

# USB4000 Spectrometer

User-Configured to be Flexible



If you're looking for an economical, versatile spectrometer, you'll find the USB4000 to be an exceptional solution. This compact, modular unit packs a 3648-element Toshiba linear CCD-array detector to provide you increased signal-to-noise and enhanced electronics for control of the spectrometer as well as its accessories.

The USB4000 Spectrometer is distinguished by its enhanced electronics: 16-bit A/D resolution with auto nulling feature (an enhanced electrical dark-signal correction); EEPROM storage of calibration coefficients for simple spectrometer start-up; 8 programmable GPIO signals for controlling peripheral devices; and an electronic shutter – a handy feature to prevent detector saturation.

The USB4000 couples easily via an SMA 905 connector to our line of spectroscopic accessories. Direct-attach accessories are available, as well as discrete light sources, optical fibers, sampling devices such as cuvette holders and flow cells, and many more. In most instances, changing the sampling system from one experiment setup to another is as easy as unscrewing a connector and swapping out accessories.

## Features

- Programmable microcontroller
- Modular design
- Automatically reads wavelength calibration coefficients of the spectrometer and configures operating software
- RoHS and CE compliant

Physical	
Dimensions:	89.1 mm x 63.3 mm x 34.4 mm
Weight:	190 g
Detector	
Detector:	Toshiba TCD1304AP linear CCD array
Detector range:	200-1100 nm
Pixels:	3648 pixels
Pixel size:	8 $\mu\text{m}$ x 200 $\mu\text{m}$
Pixel well depth:	100,000 electrons
Sensitivity:	130 photons/count at 400 nm; 60 photons/count at 600 nm
Optical Bench	
Design:	f/4, Asymmetrical crossed Czerny-Turner
Focal length:	42 mm (input); 68 mm (output)
Entrance aperture:	5, 10, 25, 50, 100 or 200 $\mu\text{m}$ wide slits or fiber (no slit)
Grating:	15 different gratings, UV through Shortwave NIR
OFLV filter:	OFLV-200-850, OFLV-350-1000
UV enhanced window:	Yes, UV4 quartz window
Fiber optic connector:	SMA 905 to 0.22 numerical aperture single-strand optical fiber
Spectroscopic	
Wavelength range:	Grating dependent
Optical resolution:	~1.5 nm FWHM
Signal-to-noise ratio:	300:1 (at full signal)
A/D resolution:	16 bit
Dark noise:	50 RMS counts
Integration time:	3.8 ms-10 seconds
Dynamic range:	2 x 10 <sup>9</sup> (system), 1300:1 for a single acquisition
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 spectrum to memory every 5 ms with USB 2.0 port
Inputs/Outputs:	Yes, 8 onboard digital user-programmable GPIOs
Breakout box compatible:	Yes, with the USB-ADP-BB adapter
Trigger modes:	4 modes
Strobe functions:	Yes
Connector:	22-pin connector



**Fun Fact:** Our USB Spectrometers are among the most popular selling miniature spectrometers on the market and can trace their lineage to the S1000 – the world's first miniature spectrometer – which we introduced in 1992. The first miniature spectrometer we sold went to a researcher at Los Alamos National Laboratories, whose work involved plutonium. Years later we tracked down that first spectrometer and now display it at company headquarters.