

Spectroscopy Fiber Probes



Our cluster of innovative fiber optic probes and fiber probe couplers designed for in-line analytical analysis in broad spectral range from UV to mid-IR.

Our immersion fiber probes include ATR (attenuated total reflection), transmission, reflection, Raman and fluorescence probes. All are compatible with any FT-MIR, FT-NIR or dispersion spectrometer, process-photometer, IR-LED or QCL spectral sensor to use in-line for PAT (process analytical technologies) applications.

Our fiber probe couplers (FPC) couple any FTIR spectrometer with various fiber optic probes and upgrade it to eliminate sampling and to run reaction monitoring in-line. Our fiber probe couplers provide high coupling efficiency for ATR absorption, transmission or reflection process-spectroscopy in a broad spectral range from UV to mid-infrared to use fiber coupled FTIR spectrometer not only with LN-cooled MCT detectors, but with uncooled detectors as well.

Our probes design is cleanable for many processes where probe optics can be contaminated by media. Industrial probes are compatible with process-interfaces to secure their semi or full automated use in complete process control systems. They can be retracted, cleaned and calibrated during chemical process to enable remote process-control in any liquid, gas or solid mixtures under harsh environmental conditions. Combined with FTIR or UV/Vis spectrophotometers, our fiber probes facilitate qualitative and quantitative product analysis and enable the determination of specific chemical and physical properties.

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We offer two categories of product portfolio: standard and customized. The standard products consist of preconfigured probes and probe couplers, which can be implemented in the laboratory, pilot plants or in production. The customized products allow users to custom configure fiber probes and couplers based on their unique process requirements.

ATR Fiber Probes

Our products are the latest generation of attenuated total reflection near & mid IR fiber, ATR probes produced for any type of FT-NIR, FT-IR and other IR spectrometers, photometers and IR LED or QCL spectral sensors. ATR immersion fiber optic probes with patented design are suitable for reaction monitoring in lab, pilot plant and for full automated process control.

There are 4 types of fiber optic probes: 1) fiber optic ATR probes (shaft-in-shaft design); 2) fiber optic ATR probes for lab applications; 3) fiber optic ATR probes for harsh environment; and 4) fiber optic ATR loop probes.

1. Fiber Optic ATR Probes (shaft-in-shaft design)

- Fiber assembly is easy detachable.
- No need to retract the whole probe out of the fermenter, just pull the fiber assembly out of the operational shaft and store it separately.
- Sealing the operational shaft is possible for the sterilization, cleaning, deactivation or any other treatment.



Sterilisable ATR fiber probe is a new product. These ATR probes are produced with any type of ATR element and for any type of FTIR spectrometers. Unique shaft-in-shaft design enables use of probe in bio process where sterilization is required without having to forgo the renowned advantages of mid-IR FTIR spectroscopy.

Main Applications:

- Fiber assembly is easy detachable.
- No need to retract the whole probe out of the fermenter, just pull the fiber assembly out of the operational shaft and store it separately. Sealing the operational shaft is possible for the sterilization, cleaning, deactivation or any other treatment.

Specification of Fiber Optic Immersion ATR Probes

Probe type	Diamond ATR	ZnSe ATR	Silicon ATR	Cubic Zirconium ATR
Transmission	5.2-17 μ m (600-1900 cm^{-1})	3.2-17 μ m (600-3100 cm^{-1}) +	5.2-17 μ m (600- 3100 cm^{-1})	1.5-6.5 μ m (1550- 650 cm^{-1})
Fiber type	PIR-900/1000 Silver Halide	PIR-900/1000 Silver Halide	PIR-900/1000 Silver Halide	CIR 500/550 Chalcogenide glass (As-S)
Temperature range	-100°C / + 140°C	-100°C / + 140°C	-100°C / +140°C	-100°C /+ 90°C
Pressure (max)	200Bar (300 Bar) on request	10 Bar	100 Bar	100 Bar

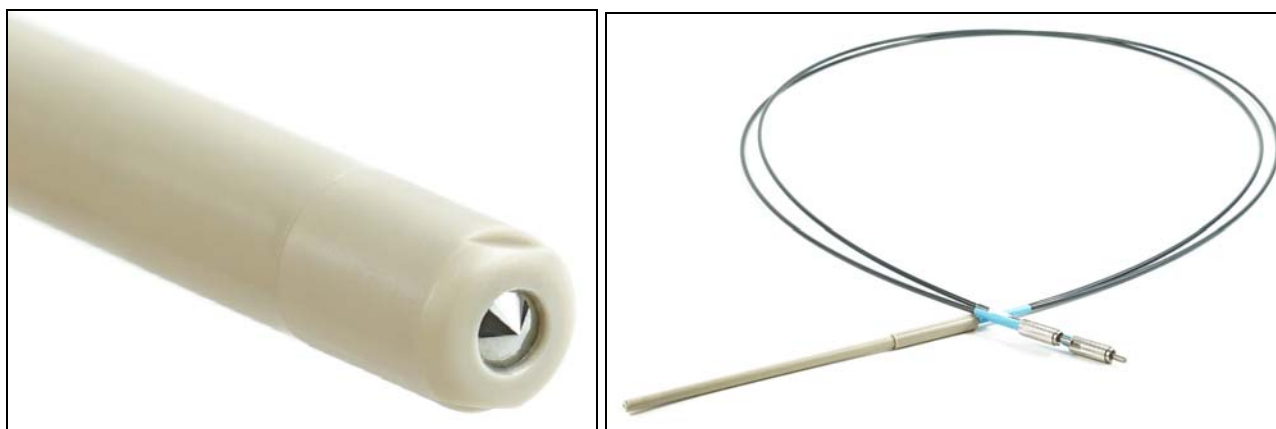
Total length	1.5 m (opt.:1m to 5m)*
Shaft length	300 mm (opt.: 100-700 mm)*
Shaft diameter	12 mm, 6.3 mm (opt.:3mm)
Shaft material	Hastelloy C22
Length of legs	500 mm (opt. 200 - 500 mm)
Protective tube material	Liquid tight SS conduit, KOPEX-tube
Minimal bending radius	130 mm
Input / output connectors	Long SMA (opt.: any other type)

Compatible process interfaces	Ceramat-FOS or SensoGate-FOS**
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*Customized dimensions are available on request

**Available for 12 mm shafts only

2. Fiber Optic ATR Probes for Lab Applications



- Evanescent absorption spectra without dead zone problems
- Optimal ATR crystal selection to match customer application
- Cost effective solution for in-line reaction monitoring

Our new designed IR fiber ATR probes with PEEK shaft are cost effective and perfect for use in small lab reactors and open vessels. All ATR probes are compatible to any type of FT-IR and other IR spectrometers, photometers and sensors.

Applications:

- Reaction monitoring in real time
- Remote polymerization control
- Crystallization process screening
- In-situ IR-spectroscopy for soft surfaces, pastes and liquids

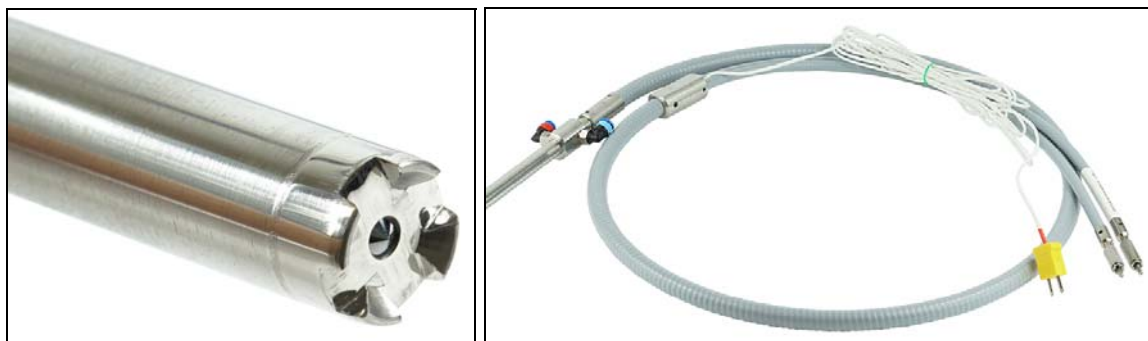
Specification of Fiber Optic ATR-Probes for Lab applications

Type of ATR element	ZnSe-ATR	Ge-ATR	Si-ATR	ZrO-ATR
Transmission range	3.2 – 17 μ m (3100-600 cm ⁻¹)	3.2 – 17 μ m (3100-600 cm ⁻¹)	3.2 – 17 μ m (3100-600 cm ⁻¹)	1.1– 6.5 μ m (9000-650 cm ⁻¹)
Fiber type	PIR-900/1000	PIR-900/1000	PIR-900/1000	CIR-500/550
Temperature range	-100°C/+140°C	-100°C/+140°C	-100°C/+140°C	-100°C/+90°C
Pressure (max)	7 Bar	7 Bar	7 Bar	7 Bar

Parameters of Fiber Optic ATR Probes for Lab Applications

Total length	1,5 m (opt: 1 to 5m)
Shaft length	150mm (opt.:100 to 500mm)
Shaft diameter	6.3mm
Shaft material	PEEK (polyetheretherketone)
Length of legs	500mm (opt.: 200 to 500mm)
Protective tube material	PEEK
Minimum bending radius	130mm
Input / output connectors	Long SMA (opt.: any other type)

3. Fiber Optic ATR Probes for Harsh Environment



- High throughput in selected parts of near & mid Infrared spectra
- ATR tip shaped for immersion in liquid flow without dead zone
- Robust for industrial applications in harsh environment up to 250°C
- Resistant to high pressure
- Compatible with all spectrometers and automated process-interfaces

Our probes include new type of attenuated total reflection (ATR) probes designed for harsh application conditions.

HT-ATR immersion IR fiber probes can be used for process-spectroscopy in near & mid IR range to monitor reactions in-line in a broad temperature range from -100° to +250°C. They can resist to high pressures up to 200bar and used with FTIR or any other IR spectrometers and spectral sensors in automated process control with process-interfaces.

Applications:

- Remote reaction monitoring in-line in temperature range -100/+250°C
- PAT (process analytical technologies) applications in lab, pilot plant or industry with process-interfaces for automated process control
- Polymerization process control
- In-situ IR-spectroscopy for PAT in chemical, petrochemical, atomic, biopharmaceutical & food industry

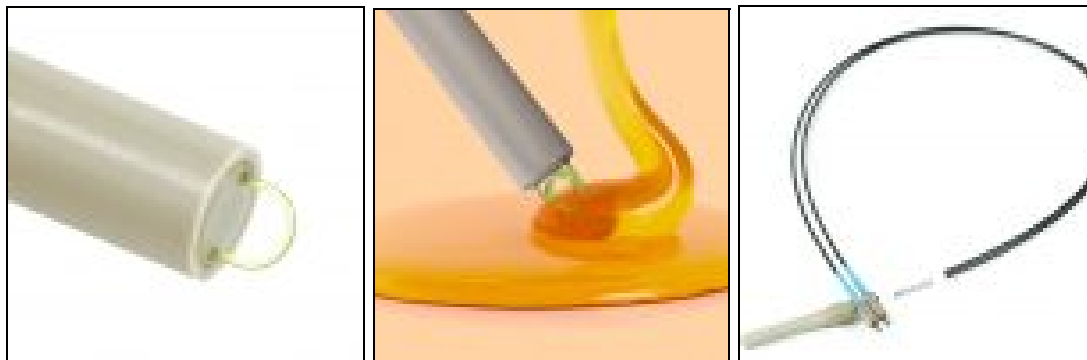
Specification of IR-Fiber HT-ATR Probes for High Temperatures

Probe type	Diamond ATR	Silicon ATR	Cubic Zirconium ATR
Transmission	5.2-17µm (600-1900cm ⁻¹)+ 3.2-4.5µm (2300-3100cm ⁻¹)	5.2-17µm (600-3100cm ⁻¹)	1.5-6.5µm (1550-6650cm ⁻¹)
Fiber type	PIR-900/1000 Silver halide	PIR-900/1000 Silver halide	CIR 500/550 Chalcogenide glass (As-S)
Temperature range	-100°C / + 250°C	-100°C / + 250°C	-100°C /+ 200°C
Pressure (max)	200bar	100bar	100bar

Common Parameters of HT-ATR Probes for High Temperatures

Total length	1.5m (opt.: 1m to 5m)*
Shaft length	300 mm (opt.: 300-700 mm)*
Shaft diameter	12mm
Shaft material	Hastelloy C22
Length of legs	500mm (opt.: 200mm to 500mm)
Protective tube material	Liquid tight SS conduit, KOPEX tube
Minimal bending radius	130mm
Input / output connectors	Long SMA (opt.: any other type)
Cooling air flow parameters	Excess pressure 0.5bar, flow 2300l/h
Inner temperature control	Inside shaft to control ATR tip temperature

4. Fiber Optic ATR Loop Probes



- High throughput at Mid infrared range
- On-line absorbance spectroscopy of liquids, pastes & soft solid surfaces
- Compatible with all FTIR, QCL and IR filter spectrometers
- Cost effective alternative to more expensive ATR IR fiber probes
- Replaceable ATR loop PIR fiber tips

ATR loop infrared PIR fiber probe was the first product line designed for use with FTIR and other mid IR spectrometers. ATR loop PIR fiber probes are perfect for remote analysis of composition of liquids, pastes and soft surfaces with no need in sample preparation. Loop fiber probe is the simplest one in our product family to enable low cost ATR spectroscopy.

Applications:

- Remote evanescent absorption (ATR) spectroscopy in-situ
- Multiple ATR spectroscopy by immersion of fiber loop in liquid
- In-vivo molecular spectroscopy for medical diagnostics by simple touch of ATR loop to skin or tissue

Specification of Fiber Optic ATR Loop Probes

Probe type	Chalcogenide-IR (CIR)	Polycrystalline-IR (PIR)
Transmission range	6500 – 1700cm ⁻¹	3600 – 600cm ⁻¹
Fiber type	Chalcogenide glass (As-S)	Silver Halide (AgCl:AgBr)
Temperature range	≤ 90°C	≤ 100°C

Common Parameters of Fiber Optic Multi-Loop Probes

Total length	1m (opt.: PIR up to 5m, CIR up to 10m) *
Shaft length	120mm *
Shaft diameter	10mm
Shaft material	PEEK
Protective tube material	PEEK
Input / output connectors	Long SMA-905 (opt.: any other type)
Detachable PIR fiber loop	Loop; multi-loop (double-, triple-loop, etc.)

*Customized dimensions are available on request.

Raman Fiber Probes

Raman spectroscopy measures the amount of light scattered in-elastically at different frequencies by molecular vibrations. This results in very detailed molecular fingerprints with high chemical specificity. Raman measurements do not require sample preparation and can be applied to aqueous systems with ease. That's why, Raman has been used extensively for a wide variety of applications, and appears to be the most promising spectroscopic method for in-line analysis of complex systems.

Our product line includes the high sensitivity Raman fiber optic probe to be used with any Raman spectrometer. Available in two options – multi-wavelength excitation (630-785 nm) and single-wavelength excitation (532 and 785 nm), these fiber probes have a bifurcated design, connecting the probe to both a laser and a spectrometer. Our Raman probe allows to analyze spectra in fingerprint (FP, 800-1800 cm⁻¹) and high wavenumber (HWVN, 2800-3800 cm⁻¹) spectral ranges using different lasers. Our Raman fiber optic probes are compatible with process-interfaces to be cleanable and to enable reaction monitoring in lab, pilot plant and run full automated process control.



Main features:

- On-line Raman spectroscopy
- Multi-wavelength excitation (630-785 nm)
- Flexible and robust for industrial applications
- in harsh environment
- Compatible with all fiber optic spectrometers

Applications:

- Reaction monitoring in real time
- Process analytical technologies (PAT)
- Analytical characterization
- Biopharmaceutical analysis
- Biofuel development & production

Common Parameters of Raman Fiber Optic Probes

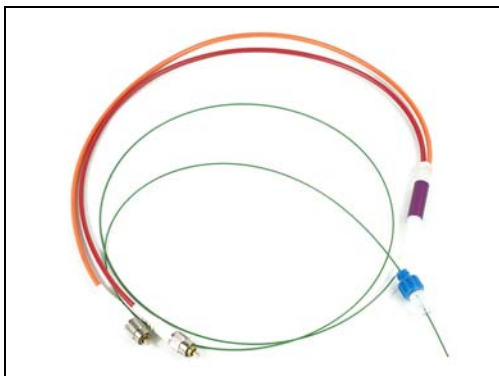
Laser wavelength	<ul style="list-style-type: none"> ● Multi-wavelength excitation: 630-785 nm standard (ideal for use with dual-lasers, e.g. 680 + 785 nm). ● Single-wavelength excitation: 532 and 785 nm standard. ● Other configurations on request: 405, 473, 488, 514, 532, 633, 670, 780, 785, 830, 1064 nm
Laser spot at the sample	<ul style="list-style-type: none"> ● Collimated beam (OD ~ 3 mm) or focused beam (OD ~ 0.2 mm) ● other configurations on request
Spectral range cut-off	<ul style="list-style-type: none"> ● 805 nm (300 cm⁻¹ for 785 nm laser) – for multi-wavelength ● 792 nm (100 cm⁻¹ for 785 nm laser) – for single-wavelength
Filter efficiency	<ul style="list-style-type: none"> ● Optical density > 6 for laser rejection ● Transmission > 95% for Raman shift
Laser transmission	> 80%
Fiber type	<ul style="list-style-type: none"> ● Laser – NIR105/125 NA=0.22 ● Detector – NIR200/220 NA=0.22
Window material	Sapphire AR coated

Lens material	Fused silica AR coated
Window sealing material	Epoxy glue
Probe shaft & body material	Stainless steel
Sealing material	FPM (Viton)
Shaft size	<ul style="list-style-type: none"> ● OD = 12 mm, length = 200±5mm ● OD = 6 mm, length = 100±5mm
Fiber length	1.2m + 2 legs of 0.5m each
Total length (shaft + fiber)	2.00 ± 0.05m
Input / output connectors	FC/PC or SMA905
Protection	Liquid tight protection (LTP)
Operating temperatures	From -20°C to 200°C (up to 300°C on request)
Pressure (max)	100 bar

Reflection Fiber Probes

Reflection fiber optic probes are designed to measure diffuse and specular reflectance, backscatter, or fluorescence of solid, liquid, and powder samples. Reflection and backscatter measurements provide important quantitative information about chemical composition of a sample.

1. Endoscopic Fiber Optic Reflection Probes



Endoscopic reflection fiber optic probe are designed to measure diffuse and specular reflectance, backscatter, or fluorescence for biomedical applications.

We offer endoscopic reflection probe with thinnest probe tip diameter (0.5mm) and unique “7+1” fiber bundle configuration. Based on bifurcated fiber optic bundle construction with “Illuminating” leg to carry light from a source to a sample – and “Reading” Leg to carry reflected light to a spectrometer. Unlike traditional fiber arrangement in reflection probes, which have “6-around-1” – fiber bundle configuration, our probes have “7 around 1”. That’s because in such configuration signal/ noise ratio is much higher than in traditional ones. All illuminating fibers of our endoscopic reflection probes are metal coated that’s why cross-talk between the illuminating fibers is blocked, and in result signal/noise ratio is higher than in similar probes with fiber polymer coatings.

Our endoscopic reflection fiber probes are available with round-to-round (R/R) or round-to-line (R/L) design.

Specification of Endoscopic Reflection Probe

Probe type	(7+1) 100/100	(7+1) 200/200	(7+1) 200/300
Probe fiber bundle:	7 illumination fibers – 100/110/125P around one Al coated read fiber – 100/110/140Al NA = 0.22 ± 0.02	7 illumination fibers – 200/220/245P around one Al coated read fiber – 200/220/290Al NA = 0.22 ± 0.02	7 illumination fibers – 200/220/245P around one Al coated read fiber – 300/330/360Al NA = 0.22 ± 0.02
Probe ferrule diameter:	0.6—1.5 mm	1.2—2.5 mm	1.4—3.0 mm
Probe ferrule length:	2.5-100 mm		
Probe ferrule material:	Stainless steel, titanium + PEEK composition		
Jacketing	Metal coated PVC + Kevlar reinforced tubing, ø3.2 mm		
Connectors:	SMA 905 with knurled ferrule (available FC/PC or ST connectors)		
Total length:	2m (available up to 20m)		
Leg ₁ , Leg ₂	0.5m		

Breakout:	Y-cross point of assembly at 1.5 meter
Wavelength range:	190-1300 nm (UV/VIS) or 350-2200 nm (VIS/NIR)
Operating temperature:	-20 °C to 80 °C (version with PEEK tubing: -70 °C to +200 °C)
Bend radius:	120mm long term
Pressure:	10 bar

2. Fiber Optic Reflection Probes



We offer a large variety of specially designed reflection & fluorescent probes. Based on bifurcated or multi-channel furcated fiber optic bundles with illuminating leg to carry light from a source to a sample and reading leg to carry reflected light to a spectrometer. Unlike traditional reflection probes, which have “6-around-1” fiber bundle configuration, our probes have “7 around 1”, and “9 around 1” design. That’s because in such configurations reflected and back-scattered signals are much higher than in traditional ones. For special applications we provide < 7 + 12 > design: 7 randomized illuminating fibers with 12 randomized reading fibers. All illuminating fibers of our reflection probes are with metal coating clad, that why cross-talk between the illuminating fibers is blocked, and in result – signal/noise ratio is higher than in similar probes with fiber polymer coatings. Our reflection fiber probes are available with two, three or four fiber legs, and round-to-round (R/R) or round-to-line (R/L) construction.

Reflection fiber optic probes are designed to measure diffuse and specular reflectance, backscatter, or fluorescence of solid, liquid, and powder samples. Reflection and backscatter measurements provide important quantitative information about chemical composition of a sample.

Main features:

- Thinnest probe tips with diameter 0.5 mm
- Fiber optic multi-leg or Y design reflection probe
- Minimal cross talk with metal coated fibers
- Flat & angled (38°) tip design
- Round-to-round, round-to-line, hexagonal & octagonal fiber probe design

Applications:

- Reaction monitoring in real time
- Process analytical technologies (PAT)
- Crystallization development & screening
- Analytical characterization
- Biopharmaceutical analysis
- Biofuel development & production

Specification of Fiber Optic Reflection Probe – <7 +1 design>

Probe type	(7+1) 00/100	(7+1) 200/200	(7+1) 200/300
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Probe fiber bundle:	7 illumination fibers – 100/110/125P around one Al coated read fiber – 100/110/140Al, NA = 0.22 ± 0.02	7 illumination fibers – 200/220/245P around one Al coated read fiber – 200/220/290Al, NA = 0.22 ± 0.02	7illumination fibers – 200/220/245P around one Al coated read fiber – 300/330/360Al, NA = 0.22 ± 0.02
Probe ferrule diameter:	0.6—1.5 mm	1.2—2.5 mm	1.4—3.0 mm
Probe ferrule length:	2.5-100 mm		
Probe ferrule material:	Stainless steel, titanium + PEEK composition		
Jacketing	Metal coated PVC +Kevlar reinforced tubing, ø3.2 mm		
Connectors:	SMA 905 with knurled ferrule (available FC/PC or ST connectors)		
Total length: Leg ₁ , Leg ₂	2m (available up to 20m)		
	0.5m		
Breakout:	Y-cross point of assembly at 1.5 meter		
Wavelength range:	190-1300 nm (UV/VIS) or 350-2200 nm (VIS/NIR)		
Operating temperature:	-20 °C to 80 °C (version with PEEK tubing: -70 °C to +200 °C)		
Bend radius:	120mm long term		
Pressure:	10 bar		

Specification of Fiber Optic Reflection Probe – <9 +1 design>

Probe type	(9+1)100/50	(9+1)200/100
Probe fiber bundle:	9 illumination fibers – 50/55/70P around one Al coated read fiber – 100/110/140Al, NA = 0.22 ± 0.02	9 illumination fibers – 100/110/125P around one Al coated read fiber – 200/220/270Al, NA = 0.22 ± 0.02
Probe ferrule diameter:	0.5 – 0.9mm	0.9 – 1.2 mm
Probe ferrule length:	2.5-100 mm	
Probe ferrule material:	Stainless steel, titanium + PEEK composition	
Jacketing	Metal coated PVC +Kevlar reinforced tubing, ø3.2 mm	
Connectors:	SMA 905 with knurled ferrule (available FC/PC or ST connectors)	
Total length: Leg ₁ , Leg ₂	2m (available up to 20m)	
	0.5m	
Breakout:	Y- cross point of assembly at 1.5 meter	

Wavelength range:	190-1300 nm (UV/VIS) or 350-2200 nm (VIS/NIR)
Operating temperature:	-20 °C to 80 °C (version with PEEK tubing— -70 °C to +200 °C)
Bend radius:	120mm long term
Pressure:	10 bar

Fluorescent Fiber Optic Probe

Many directions in biophysics, molecular and cellular biology have arisen and are developing precisely because of the new measurement methods based on fluorescence. For biophysicists, fluorescence has become a fast and sensitive method for studying the structure, dynamics, and functions of biological macromolecules-nucleic acids and proteins.

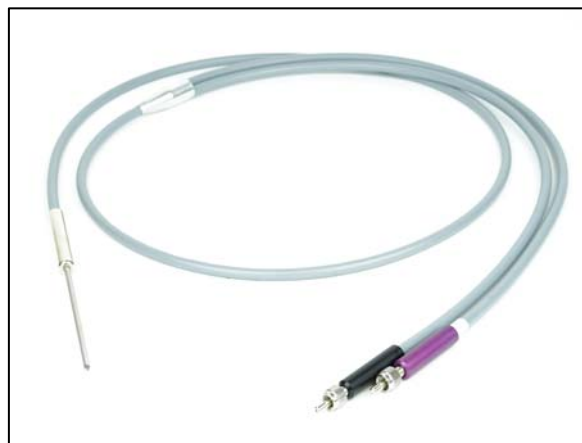
Fluorescent fiber optic probes are designed to measure fluorescence of solid, liquid, and powder samples.

Main features:

- Thinnest probe tips with diameter 0.5 mm
- Fiber optic multi leg or Y- design reflection probe
- Minimal cross talk with metal coated fibers
- Flat & angled (38°) tip design
- Round-to-round, round-to-line, hexagonal & octagonal fiber probe design

Applications:

- Reaction monitoring in real time
- Process analytical technologies (PAT)
- Crystallization development & screening
- Analytical characterization
- Biopharmaceutical analysis
- Biofuel development & production



We offer a large variety of specially designed fluorescent probes, based on bifurcated or multi-channel furcated fiber optic bundles with illuminating leg to carry light from a source to a sample and reading leg to carry reflected light to a spectrometer. Unlike traditional probes, which have “6-around-1” fiber bundle configuration, our probes have “7 around 1”, and “9 around 1” design. That’s because in such configurations reflected and back-scattered signals are much higher than in traditional ones. For special applications we provide < 7 + 12 > design: 7 randomized illuminating fibers with 12 randomized reading fibers. All illuminating fibers of our fluorescent probes are with metal coating clad, that why cross-talk between the illuminating fibers is blocked, and in result – signal/noise ratio is higher than in similar probes with fiber polymer coatings. Our fluorescent fiber probes are available with two, three or four fiber legs, and round-to-round (R/R) or round-to-line (R/L) construction.

Specification of Fiber Optic Reflection Probe – <7 +1 design>

Probe Type	(7+1) 100/100	(7+1) 200/200	(7+1) 200/300
Probe fiber bundle:	7 illumination fibers – 100/110/125P around one Al coated read fiber – 100/110/140Al, NA = 0.22 ± 0.02	7 illumination fibers – 200/220/245P around one Al coated read fiber – 200/220/290Al, NA = 0.22 ± 0.02	7illumination fibers – 200/220/245P around one Al coated read fiber – 300/330/360Al, NA = 0.22 ± 0.02
Probe ferrule diameter:	0.6—1.5 mm	1.2—2.5 mm	1.4—3.0 mm
Probe ferrule length:	2.5-100 mm		
Probe ferrule material:	Stainless steel, titanium + PEEK composition		
Jacketing	Metal coated PVC +Kevlar reinforced tubing, ø3.2 mm		
Connectors:	SMA 905 with knurled ferrule (available FC/PC or ST connectors)		

Total Length: Leg ₁ , Leg ₂	2m (available up to 20m)
	0.5m
Breakout:	Y-cross point of assembly at 1.5 meter
Wavelength range:	190-1300 nm (UV/VIS) or 350-2200 nm (VIS/NIR)
Operating temperature:	-20 °C to 80 °C (version with PEEK tubing: -70 °C to +200 °C)
Bend radius:	120mm long term
Pressure:	10 bar

Specification of Fiber Optic Reflection Probe – <9 +1 design>

Probe type	(9+1)100/50	(9+1)200/100
Probe fiber bundle:	9 illumination fibers – 50/55/70P around one Al coated read fiber – 100/110/140Al NA = 0.22 ± 0.02	9 illumination fibers – 100/110/125P around one Al coated read fiber – 200/220/270Al, NA = 0.22 ± 0.02
Probe ferrule diameter:	0.5 – 0.9mm	0.9 – 1.2 mm
Probe ferrule length:	2.5-100 mm	
Probe ferrule material:	Stainless steel, titanium + PEEK composition	
Jacketing	Metal coated PVC +Kevlar reinforced tubing, ø3.2 mm	
Connectors:	SMA 905 with knurled ferrule (available FC/PC or ST connectors)	
Total length: Leg ₁ , Leg ₂	2m (available up to 20m)	
	0.5m	
Breakout:	Y- cross point of assembly at 1.5 meter	
Wavelength range:	190-1300 nm (UV/VIS) or 350-2200 nm (VIS/NIR)	
Operating temperature:	-20 °C to 80 °C (version with PEEK tubing— -70 °C to +200 °C)	
Bend radius:	120mm long term	
Pressure:	10 bar	

Transmission Fiber Probes

1. TransFlex Fiber Probes



- On-line transmission spectroscopy in liquids at long distance
- High throughput in any part of UV–VIS to mid Infrared spectra
- Flexible and robust for industrial applications in harsh environment
- Compatible with all spectrometers and automated process-interfaces

Our product line includes the latest generation of transmission (single pass) & TransFlex (dual pass) fiber optic probes to be used with any spectrometer or photometer. Our single & dual pass fiber optic probes are compatible with process-interfaces to be cleanable and to enable reaction monitoring in lab, pilot plant and run full automated process control.

Applications:

- Reaction monitoring in real time
- Process analytical technologies (PAT)
- Crystallization development & screening
- Analytical characterization
- Biopharmaceutical analysis
- Biofuel development & production

Specification of Fiber Optic Transmission and Transflection Probes

Probe type	Transmission		Transflection		
	0,2 - 1,3 μm	0,4 - 2,2 μm	0,2 - 1,3 μm	0,4 - 2,2 μm	1,6 - 5,5 μm
Transmission range	0,2 - 1,3 μm	0,4 - 2,2 μm	0,2 - 1,3 μm	0,4 - 2,2 μm	1,6 - 5,5 μm
Fiber type	Silica UV-Vis	Silica Vis-NIR	Silica UV-Vis	Silica Vis-NIR	CIR
Gap dimension	2; 5; 10; 20 mm	2; 5; 10 mm	2; 5; 10; 20 mm	2; 5; 10 mm	0.05 – 2.0 mm
Temp. range	$\leq 200^\circ\text{C}$	$\leq 200^\circ\text{C}$	$\leq 200^\circ\text{C}$	$\leq 200^\circ\text{C}$	$\leq 100^\circ\text{C}$
Min bending radius	120 mm (for 600 μm core)				130 mm

Common Parameters of Fiber Optic Transmission and Transflection Probes

Total length	1,5 m (opt: 1 – 30m) *
Shaft length	230mm (opt: 50 – 500mm) *
Shaft diameter	12mm
Shaft material	SS, Hastelloy C22
Protective tube material	Liquid tight SS-Conduit, KOPEX tube
Input / output connectors	Long SMA; FC/PC; ST
Compatible process interfaces	Ceramat-FOS or SensoGate-FOS

*Customized dimensions are available on request

2. Transmission Infrared Fiber Optic Probe for Gases



- On-line transmission spectroscopy in gases
- High throughput in any part of NIR-MIR spectra
- Flexible and robust for industrial applications
- Compatible with any spectrometer

Our product line includes the latest generation of transmission infrared fiber optic probes for gases to be used with any spectrometer or photometer. The design of transmission fiber probe for gases is based on a bifurcated fiber bundle. Due to low mid IR attenuation in gases the collimated beam design of double pass (or multiple pass) gas cell is needed to increase optical path length to 10 – 40cm. This design is easily realized by the mean of the collimating objective and reflecting mirror cell.

Applications:

- Reaction investigation and monitoring in real time
- Analytical characterization
- Exhaust gases monitoring
- Solvent vaporization monitoring
- Associated petroleum gas monitoring

Specification of Gas Transmission Fiber Optic Probes

Probe type	Transmission in double-pass gas cell		
Transmission range	0,5 - 2,2 μ m	1,6 – 5,5 μ m	3 – 18 μ m
Fiber type	Silica	Chalcogenide IR	Polycrystalline IR
Temperature range	-50°C +200°C	-50°C +90°C	-50°C +140°C
Sensitivity	>1ppm depending on optical path, spectrometer performance, gases in test		

Common Parameters of Gas Transmission Fiber Optic Probes

Total length	1,5 m (opt: 1 – 30m) *
Transmission cell length	100mm (opt: 5 – 200mm) *
Transmission cell diameter	25mm
Shaft material	Stainless steel, Hastelloy C22
Protective tube material	Liquid tight SS conduit, KOPEX tube
Input / output connectors	Long SMA *

*Customised dimensions are available on request.