

General Specifications:

Power Input	100 - 240V AC 50/60 Hz
Detector Type	Back-thinned CCD array
Pixels	512 @ equivalent 24µm x 1392µm (24x58)
Spectrograph F#	3.5
Spectrograph Optical Layout	Crossed Czerny-Turner
Dynamic Range	~3.0 x 10 ⁴ with line binning
Digitizer Resolution	16 bit
Readout Speed	> 250 kHz
Data Transfer Speed	> 50 spectra per second via USB 2.0
Integration Time	27 - 65,535ms x 16 (512)
External Trigger	Aux Port
Operating Temperature	0°C to 35°C
TE Cooling	0°C (Standard)
Weight	Spectrometer: 1.4 kg (3 lbs) Power Supply: 0.9 kg (2 lbs)
Dimensions	Spectrometer: 107mm x 178mm x 89mm (4.2in x 7.0in x 3.5in) Power Supply: 249mm x 169mm x 57mm (9.8in x 6.6in x 2.2in)
Computer Interface	USB 2.0
Operating Systems	Windows: XP, Vista (32-bit), 7 (32-bit)

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Spectrometer Prime™ X

Fiber Coupled Back-thinned CCD Array Spectrometer

About the Prime™ X

The Prime™ X is a high-performance, TE Cooled Back-thinned 512 x 58 CCD array, linearly summed spectrometer which is equipped with a high sensitivity 512 (standard) CCD array. A 1024 CCD array is available for increased range and resolution. Both versions contain a fiber-coupled input, built-in 16-bit digitizer, external trigger and high speed USB 2.0 interface.

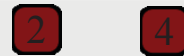
With its high dynamic range and high signal-to-noise ratio, low dark counts and long term operational stability this model will meet your UV to NIR application needs.

Flexible custom configurations and application support are available for OEM applications.



Ordering Info

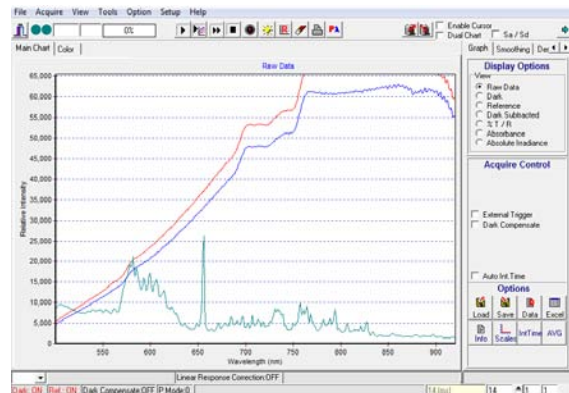
Ordering Code: Prime™ X



To order your custom system, fill in the slit ordering code (2) and grating ordering code (4).

Software

BWSpec™ features a wide range of tools designed to allow complex measurements and calculations to be completed at the click of a button. BWSpec™ allows the user to choose between multiple data formats and offers optimization of scanning parameters such as integration time and laser power output. In addition to powerful data acquisition and data processing, other features include automatic dark removal, spectrum smoothing, and manual/auto baseline correction. The software also contains an OCX interface for users to collect spectrum in Thermo Scientific GRAMS/AI.



To find out more:

Distribution in the UK & Ireland

Lambda
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The leading supplier of scientific and industrial lasers, optical systems and associated accessories, fibre optic components and instrumentation, and machine vision products.

Features:

- Over 60% QE Down at 200nm
- Over 90% Peak QE
- High UV, Vis, and NIR Response
- TE Cooled 512 Elements
- Optional Shutter Available

Applications

- Low light level UV and NIR spectroscopy
- Raman and fluorescence spectroscopy
- Remote sensing
- DNA sequencing
- Semiconductor end point inspection
- LED sorting and characterizations
- LCD display measurements

Accessories

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

Workings of a Spectrometer:

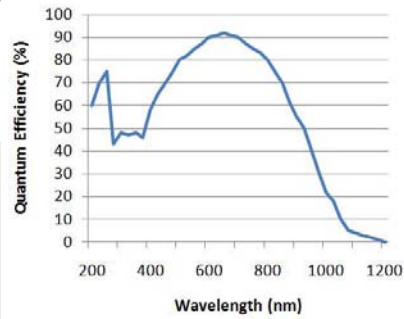
Configurable Detector

6 As the dispersed light strikes the detector's pixels, the electronics digitize the data to be displayed

The Prime™ X Back-thinned CCD offers very high quantum efficiency over the spectrum 200nm - 1000nm. Featuring a large full well capacity, low readout noise and MPP technology in the electronics to reduce dark current making this CCD ideal for low light level applications.

The advantage of a Back-thinned CCD is the Quantum Efficiency compared to the traditional front illuminated CCD. The difference between a front illuminated CCD and a Back illuminated CCD is the Back Illuminated CCD is mounted upside down on a rigid surface and thinned to less than 20 microns allowing incoming photons to fall directly onto the individual pixels without having to penetrate through the gate structures that the photons can be absorbed or reflected from.

Spectral Response (512 Pixels)



Specifications	
Wavelength Range	190nm - 1050nm
Pixels	512 x 58, Others Available
Pixel Size	24µm x 24µm
Well Depth	~200,000 e
Digitization Rate	250 kHz

Standard Collimating Mirror

3 Collimates and redirects the light beam towards the grating

Standard Focusing Mirror

5 Refocuses the dispersed light onto the detector

Both mirrors are F# matched focusing mirrors coated with AlMg₂ which produces approximately 95% reflectance when working in the UV-Vis spectrum. Aluminum (Al) provides reflectance and Magnesium (Mg₂) protects the aluminum from oxidation.

Configurable Slit

2 Determines the photon flux and optical resolution

Light entering into a spectrometer's optical bench is focused onto a pre-mounted and aligned slit, which ultimately determines the optical resolution and throughput of the spectrometer.

We offer a variety of slit widths and heights to match your specific application needs: from 5µm - 800µm wide and from 1mm - 2mm high (1mm being our standard height).

Slit Option	Dimensions	Resolution Multiplier	Ordering Code
25µm	25µm wide x 1mm high	~1.0	Slit-25
50µm	50µm wide x 1mm high	~2.0	Slit-50
100µm	100µm wide x 1mm high	~4.0	Slit-100
Custom Configurations Available			

Record your Slit Ordering Code on the back page.

Standard SMA 905

1 Precision fiber coupler

By coupling the SMA 905 adaptor with a fiber or lens, light will be guided to the slit and optically matched. This ensures reproducibility for light coupling from the fiber or lens into the optical bench.

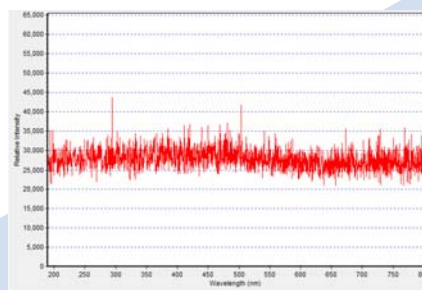
Standard Thermoelectric Cooler

7 Reduces dark noise and increases the dynamic range

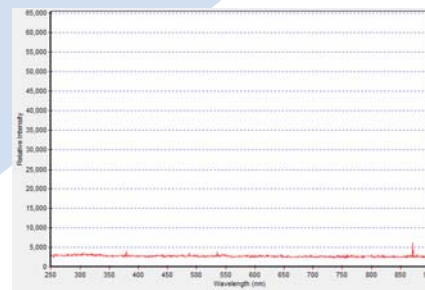
Cooling an array detector with a built-in Thermoelectric Cooler (TEC) is an effective way to reduce dark current and noise as well as to enhance the dynamic range and detection limit. The graphs below show dark current and noise for uncooled and cooled CCD detectors at an integration time of 30 seconds.

At room temperature the dark current takes up much of the well depth. When the CCD is cooled down to just 0°C by the TEC, the dark current is reduced by sixteen (16) times, and the dark shot noise is reduced by four (4) times. This allows the spectrometer to operate at long integration times and to detect weak optical signals.

Dark Current: Uncooled vs. Cooled CCD Detectors at 30 Seconds



Room Temperature



Cooled to 0°C

Configurable Grating

4 Wavelength Range and Spectral Resolution

The groove frequency of the grating determines two key aspects of the spectrometer's performance: the spectral resolution and the wavelength coverage. The higher the groove frequency the more resolution the instrument will achieve; however, the wavelength coverage will be less. Inversely, decreasing the groove frequency increases wavelength coverage at the sacrifice of spectral resolution. With over twenty-five gratings to choose from we can customize your application needs.

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 the grating will have in a specific wavelength region. We have a variety of blaze angles available per groove frequency to match your application needs.

Best Efficiency	Spectral Coverage (nm)	Resolution (nm) 25µm Slit	Ordering Code
UV-NIR	500-920	~3.0	BG01
Vis	380-750	~2.0	BG02
NIR	750-1050	~2.0	BG03
Custom Configurations Available			

Record your Grating Ordering Code on the back page.

