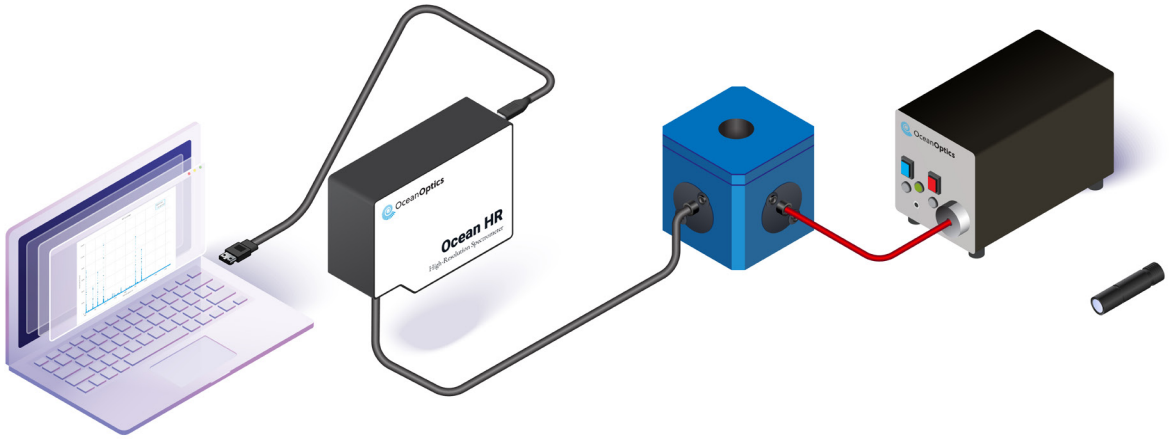
Multiple options - radiometrically calibrated sources for UV-Visible-NIR and Visible-NIR wavelengths; extended-range (to 2400 nm) option available for an additional fee

Digital calibration data - can be loaded into software for absolute intensity data

Applications flexibility - measure LEDs, digital displays and other radiant sources

Radiometric Calibrated Light Sources

Item	DH-3P-CAL Radiometrically Calibrated Light Source	DH-3P-BAL-CAL Radiometrically Calibrated Light Source	HL-3P-CAL Radiometrically Calibrated Tungsten Halogen Light Source	HL-3P-INT-CAL Radiometrically Calibrated Tungsten Halogen Light Sources for Integrating Spheres
Wavelength Range	210nm - 1.1Î¼m	230nm - 1.1Î¼m	350nm - 1.1Î¼m	350nm - 1.1Î¼m
Source	Deuterium & Tungsten Halogen	Deuterium & Tungsten Halogen	Tungsten Halogen	Tungsten halogen
Nominal Bulb Power	25 W (deuterium), 20 W (tungsten halogen)	25 W (deuterium), 20 W (tungsten halogen)	5 W	5 W
Shutter	Yes	Yes	Yes	No
Fiber Connector	SMA 905; CC-3-UV-S or 6.35 mm barrel for cosine corrector	SMA 905; CC-3-UV-S or 6.35 mm barrel for cosine corrector	SMA 905; CC-3	Integrating sphere
Power Requirements	85-264 V, 50/60 Hz	85-264 V, 50/60 Hz	85-264 V, 50/60 Hz	85-264 V, 50/60 Hz
Description	Radiometric Calibrated Deuterium & Tungsten Halogen Light Source	Radiometric Calibrated Deuterium & Tungsten Halogen Light Source	Radiometrically Calibrated Vis-NIR Light Sources	Wavelength Calibration Tungsten Halogen Sources
LSM-WARM-WHITE	LED	6.41 mW	SMA 905	LSM-WARM WHITE Broadband LED



FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Type	Product	Wavelength Range	Output	Measurement Type
Deuterium Tungsten Halogen	DH-2000-BAL DH-2000	~215-2500 nm	Continuous	Absorbance, Fluorescence, Reflectance, Transmission
Calibrated Deuterium Tungsten Halogen	DH-3P-CAL	~220-1050nm	Continuous	Calibration (Radiometric)
Tungsten Halogen	HL-2000	~360-2500nm	Continuous	Absorbance, Fluorescence, Reflectance, Transmission
Calibrated Tungsten Halogen	HL-3P-CAL	~340-2500nm	Continuous	Absorbance, Fluorescence, Reflectance, Transmission
Xenon	PX-2	0.86 nm – 7.61 nm	Pulsed	UV Absorbance, UV Reflectance
Xenon	HPX-2000	220-750 nm	Continuous	UV Absorbance, UV Reflectance
LEDs	Various (LSM-xxx)	Many options from 240 nm-white	Pulsed or Continuous	Absorbance, Fluorescence
Mercury Argon	HG-2	253-1700 nm	Continuous	Calibration (Wavelength)
Argon	AR-2	700-1700 nm	Continuous	Calibration (Wavelength)
Neon	NE-2	540-754 nm	Continuous	Calibration (Wavelength)
Xenon	XE-2	916-984 nm	Continuous	Calibration (Wavelength)
Krypton	KR-2	427-893 nm	Continuous	Calibration (Wavelength)

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

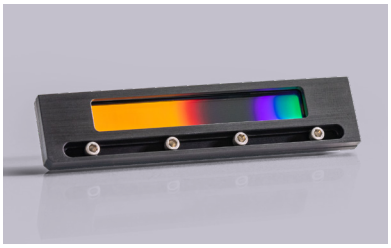
Modifying Light

Ocean Optics products give you countless options for modifying the light transmitted to your spectrometer's detector. Depending on your application needs, we provide a number of methods for changing the way light interacts with your configuration.

For high-intensity applications such as laser characterization, steps must be taken to avoid detector saturation. In other cases, changing the fiber size or adding mirrors to your spectrometer bench may increase light collection efficiency response into the mid-IR.

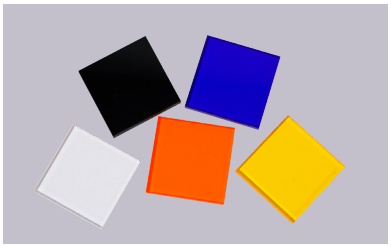
Optical Fiber

Our optical fibers are available in diameters ranging from 8 µm to 1000 µm. If you require more light for your application, you'll want a larger diameter fiber. In the absence of a slit, the fiber connected to the spectrometer acts as the optical bench's entrance aperture.



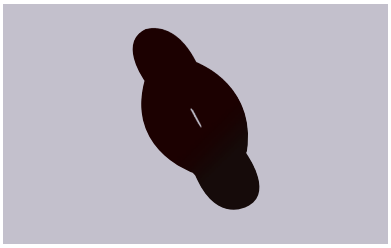
Linear Variable Filters

Our high-pass, low-pass and adjustable bandpass filters have excellent blocking characteristics and resistance to heat. They are ideal for spectrally shaping the light emitted from broadband sources.



Loose Filters

Our loose filters fit into our light sources, cuvette holders and in-line filter holders. High-pass filters eliminate second and third order effects, test for stray light and block excitation energy. Balancing filters absorb energy in some regions while transmitting in others. Bandpass filters pass energy in one region and block light above and below that region.



Entrance Aperture: Slit

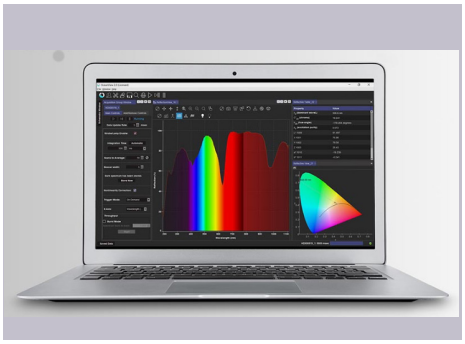
An installed slit acts as the entrance aperture to the optical bench and regulates the amount of light that enters the spectrometer and directly impacts the optical resolution. You specify the slit size. Options range from 5 to 200 µm.

Installed Filters

In addition to the variable longpass filters (order-sorting filters applied to the detector's window), we offer optional bandpass and longpass blocking filters that restrict radiation in certain wavelength regions.

Fiber Optic Variable Attenuator

Our FVA-UV Fiber Optic Variable Attenuator is an opto-mechanical device that helps control the amount of light transmitted between two fibers. This attenuates light uniformly at all wavelengths from the ultraviolet through the near-infrared.



Integration Time

This software setting is similar to the shutter speed of a camera. The higher the value specified, the longer the detector“looks” at incoming photons. Using our companion software, you can adjust this setting to suit different applications.

Neutral Density Filters

With a neutral density filter installed at your light source or sampling device, you can reduce the intensity of light that reaches the detector across all wavelengths. Filters are 2-mm thick and 8 mm in diameter and come in optical density levels of 0.6 (~25% transmis- sion), 1.0 (~10%) and 2.0 (~1%).

Gershun Tube Kits

Gershun Tube Kits are ideal for solar irradiance measurements and feature an SMA 905-terminated barrel that attaches to a fiber or the spectrometer. This provides control of the aperture size. Simply select one of the interchangeable aluminum apertures to adjust the field of view of the device from 1° to 28°.

Light Source Accessories

Parts and Replacement Items

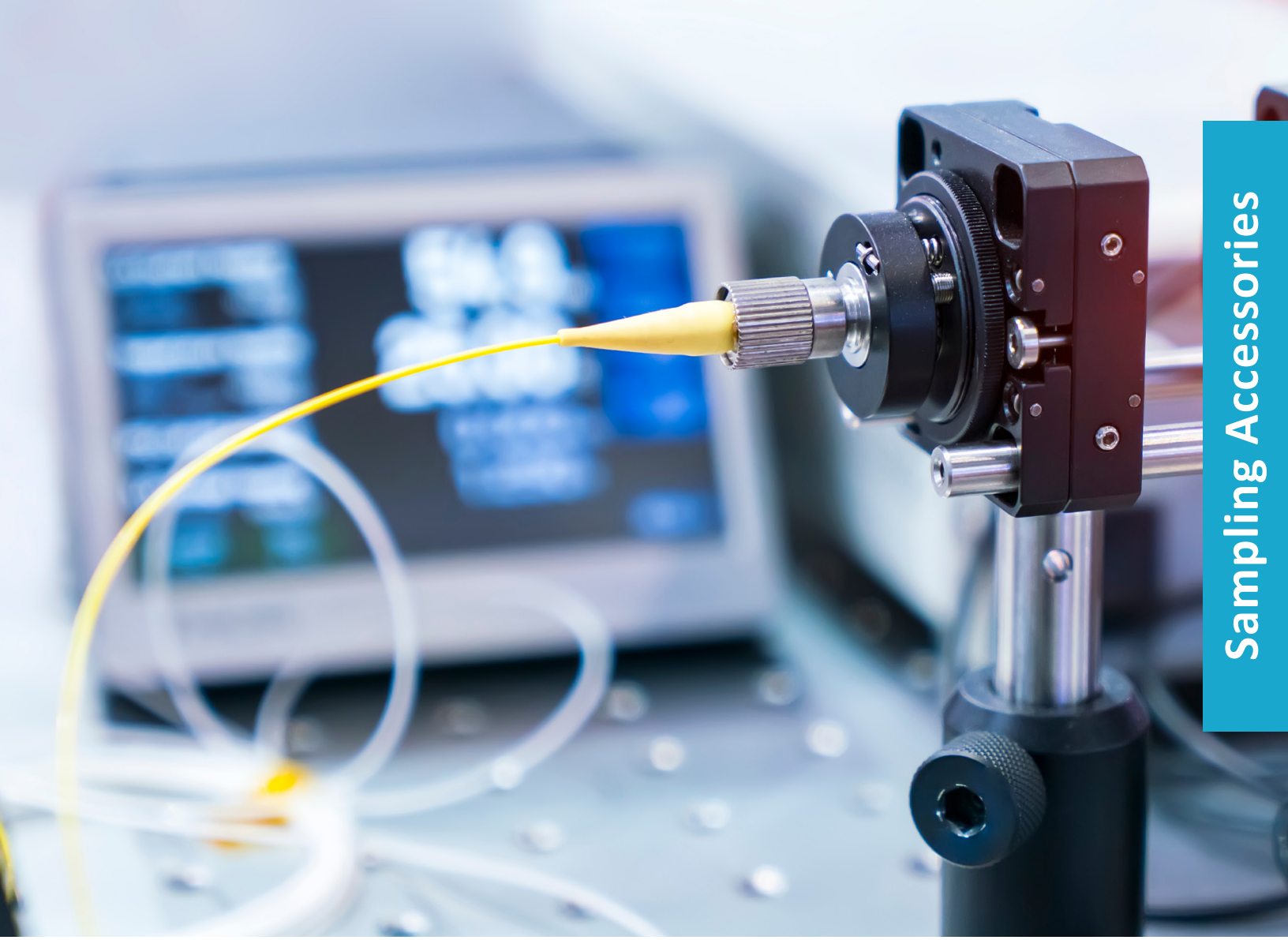
Item	Description
DH-2000-BD	Deuterium Bulb for D-2000 and DH-2000, 215-400 nm, 1000 hrs
DH-2000-BH	Halogen Bulb for all DH-2000s, 360-2500-nm, 900 hrs, 3100K
DH-2000-DUV-B	Deep UV Deuterium Bulb, 190-2000 nm, 1000 hrs
HL-2000-LL-B	Bulb for HL-2000-LL, 10,000 hrs
HL-2000-HP-B	Bulb for HL-2000-HP
REPAIR-HPX	Service charge and bulb fee for factory replacement of HPX-2000 bulb
LS-1-LL-B	Bulb for LS-1-LL, 360-2000 nm, 10,000 hrs, 2800K
PX-2-B	Bulb for PX-2 Lamp
ZGOGGLES	UV Goggles
Power Supplies	
WT-12V	Regulated 12 V universal power supply (1.5A, 110/220 VAC)
WT-24V	24 VDC power supply (110 V)

Bulb for the HL-2000

The DH2000-BH tungsten halogen bulb used in all DH2000s

The DH2000-BD deuterium bulb used in all D-2000s and DH-2000s

Bulb module for the HPX-2000



Sampling Accessories

Our modular components can be easily configured for absorbance, transmission, reflectance, fluorescence, emission or scattering experiments. These fiber optic sampling accessories create the optical interface of our modular spectrometer systems. And, with so many sampling accessories to choose from, Ocean Optics can readily meet the demands of your unique application needs.

Technical Tip:

Collimating lenses are among our most versatile sampling accessories. Lenses convert divergent beams of radiation into a parallel beam and are optimized for UV-NIR wavelengths. With collimating lenses, you can adjust for variables such as FOV, collection efficiency, spatial resolution and lens transmission and acceptance angles.

Sampling Accessories

A Sea of Tools for Sample Handling

Your optimal choice of sampling accessory depends on the application. Are you measuring absorbance, reflectance or emission? Is your sample a solid or solution? Does it have a smooth, even surface or an irregular surface? Do you need to collect radiation from a particular field of view?

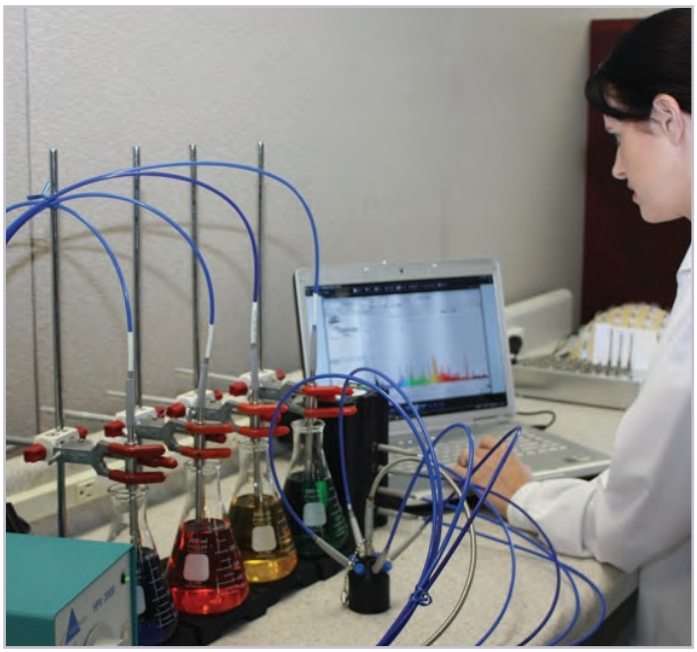
Those are just a few of the many questions that enter into your sampling accessory decision. And, much like your choice of spectrometer and optical bench accessories, the key question is a simple one: Why are you making the measurements?

Example Sampling Accessory Options:

With an extensive line of sampling accessories and the flexibility to switch among them with ease you have many options for tackling your experiment. Consider absorbance: accessories run the gamut from standard labware such as cuvettes and cuvette holders to more sophisticated tools such as flow injection analysis devices. Here are some criteria to consider for your absorbance setup:

Where will you make the measurement?

If you can isolate the sample in a container such as cuvette or test tube, your options extend to cuvette holders and similar devices. If you need to make the measurement in situ – in a process stream, for example -- you'll need a transmission dip probe (see Fibers and Probes section) or flow cell that can be embedded into the sample stream.



What is the optical density of your sample?

The OD of your sample directly affects the pathlength of the device you'll need for your measurement. Cuvette holders, for example, are available with path lengths of 1 cm and 10 cm. The more optically dense the sample, the shorter the path length that's required. On the other hand, low OD solutions require longer path lengths. Use Beer's Law to help you determine the best path length.

What is the sample volume?

The amount of sample you measure also affects your choice of sampling accessory. We offer microvolume-level cuvettes and pipettes for applications with sample volumes as low as 2 µl.

Sampling Accessories

Does your sample require continuous flow?

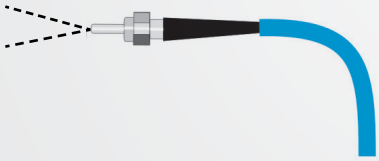
We offer sampling accessories such as flow cells that can be coupled with pumps, tubing and fittings to stream sample fluids for absorbance and other measurements.
That's just absorbance. We also offer nearly 500 sampling accessories for reflectance, emission, fluorescence and other measurements. Our Applications Scientist can help you choose the best option for your application.

What's Your Field of View?

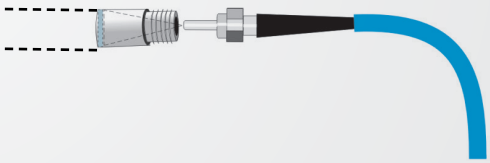
Four of our devices are used to control field of view (FOV) and aperture:

1. Optical Fiber (25° FOV, aperture = fiber diameter)
2. Collimating Lens (0° - 45° FOV, aperture = 3 mm)
3. Cosine Corrector (180° FOV, aperture = 3.9 mm)
4. Integrating Sphere (360° FOV, aperture = 25 mm)

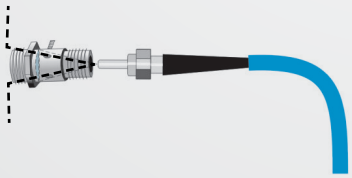
Optical Fiber: 25°



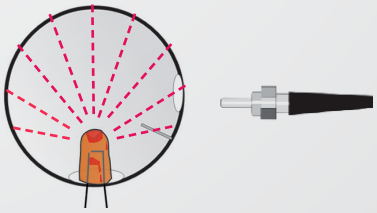
Adjustable Collimating Lens: ~0-45°



Cosine Corrector: ~180°



Integrating Sphere: 360°



Technical Tip

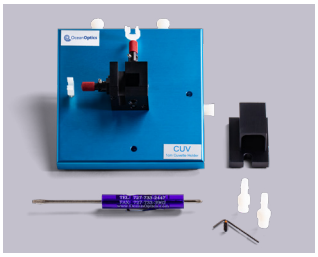
The divergence (α) of a beam focused using a single lens is: tan(α) = d/f where f is the focal length of the lens and d is the aperture of the spectrometer.

Sampling Accessories

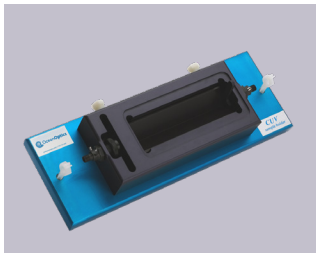
Choosing Your Accessory by Measurement Type

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

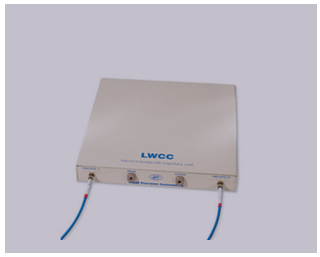
Absorbance and Transmission



1-cm Cuvette Holder
See Page 54



10-cm Cuvette Holder
See Page 54



Longpass Flow Cells
See Page 63

Cuvettes
See Page 57

Linear Variable Filters
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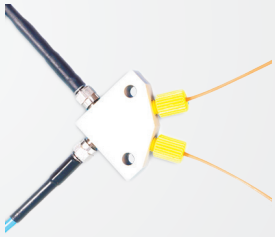

Flow Cells
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Cosine Correctors
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Integrating Spheres
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Collimating Lenses
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Diffuse Reflectance Standards
See Page 73

Integrating Spheres
See Page 68

Multifunction Reflection Stage
See Page 72

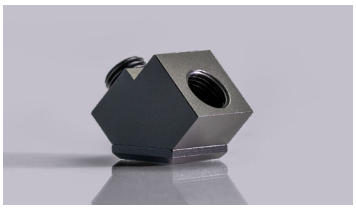
Sampling Accessories
Collimating Lenses

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

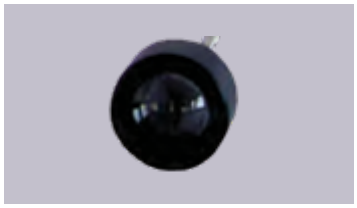
(350-2000 nm) The 74-ACR has two optical elements cemented together to form an achromatic doublet, optimized to correct for spherical and chromatic aberrations.

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.

Sampling Accessories

Collimating Lenses



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	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	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	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	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	200-2000 nm	70 °C	SMA 905, 6.35-mm ferrule, 1/4-36 external thread

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories

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.

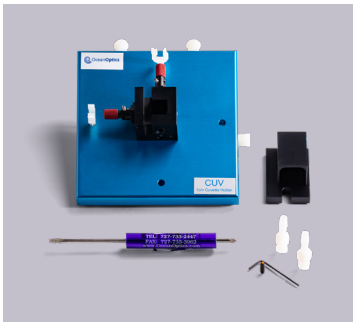
OPM-SMA
Optical Post Mount

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.

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

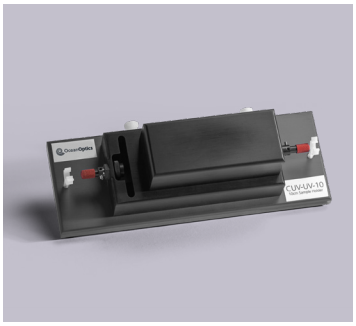
Sampling Accessories

Cuvette Holders



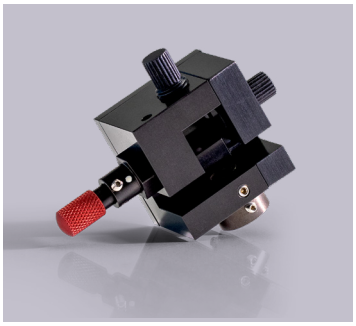
CUV-UV
Holder for 1-cm Cuvettes

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.



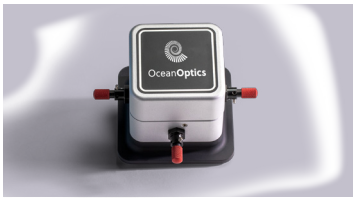
CUV-UV-10
Holder for 10-cm Cuvettes

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.



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.



SQ1-ALL
Square One cuvette holder

The SQ1-ALL curveete holder has 3 collimators, 1-cm path, 2 filter holders, integrated cover 200-2000 nm

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories
Cuvette Holders

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.

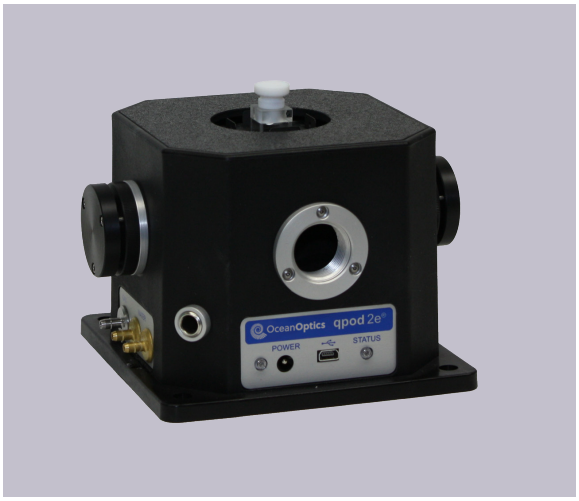
Item	CUV-UV	CUV-UV-10	CUV-FL-DA	SQ1-ALL
Dimensions:	58 mm x 140 mm x 38 mm	97 mm x 147 mm x 40 mm	57 mm x 61 mm x 29 mm	90.6 mm x 90.6 mm x 71.6 mm
Weight:	230 g	1.4 kg	80 g	544.3 g
Pathlength:	1 cm	10 cm	1 cm	1 cm
Z dimension:	15 mm	15 mm	15 mm	15 mm
Filter slot:	Up to 6 mm, screw clamp	Up to 6 mm, wheel clamp	Up to 6 mm, screw clamp	12.5mm aand 25 mm
Water input fittings:	3.175 mm (1/8”) NPT	3.175 mm (1/8”) NPT	NA	NA
Collimating lens:	2 each 74-UV	2 each 74-UV	1 pcs 74-UV	3 each 74-uv
Fiber termination:	SMA 905	SMA 905	SMA 905	SMA 905

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories

Temperature-Regulated Cuvette Holders



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.

Item	Description
QPOD	Temperature-controlled sample compartment external TC 1 Temperature Controller provided without optics
QPOD3	Temperature-controlled sample compartment with internal temperature controller provided without optics
QPOD3-ABSKIT	Absorbance Kit: temperature-controlled sample compartment with internal temperature controller and lenses for absorbance
QPOD3-FLKIT,QPOD3	Fluorescence Kit: temperature-controlled sample compartment with internal temperature controller and lenses for fluorescence
QPOD3-MPKIT,QPOD3	Multipurpose Kit: temperature-controlled sample compartment with internal temperature controller and lenses
QPOD-ABSKIT,QPOD	Absorbance Kit: temperature-controlled sample compartment with external TC 1 Temperature Controller and lenses for absorbance
QPOD-FLKIT,QPOD	Fluorescence Kit: temperature-controlled sample compartment with external TC 1 Temperature Controller and lenses for fluorescence
QPOD-MPKIT,QPOD	Multipurpose Kit: temperature-controlled sample compartment with external TC 1 Temperature Controller and lenses
CUV-QPOD-THERM	Thermistor for the qpod sample compartment

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.

Item	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-COVER	Square cuvette covers for CVD Cuv.,pk of 100. CVD-DIFFUSE,PTFE piece for LVFs used in fluorescence cuvette holders						
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.**

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories

Plastic and Quartz Cuvettes and More

Disposable Cuvettes

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

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

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.

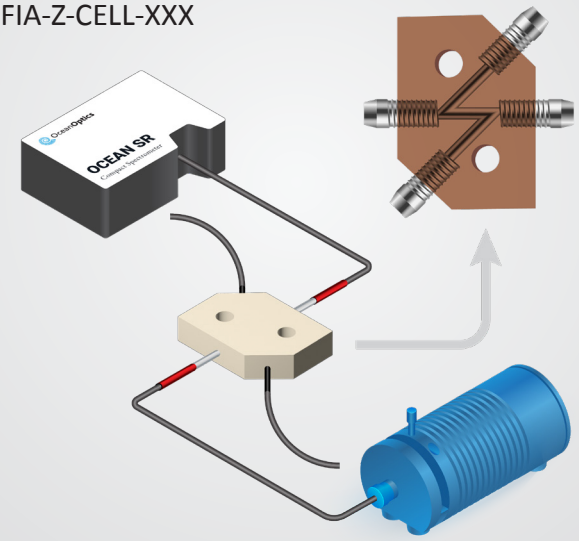
In our FIA-Z-SMA Flow Cells, standard optical fibers (available separately) connect to the SMA 905 fittings to transmit and receive light through the central axis of the Z. The FIA-Z-SMA cells use silica windows as wetting surfaces at each fiber optic junction and are available in PEEK polymer, Plexiglas,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

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

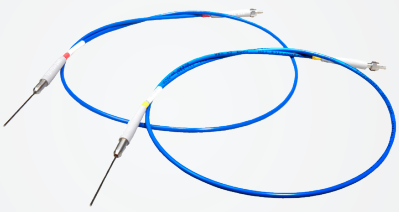
In this setup, a FIA-Z-SMA-PEEK 10-mm pathlength flow cell is between a light source and spectrometer. Tubing and connectors are included.

FIA-Z-CELL-XXX

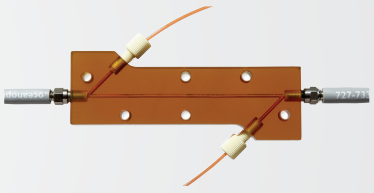


10 mm Pathlength	20 mm Pathlength	50 mm Pathlength	100 mm Pathlength
FIA-Z-SMA-10-###	FIA-Z-SMA-20-###	FIA-Z-SMA-50-###	FIA-Z-SMA-100-###

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.

Sampling Accessories

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

The Ultra Short Path flow cells are intended for measurements on optically dense (highly colored) solutions. This is made possible by a design that can accommodate extremely short optical path lengths. Wetted materials on the USP flow cell are quartz, PEEK or Delrin, and PTFE. Available optical path lengths are 0.1, 0.2, 0.5, 1.0 mm.

Popular applications include:

- measurement of dye concentrates
- measurement of high-concentration protein solutions

Product Description	Optical Path Length (mm)	Internal Volume (ul)
FIA-USP-100	0.1	30
FIA-USP-200	0.2	60
FIA-USP-500	0.5	140
FIA-USP-1000	1.0	280

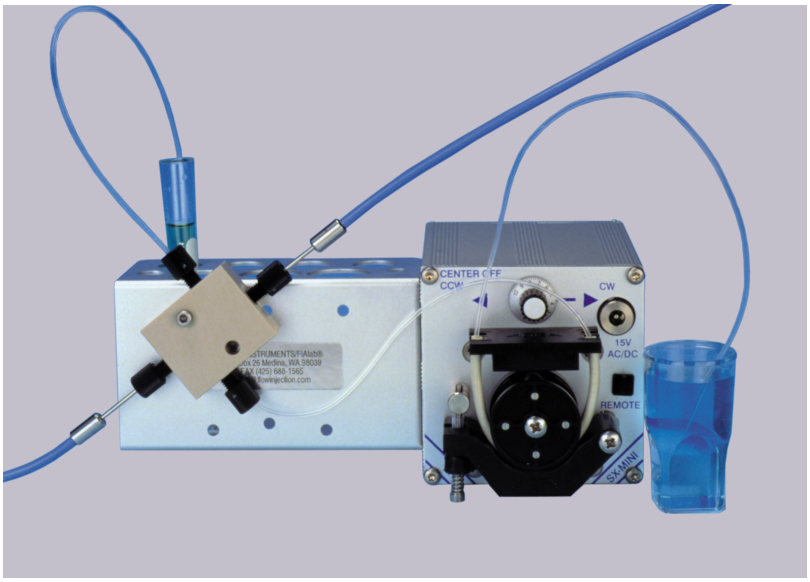
FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

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.

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	
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

Sampling Accessories

Fluid Analysis Systems

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 speci- fies 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. Con- nects 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

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

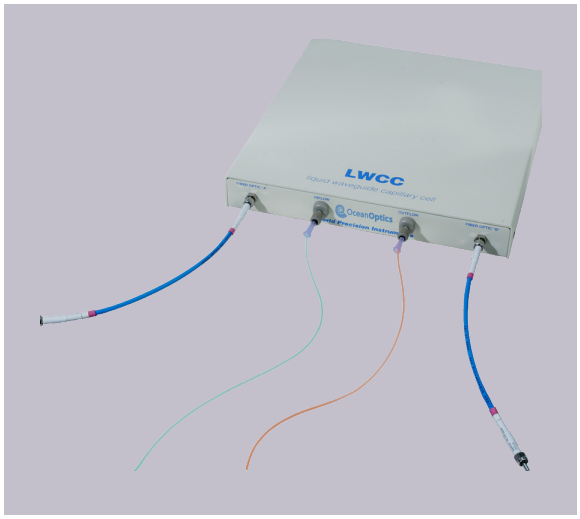
Sampling Accessories

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 path lengths 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 path length versions.

The LPC Flow Cells were 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, 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			

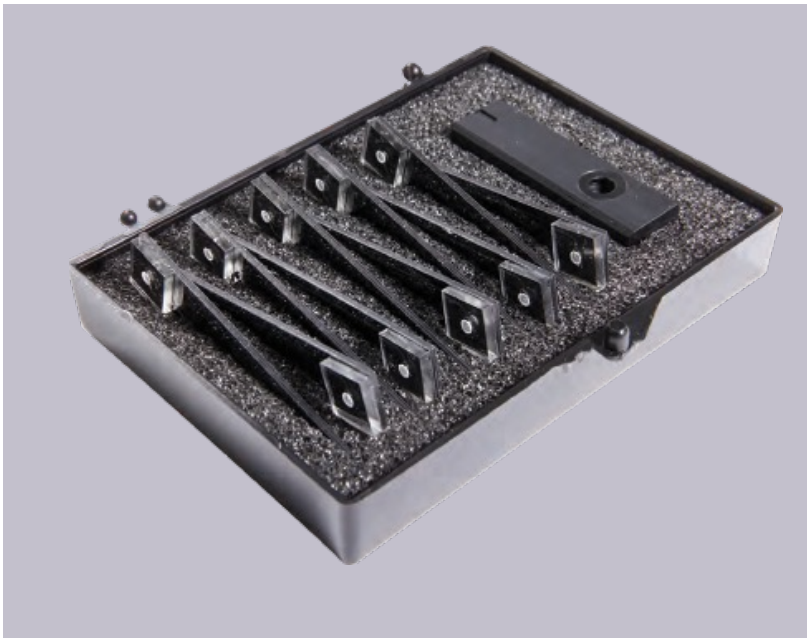
Micro Cell Specifications	LPC-10MM	LPC-100MM
Optical pathlength:	10 mm	100 mm
Internal volume:	2.4 µL	24 µL
Wavelength range (most efficient):	~230-800 nm	~230-800 nm
Fiber connection (SMA 905):	500 µm	500 µm
Maximum pressure:	1000 PSI	1000 PSI
Refractive index @ 280 nm:	<7 mAU	Not reported
Wetted material: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

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

Item	Description
CFV-PIP-SP	10 pack Pipettor UV-transparent FluoroVettes with adapter
CFV-PUMP-SP	5 pack Pump UV-transparent FluoroVettes with adapter

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories
Fluid Analysis

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

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, CC-3-UV-S, and CC-3-UV-T 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.

Item	CC-3	CC-3-UV-S	CC-3-UV-T	CC-3-DA
Diffusing material:	Opaline glass	Spectralon	PTFE	Spectralon
Typical range:	350-750nm	200-1700 nm	200-750 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°

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 or 50mm. This provides a Lambertian surface with >98% reflectivity in the visible range for irradiance measure-ments. Sample port sizes of 6 mm for the 30 mm sphere and 8 mm for the 50 mm spheres are available.

ISP-30-6-I or ISP-50-8-I

Item	Description	Sample Port
ISP-30-6-I	Integrating sphere, 59 mm diam- eter, 58 mm high	6 mm
ISP-50-8-I	Integrating sphere, 80 mm diam- eter, 78 mm high	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
Weight:	330 g (ISP-30); 730 g (ISP-50)
Spectral range:	200-2500 nm
Sphere diameter:	30 mm or50 mm
Sample port diameter:	6 mm (ISP-30); 8 mm (ISP-50)
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

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 865g yet, it is durable enough for use outside the laboratory.

Specifications	
Sphere diameter:	30 mm, 50 mm
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

Sampling Accessories

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-GTW
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	800 mm dia,. 78 mm high
Weight:	864.7 g	330 g	730 g	1,650 g	743.3 g
Power consumption:	600 mA @ 12 VCD (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:	Spectration	PTFE material	PTFE material	PTFE material	PTFE material
Reflectance:	Diffuse or specular and diffuse	Speculat and diffuse	Specular and diffuse	Specullar and difuse	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% (250-2500 nm)	>98% (400-1500 nm) >95% (250-2000 nm)
Bulb:	900-hour bulb; 3100 K color temp.	None	None	None	None

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories

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

FOIS-1

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.

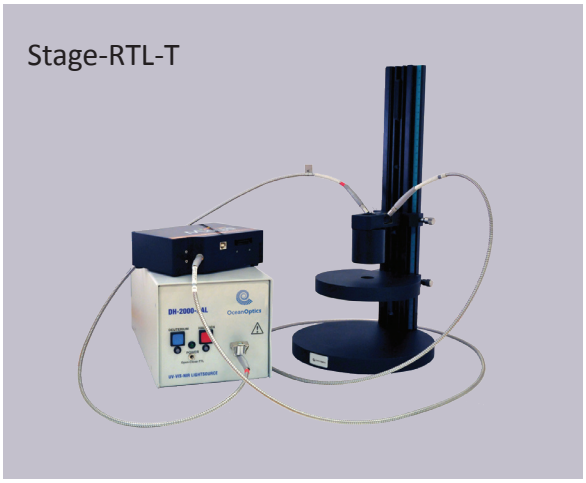
Reflection-Transmission Stage

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.

Sampling Accessories

Reflection and Transmission Stages

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

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.

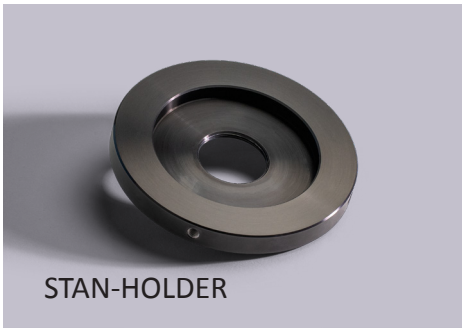
STAN-SSH-NIST

STAN-SSH-NIST

The NIST-traceable STAN-SSH-NIST is calibrated to a NIST master 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 calibration data that can be transferred to Ocean Optics OceanView Operating Software.

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

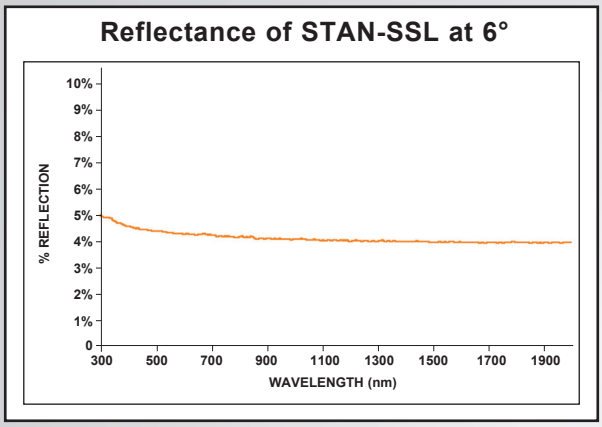
STAN-HOLDER

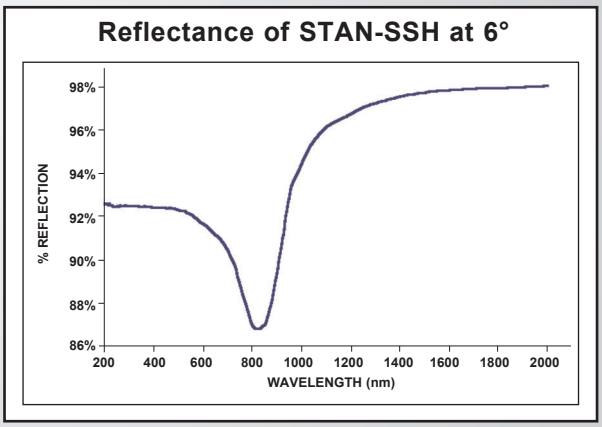
This convenient accessory option keeps your standard securely in place during measurements and helps preserve its coating.

Sampling Accessories

Reflection and Transmission Stages

Item	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 mir- ror on fused silica substrate	Front-surface protected aluminum mir- ror 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)





FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories

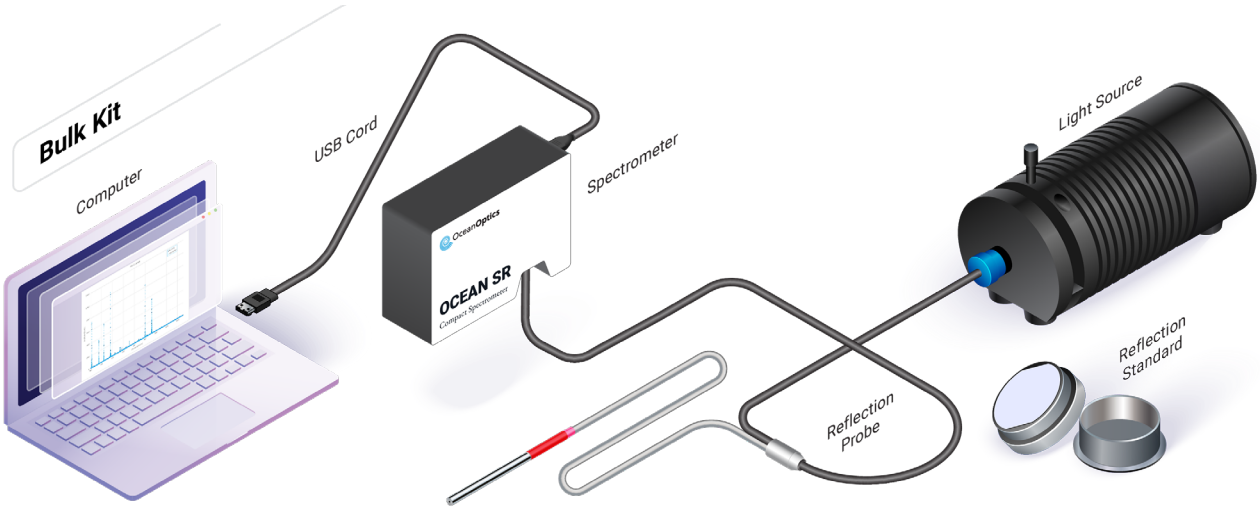
Diffuse Reflectance Standards

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.

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.



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.

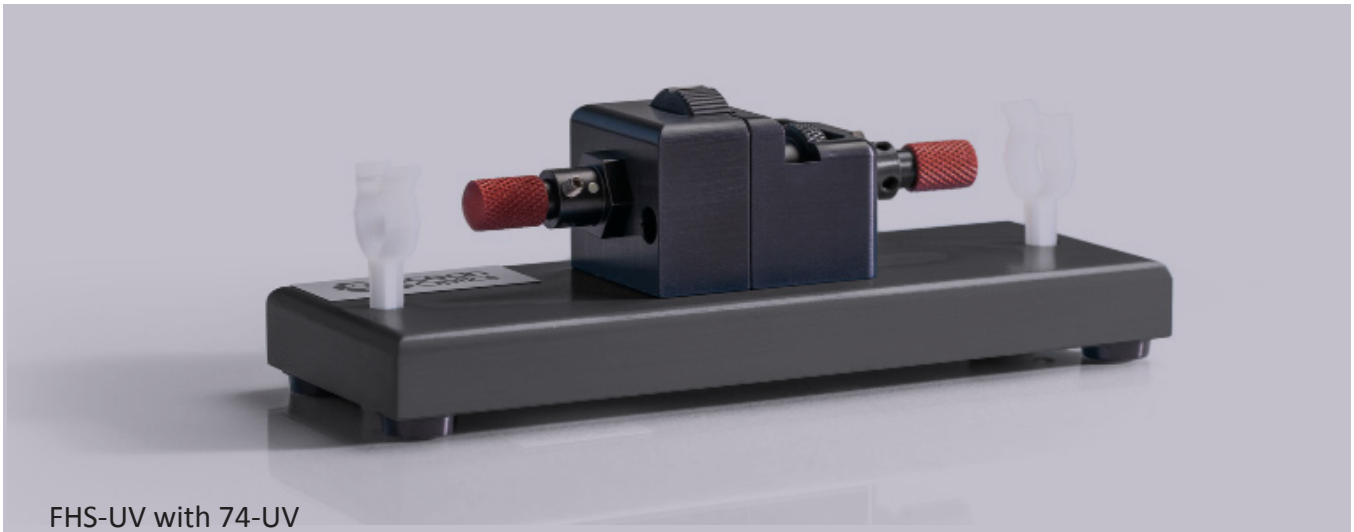
Sampling Accessories
Diffuse Reflectance Standards

Item	
LAB-CSS-12-010	Diffuse color standards set, 1”, Orange-Purple-Violet- Cyan
LED adapter:	Diffuse color standards set, 1”, RGBY and OPVC, 2%, 20%, 50%, 99% reflectance values

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories
Filter Holders



FHS-UV with 74-UV

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.

Item	FHS-UV
Dimensions:	50.6 mm x 140 mm x 43.1 mm
Weight:	240 g
Power consumption:	None
Maximum filter size:	25 mm diameter round; up to 6 mm thick
Wavelength range:	200-2000 nm
Cuvette dimensions:	NA
Shutter frequency:	NA
Shutter response time:	NA

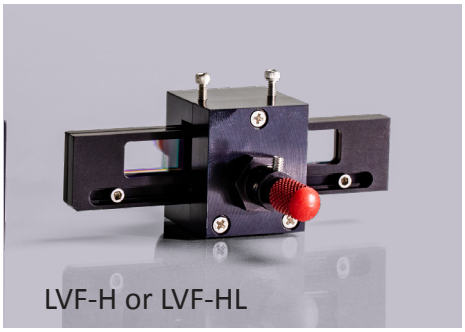
FULL PRODUCT SPECIFICATIONS

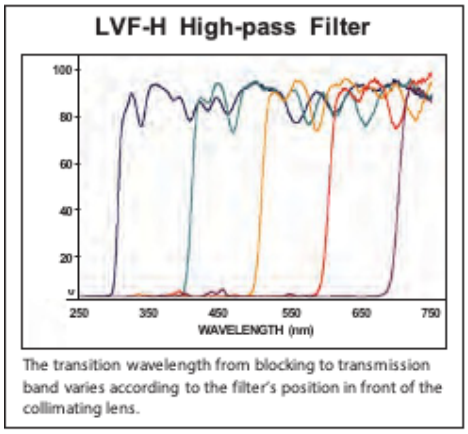
Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories
Linear Variable Filters

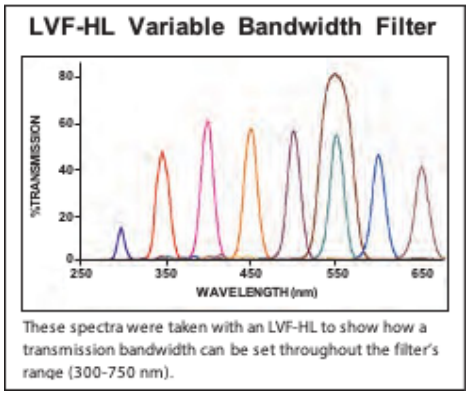
We've combined our patented high-pass and low-pass technology to create an exceptional Linear Variable Filter line that features an adjustable center wavelength and bandpass. Each filter delivers an outstanding transmission band (~90%) and blocking band (99.8%).

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.


LVF-H or LVF-HL



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



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).

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.

Sampling Accessories

Linear Variable Filters

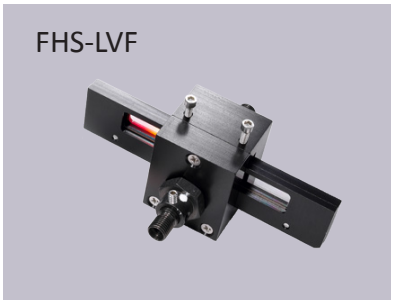
Item	Description
LVF-H	A single high-pass filter for 300-750 nm
LVF-L	A single low-pass filter for 300-750 nm
LVF-HH	Two LVF-H high-pass filters epoxied together for 300-750 nm
LVF-LL	Two LVF-L low-pass filters epoxied together for 300-750 nm
LVF-HL	An LVF-H high-pass filter and LVF-L low-pass filter 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

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

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.

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 faciltates 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

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Sampling Accessories

Absorbing Glass Filters

Item		
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

Item		
OF2-BG34R	enhance blue and red	3 mm

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

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 wave- length, >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

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

Bandpass Filters

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

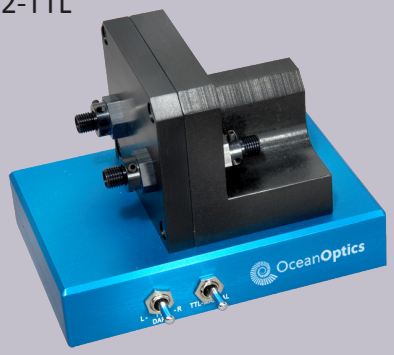
Sampling Accessories
Routing Control and More

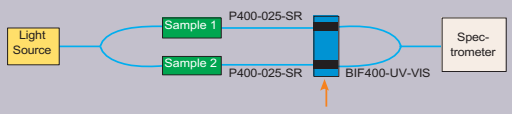
Fiber Optic Dual Switch with TTL Line

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.

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.

FOS-2X2-TTL





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.

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

INLINE-TTL-S

Sampling Accessories

Routing Control and More

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-inter- changeable 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.

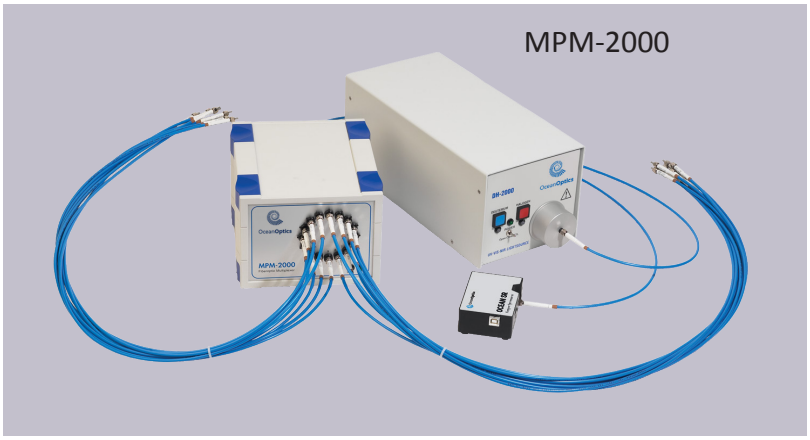
GER-KIT

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

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

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

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

Sampling Accessories

Fiber Optic Variable Attenuator

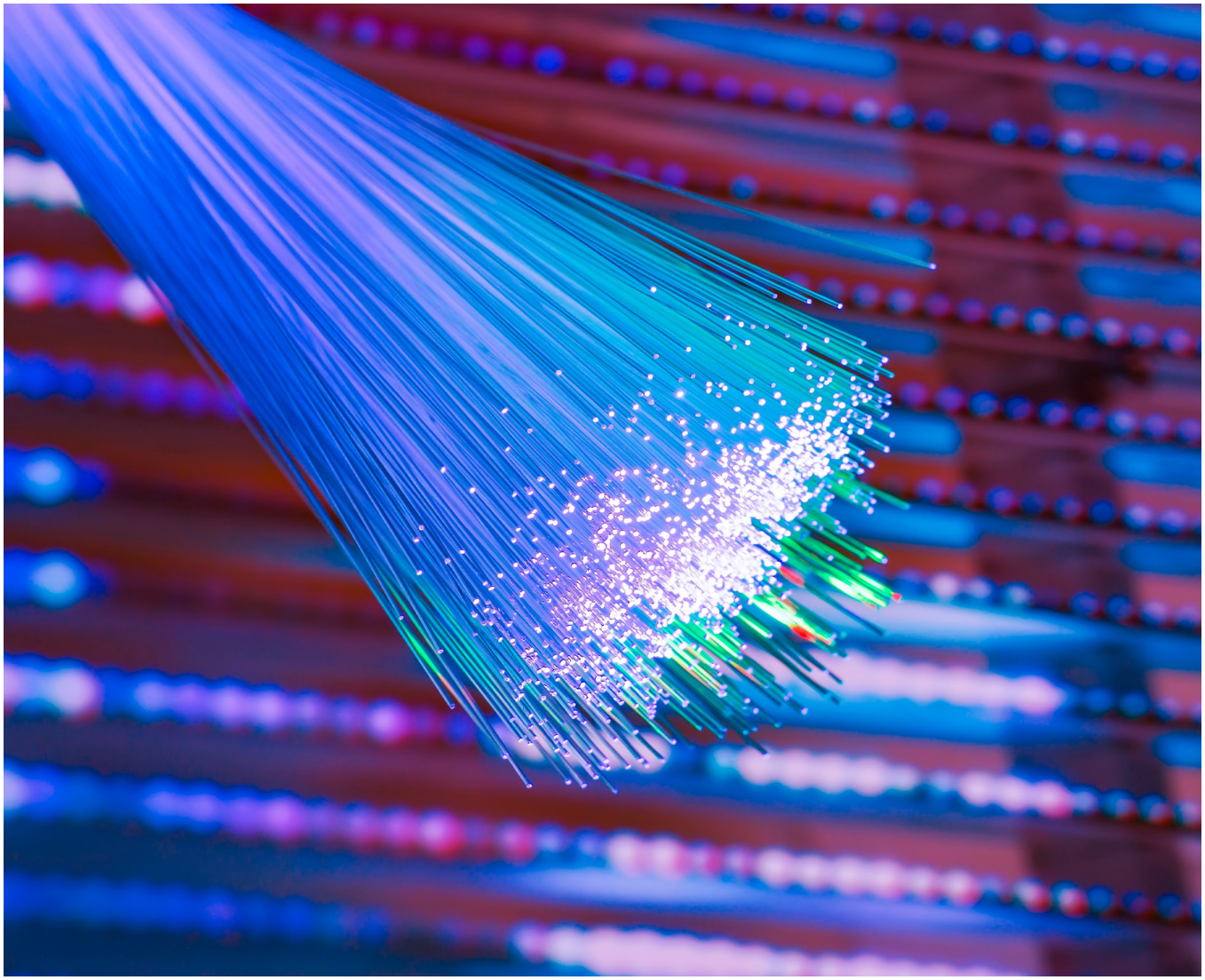
Our FVA-UV Fiber Optic Variable Attenuator is an opto-mechanical device that helps you control the amount of light transmitted between two fibers. Fibers screw into either side of the FVA-UV via SMA 905 connectors with collimating lenses that project light across a metal disk in which a slit has been 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 wave- length range.

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

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.



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.

Technical 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.

Fibers and Probes

The Most Flexible Line in the Industry

Anatomy of an Assembly

At the fiber's core is pure silica; it's the diameter of the core that you need to consider when purchasing an optical fiber assembly. (The core diameter is often in the product's item code. For example, the QP600-UV-VIS has a 600 µm diameter silica core).

Surrounding the core is a doped-fluorine silica cladding. A buffer material is then applied. A buffer coats the core and cladding , strengthens the fiber and reduces stray light even further. In most assemblies polyimide is used as the buffer; other assemblies use aluminum or acrylate. Then a jacketing is applied over the core, cladding and buffer to protect the fiber and provide strain relief.

For off-the-shelf Premium-grade"Q" Optical Fiber Assemblies, the standard jacketing is stainless steel silicone monocoil. There are several other jacketing options when creating a custom assembly. Precision SMA 905 Connectors terminate the assembly and are precisely aligned to the spectrometer's slit to ensure concentricity of the fiber. Finally, captive end caps protect the fiber tips against scratches and contaminants.

Assembly Identifiers

Our optical fiber and probe assemblies are clearly and cleanly labeled in three ways so that you always know the following about your assembly: its name, its core diameter, and its most efficient wavelength region.

The BOOT COLLAR color

corresponds to the assembly's fiber type (and its most efficient wavelength range).

A WHITE PRODUCT LABEL

on an assembly includes the product name and item code.

The BAND COLOR

signals the diameter of the assembly's core.

8 µm	Purple
50 µm	Blue
100 µm	Green
200 µm	Yellow
300 µm	Gray
400 µm	[illegible]
500 µm	Orange
600 µm	Brown
1000 µm	Clear

Band Colors

The assembly's band color lets you know the fiber type and the most efficient wavelength range in which your fiber will work.

A color band tells you the diameter fiber with which you are working.

Fibers and Probes

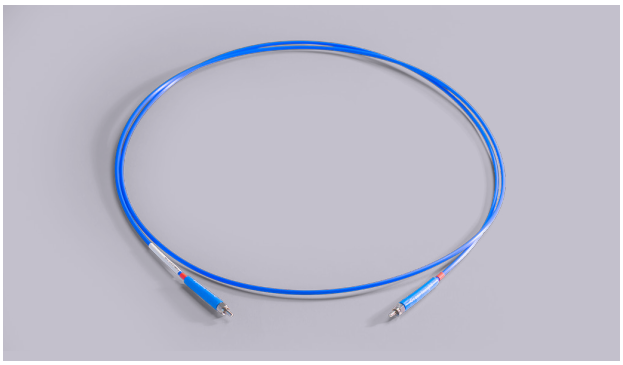
Boot Color	Fiber Type	Most Efficient Wavelength Range	Premium-grade Optical Fiber Assembly for each Fibet Type
Gray	UV-VIS XSR Solarization-resistant	180-800 nm	
Gray	UV/SR-VIS High OH content	200-1100 nm	
Blue	UV-VIS High OH content	300-1100 nm	
Red	VIS-NIR Low OH content	400-2100 nm	
Black	Fluoride	300-4500 nm	

Note: An additional option for mid-IR wavelengths (2000-6000 nm) is Chalcogenide fiber. Standard assemblies are available.

FULL PRODUCT SPECIFICATIONS

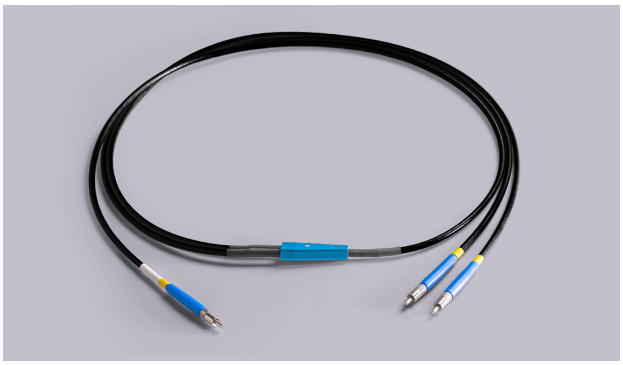
Do you need more product information?
Click this **link** or scan QR code for more information.

Fibers and Probes



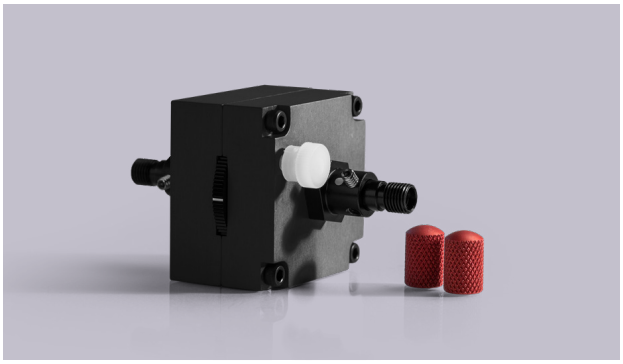
Patch Cords

Silica-core cords for UV-Vis or Vis-NIR. Solarization-resistant options for UV.



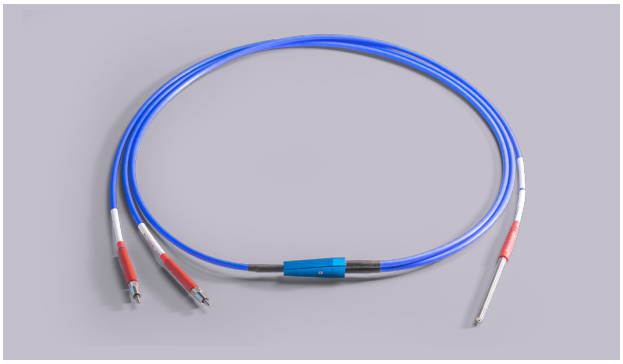
Bifurcated Optical Fibers

Bifurcated fibers split at one end, offering diverse options in length and core.



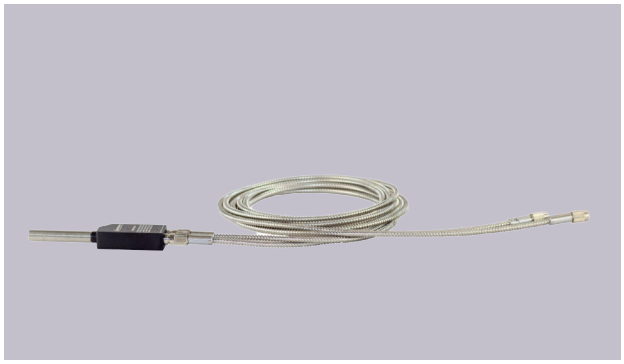
Fiber Accessories

Fiber accessories optimize positioning, including adapters, connectors, and splice bushings.



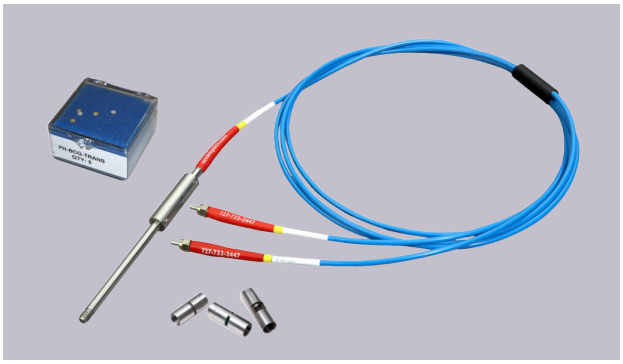
Reflection/Backscatter Probes

Probes, coupled with a spectrometer, measure reflection, and fluorescence in solids, liquids, powders.



Raman Probes

Probes, coupled with a spectrometer, measure reflection, and fluorescence in solids, liquids, powders.



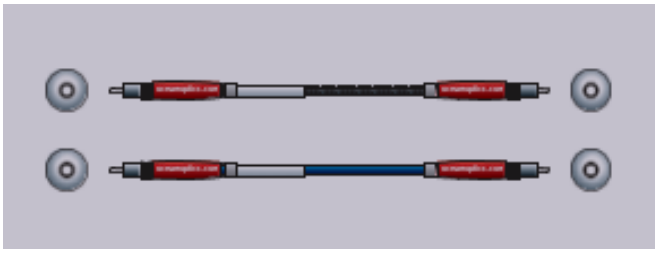
Transmission Dip Probes

Probes for 532 nm, 785 nm, and other wavelengths, are suitable for both lab and industry.

Fibers and Probes

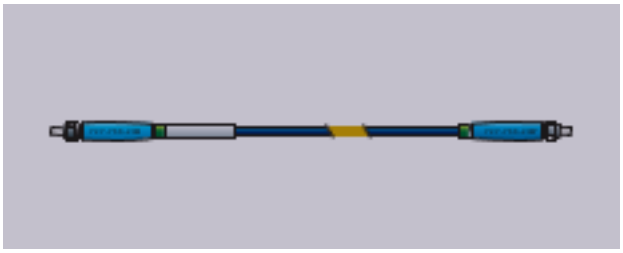
The Most Flexible Line in the Industry

From these half-dozen standard fiber designs, you can tackle an extensive range of absorbance, emission and reflectance spectroscopy needs. All Ocean Optics fibers have SMA 905 terminations for connecting to our spectrometers and accessories. Custom configurations, multiple-fiber bundles and special ferrule designs are also available.



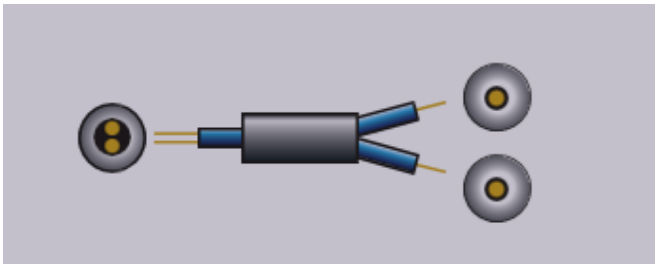
Patch Cord Assemblies

Our patch cord assemblies consist of a single fiber. Our standard, premium-grade options are available with stainless steel BX (top drawing) or silicone monocoil jacketing and PVDF.



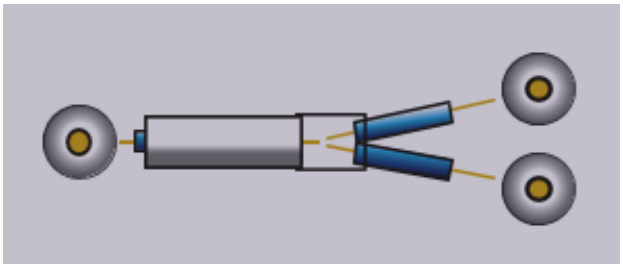
Round to Keyed Linear Fiber

At one end of this seven-fiber assembly, the fibers are aligned linearly to more efficiently direct light into the optical bench and onto the detector. The collection end of the fiber has a six fibers-around-one design.



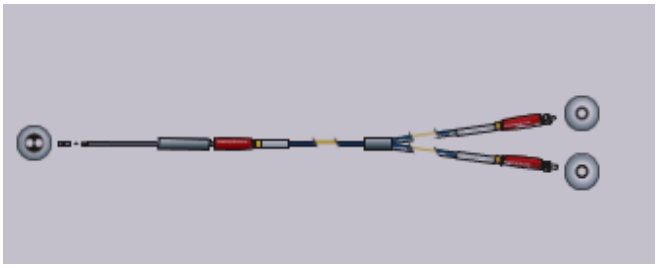
Bifurcated Fiber

Bifurcated assemblies have two fibers side-by-side in the common end and break out into two legs at the other end. Each leg can be UV-VIS or VIS-NIR or mixed.



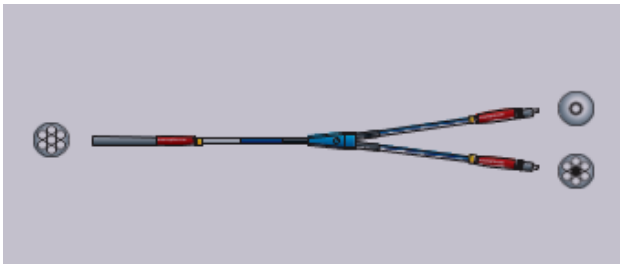
Splitter

A splitter comprises three fibers – two fibers at one end that deliver light into the third fiber at the common end. All the fibers are epoxied together at the nexus of the assembly.



Transmission Dip Probe

We offer several versions of this standard two-fiber transmission probe, designed for immersion in process streams and solutions. Various pathlength tips are available.



Premium Reflection Probe

Our standard reflection probe arrangement has seven optical fibers – six illumination fibers around one read fiber – in a stainless steel ferrule. Additional configurations are available.

Fibers and Probes: Overview

Transmission Characteristics of UV-VIS Options

One reason for degradation of light is the presence of tiny imperfections in the fiber material, causing light at lower wavelengths to scatter. The fiber is also not completely transparent at all wavelengths. For example, high OH fiber is designed to transmit as much light as possible in the UV. However, the extra water has an absorption band that leads to dips in transmission efficiency in the NIR. To achieve good transmission in the NIR, the fiber material must be low OH.

Another loss in transmission efficiency results from the evanescent field. When the light bounces off the interface between the core and cladding inside the fiber, its electric field penetrates the cladding. If the cladding material absorbs the light, the fiber will lose some of its energy.

Bending of fibers also contributes to attenuation. As the fiber is bent, it changes the angle at which light rays are striking the surface between the core and cladding. If the fiber is bent enough, light that had been below the critical angle will now exceed the critical angle and leak out of the fiber. Most of the bending occurs where a flexible fiber meets a rigid connector. To spread the bending along the length of the fiber, strain relief boots are added to the connectors.

Ocean Optics builds its fibers into assemblies that are cleaved, epoxied into precise SMA 905 or other connectors and polished with a very fine lapping film to reduce Fresnel reflection. The fiber is encased in mechanical sheath- ing to protect it and to provide good strain relief at the ends. As a result, the improvement in performance between Ocean Optics premium assemblies and ordinary telecom grade assemblies is quite significant.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Fibers and Probes: Overview

Transmission Characteristics of UV-VIS Options

Ocean Optics offers fiber material types with wavelength ranges to best match your application. On these pages are the attenuation curves for each of the fiber types we offer. High OH, or high water content fiber, is optimized for transmission in the UV-VIS. For work in the UV, especially <300 nm, our XSR and UV/SR-VIS fibers are a fine choice. These silica-core fibers are doped with fluorine to mitigate the solarizing effects of UV radiation. An Applications Scientist can provide additional assistance.

Transmission Efficiency of Optical Fibers

Transmission efficiency is the ratio of light energy exiting an optical fiber to the energy that is projected onto the other end. Transmission of light by optical fibers, however, is not 100% efficient. Energy is lost by reflection when light is launched into the fiber and at the other end when it exits the fiber. This is called Fresnel reflection and occurs when light travels across an interface between materials with different refractive indices.

Ideally, light would travel inside the fiber by total internal reflection without any loss of energy. However, several factors can degrade the light during transmission and cause attenuation or absorption of light in the fiber.

Ocean Optics offers several options for applications at higher wavelengths. For most Visible and Shortwave NIR setups, our low OH VIS-NIR fibers are a convenient, affordable option. If your work takes you farther into the NIR and mid-IR, consider our fluoride and chalcogenide fiber options. ZBLAN heavy-metal fluoride fibers are responsive to 4500 nm and distinguished by excellent IR transmittance performance. Chalcogenide fibers are respon- sive from 2000-6000 nm and characterized by low optical loss and great flexibility.

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.

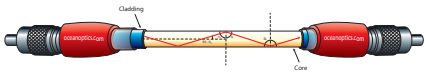
Numerical Aperture of Optical Fiber

Optical fibers are designed to transmit light from one end of the fiber to the other with minimal loss of energy. The principle of operation in an optical fiber is total internal reflection. When light passes from one material to another, its direction is changed. According to Snell's Law, the new angle of the light ray can be predicted from the refractive indices of the two materials. When the angle is perpendicular (90º) to the interface, transmission into the second material is maximum and reflection is minimum. Reflection increases as the angle gets closer to parallel to the interface. At the critical angle and below the critical angle, transmission is 0% and reflection is 100% (see figure on next page).

Fibers and Probes: Overview

Transmission Characteristics of VIS-NIR and Mid-IR Options

Light Passing Through an Optical Fiber



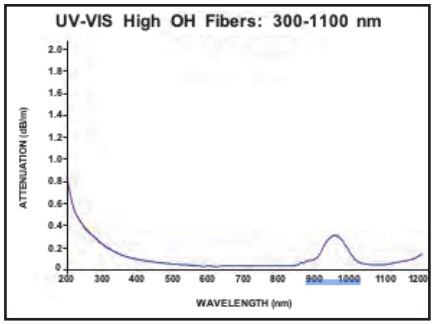
Snell's Law can be formulated to predict critical angle and also the launch or exit angle θmax from the index of refraction of the core (n1) and cladding (n2) materials. The angle also depends on the refractive index of the media (n). Equation (1)

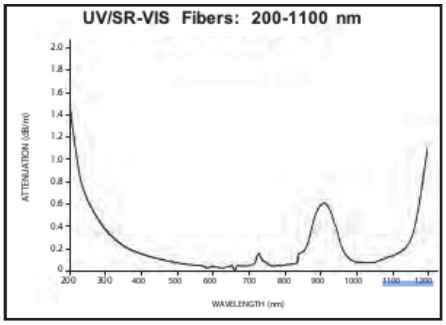
$$n \sin \theta_{max} = \sqrt{n_1^2 - n_2^2}$$

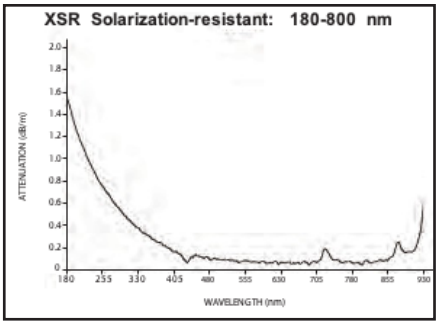
The left side of the equation is called the numerical aperture (NA) and determines the range of angles at which the fiber can accept or emit light.

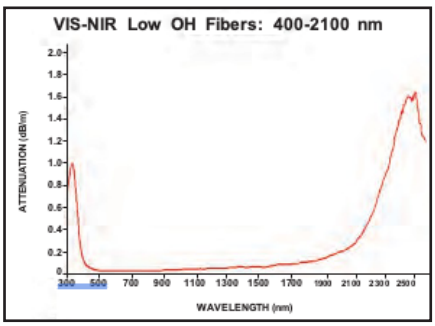
Ocean Optics fibers have a numerical aperture of 0.22. If the fiber is in a vacuum or air, this translates into an acceptance angle θmax of 12.7° (full angle is ~25°). When light is directed at the end of an optical fiber all the light rays or trajectories that are within the +/-12.7° cone are propagated down the length of the fiber by total internal reflection. All the rays that exceed that angle pass through the cladding and are lost. At the other end of the fiber, light exits in a cone that is +/- 12.7°.

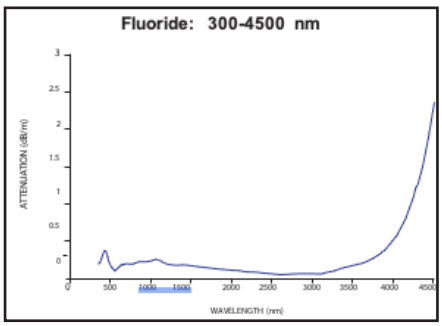
There are many types of fibers available, with a variety of numerical apertures. While a fiber with a larger numerical aperture will collect more light than a fiber with a smaller numerical aperture, it is important to look at both ends of the system to ensure that light exiting at a higher angle can be used. In opti- cal sensing, one end is gathering light from an experiment and the other is directing light to a detector. Any light that does not reach the detector will be wasted.

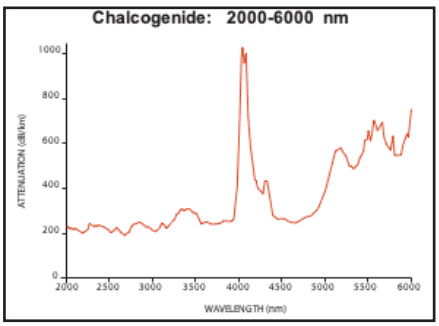












Premium Grade Optical Fiber Assemblies

Our premium-grade fibers are durable, high quality fibers optimized for spectroscopy and enhanced with extra strain relief for use even in demanding environments. We have a full range of standard patch cords and can customize assemblies. Also available are assemblies (see table at bottom) consisting of multiple fibers stacked in a linear arrangement at one end to deliver light more efficiently into the spectrometer.performance. Chalcogenide fibers are respon- sive from 2000-6000 nm and characterized by low optical loss and great flexibility.

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.

Premium-Grade Assemblies				**Assembly Length**						**Jacketing**			**Bend Radius**	
Wavelength Range	Item	Core Diameter	Buffer/ Coating	0.25 m	0.5 m	1 m	1.5 m	2 m	Silicone monocoil	Stainless-steel BX	PVDF Furcation	PEEK	LTBR	STBR
UV-VIS High OH Content 300-1100 nm	QP50-2-UV-VIS QP50-2-UV-BX	50 µm	Polyimide					X	X	 X			4 cm	2 cm
	QP100-2-UV-VIS QP100-2-UV-BX	100 µm	Polyimide					X	X	 X			4 cm	2 cm
	QP200-2-UV-VIS QP200-2-UV-BX	200 µm	Polyimide					X	X	 X			8 cm	4 cm
	QP400-1-UV-VIS QP400-1-UV-BX QP400-2-UV-VIS QP400-2-UV-BX	400 µm	Polyimide			X X			X X	 X			16 cm	8 cm
	QP600-025-UV-VIS QP600-025-UV-BX QP600-1-UV-VIS QP600-1-UV-BX QP600-2-UV-VIS QP600-2-UV-BX	600 µm	Polyimide	X X		 X X		 X X	X X X	 X X X			24 cm	12 cm
	QP1000-2-UV-VIS QP1000-2-VIS-BX	1000 µm	Acrylate					X X	X	 X			40 cm	20 cm
VIS-NIR Low OH content 400-2100 nm	QP8-2-VIS-NIR	8 µm	Acrylate					X	X				4 cm	2 cm
	QP50-2-VIS-NIR QP50-2-VIS-BX	50 µm	Polyimide					X X	X	 X			4 cm	2 cm
	QP100-2-VIS-NIR QP100-2-VIS-BX	100 µm	Polyimide					X X	X	 X			4 cm	2 cm
	QP200-2-VIS-NIR QP200-2-VIS-BX	200 µm	Polyimide					X X	X	 X			8 cm	4 cm
	QP400-1-VIS-NIR QP400-1-VIS-BX QP400-2-VIS-NIR QP400-2-VIS-BX	400 µm	Polyimide			X X		 X X	X X	 X X			16 cm	8 cm
	QP600-025-VIS-NIR QP600-025-VIS-BX QP600-1-VIS-NIR QP600-1-VIS-BX QP600-2-VIS-NIR QP600-2-VIS-BX	600 µm	Polyimide	X X		 X X		 X X	X X X	 X X X			24 cm	12 cm
	QP1000-2-VIS-NIR QP1000-2-VIS-BX	1000 µm	Acrylate					X X	X	 X			40 cm	20 cm
Fluoride 300-4500 nm	P450-0.5-FLUORIDE P450-1.5-FLUORIDE P450-1-FLUORIDE	450 µm	Acrylate		X	X	 X				X X X		15 cm	8 cm
Chalcogenide 2000-6000 nm	P500-0.5-CHAL P500-1-CHAL	500 µm	Fluoropoly-mer and PVC		X	X						X X	7.5 cm	7.5 cm

Keyed SMA Optical Fiber Assemblies

Keyed SMA Optical Fiber Assemblies, Round to Keyed Linear Assembly Length				Assembly Length						Jacketing				
Wavelength Range	Item	Core Diameter	Buffer/ Coating	0.25 m	0.5 m	1 m	1.5 m	2 m	Silicone monocoil	Stainless-steel BX	PVDF Furcation	PEEK	LTBR	STBR
300-1100 nm	PL100-2-UV-VIS	100 µm ± 3 µm	Polyimide					x	x				4 cm	2 cm
400-2100 nm	PL100-2-VIS-NIR	100 µm ± 3 µm	Polyimide					x	x				4 cm	2 cm
300-1100 nm and 400-2100 nm	PL100-2-MIXED	100 µm ± 3 µm	Polyimide					x x	x x				4 cm	2 cm
300-1100nm and 400-2100 nm	PL200-2-MIXED	200 µm ± 4 µm	Polyimide					x	x				8 cm	4 cm

Bifurcated Optical Fiber Assemblies

Premium-grade bifurcated assemblies have two fibers in the common end of the assembly that break out into separate legs. Splitters comprise three fibers epoxied at the nexus of a Y-shaped assembly and have lower transmission efficiency than bifurcated fibers.

Premium-grade Bifurcated Optical Fiber Assemblies				Assembly Length	Jacketing		Bend Radius	
Wavelength Range	Item	Core Diameter	Buffer/ Coating	2 m	Silicone monocoil	Stainless-steel BX	LTBR	STBR
VIS-NIR Low OH content 400-2100 nm	QBIF50-VIS-NIR	50 µm	Polyimide	X	X			
	QBIF200-VIS-NIR QBIF200-NIR-BX	200 µm	Polyimide	X X	X	X	8 cm	4 cm
	QBIF400-VIS-NIR QBIF400-NIR-BX	400 µm	X	X X	X	X	16 cm	8 cm
	QBIF600-VIS-NIR QBIF600-NIR-BX	600 µm	Polyimide	X X	X	X	24 cm	12 cm
Splitter Optical Fiber Assemblies								
VIS-NIR Low OH content 400-2100 nm	SPLIT200-VIS-NIR	200 µm	Polyimide	X	X		8 cm	4 cm
	SPLIT400-VIS-NIR	400 µm	Polyimide	X	X		16 cm	8 cm
UV-VIS High OH Content 300-1100 nm	SPLIT200-UV-VIS	200 µm	Polyimide	X	X		8 cm	4 cm
	SPLIT400-UV-VIS	400 µm	Polyimide	X	X		16 cm	8 cm

FULL PRODUCT SPECIFICATIONS

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Solarization Resistant Optical Fiber Assemblies

We offer two types of solarization-resistant fiber assemblies, which prevent transmission degradation in the UV: polyimide-buffer fibers for applica- tions <300 nm and aluminum-buffer fibers that offer enhanced UV transmission (signal will transmit to 180 nm) and resistance to UV degradation.

Extreme Solarization-Resistant				Assembly Length						Jacketing		Bend Radius
Wavelength Range	Item	Core Diameter	Buffer/ Coating	0.25 m	0.5 m	1 m	1.5 m	2 m	Silicone monocoil	Stainless-steel BX	LTBR	STBR
UV/SR-VIS High OH content 200-1100 nm	QP200-2-SR-BX	200 µm	Polyimide					X		X	8 cm	2 cm
	QP300-1-SR QP300-1-SR-BX	300 µm	Polyimide			X X			X	 X	12 cm	6 cm
	QP400-025-SR QP400-025-SR-BX QP400-2-SR QP400-2-SR-BX	400 µm	Polyimide	X X				 X X	X X	 X X	16 cm	8 cm
	QP600-025-SR QP600-025-SR-BX QP600-1-SR QP600-1-SR-BX QP600-2-SR QP600-2-SR-BX	600 µm	Polyimide	X X		 X X		 X X	X X X	 X X X	24 cm	12 cm
UV-VIS XSR Solarization-resistant 180-900 nm	QP115-025-XSR-BX QP115-1-XSR-BX QP115-2-XSR-BX	115 µm	Aluminum (Primary)	X		 X		 X		X X X	4 cm	2 cm
	QP230-025-XSR-BX QP230-1-XSR-BX QP230-2-XSR-BX	230 µm	Aluminum (Primary)	X		 X		 X		X X X	4 cm	2 cm
	QP455-025-XSR-BX QP455-1-XSR-BX QP455-2-XSR-BX	455 µm	Aluminum (Primary)	X		 X		 X		X X X	8 cm	4 cm
	QP600-025-XSR-BX QP600-1-XSR-BX QP600-2-XSR-BX	600 µm	Aluminum (Primary)	X		 X		 X		X X X	24 cm	12 cm

Note: Fiber bend radius is expressed as Long Term (LTBR) and Short Term (STBR).

FULL PRODUCT SPECIFICATIONS

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Fibers and Probes:

Custom Fiber and Probe Assemblies

Custom Fibers

Wavelength	Diameter	Type	Number of Fibers	Jacketing	Connectors	Ferrules
UV-VIS XSR Solarization-resistant 180-900 nm	8 µm 50 µm 115 µm 200 µm 230 µm 300 µm 320 µm 400 µm 455 µm 500 µm 550 µm 600 µm 800 µm 1000 µm	Patch Cord	One	PVC Monocoil	ST Connector	Stainless Steel or PEEK
				Zip Tube Blue PVDF	EC Connector	
UV-SR-VIS High OH content 200-1100 nm				Zip Tube Blue PVDF (larger diameter)	SMA 905 Connector	
UV-VIS High OH content 300-1100 nm		Furcated		Silicone Monocoil	SMA 905 Connector with 0-ring	Outer Diameter
VIS-NR Low OH content 400-2100 nm		Probe	One	Stainless-steel RX	Process-grade SMA 905	
				Stainless-steel fully interlocked BX	Process-grade SMA 905 with 0-ring	
					Loser SMA 905 Connector	

After selecting the best fiber type, you should consider the diameter size of the pure silica core needed inside of your assembly. We offer several diameter sizes, and can recommend the appropriate assembly based on these criteria:

1. How much light do you need for your application? Reflection and fluorescence applications generally need more light, and larger diameter fibers are often better choices than smaller diameter fibers. For a laser application, however, we may suggest a smaller diameter fiber.
2. What is the entrance aperture size of your spectrometer? Make sure that your fiber diameter size and the entrance aperture to your spectrometer are compatible and are configured properly for your application needs.
3. If you have too much light in your setup, are there ways you can attenuate the light? We believe that it's better to have too much light than not enough.

A full menu of fibers

Ocean Optics offers the finest, off-the-shelf and custom spectroscopy-grade optical fibers and probes. We've even been known to create new products to perfectly suit unique applications. Chances are good, whe have just what you're hankering for.

- Patchcord Assemblies
- Custom fibers
- Fiber Optic Probes
- OEM Assemblies
- Solarization-resistant
- Vacuum Feedthroughs
- Optical Fiber Kits
- Accessories

Trust the global leader in optical sensing to provide you with a perfect match at a sensible price. Contact an Ocean Optics Applications Scientist to find out more.

Fibers and Probes

Custom Fiber and Probe Assemblies

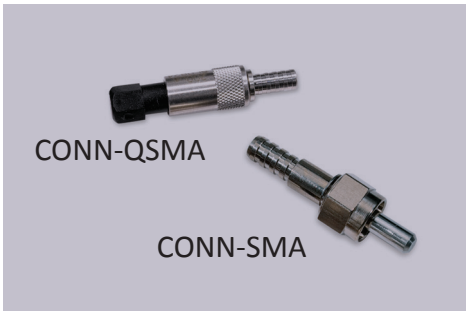
Custom Option: Jacketing Options

The fiber assembly jacketing is designed to protect the fiber and provide strain relief. But we have jacketing options that can do so much more. We offer multiple jacketing options; our most popular selections are listed below.

Item		Description	Chemical Resistance	Steam Sterilizable	Mechanical Tolerance	Length Limits
1	PVC Monocoil	PVC covering SS monocoil only	Poor	No	Good	6 m
2	Zip Tube Blue PVDF	Best for budget-conscious applications; standard in Laboratory-grade Assemblies	Poor	No	Good	50 m
3	Zip Tube Blue PVDF	Best for budget-conscious applications; larger diameter than #2	Poor	No	Good	50 m
4	Silicone Monocoil	High-end jacketing; standard in Premium-grade Assemblies (sIlicone covering SS monocoil)	Good	Yes	Good	20 m
5	Stainless-steel BX	OEM applications only; optional polyolefin heatshrink overcoat	Good	Yes	Poor	4 m
6	Stainless-steel fully interlocked BX	Excellent stainless steel jacketing supports longer lengths of fiber; optional polyolefin heatshrink overcoat	Good	Yes	Excellent	40 m

Custom Option: Connectors and Connector Adapters

Our fiber assemblies are available with several connector options. For an upgrade fee that includes the cost of the custom connector and labor, we will replace the standard SMA 905 Connector (included in the assembly price) with any custom connector from the list below. When ordering custom connectors, please specify the diameter size of the optical fiber to which it will be attached. You also can order connectors separately.



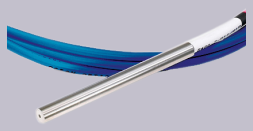
Item	Description
CONN-ST	Stainless-steel ST Connector
CONN-FC	Stainless-steel FC Connector
CONN-QSMA	Premium-grade SMA 905 Connector (standard in Premium-grade assemblies)
CONN-SMA	Laboratory-grade SMA 905 Connector (standard in Laboratory-grade assemblies)
CONN-QSMA-O	Premium-grade SMA 905 Connector with O-ring
CONN-SMA-O	Laboratory-grade SMA 905 Connector with O-ring

Fibers and Probes:

Custom Option: Ferrules for Probe Assemblies

Description	Length
1/4” (6.35 mm) diameter stainless-steel dip probe often used in solution transmission measurements	3” (76.2 mm)
1/4” (6.35 mm) diameter PEEK dip probe used in harsh environments for solution transmission measurements	3” (76.2 mm)
1/4” (6.35 mm) diameter stainless-steel ferrule used in reflection measurements	3” (76.2 mm)
1/4” (6.35 mm) diameter PEEK ferrule used in harsh environments	3” (76.2 mm)
1/8” (3.2 mm) diameter stainless-steel ferrule	3” (76.2 mm)
1/16” (1.59 mm) diameter stainless-steel ferrule	2” (51 mm)
1/4” (6.35 mm) diameter stainless-steel ferrule with angled window	2” (51 mm)
Fiber-to-lens ferrule that comes with a collimating lens	2” (51 mm)

Stainless steel
or PEEK sleeve



Stainless steel
for reflection

Stainless steel

FULL PRODUCT SPECIFICATIONS

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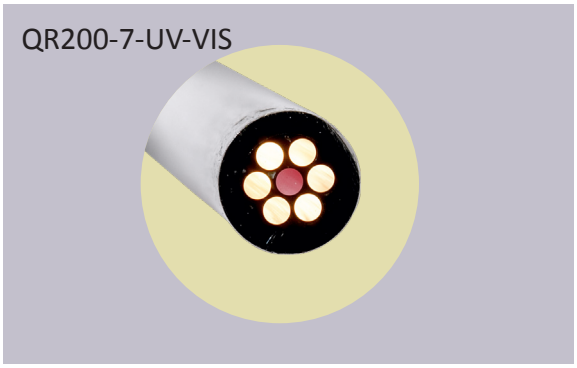
Reflection/BackscatteringProbes

Our Reflection Probes are ideal for measuring diffuse or specular reflectance from solid surfaces or backscattering and fluorescence in solutions and powders. Probes are available in lab-grade (R-series) and premium-grade (QR-series) versions. Choose from nearly 40 standard options or customize a probe by selecting different lengths and other features.

Standard Reflection/Backscattering Probes					Fiber Bundle				Jacketing	
Wavelength Range	Item	Core Diameter	6 illumination fibers around 1 read fiber	6.35 mm OD x 76.2 mm	3.18 mm OD x 74.3 mm	Silicone monocoil	Stainless-steel BX	Zip tube blue PVDF	LTBR	STBR
VIS-NIR Low OH content 400-2100 nm	QR200-7-VIS-NIR	200 µm	X	X		X		X	8 cm	4 cm
	R200-7-VIS-NIR		X	X						
	QR400-7-VIS-NIR	X	X	X		X		X	16 cm	8 cm
	R400-7-VIS-NIR		X							
	QR400-7-VIS-BX		X	X			X			
	R400-7-VIS-BX		X	X			X			
	QR600-7-VIS-NIR	400 µm	X	X		X			24 cm	12 cm
	R600-7-VIS-125F		X	X	X			X		
	QR600-7-VIS-125F		X	X		X				
	QR600-7-VIS125BX		X	X			X			
UV-VIS High OH Content 300-1100 nm	QR200-7-VIS-NIR	200 µm	X			X	X		8 cm	4 cm
	R200-7-VIS-NIR		X					X		
	QR400-7-VIS-NIR	400 µm	X			X			16 cm	8 cm
	R400-7-VIS-NIR		X					X		
	QR400-7-VIS-BX		X				X			
	R400-7-VIS-BX		X				X			
	QR600-7-VIS-NIR	600 µm	X			X			24 cm	12 cm
	R600-7-VIS-125F			X	X			X		
	QR600-7-VIS-125F			X		X				
	QR600-7-VIS125BX			X			X			
UV/SR-VIS High OH content 200-1100 nm	QR200-7-VIS-NIR	200 µm	X	X		X			8 cm	2 cm
	R200-7-VIS-NIR		X	X				X		
	QR300-7-SR	300 µm	X	X		X			12 cm	6 cm
	R300-7-SR		X	X				X		
	QR400-7-SR	400 µm	X	X		X			16 cm	8 cm
	R400-7-SR		X	X				X		
	QR400-7-SR-BX		X	X						
	R400-7-SR-BX		X	X						
	QR600-7-SR-125F	600 µm	X	X		X			24 cm	12 cm
	R600-7-UV-125F		X		X			X		
	QR600-7-SR125BX		X		X		X			
	R600-7-SR-125F		X		X			X		
	QR600-7-UV-125F		X		X	X				
	QR600-7-UV125BX		X		X		X			
	QR600-7-VIS-125F		X		X	X				
	QR600-7-VIS-125BX		X		X		X			
UV-VIS XSR Solarization-resistant 180-900 nm	QR230-7-XSR	230 µm	X	X		X			4.6 cm	2.3 cm
	QR450-7-XSR	450 µm	X	X		X			9.0 cm	4.5 cm

Reflection/Backscattering Probes

Our most typical reflection probe design has a tightly packed 6-around-1 fiber bundle to ensure parallel orientation of the fibers. Reflection probes couple to our spectrometers and light sources to measure reflection and fluorescence from solid surfaces or backscattering and fluorescence in liquids and powders. Sample applications include color and appearance measurements of solid surfaces such as filters and biological samples and backscattering measurements of milk, bulk powders and dyes. Also, we offer a 200 µm reflection probe in the same 6-around-1 design, but with a 76.2 mm PEEK ferrule for applications (such as corrosive environments) where non-metallic probes are necessary.



FULL PRODUCT SPECIFICATIONS

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Reflection/Backscattering Probes

Custom Option: Jacketing Options

The fiber assembly jacketing is designed to protect the fiber and provide strain relief. But we have jacketing options that can do so much more. We offer multiple jacketing options; our most popular selections are listed below.

Reflection Probes with Reference Leg			Fiber Bundle	Fiber					
Wavelength Range	Item	Core Diameter	6 illumination fibers around 1 read	6.35 mm OD	3.18 mm OD	Silicone monocoil	Zip tube blue PVDF	LTBR	STBR
VIS-NIR Low OH content 400-2100 nm	QR200-7-REF-VIS-NIR R200-7-REF-VIS-NIR	200 µm	X X	X X		X	X	8 cm	4 cm
UV-VIS High OH Content 300-1100 nm	QR200-7-REF-UV-VIS R200-7-REF-UV-VIS	200 µm	X X	X X		X	X	8 cm	4 cm
Reflection/Backscattering Probes for Expanded Wavelength Coverage									
UV-VIS and VIS-NIR 300-1100 nm and 400-2100 nm	QR200-12-MIXED R200-12-MIXED	200 µm	6 UV-VIS and 6 VIS-NIR illumination fibers around 1 UV-VIS and 1 VIS-NIR fibers	X X		X	X	8 cm	4 cm
Angled Probes for Solutions and Powders									
VIS-NIR Low OH content 400-2100 nm	QR200-7-ANGLE-VIS R200-7-ANGLE-VIS	200 µm	X X	X X		X	X	8 cm	4 cm
	QR400-7-ANGLE-VIS R400-7-ANGLE-VIS QR400-ANGLE-VIS	400 µm	X X X	X X		X X	X	16 cm	8 cm
UV-VIS High OH Content 300-1100 nm	QR200-7-ANGLE-UV R200-7-ANGLE-UV	200 µm	X X	X X		X	X	8 cm	4 cm
	QR400-7-ANGLE-UV R400-7-ANGLE-UV QR400-ANGLE-UV	400 µm	X X X	X X X		X X	X	16 cm	8 cm

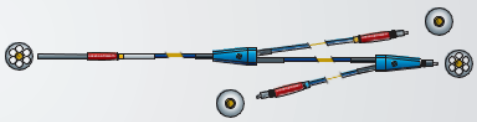
Angled Reflection Probe

A = Read Fiber

B = Dummy Fiber

Our Angled Reflection Probes have a 6-around-1 fiber design with a 30º window to remove specular effects when the probe is immersed in liquids or powders.

Reflection Probe With Reference Leg



A = Read Fiber

B = Reference Fiber

In this design, an additional fiber leg is added to the probe to monitor an illumination or reference source. This is useful where the changing output of the source needs continuous monitoring.

Transmission Dip Probes

General Purpose Probes for the Lab and Other Environments

Our T300-RT and T200-RT Transmission Dip Probes couple to our spectrometers and light sources to measure absorbance and transmission in solutions. These probes are especially useful for embedding into process streams for real-time sample monitoring. Parts included: Fiber w/SS Sleeve, Need to purchase Tip: (RT-(XX)mm. Sleeve only:T300-SLEEVE or T200-SLEEVE.

Standard Transmission Dip Probes				
Discription	**Transmission Dip Probe, 200um UV-VIS or probe**	**Transmission Dip Probe, 200um VIS-NIR probe**	**Transmission Dip Probe 300um UV-VIS probe**	**Transmission Dip Probe 300um VIS-NIR probe**
Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Range	UV-VIS	VIS-NIR	UV-VIS	VIS-NIR
Fiber Type	SR	VIS-NIR	SR	VIS-NIR
Sleeve	T-200SLEEVE	T-200SLEEVE	T-300SLEEVE	T-300SLEEVE
Sleeve Material	Stainless Steel (300 series)	Stainless Steel (300 series)	Stainless Steel (300 series)	Stainless Steel (300 series)
Fiber probe w/ Sleeve	T200-RT-UV-VIS	T200-RT-VIS-NIR	T300-RT-UV-VIS	T300-RT-VIS-NIR
Outer Diameter	3.175 mm diameter for internal stainless steel assemble, 6.35 mm with stainless steel sleeve	3.175 mm diameter for internal stainless steel assemble, 6.35 mm with stainless steel sleeve	3.175 mm diameter for internal stainless steel assemble, 6.35 mm with stainless steel sleeve	3.175 mm diameter for internal stainless steel assemble, 6.35 mm with stainless steel sleeve
Probe Length	127 mm	127 mm	127 mm	127 mm
Optics	Fused silica	Fused silica	Fused silica	Fused silica
Internal Materials	Second surface aluminum mirror	Second surface aluminum mirror	Second surface aluminum mirror	Second surface aluminum mirror
Tip (flow path)	RT-xx (2,5, 10mm)	RT-xx (2,5, 10mm)	RT-xx (2,5, 10mm)	RT-xx (2,5, 10mm)
Fiber Length	2 meters	2 meters	2 meters	2 meters
Breakout	1.0 m from the end of the probe	1.0 m from the end of the probe	1.0 m from the end of the probe	1.0 m from the end of the probe
Fiber Diameter	200 um	200 um	300 um	300 um
Fiber Jacketing	PVC Monocoil-PVDF zip tube	PVC Monocoil-PVDF zip tube	PVC Monocoil-PVDF zip tube	PVC Monocoil-PVDF zip tube
Connector	SMA 905	SMA 905	SMA 905	SMA 905
Operating Temperature	Up to 100 C without sleeve	Up to 100 C without sleeve	Up to 100 C without sleeve	Up to 100 C without sleeve
Pressure	100 psi	100 psi	100 psi	100 psi
Optional	pH tip (RT-PH)	pH tip (RT-PH)	pH tip (RT-PH)	pH tip (RT-PH)

Transmission Probes

Transmission Dip Probes for Hostile Environments

The TP300-UV-VIS Transmission Dip Probe couples to our spectrometers and light sources to measure the absorbance and transmission of solutions in harsh environments.

Also, the TP300-UV-VIS Probe is a chemically inert PEEK transmission probe that can be equipped with a tip (RT-PH) for mounting transmissive pH films in the optical path. Light is directed via one fiber through the mounted film to a mirror. Then light is redi- rected back through the film to a receive fiber that returns the light to the spectrometer. The sample is free to flow over the sides of the film.

By using an RTP-2-10 (adjustable 2-10 mm) Transmission Tip, the TP300-UV-VIS can be used for routine transmission measurements.

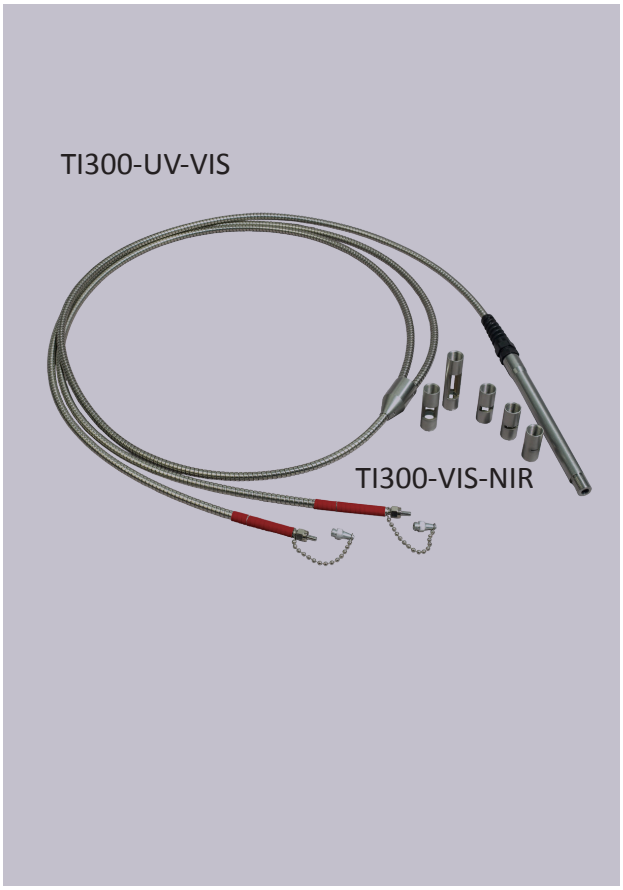
Standard Transmission Dip Probes

Item	Transmission Dip Probe 300um UV-VIS probe	Transmission Dip Probe 300um VIS-NIR probe
Material	Peek	Peek
Range	UV-VIS	VIS-NIR
Fiber Type	SR	VIS-NIR
Sleeve	DFTP300SLEEVE	DFTP300SLEEVE
Sleeve Material	PEEK	PEEK
Fiber probe w/ Sleeve	TP300-UV-VIS	TP300-VIS-NIR
Outer Diameter	3.175 mm diameter for internal stainless steel assemble, 6.35 mm with Peek sleeve	3.175 mm diameter for internal stainless steel assemble, 6.35 mm with Peek sleeve
Probe Length	107.9 mm	107.9 mm
Optics	Fused silica	Fused silica
Internal Materials	Second surface aluminum mirror	Second surface aluminum mirror
Tip (flow path)	RTP-2-10 or RTP-10-20	RTP-2-10 or RTP-10-21
Fiber Length	2 meters	2 meters
Breakout	1.0 m from the end of the probe	1.0 m from the end of the probe
Fiber Diameter	300 um	300 um
Fiber Jacketing	PVC Monocoil-PVDF zip tube	PVC Monocoil-PVDF zip tube
Connector	SMA 905	SMA 905
Operating Temperature	Up to 100 C without sleeve	Up to 100 C without sleeve
Pressure	100 psi	100 psi
Optional	pH tip (RT-PH)	pH tip (RT-PH)

Industrial Transmission Process Probes

High-Pressure, High-Temperature

Our TI300-series Transmission Industrial Dip Probes can be used in environments with pressure limits up to 250 psi and at temperatures up to 300 °C. The TI300-UV-VIS uses 300 µm diameter solarization-resistant optical fiber (200-1100 nm), while the TI300-VIS-NIR uses 300 µm diameter VIS-NIR optical fiber (400-2100 nm). The TI300 probes couple to our spectrometers and light sources to measure solution absorbance and transmission in industrial applications.



Standard Transmission Dip Probes	
Discription	**High-Pressure, High-Temperature Stransmission dip probes 300um VIS-NIR**
Material	316 Stainless Steel
Range	VIS-NIR
Fiber Type	VIS-NIR
Sleeve	DFTI300SLEEVE
Sleeve Material	316 Stainless steel
Fiber probe w/ Sleeve	TI300-VIS-NIR
Outer Diameter	12.7mm outer diatmeter; 316 stainless steel
Probe Length	Ferrule- 12.7 cm without tip; Tips - 2.6 cm to 4.9 cm, depending on tips
Optics	quartz
Internal Materials	Quartz back-coated mirror and quartz lens
Tip (flow path)	RT-TI-xx (2,5,10,25,50mm)
Fiber Length	2 meters
Breakout	1.0 m from end of probe
Fiber Diameter	300 um
Fiber Jacketing	Full interlocked stainless steel jacketing over Teflon tubing; total 7.0 mm outer diameter
Connector	SMA 905
Operating Temperature	Up to 300 C for probe body
Pressure	250 psi

FULL PRODUCT SPECIFICATIONS

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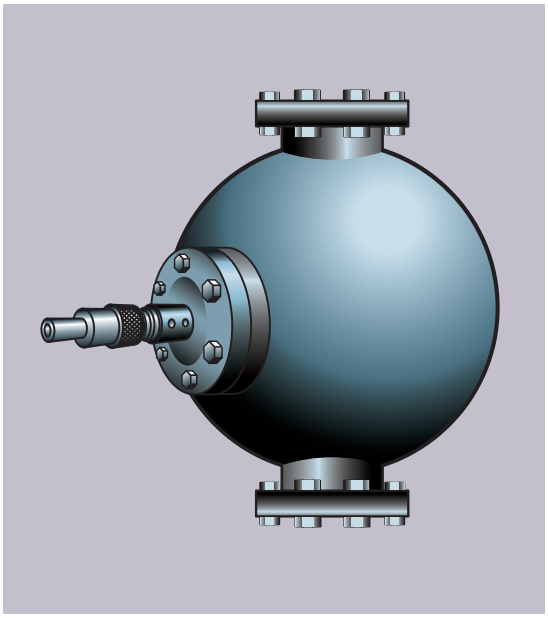
Feed throughs for Vacuum Applications

Full Range of Fiber Accessories

We offer a full range of vacuum feedthrough (VFTs) accessories for your chamber applications. General-purpose bolt-style VFTs come with an O-ring and a pair of splice bushings and are designed to penetrate NEMA enclosures. For more robust environments, we offer VFTs with a conflat flange or ISO KF industrial- grade flange.

VFTs have in-vacuum and in-air sides with SMA 905 connectors for coupling to optical fibers (available separately). VFTs are an excellent option for optical measurement applications in semiconductor and thin film processing or anywhere ultra-high vacuum applications occur.

Gaskets, mounting hardware and other accessories are available through our reseller partner Accu-Glass Products, Inc. (accuglassproducts.com).



Wavelength	Item	Fiber Type	Flange Type or O-ring				
			1.33" OD	2.75" OD Conflat	1.18" OD KF16 ISO	2.16" OD KF40 ISO	O-ring
VIS-NIR LOW OH Conent 400-2200 nm	VFT-200-VIS Series	200 µm diameter VIS-NIR	X	X	X	X	X
	VFT-400-VIS Series	400 µm diameter VIS-NIR	X	X	X	X	X
	VFT-600-VIS Series	600 µm diameter VIS-NIR	X	X	X	X	X
	VFT-1000-VIS Series	1000 µm diameter VIS-NIR	X	X	X	X	X
UV-VIS OH Conent 300-1100 nm	VFT-200-UV Series	200 µm diameter UV-VIS	X	X	X	X	
	VFT-400-UV Series	400 µm diameter UV-VIS	X	X	X	X	
	VFT-600-UV Series	600 µm diameter UV-VIS	X	X	X	X	
	VFT-1000-UV Series	1000 µm diameter UV-VIS	X	X	X	X	X
UV/SR-VIS High OH Content 200-1100 nm	VFT-200-SR	200 µm diameter SR					X
	VFT-400-SR	400 µm diameter SR					X
	VFT-600-SR	600 µm diameter SR					X
UV-VIS-XSR Solarization-resistant 180-900 nm	VFT-450-XSR-133	450 µm diameter XSR	X				
	VFT-600-XSR-133	600 µm diameter XSR	X				

Fibers and Probes

Fiber and Probe Fixtures and Holders

MFA-C-MOUNT

C-MOUNT-MIC

C-Mounts

Our C-MOUNT-MIC Adapter Assembly with adjustable focusing barrel has an SMA 905 Connector in its center for attaching to optical fibers. The internal C-mount threads of this assembly allow you to adapt fiber optic spectrometers to other optical devices such as microscopes and telescopes.

The MFA-C-MOUNT also connects to optical devices such as microscopes and telescopes, but its center connector is designed to accept probes with 6.35-mm (1/4”) outer diameter ferrules.

MFA-PT

Phototubus Microscope Adapter

The MFA-PT Phototubus Microscope Adapter adapts to a Phototubus outlet on microscopes and accepts SMA 905-terminated optical fibers.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Fibers and Probes

Fiber and Probe Fixtures and Holders

RPH-1

Reflection Probe Holders

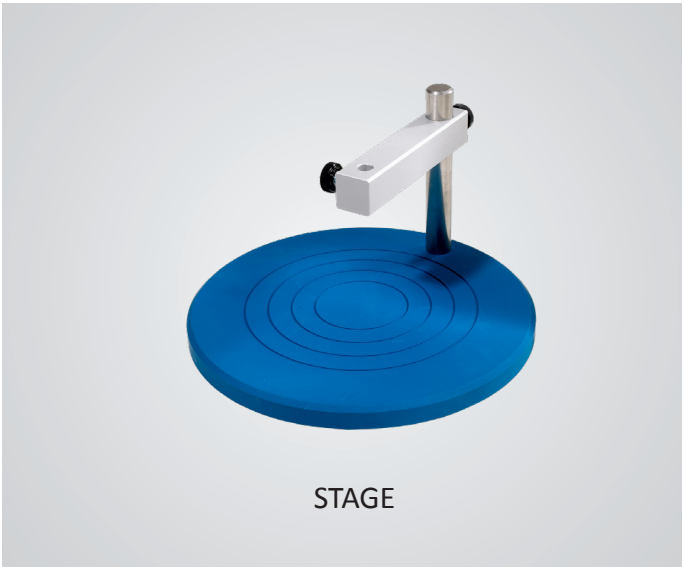
The RPH-1 is anodized aluminum platforms with holes drilled at 45° and 90° angles to the surface. The RPH-1 holds 6.35-mm (1/4”) diameter probes but with the RPH-ADP an adapter that fits on the RPH-1 you can secure 3.17 mm (1/8”) diameter probes as well.

Optical Stages

The Single-Point Reflection Stage (at right) is a probe holder for reflection measurements of optical layers and other substrates up to 150 mm in diameter. The probe holder accommodates fiber optic probes and other sampling devices up to

6.35 mm in diameter.

The Stage-RTL-T is also a sampling system for analysis of substrate materials. The STAGE-RTL-T can be configured for reflection and transmission measurements.



STAGE

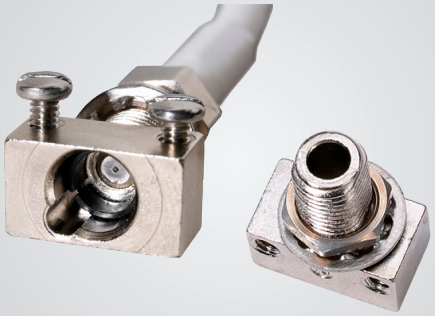
FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Fibers and Probes

Fiber and Probe Accessories

21-01 SMA Front



21-01 SMA Rear

Bulkhead Bushing

The 21-01 SMA Bulkhead Bushing assembly is a device mount for optical fibers. The 21-01 SMA Bulkhead Bushing allows easy coupling of an LED or photodiode in a TO-18 can to an SMA-terminated optical fiber.

21-02 SMA

Splice Bushings

The 21-02 SMA Splice Bushings are in-line adapters that connect SMA 905-terminated optical fibers (or any two objects with SMA 905 terminations). A splice bushing consists of a 0.75” screw with female ends. The standard 21-02 is made of nickel-plated brass while the 21-02-SS is made of stainless steel. They are useful for coupling patch cords to fiber optic probes and other devices, or for any multiple-fiber application where coupling our standard optical fibers and accessories is preferable to creating costly and complex fiber optic assemblies.

21-02- BH

SMA 905

Bulkhead and Splice Bushing Combo

The 21-02-BH SMA Bulkhead Splice Bushing is an in-line adapter that connects SMA 905-terminated optical fibers through a chamber wall or panel. The 21-02-BH features an O-ring for sealing against the inside of the panel wall and a nut and lockwasher for mounting to the outside of the panel wall.

Fibers and Probes

Probe Accessories

FC Barrel

FC Barrel

Our collimating lenses come standard with SMA 905 Connectors and interface to our SMA-terminated fibers. If you have FC-terminated fiber, you could remove the inner 6.35-mm OD SMA barrel and replace it with this FC Barrel to connect to our products.Spare SMA 905 barrels are also available.

SMA-ST-ADP

SMA-FC-ADP

Custom Option: Connector Adaptersl

Connector adapters allow you to mate an item with an SMA 905 Connector to an item with either an ST or FC Connector. Additional options are available for single-fiber laser coupling and other applications.

FOT-SMAWRENCH

Finger Fiber Wrench

The FOT-SMAWRENCH is a wrench that slips over the hex nut of the SMA 905 Connector used in Laboratory-grade Optical Fibers and helps to easily attach the fiber to connectors on spectrometers, light sources, collimating lenses and many other accessories.

ADP-SMA-SMA

Modemixer/Modestripper

The Modemixer/Modestripper is an in-line, 3-mm Suprasil rod that connects two SMA 905-terminated optical fibers to mix core modes and eliminate clad modes throughout 180-2100 nm.

Unjacketed Bulk Optical Fiber

DIY Fiber and Tools for the Modern Spectroscopist

We offer spooled, unjacketed optical fiber for customers who build their own assemblies. Choose from core diameters from 50 µm to 100 µm and High OH, Low OH and Solarization-resistant fiber. To improve the strength and flexibility of our fiber, we triple-coat it with a polyimide buffer prior to the spooling process.

Unjacketed Bulk Optical Fiber						Fiber Type		
Wavelength Range	Item	Core Diameter	Buffer/ Coating	UV-VIS	VIS-NIR	UV/SR-VIS	LTBR	STBR
VIS-NIR Low OH content 400-2100 nm	FIBER-100-VIS-NIR	100 µm	Polyimide		X		4 cm	2 cm
	FIBER-200-VIS-NIR	200 µm	Polyimide		X		8 cm	4 cm
	FIBER-300-VIS-NIR	300 µm	Polyimide		X		12 cm	6 cm
	FIBER-400-VIS-NIR	400 µm	Polyimide		X		16 cm	8 cm
	FIBER-500-VIS-NIR	500 µm	Polyimide		X		20 cm	10 cm
	FIBER-600-VIS-NIR	600 µm	Polyimide		X		24 cm	12 cm
	FIBER-1000-VIS-NIR	1000 µm	Acrylate		X		30 cm	15 cm
UV-VIS High OH Content 300-1100 nm	FIBER-100-UV-VIS	100 µm	Polyimide	X			4 cm	2 cm
	FIBER-200-UV-VIS	200 µm	Polyimide	X			8 cm	4 cm
	FIBER-300-UV-VIS	300 µm	Polyimide	X			12 cm	6 cm
	FIBER-400-UV-VIS	400 µm	Polyimide	X			16 cm	8 cm
	FIBER-500-UV-VIS	500 µm	Polyimide	X			20cm	10 cm
	FIBER-600-UV-VIS	600 µm	Polyimide	X			24 cm	12 cm
	FIBER-1000-UV-VIS	1000 µm	Acrylate	X			30 cm	15 cm
UV/SR-VIS High OH content 200-1100 nm	FIBER-200-UV/SR-VIS	200 µm	Polyimide			X	4 cm	2 cm
	FIBER-300-UV/SR-VIS	300 µm	Polyimide			X	12 cm	6 cm
	FIBER-400-UV/SR-VIS	400 µm	Polyimide			X	16 cm	8 cm
	FIBER-600-UV/SR-VIS	600 µm	Polyimide			X	24 cm	12 cm

Bare Fiber Adapter Kit

DIY - Fiber Termination and Polishing

The BFA-KIT Bare Fiber Adapter Kit is for the fiber tinkerer who wants to polish bare (unjacketed) optical fiber. The kit comes with fiber polishing holders for various sizes of optical fibers.

The Bare Fiber Adapter Kit includes the following:

- 6 fiber polishing holders for various sizes of optical fiber (1 each for 100 µm, 200 µm, 300 µm, 400 µm, 600 µm and 1000 µm optical fibers)
- A BFA-KIT-CHUCK connect-and-release adapter (which can be purchased separately as well) to fasten the SMAs onto bare optical fiber
- Several pieces of wire for cleaning out the polishing holders and connect-and-release adapter

An SMA-PUCK polishing puck is not included with the BFA-KIT, but is available separately. The puck is used to polish the surface of an optical fiber.

The FT-KIT Fiber Tinkerer Kit (not shown) includes an assortment of randomly selected, unterminated UV-VIS and VIS-NIR optical fibers. Each fiber included in the kit will be at least one meter in length. The Fiber Termination Kit (TERM-KIT) includes all the tools needed to terminate and polish fiber.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Fiber Termination Kits

Repair and Retool Like a Pro

The TERM-KIT Termination Kit provides you with all the tools you need to properly polish and terminate an optical fiber. The TERM-KIT is great for inspecting, repairing and polishing optical fiber assemblies.

Included in the kit are polishing papers in thicknesses ranging from 1 mm to 30 mm.

Included in Each TERM-KIT

- 4 SMA 905 Connectors for 50 µm or 100 µm fibers
- 4 SMA 905 Connectors for 200 µm optical fibers
- 4 SMA 905 Connectors for 400 µm optical fibers
- 4 SMA 905 Connectors for 600 µm optical fibers
- 4 SMA 905 Connectors for 1000 µm optical fibers
- Polishing puck
- Glass polishing plate (15 cm x 15 cm)
- Dozens of polishing papers

- 5-cavity crimp tool (for 2.6, 3.4, 3.8, 4.5 and 6.4 mm cavities)
- Scoring tool
- Inspection scope
- 2-hour cure epoxy
- Optical wipes

Sensors

Ocean Optics optical oxygen sensors provide an outstanding alternative to traditional chemical sensing devices and are used in life sciences, pharmaceutical manufacturing, quality control, food and beverage, and a host of other applications.

Our exclusive indicator materials are embedded in sol gel coatings that are applied to probes and other form factors. The indicators respond to specific analytes in their immediate environment with formulations available for a variety of oxygen sensing needs.

Quick Tip:
Our oxygen sensing materials can be applied to probes, patches, cuvettes and a variety of custom substrates.

Fiber Optic Chemical Sensors

Real-Time, In Situ Analyte Monitoring

We've taken our expertise in miniature fiber optic spectroscopy and combined it with advances in materials sciences to develop an innovative line of modular fiber optic chemical sensing solutions.

Ocean Optics designs its sensors by placing a transducer material at the end, or tip, of an optical fiber. These materials change optical properties in response to specific analytes in their immediate environment.

Our transducer materials include both fluorescence-based and absorbance-based indicators. These indicators are immobilized, or trapped, in a variety of proprietary hydrophobic and hydrophilic polymers and sol-gel materials. Materials can be coated on flat substrates such as optical fibers, optical flats, cuvettes and other containers.

Ocean Optics produces components that can be used to monitor oxygen in biological samples, headspace gases, slurries, cosmetics, foods and liquids in natural environments.

Fiber Optic Chemical Sensor Systems	Commercial Electrodes
O2 sensors are immune to environmental changes in pH, salinity and ionic strength	Polarographic electrodes can be affected by changes in pH, salinity and ionic strength
O2 sensors are immune to interference from moisture, CO2, methane and other substances	Electrodes are subject to interference from a number of substances and sampling conditions
Sensing materials are easily applied to probes, patches, cuvettes and other media	Electrodes typically are available in probe or cell membrane format only
Sensor coating formulations (especially for O2) are available for a variety of environments	Electrodes often have limited range of chemical compatibility
Optical sensors require less maintenance and are more robust than most electrodes	Electrodes often require tedious maintenance and have a delicate glass body that is prone to breakage
O2 sensors do not consume oxygen, allowing for continuous contact with the sample	O2 electrodes can consume oxygen at rates of ~0.1 micrograms/hour
Calibration is easily handled and can last many months before recalibration is necessary	Electrodes can require recalibration as frequently as hourly
O2 sensors have a long life – up to a year for O2 coatings	Electrodes have a typical lifetime of just three months

Sol-Gel Formulation

The Secret to Our Sensor Success

Our propriety sol-gel process produces a silica glass structure at room temperature into which we embed chemically sensitive indicator dyes. We can control matrix pore size to ensure that embedded indicator dyes do not leach out.

We now offer several indicators: ruthenium and Pt-porphyrin for photoluminescent quenching in oxygen applications and an organically modified sol gel (Ormosil) engineered to maximize immunity to ionic strength sensitivity. Sol-gel matrices also will accommodate other indicators; contact an Applications Scientist for details.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Fiber Optic ChemicalSensors

Ideal for Full Range of O2 applications

Our optical oxygen sensors are available in various form factors (patch, probe, cuvette and more) and with a range of sensing formulations appropriate for all sorts of applications. We're able to work equally effectively with both researchers who select one of our standard sensor options and OEMs who have high-volume needs or request a non-standard substrate for us to coat. That flexibility is what sets our fiber optic chemical sensors apart from galvanic electrodes and similar technologies.

Biological Environments

- Biofermentation processes
- Cell culture monitoring
- Sterile environments

Biomedical and Life Sciences

- Blood oximetry
- Cellular analysis
- Lab samples (pH titrations, low ionic strength samples)
- Tissue analysis

Food Process and Storage Monitoring

- Beverage packaging
- Vacuum-packaged foods
- Vegetable oils
- Wine fermentation

Vacuum and Semiconductor Processes

- Controlled-environment glove boxes
- Ion deposition processes

Aerospace

- Cell growth in space
- O2 monitoring in confined spaces

Pharmaceutical and Chemical Processing

- Harsh chemicals (hexane, toluene and mineral oil)
- Hydrocarbons (fuels, alcohols, hydraulic fluids)
- Packaging and headspace
- Pharmaceutical fermentation

Environmental and Ecological

- Aquaculture applications
- Marine organisms
- Natural waters (marine, surface)
- Soils and sediments
- Wastewater treatment

Fuel Monitoring

- Fuel storage monitoring
- Fuel transportation

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

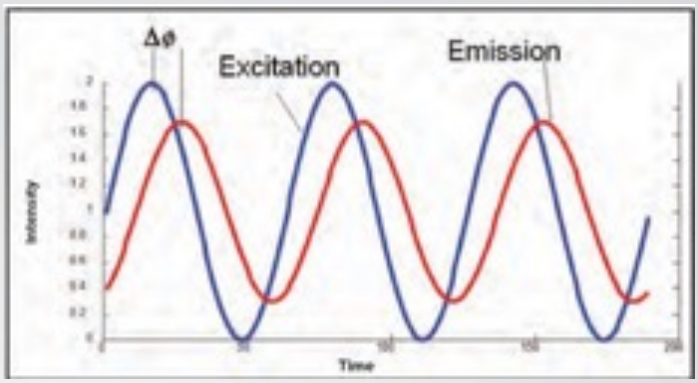
Fiber Optic Chemical Sensors

Get to Know Your Sensors

How Oxygen Sensors Work

Our oxygen sensors combine sol-gel materials and phase fluorometry techniques to measure the partial pressure of dissolved or gaseous oxygen. Oxygen-sensitive, fluorescence-based transducer materials (ruthenium) are trapped in a sol-gel coating that is applied to a probe, patch or other media. When the indicator changes optical properties in response to specific analytes in its immediate environment, our NeoFox Phase Fluorometer measures the response.

Sensor operation is simple and elegant. A pulsed blue LED transmits light at ~475 nm through an optical fiber to a probe, patch or other media coated with a thin layer of a hydrophobic sol-gel material. The light from the LED excites the indicator, emitting energy at ~600 nm. If the excited complex encounters an oxygen molecule,



the excess energy is transferred to the oxygen molecule in a non-radiative transfer, decreasing or quenching the fluorescence signal. The degree of quenching correlates to the level of oxygen concentration or to oxygen partial pressure in the coating, which is in dynamic equilibrium with oxygen in the sample.

The emitted energy is collected by the probe or fiber and carried to the NeoFox Phase Fluorometer. Phase fluorometry measures the phase shift between the excitation (blue LED) and emission (ruthenium fluorescence), which is used to calculate the excited state lifetime (tau). The fluorescence phase is measured and related to the partial pressure of oxygen through the Stern-Volmer equation. This data is then displayed in software.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Choosing the Right O2 Sensor

Getting the Most Out of Your Sensor System

Sensor Formulations

HIOXY Sensor Formulation Hydrocarbon Environments

The HIOXY sensor is designed for monitoring oxygen partial pressure in non-aqueous vapors and solutions. This sensor coating is ideal for use with oils, alcohols and hydrocarbon-based vapors and liquids. HIOXY has been tested successfully in com- mercial and military aviation fuels, gasoline, diesel, some alcohols, glycol, military hydraulic fluids and wine.

FOSPOR Sensor Formulation High-Sensitivity Coating

Our FOSPOR coating is applied to the distal end of your fiber and has a fluorescence- based Pt-porphyrin indicator. The sensor uses fluorescence quenching of the porphyrin to measure the partial pressure of dissolved or gaseous oxygen. FOSPOR coat- ing can be applied to substrates other than fibers and probes and used for applications such as through-packaging measurements in the food and pharmaceutical industries.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Choosing the Right O2 Sensor

Form Factors: Probes and Patches

Unlike traditional electrochemical sensors, Ocean Optics optical oxygen sensors can be made in small and customizable form factors. The sensing material an oxygen-sensitive fluorophore in a sol-gel host matrix can be applied to the tip of a fiber or probe, an adhesive membrane such as a patch, or a flat substrate such as a cuvette or microtiter plate. Probes and patches are the standard options.

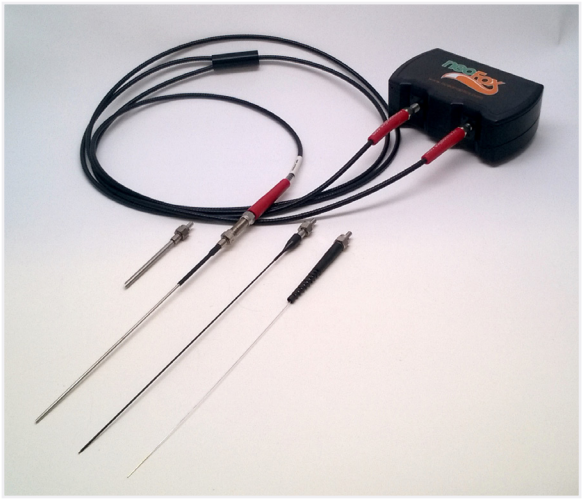
Probes are especially versatile because they can be offered in many sizes and designs and can be strength- ened for use in harsh environments. Patches are ideal for through-package measurements in the pharma- ceuticals and food and beverage industries and for non-intrusive measurements in biosystems.

Probes

We offer more than a dozen oxygen sensing probe options everything from slender probes for fine spatial resolution to rugged stainless steel probes for process environments. Our offerings cover a wide range of sampling needs, whether your application involves penetrating a package or the sample media itself or the sample environment requires a non-metallic probe material.

Patches

Our RedEye® oxygen patches can be attached to containers, packaging or other media for non-intrusive oxygen measurements in headspace and solutions. The self-adhesive patches are superior to polymer mem- branes, with better thermal and mechanical stability, superior chemical compatibility and faster response time.



Electronics

“Electronics” is the term we use to describe the detection part of our oxygen sensing system. The NeoFox Phase Measurement system comes in versions: the standard benchtop option (item code: NEOFOX). The system measures fluorescence lifetime, phase and intensity and are particularly suited for applications where sensitivity to drift and system stability are critical.

NeoFox comprises a single-channel phase fluorometer with integrated LED; it connects to a PC for data processing and display. NeoFox works with all our oxygen sensor probes, patches and other components.

Neo Fox Phase Measurement System

Benchtop and Handheld Electronics for Your Optical O2 Sensor

For oxygen sensing, the NeoFox® Phase Measurement System is our most popular fluorescence-based optical sensing system. Because of NeoFox's unique ability to improve overall system stability and make calibration easier for a wide variety of oxygen sensing setups, it is the choice for measuring fluorescence lifetime, phase and intensity. Plus, NeoFox is brilliantly suited for applications where sensitivity to drift and system stability are critical.

The NeoFox uses LED excitation and photodiode detection with filter-based wavelength selection for easy experimental setup and control. Because the unit is self-contained, it is invariant to fiber bending and stray light, and has a wide dynamic range of optical intensity as well as low optical and electronic crosstalk, and low drift and phase noise.

NEOFOX-GT is a robust benchtop option with RS-232 communications capability.

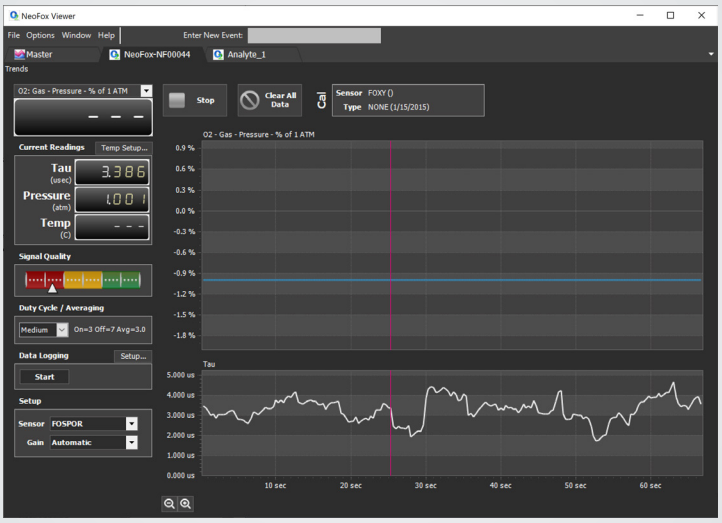
FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Neo Fox Phase Measurement System

Benchtop and Handheld Electronics for Your Optical O2 Sensor

NeoFox Specifications	
	Benchtop Item Cod: NEOFOX
Dimensions:	107.95 mm x 63.5 m x 38.1 mm
Weight:	642 g
Principle:	Photoluminescence quenching using a ruthenium compound; sensor measures O2 partial pressure
Parameters measured:	Luminescence phase shift, AC luminescence intensity, tem- perature (via optional external thermistors) and pressure (via onboard pressure transducer)
Sensor coating formulations (sol gel-embedded dyes):	General purpose (FOXY), high-sensitivity (FOSPOR) and hydrocarbon-ready (HIOXY)
Media:	Gases and liquids
Computer interface:	PC
Operating systems:	Windows XP (32-bit); also, Windows 7 (32-bit)
Power input:	5VDC, 500 mA steady state
Communications:	USB, analog out, RS-232



NeoFox Viewer Software

NeoFox Viewer is the Windows-based software that allows you to collect, manage and analyze data with your NeoFox phase measurement system. This nimble software also makes it simple to configure your NeoFox and update firmware when necessary. Use NeoFox Viewer to get the most out of your NeoFox and to ensure reliability through each measurement.

You can download a free copy of NeoFox Viewer at https://www.oceanoptics.com/photonics-systems/oxygen-measurement-system/insight/

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NeoFox Probe and Patch-Based Systems

Ful System Performance Specifications

One of the biggest advantages our fiber optic oxygen sensors offer compared with electrodes and other optical sensors is the range of available sampling options. In the table below we've compiled performance data for NeoFox-based systems used with our two primary sampling choices: oxygen probes and patches. Please note that some performance parameters vary according to the sensor format and coating formulation used.

One other item of interest: The specifications for O2% and dissolved oxygen range are given for conditions at 1ATM (atmosphere). At 1 ATM (typical conditions on Earth), we breathe many molecules such as nitrogen, helium, hydrogen and oxygen. All these molecules make up the total pressure in the environment. The ruthenium in our sensors is sensitive only to oxygen, which is just one part of the total pressure in the environment. So, when we determine the percentage of oxygen present in the environment at 1 ATM, we're measuring part of the total pressure, hence the term"partial pressure."

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

NeoFox Probe and Patch-Based Systems

Full System Performance Specifications

Probe-based System Specifications	FOSPOR Formulation	HIOXY Formulation
Recommended use:	General purpose coating	Robust coating for hydrocarbon-rich environments
O2% range (at 1atm):	0 - 500%	0 - 50%
DO range (ppm at 1atm in pure water):	0 - 40 ppm	0 - 20 ppm
Temperature range:	-200 to +60 °C	-200 to +120 °C
O2% resolution at 0% oxygen:	0.005%	0.004%
O2% resolution at 20.9% oxygen:	0.02%	0.02%
DO resolution at 0% oxygen:	2 ppb	2 ppb
DO resolution at 20.9% oxygen:	8 ppb	8 ppb
O2% accuracy	Calibration dependent	Calibration dependent
DO accuracy	Calibration dependent	Calibration dependent
Min. detectable level in gas:	0.005%	0.004%
Response time:	2 - 5 sec in gas	< 1 sec in gas
	30 - 60 sec with overcoat in gas	20 - 40 sec with overcoat in gas
	5 - 10 sec in pure water	4 - 8 sec in pure water
Patch-based System Specifications	**FOSPOR Formulation**	**HIOXY Formulation**
Recommended use:	General purpose coating	Robust coating for hydrocarbon-rich environments (requires compatible adhesive)
O2% range (at 1atm):	0 - 500%	0 - 50%
DO range (ppm at 1atm in pure water):	0 - 40 ppm	0 - 20 ppm
Temperature range:	-10 to +60 °C	"-10 to +120 °C (requires HTC version)"
O2% resolution at 0% oxygen:	0.005%	0.004%
O2% resolution at 20.9% oxygen:	0.02%	0.02%
DO resolution at 0% oxygen:	2 ppb	2 ppb
DO resolution at 20.9% oxygen:	8 ppb	8 ppb
O2% accuracy	Calibration dependent	Calibration dependent
DO accuracy	Calibration dependent	Calibration dependent
Min. detectable level in gas:	0.005%	0.004%
Response time:	2 - 5 sec in gas	< 1 sec in gas
	30 - 60 sec with overcoat in gas	20 - 40 sec with overcoat in gas
	5 - 10 sec in pure water	4 - 8 sec in pure water

Oxygen Sensing Kits

Fuly Integrated Systems for Your Probe or Patch Applications

We've packaged everything you'll need for probe or patch-based oxygen sensing applications into two convenient kits.

NEOFOX-KIT-PROBE and NEOFOX-KIT-PATCH are complete, out-of-the-box solutions for a variety of benchtop applications in research environments, teaching labs and commercial labs. Each kit allows you to set single- or multi-point calibration and to display oxygen readings in percent oxygen, partial pressure, moles per liter and more.

You'll note that we selected FOSPOR sensor formulation for both the NeoFox probe and patch kits. FOSPOR is our most versatile sensor coating chemistry and is useful for a wide range of applications. If FOSPOR is not appropriate for your applications, you can always opt for one of our modular oxygen sensing systems with a different coating formula.

Here's what you get with each kit:

NEOFOX-KIT-PROBE

- NeoFox Phase Fluorometer
- NeoFox Viewer software
- NeoFox-TP temperature probe (thermistor)
- 1000 µm bifurcated optical fiber and SMA 905 splice bushing for cou- pling NeoFox to the probe
- FOSPOR-R multipurpose probe

NEOFOX-KIT-PROBE

- NeoFox Phase Fluorometer
- NeoFox Viewer software
- NeoFox-TP temperature probe (thermistor)
- 1000 µm bifurcated borosilicate optical fiber
- 5-unit package of 8 mm diameter, self-adhesive FOXY sensor patches

Probe kits are great for applications involving biological samples such as tissue and organic matter, foods and beverages and liquids in natural environments.

Patch kits are useful anywhere non-intrusive and through-package oxygen measurements are necessary: headspace in food packaging, process monitoring in bioreactor environments and partial pressure of oxygen in biomedical vessels.

Oxygen Sensing Kits

Technical Tip Calculating Drift in Ocean Optics Oxygen Sensors

Because our optical oxygen sensors use an LED to excite the fluorescence in the oxygen-sensitive coating, the systems do experience some drift. The drift will vary by sensor formulation FOSPOR or HIOXY and is reported in the NeoFox specifications table. You can calculate drift for your experiment by adding just a few experiment parameters to a simple formula. For example, imagine you have a FOXY Probe and need to measure your sample every 2.5 hours for 100 hours. To excite the fluorescence in your sensor coating, you turn on the LED and ideally, keep it on as long as you can; this helps to ensure a good average reading.

For purposes of our example, let's say you can leave the LED on for 1 minute. You now have all the data you need to calculate drift:

New drift = reported drift * duty cycle on/duty cycle off
New drift = 0.01%/hr. (use oxygen stability value from table on p. 165) * (1 minute/(2.5 hrs.* 60 minutes/hr.)

We normalize the time units to minutes; 2.5 * 60 minutes/hr. converts into 150 minutes.

New drift = 0.01%/hr. * (1 minute/150 minutes)
New drift = 0.01%/hr. * (0.0066)
New drift = 0.000066%/hr.

We want to run the experiment for 100 hours, so to calculate the drift:

New drift = 0.000066%/hr. * 100 hrs.
New drift = 0.006%

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

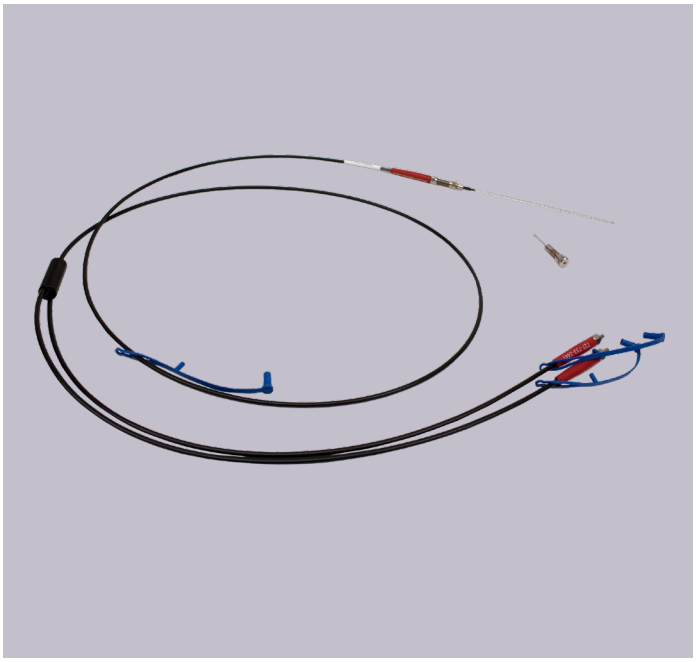
Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Oxygen sensor probes typically are available in a variety of designs and with each of our standard coating formulations (FOSPOR and HIOXY). Custom probes and accessories are also available. In most cases, you'll need a 21-02 Splice Bushing and a BIF-BORO bifurcated optical fiber to couple your probe to the NeoFox electronics. Information on the proper care of probes is available elsewhere in this section.

Preserving the Delicate Balance

Take control of environmental responsibility with Oxygen Sensors from Ocean Optics. These patch-and-probe based sensors are ideal for monitoring the quality and safety of wastewater, agricultural runoff and freshwater drinking sources and can help ensure the oxygen and pH stability of fish farm tanks and ponds.



Ocean Optics Optical oxygen sensors allow you to take in situ measurements without harming your sample.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

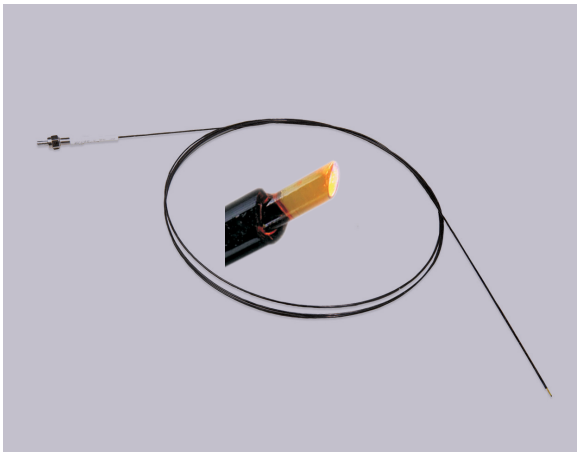
Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Polyimide Probes

Choose a polyimide probe for applications where the sample environment is hostile to metallic probes. Polyimide also offers good resistance to harsh chemicals. Note: The 200 µm version of these probes is less robust and should be handled carefully. Contact us about custom probe lengths and availability of HIOXY formula probe coatings.

Item:	Polyimide Probes
Use:	Environments hostile to metallic probes
Core diameter:	600 µm versions available
Outer diameter:	710 µm
Length:	18cm (other lengths available)
Ferrule/ jacketing:	Silicone
Reconditioning available:	Yes
Options:	FOSPOR-PI600 and FOSPOR-PI200 high-sensitivity



Electrode-replacement Probes

Our OR125-series probes are designed to replace standard 1/8” (0.125 mm) electrode probes.

Item:	Direct-replacement Probes for 1/8” OD (3.175 mm) electrodes
Use:	Replacement for 1/8” OD (3.175 mm) oxygen electrodes (smooth)
Core diameter:	1000 µm
Outer diameter:	3.175 mm
Length:	63.5 mm
Ferrule/ jacketing:	Stainless steel, titanium and PEEK versions; smooth or O-ring grooved
Reconditioning available:	Yes
Options:	FOSPOR-OR125 high-sensitivity HIOXY-OR125 hydrocarbon-ready

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

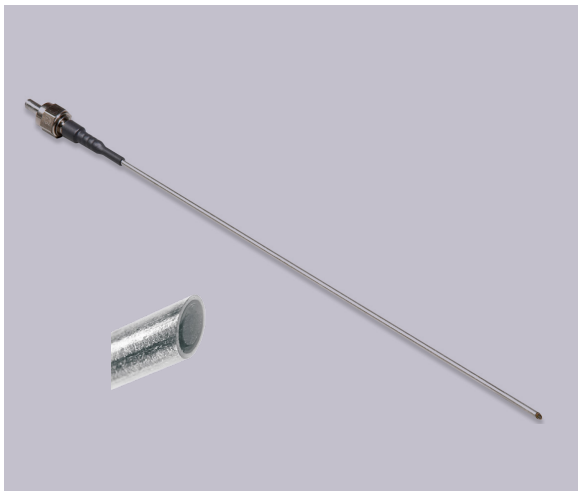
Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

General-purpose Probes

Stainless steel 1/16” (1.587 mm) OD probes are versatile options for a range of lab and other applications.

Item:	General-purpose 1.587 mm (1/16”) Probes
Use:	General purpose
Core diameter:	1000 µm
Outer diameter:	1.587 mm (1/16”)
Length:	152.4 mm
Ferrule/ jacketing:	Stainless steel
Reconditioning available:	Yes
Options:	FOSPOR-R high-sensitivity HIOXY-R hydrocarbon-ready



FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information..

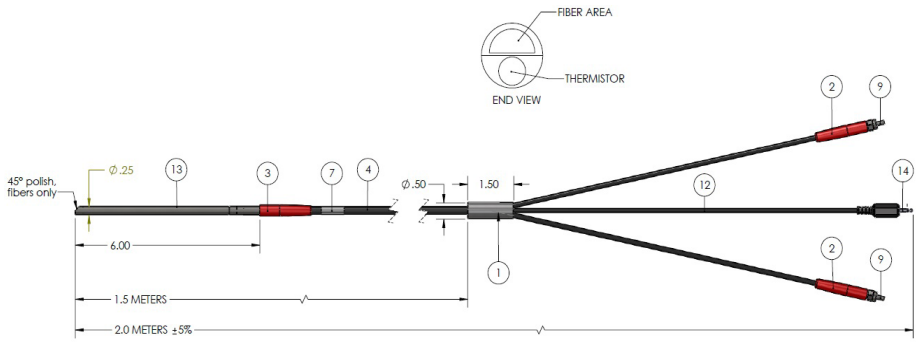
Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Process-ready Probes

Robust 1/4” (6.35 mm) stainless steel probes have a high pressure rating for process environments.

Item:	Process-ready 6.35 mm probes
Use:	Process environments
Core diameter:	1000 µm
Outer diameter:	6.35 mm
Length:	177.8 mm
Ferrule/ jacketing:	Stainless steel
Reconditioning available:	Yes
Options:	FOSPOR-1000-TSFIBER high-sensitivity HIOXY-1000-TSFIBER hydrocarbon-ready



Quick Tip

Although our line of oxygen sensor probes is extensive, there may be applications where a different probe design is required. We can coat your custom probe with our sensor material, as long as the probe is polished at a 45º angle to ensure maximum performance. Consult an Applications Scientist for details.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

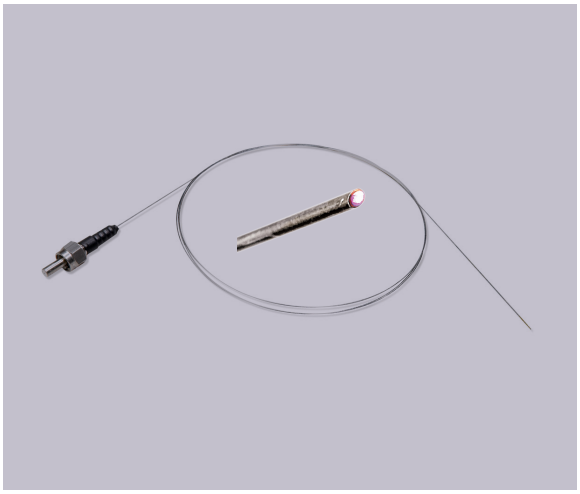
Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Small-diameter Probes

Slender, aluminum-jacketed probes work well where sampling space is limited. Standard and tissue-monitoring versions are available.

Item:	Small-diameter, Al-jacketed Probes
Use:	Fine spatial resolution applications
Core diameter:	300 µm
Outer diameter:	500 µm
Length:	18cm (other lengths available)
Ferrule/ jacketing:	Aluminum
Reconditioning available:	Yes
Options:	FOSPOR-AL300 high-sensitivity HIOXY-AL300 hydrocarbon-ready



Quick Tip: Probe Care

Your Oxygen Sensor probe is very easy to maintain. It can be left in air indefinitely, but don't leave it exposed to your excitation light source when it is not in use. Dropping the probe could cause the optical fiber to break. Be sure not to over tighten the SMA connections.

Cleaning and sterilization guidelines vary by sensor formulation and other variables. Ethylene oxide will sterilize all formulations safely. Be sure to visit our website for details.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Oxygen Probe Accessories

Accessory options include a needle probe accessory for use with R-series probes and an in-line flow cell option for low-pressure liquid streams.

The flow cell is made of PEEK polymer and includes tubing barbs for 1/16” (1.587 mm) and 1/8” (3.175 mm) ID tubing. It’s designed for use in a low-pressure flowing stream of liquid with a peristaltic or positive displacement pump.

Item:	Puncturing Needle Probe Accessories (two needle lengths available)
Use:	Puncturing septa or seals without damaging sensor coating; adapts to standard 1.587 mm (1/16”) probes and includes Swagelok adapter
Core diameter:	1000 µm (probe)
Outer diameter:	1.587 mm (1/16”)
Length:	152.4 mm (probe) and 63.5 mm (accessory)
Ferrule/ jacketing:	Stainless steel
Reconditioning available:	Yes (probe)
Options:	FOXY-R-PNA FOXY-R-PNA-2.5

Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Bifurcated Assemblies for Your Probe Setups

Our BIF-BORO bifurcated optical fibers are designed for optimizing the connection between your oxygen probe and the NeoFox electronics. You'll also need a 21-02 SMA Splice Bushing, which mates SMA-terminated optical fibers and connects the oxygen probe to the bifurcated optical fiber assembly. Both fibers and splice bushings are required for most probe setups and are priced separately. The RE-BIFBORO-2 is designed for seamless integration with RedEye patch applications.

Item:	Bifurcated borosilicate optical fiber assembly couples to sensor probe
Use:	For sensor probes of applicable size and sensitivity
Core diameter:	1000 µm, 600 µm, 300 µm
Length:	2 m
Ferrule/ jacketing:	Black PVC Monocoil
Reconditioning available:	NA
Options:	BIFBORO-1000-2 BIFBORO-600-2 BIFBORO-300-2 RE-BIFBORO-2 (3.175 mm OD, 2 m length)

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Our oxygen sensor probes are both robust and simple to maintain. Probe lifetime is typically one year before reconditioning may be necessary, providing that users are careful in handling the probe and ensure that it's not exposed to the excitation source energy for lengthy periods. Some sensor coatings are more appropriate for specific sample environments, so be sure to check the coating compatibility chart on the next page or consult with an Applications Scientist.

Oxygen Sensor Probe Cleaning and Sterilization Guide

Proper maintenance of your oxygen sensor probes may include occasional cleaning and sterilization, which is often required in biological applications. These guidelines apply to probes only and may vary as sensor formulations and other variables change. Please check our website for the most up-to-date information available. Sterilization is a more thorough probe maintenance method than cleaning. Cleaning is useful for removing inclusions, oil and the like, while sterilization refers to any process that eliminates (removes) or kills all forms of life, including transmissible agents that may contaminate the probe.

Cleaning Methods

	FOSPOR Formulation	HIOXY Formulation	Comments
Isopropanol	Safe	Safe	Requires single-point recalibration after each cleaning; also, frequent cleaning will shorten probe lifespan
Ethanol	Safe	Safe	Requires single-point recalibration after each cleaning; also, frequent cleaning will shorten probe lifespan
Methanol	Safe	Not recommended	

Note: Brief exposure of probes to these cleaning agents is recommended. Long-term exposure will affect the sensor coating.

Sterilization for Probes

Item	FOSPOR	HIOXY	Comments
Autoclaving	No	Yes	HIOXY Probes require single-point reset after autoclaving
Ethylene Oxide	Yes	Yes	Signal intensity decreases after EtO exposure; recalibration or single-point reset is required
Gamma Radiation	Not Tested	Not Tested	Probes require single-point reset after gamma radiation

Also available is an autoclavable HIOXY patch (RE-HIOXY-HTC) that uses a Polycarbonate disc as the substrate.

Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Sterilization for Patches

RedEye Patches	FOXY	HIOXY	Comments
Ethylene Oxide	Yes	Yes	The signal intensity decreases, reducing the lifespan of the sensor; single-point reset is required
Gamma Radiation	Yes	Not Tested	The signal intensity decreases, reducing the lifespan of the sensor; single-point reset is required

Also available is an autoclavable HIOXY patch (RE-HIOXY-HTC) that uses a Polycarbonate disc as the substrate.

Oxygen Sensor Probe Reconditioning

Good maintenance practices and protection from harsh environments, biofouling, physical abrasion and photobleaching will ensure optimum probe life. If the sensor coating on your oxygen probe is damaged or wears out, recoating services for most of our probe options are available. This reconditioning also includes a recalibration of the probe.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Oxygen Sensor Temperature Compensation

Options for Dealing with Temperature Effects in O2 Measurements

Temperature Probe Options for Optical Oxygen Sensor Systems

Our optical O2 sensors are affected by temperature. Temperature affects both fluorescence intensity and excited state lifetime due to the decrease of fluorescence energy quantum efficiency with temperature increase. The effect of change in temperature is seen as a change in the calibration slope.

As temperature increases and partial pressure of oxygen remains the same, compensating for temperature mitigates the risk of a false partial pressure reading. For best results, the sample must be held at a constant temperature (+/-1 °C). The temperature response of our sensors can be determined by the user. In a multichannel sensor setup, the user must account for temperature effects in each channel.

We offer temperature probe options for use with our oxygen sensor systems: a rugged, discrete thermistor or a T1000-style ¼”(6.35 mm) stainless steel probe with an embedded thermistor. The latter is available in each of three coating formulations (FOSPOR, HIOXY).

Technical Tip

Our oxygen-sensitive RedEye patches are designed primarily for benign gas and liquid environments. The patches are not compatible with chemicals that may attack acrylates and polyester adhesive polymers.

Patches are semi-disposable and do not lend themselves well to cleaning, although some sterilization methods (gamma radiation) may extend their use in biological and other environments. Please consult an Applications Scientist for details.

NEOFOX-TP

Red Eye Optical Sensing Patches

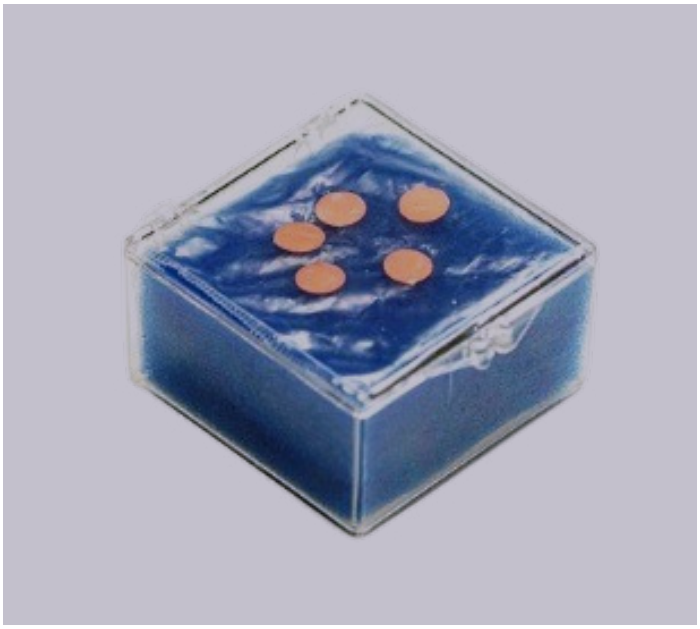
Self-adhesive Patches for Non-intrusive Oxygen Measurements

The RedEye® indicator patch measures oxygen non-invasively in sealed packaging and containers used in medical, pharmaceutical and food applications. Using a combination of proprietary sensing material and measuring technologies, this non-invasive patch enables quick determination of the presence of oxygen, as well as quantitative measurements. Oxygen monitoring can also ensure patient safety in point-of-care analysis or indicate a sterile seal on surgical instruments and drug packaging. RedEye patches meet USP Class VI certification for biocompatibility.

RedEye Features a Propriety Sol Gel Coating

RedEye patches are unique in that high-performance sol gel coatings are used rather than polymer membranes. RedEye coatings are capable of monitoring low levels of oxygen in gas (to 0.01%) and dissolved oxygen in liquids (to 4 ppb), as well as the higher oxygen levels present in cell culture and respiratory monitoring. Also available is a new design that uses the HIOXY formulation on a polycarbonate substrate autoclavable at 120 °C. Contact an Applica- tions Scientist for details on item RE-HIOXY-HTC.

The RedEye can be integrated into packaging for continuous monitoring or used externally for post-production and



R&D monitoring purposes. A fluorometer can also be used to directly measure oxygen partial pressure.

Typical Applications

- Point-of-care analysis (e.g., disposable oxygen attachments for ventilators used during anesthesia operation)
- Blood bag analysis
- Beverage and food packaging
- Bioprocess control
- Cell culture monitoring

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
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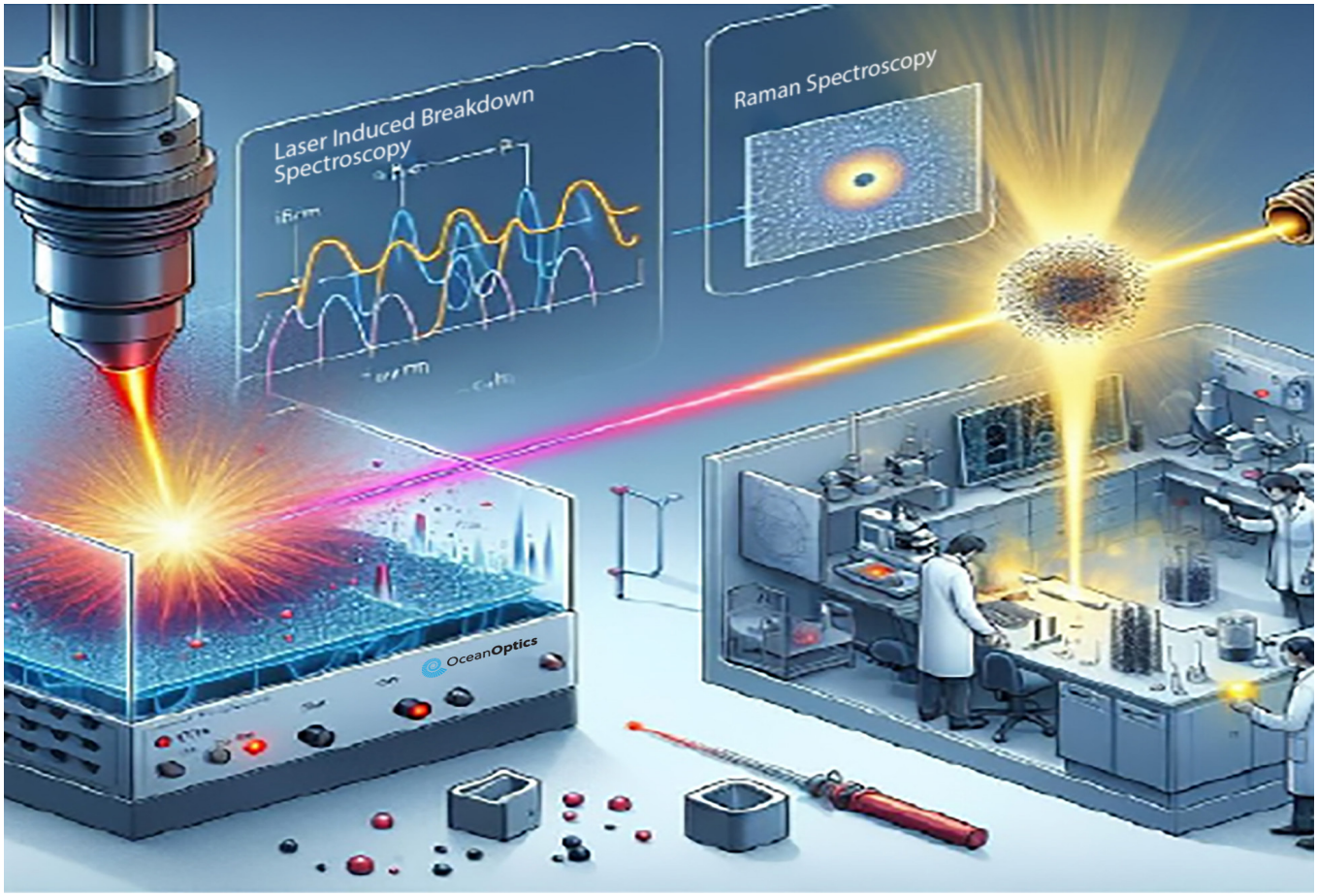


LIBS and Raman

Laser Based Spectroscopy

Laser Induced Breakdown Spectroscopy (LIBS) systems from Ocean Optics can help you analyze solids, liquids and gases with rapid results and little damage to your sample. Use our LIBS lineup for materials sorting, elemental analysis, elemental ratio monitoring, quality assurance, process control and more.

Raman spectroscopy is quickly becoming one of the preferred chemical identification techniques across a broad range of application areas. Ocean Optics provides modular probe- and cuvette-driven Raman spectroscopy along with a host of accessories and software.

Technical Tip

To convert a spectrum into Raman shifts, convert the excitation (laser) wavelength, λ_{EX} and each pixel wavelength, λ_i, into wavenumbers:

$Y = 10^7 / \lambda$, where Y is the value in wavenumbers (cm^{-1}). Once you have calculated both Y_{EX} and Y_i, simply

subtract to get Raman shifts:
$RS_i = Y_{EX} - Y_i$

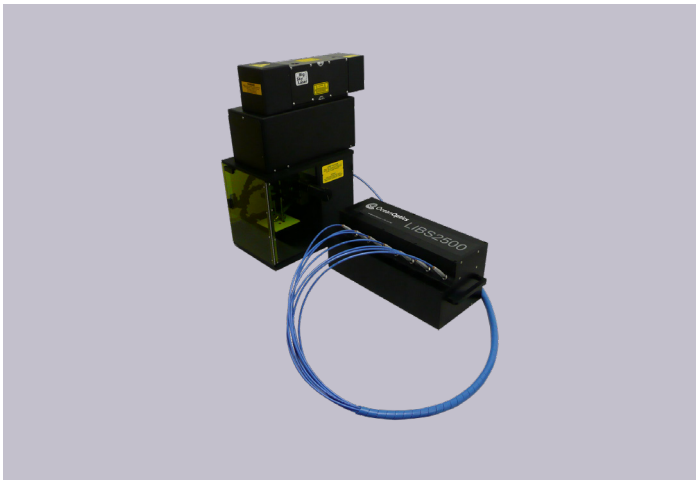
Laser Induced Breakdown Spectroscopy

Reliable, Repeatable Identification and Analysis

LIBS technology is a powerful tool for rapid, real-time elemental analysis. With LIBS, there is virtually no sample preparation, excellent portability, real-time results and sensitivity down to parts-per-million and picogram levels.

With recent advances in broadband spectral detectors, LIBS is capable of detection and identification of a comprehensive range of metal and gemological materials, as well as biological and chemical agents, hazardous materials and more.

The application areas of LIBS are growing dramatically. From environmental monitoring to materials analysis and from forensics to pharmaceuticals, LIBS fits the bill when simple and straightforward techniques are required.



LIBS Benefits

- No sample preparation
- Very small samples required
- Trace element detection possible
- Modular and turnkey options available

Parameter	LIBS	SEM/EDS	XRF	LA-ICP-MS	EPMA
Sample depth:	~50-100 µm	~5 µm	~100 µm	~80 µm	<1 µm
Sensitivity:	10-50 ppm	1000 ppm	100 ppm	<1 ppm	100 ppm
Precision:	Fair-good	Poor	Fair-good	Excellent	Fair
Accuracy:	Semi-quantitative	Qualitative	Semi-qualitative	Quantitative	Semi-quantitative
Analysis time:	Fast	Slow	Very slow	Slow	Slow
Sample consumption:	Almost non-destructive	Non-destructive	Non-destructive	Almost non-destructive	Non-destructive
Complexity:	Easy to use	Easy to use	Complicated	Complicated	Complicated
Discrimination:	Good	Poor	Good	Excellent	Fair

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

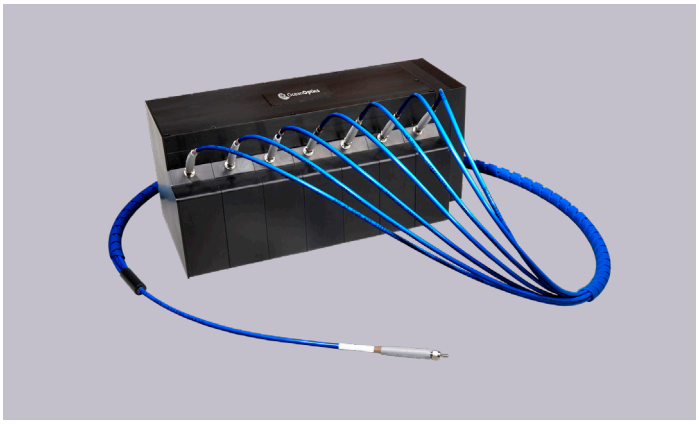
MX LIBS-4 Channel & MX LIBS-7 Channel

Qualitative Measurements in Real-Time

The small-footprint MX LIBS system is a more modular approach to Laser Induced Breakdown Spectroscopy. Built around our popular HR2 optical bench and electronics, the MX LIBS delivers superior functionality in a completely enclosed system.

While traditional LIBS detection systems have a small spectral range, the MX LIBS provides broadband spectral analysis and because of its noninvasive performance it allows you to perform real-time in situ measurements within hostile industrial, chemical and biochemical environments. The MXPro has the equivalent of four and seven HRspectrometers combined and can be configured in various setups rather easily.

The MX LIBS is easily interfaced to your PC or notebook computer via USB and is compatible with Windows operating systems.



Applications

- Environmental monitoring (soil contamination, particulates)
- Materials analysis (metals, plastics)
- Forensics and biomedical studies (teeth, bones)
- Military and safety applications (explosive particles, chemical and biological agents)
- Art restoration and conservation (pigments, precious metals)

LIBS Spectrometer Channels	
LIBS-CH1-HR2	WL Starts @ 187nm
LIBS-CH2-HR2	WL Starts @282nm
LIBS-CH3-HR2	WL Starts @ 377nm
LIBS-CH4-HR2	WL Starts @ 507nm w/OF1-GG375
LIBS-CH5-HR2	WL Starts @ 612nm w/ OF1-OG550
LIBS-CH6-HR2	WL Starts @ 712nm w/OF1-0G550
LIBS-CH7-HR2	WL Starts @ 797nm w/OF1-OG550

MX LIBS System

Qualitative Measurements in Real-Time

Specifications	
Spectrometer range:	200-980 nm
Resolution:	0.1 nm (FWHM)/ 0.05 peak
Detection:	CCDs with a combined 14,336 pixels
Frame rate:	500 Hz capability, computer-controlled
Integration time:	1 ms; variable in free-run mode
Trigger delay:	-121 µs to +135 µs in 500 ns steps, user- configured
Trigger jitter:	~20 ns
Trigger level:	TTL not to exceed 5.5 V
Interface:	USB 1.1 or USB 2.0
Operating systems:	Windows XP on desktop or notebook PCs
Software:	Ocean MX
Power requirement:	5 volts @ <1 amp, power supply included
Input optical fiber:	Sampling probe containing 7 fibers, 2 meters long (other lengths available) with 74-UV collimating lens and a sampling lens
Dimensions:	334 mm x 150 mm x 140 mm (spectrometer system only)
Weight:	6.36 kg (14 lb.)

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

MXPro System

LIBS Fiber Bundles

Fiber Bundles	
LIBS-BUN-3	Fiber Bundle for 3-Channel MXPro
LIBS-BUN-4	Fiber Bundle for 4-Channel MXPro
LIBS-BUN-5	Fiber Bundle for 5-Channel MXPro
LIBS-BUN-6	Fiber Bundle for 6-Channel MXPro
LIBS-BUN-7	Fiber Bundle for 7-Channel MXPro
LIBS-BUN-8	Fiber Bundle for 8-Channel MXPro
LIBS-COLL	LIBS Collimator

Raman Spectroscopy

High Power, Spectrum Stabilized Lasers

Our Multimode Laser Subsystem (LASER-785-IP-OEM) features high output power with a narrow spectral bandwidth. This unit's stabilized peak wave- length remains locked, regardless of case temperature.

Devices can be spectrally tailored to suit application needs and offer side mode suppression ratios better than 40 dB. This provides an extremely high signal-to-noise performance and makes this source ideal for Raman spectroscopy and pump laser applications.

We integrate this source with our high performance laser drive and temperature control M-Laser-Module for a truly turnkey solution for the laboratory. This module has a digital readout for easy set point adjustment, an independent master power key switch and laser enable switch, a remote interlock and an Emergency Power Off (EPO) button. Additional 785 nm and 532 nm laser options are available.

Spectroscopic	
Dimensions:	110 mm x 89 mm x 53 mm
Weight:	600 g
Noise:	<0.5% RMS
Output fiber:	100 µm @ 0.22 NA
Warm-up:	15 minutes
Temperature:	-10 °C to 40 °C
Stability:	<3% peak-to-peak in 8 hours
Humidity:	5-95% non-condensing
Laser life:	10,000 hours
Power consumption:	3.0 A @ 5 VDC
Power output (CW):	>500 mW
Peak wavelengths:	785 +/- 0.3 nm
Spectral line width:	0.2 nm (typical)
Rise time:	<500 msec
Control:	TTL modulation -- 0 to 100 kHz
Connector:	SMA 905 or FC

Raman Spectroscopy

High-power lasers:

532nm, 638nm, 785nm, 1064nm

Product Details:

Ocean Optics offers high power lasers for Raman excitation wavelengths of 532, 638, 785 and 1064 nm. These multimode diode lasers produce narrow spectral lines, have integrated laser drivers, and are thermoelectrically cooled for optimum performance.

Product Overview:

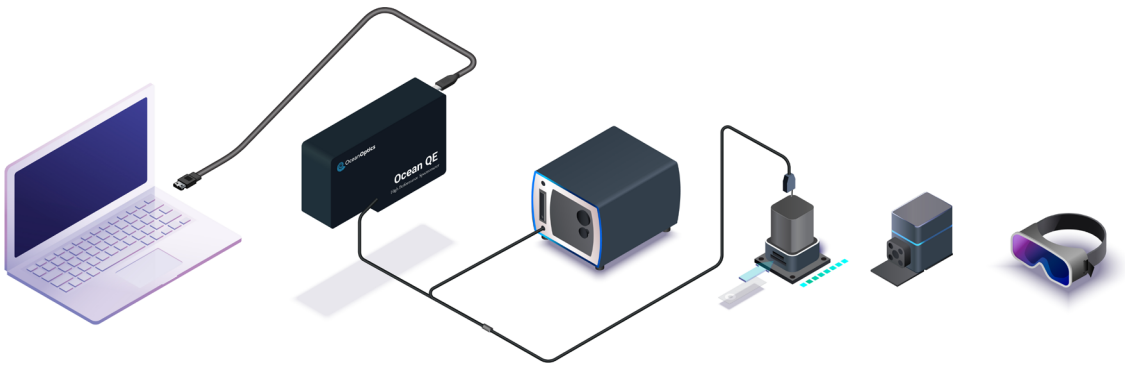
Integrated laser package – turnkey solution with integrated laser drive, TEC electronics and safety switches

Multiple options – available in 532, 638, 785 nm and 1064 nm Raman excitation wavelengths

532 nm Raman excitation – ideal for use with inorganic materials.

785 nm Raman exiciation - ideal because it falls outside the fluorescence band.

Item	Source	Typical Output Power	Fiber Connector	Excitation Wavelengths
LASER-532-LAB-FC 532 nm Raman Laser	Diode	>100 mW	FC	532 nm
LASER-638-LAB-FCA 638 nm Raman Laser	Diode	>350 mW	FC	638 nm
LASER-785-LAB-FC 785 nm Raman Lasers	Diode	>350 mW	FC	785 nm
LASER-785-LAB-SMA High Powered 785 nm Raman Lasers	Diode	>350 mW	SMA 905	785 nm
LASER-785-LAB-ADJ-FC 785 nm High Powered Raman Lasers	Diode	Adjustable to >350 mW	FC	785 nm
LASER-785-LAB-ADJ-SMA 785 nm High Powered Raman Lasers	Diode	Adjustable to >350 mW	SMA 905	785 nm
LASER-1064-LAB-ADJ-FC 1064 nm Raman Lasers	Diode	Adjustable to >500 mW	FC	1064 nm
LASER-1064-LAB-ADJ-SMA 1064 nm Raman Lasers	Diode	Adjustable to >500 mW	SMA 905	1064 nm



Raman Spectroscopy

Raman Spectrometers

High Sensitivity and Great Flexibility

Uncover molecular details with Ocean Raman Spectrometers, providing advanced solutions for precise material analysis through cutting-edge technology.

Item	QE Pro-Raman+	NR 1.7 1064 Raman
Raman shift	4429 cm^{-1} (532 nm);	2400 cm^{-1}
	2820 cm^{-1} (638 nm);	
	3002 cm^{-1} (785 nm)	
Raman excitation wavelengths	532, 638, or 785	1064 nm
Integration time	8 ms – 3600 s	1 ms – 120 s
Optical resolution	23 cm^{-1} (532 nm);	1.5 cm^{-1}
	12 cm^{-1} (638 nm);	
	14 cm^{-1} (785 nm)	
Onboard memory	Up to 15,000 spectra	NA
SNR (single scan)	10000:1	13000:1
Connectors	USB, RS-232, SMA (input fiber)	USB, RS-232, SMA (input fiber)
Physical dimensions	182 mm x 110 mm x 47 mm	182 mm x 110 mm x 47 mm
Temperature (operation)	0 °C – 55 °C	10 °C – 35 °C
Best For	Inorganic materials analysis (532 nm)	
	Materials analysis and reaction monitoring	
	SERS analysis of illicit drugs, pesticides (532 nm, 785 nm)	
	Trace-level analyte detection (638 nm)	

Raman Probes

Fiber Optic Probes for Raman Spectroscopy

We offer a number of fiber optic probes that are built specifically for Raman spectroscopy. The RIP-Series probes from InPhotonics provide optical filtering of the Rayleigh line and high-signal collection in a compact, rugged design. Compatible with Ocean Optics Raman systems, these probes are suitable for laboratory, industrial and environmental applications and are available for several excitation wavelengths.

ORP-XXX-B

Note: Part Number ending in B (Ex. ORP-830-B) Includes 1m long-105um excitation fiber with FC/PC connectors and 1m long -600um collection fiber with SMA connectors.

Item	Description
ORP-1064	1064 Raman Probe with hard anodized aluminum housing & 10mm focal length lens.
ORP-1064-B	1064 Raman Probe with hard anodized aluminum housing & 10mm focal length lens. Bundle
ORP-532	532 Raman Probe with hard anodized aluminum housing & 10mm focal length lens.
ORP-532-B	532 Raman Probe with hard anodized aluminum housing & 10mm focal length lens. Bundle
ORP-638	638 Raman Probe with hard anodized aluminum housing & 10mm focal length lens.
ORP-638-B	638 Raman Probe with hard anodized aluminum housing & 10mm focal length lens. Bundle
ORP-785	785 Raman Probe with hard anodized aluminum housing & 10mm focal length lens.
ORP-785-B	785 Raman Probe with hard anodized aluminum housing & 10mm focal length lens. Bundle
ORP-830	830 Raman Probe with hard anodized aluminum housing & 10mm focal length lens..
ORP-830-B	830 Raman Probe with hard anodized aluminum housing & 10mm focal length lens. Bundle

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Raman Accessories
Sample Holders

OOA-HOLDER-RFA Specifications	
Dimensions:	110 mm x 70 mm x 130 mm LWH (standard); 155 mm x 70 mm x 162 mm (optional)
Material:	Aluminum
Mobile optical stage:	X axis = 10 mm
	Z axis = 12.5 mm
Probe sizes accommodated:	Raman probes = adjustable for 9.5 mm (3/8”) or 12.7 mm (1/2”) OD
	Reflection probes = 6.35 mm (1/4”) OD
Cuvette pathlengths accommo- dated:	1 cm and 0.1 cm
Cuvette plug dimensions:	15 mm x 5.7 mm x 45 mm for 0.1 cm path- length cuvette
Mirror plug dimensions:	15 mm x 5.7 mm x 45 mm
Mirror plug wavelength range:	200-2500 nm; options available with better resistance to oxidization and fraying and with higher reflectivity at UV wavelengths

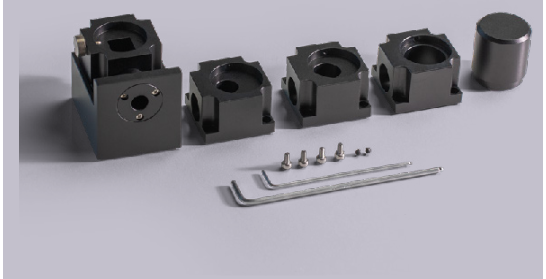
The OOA-HOLDER-RFA is a multipurpose sampling fixture that acts as a holder for Raman, fluorescence, absorbance and reflection measurements. Unlike other Raman sample holders, the OOA-HOLDER-RFA can be adjusted for a variety of lab techniques. Here are other notable features:

- Mobile XY-axis stage makes it easier to adjust the focus of your Raman probe
- Holder adjusts to accommodate 6.35 mm (1/4”), 9.5 mm (3/8”) and
- 12.7 mm (½”) OD probes
- Includes mirror and cuvette plugs to increase signal in absorbance and reflection measurements
- Has 90-degree cross-angle design for fluorescence measurements

Raman Sample Holders

Our Raman only sample holder is a handy tool for analyzing liquids (and other specimens) using Raman probes and cuvettes. Its modular design makes it capable of accommodating a variety of cuvettes and vials.

OOA-RAMAN-SH



OOA-HOLDER-RFA

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Raman Accessories

The Finishing Touch to Your Setup

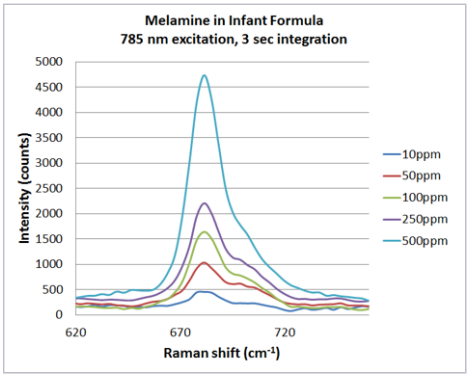
SERS

Ocean Optics SERS substrates provide a unique solution for trace-level molecular analysis using Surface Enhanced Raman Spectroscopy (SERS). SERS can help increase the sensitivity of Raman by many orders of magnitude, extending the range of Raman measurements to as low as parts-per-billion levels.

Safety First

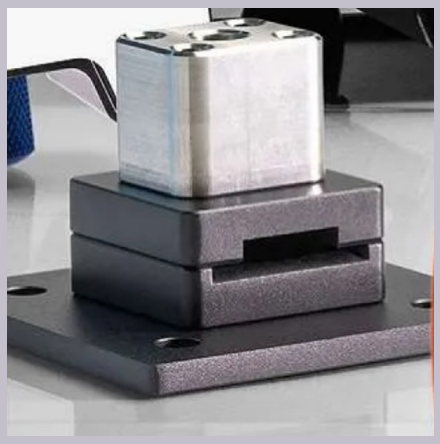
We offer laser safety goggles for use with 532 nm and 785 nm lasers.

Item Codes: RAM-GG-532, RAM-GG-785



RAM-SERS-AU-5
RAM-SERS-AG

RM-SERS-SHS



FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Software

Our comprehensive library of data acquisition and display software helps you make the most of your spectroscopic measurements and analysis. No matter what operating system you prefer, Ocean Optics has the software tool you need.

From analysis to drivers and from spectrometer operation to scripting and development, Ocean Optics software is the ideal partner.

Software (OceanView, OceanDirect)

Software Overview

Ocean Optics offers a comprehensive library of data acquisition and spectral processing software for a variety of spectroscopic applications.

Depending on the type of work you do, you can choose from a full line of spectral processing software, development tools or application-support software.

OceanDirect SDK is a proprietary software development kit (SDK) developed by Ocean Optics, designed for controlling and interfacing with their spectrometers. This SDK is tailored for advanced users who want to integrate Ocean Optics's spectrometers into custom applications.

Below are key features and functionalities of the OceanDirect SDK:

High-Performance Control: Offers low-level, high-speed access to Ocean Optics spectrometers, enabling fine-tuned operation and rapid data acquisition.

Supports both data collection and real-time processing.

Cross-Platform Compatibility:Designed to work across multiple platforms, including Windows, macOS, and Linux.

Wide Device Support: Compatible with a wide range of Ocean Optics spectrometer models, ensuring flexibility in hardware integration.
Developer-Friendly: Provides APIs in multiple programming languages like C, C++, Python, and .NET, making it accessible for developers with varied expertise.

OceanView is a game changing combination of data manipulation and visualization functionality that deliver easy customizability in a user-friendly interface. OceanView not only displays and utilizes spectral data from spectrometers, but also adds the flexibility of integrating temperature, voltage and other input data allowing users to utilize and visualize data from multiple sources. In addition, OceanView allows users to save and reload experiments and has a persistence of settings feature that conveniently recalls user settings including acquisition parameters and file locations. Users can customize their OceanView interface once and later access those same settings without having to rebuild them with each new session.

OceanView delivers a high level of experiment control. Its schematic view – a flow chart with each step of the process represented graphically – functions as both a blueprint of the data process from inputs to results and a tool to inspect and modify the process on the fly. More than 70 schematic nodes, or connection points, can be mapped in the schematic view. Other experiment control functions such as spectral splicing, interpolation and device output control are available.

Competing products do not offer data manipulation, visualization and schematic ability. This is exclusive and proprietary to Ocean Optics.

Resources

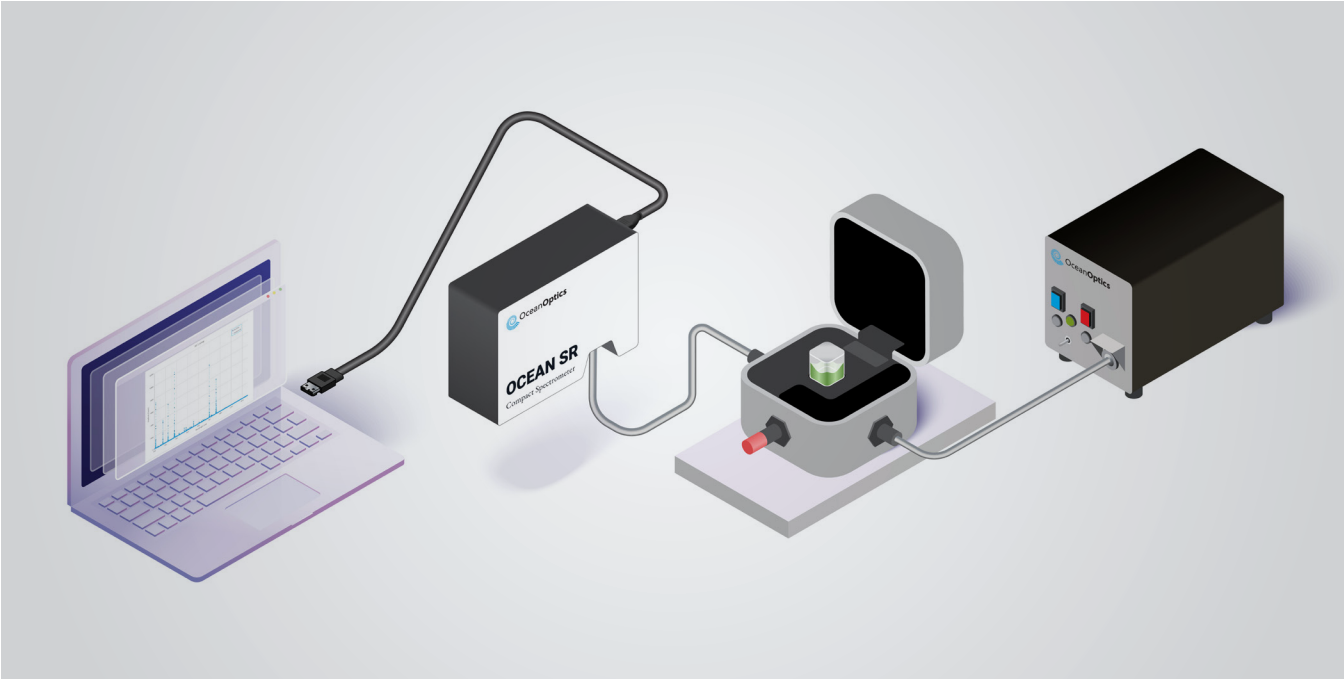
Spectroscopy setups vary widely depending on the type of spectroscopy being performed. UV-Vis spectroscopy typically involves a light source, sampling accessory, and a spectrometer to measure the light passing through a sample. Infrared (IR) spectroscopy setups often include an IR light source, a sample holder, and a NR spectrometer to measure the light. Each setup is tailored to the specific requirements of the spectroscopy technique and application to ensure accurate and reliable measurements.

Quick Tip:

Need a quick answer? Try our Live Chat online at www.oceanoptics.com.

Resources

Setup: Solutions Absorbance



Overview

Absorbance measurements are used to quantify the concentration of gases and solutions (the latter is described here) that absorb light in a media that transmits light. The signal in absorbance units is proportional to the molar absorptivity, pathlength and concentration of the sample.

Spectrometer

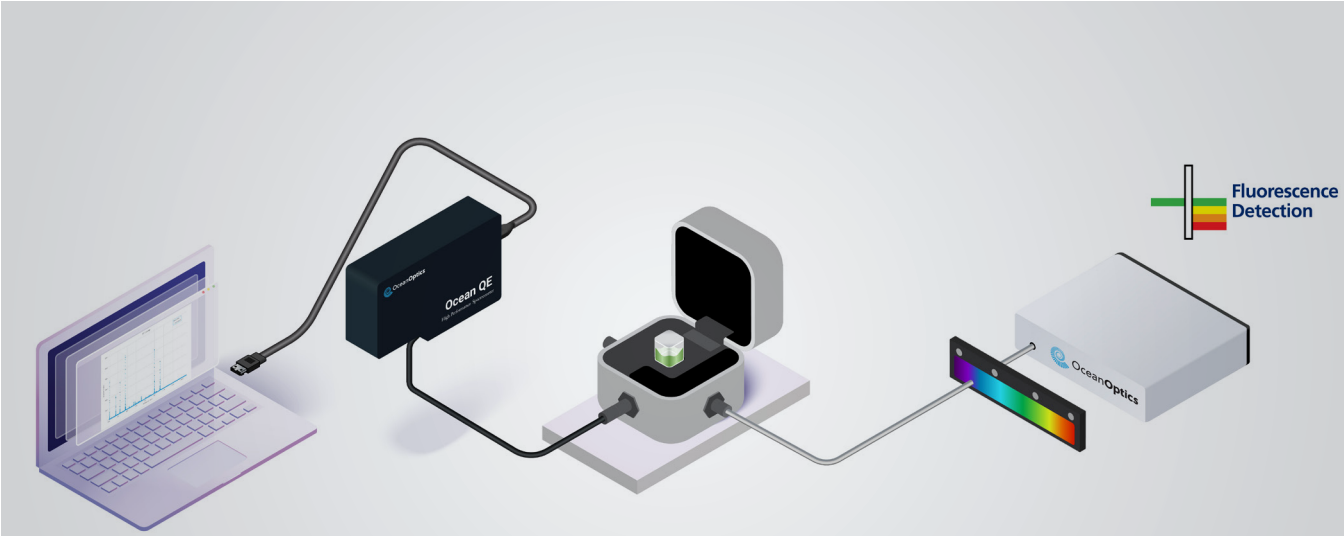
The SR6 Spectrometers are ideal for absorbance measurements from 200-850 nm. The spectrometer configured with Grating #1, which has peak efficiency at 300 nm, provides adequate resolution (~1.5 nm FWHM) for most solutions absorbance measurements. The built-in order-sorting filter eliminates second- and third-order effects that otherwise yield false peaks in absorbance spectra. The preferred light source is the DH2000-BAL Deuterium Tungsten Halogen Light Source.

Sampling Optics

For absolute absorbance measurements, use the 1-cm pathlength CUV-UV Cuvette Holder and the CV-Q-10 Quartz Cuvette. For relative absorbance, dip probes and flow cells are available. We recommend QP400-025-SR Premium-grade Solarization-resistant Optical Fibers as illumination and read fibers. Use NIST-traceable Photometric Absorbance Standards to provide certifiable results.

Resources

Setup: Fluorescence



Setup also requires USB-ADP-PX2 adapter (not shown)

Overview

Fluorescence measurements require a sensitive detector and an effective filter for discriminating between powerful excitation source wavelengths and weak spectral emissions from the sample.

Spectrometer

We offer several spectrometers that are useful for fluorescence, but recommend the high-sensitivity, preconfigured QE Spectrometers for most general fluorescence applications. The QE is the highest sensativity spectrometer to measure the weakest florescence signals.

Sampling Optics

Your standard excitation source option is our PX-2 Pulsed Xenon Source. Our proprietary LVF Linear Variable Filters are excellent tools for spectrally shaping the excitation energy from broadband sources used for fluorescence. Various sampling optics are available for detecting picomolar-range concentrations of fluorophores from surfaces and in solutions and powders.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Resources

Setup: Laser Analysis

Overview

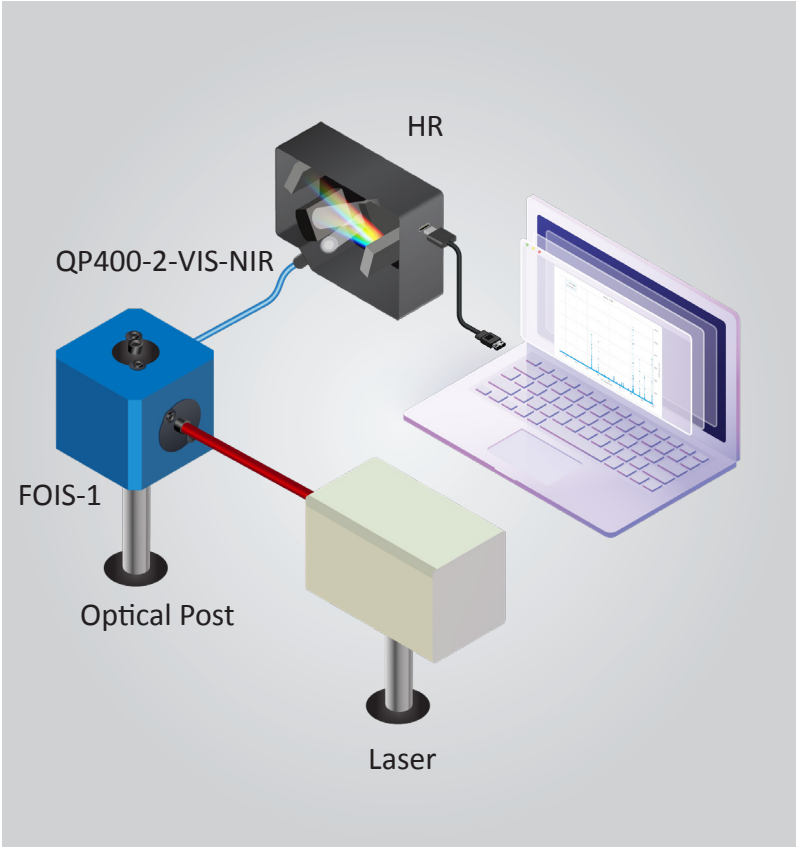
Our HR4 High-resolution Spectrometer is ideal for measuring the spectral characteristics and intensity of continuous-wave and pulsed lasers. For high-power lasers, an integrating sphere or cosine corrector attenuates the light to avoid saturating the CCD array.

Spectrometer

The HR4 Spectrometer uses the“HR” Optical Bench, which was designed to yield high optical resolution and despersion for resolving fine spectral features. For laser characterization, we recommend a grating with a high groove density, such as the H6 1200 mm-1 grating set to a 750-925 nm wavelength range and with a 5 µm Slit as the entrance aperture. This configuration provides ~0.12 nm resolution (FWHM). For better resolution, consider an 1800 mm-1 or 2400 mm-1 grating.

Sampling Optics

There are several possible sampling setups: a CC-3-UV Cosine Corrector with an optical fiber; FOIS-1 Integrating Sphere with a fiber; or fiber assembly coupled to the laser. Optical posts are used to hold fixtures in place.



Measurements

Use our OceanView operating software to obtain values such as peak, centroid and central wavelength.

FULL PRODUCT SPECIFICATIONS

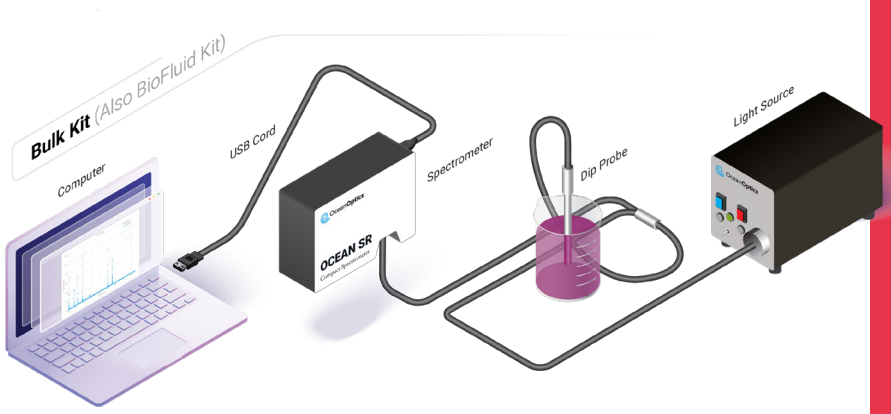
Do you need more product information?
Click this **link** or scan QR code for more information.

Resources

Setup: UV-VIS Reflection

Overview

Diffuse reflection measurements can be used to determine information about the chemical content or color of a sample.



Spectrometer

The HR-4VIS500-25 (350-1000 nm) is ideal for reflectometry of thin films. The spectrometer is preconfigured with Grating #3, which is blazed at 500 nm; an order-sorting filter to eliminate second- and third-order effects; and a 25 µm slit for optical resolution of ~0.52 nm (FWHM).

Sampling Optics

The QR400-7-UV-VIS Reflection Probe measures diffuse or specular reflectance from surfaces, or backscattering from translucent materials and fluids. The RPH-1 Probe Holder positions the QR400-7 at either 45° for diffuse reflection or 90° for specular reflection (for reflection measurements with an integrating sphere). For illumination, we recommend the DH2000-BAL Deuterium Tungsten Halogen Light Source.

Measurements

Reflectance standards include the WS-1 Diffuse Reflectance Standard for diffuse measurements and the STAN-SSH Specular Reflectance Standard for specular measurements. Use our software to correct data for deviations from 100% reflectivity of standards, field tiles or NIST-traceable materials.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Resources

Setup: Reflected Color

Overview

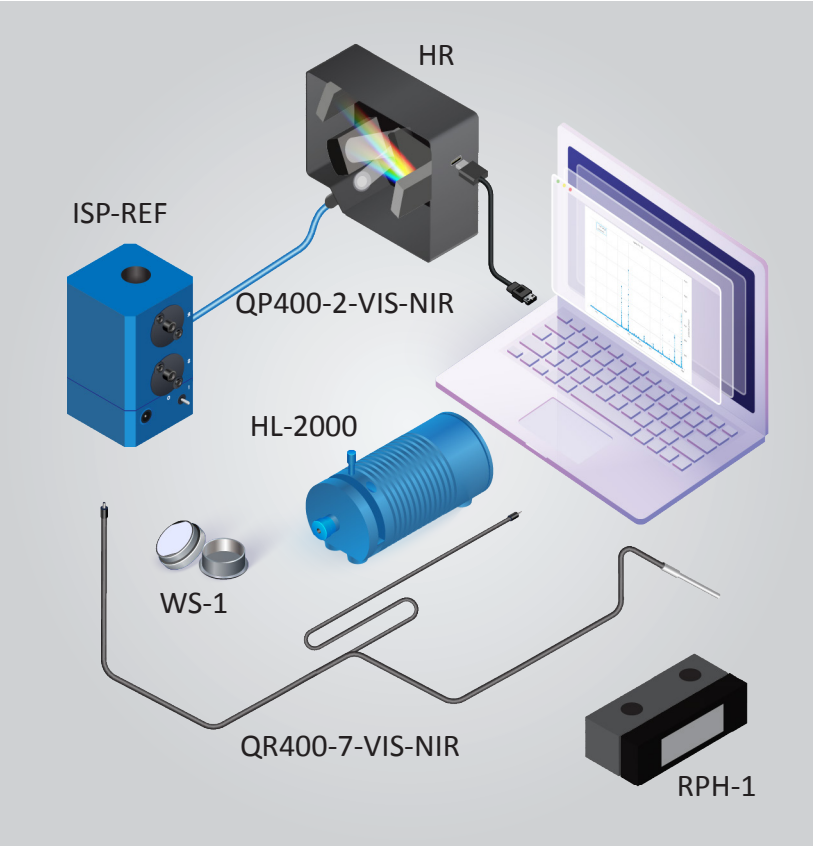
Color measurement involves determining the reflection spectrum of a sample and applying it to a standard illuminant. The amount of light energy the sample reflects is manipulated and reduced to tristimulus values X, Y and Z. These values correspond to the physiological response of the three types of color receptors in the human eye. X, Y and Z values are combined into uniform colorspace values such as L*, a* and b*.

Spectrometer

A HR6 with a 25 µm slit and Grating #2 (350-1000 nm) works well for color analysis. The HR6 has higher sensativity makes it more ideal when using an integrating sphere as the sampling optic.

Sampling Optics

When taking reflective-color measurements, your data depends on sampling geometry. The QR400-7-VIS-NIR Reflection Probe provides illumination and detection from the same direction. If you use the probe at a 45°, it measures diffuse reflection. If you use the probe at a 90°, it measures specular reflection. The distance from the probe to the surface determines the sample size. An alternative is the ISP-REFL Integrating Sphere, which provides 180° illumination and detection from flat surfaces for measuring specular and diffuse reflection.



Measurements

Reflectivity is measured against a reference standard such as the WS-1 Diffuse Reflectance Standard. OceanView operating software calculates a variety of color-space values from the reflection spectra.

FULL PRODUCT SPECIFICATIONS

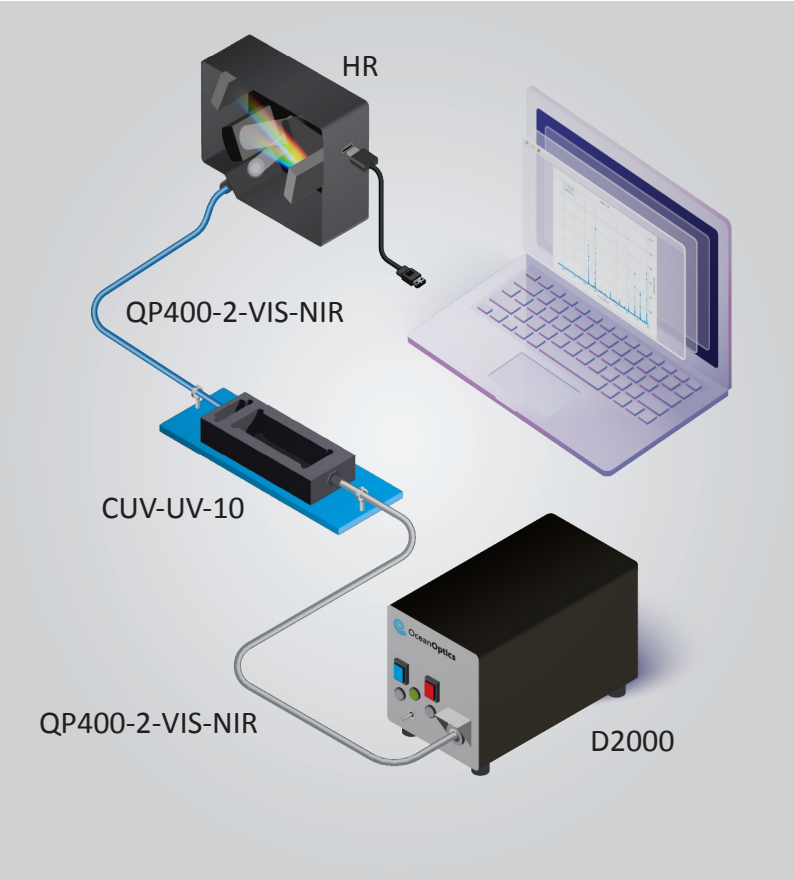
Do you need more product information?
Click this **link** or scan QR code for more information.

Resources

Setup: Gas Absorbance

Overview

Absorbance measurements are used to quantify the concentration of solutions and gases (as described here) that absorb light in a media that transmits light. The signal in absorbance units is proportional to the molar absorptivity, pathlength and concentration of the sample.



Spectrometer

A setup for measuring benzene gas, for example, would call for an HR6 High-resolution Spectrometer with an H7 grating and a 200-300 nm wavelength range with a 5 µm slit, optical resolution of ~0.07 nm (FWHM) is possible. The preferred light source for work in the ultraviolet is the DH-2000 Light Source.

Sampling Optics

The 10-cm pathlength CUV-UV-10 Cuvette Holder, the CV-Q-10 Cylindrical Cell and QP400-025-SR Premium-grade Solarization-resistant Optical Fibers (one fiber illuminates, the other reads signal) comprise the system's sampling optics. For applications requiring shorter pathlengths or open- air monitoring, use an optical fibers-and-collimating lenses configuration.

FULL PRODUCT SPECIFICATIONS

Do you need more product information?
Click this **link** or scan QR code for more information.

Resources

Optical Resolution

How to Calculate Optical Resolution

Optical resolution of a spectrometer, measured as Full Width Half Maximum (FWHM), depends on the groove density (mm-1) of the grating and the diameter of the entrance optics (optical fiber or slit).

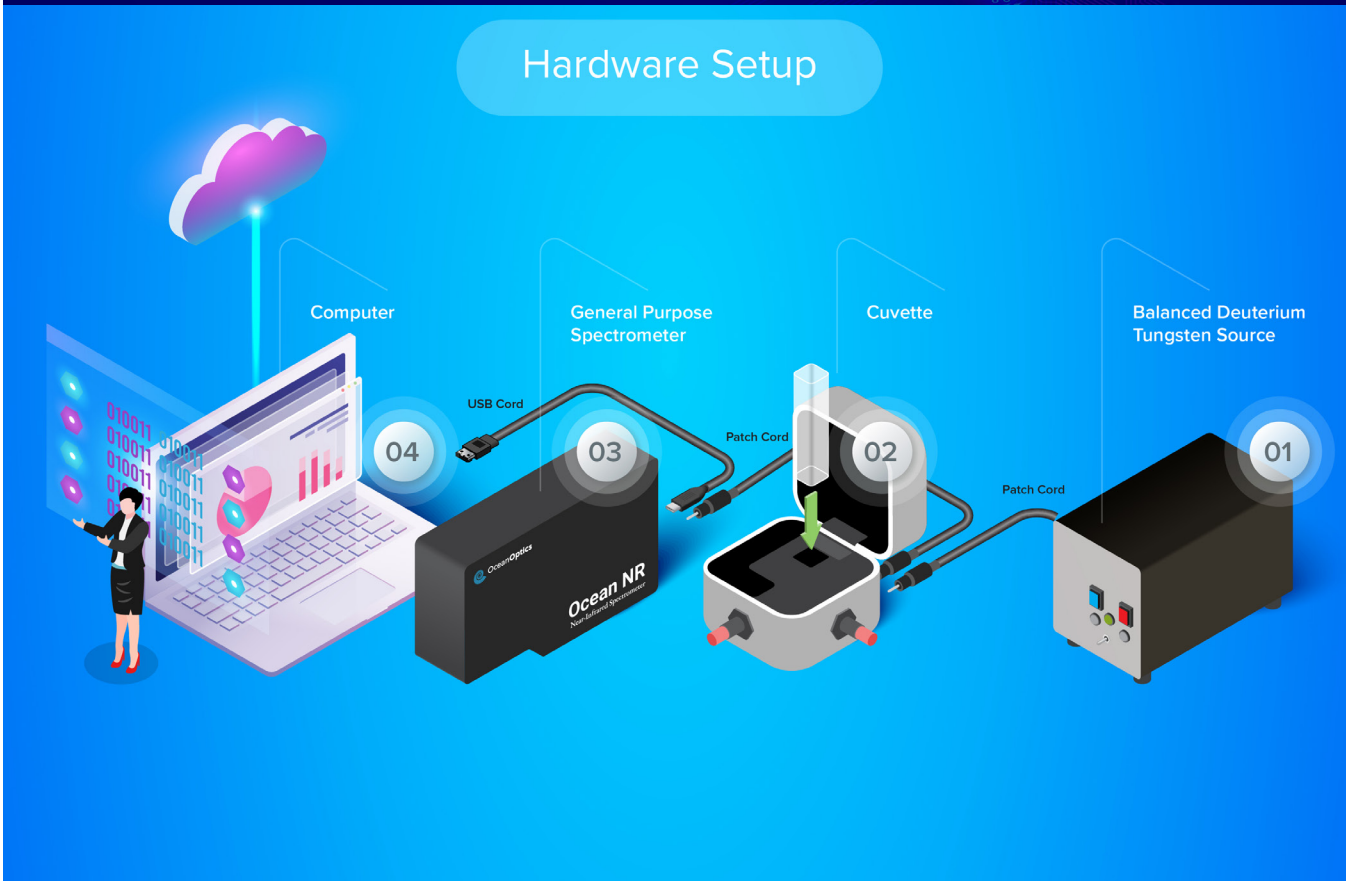
Formula for Calculating Optical Resolution

1. Determine the spectral range of the grating. Look at the grating charts within this catalog or on our website and note the value in the spectral range column in the chart. For example, Grating #3 has a spectral range of ~650 nm. Please note that the spectral range can vary by starting wave- length, which is why 650 nm is an approximation.

2. Determine the number of pixel elements in the spectrometer's detector. For a SR6 Spectrometer, this number is 2048. Divide the grating spectral range by the number of pixel elements in the detector. This is your dispersion value. For our example, 650 nm/2048 pixels = 0.32 nm/pixel.

3. Choose a slit width. Each slit has a pixel resolution value that can be found in the applicable bench accessory section of this catalog or on our web- site. For a SR6 with a 10 µm slit, this value is ~3.2 pixels. Multiply the dispersion from Step 2 (0.32 nm/pixel) * the pixel resolution value (~3.2) for optical resolution (in nm).
So, 0.32 * 3.2 = 1.02 nm.


UV CURING PROCESS
Substrate
UV Light Source
Cured Acrylate
UV Adhesive
UV Curing Starts


Hardware Setup
Computer
General Purpose
Spectrometer
Cuvette
Balanced Deuterium
Tungsten Source
USB Cord
Patch Cord
Patch Cord
04
03
02
01
Ocean NR

Ordering Information

Pricing

- For the latest pricing information, contact your local sales representative at www.oceanoptics.com/contact-us/quote-request/ or contact via phone at +1-727-733-2447. Published pricing does not include taxes, duties and other charges that may apply in some circumstances. Pricing is by component and typically does not reflect the overall system price.
- We honor pricing cited in our quotations for 30 days from the date of the quote.
- You can purchase Ocean Optics products from any of our locations or from one of our fine distributors.
- Ocean Optics prices are subject to change without notice.

Credit Cards

We accept American Express, MasterCard and VISA.

Terms

Net 30 with prior credit approval.

Sales Tax

Prior approval is required for tax exempt status. Please email to our Accounting Department at receivables@oceanoptics.com.

Shipping

Multiple shipping options are available for more than 500 Ocean Optics products. All qualifying orders received before 4 p.m. (ET) Monday through Friday will be shipped by the next business day from Ocean Optics USA directly to customers anywhere in the world if requested and available. International shipping rates and fees apply. Contact your regional Ocean Optics office for details on local shipping commitments. Orders are shipped via UPS Ground unless otherwise specified. Customers may reverse shipping charges to the carrier of their choice.

Need Extra Assistance?

You can contact an Ocean Optics representative through Live Chat on our website.

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OceanOptics

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