

Product Specification: HummingBird (HM) Series Spectrometer

Description

The HummingBird (HB) Series spectrometer incorporates a linear CCD/CMOS array and a 32-bit RISC controller. Designed with a Crossed Czerny-Turner optical bench, it provides high resolution, high sensitivity, low stray light, and fast spectral response. Its compact body features multiple mounting options for integration flexibility. Powered and communicated via USB, it includes six programmable I/O ports and supports integration times from 0.1 ms to 65 s, configurable gratings, and wavelength coverage from 180 – 1100 nm for OEM and precision analytical applications.



Models and Wavelength Ranges

- All Models: From 180 – 1100 nm

Main Features

- Compact crossed Czerny–Turner optical design for high sensitivity and low stray light
- Integrated 32-bit RISC microcontroller for fast processing and precise control
- Wavelength range: 180–1100 nm, optical resolution configurable from 0.2–10.5 nm
- Modular configuration – customizable gratings, sensors, and slits (10–300 μm)
- Multiple sensor options: fast-exposure CMOS or back-thinned CCD (NIR enhanced)
- Integration time: 0.1 ms to 65 s, depending on sensor type
- USB-powered operation with high-speed data transfer (USB 2.0 @ 480 Mbps)
- Six programmable I/O pins for external device control and triggering
- Up to 4,000 spectra buffering with continuous capture support
- Flash ROM calibration storage for wavelength, linearity, and intensity correction
- Compact, lightweight design – available with or without external housing
- Fully compatible with SpectraSmart spectral measurement software and SDK

Technical Details

- Optical resolution: 0.2 – 10.5 nm (depends on slit/grating)
- Wavelength repeatability: ± 0.05 nm (typical)
- Wavelength accuracy: ± 0.15 nm (up to ± 1.0 nm in harsh environments)
- SNR: 350 – 500 (model-dependent)
- Dynamic range: 5400 / 3600 (CMOS) – 4300 – 3800 (CCD)
- Optical structure: Crossed Czerny-Turner (2nd & 3rd order rejection)
- Grating: 15 options (180 – 1100 nm coverage)
- Slit sizes: 10 / 25 / 50 / 100 / 200 / 300 μm
- Integration time: 0.1 ms – 65 s (depends on sensor clock)
- Thermal stability: < 0.04 nm/ $^{\circ}\text{C}$
- Operating temperature: 0 $^{\circ}\text{C}$ – +50 $^{\circ}\text{C}$; Storage: –30 $^{\circ}\text{C}$ – +70 $^{\circ}\text{C}$
- Humidity: 0 – 90 % non-condensing
- Data transfer: USB 2.0 (480 Mbps high speed)
- Fiber optic interface: SMA905 ($\Phi 3.18$ mm)
- Power: USB, 300 mA @ +5 VDC (typical); Voltage 4.75 – 5.25 V; Power-up time < 4 s

Dimensions

- 83(L) \times 75.5(W) \times 26.75(H) mm (all models)

Power Requirements

- Power via USB: 300 mA @ +5 VDC (typical), up to 500 mA max
- Voltage range: 4.75 – 5.25 V
- Power-up time: < 4 s
- USB 2.0 @ 480 Mbps (High speed) Specifications

Specifications

SPEC	Content					
	HB1034 HB2034	HB1030 HB2030	HB1054 HB2054	HB1050 HB2050	HB1094 HB2094	HB1090 HB2090
Sensor	Fast-Exposure		Back-thinned NIR Enhanced		Fast-Exposure, Back-thinned	
Parameters of Optical System	f/# : 4.5, NA :0.11, Focal Length(R1-R2) :52-60 (It is recommended that the Incident NA should larger than the NA of spectrometer.)					
Dark Noise (average)	12 ^{*1} /18 ^{*2}		15		17	
Dynamic Range ^{*3}	5400 ^{*1} /3600 ^{*2}		4300		3800	
SNR ^{*4}	350		500		500	
Spectrometer	Crossed Czerny-Turner Optical Structure 2 nd & 3 rd order rejection					
Dimension	83(L) x 75.5(W) x 26.75(H) mm					
Grating	15 grating options ; spectral range from UV to NIR					
Wavelength	From 180 to 1100 nm with a variety of wavelength range					
Slit Size	10, 25, 50, 100, 200,300 um					
Integration Time	0.1ms ~ 65sec, depending on sensors					
Wavelength Repeatability	+/- 0.05 nm Continuous 100 measurements (Hg-Ar Light Source)					
Wavelength accuracy	± 0.15 nm (Testing environment is based on HB2034-050-FUVN. Accuracy may be up to ± 1.0nm according to different environment such as severe temperature change and long-time vibration. OtO can offer WL calibration software if user needed.)					
Resolution(FWHM)	0.2 nm to 10.5 nm, depending on different configuration					
Thermal Stability	<0.04nm/°C					
Environmental Conditions	Storage	-30°C to +70°C				
	Operation	0°C to +50°C				
	Humidity	0% - 90% non-condensing				

^{*1} : Sensor clock rate 2.5MHz ^{*2} : Sensor clock rate : 10MHz ^{*3} : 65535/Dark Noise(average)

^{*4} : Single acquisition