Sol™ *2.2A*

900 - 2200nm NIR TE Cooled InGaAs Array Spectrometer

The Sol™ *2.2A* is a high performance linear InGaAs array spectrometer featuring 256 pixels and providing high throughput and large dynamic range with TE Cooling down to -15°C via a built-in 3-stage cooler.

Each spectrometer features an SMA 905 fiber optic input, built-in 16-bit digitizer, and is USB 2.0 plug-and-play compatible. The built-in autozero function automatically reduces dark current and dark non-uniformity, resulting in an increased signal-to-noise ratio.

Software control allows the user to choose from four types of operation modes: Maximum Dynamic, High Dynamic, High Sensitivity, and Maximum Sensitivity. Customized spectral resolution and application support are also available.

Applications:

- **Process Monitoring**
- **NIR Spectroscopy**
- **Quality Control**
- **On-line Analyzer**
- **Material Identification**

Features:

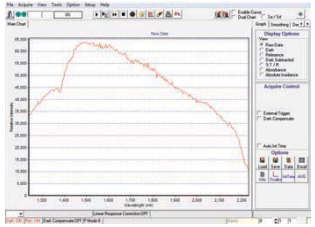
- 900nm - 2200nm Spectral Range
- Resolution as Fine as 9.0nm
- -15°C TE Cooling
- Built-in Autozero (Noise Level Reduction)
- Four Sensitivity & Dynamic Range Modes for Specific Application Needs

Accessories:

- Light Sources
- Fiber Patch Cords
- Fiber Sampling Probes
- Fiber Sample Holders

Software:

BWSpec™ is a spectral data acquisition software with a wide range of tools that are designed to perform complex measurements and calculations at the click of a button. It allows the user to choose between multiple data formats and offers optimization of scanning parameters, such as integration time. In addition to powerful data acquisition and data processing, other features include automatic dark removal, spectrum smoothing, and manual/auto baseline correction.



Specifications:

DC Power Input	5V DC @ 5 Amps
AC Adapter Input	100 - 240VAC 50/60 Hz, 1.0A @ 120VAC
Detector Type	Linear InGaAs Array
Pixels	256 x 1 @ 50µm x 250µm Per Element
Spectrograph f/#	3.5
Spectrograph Optical Layout	Crossed Czerny-Turner
Dynamic Range	Maximum Dynamic Mode: 20,000:1 High Dynamic Mode: 10,000:1 High Sensitivity Mode: 2,500:1 Maximum Sensitivity Mode: 250:1
Digitizer Resolution	16-bit or 65,535:1
Readout Speed	500 kHz
Data Transfer Speed	>300 Spectra Per Second Via USB 2.0
Integration Time	250µs to >= 64 Seconds
External Trigger	Aux Port
Operating Temperature	0°C - 35°C
TE Cooling	Three-Stage: -15°C @ Relative Humidity = 90%
Weight	~ 3.1 lbs (1.4 kg)
Dimensions	7.5in x 4.3in x 2.7in (192mm x 109mm x 68mm)
Computer Interface	USB 2.0 / 1.1
Operating Systems	Windows: XP, Vista, 7

Technical Details

Standard

Fiber Coupler

1 **Secures Fiber to Ensure Repeatable Results**

By coupling a fiber optic to the SMA 905 adaptor, light will be guided to the slit and optically matched, ensuring reproducibility. For free space sampling, a diffuser or lens assembly can be connected directly to the SMA 905 adaptor.

Configurable

Entrance Slit

2 **Determines Photon Flux and Spectral Resolution**

Light entering into a spectrometer's optical bench is vinyetted by a pre-mounted and aligned slit. This ultimately determines the spectral resolution and throughput of the spectrometer after grating selection. We offer a variety of slit widths to match your specific application needs: from 50µm - 100µm wide, with custom slits available.

Slit Option	Dimensions	Approximate Resolution 1100 - 2200nm
50µm	50µm wide x 1mm high	~9.0nm
100µm	100µm wide x 1mm high	~18.0nm
Custom Slit Widths Available		

Standard

Collimating Mirror

3 **Collimates and Redirects Light Towards Grating**

Both mirrors are *f*/# matched focusing mirrors coated with a special coating, which enhances the NIR signal.

Configurable

Diffraction Grating

4 **Diffracts Light, Separating Spectral Components**

The groove frequency of the grating determines two key aspects of the spectrometer's performance: the wavelength coverage and the spectral resolution. When the groove frequency is increased, the instrument will achieve higher resolution, but the wavelength coverage will decrease. Inversely, decreasing the groove frequency increases wavelength coverage at the cost of spectral resolution.

The blaze angle or blaze wavelength of the grating is also a key parameter in optimizing the spectrometer's performance. The blaze angle determines the maximum efficiency that the grating will have in a specific wavelength region.

Spectral Coverage (nm)	Grating	Approximate Resolution 50µm Slit
1100-2200	100/1600	9.0nm
900-2200	85/1350	15.0nm
Custom Configurations Available		

Standard

Focusing Mirror

5 **Refocuses Dispersed Light onto Detector**

Both mirrors are *f*/# matched focusing mirrors coated with a special coating, which enhances the NIR signal.

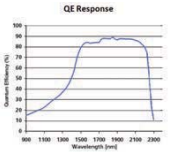
Standard

Array Detector

6 **Measures Entire Spectrum Simultaneously**

The Sol™ 2.2A features a 256 x 1 TE Cooled linear InGaAs photo diode array detector with pixel dimensions of 50µm x 250µm and 256 active pixels. Using BWSpec™, the detector mode can be switched between two sensitivity and two dynamic modes, allowing for greater control over the detector's sensitivity.

Specifications	
Wavelength Range	1100nm - 2200nm
Pixels	256
Pixel Size	50µm x 250µm
Well Depth	Maximum Dynamic Mode: ~250 Me High Dynamic Mode: ~125 Me High Sensitivity Mode: ~12.5 Me Maximum Sensitivity Mode: 1.25 Me
Digitization Rate	500 kHz



Standard

Thermoelectric Cooler

7 **Reduces Dark Noise and Improves Detection Limits**

Cooling an array detector with a built-in thermoelectric cooler (TEC) is an effective way to reduce dark current and noise, as well as to enhance the dynamic range and detection limit.

When the InGaAs array detector is cooled from a room temperature of 25°C down to -15°C by the TEC, the dark current is reduced by ~32 times and the dark noise is reduced by ~5.7 times. This allows the spectrometer to operate at longer exposure times and to detect weaker optical signals.