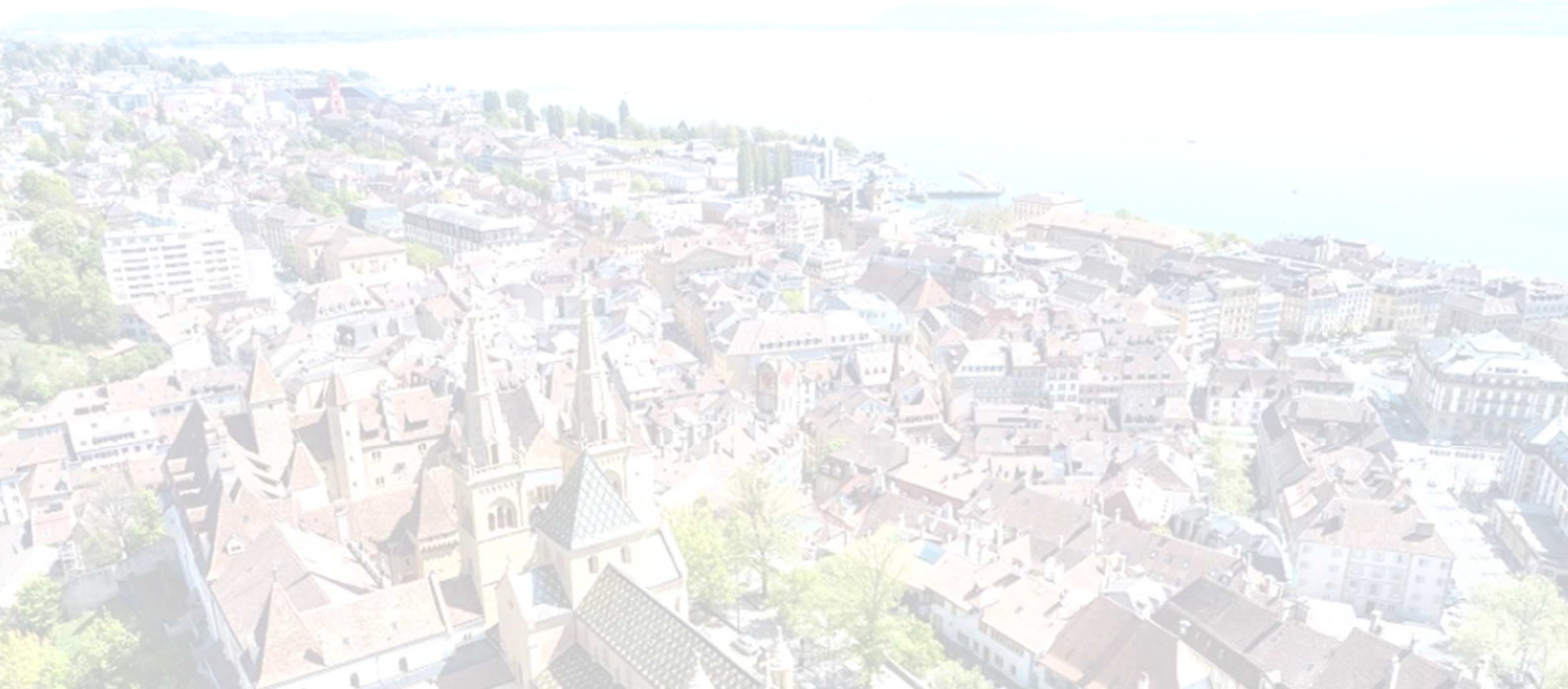
ARCoptix
Switzerland

PRODUCTS CATALOG





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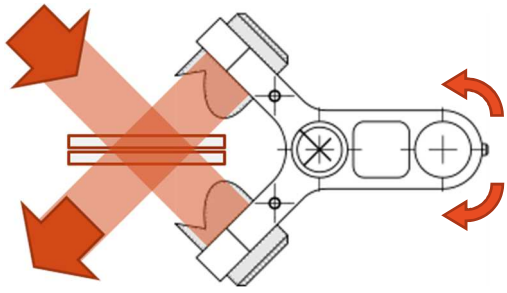
ARCOPTIX S.A. – COMPANY PRESENTATION

Who are we ?

ARCoptix S.A. is a swiss company active in the field of optical spectroscopy. Founded in 2006, our facilities are spread between our sales offices in Neuchâtel, located on the shore of lake Neuchâtel, and our production line in Tramelan, which lies in the beautiful region of the Jura mountains. Our core line of business is Fourier-transform infrared (FT-IR) spectroscopy, which can address a wide range of applications in the near-infrared (NIR) and mid-infrared (MIR) regions of the electromagnetic spectrum. With hundreds of instruments operating worldwide for more than a decade, our teams have an extensive expertise in the manufacturing and qualification of benchtop and original equipment manufacturer (OEM) FT-IR spectrometers.

What do we do ?

FT-IR spectrometers analyze the spectrum of light thanks to the scanning of an interferometer that lies at the core of the instrument. Our instruments rely on a permanently aligned interferometer, which consists in a pair of reflective corner-cubes mounted on a common swinging arm. This Y-shaped pendulum rotates on a wear-free flexure pivot, ensuring a long-lived operation by avoiding mechanical wear.



Dual corner cube mounted on a common swinging arm



Our OEM010 series featuring an internal light source, interferometer and detector.

This robust design paired with high quality, carefully selected optical components allow us to produce extremely compact, reliable and accurate analyzers with competitive performances with respect to other solutions found on the market of Fourier-transform spectroscopy. Besides standard products, we have a fast-prototyping capability that make possible the quick implementation and testing of custom configurations tailored to your specific application.

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PRODUCTS LINE

NIR

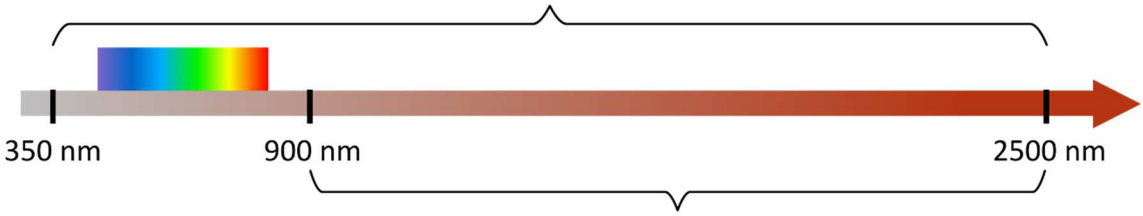
Diffuse reflection VIS-NIR
Page : 19





Fibered VIS-NIR
Page : 17

VIS-NIR Units



Desktop FT-IR
Page : 11

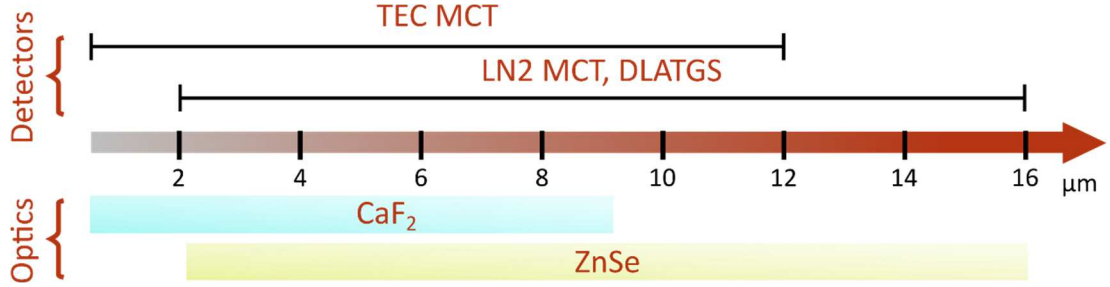


NIR FT-IR



Fibered FT-IR w/ built-in light source
Page : 13

MIR





Desktop FT-IR
Page : 9



OEM FT-IR
Pages : 22, 24





Fibered FT-IR w/ built-in light source
Page : 13

GAS SPECTROMETERS
Pages : 15 & 26 (OEM)

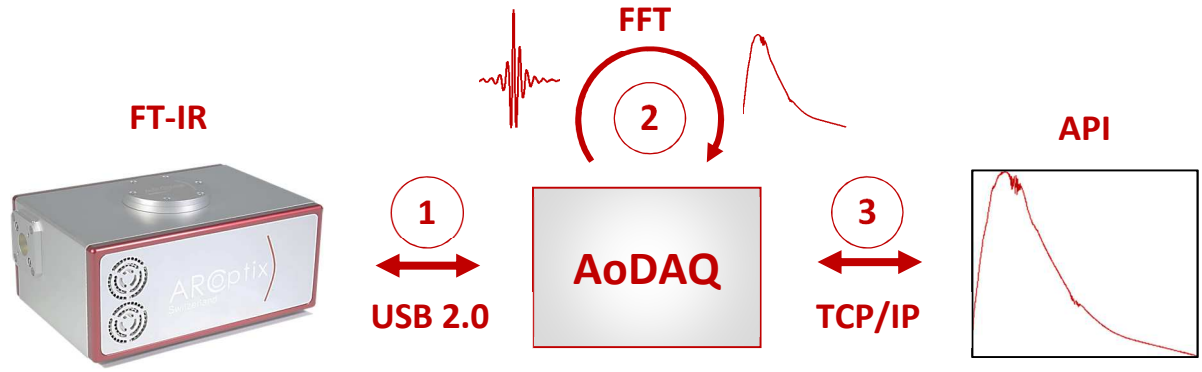
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SOFTWARE

Our software – your application

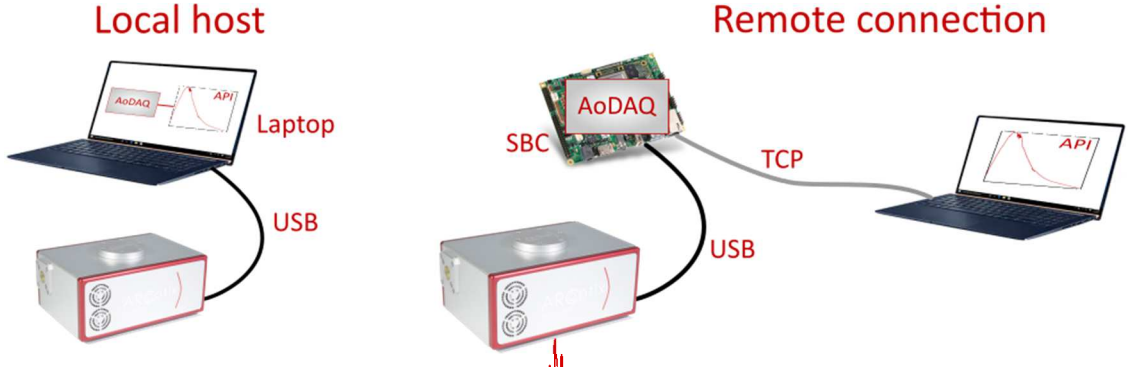
At ARCoptix, we fully appreciate and value the multiple benefits that a dedicated, performant and reliable software can bring to your application. Automatic data collection, parameters changes, status diagnosis and many other essential tasks should be implemented as simply and as efficiently as possible in order to get the most out of your spectrometer. This philosophy led to the development of a multi-threading, cross-platform and versatile software application, the ARCoptix digital acquisition system or AoDAQ.



The AoDAQ simultaneously takes care of:

1. Handling communication with the FT-IR via USB
2. Processing raw signals to deliver a spectrum
3. Running a TCP Ethernet server

The AoDAQ can be installed on all sorts of computers, from desktop machines to embedded, low-power single board computers. Thanks to the hosting of a TCP server, the instrument data and parameters can be accessed locally and/or remotely. All communication with the instrument eventually reduces to a set of TCP/IP commands that allow to quickly acquire data, adjust parameters, monitor the instrument status etc. using the programming environment of your choice.



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A MATTER OF RESOLUTION

Which resolution for your application ?

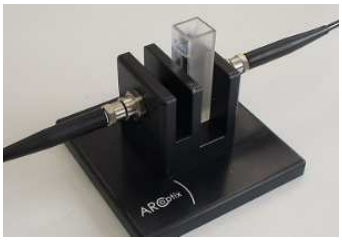
The resolution of an optical spectrometer is without doubt one of its most crucial parameters. Higher resolving power means better discrimination of closely positioned spectral features, which intuitively speaking should enable retrieving more detailed information from a given measurement. While this is true to some extent, some applications do not benefit further from a better resolution beyond a certain point. Besides, the resolution of an FT-IR cannot be improved without trading other parameters such as acquisition time or signal-to-noise ratio, thus degrading other important signal metrics. Overall, what matters most is to operate at the *right* resolution, not at the sharpest available one.

At ARCoptix, our instruments are classified in two distinct categories. Standard resolution instruments offer tunable resolutions up to 2cm^{-1}, which is ideal for the study of condensed matter in general, as it matches the width of the spectral features observed in solids and liquids in the mid and near infrared. High resolution instruments can reach resolution up to 0.5cm^{-1}, which enable resolving the finer structure of individual molecules in a gas mixture or can provide more insight on the emission of a given source such as a laser.

Standard resolution (up to 2cm^{-1}), recommended for:

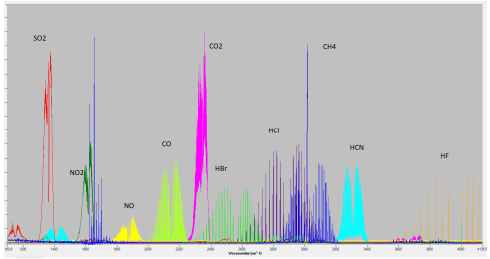


Solid measurements

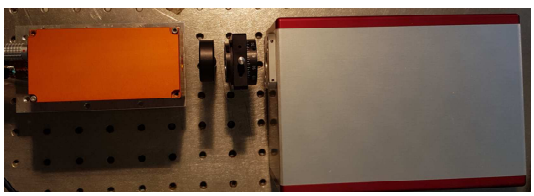


Liquid measurements

High resolution (up to 0.5cm^{-1}), recommended for:



Gas spectroscopy



Laser characterization

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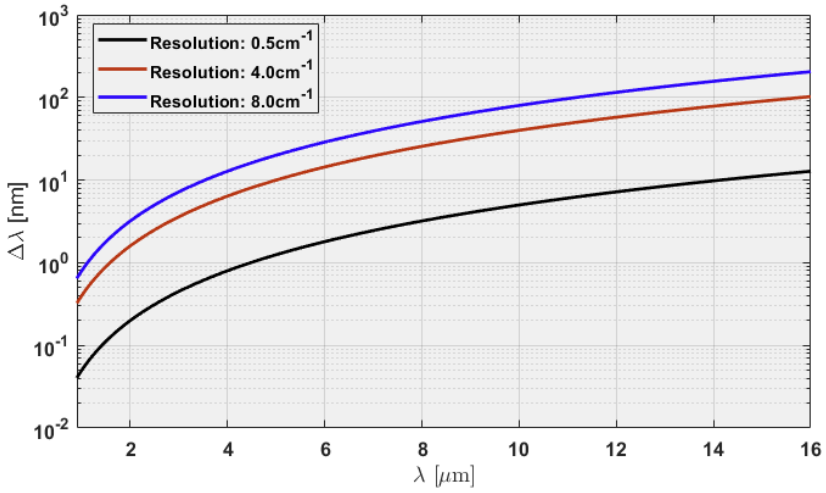
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FREQUENTLY ASKED QUESTIONS

What is the equivalent wavelength resolution of my FT-IR ?

Owing to its operating principle, a FT-IR delivers a spectrum uniformly sampled over a given spectral range in wavenumbers (ν), with units of cm^{-1}. The wavenumber is simply defined as the inverse of the wavelength (λ). The resolution of an FT-IR is constant in wavenumber (Δν), but varies with wavelength (Δ λ) due to the inverse relationship between these two units. The equivalence is given by the following rule:

$$\Delta \lambda = \frac{\Delta \nu}{\nu^2}$$



Resolution in [nm] as a function of wavelength in FT-IR systems

What is the typical emission of my ARCLIGHT-MIR/NIR ?

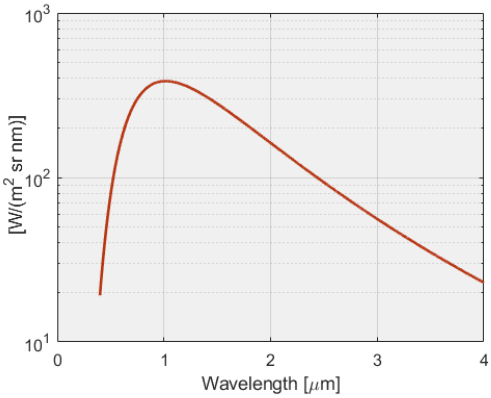
The ARCOptix ARCLIGHT lamps are thermal sources, which behave to a good approximation like blackbodies at a temperature of 2'850 °K (ARCLIGHT-NIR) and 1'550°K (ARCLIGHT-MIR), the spectral radiances of which are illustrated below. The typical total power emitted by both version of the ARCoptix ARCLIGHT source are shown in the following table.

	ARCLIGHT-NIR	ARCLIGHT-MIR
w/o fiber coupler	360 mW	180 mW
w/ fiber coupler	110 mW	40 mW
w/ optical fiber	20 mW	4 mW

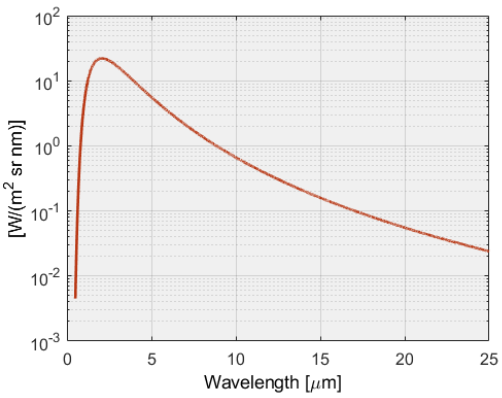
Total optical power of the ARCLIGHT in different configurations

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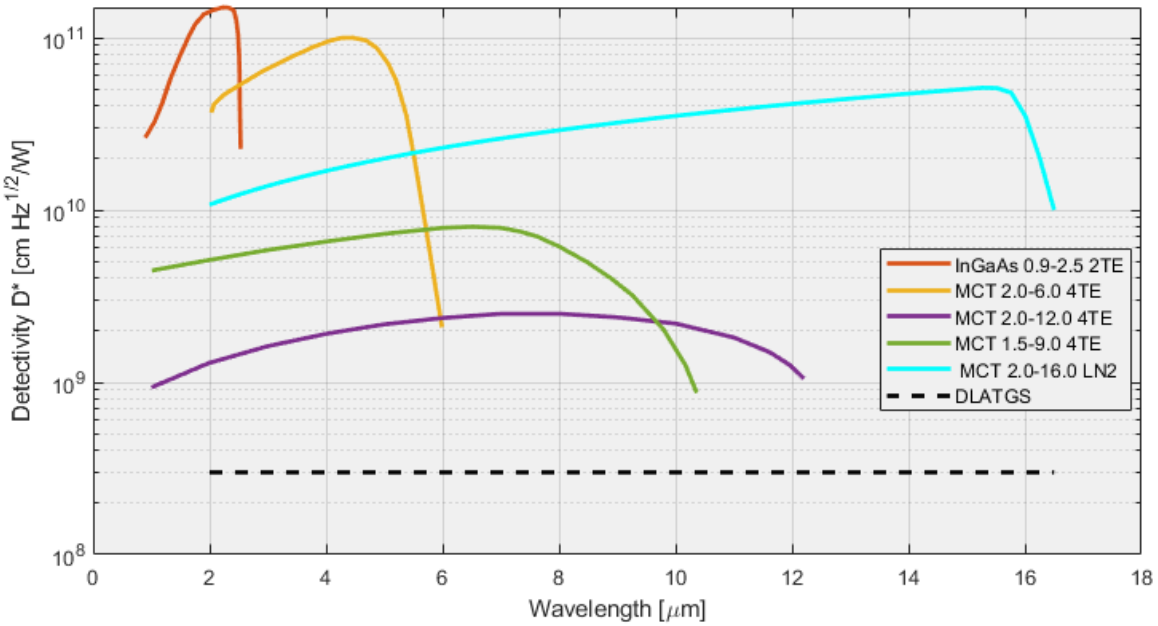
Typical radiance of the ARLIGHT-NIR



Typical radiance of the ARCLIGHT-MIR

How to choose the best detector for my application ?

The choice of a detector is a most sensitive one as it contributes to a large extent to the overall quality of your measurement. ARCoptix offers several types and models of detectors, namely extended InGaAs detectors (2 stage thermo-electric cooling), HgCdTe (MCT) detectors with either thermoelectric cooling (4 stages) or liquid nitrogen cooling as well as pyroelectric (DLATGS) detectors. Selection of a given detector is application driven, and depends on the spectral signatures that you are willing to analyze. In order to deliver a faire comparison between various types of photodetectors (or thermal detectors), the most widespread metric is the specific detectivity (labelled D*), which is given in the figure below for all of our available detectors.



Specific detectivity (D*) of ARCoptix detectors

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BENCHTOP INSTRUMENTS

Are you a scientist, engineer, technician or scholar looking for a compact, reliable and efficient FT-IR solution ? Our portfolio of benchtop FT-IR instruments can target a wide range of applications in the near-infrared or mid-infrared, such as liquid analysis, solid sample characterization, gas spectroscopy, diffuse reflectance measurements and many more. Our benchtop instruments are designed for ease of use and flexibility, and come with a large choice of sources and accessories to help you get the information that you need.

- ARCoptix FT-MIR Rocket: page 9
- ARCoptix FT-NIR Rocket: page 11
- ARCoptix Fiber coupled FT-IR: page 13
- ARCoptix GASEX MODULAR: 15
- ARCoptix VIS-NIR-FIB: page 17
- ARCoptix VIS-NIR-DR : page 19

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ARCOPTIX FT-MIR ROCKET





The ARCoptix FT-MIR Rocket is a highly peformant, compact and reliable spectrometer that is ideal for various applications in the mid-infrared. The concentration levels of CO_2 or H_2O in the interferometer volume are conveniently minimized thanks to a homemade, replaceable dessicant capsule. Thanks to its permanently aligned interferometer and solid-state reference laser, the FT-MIR Rocket offers excellent stability in both intensity and wavelength scales.

With four available spectral ranges and adjustable spectral resolution down to $2cm^{-1}$ ($0.5cm^{-1}$ on request), the FT-MIR Rocket is a highly flexible instrument that can be tailored to your application. Designed for convenience and ease-of-use, our FT-MIR spectrometer is readily operational with our ARCspectroRocket software using a standard USB 2.0 connection.

Applications

- *Mid-IR Optical Spectrum Analyzer (OSA) for MIR Lasers & LEDs*
- *Liquid, thin-film or gas measurement*
- *Material identification and quantification in various fields such as geology, food and beverage industry, …*

Features

- **4 spectral ranges :**
  - **2-6 µm (TEC-MCT)**
  - **1.5-8.5 µm (TEC-MCT)**
  - **2-12 µm (TEC-MCT)**
  - **2-16 µm (LN2C-MCT or DLATGS)**
- **Dynamically adjustable resolution:**
  - **$8cm^{-1}$**
  - **$4cm^{-1}$**
  - **$2cm^{-1}$**
  - **$0.5cm^{-1}$ (on request)**
- **Compact design: 18cm X 16cm X 8 cm**
- **Wear free moving parts for extended lifetime**
- **No purging of the interferometer required**
- **Removable fiber adapter**
- **Temperature controlled reference laser**
- **Low power consumption**
- **USB 2.0 connection**

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Specifications

Product code	FTMIR-L1-060-4TE	FTMIR-L1-085-4TE	FTMIR-L1-120-4TE	FTMIR-L1-160-LN2	FTMIR-L1-160-DLA
Beamsplitter material	CaF_2		ZnSe		
Spectral Range [cm^{-1}]	5'000 – 1'660	6600-1'200	5'000 - 830	5'000 - 650	
Spectral Range [µm]	2-6	1.5-8.5	2-12	2-16	
Detector Type	MCT (4-TE cooled)			MCT (LN2 cooled)	DLATGS
Detector Peak D* [cm $Hz^{1/2}W^{-1}$]	>$1x10^{11}$	>$8x10^{9}$	>$4x10^{9}$	>$5x10^{10}$	>$2.5x10^{8}$
Signal-to-noise ratio	> 80'000:1[i]	> 40'000:1[i]	> 40'000:1[i]	>70'000:1[i]	>8000:1[i]
Removable fiber-optic coupler	Lensed (CaF2 fiber coupler)		Reflective fiber coupler (90^o off-axis parabolic mirror)		
Recommended fiber	CIR (chalcogenide) fibers, 1-6µm	CIR (1-6µm) or PIR (3-18µm)	PIR (polycrystalline) fibers, 3-18µm		
Fibered interface	Fiber core up to Ø 1mm, NA=0.25, SMA 905 connector				
Free-space interface	Ø 12.7mm collimated (max ~30mrad half angle)				
Interferometer type	Permanently aligned, double retro-reflector design				
Resolution (unapodized) [cm^{-1}]	*0.5*[ii], 2, 4, 8 (user selectable)				
Wavenumber repeatability	<10 PPM				
Scan frequency	>4 Hz @ $4cm^{-1}$				>0.4Hz @ $4cm^{-1}$
Internal reference laser	Temperature-stabilized solid-state laser @850nm				
A/D Converter	24 bit				
Amplifier	4 gain levels low noise trans-impedance amplifier				
Operating temperature	10°C-40°C				
Power requirement	12V / 10W max			12V / 6W max	
Communication Interface	USB 2.0				
Software Interface	Windows 7/10/11 API for controlling the instrument via our DLL				
Dimensions	180mm x 160mm x 80mm (without Dewar)				
Weight	1800 g (without Dewar)				

[i] Measured with a silicon carbide (SiC) source (~1550°K) with f=18mm reflector directly shining into the free-space input port, 60s measurement, around peak sensitivity wavelength, 4cm-1, Norton-Beer weak apodization.
[ii] Available on request only, please contact us at info@arcoptix.com for details

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ARCOPTIX FT-NIR ROCKET



The ARCoptix FT-NIR Rocket is a highly peformant, compact and reliable spectrometer that is ideal for various applications in the near-infrared spectrum. Its fibered port makes it directly compatible with fibered accessories such as reflection probes or cuvette holders to analyze e.g. liquids in transmission.

Thanks to its permanently aligned interferometer and solid-state reference laser, the FT-NIR Rocket offers excellent stability in both intensity and wavelength scales. With four available spectral ranges and adjustable spectral resolution down to $2cm^{-1}$, the FT-NIR Rocket is a highly flexible instrument that can be tailored to your application. Designed for convenience and ease-of-use, our FT-NIR spectrometer is readily operational with our ARCspectroRocket software using a standard USB 2.0 connection.

Applications

- *Transmission, diffuse reflectance*
- *Light source measurement (NIR Lasers, LED, Solar,…)*
- *Material identification and quantification in various fields such as geology, food and beverage industry, drug & medical diagnostics, etc.*

Features

- **High D* 2-TE cooled InGaAs photodetector**
- **Dynamically adjustable resolution:**
  - **$8cm^{-1}$**
  - **$4cm^{-1}$**
  - **$2cm^{-1}$**
- **Compact design: 18cm X 16cm X 8 cm**
- **Wear free moving parts for extended lifetime**
- **No purging of the interferometer required**
- **SMA905 fiber input**
- **Low power consumption**
- **Compatible with various fibered accessories**
- **Temperature controlled reference laser**
- **USB 2.0 connection**

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Specifications

Product code	FTNIR-L1-025-2TE
Spectral Range [cm^{-1}]	11'000–4'000
Spectral Range [µm]	0.9–2.5
Detector type	Extended type InGaAs 2-stage TE-cooled
Detector Peak D* [cm $Hz^{1/2}W^{-1}$]	>2x10^{11}
Signal-to-noise ratio (SNR)	>100'000:1[i]
Recommended fiber	Low-OH silica Multi-mode fiber with 200µm or 600µm core
Fibered interface	Fiber core up to Ø 0.6mm, NA=0.25, SMA 905 connector
Interferometer type	Permanently aligned with dual retro-reflector
Resolution (unapodized) [cm^{-1}]	2, 4, 8 (user selectable)
Wave-number repeatability	<20 PPM
Scan frequency	>4 Hz @ 4cm^{-1}
Internal reference laser	Temperature controlled solid-state @795nm
A/D Converter	24 bit
Amplifier	4 gain levels low noise trans-impedance amplifier
Operating temperature / humidity	5°C - 40°C / non condensing
Power requirements	12V / 10W max
Communication interface	USB 2.0
Software Interface	Windows 7/10/11 API for controlling the instrument via our DLL
Dimensions	180mm x 160mm x 80mm
Weight	1800 g

[i]Measured with a 20W halogen lamp in transmission mode, 60s measurement, around peak sensitivity wavelength, Norton-Beer weak apodization, linearly corrected baseline, resolution setting 4 cm^{-1}

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ARCOPTIX FIBER COUPLED FT-IR



The ARCoptix FT-IR spectrometer is an all-fibered alternative to our "Rocket" configurations. It features the same components as the FT-NIR or FT-MIR Rocket instruments, with the addition of an internally mounted optical source that enables to modulate light before coupling it to the output port of the device. This architecture is thus more robust to external perturbations such as background thermal emission, as such parasitic light would not go through the interferometer before reaching the detector. Our FTIR-FC is ideal for fibered applications such as reflection probes used for diffuse reflection measurements.



FTMIR-FC unit mounted with an MCT detector cooled by LN2

Features

- **Internal light source**
- **SMA905 fiber connectors**
- **Available with LN2 cooled MCT photodetector**
- **Robust to ambient light perturbation**
- **Dynamically adjustable resolution:**
  - **8cm^{-1}**
  - **4cm^{-1}**
  - **2cm^{-1}**
- **Wear free moving parts for extended lifetime**
- **No purging of the interferometer required**
- **Temperature controlled reference laser**
- **Low power consumption**
- **USB 2.0 connection**

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Specifications

Product code	FTNIR-FC-025-2TE	FTMIR-FC-060-2TE	FTMIR-FC-120-4TE	FTMIR-FC-160-LN2
Beam-splitter material	CaF_2		ZnSe	
Spectral Range [cm^{-1}]	11'000 - 4'000	5'000-1'660	5'000 – 830	5'000 – 650
Spectral Range [µm]	0.9-2.5	2-6	2-12	2-16
Detector Type	InGaAs (2-TE cooled)	MCT (4-TE cooled)		MCT (LN2 cooled)
Detector peak D* [cm $Hz^{1/2}W^{-1}$]	>2 $x10^{11}$	>1 $x10^{11}$	>4$x10^{9}$	>5$x10^{10}$
Signal-to-noise ratio	> 100'000 :1[i]	> 80'000:1 [ii]	> 40'000:1 [ii]	> 70'000:1 [ii]
Recommended fiber	Low-OH, multimode silica fiber	CIR (Chalcogenide) fibers, 1-6 µm	PIR (polycrystalline) fibers, 3-18µm	
Fibered interface	Fiber core up to Ø 1mm, NA=0.25, SMA 905 connector			
Internal reference laser	795nm	850nm		
Power requirement	40W @12VDC			30W @12VDC
Integrated light source	20W QTH lamp	20W SiC globar		
Interferometer type	Permanently aligned, double retro-reflector design			
Resolution (unapodized) [cm^{-1}]	2, 4, 8 (user selectable)			
Wavenumber repeatability	<10PPM			
Scan frequency	>4 Hz @ 4cm^{-1}			
A/D Converter	24 bit			
Operating temperature	10°C-40°C			
Fiber optic interfaces	Fiber core up to Ø 1mm, NA=0.3, SMA 905 connector			
Silica gel compartment	Yes			
Communication Interface	USB 2.0			
Software Interface	Windows 7/10 API for controlling the instrument via our DLL			
Dimensions	180mm x 160mm x 80mm			
Weight	2200 g (excluding LN2 dewar)			

[i]Measured with a 20W halogen lamp in transmission mode, 60s measurement, around peak sensitivity wavelength, Norton-Beer weak apodization, linearly corrected baseline, resolution setting 4 cm^{-1}

[ii] Measured with a silicon carbide (SiC) source (~1550K) in transmission mode, 60s measurement, around peak sensitivity wavelength, 4cm-1, Norton-Beer weak apodization.

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ARCOPTIX GASEX MODULAR



19” rackable chassis (4U)



PORTA Chassis with battery management

The ARCoptix GASEX MODULAR is a fully configurable solution for gas spectroscopy applications. Besides our GASEX OEM module, the system can offer a large variety of standard components and accessories as requested by the end user application. Typical examples of accessories are heated sample lines, single board computers (SBC) for on-board processing, membrane gas pumps and so on. The GASEX MODULAR is available with a 19” rackable chassis (4U) for smooth integration in a more complex system or with our PORTA chassis equipped with a battery management system for autonomous field operation.

Applications

- *Ambient air/combustion/emission monitoring*
- *Process monitoring/control in chemical applications*
- *Food processing*
- *Toxic gas detection*
- *Greenhouse gas monitoring*
- *All kinds of relevant mobile applications*
- *Bio-medical applications*

Features

- **19” rack (4U) or PORTA chassis with battery module**
- **Fully configurable unit (internal components and front/back faces)**
- **Assistance to select or integrate relevant parts**
- **FT-IR with 4-TEC MCT detector**
- **0.2L volume, 5m optical path heated, gold plated gas cell**
- **Gold/rhodium protected cell**
- **High resolution of 0.5cm^{-1}**
- **Wear free moving parts for extended lifetime**
- **Temperature controlled reference laser**

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Specifications

Product code	GASEX-MODULAR-RCK19	GASEX-MODULAR-PORTA
Analyzer	GASEX OEM module, see below for complete product specifications	
Typical accessories	Single-board computer for onboard processing Auxiliary controller board for parameters monitoring Membrane pump, Flow-meter, Muffler/cooler (combined unit) Scrubber, Heated line	
Dimensions [mm]	489x428x127	602x464x201
Weight [kg]	15 (typical)	

Product code	GASEX-OEM-060-4TE	GASEX-OEM-085-4TE	GASEX-OEM-120-4TE
Beam-splitter Material	CaF2		ZnSe
Spectral Range [cm^{-1}]	5'000 - 1'660	6'600 – 1'200	5'000 - 830
Spectral Range [µm]	2-6	1.5-8.5	2-12
Detector type	MCT-4TE cooled		
Detector Peak D* [cm $Hz^{1/2}W^{-1}$]	> $1x10^{11}$	> $8x10^{9}$	>$4x10^{9}$
Signal-to-noise ratio	>55'000:1[i]	>35'000:1[i]	>35'000:1[i]
Interferometer type	Permanently aligned with dual retro-reflector		
Resolution (unapodized) [cm^{-1}]	*0.5*[ii], 2, 4, 8 (user selectable)		
Wave-number repeatability	<10 PPM		
Scan frequency	>1.5 Hz @ 0.5cm^{-1}		
Internal reference laser	Temperature controlled solid-state @850nm		
A/D Converter	24 bit		
Amplifier	4 gain levels low noise trans-impedance amplifier		
Power requirement	< 35W @ 12 V (FT-IR only)		
Communication interface	USB 2.0		
Software interface	Windows 7/10/11		
	GAS CELL		
Path length	5m		
Internal volume	0.2L		
Total transmission	50%		
Internal temperature [°C]	20-200 (not condensing)		
Mirrors	Rhodium & gold coating		
Windows material	BaF2		
Gas inlet/outlet connector	Swagelok 6mm or ¼" (custom on request)		
Power requirement (cell only)	400 W (peak), 25 W (steady-state) @ 110-230 VAC or 12-60 VDC		

[i] Measured with a silicon carbide (SiC) source (~1550K), 60s measurement, around peak sensitivity wavelength, Norton-Beer weak apodization, linearly corrected baseline, resolution setting 0.5 cm^{-1}

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ARCOPTIX VIS-NIR SPECTROMETER



The ARCoptix VIS-NIR spectrometer is a broadband spectroscopy solution covering both the visible (down to 350 nm) as well as the near-infrared (up to 2500 nm). This all-fibered unit integrates our ARCoptix FT-NIR spectrometer as well as a multichannel grating spectrometer to probe light in the visible range. The two individual spectra are then processed and merged automatically in our software to deliver a single measurement of the VIS-NIR spectrum.

Featuring a high resolution (better than 1.5 nm) over its entire measuring range, the ARCoptix VIS-NIR spectrometer is a highly convenient, compact and user friendly instrument for various applications. The unit includes a dedicated Y-branch fiber bundle optimized for each spectral range in order to maximize the signal measured by each built-in instrument.

Applications

- *Transmission measurement*
- *Diffuse reflectance measurement*
- *Light source characterization*
- *Material identification*

Features

- **Grating spectrometer & FT-NIR combined**
- **Y-branch fiber bundle**
- **Lightweight and compact (22x18x8 cm)**
- **High resolution < 1.5nm over the 350-2500nm range**
- **Fast acquisition time (2 s)**
- **USB 2.0 connection**
- **Access to instrument individual data & combined information**
- **Compatible with various fibered accessories**

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Specifications

Product code	VIS-NIR-FIB
Spectral range	350nm-2'500nm
Resolution	< 1.5 nm
Fiber inputs	2X SMA-905
Single acquisition scanning time [s]	2
Software interface	Windows 7/10/11
Power supply	12 VDC (power supply included)
Communication interface	USB 2.0
Dimensions [mm]	220x180x80
Weight [kg]	2.5
Operating temperature [°C]	5-35
	VIS Spectrometer
Technology	Array detector grating spectrometer
Spectral range	350nm-1'000nm
Resolution	~1.5 nm (25 µm slit)
	NIR Spectrometer
Technology	Fourier-transform spectrometer, model FTNIR-L1-025-2TE
Spectral range	900nm-2'500nm (extended InGaAs detector, 2TE cooled)
Resolution	<1.5nm (2cm^{-1})

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ARCOPTIX VIS-NIR-DR SPECTROMETER



The ARCoptix VIS-NIR-DR spectrometer is a broadband instrument designed for diffuse reflectance measurements in the visible and near-infrared. The entrance port of the instrument leads to an integrating sphere with internal illumination, which ensures optimized illumination of your sample. The VIS-NIR-DR integrates a multichannel grating spectrometer for measuring in the visible as well as an FT-IR that covers the NIR region of the electromagnetic spectrum.

Designed for ease of use, our dedicated software merges the information delivered by the two instruments and outputs a single spectrum covering the 350-2600nm interval. This software also features a direct calculation of the total solar reflectance (TSR) value for reference measurements.

Applications

- *Diffuse reflectance measurement of paints, textiles, ink, cosmetics, plastics etc.*
- *Measurement of total solar reflectance (TSR) in accordance to ASTM norms G173 and E903*

Features

- **Grating spectrometer & FT-NIR combined**
- **Sample holder**
- **Internally illuminated integrating sphere**
- **High resolution < 5nm over the 350-2600nm range**
- **Fast acquisition time (5 s)**
- **USB 2.0 connection**
- **Direct calculation of TSR value**

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Specifications

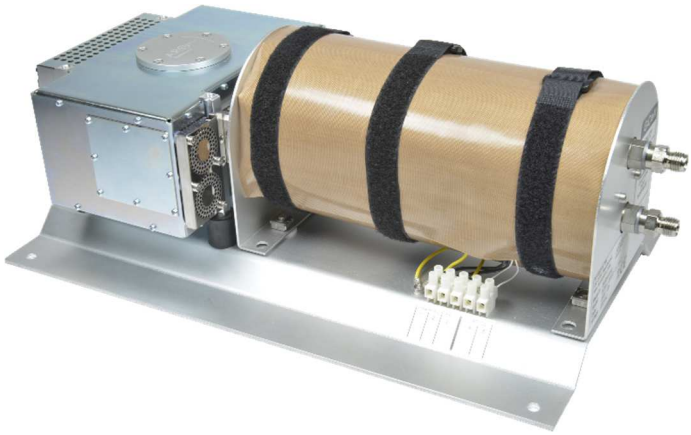
Product code	VIS-NIR-DR
Spectral range [nm]	350-2600
Resolution [nm]	< 5
Measurement geometry	Diffuse illumination, 8° viewing angle
Integrating sphere diameter [mm]	50
Integrating sphere port diameter [mm]	10
Illumination source	Halogen, 5W
Single acquisition scanning time [s]	< 5
SNR (single acquisition)	> 1000:1
Inter-instrument repeatability	±1% at 50% R
Repeatability on white reference	<0.2% variation at 50% R
Software interface	Windows 7/10/11
Operating power	20 W @ 12 VDC
Communication interface	USB 2.0
Dimensions [mm]	380x250x320
Weight [kg]	8
Operating temperature [°C]	10-40

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OEM INSTRUMENTS

Are you looking to develop an industrial application based on Fourier-Transform spectroscopy ? Compact, robust and reliable, our product line of OEM modules has been specifically designed for easy integration in a complete measuring system. Besides our standard portfolio, our engineering department has the experience and manufacturing capability to offer custom, dedicated solutions that can be tailored to match your current needs and requirements.

- ARCOPTIX OEM010: page 22
- ARCOPTIX OEM011 : page 24
- ARCOPTIX GASEX OEM : page 26

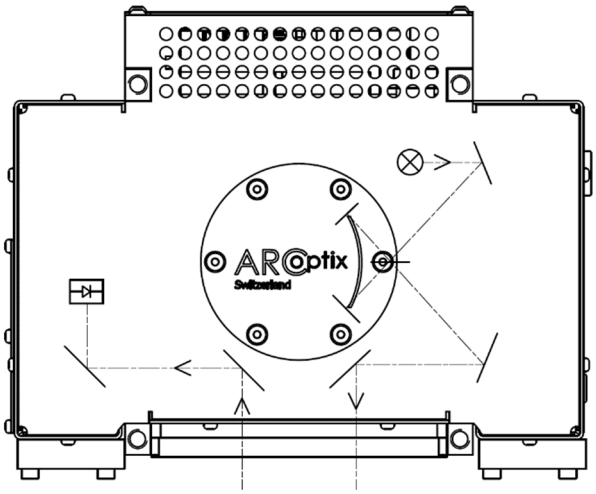
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ARCOPTIX OEM010



The ARCoptix OEM010 is our most compact FT-IR complete system. It features a built-in SiC globar heated to 1550 °K and regulated in temperature to ensure stable illumination. The light that is being output by the instrument is first modulated by our permanently aligned interferometer, making it robust against stray light that might eventually reach the detector. The OEM010 rugged casing also holds a highly sensitive TE-MCT detector which maximizes the response of the system.



Optical routing in the ARCOPTIX OEM010

Features

- **Internal light source**
- **Compact, rugged unit**
- **Custom I/O coupling modules on request**
- **Robust to ambient light perturbation**
- **Dynamically adjustable resolution:**
  - **8cm^{-1}**
  - **4cm^{-1}**
  - **2cm^{-1}**
  - **0.5 cm^{-1} (on request)**
- **Wear free moving parts for extended lifetime**
- **No purging of the interferometer required**
- **Temperature controlled reference laser**

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Specifications

Product code	FTIR-OEM010-060-4TE	FTIR-OEM010-085-4TE	FTIR-OEM010-120-4TE
Beam-splitter material	CaF_2		ZnSe
Spectral Range [cm^{-1}]	1’660-5’000	1’200-6’600	830-5’000
Spectral Range [µm]	2-6	1.5-8.5	2-12
Detector Type	MCT (2-TE cooled)	MCT (4-TE cooled)	
Detector Peak D* [cm $Hz^{1/2}W^{-1}$]	>1x10^{11}	>8x10^{9}	>4x10^{9}
Signal-to-noise ratio (SNR)	> 80'000:1[i]	>40’000:1[i]	
Output beam characteristics	Ø 12.7mm collimated (max ~30mrad half angle)		
Interferometer type	Permanently aligned, double retro-reflector design		
Resolution (unapodized) [cm^{-1}]	*0.5*[ii], 2, 4, 8 (user selectable)		
Wavenumber repeatability	<10 PPM		
Scan frequency	>4 Hz @ 4cm^{-1}		
Internal reference laser	Temperature-stabilized solid-state laser @850nm		
A/D Converter	24 bit		
Amplifier	4 gain levels low noise trans-impedance amplifier		
Operating temperature [°C]	10 to 40		
Storage temperature [°C]	-20 to 60		
Built-in light source	SiC globar (1550 °K)		
Power requirement	12V / 40W		
Communication Interface	USB 2.0		
Software Interface	Windows 7/10/11, Linux API for controlling the instrument via our DLL Single board computer available on request		
Dimensions [mm]	165x145x82		
Weight [g]	2100		

[i] Input to output direct light routing, 60s measurement, around peak sensitivity wavelength, 4cm-1, Norton-Beer weak apodization.
[ii] Available on request only, please contact us at info@arcoptix.com for details
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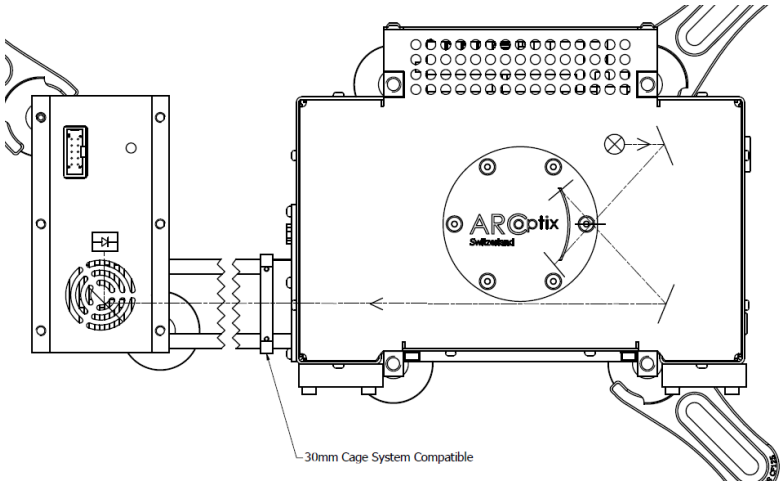
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ARCOPTIX OEM011



The ARCoptix OEM011 is a flexible alternative to our OEM010 series. The main module features a built-in light source (SiC globar) regulated in temperature as well as our permanently aligned interferometer system. The TE-MCT detector has been moved to an external module which is ideal for configurations requiring a sampling system (short path gas cell, purged volume, etc.). Both modules are easily fixed on optical breadboards and can accommodate 30 mm cage system rods for rapid prototyping.



Optical routing in the ARCOPTIX OEM011

Features

- **Internal light source**
- **Compact, rugged unit**
- **External detector module**
- **Robust to ambient light perturbation**
- **Dynamically adjustable resolution:**
  - **16cm^{-1}**
  - **8cm^{-1}**
  - **4cm^{-1}**
  - **2cm^{-1}**
  - **0.5 cm^{-1} (on request)**
- **Wear free moving parts for extended lifetime**
- **Compatible with 30 mm cage system rods**
- **Temperature controlled reference laser**

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Specifications

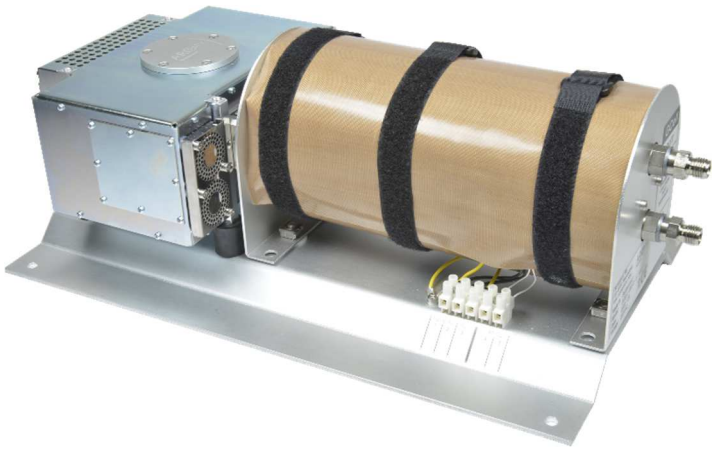
Product code	FTIR-OEM011-060-4TE	FTIR-OEM011-085-4TE	FTIR-OEM011-120-4TE
Beam-splitter material	CaF_2		ZnSe
Spectral Range [cm^{-1}]	1’660-5’000	1’200-6’600	830-5’000
Spectral Range [µm]	2-6	1.5-8.5	2-12
Detector Type	MCT (2-TE cooled)	MCT (4-TE cooled)	
Detector Peak D* [cm $Hz^{1/2}W^{-1}$]	>1x10^{11}	>8x10^{9}	>4x10^{9}
Signal-to-noise ratio (SNR)	> 80'000:1[i]	>40’000:1[i]	
Output beam characteristics	Ø 12.7 mm collimated (max ~30mrad half angle)		
Detector module FOV [mrad]	28 (half-angle, Ø 12.7 mm input aperture diameter)		
Interferometer type	Permanently aligned, double retro-reflector design		
Resolution (unapodized) [cm^{-1}]	*0.5*[ii], 2, 4, 8 (user selectable)		
Wavenumber repeatability	<10 PPM		
Scan frequency	>4Hz @ 4cm^{-1}		
Internal reference laser	Temperature-stabilized solid-state laser @850nm		
A/D Converter	24 bit		
Amplifier	4 gain levels low noise trans-impedance amplifier		
Operating temperature	10°C-40°C		
Power requirement	12V / 30W (interferometer), 12V / 10W (detector module)		
Built-in light source	SiC globar (1550 °K)		
Communication Interface	USB 2.0		
Software Interface	Windows 7/10/11, Linux API for controlling the instrument via our DLL Single board computer available on request		
Dimensions [mm]	165x145x82 (interferometer), 93x75x66 (detector module)		
Weight [g]	2100 (interferometer), 400 (detector module)		

[i] Input to output direct light routing, 60s measurement, around peak sensitivity wavelength, 4cm-1, Norton-Beer weak apodization.
[ii] Available on request only, please contact us at info@arcoptix.com for details
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ARCOPTIX GASEX OEM



The ARCoptix GASEX OEM module represents a highly efficient, rugged and fully integrated solution for gas spectroscopy in our product portfolio. Our OEM010 module is coupled to a low volume (0.2L) heated (up to 200°C) gas cell, in which light experiences multiple reflections, resulting in an integrated optical path of 5m with more than 50% transmission. The cell's internal optics is rhodium and gold coated, making it extremely resistant against most chemicals including acid gases such as HF, HCR, HBR...

The GASEX OEM has been standardized to operate with a resolution of 0.5cm^{-1}, which makes it compliant with the newest legal regulations for emission measurements. Featuring a USB 2.0 connection, the unit can also host an embedded single-board computer for standalone operation. Typical limit of detection (LoD) is in the range of 1 ppm for most of the gases – with 1 minute integration time.

Applications

- *Ambient air/combustion/emission monitoring*
- *Process monitoring/control in chemical applications*
- *Food processing*
- *Toxic gas detection*
- *Greenhouse gas monitoring*
- *All kinds of relevant mobile applications*
- *Bio-medical applications*

Features

- **Internal light source**
- **Built-in 4-TEC MCT detector**
- **0.2L volume, 5m optical path heated gas cell**
- **Rhodium protected internal optics**
- **Complete module for gas spectroscopy**
- **High resolution of 0.5cm^{-1}**
- **Wear free moving parts for extended lifetime**
- **No purging of the interferometer required**
- **Temperature controlled reference laser**
- **Compact & lightweight**
- **USB 2.0 connection**

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Specifications

Product code	GASEX-OEM-060-4TE	GASEX-OEM-085-4TE	GASEX-OEM-120-4TE
Beamsplitter Material	CaF2		ZnSe
Spectral Range [cm^{-1}]	5'000 - 1'660	6'600 – 1'200	5'000 - 830
Spectral Range [µm]	2-6	1.5-8.5	2-12
Detector Peak D* [cm $Hz^{1/2}W^{-1}$]	>1x10^{11}	> 8x10^{9}	> 4x10^{9}
Signal-to-noise ratio	>55'000:1[i]	>35'000:1[i]	>35'000:1[i]
Detector type	MCT-4TE cooled		
Interferometer type	Permanently aligned with dual retro-reflector		
Resolution (unapodized) [cm^{-1}]	*0.5*[ii], 2, 4, 8 (user selectable)		
Wave-number repeatability	<10 PPM		
Scan frequency	>1.5 Hz @ 0.5cm^{-1}		
Internal reference laser	Temperature controlled solid-state @850nm		
A/D Converter	24 bit		
Amplifier	4 gain levels low noise trans-impedance amplifier		
Built-in light source	SiC globar @1'550 K		
Power requirement (FTIR only)	< 35W @ 12 V		
Communication interface	USB 2.0		
Software interface	Windows 7/10/11		
	GAS CELL		
Path length	5m		
Internal volume	0.2L		
Total transmission	50%		
Internal temperature [°C]	20-200 (not condensing)		
Mirrors	Rhodium & gold coating		
Windows material	BaF2		
Gas inlet/outlet connector	6mm or ¼" (custom on request)		
Power requirement (cell only)	400 W (peak), 20 W (steady-state) @ 110-230 VAC or 12 VDC		
Dimensions FTIR+cell [mm]	380x180x120		
Total weight [kg]	3.9		

[i] Measured with a silicon carbide (SiC) source (~1550K), 60s measurement time, around peak sensitivity wavelength, Norton-Beer weak apodization, linearly corrected baseline, resolution setting 0.5 cm^{-1}

[ii] Available on request, please contact info@arcoptix.com for more information.

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ACCESSORIES

Accessories for FT-IR systems are a must have to deliver stable, accurate and repeatable measurements. Naturally matched to our spectrometer product line, our various accessories will facilitate the setup of your specific experimental configuration.

- ARCoptix ARCLIGHT sources page 29
- ARCoptix ARCSPHERE page 30
- Fibered reflection probes page 31
- Optical fibers page 32
- ARCoptix CUV page 33
- ARCoptix DRS98 page 34

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ARCOPTIX ARCLIGHT-MIR & ARCLIGHT-NIR



ARCLIGHT-MIR with reflector fiber coupler



ARCLIGHT-NIR with lens fiber coupler

The Arcoptix ARCLIGHT-MIR & ARCLIGHT-NIR are versatile lamps optimized for the VIS-NIR (400 nm – 4,000 nm) or MIR (1-25µm) spectral ranges. The lamps feature an electronically stabilized power supply, a variable mechanical attenuator, and are supplied with a removable fiber coupler enabling free-space of fiber-coupled operation.

Specifications

Product code	ARCLIGHT-NIR	ARCLIGHT-MIR
Light emitting element	QTH (Halogen)	SiC globar
Source temperature [K]	2’850	1’550
Spectral range [µm]	0.4-4	1-25
Spectral range [cm^{-1}]	25’000-2’500	10’000-400
Rated lifetime [hours]	4’000	10’000
Removable fiber-optic coupler	NA = 0.25, CaF2 lens	NA = 0.3, gold-coated off-axis parabolic mirror
Power consumption [W]	20 (electrical)	
Power requirement	12V via OD 2.5mm/ID2.1mm power jack (100-240 VAC to 12 VDC converter included)	
Output beam diameter [mm]	12.7	
Operational temperature [°C]	5-40	
Attenuator	Manual Iris Diaphragm	
Dimensions [mm]	92x92x43 (w/o fiber coupler), 140x92x43 (w/ fiber coupler)	
Weight [kg]	0.4	

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ARCOPTIX ARCSPHERE



The ARCoptix ARCSPHERE is an integrating sphere featuring an internal halogen light source for diffuse reflection measurements in the VIS-NIR. The highly reflective sphere has a diameter of 50mm, a sample port of 10mm with a sapphire window, and includes an SMA fiber connector allowing a direct connection to the spectrometer. The internally illuminated design provides a much stronger signal (at least 50 times more) than spheres illuminated via fiber optic coupled light sources.

Specifications

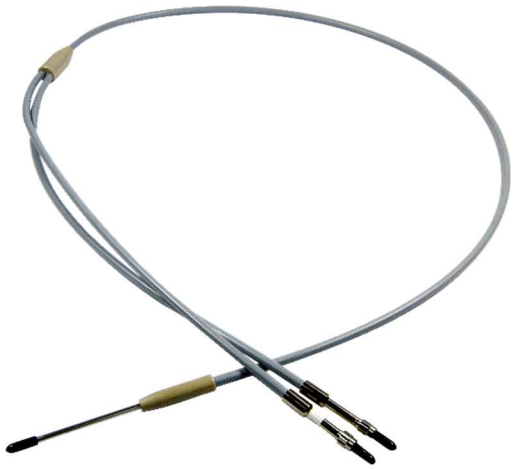
Product code	ARCSPHERE-50-HAL
Sphere internal diameter [mm]	50
Sample port diameter [mm]	10
Sample port window material	Sapphire
Optical fiber connector	SMA-905
Light emitting element	Low power halogen bulb (5W)
Source temperature [K]	~2'700
Rated life-time [hours]	4'000
Power consumption (7-12 VDC) [W]	10
External dimensions [mm]	70x70x90

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FIBERED REFLECTION PROBES





Fibered reflection probes are common accessories to measure specular or diffuse reflection in FT-IR systems. They are especially well suited for applications requiring a lot of flexibility. We offer fibered probes of three different kinds, depending on the fiber constituting glass, each targeting a specific spectral range. Light is brought to the sample via a peripheral fiber bundle which helps in achieving homogeneous illumination, and is collected by single, central fiber.

Specifications

Product code	R7-NIR-600-200F	R7-CIR-500-150F	R7-PIR-900-150F
Spectral range [µm]	0.4-2.5	2-5.5	4-16
Spectra range [cm^{-1}]	4'000-25'000	1'800-5'000	650-2'500
Illuminating fiber bundle	6x low-OH, 600 µm core diameter silica fibers	6x 500 µm core diameter CIR fibers	7x 400 µm core diameter PIR fibers
Reading fiber	low-OH, 600 µm core diameter silica fiber	500 µm core diameter CIR fiber	900 µm core diameter PIR fiber
Probe ferrule	Stainless steel ferrule ø⅛''(3.175mm x 74mm)	Stainless steel ferrule ø¼''(6.35mm x 74mm)	Stainless steel ferrule ø¼''(6.35mm x 74mm)
Length [m]	2	1.5	
Fiber connectors	SMA905		
Recommended Instrument	FTNIR-FC-025-2TE	FTMIR-FC-060-2TE	FTMIR-FC-120-4TE

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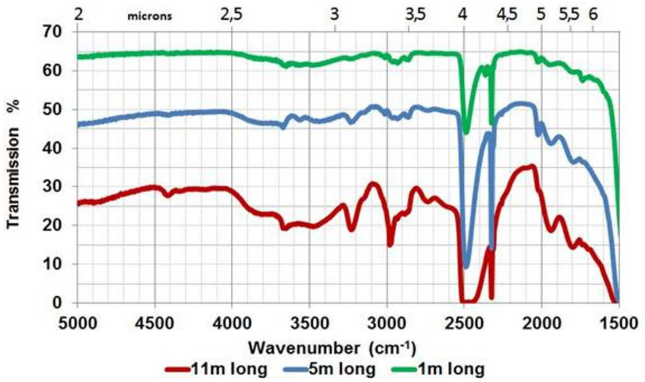
OPTICAL FIBERS



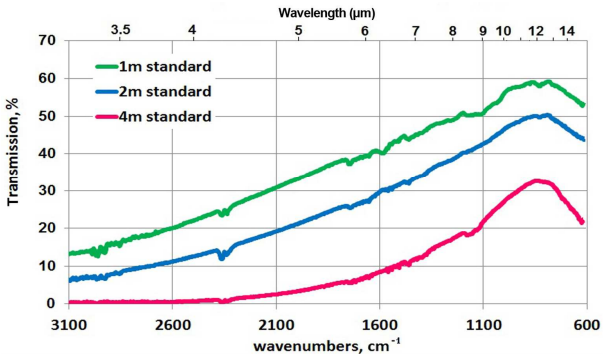
Optical fibers are a common building block of many optical systems. Low-OH fused silica multimode fibers are available for operation in the near-infrared. In the mid-infrared, we offer either chalcogenide glass fibers or polycrystalline fibers depending on the spectral range of interest. Our fibers are terminated with SMA905 connectors and are protected by a polymer jacket. Other connector types, protection jacket or lengths are available on request.

Specifications

Product code	FIB-NIR-600-100	FIB-CIR-500-100	FIB-PIR-900-100
Spectral range [µm]	0.4-2.5	2.0-5.5	4-16
Spectra range [cm^{-1}]	4’000-25’000	1’600-5’000	650-2’500
Fiber material	Low-OH fused silica	Chalcogenide glass	Polycrystalline
Core diameter [µm]	600	500	900
Glass refractive index	1.44	2.4	2.15
NA	0.22	0.28	0.25
Maximum operating temperature [°C]	125	100	140
Minimum bending radius [mm]	100	100	130
Length [m]	1*	1*	1*



CIR fiber transmission graph



PIR fiber transmission graph

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ARCOPTIX CUV

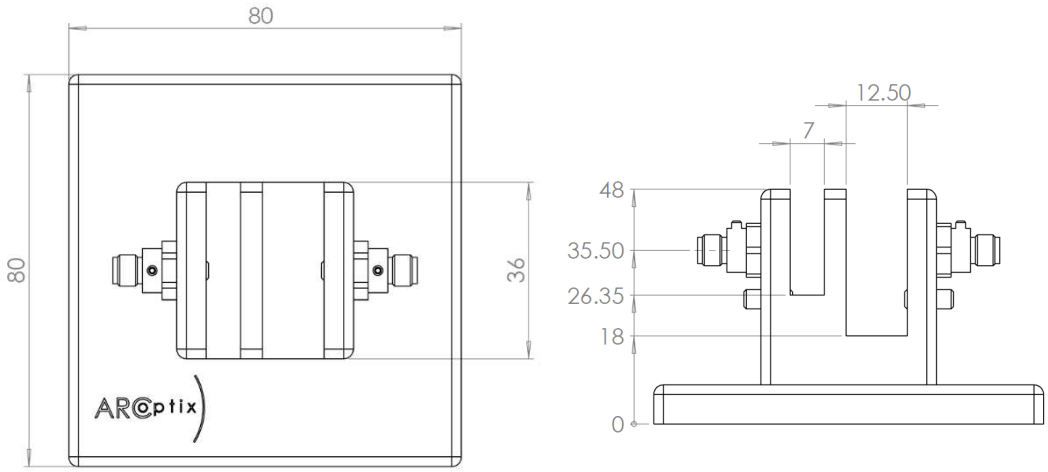


The ARCoptix CUV is our homemade cuvette holder system for transmission measurements in the near infrared. It features two fiber collimators with SMA905 connectors, a 12.5 mm wide sample port that accepts cuvette with an optical path up to 10 mm long, as well as a filter slot to avoid spurious effects (heating of the sample, extra shot noise) resulting from a too high illumination.

Specifications

Product code	PART-CUV-NIR
Spectral range [µm]	0.4-2.5
Spectra range [cm^{-1}]	4'000-25'000
Lens material	Borosilicate (BK7)
Fiber connector	SMA905

Dimensions [mm]



SPECIFICATIONS ARE SUBJECT TO CHANGES WITHOUT NOTICE
Please contact info@arcoptix.com for more information.

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ARCOPTIX DRS98



The ARCoptix DRS98 is a reference element to be used in diffuse reflection measurements. Our DRS98 is made from optical grade Teflon (PTFE), which is most suited for the VIS-NIR range. Alternatively, our DRS98G, which is made from diffused gold, can be operated down to the mid-infrared.

Specifications

Product code	PART-DRS-NIR	PART-DRS-MIR
Reflectivity range (>90%) [µm]	0.4-2.5	0.5-16
Reflectivity range (>90%) [cm^{-1}]	4'000-25'000	625-20'000
Clear aperture [mm]	20	
Dimension [mm]	Ø38 x 11	
Reflecting material	 Optical grade PTFE	 Diffused Au

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