

# USB2000+RAD Spectrometer

Preconfigured for Irradiance Measurements



The USB2000+RAD Spectroradiometer is a preconfigured combination of a powerful 2-MHz analog-to-digital (A/D) converter, programmable electronics, a 2048-element CCD-array detector, a high-speed USB 2.0 port and cosine corrector. This innovative combination produces our fastest spectrometer yet and provides resolution to 0.35 nm (FWHM). The USB2000+RAD allows users to capture and store a full spectrum into memory every millisecond when the spectrometer is interfaced to a computer via a USB 2.0 port.

This spectroradiometer system features a USB2000+ Spectrometer and attached CC-3-DA cosine corrector that does not require in-field NIST-traceable UV-VIS calibration as it is precalibrated by Ocean Optics with our SPEC-CAL-UV radiometric calibration service for UV spectrometers. The USB2000+RAD is preconfigured and is ready for measurement "out of the box" so that installation and measurement is fast, accurate and convenient.

## Features

- Programmable microcontroller
- 1,000 full spectra per second
- Modular design
- Automatically reads wavelength calibration coefficients of the spectrometer and configures operating software
- RoHS and CE compliant

## Specifications

Physical	
Dimensions:	89.1 mm x 63.3 mm x 34.4 mm
Weight:	190 g
Detector	
Detector:	Sony ILX511 linear silicon CCD array
Detector range:	200-1100 nm
Pixels:	2048 pixels
Pixel size:	14 $\mu\text{m}$ x 200 $\mu\text{m}$
Pixel well depth:	~62,500 electrons
Sensitivity:	75 photons/count at 400 nm; 41 photons/count at 600 nm
Optical Bench	
Design:	f/4, Symmetrical crossed Czerny-Turner
Focal length:	42 mm input; 68 mm output
Entrance aperture:	50 $\mu\text{m}$ wide slit
Grating:	Grating # 2 groove density 600 l/mm, set to 250-800 nm (400 nm blaze)
Detector collection lens:	Yes, L2
Collimating and focusing mirror:	Standard
UV enhanced window:	UV2 quartz window
Fiber optic connector:	SMA 905 to 0.22 numerical aperture single-strand optical fiber
Spectroscopic	
Wavelength range:	200 - 850 nm
Optical resolution:	~2.0 FWHM
Signal-to-noise ratio:	250:1 (at full signal)
A/D resolution:	16 bit
Dark noise:	50 RMS counts
Dynamic range:	2 x 10 <sup>8</sup> (system); 1300:1 for a single acquisition
Integration time:	1 ms to 65 seconds (20 s typical)
Stray light:	<0.05% at 600 nm; <0.10% at 435 nm
Corrected linearity:	>99.8%
Electronics	
Power consumption:	250 mA @ 5 VDC
Data transfer speed:	Full scans to memory every 1 ms with USB 2.0 or 1.1 port, 300 ms with serial port
Trigger modes:	3 modes
Strobe functions:	Yes
Gated delay feature:	Yes
Connector:	22-pin connector



Turn your USB2000+RAD into a spectroradiometric system for calculating Photosynthetically Active Radiation (PAR). SpectraSuite-PAR is a plug-in for our SpectraSuite spectroscopy software that uses absolute irradiance of the light incident on plants and other samples and converts the irradiance values from  $\mu\text{W}/\text{cm}^2$  (microwatts per square centimeter) to  $\mu\text{mol}/\text{m}^2/\text{s}$  (micromoles per square meter per second) – the measurement unit more commonly used for PAR analysis.