

LARRY USB2000 and LARRY USB4000 series

Scientific Grade CCD Linear Array Detectors

NEW 



KEY FEATURES

- 2048 or 3648 pixel linear arrays
- 14 μm and 8 μm pixel width and pitch
- 200 μm pixel height for spectroscopic applications
- Scientific grade, no fringing
- Fast, on-chip electronic gating capability
- Maximum dynamic range >2000:1
- 200-1100 nm spectral range
- Low noise, uncooled
- Rapid acquisition up to 500 acquisitions / sec with 1 ms integration time
- USB 2.0 for full plug-and-play PC control
- Powered via USB
- GPIO for easy integration with other instruments and devices
- External trigger and sync output via SMB with programmable delays for synchronization to pulsed sources
- LARRY USB4000 has optional shutter mode, allowing integration times to 10 μs

The LARRY USB series is a family of linear CCD array detectors that offers cost-effective, scientific-grade performance for a wide range of spectroscopic applications. They can be mounted to most spectrographs that have the output plane ≥ 10 mm outside of the spectrograph. Both standard and custom mounts are available, making them ideal for upgrading existing systems or incorporation into flexible new spectroscopic instruments.

The LARRY USB series is a custom build based on proven Ocean Optics electronics and is compatible with Ocean Optics software, enabling a broad scope of

features. The detectors connect to and are controlled by a PC via USB 2.0, allowing for easy-to-use, plug-and-play operation. Multiple detectors can be controlled in the same software, enabling simultaneous acquisition. GPIO communication can also be used to integrate with other instruments and devices.

The linear CCDs used in the LARRY USB series contain on-chip electronic gating, which allow for integration times down to 1 ms without the need for external shutters.

APPLICATIONS

- Upgrade optical spectrometers to linear CCD array capability
- Capturing spectra of short-pulse events
- Synchronization to pulsed lasers and light sources
- Fringe analysis, beam profiling/monitoring
- Synchronous and simultaneous detection with multiple detectors
- General purpose linear detector, with Thorlabs cage mount interface available

CONNECTORS

- USB 2.0 for computer control and power supply
- Trigger SubMiniature BNC (SMB), TTL input for external trigger
- Sync SMB, programmable TTL output for synchronizing other devices with the detector
- Additional SMB connector for a customizable connection
- 22-pin accessory connector for detector monitoring and GPIO communication

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SPECIFICATIONS	LARRY USB2000	LARRY USB4000
Number of sensitive pixels	2048	3648
Number of masked dark pixels	18	13
Pixel size	14 μm (w) \times 200 μm (h)	8 μm (w) \times 200 μm (h)
Array length (active)	28.7 mm	29.1 mm
Spectral range	200 nm – 1050 nm	
Integration time	1 ms – 65 sec	3.8 ms – 10 sec 10 μs option also available ¹
Well capacity (WC)	62,500 e ⁻	100,000 e ⁻
16-bit ADC output	65,535 counts	
Saturation level @ 632 nm	3.8 nJ/cm ² 1.1 \times 10 ⁻⁴ nJ per pixel	9.5 nJ/cm ² 1.5 \times 10 ⁻⁴ nJ per pixel
Readout noise (RN)	29 e ⁻ rms	46 e ⁻ rms
Dark signal non-uniformity		
1-sec integration	37 e ⁻ rms	571 e ⁻ rms
10-sec integration	406 e ⁻ rms	1739 e ⁻ rms
Dark signal offset	~1000 counts	
Dark noise		
1-sec integration	31 e ⁻ rms	69 e ⁻ rms
10-sec integration	45 e ⁻ rms	128 e ⁻ rms
Maximum dynamic range (WC / RN)	2155	2170
Readout time	2 ms	3.8 ms
Acquisition rate ²		
Normal	Up to 30 Hz	Up to 30 Hz
High-speed acquisition	Up to 500 Hz	Up to 125 Hz
External trigger jitter	\pm 420 ns	\pm 250 ns
Power	Powered by USB or from accessory connector	
Mounting	\varnothing 42.5 x 6 mm mounting boss Detector located 9.5 mm below boss surface	
Connectors	USB 2.0, 480 Mbps SMB: External trigger input (TTL) SMB: Sync output (TTL) SMB: NC / customizable connection 22-pin accessory connector: Monitoring and GPIO	

Typical performance shown.

¹Shorter integration times, down to 10 μs , possible with an alternative software package (OceanView). Please contact us if you require this option.

²Acquisition rate is based on Ocean Optics SpectraSuite software, and may depend on the PC specifications and configuration. Eliminating unnecessary background processes is recommended for high-speed operation. High-Speed Acquisition mode does not support multiple detectors on one PC.

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PC SOFTWARE

The LARRY USB series is based on Ocean Optics electronics and is fully compatible with Ocean Optics software. **Ocean Optics SpectraSuite** is the recommended platform-independent, 32- and 64-bit compatible software to operate the detectors. SpectraSuite allows full control over the LARRY USB series detectors, such as integration time, capture interval and triggering. SpectraSuite also allows for independent control of multiple LARRY detectors, all conveniently displayed on one graph in a single window. For more information about using this software, please refer to the SpectraSuite Installation and Operation Manual, which can be found at the following website: <http://oceanoptics.com/wp-content/uploads/SpectraSuite.pdf>

For applications that require very short integration times, **Ocean Optics OceanView** can be used to engage the shutter-mode function of the LARRY USB4000 detector, allowing for integration times down to 10 μ s. Please contact us if you require this option.

Alternatively, **LabView** drivers for controlling the LARRY USB series detectors directly can be found at National Instruments: http://sine.ni.com/apps/utf8/niid_web_display_download_page?p_id_guid=7833BD4A31DA1274E04400144FB7D21D

DATA FORMATS

Ocean Optics SpectraSuite software can export the acquired data in a variety of different formats, including tab-delimited ASCII (for Microsoft Excel or other analysis packages) and GRAMS SPC and JCAMP for spectroscopic applications.

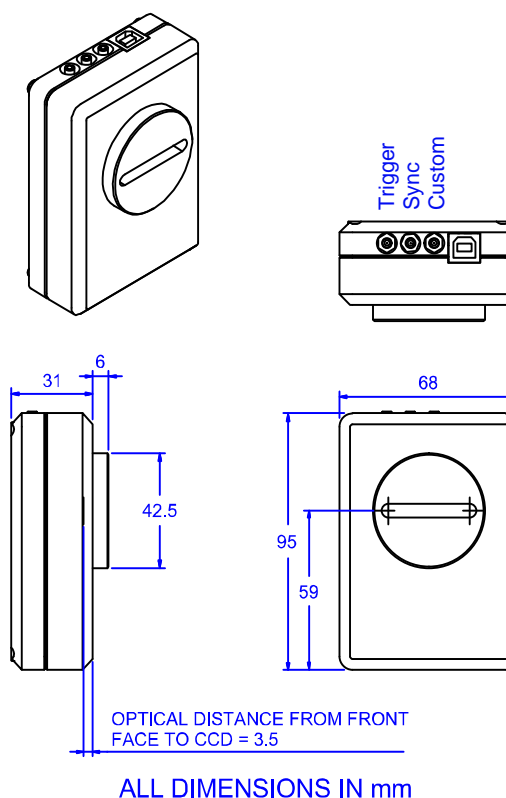
ACQUISITION RATE

One or more LARRY USB series can be operated simultaneously using Ocean Optics SpectraSuite. Under normal operation, the acquisition rate of the detectors is up to 30 Hz, limited by the integration time. The High-Speed Acquisition mode of SpectraSuite stores captured data into a system's memory, allowing for acquisition rates up to 500 Hz for the LARRY USB2000 (<2 ms integration time) and 125 Hz for the LARRY USB4000 (<4 ms integration time). Note that the acquisition rate is limited by hardware (e.g. PC specifications and with specific trigger modes). The High-Speed Acquisition mode is limited to one detector per PC at a time.

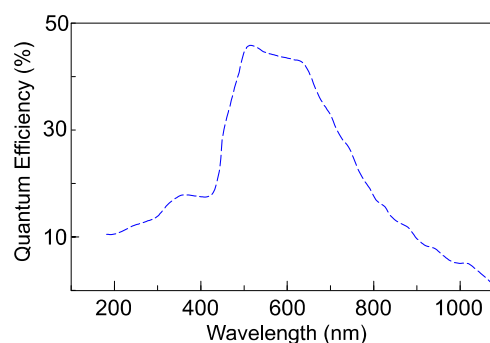
SPECTRAL CALIBRATION

The LARRY USB series detectors have onboard storage for spectral calibration data for fitting the detector to spectrographs. The calibration data is the coefficients of a fitted cubic polynomial to the λ_p vs. p data, and can be inputted into the detector via SpectraSuite or over the USB interface.

MECHANICAL DIAGRAMS



SPECTRAL RESPONSE



Typical performance shown.

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UMA-2 UNIVERSAL MOUNTING ADAPTER

The UMA-2 Universal Mounting Adapter is a general-purpose adapter that converts the Ø42.5 mm mounting boss of the LARRY USB series detectors to an assortment of standard mounts, including posts, cage systems and lens tubes. This optional accessory allows for simple integration of the LARRY USB series detectors into any set-up.

FEATURES:

- Black anodized aluminum
Size: 80 x 80 x 13 mm
- Four tapped holes for mounting posts:
Metric: M4 x 0.6, M6 x 1
Imperial: 8-32, ¼"-20
- Thorlabs 60-mm cage compatible
- Thorlabs SM2 (2.035"-40) tube compatible



Thorlabs cage rods, lens tube, mounting post and post holders not included, but can be supplied on request at U.S. list prices.

ORDERING INFORMATION

Ordering part number

Detectors

- LARRY2000** LARRY USB2000 scientific grade linear array detector
- LARRY4000** LARRY USB4000 scientific grade linear array detector

Optional items

- CAB-48** 48" RF coaxial cables (BNC to SMB connector)
- Ocean Optics software** Ocean Optics software for controlling the new LARRY USB series detectors – SpectraSuite & OceanView
- Ocean Optics OmniDriver** Cross-platform, full-featured device driver for complete programmatic control of LARRY USB series detectors
- LabView drivers** LabView drivers for controlling the LARRY USB series detectors can be found at National Instruments: www.sine.ni.com
- UMA-2** Universal mounting adapter
- D7650** Adapter plate for Oriel spectrographs (e.g. MS127i, MS260i, FICS)
- D7660** Adapter plate for SPEX 500M ½ meter spectrographs. Replaces 1451X exit slit assembly
- **Custom mounts/adapters available on request

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